



ATIS-1000659.1996(R2011)

Mobility Management Application Protocol (MMAP) RCF –
RACF Operations

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for Telecommunications –

Mobility Management Application Protocol(MMAP) RCF-RACF Operations

Secretariat

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Abstract

This standard provides an application layer protocol for the exchange of information between peer applications running in a radio system and other network elements (e.g., mobility management platforms, switching systems, and other radio systems). The basic provisions of the protocol provide the semantics and syntax for operations necessary to support the mobility aspects of telecommunication services and call control in a wireless environment.

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Foreword (This foreword is not part of American National Standard T1.659-1996.)

Subcommittee T1S1 began addressing PCS requirements in ad-hoc committees in 1993. In response to the industry's desire to have a standard solution for support of PCS mobility, T1S1 established the Mobility Management Application Protocol subworking group in 1994 with a charter to create a stage 3 protocol for supporting the mobility management requirements of the radio systems defined by T1P1 and TIA over the T1P1 "C" and "D" interface and the TIA "A" interface.

The focus of this document is the RCF-RACF functional interface. A companion document focusing on the RACF-SCF interface is *American National Standard for Telecommunications – Mobility Management Application Protocol (MMAP)*, ANSI T1.651-1996.

This standard has five annexes. All are informative and are not considered part of this standard; that is, these annexes do not include requirements for the specifications, but provide information about the specifications.

Suggestions for improvement of this standard will be welcome. They should be sent to the T1 Secretariat, c/o Alliance for Telecommunications Industry Solutions, 1200 G Street, NW, Suite 500, Washington, DC 20005.

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American National Standard
for Telecommunications –

Mobility Management Application Protocol (MMAP) RCF-RACF Operations

1 Scope, purpose, and application

1.1 Scope

The Mobility Management Application Protocol (MMAP) is a communication protocol between a radio system and other network elements (e.g., mobility management platforms, switching systems, and other radio systems). The scope of the radio systems supported are the wireless Personal Communications Services (PCS) radio systems defined by T1 and T1A. The scope of the information and operations is the support of personal and terminal mobility in a wireless environment and includes functionality such as registration, location updating, authentication, roaming, handover, and billing.

In addition, the scope of the protocol includes the exchange of information and invocation of operations as necessary to support the mobility aspects of telecommunication services (e.g., call waiting) and call control (e.g., call origination, call termination, call clearing) in a wireless environment.

1.2 Purpose

The purpose of MMAP is to provide a mechanism for the exchange of information between radio systems and other network elements to support personal and terminal mobility in a wireless environment. MMAP messages are defined to be independent of the air interface protocol. However, where necessary, air interface specific messages are also included.

1.3 Application

The MMAP is applicable to the interfaces between PCS radio systems and other network elements such as the interfaces defined by the “A” Interface in T1A and the “C” and “D” interface in T1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI J-STD-007-1996, *Telecommunications – Air interface specification for 1.8 to 2.0 GHz frequency hopping time division multiple access (TDMA) for personal communication services*¹⁾

ANSI J-STD-008-1996, *Telecommunications – Personal station-base station compatibility requirements for 1.8 to 2.0 GHz code division multiple access (CDMA) personal communication systems*¹⁾

ANSI J-STD-011-1996, *Telecommunications – PCS IS-136 based air interface compatibility 1900 MHz standard*¹⁾

¹⁾ These standards are currently in production. Contact the secretariat for more recent information.

ANSI T1.659-1996 (R2011)

ANSI J-STD-014-1996, *Telecommunications – Personal access communications system*¹⁾

ANSI J-STD-018-1996, (Proposed Trial-Use Standard), *Telecommunications –A composite CDMA/TDMA air interface compatibility standard for personal communications in 1.85 – 1.99 GHz for licensed applications*¹⁾

ANSI T1.112-1996, *Telecommunications – Signalling System Number 7 – Signalling Connection Control Part (SCCP)*

ANSI T1.114-1996, *Telecommunications – Signalling system number 7 – Transaction capabilities application part (TCAP)*

ANSI T1.607-1990, *Telecommunications – Digital subscriber signalling system no. 1 – Layer 3 signalling specification for circuit switched bearer service*

ANSI T1.610-1994, *Telecommunications – Digital subscriber signalling system no. 1 (DSS1) – Generic procedures for the control of ISDN supplementary services*

ANSI T1.651-1996, *Telecommunications – Mobility management application protocol (MMAP)*

ANSI T1.702-1995, *Telecommunications – Personal communications terminology*

ANSI T1.704-1996, *Telecommunications – Stage 2 service description for personal communications service – Circuit-mode switched bearer service*

CCITT(ITU-T) X.200, *Reference model of open systems interconnection for CCITT applications*²⁾

TIA/EIA IS-41, *Cellular radio telecommunications intersystem operations, Revision C*³⁾

TIA/EIA IS-634, *MSC-BS interface for public 800 MHz*³⁾

TIA/EIA IS-651, *SS7 based A-interface standard for PCS*³⁾

TIA/EIA IS-653, *ISDN based A-interface standard for PCS*³⁾

TSB80, *MSC-BS Interface for public 800 MHz*³⁾

3 Definitions and acronyms

3.1 Terms from Personal Communications Terminology document (ANSI T1.702)

alerting identifier
anchor
anchor identity
authentication
base station
bearer service
call
call control agent functional entity
call control functional entity
call management
call waiting
cell

²⁾ Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

³⁾ Available from the Telecommunications Industries Association, 2500 Wilson Boulevard, Suite 300, Arlington, VA 22201.

encryption
 handover
 home SCF
 identification
 international mobile equipment identifier
 international mobile subscriber identity
 interworking
 paging
 personal communications services
 PCS system
 personal terminal
 privacy
 radio system
 registration
 roaming
 routing number
 service control function
 service data function
 service profile
 service switching function
 serving entity
 subscriber identification
 supplementary service
 target entity
 teleservice
 temporary subscriber identification
 temporary mobile subscriber identification
 terminal deregistration
 terminal equipment
 terminal mobility
 terminal identifier
 terminal registration
 user identity module
 user profile
 validation
 voice privacy

3.2 Acronyms

ACSE	- Association Control Service Element
AIN	- Advanced Intelligent Network
ALT	- Automatic Link Transfer
BS	- Base Station
CCF	- Call Control Function
CCT	- Composite CDMA/TDMA

CDMA	- Code Division Multiple Access
CCAF	- Call Control Access Function
CM	- Connection Management
DN	- Directory Number
DSS1	- Digital Signaling System No. 1
ESN	- Electronic Serial Number
FE	- Functional Entity
HLR	- Home Location Register
IMSI	- International Mobile Subscriber Identity
ISDN	- Integrated Services Digital Network
ISUP	- ISDN User Part
MIN	- Mobile Identification Number
MM	- Mobility Management
MMAP	- Mobility Management Application Protocol
MS	- Mobile Station
MSC	- Mobile Switching Center
MTP	- Message Transfer Part
NANP	- North American Numbering Plan
NID	- Network Identification
OSI	- Open Systems Interconnection
PACS	- Personal Access Communications System
PCS	- Personal Communications Services
PCSC	- Personal Communications Switching Center
PS	- Personal Station
RACF	- Radio Access Control Function
RCF	- Radio Control Function
RCID	- Radio Channel Identifier
RR	- Radio Resources
RS	- Radio System
RTF	- Radio Terminal Function
SCCP	- Signaling Connection Control Part
SCF	- Service Control Function
SCP	- Service Control Point
SDF	- Service Data Function
SID	- System Identification
SRF	- Specialized Resource Function
SSD	- Shared Secret Data
SSF	- Service Switching Function
SSP	- Service Switching Point
SS7	- Signaling System 7
TCAP	- Transaction Capabilities Application Part
TDMA	- Time Division Multiple Access
TMSI	- Temporary Mobile Subscriber Identity
UIM	- User Identity Module

4 Overview

The MMAP specification defines the semantics and syntax for MMAP operations for the RCF-RACF interface as well as the mapping of the operations to lower layer protocols.

4.1 Document structure

The remaining clauses of this document are:

Clause 5 Protocol architecture: The protocol architecture clause defines the MMAP application layer structure and the mapping of operations to lower layer protocols.

Clause 6 Operations descriptions: The operations descriptions clause describes the semantics of the MMAP operations including operational rules and operation parameters. The operations are organized by common operations which apply to multiple radio systems and radio specific operations.

Clause 7 Messages, parameters, and timers: This clause describes the encodings for the MMAP operations, the parameters, and associated timers.

This standard has five annexes. All are informative and are not considered part of this standard; that is, these annexes do not include requirements for the specifications, but provide information about the specifications.

4.2 Functional architecture

Figure 1 shows the functional architecture used as a basis for this standard. This functional architecture is the same as that used for issue of the MMAP published in ANSI T1.651. The focus of this document is the RCF-RACF interface.

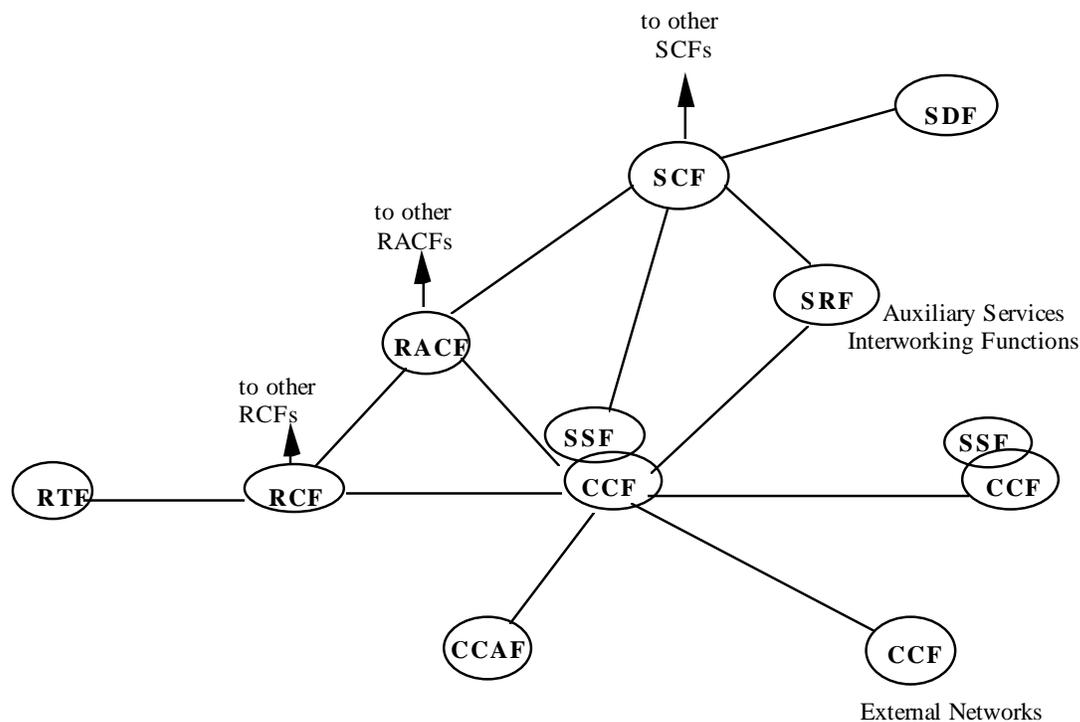


Figure 1 – Functional model

5 Protocol architecture

In terms of Open Systems Interconnection (OSI), MMAP is at the application layer. The MMAP operations are mapped on to lower layer protocols depending on the mechanism used for transport of these operations.

5.1 Mapping to SCCP

Figure 2 illustrates a protocol architecture which can be used for MMAP RCF-RACF operations when only the lower layers (i.e., SCCP and MTP) of the SS7 protocol stack are used. In this scenario, the RCF-RACF operations are carried as SCCP user data. In this case, the mapping of operations for CDMA, TDMA, and CCT shall follow the guidelines set forth in TSB80. The mapping of operations for PCS1900 shall follow the guidelines set forth in TIA/EIA IS-651.

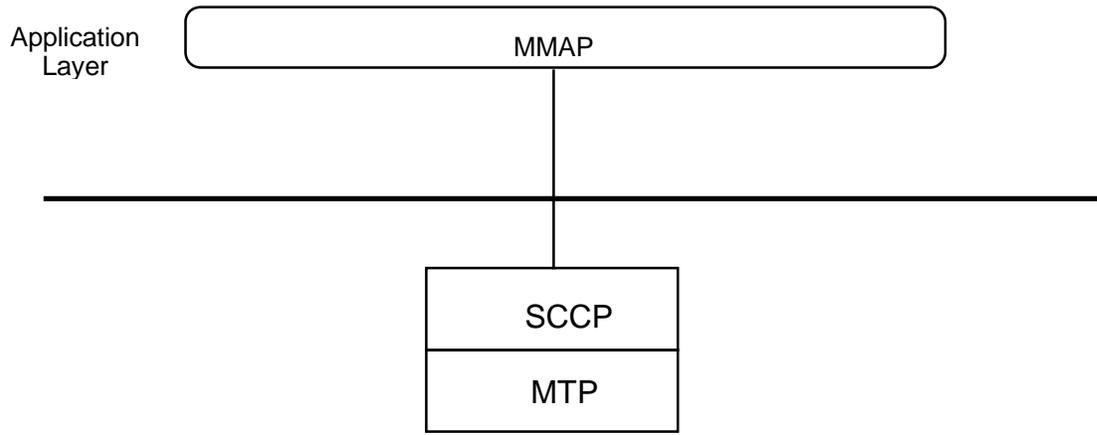


Figure 2 – Protocol architecture (SCCP)

5.2 Mapping to X.25

Figure 3 illustrates the architecture to be used when X.25 is used for the transport of MMAP operations between RCF and RACF. After a virtual circuit and application context is established between the peer entities, the MMAP operations can be exchanged over the virtual circuit. Association Control Service Element (ACSE) can be used to establish the application context.

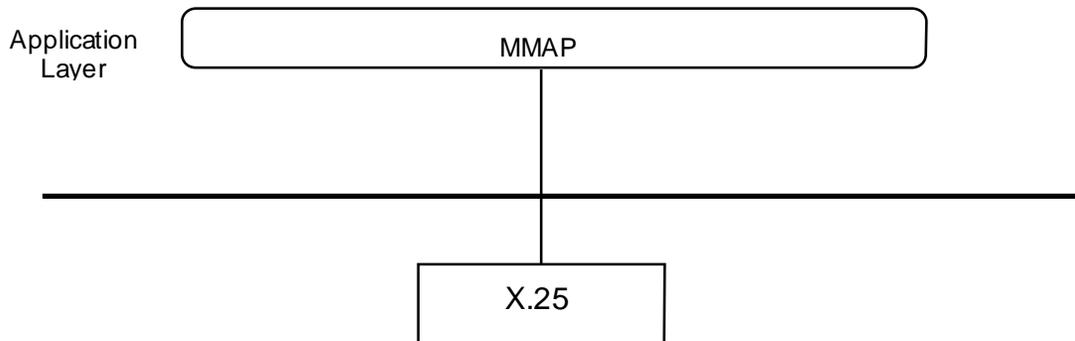


Figure 3 – Protocol architecture (X.25)

5.3 Mapping to TCAP

Figure 4 illustrates a protocol architecture which can be used when TCAP carries the MMAP RCF-RACF operations. The carriage of these operations shall follow the guidelines set forth in ANSI T1.110 and T1.114.

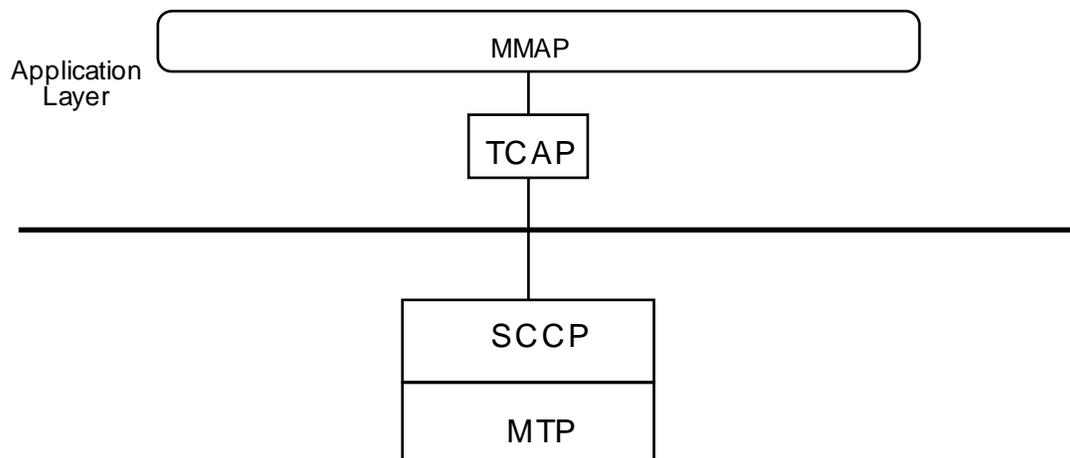


Figure 4 – Protocol architecture (TCAP)

When mapping to TCAP the MMAP operation and error shall be defined as private operation and error, respectively. The MMAP operation shall be encoded as a parameter of type OCTET STRING in the TCAP Parameter Sequence.

Table 1 provides a mapping of CDMA, TDMA, and CCT RCF-RACF operations to TCAP component and package types. Table 2 provides a mapping of PACS RCF-RACF operations to TCAP component and package types. The PCS1900 RCF-RACF operations are mapped to TCAP component type “Invoke Last” and package type “Unidirectional”. The operation code value of an Invoke component shall be set to the value of the Message Type information element of the encapsulated MMAP operation. The error code value of a Return Error component shall be set to the value of the Cause information element of the encapsulated MMAP operation.

Table 1 – Mapping of CDMA, TDMA, and CCT RCF-RACF Operations to TCAP Component and Package Types

Operation name	Component type	Package type
Assignment Complete	Return Result Last	Conversation with Permission or Response
Assignment Failure	Return Error	Conversation with Permission or Response
Assignment Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Authentication Reject	Return Error	Response
Authentication Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Authentication Response	Return Result Last	Conversation with Permission or Response
Base Station Challenge	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Base Station Challenge Response	Return Result Last	Conversation with Permission or Response
Block	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Block Acknowledge	Return Result Last	Conversation with Permission or Response
Call Indication	Invoke Last	Unidirectional
Clear Command	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Clear Complete	Return Result Last	Conversation with Permission or Response
Clear Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
CM Service Request	Invoke Last or Invoke Not Last	Query with Permission
Complete Layer 3 Information – CM Service Request	Invoke Last or Invoke Not Last	Query with Permission
Complete Layer 3 Information – Location Updating Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Complete Layer 3 Information – Paging Response	Return Result Last or Return Result Not Last	Conversation with Permission or Response
Feature Notification	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Feature Notification Acknowledge	Return Result Last or Return Result Not Last	Conversation with Permission or Response
Feature Status Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Feature Status Response	Return Result Last or Return Result Not Last	Conversation with Permission or Response

(continued)

Table 1 – Mapping of CDMA, TDMA, and CCT RCF-RACF Operations to TCAP Component and Package Types *(continued)*

Operation name	Component type	Package type
Flash With Information	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Handoff Command	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Handoff Complete	Return Result Last	Conversation with Permission or Response
Handoff Failure	Return Error	Response
Handoff Performed	Return Result Last	Conversation with Permission or Response
Handoff Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Handoff Request Acknowledge	Return Result Last	Conversation with Permission or Response
Handoff Required	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Handoff Required Reject	Return Error	Response
Identity Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Identity Response	Return Result Last	Conversation with Permission or Response
IMSI Detach Indication	Invoke Last	Unidirectional
Location Updating Accept	Return Result Last or Return Result Not Last	Conversation with Permission or Response
Location Updating Reject	Return Error	Response
Location Updating Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Paging Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Paging Response	Return Result Last or Return Result Not Last	Conversation with Permission or Response
Parameter Update Confirm	Return Result Last	Conversation with Permission or Response
Parameter Update Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Privacy Mode Command	Invoke Last or Invoke Not Last	Conversation with Permission or Response
Privacy Mode Complete	Return Result Last	Conversation with Permission or Response
Reset	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Reset Acknowledge	Return Result Last	Conversation with Permission or Response
Reset Circuit	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Reset Circuit Acknowledge	Return Result Last	Conversation with Permission or Response

(continued)

Table 1 – Mapping of CDMA, TDMA, and CCT RCF-RACF Operations to TCAP Component and Package Types *(concluded)*

Operation name	Component type	Package type
Soft Handoff Drop Source	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Soft Handoff Drop Target	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
SSD Update Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
SSD Update Response	Return Result Last	Conversation with Permission or Response
Status Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Status Response	Return Result Last	Conversation with Permission or Response
Terminating Handoff Complete	Return Result Last	Response
Terminating Handoff Proceed	Invoke Last	Unidirectional
Terminating Handoff Request	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Terminating Handoff Request Acknowledge	Return Result Last or Return Result Not Last	Conversation with Permission or Response
Terminating Handoff Request Reject	Return Error	Response
TMSI Reallocation Command	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
TMSI Reallocation Complete	Return Result Last	Conversation with Permission or Response
Unblock	Invoke Last or Invoke Not Last	Query with Permission or Conversation with Permission
Unblock Acknowledge	Return Result Last	Conversation with Permission or Response

**Table 2 – Mapping of PACS RCF-RACF Operations to
TCAP Component and Package Types**

Operation name	Component type	Package type
ALT_AUTH_ACK	Return Result Last	Conversation with Permission or Response
ALT_AUTH_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
ALT_COMP	Invoke Last	Unidirectional
ALT_DENY	Invoke Last	Unidirectional
ALT_RDY	Invoke Last	Unidirectional
AUTH_REQ_A – ALERT_ACK	Return Result Not Last	Conversation with Permission
AUTH_REQ_A – CALL_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
AUTH_REQ_A – CALL_REQ_EMER	Invoke Not Last	Query with Permission or Conversation with Permission
AUTH_REQ_A – TERM_REG_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
AUTH_REQ_B – ALERT_ACK	Return Result Not Last	Conversation with Permission
AUTH_REQ_B – CALL_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
AUTH_REQ_B – CALL_REQ_EMER	Invoke Not Last	Query with Permission or Conversation with Permission
AUTH_REQ_B – TERM_REG_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
CALL_WAIT_IND	Invoke Not Last	Query with Permission or Conversation with Permission
COUNT_UPDATE_ACK	Return Result Last	Conversation with Permission or Response
COUNT_UPDATE_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
EMER_CALL_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
MULTI-PARTY_CALL_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
NET_CHAL_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
NET_CHAL_RESP	Return Result Last	Conversation with Permission or Response
P_ALERT	Invoke Not Last	Query with Permission or Conversation with Permission
P_CONNECT	Invoke Last	Unidirectional
P_DISC	Invoke Not Last	Query with Permission or Conversation with Permission
P_INFO	Invoke Not Last	Query with Permission or Conversation with Permission
P_RELEASE	Invoke Not Last	Query with Permission
P_REL_COM	Invoke Last	Unidirectional

(continued)

**Table 2 – Mapping of PACS RCF-RACF Operations to
TCAP Component and Package Types** *(concluded)*

Operation name	Component type	Package type
RCID_ASSIGN	Return Result Not Last	Conversation with Permission or Response
SSD_UPDATE_REQ	Invoke Not Last	Query with Permission or conversation with Permission
SSD_UPDATE_RESP	Return Result Last	Conversation with Permission or Response
TERM_REG_ACK	Return Result Last	Conversation with Permission or Response
UNQ_CHAL_REQ	Invoke Not Last	Query with Permission or Conversation with Permission
UNQ_CHAL_RESP	Return Result Last	Conversation with Permission or Response

6 Operations descriptions

This clause defines operations of the RCF-RACF mobility management interface as depicted in figure 1.

Most of the RCF-RACF operations in 6.1, Common operations descriptions, as well as some air-interface-specific operations are derived from the TIA IS-634 and TSB80 BS-MSC interface due to the similarity between the BS-MSC and the RCF-RACF interfaces. Some similarities between these interfaces are:

- both are based on a DSS1 call model;
- both must inter-work between existing air interface standards (e.g., CDMA) and existing mobility management network standards (e.g., IS-41).

Where necessary, modifications with respect to IS-634 to align it with T1S1.1 requirements are identified in this document. General modifications are identified below while operation-specific modifications are identified in the following clauses.

The general modifications with respect to IS-634 are identified in the following list.

- The IS-634 MSC function includes the SSF/CCF and RACF functions as shown in figure 1. Thus, in MMAP, the IS-634 A interface must be split into two (2) reference points which are the RCF-RACF reference point for mobility management and RCF-SSF/CCF for call control.
- The IS-634 term MSC is replaced with the term RACF when referring to mobility management operations (e.g., CM Service Request).
- The IS-634 term MSC is replaced with the term SSF/CCF when referring to call control operations (e.g., Setup, Alerting, Connect, Connect Ack).
- The IS-634 term BS is replaced with the term RCF.
- Detailed operation descriptions and rules (i.e., successful, failure) are found in TSB80. A brief operational description and any required changes to the operational rules are identified in this document.
- References to call control operation in IS-634 are superseded by the call control as defined in TIA/EIA/IS-653. For example, IS-634 refers to a DSS1-like Setup message sent to the MSC. For this standard, the Setup message is defined in IS-653 and is sent to the SSF/CCF.
- For every message, additional parameters, if any, are identified. The usage – mandatory, conditional, or optional – of these parameters is also indicated. If addition of a parameter affects the usage of an existing parameter in the TSB80 message, a “special note” is included.
- Parameters and operations (messages) which have been modified are included in this document and supersede those found in TSB80. These are included in tabular form in clause 7, Messages, parameters and timers, of this document.

The RCF-RACF operations in 6.4, PACS operations descriptions, are derived from ANSI J-STD-014.

The RCF-RACF operations in 6.6, PCS1900 operations descriptions, are derived from TIA/EIA/IS-651, SS7 Based A-Interface, Part IIIa Layer 3 for PCS1900 Air Interface, and ANSI J-STD-007, Volume 2, Part 2, due to the similarity of the mobility functionality between the RS-PCSC and the RCF-RACF interfaces.

The general modifications with respect to IS-651 are identified in the following list.

- The IS-651 PCSC function includes the SSF/CCF and RACF functions as shown in figure 1. Thus, in MMAP, the IS-651 A interface must be split into two (2) reference points which are the RCF-RACF reference point for mobility management and RCF-SSF/CCF for call control.
- The IS-651 term PCSC is replaced with the term RACF when referring to mobility management operations (e.g., CM Service Request).

- The IS-651 term PCSC is replaced with the term SSF/CCF when referring to call control operations (e.g., Setup, Alerting, Connect, Connect Ack).
- The IS-651 term RS is replaced with the term RCF.
- Detailed operation descriptions and rules (i.e., successful, failure) are found in IS-651. A brief operational description and any required changes to the operational rules are identified in this document.
- References to call control operation in IS-651 are superseded by the call control as defined in TIA/EIA IS-653. For example, IS-651 refers to a DSS1-like Setup message sent to the PCSC. For this standard, the Setup message is defined in IS-653 and is sent to the SSF/CCF.
- For every message, additional parameters, if any, are identified. The usage – mandatory, conditional, or optional – of these parameters is also indicated. If addition of a parameter affects the usage of an existing parameter in the IS-651 message, a “special note” is included.
- Parameters and operations (messages) which have been modified are included in this document and supersede those found in IS-651. These are included in tabular form in clause 7, Messages, parameters and timers, of this document.

6.1 Common operations descriptions

6.1.1 Call processing operations

6.1.1.1 Assignment complete

Name: Assignment Complete

Direction: RCF --> RACF

Description:

This operation is used to indicate that the radio resource assignment has been successfully completed. Refer to TIA TSB80, Section 2.2.1.10.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|-------------------|----------|
| 1. Call Reference | OPTIONAL |
|-------------------|----------|

This parameter identifies a call instance.

Special Notes: None.

6.1.1.2 Assignment failure

Name: Assignment Failure

Direction: RCF --> RACF

Description:

This operation is used to indicate that the radio resource assignment has failed. Refer to TIA TSB80, Section 2.2.1.11.

Modifications with respect to TSB80 Operational Rules:

- If the Mobile Identity (Interface DN) is different than the one that was received in the Assignment Request message, the RACF may use this Interface DN during the reassignment procedure.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|-----------------------------------|-------------|
| 1. Mobile Identity (Interface DN) | CONDITIONAL |
|-----------------------------------|-------------|

This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF. This parameter is included in this message when the RACF assigns the DN.

Special Notes: None.

6.1.1.3 Assignment request

Name: Assignment Request

Direction: RCF <-- RACF

Description:

This operation is used by the RACF to request assignment of radio resources. Refer to TIA TSB80, Section 2.2.1.9.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) CONDITIONAL

This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF. This parameter is included in this message when the RACF assigns the DN.

Special Notes:

1. Circuit Identity Code

This parameter may not be needed, since the Interface DN is used to identify the circuit between the RCF and the SSF/CCF.

6.1.1.4 Call indication

Name: Call Indication

Direction: RCF --> RACF

Description:

This message is sent from the RCF to the RACF to provide indication that a call is being or has been established. Such an indication may be used by the RACF to mark the busy status of the RTF and is useful in implementation of supplementary services such as Call Forward on Busy.

Operational Rules:

The RCF sends this message when a call is being or has been established.

Parameter List:

1. Message Type MANDATORY
This parameter identifies the message.
2. Mobile Identity (Interface DN) OPTIONAL
This parameter identifies the DN assigned to the B-channel allocated for the call between the RCF and the SSF/CCF.
3. Call Reference OPTIONAL
This parameter identifies the call that is being or has been established.
4. Setup Time OPTIONAL
The time at which the call was setup.
5. Connect Time OPTIONAL
The time at which the call was connected.
6. Channel Number OPTIONAL
Logical number assigned to the equipment providing the traffic channel.

6.1.1.5 Clear command

Name: Clear Command

Direction: RCF <-- RACF

Description:

This operation is used to respond to a Clear Request. It may also be used to initiate call clearing. Refer to TIA TSB80, Section 2.3.1.6.

Modifications with respect to TSB80 Operational Rules:

- Section 2.3.1.6, Clear Command – The Release Complete referred to in this paragraph is understood to be the DSS1 interface operation.
- If the Call Reference List is not included in this message, all associated calls should be cleared.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL
This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF.
2. Call Reference List OPTIONAL
This parameter identifies the call or calls being cleared.

Special Notes: None.

6.1.1.6 Clear complete

Name: Clear Complete

Direction: RCF --> RACF

Description:

This operation is used to confirm resource clearing by the RCF. Refer to TIA TSB80, Section 2.3.1.7.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL
This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF.
2. Call Reference List OPTIONAL
This parameter identifies the call or calls being cleared.
3. Connect Time OPTIONAL
The time at which the call was connected.
4. Setup Time OPTIONAL
The time at which the call was setup.
5. Disconnect Time OPTIONAL
The time at which the call was disconnected.

Special Notes: None.

6.1.1.7 Clear request

Name: Clear Request

Direction: RCF --> RACF

Description:

This operation is used to indicate that the referenced call is no longer active due to normal call clearing (i.e., RTF initiated) or failure conditions (i.e., RCF initiated). Refer to TIA TSB80, Section 2.3.1.5.

Modifications with respect to TSB80 Operational Rules:

- Section 2.3.1.1, Successful Clear Scenarios – Normal (RTF) call clearing is indicated via DSS1 (T1.607) procedures (i.e., Disconnect followed by Release and Release Complete) between the RCF and SSF/CCF instead of just Release and Release Complete.
- Section 2.3.1.1, Successful Clear Scenarios – For all cases of RTF or RCF (i.e., normal or failure) initiated clearing, the RCF will send a Clear Request to the RACF. The RACF responds with a Clear Command followed by an RCF response of Clear Complete.
- Section 2.3.1.1, Successful Clear Scenarios – RCF rejection of call setup shall follow Section 5.2.2 of T1.607.
- Section 2.3.1.5, Clear Request – The RCF sends Clear Request for normal as well as failure call clearing.
- If the Call Reference List is not included in this message, all associated calls should be cleared.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|--|----------|
| 1. Mobile Identity (Interface DN) | OPTIONAL |
| This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF. | |
| 2. Call Reference List | OPTIONAL |
| This parameter identifies the call or calls being cleared. | |
| 3. Connect Time | OPTIONAL |
| The time at which the call was connected. | |
| 4. Setup Time | OPTIONAL |
| The time at which the call was setup. | |
| 5. Disconnect Time | OPTIONAL |
| The time at which the call was disconnected. | |

Special Notes: None.

6.1.1.8 CM service request

Name: CM Service Request

Direction: RCF --> RACF

Description:

This operation is used to initiate an RTF originated call. Refer to TIA TSB80, Section 2.2.1.1.

Modifications with respect to TSB80 Operational Rules:

- Section 2.2.1, Mobile Originated Calls – The listed call processing messages are replaced with the very same from T1.607. These are: Setup, Call Proceeding, Alerting, Connect and Connect Acknowledge.
- Section 2.2.1.1.1, Successful Operation – In all cases the SSF/CCF waits to receive a DSS1 Setup.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|-----------------------------------|-------------|
| 1. Mobile Identity (Interface DN) | CONDITIONAL |
|-----------------------------------|-------------|

This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF. This parameter is included in this message when the RCF assigns the DN.

Special Notes: None.

6.1.1.9 Complete layer 3 information

Name: Complete Layer 3 Information

Direction: RCF --> RACF

Description:

This operation is used to encapsulate initial access messages (CM Service Request, Page Response, and Location Update Request) from the RCF to RACF. It supplements the initial access message with the cell identity (i.e., location area) of the subscriber equipment. Refer to TIA TSB80, Section 2.2.1.2.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.1.10 Feature status request

Name: Feature Status Request

Direction: RCF --> RACF

Description:

This operation is sent from the RCF to the RACF to verify the status of the supplementary service requested by the RTF.

Operational Rules:

The RCF sends this message when it recognizes that the RTF is invoking a supplementary service (e.g., three-way calling).

Parameter List:

- | | |
|--|-----------|
| 1. Protocol Discriminator | MANDATORY |
| This parameter identifies the type of operation (i.e., call processing). | |
| 2. Message Type | MANDATORY |
| This parameter identifies the message. | |
| 3. Mobile Identity | MANDATORY |
| This parameter identifies the RTF. | |

- | | |
|--|-----------|
| 4. Feature ID | MANDATORY |
| This parameter identifies the feature for which status is being requested. | |
| 5. Mobile Identity (ESN) | OPTIONAL |
| This parameter identifies the ESN of the RTF. | |
| 6. Called Party BCD Number | OPTIONAL |
| This parameter identifies the dialed number. | |

6.1.1.11 Feature status response

Name: Feature Status Response

Direction: RCF <-- RACF

Description:

This operation is sent from the RACF to the RCF to report the status of the feature requested by the RTF.

Operational Rules:

The RACF sends this message indicating the status (e.g., active, not active) of the feature being requested.

Parameter List:

- | | |
|---|-----------|
| 1. Protocol Discriminator | MANDATORY |
| This parameter identifies the type of operation (i.e., call processing). | |
| 2. Message Type | MANDATORY |
| This parameter identifies the message. | |
| 3. Feature Status | MANDATORY |
| This parameter identifies the status (e.g., active, not active) of the feature. | |
| 4. Feature ID | MANDATORY |
| This parameter identifies the feature for which the status is being reported. | |

6.1.1.12 Flash with information

Name: Flash with Information

Direction: RCF <--> RACF

Description:

This operation is used by the RACF and RCF for supplementary services. This operation is used by the RACF, for example, to indicate to the RCF that a subsequent call is to be delivered on an existing connection, i.e., as a call waiting notification. This operation is sent from the RCF to the RACF, for example, to indicate that a "hook-flash" has been received from the RTF. Refer to TIA TSB80, Section 2.5.1.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.1.13 Paging request

Name: Paging Request

Direction: RCF <-- RACF

Description:

This operation is used to identify the location of the RTF user. Refer to TIA TSB80, Section 2.2.2.1.

Modifications with respect to TSB80 Operational Rules:

- Section 2.2.2, Mobile Terminated Calls – The listed call processing messages are replaced with the very same from T1.607. These are: Setup, Alerting, Connect and Connect Acknowledge. Call Confirmed is not defined in T1.607. Instead, Call Proceeding is an option which may be used as per 5.2.5.1 of T1.607.

Modifications with respect to TSB80 Parameter List: None.

6.1.1.14 Paging response

Name: Paging Response

Direction: RCF --> RACF

Description:

This operation is used to respond to the Paging Request once the RTF has responded. Refer to TIA TSB80, Section 2.2.2.2.

Modifications with respect to TSB80 Operational Rules:

- Section 2.2.2.2, Paging Response – The Assignment Request may be used for connection establishment as the subsequent RACF response to the Paging Response.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|-----------------------------------|-------------|
| 1. Mobile Identity (Interface DN) | CONDITIONAL |
|-----------------------------------|-------------|

This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF. This parameter is included in this message when the RCF assigns the DN.

Special Notes: None.

6.1.1.15 Privacy mode command

Name: Privacy Mode Command

Direction: RCF <-- RACF

Description:

This operation is used to control Voice Privacy (VP) and Signaling Message Encryption (SME). It may also be used to provide the RCF with VP and SME information. Refer to TIA TSB80, Section 2.2.1.5.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.1.16 Privacy mode complete

Name: Privacy Mode Complete

Direction: RCF --> RACF

Description:

This operation is used in response to the Privacy Mode Command or to indicate a change or a request for change of voice privacy by the RTF. Refer to TIA TSB80, Section 2.2.1.6.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2 Mobility management operations

6.1.2.1 Authentication reject

Name: Authentication Reject

Direction: RCF <-- RACF

Description:

This operation is used to indicate that the authentication of the RTF has been rejected. Refer to TIA TSB80, Section 4.2.2.3.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.2 Authentication request

Name: Authentication Request

Direction: RCF <-- RACF

Description:

This operation is used to request authentication of a unique RTF. Refer to TIA TSB80, Section 4.2.2.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.3 Authentication response

Name: Authentication Response

Direction: RCF --> RACF

Description:

This operation is used to respond to the Authentication Request. Refer to TIA TSB80, Section 4.2.2.2.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions: None.

Special Notes: None.

6.1.2.4 Base station (RCF) challenge

Name: Base Station Challenge

Direction: RCF --> RACF

Description:

This operation is used to verify the new SSD calculated at the RTF. Refer to TIA TSB80, Section 4.2.1.3.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.5 Base station (RCF) challenge response

Name: Base Station Challenge Response

Direction: RCF <-- RACF

Description:

This operation is used to respond to the Base Station (RCF) Challenge. Refer to TIA TSB80, Section 4.2.1.4.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.6 Location updating accept

Name: Location Updating Accept

Direction: RCF <-- RACF

Description:

This operation is used to acknowledge a Location Updating Request. Refer to TIA TSB80, Section 4.1.2.4.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.7 Location updating reject

Name: Location Updating Reject

Direction: RCF <-- RACF

Description:

This operation is used to reject a Location Updating Request. Refer to TIA TSB80, Section 4.1.2.5.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.8 Location updating request

Name: Location Updating Request

Direction: RCF --> RACF

Description:

This operation is used to indicate the current location of the RTF. Refer to TIA TSB80, Section 4.1.2.3.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.9 Parameter update confirm

Name: Parameter Update Confirm

Direction: RCF --> RACF

Description:

This operation is used to confirm that the RTF has incremented its call history count. Refer to TIA TSB80, Section 4.2.3.2.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.10 Parameter update request

Name: Parameter Update Request

Direction: RCF <-- RACF

Description:

This operation is used to request the RTF to update its call history count. Refer to TIA TSB80, Section 4.2.3.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.11 SSD update request

Name: SSD Update Request

Direction: RCF <-- RACF

Description:

This operation is used to request that the RTF update its SSD. Refer to TIA TSB80, Section 4.2.1.2.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.12 SSD update response

Name: SSD Update Response

Direction: RCF --> RACF

Description:

This operation is used to indicate whether or not the RTF has successfully updated its SSD. Refer to TIA TSB80, Section 4.2.1.5.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.13 Status request

Name: Status Request

Direction: RCF <-- RACF

Description:

This operation is used to direct the RCF to request specific information from the RTF. Refer to TSB80, Section 4.3.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.2.14 Status response

Name: Status Response

Direction: RCF --> RACF

Description:

This operation is used to report to the RACF the specific information requested from the RTF. Refer to TSB80, Section 4.3.2.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.3 Radio resource management operations

6.1.3.1 Handoff command

Name: Handoff Command

Direction: RCF <-- RACF

Description:

This operation is used to inform the source RCF that a target channel has been allocated for the handoff. Refer to TIA TSB80, Section 3.3.2.4.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN for the target RCF) MANDATORY
This parameter identifies the DN associated with the B-channel allocated for the handoff call between the target RCF and the SSF/CCF.
2. Mobile Identity (Interface DN for the source RCF) OPTIONAL
This parameter identifies the DN associated with the B-channel allocated for the handoff call between the source RCF and the SSF/CCF.
3. RACF Address OPTIONAL
This parameter identifies the RACF associated with the target RCF's neighbor(s).
4. NID OPTIONAL
This parameter identifies a network within a system.
5. Neighbor Configuration OPTIONAL
This parameter identifies the configuration of the neighbor with respect to the target cell.
6. Pilot Increment OPTIONAL
This parameter identifies the Pilot PN sequence offset index increment that the RTF uses in the search for other potential target cells.

Special Notes: None.

6.1.3.2 Handoff commenced

Name: Handoff Commenced

Direction: RCF --> RACF

Description:

This operation is sent from the source RCF to RACF to indicate that a handoff command has been sent to the RTF (in case of a hard handoff), and that an acknowledgment has been received from the RTF. Refer to TIA TSB80, Section 3.3.2.4.2.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.3.3 Handoff complete

Name: Handoff Complete

Direction: RCF --> RACF

Description:

This operation is used by the target RCF to signal to the RACF that the RTF has successfully accessed the target cell. In particular, this operation is used in the drop source procedure to indicate that the target RCF has successfully assumed the controlling transcoder function for the mobile connection. Refer to TIA TSB80, Section 3.3.2.4.3.

Modifications with respect to TSB80 Operational Rules: None.

Modification with respect to TSB80 Parameter List: None.

6.1.3.4 Handoff failure

Name: Handoff Failure

Direction: RCF --> RACF

Description:

This operation is used by both the source and target RCFs. The source RCF uses this operation to inform the RACF that a handoff could not be successfully performed and that the resources at the target should be cleared. The target RCF uses this operation when it cannot accommodate a handoff. Refer to TIA TSB80, Section 3.3.2.6.2.

Modifications to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN for the source RCF) OPTIONAL

This parameter identifies the DN associated with the B-channel allocated for the handoff call between the source RCF and the SSF/CCF. This parameter is included when the message is sent from the source RCF, not when the message is sent from the target RCF.

Special Notes: None.

6.1.3.5 Handoff performed

Name: Handoff Performed

Direction: RCF --> RACF

Description:

This operation is used by the source RCF to inform the RACF that a handoff has been performed. Refer to TIA TSB80, Section 3.3.2.4.4.

Modifications to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.3.6 Handoff request

Name: Handoff Request

Direction: RCF <-- RACF

Description:

This operation is used to request a target RCF to provide resources for a handoff of an existing mobile connection. Refer to TIA TSB80, Section 3.3.2.3.1.

Modifications to TSB80 Operational Rules:

- Section 3.3.2.3.1.1, Successful Operation : The candidate target RCF may also assign the interface DN associated with the handed off call.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN for the target RCF) **CONDITIONAL**

This parameter identifies the DN assigned to the B-channel allocated for the call between the RCF and the SSF/CCF. This parameter is included in the message when the RACF assigns the DN.

Special Notes: None.

6.1.3.7 Handoff request acknowledge

Name: Handoff Request Acknowledge

Direction: RCF --> RACF

Description:

This operation is used to inform the RACF of the resources allocated as a result of the Handoff Request or Soft Handoff Drop Source received from the RACF. Refer to TIA TSB80, Section 3.3.2.3.2.

Modifications to TSB80 Operational Rules:

- Section 3.3.2.3.1.1, Successful Operation – The candidate target RCF may also assign the Interface DN associated with the bearer channel assigned to the handed off call.
- This message may also be sent in response to Soft Handoff Drop Source message.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN for the target RCF) **CONDITIONAL**

This parameter identifies the DN associated with the B-channel allocated for the handoff call between the target RCF and the SSF/CCF. This parameter is included in the message when the RCF assigns the DN.

2. RACF Address OPTIONAL
This parameter identifies the RACF associated with the target RCF's neighbor(s).
3. NID OPTIONAL
This parameter identifies a network within a system.
4. Neighbor Configuration OPTIONAL
This parameter identifies the configuration of the neighbor with respect to the target cell.
5. Pilot Increment OPTIONAL
This parameter identifies the Pilot PN sequence offset index increment that the RTF uses in the search for other potential target cells.

Special Notes: None.

6.1.3.8 Handoff required

Name: Handoff Required

Direction: RCF --> RACF

Description:

This operation is used for an initial handoff to indicate that the RTF requires a handoff. Refer to TIA TSB80, Section 3.3.2.2.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN for the source RCF) OPTIONAL
This parameter identifies the DN associated with the B-channel allocated for the handoff call between the source RCF and the SSF/CCF. This parameter is included in the message when the RCF assigns the DN.

Special Notes: None.

6.1.3.9 Handoff required reject

Name: Handoff Required Reject

Direction: RCF <-- RACF

Description:

This operation is used to inform the source RCF that the handoff cannot be accomplished. Refer to TIA TSB80, Section 3.3.2.6.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN for the source RCF) OPTIONAL
This parameter identifies the DN associated with the B-channel allocated for the handoff call between the source RCF and the SSF/CCF.

Special Notes: None.

6.1.4 Facility management operations

These operations are used when the RACF manages directory numbers or when the RACF manages circuits used for handoff between the RCFs (via an SSF/CCF).

6.1.4.1 Block

Name: Block

Direction: RCF --> RACF

Description:

This operation is sent from RCF to RACF to indicate that a DN or a circuit must not be used for calls or handoffs, respectively. Refer to TIA TSB80, Section 5.3.2.1.

Modifications with respect to TSB80 Operational Rules:

- Section 5.3.2.1.1, Successful Operation – This operation may be used to block a DN or a dedicated circuit.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|---|----------|
| 1. Mobile Identity (Interface DN) | OPTIONAL |
| This parameter identifies the DN that is being blocked. | |

Special Notes:

- | | |
|--|--|
| 1. Circuit Identity Code | |
| This parameter may be used to identify the circuit (used for handoffs) that is being blocked. When Interface DN is included, this parameter should be set to zero. | |

6.1.4.2 Block acknowledge

Name: Block Acknowledge

Direction: RCF <-- RACF

Description:

This operation is sent from RACF to RCF to acknowledge receipt of the Block message and to indicate appropriate action has been taken. Refer to TIA TSB80, Section 5.3.2.2.

Modifications with respect to TSB80 Operational Rules:

- Section 5.3.2.2.1, Successful Operation – This operation may be used to acknowledge blocking of a DN or a circuit.

Modifications with respect to TSB80 Parameter List:

Additions:

- | | |
|---|----------|
| 1. Mobile Identity (Interface DN) | OPTIONAL |
| This parameter identifies the DN that has been blocked. | |

Special Notes:

- | | |
|--|--|
| 1. Circuit Identity Code | |
| This parameter may be used to identify the circuit (used for handoffs) that has been blocked. When Interface DN is included, this parameter should be set to zero. | |

6.1.4.3 Reset

Name: Reset

Direction: RCF <--> RACF

Description:

This operation is sent from RCF to RACF or from RACF to RCF upon initialization or in the event of a global failure at either of the two entities. This operation results in a reset of all call-related data (e.g., DN or circuit block status). Refer to TIA TSB80, Section 5.3.4.

Modifications with respect to TSB80 Operational Rules:

- Section 5.3.4.1.1, Successful Operation – The RACF, on receiving this operation from the RCF, shall idle all circuits and directory numbers associated with the RCF.
- Section 5.3.4.3.1, Successful Operation – The RCF, on receiving this operation from the RACF, shall block all circuits and directory numbers that were previously blocked using the Block message and idle all other circuits and directory numbers.

Modifications with respect to TSB80 Parameter List: None.

6.1.4.4 Reset acknowledge

Name: Reset Acknowledge

Direction: RCF <--> RACF

Description:

This operation is sent from RCF to RACF or from RACF to RCF in response to the Reset operation. Refer to TIA TSB80, Section 5.3.4.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.1.4.5 Reset circuit

Name: Reset Circuit

Direction: RCF <--> RACF

Description:

This operation is sent from RCF to RACF or from RACF to RCF to reset (i.e., idle) a particular circuit (used for handoffs) or a DN when the sending entity has lost all data pertaining to a call. Refer to TIA TSB80, Section 5.3.3.

Modifications with respect to TSB80 Operational Rules:

- Section 5.3.3, Reset Circuit – This operation may be sent when the RCF or RACF have lost information regarding the open transaction between the two entities.
- Section 5.3.3.1.1, Successful Operation – The RACF, on receiving this operation, may mark a circuit or a DN idle.
- Section 5.3.3.3.1, Successful Operation – The RCF, on receiving this operation, may mark a circuit or a DN idle.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL

This parameter identifies the DN that is being reset.

Special Notes:

1. Circuit Identity Code

This parameter may be used to identify the circuit (used for handoffs) that is being reset. When Interface DN is included, this parameter should be set to zero.

6.1.4.6 Reset circuit acknowledge

Name: Reset Circuit Acknowledge

Direction: RCF <--> RACF

Description:

This operation is sent from RCF to RACF or from RACF to RCF to indicate that the requested circuit (used for handoffs) or the directory number has been reset. Refer to TIA TSB80, Section 5.3.3.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL

This parameter identifies the DN that has been reset.

Special Notes:

1. Circuit Identity Code

This parameter may be used to identify the circuit (used for handoffs) that has been reset. When Interface DN is included, this parameter should be set to zero.

6.1.4.7 Unblock

Name: Unblock

Direction: RCF --> RACF

Description:

This operation is sent from RCF to RACF to indicate that particular DN or a circuit blocked previously using Block message can now be used (i.e., it is unblocked). Refer to TIA TSB80, Section 5.3.2.3.

Modifications with respect to TSB80 Operational Rules:

- Section 5.3.2.3.1, Successful Operation – This operation may be used to unblock a DN or a circuit.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL

This parameter identifies the DN that is being unblocked.

Special Notes:

1. Circuit Identity Code

This parameter may be used to identify the circuit (used for handoffs) that is being unblocked. When Interface DN is included, this parameter should be set to zero.

6.1.4.8 Unblock acknowledge

Name: Unblock Acknowledge

Direction: RCF <-- RACF

Description:

This operation is sent from RACF to RCF to acknowledge receipt of the Unblock message and to indicate appropriate action has been taken. Refer to TIA TSB80, Section 5.3.2.4.

Modifications with respect to TSB80 Operational Rules:

- Section 5.3.2.4.1, Successful Operation – This operation may also be used to acknowledge unblocking of a DN or a circuit.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL
This parameter identifies the DN that has been unblocked.

Special Notes:

1. Circuit Identity Code
This parameter may be used to identify the circuit (used for handoffs) that has been unblocked. When Interface DN is included, this parameter should be set to zero.

6.2 CDMA operations descriptions

6.2.1 Common operations

CDMA uses the following common operations as defined in clause 6.1:

- Assignment Complete
- Assignment Failure
- Assignment Request
- Authentication Reject
- Authentication Request
- Authentication Response
- Base Station Challenge
- Base Station Challenge Response
- Block
- Block Acknowledge
- Call Indication
- Clear Command
- Clear Complete
- Clear Request
- CM Service Request
- Complete Layer 3 Information
- Feature Status Request
- Feature Status Response
- Flash With Information
- Handoff Command
- Handoff Commenced
- Handoff Complete
- Handoff Failure
- Handoff Performed
- Handoff Request
- Handoff Request Acknowledge
- Handoff Required
- Handoff Required Reject
- Location Updating Accept
- Location Updating Reject
- Location Updating Request
- Paging Request
- Paging Response

Parameter Update Confirm
Parameter Update Request
Privacy Mode Command
Privacy Mode Complete
Reset
Reset Acknowledge
Reset Circuit
Reset Circuit Acknowledge
SSD Update Request
SSD Update Response
Status Request
Status Response
Unblock
Unblock Acknowledge

6.2.2 CDMA specific operations

6.2.2.1 Call processing operations

6.2.2.1.1 Feature notification

Name: Feature Notification

Direction: RCF <-- RACF

Description:

This operation is used to send to the RTF (via the RCF) information regarding supplementary services. Refer to TIA TSB80, Section 2.5.1.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.2.2.1.2 Feature notification acknowledge

Name: Feature Notification Acknowledge

Direction: RCF --> RACF

Description:

This operation is sent in response to the Feature Notification message. Refer to TIA TSB80, Section 2.5.1.1.

Modifications with respect to TSB80 Operational Rules: None.

Modifications with respect to TSB80 Parameter List: None.

6.2.2.2 Radio resource management operations

6.2.2.2.1 Soft handoff drop source

Name: Soft Handoff Drop Source

Direction: RCF <--> RACF

Description:

This operation is used to indicate the dropping of the source leg in a soft handoff process and thus the movement of control and potentially transcoder functionality. It is sent from the source RCF to request the target RCF to take over as the source RCF in the soft handoff. Refer to TIA TSB80, Section 3.3.2.5.2.

Modifications with respect to TSB80 Operational Rules:

- Section 3.3.2.5.2.1, Successful Operation – The RACF may allocate circuits when it receives this message. The RACF replaces the source RCF DN received in the message with the target RCF DN and sends the message to the target RCF.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL

This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF. Note that Interface DN may be needed in the Soft Handoff Drop Source message in the RACF to the target RCF direction to identify the handoff call to the RCF.

Special Notes: None.

6.2.2.2.2 Soft handoff drop target

Name: Soft Handoff Drop Target

Direction: RCF <--> RACF

Description:

This operation is used to direct or indicate the dropping of a target leg in a soft handoff process. When sent from the source RCF, it directs the target RCF to drop out of the soft handoff. When sent from a target RCF, it indicates to the source that the target is dropping out. Refer to TIA TSB80, Section 3.3.2.5.1.

Modifications with respect to TSB80 Operational Rules:

- When initiated from a target RCF, this message indicates that the target must drop out of the soft handoff procedure.

Modifications with respect to TSB80 Parameter List:

Additions:

1. Mobile Identity (Interface DN) OPTIONAL

This parameter identifies the DN associated with the B-channel allocated for the call between the RCF and the SSF/CCF.

Special Notes: None.

6.3 CCT operations descriptions

6.3.1 Common operations

CCT uses the following operations as defined in 6.1:

- Assignment Complete
- Assignment Failure
- Assignment Request
- Authentication Reject
- Authentication Request
- Authentication Response
- Base Station Challenge
- Base Station Challenge Response
- Block
- Block Acknowledge
- Call Indication
- Clear Command
- Clear Complete
- Clear Request
- CM Service Request
- Complete Layer 3 Information
- Feature Status Request
- Feature Status Response
- Flash With Information
- Handoff Command
- Handoff Complete
- Handoff Failure
- Handoff Performed
- Handoff Request
- Handoff Request Acknowledge
- Handoff Required
- Handoff Required Reject
- Location Updating Accept
- Location Updating Reject
- Location Updating Request
- Paging Request
- Paging Response
- Parameter Update Confirm

Parameter Update Request

Privacy Mode Command

Privacy Mode Complete

Reset

Reset Acknowledge

Reset Circuit

Reset Circuit Acknowledge

SSD Update Request

SSD Update Response

Status Request

Status Response

Unblock

Unblock Acknowledge

6.3.2 CCT specific operations

6.3.2.1 Mobility management operations

6.3.2.1.1 Identity request

Name: Identity Request

Direction: RCF <-- RACF

Description:

This operation is used to request the identity of the personal terminal from the RTF.

Operational Rules:

The RACF requests an RTF identity using this operation. Upon receiving an Identity Request, the RCF formulates a request towards the RTF. When the response from the RTF is received, the RCF responds to the RACF using the Identity Response operation.

Parameter List:

<u>Name</u>	<u>Usage</u>
Protocol Discriminator	M
Message Type	M
Identity Type	M

Definitions:

Protocol Discriminator	- Identifies the type of operation, i.e., mobility management.
Message Type	- Identifies the operation, i.e., Identity Request.
Identity Type	- Identifies the type of the RTF identity requested.

6.3.2.1.2 Identity response

Name: Identity Response

Direction: RCF --> RACF

Description:

This operation is used to send the requested RTF identity to the RACF.

Operational Rules:

The RCF sends the requested RTF identity using this operation. When the response from the RTF is received, the RCF responds to the RACF using the Identity Response operation.

Parameter List:

<u>Name</u>	<u>Usage</u>
Protocol Discriminator	M
Message Type	M
Mobile Identity	M

Definitions:

- | | |
|------------------------|--|
| Protocol Discriminator | - Identifies the type of operation, i.e., mobility management. |
| Message Type | - Identifies the operation, i.e., Identity Response. |
| Mobile Identity | - The RTF identity requested by the RACF. |

6.3.2.1.3 IMSI detach indication

Name: IMSI Detach Indication

Direction: RCF --> RACF

Description:

This operation is used to send an indication about RTF power-down to the RACF.

Operational Rules:

Upon receiving an indication from the RTF that it has powered down, the RCF uses the IMSI Detach Indication operation to send the same indication.

Parameter List:

<u>Name</u>	<u>Usage</u>
Protocol Discriminator	M
Message Type	M
Mobile Identity (IMSI)	M

Definitions:

Protocol Discriminator	- Identifies the type of operation, i.e., mobility management.
Message Type	- Identifies the operation, i.e., IMSI Detach Indication.
Mobile Identity (IMSI)	- Identifies the RTF.

6.3.2.1.4 TMSI reallocation command

Name: TMSI Reallocation Command

Direction: RCF <-- RACF

Description:

This operation is used to send a new temporary identity to the RTF.

Operational Rules:

The RACF sends a new temporary identity for the RTF using this operation. Upon receiving a TMSI Reallocation Command, the RCF formulates a command towards the RTF indicating the new temporary identity.

Parameter List:

<u>Name</u>	<u>Usage</u>
Protocol Discriminator	M
Message Type	M
Location Area Identification	M
Mobile Identity (TMSI)	M

Definitions:

Protocol Discriminator	- Identifies the type of operation, i.e., mobility management.
Message Type	- Identifies the operation, i.e., TMSI Reallocation Command.
Location Area Identification	- Identifies the present location area of RTF.
Mobile Identity (TMSI)	- Identifies the RTF.

6.3.2.1.5 TMSI reallocation complete

Name: TMSI Reallocation Complete

Direction: RCF --> RACF

Description:

This operation is used to acknowledge the new temporary identity to the RACF.

Operational Rules:

The RCF sends the acknowledgment of the new temporary identity for the RTF using this operation. Upon receiving an acknowledgment from the RTF for the previously sent temporary identity, the RCF sends the acknowledgment to the RACF using the TMSI Reallocation Complete operation.

Parameter List:

<u>Name</u>	<u>Usage</u>
Protocol Discriminator	M
Message Type	M

Definitions:

Protocol Discriminator	- Identifies the type of operation, i.e., mobility management.
Message Type	- Identifies the operation, i.e., TMSI Reallocation Complete.

6.3.2.2 Radio resource management operations

6.3.2.2.1 Terminating handoff complete

Name: Terminating Handoff Complete

Direction: RCF --> RACF

Description:

This operation is used to indicate that the terminating handoff is completed.

Operational Rules:

Upon detecting the completion of a terminating handover, the target RCF informs the RACF via Terminating Handoff Complete.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M

Definitions:

Message Type - Identifies the operation, i.e., Terminating Handoff Complete.

6.3.2.2.2 Terminating handoff proceed

Name: Terminating Handoff Proceed

Direction: RCF <-- RACF

Description:

This operation is used by the RACF to inform the source RCF that the terminating handoff can proceed.

Operational Rules:

When the RACF determines that the terminating handoff request can be accepted, it informs the source RCF using the Terminating Handoff Proceed operation.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Mobile Identity (Interface DN for the target RCF)	M
Cell Identifier List	M

Definitions:

Message Type	- Identifies the operation, i.e., Terminating Handoff Proceed.
Mobile Identity (Interface DN)	- Identifies the DN associated with the B-channel allocated for the call between the target RCF and the SSF/CCF.
Cell Identifier List	- Identifies a number of target cells.

6.3.2.2.3 Terminating handoff request

Name: Terminating Handoff Request

Direction: RCF --> RACF

Description:

This operation is used by the target RCF to initiate a terminating handoff.

Operational Rules:

When the target RCF receives a request from the RTF to initiate a terminating handoff, it informs the RACF using the Terminating Handoff Request operation. If the source RCF is connected to another RACF, its address is also included as a parameter. The Mobile Identity (Interface DN for the target RCF) is included when the RCF assigns the DN.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Mobile Identity (Interface DN for the source RCF)	M
RCF Address (source)	M
Cell Identifier List	M
RACF Address (source)	O
Mobile Identity (Interface DN for the target RCF)	O

Definitions:

Message Type	- Identifies the operation, i.e., Terminating Handoff Request.
Mobile Identity (Interface DN for the source RCF)	- Identifies the DN associated with the B-channel allocated for the call between the source RCF and the SSF/CCF.
RCF Address (source)	- Identifies the source RCF.
Cell Identifier List	- Identifies a number of target cells.
RACF Address (source)	- Identifies the RACF (if different) of the source RCF.
Mobile Identity (Interface DN for the target RCF)	- Identifies the DN associated with the B-channel allocated for the call between the target RCF and the SSF/CCF.

6.3.2.2.4 Terminating handoff request acknowledge

Name: Terminating Handoff Request Acknowledge

Direction: RCF <-- RACF

Description:

This operation is used by the RACF to acknowledge the acceptance of a terminating handoff request.

Operational Rules:

When the RACF receives a request from the target RCF for a terminating handoff, and it decides to accept the request, it informs the target RCF using Terminating Handoff Request Acknowledge operation. The Mobile Identity (Interface DN for the target RCF) is included when the RACF assigns the DN.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Mobile Identity (Interface DN for the target RCF)	O

Definitions:

- Message Type - Identifies the operation, i.e., Terminating Handoff Request Acknowledge.
- Mobile Identity (Interface DN) - Identifies the DN associated with the B-channel allocated for the call between the target RCF and the SSF/CCF.

6.3.2.2.5 Terminating handoff request reject

Name: Terminating Handoff Request Reject

Direction: RCF <-- RACF

Description:

This operation is used by the RACF to reject a terminating handoff request.

Operational Rules:

When the RACF receives a request from the target RCF for a terminating handoff, and it decides to reject the request, it informs the target RCF using Terminating Handoff Request Reject operation.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Cause	M

Definitions:

Message Type - Identifies the operation, i.e., Terminating Handoff Request Reject.
Cause - Identifies the cause for rejecting the terminating handoff.

6.4 PACS operations descriptions

6.4.1 Common operations

PACS does not utilize any RCF-RACF common operations defined in 6.1.

6.4.2 PACS specific operations

6.4.2.1 ALT_AUTH_ACK

Name: ALT_AUTH_ACK

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to the target RCF to indicate that the RTF is authorized to receive service from the area served by the target RCF.

Operational Rules:

The RACF uses this message to instruct the target RCF to proceed with the ALT. The RACF must include the Session Key in this message to target RCF if encipherment is supported by both target and source RCFs and encipherment is selected at the time of Call Request.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
RCID	M
Session Key	C
Call Reference	O
Mini Profile	O

Definitions:

Message Type - Identifies the message sent.
 RCID - Identifies the radio link to which the message applies.
 Session Key - The key used to encrypt the radio channel.
 Call Reference - Identifies the call to which a message applies.
 Mini Profile - Profile of features subscribed.

6.4.2.2 ALT_AUTH_REQ

Name: ALT_AUTH_REQ

Direction: RCF --> RACF

Description:

This message is sent from the target RCF to the RACF to inform the RACF of an ALT_REQ from an RTF.

Operational Rules:

When an ALT_REQ message is received from an RTF, the RCF must verify with the RACF if the RTF is authorized to receive service from the target RCF.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
RCID	M
Complete Registration Area ID	M
Call Reference	O

Definitions:

- Message Type - Identifies the message sent.
- RCID - Identifies the radio link to which the message applies.
- Complete Registration Area ID - A unique identifier to distinguish registration areas.
- Call Reference - Identifies the call to which a message applies.

6.4.2.3 ALT_COMP

Name: ALT_COMP

Direction: RCF --> RACF

Description:

This message is sent from the target RCF to the RACF or from the RACF to the source RCF to indicate that the transfer has taken place.

Operational Rules:

When the target RCF gets the ALT complete message from the RTF, the target RCF sends this message to the RACF to indicate that the ALT has been successfully completed. The message is also used by the RACF to inform the source RCF that the ALT has been completed. The RACF must wait for the ALT_COMP message from the target RCF before sending the ALT_COMP message to the source RCF.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
RCID	M
ALT_DN	M
Call Reference	O

Definitions:

Message Type - Identifies the message sent.
 RCID - Identifies the radio link to which the message applies.
 ALT_DN - A directory number used for ALT procedures.
 Call Reference - Identifies the call to which a message applies.

6.4.2.4 ALT_DENY

Name: ALT_DENY

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to both, the source RCF and the target RCF, to indicate that the RTF should be denied the ALT attempt.

Operational Rules:

This message is used if the RACF determines that the ALT should not be allowed to proceed. RACF sends this message to the source RCF. The source RCF relays the message to the RTF. The message is sent to destination RCF as an unsuccessful result of the ALT_AUTH_REQ.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
RCID	M
Cause	M
Call Reference	O

Definitions:

- Message Type - Identifies the message sent.
- RCID - Identifies the radio link to which the message applies.
- Cause - Indicates the reason for the message.
- Call Reference - Identifies the call to which a message applies.

6.4.2.5 ALT_RDY

Name: ALT_RDY

Direction: RCF <--> RACF

Description:

This message is sent from the target RCF to the RACF to indicate that the target RCF is ready for the ALT, and from the RACF to the source RCF to indicate that it can start sending the ALT_EXEC to the RTF.

Operational Rules:

When the appropriate path has been established between the target RCF and the source RCF, the target RCF sends ALT_RDY message to the RACF. When RACF receives ALT_RDY from target RCF, the RACF sends the ALT_RDY to the source RCF.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
RCID	M
Call Reference	O

Definitions:

Message Type - Identifies the message sent.
 RCID - Identifies the radio link to which the message applies.
 Call Reference - Identifies the call to which a message applies.

6.4.2.6 AUTH_REQ_A

Name: AUTH_REQ_A

Direction: RCF --> RACF

Description:

The AUTH_REQ_A message is intended to carry initial messages using the secret-key Authentication and Key Agreement (AKA) protocol.

Operational Rules:

The AUTH_REQ_A message is the first message sent during the process of a call setup or terminal registration. The message contains both security and authentication information elements, along with any necessary call processing elements. Certain contents of the message are encapsulated, enciphered, and sent as a single information element, while others are sent un-enciphered. The four messages that can be encapsulated are ALERT_ACK (defined in 6.4.2.6.1), CALL_REQ (defined in 6.4.2.6.2), CALL_REQ_EMER (defined in 6.4.2.6.3), and TERM_REG_REQ (defined in 6.4.2.6.4). The initial message type identifies the message encapsulated. If encipherment is selected in the security menu selection, the contents of the Enveloped Information Elements should be enciphered. The Registration Flag should be included if a registration or deregistration is requested. Directory Number should be included if the Initial Message Type is ALERT_ACK and the Directory Number management is done by the RCF. If system-wide or local anonymity is not supported or if the authentication fails because of an unrecognized Temporary Subscriber ID, Subscriber ID and UIMESN must be included in the message. Otherwise Temporary Subscriber ID is included. Complete Registration Area ID should be included if registration or deregistration is requested.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Security Menu Selection	M
RAND	M
Real Time	M
AUTHR	M
COUNT	M
Correlation ID	M
Initial Message Type	M
Enveloped Information Elements	M
Registration Flag	C
Complete Registration Area ID	C
Directory Number	C
Subscriber ID	C
Temporary Subscriber ID	C
UIMESN	C

Definitions:

Message Type	- Identifies the message sent.
Call Reference	- Identifies the call to which a message applies.
Security Menu Selection	- Menu for privacy algorithm and authentication protocol.
RAND	- An input to the algorithm used for authentication.
Real Time	- An input to the algorithm used for authentication.

AUTHR	- Result of authentication calculation at the RTF.
COUNT	- A number identifying the call history of the RTF.
Correlation ID	- A number used to correlate response with request.
Initial Message Type	- One of the four messages allowed in AUTH_REQ.
Enveloped Information Elements	- Call processing elements requiring encipherment.
Registration Flag	- A flag denoting if registration is requested.
Complete Registration Area ID	- A unique identifier to distinguish registration areas.
Directory Number	- A number associated with the interface.
Subscriber ID	- Identity of the subscriber.
Temporary Subscriber ID	- Temporary identity of the subscriber.
UIMESN	- Serial number of the user identity module.

6.4.2.6.1 ALERT_ACK

This information is sent to inform RACF of the alert acknowledgment by the RTF. The initial message type in AUTH_REQ_A or AUTH_REQ_B identifies that ALERT_ACK is encapsulated in that message. If encipherment is selected in the security menu selection, the associated information elements are enciphered.

The enveloped information elements are:

<u>Name</u>	<u>Usage</u>
Alert Identifier	M
ESN	M
Complete Port ID	M

Definitions:

Alert Identifier	- Identifier used to alert an RTF.
ESN	- Electronic Serial Number of the RTF.
Complete Port ID	- Complete identification of the port.

6.4.2.6.2 CALL_REQ

This information is sent to inform RACF of the call attempt by the RTF. The initial message type in AUTH_REQ_A or AUTH_REQ_B identifies that CALL_REQ is encapsulated in that message. If encipherment is selected in the security menu selection, the associated information elements are enciphered. The Called Party Number is optional to facilitate overlap dialing.

The enveloped information elements are:

<u>Name</u>	<u>Usage</u>
Bearer Capability	M
Calling Party Number	M
ESN	M
Transit Network Selection	O
Called Party Number	O
Called Party Subaddress	O
Calling Party Subaddress	O
Precedence Level	O

Definitions:

Bearer Capability	-	Identifies the bearer service of the call.
Calling Party Number	-	Phone number of the calling party.
ESN	-	Electronic Serial Number of the RTF.
Transit Network Selection	-	Identifies the requested transit network.
Called Party Number	-	Phone number of the called party.
Called Party Subaddress	-	Subaddress associated with the called party.
Calling Party Subaddress	-	Subaddress associated with the calling party.
Precedence Level	-	Priority of the call.

6.4.2.6.3 CALL_REQ_EMER

This information is sent to inform RACF of the emergency call attempt by the RTF. The initial message type in AUTH_REQ_A or AUTH_REQ_B identifies that CALL_REQ_EMER is encapsulated in that message. If encipherment is selected in the security menu selection, the associated information elements are enciphered. Upon the receipt of this message type, the network should recognize the emergency of the call and must not initiate the SSD update procedure. The Called Party Number is optional to facilitate overlap dialing. If authentication fails, then the RTF resorts to sending EMER_CALL_REQ.

The enveloped information elements are:

<u>Name</u>	<u>Usage</u>
Bearer Capability	M
Calling Party Number	M
ESN	M
Transit Network Selection	O
Called Party Number	O
Called Party Subaddress	O
Calling Party Subaddress	O
Precedence Level	O

Definitions:

Bearer Capability	-	Identifies the bearer service of the call.
Calling Party Number	-	Phone number of the calling party.
ESN	-	Electronic Serial Number of the RTF.
Transit Network Selection	-	Identifies the requested transit network.
Called Party Number	-	Phone number of the called party.
Called Party Subaddress	-	Subaddress associated with the called party.
Calling Party Subaddress	-	Subaddress associated with the calling party.
Precedence Level	-	Priority of the call.

6.4.2.6.4 TERM_REG_REQ

This information is sent to inform RACF of the registration attempt by the RTF. The initial message type in AUTH_REQ_A or AUTH_REQ_B identifies that TERM_REG_REQ is encapsulated in that message. This message does not contain any associated information elements.

6.4.2.7 AUTH_REQ_B

Name: AUTH_REQ_B

Direction: RCF --> RACF

Description:

The AUTH_REQ_B message is intended to carry initial messages using the public-key Authentication and Key Agreement (AKA) protocol.

Operational Rules:

The AUTH_REQ_B message is the first message sent during the process of a call setup or terminal registration. The message contains both security and authentication information elements, along with any necessary call processing elements. Certain contents of the message are encapsulated, enciphered, and sent as a single information element, while others are sent un-enciphered. The four messages that can be encapsulated are ALERT_ACK (defined in 6.4.2.6.1), CALL_REQ (defined in 6.4.2.6.2), CALL_REQ_EMER (defined in 6.4.2.6.3), and TERM_REG_REQ (defined in 6.4.2.6.4). The initial message type identifies the message encapsulated. If encipherment is selected in the security menu selection, the contents of the Enveloped Information Elements should be enciphered. The Registration Flag should be included if a registration or deregistration is requested. Directory Number should be included if the Initial Message Type is ALERT_ACK and the Directory Number management is done by the RCF. Complete Registration Area ID should be included if registration or deregistration is requested.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Security Menu Selection	M
Rabin Encrypted Elements	M
Real Time	M
COUNT	M
Correlation ID	M
Initial Message Type	M
Enveloped Information Elements	M
Registration Flag	C
Complete Registration Area ID	C
Directory Number	C

Definitions:

Message Type	- Identifies the message sent.
Call Reference	- Identifies the call to which a message applies.
Security Menu Selection	- Menu for privacy algorithm and authentication protocol.
Rabin Encrypted Elements	- Authentication credentials used in Public Key AKA.
Real Time	- An input to the algorithm used for authentication.
COUNT	- A number identifying the call history of the RTF.
Correlation ID	- A number used to correlate response with request.
Initial Message Type	- One of the four messages allowed in AUTH_REQ.
Enveloped Information Elements	- Call processing elements requiring encipherment.
Registration Flag	- A flag denoting if registration is requested.
Complete Registration Area ID	- A unique identifier to distinguish registration areas.
Directory Number	- A number associated with the interface.

6.4.2.8 CALL_WAIT_IND

Name: CALL_WAIT_IND

Direction: RCF <-- RACF

Description:

This message is sent to inform the RCF that a call is waiting for an RTF.

Operational Rules:

If the user of the RTF has subscribed to call waiting, an arriving call while the user is already on a call will be indicated by the CALL_WAIT_IND message. If an RTF is involved in multiple calls, all calls will use the same RCID as assigned by the RACF at the beginning of the first call. However, the Call Reference will uniquely identify the individual calls.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	M

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RCID - Identifies the radio link to which the message applies.

6.4.2.9 COUNT_UPDATE_ACK

Name: COUNT_UPDATE_ACK

Direction: RCF --> RACF

Description:

This message is sent to positively acknowledge the change of the call history parameter (COUNT) as requested by the RACF.

Operational Rules:

When the RCF receives a message indicating the updating of the COUNT by the RTF, the RCF sends the COUNT_UPDATE_ACK to the RACF. If an RCID is assigned prior to this message, RCID must be included, else Correlation ID must be included.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.10 COUNT_UPDATE_REQ

Name: COUNT_UPDATE_REQ

Direction: RCF <-- RACF

Description:

This message is sent to RCF to request updating the COUNT stored in the RTF.

Operational Rules:

This message is sent in the event that the call history parameter (COUNT) stored at both the RACF and RTF should be updated. A six bit value to which the RTF should set its COUNT parameter is included in this message. If an RCID is assigned prior to this message, RCID must be included, else Correlation ID must be included.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
COUNT	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- COUNT - A number identifying the call history of the RTF.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.11 EMER_CALL_REQ

Name: EMER_CALL_REQ

Direction: RCF --> RACF

Description:

This message is sent to inform the RACF of an emergency call attempt by the indicated RTF.

Operational Rules:

This message is sent when the user requests an emergency call and authentication is not possible (such as when the authentication failed or when the A-key is not provisioned). It is sent unencrypted.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Correlation ID	M
ESN	M
Bearer Capability	M
Subscriber ID	M
Called Party Number	M
Called Party Subaddress	O
Calling Party Number	O
Calling Party Subaddress	O
Directory Number	O

Definitions:

Message Type	- Identifies the message sent.
Call Reference	- Identifies the call to which a message applies.
Correlation ID	- A number used to correlate response with request.
ESN	- Electronic Serial Number of the RTF.
Bearer Capability	- Identifies the bearer service of the call.
Subscriber ID	- Identity of the subscriber.
Called Party Number	- Phone number of the called party.
Called Party Subaddress	- Subaddress associated with the called party.
Calling Party Number	- Phone number of the calling party.
Calling Party Subaddress	- Subaddress associated with the calling party.
Directory Number	- A number associated with the interface.

6.4.2.12 MULTI-PARTY_CALL_REQ

Name: MULTI-PARTY_CALL_REQ

Direction: RCF --> RACF

Description:

This message is sent to inform the RACF of a multi-party call attempt by the indicated RTF.

Operational Rules:

When the RTF is already involved in a call and wishes to add another party, it indicates by sending a MULTI-PARTY_CALL_REQ to the RCF. A new Call Reference distinguishes this call from the existing call. Since a call is already existing, the RCF can decipher (if enciphered over the air interface) the call processing parameters. Therefore, the call processing parameters are sent unencrypted from RCF to RACF.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Bearer Capability	M
RCID	M
Feature Activation	O
Transit Network Selection	O
Called Party Number	O
Called Party Subaddress	O

Definitions:

Message Type	- Identifies the message sent.
Call Reference	- Identifies the call to which a message applies.
Bearer Capability	- Identifies the bearer service of the call.
RCID	- Identifies the radio link to which the message applies.
Feature Activation	- Parameter used to request control of a feature.
Transit Network Selection	- Identifies the requested transit network.
Called Party Number	- Phone number of the called party.
Called Party Subaddress	- Subaddress associated with the called party.

6.4.2.13 NET_CHAL_REQ

Name: NET_CHAL_REQ

Direction: RCF --> RACF

Description:

This message is sent to request authentication of the network.

Operational Rules:

When the network directs the RTF to perform certain tasks (e.g., to update the Shared Secret Data (SSD)), the RTF sends this message to ensure that the message is received from a valid network. The RTF provides a thirty two (32) bit random number to be used in the calculation of AUTHBS. If an RCID is assigned prior to this message, RCID should be used. Else, Correlation ID should be used to correlate the request with the response.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RANDBS	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RANDBS - Network challenge random number.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.14 NET_CHAL_RESP

Name: NET_CHAL_RESP

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to the RCF to provide a response to NET_CHAL_REQ.

Operational Rules:

When a NET_CHAL_REQ message is received from the RTF, the network computes the response (AUTHBS). If an RCID is assigned prior to this message, RCID should be used. Else, Correlation ID should be used to correlate the request with the response.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
AUTHBS	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- AUTHBS - Network challenge response.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.15 P_ALERT

Name: P_ALERT

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to the RCF to request that an RTF be alerted.

Operational Rules:

When RACF receives an MMAP Routing Request from the visited SCF, the RACF looks up the Alert Identifier for the RTF and sends a P_ALERT to all RCFs in the registration area where the RTF is currently registered.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Alert Identifier	M
Group Identifier	O

Definitions:

Message Type	- Identifies the message sent.
Alert Identifier	- Identifier used to alert an RTF.
Group Identifier	- Identifies a group of RCFs in the registration area.

6.4.2.16 P_CONNECT

Name: P_CONNECT

Direction: RCF --> RACF

Description:

This message is sent from the RCF to the RACF to inform the RACF that a call is now connected through to an RTF.

Operational Rules:

When RCF receives a message from RTF indicating that the call has been successfully established, the RCF sends a P_CONNECT message to the RACF.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	M

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RCID - Identifies the radio link to which the message applies.

6.4.2.17 P_DISC

Name: P_DISC

Direction: RCF --> RACF

Description:

This message is used to inform the RACF that RCF is clearing a call.

Operational Rules:

When RCF has completed clearing a call with the SSF, the RCF sends a P_DISC message to the RACF to inform that the call identified by the combination of RCID and Call Reference is cleared.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	M
Cause	O
Feature Activation	O

Definitions:

Message Type	-	Identifies the message sent.
Call Reference	-	Identifies the call to which a message applies.
RCID	-	Identifies the radio link to which the message applies.
Cause	-	Indicates the reason for the message.
Feature Activation	-	Parameter used to request control of a feature.

6.4.2.18 P_INFO

Name: P_INFO

Direction: RCF <--> RACF

Description:

This message is sent in either direction to provide miscellaneous call-related information.

Operational Rules:

This message is sent from the RACF to the RCF to convey RTF display information (e.g., advise of charge) or to request keypress information. It is sent from the RCF to the RACF to convey keypress information and button actions (e.g., Personal Identification Number).

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	M
Keypress	O
Information Request	O
Feature Activation	O
Feature Indication	O
Locking Shift	O
Display	O

Definitions:

Message Type	-	Identifies the message sent.
Call Reference	-	Identifies the call to which a message applies.
RCID	-	Identifies the radio link to which the message applies.
Keypress	-	Information to convey RTF keypad actions.
Information Request	-	Additional information requested.
Feature Activation	-	Parameter used to request control of a feature.
Feature Indication	-	Identifies the current status of the feature.
Locking Shift	-	Identifies a new active codeset.
Display	-	Display information to the user.

6.4.2.19 P_RELEASE

Name: P_RELEASE

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to the RCF to inform the RCF that a call is released and the network access resources associated with the call can be released.

Operational Rules:

For a stable call, P_RELEASE is sent after the call is disconnected to instruct the network to release its resources. When the call has not been established, P_RELEASE is used in error scenarios. The cause will indicate the reason for releasing the call. A response to this message of P_REL_COM is expected, but only after the RCF has relayed the RELEASE to the RTF, received a REL_COM from it, and released its own resources associated with the call. If an RCID is assigned prior to this message, RCID must be included, else Correlation ID must be included.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	C
Correlation ID	C
Cause	O

Definitions:

Message Type - Identifies the message sent.
 Call Reference - Identifies the call to which a message applies.
 RCID - Identifies the radio link to which the message applies.
 Correlation ID - A number used to correlate response with request.
 Cause - Indicates the reason for the message.

6.4.2.20 P_REL_COM

Name: P_REL_COM

Direction: RCF --> RACF

Description:

This message is sent from the RCF to RACF to inform the RACF that the call has been cleared.

Operational Rules:

The RCF must wait (or time-out) for REL_COM message from the RTF before sending the P_REL_COM to the RACF. After receiving the P_REL_COM, the network resources associated with this call will be released. No further message associated with this call will be exchanged after sending P_REL_COM. P_REL_COM is also used in response to a premature call release by the RTF. In this scenario, the Cause will indicate the reason for call release. If an RCID is assigned prior to this message, RCID must be included, else Correlation ID must be included.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RCID	C
Correlation ID	C
Cause	O

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.
- Cause - Indicates the reason for call release.

6.4.2.21 RCID_ASSIGN

Name: RCID_ASSIGN

Direction: RCF <-- RACF

Description:

This message is used to assign RCID for the call.

Operational Rules:

This message is sent from the RACF to the RCF in response to ALERT_ACK or CALL_REQ to assign RCID for the call. If encipherment is selected during CALL_REQ or ALERT_ACK, certain call processing parameters which are enciphered will be deciphered by the RACF and included in the RCID_ASSIGN message. Session Key must be included if encipherment is selected in CALL_REQ or ALERT_ACK. Bearer capability must be included for the RCF to determine if the call is a data call or voice call. Directory Number must be included if the Directory Number management is done by the RACF. Alert Identifier must be included if registration is also requested with CALL_REQ.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Correlation ID	M
Bearer Capability	M
RCID	M
Mini Profile	M
Session Key	C
Transit Network Selection	C
Called Party Number	C
Called Party Subaddress	C
Calling Party Number	C
Calling Party Subaddress	C
Directory Number	C
Alert Identifier	C
Subscriber ID	O
Temporary Subscriber ID	O
NET_AUTH	O

Definitions:

Message Type	- Identifies the message sent.
Call Reference	- Identifies the call to which a message applies.
Correlation ID	- A number used to correlate response with request.
Bearer Capability	- Identifies the bearer service of the call.
RCID	- Identifies the radio link to which the message applies.
Mini Profile	- Profile of features subscribed.
Session Key	- The key used to encrypt the radio channel.
Transit Network Selection	- Identifies the requested transit network.
Called Party Number	- Phone number of the called party.
Called Party Subaddress	- Subaddress associated with the called party.
Calling Party Number	- Phone number of the calling party.
Calling Party Subaddress	- Subaddress associated with the calling party.
Directory Number	- A number associated with the interface.
Alert Identifier	- Identifier used to alert an RTF.
Subscriber ID	- Identity of the subscriber.
Temporary Subscriber ID	- Temporary identity of the subscriber.
NET_AUTH	- A parameter to validate the network.

6.4.2.22 SSD_UPDATE_REQ

Name: SSD_UPDATE_REQ

Direction: RCF <-- RACF

Description:

This message is sent to instruct RTF to update the stored the Shared Secret Data (SSD).

Operational Rules:

This message is sent from the RACF to the RCF in the event that the SSD stored at both the RACF and RTF should be updated. The RACF provides a 56-bit random number (RANDSSD) which will be used by RTF in generating the response. If an RCID is assigned prior to this message, RCID should be used. Else, Correlation ID should be used to correlate the request with the response.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RANDSSD	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RANDSSD - A random number used as input to SSD update algorithm.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.23 SSD_UPDATE_RESP

Name: SSD_UPDATE_RESP

Direction: RCF --> RACF

Description:

This message is sent from the RCF to the RACF to acknowledge the SSD_UPDATE_REQ message.

Operational Rules:

This message provides verification of the acknowledgment of the network challenge request from the RTF. The cause field is used to indicate whether the acknowledgment is successful or not. If an RCID is assigned prior to this message, RCID should be used. Else, Correlation ID should be used to correlate the request with the response.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Cause	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- Cause - Indicates the reason for the message.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.24 TERM_REG_ACK

Name: TERM_REG_ACK

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to the RCF to acknowledge registration request.

Operational Rules:

The message is used to assign Alert Identifier to the RTF. Session Key must be included if encipherment is selected for the TERM_REG_REQ. NET_AUTH must be included to authenticate the network, if encipherment is not selected.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
Correlation ID	M
Session Key	C
NET_AUTH	C
Complete Registration Area ID	O
Alert Identifier	O
Temporary Subscriber ID	O
Feature Indication	O

Definitions:

Message Type	-	Identifies the message sent.
Call Reference	-	Identifies the call to which a message applies.
Correlation ID	-	A number used to correlate response with request.
Session Key	-	The key used to encrypt the radio channel.
NET_AUTH	-	A parameter used to validate the network.
Complete Registration Area ID	-	A unique identifier to distinguish registration areas.
Alert Identifier	-	Identifier used to alert an RTF.
Temporary Subscriber ID	-	Temporary identity of the subscriber.
Feature Indication	-	Identifies the current status of the feature.

6.4.2.25 UNQ_CHAL_REQ

Name: UNQ_CHAL_REQ

Direction: RCF <-- RACF

Description:

This message is sent from the RACF to the RCF to check the validity of an RTF.

Operational Rules:

The RACF provides a twenty-four (24) bit random number (RANDU) in the UNQ_CHAL_REQ message for use in the authentication process. If an RCID is assigned prior to this message, RCID must be included, else Correlation ID must be included.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
RANDU	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- RANDU - Random number used in computing unique challenge response.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.4.2.26 UNQ_CHAL_RESP

Name: UNQ_CHAL_RESP

Direction: RCF --> RACF

Description:

This message is sent to provide a response from the RTF to the unique challenge.

Operational Rules:

The AUTHU received from the RTF is included in the UNQ_CHAL_RESP. The RACF computes AUTHU and compares it with the AUTHU received from the RTF to verify the validity of the RTF. If an RCID is assigned prior to this message, RCID must be included, else Correlation ID must be included.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Call Reference	M
AUTHU	M
RCID	C
Correlation ID	C

Definitions:

- Message Type - Identifies the message sent.
- Call Reference - Identifies the call to which a message applies.
- AUTHU - Unique challenge response computed by the RTF.
- RCID - Identifies the radio link to which the message applies.
- Correlation ID - A number used to correlate response with request.

6.5 TDMA operations descriptions

6.5.1 Common operations

TDMA uses the following common operations as defined in 6.1:

- Assignment Complete
- Assignment Failure
- Assignment Request
- Authentication Reject
- Authentication Request
- Authentication Response
- Base Station Challenge
- Base Station Challenge Response
- Block
- Block Acknowledge
- Call Indication
- Clear Command
- Clear Complete
- Clear Request
- CM Service Request
- Complete Layer 3 Information
- Feature Status Request
- Feature Status Response
- Flash With Information
- Handoff Command
- Handoff Commenced
- Handoff Complete
- Handoff Failure
- Handoff Performed
- Handoff Request
- Handoff Request Acknowledge
- Handoff Required
- Handoff Required Reject
- Location Updating Accept
- Location Updating Reject
- Location Updating Request
- Paging Request
- Paging Response

Parameter Update Confirm
Parameter Update Request
Privacy Mode Command
Privacy Mode Complete
Reset
Reset Acknowledge
Reset Circuit
Reset Circuit Acknowledge
SSD Update Request
SSD Update Response
Status Request
Status Response
Unblock
Unblock Acknowledge

6.5.2 TDMA specific operations

There are no TDMA specific operations.

6.6 PCS1900 operations descriptions

6.6.1 Mobility management operations

6.6.1.1 Abort

Name: Abort

Direction: RCF <-- RACF

Description:

This message is sent to release the mobility management connection and to indicate the reason for the release.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.2 Authentication reject

Name: Authentication Reject

Direction: RCF <-- RACF

Description:

This message is sent to indicate that authentication has failed and that the receiving RTF shall abort all activities.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.3 Authentication request

Name: Authentication Request

Direction: RCF <-- RACF

Description:

This message is sent to initiate authentication.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.4 Authentication response

Name: Authentication Response

Direction: RCF --> RACF

Description:

This message is sent to return the authentication result.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.5 CM service abort

Name: CM Service Abort

Direction: RCF --> RACF

Description:

This message is sent to terminate the mobility management connection establishment in progress and to release the radio resource connection.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.6 CM service accept

Name: CM Service Accept

Direction: RCF <-- RACF

Description:

This message is sent to indicate that the requested service has been accepted.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.7 CM service reject

Name: CM Service Reject

Direction: RCF <-- RACF

Description:

This message is sent to indicate that the requested service cannot be provided.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.8 CM service request

Name: CM Service Request

Direction: RCF --> RACF

Description:

This message is sent to request a service for the connection management sublayer entities (e.g., circuit switched connection establishment, supplementary services activation, short message transfer).

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List:

Additions:

1. Interface DN OPTIONAL

This parameter identifies the Directory Number (DN) assigned to the B-channel allocated for the call between the RCF and the SSF/CCF.

Special Notes: None.

6.6.1.9 CM reestablishment request

Name: CM Reestablishment Request

Direction: RCF --> RACF

Description:

This message is sent to request re-establishment of a connection if the previous one has failed.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.10 Identity request

Name: Identity Request

Direction: RCF <-- RACF

Description:

This message is sent to request the identity of the RTF.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.11 Identity response

Name: Identity Response

Direction: RCF --> RACF

Description:

This message provides the requested identity.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.12 IMSI detach indication

Name: IMSI Detach Indication

Direction: RCF --> RACF

Description:

This message is sent to indicate that the RTF has been deactivated.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.13 Location updating accept

Name: Location Updating Accept

Direction: RCF <-- RACF

Description:

This message is sent to indicate that location updating or IMSI attach has been completed.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.14 Location updating reject

Name: Location Updating Reject

Direction: RCF <-- RACF

Description:

This message is sent to indicate that location updating or IMSI attach has failed.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.15 Location updating request

Name: Location Updating Request

Direction: RCF --> RACF

Description:

This message is sent to request updating of the RTF's location information (normal updating or periodic updating) or to request IMSI attach.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.16 MM status

Name: MM Status

Direction: RCF <--> RACF

Description:

This message is sent to report error conditions associated with the mobility management connection.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.17 TMSI reallocation command

Name: TMSI Reallocation Command

Direction: RCF <-- RACF

Description:

This message is sent to reallocate or delete a TMSI.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.1.18 TMSI reallocation complete

Name: TMSI Reallocation Complete

Direction: RCF --> RACF

Description:

This message is sent to indicate that reallocation or deletion of a TMSI has been completed.

Modifications with respect to J-STD-007 Operational Rules: None.

Modifications with respect to J-STD-007 Parameter List: None.

6.6.2 Radio resource management operations

6.6.2.1 Assignment complete

Name: Assignment Complete

Direction: RCF --> RACF

Description:

This message is sent to indicate that the RTF has established the signalling link.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.2 Assignment failure

Name: Assignment Failure

Direction: RCF --> RACF

Description:

This message is sent to indicate that the RTF has failed to seize the new channel.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.3 Assignment request

Name: Assignment Request

Direction: RCF <-- RACF

Description:

This message is sent to request the RCF to assign the radio resources.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.4 Cipher mode command

Name: Cipher Mode Command

Direction: RCF <-- RACF

Description:

This message is sent to indicate that the network has started deciphering and that enciphering and deciphering shall be started in the RTF, or to indicate that ciphering will not be performed.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.5 Cipher mode complete

Name: Cipher Mode Complete

Direction: RCF --> RACF

Description:

This message is sent to indicate that ciphering and deciphering has been started in the RTF.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.6 Cipher mode reject

Name: Cipher Mode Reject

Direction: RCF --> RACF

Description:

This message is sent to indicate that ciphering and deciphering has not been started in the RTF.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.7 Classmark request

Name: Classmark Request

Direction: RCF <-- RACF

Description:

This message is sent to request an update of classmark parameters of the RTF.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.8 Classmark update

Name: Classmark Update

Direction: RCF <--> RACF

Description:

This message is sent to the RCF to update the classmark parameters. It is sent to the RACF as a response to Classmark Request.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.9 Clear command

Name: Clear Command

Direction: RCF <-- RACF

Description:

This message is sent to clear dedicated radio resources.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.10 Clear complete

Name: Clear Complete

Direction: RCF --> RACF

Description:

This message is sent to indicate that dedicated radio resources have been cleared.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.11 Clear request

Name: Clear Request

Direction: RCF --> RACF

Description:

This message is sent to clearing of dedicated resources.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.12 Complete layer 3 information

Name: Complete Layer 3 Information

Direction: RCF --> RACF

Description:

This message is used to encapsulate initial access messages (CM Service Request, Page Response, CM Reestablishment Request, IMSI Detach, and Location Update Request) from the RCF to RACF.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.13 Handover candidate enquire

Name: Handover Candidate Enquire

Direction: RCF <-- RACF

Description:

This message is sent to query the list of target candidate cells for handover.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.14 Handover candidate response

Name: Handover Candidate Response

Direction: RCF --> RACF

Description:

This message is sent in response to Handover Candidate Enquire, and contains a list of target candidate cells.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.15 Handover command

Name: Handover Command

Direction: RCF <-- RACF

Description:

This message is sent to the source RCF to indicate to which target channel the RTF should retune.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.16 Handover complete

Name: Handover Complete

Direction: RCF --> RACF

Description:

This message is sent by the target RCF to indicate that the RTF has established the signalling link.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.17 Handover detect

Name: Handover Detect

Direction: RCF --> RACF

Description:

This message is sent by the target RCF to indicate that the RTF has successfully accessed the target cell.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.18 Handover failure

Name: Handover Failure

Direction: RCF --> RACF

Description:

This message is used by both the target and the source RCF. The source RCF uses this operation to inform the RACF that a handover could not be successfully performed and that resources at the target should be cleared. The target RCF uses this operation when it cannot accommodate a handover.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.19 Handover performed

Name: Handover Performed

Direction: RCF --> RACF

Description:

This message is sent to indicate that an intra-RCF handover has been performed.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.20 Handover request

Name: Handover Request

Direction: RCF <-- RACF

Description:

This message is sent to the target RCF to request resources for a handover.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.21 Handover request acknowledge

Name: Handover Request Acknowledge

Direction: RCF --> RACF

Description:

This message is sent by the target RCF to indicate that resources for a handover have been allocated.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.22 Handover required

Name: Handover Required

Direction: RCF --> RACF

Description:

This message is sent from the source RCF to indicate that a handover is required.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.23 Handover required reject

Name: Handover Required Reject

Direction: RCF <-- RACF

Description:

This message is sent to the source RCF to indicate that the handover cannot be accomplished.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.24 Paging

Name: Paging

Direction: RCF <-- RACF

Description:

This message is sent to trigger channel access by a RTF.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.25 Queueing indication

Name: Queueing Indication

Direction: RCF --> RACF

Description:

This message is sent to indicate that the requested operation is put in the queue.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.26 RACF invoke trace

Name: RACF Invoke Trace

Direction: RCF <-- RACF

Description:

This message is sent to start the production of tracing records at the RCF. It is the same as PCSC Invoke Trace defined in IS-651.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.27 Resource indication

Name: Resource Indication

Direction: RCF --> RACF

Description:

This message is sent in response to Resource Request message, and it indicates the status of the resources requested.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.28 Resource request

Name: Resource Request

Direction: RCF <-- RACF

Description:

This message is sent to request status of resources associated with a particular cell.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.29 SAPI 'n' reject

Name: SAPI 'n' Reject

Direction: RCF --> RACF

Description:

This message is sent when a message with SAPI value n>0 fails.

Modifications with respect to IS-651 Operational Rules: None.

Modifications with respect to IS-651 Parameter List: None.

6.6.2.30 Send info for outgoing call

Name: Send Info For Outgoing Call

Direction: RCF --> RACF

Description:

This message is sent to inform the RACF about the bearer capability and called party number for RTF originated calls.

Operational Rules:

This message is sent to the RACF after the RCF receives the setup request from the RTF.

Parameter List:

<u>Name</u>	<u>Usage</u>
Message Type	M
Mobile Identity	M
Called Party Number	M
Bearer Capability1	M
Bearer Capability2	O

Definitions:

Message Type	-	Identifies the message sent.
Mobile Identity	-	Identifies the RTF.
Called Party Number	-	Identifies the number of the called party.
Bearer Capability1	-	Identifies the bearer service of the call.
Bearer Capability2	-	Identifies additional bearer service for the call.

7 Messages, parameters, and timers

This clause defines application level message formats; i.e., it shows the information elements contained within each message. The usage of the parameter is specified as “mandatory” (M) or “optional” (O). All the parameters that appear as “conditional” in clause 6 are shown as “optional” with respect to inclusion in the message.

For those messages defined in TSB80, the reader is referred to Section 6 of TSB80 for a complete definition and specification of messages. Where a change has been made to the corresponding Layer 3 message in TSB80, the message format is included in this clause. However, the reader is referred to TSB80 for information on usage of the TSB80 parameters included in the modified messages. The ordering and usage of these information elements is described in TSB80.

For those messages defined in IS-651, the reader is referred to Part IIIa of TIA/EIA IS-651 for a complete definition and specification of messages. Where a change has been made to the corresponding message in IS-651, the message format is included in this section. The ordering and usage of these information elements is described in IS-651.

7.1 Common operations

7.1.1 Message definitions

7.1.1.1 Call processing message formats

7.1.1.1.1 Assignment complete

This message is originally defined in TSB80, Section 6.1.2.16, Assignment Complete. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Channel Number	TSB80, Section 6.2.2.6	RCF --> RACF	M
Cell Identifier	TSB80, Section 6.2.2.20	RCF --> RACF	O
Signaling Type	TSB80, Section 6.2.2.5	RCF --> RACF	O
RF Channel identity	TSB80, Section 6.2.2.8	RCF --> RACF	O
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RCF --> RACF	O
Cause	TSB80, Section 6.2.2.19	RCF --> RACF	O
Encryption Information	TSB80, Section 6.2.2.12	RCF --> RACF	O
Call Reference	Clause 7.1.2.1	RCF --> RACF	O

7.1.1.1.2 Assignment failure

This message is originally defined in TSB80, Section 6.1.2.17, Assignment Failure. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Cause	TSB80, Section 6.2.2.19	RCF --> RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.1.3 Assignment request

This message is originally defined in TSB80, Section 6.1.2.15, Assignment Request. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Channel Type	TSB80, Section 6.2.2.7	RACF --> RCF	M
Signaling Type	TSB80, Section 6.2.2.5	RACF --> RCF	O
Priority	TSB80, Section 6.2.2.18	RACF --> RCF	O
Circuit Identity Code	TSB80, Section 6.2.2.22	RACF --> RCF	O
Cell Identifier	TSB80, Section 6.2.2.20	RACF --> RCF	O
Channel Number	TSB80, Section 6.2.2.6	RACF --> RCF	O
Encryption Information	TSB80, Section 6.2.2.12	RACF --> RCF	O
Service Option	TSB80, Section 6.2.2.66	RACF --> RCF	O
Transcoder Mode	TSB80, Section 6.2.2.58	RACF --> RCF	O
Signal	TSB80, Section 6.2.2.50	RACF --> RCF	O
Calling Party ASCII Number	TSB80, Section 6.2.2.37	RACF --> RCF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RACF --> RCF	O

7.1.1.1.4 Call indication

This message is defined as follows:

Information Element	Reference	Direction	Type
Message Type	Clause 7.1.2.7	RCF --> RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O
Call Reference	Clause 7.1.2.1	RCF --> RACF	O
Setup Time	Clause 7.1.2.13	RCF --> RACF	O
Connect Time	Clause 7.1.2.3	RCF --> RACF	O
Channel Number	TSB80, Section 6.2.2.6	RCF --> RACF	O

7.1.1.1.5 Clear command

This message is originally defined in TSB80, Section 6.1.2.21, Clear Command. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Cause	TSB80, Section 6.2.2.19	RACF --> RCF	M
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RACF --> RCF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RACF --> RCF	O
Call Reference List	Clause 7.1.2.2	RACF --> RCF	O

7.1.1.1.6 Clear complete

This message is originally defined in TSB80, Section 6.1.2.22, Clear Complete. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF	O
Power Down Indicator	TSB80, Section 6.2.2.60	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O
Call Reference List	Clause 7.1.2.2	RCF --> RACF	O
Connect Time	Clause 7.1.2.3	RCF --> RACF	O
Setup Time	Clause 7.1.2.13	RCF --> RACF	O
Disconnect Time	Clause 7.1.2.4	RCF --> RACF	O

7.1.1.1.7 Clear request

This message is originally defined in TSB80, Section 6.1.2.20, Clear Request. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Cause	TSB80, Section 6.2.2.19	RCF --> RACF	M
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O
Call Reference List	Clause 7.1.2.2	RCF --> RACF	O
Connect Time	Clause 7.1.2.3	RCF --> RACF	O
Setup Time	Clause 7.1.2.13	RCF --> RACF	O
Disconnect Time	Clause 7.1.2.4	RCF --> RACF	O

7.1.1.1.8 CM service request

This message is originally defined in TSB80, Section 6.1.2.2, CM Service Request. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF --> RACF	M
Reserved Octet	TSB80, Section 6.2.2.40	RCF --> RACF	M
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
CM Service Type	TSB80, Section 6.2.2.51	RCF --> RACF	M
Classmark Information Type 2	TSB80, Section 6.2.2.15	RCF --> RACF	M
Mobile Identity	Clause 7.1.2.8	RCF --> RACF	M
Called Party BCD Number	TSB80, Section 6.2.2.52	RCF --> RACF	O
Mobile Identity (ESN)	Clause 7.1.2.8	RCF --> RACF	O
Signaling Type	TSB80, Section 6.2.2.5	RCF --> RACF	O
Slot Cycle Index	TSB80, Section 6.2.2.17	RCF --> RACF	O
Authentication Response Parameter (AUTHR)	TSB80, Section 6.2.2.46	RCF --> RACF	O
Authentication Confirmation Parameter (RANDC)	TSB80, Section 6.2.2.42	RCF --> RACF	O
Authentication Parameter COUNT	TSB80, Section 6.2.2.47	RCF --> RACF	O
Authentication Challenge Parameter (RAND)	TSB80, Section 6.2.2.45	RCF --> RACF	O
Service Option	TSB80, Section 6.2.2.66	RCF --> RACF	O
Voice Privacy Request	TSB80, Section 6.2.2.13	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.1.9 Complete layer 3 information

See TSB80, Section 6.1.2.1, Complete Layer 3 Information.

7.1.1.1.10 Feature status request

This message is defined as follows:

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF --> RACF	M
Message Type	Clause 7.1.2.7	RCF --> RACF	M
Mobile Identity	Clause 7.1.2.8	RCF --> RACF	M
Feature ID	Clause 7.1.2.5	RCF --> RACF	M
Mobile Identity (ESN)	Clause 7.1.2.8	RCF --> RACF	O
Called Party BCD Number	TSB80, Section 6.2.2.52	RCF --> RACF	O

7.1.1.1.11 Feature status response

This message is defined as follows:

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RACF --> RCF	M
Message Type	Clause 7.1.2.7	RACF --> RCF	M
Feature Status	Clause 7.1.2.6	RACF --> RCF	M
Feature ID	Clause 7.1.2.5	RACF --> RCF	M

7.1.1.1.12 Flash with information

See TSB80, Section 6.1.3.7, Flash with Information.

7.1.1.1.13 Paging request

See TSB80, Section 6.1.2.3, Paging Request.

7.1.1.1.14 Paging response

This message is originally defined in TSB80, Section 6.1.2.4, Paging Response. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF --> RACF	M
Reserved Octet	TSB80, Section 6.2.2.40	RCF --> RACF	M
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Classmark Information Type 2	TSB80, Section 6.2.2.15	RCF --> RACF	M
Mobile Identity	Clause 7.1.2.8	RCF --> RACF	M
Tag	TSB80, Section 6.2.2.62	RCF --> RACF	O
Mobile Identity (ESN)	Clause 7.1.2.8	RCF --> RACF	O
Signaling Type	TSB80, Section 6.2.2.5	RCF --> RACF	O
Slot Cycle Index	TSB80, Section 6.2.2.17	RCF --> RACF	O
Authentication Response Parameter (AUTHR)	TSB80, Section 6.2.2.46	RCF --> RACF	O
Authentication Confirmation Parameter (RANDC)	TSB80, Section 6.2.2.42	RCF --> RACF	O
Authentication Parameter COUNT	TSB80, Section 6.2.2.47	RCF --> RACF	O
Authentication Challenge Parameter (RAND)	TSB80, Section 6.2.2.45	RCF --> RACF	O
Service Option	TSB80, Section 6.2.2.66	RCF --> RACF	O
Voice Privacy Request	TSB80, Section 6.2.2.13	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.1.15 Privacy mode command

See TSB80, Section 6.1.2.18, Privacy Mode Command.

7.1.1.1.16 Privacy mode complete

See TSB80, Section 6.1.2.19, Privacy Mode Complete.

7.1.1.2 Mobility management message formats**7.1.1.2.1 Authentication reject**

See TSB80, Section 6.1.4.3, Authentication Reject.

7.1.1.2.2 Authentication request

See TSB80, Section 6.1.4.1, Authentication Request.

7.1.1.2.3 Authentication response

See TSB80, Section 6.1.4.2, Authentication Response.

7.1.1.2.4 Base station challenge

See TSB80, Section 6.1.4.5, Base Station Challenge.

7.1.1.2.5 Base station challenge response

See TSB80, Section 6.1.4.6, Base Station Challenge Response.

7.1.1.2.6 Location updating accept

See TSB80, Section 6.1.4.9, Location Updating Accept.

7.1.1.2.7 Location updating reject

See TSB80, Section 6.1.4.10, Location Updating Reject.

7.1.1.2.8 Location updating request

See TSB80, Section 6.1.4.8, Location Updating Request.

7.1.1.2.9 Parameter update confirm

See TSB80, Section 6.1.4.12, Parameter Update Confirm.

7.1.1.2.10 Parameter update request

See TSB80, Section 6.1.4.11, Parameter Update Request.

7.1.1.2.11 SSD update request

See TSB80, Section 6.1.4.4, SSD Update Request.

7.1.1.2.12 SSD update response

See TSB80, Section 6.1.4.7, SSD Update Response.

7.1.1.2.13 Status request

See TSB80, Section 6.1.4.13, Status Request.

7.1.1.2.14 Status response

See TSB80, Section 6.1.4.14, Status Response.

7.1.1.3 Radio resource management message formats**7.1.1.3.1 Handoff command**

This message is originally defined in TSB80, Section 6.1.5.8, Handoff Command. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Layer 3 Information	TSB80, Section 6.2.2.38	RACF --> RCF	M
Mobile Identity (Interface DN for target RCF)	Clause 7.1.2.8	RACF --> RCF	M
Signaling Type (allocated)	TSB80, Section 6.2.2.5	RACF --> RCF	O
RF Channel Identity	TSB80, Section 6.2.2.8	RACF --> RCF	O
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RACF --> RCF	O
Channel Number	TSB80, Section 6.2.2.6	RACF --> RCF	O
Cell Identifier List	TSB80, Section 6.2.2.21	RACF --> RCF	O
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RACF --> RCF	O
Handoff Power Level	TSB80, Section 6.2.2.31	RACF --> RCF	O
Target Timing Advance	TSB80, Section 6.2.2.32	RACF --> RCF	O
Shortened Burst Indication	TSB80, Section 6.2.2.29	RACF --> RCF	O
SID	TSB80, Section 6.2.2.9	RACF --> RCF	O
Transcoder Handoff Time	TSB80, Section 6.2.2.11	RACF --> RCF	O
Extended Handoff Direction Parameters	TSB80, Section 6.2.2.73	RACF --> RCF	O
Hard Handoff Parameters	TSB80, Section 6.2.2.63	RACF --> RCF	O
Forward Power Control Parameters	TSB80, Section 6.2.2.69	RACF --> RCF	O
Neighbor List	TSB80, Section 6.2.2.82	RACF --> RCF	O
Private Parameters	TSB80, Section 6.2.2.24	RACF --> RCF	O
Mobile Identity (Interface DN for source RCF)	Clause 7.1.2.8	RACF --> RCF	O
RACF Address	Clause 7.1.2.12	RACF --> RCF	O
NID	Clause 7.1.2.10	RACF --> RCF	O
Pilot Increment	Clause 7.1.2.11	RACF --> RCF	O
Neighbor Configuration	Clause 7.1.2.9	RACF --> RCF	O

7.1.1.3.2 Handoff commenced

See TSB80, Section 6.1.5.10, Handoff Commenced.

7.1.1.3.3 Handoff complete

See TSB80, Section 6.1.5.11, Handoff Complete.

7.1.1.3.4 Handoff failure

This message is originally defined in TSB80, Section 6.1.5.7, Handoff Failure. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Cause	TSB80, Section 6.2.2.19	RCF --> RACF	M
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.3.5 Handoff performed

See TSB80, Section 6.1.5.12, Handoff Performed.

7.1.1.3.6 Handoff request

This message is originally defined in TSB80, Section 6.1.5.5, Handoff Request. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Channel Type	TSB80, Section 6.2.2.7	RACF --> RCF	M
Encryption Information	TSB80, Section 6.2.2.12	RACF --> RCF	M
Classmark Information Type 2	TSB80, Section 6.2.2.15	RACF --> RCF	M
Cell Identifier List (Target)	TSB80, Section 6.2.2.21	RACF --> RCF	M
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RACF --> RCF	M
Cell Identifier List (Serving)	TSB80, Section 6.2.2.21	RACF --> RCF	O
Transcoder Mode	TSB80, Section 6.2.2.58	RACF --> RCF	O
Signaling Type (Current)	TSB80, Section 6.2.2.5	RACF --> RCF	O
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RACF --> RCF	O
Mobile Identity (ESN)	Clause 7.1.2.8	RACF --> RCF	O
Handoff Power Level	TSB80, Section 6.2.2.31	RACF --> RCF	O
Downlink Radio Environment	TSB80, Section 6.2.2.25	RACF --> RCF	O
Priority	TSB80, Section 6.2.2.18	RACF --> RCF	O
Alert State	TSB80, Section 6.2.2.34	RACF --> RCF	O
Service Option	TSB80, Section 6.2.2.66	RACF --> RCF	O
Waiting For Order State	TSB80, Section 6.2.2.76	RACF --> RCF	O
CDMA Serving One Way Delay	TSB80, Section 6.2.2.79	RACF --> RCF	O
Private Parameters	TSB80, Section 6.2.2.24	RACF --> RCF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RACF --> RCF	O

7.1.1.3.7 Handoff request acknowledge

This message is originally defined in TSB80, Section 6.1.5.6, Handoff Request Acknowledge. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Signaling Type (allocated)	TSB80, Section 6.2.2.5	RCF --> RACF	O
RF Channel Identity	TSB80, Section 6.2.2.8	RCF --> RACF	O
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RCF --> RACF	O
Channel Number	TSB80, Section 6.2.2.6	RCF --> RACF	O
Cell Identifier List	TSB80, Section 6.2.2.21	RCF --> RACF	O
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF	O
Handoff Power Level	TSB80, Section 6.2.2.31	RCF --> RACF	O
Target Timing Advance	TSB80, Section 6.2.2.32	RCF --> RACF	O
Shortened Burst Indication	TSB80, Section 6.2.2.29	RCF --> RACF	O
SID	TSB80, Section 6.2.2.9	RCF --> RACF	O
Transcoder Handoff Time	TSB80, Section 6.2.2.11	RCF --> RACF	O
Extended Handoff Direction Parameters	TSB80, Section 6.2.2.73	RCF --> RACF	O
Hard Handoff Parameters	TSB80, Section 6.2.2.63	RCF --> RACF	O
Forward Power Control Parameters	TSB80, Section 6.2.2.69	RCF --> RACF	O
Neighbor List	TSB80, Section 6.2.2.82	RCF --> RACF	O
Private Parameters	TSB80, Section 6.2.2.24	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O
RACF Address	Clause 7.1.2.12	RCF --> RACF	O
NID	Clause 7.1.2.10	RCF --> RACF	O
Pilot Increment	Clause 7.1.2.11	RCF --> RACF	O
Neighbor Configuration	Clause 7.1.2.9	RCF --> RACF	O

7.1.1.3.8 Handoff required

This message is originally defined in TSB80, Section 6.1.5.4, Handoff Required. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Cause	TSB80, Section 6.2.2.19	RCF --> RACF	M
Cell Identifier List (Target)	TSB80, Section 6.2.2.21	RCF --> RACF	M
Classmark Information Type 2	TSB80, Section 6.2.2.15	RCF --> RACF	O
Cell Identifier List (Serving)	TSB80, Section 6.2.2.21	RCF --> RACF	O
Response Request	TSB80, Section 6.2.2.35	RCF --> RACF	O
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF	O
Encryption Information	TSB80, Section 6.2.2.12	RCF --> RACF	O
Transcoder Mode	TSB80, Section 6.2.2.58	RCF --> RACF	O
Signaling Type	TSB80, Section 6.2.2.5	RCF --> RACF	O
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RCF --> RACF	O
Mobile Identity (ESN)	Clause 7.1.2.8	RCF --> RACF	O
Handoff Power Level	TSB80, Section 6.2.2.31	RCF --> RACF	O
Downlink Radio Environment	TSB80, Section 6.2.2.25	RCF --> RACF	O
Priority	TSB80, Section 6.2.2.18	RCF --> RACF	O
Alert State	TSB80, Section 6.2.2.34	RCF --> RACF	O
Service Option	TSB80, Section 6.2.2.66	RCF --> RACF	O
Waiting For Order State	TSB80, Section 6.2.2.76	RCF --> RACF	O
CDMA Serving One Way Delay	TSB80, Section 6.2.2.79	RCF --> RACF	O
Private Parameters	TSB80, Section 6.2.2.24	RCF --> RACF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.3.9 Handoff required reject

This message is originally defined in TSB80, Section 6.1.5.9, Handoff Required Reject. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Cause	TSB80, Section 6.2.2.19	RACF --> RCF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RACF --> RCF	O

7.1.1.4 Facility management message formats

7.1.1.4.1 Block

This message is originally defined in TSB80, Section 6.1.6.2, Block. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Circuit Identity Code	TSB80, Section 6.2.2.22	RCF --> RACF	M
Cause	TSB80, Section 6.2.2.19	RCF --> RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.4.2 Block acknowledge

This message is originally defined in TSB80, Section 6.1.6.3, Block Acknowledge. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Circuit Identity Code	TSB80, Section 6.2.2.22	RACF --> RCF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RACF --> RCF	O

7.1.1.4.3 Reset

See TSB80, Section 6.1.6.6, Reset.

7.1.1.4.4 Reset acknowledge

See TSB80, Section 6.1.6.7, Reset Acknowledge.

7.1.1.4.5 Reset circuit

This message is originally defined in TSB80, Section 6.1.6.8, Reset Circuit. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF <-> RACF	M
Circuit Identity Code	TSB80, Section 6.2.2.22	RCF <-> RACF	M
Cause	TSB80, Section 6.2.2.19	RCF <-> RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF <-> RACF	O

7.1.1.4.6 Reset circuit acknowledge

This message is originally defined in TSB80, Section 6.1.6.9, Reset Circuit Acknowledge. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF <-> RACF	M
Circuit Identity Code	TSB80, Section 6.2.2.22	RCF <-> RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF <-> RACF	O

7.1.1.4.7 Unblock

This message is originally defined in TSB80, Section 6.1.6.4, Unblock. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF	M
Circuit Identity Code	TSB80, Section 6.2.2.22	RCF --> RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF	O

7.1.1.4.8 Unblock acknowledge

This message is originally defined in TSB80, Section 6.1.6.5, Unblock Acknowledge. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RACF --> RCF	M
Circuit Identity Code	TSB80, Section 6.2.2.22	RACF --> RCF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RACF --> RCF	O

7.1.2 Parameter definitions

This subclause defines only those parameter formats that are not included in TSB80 or have been modified for the purpose of this standard. Identifiers for the information elements not defined in TSB80 are specified in clause 7.1.3.

7.1.2.1 Call reference

This parameter is used to identify a call instance. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Value								2-3

7.1.2.2 Call reference list

This parameter is used to identify multiple call instances. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Number of Call References								2
Call Reference Value 1								3-4
:								:
:								:
Call Reference Value n								(2n+1) – (2n+2)

7.1.2.3 Connect time

This parameter identifies the time the call was connected. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
UTC Time								3-n

7.1.2.4 Disconnect time

This parameter identifies the time the call was disconnected. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
UTC Time								3-n

7.1.2.5 Feature ID

This parameter identifies a feature. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Value								2

The value is coded as shown in table 3.

Table 3 – Feature ID values

Binary Values	Meaning
00000000	Three-way calling
00000001 – 11111111	Reserved

7.1.2.6 Feature Status

This parameter identifies status of a feature. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Value								2

The value is coded as shown in table 4.

Table 4 – Feature status values

Binary Values	Meaning
00000000	Feature Authorized and Active
00000001	Feature Not Authorized
00000010	Feature Authorized and Deactivated
00000011 – 11111111	Reserved

7.1.2.7 Message type

This parameter is defined as in Section 6.2.2.4 of TSB80, Message Type. However, for the purpose of this standard, Message Type values are added as shown in table 5.

Table 5 – Message type values

Message Name	Message Type Value	Message Category
Call Indication	70H	Call Processing
Feature Status Request	71H	Call Processing
Feature Status Response	72H	Call Processing
Identity Request	73H	Mobility Management
Identity Response	74H	Mobility Management
IMSI Detach Indication	75H	Mobility Management
Terminating Handoff Complete	76H	Radio Resource Management
Terminating Handoff Proceed	77H	Radio Resource Management
Terminating Handoff Request	78H	Radio Resource Management
Terminating Handoff Request Acknowledge	79H	Radio Resource Management
Terminating Handoff Request Reject	7AH	Radio Resource Management
TMSI Reallocation Command	7BH	Mobility Management
TMSI Reallocation Complete	7CH	Mobility Management

7.1.2.8 Mobile identity

This parameter is defined as in Section 6.2.2.16 of TSB80, Mobile Identity, with some modifications. Mobile Identity Type values are shown in table 6.

Table 6 – Mobile identity type values

Binary Values	Meaning
000	No Identity Code
001	MIN
010	Broadcast Address
011	Interface DN
100	TMSI
101	ESN
110	IMSI
111	Reserved

7.1.2.9 Neighbor configuration

This parameter identifies the configuration of the neighbor with respect to the target cell. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Reserved (set to "00000")				Neighbor Configuration Value				2

Neighbor Configuration Value is defined as in ANSI J-STD-008.

7.1.2.10 NID

Network Identification (NID) is the identification of a network within a system, which is identified by SID. NID is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
NID value								2-3

7.1.2.11 Pilot increment

This field is set to the pilot PN sequence increment, in units of 64 PN chips, that RTFs are to use for searching other potential target cells. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Reserved (set to "0000")				Pilot Increment value				2

7.1.2.12 RACF address

This parameter identifies an RACF. The coding of this parameter allows this address to be of various formats (e.g., an SS7 address, X.121 address, private address, etc.). It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Address Type								3
Address								4-n

The “Address Type” indicates the type of address information contained in the “Address” field. The “Address” consists of one or any combination of the following elements:

- signaling point code;
- generic address (e.g., X.121, E.164, etc.);
- subsystem number

Table 7 – Address type values

Bit	Meaning
7	“0” – international address “1” – national address
6	“0” – routing should be based on the address included “1” – routing should be based on destination point code and subsystem number
5-2	Generic Address Indicator
1	“1” indicates that address contains a signaling point code
0	“1” indicates that address contains a subsystem number

If the address is an SS7 address, and both, Subsystem Number and Signaling Point Code, are specified, the “Address” field is coded as:

7	6	5	4	3	2	1	0	Octet
Subsystem Number								1
Signaling Point Code								2-4
Generic Address								5-n

Subsystem Number and Signaling Point Code are defined as in 3.4.2 in chapter T1.112.3 of ANSI T1.112.

If the address is not an SS7 address, the “Address” field consists of only “Generic Address”.

Generic Address Indicator is defined as shown in table 8.

Table 8 – Generic address indicator values

Value	Meaning
0000	Address not included.
0001	Address includes a translation type (i.e., the address should be global title translated), numbering plan, and encoding scheme.
0010	Address includes a translation type.
0011-0111	Not assigned to U.S. networks
1000-1101	Spare.
1110	Address includes numbering plan and encoding scheme; no translation is required.
1111	Reserved for extension.

For Generic Address Indicator value of “0001” and “0010”, see 3.4.2.3.1 and 3.4.2.3.2, respectively, in chapter T1.112.3 of ANSI T1.112 for the format of “Generic Address”.

For Generic Address Indicator value of “1110”, the “Generic Address” is coded as below:

7	6	5	4	3	2	1	0	Octet
Numbering Plan				Encoding Scheme				1
Address								2-n

Numbering Plan is defined as shown in table 9.

Table 9 – Numbering plan values

Value	Meaning
0000	unknown
0001	ISDN/Telephony Numbering Plan (Rec. E.164/E.163)
0010	reserved
0011	Data Numbering Plan (Rec. X.121)
0100	Telex Numbering Plan (Rec. F.69)
0101	Maritime Mobile Numbering Plan (Rec. E.210, 211)
0110	Land Mobile Numbering Plan (Rec. E.212)
0111	ISDN/Mobile Numbering Plan (Rec. E.214)
1000-1101	Spare
1110	Private
1111	Reserved for extension

Encoding Scheme is defined as shown in table 10.

Table 10 – Encoding scheme values

Value	Meaning
0000	unknown
0001	BCD, Odd number of digits
0010	BCD, Even number of digits
0011-1101	Spare
1110	Octet String
1111	Reserved for extension

7.1.2.13 Setup time

This parameter identifies the time the call was setup. It is coded as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
UTC Time								3-n

7.1.3 Information element identifiers

The information element identifiers are specified in table 11.

Table 11 – Information element identifier values

Identifier	Information Element
0111 0101	Call Reference
0111 0111	Call Reference List
0111 0100	Connect Time
0111 0010	Disconnect Time
0111 1000	Feature ID
0111 1001	Feature Status
0111 1010	Identity Type
0111 1011	Neighbor Configuration
0111 1100	NID
0111 1101	Pilot Increment
0111 1110	RCF Address
0111 1111	RACF Address
0111 0011	Setup Time

7.1.4 Timer definitions

RCF and RACF shall support timers associated with the messages that are originally defined in TSB80. These timers are as defined in TSB80.

7.2 CDMA operations

7.2.1 Message definitions

7.2.1.1 Call processing message formats

See 7.1 for common messages used by CDMA. CDMA-specific messages are defined below.

7.2.1.1.1 Feature notification

See TSB80, Section 6.1.3.9, Feature Notification.

7.2.1.1.2 Feature notification acknowledge

See TSB80, Section 6.1.3.10, Feature Notification Acknowledge.

7.2.1.2 Mobility management message formats

See 7.1 for common messages used by CDMA. There are no CDMA-specific mobility management messages.

7.2.1.3 Radio resource management message formats

See 7.1 for common messages used by CDMA. CDMA-specific messages are defined below.

7.2.1.3.1 Soft handoff drop source

This message is originally defined in TSB80, Section 6.1.5.14, Soft Handoff Drop Source. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF --> RCF	M
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RCF --> RACF --> RCF	M
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF --> RCF	O
Response Request	TSB80, Section 6.2.2.35	RCF --> RACF --> RCF	O
Transcoder Handoff Time	TSB80, Section 6.2.2.11	RCF --> RACF --> RCF	O
Private Parameters	TSB80, Section 6.2.2.24	RCF --> RACF --> RCF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF --> RCF	O

7.2.1.3.2 Soft handoff drop target

This message is originally defined in TSB80, Section 6.1.5.13, Soft Handoff Drop Target. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Message Type	TSB80, Section 6.2.2.4	RCF --> RACF --> RCF	M
Cause	TSB80, Section 6.2.2.19	RCF --> RACF --> RCF	M
IS-95 Channel Identity	TSB80, Section 6.2.2.10	RCF --> RACF --> RCF	M
Cell Identifier List	TSB80, Section 6.2.2.21	RCF --> RACF --> RCF	O
Circuit Identity Code Extension	TSB80, Section 6.2.2.23	RCF --> RACF --> RCF	O
Private Parameters	TSB80, Section 6.2.2.24	RCF --> RACF --> RCF	O
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF --> RACF --> RCF	O

7.2.1.4 Facility management message formats

See clause 7.1 for common messages used by CDMA. There are no CDMA-specific facility management messages.

7.2.2 Parameter definitions

See 7.1.2.

7.2.3 Timer definitions

See 7.1.4.

7.3 CCT operations

7.3.1 Message definitions

7.3.1.1 Call processing message formats

See 7.1 for common messages used by CCT. There are no CCT-specific call processing messages.

7.3.1.2 Mobility management message formats

See 7.1 for common messages used by CCT. CCT-specific messages are defined below.

7.3.1.2.1 Identity request

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF <-- RACF	M
Message Type	Clause 7.1.2.7	RCF <-- RACF	M
Identity Type	Clause 7.3.2.1	RCF <-- RACF	M

7.3.1.2.2 Identity response

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF --> RACF	M
Message Type	Clause 7.1.2.7	RCF --> RACF	M
Mobile Identity	Clause 7.1.2.8	RCF --> RACF	M

7.3.1.2.3 IMSI detach indication

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF --> RACF	M
Message Type	Clause 7.1.2.7	RCF --> RACF	M
Mobile Identity	Clause 7.1.2.8	RCF --> RACF	M

7.3.1.2.4 TMSI reallocation command

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF <-- RACF	M
Message Type	Clause 7.1.2.7	RCF <-- RACF	M
Location Area Identification	TSB80, Section 6.2.2.43	RCF <-- RACF	M
Mobile Identity (TMSI)	Clause 7.1.2.8	RCF <-- RACF	M

7.3.1.2.5 TMSI reallocation complete

Information Element	Reference	Direction	Type
Protocol Discriminator	TSB80, Section 6.2.2.39	RCF --> RACF	M
Message Type	Clause 7.1.2.7	RCF --> RACF	M

7.3.1.3 Radio resource management message formats

See 7.1 for common messages used by CCT. CCT-specific messages are defined below.

7.3.1.3.1 Terminating handoff complete

Information Element	Reference	Direction	Type
Message Type	Clause 7.1.2.7	RCF --> RACF	M

7.3.1.3.2 Terminating handoff proceed

Information Element	Reference	Direction	Type
Message Type	Clause 7.1.2.7	RCF <-- RACF	M
Mobile Identity (Interface DN)	Clause 7.1.2.8	RCF <-- RACF	M
Cell Identifier List	TSB80, Section 6.2.2.21	RCF <-- RACF	M

7.3.1.3.3 Terminating handoff request

Information Element	Reference	Direction	Type
Message Type	Clause 7.1.2.7	RCF --> RACF	M
Mobile Identity (Interface DN-source)	Clause 7.1.2.8	RCF --> RACF	M
RCF Address	Clause 7.3.2.2	RCF --> RACF	M
Cell Identifier List	TSB80, Section 6.2.2.21	RCF --> RACF	M
RACF Address	Clause 7.1.2.12	RCF --> RACF	O
Mobile Identity (Interface DN-target)	Clause 7.1.2.8	RCF --> RACF	O

7.3.1.3.4 Terminating handoff request acknowledge

Information Element	Reference	Direction	Type
Message Type	Clause 7.1.2.7	RCF <-- RACF	M
Mobile Identity (Interface DN-target)	Clause 7.1.2.8	RCF <-- RACF	O

7.3.1.3.5 Terminating handoff request reject

Information Element	Reference	Direction	Type
Message Type	Clause 7.1.2.7	RCF <-- RACF	M
Cause	TSB80, Section 6.2.2.19	RCF <-- RACF	M

7.3.1.4 Facility management message formats

See 7.1 for common messages used by CCT. There are no CCT-specific facility management messages.

7.3.2 Parameter definitions

This subclause specifies those parameters that are not defined in TSB80 and are used only by CCT operations. Identifiers for the information elements defined in this subclause are specified in clause 7.1.3.

7.3.2.1 Identity type

Identity Type is used to identify which identity is requested. This parameter is defined as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Value								2

Identity Type parameter is coded as shown in table 12.

Table 12 – Identity type values

Binary Values	Meaning
00000000	Reserved
00000001	MIN
00000010	Reserved
00000011	Reserved
00000100	Reserved
00000101	ESN
00000110	IMSI
00000111 – 11111111	Reserved

7.3.2.2 RCF address

This parameter identifies an RCF. It is defined as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

7.3.3 Timer definitions

See 7.1.4.

7.4 PACS operations

7.4.1 Message definitions

This subclause defines message formats; i.e., it shows the information elements contained within each message. The reader is referred to ANSI J-STD-014 for encoding of some information elements. However, it should be noted that identifiers for all the information elements are specified in 7.4.3.

7.4.1.1 ALT_AUTH_ACK

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	M
Session Key	Clause 7.4.2.6	RACF --> RCF	O
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	O
Mini Profile	Clause 7.4.2.5	RACF --> RCF	O

7.4.1.2 ALT_AUTH_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	M
Complete Registration Area ID	ANSI J-STD-014 Section 7.3.3.9	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	O

7.4.1.3 ALT_COMP

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	M
ALT_DN	ANSI J-STD-014 Section 7.3.3.10	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	O

7.4.1.4 ALT_DENY

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	M
Cause	ANSI J-STD-014 Section 7.3.3.8	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	O

7.4.1.5 ALT_RDY

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF <-> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF <-> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF <-> RCF	O

7.4.1.6 AUTH_REQ_A

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
Security Menu Selection	ANSI J-STD-014 Section 7.3.3.21	RCF --> RACF	M
RAND	ANSI J-STD-014 Section 7.3.3.22	RCF --> RACF	M
Real Time	ANSI J-STD-014 Section 7.3.3.24	RCF --> RACF	M
AUTHR	ANSI J-STD-014 Section 7.3.3.25	RCF --> RACF	M
COUNT	ANSI J-STD-014 Section 7.3.3.17	RCF --> RACF	M
Correlation ID	Clause 7.4.2.1	RCF --> RACF	M
Initial Message Type	ANSI J-STD-014 Section 7.3.3.26	RCF --> RACF	M
Enveloped Information Elements	ANSI J-STD-014 Section 7.3.3.23	RCF --> RACF	M ^a
Registration Flag	ANSI J-STD-014 Section 7.3.3.11	RCF --> RACF	O
Complete Registration Area ID	ANSI J-STD-014 Section 7.3.3.9	RCF --> RACF	O
Directory Number	Clause 7.4.2.2	RCF --> RACF	O
Subscriber ID	ANSI J-STD-014 Section 7.3.3.3	RCF --> RACF	O
Temporary Subscriber ID	ANSI J-STD-014 Section 7.3.3.5	RCF --> RACF	O
UIMESN	ANSI J-STD-014 Section 7.3.3.35	RCF --> RACF	O

- a. Enveloped Information Elements include one of the following: ALERT_ACK, CALL_REQ, CALL_REQ_EMER, or TERM_REG_REQ, as defined in 7.4.1.6.1, 7.4.1.6.2, 7.4.1.6.3, and 7.4.1.6.4, respectively.

7.4.1.6.1 ALERT_ACK

Information Element	Reference	Direction	Type
Alert Identifier	ANSI J-STD-014 Section 7.3.3.6	RCF --> RACF	M
ESN	ANSI J-STD-014 Section 7.3.3.4	RCF --> RACF	M
Complete Port ID	ANSI J-STD-014 Section 7.3.3.33	RCF --> RACF	M

7.4.1.6.2 CALL_REQ

Information Element	Reference	Direction	Type
Bearer Capability	ANSI J-STD-014 Section 7.3.3.30	RCF --> RACF	M
Calling Party Number	ANSI T1.607	RCF --> RACF	M
ESN	ANSI J-STD-014 Section 7.3.3.4	RCF --> RACF	M
Transit Network Selection	ANSI T1.607	RCF --> RACF	O
Called Party Number	ANSI T1.607	RCF --> RACF	O
Called Party Subaddress	ANSI T1.607	RCF --> RACF	O
Calling Party Subaddress	ANSI T1.607	RCF --> RACF	O
Precedence Level	ANSI J-STD-014 Section 7.3.3.31	RCF --> RACF	O

7.4.1.6.3 CALL_REQ_EMER

Information Element	Reference	Direction	Type
Bearer Capability	ANSI J-STD-014 Section 7.3.3.30	RCF --> RACF	M
Calling Party Number	ANSI T1.607	RCF --> RACF	M
ESN	ANSI J-STD-014 Section 7.3.3.4	RCF --> RACF	M
Transit Network Selection	ANSI T1.607	RCF --> RACF	O
Called Party Number	ANSI T1.607	RCF --> RACF	O
Called Party Subaddress	ANSI T1.607	RCF --> RACF	O
Calling Party Subaddress	ANSI T1.607	RCF --> RACF	O
Precedence Level	ANSI J-STD-014 Section 7.3.3.31	RCF --> RACF	O

7.4.1.6.4 TERM_REG_REQ

There are no enveloped information elements associated with this procedure.

7.4.1.7 AUTH_REQ_B

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
Security Menu Selection	ANSI J-STD-014 Section 7.3.3.21	RCF --> RACF	M
Rabin Encrypted Elements	ANSI J-STD-014 Section 7.3.3.27	RCF --> RACF	M
Real Time	ANSI J-STD-014 Section 7.3.3.24	RCF --> RACF	M
Correlation ID	Section 7.4.2.1	RCF --> RACF	M
Initial Message Type	ANSI J-STD-014 Section 7.3.3.26	RCF --> RACF	M
Enveloped Information Elements	ANSI J-STD-014 Section 7.3.3.23	RCF --> RACF	M ^a
Registration Flag	ANSI J-STD-014 Section 7.3.3.11	RCF --> RACF	O
Complete Registration Area ID	ANSI J-STD-014 Section 7.3.3.9	RCF --> RACF	O
Directory Number	Clause 7.4.2.2	RCF --> RACF	O

- a. Enveloped Information Elements include one of the following: ALERT_ACK, CALL_REQ, CALL_REQ_EMER, or TERM_REG_REQ, as defined in 7.4.1.6.1, 7.4.1.6.2, 7.4.1.6.3, and 7.4.1.6.4, respectively.

7.4.1.8 CALL_WAIT_IND

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	M

7.4.1.9 COUNT_UPDATE_ACK

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	O
Correlation ID	Clause 7.4.2.1	RCF --> RACF	O

7.4.1.10 COUNT_UPDATE_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
COUNT	ANSI J-STD-014 Section 7.3.3.17	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	O
Correlation ID	Clause 7.4.2.1	RACF --> RCF	O

7.4.1.11 EMER_CALL_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
Correlation ID	Clause 7.4.2.1	RCF --> RACF	M
ESN	ANSI J-STD-014 Section 7.3.3.4	RCF --> RACF	M
Bearer Capability	ANSI J-STD-014 Section 7.3.3.30	RCF --> RACF	M
Subscriber ID	ANSI J-STD-014 Section 7.3.3.3	RCF --> RACF	M
Called Party Number	ANSI T1.607	RCF --> RACF	M
Called Party Subaddress	ANSI T1.607	RCF --> RACF	O
Calling Party Number	ANSI T1.607	RCF --> RACF	O
Calling Party Subaddress	ANSI T1.607	RCF --> RACF	O
Directory Number	Clause 7.4.2.2	RCF --> RACF	O

7.4.1.12 MULTI-PARTY_CALL_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
Bearer Capability	ANSI J-STD-014 Section 7.3.3.30	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	M
Feature Activation	ANSI J-STD-014 Section 7.3.3	RCF --> RACF	O
Transit Network Selection	ANSI T1.607	RCF --> RACF	O
Called Party Number	ANSI T1.607	RCF --> RACF	O
Called Party Subaddress	ANSI T1.607	RCF --> RACF	O

7.4.1.13 NET_CHAL_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
RANDBS	ANSI J-STD-014 Section 7.3.3.13	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	M

7.4.1.14 NET_CHAL_RESP

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
AUTHBS	ANSI J-STD-014 Section 7.3.3.14	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	O
Correlation ID	Clause 7.4.2.1	RACF --> RCF	O

7.4.1.15 P_ALERT

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Alert Identifier	ANSI J-STD-014 Section 7.3.3.6	RACF --> RCF	M
Group Identifier	Clause 7.4.2.3	RACF --> RCF	O

7.4.1.16 P_CONNECT

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	M

7.4.1.17 P_DISC

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	M
Cause	ANSI J-STD-014 Section 7.3.3.8	RCF --> RACF	O
Feature Activation	ANSI J-STD-014 Section 7.3.3	RCF --> RACF	O

7.4.1.18 P_INFO

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF <-> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF <-> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF <-> RCF	M
Keypress	ANSI J-STD-014 Section 7.3.3.34	RACF <-> RCF	O
Information Request	ANSI T1.610	RACF <-> RCF	O
Feature Activation	ANSI J-STD-014 Section 7.3.3	RACF <-> RCF	O
Feature Indication	ANSI J-STD-014 Section 7.3.3	RACF <-> RCF	O
Locking Shift	ANSI T1.607	RACF <-> RCF	O
Display	ANSI T1.607	RACF <-> RCF	O

7.4.1.19 P_RELEASE

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	O
Correlation ID	Clause 7.4.2.1	RACF --> RCF	O
Cause	ANSI J-STD-014 Section 7.3.3.10	RACF --> RCF	O

7.4.1.20 P_REL_COM

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	O
Correlation ID	Clause 7.4.2.1	RCF --> RACF	O
Cause	ANSI J-STD-014 Section 7.3.3.10	RCF --> RACF	O

7.4.1.21 RCID_ASSIGN

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
Correlation ID	Clause 7.4.2.1	RACF --> RCF	M
Bearer Capability	ANSI J-STD-014 Section 7.3.3.30	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	M
Session Key	Clause 7.4.2.6	RACF --> RCF	M
Mini Profile	Clause 7.4.2.5	RACF --> RCF	M
Transit Network Selection	ANSI T1.607	RACF --> RCF	O
Called Party Number	ANSI T1.607	RACF --> RCF	O
Called Party Subaddress	ANSI T1.607	RACF --> RCF	O
Calling Party Number	ANSI T1.607	RACF --> RCF	O
Calling Party Subaddress	ANSI T1.607	RACF --> RCF	O
Directory Number	Clause 7.4.2.2	RACF --> RCF	O
Alert Identifier	ANSI J-STD-014 Section 7.3.3.6	RACF --> RCF	O
Subscriber ID	ANSI J-STD-014 Section 7.3.3.5	RACF --> RCF	O
Temporary Subscriber ID	ANSI J-STD-014 Section 7.3.3.5	RACF --> RCF	O
NET_AUTH	ANSI J-STD-014 Section 7.3.3.18	RACF --> RCF	O

7.4.1.22 SSD_UPDATE_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
RANDSSD	ANSI J-STD-014 Section 7.3.3.12	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	O
Correlation ID	Clause 7.4.2.1	RACF --> RCF	O

7.4.1.23 SSD_UPDATE_RESP

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
Cause	ANSI J-STD-014 Section 7.3.3.10	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	O
Correlation ID	Clause 7.4.2.1	RCF --> RACF	O

7.4.1.24 TERM_REG_ACK

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
Correlation ID	Clause 7.4.2.1	RACF --> RCF	M
Session Key	Clause 7.4.2.6	RACF --> RCF	O
NET_AUTH	ANSI J-STD-014 Section 7.3.3.18	RACF --> RCF	O
Complete Registration Area ID	ANSI J-STD-014 Section 7.3.3.9	RACF --> RCF	O
Alert Identifier	ANSI J-STD-014 Section 7.3.3.6	RACF --> RCF	O
Temporary Subscriber ID	ANSI J-STD-014 Section 7.3.3.5	RACF --> RCF	O
Feature Indication	ANSI J-STD-014 Section 7.3.3	RACF --> RCF	O

7.4.1.25 UNQ_CHAL_REQ

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RACF --> RCF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RACF --> RCF	M
RANDU	ANSI J-STD-014 Section 7.3.3.15	RACF --> RCF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RACF --> RCF	O
Correlation ID	Clause 7.4.2.1	RACF --> RCF	O

7.4.1.26 UNQ_CHAL_RESP

Information Element	Reference	Direction	Type
Message Type	Clause 7.4.2.4	RCF --> RACF	M
Call Reference	ANSI J-STD-014 Section 7.3.3.32	RCF --> RACF	M
AUTHU	ANSI J-STD-014 Section 7.3.3.16	RCF --> RACF	M
RCID	ANSI J-STD-014 Section 7.3.3.2	RCF --> RACF	O
Correlation ID	Clause 7.4.2.1	RCF --> RACF	O

7.4.2 Parameter definitions

This subclause provides definitions for information elements. Note that identifiers for these information elements are specified in 7.4.3.

7.4.2.1 Correlation ID

The purpose of the Correlation Identifier is to associate requests for encryption with their responses. Subsequent exchanges of messages use the Radio Call Identifier for this purpose. The correlation identifier is generated by the RCF or RACF.

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

7.4.2.2 Directory number

The Directory Number is the number selected by the RCF to receive an incoming call.

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

7.4.2.3 Group identifier

The Group ID is used to identify a group of RCFs in a registration area.

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

7.4.2.4 Message type

The purpose of the message type is to identify the message being sent. The message type is one octet encoded as shown in table 13.

Table 13 – PACS message type values

Bits							Message	
8	7	6	5	4	3	2	1	
0	0	1						Radio Related Messages
			0	0	0	0	1	– RCID_ASSIGN
			0	1	0	1	1	– ALT_COMP
			0	1	0	0	0	– ALT_AUTH_REQ
			0	1	0	0	1	– ALT_AUTH_ACK
			0	1	0	1	0	– ALT_DENY
			0	1	0	1	1	– ALT_RDY
0	1	1						Registration Messages
			0	0	0	0	0	– AUTH_REQ_A
			0	0	0	1	1	– AUTH_REQ_B
			0	0	0	1	0	– TERM_REG_ACK
1	0	0						Call Control Messages
			0	0	0	1	0	– MULTI-PARTY_CALL_REQ
			0	0	1	0	0	– EMER_CALL_REQ
			0	0	1	1	0	– P_ALERT
			0	1	0	0	0	– P_CONNECT
			0	1	1	1	1	– P_INFO
			1	0	0	0	1	– P_DISC
			1	0	0	1	0	– P_RELEASE
			1	0	0	1	1	– P_REL_COM
			1	0	1	0	0	– CALL_WAIT_IND
1	0	1						Security Messages
			0	0	0	1	0	– SSD_UPDATE_REQ
			0	0	0	1	1	– SSD_UPDATE_RESP
			0	0	1	1	0	– NET_CHAL_REQ
			0	0	1	1	1	– NET_CHAL_RESP
			0	1	0	1	0	– UNQ_CHAL_REQ
			0	1	0	1	1	– UNQ_CHAL_RESP
			0	1	1	1	0	– COUNT_UPDATE_REQ
			0	1	1	1	1	– COUNT_UPDATE_ACK

All other Message Type values are reserved for future use.

7.4.2.5 Mini profile

The Mini Profile is an indicator of whether the user subscribes to the three-way calling, call waiting, calling number delivery, or calling number privacy feature. Each feature shall use 2 bits as per the following coding: (00 – not available, 01 – not authorized, 10 – authorized, but de-activated, and 11 – authorized and activated).

The first octet of the “Value” is formatted as follows: Bits 1 and 2 shall be set to indicate three-way calling feature, bits 3 and 4 shall be set to indicate call waiting feature, bits 5 and 6 shall be set to indicate calling

number delivery feature, and bits 7 and 8 shall be set to indicate calling number privacy feature. The rest of the octets of the "Value" are reserved for future use.

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

7.4.2.6 Session key

The Session key is passed from the RACF to the RCF. This key will be used to encrypt the radio channel.

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

7.4.3 Information element identifiers

The information element identifiers are encoded as shown in table 14.

Table 14 – PACS information element identifier values

Bits 8 7 6 5 4 3 2 1	Information Element
0 1 0 1 1 0 0 0	Alert Identifier
0 1 0 1 1 1 0 0	ALT_DN
0 1 1 0 0 0 0 0	AUTHBS
0 1 1 0 1 0 0 0	AUTHR
0 1 1 0 0 0 1 0	AUTHU
0 0 0 0 0 1 0 0	Bearer Capability
0 1 1 1 1 0 1 0	Call Reference
0 0 0 0 1 0 0 0	Cause
0 1 1 0 0 1 0 0	Complete Port ID
0 1 0 1 1 0 1 1	Complete Registration Area ID
0 1 0 1 0 0 0 0	Complete RPCU Identifier
0 1 0 1 0 0 0 1	Correlation ID
0 1 1 0 0 0 1 1	COUNT
0 1 0 1 1 1 0 1	Directory Number
0 1 1 0 1 0 0 1	Enveloped Information Elements
0 1 0 1 0 1 0 0	ESN
0 1 1 0 0 0 0 1	Group ID
0 1 1 0 1 0 1 0	Initial Message Type
0 1 1 1 1 1 1 0	Keypress
0 1 0 1 1 1 0 0	Mini profile
0 1 0 1 0 1 1 1	NET_AUTH
0 1 1 0 1 0 1 1	Rabin Encrypted Elements
0 1 1 0 0 1 1 0	RAND
0 1 0 1 1 1 1 1	RANDBS
0 1 0 1 1 1 1 0	RANDSSD
0 1 1 0 0 0 0 1	RANDU
0 1 0 1 0 0 1 0	RCID
0 1 1 0 0 1 1 1	Real Time
0 1 0 1 1 1 0 1	Registration Flag
0 1 1 0 0 1 0 1	Security Menu Selection
0 1 0 1 0 1 1 1	Session Key
0 1 1 0 1 1 1 1	SUCert
0 1 1 0 1 1 1 0	SUPubKey
0 1 0 1 0 0 1 1	Subscriber ID
0 1 0 1 0 1 0 1	Temporary Subscriber ID
0 1 1 1 1 0 0 1	UIMESN

All other Information Element Identifiers are reserved for future use.

7.5 TDMA operations

7.5.1 Message definitions

7.5.1.1 Call processing message formats

See 7.1 for common messages used by TDMA. There are no TDMA-specific call processing messages.

7.5.1.2 Mobility management message formats

See 7.1 for common messages used by TDMA. There are no TDMA-specific mobility management messages.

7.5.1.3 Radio resource management message formats

See 7.1 for common messages used by TDMA. There are no TDMA-specific radio resource management messages.

7.5.1.4 Facility management message formats

See 7.1 for common messages used by TDMA. There are no TDMA-specific facility management messages.

7.5.2 Parameter definitions

See 7.1.2.

7.5.3 Timer definitions

See 7.1.4.

7.6 PCS1900 operations

7.6.1 Message definitions

This defines message formats; i.e., it shows the information elements contained within each message. It also shows the ordering and usage of these information elements.

7.6.1.1 Mobility management message formats

7.6.1.1.1 Abort

See ANSI J-STD-007, Abort.

7.6.1.1.2 Authentication reject

See ANSI J-STD-007, Authentication Reject.

7.6.1.1.3 Authentication request

See ANSI J-STD-007, Authentication Request.

7.6.1.1.4 Authentication response

See ANSI J-STD-007, Authentication Response.

7.6.1.1.5 CM service abort

See ANSI J-STD-007, CM Service Abort.

7.6.1.1.6 CM service accept

See ANSI J-STD-007, CM Service Accept.

7.6.1.1.7 CM service reject

See ANSI J-STD-007, CM Service Reject.

7.6.1.1.8 CM service request

This is a DTAP message originally defined in ANSI J-STD-007, Volume 2 Part 2. However, for the purpose of this standard, this definition is modified as shown below:

Information Element	Reference	Direction	Type
Protocol Discriminator	ANSI J-STD-007 Volume 2 Part 2 2.10.2	RCF --> RACF	M
Skip Indicator	ANSI J-STD-007 Volume 2 Part 2 2.10.3.1	RCF --> RACF	M
Message Type	ANSI J-STD-007 Volume 2 Part 2 2.10.4	RCF --> RACF	M
CM Service Type	ANSI J-STD-007 Volume 2 Part 2 2.10.5.3.3	RCF --> RACF	M
Ciphering key sequence number	ANSI J-STD-007 Volume 2 Part 2 2.10.5.1.2	RCF --> RACF	M
Mobile station classmark 2	ANSI J-STD-007 Volume 2 Part 2 2.10.5.1.6	RCF --> RACF	M
Mobile Identity	ANSI J-STD-007 Volume 2 Part 2 2.10.5.1.4	RCF --> RACF	M
PCS1900 Interface DN	Clause 7.6.2.1	RCF --> RACF	O

7.6.1.1.9 CM reestablishment request

See ANSI J-STD-007, CM Reestablishment Request.

7.6.1.1.10 Identity request

See ANSI J-STD-007, Identity Request.

7.6.1.1.11 Identity response

See ANSI J-STD-007, Identity Response.

7.6.1.1.12 IMSI detach indication

See ANSI J-STD-007, IMSI Detach Indication.

7.6.1.1.13 Location updating accept

See ANSI J-STD-007, Location Updating Accept.

7.6.1.1.14 Location updating reject

See ANSI J-STD-007, Location Updating Reject.

7.6.1.1.15 Location updating request

See ANSI J-STD-007, Location Updating Request.

7.6.1.1.16 MM status

See ANSI J-STD-007, MM Status.

7.6.1.1.17 TMSI reallocation command

See ANSI J-STD-007, TMSI Reallocation Command.

7.6.1.1.18 TMSI reallocation complete

See ANSI J-STD-007, TMSI Reallocation Complete.

7.6.1.2 Radio resource management message formats

7.6.1.2.1 Assignment complete

See IS-651, Assignment Complete.

7.6.1.2.2 Assignment failure

See IS-651, Assignment Failure.

7.6.1.2.3 Assignment request

See IS-651, Assignment Request.

7.6.1.2.4 Cipher mode command

See IS-651, Cipher Mode Command.

7.6.1.2.5 Cipher mode complete

See IS-651, Cipher Mode Complete.

7.6.1.2.6 Cipher mode reject

See IS-651, Cipher Mode Reject.

7.6.1.2.7 Classmark request

See IS-651, Classmark Request.

7.6.1.2.8 Classmark update

See IS-651, Classmark Update.

7.6.1.2.9 Clear command

See IS-651, Clear Command.

7.6.1.2.10 Clear complete

See IS-651, Clear Complete.

7.6.1.2.11 Clear request

See IS-651, Clear Request.

7.6.1.2.12 Complete layer 3 information

See IS-651, Complete Layer 3 Information.

7.6.1.2.13 Handover candidate enquire

See IS-651, Handover Candidate Enquire.

7.6.1.2.14 Handover candidate response

See IS-651, Handover Candidate Response.

7.6.1.2.15 Handover command

See IS-651, Handover Command.

7.6.1.2.16 Handover complete

See IS-651, Handover Complete.

7.6.1.2.17 Handover detect

See IS-651, Handover Detect.

7.6.1.2.18 Handover failure

See IS-651, Handover Failure.

7.6.1.2.19 Handover performed

See IS-651, Handover Performed.

7.6.1.2.20 Handover request

See IS-651, Handover Request.

7.6.1.2.21 Handover request acknowledge

See IS-651, Handover Request Acknowledge.

7.6.1.2.22 Handover required

See IS-651, Handover Required.

7.6.1.2.23 Handover required reject

See IS-651, Handover Required Reject.

7.6.1.2.24 Paging

See IS-651, Paging.

7.6.1.2.25 Queueing indication

See IS-651, Queueing Indication.

7.6.1.2.26 RACF invoke trace

See IS-651, PCSC Invoke Trace.

7.6.1.2.27 Resource indication

See IS-651, Resource Indication.

7.6.1.2.28 Resource request

See IS-651, Resource Request.

7.6.1.2.29 SAPI 'n' reject

See IS-651, SAPI 'n' Reject.

7.6.1.2.30 Send info for outgoing call

This message is defined as follows:

Information Element	Reference	Direction	Type
Message Type	ANSI J-STD-007 Volume 2 Part 2 2.10.4	RCF --> RACF	M
Mobile Identity	ANSI J-STD-007 Volume 2 Part 2 2.10.5.1.4	RCF --> RACF	M
Called Party Number	ANSI J-STD-007 Volume 2 Part 2 2.10.5.4.5	RCF --> RACF	M
Bearer Capability1	ANSI J-STD-007 Volume 2 Part 2 2.10.5.4.5	RCF --> RACF	M
Bearer Capability2	ANSI J-STD-007 Volume 2 Part 2 2.10.5.4.5	RCF --> RACF	O

7.6.2 Parameter definitions

This subclause defines only those parameter formats that are not included in IS-651, ANSI J-STD-007, or have been modified for the purpose of this standard.

7.6.2.1 PCS1900 interface DN

This parameter is defined as below:

7	6	5	4	3	2	1	0	Octet
Element Identifier								1
Length								2
Value								3-n

The Element Identifier for this parameter is "0100 0001".

The value is a NANP number encoded in E.164 format.

Annex A (informative)

Signaling flows for CDMA, TDMA, and CCT

This annex presents signaling flows that illustrate the usage of MMAP messages in service scenarios.

The signaling flows presented in this annex are applicable to CDMA, TDMA, and CCT. However, it should be noted that the RTF-RCF messaging shown in the signaling flows is derived primarily from CDMA.

The following conventions are used in this annex:

- In the figures, the MMAP (RCF-RACF, RACF-RACF, and RACF-SCF) messages are labeled in bold text.
- The bold arrows in the figures imply that the protocol for that interface is defined in MMAP (RCF-RACF, RACF-RACF, and RACF-SCF).
- The text supporting the figures, not the figures themselves, describe optional procedures.
- RTF-RCF messaging is supposed to be generic, albeit most of it is derived from CDMA.
- If specific message names are used for interfaces other than those specified by MMAP, the message name is preceded by the protocol suite that defines these messages. For example, “IS-41” precedes messages between visited SCF and home SCF and “ISDN” precedes messages between RCF and SSF/CCF.
- A double-headed arrow is used to indicate a procedure between two entities. There may be multiple messages exchanged between the two entities to accomplish the procedure.
- IS-41 messages have the same name for a request and its response. In order to distinguish between the two, the request message is shown in uppercase letters (e.g., ROUTREQ) and the response message is shown in lowercase letters (e.g., routreq).

A.1 Mobile origination

This clause discusses the signaling flow associated with a mobile station call origination, as shown in figure A.1.

- a) The RTF transmits an Origination Message over the access channel of the air interface to the RCF to request service.
- b) The RCF acknowledges the receipt of the Origination Message with a Base Station Acknowledgment Order to the RTF.
- c) The RCF constructs the CM Service Request message, places it in the Complete Layer 3 Information message, and sends the message to the RACF. This message includes the ISDN Interface Directory Number (DN).
- d) The RACF sends a Qualification Request message to the SCF, containing the Interface DN so that the SCF can correlate this message with the AIN query received later in the flow.
- e) The SCF authenticates and validates the user, if requested, and returns a Qualification Request Return Result to the RACF.
- f) At this stage, the RACF completes establishment of the signaling channel (e.g., SCCP) connection with the RCF, and sends an Assignment Request message to the RCF to request assignment of radio resources, a traffic channel for speech/data in this case. This message specifies the signaling type (e.g., CDMA) as well.
- g) The RCF sends a Channel Assignment Message over the paging channel to initiate the establishment of a radio traffic channel.
- h) The RTF begins sending the traffic channel preamble (Tch Preamble) over the designated reverse traffic channel.
- i) The RCF acquires the reverse traffic channel, and sends the Base Station Acknowledgment Order to the RTF over the forward traffic channel.
- j) The RTF acknowledges the reception of the RCF's message by sending the Mobile Station Acknowledgment Order.
- k) The RCF then sends the Service Option Response Order to the RTF specifying the service configuration for the call. The RTF begins processing traffic in accordance with the specified service option number.
- l) After the radio traffic channel has been established, the RCF sends the Assignment Complete message to the RACF.
- m) The RCF sends an ISDN SETUP message to the SSF/CCF, providing necessary information for call setup to the called party, such as the bearer capability (set to "speech").
- n) The SSF/CCF encounters a trigger associated with the Terminal Service Profile for the interface to the RCF, and sends an AIN query to the SCF containing the directory number associated with the interface (also referred to as the Interface DN).
- o) The SCF sends an AIN response to the SSF/CCF, with the MIN as the CallingPartyID (passed screening).
- p) The SSF/CCF sends an ISUP Initial Address Message (IAM) to the destination CCF.
- q) The SSF/CCF also sends an ISDN CALL PROCEEDING message to the RCF.
- r) The destination CCF sends an ISUP Address Complete Message (ACM) to the SSF/CCF.
- s) The SSF/CCF sends an ISDN ALERTING message to the RCF. This may include Progress Indicator element to indicate how call progress information will be passed.

- t) The RCF sends the Alert with Information message to the RTF to cause ringing at the mobile. The alerting may also be in-band.
- u) The destination CCF sends an ISUP Answer Message (ANM) to the SSF/CCF.
- v) The SSF/CCF sends an ISDN CONNect message to the RCF, once the call has been established.
- w) The RCF acknowledges the receipt of the CONNect message by sending an ISDN CONNect ACKnowledge message to the SSF/CCF.

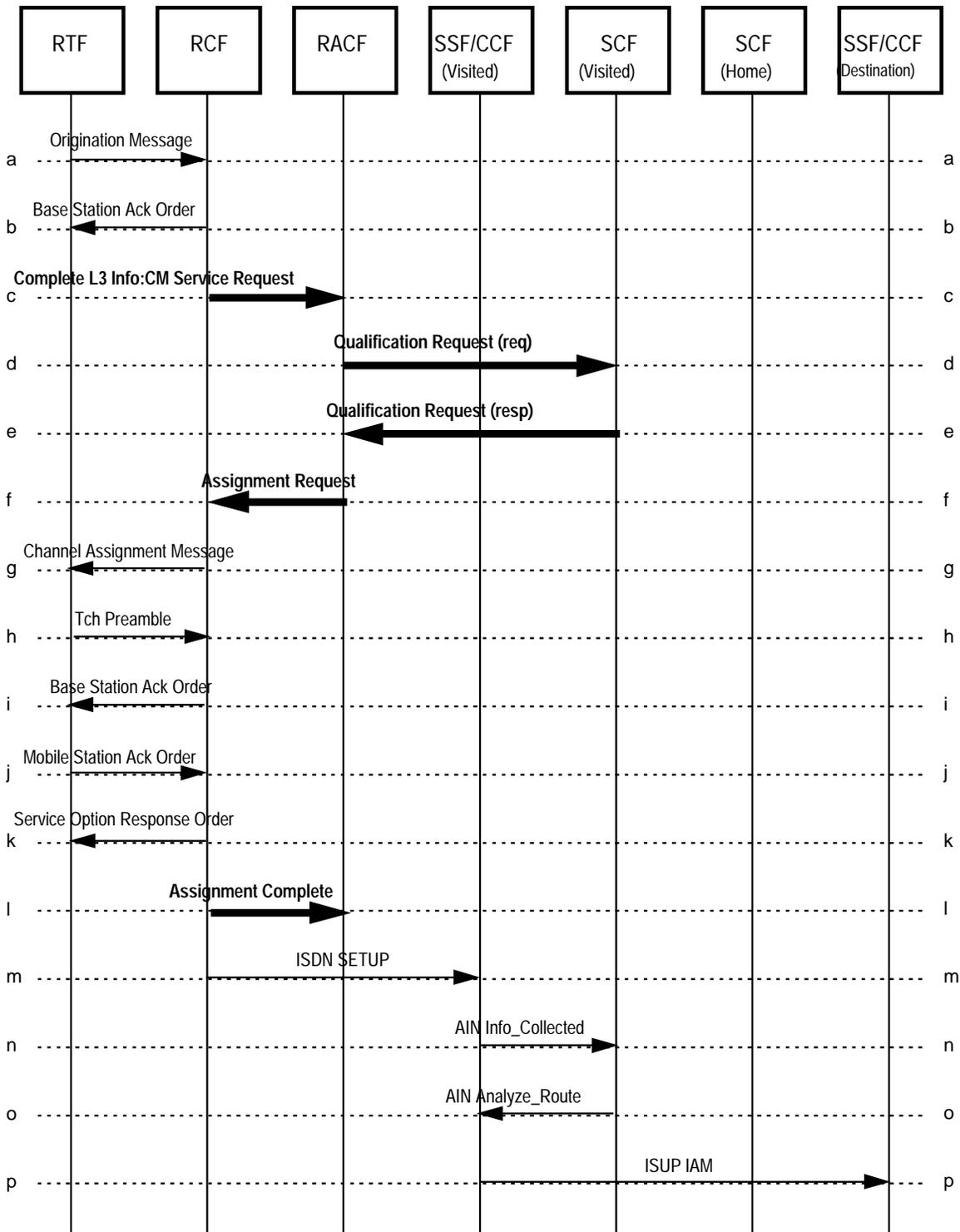


Figure A.1 – Mobile origination (1 of 2)

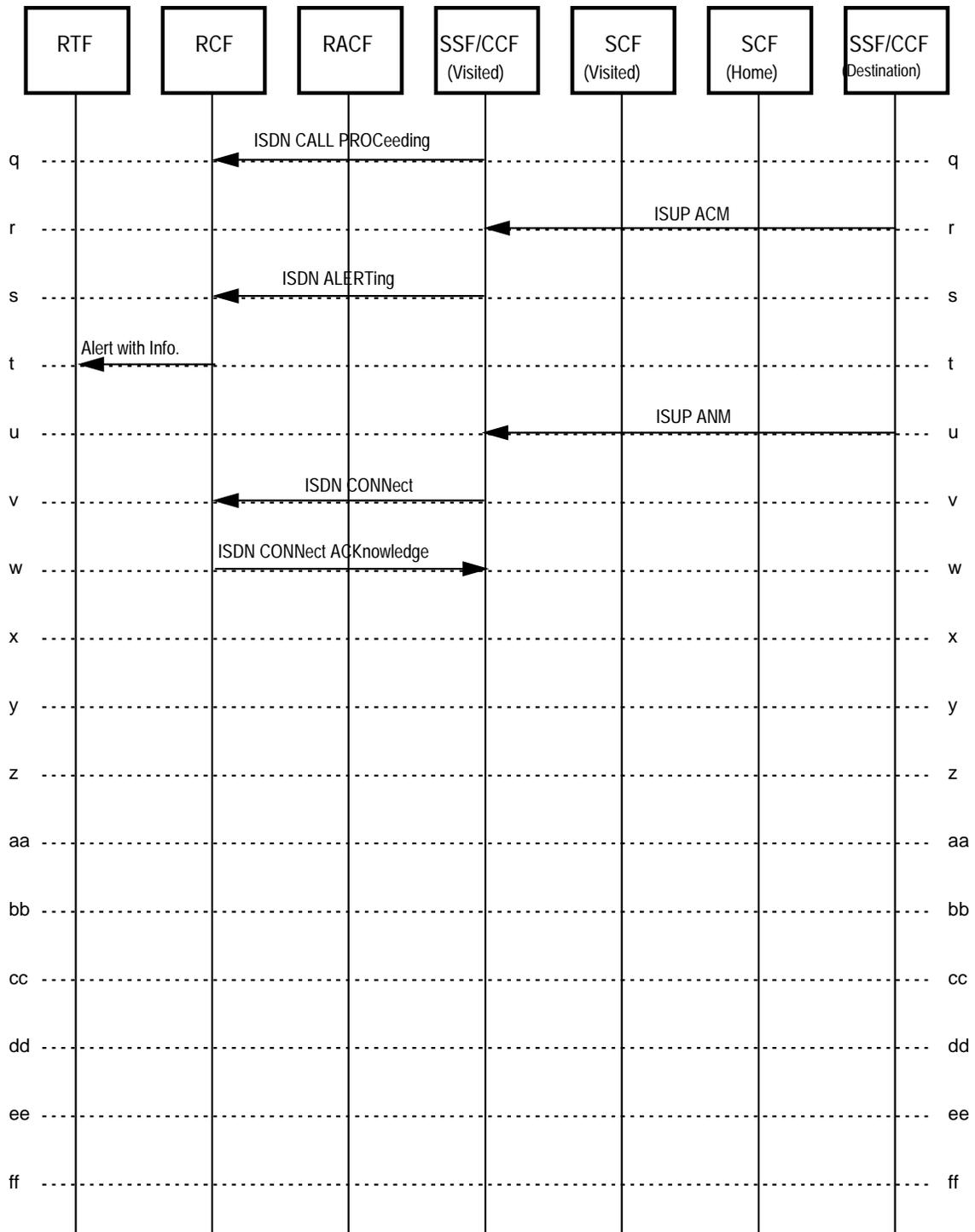


Figure A.1 – Mobile origination (2 of 2)

A.2 Mobile origination with privacy mode procedure

This clause discusses the signaling flow associated with a mobile station call origination in which the voice privacy option is requested by the mobile station subscriber.

- a) The RTF transmits an Origination Message over the access channel of the air interface to the RCF to request service.
- b) The RCF acknowledges the receipt of the Origination Message with a Base Station Acknowledgment Order to the RTF.
- c) The RCF constructs the CM Service Request message, places it in the Complete Layer 3 Information message, and sends the message to the RACF. This message includes the ISDN Interface Directory Number (DN).
- d) The RACF sends a Qualification Request message to the SCF, containing the Interface DN so that the SCF can correlate this message with the AIN query received later in the flow.
- e) The SCF authenticates and validates the user, if requested, and returns a Qualification Request Return Result to the RACF.
- f) At this stage, the RACF completes establishment of the signaling channel (e.g., SCCP) connection with the RCF and sends a Privacy Mode Command to the RCF to specify that encryption be provided for traffic information, or signaling information, or both.
- g) The RCF returns the Privacy Mode Complete message to the RACF to indicate successful receipt of the Privacy Mode Command message.
- h) The RACF sends an Assignment Request message to the RCF to request assignment of radio resources, a traffic channel for speech/data in this case. This message specifies the signaling type (e.g., CDMA) as well.
- i) The RCF sends a Channel Assignment Message over the paging channel to initiate the establishment of a radio traffic channel.
- j) The RTF begins sending the traffic channel preamble (Tch Preamble) over the designated reverse traffic channel.
- k) The RCF acquires the reverse traffic channel, and sends the Base Station Acknowledgment Order to the RTF over the forward traffic channel.
- l) The RTF acknowledges the reception of the RCF's message by sending the Mobile Station Acknowledgment Order.
- m) The RCF then sends the Service Option Response Order to the RTF specifying the service configuration for the call. The RTF begins processing traffic in accordance with the specified service option number.
- n) After the radio traffic channel has been assigned, voice privacy can be established when the RCF transmits a Long Code Transition Request to the RTF.
- o) The RTF performs the required encryption procedures and acknowledges the RCF with a Long Code Transition Response message.
- p) After the radio traffic channel has been established, the RCF sends the Assignment Complete message to the RACF.
- q) The RCF sends an ISDN SETUP message to the SSF/CCF, providing necessary information for call setup to the called party, such as the bearer capability (set to "speech").
- r) The SSF/CCF encounters a trigger associated with the Terminal Service Profile for the interface to the RCF, and sends an AIN query to the SCF containing the directory number associated with the interface (also referred to as the Interface DN).

- s) The SCF sends an AIN response to the SSF/CCF, with the MIN as the CallingPartyID (passed screening).
- t) The SSF/CCF sends an ISUP Initial Address Message (IAM) to the destination CCF.
- u) The SSF/CCF also sends an ISDN CALL PROCEEDING message to the RCF.
- v) The destination CCF sends an ISUP Address Complete Message (ACM) to the SSF/CCF.
- w) The SSF/CCF sends an ISDN ALERTING message to the RCF. This may include Progress Indicator element to indicate how call progress information will be passed.
- x) The RCF sends the Alert with Information message to the RTF to cause ringing at the mobile. The alerting may also be in-band.
- y) The destination CCF sends an ISUP Answer Message (ANM) to the SSF/CCF.
- z) The SSF/CCF sends an ISDN CONNECT message to the RCF, once the call has been established.
- aa) The RCF acknowledges the receipt of the CONNECT message by sending an ISDN CONNECT ACKNOWLEDGE message to the SSF/CCF.

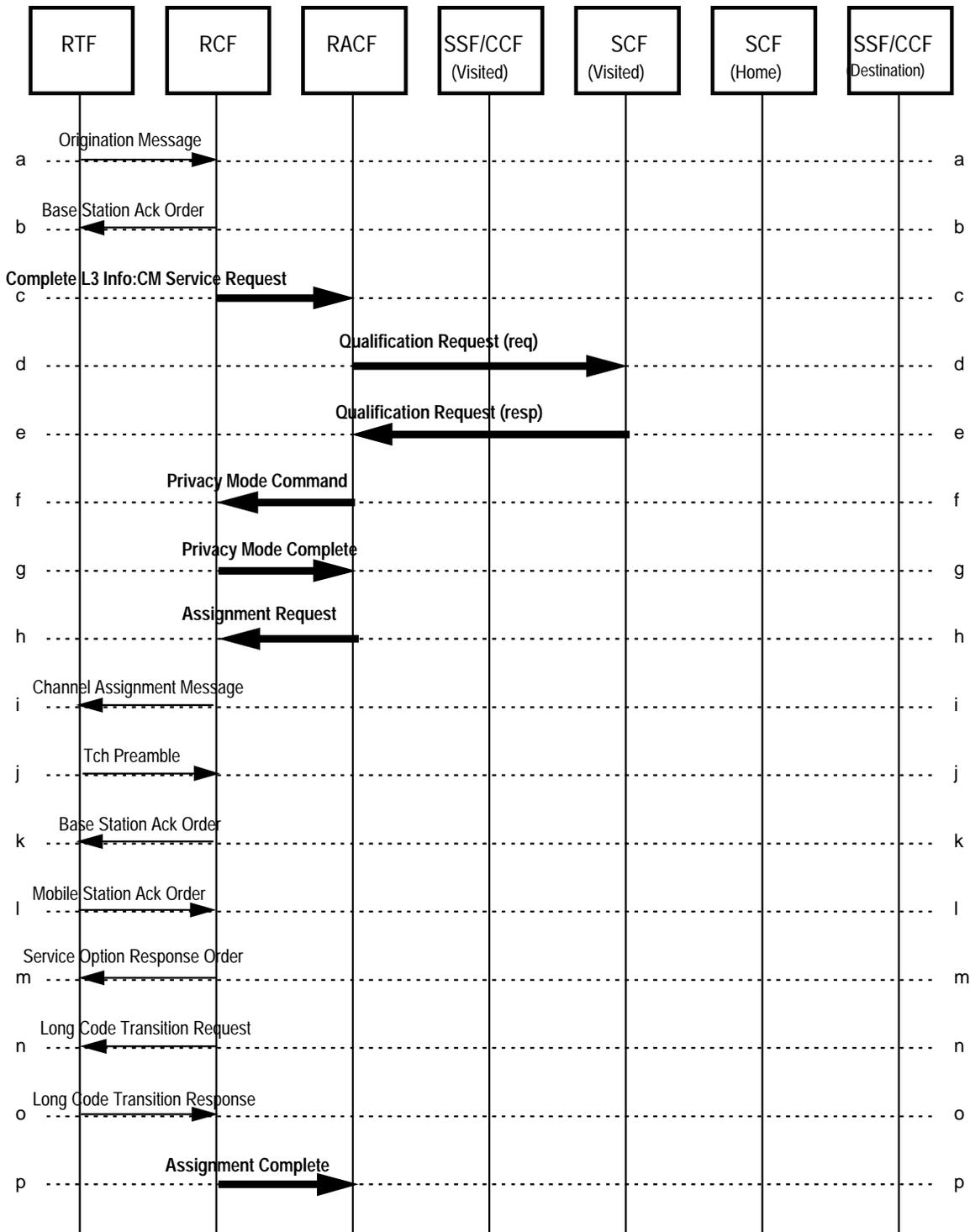


Figure A.2 – Mobile origination with privacy mode procedure (1 of 2)

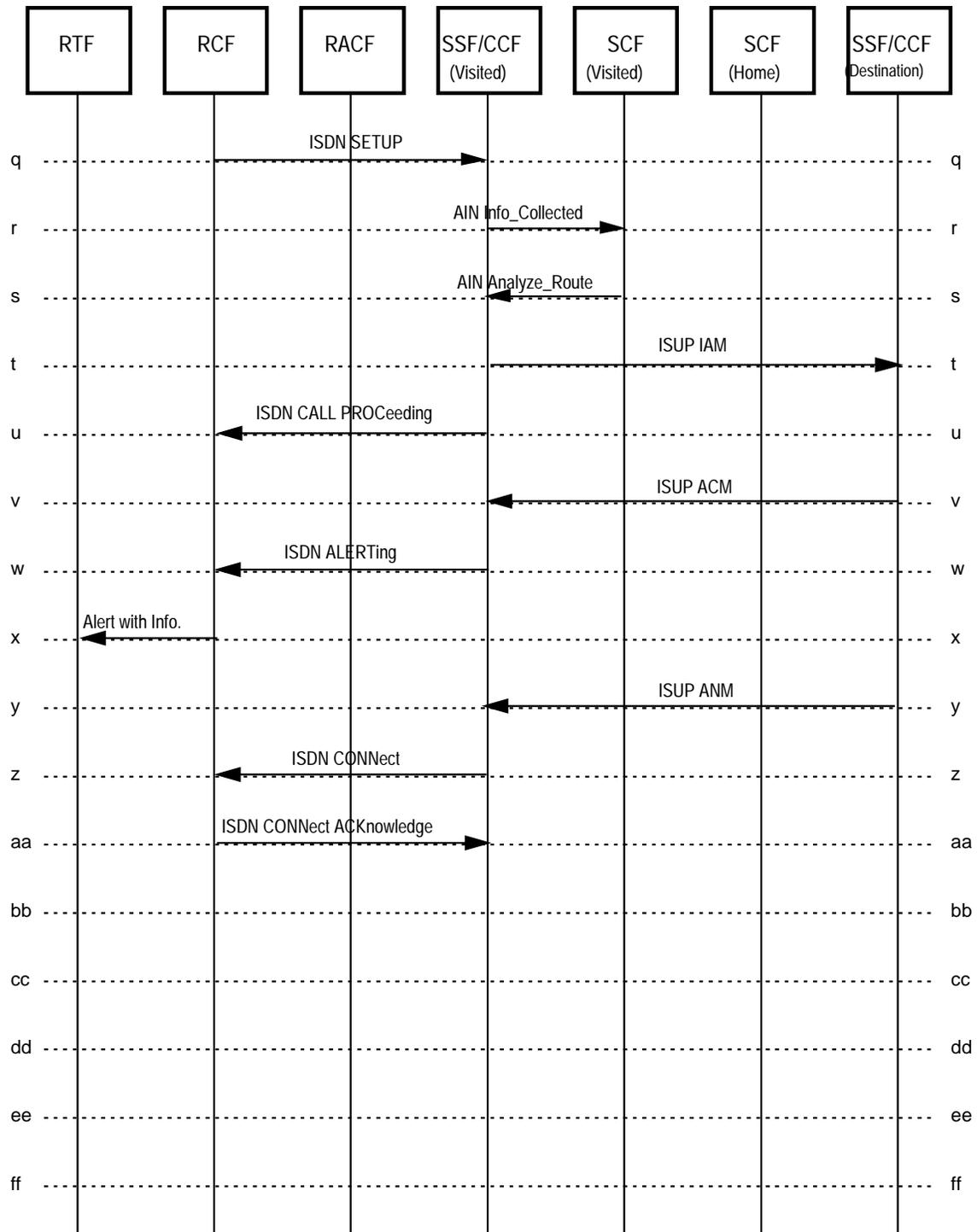


Figure A.2 – Mobile origination with privacy mode procedure (2 of 2)

A.3 Mobile termination

This clause describes the signaling flow associated with a mobile station call termination, as shown in figure A.3.

- a) The Originating SSF/CCF determines the need for AIN processing, and sends an AIN query to the home SCF. Note that in another scenario (not shown in the accompanying figure), the AIN query may be sent to a serving SCF that is not the home SCF, and the serving SCF, in that case, sends an IS-41 LOCREQ message to the home SCF to determine the location of the mobile station.
- b) The home SCF sends an IS-41 ROUTREQ message to the visited SCF.
- c) The visited SCF sends a Routing Request to the RACF.
- d) The RACF sends a Paging Request to the RCF to locate the mobile user.
- e) The RCF issues a Page Message containing the address of the mobile over the paging channel.
- f) The RTF acknowledges the page by transmitting a Page Response Message over the access channel.
- g) The RCF constructs the Paging Response message, places it in the Complete Layer 3 Information message, and sends it to the RACF. This message includes the ISDN Interface DN over which the call should be delivered to the RCF.
- h) The RCF acknowledges the receipt of Page Response Message from the RTF with a Base Station Acknowledge Order to the RTF.
- i) The RACF sends a Qualification Request message to the SCF to validate/authenticate the user.
- j) The SCF authenticates and validates the user, if requested, and returns a Qualification Request Return Result to the RACF.
- k) The RACF sends a Routing Request Return Result containing the Interface DN to the visited SCF.
- l) The RACF also sends an Assignment Request message to the RCF to request assignment of radio resources, a traffic channel for speech in this case. This message specifies the signaling type (e.g., CDMA) as well.
- m) The visited SCF sends the IS-41 routreq response message to the home SCF, containing the address to which the call should be delivered (to the RCF).
- n) The home SCF sends an AIN response to the originating SSF/CCF containing the address to which the call should be delivered.
- o) The originating SSF/CCF sends an ISUP IAM to the SSF/CCF where the call is to be delivered; i.e., to the terminating SSF/CCF.
- p) The terminating SSF/CCF sends an ISDN SETUP message to the interface identified by the Interface DN to which the call was routed.
- q) The RCF starts the channel assignment procedure by sending a Channel Assignment Message to the RTF.
- r) The RTF begins sending the traffic channel preamble (Tch Preamble) over the designated reverse traffic channel.
- s) The RCF acquires the reverse traffic channel, and sends the Base Station Acknowledgment Order to the RTF over the forward traffic channel.
- t) The RTF acknowledges the reception of the RCF's message by sending the Mobile Station Acknowledgment Order.

- u) The RCF then sends the Service Option Response Order to the RTF specifying the service configuration for the call. The RTF begins processing traffic in accordance with the specified service option number.
- v) After the radio traffic channel and terrestrial circuit have both been established, the RCF sends the Assignment Complete message to the RACF.
- w) The RCF sends the Alert with Information message to the RTF to cause ringing at the mobile.
- x) The RTF acknowledges the reception of the message from the RCF by sending the Mobile Station Acknowledgment Order to the RCF.
- y) The RCF then sends the ISDN ALERTing message to the SSF/CCF to indicate that alerting at the called mobile has begun.
- z) The terminating SSF/CCF sends an ISUP Address Complete Message (ACM) to the originating SSF/CCF.
- aa) When the call has been answered by the mobile, the RTF sends a Connect Order to the RCF.
- bb) The RCF acknowledges the receipt of the Connect Order by sending a Base Station Acknowledgment Order over the forward traffic channel.
- cc) The RCF sends an ISDN CONNect message to the SSF/CCF to indicate that the call has been answered.
- dd) The terminating SSF/CCF sends an ISUP Answer Message (ANM) to the originating SSF/CCF.
- ee) The SSF/CCF sends an ISDN CONNect ACKnowledge message to the RCF to acknowledge the receipt of the ISDN CONNect message.

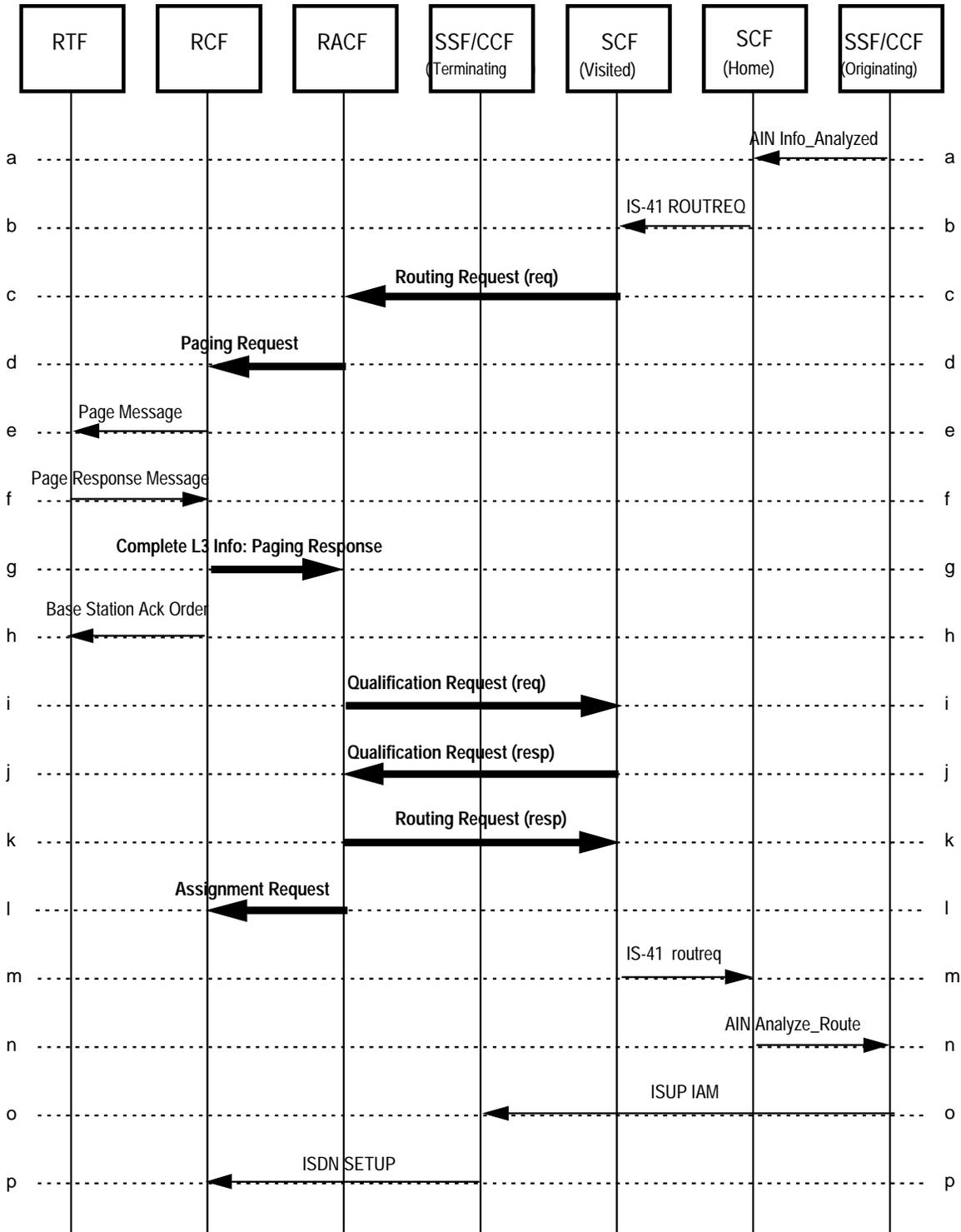


Figure A.3 – Mobile termination (1 of 2)

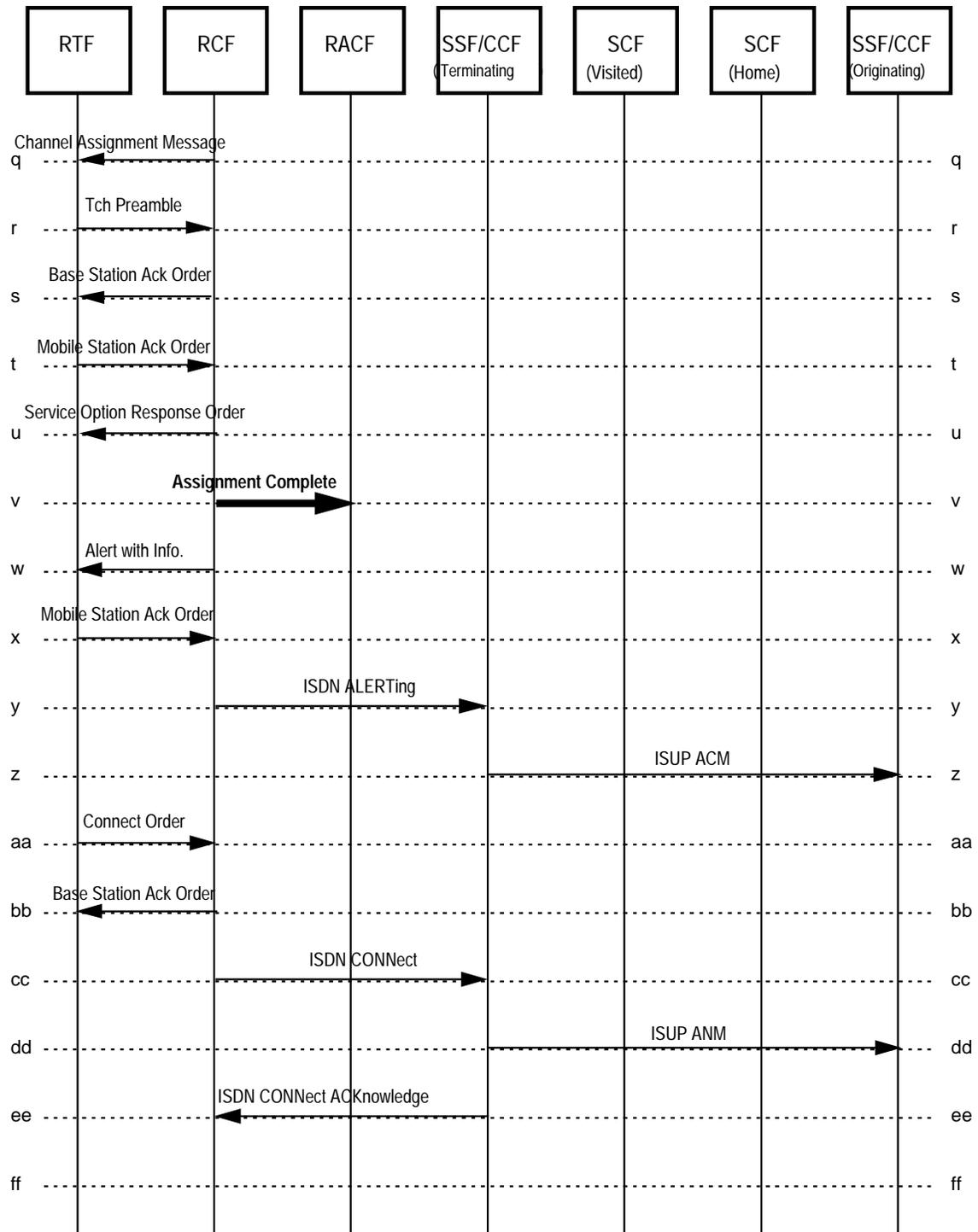


Figure A.3 – Mobile termination (2 of 2)

A.4 Mobile termination with assignment retry

This clause describes the signaling flow when channel assignment is retried between the RACF and RCF for a mobile station call termination, as shown in figure A.4.

Steps (a) – (p) of this flow are the same as Steps (a) – (p) of call termination described in clause A.3.

- a) The RCF recognizes that the assignment cannot be completed and sends the Assignment Failure to the RACF.
- b) The RACF retries by sending an Assignment Request message to the RCF. The RCF recognizes that channel assignment can be accomplished and initiates channel assignment procedure with the RTF.

The rest of the steps of this signaling flow are the same as Steps (q) – (ee) of call termination described in clause A.3.

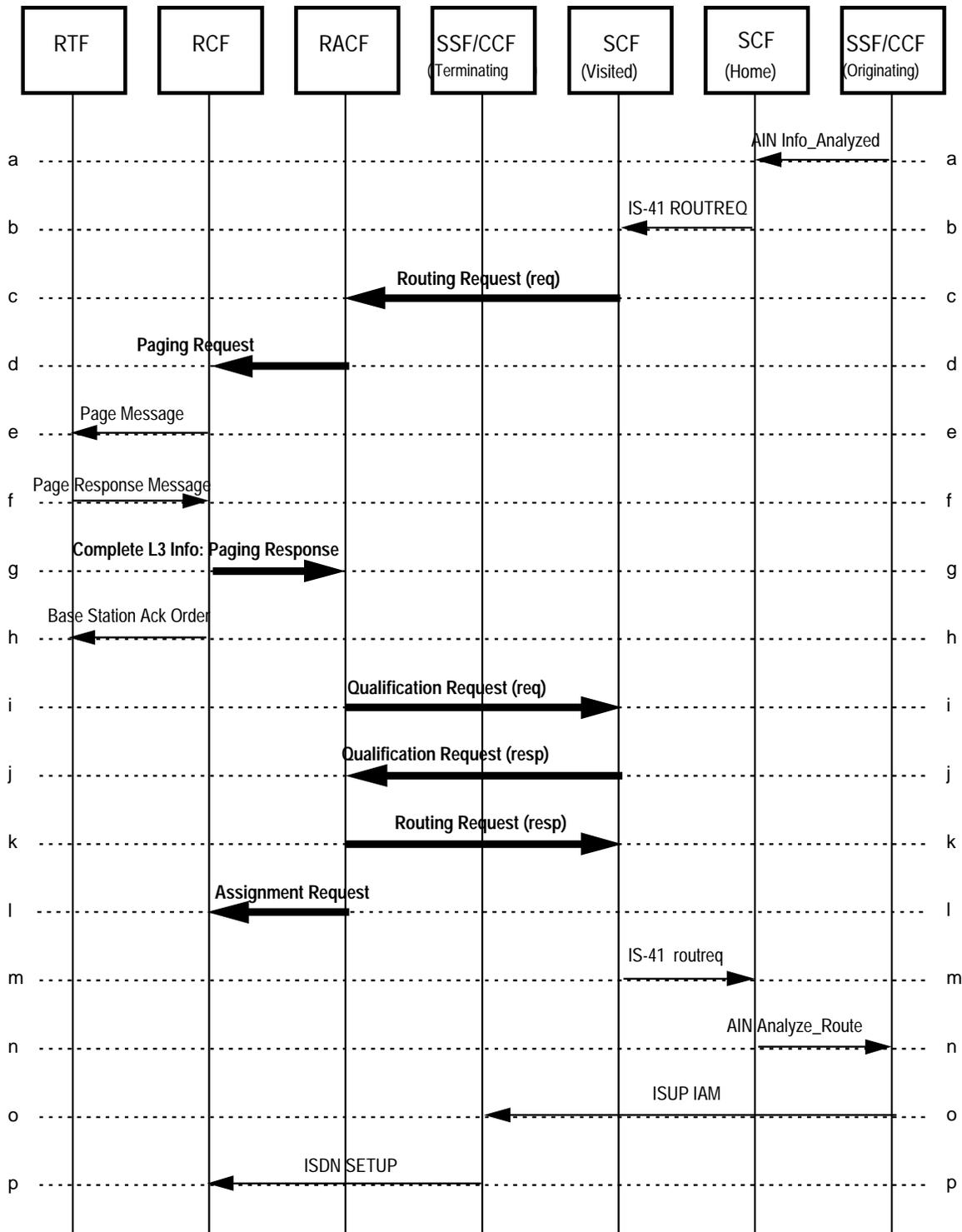


Figure A.4 – Mobile termination with assignment retry (1 of 2)

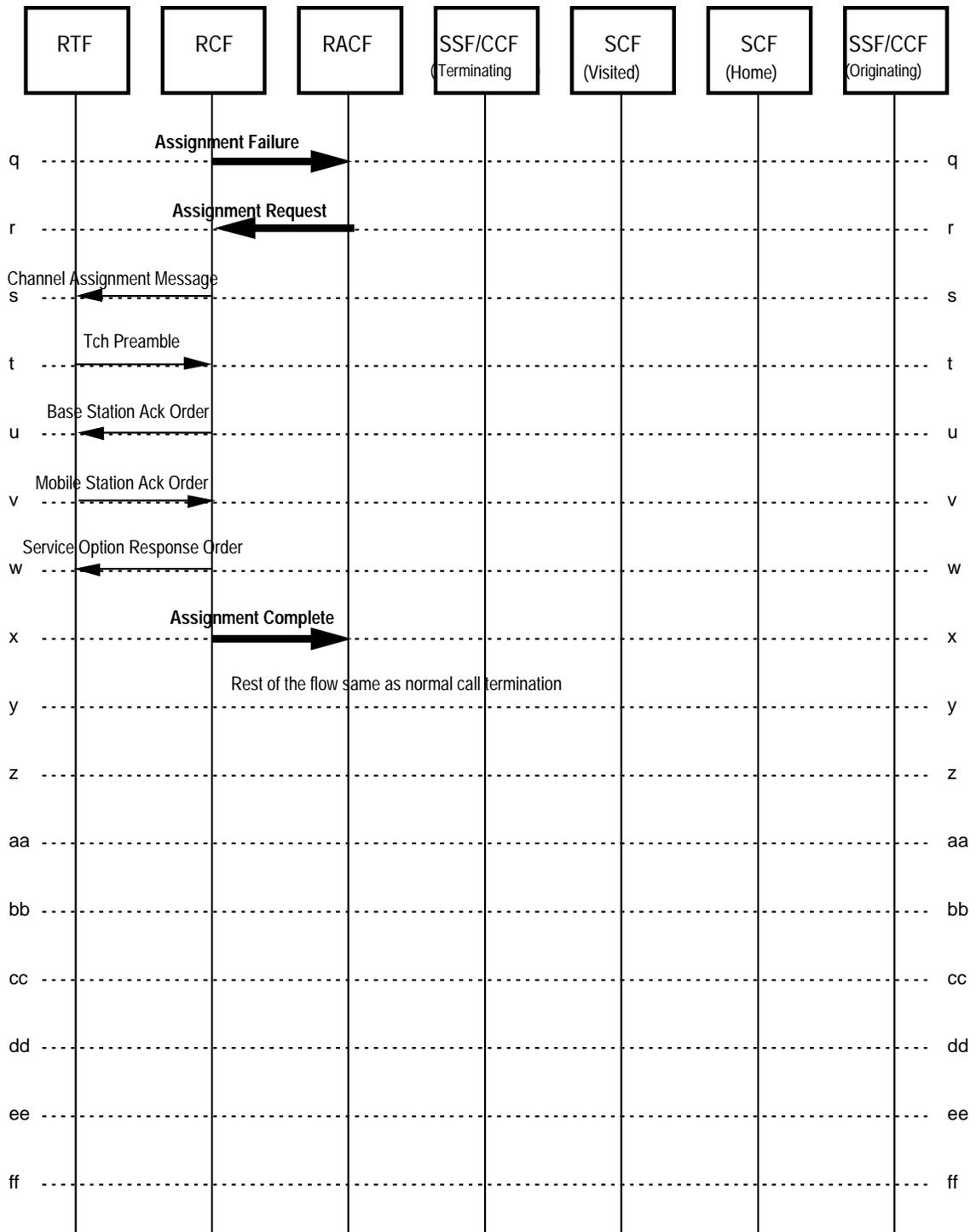


Figure A.4 – Mobile termination with assignment retry (2 of 2)

A.5 Call clearing

A.5.1 Call clearing initiated by RTF

This clause provides the signaling flow for a call clearing procedure initiated by the RTF, as shown in figure A.5.

- a) The RTF initiates call clearing by transmitting a Release Order over the reverse traffic channel.
- b) The RCF disconnects the call and sends an ISDN DISConnect message to the SSF/CCF, containing the Call Reference of the call and the Cause of the disconnection.
- c) The RCF also sends a Release Order to the RTF over the forward traffic channel to acknowledge the receipt of Release Order from the RTF.
- d) The serving SSF/CCF informs the far end that the call is to be cleared by sending an ISUP REL message.
- e) The SSF/CCF also acknowledges the receipt of ISDN DISConnect from the RCF by sending an ISDN RELEase message.
- f) The far end SSF/CCF acknowledges the receipt of ISUP REL by sending an ISUP RLC message.
- g) The RCF returns an ISDN RELEase COMPlete message to the serving SSF/CCF.
- h) The RCF sends a Clear Request message to the RACF to inform the RACF that the call has been cleared.
- i) The RACF returns a Clear Command message to the RCF.
- j) The RCF returns a Clear Complete message to the RACF, after it releases the appropriate resources. Note that this is an optional step.
- k) At this stage, the RACF initiates clearing of SCCP connection with the RCF. The RACF also sends a Clear Request to the SCF to inform the SCF that the call has been cleared.
- l) The SCF acknowledges the receipt of the Clear Request with a Clear Request Return Result message.

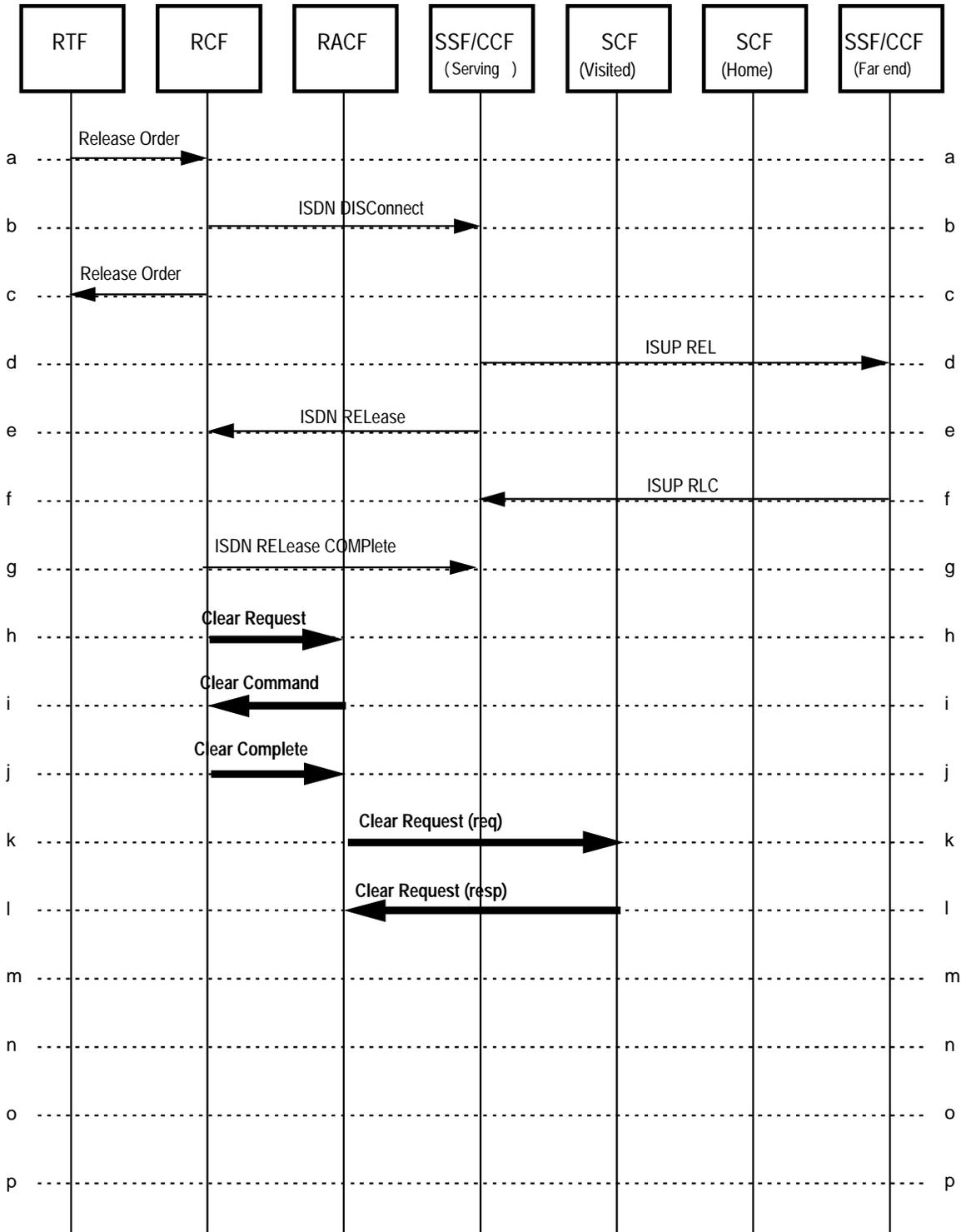


Figure A.5 – Call clearing initiated by RTF

A.5.2 Call clearing initiated by SSF/CCF

In this scenario (figure A.6), the call clearing is initiated when the far end party disconnects.

- a) The far end party goes on-hook, and an ISUP REL message is sent to the serving SSF/CCF.
- b) The serving SSF/CCF sends an ISDN DISConnect message to the RCF, containing information such as the Call Reference for the call and the Cause for disconnection.
- c) The RCF responds with an ISDN RELease message to the serving SSF/CCF.
- d) The SSF/CCF responds to the RCF with an ISDN RELease COMPlete message.
- e) The SSF/CCF also sends an ISUP RLC message to the far end SSF/CCF to acknowledge the receipt of the ISUP REL message.
- f) The RCF initiates call clearing over the air interface by transmitting a Release Order over the forward traffic channel to the RTF.
- g) The RTF acknowledges the RCF message by sending a Release Order over the reverse traffic channel.
- h) The RCF sends a Clear Request message to the RACF to inform the RACF that the call has been cleared.
- i) The RACF returns a Clear Command message to the RCF.
- j) The RCF returns a Clear Complete message to the RACF, after it releases the appropriate resources. Note that this is an optional step.
- k) At this stage, the RACF initiates clearing of SCCP connection with the RCF. The RACF also sends a Clear Request to the SCF to inform the SCF that the call has been cleared.
- l) The SCF acknowledges the receipt of the Clear Request with a Clear Request Return Result message.

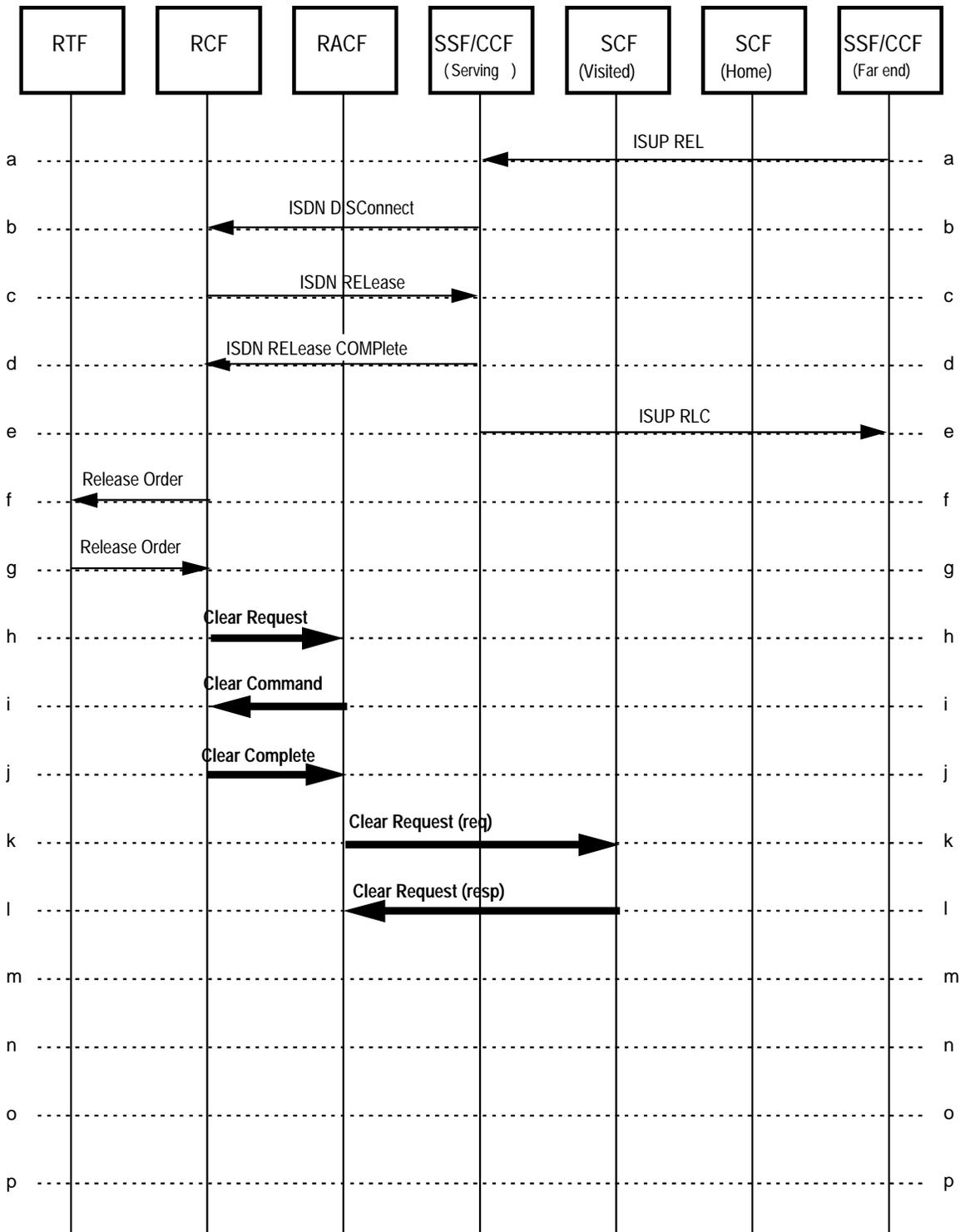


Figure A.6 – Call clearing initiated by SSF/CCF

A.5.3 Call clearing initiated by SCF

This clause provides the signaling flow for a call clearing procedure initiated by the SCF, as shown in figure A.7.

- a) The SCF initiates call clearing by sending a Clear Request message to the RACF.
- b) The RACF sends a Clear Command message to the RCF.
- c) The RCF sends an ISDN DISConnect message to the SSF/CCF to disconnect the call.
- d) The SSF/CCF responds to the RCF with an ISDN RELease message.
- e) The SSF/CCF sends an ISUP REL message to the far end SSF/CCF to disconnect the call.
- f) The RCF initiates call clearing over the air interface by transmitting a Release Order over the forward traffic channel to the RTF.
- g) The RTF acknowledges the RCF message by sending a Release Order over the reverse traffic channel.
- h) The RCF sends an ISDN RELease COMPLETE message to the SSF/CCF to acknowledge the receipt of ISDN RELease message.
- i) The far end SSF/CCF responds to the serving SSF/CCF with an ISUP RLC message.
- j) The RCF also sends a Clear Complete message to the RACF, after it releases the appropriate resources.
- k) At this stage, the RACF initiates clearing of SCCP connection with the RCF. The RACF also acknowledges successful clearing of the call by sending a Clear Request Return Result message to the SCF.

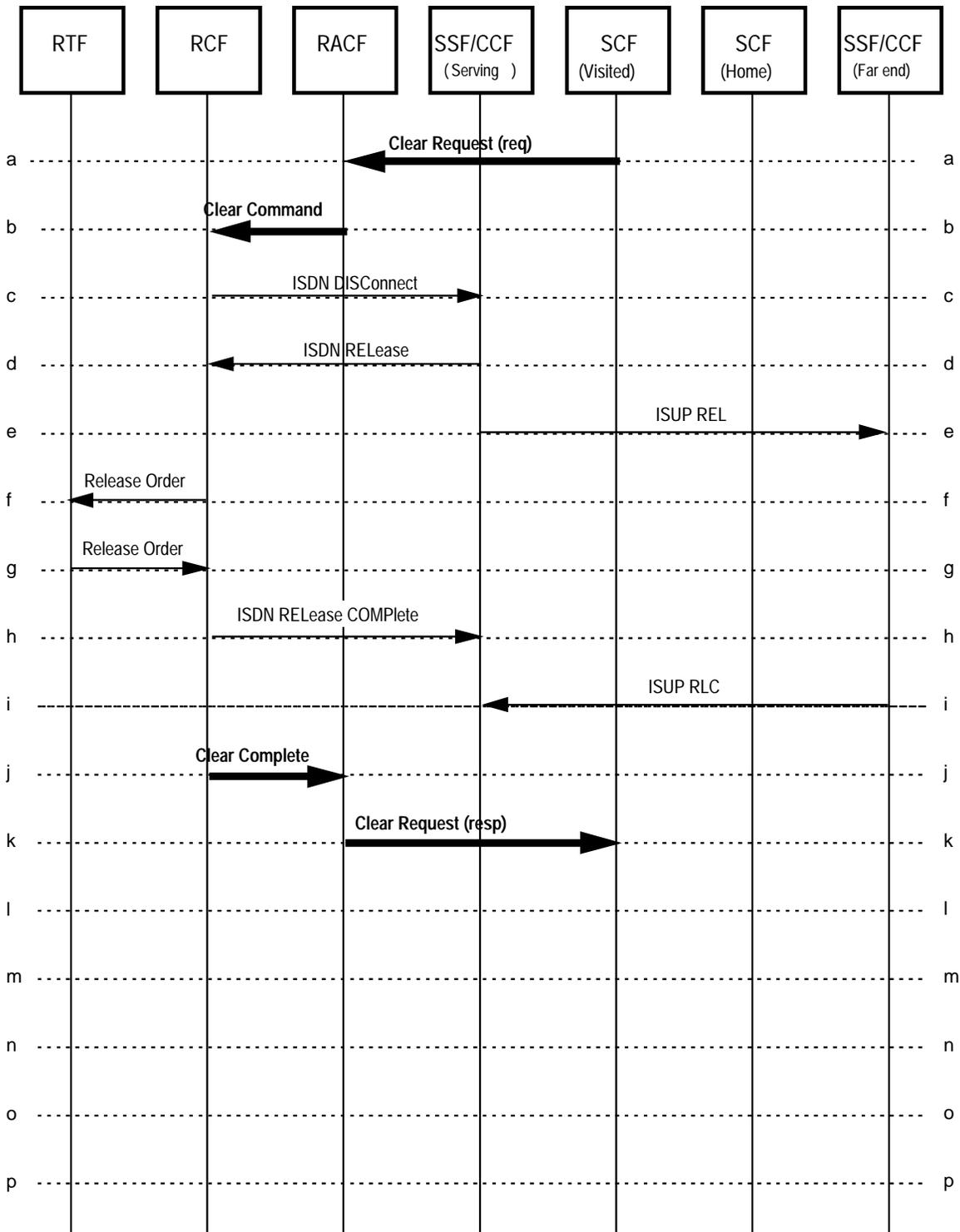


Figure A.7 – Call clearing initiated by SCF

A.6 Call failure

This clause describes some illustrative failure scenarios associated with call setup procedures.

A.6.1 Scenario 1

This clause provides the signaling flow for a call clearing procedure initiated by the RCF, as shown in figure A.8, when there is a radio channel failure or the mobile is not active.

- a) In the case of a radio failure between the RTF and the RCF, or if the RTF is not active, the RCF sends an ISDN DISConnect message to the SSF/CCF.
- b) The SSF/CCF responds to the RCF with an ISDN RELease.
- c) The RCF sends an ISDN RELease COMPLETE to the SSF/CCF.
- d) The serving SSF/CCF informs the far end that the call is to be cleared by sending an ISUP REL message.
- e) The far end SSF/CCF acknowledges the receipt of ISUP REL by sending an ISUP RLC message.
- f) The RCF sends a Clear Request message to the RACF to inform the RACF that the call has been cleared.
- g) The RACF returns a Clear Command message to the RCF.
- h) The RCF returns a Clear Complete message to the RACF, after it releases the appropriate resources. Note that this is an optional step.
- i) At this stage, the RACF initiates SCCP connection clearing with the RCF. The RACF also sends a Clear Request to the SCF to inform the SCF that the call has been cleared.
- j) The SCF acknowledges the receipt of the Clear Request with a Clear Request Return Result message.

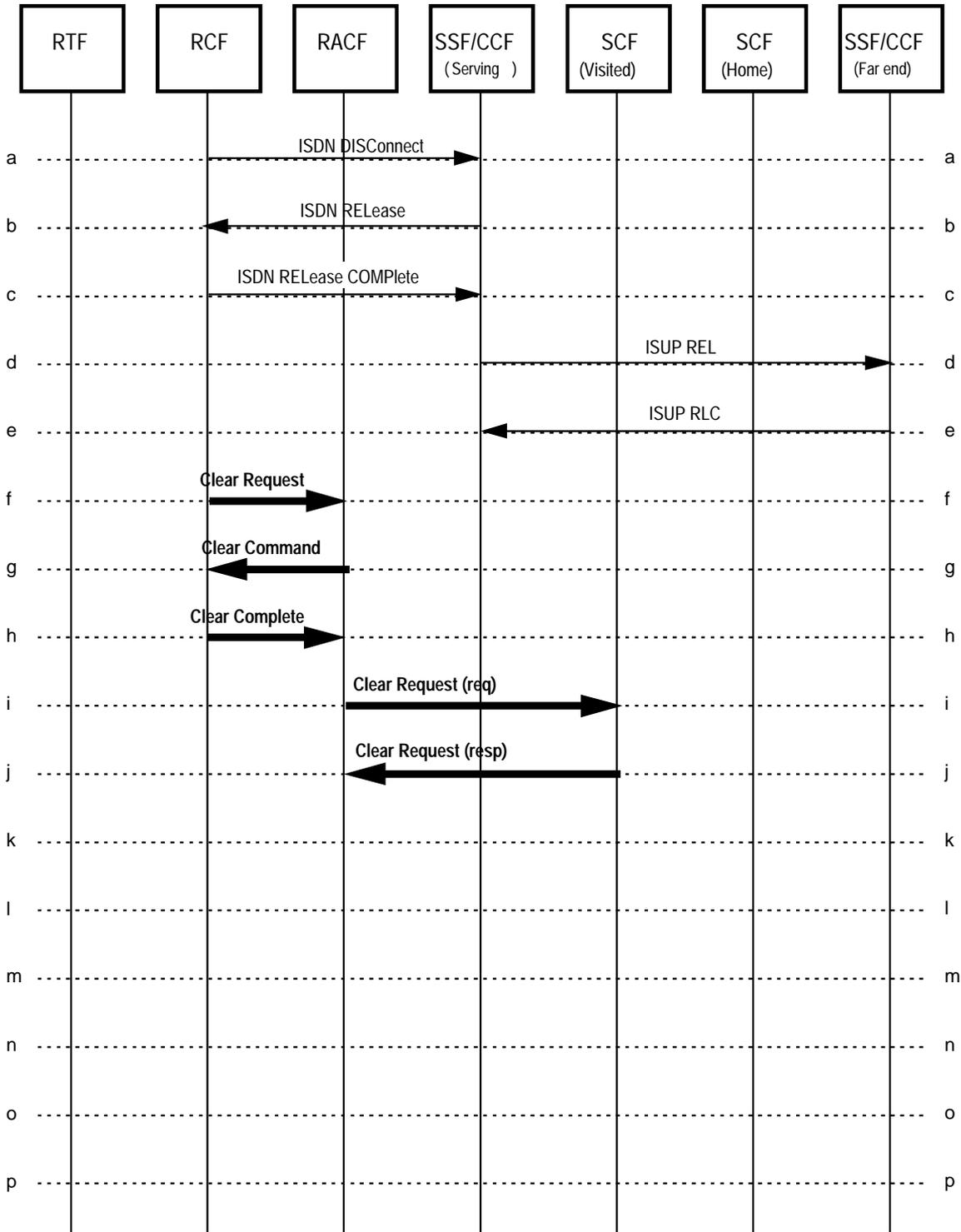


Figure A.8 – Call failure - scenario 1

A.6.2 Scenario 2

This clause provides the signaling flow for a call clearing procedure initiated by the RCF, as shown in figure A.9, when the RCF cannot set up a call.

- a) The SSF/CCF sends an ISDN SETUP message to the RCF to initiate a call establishment.
- b) The RCF determines it cannot complete the call and sends an ISDN RELease COMPLETE to the SSF/CCF.
- c) The serving SSF/CCF informs the far end that the call is to be cleared by sending an ISUP REL message.
- d) The far end SSF/CCF acknowledges the receipt of ISUP REL by sending an ISUP RLC message.
- e) The RCF sends a Clear Request message to the RACF to inform the RACF that the call has been cleared.
- f) The RACF returns a Clear Command message to the RCF.
- g) The RCF returns a Clear Complete message to the RACF, after it releases the appropriate resources. Note that this is an optional step.
- h) At this stage, the RACF initiates SCCP connection clearing with the RCF. The RACF also sends a Clear Request to the SCF to inform the SCF that the call has been cleared.
- i) The SCF acknowledges the receipt of the Clear Request with a Clear Request Return Result message.

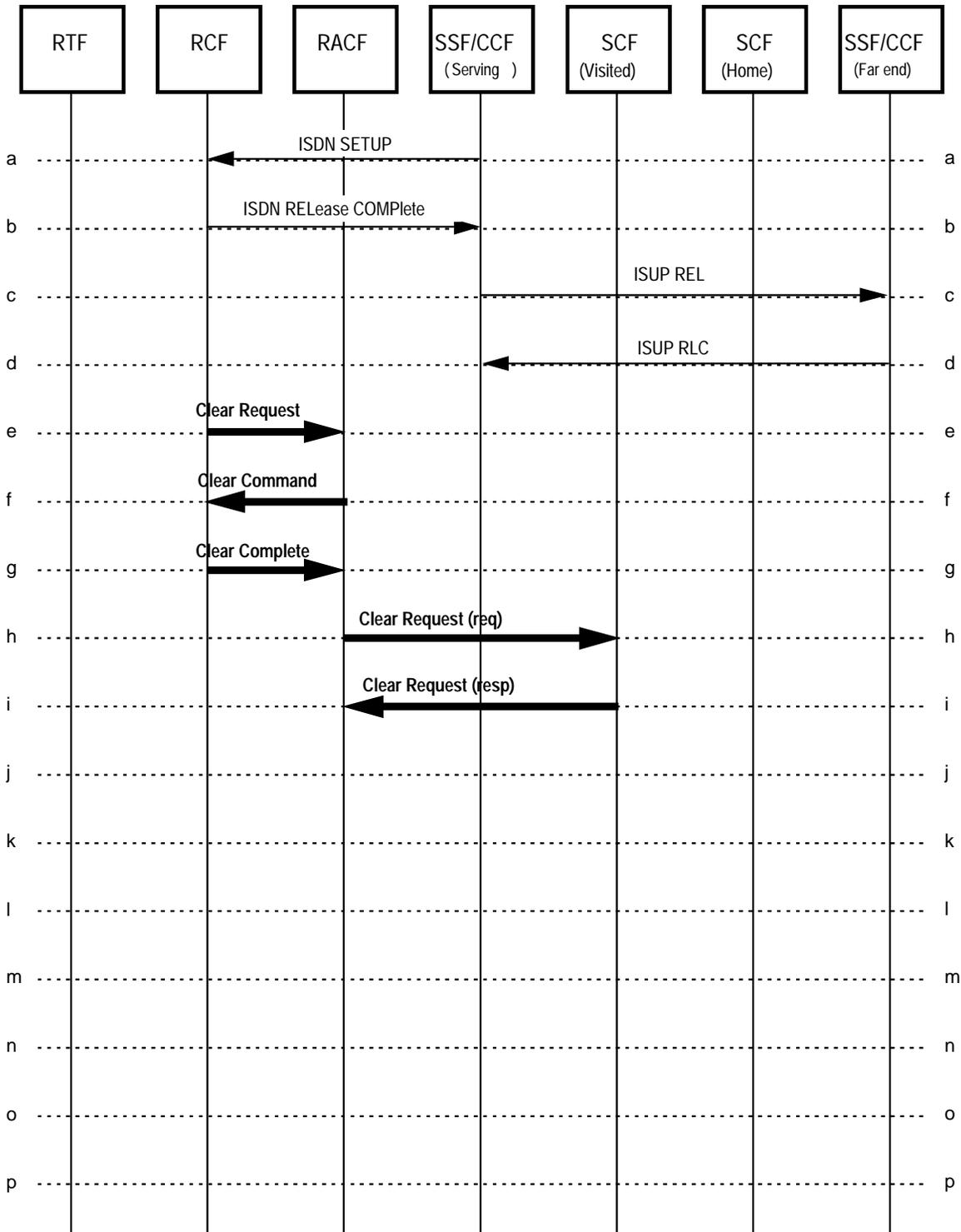


Figure A.9 – Call failure - scenario 2

A.6.3 Scenario 3

In this scenario (figure A.10), the call clearing is initiated when the serving switch cannot complete the call in response to a call request by the RCF.

- a) The RCF sends an ISDN SETUP message to the SSF/CCF to initiate a call establishment.
- b) The SSF/CCF determines it cannot complete the call and sends an ISDN RELEase COMPLETE message to the RCF.
- c) The RCF initiates call clearing over the air interface by transmitting a Release Order over the forward traffic channel to the RTF.
- d) The RTF acknowledges the RCF message by sending a Release Order over the reverse traffic channel.
- e) The RCF sends a Clear Request message to the RACF to inform the RACF that the call has been cleared.
- f) The RACF returns a Clear Command message to the RCF.
- g) The RCF returns a Clear Complete message to the RACF, after it releases the appropriate resources. Note that this is an optional step.
- h) At this stage, the RACF initiates SCCP connection clearing with the RCF. The RACF also sends a Clear Request to the SCF to inform the SCF that the call has been cleared.
- i) The SCF acknowledges the receipt of the Clear Request with a Clear Request Return Result message.

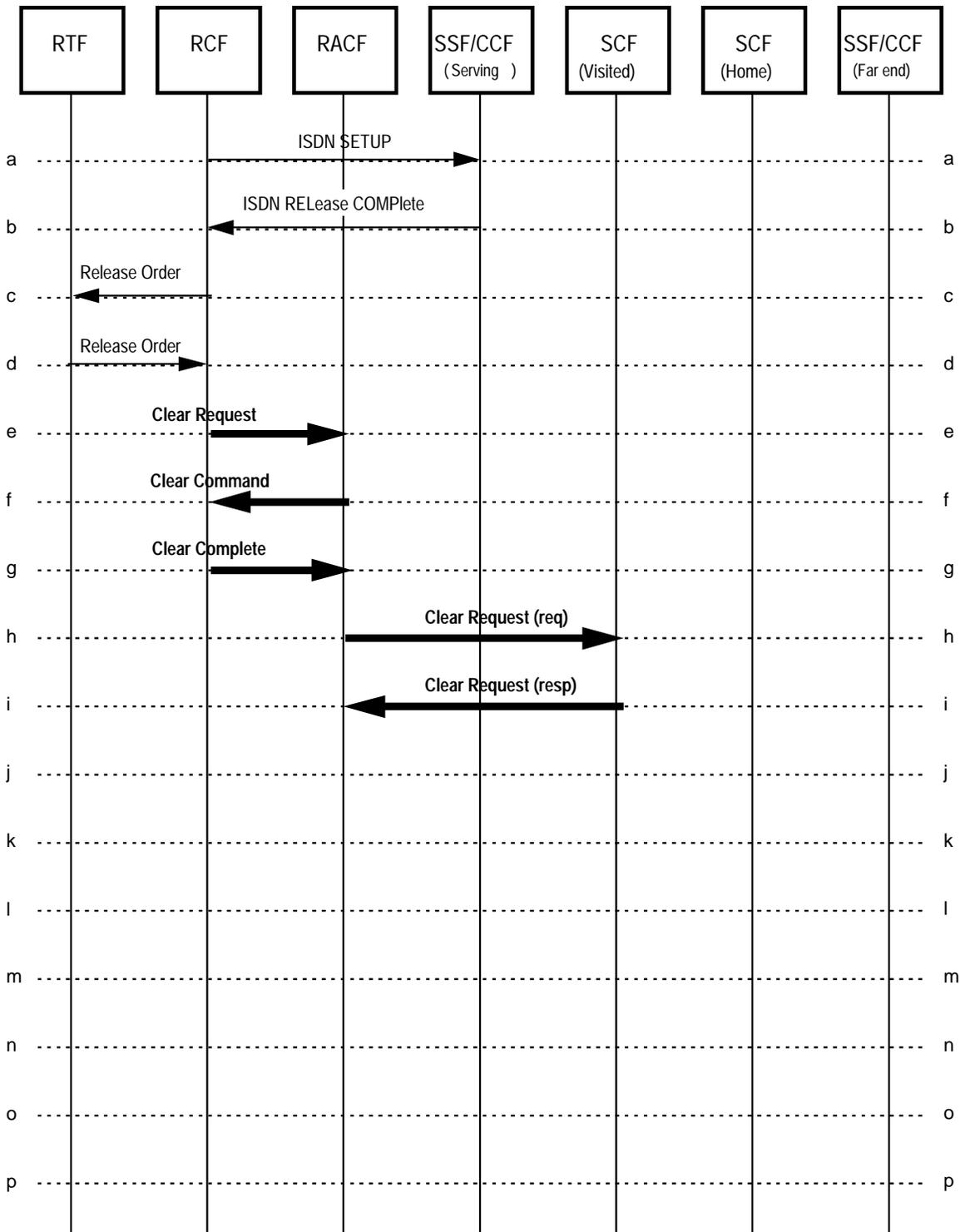


Figure A.10 – Call failure - scenario 3

A.7 Call waiting

This clause describes the signaling flow associated with the call waiting feature, as shown in figure A.11. This scenario assumes that the call waiting feature is active on the ISDN interface to the switch. Note that there are methods of performing call waiting other than using the MMAP operations.

- a) The Originating SSF/CCF determines the need for AIN processing, and sends an AIN query to the home SCF.
- b) The home SCF sends an IS-41 ROUTREQ message to the visited SCF.
- c) The visited SCF sends a Call Waiting Indication to the RACF.
- d) The RACF sends a Flash with Information message to the RCF to inform the RCF that another call is arriving for the user.
- e) The RACF sends a Call Waiting Indication Return Result message to the SCF to acknowledge successful receipt of the Call Waiting Indication message.
- f) The visited SCF sends the IS-41 routreq response message to the home SCF, containing the address to which the call should be delivered (to the RCF).
- g) The home SCF sends an AIN response to the originating SSF/CCF containing the address to which the call should be delivered.
- h) The originating SSF/CCF sends an ISUP IAM to the SSF/CCF where the call is to be delivered; i.e., to the terminating SSF/CCF.
- i) The terminating SSF/CCF sends an ISDN SETUP message to the interface identified by the Interface DN to which the call was routed.
- j) The RCF alerts the RTF about the new incoming call.
- k) The RTF indicates to the RCF that it is willing to accept the second call.
- l) The RCF sends an ISDN HOLD message to the SSF/CCF to put the first call on hold.
- m) The SSF/CCF acknowledges the reception of the RCF's message by sending the ISDN HOLD ACK message.
- n) The RCF sends an ISDN CONNect message to the SSF/CCF to indicate that the call has been answered.
- o) The terminating SSF/CCF sends an ISUP Answer Message (ANM) to the originating SSF/CCF.
- p) The SSF/CCF sends an ISDN CONNect ACKnowledge message to the RCF to acknowledge the receipt of the ISDN CONNect message.

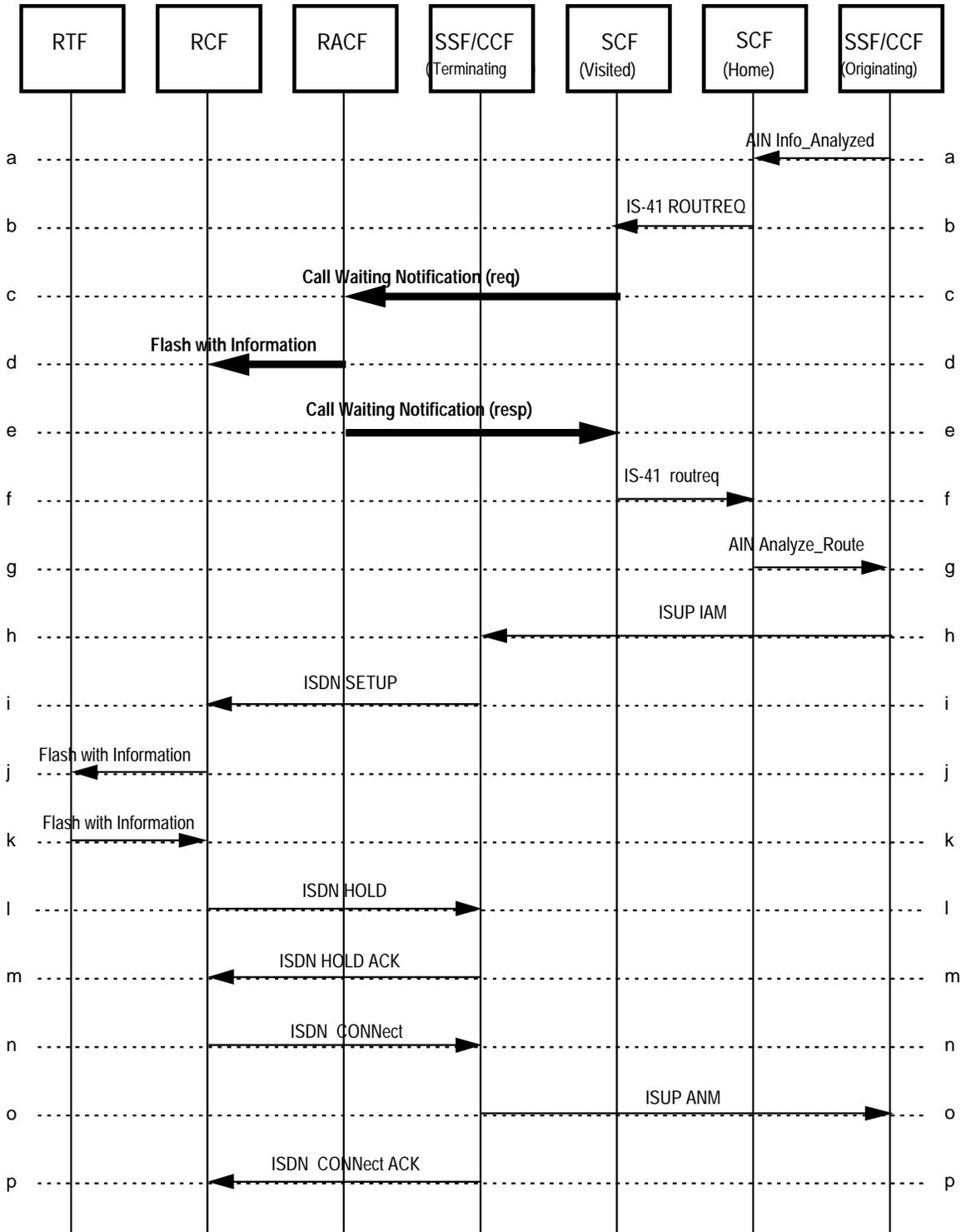


Figure A.11 – Call waiting

A.8 Call forwarding

This clause describes signaling flows associated with call forwarding. Specifically, this clause describes a call forwarding no-answer and call forwarding busy scenario. Note that there may be other scenarios associated with the call forwarding feature, which are not illustrated in this clause.

A.8.1 Call forwarding no-answer

This clause discusses the signaling flow associated with call forwarding no-answer scenario, as shown in figure A.12. Note that Steps (a) – (z) are the same as in case of mobile termination.

- aa) The SSF/CCF times out waiting for an ISDN CONNect message; i.e., the user does not answer after a certain number of rings. The SSF/CCF invokes call forwarding feature and forwards the call to a default DN with which an AIN trigger is associated.
- bb) The SSF/CCF sends the AIN Info_Collected message to the visited SCF; this message contains the interface DN allocated for the call.
- cc) The visited SCF sends an IS-41 TRANUMREQ to request the call forwarding number from the home SCF.
- dd) The home SCF responds with the call forwarding number.
- ee) The visited SCF sends an AIN Analyze_Route to the SSF/CCF with the forward-to number.
- ff) The SSF/CCF sends an IAM to the SSF/CCF associated with the forward-to number. In parallel, the SSF/CCF may start ISDN call clearing for the call that was initially set up between the RCF and the SSF/CCF, as described in Step (ii).
- gg) The SSF/CCF (forward-to) responds with an ISUP ACM message.
- hh) When the call is completed, the SSF/CCF (forward-to) sends an ISUP ANM.
- ii) The SSF/CCF sends an ISDN DISConnect message to the RCF, containing information such as the Call Reference for the call and the Cause for disconnection.
- jj) The RCF responds with an ISDN RELease message to the serving SSF/CCF.
- kk) The SSF/CCF responds to the RCF with an ISDN RELease COMPlete message.
- ll) The RCF initiates call clearing over the air interface by transmitting a Release Order over the forward traffic channel to the RTF.
- mm) The RTF acknowledges the RCF message by sending a Release Order over the reverse traffic channel.
- nn) The RCF sends a Clear Request message to the RACF to inform the RACF that the call has been cleared.
- oo) The RACF returns a Clear Command message to the RCF.
- pp) The RCF returns a Clear Complete message to the RACF, after it releases the appropriate resources. Note that this is an optional step.
- qq) At this stage, the RACF initiates clearing of SCCP connection with the RCF. The RACF also sends a Clear Request to the SCF to inform the SCF that the call has been cleared.
- rr) The SCF acknowledges the receipt of the Clear Request with a Clear Request Return Result message.

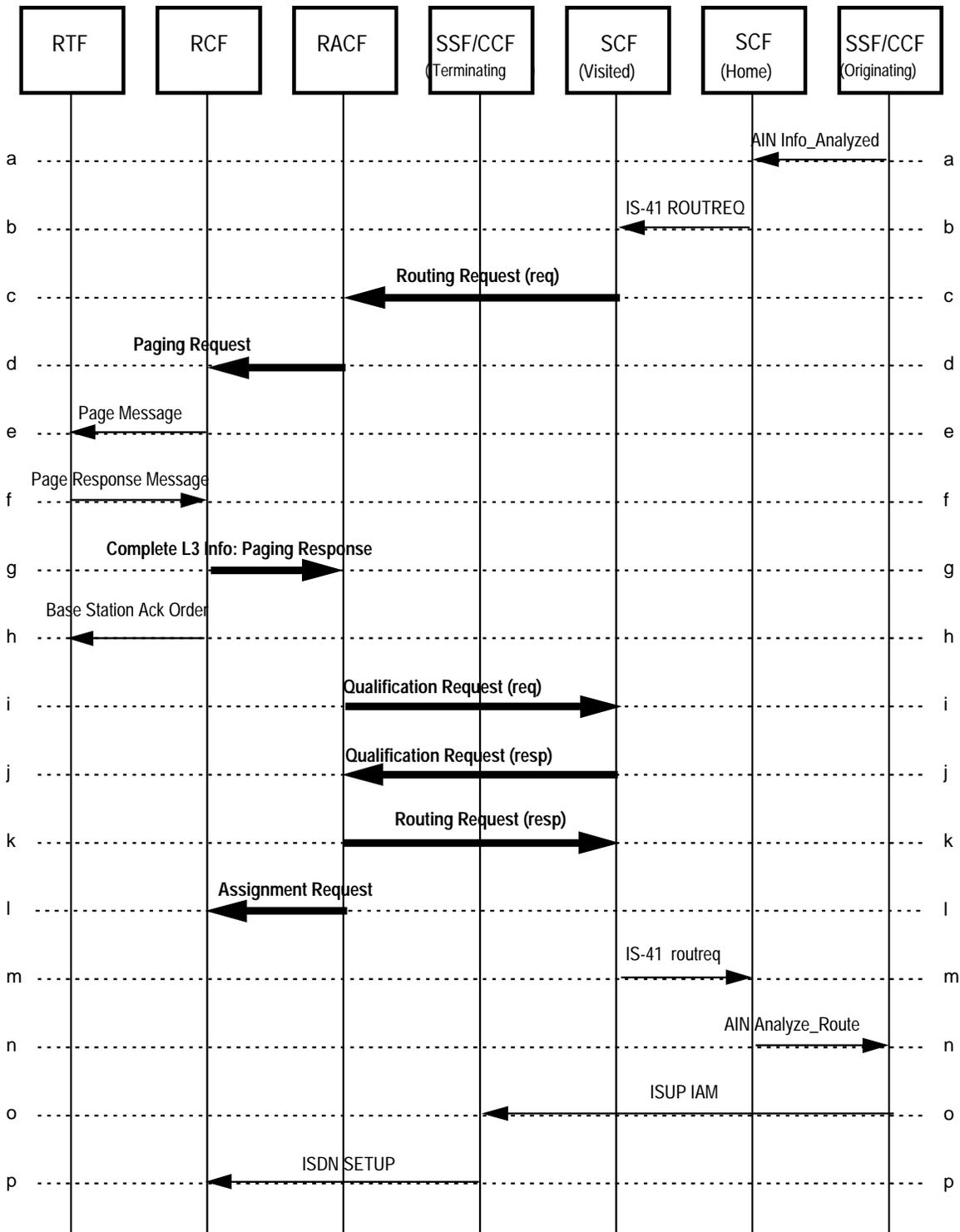


Figure A.12 – Call forwarding no-answer (1 of 3)

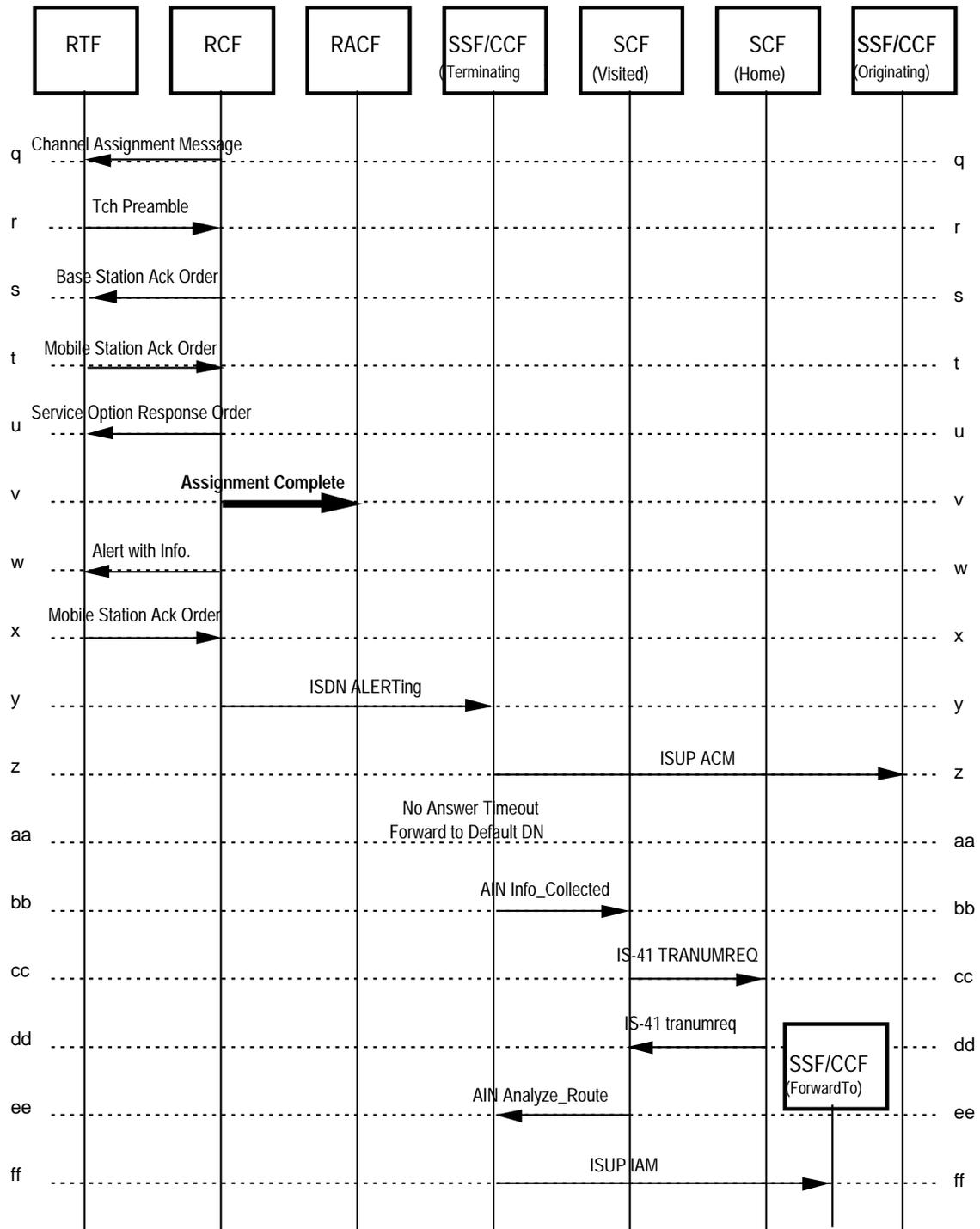


Figure A.12 – Call forwarding no-answer (2 of 3)

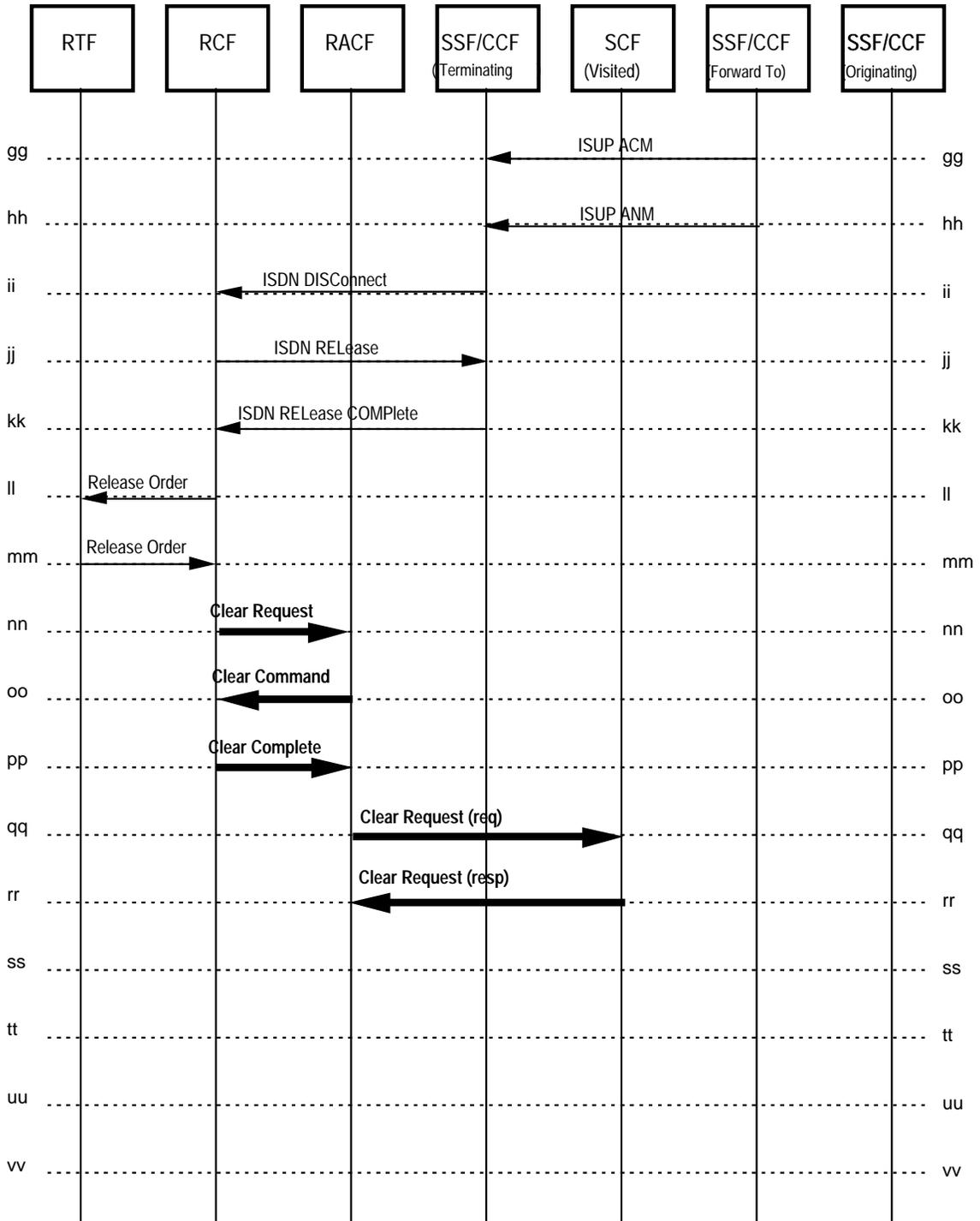


Figure A.12 – Call forwarding no-answer (3 of 3)

A.8.2 Call forwarding busy

This clause discusses the signaling flow associated with call forwarding busy scenario, as shown in figure A.13.

- a) The Originating SSF/CCF determines the need for AIN processing, and sends an AIN query to the home SCF.
- b) The home SCF sends an IS-41 ROUTREQ message to the visited SCF.
- c) The visited SCF determines that the user is busy and sends the IS-41 routreq response message to the home SCF indicated that the user is busy.
- d) The home SCF sends an AIN response to the originating SSF/CCF containing the forward-to number.
- e) The originating SSF/CCF sends an ISUP IAM to the SSF/CCF where the call is to be delivered, referred to as the "forward-to" SSF/CCF in the figure.
- f) The SSF/CCF (forward-to) responds with an ISUP ACM message.
- g) When the call is completed, the SSF/CCF (forward-to) sends an ISUP ANM.

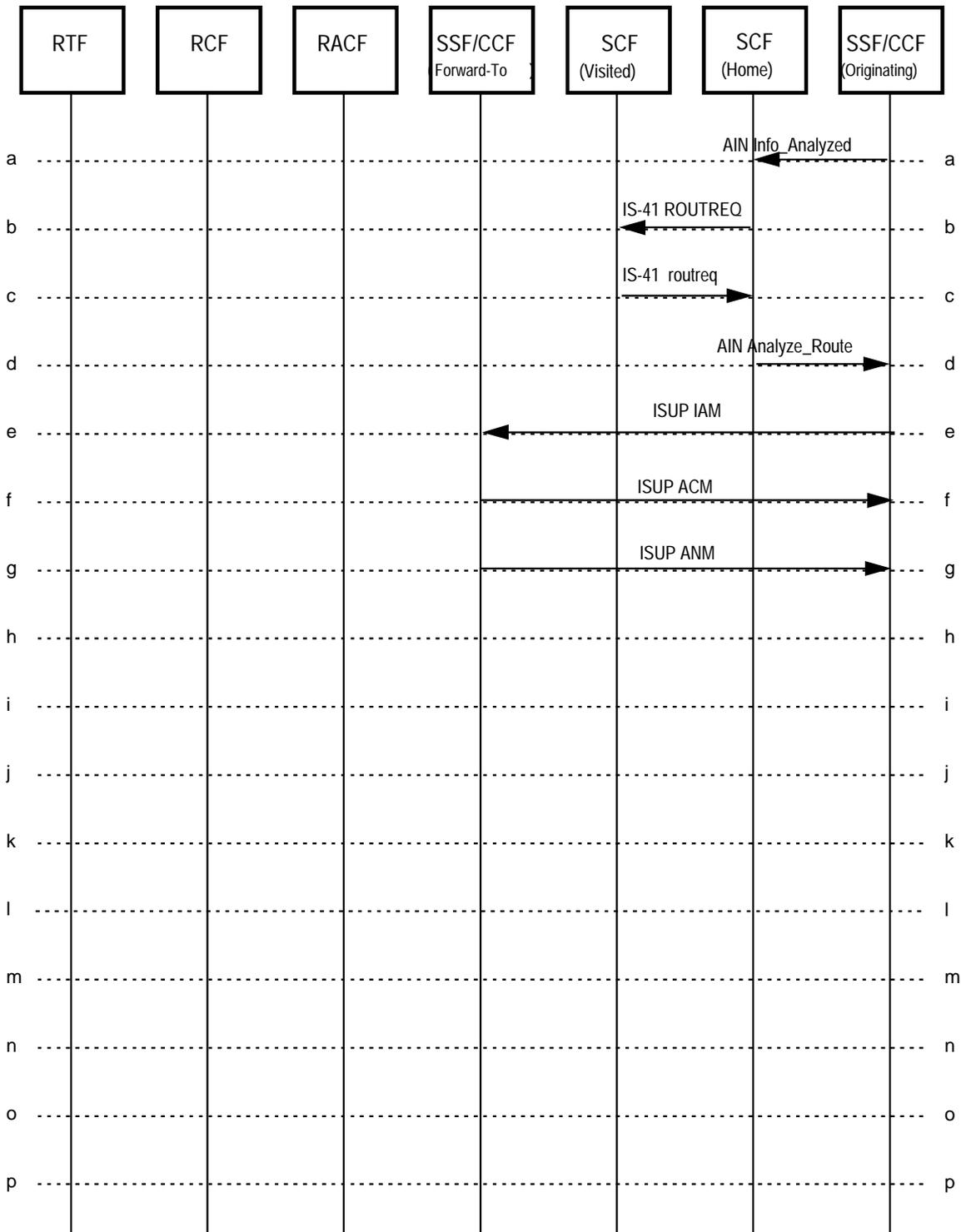


Figure A.13 – Call forwarding busy

A.8.3 Call forwarding not-found

This clause discusses the signaling flow associated with call forwarding not-found scenario, as shown in figure A.14.

- a) The Originating SSF/CCF determines the need for AIN processing, and sends an AIN query to the home SCF.
- b) The home SCF sends an IS-41 ROUTREQ message to the visited SCF.
- c) The visited SCF sends a Routing Request to the RACF.
- d) The RACF sends a Paging Request to the RCF to confirm the location of the mobile user.
- e) The RCF issues a Page Message containing the address of the mobile over the paging channel.
- f) The timer in the visited SCF associated with the Routing Request message expires, and the visited SCF sends an IS-41 routreq message to the home SCF indicating that the user was not found.
- g) The home SCF sends an AIN response to the originating SSF/CCF containing the call forwarding not-found number.
- h) The originating SSF/CCF sends an ISUP IAM to the SSF/CCF where the call is to be delivered; i.e., to the "forward-to" SSF/CCF.
- i) The SSF/CCF (forward-to) responds with an ISUP ACM message.
- j) When the call setup is completed, the forward-to SSF/CCF responds to the originating SSF/CCF with an ISUP ANM message.

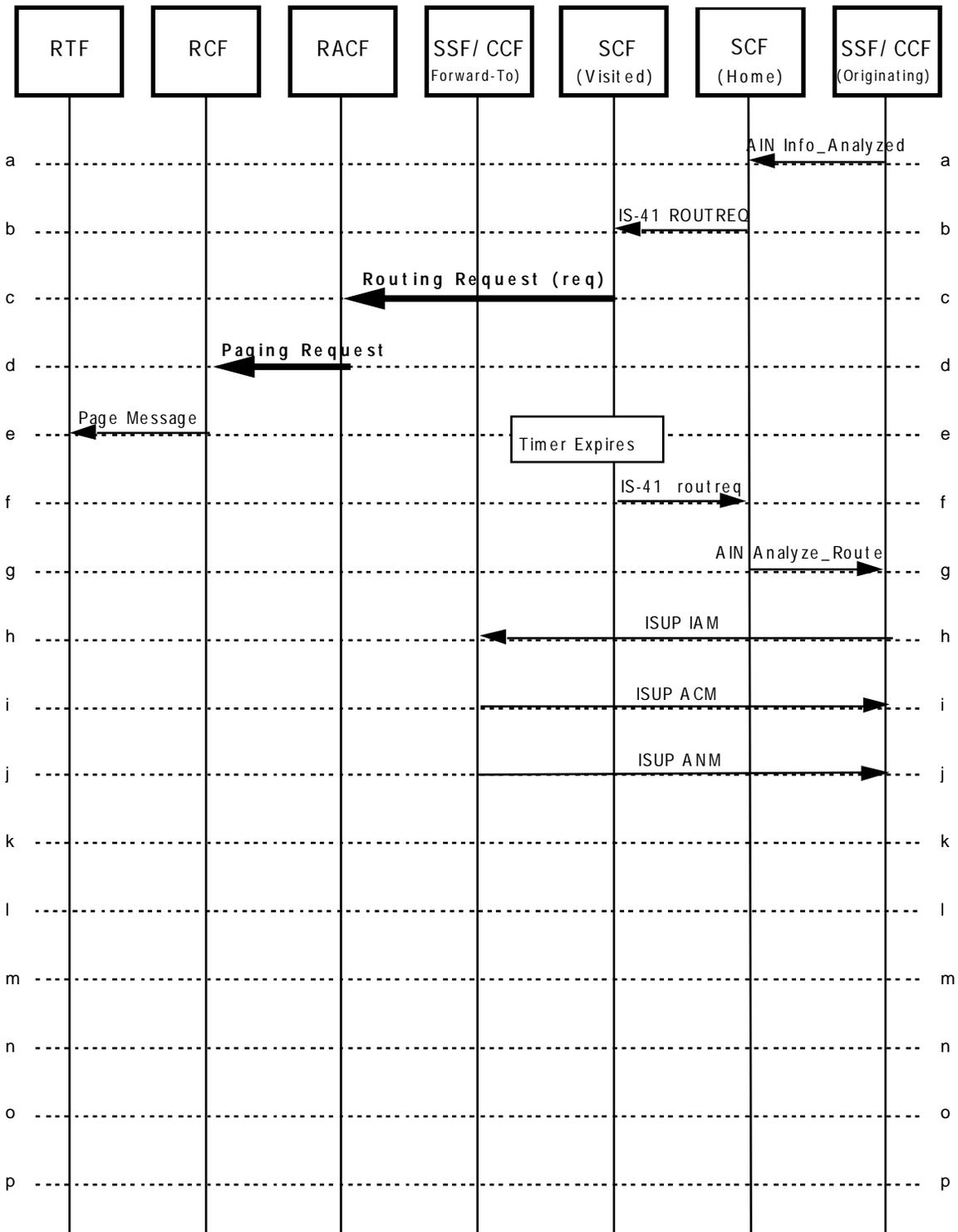


Figure A.14 – Call forwarding not-found

A.9 Three-way calling

This clause describes signaling flows associated with three-way calling. Specifically, this clause describes a scenario where user's subscription to three-way calling feature is active, and a scenario where the subscription is not active. Note that there may be other scenarios associated with three-way calling, which are not illustrated in this clause.

A.9.1 Scenario 1

This clause discusses the signaling flow associated with three-way calling scenario when the user's subscription to three-way calling feature is active, as shown in figure A.15. Note that Steps (b) – (e) are optional.

- a) The user indicates the desire to originate another call.
- b) The RCF may send a Feature Status Request message to the RACF to determine if the three-way calling feature is active.
- c) The RACF may send a Qualification Request message to the visited SCF to request the user's profile.
- d) The visited SCF sends profile information to the RACF.
- e) The RACF checks the status of the three-way calling feature and returns it in the Feature Status Response message.
- f) The RCF sends an ISDN INFO to the SSF/CCF requesting invocation of three-way call on the ISDN interface.
- g) The SSF/CCF replies with ISDN INFO to indicate acceptance of the three-way call request.
- h) The RCF sends an ISDN SETUP for the second call, containing the dialed digits.
- i) The SSF/CCF send an ISDN HOLD to the RCF to put the first call on hold.
- j) The RCF acknowledges with ISDN HOLD ACK message.
- k) The SSF/CCF triggers on the origination attempt for the second call, and sends an AIN Info_Collected message to the SCF.
- l) The visited SCF processes the message and also checks if the three-way calling feature is active in user's subscription. If it is, the visited SCF responds with an AIN Analyze_Route containing the dialed digits.
- m) The visited SSF/CCF sends an ISUP Initial Address Message (IAM) to the destination SSF/CCF.
- n) The visited SSF/CCF also sends an ISDN CALL PROCEEDing message to the RCF.
- o) The destination SSF/CCF sends an ISUP Address Complete Message (ACM) to the visited SSF/CCF.
- p) The visited SSF/CCF sends an ISDN ALERTing message to the RCF. This may include Progress Indicator element to indicate how call progress information will be passed.
- q) The RCF sends the Alert with Information message to the RTF to cause ringing at the mobile. The alerting may also be in-band.
- r) The destination SSF/CCF sends an ISUP Answer Message (ANM) to the visited SSF/CCF.
- s) The visited SSF/CCF sends an ISDN CONNect message to the RCF, once the call has been established.
- t) The RCF acknowledges the receipt of the CONNect message by sending an ISDN CONNect ACKnowledge message to the visited SSF/CCF. At this point, the user is on the second call, with the first call on hold.

- u) The user may initiate conferencing of the second call to form a three-way conference, resulting in a Flash With Information message from RTF to RCF.
- v) The RCF sends an ISDN RETrieve message to the SSF/CCF to retrieve the first call.
- w) The SSF/CCF forms a three-way conference using the call reference for the first call, and sends an ISDN RETrieve ACKnowledge message to the RCF.
- x) The SSF/CCF sends an ISDN RELease to the RCF to release the call reference for the second call.
- y) The RCF acknowledges with an ISDN RELease COMplete.

The reader is referred to IS-653 for a description of various call clearing scenarios associated with a three-way call.

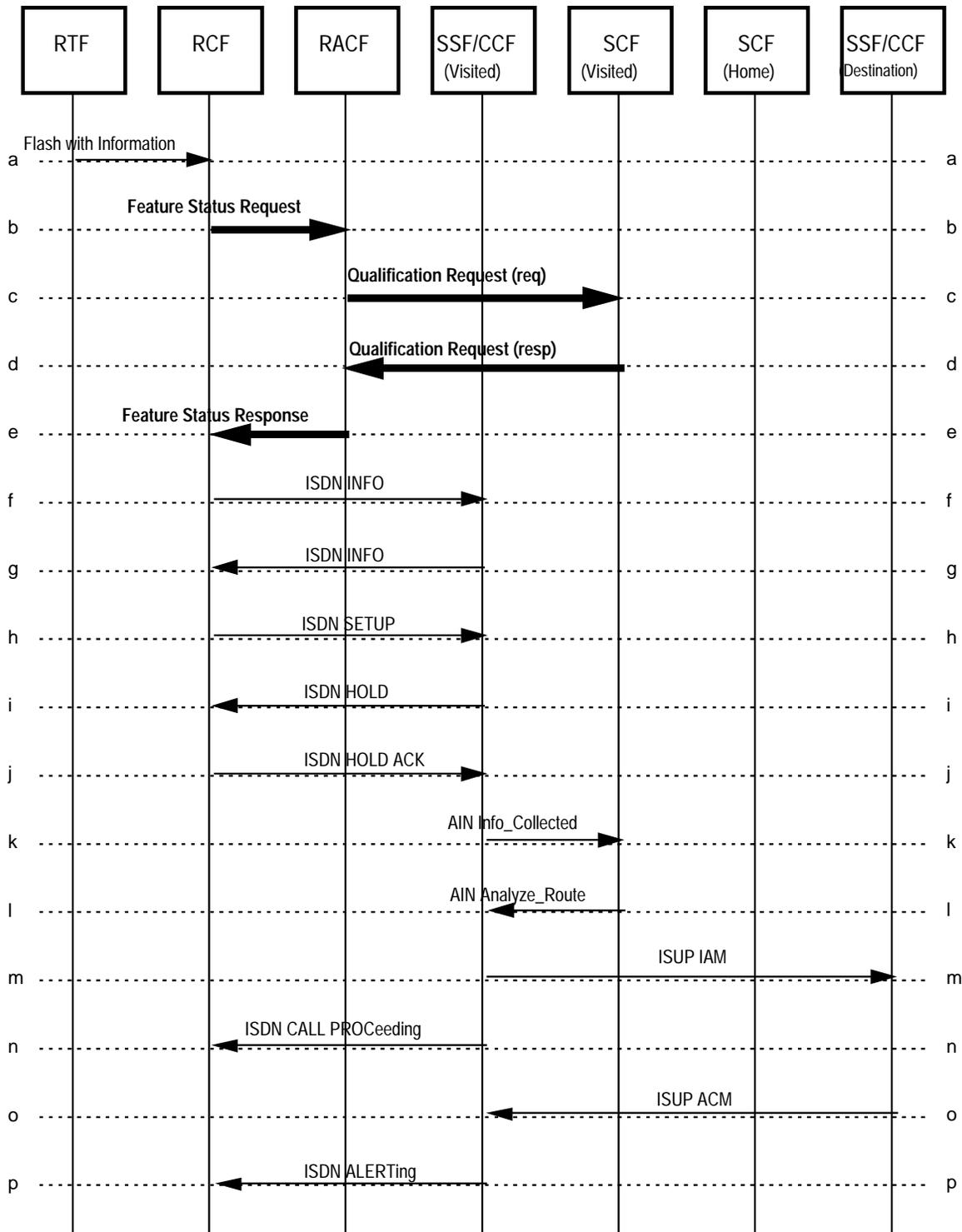


Figure A.15 – Three-way calling scenario 1 (1 of 2)

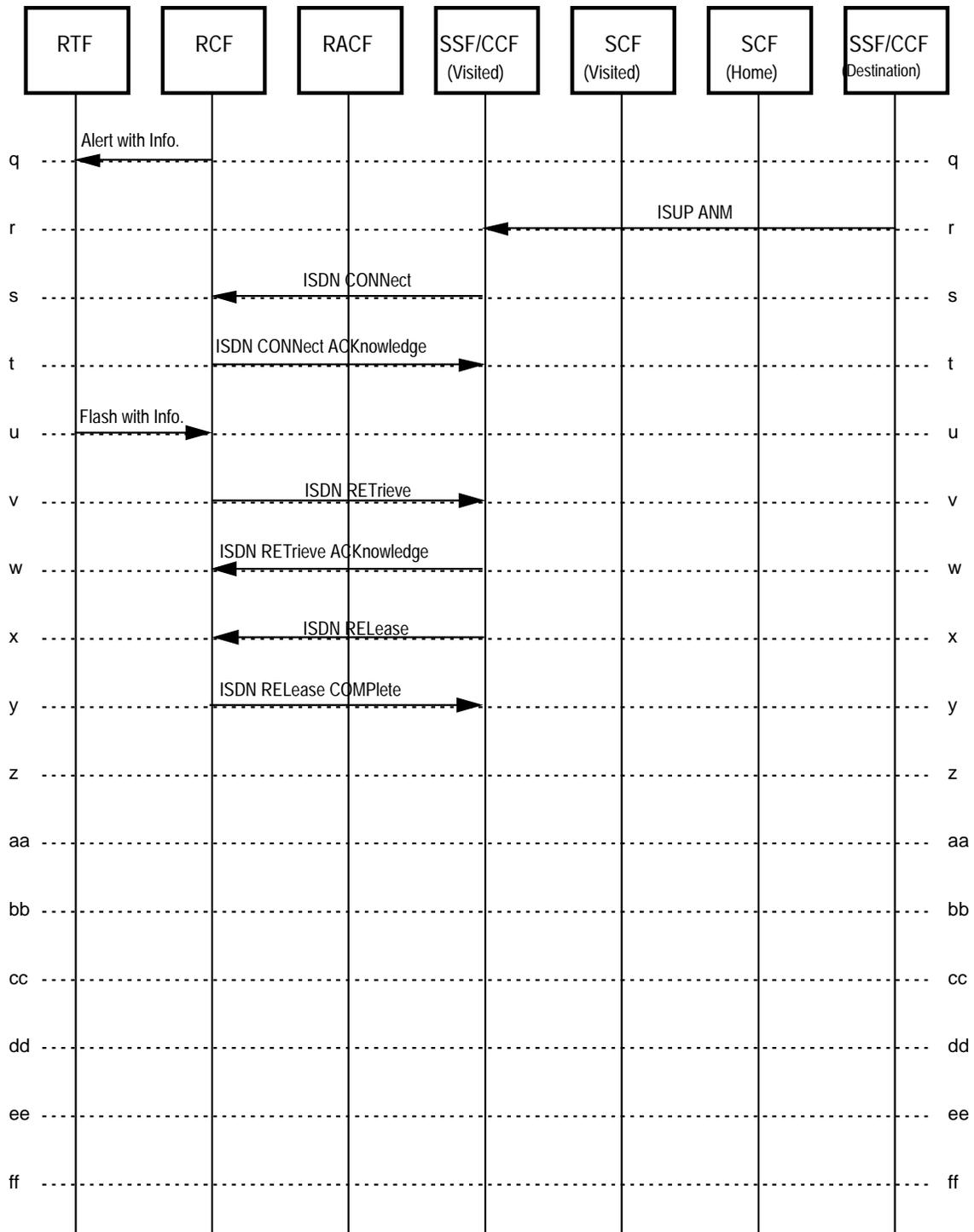


Figure A.15 – Three-way calling scenario 1 (2 of 2)

A.9.2 Scenario 2

This clause discusses the signaling flow associated with three-way calling scenario when the user's subscription to three-way calling feature is not active, as shown in figure A.16.

- a) The user indicates the desire to originate another call.
- b) The RCF sends an ISDN INFO to the SSF/CCF requesting invocation of three-way call on the ISDN interface.
- c) The SSF/CCF replies with ISDN INFO to indicate acceptance of the three-way call request.
- d) The RCF sends an ISDN SETUP for the second call, containing the dialed digits.
- e) The SSF/CCF send an ISDN HOLD to the RCF to put the first call on hold.
- f) The RCF acknowledges with ISDN HOLD ACK message.
- g) The SSF/CCF triggers on the origination attempt for the second call, and sends an AIN Info_Collected message to the SCF.
- h) The visited SCF processes the message and also checks if the three-way calling feature is active in user's subscription. The visited SCF detects that the feature is not active and responds with an AIN Send_To_Resource message to play an announcement to the user.
- i) The SSF/CCF plays the announcement and initiates the clearing of the second call.
- j) The RCF responds with an ISDN RELease message.
- k) The SSF/CCF responds with an ISDN RELease COMPlete message.
- l) The RCF retrieves the first call using ISDN RETRieve message.
- m) The SSF/CCF responds with an ISDN RETRieve ACKnowledge message.

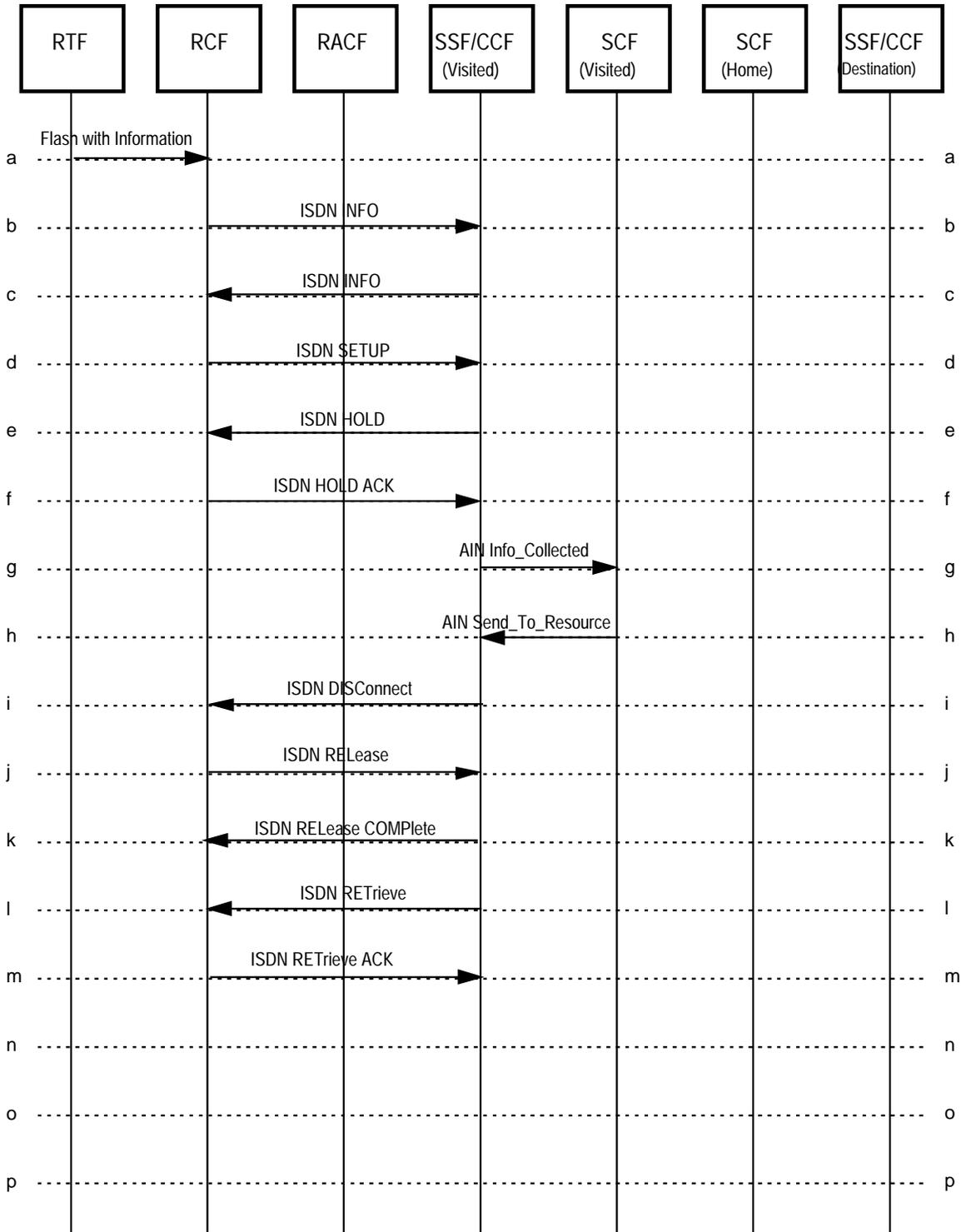


Figure A.16 – Three-way calling scenario 2

A.10 Location registration

This clause discusses the signaling flow associated with location registration, as shown in figure A.17. Note that Steps (d) and (e) are optional.

- a) The RTF initiates registration operation by sending the Registration Message to the RCF. If authentication is required, the Registration Message will include the relevant authentication parameters.
- b) The RCF constructs a Location Updating Request message, places it in the Complete Layer 3 Information message, and sends it to the RACF. If the Registration Message in Step (a) included authentication parameters, these parameters are included in the Location Updating Request message as well.
- c) The RACF sends a Registration Request message to the SCF including authentication parameters, if they were received from the RCF.
- d) If the Registration Request message included authentication parameters, the visited SCF sends an IS-41 AUTHREQ to the home SCF.
- e) The home SCF performs the necessary authentication procedure and returns an IS-41 authreq response message to the visited SCF.
- f) The visited SCF formulates an IS-41 REGNOT message and sends it to the home SCF.
- g) The home SCF updates the location of the mobile and responds with an IS-41 regnot response message to the visited SCF. In parallel, the home SCF may initiate registration cancellation procedures with the previously visited SCF, as described in Step (k).
- h) The visited SCF returns a Registration Request response message to the RACF after updating its location register.
- i) The RACF sends a Location Updating Accept message to the RCF to indicate that the Location Update Request has been processed. In case of SCCP transport, this message is carried in the SCCP Connection Refused primitive.
- j) The RCF transmits a Registration Accept Order to the RTF to indicate successful location registration operation.
- k) The home SCF sends an IS-41 REGCANC message to visited SCF where the user was previously registered to request cancellation of registration.
- l) The visited SCF (old) responds with an IS-41 regcanc message.

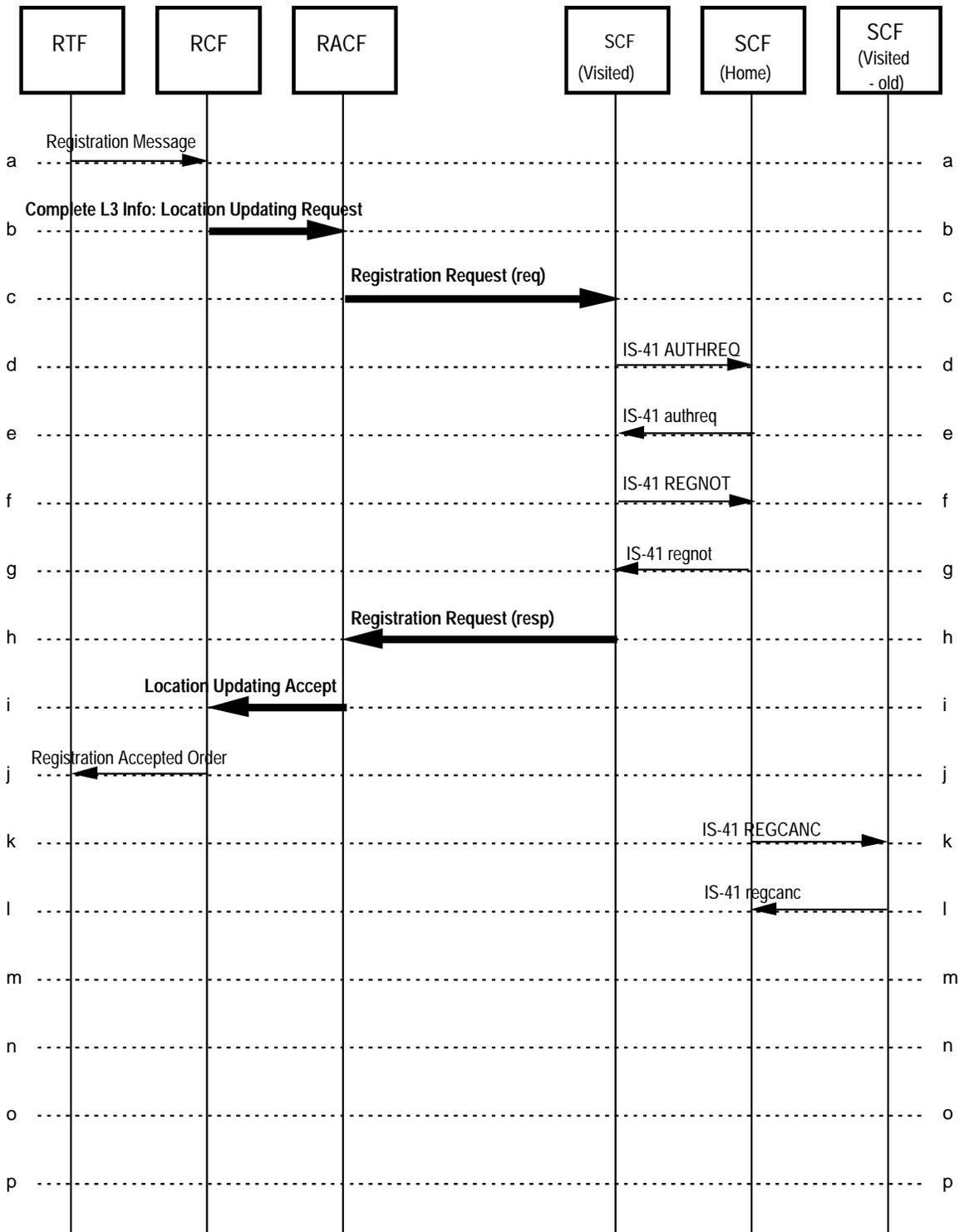


Figure A.17 – Location registration

A.11 Authentication

This clause discusses signaling flows associated with authentication. These flows discuss SSD Update, Unique Challenge, and Parameter Update procedures.

A.11.1 SSD update

This subclause discusses the signaling flow associated with a Shared Secret Data Update procedure, as shown in figure A.18.

- a) The home SCF initiates the SSD update procedure by sending an IS-41 AUTHDIR message to the visited SCF. This message includes the RANDSSD, a random number to be used in the update procedure.
- b) The visited SCF acknowledges the receipt of the IS-41 AUTHDIR message by sending an IS-41 authdir response message to the home SCF.
- c) The visited SCF sends an Authentication Directive to the RACF to request SSD update. The update information includes the RANDSSD.
- d) The RACF sends an SSD Update Request message to the RCF to indicate that the SSD at the RTF needs updating.
- e) The RCF sends an SSD Update Order to the RTF to indicate that the mobile should update its SSD.
- f) The RTF generates the new SSD using the RANDSSD, and then selects a random number (RANDBS) and sends it to the RCF in a Base Station Challenge Order message.
- g) The RCF sends the RANDBS to the RACF in a Base Station Challenge message.
- h) The RACF sends the RANDBS to the SCF in a Network Challenge Request message.
- i) The SCF calculates AUTHBS using the RANDBS and the new SSD, and sends it to the RACF in the Network Challenge Response message.
- j) The RACF sends the AUTHBS to the RCF in the Base Station Challenge Response message.
- k) The RCF forwards the response to the RTF in a Base Station Challenge Order Confirmation message.
- l) If the AUTHBS is valid, the RTF returns a successful indication in an SSD Update Confirmation Order message to the RCF. If the AUTHBS is not valid, the RTF returns a failure indication in an SSD Update Confirmation Order message.
- m) The RCF returns the outcome of the SSD update procedure to the RACF in an SSD Update Response message.
- n) The RACF forwards the outcome to the visited SCF in an Authentication Directive Response message.
- o) The visited SCF sends an IS-41 Authentication Status Report message to the home SCF to report the outcome of the SSD update procedure.

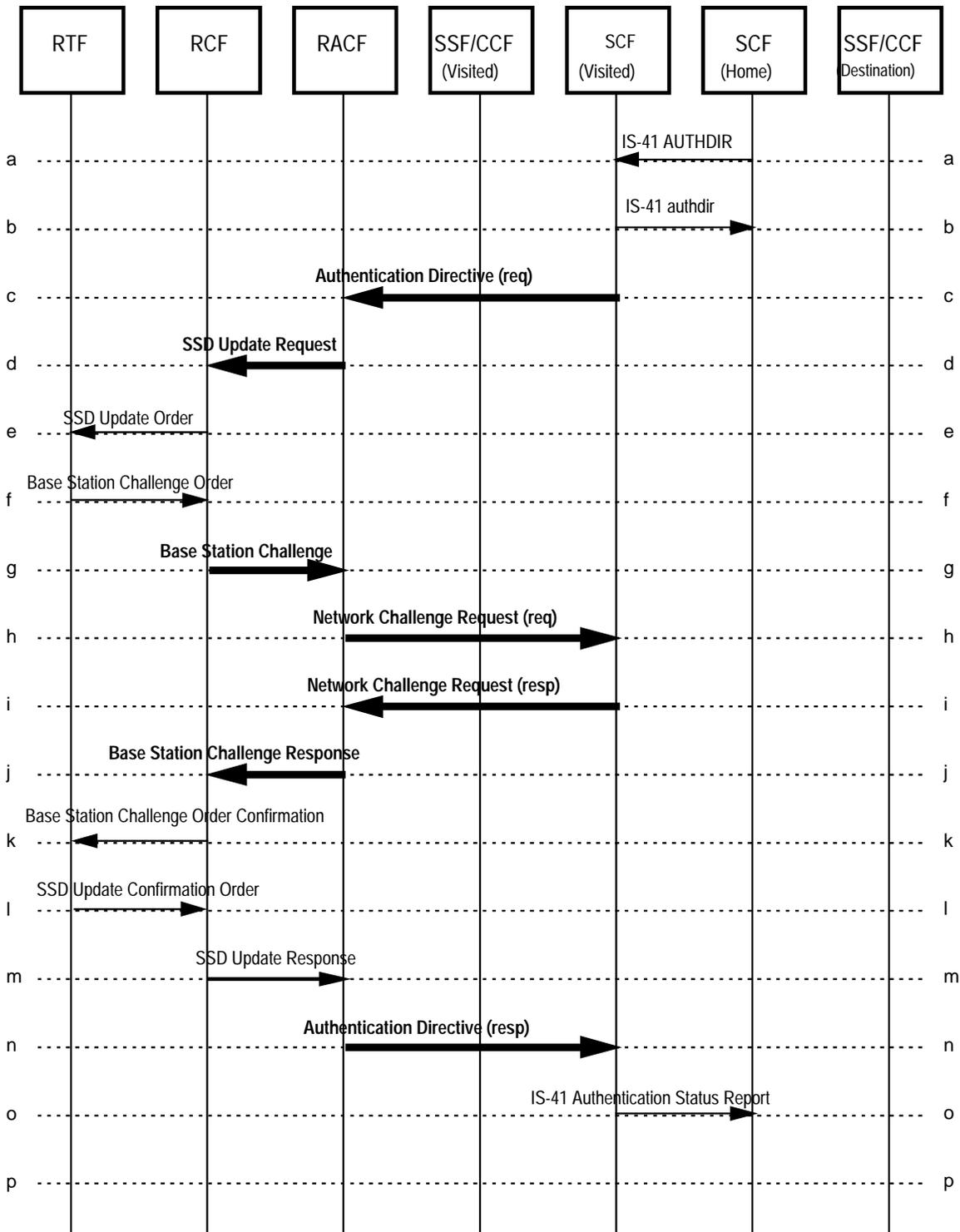


Figure A.18 – SSD update

A.11.2 Unique challenge

This subclause discusses the signaling flow associated with a Unique Challenge procedure, as shown in figure A.19.

- a) The home SCF initiates the unique challenge procedure by sending an IS-41 AUTHDIR message to the visited SCF. This message includes the RANDU, a random number to be used in the unique challenge procedure and the AUTHU, the expected outcome.
- b) The visited SCF acknowledges the receipt of the IS-41 AUTHDIR message by sending an IS-41 authdir response message to the home SCF.
- c) The visited SCF sends an Authentication Directive to the RACF to request invocation of unique challenge procedure. This message includes the RANDU.
- d) The RACF sends an Authentication Request message to the RCF including the RANDU.
- e) The RCF forwards the information to the RTF in an Authentication Challenge message.
- f) The RTF computes the AUTHU using the RANDU as input, and sends it to the RCF in an Authentication Challenge Response message.
- g) The RCF forwards the response to the RACF in an Authentication Response message.
- h) The RACF forwards the AUTHU to the SCF in an Authentication Directive Response message.
- i) The SCF compares the AUTHU value received from the RTF (via the RCF and RACF) with the value received in Step (a). If the values match, the SCF reports the outcome of the unique challenge procedure to the home SCF (Step (k)). If the values do not match, the SCF sends an Authentication Failure Indication to the RACF and reports the outcome of the unique challenge procedure to the home SCF (Step (k)).
- j) The RACF sends an Authentication Reject message to the RCF to indicate the failure of unique challenge procedure.
- k) The visited SCF sends an IS-41 Authentication Status Report message to the home SCF to report the outcome of the unique challenge procedure.

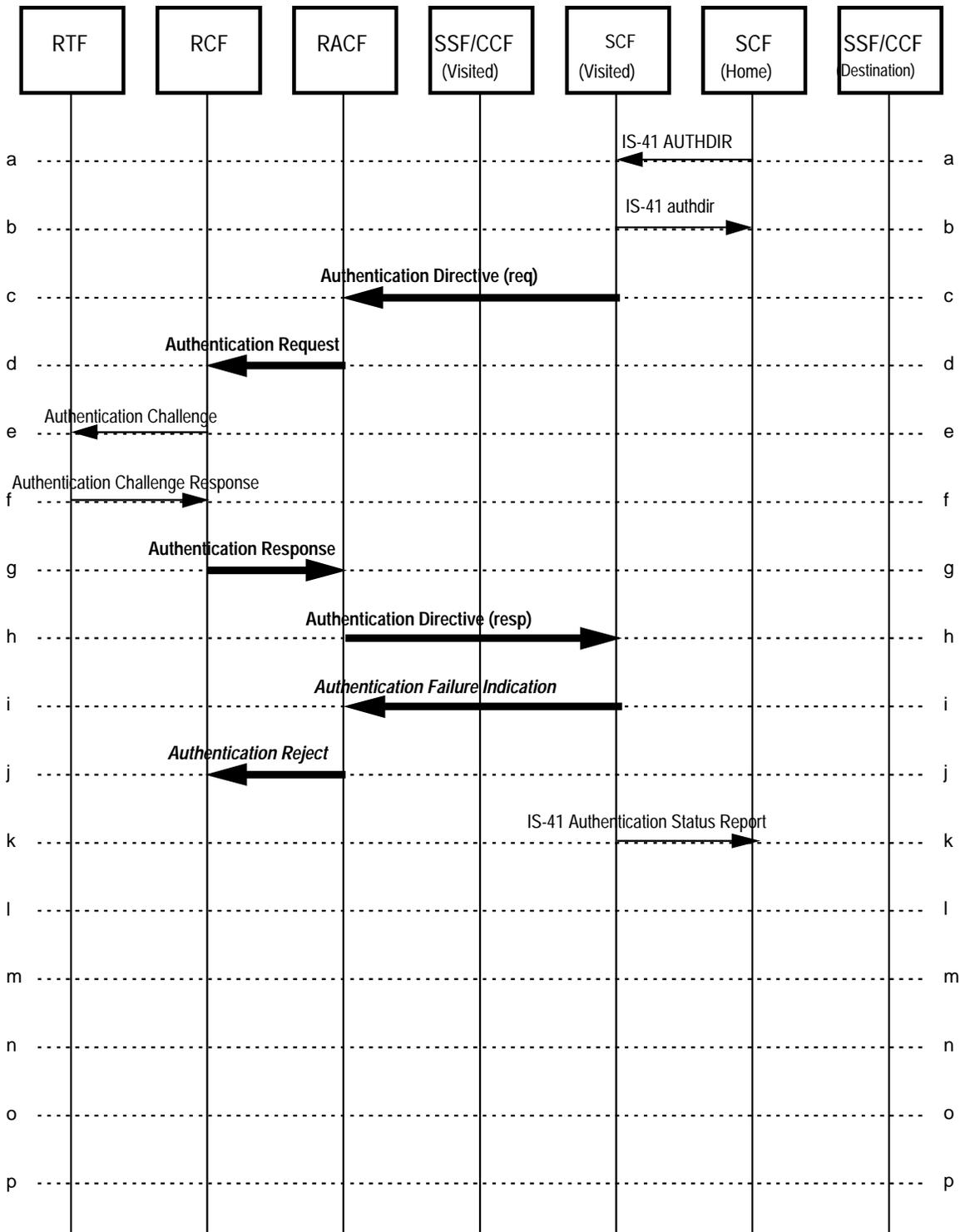


Figure A.19 – Unique challenge

A.11.3 Parameter update

This subclause discusses the signaling flow associated with parameter update procedure, as shown in figure A.20.

- a) The home SCF initiates the parameter update procedure by sending an IS-41 AUTHDIR message to the visited SCF.
- b) The visited SCF acknowledges the receipt of the IS-41 AUTHDIR message by sending an IS-41 authdir response message to the home SCF.
- c) The visited SCF sends an Authentication Directive to the RACF to request invocation of parameter update procedure.
- d) The RACF sends a Parameter Update Request message to the RCF.
- e) The RCF forwards the information to the RTF in a Parameter Update Order message.
- f) The RTF increments the call history count and responds with a Parameter Update Order Ack message.
- g) The RCF forwards the response to the RACF in a Parameter Update Confirm message.
- h) The RACF forwards the response to the SCF in an Authentication Directive Response message.
- i) The visited SCF sends an IS-41 Authentication Status Report message to the home SCF to report the outcome of the parameter update procedure.

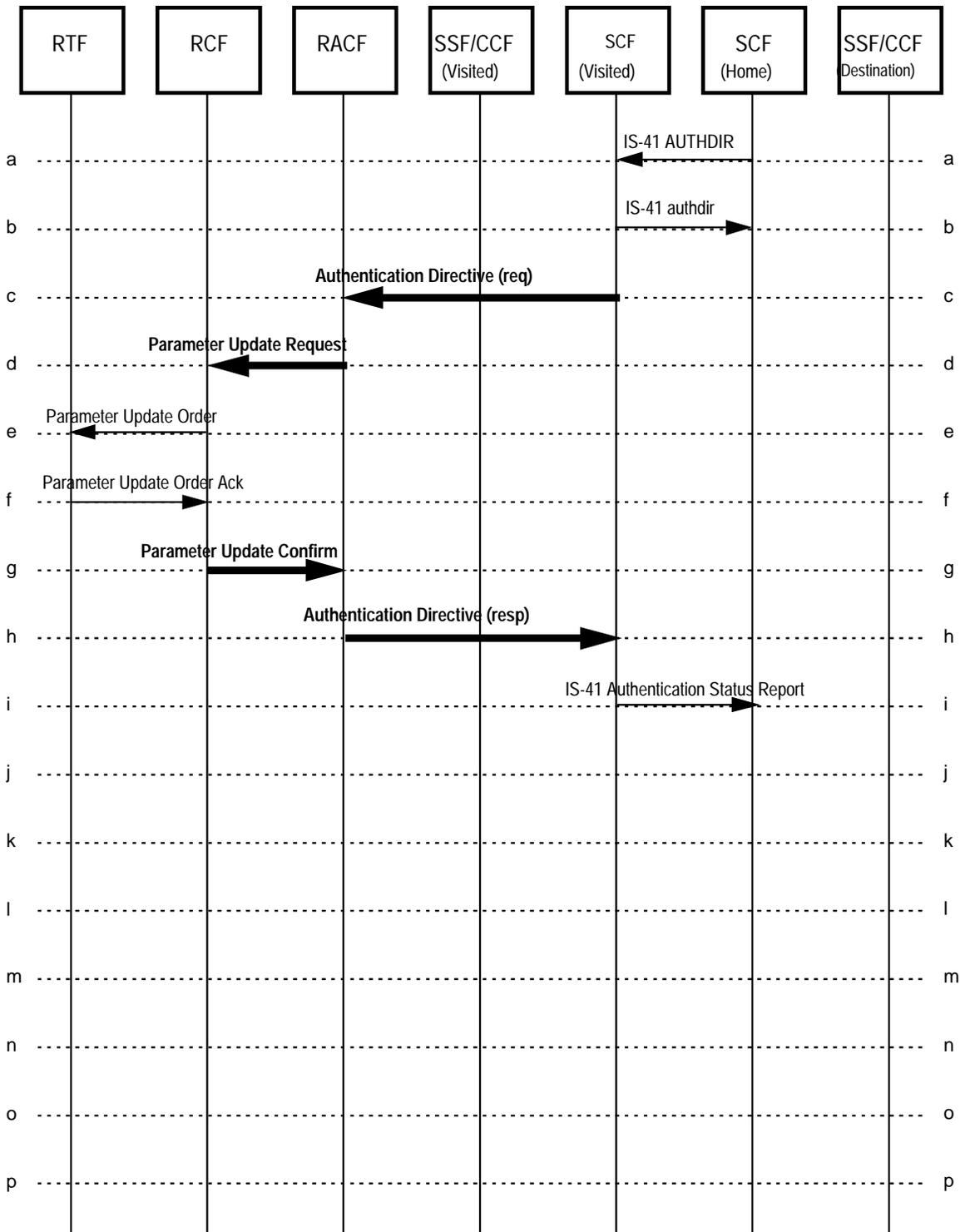


Figure A.20 – Parameter update

A.12 Intra-RACF handoff

This clause discusses the signaling flow associated with a handoff from one RCF to another, both of which are under the same RACF's domain. The handoff is managed by the RACF and the source RCF acts as the anchor.

Clause A.12.1 depicts a soft handoff scenario and clause A.12.2 depicts a hard handoff scenario.

A.12.1 Soft handoff

This subclause discusses a soft handoff scenario, as shown in figure A.21. Note that Steps (e) – (k) may not be needed in the scenario that a connection between the two RCFs already exists (i.e., a “nailed-up” connection). This scenario assumes that RCFs (not the RACF) allocate the DN if dedicated circuits are not used. However, operations proposed for handoff in this standard support allocation of the DN by RACF as well.

- a) The source RCF determines that a handoff to another RCF is necessary due to RF reasons, and sends a Handoff Required message to the RACF. Included in the message is a list of candidate target cells.
- b) The RACF determines the best candidate target RCF and sends a Handoff Request message to that RCF for reservation of a radio traffic channel and to provide a DN assignment.
- c) The target RCF determines that the appropriate resources are available, and reserves or allocates the radio traffic channel. It also assigns the DN over which the handoff will be received and sends this information to the RACF in a Handoff Request Ack message. In this message, the target RCF sends the channel information for soft handoff.
- d) The RACF then sends the target RCF DN and the source RCF DN (used for the second path from the source RCF to the SSF/CCF) in a Handoff Command message to the source RCF. In this message, the RACF forwards the information received from the target RCF; i.e., channel information for soft handoff.
- e) Upon receiving the Handoff Command message from the RACF, the source RCF sends an ISDN SETUP to the SSF/CCF with the calling party number set to the DN allocated for handoff by the source RCF and the called party number set to the DN allocated for handoff by the target RCF.
- f) The SSF/CCF acknowledges the ISDN SETUP message with the ISDN CALL PROC message sent to the source RCF.
- g) Simultaneous to sending the ISDN CALL PROC message, the SSF/CCF sends an ISDN SETUP message to the target RCF to establish a call.
- h) The target RCF recognizes the call as a handoff attempt (based on the DN used) and sends an ISDN CONN message to the SSF/CCF.
- i) The SSF/CCF sends an ISDN CONN ACK message to the target RCF.
- j) Simultaneous to sending the ISDN CONN ACK message, the SSF/CCF sends an ISDN CONN message back to the source RCF.
- k) The source RCF acknowledges the ISDN CONN with an ISDN CONN ACK.
- l) With the call between the two RCFs established, the source RCF sends a Handoff Direction message to the RTF with the target radio traffic channel information previously provided by the RACF in the Handoff Command message.
- m) The RTF responds with an Acknowledgment Order confirming the radio traffic channel assignment(s), and then proceeds to re-tune and/or add the new channel(s).
- n) When the RTF has re-tuned and/or added the new channel(s) and sync is established, a Handoff Complete message is sent to the source RCF.
- o) The source RCF, upon receiving the Handoff Complete message from the RTF, informs the RACF, via the Handoff Performed message, that a handoff was executed.
- p) The RACF informs the SCF that a handoff has occurred by sending a Handover Complete Indication message. Note that this procedure is optional.

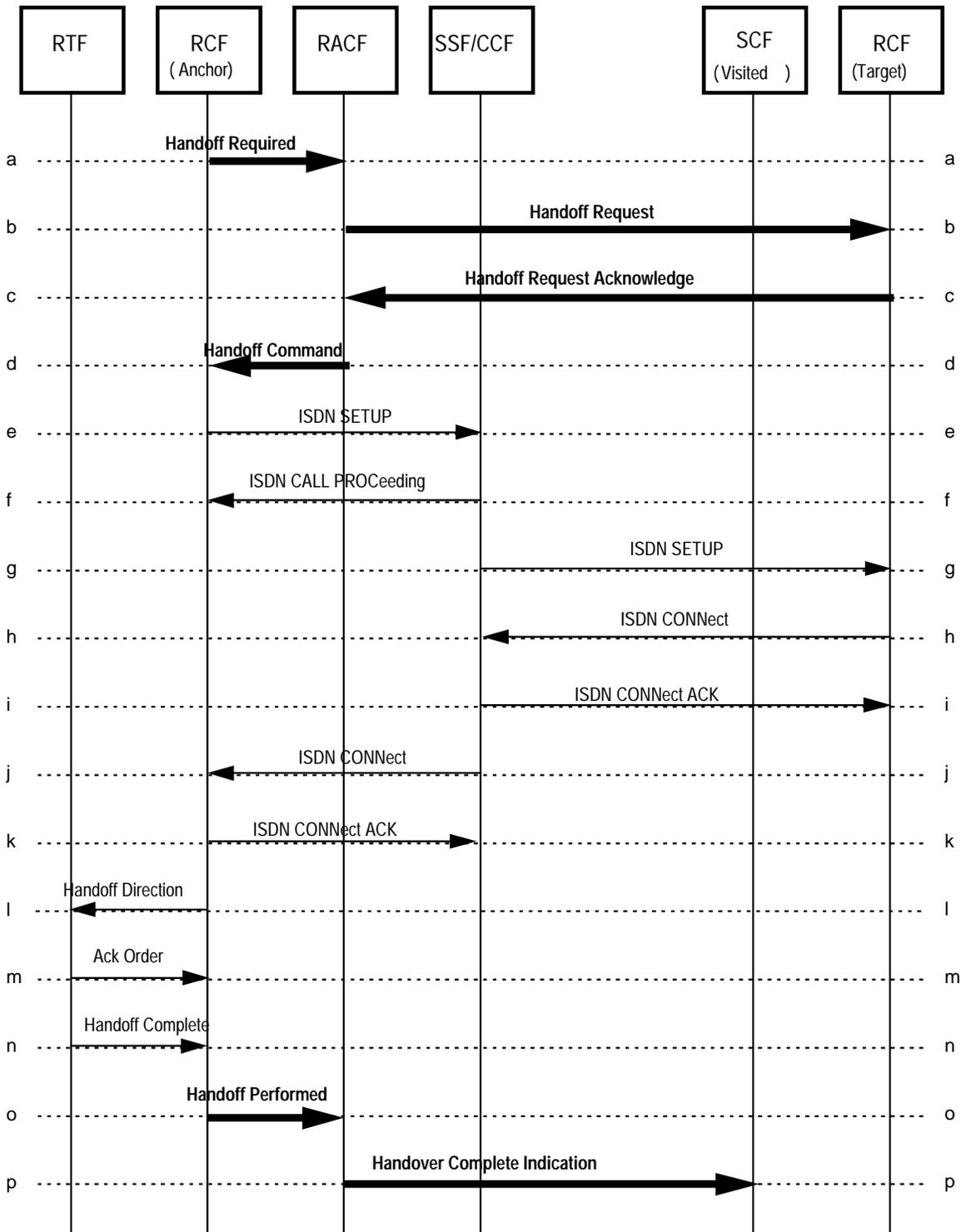


Figure A.21 – Intra-RACF soft handoff

A.12.2 Hard handoff

This clause discusses a hard handoff scenario, as shown in figure A.22. Note that steps (e) – (k) may not be needed in the scenario that a connection between the two RCFs already exists (i.e., there exists a “nailed-up” connection). This scenario assumes that RCFs (not the RACF) allocate the DN if dedicated circuits are not used. However, operations proposed for handoff in this standard support allocation of the DN by RACF as well.

- a) The source RCF determines that a handoff to another RCF is necessary due to RF reasons, and sends a Handoff Required message to the RACF. Included in the message is a list of candidate target cells. The source RCF indicates the need for a hard handoff in this message by either not including the IS-95 Channel Identity parameter or by setting the appropriate bits in that parameter.
- b) The RACF determines the best candidate target RCF and sends a Handoff Request message to that RCF for reservation of a radio traffic channel and to provide a DN assignment.
- c) The target RCF determines that the appropriate resources are available, and reserves or allocates the radio traffic channel. It also assigns the DN over which the handoff will be received and sends this information to the RACF in a Handoff Request Ack message. In this message, the target RCF sets the hard handoff bit in the IS-95 Channel Identity parameter for hard handoff.
- d) The RACF then sends the target RCF DN and the source RCF DN (used for the second path from the source RCF to the SSF/CCF) in a Handoff Command message to the source RCF. In this message, the RACF forwards the information received from the target RCF; i.e., indicate hard handoff by setting the appropriate bit in the IS-95 Channel Identity parameter.
- e) Upon receiving the Handoff Command message from the RACF, the source RCF sends an ISDN SETUP to the SSF/CCF with the calling party number set to the DN allocated for handoff by the source RCF and the called party number set to the DN allocated for handoff by the target RCF.
- f) The SSF/CCF acknowledges the ISDN SETUP message with the ISDN CALL PROC message sent to the source RCF.
- g) Simultaneous to sending the ISDN CALL PROC message, the SSF/CCF sends an ISDN SETUP message to the target RCF to establish a call.
- h) The target RCF recognizes the call as a handoff attempt (based on the DN used) and sends an ISDN CONN message to the SSF/CCF.
- i) The SSF/CCF sends an ISDN CONN ACK message to the target RCF.
- j) Simultaneous to sending the ISDN CONN ACK message, the SSF/CCF sends an ISDN CONN message back to the source RCF.
- k) The source RCF acknowledges the ISDN CONN with an ISDN CONN ACK.
- l) With the call between the two RCFs established, the source RCF sends a Handoff Direction message to the RTF with the target radio traffic channel information previously provided by the RACF in the Handoff Command message.
- m) The RTF responds with an Acknowledgment Order confirming receipt of the handoff directions.
- n) The source RCF sends a Handoff Commenced to the RACF indicating that the RTF has responded to the Handoff Command message.
- o) When the target RCF detects the arrival of the RTF on the specified target channel, it transmits an Acknowledge Order to the RTF.
- p) The RTF sends a Handoff Completion Message to the target RCF.
- q) The target RCF responds with an Acknowledge Order.
- r) The target RCF informs the RACF, via the Handoff Complete message, that a handoff was executed.
- s) The RACF informs the SCF that a handoff has occurred by sending a Handover Complete Indication message. Note that this procedure is optional.

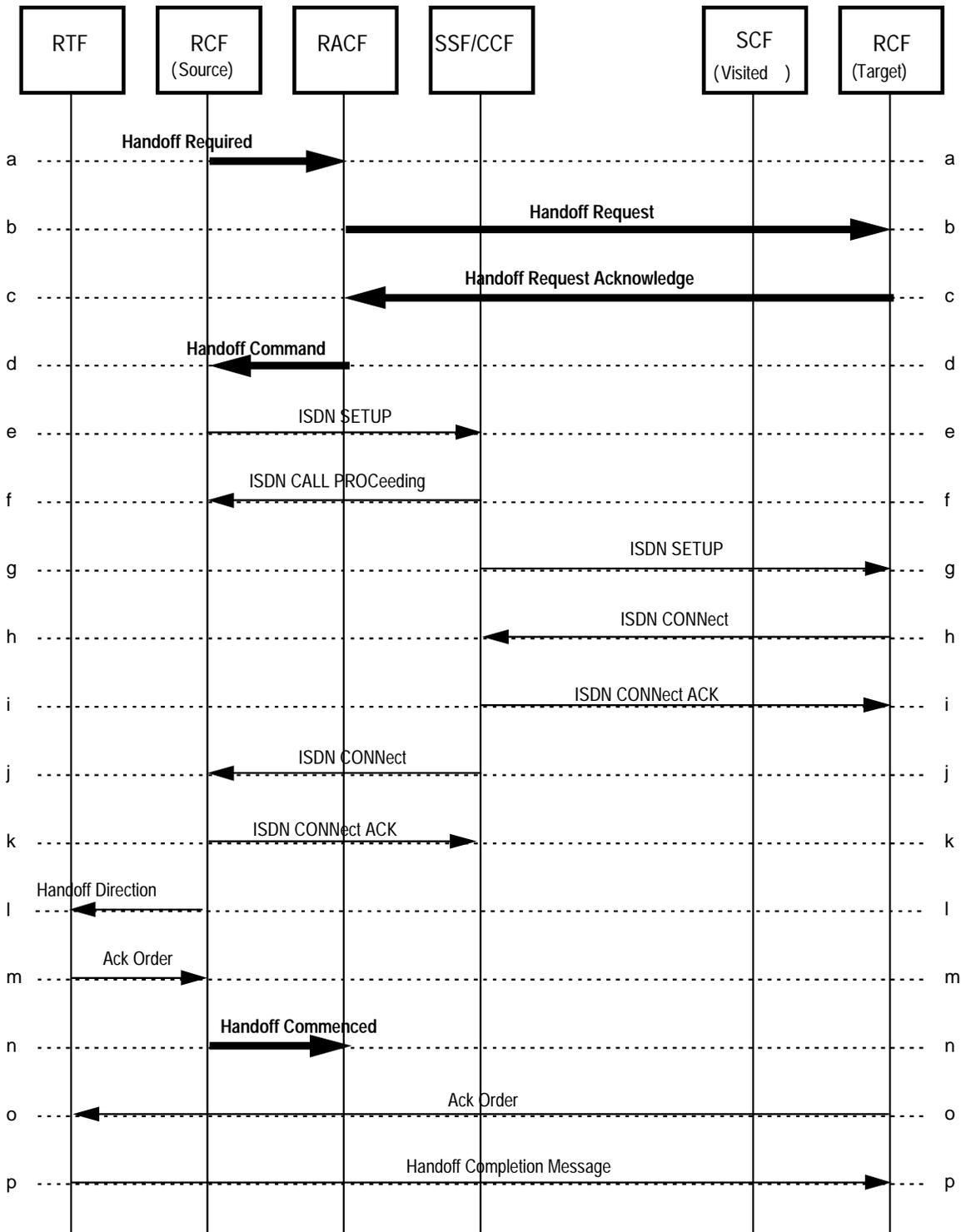


Figure A.22 – Intra-RACF hard handoff (1 of 2)

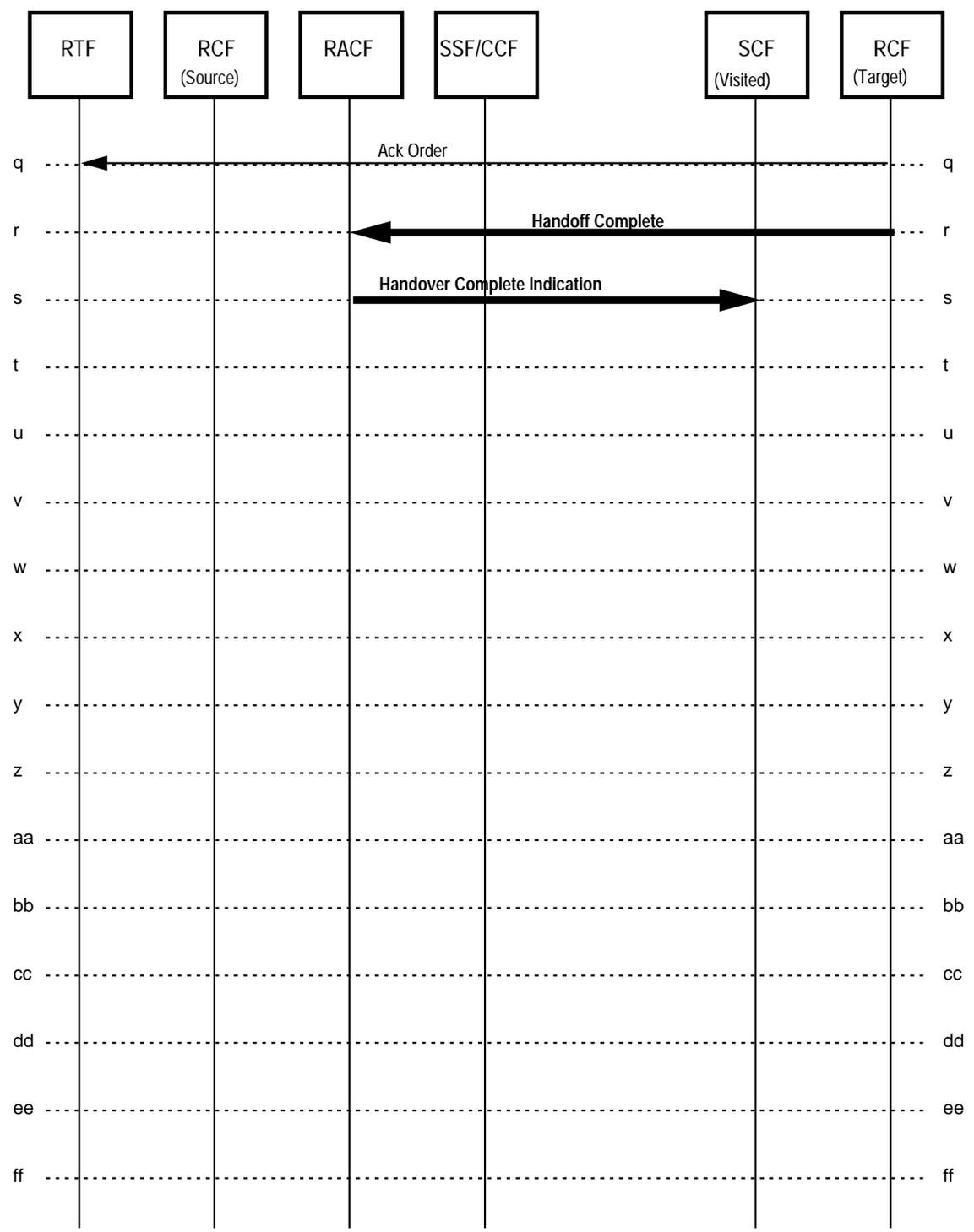


Figure A.22 – Intra-RACF hard handoff (2 of 2)

A.13 Inter-RACF soft handoff

This clause discusses the signaling flow associated with a handoff from one RCF to another, both of which are under a different RACF's domain. Steps (g) – (m) may not be needed in the scenario that a connection between the two RCFs already exists (i.e., a “nailed-up” connection).

- a) The source RCF determines that a handoff to another RCF is necessary due to RF reasons, and sends a Handoff Required message to the source RACF. Included in the message is a list of candidate target cells.
- b) The source RACF determines that a candidate target RCF under the control of a candidate target RACF is the best, and sends a Facilities Directive Invoke to that RACF for reservation of a radio traffic channel in the identified target RCF.
- c) The target RACF relays information in the Facilities Directive Invoke in a Handoff Request message to the target RCF for reservation of a radio traffic channel and to provide a DN assignment.
- d) The target RCF determines that the appropriate resources are available, and reserves or allocates the radio traffic channel. It also assigns the DN over which the handoff will be received and sends this information to the target RACF in a Handoff Request Ack message.
- e) The target RACF relays the information received from the target RCF (in the Handoff Request Ack message) to the source RACF in a Facilities Directive Return Result message.
- f) The source RACF then sends the target RCF DN and the source RCF DN (used for the second path from the source RCF to the SSF/CCF) in a Handoff Command message to the source RCF.
- g) Upon receiving the Handoff Command message from the source RACF, the source RCF sends an ISDN SETUP to the SSF/CCF using the new DNs.
- h) The SSF/CCF acknowledges the ISDN SETUP message with the ISDN CALL PROC message sent to the source RCF.
- i) Simultaneous to sending the ISDN CALL PROC message, the SSF/CCF sends an ISDN SETUP message to the target RCF to establish a call.
- j) The target RCF recognizes the call as a handoff attempt (based on the DN used) and sends an ISDN CONN message to the SSF/CCF.
- k) The SSF/CCF sends an ISDN CONN ACK message to the target RCF.
- l) Simultaneous to sending the ISDN CONN ACK message, the SSF/CCF sends an ISDN CONN message back to the source RCF.
- m) The source RCF acknowledges the ISDN CONN with an ISDN CONN ACK.
- n) With the call between the two RCFs established, the source RCF sends a Handoff Direction message to the RTF with the target radio traffic channel information previously provided by the RACF in the Handoff Command message.
- o) The RTF responds with an Acknowledgment Order confirming the radio traffic channel assignment(s), and then proceeds to re-tune and/or add the new channel(s).
- p) When the RTF has re-tuned and/or added the new channel(s) and sync is established, a Handoff Complete message is sent to the source RCF.
- q) The source RCF, upon receiving the Handoff Complete message from the RTF, informs the RACF, via the Handoff Performed message, that a handoff was executed.
- r) The RACF informs the SCF that a handoff has occurred by sending a Handover Complete Indication message. Note that this procedure is optional.
- s) The visited SCF informs the target RACF that a handoff has occurred by sending a Handover Performed Indication. Note that this procedure is optional.

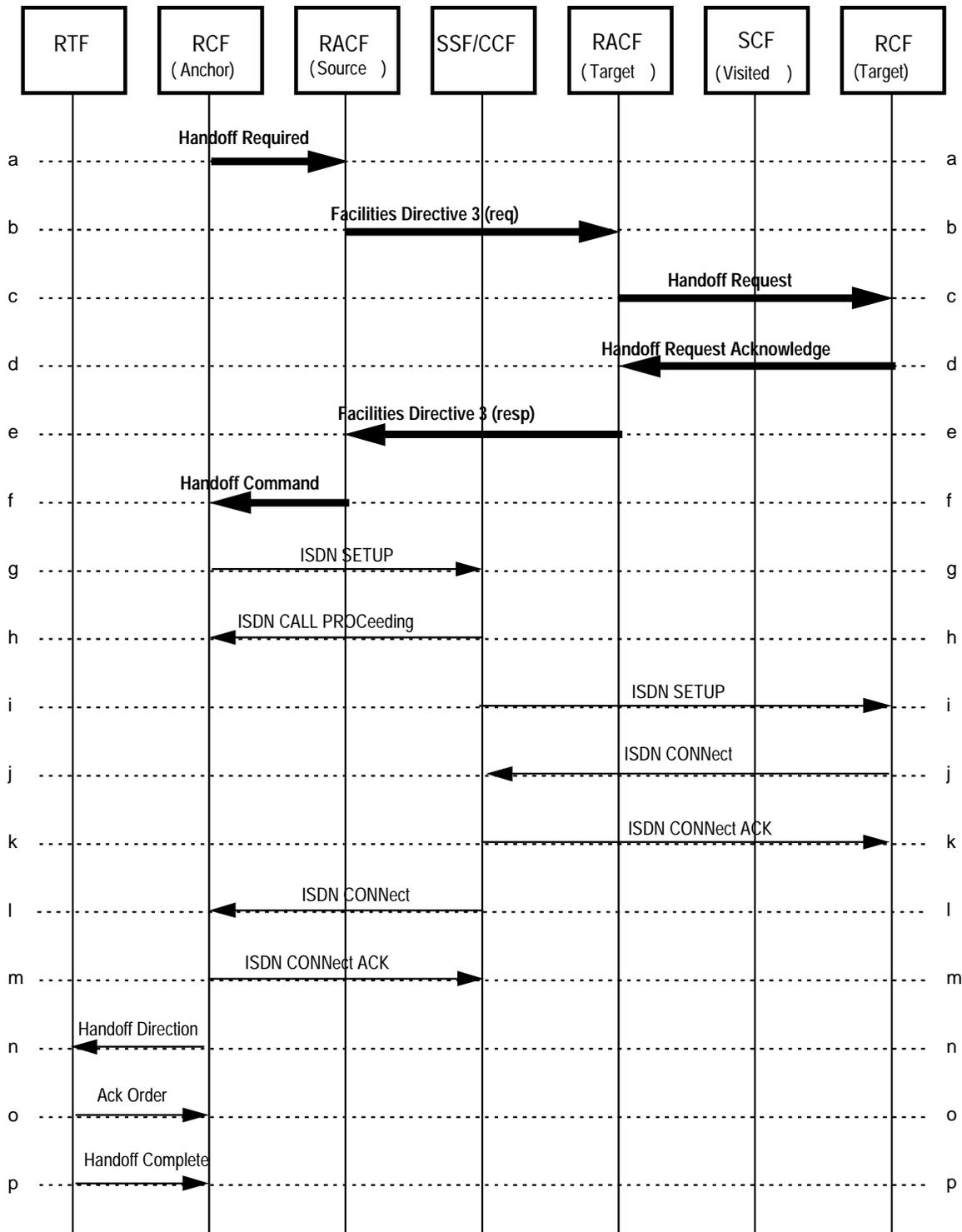


Figure A.23 – Inter-RACF initial handoff (1 of 2)

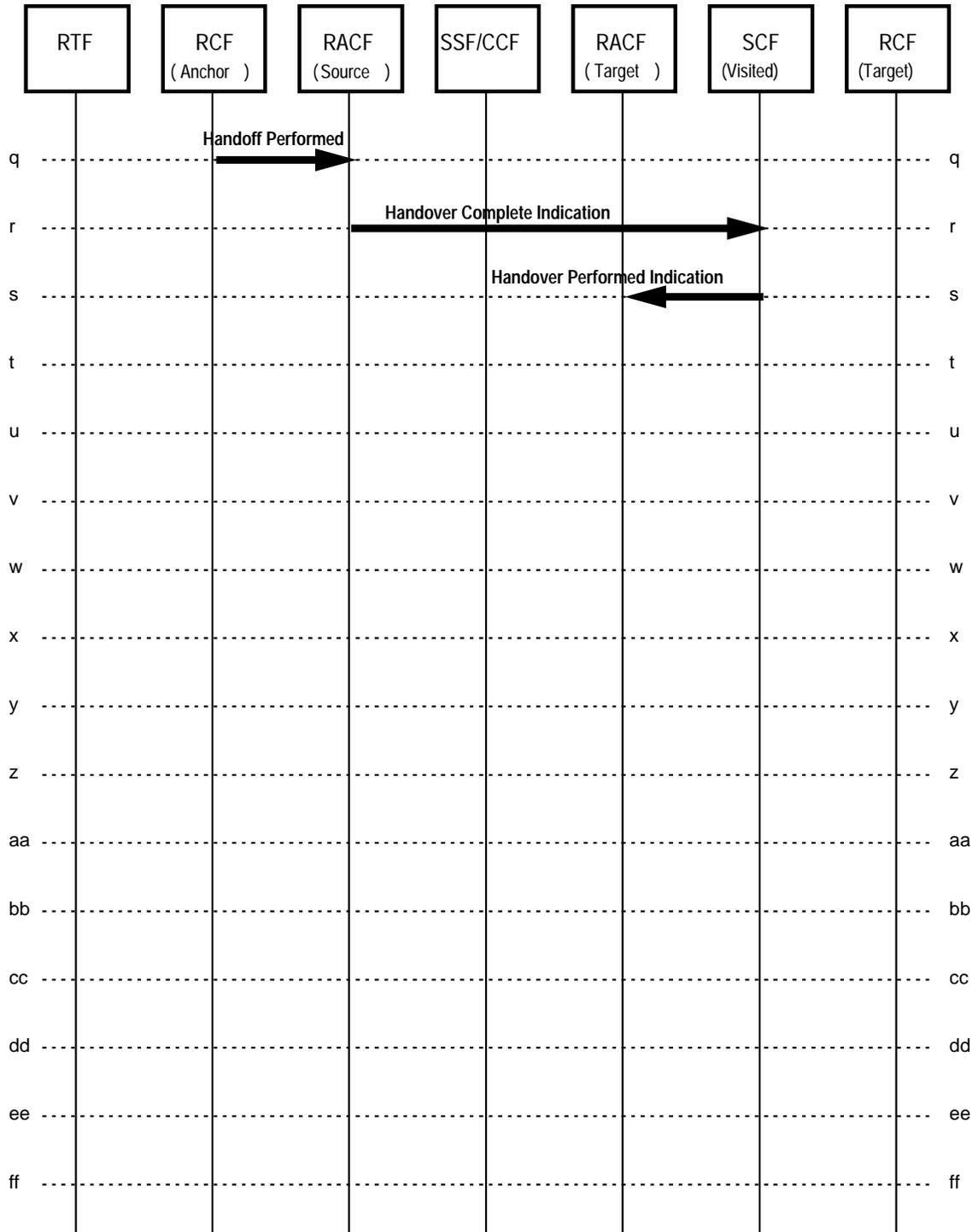


Figure A.23 – Inter-RACF initial handoff (2 of 2)

A.14 Inter-RACF handoff failure at the target

This clause discusses the signaling flow associated with a handoff from one RCF to another and the handoff is rejected at the target. Note that Steps (b) and (c) occur in the “inter-RACF” handoff scenario only.

- a) The source RCF determines that a handoff to another RCF is necessary due to RF reasons, and sends a Handoff Required message to the RACF. Included in the message is a list of candidate target cells.
- b) The RACF determines that a candidate target RCF under the control of a candidate target RACF is the best, and sends a Facilities Directive Invoke to that RACF for reservation of a radio traffic channel in the identified target RCF.
- c) The target RACF relays information in the Facilities Directive Invoke in a Handoff Request message to the target RCF for reservation of a radio traffic channel and to provide a DN assignment.
- d) The target RCF determines that it cannot allocate the appropriate resources, and conveys this information to the target RACF in a Handoff Failure message.
- e) The target RACF relays the information received from the target RCF (in the Handoff Failure message) to the source RACF in a Facilities Directive Return Error message.
- f) The source RACF sends a Handoff Required Reject message to the source RCF conveying the failure of handoff requested by the source RCF.

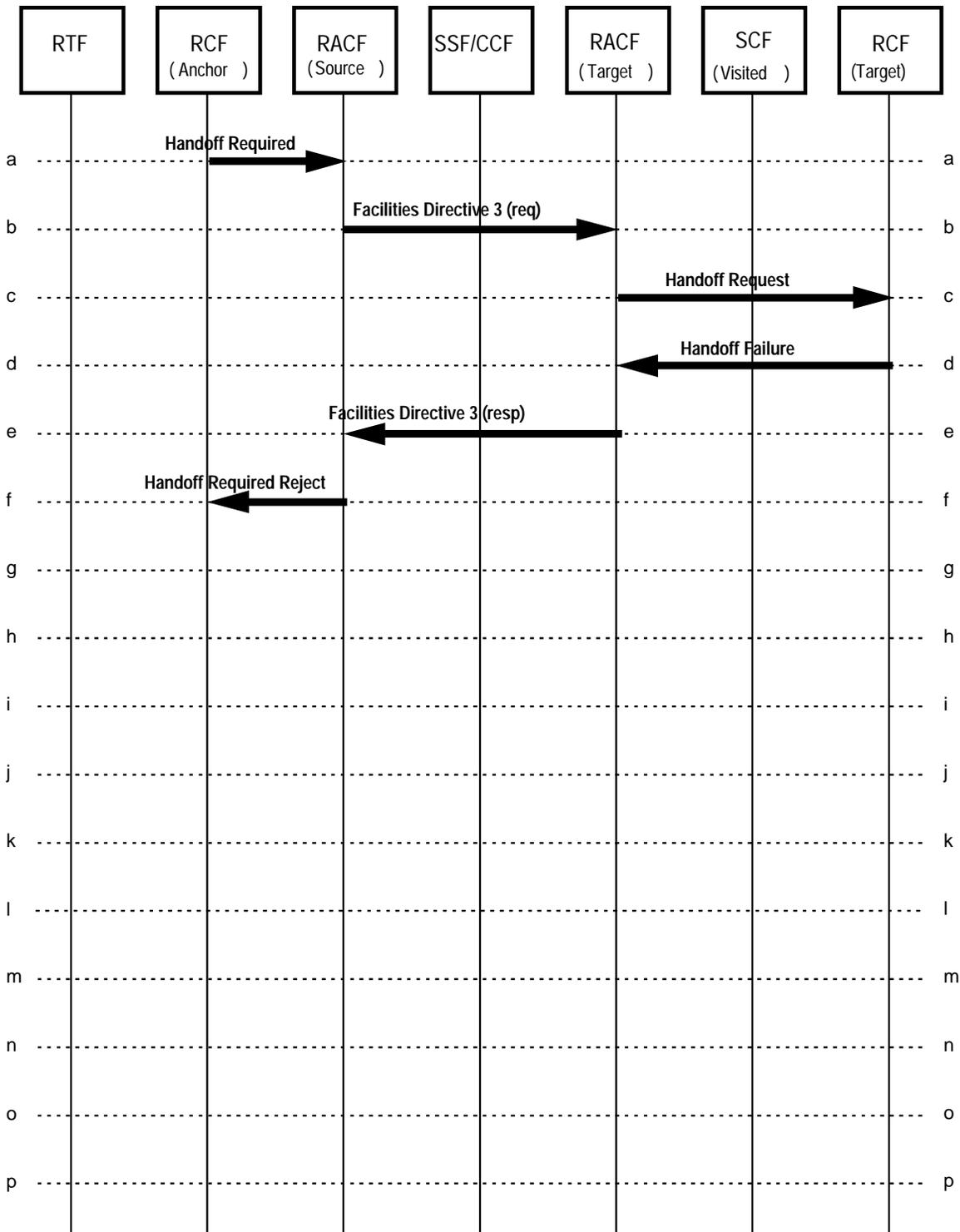


Figure A.24 – Inter-RACF handoff failure at the target

A.15 Inter-RACF handoff failure at the source

This clause discusses the signaling flow associated with a handoff from one RCF to another, both of which are under a different RACF's domain, and the handoff fails at the source RCF, as shown in figure A.25.

- a) The source RCF determines that a handoff to another RCF is necessary due to RF reasons, and sends a Handoff Required message to the anchor RACF. Included in the message is a list of candidate target cells.
- b) The anchor RACF determines the best candidate target RCF under the control of a target RACF, and sends a Facilities Directive Invoke to that RACF for reservation of a radio traffic channel in the identified target RCF.
- c) The target RACF relays information in the Facilities Directive Invoke in a Handoff Request message to the target RCF for reservation of a radio traffic channel and to provide a DN assignment.
- d) The target RCF determines that the appropriate resources are available, and reserves or allocates the radio traffic channel. It also assigns the DN over which the handoff will be received and sends this information to the target RACF in a Handoff Request Ack message.
- e) The target RACF relays the information received from the target RCF (in the Handoff Request Ack message) to the anchor RACF in a Facilities Directive Return Result message.
- f) The anchor RACF then sends the target RCF DN and the source RCF DN (used for the second path from the anchor RCF to the SSF/CCF) in a Handoff Command message to the source RCF.
- g) Upon receiving the Handoff Command message from the anchor RACF, the source RCF sends an ISDN SETUP to the SSF/CCF using the new DNs.
- h) The SSF/CCF acknowledges the ISDN SETUP message with the ISDN CALL PROC message sent to the source RCF.
- i) Simultaneous to sending the ISDN CALL PROC message, the SSF/CCF sends an ISDN SETUP message to the target RCF to establish a call.
- j) The target RCF recognizes the call as a handoff attempt (based on the DN used) and sends an ISDN CONN message to the SSF/CCF.
- k) The SSF/CCF sends an ISDN CONN ACK message to the target RCF.
- l) Simultaneous to sending the ISDN CONN ACK message, the SSF/CCF sends an ISDN CONN message back to the source RCF.
- m) The source RCF acknowledges the ISDN CONN with an ISDN CONN ACK.
- n) With the terrestrial traffic channel established, the source RCF sends a Handoff Direction message to the RTF with the target radio traffic channel information previously provided by the RACF in the Handoff Command message.
- o) The source RCF determines that the handoff was unsuccessful, releases any resources allocated for the handoff, and sends a Handoff Failure message to the RACF.
- p) Simultaneous to Step (o), the source RCF sends an ISDN DISC message to the SSF/CCF to clear the call associated with the handoff (assuming no other cells associated with the target RCF are involved in the call).
- q) The SSF/CCF responds with an ISDN REL message.
- r) The SSF/CCF also sends an ISDN DISC to the target RCF to release that leg of the call.
- s) The target RCF responds with an ISDN REL.

- t) The source RCF sends an ISDN REL COMP to confirm the receipt of ISDN REL from the SSF/CCF.
- u) The SSF/CCF sends an ISDN REL COMP to the target RCF to confirm the receipt of ISDN REL.

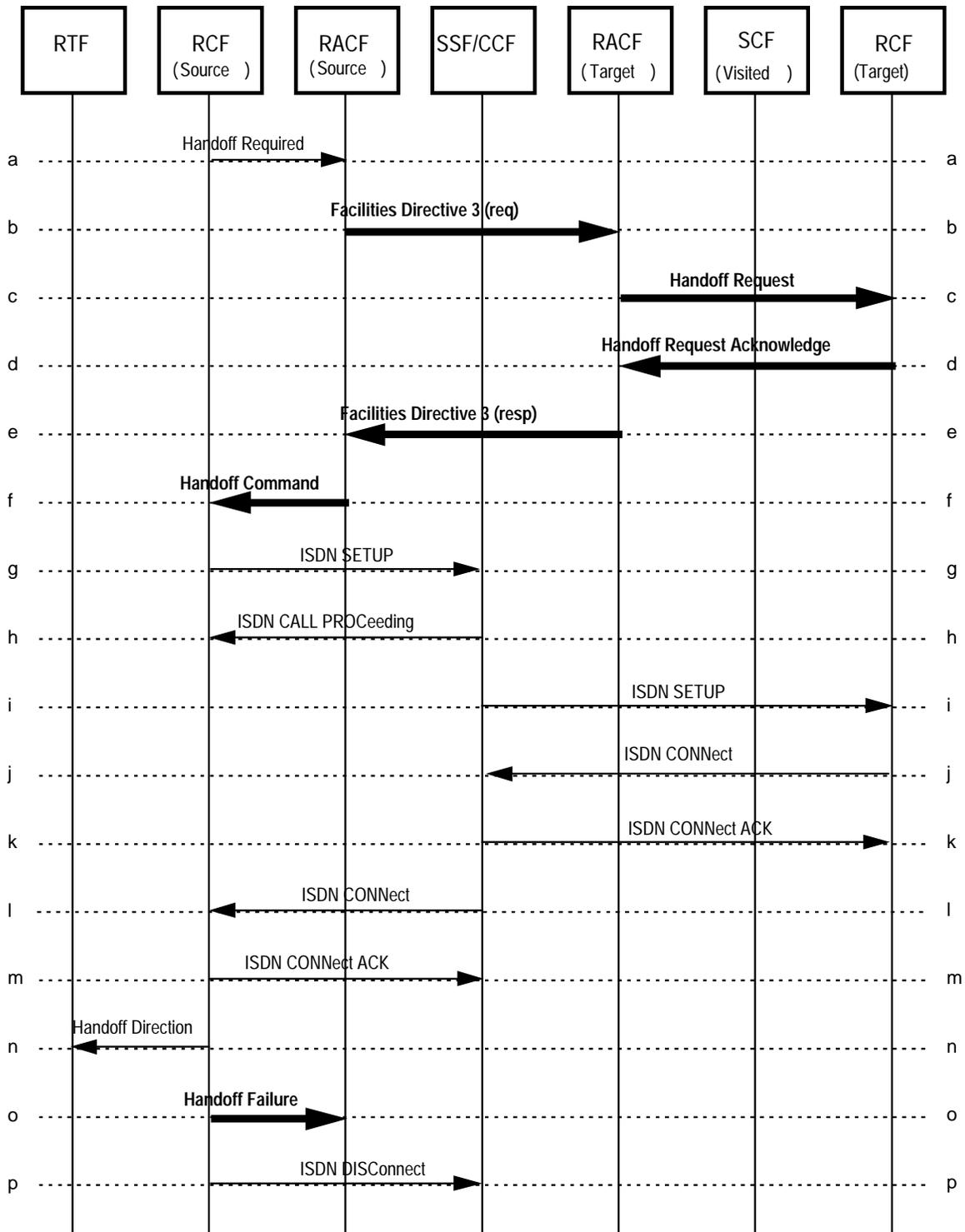


Figure A.25 – Inter-RACF handoff failure at the source (1 of 2)

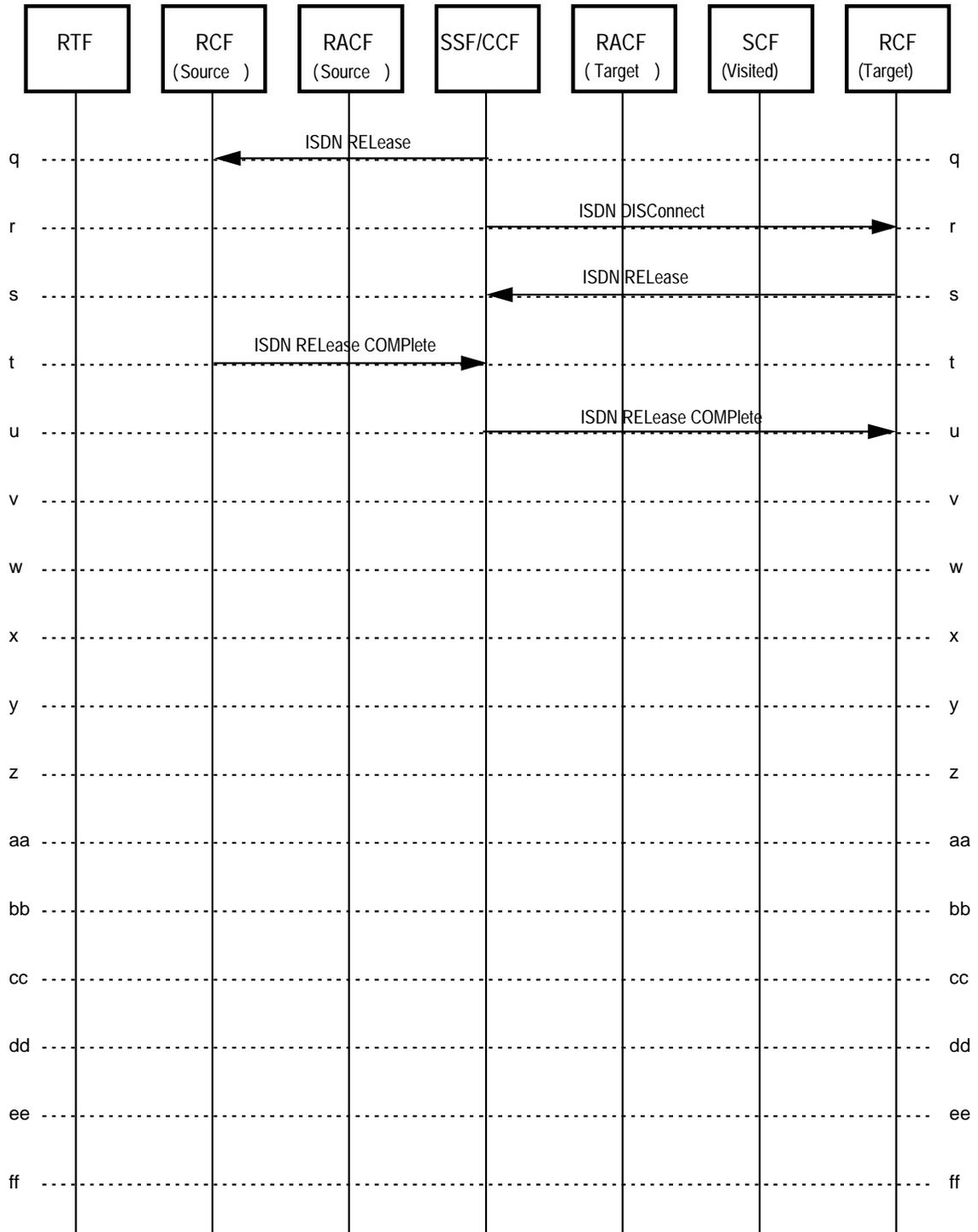


Figure A.25 – Inter-RACF handoff failure at the source (2 of 2)

A.16 Soft handoff drop source

This procedure may be used to move the transcoding function from the source RCF to the target RCF when there is an existing circuit between the source and the target RCFs (this call was set up during initial handoff) and there are no source RCF radio channels involved in the call. Note that the call between the source and target RCFs is not cleared at the conclusion of this procedure. Instead, PCM is passed between the source and target RCFs until the call is cleared.

Figure A.26 shows the flow for this procedure, which is described by the following steps:

- a) The source RCF determines that the cell(s) associated with the source RCF for this call should be dropped, and it sends a Handoff Direction message to the mobile station.
- b) The mobile station replies with a Handoff Completion message upon completion of the handoff direction instructions.
- c) The source RCF informs the RACF that the mobile's active set has changed by sending a Handoff Performed message.
- d) The source RCF sends a Soft Handoff Drop Source message to the RACF containing the interface DN associated with the handoff.
- e) The RACF replaces the interface DN received from the source RCF with the interface DN allocated on the target RCF for the handoff, and sends the Soft Handoff Drop Source message to the target RCF.
- f) The target RCF responds with a Handoff Request Acknowledge message indicating an acceptance of the transcoding function at the indicated handoff time, a proposal of a different time, or a request for a hard handoff.
- g) The RACF sends a Handoff Command message to the source RCF upon receipt of the Handoff Request Acknowledge message from the target RCF.
- h) At the specified Transcoder Handoff Time, the source RCF no longer transcodes the subscriber speech, and the source RCF's transcoder is placed in by-pass mode. At the same time, the target RCF switches to active transcoder mode, and sends a Handoff Direction message to the mobile station.
- i) The mobile station returns a Handoff Completion message to indicate completion of handoff directions.
- j) The target RCF sends a Handoff Complete message to the RACF indicating that it has successfully acquired the active transcoding function.
- k) The RACF may optionally send a Handover Complete Indication message to the SCF.

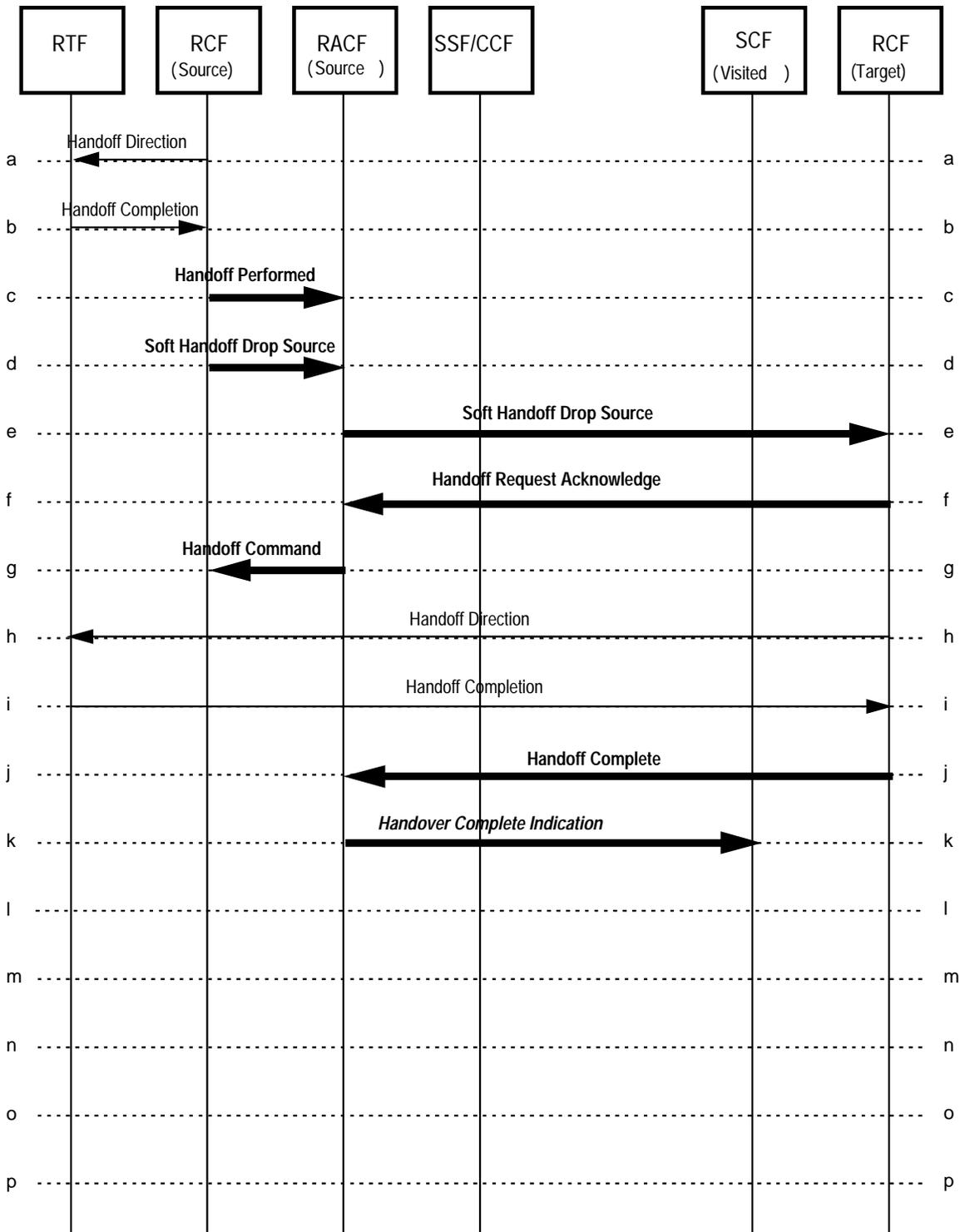


Figure A.26 – Soft handoff drop source

A.17 Soft handoff drop target

This clause provides the flow associated with a successful soft handoff drop target procedure, as shown in figure A.27. This procedure shows two cells being dropped. Note that the call clearing procedure occurs when there are no cells associated with the target RCF involved in the handoff.

- a) The source RCF determines that a cell associated with the target RCF should be dropped from the soft handoff, and sends a Handoff Direction message to the mobile station.
- b) The mobile station replies with a Handoff Completion message upon completion of the handoff direction instructions.
- c) The source RCF informs the RACF that the mobile's active set has changed by sending a Handoff Performed message.
- d) The source RCF sends a Soft Handoff Drop Target message to the RACF containing the interface DN associated with the handoff.
- e) The RACF replaces the interface DN received from the source RCF with the interface DN allocated on the target RCF for the handoff, and sends the Soft Handoff Drop Target message to the target RCF.
- f) The source RCF determines that a second (and last) cell associated with the target RCF should be dropped from the soft handoff, and thus it sends a Handoff Direction message to the mobile station.
- g) The mobile station replies with a Handoff Completion message upon completion of the handoff direction instructions.
- h) The source RCF informs the RACF that the mobile's active set has changed by sending a Handoff Performed message.
- i) The source RCF sends an ISDN DISC message to the SSF/CCF to clear the call associated with the handoff.
- j) The SSF/CCF responds with an ISDN REL message.
- k) The SSF/CCF also sends an ISDN DISC to the target RCF to release that leg of the call.
- l) The target RCF responds with an ISDN REL.
- m) The source RCF sends an ISDN REL COMP to confirm the receipt of ISDN REL from the SSF/CCF.
- n) The SSF/CCF sends an ISDN REL COMP to the target RCF to confirm the receipt of ISDN REL.

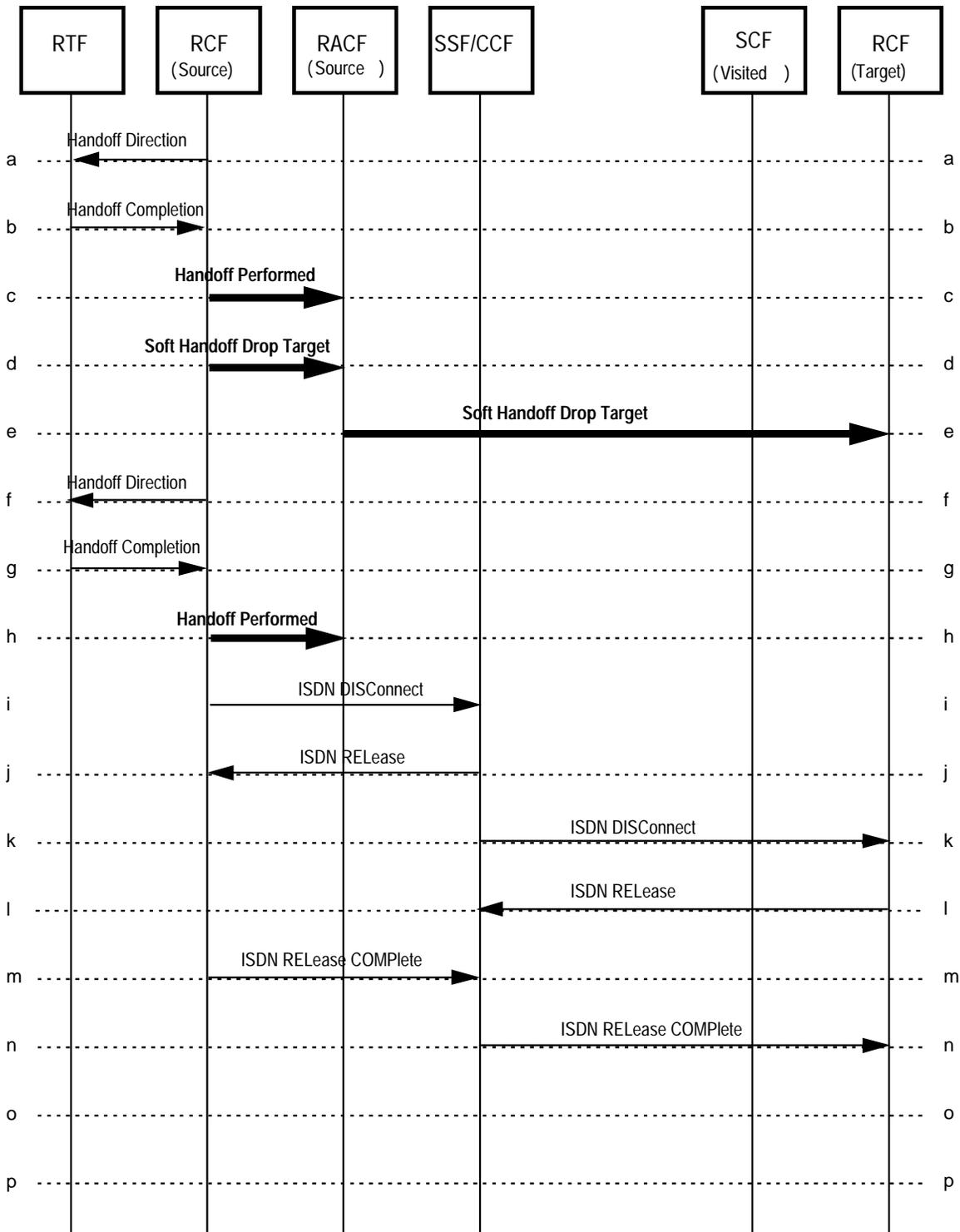


Figure A.27 – Soft handoff drop target

Annex B

(informative)

Signaling flows for PACS

This annex presents signaling flows that illustrate the usage of MMAP messages in service scenarios.

The signaling flows presented in this annex are applicable to PACS.

The following conventions are used in this annex:

- In the figures, the MMAP (RCF-RACF, RACF-RACF, and RACF-SCF) messages are labeled in bold text.
- The bold arrows in the figures imply that the protocol for that interface is defined in MMAP (RCF-RACF, RACF-RACF, and RACF-SCF).
- The text supporting the figures, not the figures themselves, describe optional procedures.
- RTF-RCF messaging is derived from ANSI J-STD-014.
- If specific message names are used for interfaces other than those specified by MMAP, the message name is preceded by the protocol suite that defines these messages. For example, “IS-41” precedes messages between visited SCF and home SCF and “ISDN” precedes messages between RCF and SSF/CCF.
- A double-headed arrow is used to indicate a procedure between two entities. There may be multiple messages exchanged between the two entities to accomplish the procedure.
- IS-41 messages have the same name for a request and its response. In order to distinguish between the two, the request message is shown in uppercase letters (e.g., ROUTREQ) and the response message is shown in lowercase letters (e.g., routreq).

B.1 SSD update procedure

This clause discusses the call flow associated with a SSD Update procedure for PACS shown in figure B.1. The flow assumes SSD is shared.

- a) The Authentication Center (AC) initiates the SSD Update procedure by sending an IS-41 Authentication Directive Invoke (AUTHDIR) message to the home SCF. The message contains RANDSSD and the new SSD. RANDSSD is a random number used in the Cellular Authentication and Voice Encryption (CAVE) algorithm that generates new SSD.
- b) The home SCF determines which visited SCF the RTF is currently registered at and sends an IS-41 AUTHDIR message to that visited SCF. The message contains RANDSSD and the new SSD.
- c) The visited SCF replaces the RTF's SSD that it currently has stored with the new SSD and acknowledges receipt of the IS-41 AUTHDIR message by sending an IS-41 Authentication Directive Return Result (authdir) to the home SCF.
- d) The home SCF passes the authdir along to the AC.
- e) The visited SCF waits for an appropriate time to initiate an SSD Update with the RTF. This may be during the RTF's Terminal Registration Pending State, RCID Pending State, or once the RTF is in the Stable Call State. Once the visited SCF determines the time is appropriate, the visited SCF sends an Authentication Directive Request message to the RACF. This message contains RANDSSD. The presence of RANDSSD indicates to the RACF that an SSD Update is required.
- f) The RACF sends a SSD_UPDATE_REQ containing RANDSSD to the RCF.
- g) The RCF sends a SSD_UPDATE_REQ message containing RANDSSD to the RTF.
- h) The RTF uses RANDSSD, its A-Key, and its ESN in CAVE Process One to generate SSD_A_NEW and SSD_B_NEW. The RTF also selects a random number (RANDBS) and uses it along with the its ESN, SubID1, and SSD_A_NEW in CAVE process 2 to generate AUTHBS.
- i) The RTF sends RANDBS to the RCF in a NET_CHAL_REQ message.
- j) The RCF sends RANDBS to the RACF in a NET_CHAL_REQ message.
- k) The RACF receives RANDBS from the RCF and sends it to the visited SCF in a Network_Challenge_Request Request.
- l) The visited SCF receives RANDBS and uses it along with the RTF's ESN, SubID1, and SSD_A_NEW in CAVE process 2 to generate AUTHBS.
- m) The visited SCF sends AUTHBS to the RACF in a Network_Challenge_Request Response.
- n) The RACF sends AUTHBS to the RCF in a NET_CHAL_RESP message.
- o) The RCF sends AUTHBS to the RTF in a NET_CHAL_RESP message.
- p) If the AUTHBS sent from the visited SCF agrees with the AUTHBS generated by to RTF, then the RTF replaces its previous SSD_A and SSD_B with SSD_A_NEW and SSD_B_NEW.
- q) The RTF sends a SSD_UPDATE_RESP with a Cause of SSD Update Performed to the RCF.
- r) The RCF sends a SSD_UPDATE_RESP with the same cause to the RACF.
- s) The RACF sends a Authentication Directive Response to the visited SCF.
- t) Upon receiving the Authentication Directive Response acknowledging the successful completion of the SSD Update, the visited SCF initiates a Unique Challenge to verify the new SSD. The visited SCF selects a random number (RANDU) for use in the Unique Challenge procedure and uses it along with the RTF's SSD_A, SubID1, ESN, and SubID2 in CAVE Process 7 to generate AUTHU.
- u) The visited SCF sends an Authentication Directive Request containing RANDU to the RACF.

- v) The RACF sends a UNQ_CHAL_REQ containing RANDU to the RCF.
- w) The RCF sends a UNQ_CHAL_REQ containing RANDU to the RTF.
- x) The RTF uses RANDU along with the RTF's SSD_A, SubID1, ESN, and SubID2 in CAVE Process 7 to generate AUTHU.
- y) The RTF sends AUTHU to the RCF in a UNQ_CHAL_RESP message.
- z) The RCF sends AUTHU to the RACF in a UNQ_CHAL_RESP message.
- aa) The RACF sends AUTHU to the visited SCF in a Authentication Directive Response message.
- bb) The visited SCF verifies that the AUTHU sent from the RTF agrees with the one it generated.
- cc) Once the SSD Update and Unique Challenge portions of the SSD Update Procedure are complete, the visited SCF informs the home SCF by sending a IS-41 Authentication Status Report Invoke (ASREPORT) message. This message contains SSDUpdateReport and UniqueChallengeReport which indicate the outcome of the SSD Update and the Unique Challenge to the home SCF.
- dd) The home SCF sends the IS-41 ASREPORT message containing SSDUpdateReport and UniqueChallengeReport to the AC.

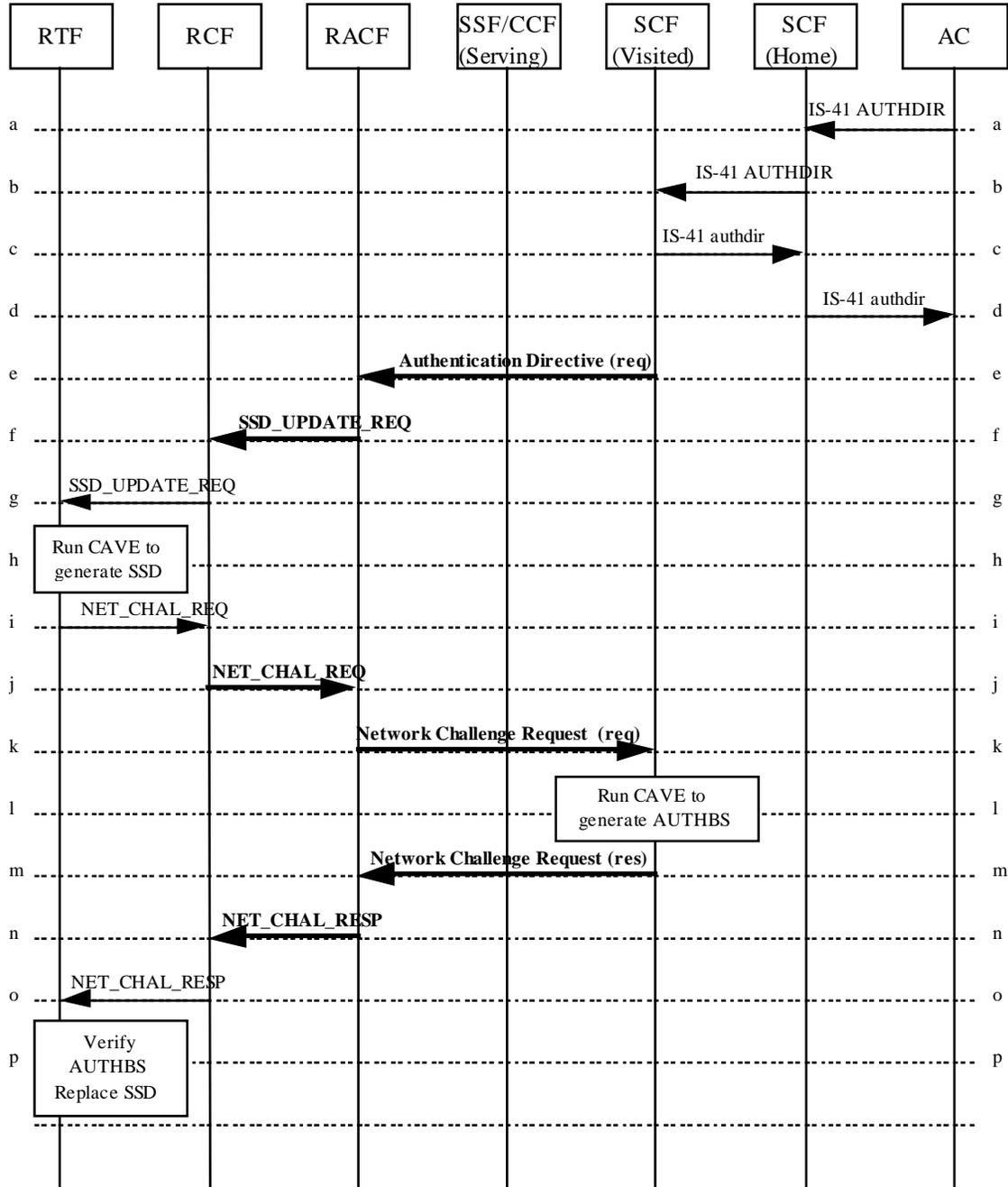


Figure B.1 – SSD update (1 of 2)

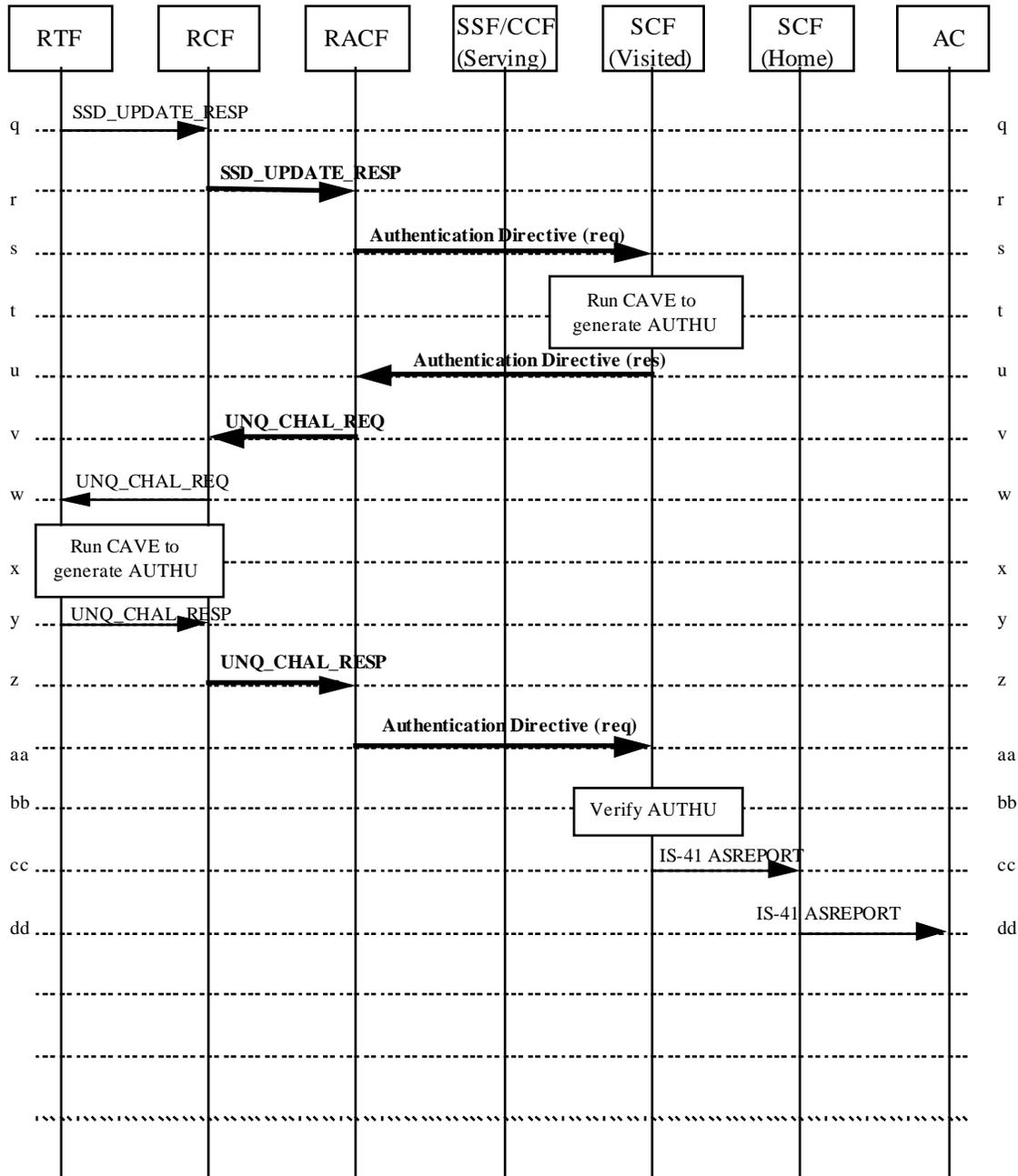


Figure B.1 – SSD update (2 of 2)

B.2 Registration

This clause discusses the call flow for PACS associated with Registration when moving from one visited SCF to another visited SCF. It assumes authentication is required and that SSD is shared. The call flow is provided in figure B.2.

- a) The RTF receives system information by listening to the System Broadcast Channel (SBC).
- b) The RTF Exclusive-Ors (XOR) RealTime and RAND from the SBC and uses it along with SSD_A, its ESN, and SubID1 in CAVE Process One to generate AUTHR.
- c) After acquiring a traffic channel, the RTF sends AUTHR, COUNT, RealTime, and RAND to the RCF in a TERM_REG_REQ via AUTH_REQ_A.
- d) The RCF sends AUTHR, COUNT, RealTime, and RAND to the RACF in a TERM_REG_REQ via AUTH_REQ_A.
- e) The RACF sends a Registration_Request Request message containing AUTHR, COUNT and the RealTime Exclusive-Ors with RAND to the visited SCF. The RealTime Exclusive-Ors with RAND is placed in the RAND field of the message.
- f) The visited SCF sends an IS-41 Authentication Request Invoke (AUTHREQ) message to the home SCF. The message contains AUTHR, COUNT, and RAND.
- g) The home SCF sends an IS-41 AUTHREQ containing AUTHR, COUNT and RAND to the AC.
- h) The AC sends an IS-41 Count Request Invoke (COUNTREQ) to the home SCF requesting the COUNT.
- i) The home SCF sends the IS-41 COUNTREQ to request the COUNT from the old SCF.
- j) The old SCF sends the COUNT to the home SCF in an IS-41 Count Request Return Result (countreq).
- k) The home SCF sends the COUNT to the AC in an IS-41 countreq.
- l) The AC verifies the COUNT received from the RTF and the COUNT received from the old SCF agree. It generates AUTHR using the RTF's SubID1, ESN, SSD_A, and RAND in CAVE Process One. It verifies that the AUTHR it generated agrees with that received from the RTF.
- m) If all comparisons are successful the AC sends an IS-41 Authentication Request Return Result (authreq) to the home SCF. This message contains the RTF's SSD.
- n) The home SCF passes the IS-41 authreq containing the RTF's SSD to the visited SCF.
- o) The visited SCF formulates an IS-41 Registration Notification Invoke (REGNOT) message and sends it to the home SCF.
- p) The home SCF sends an IS-41 Registration Cancellation Invoke (REGCANC) message to the old SCF.
- q) The old SCF sends an IS-41 Registration Cancellation Return Result (regcanc) to the home SCF.
- r) The home SCF updates the location of the RTF and responds with an IS-41 Registration Notification Return Result (regnot) message to the visited SCF.
- s) The visited SCF sends a Registration_Request_Response to the RACF after updating its location register.
- t) The RACF sends a TERM_REG_ACK message to the RCF containing the SKEY and Alert ID.
- u) Layer 2 encryption begins using the SKEY over the air interface.
- v) The RCF sends a TERM_REG_ACK to the RTF containing the Alert ID.
- w) The RTF sends a REL_COM message to the RCF to release the associated radio resources.
- x) The RCF sends a P_REL_COM to the RACF.

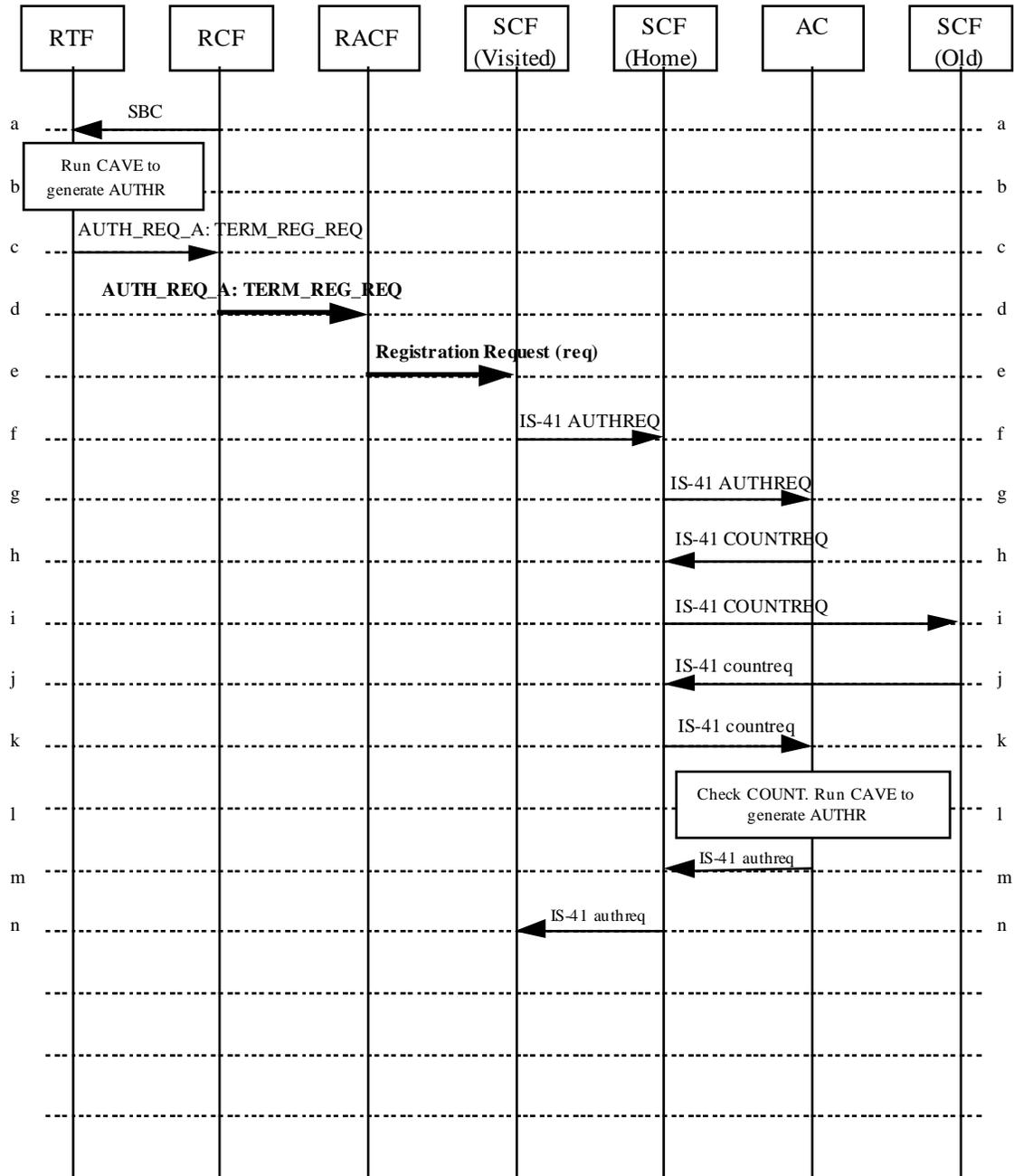


Figure B.2 – Registration (1 of 2)

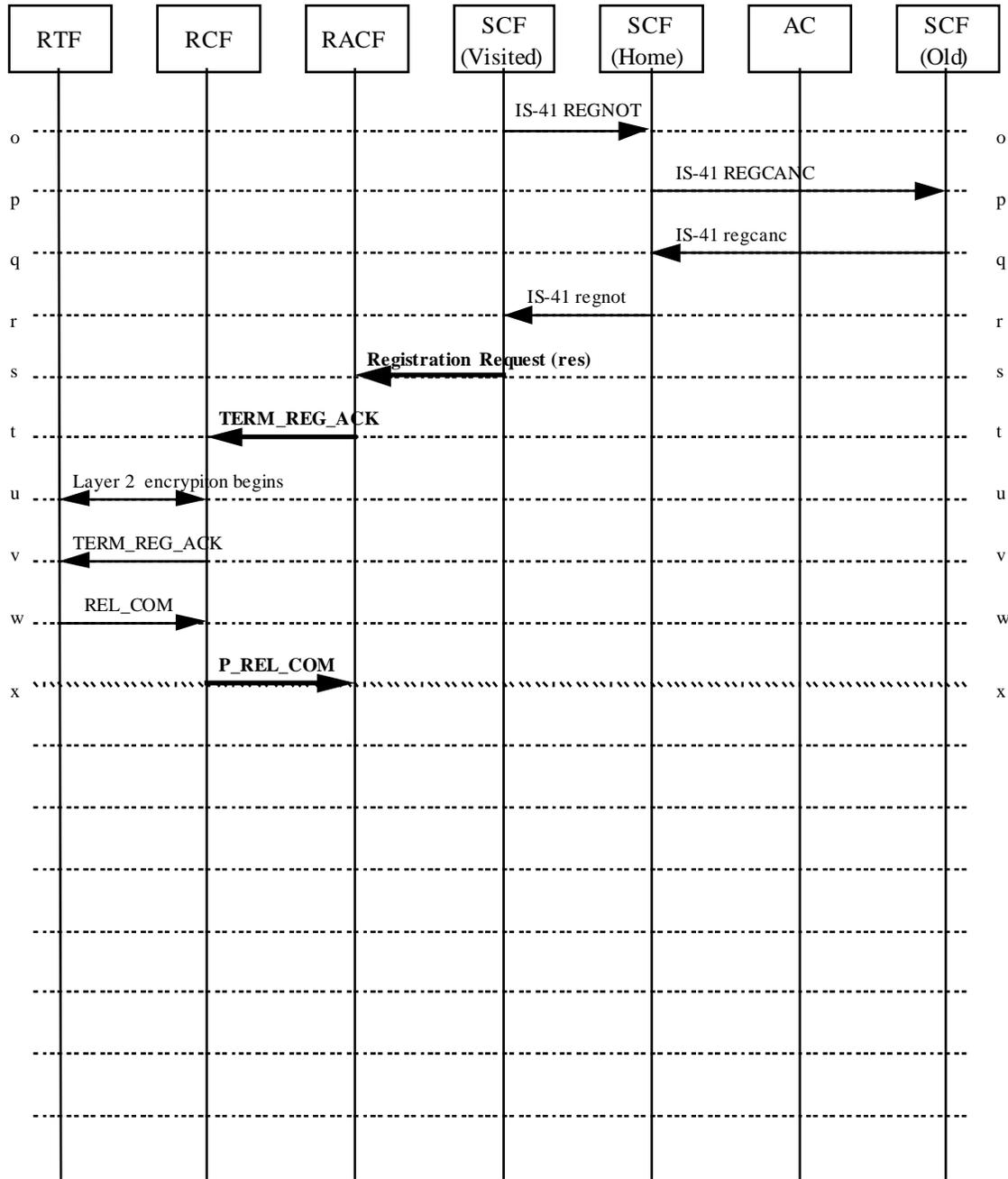


Figure B.2 – Registration (2 of 2)

B.3 Mobile origination

This clause discusses the call flow associated with a mobile station call origination, as shown in figure B.3.

- a) The RCF broadcasts system information in the System Broadcast Channel (SBC). The information includes a random number (RAND) and the real time (RealTime).
- b) When the user attempts a call origination, the RTF runs the CAVE algorithm to generate the authentication response (AUTHR), the session key to encrypt the channel (SKEY) and the one-time-counter (OTPCNTR).
- c) The RTF acquires a traffic channel and sends a CALL_REQ message via the AUTH_REQ_A message. The message includes RTF's security credentials (AUTHR, COUNT, RAND, RealTime, SubID and UIMESN [or TSubID]), and the call processing elements enciphered using the OPCNTR.
- d) The RCF sends a CALL_REQ message via the AUTH_REQ_A message to the RACF. The message includes the security credentials, and the call processing elements enciphered using the OPCNTR.
- e) The RACF sends a Qualification Request message to the SCF, containing the Interface DN so that the SCF can correlate this message with the AIN query received later in the flow.
- f) The SCF runs CAVE to generate AUTHR and other privacy parameters. It authenticates and validates the user, if requested.
- g) The SCF returns a Qualification Request Return Result to the RACF.
- h) The RCF maps the privacy parameters to the session key (SKEY) and OPCNTR. It decipheres the call processing parameters and sends a RCID_ASSIGN message to the RCF. The message includes SKEY which will be used to encipher all the subsequent messages over the radio link, and the deciphered call processing elements.
- i) The RCF and the RTF establish Layer 2 encipherment using SKEY.
- j) The RCF sends an RCID_ASSIGN message to the RTF.
- k) The RCF sends an ISDN SETUP message to the SSF/CCF, providing necessary information for call setup to the called party, such as the bearer capability (set to "speech").
- l) The SSF/CCF encounters a trigger associated with the Terminal Service Profile for the interface to the RCF, and sends an AIN query to the SCF containing the directory number associated with the interface (also referred to as the Interface DN).
- m) The SCF sends an AIN response to the SSF/CCF, with the MIN as the CallingPartyID (passed screening).
- n) The SSF/CCF sends an ISUP Initial Address Message (IAM) to the destination CCF.
- o) The SSF/CCF also sends an ISDN CALL PROCEEDING message to the RCF.
- p) The destination CCF sends an ISUP Address Complete Message (ACM) to the SSF/CCF.
- q) The SSF/CCF sends an ISDN ALERTING message to the RCF. This may include Progress Indicator element to indicate how call progress information will be passed.
- r) The RCF sends an ALERTING message to the RTF to cause ringing at the mobile. The alerting may also be in-band.
- s) When the remote user answers the call, the destination CCF sends an ISUP Answer Message (ANM) to the SSF/CCF.
- t) The SSF/CCF sends an ISDN CONNECT message to the RCF, once the call has been established.

- u) The RCF sends a CONNECT message to the RTF.
- v) The RTF acknowledges by sending a CONN_ACK message to the RCF.
- w) The RCF sends an ISDN CONNect ACKnowledge message to the SSF/CCF.
- x) The RCF sends a P_CONNECT message to the RACF to indicate that the call has been connected.
- y) The RACF sends a Call Indication message to the SCF.
- z) The SCF may initiate a Count Update procedure to increment the COUNT at the RTF and at the SCF.

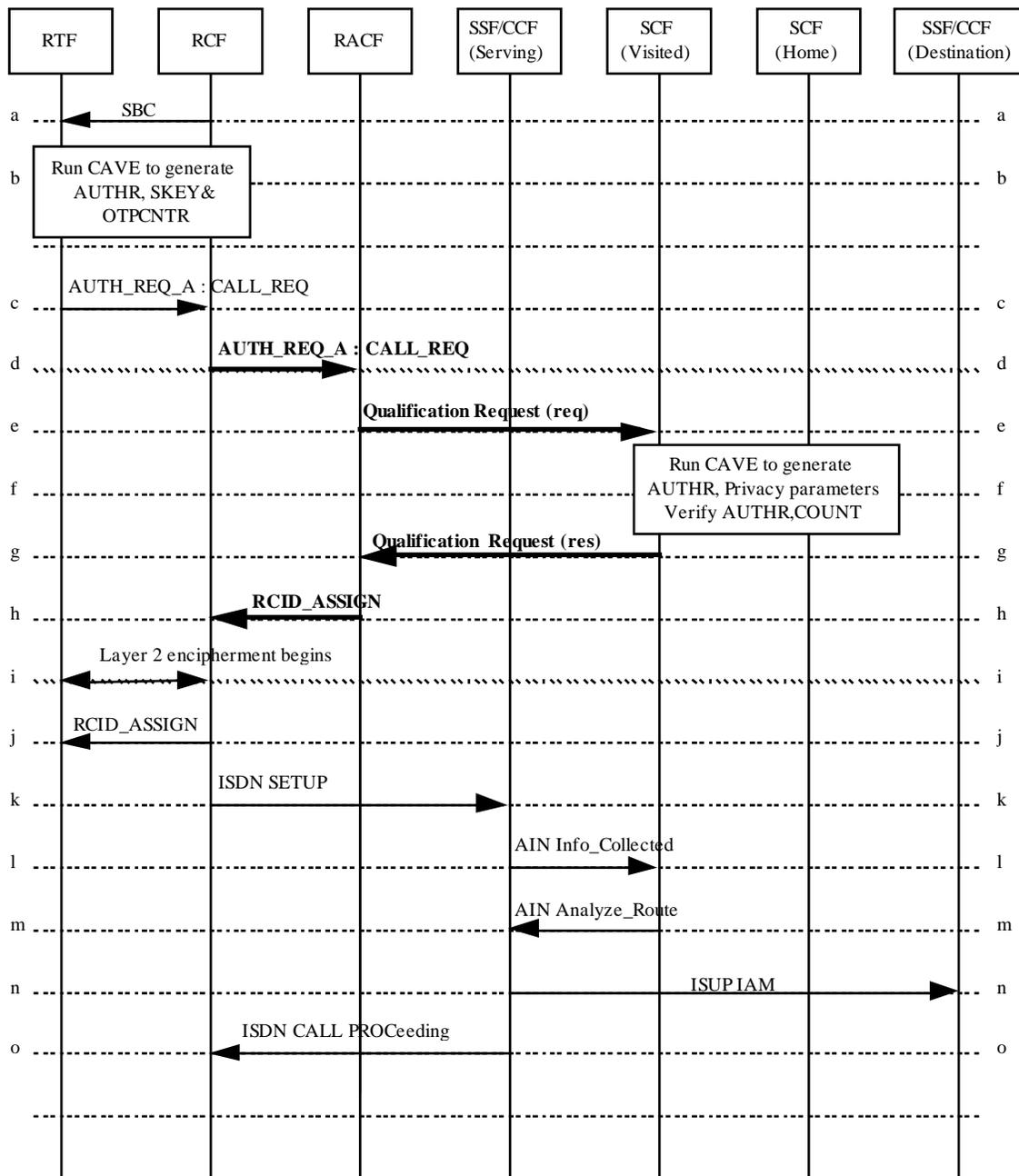


Figure B.3 – Mobile origination (1 of 2)

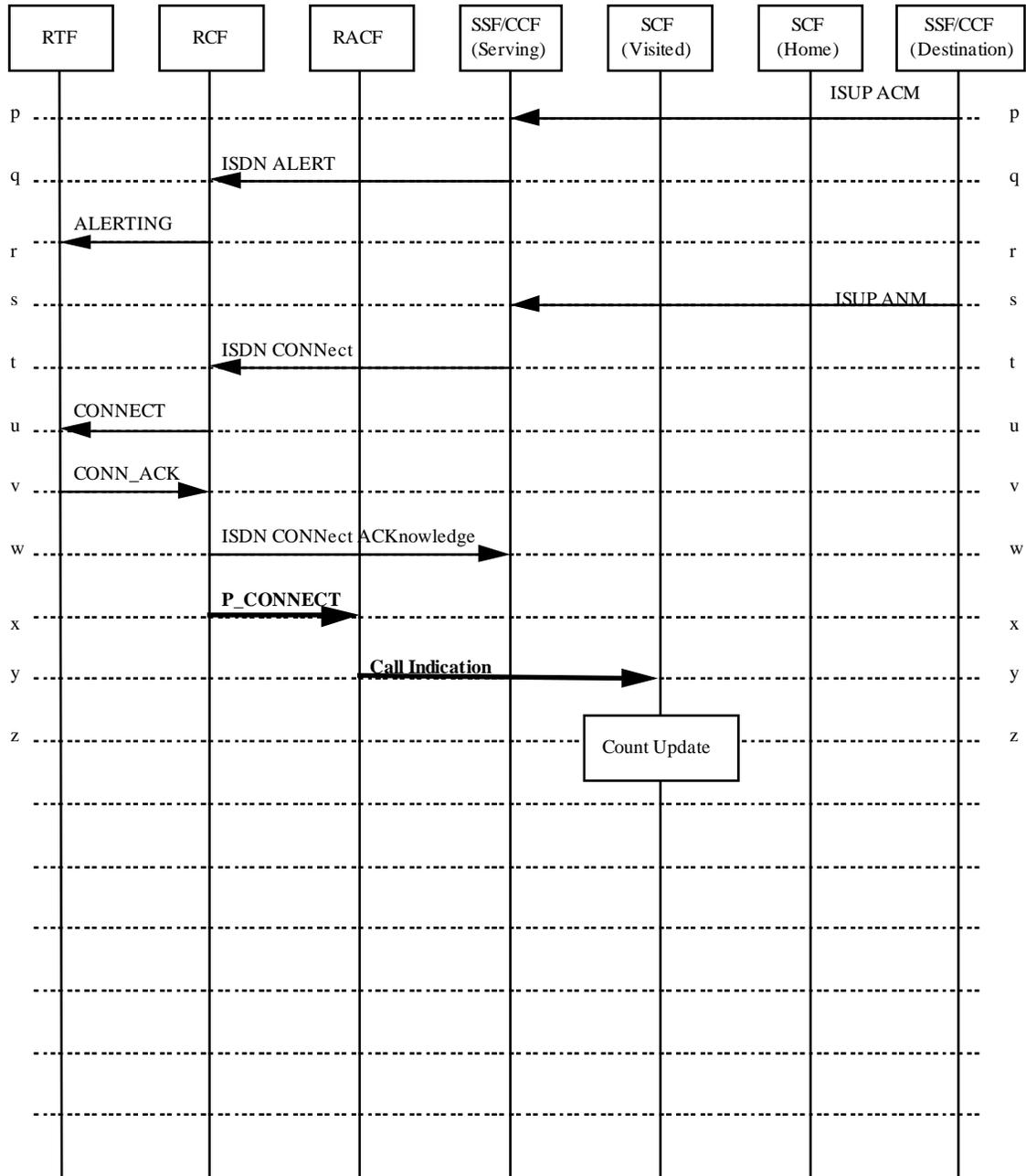


Figure B.3 – Mobile origination (2 of 2)

B.4 Mobile termination

This clause describes the call flow associated with a personal station call termination, as shown in figure B.4.

- a) The Originating SSF/CCF determines the need for AIN processing, and sends an AIN query to the home SCF. Note that in another scenario (not shown in the accompanying figure), the AIN query may be sent to a serving SCF that is not the home SCF, and the serving SCF, in that case, sends an IS-41 LOCREQ message to the home SCF to determine the location of the personal station.
- b) The home SCF sends an IS-41 ROUTREQ message to the visited SCF.
- c) The visited SCF sends a Routing Request to the RACF.
- d) The RACF sends a P_ALERT to locate the user to all the RCFs in the registration area where the user is registered.
- e) The RCF broadcasts the Alert_ID of the user in the SBC.
- f) When the addressed RTF recognizes its broadcast alert, it reads RAND and RealTime from the SBC.
- g) The RTF runs the CAVE to generate the authentication response (AUTHR), the SKEY, and the OTPCNTR.
- h) The RTF sends an ALERT_ACK message via the AUTH_REQ_A message. The message includes the RTF security credentials, and call processing elements enciphered using the OTPCNTR.
- i) The RCF forwards the ALERT_ACK message via AUTH_REQ_A message to the RACF.
- j) The RACF sends a Qualification Request message to the SCF to validate/authenticate the user.
- k) The SCF runs CAVE to generate the privacy parameters, compares AUTHR and COUNT and authenticates and validates the user.
- l) The SCF returns a Qualification Request Return Result to the RACF. The message includes privacy parameters.
- m) The RCF maps the privacy parameters to the session key (SKEY) and OTPCNTR. It decipheres the call processing parameters and sends a RCID_ASSIGN message to the RCF. The message includes SKEY which will be used to encipher all the subsequent messages over the radio link, and the deciphered call processing elements.
- n) The RCF and the RTF establish Layer 2 encipherment using SKEY.
- o) The RCF sends the RCID_ASSIGN message to the RTF.
- p) The RACF sends a Routing_Request response message to the visiting SCF. The message includes the address to which the call should be delivered.
- q) The visited SCF sends the IS-41 routreq response message to the home SCF, containing the address to which the call should be delivered (to the RCF).
- r) The home SCF sends an AIN response to the originating SSF/CCF containing the address to which the call should be delivered.
- s) The originating SSF/CCF sends an ISUP IAM to the SSF/CCF where the call is to be delivered; i.e., to the terminating SSF/CCF.
- t) The terminating SSF/CCF sends an ISDN SETUP message to the interface identified by the Interface DN to which the call was routed.
- u) The RCF sends an INCOMING_CALL message to the RTF.

- v) The RTF responds by sending an ALERTING message to the RCF.
- w) The RCF then sends the ISDN ALERTing message to the SSF/CCF to indicate that alerting at the called mobile has begun.
- x) The terminating SSF/CCF sends an ISUP Address Complete Message (ACM) to the originating SSF/CCF.
- y) When the call has been answered by the mobile, the RTF sends a CONNECT message to the RCF.
- z) The RCF sends an ISDN CONNect message to the SSF/CCF to indicate that the call has been answered.
- aa) The terminating SSF/CCF sends an ISUP Answer Message (ANM) to the originating SSF/CCF.
- bb) The SSF/CCF sends an ISDN CONNect ACKnowledge message to the RCF to acknowledge the receipt of the ISDN CONNect message.
- cc) The RCF sends a CONN_ACK message to the RTF.
- dd) The RCF sends a P_CONNECT message to the RACF to indicate that the call has been connected.
- ee) The RACF sends a Call Indication message to the SSF/CCF.
- ff) The SCF may initiate a Count Update procedure to increment the COUNT at the RTF and at the SSF.

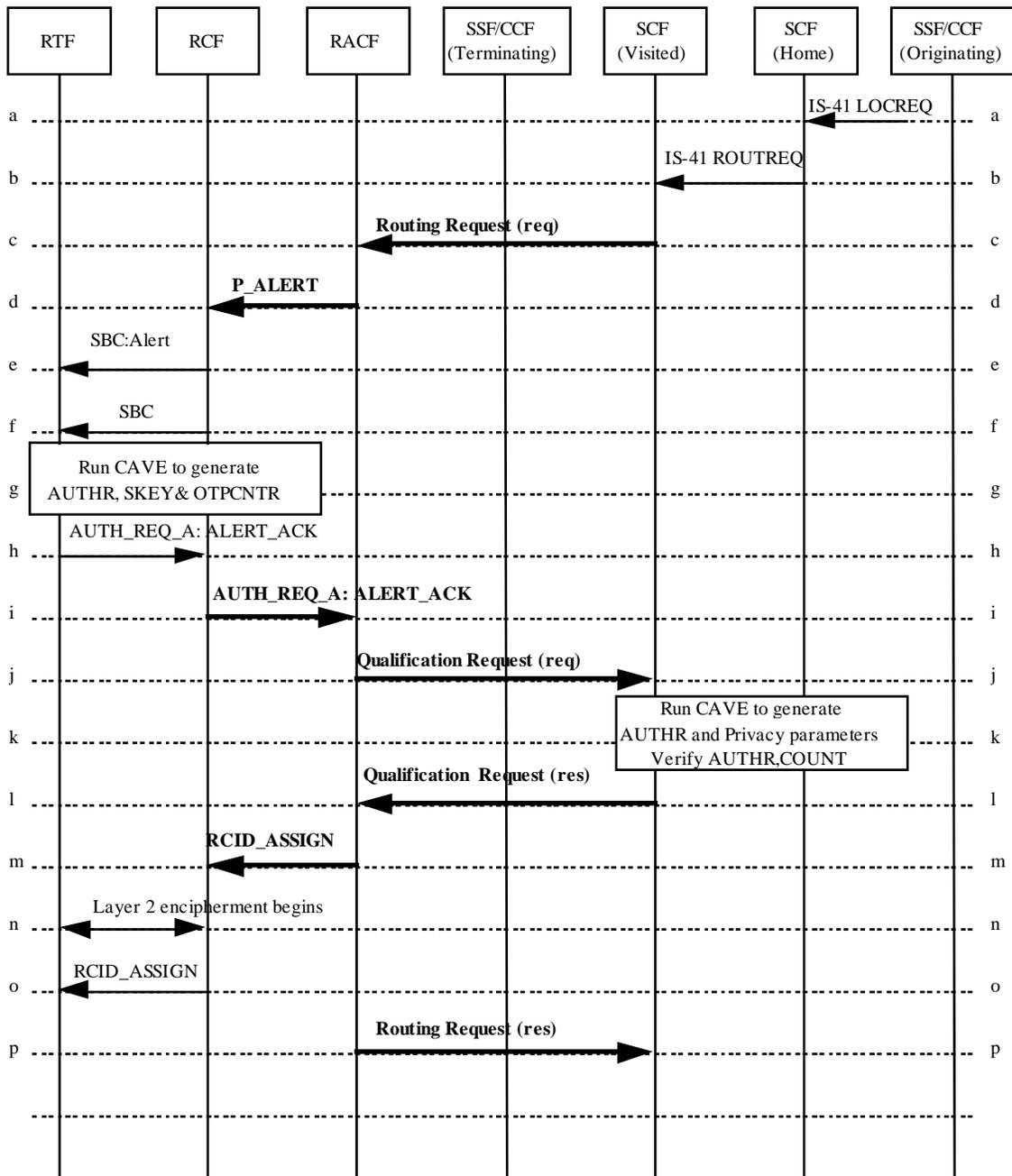


Figure B.4 – Mobile termination (1 of 2)

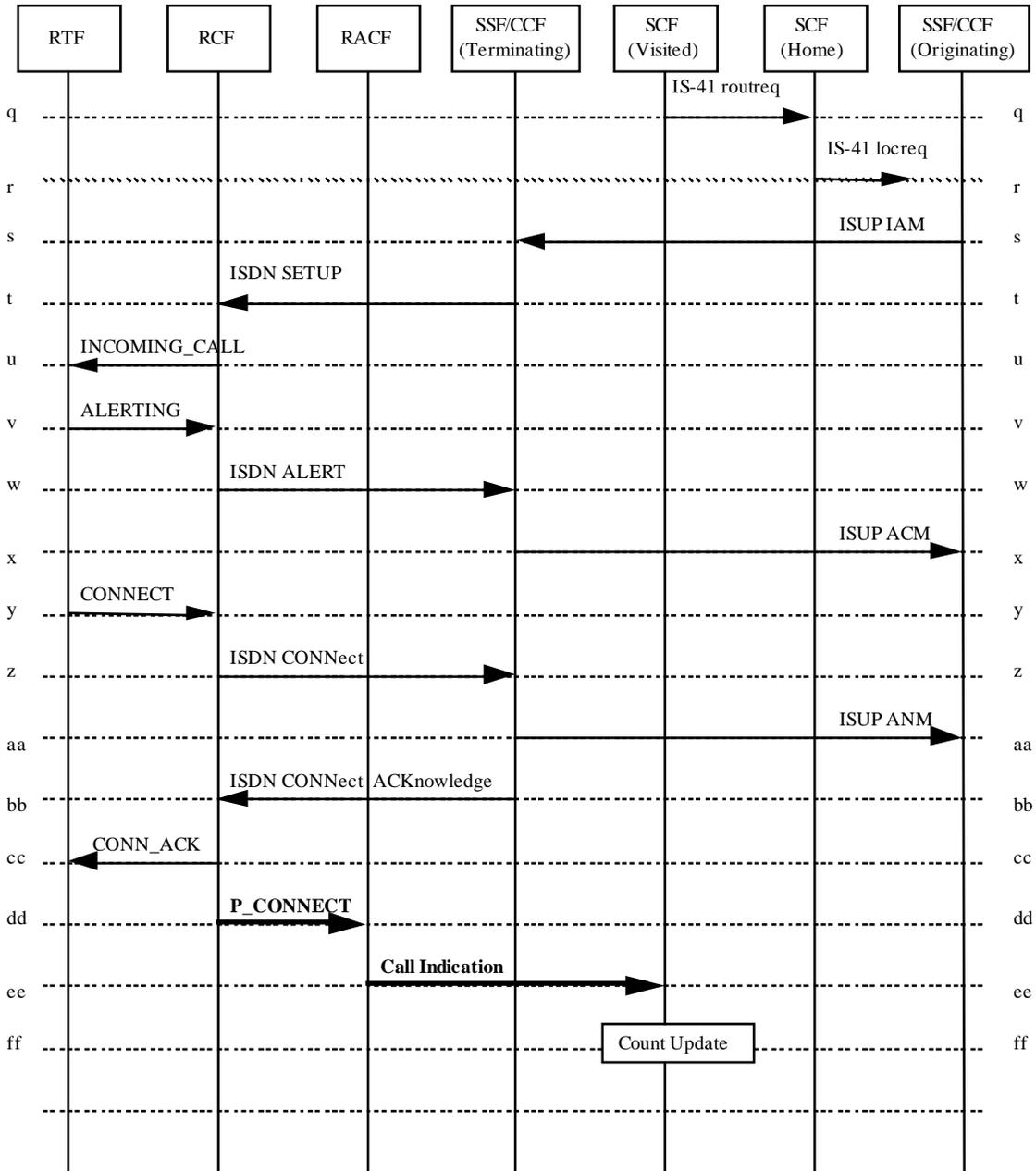


Figure B.4 – Mobile termination (2 of 2)

B.5 Count update procedure

This clause discusses the call flow associated with a Count Update procedure for PACS shown in figure B.5. The flow assumes SSD is shared.

- a) The visited SCF receives an indication that a call is now stable and initiates the Count Update Procedure by sending an Authentication Directive message containing the `init_Count_Update` parameter to the RACF.
- b) The RACF sends a `COUNT_UPDATE_REQ` to the RCF.
- c) The RCF sends a `COUNT_UPDATE_REQ` to the RTF.
- d) The RTF increments its count by one.
- e) The RTF sends a `COUNT_UPDATE_ACK` to the RCF.
- f) The RCF sends a `COUNT_UPDATE_ACK` to the RACF.
- g) The RACF sends an Authentication Directive Response to the visited SCF indicating that the Count Update was successful.

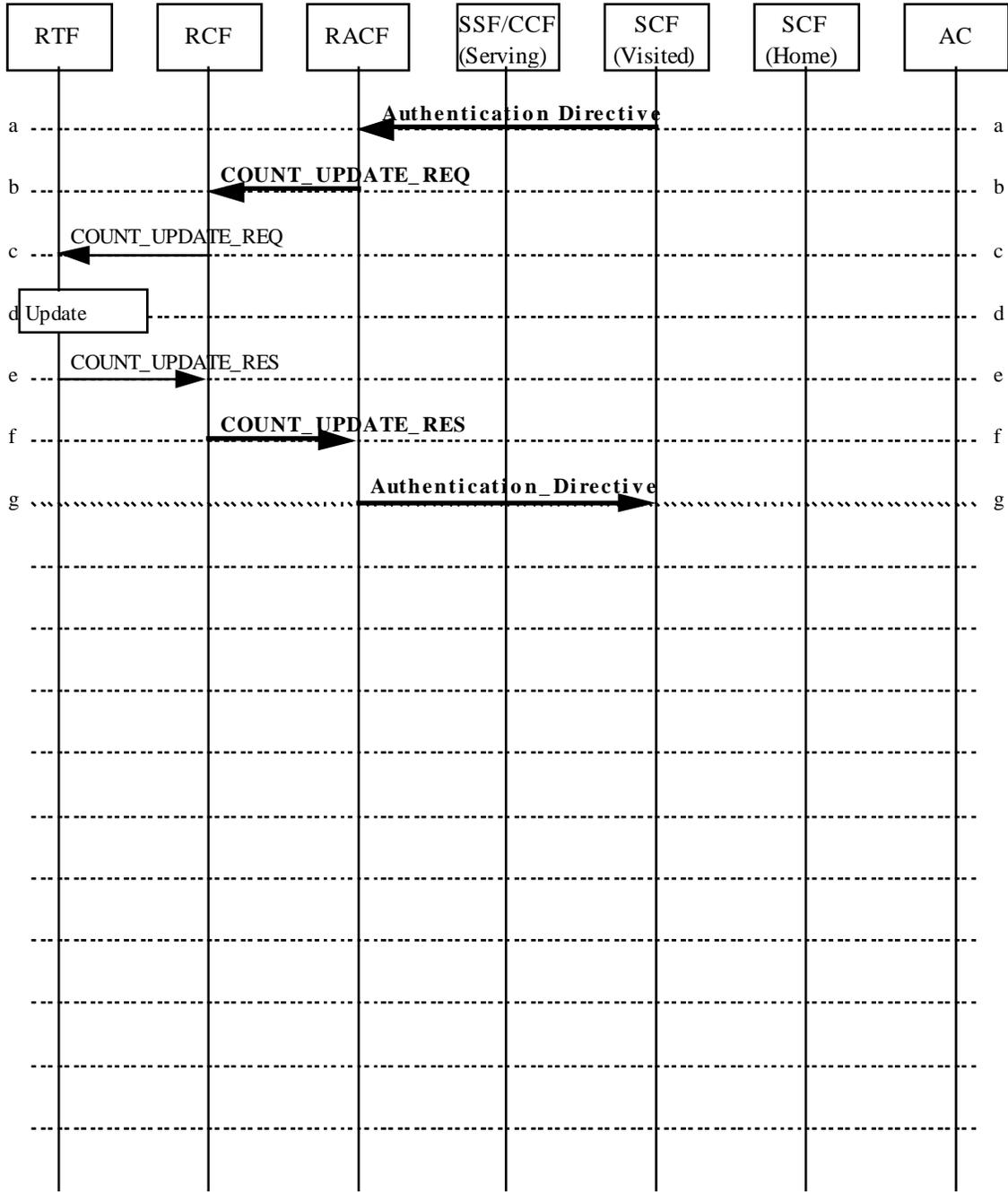


Figure B.5 – Count update

B.6 Call clearing

B.6.1 Call clearing initiated by RTF

This subclause provides the call flow for a call clearing procedure initiated by the RTF, as shown in figure B.6.

- a) The RTF initiates call clearing by transmitting a DISC message to the RCF.
- b) The RCF sends an ISDN DISConnect message to the SSF/CCF, containing the Call Reference of the call and the Cause of the disconnection.
- c) The serving SSF/CCF informs the far end that the call is to be cleared by sending an ISUP REL message.
- d) The far end SSF/CCF acknowledges the receipt of ISUP REL by sending an ISUP RLC message.
- e) The SSF/CCF also acknowledges the receipt of ISDN DISConnect from the RCF by sending an ISDN RELEase message.
- f) The RCF returns an ISDN RELEase COMPLete message to the serving SSF/CCF.
- g) The RCF sends a P_DISC message to the RACF to inform the RACF that the call has been cleared.
- h) The RACF a Clear_Request message to the visited SCF.
- i) The visited SCF sends a Clear_Request response message to the RACF.
- j) The RACF sends a P_RELEASE message to the RCF.
- k) The RCF sends a RELEASE message to the RTF.
- l) The RTF sends a REL_COM message to the RCF and releases all radio resources associated with the call.
- m) The RCF releases all radio resources associated with the call and sends a P_REL_COM message to the RACF.

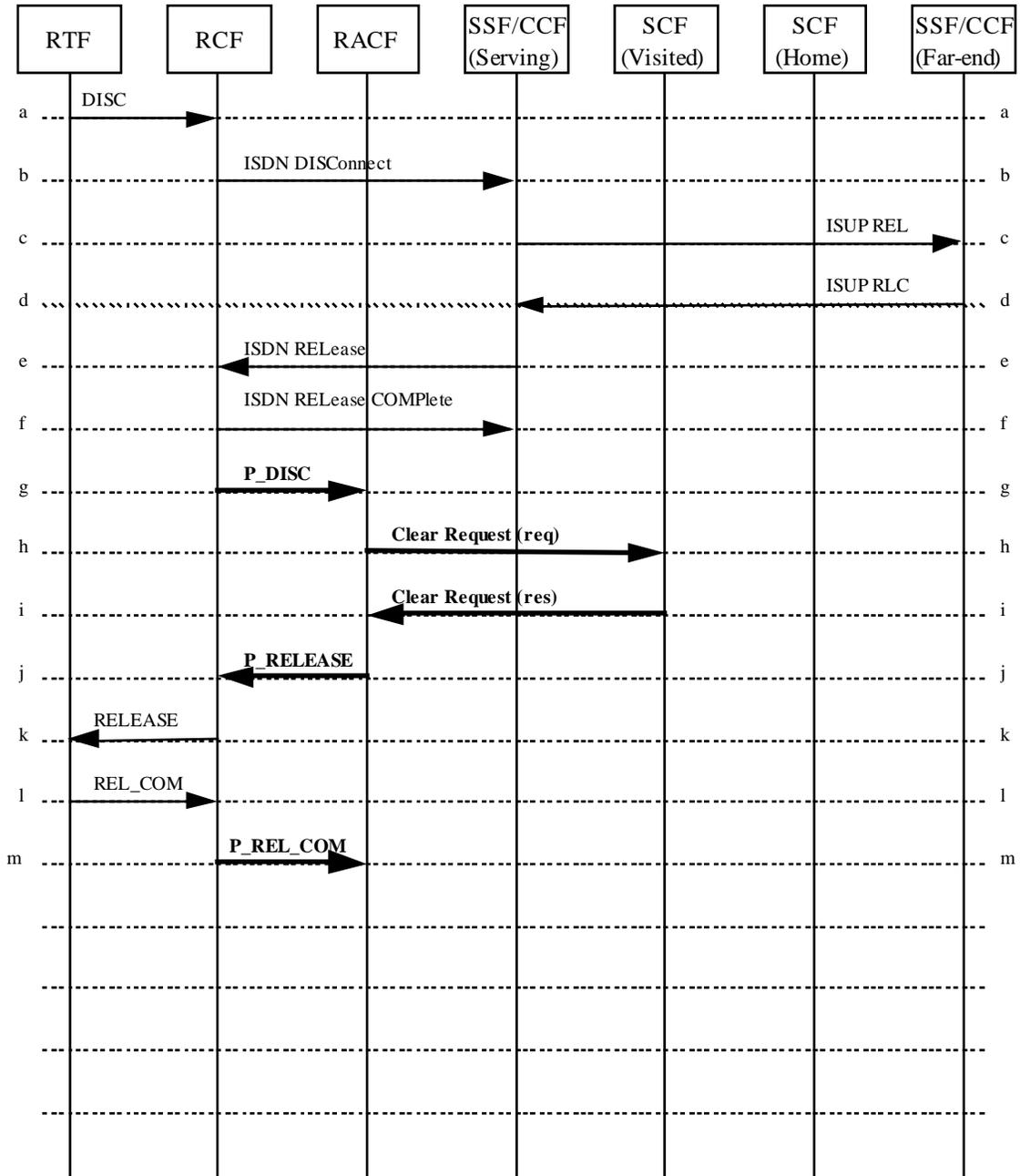


Figure B.6 – Call clearing initiated by RTF

B.6.2 Call clearing initiated by Far-end

In this scenario (figure B.7), the call clearing is initiated when the far end party disconnects.

- a) The far end party goes on-hook, and an ISUP REL message is sent to the serving SSF/CCF.
- b) The serving SSF/CCF sends an ISDN DISConnect message to the RCF, containing information such as the Call Reference for the call and the Cause for disconnection.
- c) The RCF sends a DISC message to the RTF.
- d) The RCF sends an ISDN RELease message to the serving SSF/CCF.
- e) The SSF/CCF responds to the RCF with an ISDN RELease COMPlete message.
- f) The SSF/CCF also sends an ISUP RLC message to the far end SSF/CCF to acknowledge the receipt of the ISUP REL message.
- g) The RCF sends a P_DISC message to the RACF to inform the RACF that the call has been cleared.
- h) The RACF sends a Clear_Request message to the visited SCF.
- i) The visited SCF sends a Clear_Request response message to the RACF.
- j) The RACF sends a P_RELEASE message to the RCF.
- k) The RCF sends a RELEASE message to the RTF.
- l) The RTF sends a REL_COM message to the RCF and releases all radio resources associated with the call.
- m) The RCF releases all radio resources associated with the call and sends a P_REL_COM message to the RACF.

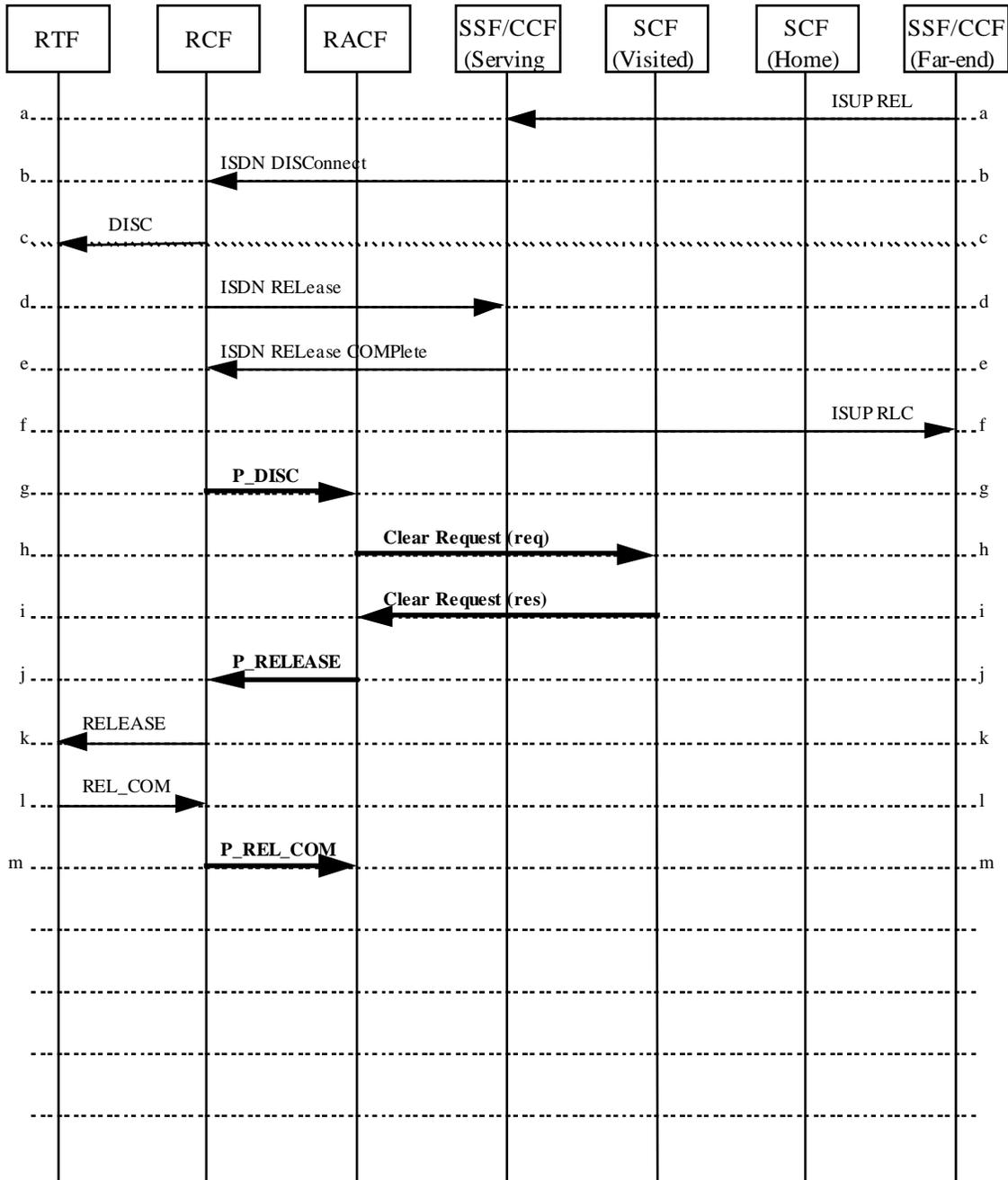


Figure B.7 – Call clearing initiated by far-end

B.7 Inter-RCF automatic link transfer

This clause discusses the call flow associated with an Automatic Link Transfer (handoff) from one RCF to another, both of which are under the RACF's domain.

A step-by-step description of a call flow for ALT is shown in figure B.8.

- a) There is existing communications serving an active call on an ISDN interface serving the old RCF. Because the radio signal has dropped below a pre-determined threshold, the RTF sends an ALT_REQ to a new RCF.
- b) The new RCF inspects the RCID and determines that this ALT is not intra-RCF. The new RCF sends the RTF an ALT_ACK message.
- c) The new RCF sends an ALT_AUTH_REQ message to the RACF to validate the user.
- d) The RACF validates the user and responds with an ALT_AUTH_ACK message. The message includes the SKEY to be used for encrypting the radio link.
- e) The RCF sends an ISDN SETUP message to the SSF/CCF.
- f) The SSF/CCF responds with an ISDN CALL PROCEEDING message.
- g) The SSF/CCF recognizes the ALT request. The ALT request takes precedence over the AIN BRI Off-Hook Delay trigger. Digit analysis of old ALT_DN determines that this ALT is to an RCF served by an ISDN interface on the same SSF/CCF. The SSF/CCF issues an Facility message to the old RCF.
- h) The old RCF responds with a Facility message and a Facility information element.
- i) The SSF/CCF receives the Facility message, then engages a bridge between the remote end of the call and the two (2) subscriber loops with the ALT.
- j) The SSF/CCF sends an ISDN CONNECT message to the new RCF.
- k) The new RCF returns an ISDN CONNECT ACKNOWLEDGE message.
- l) The new RCF sends an ALT_RDY message to the RACF to indicate that the RTF can complete the ALT to the new RCF.
- m) The RACF sends the ALT_RDY message to the old RCF.
- n) The new RCF sends a START_CIPHER message. The START_CIPHER message will be repeated until the new RCF receives an ALT_COMP message from the RTF or until timed out.
- o) The old RCF sends an ALT_EXEC message. The ALT_EXEC message repeats until the old RCF receives an ALT_COMP message from the RACF or until timed out.
- p) The RTF sends the new RCF an ALT_COMP message to indicate that the RTF has completed the transition to the new RCF.
- q) Once the new RCF has received the ALT_COMP message, the new RCF sends to the RACF an ALT_COMP message. (The RCF must ensure that the new ALT_DN and RCID pair is unique within its list of active calls.)
- r) The RACF sends to the old RCF an ALT_COMP message.
- s) The old RCF completes the interaction with SSF/CCF by sending an ISDN DISCONNECT message.
- t) The SSF/CCF sends the old RCF an ISDN RELEASE message.
- u) The old RCF sends the SSF/CCF an ISDN RELEASE COMPLETE message.
- v) The RACF sends the visiting SCF a Handover_Complete_Indication message. The message includes the new DN.
- w) After the ALT is complete, the new RCF may reassign the ALT_DN by sending an RCID_ASSIGN message if necessary.
- x) The RCF sends the new ALT_DN to the RTF.

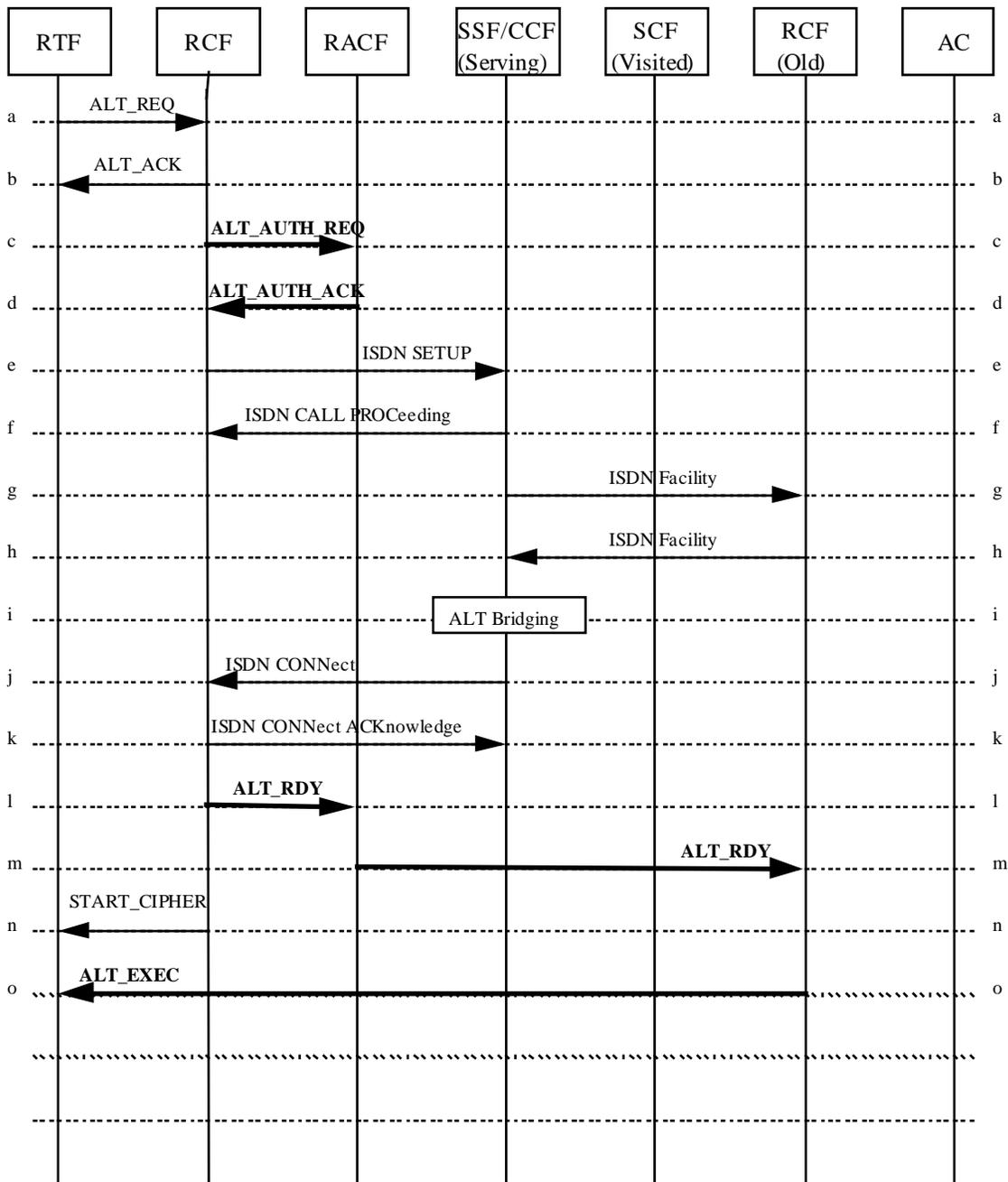


Figure B.8 – Inter-RCF ALT (1 of 2)

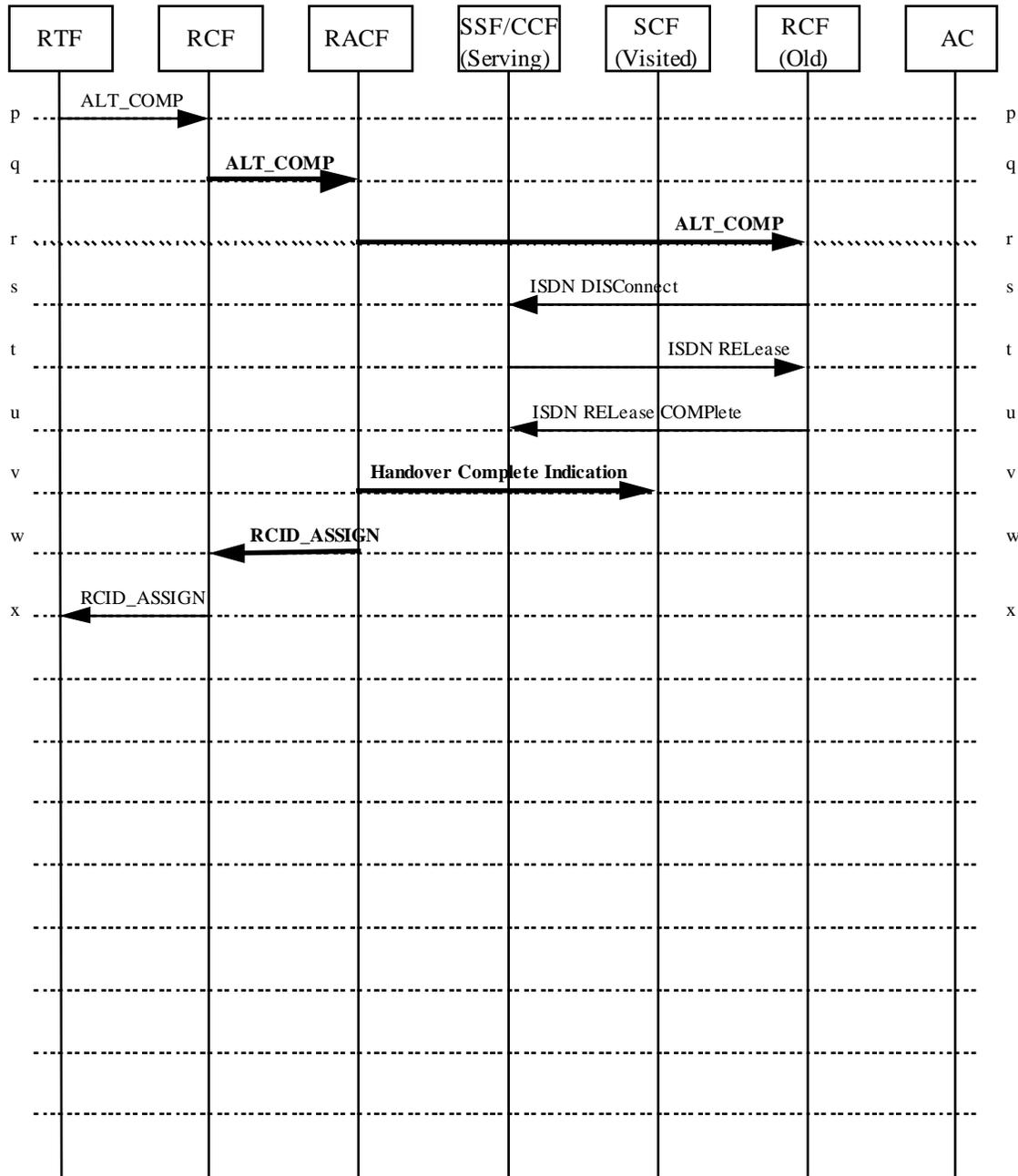


Figure B.8 – Inter-RCF ALT (2 of 2)

Annex C (informative)

Physical scenarios

The MMAP operations support the following example physical scenarios:

C.1 Physical scenario 1

Physical scenario 1 (see figure C.1) is characterized by:

signaling and bearer services interface(s) between:

- the Personal Station (PS) and the Radio System (RS)
- the RS and the Switching Platform

a signaling interface between:

- the Switching Platform and the Mobility Management Platform
- the RS and the Mobility Management Platform

MMAP operations are sent and received over the signaling Interfaces or routes between the RCF and RACF via methodologies such as SS7.

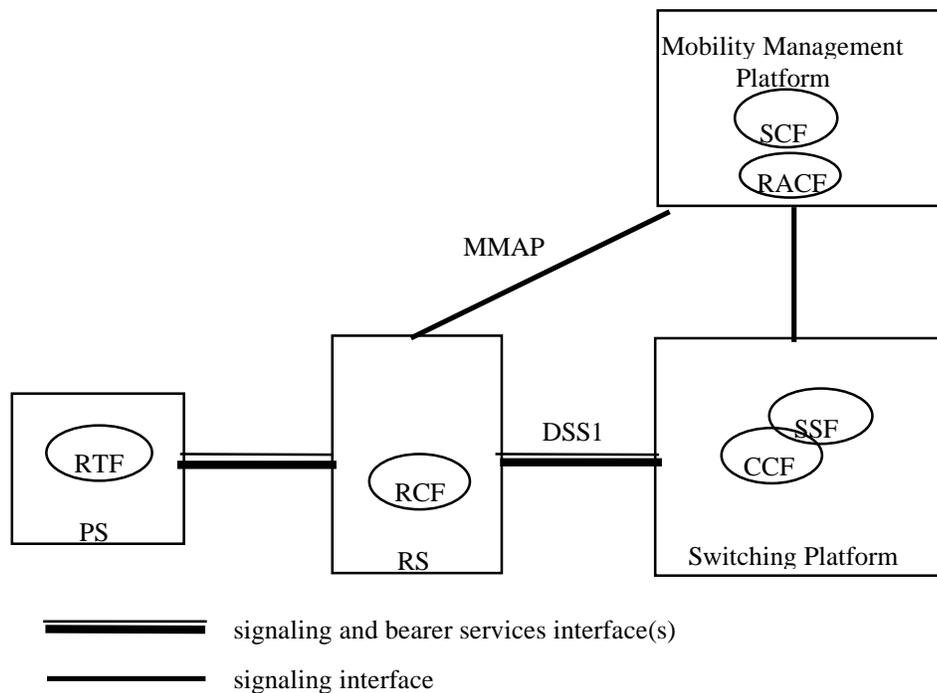


Figure C.1 – Physical Scenario 1: RCF-to-RACF via direct route

C.2 Physical scenario 2

Physical scenario 2 is characterized by two categories of RACF functionality that involve call setup and handoff. The call setup aspect is referred here as RACF-Access Control (RACF-AcC) and the handoff aspect is referred as RACF-Handoff Control (RACF-HoC). Subclause C.2.1 describes the physical scenario and subclause C.2.2 provides additional information on RACF-AcC and RACF-HoC.

C.2.1 Physical scenario

An example physical scenario where the RACF-AcC and RACF-HoC reside on separate physical platforms is shown in figure C.2.

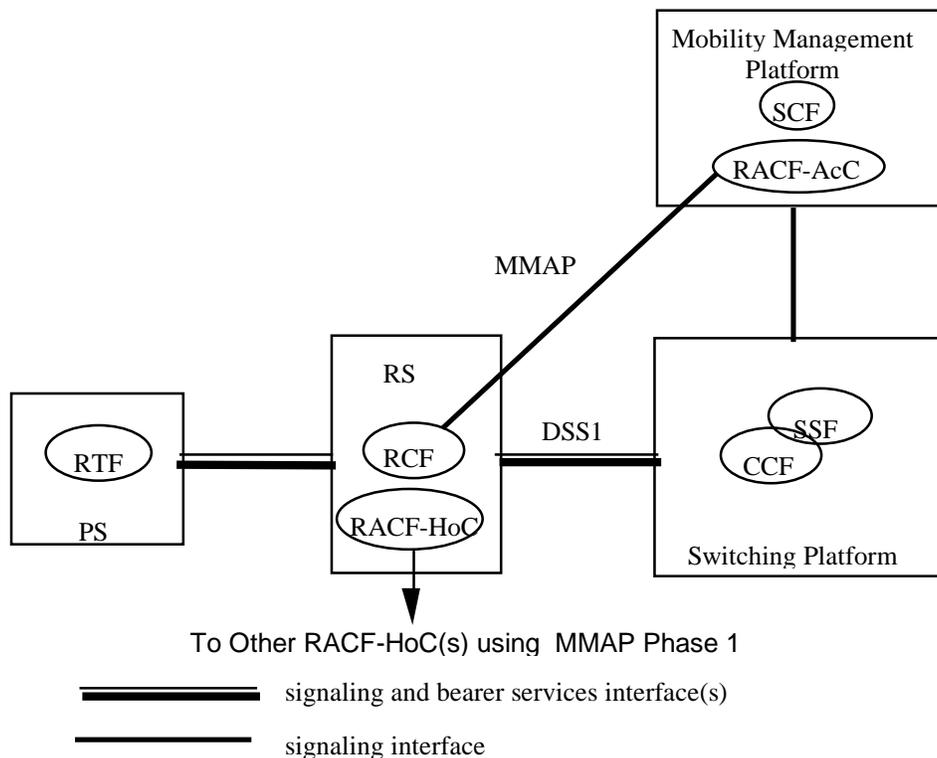


Figure C.2 – Physical Scenario 2: RCF-to-RACF AcC via direct route

C.2.2 Synopsis of RACF functionality

A brief description of RACF functionality in each of its two roles is included here for information purposes only.

C.2.2.1 RACF-Access Control (RACF-AcC)

The following functionality of RACF is associated with the Access Control (AcC) aspects. In this role, the RACF works with the Visiting SCF (VSCF) to perform mobility management functions for subscriber access. For example, the RACF-AcC:

- Verifies subscriber qualification upon service request. This is done by comparing the service request from the PS with the stored profile in the VSCF. It may download the profile from the VSCF or query it when it needs the information.

- Mediates between RCF and VSCF for paging and routing information response.
- Request authentication process from VSCF.
- Associates RTF with RCF Interface Directory Number (DN) and maintains Interface DN for the duration of the call.
- Optionally keeps track of time and reports it to VSCF. It may maintain timers to keep track of the call setup time, the time the call was connected, and the time the call was disconnected.

C.2.2.2 RACF-Handoff Control (RACF-HoC)

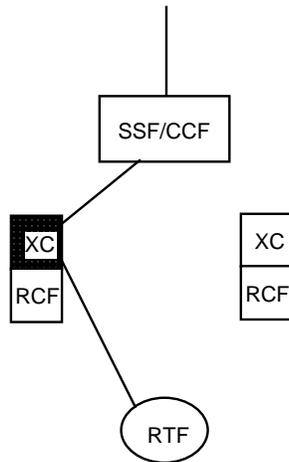
In this category, the RACF-HoC manages handoff, for example, by doing the following:

- Initiates handoff based on the status of subordinate RCFs.
- Identifies candidate RCFs for handoff and determines target RCF.
- Interacts with peer handoff controls to carry out the handoff and sets up appropriate connections.
- Directs handoff resource allocation and use.

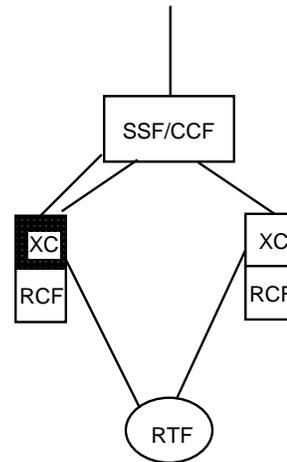
Annex D (informative)

Handoff connections

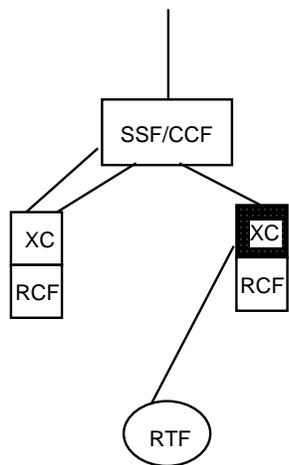
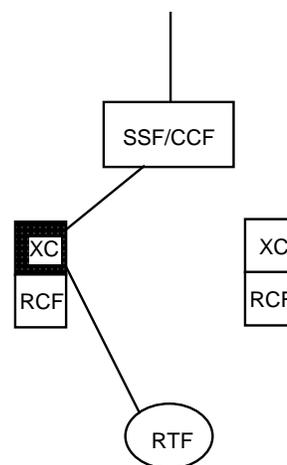
This annex provides figures that illustrate the connections before and after initial handoff, drop source, and drop target procedures.



Initial Connection



After Initial Handoff

After Drop Source or
Hard Handoff

After Drop Target



Transcoder
Active



Transcoder
Bypass

Annex E

(informative)

Bibliography

This annex lists references that are for information only and are not essential for the completion of the requirements in this standard.

1. TR-NWT-001284, *Advanced intelligent network (AIN) 0.1 switching systems generic requirements*. Bellcore, Issue 1, August 1992.⁴⁾
2. TR-NWT-001285, *Advanced intelligent network (AIN) switch – Service control point (SCP) application protocol interface generic requirements*. Bellcore, Issue 1, August 1992.⁴⁾

⁴⁾ Available from Bellcore Customer Service, 8 Corporate Place, Room 3A-184, Piscataway, NJ 08854-4156.