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Terrestrial Trunked Radio (TETRA);
Voice plus Data (V+D);
Part 3: Interworking at the Inter-System Interface (ISI);
Sub-part 5: Additional Network Feature
for Mobility Management (ANF-ISIMM)

Reference
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Contents

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee TETRA and Critical Communications Evolution (TCCE), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

ETSI EN 300 392-1: "General network design";

ETSI EN 300 392-2: "Air Interface (AI)";

ETSI EN 300 392-3: "Interworking at the Inter-System Interface (ISI)";

ETSI EN 300 392-3-1: "General design";

ETSI EN 300 392-3-2: "Additional Network Feature Individual Call (ANF-ISIIC)";

ETSI EN 300 392-3-3: "Additional Network Feature Group Call (ANF-ISIGC)";

ETSI EN 300 392-3-4: "Additional Network Feature Short Data Service (ANF-ISISDS)";

ETSI EN 300 392-3-5: "Additional Network Feature for Mobility Management (ANF-ISIMM)";

ETSI TS 100 392-3-6: "Speech format implementation for circuit mode transmission";

ETSI TS 100 392-3-7: "Speech Format Implementation for Packet Mode Transmission";

ETSI TS 100 392-3-8: "Speech Format Implementation";

ETSI ETS 300 392-4: "Gateways basic operation";

ETSI EN 300 392-5: "Peripheral Equipment Interface (PEI)";

ETSI EN 300 392-7: "Security";

ETSI EN 300 392-9: "General requirements for supplementary services";

ETSI EN 300 392-10: "Supplementary services stage 1";

ETSI EN 300 392-11: "Supplementary services stage 2";

ETSI EN 300 392-12: "Supplementary services stage 3";

ETSI ETS 300 392-13: "SDL model of the Air Interface (AI)";

ETSI ETS 300 392-14: "Protocol Implementation Conformance Statement (PICS) proforma specification";

ETSI TS 100 392-15: "TETRA frequency bands, duplex spacings and channel numbering";

ETSI TS 100 392-16: "Network Performance Metrics";

ETSI TR 100 392-17: "TETRA V+D and DMO specifications";

ETSI TS 100 392-18: "Air interface optimized applications".

NOTE 1: Part 3, sub-parts 6 and 7 (Speech format implementation), part 4, sub-part 3 (Data networks gateway), part 10, sub-part 15 (Transfer of control), part 13 (SDL) and part 14 (PICS) of this multi-part deliverable are in status "historical" and are not maintained.

NOTE 2: Some parts are also published as Technical Specifications such as TS 100 392-2 and those may be the latest version of the document.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document adds enhancement which was introduced after the publication of ETSI EN 300 392-3-5 (V1.2.1). The main addition is:

- Support of group attachement to foreign SwMI groups.

1 Scope

The present document defines the mobility management of interworking at the Inter-System Interface (ISI) for Terrestrial Trunked Radio (TETRA) system supporting Voice plus Data (V+D).

The TETRA V+D Inter-working - basic operation part defines the Inter-System Interface (ISI) between the SwMIs as specified in the following sub-parts:

- Additional Network Feature - Inter-System Interface General Description (ANF-ISIGD).
- Additional Network Feature - Inter-System Interface Individual Call (ANF-ISIIC).
- Additional Network Feature - Inter-System Interface Group Call (ANF-ISIGC).
- Additional Network Feature - Inter-System Interface Short Data Service (ANF-ISISDS).
- Additional Network Feature - Inter-System Interface Mobility Management (ANF-ISIMM).

NOTE: These ENs are produced in analogy with the Recommendation ITU-T I.130 [8].

The present document contains the ANF-ISIMM part. The ANF-ISIMM part defines additional Mobility Management (MM) services to the SwMIs. If supported, the ANF-ISIMM services complement the intra-SwMI-MM, authentication and key management services. In support of these, the ANF-ISIMM enables the invocation and operation of these services between the SwMIs over the ISI. Thus, ANF-ISIMM offers the following services:

- Migration and restricted migration.
- Individual subscriber and group profile update.
- Profile update.
- De-registration.
- Group attachment/detachment.
- Individual subscriber and group database fault recovery.
- Authentication, one-directionally or mutually between the individual subscriber and the home SwMI.
- Over-The-Air-Re-keying (OTAR) for Static Cipher Key (SCK) generation and SCK delivery.

For the following service only the stage 1 descriptions are included:

- Linking/unlinking of groups.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

[2] ETSI EN 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".

[3] ETSI EN 300 392-3-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 1: General design".

[4] ETSI EN/ETSI ETS 300 392-12 (all parts): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3".

[5] ETSI EN 300 392-7: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 7: Security".

[6] ISO/IEC 11572: "Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol".

[7] ISO/IEC 11582: "Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Generic functional protocol for the support of supplementary services - Inter-exchange signalling procedures and protocol".

[8] Recommendation ITU-T I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[9] Recommendation ITU-T Z.100: "Specification and Description Language - Overview of SDL-2010".

[10] ETSI EN/ETSI ETS 300 392-10 (all parts): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1".

[11] ETSI EN 300 392-10-6: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 6: Call Authorized by Dispatcher (CAD)".

[12] ETSI EN 300 392-10-18: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 18: Barring of Outgoing Calls (BOC)".

[13] ETSI EN 300 392-9: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".

[14] Recommendation ITU-T X.219: "Remote Operations: Model, notation and service definition".

[15] ETSI EN 300 392-3-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 2: Additional Network Feature Individual Call (ANF-ISIIC)".

[16] ETSI EN 300 392-3-3: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 3: Additional Network Feature Group Call (ANF-ISIGC)".

[17] ETSI TS 101 747: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); IP Interworking (IPI)".

[18] Void.

[19] ETSI EN 300 392-12-22: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 22: Dynamic Group Number Assignment (DGNA)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

basic migration profile: basic service profile related to a particular TSI used in a visited SwMI of which the MNI is different from that of the TSI

forward registration: registration that takes place during a call using announced type 1 cell re-selection mechanism

group home: SwMI owning the Group Home DataBase

Group Home DataBase (G-HDB): database at group home where the current attachment information and all group parameters are permanently stored

group home SwMI: SwMI where the Group Home DataBase (G-HDB) resides

NOTE: The MNI of the group home SwMI is equal to that of that group.

Group linking controlling SwMI: SwMI which controls the dynamic group linking and which controls a group call on linked groups

Group linking participating SwMI: SwMI that participates in the group linking by linking (joining) one group to the group linking

Group Visitor DataBase (G-VDB): database where the current attachment information and all group parameters are stored when the group is attached within the area of the G-VDB

Home Authentication Centre (HAC): database where the authentication and the OTAR parameters are permanently stored

home SwMI: SwMI where the Individual subscriber Home DataBase (I-HDB) and the Group Home DataBase (G-HDB) co-locate

individual subscriber home SwMI: SwMI where the Individual subscriber Home DataBase (I-HDB) resides

NOTE: The MNI of the individual subscriber home SwMI is equal to that of that subscriber.

Individual subscriber-Home DataBase (I-HDB): database where the current location and all individual subscriber parameters are permanently stored

Individual subscriber-Visitor DataBase (I-VDB): database where the current location and all individual subscriber parameters are stored when the individual subscriber is registered within the area of the I-VDB

Individual TETRA Subscriber Identity (ITSI): TSI assigned to an individual user

linked group: one or more group identities in different TETRA SwMIs which form a multigroup across several TETRA SwMIs

Location Area (LA): area within radio coverage of a base station or group of base stations within which a MS is allowed to operate

location update registration: act of exchanging identity information with a SwMI in order to create or update a location record in this SwMI

migrated subscriber: individual subscriber that has migrated into a TETRA SwMI

migration: act of performing a registration in a SwMI where no valid location record exists for the individual subscriber

migration profile: basic migration or the SS-migration service profile related to a particular TSI used in a visited SwMI of which the MNI is different from that of the TSI

Mobile Network Identity (MNI): identity that is broadcast by all TETRA base stations to uniquely identify the SwMI

NOTE: It consists of the Mobile Country Code (MNC) and the Mobile Network Code (MNC).

Mobile Station (MS): physical grouping that contains all of the mobile equipment that is used to obtain TETRA services

NOTE: By definition, a mobile station contains at least one Mobile Radio Stack (MRS).

original basic migration profile: basic service profile related to a particular TSI which is sent from the home SwMI to the visited SwMI

original migration profile: basic migration or the SS-migration service profile related to a particular TSI which is sent from the home SwMI to the visited SwMI

original SS-migration profile: supplementary service profile related to a particular TSI which is sent from the home SwMI to the visited SwMI

previous visited SwMI: previous visited SwMI

NOTE: The previous visited SwMI exists for the individual subscriber if he was registered or migrated prior to the migration.

protocol instance: entity that performs the protocol actions of one service instance

registration: act of becoming an active and recognized TETRA subscriber by exchange of ITSI with the SwMI

Sealed Static Cipher Key (SSCK): static cipher key that has been cryptographically protected

service instance: one invocation and the corresponding operation of the service

Session Authentication Key for a visited network (KSv, KSv'): key generated from the authentication key and a random seed for authentication that is used for authentication in a visited network

NOTE: It is sent from the home network to a visited network.

Session Key for OTAR for a visited network (KSOv): key derived from an MS's authentication key and a random seed for OTAR that is used for OTAR in a visited network

NOTE: KSOv may be used to protect the transfer of the Static Cipher Key, Group Cipher Key and Group Session Key for OTAR in a visited network. It may be sent from the home network to a visited network.

Static Cipher Key (SCK): predetermined cipher key that is used to provide confidentiality in class 2 systems with a corresponding algorithm and is also used in DMO or for fallback

SS-migration profile: supplementary service profile related to a particular TSI used in a visited SwMI of which the MNI is different from that of the TSI

supplementary service: modifies or supplements a bearer service or a teleservice

NOTE: A supplementary service cannot be offered to a customer as a stand alone service. It should be offered in combination with a bearer service or a teleservice.

Switching and Management Infrastructure (SwMI): all of the TETRA equipment for a Voice plus Data (V+D) network except for subscriber terminals

NOTE: The SwMI enables subscriber terminals to communicate with each other via the SwMI.

Switching and Management Infrastructure - Mobility Management (SwMI-MM): peer MM entity of MS-MM that resides in the SwMI

NOTE: MS-MM is defined in ETSI EN 300 392-2 [1], clauses 15 and 16.

temporary basic migration profile: service profile related to a particular TSI which is sent from the visited SwMI to the home SwMI as a response to a received original basic migration profile

temporary migration profile: basic migration or the SS-migration service profile related to a particular TSI which is sent from the visited SwMI to the home SwMI as a response to a received original basic migration or SS-migration service profile

temporary SS-migration profile: supplementary service profile related to a particular TSI which is sent from the visited SwMI to the home SwMI as a response to a received original SS-migration profile

TETRA Subscriber Identity (TSI): global network address that is to identify an individual or a group subscriber within the domain of all TETRA SwMIs

visited SwMI: SwMI where the I-VDB, and optionally the G-VDB and the VAC reside

NOTE 1: The MNI of the visited SwMI of the individual subscriber or of the group may be the same as that of their home SwMI.

NOTE 2: The definition of the "visited SwMI" is for the purpose of the ISI interface. In the Air Interface standard ETSI EN 300 392-2 [1] the visited SwMI is referring to the SwMI which is broadcasting an MCC and/or MNC which is different than the MCC and MNC of the related TETRA identity.

Visitor Authentication Centre (VAC): database where the authentication and the OTAR parameters are stored when the individual subscriber is registered within the I-VDB collocated with the VAC

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AI	Air Interface
ANF	Additional Network Feature
APDU	Application Protocol Data Unit
ASSI	Associated Short Subscriber Identity
CC	Call Control
CCK	Common Cipher Key
C-LDB	Controlling Linking Data Base
conf, _conf	confirmation
CONS	Connection Orientated Network Service
DCK	Derived Cipher Key
DE-REG	DE-REGISTRATION
DMO	Direct Mode Operation
FE	Functional Entity
GCK	Group Cipher Key
GDR	Group Database Recovery
GFP	General Functional Protocol
G-HDB	Group Home DataBase
G-HDR	Group Home Database Recovery
GSSI	Group Short Subscriber Identity
GTSI	Group Tetra Subscriber Identity
G-VDB	Group Visitor DataBase
G-VDR	Group Visitor Database Recovery
HAC	Home Authentication Centre
HDB	Home DataBase
HMM	Home Mobility Management

IDR	Individual subscriber Database Recovery
I-HDB	Individual subscriber Home DataBase
ind, _ind	indication
IP	Internet Protocol
ISI	Inter System Interface
ISIGC	Inter-System Interface Group Call
ISIGD	Inter-System Interface General Description
ISIIC	Inter-System Interface Individual Call
ISIMM	Inter-System Interface Mobility Management
ISISDS	Inter-System Interface Short Data Service
ISSI	Individual Short Subscriber Identity
ITSI	Individual Tetra Subscriber Identity
I-VDB	Individual subscriber Visitor DataBase
KSO	Session Key for OTAR
KSOv	Session Key for OTAR for a visited network
KSv, KSv'	Session Authentication Key for a visited network
LA	Location Area
MCC	Mobile Country Code
MLE	Mobile Link Entity
MM	Mobility Management
MNC	Mobile Network Code
MNI	Mobile Network Identity
MRS	Mobile Radio Stack
MS	Mobile Station
MSC	Message Sequence Chart
OTAR	Over The Air Re-keying
PDU	Protocol Data Unit
PISN	Private Integrated Services Network
P-LDB	Participating Linking Data Base
PSS1	Private Integrated Signalling System Number 1
PTT	Push To Talk
req, _req	request
resp, _resp	response
RO	Remote Operations
RS	Random Seed
RSI	Removal of Subscriber Information
RSO	Random seed for OTAR
SAP	Service Access Point
SCK	Static Cipher Key
SCKN	Static Cipher Key Number
SCK-VN	Static Cipher Key Version Number
SDL	Specification and Description Language
SDS	Short Data Service
SGCK	Sealed Group Cipher Key
SS	Supplementary Service
SSCK	Sealed Static Cipher Key
SSI	Short Subscriber Identity
SwMI-MM	Switching and Management Infrastructure - Mobility Management
TSI	TETRA Subscriber Identity
VAC	Visitor Authentication Centre
VDB	Visitor Data Base
VMM	Visited Mobility Management

4 Overview

4.1 General

ANF-ISIMM shall allow the operation of MM, authentication and Over The Air Re-keying (OTAR) services for migrating or migrated individual subscribers. In addition, ANF-ISIMM supports the group management services over the ISI.

NOTE: The AI MM services are defined in ETSI EN 300 392-2 [1], clause 15. The AI authentication and the OTAR key management services are defined in ETSI EN 300 392-7 [5], clause 4.

4.2 Applicability

4.2.1 Entities

ANF-ISIMM is applicable for the MM entities in SwMIs, i.e. the SwMI MMs. The SwMI MMs correspond in the SwMI side to the MMs in MSs (MS-MMs) as defined in ETSI EN 300 392-2 [1], clauses 15 and 16.

4.2.2 Services

The ANF-ISIMM services shall be applicable, and thus, enable the extension of the following TETRA services over the ISI:

a) registration on individual subscriber demand;

b) registration on SwMI demand (on visited SwMI demand);

c) registration initiated by MLE when change of Location Area (LA) occurs, except forward registration;

d) de-registration on individual subscriber demand;

e) de-registration on SwMI demand (on visited and on home SwMI demand);

f) attachment of group identities on individual subscriber demand;

g) attachment of group identities on SwMI demand (on visited and on group home SwMI demand);

h) detachment of group identities on individual subscriber demand;

i) detachment of group identities on SwMI demand (on visited and on group home SwMI demand);

j) authentication on SwMI demand (on visited SwMI demand);

k) authentication on individual subscriber demand;

l) OTAR SCK generation service on individual subscriber demand;

m) OTAR SCK generation service on SwMI demand (on visited SwMI demand);

n) OTAR SCK delivery service on individual subscriber demand;

o) OTAR SCK delivery service on SwMI demand (on visited SwMI demand).

NOTE: The services in a) to i) are defined in ETSI EN 300 392-2 [1], clauses 15 and 16; the services in j) to o) are defined in ETSI EN 300 392-7 [5], clause 4.

The ANF-ISIMM services extend the above mentioned services as follows:

- migration: services in a) to c);
- de-registration: service in d) and e);
- group attachment: services in f) and g);

- group detachment: services in h) and i);
- authentication: services in j) and k);
- OTAR: services in l) to o).

In addition, the ANF-ISIMM profile update service supports, as part of migration service or as an independent service, the individual subscriber TETRA supplementary service profile exchange between the SwMI, as defined in ETSI EN/ETS 300 392-12 [4]. Consequently, the supplementary service profiles of a group may be exchanged as part of ANF-ISIMM group attachment service or as an independent service.

4.3 Testability

The ANF-ISIMM shall be testable over the ISI. Testing is intended to be performed at the ISI interface. The testing methods are outside the scope of the present document.

4.4 Provision/withdrawal

The provision and the withdrawal of the ANF-ISIMM services shall be by pre-arrangement between the SwMI operators. In addition, the services may be withdrawn for administrative reasons by the SwMI operator.

The definition of the provision and withdrawal of the ANF-ISIMM services are outside the scope of the present document.

4.5 Activation/deactivation

The activation and deactivation of the ANF-ISIMM services is done upon provision and withdrawal of the ANF-ISIMM services, respectively.

4.6 Charging

The charging is outside the scope of the present document.

5 The generic ANF-ISIMM stage 1 service model

5.1 ANF-ISIMM - the service provider

ANF-ISIMM shall be a SwMI V+D layer 3 (network layer) service provider. ANF-ISIMM shall offer services to SwMI MMs.

The generic stage 1 service model is illustrated in figure 1. The control aspects of the services are defined in terms of primitives. The primitives are sent across the ISIMM Service Access Points (ISIMM-SAPs) between the service provider and the service users. The ANF-ISIMM services use the following four generic service primitives:

- request (req);
- indication (ind);
- response (resp); and
- confirm (conf).

The service-specific primitives are defined for each service as part of the stage 1 service description in the following clauses. In the stage 1 descriptions, the ANF-ISIMM shall been seen as one entity.

NOTE: The stage 2 and 3 descriptions follow the stage 1 descriptions. In the stage 2 descriptions the ANF-ISIMM service behaviour is broken to Functional Entities (FEs). The stage 3 descriptions define the protocol aspects of the ANF-ISIMM services.

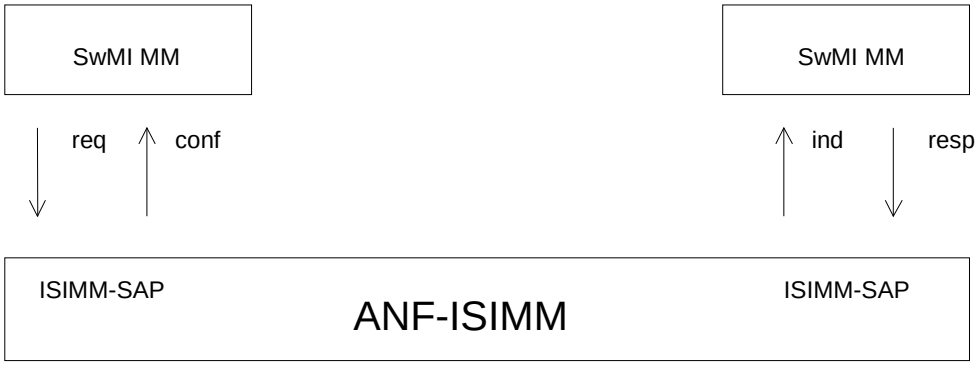


Figure 1: ANF-ISIMM stage 1 service model

5.2 SwMI MMs - the ANF-ISIMM service users

The SwMI MMs shall have the following generic roles as ANF-ISIMM service users:

- The individual subscriber home SwMI MM:
  - The home SwMI MM shall be the SwMI MM in which the individual subscriber has permanent subscription.
- The group home SwMI MM:
  - The group home SwMI MM shall be the SwMI MM in which group has permanent subscription.
- The visited SwMI MM:
  - The visited SwMI MM shall be the SwMI MM in which the individual subscriber is migrating or is migrated or in which the group is attached or being attached to at least one individual subscriber.
- The previous visited SwMI MM:
  - The previous visited SwMI MM may exist for the migrating individual subscriber when he is migrating to the new visited SwMI MM if he was registered or migrated prior to the migration.

The individual subscriber home SwMI MM shall reside within the individual subscriber home SwMI; the group home SwMI MM shall reside inside group home SwMI; the visited SwMI MM shall reside within the visited SwMI; the previous visited SwMI MM shall reside within the previous visited SwMI. The MNI of a SwMI MM shall be that of the SwMI in which it resides. These SwMI MMs may coincide, i.e. their MNIs may be the same; however, the ANF-ISIMM shall be invoked between these SwMI MMs when they do not coincide.

NOTE 1: The ANF-ISIMM services are applicable over the ISI, and thus, if the SwMI MMs coincide the internal actions within the SwMI may be carried out using different services and protocols than those defined for ANF-ISIMM. For example, the ISI General Functional Protocol (GFP), which provides the Private Signalling System 1 (PSS1) signalling connection across the ISI, may or may not be invoked within one SwMI.

The SwMI MMs shall be collocated with the SwMI databases, and with the SwMI Call Controls (CCs) as follows:

- The individual subscriber home SwMI MM:
  - shall be collocated with the Individual subscriber Home DataBase (I-HDB); and
  - may be collocated with the Group HDB (G-HDB) and the Home Authentication Centre (HAC), and with the CC in the case of group call restoration support.
- The group home SwMI MM:
  - shall be collocated with the Group HDB and group call CC; and
  - may be collocated with the Individual subscriber Home DataBase.

- The visited SwMI MM:
  - shall be collocated with the Individual subscriber Visitor DataBase (I-VDB); and
  - may be collocated with the Group VDB (G-VDB) and the Visitor Authentication Centre (VAC).
- The previous visited SwMI MM:
  - shall be collocated with the I-VDB;
  - may be collocated with the G-VDB and the VAC and the CC in the case of individual call restoration support.

NOTE 2: When individual subscriber and group home SwMIs collocate, then that SwMI may be called for short "home SwMI".

5.3 Stage 1 description conventions

The following clauses define the stage 1 service behaviour. These service descriptions are produced in accordance with Recommendation ITU-T I.130 [8]. Consequently, each stage 1 description comprises:

- the pre-requisite requirements for the service, if any;
- the service definition;
- the service description;
- the service architecture model;
- the normal operation definition:
  - the behaviour of the SwMI MMs, i.e. the actions within the SwMI MM, the updates to the collocated databases and CCs, and the service related actions in the AI (or in the corresponding medium between the SwMI and the individual subscriber). The defined operation shall take place in the order they are defined unless otherwise stated; and
  - the ANF-ISIMM actions which are defined in terms of primitives. In these primitive descriptions, the primitive arguments are defined when they are mapped to the information elements of the ANF-ISIMM Protocol Data Units (PDUs). Other arguments used internally in the SwMI, e.g. for ISI GFP connection establishment purposes, are outside the scope of the present document;

NOTE: The reader is advised to read the stage 2 information flow sequences in conjunction with the stage 1 normal (and exceptional) operation definitions.

- the exceptional operation definition, which shall be applied if the normal operation is rejected or fails;
- the interactions between the different ANF-ISIMM services, and between the ANF-ISIMM services and other TETRA ANF services. These interactions may be complemented by other TETRA ANF or TETRA supplementary service standards; and
- the ANF-ISIMM stage 1 service behaviour using the Specification and Description Language (SDL) conventions.

The service actions are defined for one service instance, i.e. for the invocation and operation of one service, but there may be multiple service instances simultaneously. Clause 37 defines generic ANF-ISIMM service and protocol issues which shall be applicable in conjunction with all ANF-ISIMM services and protocols unless otherwise stated.

6 Migration service description - stage 1

6.1 Pre-requisite requirements for the migration service

In order to hasten the migration for an individual subscriber associated to a MS, the SwMI MM should support the neighbour cell broadcast service, see ETSI EN 300 392-2 [1], clause 18, for the neighbour cells that reside in different SwMIs, i.e. to SwMIs having different MNIs.

NOTE: The neighbour cell information exchange needed between the SwMIs is outside the scope of the present document.

6.2 Service definition

The migration service enables the individual subscriber to migrate to a visited SwMI MM when the MNI of the individual subscriber and that of the SwMI MM do not coincide.

In addition, the migration service supports call restoration when the individual subscriber migrates during an established call.

6.3 Service description

The migration service as defined in this clause is a mandatory service for SwMI MMs that support ANF-ISIMM.

The migration service allows the individual subscriber to migrate to the visited SwMI MM. In support of that, ANF-ISIMM shall comprise the following functionality:

- the individual subscriber home SwMI MM and the visited SwMI MM shall update the individual subscriber's migration to I-HDB and I-VDB, respectively, for location tracking purposes;
- the individual subscriber's migration profile(s) shall be created for service authorization purposes:
  - the migration profile(s) shall comprise the basic migration profile and the SS-migration profile(s) as applicable for the supplementary services. The migration profile(s) shall either be created from the pre-defined migration profile(s) or they shall be exchanged between the home SwMI MM and the visited SwMI MM. The service profile(s) shall be saved in the I-VDB and they may be saved in the I-HDB;

NOTE 1: The parameter values of the pre-defined migration profiles are outside the scope of the present document. Also the mechanisms how these pre-defined profiles are defined in the first place are outside the scope of the present document.

- if the individual subscriber is engaged in a call when he migrates and the call restoration is supported, the ANF-ISIMM shall support the exchange of information needed for the call restoration. The call restoration is described in ETSI EN 300 392-3-2 [15] and ETSI EN 300 392-3-3 [16]; and

NOTE 2: The support of call restoration in conjunction with announced type 1 cell re-selection, see ETSI EN 300 392-2 [1], clause 18.3.4.7.6, is outside the scope of the present document.

- if the previous visited SwMI MM exists for the individual subscriber, the Removal of Subscriber Information (RSI) service (as defined in clause 8) shall be invoked. The RSI service e.g. removes the old I-VDB record from the previous visited SwMI. In addition, if the individual subscriber is engaged in an individual call when he migrated, the RSI invokes the call restoration from the previous visited SwMI to the visited SwMI.

NOTE 3: The group call is restored from the group home SwMI to the visited SwMI, but the individual call is restored from the previous visited SwMI to the visited SwMI.

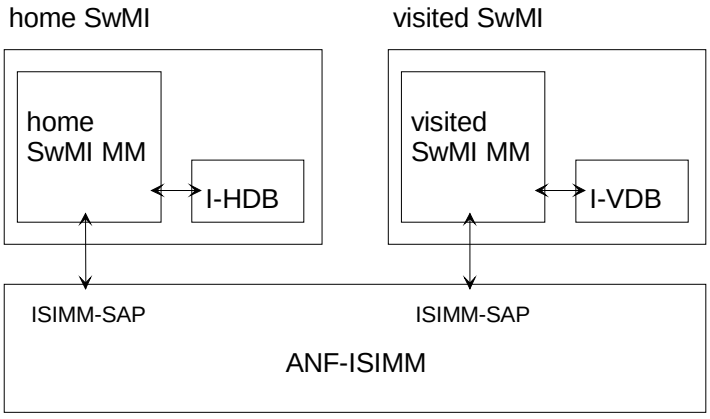
See also annex A which clarifies the interactions between the migration and RSI services.

Neither the migrated subscriber nor the home SwMI may be charged for services that the home SwMI has not requested in the migration unless agreed differently between the parties.

6.4 Service architecture

Figure 2 illustrates the service architecture of the migration service.

NOTE: The home SwMI in figure 2 is the individual subscriber home SwMI.



NOTE: The arrows illustrate the information exchange routes of the service. In the case of a solid arrow, the information exchange is mandatory; in the case of a broken arrow, the information exchange is conditional.

Figure 2: The service architecture of the migration service

6.5 Normal procedures

6.5.1 Invocation

6.5.1.1 Invocation criteria

The visited SwMI MM shall invoke ANF-ISIMM if the following conditions are met:

- the visited SwMI MM receives the migration request from the individual subscriber. The migration request is identified by the receipt of U-LOCATION UPDATE DEMAND PDU as defined in ETSI EN 300 392-2 [1], clause 16;
- according to the I-VDB, the individual subscriber is not registered (nor migrated) in the visited SwMI MM, i.e. there is no valid I-VDB record for the individual subscriber; and
- there is no pre-defined information in the visited SwMI MM indicating that the restricted migration as defined in clause 7 will be granted to the individual subscriber or that the individual subscriber is not allowed to migrate in the visited SwMI MM.

6.5.1.2 Invocation of ANF-ISIMM

If the migration invocation criteria is met, the visited SwMI MM shall create an I-VDB record for the individual subscriber. Then, the visited SwMI MM shall invoke ANF-ISIMM by issuing the Migration_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and operation of the service;

b) Individual Short Subscriber Identity (ISSI) of the individual subscriber;

c) MNI of the individual subscriber;

d) MNI of the visited SwMI MM: shall be used for addressing purposes over the ISI to cater for the migrated individual subscriber;

e) migration type, which shall be either:

- migration: if the location update type in the received U-LOCATION UPDATE PDU does not indicate call restoration, e.g. is "Migrating location updating"; or
- migration with call restoration: if the location update type in the received U-LOCATION UPDATE PDU indicates call restoration, e.g. "Call restoration migrating location updating";

the Migration type information shall be used to indicate whether the individual subscriber requests his ongoing calls to be restored for him;

NOTE 1: If the AI location update type (indicated by migrating subscriber) indicates call restoration, it is interpreted as a request to restore the call across the ISI. In addition, the call restoration procedures as defined in clauses 14 and 18 in ETSI EN 300 392-2 [1], are applicable.

NOTE 2: As defined in clause 8 the individual subscriber home SwMI indicates the call restoration to the previous visited SwMI, and the previous visited SwMI may restore or clear the ongoing individual call(s). The call(s) are restored if the individual subscriber home SwMI, the visited SwMI and the previous visited SwMI support the call restoration service for the individual subscriber. If the call restoration is not supported by any of the three SwMIs for the individual subscriber, the previous visited SwMI clears the ongoing calls.

f) restricted migration support, which shall be either:

- supported: if the visited SwMI MM supports restricted migration for the individual subscriber; or
- not supported: if the visited SwMI MM does not support restricted migration for the individual subscriber;

g) supported pre-defined profile references: the information shall contain the references of the pre-defined migration profile set which may be used for the individual subscriber in the visited SwMI. The information shall be a set of one to sixteen pre-defined profile reference sets. Each Profile reference set shall be a number from one to sixteen. One profile reference set shall refer to the pre-defined migration profile(s) of which the contents are known to the individual subscriber home and to the visited SwMI MM. Each reference set shall correspond to a basic and possibly to one or more SS-migration profiles. One reference set shall contain all the profile information needed for the creation of the migration profile(s) for the individual subscriber in the visited SwMI MM;

h) profile exchange support information, which shall be either:

- supported: if the visited SwMI MM supports the exchange of basic and SS-migration profiles for the individual subscriber, i.e. if the individual subscriber home SwMI may send them to the visited SwMI MM to be used for the individual subscriber while he is migrated; or
- not supported: if the visited SwMI MM does not support the exchange of the migration profile(s) for the individual subscriber;

i) group information in subscriber profile:

- supported: if the visited SwMI MM supports the inclusion of group information in the individual subscriber profile; or

NOTE 3: The type "Supported" implies that the types 2), 3a) and 3b) as defined in clause 6.5.2 are supported by the visited SwMI MM.

- not supported: if the visited SwMI MM does not support the inclusion of group information in the individual subscriber profile;

j) authentication invocation, which shall be "Not invoked". The information shall indicate that the authentication service is not invoked on the migrating individual subscriber;

NOTE 4: The interaction with the authentication service is defined in clause 12.7.

k) recovery: the value shall be "No recovery";

l) optionally: age stamp, if the age of the recorded migration request is greater than zero, i.e. if the Migration_req is not sent immediately upon receipt of the migration request from the individual subscriber. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the individual subscriber's migration request;

m) conditionally: call restoration support type, if migration type is "migration with call restoration". It shall be either:

- supported: if the visited SwMI supports call restoration across the ISI for the individual subscriber; or
- not supported: if the visited SwMI does not support call restoration across the ISI for the individual subscriber;

NOTE 5: As defined in clause 8 the previous visited SwMI restores ongoing individual calls if the individual subscriber home SwMI, the visited SwMI and the previous visited SwMI support the call restoration service for the individual subscriber. This parameter indicates whether the visited SwMI supports call restoration for the individual subscriber.

n) optionally: the length of the PISN number of the visited SwMI MM and the PISN number. If included, the individual subscriber home SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the individual subscriber; and

NOTE 6: The PISN number may be used to indicate the preferred gateway if the visited SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of a wide area SwMI.

o) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

6.5.2 Operation

6.5.2.0 General

Upon receipt of the Migration_ind (containing the same information as the corresponding Migration_req) from ANF-ISIMM, the individual subscriber home SwMI MM shall verify that the migration is allowed to continue:

- if the age stamp is included, verify that the age stamp in the received Migration_ind indicates a newer migration than the currently recorded migration or registration in the individual subscriber's I-HDB record; and

In addition the individual subscriber home SwMI of the migrating subscriber may verify if the individual subscriber has the rights to migrate to the visited SwMI. The details of the verification on the individual subscriber's rights to migrate are outside the scope of the present document.

If the individual subscriber home SwMI MM does not reject the migration or grant the restricted migration to the individual subscriber as described in clause 7 then the individual subscriber home SwMI MM shall continue the operation of the migration service according to one of the following cases:

1) by using the pre-defined profile(s) for the individual subscriber. In this case, the operation continues as defined in clause 6.5.2.1;

2) by exchanging the basic migration profile with the visited SwMI MM. In this case, the operation continues as defined in clause 6.5.2.2;

3) by exchanging the basic and SS-migration profiles with the visited SwMI MM. The SS-migration profile(s) are exchanged either before the final migration approval (sub-case 3a)) or after the final migration approval (sub-case 3b). In this case, the operation continues as defined in clause 6.5.2.2.

NOTE: After the final migration approval the visited SwMI MM allows the individual subscriber to migrate in the AI (i.e. the D-LOCATION UPDATE ACCEPT is sent), and the migration service does not support any means to reject the migration after that.

Figure 3 illustrates the cases 2), 3a) and 3b).

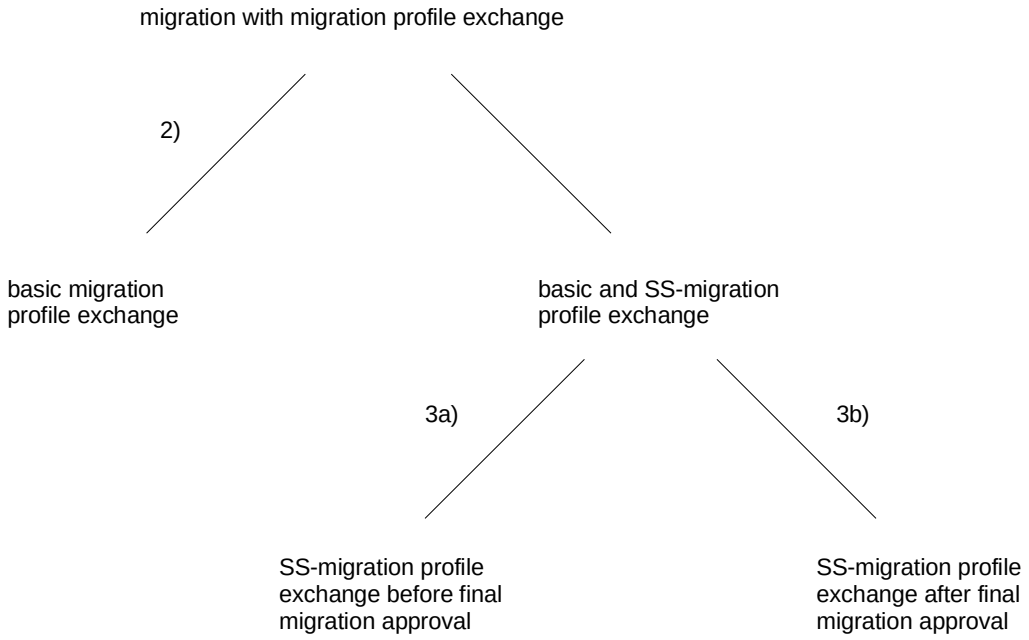


Figure 3: Illustration of the migration profile exchange cases 2), 3a) and 3b)

6.5.2.1 Migration with pre-defined migration profile(s)

6.5.2.1.0 General

This clause is applicable for the case 1).

6.5.2.1.1 Support for call restoration

If the migration has not been rejected or the restricted migration is not to be granted to the individual subscriber (as described in clause 7), and if the migration type is "migration with call restoration" in the received Migration_ind, then the individual subscriber home SwMI MM shall continue the operation in one of the following ways:

- if the call restoration support type is "supported" in the Migration_ind the individual subscriber home SwMI shall invoke RSI service indicating that the new visited SwMI supports call restoration. The call restoration is defined in ETSI EN 300 392-3-2 [15] and ETSI EN 300 392-3-3 [16]; or
- if the call restoration support type is "not supported" in the Migration_ind and/or if the individual subscriber home SwMI does not support call restoration: The individual subscriber home SwMI MM shall invoke RSI service indicating that the new visited SwMI does not support call restoration.

NOTE: In order to hasten the call restoration it is invoked at this stage as the migration has been approved, even if the final approval has not been sent. However, it is still possible that the individual subscriber's migration or group attachment fails resulting in clearing the restored call. The call restoration and the clearing of the call are defined in ETSI EN 300 392-3-2 [15] and ETSI EN 300 392-3-3 [16].

6.5.2.1.2 Final migration approval

6.5.2.1.2.1 Updates to I-HDB

If the migration has not been rejected or the restricted migration is not to be granted to the individual subscriber (as defined in clause 7), the individual subscriber home SwMI MM shall:

- update the individual subscriber's registration status as "registered, migrated" in the I-HDB record;
- save the age of the migration request to the I-HDB so that the individual subscriber home SwMI MM is able to determine the age of the recorded migration at any time. If the age stamp was not included in the Migration_ind, the current age shall be considered as zero; and

- update the location information as the MNI of the visited SwMI and, if included, the PISN number of the visited SwMI MM in the I-HDB record.

In addition, the individual subscriber home SwMI MM may save the information that the pre-defined migration profile(s) are used for the individual subscriber.

The age of the recorded migration may be saved e.g. by updating the current real time or by using a relative time from which the individual subscriber home SwMI MM shall be able to derive the elapsed time. The individual subscriber home SwMI MM shall save the information in order to compare competing migration requests, if needed. This may take place e.g. if the individual subscriber home SwMI MM receives two Migration_inds for the individual subscriber from two different SwMI MMs. This, again, may take place when the individual subscriber is roaming in an area between two visited SwMIs and the individual subscriber requests migration in both of them within a very short time.

6.5.2.1.2.2 Invocation of Removal of Subscriber Information (RSI)

The RSI service shall be invoked, if applicable, as defined in clause 8.4.1.1.

6.5.2.1.2.3 Sending of migration approval

The individual subscriber home SwMI MM shall send the Migration_resp to ANF-ISIMM indicating that the individual subscriber home SwMI MM has approved the migration. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) migration type, which shall be either:

   - migration: if the migration type was "migration" in the received Migration_ind, or if the migration type was "migration with call restoration" but the call restoration support type was "not supported" in the received Migration_ind; or

   - migration with call restoration: if the migration type was "migration with call restoration" and the call restoration support type was "supported" in the received Migration_ind;

d) used pre-defined profile reference: the information shall contain the reference of the pre-defined migration profile set which shall be used for the individual subscriber in the visited SwMI MM. The information shall be a number from one to sixteen, and the value shall be one of the values received as Pre-defined profile information in the Migration_ind;

e) recovery: the value shall be "No recovery";

f) optionally: the length of the PISN number of the individual subscriber home SwMI MM and the PISN number. If included, the visited SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the individual subscriber; and

NOTE: The PISN number may be used to indicate the preferred gateway if the individual subscriber home SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of wide area SwMI.

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the individual subscriber home SwMI MM shall become idle.

6.5.2.1.2.4 Receipt of migration approval

Upon receipt of Migration_conf (containing the same information as the corresponding Migration_resp) from the ANF-ISIMM, the visited SwMI MM shall:

- verify that ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Migration_req;

- derive the contents of the migrated profiles (both basic and if needed SS) for the individual as indicated by the pre-defined profile set reference;

- update the registration status as "registered, migrated" to the I-VDB record;

- save the age of the migration request to the I-VDB so that the visited SwMI MM is able to determine the age of the recorded migration at any time. If the age stamp was not included in the Migration_req the current age shall be considered as zero; and
- send the D-LOCATION UPDATE ACCEPT PDU granting the migration to the individual subscriber as defined in ETSI EN 300 392-2 [1], clause 16.

Then, the visited SwMI MM shall become idle.

6.5.2.2 Migration with migration profile exchange

6.5.2.2.0 General

This clause is applicable for cases 2), 3a) and 3b).

6.5.2.2.1 Basic migration profile exchange

6.5.2.2.1.0 General

This clause is applicable for cases 2), 3a) and 3b).

6.5.2.2.1.1 Sending of original basic migration profile

The individual subscriber home SwMI MM shall provide the visited SwMI MM with the original basic migration profile by sending the Profile update_req to ANF-ISIMM. The primitive shall contain the following information:

NOTE 1: The term original migration profile, basic or SS-migration, is used for the profile which the individual subscriber home SwMI MM sends to the visited SwMI MM.

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) following conditional element(s) present information element shall be "Not present" and indicate that the MNI of the individual subscriber and the MNI of the visited SwMI MM shall not follow this information in the primitive;

d) profile type: the value shall be "Individual subscriber";

e) individual basic migration profile (original): the original individual basic migration profile shall indicate the individual basic service profile that the individual subscriber home SwMI MM requests to be used for the individual subscriber in the visited SwMI. The profile shall contain the following information:

- profile status, shall be "Profile Replacement";
- point-to-point service, shall be either:
  - supported; or
  - not supported;
- point-to-multipoint service, shall be either:
  - supported; or
  - not supported;
- point-to-multipoint acknowledged service, shall be either:
  - supported; or
  - not supported;
- point-to-multipoint broadcast service, shall be either:
  - supported; or

- not supported;

- speech service, shall be either:
  - one of more of the supported services; or
  - not supported;
- circuit mode unprotected data service, shall be either:
  - supported; or
  - not supported;
- circuit mode protected (low) data service, shall be either of the following:
  - supported; or
  - not supported;
- circuit mode protected (high) data service, shall be either of the following:
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - no interleaving:
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or
    - not supported;
  - medium interleaving depth = 4 shall be either of the following:
    - supported; or
    - not supported;
  - long interleaving depth = 8 shall be either of the following:
    - supported; or
    - not supported;
- duplex service, shall be either:
  - supported; or
  - not supported;
- IP service shall be either:
  - supported; or
  - not supported;
- authentication service shall be either:
  - supported; or
  - not supported;

- OTAR SCK generation service shall be either:
  - supported; or
  - not supported;
- OTAR SCK delivery service shall be either:
  - supported; or
  - not supported;
- AI encryption state list, shall specify all the AI encryption states that the individual subscriber may support (i.e. is able to and allowed to support) in the visited SwMI. The possible supported states are the following:
  - 1;
  - 2; and
  - 3;

  the values are defined in ETSI EN 300 392-7 [5],clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the individual subscriber, if any. In addition, the values 2, and 3 shall imply that the AI encryption is supported for the individual subscriber for the circuit mode speech and data services, SDS and IP service;
- end-to-end encryption shall be either:
  - supported; or
  - not supported;

  the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service instance, when the call is invoked;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements:
  - conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:
    - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
    - SS-status: shall indicate if the supplementary service indicated in the first sub-element is supported or not for the individual subscriber, and if supported whether the original SS-migration profile will be sent to the visited SwMI MM. The element shall have one of the following:
      - not supported: shall indicate that the supplementary service is not supported;
      - supported, with original SS-migration profile: shall indicate that the supplementary service is supported with the corresponding original SS-migration profile (i.e. the original SS-migration profile will be sent in the following SS-profile update_req); or
      - supported, without original SS-migration profile: without original SS-migration profile: shall indicate that the supplementary service is supported without the corresponding original SS-migration profile;
- optionally: default SS-information. If included, shall be one of the following:
  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the individual subscriber; or

  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the individual subscriber;

- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:

  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;
  - optionally: advanced link, shall be either:
    - supported; or
    - not supported;

- optionally: maximum number of timeslots, shall be one of the following:

  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;

- optionally: call time-out timer (T310), shall be one of the following:

  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;
  - 3 minutes;
  - 4 minutes;
  - 5 minutes;
  - 6 minutes;
  - 8 minutes;
  - 10 minutes;
  - 12 minutes;
  - 15 minutes;
  - 20 minutes; or
  - 30 minutes;

- optionally: call time-out set-up phase timer (T301), shall be one of the following:
  - 1 second;
  - 2 seconds;
  - 5 seconds;
  - 10 seconds;
  - 20 seconds;
  - 30 seconds; or
  - 60 seconds;
- optionally: group information, the information element may be repeated. One information element shall specify the relationship between the individual subscriber and the indicated group. One information element shall contain the following sub-elements:
  - GSSI of the group. The individual subscriber is allowed to attach to the group;
  - subscriber status, shall indicate one of the following:
  - not important subscriber; or
  - important subscriber;
  - class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
  - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;
- optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;

f) SS-profile update indicator, which shall be one of the following:

- SS-profile update_req not applicable: the sending of the original SS-migration profiles to the visited SwMI MM is not applicable for the individual subscriber;
- SS-profile update_req sent before final migration approval: The original SS-migration profile(s) are exchanged before the Migration_resp is issued; or
- SS-profile update_req sent after the Migration_resp: the original SS-migration profiles are exchanged after the Migration_resp is issued; and

g) recovery: the value shall be "No recovery"; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The SS-profile update indicator shall indicate if the individual subscriber home SwMI MM sends the original SS-migration profiles to the visited SwMI MM. The sending of a particular original SS-migration profile is mandatory if the two following conditions are met:

- if the SS-migration profile is required in the visited SwMI for a migrated individual subscriber according to the corresponding supplementary service sub-part of ETSI EN/ETS 300 392-12 [4]; and
- if the support of the corresponding supplementary service is requested for the individual subscriber in the visited SwMI as part of the basic migration profile.

In addition, if the individual subscriber home SwMI MMs sends one or more SS-migration profiles to the visited SwMI MM the SS-profile update indicator shall indicate when the SS-migration profiles are sent to the visited SwMI MM. Thus, they are sent to the visited SwMI MM, i.e. either:

- according to case 3a): before the Migration_resp is issued, i.e. immediately after the Profile update_req is issued;
- if the SS-migration profiles that are created by the visited SwMI MM may cause the individual subscriber home SwMI MM to reject the migration or to allow only the restricted migration for the individual subscriber, see clause 7, then the individual subscriber home SwMI MM shall send the SS-profile update_req before the Migration_resp is sent. This may be the case if certain supplementary services are not supported in the visited SwMI, e.g. Supplementary Service - Call Authorized by Dispatcher (SS-CAD) or Supplementary Service - Barring of Outgoing Calls (SS-BOC), see ETSI EN 300 392-10-6 [11] and ETSI EN 300 392-10-18 [12] respectively; or
- according to case 3b): immediately after the Migration_resp.

NOTE 2: The possible advantage of sending the original SS-migration profiles after approving the migration is to hasten the individual subscriber's migration in the AI.

6.5.2.2.1.2 Creation of basic migration profile

Upon receipt of the Profile update_ind (containing the same information as the corresponding Profile update_req) from ANF-ISIMM, the visited SwMI MM shall verify that the received ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Migration_req.

Then, the visited SwMI MM shall create the basic migration profile for the migrated individual subscriber. The profile shall contain the individual subscriber's service authorization in the visited SwMI as defined in clause 6.5.2.2.1.3. The visited SwMI MM shall create the basic migration profile in one of the following ways:

- the original migration profile shall be used as received from the individual subscriber home SwMI MM, i.e. the services are supported for the individual subscriber as requested by the individual subscriber home SwMI;
- the temporary migration profile shall be created and used while the individual subscriber is migrated in the visited SwMI. In this case the visited SwMI MM does not offer services for the individual subscriber as proposed by the individual subscriber home SwMI MM but creates a temporary profile that shall be used instead. The reason for creating the temporary migration profile may be e.g. that the visited SwMI MM cannot support the services as requested by the individual subscriber home SwMI MM or that the visited SwMI MM restricts the use of its services for migrated individual subscribers.

NOTE: The term temporary migration profile, basic or SS-migration, is used for the profile which the visited SwMI MM sends to the individual subscriber home SwMI MM.

The visited SwMI MM shall save the created migration profile to the I-VDB.

6.5.2.2.1.3 Sending of temporary basic migration profile

The visited SwMI MM shall provide the individual subscriber home SwMI MM with the created basic migration profile information by sending the Profile update_resp to ANF-ISIMM. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Migration_req;

b) ISSI;

c) profile type: the value shall be "Individual subscriber";

d) basic migration profile info: shall indicate whether the original individual basic migration profile was accepted as received or whether the temporary individual basic migration profile was created. If the temporary individual basic migration profile was created it shall be included in the primitive;

e) conditionally: if the Basic migration profile info has the value "Redefined by visited SwMI MM", the Individual basic migration profile (temporary) shall be included as follows:

- profile status, shall be "Profile Response";

- point-to-point service, shall be:
  - supported; or
  - not supported;
- point-to-multipoint service, shall be:
  - supported; or
  - not supported;
- point-to-multipoint acknowledged service, shall be:
  - supported; or
  - not supported;
- point-to-multipoint broadcast service, shall be:
  - one of more of the supported services; or
  - not supported;
- speech service, shall be either of the following:
  - supported; or
  - not supported;
- circuit mode unprotected data service, shall be either of the following:
  - supported; or
  - not supported;
- circuit mode protected (low) data service, shall be either of the following:
  - supported; or
  - not supported;
- circuit mode protected (high) data service, shall be either of the following:
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - no interleaving:
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or
    - not supported;
  - medium interleaving depth = 4 shall be either of the following:
    - supported; or
    - not supported;

  - long interleaving depth = 8 shall be either of the following:
    - supported; or
    - not supported;

- duplex service, shall be one of the following:
  - supported; or
  - not supported;
- IP service shall be one of the following:
  - supported; or
  - not supported;
- authentication service shall be one of the following:
  - supported; or
  - not supported;
- OTAR SCK generation service shall be one of the following:
  - supported; or
  - not supported;
- AI encryption state, shall specify the supported AI encryption state for the individual subscriber. The possible supported state shall be one of the following:
  - 1;
  - 2; and
  - 3;

  the values are defined in ETSI EN 300 392-7 [5],clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the individual subscriber, if any. In addition, the values 2, and 3 shall imply that the AI encryption is supported for the individual subscriber for the circuit mode speech and data services, SDS and IP service;
- end-to-end encryption shall be one of the following:
  - supported; or
  - not supported;

  the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service instance, when the call is invoked;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;

- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:

  - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
  - SS-response status: Shall indicate if the supplementary service is supported or not for the individual subscriber. The element shall be either of the following:
    - not supported: shall indicate that the supplementary service is not supported;
    - supported: shall indicate that the supplementary service is supported.

  if the SS-migration profile is required for the supplementary service, the individual subscriber home SwMI MM shall send the profile in a SS-profile update_req to the visited SwMI or the supplementary service is not supported despite of the value of the SS-response status element;

- optionally: default SS-information. If included, shall be one of the following:

  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the individual subscriber; or
  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the individual subscriber;

- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:

  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;

- optionally: advanced link, shall be one of the following:

  - supported; or
  - not supported;

- optionally: maximum number of timeslots, shall be one of the following:

  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;

- optionally: call time-out timer (T310), shall be one of the following:

  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;
  - 3 minutes;

        - 4 minutes;
        - 5 minutes;
        - 6 minutes;
        - 8 minutes;
        - 10 minutes;
        - 12 minutes;
        - 15 minutes;
        - 20 minutes; or
        - 30 minutes;
    - optionally: call time-out set-up phase timer (T301), shall be one of the following:
        - 1 second;
        - 2 seconds;
        - 5 seconds;
        - 10 seconds;
        - 20 seconds;
        - 30 seconds; or
        - 60 seconds;
    - optionally: group information, the information element may be repeated. One information element shall specify the relationship between the individual subscriber and the indicated group. One information element shall contain the following sub-elements:
        - GSSI of the group. The individual subscriber is allowed to attach to the group;
        - subscriber status: shall indicate one of the following:
            - not important subscriber; or
            - important subscriber;
        - class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
        - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;
    - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;

f) recovery: The value shall be "No recovery"; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

6.5.2.2.1.4 Receipt of temporary basic migration profile

Upon receipt of the Profile update_conf (containing the same information as the corresponding Profile update_resp) from ANF-ISIMM, the individual subscriber home SwMI MM shall:

- verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the received Migration_ind; and

- verify that the migration is allowed, i.e. that there is no reason to reject the migration based on the received temporary basic migration profile.

In addition, the individual subscriber home SwMI MM may save the temporary basic migration profile in the I-HDB. The saving and use of the temporary basic migration profile is optional in the individual subscriber home SwMI.

6.5.2.2.2 SS-migration profile(s) exchange

6.5.2.2.2.0 General

This clause is applicable for the case 3a).

6.5.2.2.2.1 Sending of original SS-migration profile(s)

When applicable, the individual subscriber home SwMI MM shall send the original SS-migration profile(s) immediately after sending the Profile update_req. The original SS-migration profile(s) shall be sent to ANF-ISIMM by using the SS-profile update_req.

The SS-migration profile may be sent simultaneously with the Profile update (before receiving Profile update_conf) from the individual subscriber home SwMI to expedite the migration. In this case the SS information in the Profile update may be left out since the individual subscriber home SwMI cannot anyway use the information for the SS-profile update.

The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) following conditional element(s) present information element shall be "Not present" and indicate that the MNI of the individual subscriber and the MNI of the visited SwMI MM shall not follow this information in the primitive;

d) profile type: the value shall be "Individual subscriber";

e) recovery: the value shall be "No recovery";

f) number of SS-migration profiles: the value shall indicate how many SS-migration profiles (original) follows;

g) SS-migration profile (original): one or more original SS-migration profiles. Each original SS-migration profile shall be the supplementary service profile that the individual subscriber home SwMI MM requests to be used SwMI for the individual subscriber in the visited (for the corresponding supplementary service). The profile shall contain information as defined in clause 6.5.2.2.2.3 and in ETSI EN/ETS 300 392-12 [4]; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

6.5.2.2.2.2 Creation of SS-migration profile(s)

Upon receipt of the SS-profile update_ind (containing the same information as the corresponding SS-profile update_req) from ANF-ISIMM, the visited SwMI MM shall:

- verify that the received ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Migration_req;

- verify for each received original SS-migration profile that:

  - the supplementary service is supported for the individual subscriber in the visited SwMI; and

  - the SS-migration profile is applicable for the supplementary service, see the corresponding sub-part of ETSI EN/ETS 300 392-12 [4].

If verification on the received original SS-migration profiles is successful, the visited SwMI MM shall create the corresponding SS-migration profile in one of the following ways:

- the original SS-migration profile shall be used as received from the individual subscriber home SwMI MM, i.e. the supplementary service is supported for the individual subscriber as requested by the individual subscriber home SwMI;

- the temporary SS-migration profile shall be created and used for the duration of the migration, i.e. the visited SwMI MM does not support the supplementary service for the individual subscriber as proposed by the individual subscriber home SwMI MM but creates instead a temporary profile (temporary SS-migration profile) that shall be used. The reason for creating the temporary SS-migration profile may be e.g. that the visited SwMI MM cannot support the supplementary service as requested by the individual subscriber home SwMI MM, that the visited SwMI MM restricts the use of the supplementary service for migrated individual subscribers, etc.;

NOTE: The term temporary migration profile, basic or SS-migration, is used for the profile which the visited SwMI MM sends to the individual subscriber home SwMI MM.

- the visited SwMI MM shall verify that the SS-migration profile is created for each supported supplementary service if required, see the corresponding supplementary service sub-part of ETSI EN/ETS 300 392-12 [4]. If not created when required, the supplementary service shall be considered as not supported for the individual subscriber and updated accordingly to the individual subscriber's basic migration profile.

Then, the visited SwMI MM shall save the created SS-migration profile(s) to the I-VDB.

6.5.2.2.2.3 Sending of temporary SS-migration profile(s)

Upon creation of the SS-migration profiles, the visited SwMI MM shall send the SS-profile update_resp to ANF-ISIMM containing the created SS-migration profile(s) information. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Migration_req;

b) ISSI;

c) profile type: the value shall be "Individual subscriber";

d) number of not supported SSs; the value shall indicate how many not supported supplementary service indications follows;

e) conditionally: SS-xx not supported indication, for each supplementary service if the creation of the corresponding SS-migration profile has failed and if the supplementary service requires the SS-migration profile. If present, the information shall indicate that the supplementary service is not supported for the individual subscriber in the visited SwMI. In addition, if present, this information shall override the information included in the basic migration profile. The creation can have failed if e.g. the individual subscriber home SwMI MM did not send the original SS-migration profile for the supplementary service;

NOTE 1: The SS-xx stands for any TETRA supplementary service as defined in ETSI EN/ETS 300 392-10 [10].

f) number of SS-migration profiles: the value shall indicate how many SS-migration profiles (original) follows;

g) SS-migration profile (temporary): shall indicate for each received original SS-migration profile the corresponding SS-migration profile information which shall be one of the following:

   - the original SS-migration profile is saved in the I-VDB as the SS-migration profile for that supplementary service;

   - the created temporary migration profile which is saved in the I-VDB as the SS-migration profile for that supplementary service. In addition, the contents of the temporary SS-migration profile may be included; or

   - the creation of the temporary SS-migration profile failed. If the SS-migration profile is needed for the supplementary service, the corresponding information in the Profile update_resp shall indicate that the supplementary service is not supported for the individual subscriber;

NOTE 2: The rules to return a particular temporary SS-migration profile, if created, is supplementary service dependant and is defined in each supplementary service description, see ETSI EN/ETS 300 392-12 [4]; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

6.5.2.2.2.4 Receipt of temporary SS-migration profile(s)

Upon receipt of the SS-profile update_conf (containing the same information as the corresponding SS-profile update_resp) from ANF-ISIMM, the individual subscriber home SwMI MM shall:

- verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the received Migration_ind; and
- verify that the migration is allowed, i.e. that there is no reason to reject the migration based on the received temporary SS-migration profile(s).

In addition, the individual subscriber home SwMI MM may save the temporary SS-migration profile(s) in the I-HDB. The saving and use of the temporary SS-migration profile(s) is optional in the individual subscriber home SwMI.

6.5.2.2.3 Support for call restoration

As defined in clause 6.5.2.1.1. This clause shall be applicable for cases 2), 3a) and 3b).

6.5.2.2.4 Final migration approval

6.5.2.2.4.0 General

This clause is applicable for cases 2), 3a) and 3b).

6.5.2.2.4.1 Updates to I-HDB

As defined in clause 6.5.2.1.2.1, except that the individual subscriber home SwMI MM shall not save the information that the pre-defined migration profiles are used.

6.5.2.2.4.2 Invocation of RSI

The RSI service shall be invoked, if applicable, as defined in clause 8.4.1.1.

6.5.2.2.4.3 Sending of migration approval

As defined in clause 6.5.2.1.2.3 except that the following information shall replace the corresponding information in the Migration_resp (and in the corresponding Migration _conf):

a) used pre-defined profile reference: the information shall not refer to any pre-defined migration profile set as the pre-defined migration profile sets are not used (but replaced by the migration profile exchange between the SwMIs).

6.5.2.2.4.4 Receipt of migration approval

As defined in clause 6.5.2.1.2.4.

6.5.2.2.5 SS-migration profile exchange after final migration approval

6.5.2.2.5.1 General

This clause is applicable for the case 3b).

6.5.2.2.5.1 Sending of original SS-migration profile(s) after final migration approval

As defined in clause 6.5.2.2.2.1, except that the SS-profile update_req is sent immediately after the Migration_resp.

6.5.2.2.5.2 Creation of SS-migration profile(s) after final migration approval

As defined in clause 6.5.2.2.2.2.

6.5.2.2.5.3 Sending of temporary SS-migration profile(s) after final migration approval

As defined in clause 6.5.2.2.2.3, except that the visited SwMI MM shall become idle after sending the SS-profile update_resp.

6.5.2.2.5.4 Receipt of temporary SS-migration profile(s) after final migration approval

Upon receipt of the SS-profile update_conf (containing the same information as the corresponding SS-profile update_resp) from ANF-ISIMM, the individual subscriber home SwMI MM shall verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the received Migration_ind.

In addition, the individual subscriber home SwMI MM may save the temporary SS-migration profile(s) in the I-HDB. The saving and use of the temporary SS-migration profile(s) is optional in the individual subscriber home SwMI.

Then, the individual subscriber home SwMI MM shall become idle.

6.6 Exceptional procedures

6.6.0 General

Clauses 6.6.1 and 6.6.2 define the exceptional procedures that shall be applied if the normal operation of the migration service fails. If applicable, these exceptional procedures shall be overridden by the restricted migration service.

NOTE 1: All exceptional procedures that are applied within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked or continued over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

Both the individual subscriber home SwMI MM and the visited SwMI MM shall be able to abort the migration procedure at any time during the migration sequence by sending Migration reject_req indicating appropriate rejection cause.

Generally, if the Migration_resp and Migration_conf have been exchanged between the individual subscriber home and the visited SwMI MMs the migration shall be granted for the migrating individual subscriber in the AI and the databases shall be updated accordingly. However, if the operation fails before the exchange of the Migration_resp and the Migration_conf the ANF-ISIMM migration service shall be considered as rejected and the following shall take place:

- the individual subscriber home SwMI MM shall send the Migration reject_req to the ANF-ISIMM which shall deliver the corresponding Migration reject_ind to the visited SwMI MM, if possible; and
- the database updates as defined under normal operation shall be cancelled in the I-VDB and if the migrating MS was reliably identified the registration status shall be updated as "De-registered, migration rejected" in the I-HDB.

The Migration reject_req (and the corresponding Migration reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) migration rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable migration may be re-invoked;
- unknown subscriber;
- unknown SwMI;
- temporary error migration may be re-invoked;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- too old age stamp, i.e. the age stamp in the received request is older than the age of the registration status update in the I-HDB;

- migration/restricted migration not allowed;
- migration profile rejection;
- unknown pre-defined profile migration may be re-invoked; or
- authentication failed;

d) recovery: the value shall be "No recovery";

e) optionally: MNI of the individual subscriber; and

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM may try to re-invoke the ANF-ISIMM migration service up to two times in certain error situations. If these re-invocations do not result in successful completion of the service the individual subscriber's migration shall be rejected in the AI as defined in ETSI EN 300 392-2 [1], clause 16.

If the individual subscriber's migration is rejected the Removal of Subscriber Information (RSI) service shall be invoked, if the migrating MS was reliably identified, as defined in clause 8, except if the migration rejection cause is "unknown subscriber" or "unknown error". For the usage of Authentication in case of rejected migration, see clause 12.7.2.

If a temporary failure has caused the migration service to fail the Individual subscriber Database Fault Recovery (IDR) service should be invoked as described in clause 13 to ensure that the concerned I-VDBs and I-HDBs are consistent.

NOTE 2: The invocation of the IDR service is especially needed if the individual subscribers have been allowed to migrate in the visited SwMI MM without successfully contacting the individual subscriber home SwMI MM.

6.6.1 Detected by the visited SwMI MM

If the visited SwMI MM detects an unrecoverable error in the received Profile update_ind it shall send the Profile reject_req instead of Profile update_resp to the ANF-ISIMM. The ANF-ISIMM shall deliver the Profile reject_ind to the individual subscriber home SwMI MM. Then, the individual subscriber home SwMI MM shall either:

- grant the migration with a predefined migration profile set: the individual subscriber home SwMI MM shall send the Migration_resp which shall contain the reference to the predefined migration profile set to be used for the subscriber; or
- reject the migration by sending the Migration reject_req as defined in clause 6.6.

If the visited SwMI MM detects an unrecoverable error in the received SS-profile update_ind it shall send the SS-profile reject_req instead of SS-profile update_resp to the ANF-ISIMM. The ANF-ISIMM shall deliver the SS-profile reject_ind to the individual subscriber home SwMI MM. Then, either of the following shall take place:

- if the Migration_resp has not been sent, the individual subscriber home SwMI MM shall either:
  - grant the migration with a predefined migration profile set: The individual subscriber home SwMI MM shall send the Migration_resp which shall contain the reference to the predefined migration profile set to be used for the subscriber; or
  - rejected the migration by sending the Migration reject_req as defined in clause 6.6;

or

- if the Migration_resp has been sent prior to the receipt of the SS-profile reject_ind, the visited SwMI MM shall grant the migration for the migrating individual subscriber in the AI and complete the database actions.

NOTE: A migrated individual subscriber may be de-registered by applying the de-registration service as defined in clause 9 at any time after the unsuccessful completion of the migration service.

The Profile reject_req (and the corresponding Profile reject_ind) or the SS-profile reject_req (and the corresponding SS-profile reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the related Migration_ind;

b) ISSI;

c) profile rejection cause (in the case of Profile reject_req) or SS-profile rejection cause (in the case of SS-profile reject_req), which shall be one of the following (the values can be used only by the visited SwMI MM as the Profile reject_req and the SS-profile reject_req can be sent by the visited SwMI MM only):

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- temporary error;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- failed migration profile reception; or
- SS-migration profile not applicable, if the SS-migration profile is not applicable for the particular supplementary service. Applicable for the SS-profile reject_req and SS-profile reject_ind;

d) recovery: the value shall be "No recovery"; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the visited SwMI MM is not able to complete the individual subscriber's migration in the AI (upon receipt of the Migration_conf), the visited SwMI MM shall invoke the de-registration service in order to indicate to the individual subscriber home SwMI MM that the individual subscriber is not migrated in the visited SwMI MM.

6.6.2 Detected by the individual subscriber home SwMI MM

Upon receipt of the Migration_ind from the ANF-ISIMM, the individual subscriber home SwMI MM may reject the requested migration. The reason for the rejection may be e.g. that the individual subscriber is not allowed to migrate in the visited SwMI MM, that there is an unrecoverable error in the received Migration_ind, that the received age stamp indicates an older age than the age of the recorded migration, restricted migration or de-registration in the I-HDB. The age stamps may cause the rejection if the individual subscriber roams in a border area between two SwMIs; however, the comparison of the age stamps ensures that the correct (newer) migration is retained. The rejection of the migration shall take place as defined in clause 6.6.

In addition, the individual subscriber home SwMI MM may reject the individual subscriber's migration upon receipt of the Profile update_conf. In addition, if the SS-profile update_resp is sent before the Migration_resp the individual subscriber home SwMI MM may reject the individual subscriber's migration upon receipt of the SS-profile update_conf. The migration may be rejected at this time if e.g. the visited SwMI MM does not support a particular basic or supplementary service. The rejection of the migration shall take place as defined in clause 6.6.

6.7 Interactions

6.7.1 Interactions with the authentication service

See clause 12.7. This clause may be applicable for the cases 1), 2), 3a) and 3b).

6.7.2 Interactions with the group attachment and the group detachment services

The migration service shall be invoked and operated independently of the group attachment and the group detachment service, if either or both of these are invoked concurrently with the migration service. Thus, all possible interactions between the services shall be the responsibility of the SwMI MM.

If a group has been attached on behalf of an individual subscriber whose migration has been rejected, the SwMI MM shall invoke the group detachment service on behalf of the individual subscriber in order to detach the group.

6.8 Dynamic description

Figures 4 and 5 contains the dynamic description of the migration service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the individual subscriber home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the migration service:

- migration reject_req and Migration reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the migration;
- migration reject_resp and Migration reject_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the rejection of migration when the migration is rejected in the visited SwMI;
- migration_req and Migration_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to request migration;
- migration_resp and Migration_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to grant the migration;
- profile reject_req and Profile reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the individual subscriber's basic migration profiles;
- profile update_req and Profile update_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide the visited SwMI MM with the individual subscriber's basic migration profile;
- profile update_resp and Profile update_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the individual subscriber's basic migration profile and may be used to provide the individual subscriber home SwMI MM with the temporary basic migration profile;
- SS-profile reject_req and SS-profile reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the individual subscriber's SS-migration profile(s);
- SS-profile update_req and SS-profile update_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide the visited SwMI with the individual subscriber's SS-migration profile(s); and
- SS-profile update_resp and SS-profile update_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the individual subscriber's SS-migration profile(s) and may be used to provide the individual subscriber home SwMI with the temporary SS-migration profile(s).

The following states shall be used for the migration service:

- INVOKED: the migration service is invoked;
- MIGRATION-REQUESTED: the migration request is delivered to the individual subscriber home SwMI MM;
- MIGRATION-REJECTION-ACK: the response to migration rejection is expected;
- WAIT-FOR-PROFILE-ACK: the migration profiles have been delivered to the visited SwMI MM;
- WAIT-FOR-MIGRATION-ACK: the migration response is expected;
- WAIT-FOR-SS-PROFILES: the SS-migration profiles are expected; and
- WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile response is expected.

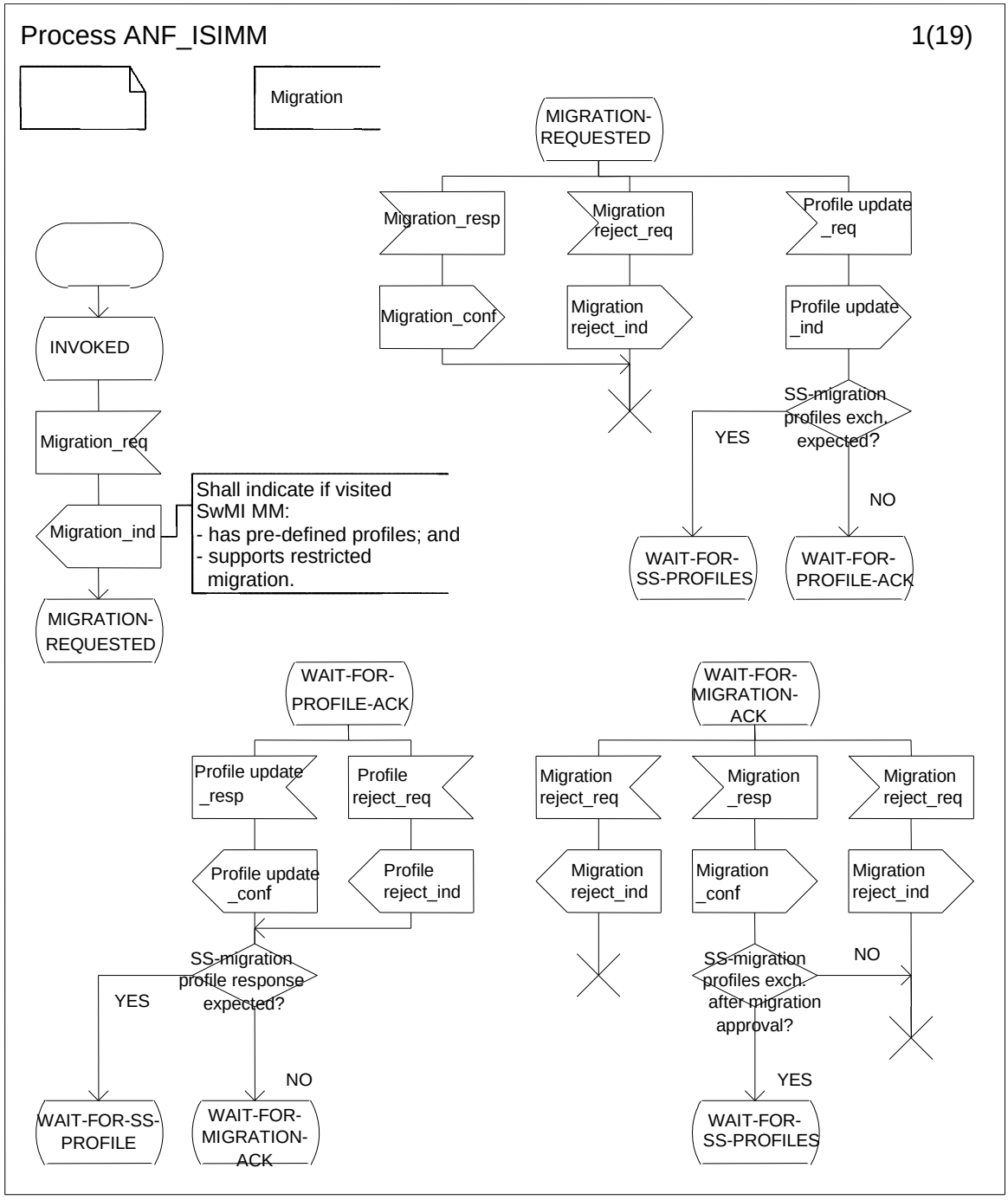


Figure 4: Dynamic description of migration using SDL

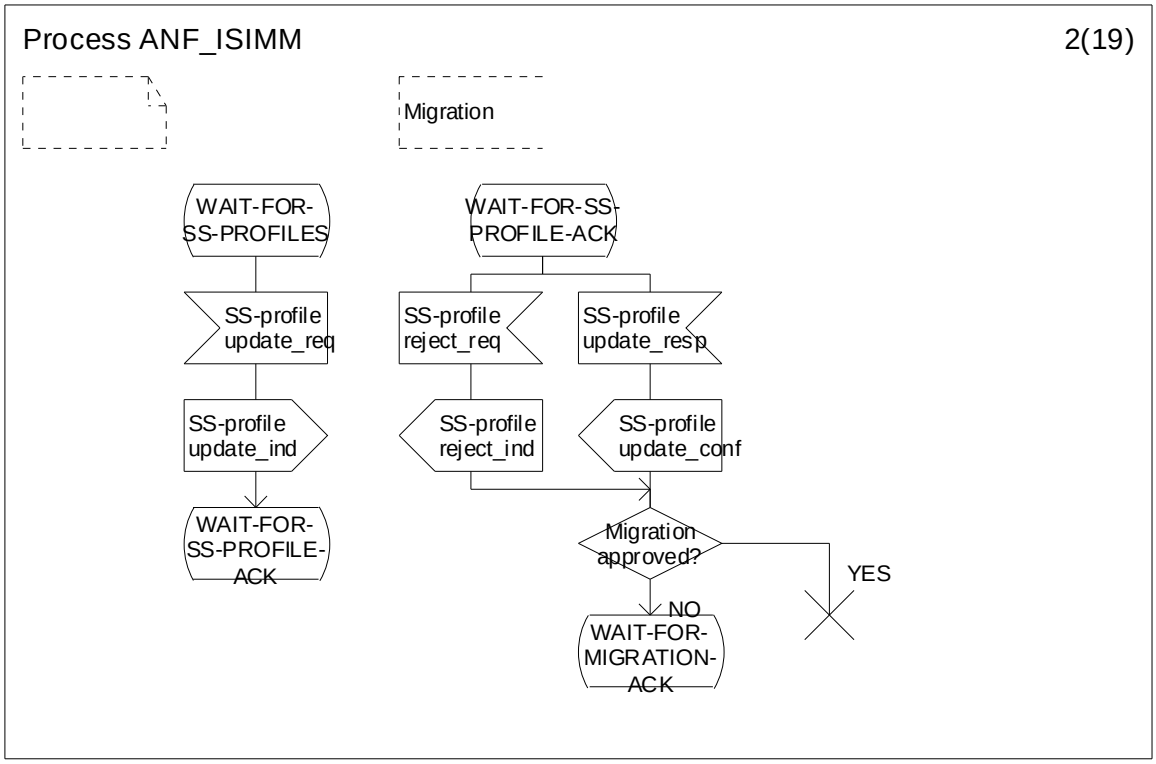


Figure 5: Dynamic description of migration using SDL

7 Restricted migration service description - stage 1

7.1 Pre-requisite requirements for the restricted migration service

In order to hasten the restricted migration service for an individual subscriber associated to a MS, the SwMI should support the neighbour cell broadcast service, see ETSI EN 300 392-2 [1], clause 18, for the neighbour cells that reside in different SwMIs.

NOTE: The neighbour cell information exchange needed between the SwMIs is outside the scope of the present document.

7.2 Service definition

The restricted migration service enables the restricted migration for the individual subscriber, i.e. it enables the individual subscriber to migrate in a SwMI with the right to make and to receive circuit switched emergency calls.

NOTE: The emergency call is a call of which the call priority has an emergency value as defined in ETSI EN 300 392-2 [1], clauses 11.3.4 and 14.8.12.

In addition, the restricted migration service supports call restoration when the individual subscriber migrates during an established emergency group call.

7.3 Service description

The restricted migration service is an optional service for SwMI MMs that support ANF-ISIMM. If supported, it shall be as defined in this clause. The service can only be applied if both the individual subscriber home SwMI MM and the visited SwMI MM support it.

NOTE 1: The restricted migration is normally granted to the migrating individual subscriber if the individual subscriber is not allowed to migrate as described in clause 6.

The restricted migration service allows the individual subscriber to migrate in the visited SwMI using the "restricted migration", i.e. with the right to make and to receive circuit-switched emergency calls.

ANF-ISIMM shall comprise the following functionality in support of the restricted migration service:

- the individual subscriber home SwMI MM and the visited SwMI MM shall update the individual subscriber's restricted migration to I-HDB and I-VDB, respectively, for location tracking purposes;
- the individual subscriber home SwMI MM and the visited SwMI MM shall authorize the individual subscriber's restricted migration;
- the restricted migration service profile shall be created indicating that the individual subscriber is only allowed to participate circuit-switched emergency calls. The individual subscriber shall be allowed to invoke and receive the emergency calls;

NOTE 2: The meaning of the restricted migration service is to allow circuit-switched emergency calls to an individual subscriber that is in emergency situation. The emergency calls are identified as defined in ETSI EN 300 392-2 [1], clause 14.8.12. However, it is outside the scope of the present document to define which types of circuit-switched emergency calls are allowed, e.g. whether only individual or also group calls are allowed.

- if the individual subscriber is engaged in an emergency group call when he migrates, the individual subscriber home SwMI MM shall support the group call restoration to the visited SwMI. The group call restoration is described in another ETSI deliverable;

NOTE 3: The support of call restoration in conjunction with announced type 1 cell re-selection, see ETSI EN 300 392-2 [1], clause 18.3.4.7.6, is outside the scope of the present document.

- if the previous visited SwMI MM exists for the individual subscriber, the Removal of Subscriber Information (RSI) service (as defined in clause 8) shall be invoked. The RSI service e.g. removes the old I-VDB record from the previous visited SwMI. In addition, if the individual subscriber is engaged in an individual emergency call when he migrated, the RSI invokes the call restoration from the previous visited SwMI to the visited SwMI.

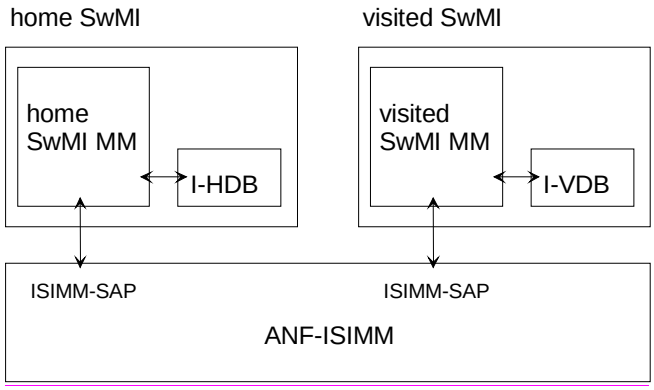
NOTE 4: The group call is restored from the individual subscriber home SwMI to the visited SwMI, but the individual call is restored from the previous visited SwMI to the visited SwMI.

See also annex A which clarifies the interactions between the restricted migration and RSI services.

7.4 Service architecture

Figure 6 illustrates the service architecture of the restricted migration service.

NOTE: The home SwMI in figure 6 is the individual subscriber home SwMI.



NOTE: The arrows illustrate the information exchange routes of the service. In the case of a solid arrow the information exchange is mandatory; in the case of a broken arrow the information exchange is conditional.

Figure 6: The service architecture of the restricted migration service

7.5 Normal procedures

7.5.1 Invocation

7.5.1.1 Invocation criteria

If supported, the restricted migration service shall be invoked in one of the following ways:

1) by the visited SwMI MM upon receipt of the individual subscriber's migration request if:

NOTE 1: The migration request is identified by the receipt of U-LOCATION UPDATE DEMAND PDU as defined in ETSI EN 300 392-2 [1], clause 16.

- according to the I-VDB, the individual subscriber is not registered (nor migrated) in the visited SwMI MM, i.e. there is no valid I-VDB record for the individual subscriber; and
- there is pre-defined information in the visited SwMI MM indicating that restricted migration will be granted to the individual subscriber or that the individual subscriber is not allowed to migrate normally to the visited SwMI, but the visited SwMI allows restricted migration;

NOTE 2: The definition of the pre-defined restricted migration information is outside the scope of the present document.

2) by the individual subscriber home SwMI MM upon receipt of the Migration_ind (received from the visited SwMI MM) as defined in clause 6.5 if:

- the analysis in the individual subscriber home SwMI MM indicates that restricted migration will be allowed for the individual subscriber; and
- the Restricted migration support information indicated "Supported" in the received Migration_ind; or

3) by the individual subscriber home SwMI MM upon receipt of the Profile update_conf or upon SS-profile update_conf (received from the visited SwMI MM if SS-migration profile(s) are sent immediately after basic migration profiles) as defined in clause 6.5 if:

   - the analysis in the individual subscriber home SwMI MM indicates that restricted migration will be allowed for the individual subscriber; and

   - the Restricted migration support information indicated "Supported" in the received Migration_ind.

7.5.1.2 Invocation of ANF-ISIMM

If the invocation criteria as defined in any of the cases 1) to 3) is met, the invocation shall continue according to the corresponding case as follows:

1) The visited SwMI MM shall create an I-VDB record for the individual subscriber. Then, the visited SwMI MM shall invoke ANF-ISIMM by issuing the Migration_req. The primitive shall contain the following information:

   a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and operation of the service;

   b) ISSI of the individual subscriber;

   c) MNI of the individual subscriber;

   d) MNI of the visited SwMI: shall be used for addressing purposes over the ISI to cater for the individual subscriber;

   e) migration type, which shall be either:

      - restricted migration: if the location update type in the received U-LOCATION UPDATE PDU does not indicate call restoration, e.g. is "Migrating location updating"; or

      - restricted migration with call restoration: if the location update type in the received U-LOCATION UPDATE PDU indicates call restoration, e.g. "Call restoration migrating location updating";

NOTE 1: If the AI location update type (indicated by migrating subscriber) indicates call restoration, it is interpreted as a request to restore the call across the ISI. In addition, the call restoration procedures as defined in clauses 14 and 18 in ETSI EN 300 392-2 [1], are applicable.

NOTE 2: As defined in clause 8 the individual subscriber home SwMI indicates the call restoration to the previous visited SwMI, and the previous visited SwMI may restore or clear the ongoing individual call(s). The call(s) are restored if the individual subscriber home SwMI, the visited SwMI and the previous visited SwMI support the call restoration service for the individual subscriber. If the call restoration is not supported by any of the three SwMIs for the individual subscriber, the previous visited SwMI clears the ongoing calls.

   f) restricted migration support: supported;

   g) supported pre-defined profile references: the information shall contain the references of the pre-defined migration profile set which may be used for the individual subscriber in the visited SwMI. The information shall be a set of one to sixteen pre-defined profile reference sets. Each Profile reference set shall be a number from one to sixteen. One profile reference set shall refer to the pre-defined migration profile(s) of which the contents are known to the individual subscriber home and to the visited SwMI MM. Each reference set shall correspond to a basic and possibly to one or more SS-migration profiles. One reference set shall contain all the profile information needed for the creation of the migration profile(s) for the individual subscriber in the visited SwMI MM;

   h) profile exchange support information, which shall be either:

      - supported: if the visited SwMI MM supports the exchange of basic and SS-migration profiles for the individual subscriber, i.e. if the individual subscriber home SwMI may send them to the visited SwMI MM to be used for the individual subscriber while he is migrated; or

      - not supported: if the visited SwMI MM does not support the exchange of the migration profile(s) for the individual subscriber;

i) group information in subscriber profile:

- supported: if the visited SwMI MM supports the inclusion of group information in the individual subscriber profile; or
- not supported: if the visited SwMI MM does not support the inclusion of group information in the individual subscriber profile;

j) authentication invocation, which shall be "Not invoked". The information shall indicate that the authentication service is not invoked on the migrating individual subscriber;

NOTE 3: The interaction with the authentication service is defined in clause 12.7.

k) recovery: the value shall be "No recovery";

l) optionally: age stamp, if the age of the recorded migration request is more than zero, i.e. if the Migration_req is not sent immediately upon receipt of the migration request from the individual subscriber. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the individual subscriber's migration request;

m) conditionally: call restoration support type, if Migration type is "Restricted migration with call restoration". It shall be either:

- supported: if the visited SwMI supports call restoration across the ISI for the individual subscriber; or
- not supported: if the visited SwMI does not support call restoration across the ISI for the individual subscriber;

NOTE 4: As defined in clause 8 the previous visited SwMI restores ongoing individual calls if the individual subscriber home SwMI, the visited SwMI and the previous visited SwMI support the call restoration service for the individual subscriber. This parameter indicates whether the visited SwMI supports call restoration for the individual subscriber.

n) optionally: the length of the PISN number of the visited SwMI MM and the PISN number. If included, the individual subscriber home SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the individual subscriber; and

NOTE 5: The PISN number may be used to indicate the preferred gateway if the visited SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of a wide area SwMI.

o) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

2) and 3) The individual subscriber home SwMI MM shall:

- update the individual subscriber's registration status as "registered, restricted migration" in the I-HDB record;
- save the age of the migration request to the I-HDB so that the individual subscriber home SwMI MM is able to determine the age of the recorded migration at any time. If the age stamp was not included in the Migration_ind the current age shall be considered as zero; and
- update the location information as the MNI of the visited SwMI MM and, if included, the PISN number of the visited SwMI MM in the I-HDB record.

The age of the recorded restricted migration may be saved e.g. by updating the current real time or by using a relative time from which the individual subscriber home SwMI MM shall be able to derive the elapsed time. The individual subscriber home SwMI MM shall save the information in order to compare competing migration requests, if needed. This may take place e.g. if the individual subscriber home SwMI MM receives two Migration_inds for the individual subscriber from two different SwMI MMs. This, again, may take place when the individual subscriber is roaming in an area between two visited SwMIs and the individual subscriber requests migration in both of them within a very short time.

Then, the individual subscriber home SwMI MM shall send the Migration_resp to ANF-ISIMM indicating that the restricted migration shall be granted to the individual subscriber. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) migration type, which shall be either:

- restricted migration: if the migration type was "migration" in the received Migration_ind, or if the migration type was "migration with call restoration" but the call restoration support type was "not supported" in the received Migration_ind; or
- restricted migration with call restoration: if the migration type was "migration with call restoration" and the call restoration support type was "supported" in the received Migration_ind;

d) used pre-defined profile reference: the information shall contain the reference of the pre-defined migration profile set which shall be used for the individual subscriber in the visited SwMI MM. The information shall be a number from one to sixteen, and the value shall be one of the values received as Pre-defined profile information in the Migration_ind;

e) recovery: the value shall be "No recovery";

f) optionally: the length of the PISN number of the individual subscriber home SwMI MM and the PISN number. If included, the visited SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the individual subscriber; and

NOTE 6: The PISN number may be used to indicate the preferred gateway if the individual subscriber home SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of a wide area SwMI.

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;

in addition, in case 3) the individual subscriber home SwMI MM shall remove the temporary migration profile(s), if any, from the I-HDB;

then, the individual subscriber home SwMI MM shall become idle.

7.5.2 Operation

7.5.2.0 General

The following three clauses shall be applicable as follows:

- clause 7.5.2.1, if the restricted migration has been invoked according to case 1);
- clause 7.5.2.2, if the restricted migration has been invoked according to cases 1) to 3); and
- clause 7.5.2.3, if the restricted migration has been invoked according to case 1) to 3).

7.5.2.1 Operation when the visited SwMI MM invokes restricted migration

Upon receipt of the Migration_ind (containing the same information as the corresponding Migration_req) from ANF-ISIMM, the individual subscriber home SwMI MM shall verify that the restricted migration is allowed to continue:

- if the age stamp is included, verify that the age stamp in the received Migration_ind indicates a newer migration that the currently recorded migration or registration in the individual subscriber's I-HDB record; and
- verify that the individual subscriber has the right to migrate using restricted migration to the visited SwMI. The details of the verification on the individual subscriber's rights to use restricted migration are outside the scope of the present document.

Then, the individual subscriber home SwMI MM shall:

- update the individual subscriber's registration status as "registered, restricted migration" in the I-HDB record;
- save the age of the migration request to the I-HDB so that the individual subscriber home SwMI MM is able to determine the age of the recorded migration at any time. If the age stamp was not included in the Migration_ind the current age shall be considered as zero; and
- update the location information as the MNI of the visited SwMI and, if included, the PISN number of the visited SwMI MM in the I-HDB record.

The age of the recorded restricted migration may be saved e.g. by updating the current real time or by using a relative time from which the individual subscriber home SwMI MM shall be able to derive the elapsed time. The individual subscriber home SwMI MM shall save the information in order to compare competing migration requests, if needed. This may take place e.g. if the individual subscriber home SwMI MM receives two Migration_inds for the individual subscriber from two different SwMI MMs. This, again, may take place when the individual subscriber is roaming in an area between two visited SwMIs and the individual subscriber requests migration in both of them within a very short time.

Then, the individual subscriber home SwMI MM shall send the Migration_resp to ANF-ISIMM indicating that the restricted migration shall be granted to the individual subscriber. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) migration type, which shall be either:

   - restricted migration: if the migration type was "migration" in the received Migration_ind, or if the migration type was "migration with call restoration" but the call restoration support type was "not supported" in the received Migration_ind; or

   - restricted migration with call restoration: if the migration type was "migration with call restoration" and the call restoration support type was "supported" in the received Migration_ind;

d) used pre-defined profile reference: the information shall contain the reference of the pre-defined migration profile set which shall be used for the individual subscriber in the visited SwMI MM. The information shall be a number from one to sixteen, and the value shall be one of the values received as Pre-defined profile information in the Migration_ind;

e) recovery: the value shall be "No recovery";

f) optionally: PISN number of the individual subscriber home SwMI MM to be used for addressing purposes over the ISI to cater for the individual subscriber; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the individual subscriber home SwMI MM shall either become idle or, if applicable, continue as defined below.

7.5.2.2 Invocation of RSI

If the RSI service shall be invoked, if applicable, as defined in clause 8.

7.5.2.3 Support for emergency call restoration

If the migration type is "Restricted migration with call restoration" in the received Migration_ind and:

- if the call restoration support type is "supported" in the Migration_ind the individual subscriber home SwMI shall invoke RSI service indicating that the new visited SwMI supports call restoration. The call restoration is defined in ETSI EN 300 392-3-2 [15] and ETSI EN 300 392-3-3 [16]; or

- if the call restoration support type is "not supported" in the Migration_ind and/or if the collocated group home SwMI does not support group call restoration: The individual subscriber home SwMI MM shall invoke RSI service indicating that the new visited SwMI does not support group call restoration.

Then, the individual subscriber home SwMI MM shall become idle.

7.5.2.4 Receipt of restricted migration approval

Upon receipt of Migration_conf (containing the same information as the corresponding Migration_resp) from ANF-ISIMM, the visited SwMI MM shall:

- verify that ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Migration_req;

- update the registration status as "registered, restricted migration" to the I-VDB record; and

- save the age of the migration request to the I-VDB so that the visited SwMI MM is able to determine the age of the recorded migration at any time. If the age stamp was not included in the Migration_req, the current age shall be considered as zero; and

- send the D-LOCATION UPDATE ACCEPT PDU to the migrating individual subscriber as defined in ETSI EN 300 392-2 [1], clause 16.

Then, the visited SwMI MM shall become idle.

7.6 Exceptional procedures

7.6.0 General

Clauses 7.6.1 and 7.6.2 define the exceptional procedures that shall be applied if the normal operation of the restricted migration service fails. These exceptional procedures may be overridden by exceptional procedures that are included in an additional agreement which is made between the SwMI operators, see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional procedures that are applied within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked or continued over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

Generally, if the Migration_resp and Migration_conf have been exchanged between the individual subscriber home and the visited SwMI MMs the restricted migration shall be granted for the migrating individual subscriber in the AI and the databases shall be updated as defined under normal operation. However, if the operation fails before the exchange of the Migration_resp and the Migration_conf the ANF-ISIMM migration service shall be considered as rejected and the following shall take place:

- the individual subscriber home SwMI MM shall send the Migration reject_req to the ANF-ISIMM which shall deliver the corresponding Migration reject_ind to the visited SwMI MM, if possible; and

- the database updates as defined under normal operation shall be cancelled in the I-VDB and the registration status shall be update as "De-registered, migration rejected" in the I-HDB.

The Migration reject_req (and the corresponding Migration reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Migration_ind;

b) ISSI;

c) migration rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown subscriber;
- unknown SwMI;
- temporary error;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- too old age stamp, i.e. the age stamp in the received request is older than the age of the registration status update in the I-HDB;
- migration/restricted migration not allowed;
- migration profile rejection;
- unknown pre-defined profile; or
- authentication failed; and

d) recovery: the value shall be "No recovery";

e) optionally: MNI of the individual subscriber; and

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM shall try to re-invoke the ANF-ISIMM restricted migration (or migration) service up to two times. If these re-invocations do not result in successful completion of the service the individual subscriber's migration shall be rejected in the AI as defined in ETSI EN 300 392-2 [1], clause 16.

If the individual subscriber's restricted migration is rejected the RSI service shall be invoked, if applicable, as defined in clause 8, except if the migration rejection cause is "unknown subscriber" or "unknown error".

If a temporary failure has caused the restricted migration service to fail the IDR service should be invoked as described in clause 13 to ensure that the concerned I-VDBs and I-HDBs are consistent.

NOTE 3: The invocation of the IDR service is especially needed if the individual subscribers have been allowed to migrate in the visited SwMI MM without successfully contacting the individual subscriber home SwMI MM.

7.6.1 Detected by the visited SwMI MM

If the visited SwMI MM detects an unrecoverable error in the received Migration_conf or is not able to complete the individual subscriber's migration in the AI (upon receipt of the Migration_conf), the visited SwMI MM shall invoke the de-registration service as defined in clause 9 in order to indicate to the individual subscriber home SwMI MM that the individual subscriber is not migrated in the visited SwMI MM.

7.6.2 Detected by the individual subscriber home SwMI MM

Upon receipt of the Migration_ind from the ANF-ISIMM, the individual subscriber home SwMI MM may reject the individual subscriber's restricted migration. The reason for the rejection may be e.g. that the individual subscriber is not allowed to migrate in the visited SwMI MM, the individual subscriber home SwMI MM detects an unrecoverable error in the received Migration_ind or that the received age stamp indicates an older age than the age of the recorded migration, restricted migration or de-registration in the I-HDB. The latter can take place e.g. if the individual subscriber roams in a border area between two or more SwMIs. The rejection of the migration shall take place as defined in clause 7.6.

7.7 Interactions

7.7.1 Interactions with the authentication service

See clause 12.7. This clause may be applicable for the cases 1), 2) and 3).

7.7.2 Interactions with the group attachment and the group detachment services

The restricted migration service shall be invoked and operated independently of the group attachment and the group detachment service, if either or both of these are invoked concurrently with the restricted migration service. Thus, all possible interactions between the services shall be the responsibility of the SwMI MM.

If a group has been attached on behalf of an individual subscriber whose restricted migration has been rejected, the SwMI MM shall invoke the group detachment service on behalf of the individual subscriber in order to detach the group.

7.8 Dynamic description

Figure 7 illustrates the dynamic description of the restricted migration service as provided by the ANF-ISIMM.

In the case of the restricted migration as defined in cases 2) and 3) in clause 7.5, the dynamic description illustrated in this clause contains only the restricted migration service behaviour. Thus, this restricted migration service behaviour complements the dynamic description as defined in clause 6.5. Note, however, that in the case of restricted migration, the SS-migration profile exchange (as described in clause 6.5) shall not take place after migration approval.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the individual subscriber home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

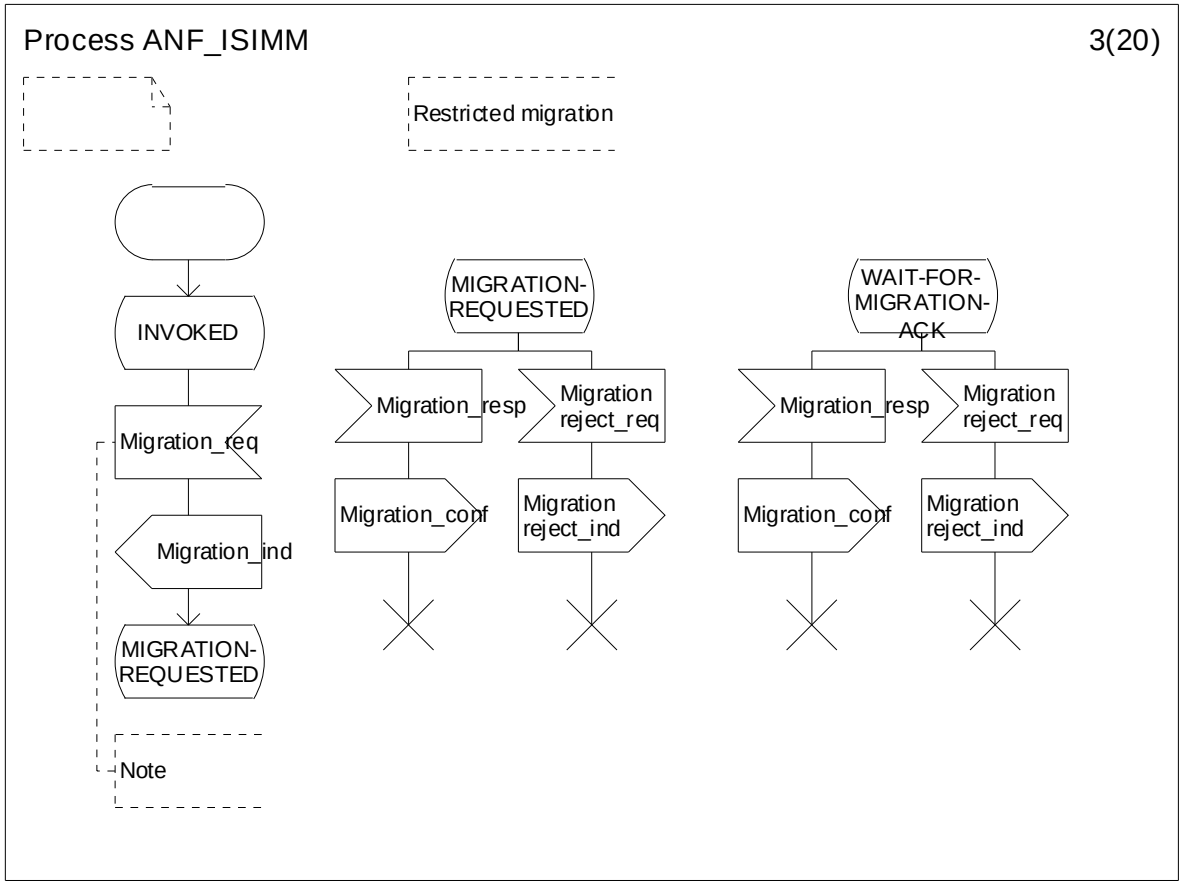
The following service primitives shall be applicable for the restricted migration service:

- migration reject_req and Migration reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the restricted migration;
- migration reject_resp and Migration reject_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the rejection of the restricted migration when the migration is rejected due to failed authentication in the visited SwMI;
- Migration_req and Migration_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to request restricted migration; and
- Migration_resp and Migration_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to grant the restricted migration.

The following states shall be used for the migration service:

- INVOKED: the migration or restricted migration service is invoked;

- MIGRATION-REQUESTED: the migration or restricted migration request is delivered to the individual subscriber home SwMI MM;
- WAIT-FOR-PROFILE-ACK: the migration profiles have been delivered to the visited SwMI MM;
- WAIT-FOR-MIGRATION-ACK: the restricted migration response is expected.



NOTE: In case 1) as described in clause 7.5 the Migration_req shall indicate that only restricted migration is allowed for the individual subscriber.

Figure 7: Dynamic description of restricted migration using SDL

8 Removal of Subscriber Information (RSI) service description - stage 1

8.1 Service definition

The RSI service enables the individual subscriber home SwMI MM to remove the individual subscriber's information:

- from the visited SwMI when a migration to new visited SwMI is done;
- from the current visited SwMI initiated by the individual subscriber home SwMI MM to remove a migrated individual subscriber e.g. when subscriber is deleted from the individual subscriber home SwMI database or the subscriber's authorization to receive any service in the visited SwMI MM is removed.

In addition, the service supports individual call restoration when the individual subscriber migrates during an established call.

8.2 Service description

The RSI service as defined in this clause is a mandatory service for SwMI MMs that support ANF-ISIMM.

The service shall take place when an individual subscriber migrates so the previous visited SwMI MM exists for the individual subscriber.

The service shall comprise the removal of individual subscriber information from the previous or current visited SwMI MM. The information shall be related to the individual subscriber's migration or restricted migration in the previous visited SwMI. This information may comprise e.g. the migration or restricted migration information, group attachments, authentication and OTAR information.

In addition, if the individual subscriber migrates during an established call the RSI service may comprise the support of individual call restoration. In this case, a circuit switched individual call may be re-established from the previous visited SwMI to the visited SwMI. Depending on the granted migration type, either all circuit switched individual calls or circuit switched individual emergency calls may be restored.

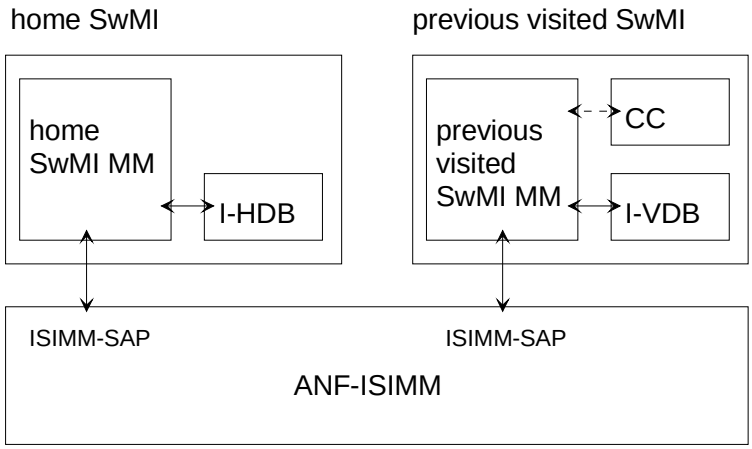
NOTE 1: The individual call restoration is defined in ETSI EN 300 392-3-2 [15].

NOTE 2: The support of call restoration in conjunction with announced type 1 cell re-selection, see ETSI EN 300 392-2 [1], clause 18.3.4.7.6, is outside the scope of the present document.

8.3 Service architecture

Figure 8 illustrates the service architecture of the RSI service.

NOTE: The home SwMI in the figure 8 is the individual subscriber home SwMI.



NOTE: The arrows illustrate the information exchange routes of the service. In the case of a solid arrow the information exchange is mandatory; in the case of a broken arrow the information exchange is conditional. The CC exists in the previous visited SwMI if the individual subscriber is engaged in a call when he migrates.

Figure 8: The service architecture of the RSI service

8.4 Normal procedures

8.4.1 Invocation

8.4.1.1 Invocation criteria

The individual subscriber home SwMI MM shall invoke the RSI service if any of the following cases is valid:

1) the individual subscriber has requested migration or registration according to the AI procedures as defined in ETSI EN 300 392-2 [1], clause 16; and

NOTE 1: The interaction with the authentication service is defined in clause 12.7.

NOTE 2: Annex A illustrates the interactions of the migration or of the restricted migration service and of the RSI service.

the previous visited SwMI MM exists for the individual subscriber. The previous visited SwMI MM shall exist for the individual subscriber if the individual subscriber's registration status in the I-HDB is "registered, migrated" or "registered, restricted migration" prior to the migration (or the restricted migration); or

2) the individual subscriber has requested migration or registration according to the AI procedures as defined in ETSI EN 300 392-2 [1], clause 16; and

the individual subscriber home SwMI MM notices need to remove the subscriber from the current visited SwMI, e.g. when the subscriber is deleted from the individual subscriber home SwMI database or the subscriber's authorization to receive any service in the visited SwMI MM is removed.

8.4.1.2 Invocation of ANF-ISIMM

If the RSI service invocation criteria is met, the individual subscriber home SwMI MM shall invoke ANF-ISIMM by issuing the Remove subs_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the individual subscriber home SwMI MM shall allocate a unique value to be used until the restricted migration operation is completed;

b) ISSI;

c) MNI of the individual subscriber;

d) MNI of the previous visited SwMI MM;

e) migration type, which shall be one of the following:

- migration, if either:
  - the visited SwMI MM received a U-LOCATION UPDATE DEMAND PDU from the individual subscriber with the location update type "Migrating location updating" and if the visited SwMI MM and the individual subscriber home SwMI MM coincide; or
  - the individual subscriber home SwMI MM has sent Migration_resp with the migration type "migration" as defined in clause 6.5.2;
- migration with call restoration, if either:
  - the visited SwMI MM received a U-LOCATION UPDATE DEMAND PDU from the individual subscriber with the location update type "Call restoration migrating location updating" and if the visited SwMI MM and the individual subscriber home SwMI MM coincide; or
  - the individual subscriber home SwMI MM has sent ANF-ISIMM Migration_resp with the migration type "migration with call restoration" as defined in clause 6.5.2;
- restricted migration, if either:
  - the visited SwMI MM received a U-LOCATION UPDATE DEMAND PDU from the individual subscriber with the location update type "Migrating location updating" and if the visited SwMI MM and the individual subscriber home SwMI MM coincide; or
  - the individual subscriber home SwMI MM has sent ANF-ISIMM Migration_resp with the migration type "restricted migration" as defined in clause 7.5.2;
- restricted migration with call restoration, if either:
  - the visited SwMI MM received a U-LOCATION UPDATE DEMAND PDU from the individual subscriber with the location update type "Call restoration migrating location updating", if the visited SwMI MM and the individual subscriber home SwMI MM coincide and if the individual subscriber is allowed to participate only circuit switched emergency calls; or
  - the individual subscriber home SwMI MM has sent ANF-ISIMM Migration_resp with the migration type "restricted migration with call restoration" as defined in clause 7.5.2;

the migration type information shall be used to indicate to the previous visited SwMI to either restore or clear the possible ongoing call (or calls) in the previous visited SwMI;

f) call restoration support (of the visited SwMI): if Migration type is "Migration with call restoration" or "Restricted migration with call restoration". It shall be either:

- supported: if the visited SwMI supports call restoration over the ISI for the individual subscriber; or
- not supported: if the visited SwMI does not support call restoration over the ISI for the individual subscriber;

g) conditionally: forced removal overriding the age stamp, visited SwMI cannot reject the removal e.g. if subscriber is deleted from the individual subscriber home SwMI database;

h) conditionally: the MNI and the PISN number of the visited SwMI, if the migration type is Migration with call restoration or Restricted migration with call restoration; and

i) recovery: the value shall be "No recovery";

j) conditionally: age stamp, if the age of the recorded migration request is greater than zero, i.e. if the Migration_req is not sent immediately upon receipt of the migration request from the individual subscriber. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the individual subscriber's migration request;

k) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

8.4.2 Operation

Upon receipt of the Remove subs_ind (containing the same information as the corresponding Remove subs_req) from ANF-ISIMM, the previous visited SwMI MM shall verify:

- that the individual subscriber has an I-VDB record; and
- that the age stamp in the received Remove subs_ind indicates a newer migration that the currently recorded migration or registration in the I-VDB record.

If both of the above mentioned cases are valid, the previous visited SwMI MM shall remove:

- the individual subscriber's I-VDB record;
- the individual subscriber's ITSI - (V)ATSI association;
- the individual subscriber's VAC record, if any. The possible VAC record contains the authentication and/or OTAR information that has been created as part of the authentication and/or OTAR services as defined in clauses 12 and 13, respectively; and
- the individual subscriber's group attachments from the G-VDB, if any.

The possible group attachments have been created as part of the group attachment service as defined in clause 15. They may be saved in the individual subscriber's I-VDB record and/or in the G-VDB or each group, and they shall be removed as part of the RSI service regardless of in which database they are stored. If a group does not become detached in the visited SwMI, i.e. if there is still at least one individual subscriber that is attached to the group, the previous visited SwMI MM shall remove the individual subscriber's group attachment(s) locally (in the previous visited SwMI). However, if a group becomes detached in the previous visited SwMI due to the RSI service, the Group detachment service as defined in clause 16 shall be invoked.

If the Migration type is "Migration with call restoration" or "Restricted migration with call restoration" in the received Remove subs_ind and:

- if the call restoration support type is "supported" in the Remove subs_ind and if the previous visited SwMI supports individual call restoration: call restoration shall be operated as defined in ETSI EN 300 392-3-2 [15] and ETSI EN 300 392-3-3 [16] The old visited SwMI should start a timer to preserve call related information until call restoration has been performed. Timer value is a local issue. The call restoration request shall indicate the individual subscriber's ITSI, the MNI and the PISN number of the visited SwMI and the migration type. It the Migration type is "Migration with call restoration" then any type of circuit switched individual call shall be restored; if the Migration type is "Restricted migration with call restoration" then only the circuit mode individual emergency calls may be restored. If the migrated subscriber was the last group member located in this SwMI then the previous visited SwMI MM should give the collocated CC application an indication that the specific group has become detached from the SwMI and any calls to this group will be disconnected. The emergency call is a call of which the call priority has an emergency value as defined ETSI EN 300 392-2 [1], clauses 11.3.4 and 14.8.12;

- if the call restoration support type is "not supported" in the Remove subs_ind and/or if the previous visited SwMI does not support individual call restoration: The previous visited SwMI shall indicate to the co-allocated CC that calls should be cleared.

Then, the previous visited SwMI MM shall send the Remove subs_resp to ANF-ISIMM. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Remove subs_ind; and

b) ISSI;

c) MNI (of the subscriber);

d) recovery: the value shall be "No recovery"; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the previous visited SwMI MM shall become idle.

Upon receipt of Remove subs_conf (containing the same information as the corresponding Remove subs_resp) from ANF-ISIMM, the individual subscriber home SwMI MM shall become idle.

8.5 Exceptional procedures

This clause defines the exceptional procedures that shall be applied if the normal operation of the RSI service fails.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM so that the service cannot be invoked over the ISI, if the service cannot be continued over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

Generally, the RSI database actions as defined under normal operation shall be carried out:

- if the Remove subs_resp and the corresponding Remove subs_conf has been exchanged between the individual subscriber home and the previous visited SwMI MMs; or

- if the operation of the RSI service is completed in the previous visited SwMI MM except that the sending of the Remove subs_resp and/or of the Remove subs_conf fails.

If neither of the above mentioned conditions is met, the following exceptional procedure shall take place:

- the previous visited SwMI MM shall send the Remove reject_req to the ANF-ISIMM which shall deliver the corresponding Remove reject_ind to the individual subscriber home SwMI MM, if possible; and

- the database updates as defined under normal operation shall be cancelled.

The Remove reject_req (and the corresponding Remove reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Remove subs_ind;

b) ISSI;

c) MNI (of the subscriber);

d) RSI rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI;
- temporary error: e.g. SwMI indicates that currently not capable to perform RSI; or
- too old age stamp, i.e. the age stamp in the received request is older than the age of the registration status update in the I-VDB. RSI not to be re-invoked;

e) recovery: the value shall be "No recovery"; and

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, if the exceptional procedure has been carried out the individual subscriber home SwMI MM shall re-invoke the service until the service is successfully completed.

Upon receipt of the Remove subs_ind, if there is not any I-VDB record corresponding to the ITSI received in the Remove subs_ind the previous visited SwMI MM shall acknowledge the service positively, i.e. using Remove subs_resp, as the service may be a re-invocation, e.g. if the previously sent Remove subs_conf has been lost.

If MNI of the individual subscriber is not known to the previous visited SwMI MM, if the previous visited SwMI MM detects an unrecoverable error in the received Remove subs_ind or if the RSI cannot be carried out due to any other reason in the previous visited SwMI MM, the previous visited SwMI MM shall reject the service as defined above.

8.6 Interaction with authentication

If the authentication has been invoked in conjunction with the migration (or the restricted migration) and if the authentication has been rejected, the RSI service shall not be invoked (in order to ensure that a malicious individual subscriber's migration request does not cause invocation of RSI service).

8.7 Dynamic description

Figure 9 contains the dynamic description of the RSI service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the individual subscriber home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the previous visited SwMI or if explicitly mentioned from and to the previous visited SwMI.

The following service primitives shall be applicable for the RSI service:

- remove reject_req and Remove reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the request to remove the individual subscriber's temporary information from the previous visited SwMI;
- remove subs_req and Remove subs_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to request the removal of individual subscriber's temporary information from the previous visited SwMI; and

- remove subs_resp and Remove subs_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the request to remove individual subscriber's temporary information from the previous visited SwMI.

The following states shall be used for the RSI service:

- INVOKED: the RSI service is invoked;
- REMOVAL-REQUESTED: the RSI service request is delivered to the individual subscriber home SwMI MM.

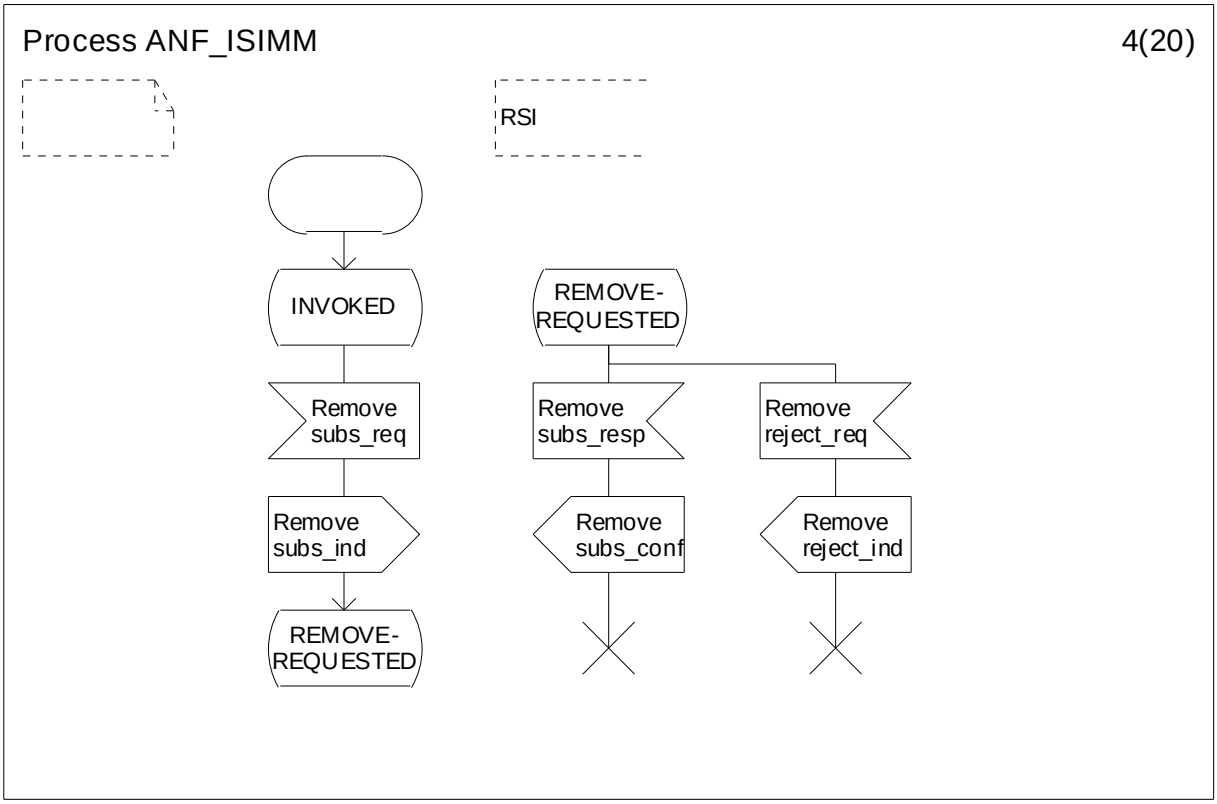


Figure 9: Dynamic description of RSI service using SDL

9 De-registration service description - stage 1

9.1 Service definition

The de-registration service enables the de registration of a migrated individual subscriber. After the de registration, the individual subscriber will not be offered any service in the visited SwMI.

9.2 Service description

The de-registration service as defined in this clause shall be a mandatory service for SwMI MMs that support ANF-ISIMM.

The service shall enable the visited SwMI MM to inform the individual subscriber home SwMI MM about the de-registration of the migrated individual subscriber due to:

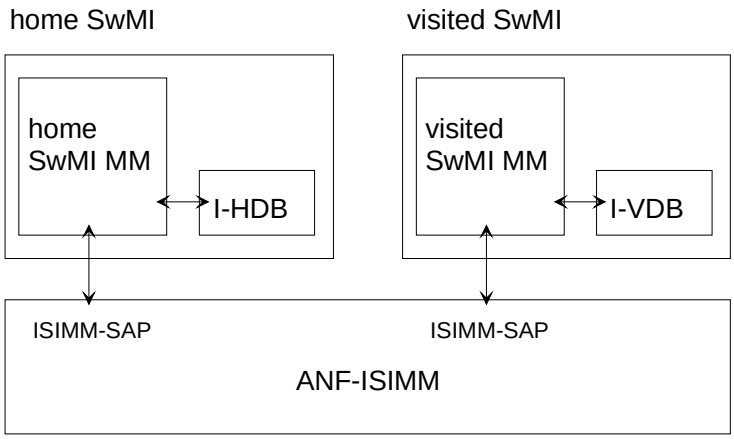
- the receipt of the de-registration indication from the migrated individual subscriber at power off; and
- if the visited SwMI MM has detected that the individual subscriber is de-registered, i.e. the SwMI has lost radio contact to the individual subscriber.

As part of the de-registration service, the individual subscriber information shall be updated in the databases in the individual subscriber home SwMI and his information related to the migration or restricted migration shall be removed from the databases in the visited SwMI. Then, the individual subscriber will be considered as de-registered, and he will not be offered any service in the visited SwMI unless he migrates again as defined in clauses 6 and 7.

9.3 Service architecture

Figure 10 illustrates the service architecture of the de-registration service.

NOTE: The home SwMI in the figure 10 is the individual subscriber home SwMI.



NOTE 1: The arrows illustrate the information exchange routes of the service.
NOTE 2: The G-HDB and/or the G-VDB may also be involved in the group home and/or in the visited SwMI if the individual subscriber's group attachments exist in these databases.

Figure 10: The service architecture of the de-registration service

9.4 Normal procedures

9.4.1 Invocation

9.4.1.1 Invocation criteria

The de-registration service shall be invoked using ANF-ISIMM if any of the following cases is valid:

1) The visited SwMI MM receives a de-registration request from the migrated individual subscriber as defined in ETSI EN 300 392-2 [1], clause 16.6, and the individual subscriber's registration status in the I-VDB indicates "registered, migrated" or "registered, restricted migration".

NOTE 1: Upon receipt of the de-registration request, the visited SwMI MM may delay the invocation of the ANF-ISIMM de-registration service up to 10 seconds. This may be done in order to avoid unnecessary signalling between the SwMIs in the case of in immediate power on.

2) The visited SwMI MM determines that the individual subscriber is de-registered, i.e. the visited SwMI MM does not have radio contact with the individual subscriber, but the registration status in the I-VDB indicates "registered, migrated" or "registered, restricted migration".

NOTE 2: Case 2) may be detected e.g. after a failed call set-up attempt to the migrated individual subscriber.

9.4.1.2 Invocation of ANF-ISIMM

If the invocation criteria as defined in any of the cases 1) to 2) is met, the invocation shall continue according to the corresponding case as follows:

- The visited SwMI MM shall remove:
  - the individual subscriber's I-VDB record;
  - the individual subscriber's ITSI - (V)ATSI association;
  - the individual subscriber's VAC record, if any. The possible VAC record contains the authentication and/or OTAR information that has been created as part of the authentication and/or OTAR services as defined in clauses 12 and 13, respectively; and
  - the individual subscriber's group attachments from the G-VDB, if any.
- The possible group attachments have been created as part of the group attachment service as defined in clause 15. They may be saved in the individual subscriber's I-VDB record and/or in the G-VDB or each group, and they shall be removed as part of the de-registration service regardless of in which database they are stored. If a group does not become detached in the visited SwMI, i.e. if there is still at least one individual subscriber that is attached to the group, the previous visited SwMI MM shall remove the individual subscriber's group attachment(s) locally (in the previous visited SwMI). However, if a group becomes detached in the previous visited SwMI due to the de-registration service, the Group detachment service as defined in clause 16 shall be invoked.
- Then, the visited SwMI MM shall invoke ANF-ISIMM by issuing the De-registration_req. The primitive shall contain the following information:
  a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;
  b) ISSI;
  c) MNI of the individual subscriber;
  d) MNI of the visited SwMI MM;
  e) de-registration type, which shall be either:
     - "Subscriber initiated", in case 1); or
     - "Visited SwMI MM detected", in case 2); and
  f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

9.4.2 Operation

Upon receipt of the De-registration_ind (with the same information as the corresponding De-registration_req) from ANF-ISIMM, the individual subscriber home SwMI MM shall verify that according to the I-HDB:

- the individual subscriber is recorded as "registered, migrated" or "registered, restricted migration"; and
- the location information (the MNI of the visited SwMI MM and, if included, the PISN number of the visited SwMI MM) points to the invoking visited SwMI MM.

If the above mentioned is true, the individual subscriber home SwMI MM shall remove the individual subscriber's location information from the I-HDB and update the registration status as "de-registered" in the I-HDB. In addition, if the individual subscriber has any recorded group attachments in the I-HDB and/or in the G-HDB, the individual subscriber and group home SwMI MMs shall remove them locally in the individual subscriber and group home SwMI MMs. If any of these groups become detached in the visited SwMI due to the de-registration, i.e. if no individual subscribers are attached to a group in the visited SwMI, the visited SwMI MM shall invoke the group detachment service as defined in clause 16.

Then, in case 1) and 2) the individual subscriber home SwMI MM shall acknowledge the service by sending De-registration_resp to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received De-registration_ind; and

b) ISSI; and

c) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the individual subscriber home SwMI MM shall become idle.

Upon receipt of the De-registration_conf (with the same information as the corresponding De-registration_resp), the visited SwMI MM shall become idle.

9.5 Exceptional procedures

9.5.0 General

This clause defines the exceptional procedures that shall be applied if the normal operation of the de-registration service fails. These exceptional procedures may be overridden by an additional agreement between the SwMI operators (that cover the exceptional situation), see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM so that the service cannot be invoked over the ISI, if the service cannot be continued over the ISI or that there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM etc.

The database actions of the de-registration service as defined under normal operation shall be carried out:

- if the De-registration_resp and the De-registration_conf have been exchanged between the individual subscriber home and the visited SwMI MMs; or

- if the operation of the de-registration service is completed except that the exchange of the De-registration_resp and/or the De-registration_conf fails;

- if neither of the above mentioned conditions is met, the following shall take place:

  - the De-reg reject_req and the De-reg reject_ind shall be exchanged between the individual subscriber home and the visited SwMI MMs, if possible. The De-reg reject_req shall be sent by the invoked SwMI; and

  - the database updates as defined under normal operation shall be cancelled.

The De-reg reject_req shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received De-registration_ind;

b) ISSI;

c) de-registration rejection cause, which shall be one of the following:

   - unknown error: a generic error cause, which shall be used when the other error causes are not applicable;

   - unknown subscriber;

   - unknown SwMI;

   - temporary error; or

d) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, if the de-registration as defined in cases 1) and 2) fails the visited SwMI MM shall re-invoke the service until the service is successfully completed.

NOTE 3: If the de-registration fails, e.g. if a visited SwMI MM does not recognize the visited SwMI MM, the additional actions carried out by the invoking SwMI MM are outside the scope of the present document.

9.5.1 Detected by the visited SwMI MM

Upon receipt of the De-registration_ind:

- if the visited SwMI MM cannot de-register the individual subscriber in the AI (e.g. if the individual subscriber is not reachable) but the individual subscriber's I-VDB record exists in the I-VDB, the visited SwMI MM shall remove the I-VDB record and acknowledge the service positively by sending the De-registration_resp. Then, the individual subscriber is considered as de-registered from the visited SwMI MM; or

- if the visited SwMI MM detects an unrecoverable error in the received primitive or if it cannot complete the operation of the service, it shall send the De-reg reject_req instead of De-registration_resp to the ANF-ISIMM. The ANF-ISIMM shall deliver the De-reg reject_ind to the individual subscriber home SwMI MM. Then, the de-registration shall be rejected as defined in clause 9.5.

9.5.2 Detected by the individual subscriber home SwMI MM

Upon receipt of the De-registration_ind:

- if the age stamp in the De-registration_ind is older than the age of the registration status update in the I-HDB the operation shall continue as defined under normal operation except that the individual subscriber home SwMI MM shall not update the I-HDB (so that the newer update shall be retained). The normal procedure shall be used as it is likely that the individual subscriber is roaming in border area of two or more SwMIs, and the normal procedure results in correct outcome; or

- if the individual subscriber home SwMI MM detects an unrecoverable error in the received primitive or if it cannot complete the operation of the service, it shall send the De-reg reject_req instead of De-registration_resp to the ANF-ISIMM. The ANF-ISIMM shall deliver the De-reg reject_ind to the visited SwMI MM. Then, the de-registration shall be rejected as defined in clause 9.5.

9.6 Dynamic description

Figure 11 contains the dynamic description of the de-registration service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the individual subscriber home SwMI;

- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the de-registration service:

- De-registration_req and De-registration_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate individual subscriber's de-registration and it may be used to request the de-registration of an individual subscriber;

- De-registration_resp and De-registration_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to respond to the de-registration request; and

- De-reg reject_req and De-reg reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the request to de-register an individual subscriber.

The following states shall be used for ANF-ISIMM de-registration service:

- INVOKED: de-registration invoked;

- OPERATING: de-registration operation in progress.

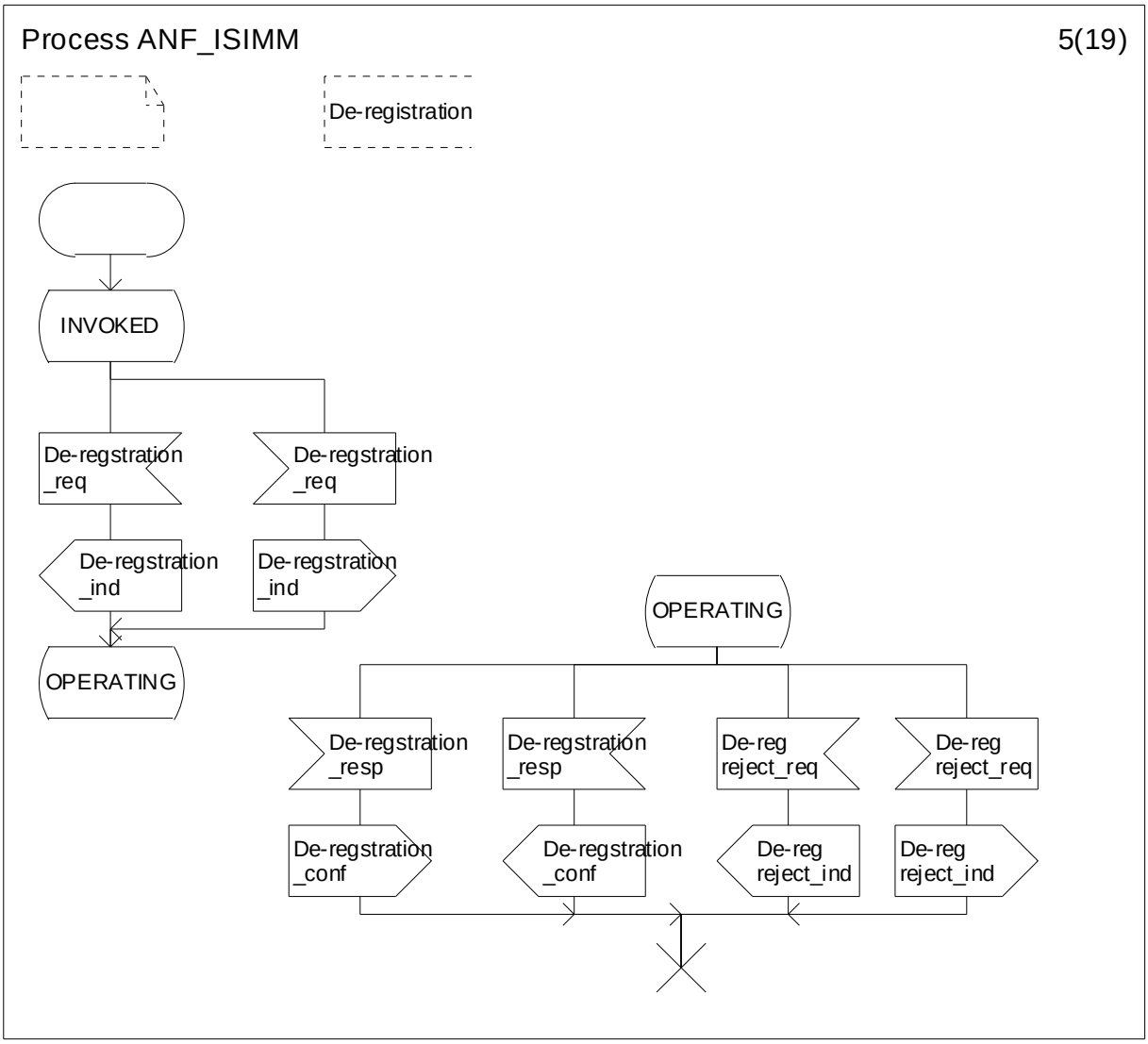


Figure 11: ANF-ISIMM de-registration service

10 Profile update service description - stage 1

10.1 Service definition

The profile update service enables the individual subscriber home SwMI MM to update the basic migration profile to the visited SwMI where the individual subscriber is migrated. The profile update service enables the group home SwMI MM to update the basic migration profile to the visited SwMI where the group is attached.

10.2 Service description

The profile update service is an optional service to SwMI MMs that support ANF-ISIMM. If supported, it shall be as defined in this clause.

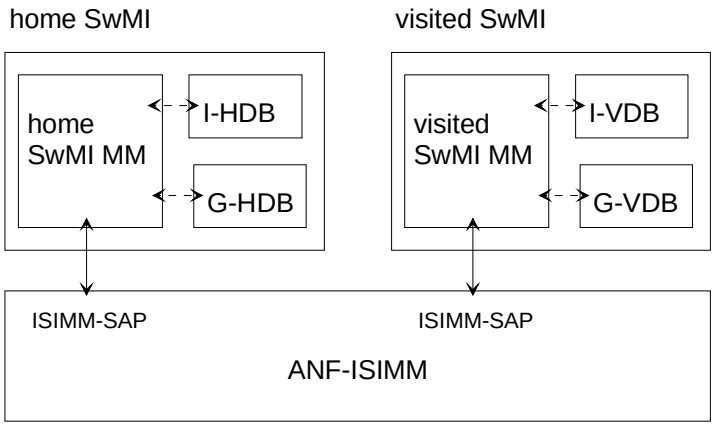
The service shall allow the home SwMI MM to update the basic migration profile to the visited SwMI MM. The service shall be used in support of the migrated individual subscriber or of the group that is attached in the visited SwMI. The basic migration profile update may be done for an individual subscriber at any time while he is migrated in the visited SwMI MM or for a group at any time while the group is attached in the visited SwMI.

The visited SwMI MM may re-define the contents of the transported migration profiles. If the contents are changed the home SwMI MM shall be informed about it.

10.3 Service architecture

Figure 12 illustrates the service architecture of the profile update service.

NOTE: The home SwMI in the figure 12 is either the individual subscriber or group SwMI or those may collocate.



NOTE: The arrows illustrate the information exchange routes of the service. In the case of a solid arrow, the information exchange is mandatory; in the case of a broken arrow, the information exchange is conditional. If the service is invoked against an individual subscriber the I-HDB and the I-VDB are involved; if against group the G-HDB and the G-VDB are involved.

Figure 12: The service architecture of the profile update service

10.4 Normal procedures

10.4.1 Invocation

10.4.1.1 Invocation criteria

The home SwMI MM shall invoke the profile update service if it wishes to update the basic migration profile of an individual subscriber of a group as follows:

- on behalf of an individual subscriber:
  - if the individual subscriber is migrated, i.e. his registration status in the I-HDB indicates "registered, migrated"; and
  - the basic migration profile has been exchanged as part of the individual subscriber's migration in the visited SwMI, i.e. if the migration has taken place as case 2), 3a) or 3b) as defined in clause 6; or
- on behalf of a group:
  - the group is attached in the visited SwMI, i.e. the group attachment information in its G-HDB record or in at least one I-HDB record indicates "attached in visited SwMI MM"; and
  - the basic migration profile has been exchanged as part of the first group attachment in the visited SwMI as defined in clause 15.

NOTE: This service enables the home SwMI MM to update the service authorizations for a migrated individual subscriber or for a group attached in the visited SwMI MM, e.g. if the home SwMI MM has changed the authorizations; however, in order to be effective the changes need to be approved by the visited SwMI MM as when the migration profile update is made in conjunction with the migration service.

10.4.1.2 Invocation of ANF-ISIMM

The home SwMI MM shall provide the visited SwMI MM with the updated original basic migration profile by sending the Profile update_req to ANF-ISIMM. The primitive shall contain the following information:

NOTE 1: The term original basic migration profile is used for the basic profile which the home SwMI MM sends to the visited SwMI MM.

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;

b) ISSI or GSSI;

c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the group and the MNI of the visited SwMI MM follow this information in the primitive;

d) MNI of the individual subscriber or of the group if parameter;

e) MNI of the visited SwMI MM;

f) profile type: the value shall be either "Individual" or "Group" indicating whether the included basic migration profile is that of an individual subscriber or of a group;

g) basic migration profile (original): the original basic migration profile shall indicate the basic service profile that the home SwMI MM requests to be used for the individual subscriber or group in the visited SwMI. The profile shall be one of the following:

- the entire replacement of the individual subscriber migration profile currently saved in the I-VDB: The contents of the original migration profile shall be as defined in clause 6.5.2.2.1.1;
- the entire replacement of the group migration profile currently saved in the G-VDB: The contents of the original migration profile shall be as defined in clause 15.4.2.1.2.2;
- one or more parameters in the currently saved individual subscriber migration profile shall be updated (but not the entire profile). The contents of the original migration profile shall be as follows:
  - profile status, shall be "Profile Update";
  - point-to-point service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or
    - not supported;
  - point-to-multipoint service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or
    - not supported;
  - point-to-multipoint acknowledged service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or
    - not supported;

- point-to-multipoint broadcast service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- speech service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - one of the supported services; or
  - not supported;
- circuit mode unprotected data service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- circuit mode protected (low) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- circuit mode protected (high) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - undefined, indicating that the currently saved value shall not be changed; or
  - no interleaving:
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or
    - not supported;
  - medium interleaving depth = 4 shall be either of the following:
    - supported; or
    - not supported;
  - long interleaving depth = 8 shall be either of the following:
    - supported; or
    - not supported;

- duplex service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- IP service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- authentication service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- OTAR SCK generation service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- OTAR SCK delivery service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- AI encryption state list, shall indicate one of the following:
  - "Undefined" indicating that the currently saved value shall not be changed; or
  - all the AI encryption states that the individual subscriber may support (i.e. is able to and allowed to support) in the visited SwMI. The possible supported states are the following:
    - 1;
    - 2; and
    - 3;
- the values are defined in ETSI EN 300 392-7 [5], clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the individual subscriber, if any. In addition, the values 2 and 3 shall imply that the AI encryption is supported for the individual subscriber for the circuit mode speech and data services, SDS and IP service;
- end-to-end encryption shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;

- the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service instance, when the call is invoked;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;
- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:
    - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
    - SS-status: shall indicate if the supplementary service indicated in the first sub-element is supported or not for the individual subscriber, and if supported whether the original SS-migration profile will be sent to the visited SwMI MM. The element shall have one of the following:
        - not supported: shall indicate that the supplementary service is not supported;
        - supported, with original SS-migration profile: shall indicate that the supplementary service is supported with the corresponding original SS-migration profile (i.e. the original SS-migration profile will be sent in the following SS-profile update_req); or
        - supported, without original SS-migration profile: without original SS-migration profile: shall indicate that the supplementary service is supported without the corresponding original SS-migration profile;
- the SS-information shall be an amendment to the currently saved SS-information, if the following Default SS-information is not sent; the SS-information shall replace the currently saved SS-information (in the VDB record) with the following Default SS-information if the latter is sent;

NOTE 2: In addition, the Profile status type "Profile replacement" may be used to replace all the existing SS-information in the VDB.

- optionally: default SS-information. If included, shall be one of the following:
    - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the individual subscriber; or
    - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the individual subscriber;
- if the Default SS-information is included that shall either alone or with the SS-information, if included, replace the existing SS-information in the VDB;
- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:
    - pre-defined short message;
    - user defined short message;
    - user defined Data 1;
    - user defined Data 2;
    - user defined Data 3; and
    - user defined Data 4;
- optionally: advanced link, shall be either:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or

- not supported;

- optionally: maximum number of timeslots, shall be one of the following:
  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;
- optionally: call time-out timer (T310), shall be one of the following:
  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;
  - 3 minutes;
  - 4 minutes;
  - 5 minutes;
  - 6 minutes;
  - 8 minutes;
  - 10 minutes;
  - 12 minutes;
  - 15 minutes;
  - 20 minutes; or
  - 30 minutes;
- optionally: call time-out set-up phase timer (T301), shall be one of the following:
  - 1 second;
  - 2 seconds;
  - 5 seconds;
  - 10 seconds;
  - 20 seconds;
  - 30 seconds; or
  - 60 seconds;
- optionally: group information, the information element may be repeated. One information element shall specify the relationship between the individual subscriber and the indicated group. One information element shall contain the following sub-elements:
  - GSSI of the group. The individual subscriber is allowed to attach to the group;
  - subscriber status, shall indicate one of the following:
    - not important subscriber; or
    - important subscriber;

        - class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
        - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;
    - if the element is included, it shall be an amendment to the existing Group information that is saved in the individual subscriber's VDB record;

NOTE 3: The Profile status type "Profile replacement" may be used to replace all the existing Group information in the VDB.

    - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;

- the optional information may be included if the home SwMI MM requests support for the corresponding service or feature;
- one or more parameters in the currently saved group profile shall be updated (but not the entire profile). The contents of the original migration profile shall be as follows:
    - profile status, shall be "Profile Update";
    - point-to-multipoint service, shall be one of the following:
        - undefined, indicating that the currently saved value shall not be changed;
        - supported; or
        - not supported;
    - point-to-multipoint acknowledged service, shall be one of the following:
        - undefined, indicating that the currently saved value shall not be changed;
        - supported; or
        - not supported;
    - point-to-multipoint broadcast service, shall be one of the following:
        - undefined, indicating that the currently saved value shall not be changed;
        - supported; or
        - not supported;
    - speech service, shall be one of the following:
        - undefined, indicating that the currently saved value shall not be changed;
        - one or more of the supported services; or
        - not supported;
    - circuit mode unprotected data service, shall be one of the following:
        - undefined, indicating that the currently saved value shall not be changed;
        - supported; or
        - not supported;
    - circuit mode protected (low) data service, shall be either of the following:
        - undefined, indicating that the currently saved value shall not be changed;
        - supported; or

- not supported;

- circuit mode protected (high) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - undefined, indicating that the currently saved value shall not be changed; or
  - no interleaving:
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or
    - not supported;
  - medium interleaving depth = 4 shall be either of the following:
    - supported; or
    - not supported;
  - long interleaving depth = 8 shall be either of the following:
    - supported; or
    - not supported;
- IP service shall be one ob3f the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- AI encryption state list, shall indicate one of the following:
  - "Undefined" indicating that the currently saved value shall not be changed; or
  - all the AI encryption states that the group may support (i.e. is able to and allowed to support) in the visited SwMI. The possible supported states are the following:
    - 1;
    - 2; and
    - 3;
- the values are defined in ETSI EN 300 392-7 [5], clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the group, if any. In addition, the values 2 and 3 shall imply that the AI encryption is supported for the group for the circuit mode speech and data services, SDS and IP service;

- end-to-end encryption shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service instance, when the call is invoked;
- group attachment/detachment, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - first group attachment and last group detachment;
  - important user group attachment shall be sent to home SwMI; or
  - every group attachment shall be sent to home SwMI;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;
- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:
  - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
  - SS-status: shall indicate if the supplementary service indicated in the first sub-element is supported or not for the individual subscriber, and if supported whether the original SS-migration profile will be sent to the visited SwMI MM. The element shall have one of the following:
    - not supported: shall indicate that the supplementary service is not supported;
    - supported, with original SS-migration profile: shall indicate that the supplementary service is supported with the corresponding original SS-migration profile (i.e. the original SS-migration profile will be sent in a SS-profile update_req); or
    - supported, without original SS-migration profile: without original SS-migration profile: shall indicate that the supplementary service is supported without the corresponding original SS-migration profile;
- the SS-information shall be an amendment to the currently saved SS-information, if the following Default SS-information is not sent; the SS-information shall replace the currently saved SS-information (in the VDB record) with the following Default SS-information if the latter is sent;

NOTE 4: In addition, the Profile status type "Profile replacement" may be used to replace all the existing SS-information in the VDB.

- optionally: default SS-information. If included, shall be one of the following:
  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the group; or
  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the group;
- if the Default SS-information is included that shall either alone or with the SS-information, if included, replace the existing SS-information in the VDB;

- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:
  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;
- optionally: advanced link, shall be either:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- optionally: maximum number of timeslots, shall be one of the following:
  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;
- optionally: call time-out timer (T310), shall be one of the following:
  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;
  - 3 minutes;
  - 4 minutes;
  - 5 minutes;
  - 6 minutes;
  - 8 minutes;
  - 10 minutes;
  - 12 minutes;
  - 15 minutes;
  - 20 minutes; or
  - 30 minutes;
- optionally: call time-out set-up phase timer (T301), shall be one of the following:
  - 1 second;
  - 2 seconds;

- 5 seconds;
- 10 seconds;
- 20 seconds;
- 30 seconds; or
- 60 seconds;

- optionally: group priority, if included, shall indicate an internally defined priority to be used within the visited SwMI. It shall be used in the call set up in addition to the call priority element:
  - no priority;
  - low priority;
  - normal priority;
  - high priority; or
  - emergency priority;

NOTE 5: This priority is not related to the AI call priority.

- optionally: subscriber information, the information element may be repeated. One information element shall specify the relationship between the group and the indicated individual subscriber. One information element shall contain the following sub-elements:
  - ISSI of the individual subscriber and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present" . The individual subscriber may attach to it;
  - subscriber status, shall indicate one of the following:
    - not important subscriber; or
    - important subscriber;
  - class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
  - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;
- if included, the subscriber information shall be an amendment to the currently saved subscriber information;
- optionally: any type 3 elements as defined in the present document;

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

10.4.2 Operation

Upon receipt of the Profile update_ind (containing the same information as the corresponding Profile update_req) from ANF-ISIMM, the visited SwMI MM shall verify that:

- if the profile update service in invoked against an individual subscriber that the individual subscriber's registration status in the I-VDB indicates "registered, migrated"; or
- if the profile update service in invoked against a group subscriber that is attached in the visited SwMI, i.e. of which the group attachment information in its G-VDB record or in at least one I-VDB record indicates "attached in visited SwMI MM".

Then, the visited SwMI MM shall create the basic migration profile as requested either for the migrated individual subscriber or for the group. The profile shall define the individual subscriber's or group's service authorization in the visited SwMI. The visited SwMI MM shall create the basic migration profile in one of the following ways:

- the original migration profile shall be used as received from the home SwMI MM, i.e. the services are supported for the individual subscriber or group as requested by the home SwMI;
- the temporary migration profile shall be created and used while the individual subscriber is migrated or group is attached in the visited SwMI MM. In this case the visited SwMI MM does not offer services for the individual subscriber or group as proposed by the home SwMI MM but creates a temporary profile that shall be used instead. The reason for creating the temporary migration profile may be e.g. that the visited SwMI MM cannot support the services as requested by the home SwMI MM or that the visited SwMI MM restricts the use of its services for migrated individual subscribers or their groups.

NOTE 1: The term temporary basic migration profile is used for the basic profile which the visited SwMI MM sends to the home SwMI MM.

The visited SwMI MM shall save the created migration profile to the individual subscriber's I-VDB record or to the group's G-VDB record and it shall replace the previous migration profile.

The visited SwMI MM shall provide the home SwMI MM with the created basic migration profile information by sending the Profile update_resp to ANF-ISIMM. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Profile update_ind;

b) ISSI or GSSI;

c) profile type: the value shall be either "Individual subscriber" or "Group" indicating whether the included basic migration profile is that of an individual subscriber or of a group;

d) basic migration profile info: shall indicate whether the original basic migration profile was accepted as received or whether the temporary basic migration profile was created. If the temporary migration profile was created, the contents shall be included in the primitive:

- the contents of the individual subscriber temporary migration profile shall be as follows:
  - profile status, shall be "Profile Response";
  - point-to-point service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or
    - not supported;
  - point-to-multipoint service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or
    - not supported;
  - point-to-multipoint acknowledged service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or
    - not supported;
  - point-to-multipoint broadcast service, shall be one of the following:
    - undefined, indicating that the currently saved value shall not be changed;
    - supported; or

- not supported;

- speech service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - one or more of the supported services; or
  - not supported;
- circuit mode unprotected data service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- circuit mode protected (low) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- circuit mode protected (high) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - undefined, indicating that the currently saved value shall not be changed; or
  - no interleaving;
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or
    - not supported;
  - medium interleaving depth = 4 shall be either of the following:
    - supported; or
    - not supported;
  - long interleaving depth = 8 shall be either of the following:
    - supported; or
    - not supported;
- duplex service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;

- IP service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- authentication service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- OTAR SCK generation service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- OTAR SCK delivery service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- AI encryption state list, shall indicate one of the following:
  - "Undefined" indicating that the currently saved value shall not be changed; or
  - the supported AI encryption state for the individual subscriber. The possible supported state shall be one of the following:
    - 1;
    - 2; and
    - 3;
- the values are defined in ETSI EN 300 392-7 [5], clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the individual subscriber, if any. In addition, the values 2 and 3 shall imply that the AI encryption is supported for the individual subscriber for the circuit mode speech and data services, SDS and IP service;
- end-to-end encryption shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service instance, when the call is invoked;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;

- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:
  - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
  - SS-response status: shall indicate if the supplementary service is supported or not for the individual subscriber. The element shall be either of the following:
    - not supported: shall indicate that the supplementary service is not supported;
    - supported: shall indicate that the supplementary service is supported;
- if the SS-migration profile is required for the supplementary service, the home SwMI MM shall send the profile in a SS-profile update_req to the visited SwMI or the supplementary service is not supported despite of the value of the SS-response status element;
- optionally: default SS-information. If included, shall be one of the following:
  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the individual subscriber; or
  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the individual subscriber;
- if the Default SS-information is included it shall either alone or with the SS-information, if included in the primitive, replace the existing SS-information in the VDB;
- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:
  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;
- optionally: advanced link, shall be either:
  - supported; or
  - not supported;
- optionally: maximum number of timeslots, shall be one of the following:
  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;
- optionally: call time-out timer (T310), shall be one of the following:
  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;

        - 3 minutes;
        - 4 minutes;
        - 5 minutes;
        - 6 minutes;
        - 8 minutes;
        - 10 minutes;
        - 12 minutes;
        - 15 minutes;
        - 20 minutes; or
        - 30 minutes;
    - optionally: call time-out set-up phase timer (T301), shall be one of the following:
        - 1 second;
        - 2 seconds;
        - 5 seconds;
        - 10 seconds;
        - 20 seconds;
        - 30 seconds; or
        - 60 seconds;
    - optionally: group information, the information element may be repeated. One information element shall specify the relationship between the individual subscriber and the indicated group. One information element shall contain the following sub-elements:
        - GSSI of the group. The individual subscriber is allowed to attach to the group;
        - subscriber status, shall indicate one of the following:
            - not important subscriber; or
            - important subscriber;
        - class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
        - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;
    - if the element is included, it shall be an amendment to the existing Group information that is saved in the individual subscriber's VDB record;

NOTE 2: The Profile status type "Profile replacement" may be used to replace all the existing Group information in the VDB.

    - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;

- the value "Undefined" may be used for a parameter only if the corresponding parameter in the received Profile update_ind had the value "Undefined";
- the contents of the group temporary migration profile shall be as follows:
    - profile status, shall be "Profile Response";

- point-to-multipoint service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- point-to-multipoint acknowledged service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- point-to-multipoint broadcast service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- speech service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - one or more of the supported services; or
  - not supported;
- circuit mode unprotected data service, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- circuit mode protected (low) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- circuit mode protected (high) data service, shall be either of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - undefined, indicating that the currently saved value shall not be changed; or
  - no interleaving;
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or

- not supported;

- medium interleaving depth = 4 shall be either of the following:
  - supported; or
  - not supported;
- long interleaving depth = 8 shall be either of the following:
  - supported; or
  - not supported;

- IP service shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- AI encryption state list, shall indicate one of the following:
  - "Undefined" indicating that the currently saved value shall not be changed; or
  - all the AI encryption states that the group may support (i.e. is able to and allowed to support) in the visited SwMI. The possible supported states are the following:
    - 1;
    - 2; and
    - 3;
- the values are defined in ETSI EN 300 392-7 [5], clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the group, if any. In addition, the values 2 and 3 shall imply that the AI encryption is supported for the group for the circuit mode speech and data services, SDS and IP service;
- end-to-end encryption shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service instance, when the call is invoked;
- group attachment/detachment, shall be one of the following:
  - undefined, indicating that the currently saved value shall not be changed;
  - first group attachment and last group detachment;
  - important user group attachment shall be sent to home SwMI; or
  - every group attachment shall be sent to home SwMI;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;

- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-element:
  - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
  - SS-response status: Shall indicate if the supplementary service is supported or not for the individual subscriber. The element shall be either of the following:
    - not supported: shall indicate that the supplementary service is not supported;
    - supported: shall indicate that the supplementary service is supported;
- if the SS-migration profile is required for the supplementary service, the home SwMI MM shall send the profile in a SS-profile update_req to the visited SwMI or the supplementary service is not supported despite of the value of the SS-response status element;
- optionally: default SS-information. If included, shall be one of the following:
  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the group; or
  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the group;
- if the Default SS-information is included that shall either alone or with the SS-information, if included, replace the existing SS-information in the VDB;
- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:
  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;
- optionally: advanced link, shall be either:
  - undefined, indicating that the currently saved value shall not be changed;
  - supported; or
  - not supported;
- optionally: maximum number of timeslots, shall be one of the following:
  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;
- optionally: call time-out timer (T310), shall be one of the following:
  - 30 seconds;
  - 45 seconds;
  - 60 seconds;

- 2 minutes;
- 3 minutes;
- 4 minutes;
- 5 minutes;
- 6 minutes;
- 8 minutes;
- 10 minutes;
- 12 minutes;
- 15 minutes;
- 20 minutes; or
- 30 minutes;

- optionally: call time-out set-up phase timer (T301), shall be one of the following:
  - 1 second;
  - 2 seconds;
  - 5 seconds;
  - 10 seconds;
  - 20 seconds;
  - 30 seconds; or
  - 60 seconds;
- optionally: group priority, if included, shall indicate an internally defined priority to be used within the Visited SwMI. It shall be used in the call set up in addition to the call priority element:
  - no priority;
  - low priority;
  - normal priority;
  - high priority; or
  - emergency priority;

NOTE 3: This priority is not related to the AI call priority.

- optionally: subscriber information, the information element may be repeated. One information element shall specify the relationship between the group and the indicated individual subscriber. One information element shall contain the following sub-elements:
  - ISSI of the individual subscriber and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present". The individual subscriber may attach to it;
  - subscriber status, shall indicate one of the following:
    - not important subscriber; or
    - important subscriber;

        - class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
        - optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;
      - if included, the subscriber information shall be an amendment to the currently saved subscriber information;
      - optionally: any type 3 elements as defined in the present document;
    - the value "Undefined" may be used for a parameter only if the corresponding parameter in the received Profile update_ind had the value "Undefined";

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the Profile update_conf (containing the same information as the corresponding Profile update_resp) from ANF-ISIMM, the home SwMI MM shall verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the sent Profile update_req.

NOTE 4: If the home SwMI may de-register the individual subscriber due to the temporary basic migration profile information by using the de-registration service as defined in clause 9.

Then, the home SwMI MM may save the temporary basic migration profile in the I-HDB or the G-HDB. The saving and use of the temporary basic migration profile is optional in the home SwMI.

Then, the home SwMI MM shall become idle.

10.5 Exceptional operation

This clause defines the exceptional procedures that shall be applied if the normal operation of the profile update service fails. These exceptional procedures may be overridden by exceptional procedures that are included in an additional agreement which is made between the SwMI operators, see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional procedures that are applied within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked or continued over the ISI or of the group or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

Generally, if the Profile update_resp and the Profile update_conf have been exchanged between the home and the visited SwMI MMs the database updates as defined under normal operation shall be completed. However, if the service fails before the exchange of the Profile update_resp and the Profile update_conf the following shall take place:

- the service related database actions shall be cancelled in the I-VDB and I-HDB (if the service is invoked against an ISSI) or in the G-VDB and G-HDB (if the service is invoked against a GSSI); and
- the visited SwMI MM shall send the Profile reject_req to the ANF-ISIMM which shall deliver the corresponding Profile reject_ind to the home SwMI MM, if possible.

The Profile reject_req (and the corresponding Profile reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Profile update_ind;

b) ISSI or GSSI;

c) profile rejection cause, which shall be one of the following:
   - unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
   - unknown subscriber;
   - unknown SwMI;

- temporary error;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- failed migration profile reception; or
- SS-migration profile not applicable; and

d) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The home SwMI MM may re-invoke the service until the service is successfully completed.

NOTE 3: The home SwMI MM may invoke the de-registration as defined in clause 9 to de-register the migrated individual subscriber e.g. if the profile update service fails.

10.6 Dynamic description

Figure 13 contains the dynamic description of the profile update service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the profile update service:

- profile reject_req and Profile reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the individual subscriber's or group's basic migration profiles;
- profile update_req and Profile update_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide the visited SwMI MM with the individual subscriber's or group's basic migration profile; and
- profile update_resp and Profile update_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the individual subscriber's or group's basic migration profile and may be used to provide the home SwMI MM with the temporary basic migration profile.

The following states shall be used for ANF-ISIMM profile update service:

- INVOKED: profile update service invoked;
- OPERATING: profile update service operation is in progress.

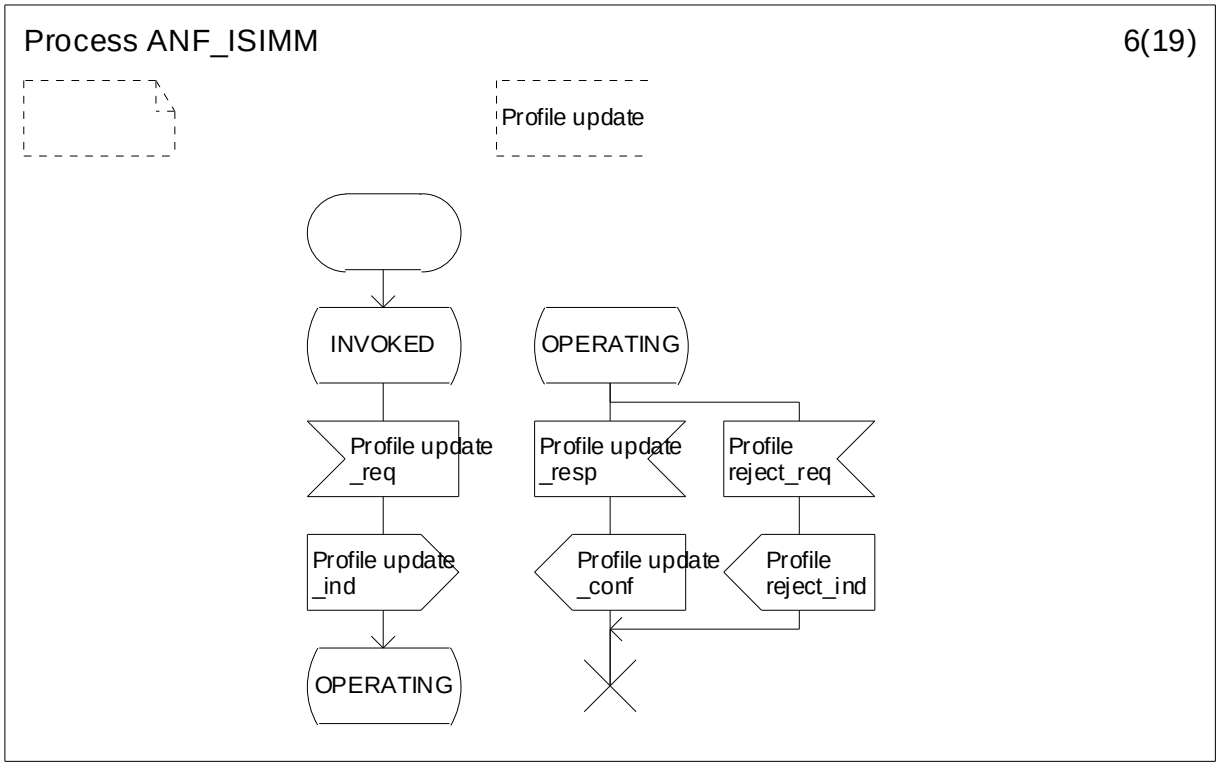


Figure 13: ANF-ISIMM profile update service

11 SS-profile update service description - stage 1

11.1 Service definition

The SS-profile update service enables the home SwMI MM to update the SS-migration profiles to the visited SwMI in which the individual subscriber is migrated or in which the group is attached.

11.2 Service description

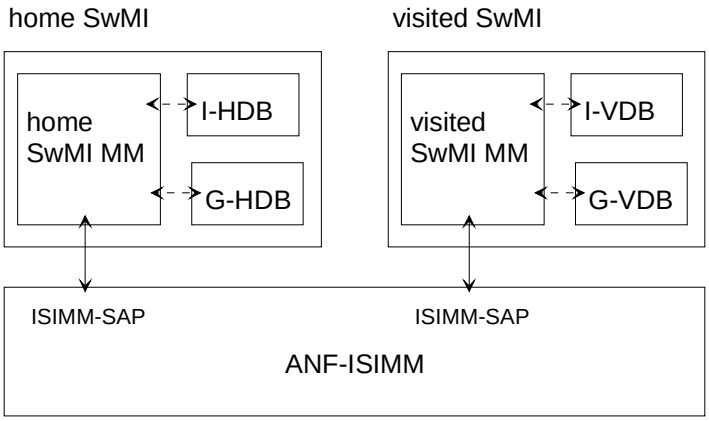
The SS-profile update service is an optional service to SwMI MMs that support ANF-ISIMM. If supported, it shall be as defined in this clause.

The service shall allow the home SwMI MM to update one or more SS-migration profile(s) to the visited SwMI MM. The service shall be used in support of the migrated individual subscriber or of the group that is attached in the visited SwMI. The SS-migration profile update may be done for an individual subscriber at any time while he is migrated in the visited SwMI or for a group at any time while the group is attached in the visited SwMI.

The visited SwMI MM may re-define the contents of the transported SS-migration profile(s). If the contents are changed the home SwMI MM shall be informed about it.

11.3 Service architecture

Figure 14 illustrates the service architecture of the SS-profile update service.



NOTE: The arrows illustrate the information exchange routes of the service. In the case of a solid arrow, the information exchange is mandatory; in the case of a broken arrow, the information exchange is conditional. If the service is invoked against an individual subscriber the I-HDB and the I-VDB are involved; if against group the G-HDB and the G-VDB are involved.

Figure 14: The service architecture of the SS-profile update service

11.4 Normal procedures

11.4.1 Invocation

11.4.1.1 Invocation criteria

The home SwMI MM shall invoke the SS-profile update service if it wishes to update one or more SS-migration profile(s) of an individual subscriber of a group as follows:

- on behalf of an individual subscriber:
  - if the individual subscriber is migrated, i.e. his registration status in the I-HDB indicates "registered, migrated"; and
  - if the basic migration profile has been exchanged as part of the individual subscriber's migration in the visited SwMI, i.e. if the migration has taken place as case 2), 3a) or 3b) as defined in clause 6; or
  - if the corresponding supplementary service is supported for the migrated individual subscriber and if the SS-migration profile is applicable for the supplementary service as defined in the corresponding sub-part of ETSI EN/ETS 300 392-12 [4]; or
- on behalf of a group:
  - the group is attached in the visited SwMI, i.e. the group attachment information in its G-HDB record or in at least one I-HDB record indicates "attached in visited SwMI MM"; and
  - the basic migration profile has been exchanged as part of the first group attachment in the visited SwMI as defined in clause 15; or
  - if the corresponding supplementary service is supported for the group in the visited SwMI and if the SS-migration profile is applicable for the supplementary service as defined in the corresponding sub-part of ETSI EN/ETS 300 392-12 [4].

NOTE: This service enables the home SwMI MM to update the service authorizations for a migrated individual subscriber or for a group attached in the visited SwMI MM, e.g. if the home SwMI MM has changed the authorizations; however, in order to be effective the changes need to be approved by the visited SwMI MM as when the migration profile update is made in conjunction with the migration service.

11.4.1.2 Invocation of ANF-ISIMM

The home SwMI MM shall send the original SS-migration profile(s) to ANF-ISIMM by using the SS-profile update_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and operation of the service;

b) ITSI or GTSI;

c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the individual subscriber or group and the MNI of the visited SwMI MM follow this information in the primitive;

d) MNI of the individual subscriber or of the group;

e) MNI of the visited SwMI MM;

f) number of SS-migration profiles which shall indicate the number of the following profiles;

g) original SS-migration profile(s): one or more original SS-migration profiles. Each original SS-migration profile shall be the supplementary service profile that the home SwMI MM requests to be used for the individual subscriber or the group in the visited SwMI (for the corresponding supplementary service). The profile shall contain information as defined in clause 6.5.2.2.2.1 (in the case of individual subscriber) or clause 15.4.2.1.3.1 (in the case of group) and in ETSI EN/ETS 300 392-12 [4] (both individual subscriber and group); and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

11.4.2 Operation

11.4.2.1 Creation of temporary SS-migration profiles

Upon receipt of the SS-profile update_ind (containing the same information as the corresponding SS-profile update_req) from ANF-ISIMM, the visited SwMI MM shall verify that:

- if the profile update service in invoked against an individual subscriber that the individual subscriber's registration status in the I-VDB indicates "registered, migrated"; or

- if the profile update service in invoked against a group that is attached in the visited SwMI, i.e. of which the group attachment information in its G-HDB record or in at least one I-HDB record indicates "attached in visited SwMI MM".

In addition, the visited SwMI MM shall verify for each received original SS-migration profile that:

1) the supplementary service is supported for the individual subscriber or the group in the visited SwMI;

2) the SS-migration profile is applicable for the supplementary service, see the corresponding sub-part of ETSI EN/ETS 300 392-12 [4].

If cases 1) and 2) are valid, the visited SwMI MM shall create the corresponding SS-migration profile in one of the following ways:

- the original SS-migration profile shall be used as received from the home SwMI MM, i.e. the supplementary service is supported for the individual subscriber or group as requested by the home SwMI;

- the temporary SS-migration profile shall be created and used for the duration of the migration, i.e. the visited SwMI MM does not support the supplementary service for the individual subscriber or for the group as proposed by the home SwMI MM but creates instead a temporary profile (temporary SS-migration profile) that shall be used. The reason for creating the temporary SS-migration profile may be e.g. that the visited SwMI MM cannot support the supplementary service as requested by the home SwMI MM, that the visited SwMI MM restricts the use of the supplementary service for migrated individual subscribers, etc.;

NOTE: The term temporary migration profile, basic or SS-migration, is used for the profile which the visited SwMI MM sends to the home SwMI MM; and

- the visited SwMI MM shall verify that the SS-migration profile is created for each supported supplementary service if required, see the corresponding supplementary service sub-part of ETSI EN/ETS 300 392-12 [4]. If not created when required, the supplementary service shall be considered as not supported for the individual subscriber and updated accordingly to the individual subscriber's basic migration profile.

The visited SwMI MM shall save the created migration profile to the individual subscriber's I-VDB record or to the group's G-VDB record and it shall replace the previous migration profile.

11.4.2.2 Informing home SwMI MM about the temporary SS-migration profiles

Upon creation of the SS-migration profiles, the visited SwMI MM shall send the SS-profile update_resp to ANF-ISIMM containing the created SS-migration profile(s) information. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received SS-profile update_ind;

b) ISSI or GSSI;

c) profile type: the value shall be "individual subscriber" or "group" based on the parameter b);

d) recovery: the value shall be "No recovery";

e) number of not supported SSs: shall indicate the number of not supported SSs. The number shall be zero if no SS-migration profile(s) were required or, if required, and the creation was successful;

f) conditionally: SS-xx not supported indication, shall be present as many times as indicated by the "Number of not supported SSs". Each element shall identify one not supported supplementary service (as the creation of the mandatory SS-migration profile has failed). If present, this information shall override the information included in the Profile update_resp. The creation can have failed if e.g. the home SwMI MM did not send the original SS-migration profile for the supplementary service;

NOTE 1: The SS-xx stands for any TETRA supplementary service.

g) number of SS-migration profiles which shall indicate the number of the following profiles;

h) SS-migration profile (temporary): shall contain the information of one created temporary SS-migration profile, if the corresponding original SS-migration profile was received. The information shall be as follows:

- SS-type: shall identify the TETRA supplementary service to which the following SS-migration profile refers, see clause 34.2.85;

- SS-profile response status, shall specify the relationship between the original SS-migration profile (received in the SS-profile update_ind) and the created temporary SS-migration profile. Shall be one of the following:

  - original SS-migration profile accepted as received, the original SS-migration profile is saved in the I-VDB or in the G-VDB as the SS-migration profile for that supplementary service;

  - original SS-migration profile redefined, contents not sent to the home SwMI MM, the created temporary migration profile created does not equal the received original SS-migration profile. The contents of the created temporary SS-migration profile are not sent to the home SwMI MM;

  - original SS-migration profile redefined, contents sent to the home SwMI MM, the created temporary migration profile created does not equal the received original SS-migration profile. The contents of the created temporary SS-migration profile are sent to the home SwMI MM; or

- creation of the SS-migration profile failed: the creation of the SS-migration profile failed. If the SS-migration profile is needed for the supplementary service, the corresponding information in the SS-profile update_resp shall indicate that the supplementary service is not supported for the individual subscriber or for the group;

- conditionally: SS-ISI-PROFILE, if the "SS-profile response status" has the value "Original SS-migration profile redefined, contents sent to the home SwMI MM". Shall indicate the used temporary SS-migration profile. The element shall contain the ISI profile as defined for the indicated supplementary service in the corresponding sub-part of ETSI EN/ETS 300 392-12 [4];

NOTE 2: The rules to return a particular temporary SS-migration profile, if created, is supplementary service dependant and is defined in each supplementary service description, see ETSI EN/ETS 300 392-12 [4].

SS-migration profile response element shall be repeated; there shall be as many SS-migration profile response elements in the SS-profile update_resp as there were SS-migration profile request elements in the SS-profile update_ind;

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM shall become idle.

Upon receipt of the SS-profile update_conf (containing the same information as the corresponding SS-profile update_resp) from ANF-ISIMM, the home SwMI MM shall verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the sent SS-profile update_req.

NOTE 3: The de-registration service as defined in clause 9 may be used to de-register the migrated individual subscriber e.g. if the profile update service fails.

Then, if received, the home SwMI MM may save the temporary SS-basic migration profile(s) in the I-HDB or the G-HDB. The saving and use of the temporary SS-migration profile(s) is optional in the home SwMI.

Then, the home SwMI MM shall become idle.

11.5 Exceptional operation

This clause defines the exceptional procedures that shall be applied if the normal operation of the SS-profile update service fails. These exceptional procedures may be overridden by exceptional procedures that are included in an additional agreement which is made between the SwMI operators, see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional procedures that are applied within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked or continued over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

Generally, if the SS-profile update_resp and the SS-profile update_conf have been exchanged between the home and the visited SwMI MMs the database updates shall be completed as defined under normal operation. However, if the service fails before the exchange of the SS-profile update_resp and the SS-profile update_conf the following shall take place:

- the service related database actions shall be cancelled in the I-VDB and I-HDB (if the service is invoked against an ISSI) or in the G-VDB and G-HDB (if the service is invoked against a GSSI); and

- the visited SwMI MM shall send the SS-profile reject_req to the ANF-ISIMM which shall deliver the corresponding SS-profile reject_ind to the home SwMI MM, if possible.

The SS-profile reject_req (and the corresponding SS-profile reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received SS-profile update_ind;

b) ISSI or GSSI;

c) profile rejection cause, which shall be one of the following:

- unknown subscriber;
- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI;
- temporary error;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- failed migration profile reception; or
- SS-migration profile not applicable, if the SS-migration profile is not applicable for the particular supplementary service. Applicable for the SS-profile reject_req and SS-profile reject_ind; and

d) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The home SwMI MM shall re-invoke the service until successfully completed.

11.6 Dynamic description

Figure 15 contains the dynamic description of the SS-profile update service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the SS-profile update service:

- SS-profile update reject_req and SS-profile update reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the individual subscriber's or group's SS-migration profile(s);
- SS-profile update_req and SS-profile update_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide the visited SwMI MM with the individual subscriber's or group's SS-migration profile(s); and
- SS-profile update_resp and SS-profile update_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the individual subscriber's or group's SS-migration profile(s) and may be used to provide the home SwMI MM with the temporary SS-migration profile(s).

The following states shall be used for ANF-ISIMM SS-profile update services:

- INVOKED: SS-profile update service invoked;
- OPERATING: SS-profile update service operation is in progress.

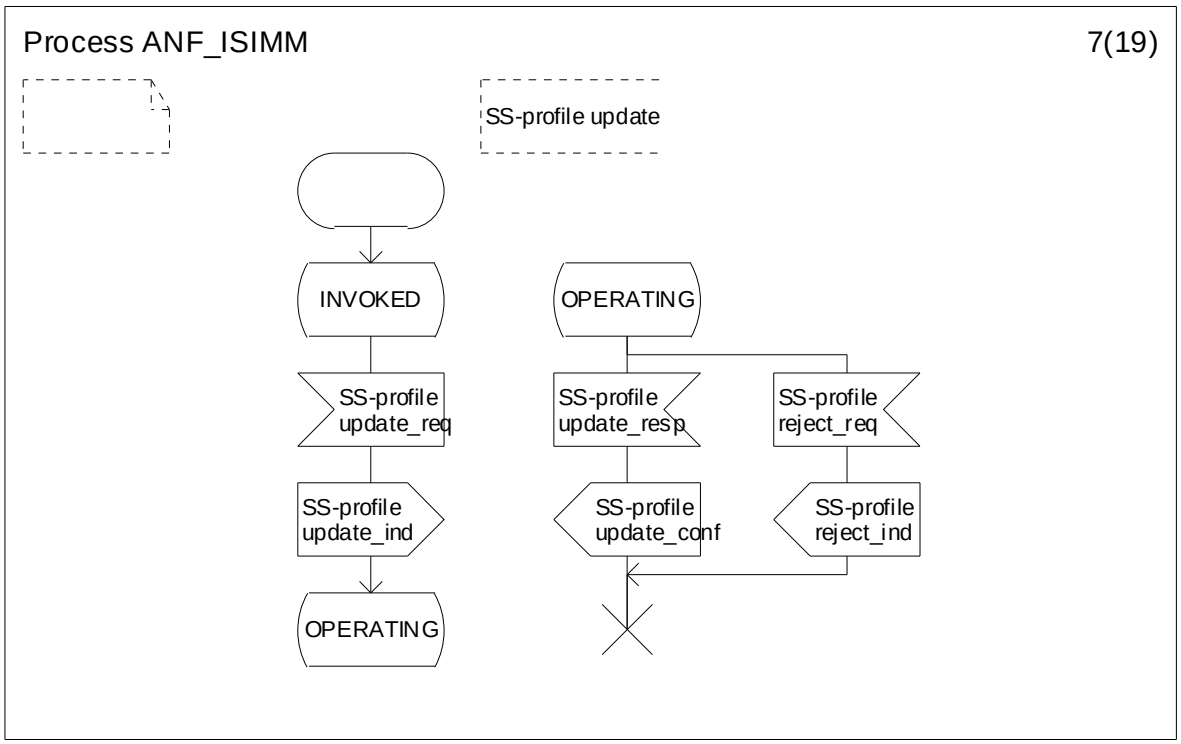


Figure 15: ANF-ISIMM SS-profile update service

12 Authentication service description - stage 1

12.1 Pre-requisite requirements for the authentication service

As a pre-requisite for the authentication service as provided by ANF-ISIMM the second stage algorithms TA12 and TA22, see ETSI EN 300 392-7 [5], clause 4.1.4, shall be common for the migrating individual subscriber and for the visited SwMI. The use of algorithm TA101, see ETSI EN 300 392-7 [5], clauses 4.1.7, 4.1.8 and 4.1.9 is optional for the MS and the home SwMI.

In addition, for the assignment of the DCK, which may be assigned in conjunction with the authentication, the algorithm TB4, see ETSI EN 300 392-7 [5], clause 4.2.1, shall be common for the migrating individual subscriber and for the visited SwMI. For the successful generation of the Modified GCK (MGCK) from the GCK and CCK, which may be assigned in conjunction with the authentication, the algorithm TA71, see ETSI EN 300 392-7 [5], clause 4.2.2, shall be common for the migrating individual subscriber and for the visited SwMI.

12.2 Service definition

The authentication service enables the visited SwMI MM to authenticate the migrated individual subscriber and/or the migrated individual subscriber to authenticate the home SwMI MM.

NOTE: As the original authentication parameters are provided by the home SwMI MM it is considered to be the authenticated SwMI MM.

12.3 Service description

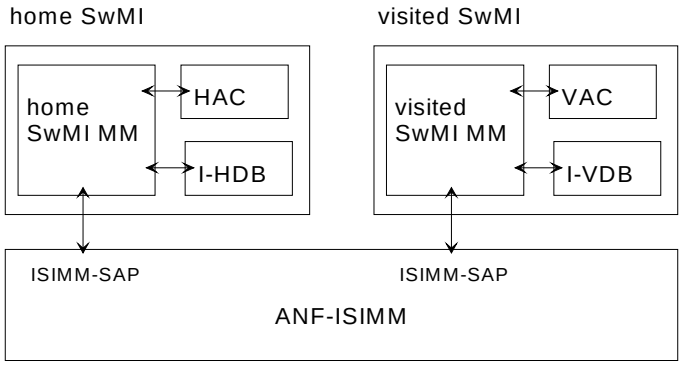
The authentication service is an optional service for SwMI MMs that support ANF-ISIMM. If supported, it shall be as defined in the present document.

The authentication service shall enable the visited SwMI MM to fetch the session authentication key parameters from the home SwMI MM. The parameters are the Session authentication Keys for a visited network (KSv, KSv'), the Random Seed (RS) and their validity time.

The visited SwMI MM shall use the parameters to authenticate the individual subscriber, to allow the individual subscriber to authenticate the home SwMI MM or both. In addition, the parameters may be used to assign the Derived Cipher Key (DCK), Common Cipher Key (CCK) and the Group Cipher Key (GCK), which are generated in the visited SwMI, to the migrated individual subscriber, see ETSI EN 300 392-7 [5], clause 4.

12.4 Service architecture

Figure 16 illustrates the service architecture of the authentication service.



NOTE 1: The arrows illustrate the information exchange routes of the service.
NOTE 2: The HAC and the VAC may also be located outside the home SwMI and the visited SwMI, respectively; however, the home SwMI MM and the visited SwMI MM shall have access to these databases as illustrated in the figure.

Figure 16: The service architecture of the authentication service

12.5 Normal procedures

12.5.1 Invocation

12.5.1.1 Invocation criteria

ANF-ISIMM shall be invoked when a request for authentication has been initiated in a visited SwMI MM in the following case, hence known as case 1):

- if the migrated individual subscriber's valid session authentication key parameters are not available in the visited SwMI MM; and
- if the individual subscriber is migrating or is migrated in the visited SwMI MM, i.e. if the individual subscriber's registration status is "registered, migrated" or "registered, restricted migration" in the I-VDB in the visited SwMI MM.

In addition, ANF-ISIMM may be invoked in the following case, hence known as case 2):

- if the individual subscriber's authentication has been carried out using the previously fetched session authentication key parameters as defined in ETSI EN 300 392-7 [5] clause 4, and the authentication has been successfully completed; and

NOTE: If the authentication fails, the actions are as defined in clause 8.4.

- if the individual subscriber's registration status is "registered, migrated" or "registered, restricted migration" in the I-VDB in the visited SwMI MM.

12.5.1.2 Invocation of ANF-ISIMM

If the invocation criteria as defined in case 1) is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing Authentication demand_req. The Authentication demand_req shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;

b) ISSI;

c) MNI of the individual subscriber;

d) MNI of the visited SwMI MM; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the invocation criteria as defined in case 2) is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing Authentication result_req. The Authentication result_req shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;

b) ISSI;

c) MNI of the individual subscriber;

d) MNI of the visited SwMI MM; and

e) authentication type, which shall be one of the following:

- "ITSI authenticated";
- "SwMI authenticated"; or
- "ITSI and SwMI authenticated";

f) Subsequent/Original use of parameters: Shall indicate that the authentication has been carried out with the subsequently fetched session authentication key parameters and shall have the value: "Subsequent use";

g) conditionally: MNI (of the subscriber);

h) conditionally: MNI (of the visited SwMI MM);

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

After sending the Authentication result_req the visited SwMI MM shall become idle. Upon receipt of the Authentication result_ind (containing the same information as the corresponding Authentication result_req) from ANF-ISIMM, the home SwMI MM shall become idle.

12.5.2 Operation

12.5.2.0 General

This clause is valid for case 1).

12.5.2.1 Exchange of authentication parameters

Upon receipt of the Authentication demand_ind (containing the same information as the corresponding Authentication demand_req) from the ANF-ISIMM, the home SwMI MM shall verify that according to the I-HDB:

- the individual subscriber is recorded as "registered, migrated" or "registered, restricted migration"; and
- the location information (the MNI of the visited SwMI MM and, if included, the PISN number of the visited SwMI MM) points to the invoking visited SwMI MM.

If the above mentioned is true, the home SwMI MM shall record the ANF-ISIMM invoke id, fetch the session authentication key parameters from the collocated HAC and send the Authentication response_req to ANF-ISIMM.

The Authentication response_req shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Authentication demand_ind;

b) ISSI;

c) KSv: shall be used as input for the algorithm TA12 in the visited SwMI;

d) RS: shall be used as input for the algorithm TA11 and/or TA21 in the migrating MS;

e) KSv': shall be used as input for the algorithm TA22 in the visited SwMI;

f) validity time type: shall define the maximum length of the time the KSv, the RS and the KSv' may be used in the visited SwMI. The value shall be one of the following: "Once", "Hours", "Days", "Weeks" and "No limit", see also Validity time;

g) conditionally: validity time: shall be present if the value of the Validity time type is "Hours", "Days" or "Weeks". It shall be used to define the number of hours, days or weeks corresponding to the value of the Validity time type. The value shall be a number from 1 to 32; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the Authentication response_ind (containing the same information as the corresponding Authentication response_req), the visited SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the visited SwMI MM shall authenticate the individual subscriber and/or allow the individual subscriber to authenticate the home SwMI MM as defined in ETSI EN 300 392-7 [5], clause 4. In addition, the visited SwMI MM shall save the visited session authentication key parameters to the collocated VAC as indicated by the received validity time, or the visited SwMI MM shall define for its own purposes a shorter validity time than the received validity time.

12.5.2.2 Sending of authentication result

When the authentication of the individual subscriber's and/or of the home SwMI is completed in the visited SwMI, the visited SwMI MM shall send the Authentication result_req to ANF-ISIMM.

The Authentication result_req shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Authentication demand_req;

b) ISSI;

c) authentication type, which shall be one of the following:

- "ITSI authenticated";
- "SwMI authenticated"; or
- "ITSI and SwMI authenticated";

d) Subsequent/Original use of parameters: Shall indicate that the authentication has been carried out with the session authentication key parameters that are fetched as part of the service operation and shall have the value: "Original use"; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

After sending the Authentication result_req the visited SwMI shall become idle. Upon receipt of the Authentication result_ind (containing the same information as the corresponding Authentication result_req) from ANF-ISIMM, the home SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the home SwMI MM shall become idle.

12.6 Exceptional procedures

12.6.0 General

This clause defines the exceptional procedures that shall be applied if the normal operation of the authentication service fails. These exceptional procedures may be overridden by an additional agreement between the SwMI operators (that cover the exceptional situation), see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM if the service cannot be invoked over the ISI, if the service cannot be continued or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM etc.

NOTE 3: Clause 12.7.2 defines the exceptional procedures if the authentication is invoked in conjunction with the migration or the restricted migration services and the authentication fails.

Generally, if the Authentication result_req and the Authentication result_ind have been exchanged between the home and the visited SwMI MMs the database updates and the AI actions shall be completed as defined under normal operation. However, if the service fails before the exchange the Authentication result_req and the Authentication result_ind the following shall take place:

- the Auth reject_req and the Auth reject_ind shall be exchanged between the home and the visited SwMI MMs, if possible; and
- the database updates as defined under normal operation shall be cancelled in the VAC and in the HAC.

The Auth reject_req (and the corresponding Auth reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: If this primitive does not invoke a new ANF-ISIMM service instance, the value shall be the same as in the Authentication demand_req and the Authentication demand_ind, otherwise the visited SwMI MM shall allocate a unique value to be used;

b) ISSI;

c) authentication rejection cause:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown subscriber;
- unknown SwMI;
- temporary error;
- service not supported;
- ITSI authentication failed;
- SwMI authentication failed;
- SwMI and ITSI authentication failed;
- acceptable number of authentication parameter requests failed, detected by home SwMI; or
- obsolete authentication parameters; and

d) Original/Subsequent use of parameters: Shall define original/subsequent use of parameters if the Authentication rejection cause is "ITSI authentication failed", "SwMI authentication failed" or "SwMI and ITSI authentication failed", otherwise the element shall be set to value "Original";

e) conditionally: MNI of the individual subscriber, shall be present if the value of the Original/Subsequent use of parameters is "Subsequent use", otherwise shall be omitted;

f) conditionally: MNI of the visited SwMI MM, shall be present if the value of the Original/Subsequent use of parameters is "Subsequent use", otherwise shall be omitted; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM may re-invoke the authentication service as defined under normal operation several times in order to (try to) complete the authentication service successfully. If the service is not re-invoked or if the re-invocations are not successful, the following shall take place:

- the visited SwMI MM shall reject the individual subscriber's migration in the AI as defined in ETSI EN 300 392-2 [1], clause 16;
- de-register the individual subscriber as defined in clause 9 if he is migrated; and
- the registration status shall be updated as "De-registered, migration rejected" in the I-HDB and the I-VDB record shall be removed.

If a temporary failure has caused the authentication service to fail the IDR service should be invoked as described in clause 14 to ensure that the concerned I-VDBs and I-HDBs are consistent.

NOTE 4: The invocation of the IDR service is especially needed if the individual subscribers have been de-registered in the visited SwMI MM without contacting the home SwMI, e.g. during a temporary failure situation that has affected the link between the home and the visited SwMI MMs.

12.6.1 Detected by the visited SwMI MM

Upon receipt of the Authenticate response_ind, if the visited SwMI MM detects an unrecoverable error in the received parameters or if the authentication fails in the AI, the authentication may be re-invoked over the ISI. In addition, if the authentication fails in the AI, it may be re-invoked several times. However, if the possible re-invocation(s) does not result in successful authentication, the authentication shall be rejected as defined in clause 12.6.

12.6.2 Detected by the home SwMI MM

Upon receipt of the Authenticate demand_ind, if the home SwMI MM cannot support the authentication service or detects an unrecoverable error in the received parameters the home SwMI MM shall reject the service as defined in clause 12.6.

Upon receipt of the Authentication result_ind, if the home SwMI MM detects an error it shall discard the received primitive.

12.7 Interaction with migration and restricted migration

12.7.1 Normal operation

If the visited SwMI MM authenticates the migrating individual subscriber the authentication service should be carried out in conjunction with the migration or restricted migration service as described in clauses 6 and 7, respectively. Thus, the visited SwMI MM shall send the Authentication demand_req and the Migration_req simultaneously to ANF-ISIMM. In addition, the Migration_req shall contain the following information:

- in case of migration:

  a) authentication invocation, which shall be "Invoked". The information shall indicate that the authentication service is invoked on the migrating individual subscriber; and

- in case of restricted migration:

  b) authentication invocation, which shall be "Invoked". The information shall indicate that the authentication service is invoked on the migrating individual subscriber.

Upon receipt of the Migration_ind containing the information that the authentication service is carried out with the migration or restricted migration service, the home SwMI MM shall record the information. Then, the home SwMI MM shall neither update the individual subscriber's I-HDB record nor send the Migration_resp until it has received the Authentication result_ind indicating that the authentication has been successfully carried out.

NOTE: The home SwMI MM waits for the Authentication result_ind in order to avoid updating the individual subscriber information and/or granting the migration in the case of a malicious individual subscriber.

12.7.2 Exceptional procedures

If the authentication is invoked in conjunction with the migration or the restricted migration service, and the authentication fails, the following shall take place:

- the visited SwMI MM shall reject the individual subscriber's migration in the AI as defined in ETSI EN 300 392-2 [1], clause 16;
- the visited SwMI MM shall send the Auth reject_req and the Migration reject_req to the ANF-ISIMM and remove the individual subscriber's I-VDB record; and
- upon receipt of the corresponding Auth reject_ind and Migration reject_ind, the home SwMI MM should initiate an authentication check at the previously visited SwMI. Upon receipt of the corresponding Auth reject_ind the home SwMI MM shall update the individual subscriber's registration status as "De-registered, migration rejected" in the I-HDB.

The Auth reject_req shall contain the information as defined in clause 12.6. The Migration reject_req shall contain the information in the case of migration service or in the case of restricted migration service as defined in clause 6.6 or clause 7.6, respectively, except that:

- the Migration rejection cause shall be "Authentication failed"; and
- the RSI service shall not be invoked as it is likely that the migrating individual subscriber is not subscribed to the ITSI he claims to be.

12.8 Dynamic description

Figure 17 contains the dynamic description of the authentication service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the home SwMI; and
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the authentication service:

- authentication demand_req and Authentication demand_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to request individual subscriber's authentication parameters;
- authentication response_req and Authentication response_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide individual subscriber's authentication parameters;
- authentication result_req and Authentication result_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate that the individual subscriber's authentication was successful;
- auth reject_req and Auth reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate that the individual subscriber's authentication parameter request or authentication has failed;
- migration reject_req and Migration reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the migration; and
- migration reject_resp and Migration reject_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the rejection of migration when the migration is rejected in the visited SwMI.

The following states shall be used for ANF-ISIMM authentication service:

- AUTH-PARAM-PROVIDED: the authentication result is expected;
- AUTH-PARAM-REQUESTED: the authentication service is in progress;
- IDLE: no authentication in progress;
- INVOKED: the authentication service has been invoked;
- MIGRATION-REJECTION: the migration rejection is expected; and
- MIGRATION-REJECTION-ACK: the response to migration rejection is expected.

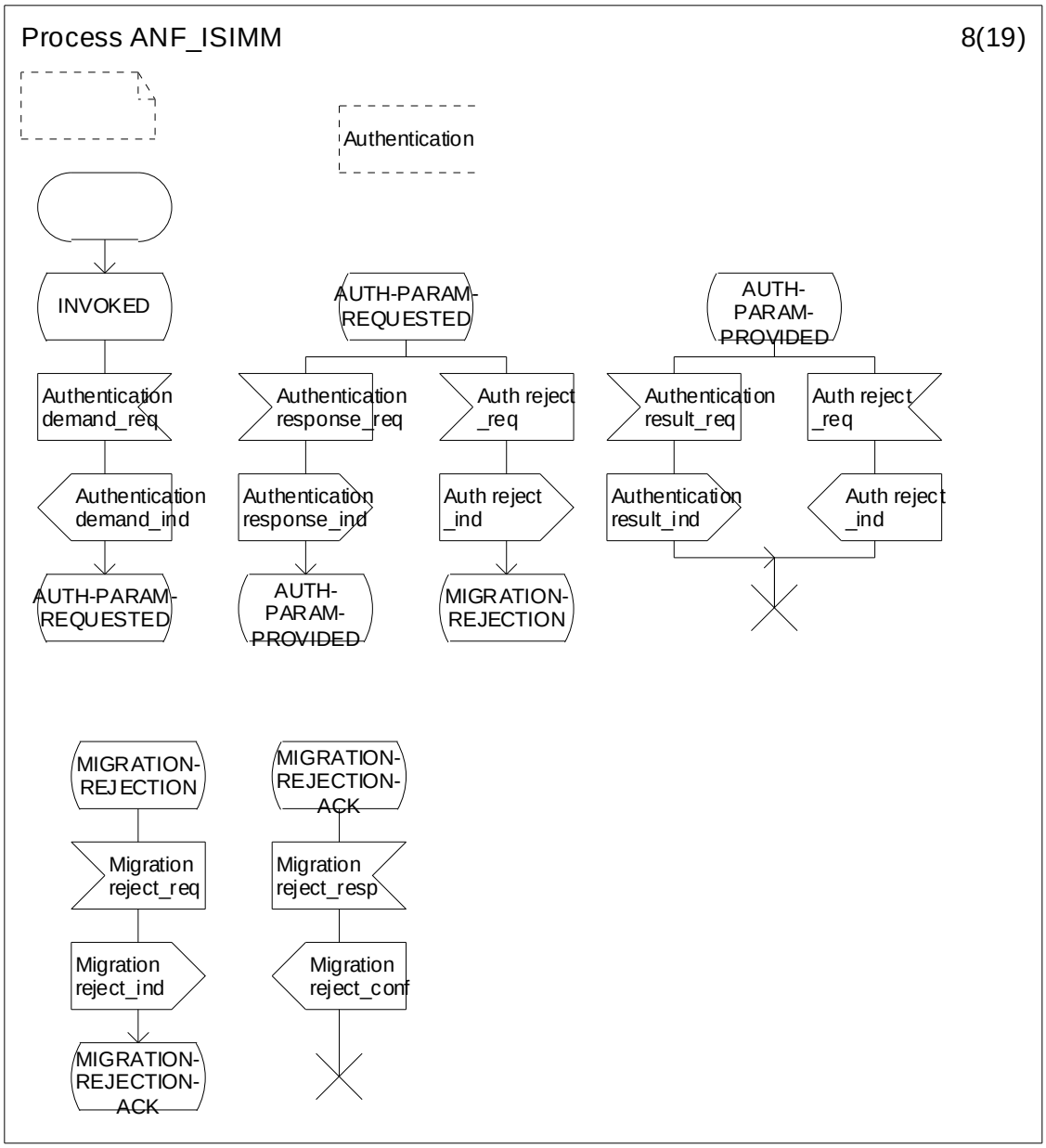


Figure 17: Stage 1 SDL description of ANF-ISIMM authentication service

13 Over The Air Re-keying (OTAR) service description - stage 1

13.1 Pre-requisite requirements

As a pre-requisite for the Static Cipher Key (SCK) generation service, as defined in this clause, the migrated individual subscriber and the visited SwMI shall hold the TA51 and TA52 of the matched algorithm pair, respectively, see ETSI EN 300 392-7 [5], clause 4.2.4. The use of algorithm TA101, see ETSI EN 300 392-7 [5], clause 4.2 and session modification key GCK0 is optional for the MS and the home SwMI.

13.2 Service definition

The OTAR service enables the assignment of the SCK to the migrated individual subscriber. The SCK may be generated in the visited SwMI or in the home SwMI.

13.3 Service description

The OTAR service is an optional service for SwMIs MMs that support ANF-ISIMM. If supported, it shall be as defined in this clause.

The OTAR service shall allow the assignment of SCK(s), GCK(s) and GSKO for a migrated individual subscriber as follows:

- the OTAR generation service:
  - the service shall enable the assignment of SCK(s) that are generated in the visited SwMI. In support of that, the OTAR SCK generation parameters shall be transported from the home SwMI MM to the visited SwMI MM. The parameters shall comprise the Session Key for OTAR (for a visited network KSOv), the Random Seed for OTAR (RSO) and the validity time type (once, hours, days, weeks, no limit) and, if needed, the validity time (number of hours, days or weeks). The parameters may be saved in the VAC in the visited SwMI in order to be used several times. The service shall be invoked by the visited SwMI MM.
- the OTAR SCK delivery service:
  - the service shall enable the assignment of SCK(s) that are generated in the home SwMI. In support of that, the OTAR SCK delivery parameters shall be transported from the home SwMI MM to the visited SwMI MM. The parameters shall comprise the RSO and one or more sets of the Sealed SCK (SSCK), of the SCK Version Number (SCK-VN) and of the SCK Number (SCKN). One parameter set shall enable the assignment of one SCK. The service may be invoked by the home SwMI MM or by the visited SwMI MM.

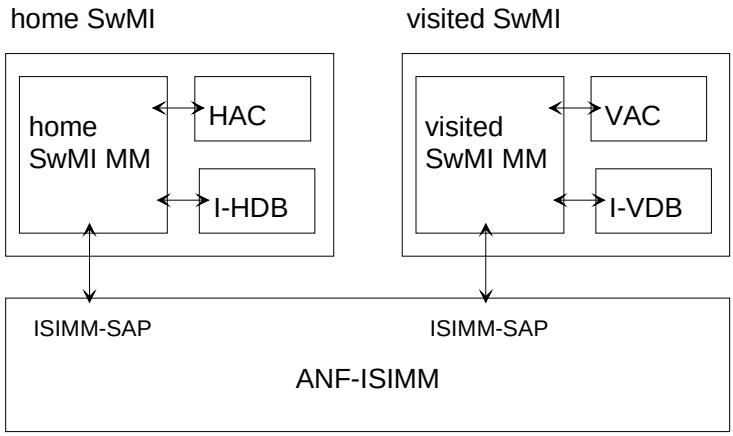
NOTE 1: Normally, if the visited SwMI MM requests the delivery of the SCK which is provided by the home SwMI MM the request originates from the migrated individual subscriber.

NOTE 2: The SCK that is assigned using the OTAR SCK delivery service cannot be used in the visited SwMI as the key is transported in sealed form to the migrated individual subscribers.

NOTE 3: GCK and GSKO used by a SwMI may be provided to the MS by that SwMI only, and is not provided to the visited MS via the ISI from the home SwMI.

13.4 Service architecture

Figure 18 illustrates the service architecture of the OTAR service.



NOTE 1: The arrows illustrate the information exchange routes of the service.
NOTE 2: The HAC and the VAC may also be located outside the home SwMI and the visited SwMI, respectively; however, the home SwMI MM and the visited SwMI MM shall have access to these databases as illustrated in the figure.

Figure 18: The service architecture of the OTAR service

13.5 Normal procedures

13.5.1 Invocation

13.5.1.1 Invocation criteria

ANF-ISIMM shall be invoked if the following conditions are met:

- if the request for OTAR invocation has been received by the SwMI MM; and
- if one of the following cases is valid:
  - if the invocation of the OTAR SCK generation service is requested in the visited SwMI MM in order to obtain the OTAR SCK generation parameters for the migrated individual subscriber; and
  - if the individual subscriber's registration status in the I-VDB record is either "registered, migrated" or "registered, restricted migration";
  - if the invocation of the OTAR SCK delivery service is requested in the visited SwMI MM in order to obtain the OTAR SCK delivery parameters for the migrated individual subscriber; and
  - if the individual subscriber's registration status in the I-VDB record is "registered, migrated";
  - if the invocation of the OTAR SCK delivery service is requested in the home SwMI MM in order to deliver the OTAR SCK delivery parameters for the migrated individual subscriber; and
  - if the individual subscriber's registration status in the I-HDB record is "registered, migrated";
- in addition, ANF-ISIMM may be invoked in the following case:
  - if the previously fetched OTAR SCK generation parameters (as defined in case 1)) have been subsequently used by the visited SwMI MM to assign a SCK to a migrated individual subscriber as defined in ETSI EN 300 392-7 [5], clause 5 or 6;
  - if the SCK assignment has been successfully completed; and
  - if the individual subscriber's registration status in the I-VDB record is either "registered, migrated" or "registered, restricted migration".

NOTE: The case of an unsuccessful subsequent use of OTAR SCK generation parameters as well as other unsuccessful cases are defined in clause 13.6.

13.5.1.2 Invocation of ANF-ISIMM

13.5.1.2.1 Case 1)

If the invocation criteria as defined in case 1) is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing the OTAR-param demand_req. The OTAR-param demand_req shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;

b) ISSI;

c) MNI of the individual subscriber;

d) MNI of the visited SwMI MM; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

13.5.1.2.2 Case 2)

If the invocation criteria as defined in case 2) is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing the OTAR-key demand_req. The OTAR-key demand_req shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;

b) ISSI;

c) MNI of the individual subscriber;

d) MNI of the visited SwMI MM;

e) number of SCKs requested: shall indicate the number of SCKs expected to be provided. The value shall be a number from 1 to 4;

f) SCKN(s): shall indicate the position of the SCK in the SCK set. The value shall be repeated as many times as indicated by the value of the Number of SCKs requested. Each SCKN shall be a number from 1 to 32; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

13.5.1.2.3 Case 3)

If the invocation criteria as defined in case 3) is met, the home SwMI MM shall invoke ANF-ISIMM by issuing the OTAR-key provide_req. The OTAR-key provide_req shall contain the following information:

a) ANF-ISIMM invoke id: the home SwMI MM shall allocate a unique value to be used during the invocation and the operation of the service;

b) ISSI;

c) Random Seed for OTAR (RSO): shall be used as input for the Session Key for OTAR for a visited network (KSOv) generation. The value shall be an 80 bit number;

d) number of SCKs provided: shall indicate the number of provided SCKs. The value shall be a number from 1 to 4;

e) SCKN(s): the SCKN shall indicate the position of the SCK in the SCK set. The SCKN shall be a number from 1 to 32;

f) SCK Version Numbers (SCK-VN(s)): the SCK-VN shall identify the version of the SCK. The value shall be a 16 bit number;

g) Sealed keys (SSCK(s)): the SSCK shall be the result of the application of TA51 to SCK, SCK-VN, KSO and SCKN. The value shall be a bit string of 120 bits;

h) Home/Visited SwMI MM initiated: shall indicate that the OTAR SCK delivery service has been initiated by the home SwMI MM and shall have the value "Home SwMI MM initiated";

i) conditionally: MNI of the individual subscriber;

j) conditionally: MNI of the visited SwMI MM; and

k) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The SCKN, the SCK-VN and the SSCK shall appear in conjunction and as many times as indicated by the Number of SCKs provided.

13.5.1.2.4 Case 4)

If the invocation criteria as defined in case 4) is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing the OTAR-param result_req. The OTAR-param result_req shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value;

b) ISSI;

c) SCKN(s): the SCKN shall indicate the position of the SCK in the SCK set. Each SCKN shall be a number from 1 to 32;

d) Original/Subsequent use of parameters: shall indicate that the OTAR has been carried out with the subsequently fetched OTAR SCK generation parameters and shall have the value: "Subsequent use";

e) conditionally: MNI of the individual subscriber;

f) conditionally: MNI of the visited SwMI MM; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

13.5.2 Operation

13.5.2.1 Case 1)

Upon receipt of the OTAR-param demand_ind (containing the same information as the corresponding OTAR-param demand_req) from the ANF-ISIMM, the home SwMI MM shall verify that according to the I-HDB:

- the individual subscriber's registration status "registered, migrated" or "registered, restricted migration"; and
- the location information (the MNI of the visited SwMI MM and, if included, the PISN number of the visited SwMI MM) points to the invoking visited SwMI MM.

Then, the home SwMI MM shall record the ANF-ISIMM invoke id, fetch the OTAR SCK generation parameters from the HAC and send the OTAR param provide_req to ANF-ISIMM with the following parameters:

a) ANF-ISIMM invoke id: the value shall be the same as in the received OTAR-param demand_ind;

b) ISSI;

c) KSOv: shall be used for the generation of SSCK in the visited SwMI;

d) RSO: shall be used as input for the KSOv generation (in the MS). The value shall be an 80 bit number;

e) validity time type: shall indicate with the Validity time the maximum length of the time the KSO and the RSO may be used in the visited SwMI. The value shall be one of the following: "Once", "Hours", "Days", "Weeks" and "No limit";

f) conditionally: validity time: shall be present if the value of the Validity time type is "Hours", "Days" or "Weeks"; shall be used to define the number of hours, days or weeks in the Validity time type information. The value shall be a number from 1 to 32; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the OTAR-param provide_ind (containing the same information as the corresponding OTAR-param provide_req) from ANF-ISIMM, the visited SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the visited SwMI MM shall generate and assign the SCK to the individual subscriber as defined in ETSI EN 300 392-7 [5], clause 4. In addition, the visited SwMI MM shall save the received OTAR SCK generation parameters in the VAC for the received validity time, or the visited SwMI MM shall define for its own purposes a shorter validity time than the received validity time. Then, the visited SwMI MM shall send the OTAR-param result_req to ANF-ISIMM with the following parameters:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent OTAR-param demand_req;

b) ISSI;

c) Original/Subsequent use of parameters: shall indicate that the OTAR has been carried out with the OTAR SCK generation parameters that are fetched as part of the service operation and shall have the value: "Original use"; and

d) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the OTAR-param result_ind (containing the same information as the corresponding OTAR-param result_req) from ANF-ISIMM, the home SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the home SwMI MM shall become idle, and the visited SwMI MM shall become idle.

13.5.2.2 Case 2)

Upon receipt of the OTAR-key demand_ind (containing the same information as the corresponding OTAR-key demand_req) from the ANF-ISIMM, the home SwMI MM shall verify that according to the I-HDB the individual subscriber's:

- registration status is "registered, migrated"; and
- the location information (the MNI of the visited SwMI MM and, if included, the PISN number of the visited SwMI MM) points to the invoking visited SwMI MM.

Then, then home SwMI MM shall record the ANF-ISIMM invoke id and fetch the OTAR SCK delivery parameters from the HAC and send the OTAR key provide_req to ANF-ISIMM with the following parameters:

a) ANF-ISIMM invoke id: the value shall be the same as in the received OTAR-key demand_ind;

b) ISSI;

c) Random Seed for OTAR (RSO): shall be used as input for the Session Key for OTAR for a visited network (KSOv) generation. The value shall be an 80 bit number;

d) number of SCKs provided: shall indicate the number of provided SCKs. The value shall be a number from 1 to 4;

e) SCKN(s): the SCKN shall indicate the position of the SCK in the SCK set. Each SCKN shall be a number from 1 to 32;

f) SCK Version Numbers (SCK-VN(s)): the SCK-VN shall identify the version of the SCK. The value shall be a 16 bit number;

g) Sealed keys (SSCK(s)): the SSCK shall be the result of the application of TA51 to SCK, SCK-VN, KSO and SCKN. The value shall be a bit string of 120 bits;

h) Home/Visited SwMI MM initiated: shall indicate that the OTAR SCK delivery service has been initiated by the visited SwMI MM and shall have the value "Visited SwMI MM initiated"; and

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The SCKN, the SCK-VN and the SSCK shall appear in conjunction and as many times as indicated by the Number of SCKs provided.

Upon receipt of the OTAR-key provide_ind (containing the same information as the corresponding OTAR-key provide_req) from ANF-ISIMM, the visited SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the visited SwMI MM shall assign the SCK to the individual subscriber as defined in ETSI EN 300 392-7 [5], clause 4. In addition, the visited SwMI MM shall send the OTAR-key result_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent OTAR-key demand_req; and

b) ISSI;

c) number of SCKs requested;

d) SCK number and result; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the OTAR-key result_ind (containing the same information as the corresponding OTAR-key result_req) from ANF-ISIMM, the home SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the home SwMI MM shall become idle, and the visited SwMI MM shall become idle.

13.5.2.3 Case 3)

Upon receipt of the OTAR-key provide_ind (containing the same information as the corresponding OTAR-key provide_req) from ANF-ISIMM, the visited SwMI MM shall verify that the individual subscriber's registration status in the I-VDB is "registered, migrated". Then, the visited SwMI MM shall assign the SCK to the individual subscriber as defined in ETSI EN 300 392-7 [5], clause 4. Then, the visited SwMI MM shall send the OTAR-key result_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received OTAR-key provide_ind;

b) ISSI;

c) number of SCKs requested;

d) SCK number and result; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the OTAR-key result_ind (containing the same information as the corresponding OTAR-key result_req) from ANF-ISIMM, the home SwMI MM shall verify that the ANF-ISIMM invoke id is correct. Then, the home SwMI MM shall become idle, and the visited SwMI MM shall become idle.

13.5.2.4 Case 4)

Upon receipt of the OTAR-param result_ind (containing the same information as the corresponding OTAR-param result_req) from ANF-ISIMM, the home SwMI MM may save the result. Then, the home SwMI MM shall become idle, and the visited SwMI MM shall become idle.

13.6 Exceptional procedures

13.6.0 General

This clause defines the exceptional procedures that shall be applied if the normal operation of the OTAR service fails. However, in the case of OTAR delivery service, if the assignment of one or more SCKs fail in the AI the rejection shall be reported as part of normal operation, i.e. using the OTAR-key result_req (and the corresponding OTAR-key result_ind) which shall indicate the rejected SCKN(s) of the rejected key(s).

The exceptional procedures as defined in this clause may be overridden by an additional agreement between the SwMI operators (that cover the exceptional situation), see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM if the service cannot be invoked over the ISI, if the service cannot be continued or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM.

Generally, if the OTAR-param result_req and the OTAR-param result_ind or the OTAR-key result_req and the OTAR-key result_ind have been exchanged between the home and the visited SwMI MMs the database updates and the AI actions as defined under normal operation shall be completed. However, if the service fails before the exchange the OTAR-param result_req and the OTAR-param result_ind or the OTAR-key result_req and the OTAR-key result_ind the following shall take place:

- in the case of OTAR generation service the OTAR-param reject_req and the OTAR-param reject_ind shall be exchanged between the home and the visited SwMI MMs, if possible; or
- in the case of OTAR delivery service the OTAR-key reject_req and the OTAR-key reject_ind shall be exchanged between the home and the visited SwMI MMs, if possible; and
- the database updates as defined in clause 13.5 shall be cancelled in the VAC and in the HAC.

The OTAR-param reject_req (and the corresponding OTAR-param reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the OTAR-param demand_req and the OTAR-param demand_req;

b) ISSI;

c) OTAR SCK param rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown subscriber;
- unknown SwMI;
- temporary error;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- assignment fails in the air i/f;
- subscriber not reachable; or
- obsolete OTAR SCK generation service parameters; and

d) SCK number (SCKN);

e) Original/Subsequent use of parameters: shall be either "Original use" or "Subsequent use" as applicable;

f) conditionally: MNI of the individual subscriber, if the Original/Subsequent use of parameters has the value "Subsequent use";

g) conditionally: MNI of the visited SwMI MM, if the Original/Subsequent use of parameters has the value "Subsequent use"; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The OTAR-key reject_req (and the corresponding OTAR-key reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the OTAR-key demand_req and the OTAR-key demand_req or in the OTAR-key provide_req and the OTAR-key provide_req;

b) ISSI;

c) OTAR SCK key rejection cause, which shall be one of the following:

- unknown subscriber;
- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI;
- temporary error;
- service not supported, e.g. service not supported for the subscriber, for his fleet;
- assignment fails in the air i/f;
- subscriber not reachable;
- obsolete OTAR SCK key service parameters;
- sealed key failed to decrypt; or
- incorrect SCKN; and

d) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM may re-invoke the service (as defined in cases 1) to 4)) up to two times in order to (try to) complete the service successfully. However, the peer SwMI MM may reject the subsequent requests, e.g. based on its own security policies. If the service is not re-invoked or if the re-invocations are not successful, the related database actions (as defined in clause 13.5) shall be cancelled in HAC and VAC.

13.6.1 Detected by the visited SwMI MM

Upon receipt of the OTAR-param response_ind or the OTAR-key response_ind, if the visited SwMI MM detects an unrecoverable error in the received parameters or if the service fails in the AI, the service may be re-invoked over the ISI. If the possible re-invocation does not result in successful OTAR, the service shall be rejected as defined in clause 13.6.

13.6.2 Detected by the home SwMI MM

Upon receipt of the OTAR-param demand_ind and the OTAR-key demand_ind, if the home SwMI MM cannot support the OTAR service or detects an unrecoverable error in the received parameters the home SwMI MM shall reject the service as defined in clause 13.6.

Upon receipt of the OTAR-param result_ind or the OTAR-key result_ind, if the home SwMI MM detects an error it shall discard the received primitive. If the home SwMI MM has invoked the OTAR key delivery service, the home SwMI MM may re-invoke the service as defined in clause 13.6.

13.7 Dynamic description

Figures 19 and 20 contain the dynamic description of the OTAR SCK generation parameters and OTAR SCK delivery services, respectively, as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the home SwMI; and
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for OTAR:

- OTAR-key reject_req and OTAR-key reject _ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate that the requested OTAR SCK delivery invocation or operation is rejected;
- OTAR-key demand_req and OTAR-key demand_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to request the OTAR SCK delivery from the visited SwMI MM;
- OTAR-key provide_req and OTAR-key provide_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide the visited SwMI MM with the OTAR SCK delivery parameters;
- OTAR-key result_req and OTAR-key result_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate the successful result of the OTAR SCK delivery operation;
- OTAR-param reject _req and OTAR-param reject _ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate that the requested OTAR SCK generation service operation has failed;
- OTAR-param demand_req and OTAR-param demand_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to request OTAR SCK generation parameters;
- OTAR-param provide _req and OTAR-param provide_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate successful result of the OTAR SCK generation parameters operation; and
- OTAR-param result_req and OTAR-param result_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to provide OTAR SCK generation parameters.

The following states shall be used for OTAR service:

- IDLE: no OTAR in progress;
- OTAR-PARAM-REQUESTED: OTAR SCK generation parameters in progress;
- OTAR-PARAM-PROVIDED: OTAR SCK generation parameters result is expected;
- OTAR-KEY-REQUESTED: OTAR SCK delivery in progress;
- OTAR-KEY-PROVIDED: OTAR SCK delivery result is expected.

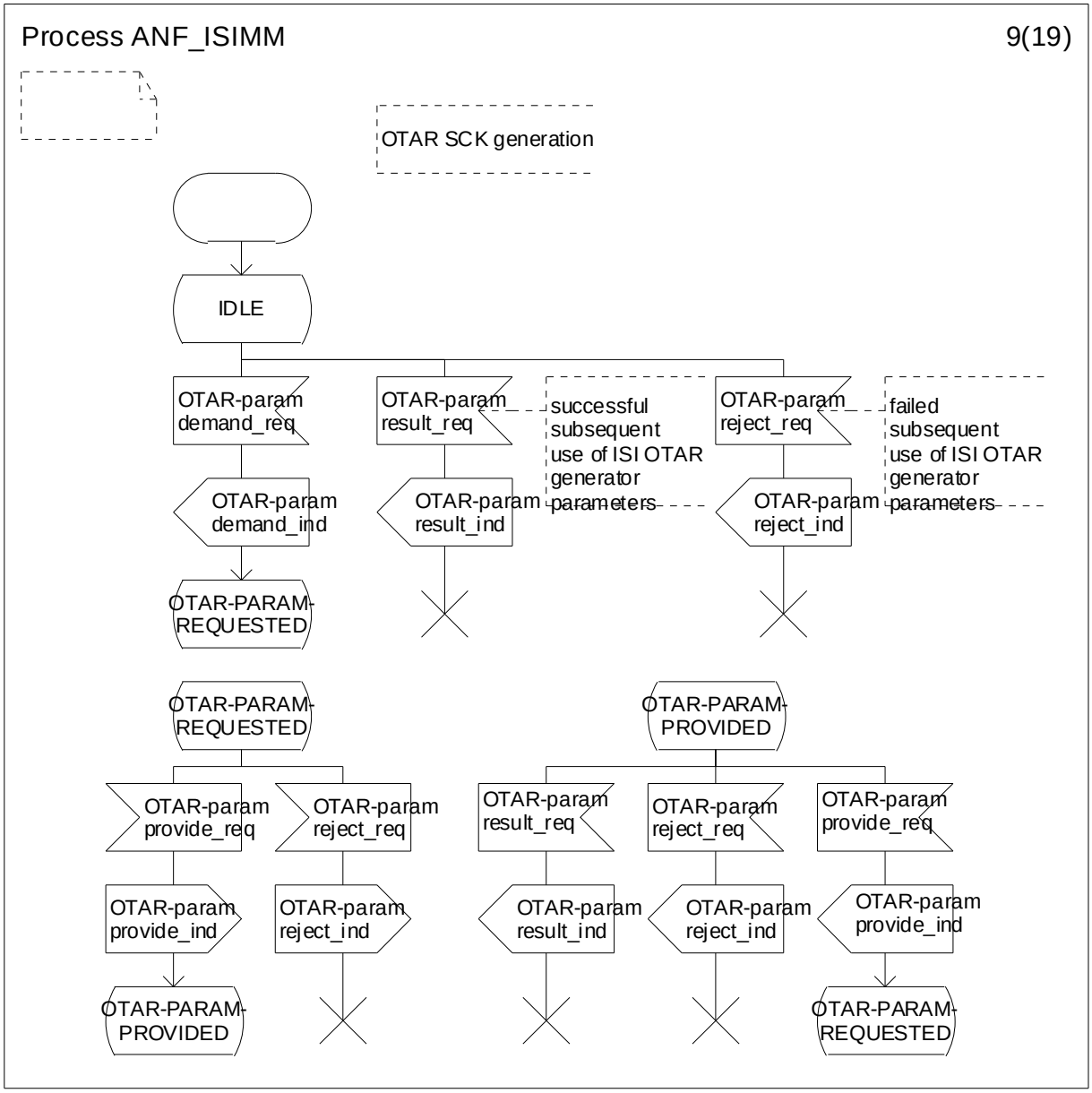


Figure 19: Stage 1 SDL description of ISI OTAR SCK generation service

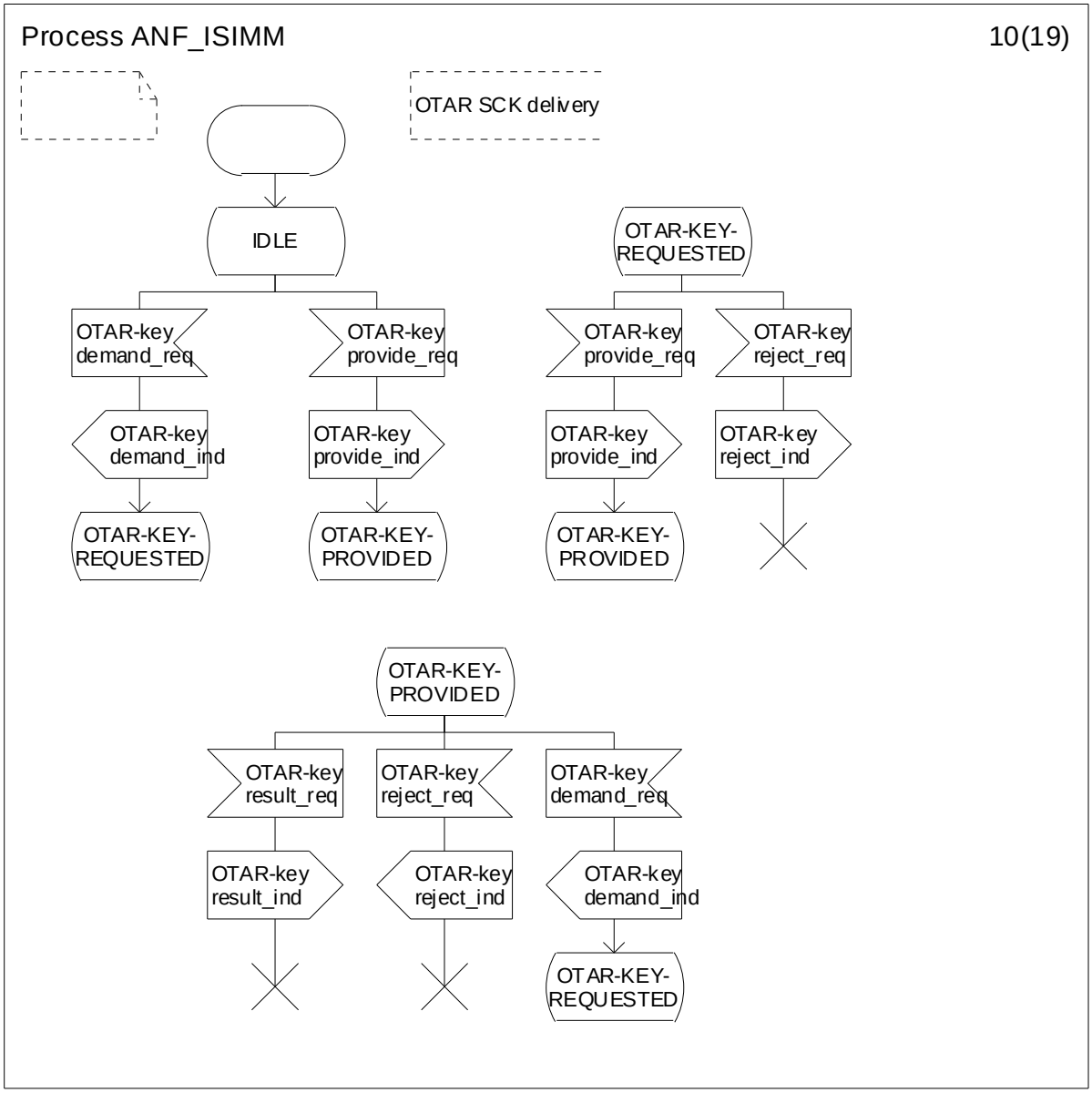


Figure 20: Stage 1 SDL description of ISI OTAR SCK delivery service

14 Individual subscriber Database Recovery (IDR) service description - stage 1

14.1 Service definition

The IDR service enables the recovery of individual subscriber data in databases between SwMIs.

14.2 Service description

The IDR service as defined in this clause is a mandatory service for SwMI MMs that support ANF-ISIMM.

The IDR service shall enable both of the following across the ISI:

- the SwMI MM to recover the inconsistent individual subscriber information in their databases after a faulty situation:
  - the service shall be invoked after a faulty situation which may be a full or partial system, database or connection close-down (crash). It shall be any faulty situation that have affected directly or indirectly the database services so that the individual subscriber information distributed in the databases in the different SwMIs is not correct;
- the SwMI MM the means to verify (e.g. periodically) that the individual subscriber information is consistent in the SwMI databases across the ISI.

The service is defined between two SwMI MMs in this clause. These two SwMI MMs shall be the invoking SwMI MM and the invoked SwMI MM and they shall carry out the service as a collaborating pair. There shall be as many of these pairs as there are SwMI MMs connected to the invoking SwMI MM, unless it is certain that the recovery is not needed across certain ISI(s). From the IDR service point of view the different collaborating pairs operate independently from each other.

The service shall comprise both of the following:

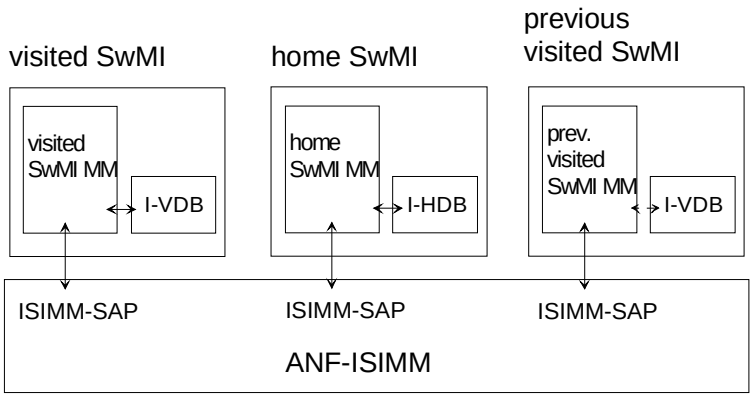
- Home Mobility Management (HMM) recovery: the service recovers the I-HDB, e.g. if it has been affected by a faulty situation. The service also removes the obsolete data related to the individual subscribers from the collocated HAC and G-HDB, if needed;
- Visitor Mobility Management (VMM) recovery: the service recovers the I-VDB, e.g. if it has been affected by a faulty situation. The service also removes the obsolete data related to the individual subscribers from the collocated VAC and G-VDB, if needed.

NOTE: It is possible, that the SwMI MM initiates the HMM and the VMM recovery at the same time. This is needed if both the I-VDB and the I-HDB in the SwMI are affected by the faulty situation.

The service shall apply the migration, the restricted migration and the RSI services as defined in the present document with the amendments as defined in this clause.

14.3 Service architecture

Figure 21 illustrates the service architecture of the IDR service.



NOTE 1: The arrows illustrate the information exchange routes of the service.
NOTE 2: In addition, the following databases may be applicable for the IDR service:
- the G-VDB and the VAC in the visited SwMI and the previous visited SwMI; and
- the G-HDB and the HAC in the home SwMI.

Figure 21: The service architecture of the IDR service

14.4 Normal procedures

14.4.1 Invocation

14.4.1.1 Invocation criteria

The IDR shall be invoked as defined in the following two cases:

1) HMM recovery shall be invoked if both of the following are valid:

   - if there is a need to invoke the service, i.e. if either of the following is valid:

     - if there is a risk that the individual subscriber information saved in the I-HDB is not consistent with the I-VDB in another SwMI; or

     - in order to verify (e.g. periodically) that the individual subscriber information in the I-HDB is consistent with the I-VDB in another SwMI; and

   - if the following I-HDB information is available for each individual subscriber:

     - the individual subscriber numbers to be recovered (ISSIs); and

     - the migration profile(s), basic and SS, of the individual subscriber.

2) VMM recovery shall be invoked if both of the following are valid:

   - if there is a need to invoke the service, i.e. if either of the following is valid:

     - if there is a risk that the individual subscriber information saved in the I-VDB is not consistent with the I-HDB of the home SwMI; or

     - in order to verify (e.g. periodically) that the individual subscriber information saved in the I-VDB is consistent with the I-HDB of the home SwMI; and

   - if the following I-VDB information is available: At least the ITSIs of the visiting individual subscribers and the age stamp information of the original migration or of a newer recorded interaction between the visited SwMI MM and the individual subscriber. Such interaction may be e.g. a periodic registration in the visited SwMI.

As stated before, the IDR service shall be invoked separately between the invoking SwMI MM and every SwMI MMs which share the ISI with the invoking SwMI MM if the above mentioned conditions are met.

14.4.1.2 Invocation of ANF-ISIMM

In case 1) the home SwMI MM shall start the HMM recovery as follows:

- The home SwMI MM shall prepare the I-HDB ready for the HMM recovery. Thus, it shall restore the latest reliable copy of the I-HDB or if such copy is not available the I-HDB records shall be cleared. If the I-HDB records are cleared, they shall be created with the following information: the individual subscriber numbers to be recovered (ISSIs) and the migration profile(s), basic and SS, of the individual subscriber.

NOTE 1: It is assumed that each I-HDB knows its MNI.

NOTE 2: As the back-up copies are normally done in certain intervals it is possible that the latest database updates are not included in the back-up copy of the I-HDB. However, the purpose of the IDR service is to correct such inconsistencies as long as the stated required data is available (e.g. the ISSIs).

- It is assumed that the home SwMI MMs saves the age or the time related to the migration in the collocated I-HDB as part of the migration or restricted migration service as defined in clauses 6 and 7, respectively. However, the home SwMI MM may need to invoke the IDR when its capabilities to retrieve the age information has been affected, and thus, it may not be able to derive the correct age of some or all of the recorded migration acts. However, the home SwMI MM shall be able to provide the following information in the case of HMM recovery:

  - if available, the real age of the migration which has been made in the visited SwMI MM; or

  - if the age of the migration is not reliably available in the home SwMI MM, an age that is "old enough": The "old enough" age shall not be less than the real age, but may be more than the real age if the exact age cannot be determined. If the home SwMI MM is not able to determine the real age the special "maximum age" shall be used. In other words, the "maximum age" shall be used if nothing else is available.

- The home SwMI MM shall invoke ANF-ISIMM by issuing the HMM recovery _req as follows, hence referred as case 1):

  a) ANF-ISIMM invoke id: the home SwMI MM shall allocate a unique value to be used during the invocation and operation of the service;

  b) recovery type: Individual subscriber, i.e. the recovery recovers individual subscriber data (as opposed to group data);

  c) MNI of the invoking SwMI: the MNI of the home SwMI MM;

  d) MNI of the invoked SwMI: the MNI of the visited SwMI MM; and

  e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

In case 2) the visited SwMI MM shall start the VMM recovery as follows:

- The visited SwMI MM shall prepare the I-VDB ready for the VMM recovery by doing all the following actions:

  - the visited SwMI MM shall restore the latest reliable copy of the I-VDB. The copy shall contain at least the following information of the individual subscribers: the ITSIs of the individual subscriber and the age stamp information of the original migration or of a newer interaction between the SwMI MM and the individual subscriber. Such interaction may be e.g. a periodic registration in the visited SwMI; and

- the visited SwMI MM shall make the necessary preparations in order to provide the home SwMI MM with the appropriate age stamp for the recorded migrations and restricted migrations. The visited SwMI MM shall be able to provide the home SwMI MM with the correct age of the migration or the restricted migration. The correct age shall be either:
  - the real age of the migration, the restricted migration or, if available, of the last recorded contact within the SwMI, e.g. registration (location update) that is done in the visited SwMI after the migration; or
  - an age that is "old enough": The "old enough" age shall not be less than the real age, but may be more than the real age if the exact age cannot be determined. If the SwMI MM is not able to determine the real age the special "maximum age" shall be used;
- the age stamp shall not indicate a younger age than the real age as the home SwMI MM uses the age stamp to determine the validity of the virtual migration or restricted migration. I.e. when the SwMI MM receives a Migration_ind it shall compare the age stamp of that indication to the age of the recorded migration (or the restricted migration), if any, in the I-HDB;
- depending on the implementation, the ensuring of the correctness of the age stamp information may be done e.g. in one of the following ways:
  - if absolute time is saved to indicate the age of the actions, that information shall be used as it is recorded; or
  - if relative time is used, it shall be ensured that the needed age difference additions shall be made as applicable to ensure that the age information is either correct or not less than the true age of the actions. Thus, the SwMI MM shall ensure that the duration of the faulty situation is included in the time information. In addition, the length of the interval for saving the back up copies may need to be added to the ages, too, if such back up copy is used and if it is likely that the faulty situation did not start imminently after the back up copy was saved.

- The visited SwMI MM shall invoke ANF-ISIMM by issuing the VMM recovery_req with the following information:

  a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and the operation of the service (carrying out one VMM recovery service);

  b) recovery type: individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group);

  c) MNI of the invoking SwMI: the MNI of the visited SwMI MM;

  d) MNI of the invoked SwMI: the MNI of the home SwMI MM; and

  e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

14.4.2 Operation

14.4.2.0 General

This clause is applicable for cases 1) and 2) unless otherwise stated.

14.4.2.1 The visited SwMI MM receives the HMM recovery indication

This clause is applicable only for case 1).

Upon receipt of the HMM recovery_ind (containing the same information as the corresponding HMM recovery_req) from the ANF-ISIMM, the visited SwMI MM shall record the ANF-ISIMM invoke id and verify that it can support the HMM recovery. If the support is possible, the visited SwMI MM shall send the HMM recovery_resp to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery_ind;

b) recovery type: individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group data);

c) MNI (home SwMI MM): MNI of the invoking SwMI;

d) MNI (visited SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the HMM recovery_conf (containing the same information as the corresponding HMM recovery_resp) from the ANF-ISIMM, the home SwMI MM shall consider the HMM recovery as started, and it shall be ready to recover the virtual service primitives of the HMM recovery as defined in this clause.

14.4.2.1A The home SwMI MM receives the VMM recovery indication

This clause is applicable only for case 2).

Upon receipt of the VMM recovery_ind (containing the same information as the corresponding VMM recovery _req) from the ANF-ISIMM, the home SwMI MM shall record the ANF-ISIMM invoke id and verify that it can support the VMM recovery. The home SwMI MM shall be able to support the VMM recovery if the I-HDB is in a consistent state.

Then, the home SwMI MM shall send the VMM recovery_resp to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received VMM recovery_ind;

b) recovery type: individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group data);

c) MNI (visited SwMI MM): MNI of the invoking SwMI;

d) MNI (home SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the VMM recovery_conf (corresponding to the VMM recovery_resp) from the ANF-ISIMM, the visited SwMI MM shall consider the VMM recovery service as started.

14.4.2.2 The virtual migration or restricted migration

The visited SwMI MM shall detect the I-VDB for the first or next migrated individual subscriber that has an I-VDB record. If the registration status is either "registered, migrated" "registered, restricted migration" the visited SwMI MM shall invoke the migration or restricted migration as follows:

- as defined in clause 6.5.1.2 or clause 7.5.1.2, the invocation criteria as defined for the services shall be applicable and the corresponding service invoked as the service invocation was due to the receipt of the LOCATION UPDATE PDU from the individual subscriber. Thus, the fact that the Migration_req is sent due to the IDR does not change the invocation criteria between the Migration or the Restricted migration services;

- the visited SwMI MM shall send the Migration_req as defined in clause 6.5.1.2 or clause 7.5.1.2, with the following exceptions:

  - ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery demand_ind;

  - "Migration type" information shall be:

    - migration, if the migration service has been invoked; or

    - restricted migration, if the restricted migration service has been invoked;

NOTE 1: The migration type does not indicate call restoration as the possible call has either been re-routed to the visited SwMI or cleared based on the original migration invocation.

  - "Age stamp" information shall be present and indicate the age of the migration or the last recorded contact with the SwMI MM;

- "Call restoration support" information shall be omitted; and
- "Recovery" information shall be present to indicate that the Migration_req is sent as part of the recovery service.

Then, the operation shall take place in the case of migration as defined in clause 6 and in the case of restricted migration as defined in clause 7 except that:

- if exchanged, the SS-migration profiles shall be exchanged before the Migration_resp; and
- the conditional "Recovery" information shall be added to all exchanged primitives. The "Recovery" information shall indicate that the service is part of the recovery service.

NOTE 2: In the case of lack of resources, the SwMI MM may give a lower priority to the actions related to the IDR service than to other services, e.g. to the normal (non-recovery related) migration service.

14.4.2.3 The virtual RSI

If applicable, i.e. if the invocation criteria as defined for the RSI in the present document is met, the invocation and the operation of the RSI service shall take place as defined in the present document except that:

- ANF-ISIMM invoke id: the value shall be the same as in the sent HMM recovery demand_req;
- "Recovery" information shall be added to the exchanged primitives. The "Recovery" information shall indicate that the service is part of the recovery service; and
- age stamp shall indicate the age as received in the Migration_ind or if the sending of the Remove subs_req has been delayed for any reason, the delay shall be added to the value of the age stamp;

NOTE: If the invocation of the RSI in the case of IDR implies that virtual migration requested by the visited SwMI MM has been accepted (and not rejected due to an old age stamp) by the home SwMI MM.

14.4.2.4 The iteration

Upon completion of the virtual RSI service, i.e. the RSI due to the recovery service, or if the virtual RSI is not invoked, upon completion of the virtual migration or the virtual restricted migration, the visited SwMI MM shall continue the execution of the recovery service. Thus, the visited SwMI MM shall detect the information of the next individual subscriber as described in clause 14.4.2.2 and continue as defined in that clause.

Upon completion of the virtual migration or restricted migration, the virtual RSI shall be invoked, if applicable.

Then, visited SwMI MM shall continue the iteration as defined in this clause until the I-VDB is scanned through, i.e. when the virtual migration or virtual restricted migration and the virtual RSI, if applicable, is carried out for all the individual subscribers that are recorded as migrated in the SwMI MM.

During the recoveries, the SwMI MMs may control the pace in which the recovery related messages are sent by delaying the sending of the primitives, so that the recovery does not disturb any non-recovery related services. However, if such delays take place, the SwMI MM shall add the delay to value of the age stamp.

14.4.2.5 The completion of the IDR

14.4.2.5.1 VMM recovery

In case 2), when the records in the I-VDB has been scanned through the visited SwMI MM shall send the VMM recovery completed_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the send VMM recovery_req;

b) recovery type: individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group data);

c) MNI (visited SwMI MM): MNI of the invoking SwMI;

d) MNI (home SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM shall become idle.

Upon receipt of the VMM recovery completed_ind (containing the same information as the corresponding VMM recovery completed_req), the home SwMI MM shall become idle.

14.4.2.5.2 HMM recovery

In case 1), when the records in the I-VDB has been scanned through the following shall take place:

The visited SwMI MM shall send the HMM recovery completed_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery demand_ind;

b) recovery type: individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group data);

c) MNI (home SwMI MM): MNI of the invoking SwMI;

d) MNI (visited SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the home SwMI MM shall become idle.

Upon receipt of the HMM recovery completed_ind (containing the same information as the corresponding HMM recovery completed_req), the home SwMI MM shall become idle.

14.5 Exceptional procedures

This clause defines the exceptional procedures that shall be applied if the normal operation of the IDR service fails. The exceptional procedures as defined for the migration, restricted migration and RSI services are applicable for the IDR service when these services are invoked as part of the IDR service.

The exceptional procedures as defined in this clause may be overridden by an additional agreement between the SwMI operators (that cover the exceptional situation), see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM if the service cannot be invoked over the ISI, if the service cannot be continued or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM etc.

Upon receipt of the HMM recovery_ind, the visited SwMI MM shall reject the HMM recovery if its own I-VDB is not in a consistent state, i.e. if it considers that the contents of its I-VDB cannot be trusted. In addition, the HMM recovery may need to be rejected for other reasons, e.g. unknown SwMI.

If the visited SwMI MM rejects the HMM recovery it shall send the HMM recovery reject_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery demand_ind;

b) recovery type: recovery type: individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group data);

c) MNI (home SwMI MM): MNI of the invoking SwMI;

d) MNI (visited SwMI MM): MNI of the invoked SwMI;

e) recovery rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI; or
- temporary error; and

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the VMM recovery_ind, the home SwMI MM shall reject the VMM recovery if its own I-HDB is not in a consistent state, i.e. if it considers that the contents of its I-HDB cannot be trusted. In addition, the VMM recovery may need to be rejected for other reasons, e.g. unknown SwMI.

If the visited SwMI MM rejects the VMM recovery it shall send the VMM recovery reject_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received VMM recovery demand_ind;

b) recovery type: recovery type: Individual subscriber, i.e. the recovery recovers individual subscriber data (opposed to group data);

c) MNI (visited SwMI MM): MNI of the invoking SwMI;

d) MNI (home SwMI MM): MNI of the invoked SwMI;

e) recovery rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI; or
- temporary error; and

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the HMM or VMM recovery rejection cause is "unknown SwMI" the home SwMI MM may re-invoke the service up to two times in order to (try to) complete the service successfully. However, if the recovery rejection cause is "temporary error" the visited SwMI MM shall invoke the VMM recovery service to recover its I-VDB, and thus, the home SwMI MM shall not re-invoke the HMM recovery service against the visited SwMI MM.

14.6 Dynamic description

Figures 22 and 23 contains the dynamic description of the IDR service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the IDR service in addition to the primitives defined for migration, restricted migration and RSI:

- HMM recovery completed_req and HMM recovery completed_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate the completion of the IDR operation;
- HMM recovery _req and HMM recovery _ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to invoke the HMM recovery;
- HMM recovery_resp and HMM recovery_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the invocation indication of the HMM recovery; and

- HMM recovery reject_req and HMM recovery reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the invocation of the HMM recovery.

The following states shall be used for IDR service in addition to the states defined for the migration, the restricted migration and the RSI services:

- IDLE: no IDR in progress. Shall replace the IDLE state defined for migration, restricted migration and RSI;
- RECOVERY-REQUESTED: IDR service requested by the home SwMI MM;
- RECOVERY-INITIATED: IDR service in progress;
- WAIT-FOR-COMPLETION: awaiting indication that the service has been completed; and
- REMOVE: awaiting RSI service invocation.

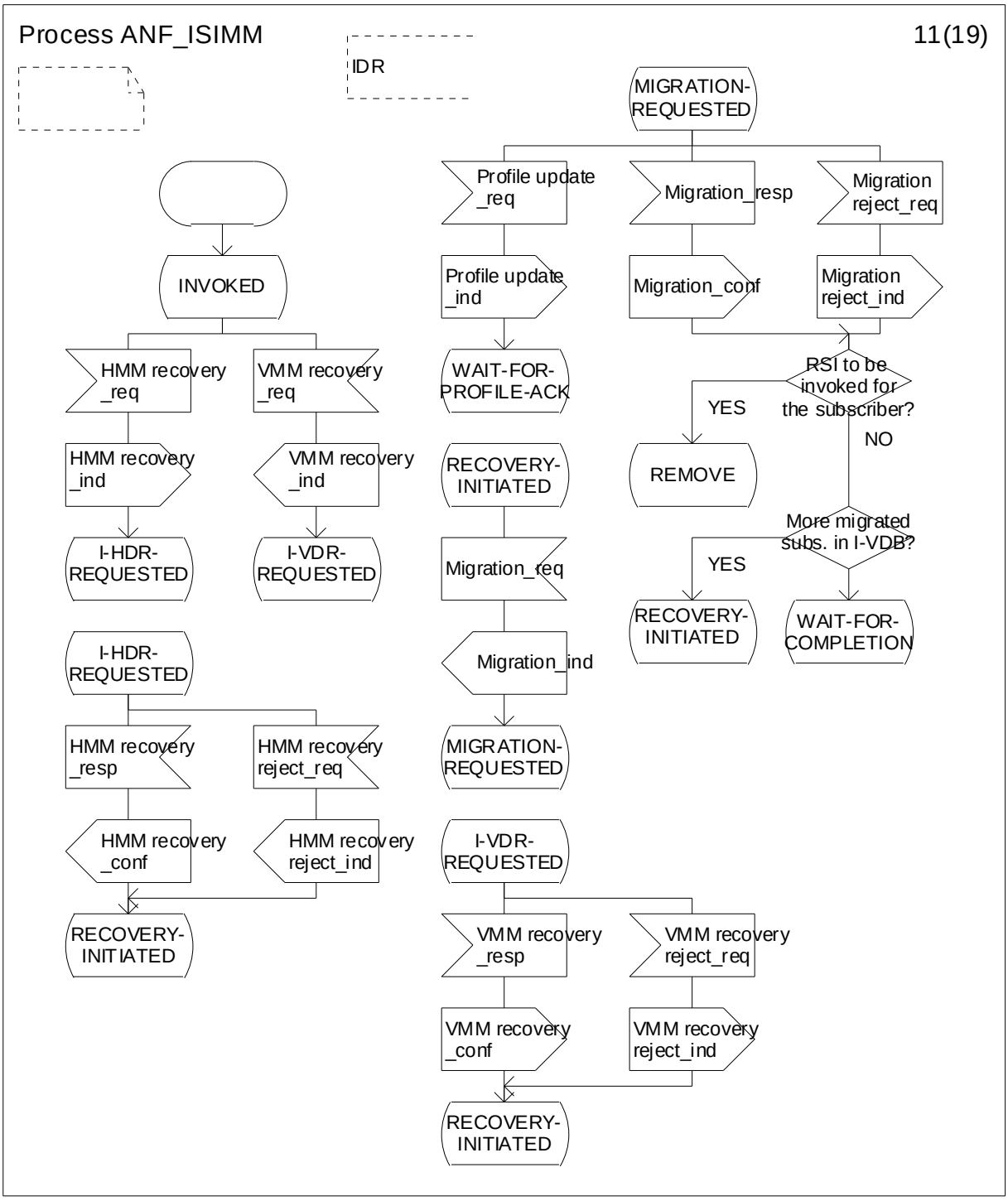


Figure 22: Stage 1 SDL description of IDR service

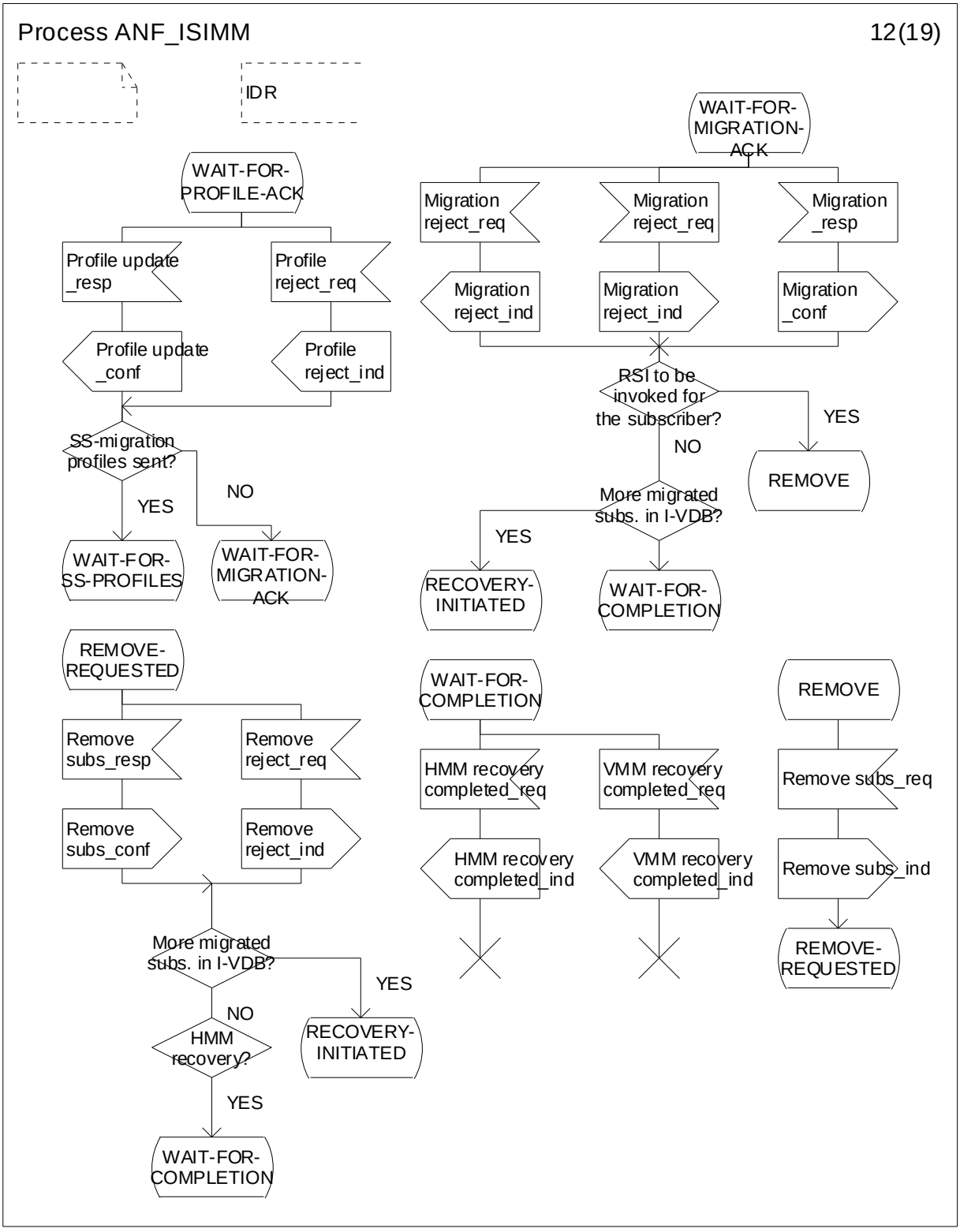


Figure 23: Stage 1 SDL description of IDR service

15 Group attachment service description - stage 1

15.1 Service definition

The group attachment service as defined in this clause extends the AI group attachment service, see note 1, across the ISI. The service provides the ability to attach to a group which does not belong to the SwMI where the subscriber is currently present by identifying the attached group by its GTSI. Consequently, the service supports the extension of the group calls across the ISI and the migrated subscribers' participation in these calls.

NOTE 1: The term AI group attachment service refers to the attachment/detachment of group identities service and the subservice enabling the group attachment and detachment within the registration service as defined in ETSI EN 300 392-2 [1], clause 15, when these services are used to attach the individual subscriber to the group. The ANF-ISIMM services related to these AI services when they are used to detach the individual subscriber from the group are defined in clause 16.

NOTE 2: The group call is defined in EN 300 392-3-3 [16].

The group attachment service is supported between the SwMI MM in which the subscriber is located and group home SwMI MM.

NOTE 3: In the group management point of view the "visited SwMI" in clauses 15.1 to 15.7 means a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

NOTE 4: The group attachment service in which the home SwMI of the group is different from the home SwMI of the individual subscriber provides limited service as the migration of the individual user is not directly informed to the group home SwMI.

15.2 Service description

The group attachment service is a conditional service for SwMI MMs. It shall be supported by a SwMI MM if the collocated SwMI CC supports Additional Network Feature - Inter-System Interface Group Call (ANF-ISIGC). If supported, the group attachment service shall be as defined in this clause.

The group attachment service enables the subscriber's attachment to the group across the ISI as follows:

- from the visited SwMI MM to the group home SwMI MM: The visited SwMI MM may invoke the service across the ISI in order to attach a subscriber to the group, see note 1;

NOTE 1: This implies that the individual subscriber has requested the group attachment in the AI.

- the group attachment may be the first or a subsequent group attachment:
  - the first group attachment is applicable if no individual subscribers are attached to the group in the visited SwMI prior to the requested group attachment; and
  - the subsequent group attachment is applicable if one or more individual subscribers are attached to the group in the visited SwMI, but the group attachment will be indicated to the group home SwMI. The service is used e.g. to indicate to the group home SwMI MM that an important member of the group is attached to the group;
- from the group home SwMI MM to the visited SwMI MM: The group home SwMI MM may invoke the service across the ISI in order to attach a migrated subscriber to the group. The group attachment may be the first or a subsequent group attachment.

NOTE 2: Group home SwMI knows migration of its own individual subscriber and so can invoke group attachment across the ISI for those. How the group home SwMI may know migration of individual users belonging to other SwMIs is outside the scope of the present document.

As part of the group attachment service, the visited SwMI MM shall create the basic migration profile of the group. In addition, if a supplementary service is supported for the group in the visited SwMI the corresponding SS-migration profile may or shall be created for the group, see ETSI EN/ETS 300 392-12 [4]. The migration profile(s) are either created from the predefined profile(s) in the visited SwMI or their contents are exchanged across the ISI. The migration profile(s) shall be created when the first subscriber is attached to the group across ISI and they are used until the last subscriber is detached from the group in the visited SwMI MM.

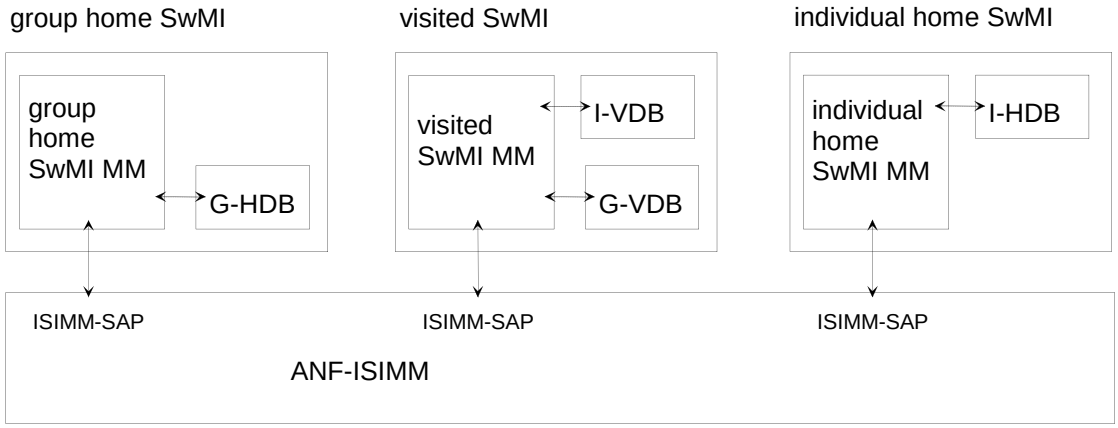
NOTE 3: The definition of the pre-defined profiles is outside the scope of the present document.

Upon completion of the group attachment service, the following shall take place when the group call is invoked:

- the group home SwMI CC shall extend the group call across the ISI to the visited SwMIs in which the group is attached to one or more individual subscribers; and
- the visited SwMI CC shall establish the group call to the individual subscribers that are attached to the group in that visited SwMI.

15.3 Service architecture

Figure 24 illustrates the service architecture of the group attachment service.



NOTE: The arrows illustrate the information exchange routes of the service.

Figure 24: The service architecture of the group attachment service

15.4 Normal procedures

15.4.1 Invocation

15.4.1.1 Invocation criteria

ANF-ISIMM shall be invoked if any of the following takes place:

- The subscriber has invoked the (MS initiated) AI group attachment service as defined in ETSI EN 300 392-2 [1], clause 15.

NOTE 1: The AI group attachment invocation is identified in the visited SwMI MM by the receipt of the U-ATTACH/DETACH GROUP IDENTITY PDU or of the U-LOCATION UPDATE DEMAND if either of them contains the following information:

- "Group identity attach/detach mode" is "Attachment";
- "Group identity uplink" contains "Group identity attach/detach type identifier" as "Attachment" and both "GSSI" and "Address Extension" which specify the group to be attached;
- in the case of U-LOCATION UPDATE DEMAND PDU the information shall be included in the "Group identity location demand" element.

- In addition, the migration or restricted migration service as defined in clauses 6 and 7, respectively, shall have been invoked and completed for the individual subscriber. The visited SwMI MM shall consider the migration or the restricted migration as successfully completed if the registration status is "registered, migrated" or "registered, restricted migration" in the I-VDB.

NOTE 2: When individual subscriber home SwMI invokes group attachment to a group of another SwMI for its subscriber that is not migrated, the migration service is not applicable.

- Optionally, the group home SwMI MM may invoke the group attachment service across the ISI in order to attach a migrated subscriber to the group. In this case, the migration or restricted migration service as defined in clauses 6 and 7, respectively, shall have been invoked and completed for the individual subscriber. The group home SwMI MM shall consider the migration or the restricted migration as successfully completed if the registration status is "registered, migrated" or "registered, restricted migration" in the I-HDB and the associated location information refers to the visited SwMI.

NOTE 3: Group home SwMI may invoke group attachment across ISI for its own individual subscribers. Invocation of group attachment of other subscribers is outside the scope of the present document.

Upon initiation of the group attachment service, the following cases are identified and the related actions are defined in this clause:

1) A request for group attachment has been initiated in a visited SwMI MM, and according to the G-VDB the group is not previously attached to any subscriber in the visited SwMI MM.

2) A request for group attachment has been initiated in a visited SwMI MM, and according to the G-VDB the group is previously attached to at least one other subscriber in the visited SwMI MM but the group's profile indicates that every group attachment shall be sent to the group home SwMI MM.

3) A request for group attachment has been initiated in a visited SwMI MM, and according to the G-VDB the group is previously attached to at least one other subscriber in the visited SwMI MM, but the migration profile of the group or of the individual subscriber indicates that the individual subscriber is an important member of the group.

4) A request for group attachment has been initiated in a visited SwMI MM, according to the G-VDB the group is previously attached to at least one other individual subscriber in the visited SwMI MM, but neither migration profile of the group nor of the individual subscriber indicates that the subscriber is allowed to attach to the group.

5) A request for group attachment has been initiated in the group home SwMI MM for a migrated subscriber and the group's G-HDB information indicates that the group is not attached to any subscriber in the visited SwMI MM in which the individual subscriber is migrated.

6) A request for group attachment has been initiated in the group home SwMI MM for a migrated subscriber and the group's G-HDB information indicates that the group is attached to at least one other individual in the visited SwMI MM in which the individual subscriber is migrated.

If the group attachment service is supported by the SwMI MM, the support of cases 1) to 4) is mandatory; the support of cases 5) and 6) is optional. However, if supported both cases 5) and 6) shall be supported (and not only either one).

NOTE 4: Cases 5) and 6) are applicable, when the migrated subscriber is a member of the group home SwMI.

15.4.1.2 Invocation of ANF-ISIMM

15.4.1.2.1 Case 1)

In case 1) if the group attachment invocation criteria is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing the Group attachment_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and operation of the service (serving one group attachment act);

b) GSSI of the group;

c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the group and the MNI of the visited SwMI MM follow this information in the primitive;

NOTE 1: The qualifier conditional in the information name refers to the definition of a conditional information as defined for the static descriptions of the primitive (and not to the dynamic descriptions as defined here).

d) conditionally: MNI of the group;

e) conditionally: MNI of the visited SwMI MM: shall be used to indicate the visited SwMI MM;

f) First/Subsequent group attachment, which shall be "First group attachment";

g) Home/Visited SwMI MM initiated, which shall be "Visited SwMI MM initiated";

h) profile exchange support, which shall be either:

- supported, if the visited SwMI MM supports the exchange of basic and SS-migration profiles for the group, i.e. if the group home SwMI may send them to the visited SwMI MM to be used for the group while it is attached in the visited SwMI; or

- not supported, if the visited SwMI MM does not support the exchange of the migration profile(s) for the group;

i) subscriber information in group profile support, which shall be either:

- supported: shall indicate that the visited SwMI MM supports the inclusion of "Subscriber information" element(s) in the group's basic migration profile; or

- not supported: shall indicate that the visited SwMI MM does not support the inclusion of "Subscriber information" element(s) in the group's basic migration profile;

j) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

k) following conditional element(s) present information element shall be "Present" and indicate that the supported "Pre-defined profile set reference(s)" information follows this information in the primitive;

l) conditionally: pre-defined profile set reference(s), supported sets, The information shall contain the references of the pre-defined migration profile sets which may be used for the group in the visited SwMI. The information shall be a set of one to sixteen pre-defined profile reference sets. Each Profile reference set shall refer to a number from one to sixteen. One profile reference set shall refer to the pre-defined migration profile(s) of which the contents are known to the group home and to the visited SwMI MMs. Each reference set shall correspond to a basic and possibly to one or more SS-migration profiles. One reference set shall contain all the profile information needed for the creation of the migration profile(s) for the group in the visited SwMI MM;

NOTE 2: The term temporary migration profile, basic or SS-migration, is used for the profile which the visited SwMI MM sends to the group home SwMI MM.

m) following conditional element(s) present information element shall be "Not present" and indicate that the acceptable "Pre-defined profile set reference(s)" information does not follow this information in the primitive;

n) recovery: the value shall be "No recovery";

o) conditionally: age stamp, shall be included if the age of the recorded group attachment request is greater than zero, i.e. if the Group attachment_req is not sent immediately upon initiation of the group attachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the AI group attachment service request or since it originally invoked the group attachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error);

p) optionally: the length of the PISN number of the visited SwMI MM and the PISN number. If included, the group home SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the group; and

NOTE 3: The PISN number may be used to indicate the preferred gateway if the visited SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of wide area SwMI.

q) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.1.2.2 Cases 2) to 4)

In cases 2) to 4) if the group attachment invocation criteria is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing the Group attachment_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the service instance;

b) GSSI of the group;

c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the group and the MNI of the visited SwMI MM follow this information in the primitive;

d) MNI of the group;

e) MNI of the visited SwMI MM: shall be used to indicate the visited SwMI MM;

f) First/Subsequent group attachment, which shall be "Subsequent group attachment";

g) Home/Visited SwMI MM initiated, which shall be "Visited SwMI MM initiated";

h) profile exchange support: "Not supported";

i) subscriber information in group profile support: "Not supported";

j) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

k) following conditional element(s) present information element shall be "Not present" and indicate that the preferred "Pre-defined profile set reference(s)" information does not follow this information in the primitive (as the migration profile(s) of the group have already been created);

l) following conditional element(s) present information element shall be "Not present" and indicate that the acceptable "Pre-defined profile set reference(s)" information does not follow this information in the primitive (as the migration profile(s) of the group have already been created);

m) recovery: the value shall be "No recovery";

n) conditionally: age stamp, shall be included if the age of the recorded group attachment request is greater than zero, i.e. if the Group attachment_req is not sent immediately upon initiation of the group attachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the AI group attachment service request or since it originally invoked the group attachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error);

o) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.1.2.3 Case 5)

In case 5) if the group attachment invocation criteria is met, the group home SwMI MM shall invoke ANF-ISIMM either:

- by issuing the Group attachment_req if the pre-defined migration profile(s) shall be used for the group in the visited SwMI. The Group attachment_req shall contain the following information:

  a) ANF-ISIMM invoke id: the group home SwMI MM shall allocate a unique value to be used during the service instance;

  b) GSSI of the group;

  c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the group and the MNI of the visited SwMI MM follow this information in the primitive;

  d) MNI of the group;

  e) Linking information: linked;

  f) conditional: GSSI (linking controlling group): the GSSI of the linking controlling group;

  g) conditional: MNI (linking controlling group): the MNI of the linking controlling group;

  h) MNI of the visited SwMI MM: shall be used to indicate the visited SwMI MM;

  i) First/Subsequent group attachment, which shall be "First group attachment";

  j) Home/Visited SwMI MM initiated, which shall be "Home SwMI MM initiated";

  k) profile exchange support: "Not supported";

  l) subscriber information in group profile support: "Not supported";

  m) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

  n) following conditional element(s) present information element shall be "Present" and indicate that the preferred "Pre-defined profile set reference(s)" information follows this information in the primitive;

  o) pre-defined profile set reference, preferred set: the information shall contain the reference of the preferred pre-defined migration profile set which shall be used for the group in the visited SwMI MM, if supported. The information shall refer to a number from one to sixteen. The profile reference set shall refer to the pre-defined migration profile(s) of which the contents are known to the group home and to the visited SwMI MMs. The reference set shall correspond to a basic and possibly to one or more SS-migration profiles. The reference set shall contain all the profile information needed for the creation of the migration profile(s) for the group in the visited SwMI MM;

  p) following conditional element(s) present information element shall be "Present" and indicate that the acceptable "Pre-defined profile set reference(s)" follow this information in the primitive;

  q) pre-defined profile set reference(s), acceptable sets: the information shall contain the references of the acceptable pre-defined migration profile sets which may be used for the group in the visited SwMI. The information shall be a set of one to sixteen pre-defined profile reference sets. Each Profile reference set shall refer to a number from one to sixteen. One profile reference set shall refer to the pre-defined migration profile(s) of which the contents are known to the group home and to the visited SwMI MMs. Each reference set shall correspond to a basic and possibly to one or more SS-migration profiles. One reference set shall contain all the profile information needed for the creation of the migration profile(s) for the group in the visited SwMI MM;

  r) recovery: the value shall be "No recovery";

s) conditionally: age stamp, shall be included if the age of the recorded group attachment request is greater than zero, i.e. if the Group attachment_req is not sent immediately upon initiation of the group attachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the AI group attachment service request or since it originally invoked the group attachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

t) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document; or

- by issuing the Profile update_req if the group home SwMI wishes to send the migration profile(s) to be used for the group in the visited SwMI to the visited SwMI MM. The Profile update_req shall contain the following information:

NOTE 1: The term original migration profile, basic or SS-migration, is used for the profile which the group home SwMI MM sends to the visited SwMI MM.

a) ANF-ISIMM invoke id: the group home SwMI MM shall allocate a unique value to be used during the service instance;

b) GSSI;

c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the group and the MNI of the visited SwMI MM follow this information in the primitive;

d) MNI of the group. shall indicate the MNI of the group to the visited SwMI;

e) MNI of the visited SwMI MM: shall be used to indicate the visited SwMI MM;

f) profile type: the value shall be "Group";

g) group basic migration profile (original): the original basic migration profile shall indicate the basic service profile that the group home SwMI MM requests to be used for the group in the visited SwMI. The profile shall contain the following information:

  - profile status, shall be "Profile Replacement";
  - point-to-multipoint service, shall be:
    - supported; or
    - not supported;
  - point-to-multipoint acknowledged service, shall be:
    - supported; or
    - not supported;
  - point-to-multipoint broadcast service, shall be:
    - supported; or
    - not supported;
  - speech service, shall be either:
    - one or more of the supported services; or
    - not supported;
  - circuit mode unprotected data service, shall be either of the following:
    - supported; or
    - not supported;

- circuit mode protected (low) data service, shall be either of the following:
  - supported; or
  - not supported;
- circuit mode protected (high) data service, shall be either of the following:
  - supported; or
  - not supported;
- interleaving depth, shall be as follows:
  - no interleaving;
    - supported; or
    - not supported;
  - short interleaving depth = 1 shall be either of the following:
    - supported; or
    - not supported;
  - medium interleaving depth = 4 shall be either of the following:
    - supported; or
    - not supported;
  - long interleaving depth = 8 shall be either of the following:
    - supported; or
    - not supported;
- IP service shall be either:
  - supported; or
  - not supported;
- AI encryption state list, shall specify all the AI encryption states that the group may support (i.e. is able to and allowed to support) in the visited SwMI. The possible supported states are the following:
  - 1;
  - 2; and
  - 3;
- the values are defined in ETSI EN 300 392-7 [5], clause 6.2 as security class and they indicate e.g. the type of the supported encryption keys for the group, if any. In addition, the values 2 and 3 shall imply that the AI encryption is supported for the following group services: circuit mode speech and data services, SDS and IP service;
- end-to-end encryption service, shall be either:
  - supported; or
  - not supported;
- the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service, when a call is invoked;

- group attachment/detachment, shall be one of the following:
  - first group attachment and last group detachment;
  - important user group attachment shall be sent to group home SwMI; or
  - every group attachment shall be sent to group home SwMI;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;
- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:
  - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;
  - SS-status: shall indicate if the supplementary service indicated in the first sub-element is supported or not for the group, and if supported whether the original SS-migration profile will be sent to the visited SwMI MM. The element shall have one of the following:
    - not supported: shall indicate that the supplementary service is not supported;
    - supported, with original SS-migration profile: shall indicate that the supplementary service is supported with the corresponding original SS-migration profile (i.e. the original SS-migration profile will be sent in the following SS-profile update_req); or
    - supported, without original SS-migration profile: without original SS-migration profile: shall indicate that the supplementary service is supported without the corresponding original SS-migration profile;
- default SS-information, shall be one of the following:
  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the group; or
  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the group;
- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:
  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;
- optionally: maximum number of timeslots, shall be one of the following:
  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;

- optionally: call time-out timer (T310), shall be one of the following:
  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;
  - 3 minutes;
  - 4 minutes;
  - 5 minutes;
  - 6 minutes;
  - 8 minutes;
  - 10 minutes;
  - 12 minutes;
  - 15 minutes;
  - 20 minutes; or
  - 30 minutes;
- optionally: call time-out set-up phase timer (T301), shall be one of the following:
  - 1 second;
  - 2 seconds;
  - 5 seconds;
  - 10 seconds;
  - 20 seconds;
  - 30 seconds; or
  - 60 seconds;
- optionally: group priority, if included, shall indicate an internally defined priority to be used within the visited SwMI. It shall be used in the call set up in addition to the call priority element:
  - no priority;
  - low priority;
  - normal priority;
  - high priority; or
  - emergency priority;

NOTE 2: This priority is not related to the AI call priority.

- optionally: subscriber information, the information element may be repeated. One information element shall specify the relationship between the group and the indicated individual subscriber. One information element shall contain the following sub-elements:
  - ISSI of the individual subscriber and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

- subscriber status, shall indicate one of the following:
  - not important subscriber; or
  - important subscriber;
- class of usage: shall have a value from 0 to 7, see ETSI EN 300 392-2 [1], clause 16.10.6; and
- optionally: proprietary information. The content of the proprietary information is outside the scope of the present document;

▪ optionally: any type 3 elements as defined in the present document;

h) SS-profile update indicator, which shall be one of the following:

▪ SS-profile update_req not applicable: The sending of the original SS-migration profiles to the visited SwMI MM is not applicable for the group; or

▪ SS-profile update_req sent after the Group attachment_resp: The original SS-migration profile(s) are exchanged after the Group attachment_resp is issued;

i) recovery: the value shall be "No recovery"; and

j) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

- The SS-profile update indicator shall indicate if the group home SwMI MM sends the original SS-migration profiles to the visited SwMI MM or not. The sending of a particular original SS-migration profile is mandatory if the two following conditions are met:
  - if the SS-migration profile is required in the visited SwMI for a group that is attached in the visited SwMI MM according to the corresponding supplementary service sub-part(s) of ETSI EN/ETS 300 392-12 [4]; and
  - if the support of the corresponding supplementary service is requested for the group in the visited SwMI as part of the basic migration profile in the Profile update_req.

15.4.1.2.4 Case 6)

In case 6) if the group attachment invocation criteria is met, the group home SwMI MM shall invoke ANF-ISIMM by issuing the Group attachment_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the group home SwMI MM shall allocate a unique value to be used during the service instance;

b) GSSI of the group;

c) following conditional element(s) present information element shall be "Present" and indicate that the MNI of the group and the MNI of the visited SwMI MM follow this information in the primitive;

d) MNI of the group;

e) MNI of the visited SwMI MM: shall be used to indicate the visited SwMI;

f) First/Subsequent group attachment, which shall be "Subsequent group attachment";

g) Home/Visited SwMI MM initiated, which shall be "Home SwMI MM initiated";

h) profile exchange support: "Not supported";

i) subscriber information in group profile support: "Not supported";

j) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

k) following conditional element(s) present information element shall be "Not present" and indicate that the preferred "Pre-defined profile set reference(s)" information does not follow this information in the primitive (as the migration profile(s) of the group have already been created);

l) following conditional element(s) present information element shall be "Not present" and indicate that the acceptable "Pre-defined profile set reference(s)" information does not follow this information in the primitive (as the migration profile(s) of the group have already been created);

m) recovery: the value shall be "No recovery";

n) conditionally: age stamp, shall be included if the age of the recorded group attachment request is greater than zero, i.e. if the Group attachment_req is not sent immediately upon initiation of the group attachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the AI group attachment service request or since it originally invoked the group attachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

o) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2 Operation

15.4.2.1 Case 1)

15.4.2.1.0 General

Upon receipt of the Group attachment_ind (containing the same information as the corresponding Group attachment_req) from the ANF-ISIMM, the group home SwMI MM shall validate the group attachment. The group attachment may be rejected if e.g. it is not allowed for the individual subscriber or if the age stamp is included in the Group attachment_ind and if it indicates a newer age than the age of the individual subscriber's recorded detachment from the group, if such recording exists in the G-HDB.

If the group home SwMI MM does not reject the group attachment the group home SwMI MM shall continue the operation of the group attachment service according to one of the following ways:

- by using the pre-defined profile(s). In this case, the operation continues as defined in clause 15.4.2.1.1;
- by exchanging the basic migration profile with the visited SwMI MM. In this case, the operation continues as defined in clause 15.4.2.1.2;
- by exchanging the basic migration and the SS-migration profile(s) with the visited SwMI MM. In this case, the operation continues as defined in clause 15.4.2.1.2.

15.4.2.1.1 Group attachment with pre-defined migration profile(s)

15.4.2.1.1.1 Updates to G-HDB

The group home SwMI MM shall create a G-HDB record for the group with the following information:

- the MNI of the visited SwMI MM as the visited SwMI MM in which the group has been attached;
- the age information of the group attachment request so that the group home SwMI MM is able to determine the age of the recorded group attachment at any time. If the age stamp was not included in the Group attachment_ind the current age shall be considered as zero; and
- if included, the PISN number of the visited SwMI MM. The PISN number shall be used for all ISI connections that are established for the group to the visited SwMI.

In addition, the group home SwMI MM may save in the G-HDB record of the group the following information:

- the indication that the pre-defined migration profile(s) are used for the group; and
- the individual subscriber's attachment to the group.

The age of the recorded group attachment may be saved e.g. by updating the current real time or by using a relative time from which the group home SwMI MM shall be able to derive the elapsed time. The group home SwMI MM shall save the information in order to compare competing group attachment and group detachment (group detachment is defined in clause 16) requests, if needed. This may take place e.g. if the group home SwMI MM receives one Group attachment_ind and one Group detachment_ind for the individual subscriber for one group from the visited SwMI MM; if so, the one with the newer age stamp shall be accepted, the other one shall be rejected.

15.4.2.1.1.2 Attach linked group

If the group attachment invocation criteria is met, the group home SwMI MM shall check whether the attached group is linked or not. If the group is linked, the group linking controlling SwMI shall be informed of the new attachment as described in clause 18a before continuing.

15.4.2.1.1.3 Sending of group attachment approval

The group home SwMI MM shall send the Group attachment_resp to ANF-ISIMM indicating that the group home SwMI MM has approved the group attachment. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group attachment_ind;

b) GSSI;

c) Linking information: linked;

d) conditional: GSSI (linking controlling group): the GSSI of the linking controlling group;

e) conditional: MNI (linking controlling group): the MNI of the linking controlling group;

f) First/Subsequent group attachment, which shall be "First group attachment";

g) Home/Visited SwMI MM initiated;

h) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

i) following conditional element(s) present information element shall be "Present" and indicate that the used "Pre-defined profile set reference(s)" information follows this information in the primitive;

j) pre-defined profile set reference(s), used set: The information shall contain the reference of the pre-defined migration profile set which shall be used for the group in the visited SwMI MM. The information shall refer to a number from one to sixteen, and the value shall be one of the values received as "Pre-defined profile set reference, supported sets" in the Group attachment_ind;

k) recovery: the value shall be "No recovery";

l) conditionally: age stamp, shall be included if the age of the recorded group attachment response is greater than zero, i.e. if the Group attachment_resp is not sent immediately upon completion of the group attachment act in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM completed the group attachment act;

m) optionally: the length of the PISN number of the group home SwMI MM and the PISN number. If included, the visited SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the group; and

NOTE: The PISN number may be used to indicate the preferred gateway if the group home SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of wide area SwMI.

n) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2.1.1.4 Receipt of group attachment approval

Upon receipt of Group attachment_conf (containing the same information as the corresponding Group attachment_resp) from the ANF-ISIMM, the visited SwMI MM shall:

- verify that the ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Group attachment_req;
- create the G-VDB record for the group, if needed, see note 1;

NOTE 1: Depending on the implementation, the group record may exist in the G-VDB even when the group is not attached in the visited SwMI MM. The record exists if the visited SwMI MM saves the group detachment information in the G-VDB in order to support e.g. the GDR service as defined in clause 17.

- if the attached group is linked, then store the linked group GSSI and MNI in the G-VDB;
- derive the contents of the migration profiles (both basic and, if needed, SS) for the group as indicated by the "Pre-defined profile set reference, used set" information in the Group attachment_conf;
- if the age stamp is included, verify that it indicates a newer age than the age of the individual subscriber's recorded detachment from the group, if such recording exists in the G-VDB;

NOTE 2: It is not mandatory to save the group detachment information in the databases after the group attachment has been removed, i.e. in the case of group detachment the attachment may be removed without saving the information that the group has been detached nor the time information of the detachment act. In addition, especially in the case of first group attachment as there is no existing record for the group in the G-VDB it is possible that there is no information of the previous detachments related to the group.

- complete the (MS initiated) AI group attachment service in order to grant the group attachment to the individual subscriber as defined in ETSI EN 300 392-2 [1], clause 15;

NOTE 3: The granting of the group attachment implies the following information in the D-ATTACH/DETACH GROUP IDENTITY ACKNOWLEDGEMENT PDU or the D-LOCATION UPDATE ACCEPT PDU:

  - "Group identity accept/reject" as "Attachment/detachment accepted";
  - "Group identity attach/detach type identifier" as "Attachment".

- update the individual subscriber as "attached" to the G-VDB; and
- save the current time for the age stamp purposes to the G-VDB record in a way that the visited SwMI MM is able to determine the age of the individual subscriber's group attachment act at any time.

Then, the visited SwMI MM shall become idle.

15.4.2.1.2 Group attachment with migration profile exchange

15.4.2.1.2.1 Updates to G-HDB

If the group home SwMI MM does not reject the group attachment, it shall create the G-HDB record of the group with the following information:

- the MNI of the visited SwMI MM as the visited SwMI MM in which the group has been attached;
- the age information of the group attachment request so that the group home SwMI MM is able to determine the age of the recorded group attachment at any time. If the age stamp was not included in the Group attachment_ind, the current age shall be considered as zero; and
- if included, the PISN number of the visited SwMI MM.

15.4.2.1.2.2 Sending of original basic migration profile

The group home SwMI MM shall provide the visited SwMI MM with the original group basic migration profile by sending the Profile update_req to ANF-ISIMM. The primitive shall contain the following information:

NOTE: The term original migration profile, basic or SS-migration, is used for the profile which the group home SwMI MM sends to the visited SwMI MM.

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group attachment_ind;

b) GSSI;

c) following conditional element(s) present information element shall be "Not present" and indicate that the MNI of the group and the MNI of the visited SwMI MM do not follow this information in the primitive;

d) profile type: the value shall be "group";

e) group basic migration profile (original): the original basic migration profile shall indicate the basic service profile that the group home SwMI MM requests to be used for the group in the visited SwMI. The contents of the profile shall be as in g) in Profile update_req in clause 15.4.1.2.3;

f) SS-profile update indicator, which shall be one of the following:

- SS-profile update_req not applicable: the sending of the original SS-migration profiles to the visited SwMI MM is not applicable for the group; or

- SS-profile update_req sent (after the Group attachment_resp): the original SS-migration profile(s) are exchanged after the Group attachment_resp is issued;

g) recovery: the value shall be "No recovery"; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The SS-profile update indicator shall indicate if the group home SwMI MM sends the original SS-migration profile(s) to the visited SwMI MM or not. The sending of a particular original SS-migration profile is mandatory if the two following conditions are met:

- if the SS-migration profile is required in the visited SwMI for a group that is attached in the visited SwMI MM according to the corresponding supplementary service sub-part(s) of ETSI EN/ETS 300 392-12 [4]; and

- if the support of the corresponding supplementary service is requested for the group in the visited SwMI as part of the basic migration profile.

15.4.2.1.2.3 Creation of basic migration profile

Upon receipt of the Profile update_ind (containing the same information as the corresponding Profile update_req) from ANF-ISIMM, the visited SwMI MM shall verify that the received ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Group attachment_req.

Then, the visited SwMI MM shall create the basic migration profile for the group. The profile shall contain the service authorizations concerning the group in the visited SwMI. The visited SwMI MM shall create the basic migration profile in one of the following ways:

- The original migration profile shall be used as received from the group home SwMI MM, i.e. the services are supported for the group as requested by the group home SwMI.

- The temporary migration profile shall be created and used while the individual subscriber is in the visited SwMI. In this case the visited SwMI MM does not offer services for the group as proposed by the group home SwMI MM but creates a temporary migration profile that shall be used instead. The reason for creating the temporary migration profile may be e.g. that the visited SwMI MM cannot support the services as requested by the group home SwMI MM or that the visited SwMI MM restricts the use of its services for groups.

The visited SwMI MM shall save the created basic migration profile to the G-VDB.

15.4.2.1.2.4 Sending of temporary basic migration profile

The visited SwMI MM shall provide the group home SwMI MM with the created basic migration profile information by sending the Profile update_resp to ANF-ISIMM. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Group attachment_req;

b) GSSI;

c) profile type (individual/group): shall be set to "Group";

d) basic migration profile info: shall indicate one of the following as applicable:

- accepted as received: the visited SwMI MM accepted and saved the original basic migration profile as it was received;
- redefined by the visited SwMI MM: the visited SwMI MM created a new temporary basic migration profile to be used for the group. The contents of the temporary basic migration profile shall be sent to the group home SwMI MM, see the element Basic migration profile (temporary);

e) conditionally: basic migration profile (temporary), if the value of the Basic migration profile info is "Redefined by the visited SwMI MM", otherwise the element shall be omitted. If included, the group basic migration profile shall contain the following information:

- profile status, shall be "Profile Response";
  - point-to-multipoint service, shall be either of the following:
    - supported; or
    - not supported;
  - point-to-multipoint acknowledged service, shall be either of the following:
    - supported; or
    - not supported;
  - point-to-multipoint broadcast service, shall be either of the following:
    - supported; or
    - not supported;
  - speech service, shall be either:
    - one or more of the supported services; or
    - not supported;
  - circuit mode unprotected data, shall be either of the following:
    - supported; or
    - not supported;
  - circuit mode protected (low) data service, shall be either of the following:
    - supported; or
    - not supported;
  - circuit mode protected (high) data service, shall be either of the following:
    - supported; or
    - not supported;
  - interleaving depth, shall be as follows:
    - no interleaving:
      - supported; or
      - not supported;

- short interleaving depth = 1 shall be either of the following:
  - supported; or
  - not supported;
- medium interleaving depth = 4 shall be either of the following:
  - supported; or
  - not supported;
- long interleaving depth = 8 shall be either of the following:
  - supported; or
  - not supported;

- IP service shall be either:
  - supported; or
  - not supported;
- AI encryption state list, shall specify the supported AI encryption state for the group. The supported state shall be one of the following:
  - 1;
  - 2; or
  - 3;
- the values are defined in ETSI EN 300 392-7 [5], and they indicate e.g. the type of the supported encryption keys for the group, if any. In addition, the values 2 and 3 shall imply that the AI encryption is supported for the following group services: circuit mode speech and data services, SDS and IP service;
- end-to-end encryption shall be either:
  - supported; or
  - not supported;
- the value supported shall mean that the end-to-end encryption may be used. The end-to-end encryption is applicable for the circuit mode speech and data services. The use of the end-to-end encryption shall be determined on the invocation of each service, when a call is invoked;
- group attachment/detachment, shall be one of the following:
  - first group attachment and last group detachment;
  - important user group attachment shall be sent to group home SwMI; or
  - every group attachment shall be sent to group home SwMI;
- number of SS-information: shall be a value from 0 to 32 and indicate the number of following SS-information elements;
- conditionally: SS-information, element shall be present as many times as indicated by the "Number of SS-information" element. One information element shall define one supplementary service. The information element shall contain the following two sub-elements:
  - SS-type: shall identify a TETRA supplementary service, see clause 34.2.85;

- SS-response status: shall indicate if the supplementary service is supported or not for the individual subscriber. The element shall be either of the following:
  - not supported: shall indicate that the supplementary service is not supported;
  - supported: shall indicate that the supplementary service is supported;

- if the SS-migration profile is required for the supplementary service, the group home SwMI MM shall send the profile in a SS-profile update_req to the visited SwMI or the supplementary service is not supported despite of the value of the SS-response status element;
- default SS-information, shall be one of the following:
  - shall not be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements shall not be supported for the group; or
  - shall be supported: shall indicate that the TETRA supplementary services that are not listed in the SS-information elements may be supported for the group;
- optionally: SDS profile. If included, shall be used to indicate "Supported" or "Not supported" for each of the following SDS sub-elements:
  - pre-defined short message;
  - user defined short message;
  - user defined Data 1;
  - user defined Data 2;
  - user defined Data 3; and
  - user defined Data 4;
- optionally: maximum number of timeslots, shall be one of the following:
  - up to one slot;
  - up to two slots;
  - up to three slots; or
  - up to four slots;
- optionally: call time-out timer (T310), shall be one of the following:
  - 30 seconds;
  - 45 seconds;
  - 60 seconds;
  - 2 minutes;
  - 3 minutes;
  - 4 minutes;
  - 5 minutes;
  - 6 minutes;
  - 8 minutes;
  - 10 minutes;
  - 12 minutes;

        - 15 minutes;
        - 20 minutes; or
        - 30 minutes;
    - optionally: call time-out set-up phase timer (T301), shall be one of the following:
        - 1 second;
        - 2 seconds;
        - 5 seconds;
        - 10 seconds;
        - 20 seconds;
        - 30 seconds; or
        - 60 seconds;
    - optionally: group priority, if included, shall indicate an internally defined priority to be used within the visited SwMI. It shall be used in the call set up in addition to the call priority element:
        - no priority;
        - low priority;
        - normal priority;
        - high priority; or
        - emergency priority;

NOTE: This priority is not related to the AI call priority.

- conditionally: subscriber information in group profile is supported, included if the inclusion of subscriber information in group profile is not supported by the visited SwMI MM and if the corresponding information was included in the received Profile update_req. The information element shall have the value "Not supported";
- optionally: any type 3 elements as defined in the present document;

f) recovery: the value shall be "No recovery"; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2.1.2.5 Receipt of temporary basic migration profile

Upon receipt of the Profile update_conf (containing the same information as the corresponding Profile update_resp) from ANF-ISIMM, the group home SwMI MM shall:

- verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the received Group attachment_ind; and
- verify that the group attachment is allowed, i.e. that there is no reason to reject the group attachment based on the received temporary basic migration profile.

In addition, the group home SwMI MM may save the temporary basic migration profile in the G-HDB. The saving and use of the temporary basic migration profile is optional in the group home SwMI.

15.4.2.1.2.6 Sending of group attachment approval

Shall be as clause 15.4.2.1.1.3 with the following exceptions on items i) and j):

a) following conditional element(s) present information element shall be "Not present" and indicate that the "Pre-defined profile set reference(s)" information does not follow this information in the primitive; and

b) pre-defined profile set reference(s), element shall be omitted.

15.4.2.1.2.7 Receipt of group attachment approval

Shall be as clause 15.4.2.1.1.3 except that the action to create the contents of the migration profile(s) shall be omitted (as they are created already).

15.4.2.1.3 SS-migration profile(s) exchange

15.4.2.1.3.0 General

This clause is applicable if the SS-migration profile indicator had the value "SS-profile update_req sent after the Group attachment_resp" in the sent Profile update_req.

15.4.2.1.3.1 Sending of original SS-migration profile(s)

When applicable, the group home SwMI MM shall send the original SS-migration profile(s) either immediately after sending the Profile update_req or after receiving Profile update_conf. The original SS-migration profile(s) shall be sent to ANF-ISIMM by using the SS-profile update_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group attachment_ind;

b) GSSI;

c) following conditional element(s) present information element shall be "Not present" and indicate that the MNI of the group and the MNI of the visited SwMI MM do not follow this information in the primitive;

d) profile type: the value shall be "group";

e) recovery: the value shall be "No recovery";

f) number of SS-migration profiles: the value shall indicate the number of following SS-migration profiles;

g) SS-migration profile (original): the One original SS-migration profile (original) shall contain one original SS-migration profile. The original SS-migration profile shall be the supplementary service profile that the group home SwMI MM requests to be used for the group in the visited SwMI (for the corresponding supplementary service). The profile shall contain the following information:

- SS-type: shall indicate the supplementary service to which the following SS-migration profile refers; see clause 34.2.85;
- SS-status: shall indicate if the supplementary service indicated in the first sub-element is supported or not for the group, and if supported whether the original SS-migration profile will be sent to the visited SwMI MM. The element shall have one of the following:
  - not supported: shall indicate that the supplementary service is not supported;
  - supported, with original SS-migration profile: shall indicate that the supplementary service is supported with the corresponding original SS-migration profile (i.e. the original SS-migration profile will be sent in the following SS-profile update_req); or
  - supported, without original SS-migration profile: without original SS-migration profile: shall indicate that the supplementary service is supported without the corresponding original SS-migration profile;
- SS-ISI-PROFILE, shall contain the ISI profile as defined for the indicated supplementary service in the corresponding sub-part of ETSI EN/ETS 300 392-12 [4];
- SS-migration profile (original) element shall be repeated as many times as needed to convey all the SS-migration profiles. However, the element shall appear at least once;

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2.1.3.2 Creation of SS-migration profile(s)

Upon receipt of the SS-profile update_ind (containing the same information as the corresponding SS-profile update_req) from ANF-ISIMM, the visited SwMI MM shall:

- verify that the received ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Group attachment_req;
- verify for each received original SS-migration profile that:
  - the supplementary service is supported for the group in the visited SwMI; and
  - the SS-migration profile is applicable for that supplementary service, see the corresponding sub-part of ETSI EN/ETS 300 392-12 [4].

If verification on the received original SS-migration profiles is successful, the visited SwMI MM shall create the corresponding SS-migration profile in one of the following ways:

- the original SS-migration profile shall be used as received from the group home SwMI MM, i.e. the supplementary service is supported for the group as requested by the group home SwMI;
- the temporary SS-migration profile shall be created and used for the duration that the group is attached in the visited SwMI MM. I.e. if the visited SwMI MM does not support the supplementary service for the individual subscriber as proposed by the group home SwMI MM but creates instead a temporary profile (temporary SS-migration profile) that shall be used. The reason for creating the temporary SS-migration profile may be e.g. that the visited SwMI MM cannot support the supplementary service as requested by the group home SwMI MM, that the visited SwMI MM restricts the use of the supplementary service for extended groups, etc.

NOTE: The term temporary migration profile, basic or SS-migration, is used for the profile which the visited SwMI MM sends to the group home SwMI MM; and

- the visited SwMI MM shall verify that the SS-migration profile is created for each supported supplementary service if required, see the corresponding supplementary service sub-part of ETSI EN/ETS 300 392-12 [4]. If not created when required, the supplementary service shall be considered as not supported for the group and updated accordingly to the basic migration profile of the group.

Then, the visited SwMI MM shall save the created SS-migration profile(s) to the G-VDB.

15.4.2.1.3.3 Sending of temporary SS-migration profile(s)

Upon creation of the SS-migration profiles, the visited SwMI MM shall send the SS-profile update_resp to ANF-ISIMM containing the created SS-migration profile(s) information. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Group attachment_req;

b) GSSI;

c) profile type: the value shall be "group";

d) recovery: the value shall be "No recovery";

e) number of not supported SSs: shall indicate the number of not supported SSs. The number shall be zero if no SS-migration profile(s) were required or, if required, and the creation was successful;

f) conditionally: SS-xx not supported indication, shall be present as many times as indicated by the "Number of not supported SSs". Each element shall identify one not supported supplementary service (as the creation of the mandatory SS-migration profile has failed). If present, this information shall override the information included in the Profile update_resp. The creation can have failed if e.g. the group home SwMI MM did not send the original SS-migration profile for the supplementary service;

NOTE 1: The SS-xx stands for any TETRA supplementary service.

g) number of SS-migration profiles: the value shall indicate the number of following SS-migration profiles;

h) SS-migration profile (temporary): shall contain the information of one created temporary SS-migration profile, if the corresponding original SS-migration profile was received. The information shall be as follows:

- SS-type: shall identify the TETRA supplementary service to which the following SS-migration profile refers; see clause 34.2.85;

- SS-profile response status, shall specify the relationship between the original SS-migration profile (received in the SS-profile update_ind) and the created temporary SS-migration profile. Shall be one of the following:

  - original SS-migration profile accepted as received, the original SS-migration profile is saved in the G-VDB as the SS-migration profile for that supplementary service;

  - original SS-migration profile redefined, contents not sent to the group home SwMI MM, the created temporary migration profile created does not equal the received original SS-migration profile. The contents of the created temporary SS-migration profile are not sent to the group home SwMI MM;

  - original SS-migration profile redefined, contents sent to the group home SwMI MM, the created temporary migration profile created does not equal the received original SS-migration profile. The contents of the created temporary SS-migration profile are sent to the group home SwMI MM; or

  - creation of the SS-migration profile failed: the creation of the SS-migration profile failed. If the SS-migration profile is needed for the supplementary service, the corresponding information in the SS-profile update_resp shall indicate that the supplementary service is not supported for the group;

- conditionally: SS-ISI-PROFILE, if the "SS-profile response status" has the value "Original SS-migration profile redefined, contents sent to the group home SwMI MM". Shall indicate the used temporary SS-migration profile. The element shall contain the ISI profile as defined for the indicated supplementary service in the corresponding sub-part of ETSI EN/ETS 300 392-12 [4];

NOTE 2: The rules to return a particular temporary SS-migration profile, if created, is supplementary service dependant and is defined in each supplementary service description, see ETSI EN/ETS 300 392-12 [4].

- SS-migration profile response element shall be repeated; there shall be as many SS-migration profile response elements in the SS-profile update_resp as there were SS-migration profile request elements in the SS-profile update_ind;

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2.1.3.4 Receipt of temporary SS-migration profile(s)

Upon receipt of the SS-profile update_conf (containing the same information as the corresponding SS-profile update_resp) from ANF-ISIMM, the group home SwMI MM shall:

- verify that the ANF-ISIMM invoke id is correct in the received primitive, i.e. the value is the same as in the received Group attachment_ind; and

- verify that the migration is allowed, i.e. that there is no reason to reject the migration based on the received temporary SS-migration profile(s).

In addition, the group home SwMI MM may save the temporary SS-migration profile(s) in the G-HDB. The saving and use of the temporary SS-migration profile(s) is optional in the group home SwMI.

15.4.2.2 Cases 2) to 4)

15.4.2.2.1 Updates to G-HDB

If the group home SwMI MM does not reject the group attachment, it may update the individual subscriber's group attachment and the time information of the attachment (used to determine the age of the attachment) to the G-HDB of the group.

The age of the recorded group attachment may be saved e.g. by updating the current real time or by using a relative time from which the group home SwMI MM shall be able to derive the elapsed time. The group home SwMI MM shall save the information in order to compare competing group attachment and group detachment (see clause 16) requests, if needed. This may take place e.g. if the group home SwMI MM receives one Group attachment_ind and one Group detachment_ind for the individual subscriber for one group from the visited SwMI MM.

15.4.2.2.2 Sending of group attachment approval

The group home SwMI MM shall send the Group attachment_resp to ANF-ISIMM indicating that the group home SwMI MM has approved the group attachment. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group attachment_ind;

b) GSSI;

c) First/Subsequent group attachment, which shall be "Subsequent group attachment";

d) Home/Visited SwMI MM initiated, which shall be "Visited SwMI MM initiated";

e) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

f) following conditional element(s) present information element shall be "Not present" and indicate that the used "Pre-defined profile set reference(s)" information do not follow this information in the primitive;

g) recovery: the value shall be "No recovery";

h) conditionally: age stamp, shall be included if the age of the recorded group attachment response is greater than zero, i.e. if the Group attachment_resp is not sent immediately upon completion of the group attachment act in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM completed the group attachment act; and

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2.2.3 Receipt of group attachment approval

Upon receipt of Group attachment_conf (containing the same information as the corresponding Group attachment_resp) from the ANF-ISIMM, the visited SwMI MM shall:

- verify that ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Group attachment_req;
- if the age stamp is included, verify that it indicates a newer age than the age of the individual subscriber's recorded detachment from the group, if such recording exists in the G-VDB;

NOTE 1: It is not mandatory to save the group detachment information in the databases after the group attachment has been removed, i.e. in the case of group detachment the attachment may be removed without saving the information that the group has been detached nor the time information of the detachment act. In addition, especially in the case of first group attachment as there is no existing record for the group in the G-VDB it is possible that there is no information of the previous detachments related to the group.

- complete the (MS initiated) AI group attachment service in order to grant the group attachment to the individual subscriber as defined in ETSI EN 300 392-2 [1], clause 15;

NOTE 2: The granting of the group attachment implies the following information in the D-ATTACH/DETACH GROUP IDENTITY ACKNOWLEDGEMENT PDU or the D-LOCATION UPDATE ACCEPT PDU:

  - "Group identity accept/reject" as "Attachment/detachment accepted"; and
  - "Group identity attach/detach type identifier" as "Attachment".

- update the individual subscriber as "attached" to the G-VDB record of the group; and
- save the current time for the age stamp purposes to the G-VDB record of the group in a way that the visited SwMI MM is able to determine the age of the individual subscriber's group attachment act at any time.

Then, the visited SwMI MM shall become idle.

15.4.2.3 Case 5)

15.4.2.3.0 General

Either the clause 15.4.2.3.1 or clause 15.4.2.3.2 is applicable depending on the received primitive as follows:

- if the received primitive is Group attachment_ind, clause 15.4.2.3.1 is valid; or
- if the received primitive is Profile update_ind, clause 15.4.2.3.2 is valid.

15.4.2.3.1 Group home SwMI MM initiated group attachment with pre-defined migration profile(s)

Upon receipt of the Group attachment_ind (containing the same information as the corresponding Group attachment_req) from the ANF-ISIMM, the visited SwMI MM shall:

- create the G-VDB record of the group;
- if the attached group is linked, then store the linked group GSSI and MNI in the G-VDB;
- create the basic and, if applicable, the SS-migration profile(s) of the group. The migration profile(s) shall be created based on the information as received from the group home SwMI MM in the Group attachment_ind. Thus, the first referenced pre-defined profile that is supported by the visited SwMI MM shall be used for the creation of the migration profile(s). If the creation of any of the SS-migration profiles fail in the visited SwMI and if the SS-migration profile is required for that supplementary service in the visited SwMI the supplementary service shall be considered as "not supported";
- save the created migration profile(s) to the G-VDB record of the group;
- assign a (V)GSSI for the group to be used in the visited SwMI, see ETSI EN 300 392-1 [2], clause 7;
- attach the individual subscriber to the group as defined in ETSI EN 300 392-2 [1], clause 16;
- update the individual subscriber's group attachment act to the G-VDB record of the group; and
- save the current time for the age stamp purposes to the G-VDB record of the group in a way that the visited SwMI MM is able to determine the age of the individual subscriber's group attachment act at any time.

Then, the visited SwMI MM shall send the Group attachment_resp to the ANF-ISIMM indicating that the group attachment has been successfully completed in the visited SwMI MM. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group attachment_ind;

b) GSSI;

c) First/Subsequent group attachment, which shall be "First group attachment";

d) Home/Visited SwMI MM initiated shall be "Home SwMI MM initiated";

e) ISSI of the individual subscriber that has been attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

f) following conditional element(s) present information element shall be "Present" and indicate that the used "Pre-defined profile set reference(s)" information follows this information in the primitive;

g) pre-defined profile reference, used set: the information shall contain the reference of the pre-defined migration profile set which has been used to create the migration profile of the group;

h) recovery: the value shall be "No recovery";

i) conditionally: age stamp, shall be included if the age of the recorded group attachment response is greater than zero, i.e. if the Group attachment_resp is not sent immediately upon completion of the group attachment act in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM completed the group attachment act;

j) optionally: the length of the PISN number of the visited SwMI MM and the PISN number. If included, the group home SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the group; and

NOTE 1: The PISN number may be used to indicate the preferred gateway to the group home SwMI MM if the visited SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of wide area SwMI.

k) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the Group attachment_conf (containing the same information as the corresponding Group attachment_resp) from the ANF-ISIMM, the group home SwMI MM shall update to the G-HDB record of the group the information that the group is attached in that visited SwMI, and if included in the Group attachment_conf, the PISN number of the visited SwMI MM to be used to cater for the group to the visited SwMI, e.g. when the group call is invoked.

In addition, the group home SwMI MM may save in the G-HDB record of the group:

- the information (e.g. the contents or the reference) of the pre-defined migration profile(s) that are used for the group; and
- the individual subscriber's attachment to the group.

The group home SwMI MM shall then check whether the attached group is linked or not. If the group is linked, the group linking controlling SwMI shall be informed of the new attachment as described in clause 18a before continuing.

15.4.2.3.2 Group home SwMI MM initiated group attachment with migration profile exchange

15.4.2.3.2.1 Creation of basic migration profile

Upon receipt of the Profile update_ind (containing the same information as the corresponding Profile update_req) from ANF-ISIMM, the visited SwMI MM shall create the basic migration profile for the group. The profile shall contain the service authorizations concerning the group in the visited SwMI. The visited SwMI MM shall create the basic migration profile in one of the following ways:

- the original migration profile shall be used as received from the group home SwMI MM, i.e. the services are supported for the group as requested by the group home SwMI;
- the temporary migration profile shall be created and used while the individual subscriber is in the visited SwMI. In this case the visited SwMI MM does not offer services for the group as proposed by the group home SwMI MM but creates a temporary profile that shall be used instead. The reason for creating the temporary migration profile may be e.g. that the visited SwMI MM cannot support the services as requested by the group home SwMI MM or that the visited SwMI MM restricts the use of its services for groups.

NOTE: The term temporary migration profile, basic or SS-migration, is used for the profile which the visited SwMI MM sends to the group home SwMI MM.

Then, the visited SwMI MM shall assign the (V)GSSI for the group as defined in ETSI EN 300 392-1 [2], clause 7, and save that and the created basic migration profile to the G-VDB.

15.4.2.3.2.2 Sending of temporary basic migration profile

As defined in clause 15.4.2.1.2.4 except that the following conditional element may be included as part of the temporary basic migration profile (before the information "Any type 3 element"): if the inclusion of the subscriber information in group profile is not supported the element "Subscriber information in group profile is not supported" shall be included with the value "Not supported".

15.4.2.3.2.3 Receipt of temporary basic migration profile

As defined in clause 15.4.2.1.2.5 except that:

- the ANF-ISIMM invoke id shall be the same as in the sent Profile update_req; and
- if the received Profile update_ind included the "Subscriber information" but the inclusion is not supported by the visited SwMI MM, the visited SwMI MM shall include the parameter "g) Subscriber information in group profile not supported" in the group basic migration profile in the Profile udpate_resp.

15.4.2.3.2.4 Sending of request for group attachment

The group home SwMI MM shall send the Group attachment_req to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Profile update_req;

b) GSSI of the group;

c) following conditional element(s) present information element shall be "Not present" and indicate that the MNI of the group and the MNI of the visited SwMI MM do not follow this information in the primitive;

d) First/Subsequent group attachment, which shall be "First group attachment";

e) Home/Visited SwMI MM initiated, which shall be "Home SwMI MM initiated";

f) profile exchange support, which shall be "Not supported";

g) subscriber information in group profile support, which shall be "Not supported";

h) ISSI of the individual subscriber to be attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

i) following conditional element(s) present information element shall be "Not present" and indicate that the preferred "Pre-defined profile set reference(s)" set information does not follow this information in the primitive;

j) following conditional element(s) present information element shall be "Not present" and indicate that the acceptable "Pre-defined profile set reference(s)" set information does not follow this information in the primitive;

k) recovery: the value shall be "No recovery";

l) conditionally: age stamp, shall be included if the age of the recorded group attachment request is greater than zero, i.e. if the Group attachment_req is not sent immediately upon initiation of the group attachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the AI group attachment service request or since it originally invoked the group attachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

m) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

15.4.2.3.2.5 Reception of group attachment

Upon receipt of the Group attachment_ind (containing the same information as the corresponding Group attachment_req) from the ANF-ISIMM, the visited SwMI MM shall:

- verify that ANF-ISIMM invoke id is correct, i.e. the value is the same as in the received Profile update_ind;
- attach the individual subscriber to the group as defined in ETSI EN 300 392-2 [1], clause 16;
- update the individual subscriber's attachment to the group to the G-VDB record of the group.

Then, the visited SwMI MM shall send the Group attachment_resp to the ANF-ISIMM indicating that the group attachment has been successfully completed in the visited SwMI MM. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Profile update_ind;

b) GSSI;

c) First/Subsequent group attachment, which shall be "First group attachment";

d) Home/Visited SwMI MM initiated, which shall be "Home SwMI MM initiated";

e) ISSI of the individual subscriber that has been attached to the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

f) following conditional element(s) present information element shall be "Not present" and indicate that the used "Pre-defined profile set reference(s)" information does not follow this information in the primitive;

g) recovery: the value shall be "No recovery";

h) conditionally: age stamp, shall be included if the age of the recorded group attachment response is greater than zero, i.e. if the Group attachment_resp is not sent immediately upon completion of the group attachment act in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM completed the group attachment act;

i) optionally: the length of the PISN number of the group home SwMI MM and the PISN number. If included, the visited SwMI MM shall save and use the PISN number for addressing purposes over the ISI to cater for the group; and

NOTE 1: The PISN number may be used to indicate the preferred gateway to the visited SwMI MM if the group home SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of wide area SwMI.

j) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, based on the value of the SS-migration profile indicator in the Profile update_ind, the visited SwMI MM shall become idle or wait for the SS-profile update_req.

Upon receipt of the Group attachment_conf (containing the same information as the corresponding Group attachment_resp) from the ANF-ISIMM, the group home SwMI MM shall update to the G-HDB record of the group the information that the group is attached in that visited SwMI.

In addition, the group home SwMI MM may save in the G-HDB record of the group:

- if included in the Group attachment_conf, the PISN number of the visited SwMI MM to be used to cater for the group to the visited SwMI, e.g. when the group call is invoked; and
- the individual subscriber's attachment to the group.

The group home SwMI MM shall then check whether the attached group is linked or not. If the group is linked, the group linking controlling SwMI shall be informed of the new attachment as described in clause 18a before continuing.

15.4.2.3.2.6 SS-migration profile(s) exchange

As defined in clause 15.4.2.1.3.

15.5 Exceptional procedures

15.5.0 General

This clause defines the exceptional procedures that shall be applied if the normal operation of the group attachment service fails. These exceptional procedures may be overridden by exceptional procedures that are included in an additional agreement which is made between the SwMI operators, see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional procedures that are applied within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked or continued at some point after invocation over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM etc.

Generally, if the Group attachment_resp and Group attachment_conf have been exchanged between the group home and the visited SwMI MMs the group attachment shall be granted for the individual subscriber in the AI and the databases shall be updated accordingly. However, if the operation fails before the exchange of the Group attachment_resp and the Group attachment_conf the ANF-ISIMM group attachment service shall be considered as rejected and the following shall take place:

- the rejection shall be indicated across the ISI in either one of the following ways:
  - if the rejection is detected by the group home SwMI MM it shall send the Group att reject_req to the ANF-ISIMM which shall deliver the corresponding Group att reject_ind to the visited SwMI MM, if possible; Then, the visited SwMI MM shall send the Group att reject_resp to the ANF-ISIMM which shall deliver the corresponding Group att reject_conf to the visited SwMI MM, if possible; or
  - if the rejection is detected by the visited SwMI MM it shall send the Group att reject_req to the ANF-ISIMM which shall deliver the corresponding Migration reject_ind to the visited SwMI MM, if possible. Then, the group home SwMI MM shall send the Group att reject_resp to the ANF-ISIMM which shall deliver the corresponding Group att reject_conf to the visited SwMI MM, if possible;
- the database updates as defined under normal operation shall be cancelled in the I-VDB in the I-HDB;
- if the visited SwMI MM rejects the group attachment upon receipt of the Profile update_ind, the Profile update_resp and the Profile update_conf shall not be sent.

The Group att reject_req (and the corresponding Group att reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the previously exchanged primitives of the service instance;

b) GSSI;

c) First/Subsequent group attachment, which shall be:
   - "First group attachment", if the requested group attachment would have been the first group attachment, i.e. in the Group att reject_req this implies that the group is currently not attached in the visited SwMI MM;
   - "Subsequent group attachment", if the requested group attachment would have been a subsequent group attachment, i.e. in the Group att reject_req this implies that the group is currently attached in the visited SwMI MM;

d) ISSI;

e) group attachment rejection cause, which shall be one of the following as applicable:
   - unknown error, a generic error cause, which shall be used when the other error causes are not applicable;
   - unknown individual subscriber e.g. the individual subscriber is not migrated in the visited SwMI, or there is no information of the individual subscriber in the I-HDB or in the I-VDB;

- unknown group, e.g. the group does not exist in the group home SwMI (detected by the group home SwMI) or the group is not attached in the visited SwMI in the case of "Subsequent group attachment" SwMI (detected by the visited SwMI);
- not authorized, e.g. if the individual subscriber is not authorized to attach to the group in the visited SwMI;
- unknown SwMI;
- temporary error;
- service not supported, e.g. service not supported for the individual subscriber or for the group;
- not reachable, i.e. the individual subscriber to be attached to the group is not reachable;
- individual subscriber rejection;
- age stamp mismatch, i.e. the age of the subscriber's attachment request is older than a group detachment related to the same individual subscriber;
- migration profile rejection, e.g. fatal migration profile error in the group migration profile; or
- unknown pre-defined profile set reference; and

f) recovery: the value shall be "No recovery";

g) conditionally: age stamp, shall be included if the age of the recorded group attachment rejection is greater than zero, i.e. if the Group att reject_req is not sent immediately upon completion of the group attachment rejection in the SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the SwMI MM rejected the group attachment act; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Both SwMI MM may send the Group att reject_req at any time after the Group attachment_req has been sent and before the Group attachment_resp has been sent. If the Group attachment_resp has been sent, the group detachment service shall be used to detach the individual subscriber from the group.

In the case of the rejection the SwMI MM that invoked the rejected service shall re-invoke the service until successfully completed. If these re-invocations do not result in successful completion of the service the individual subscriber's group attachment shall be rejected in the AI, if ongoing, as defined in ETSI EN 300 392-2 [1], clause 16.

If a temporary failure has caused the group attachment service to fail the Group Database fault Recovery (GDR) service should be invoked as described in clause 17 to ensure that the concerned G-VDB(s) and G-HDB are consistent.

15.5.1 Detected by the visited SwMI MM

If the visited SwMI MM detects an unrecoverable error in the received Profile update_ind or in the received SS-profile update_ind it shall send the Profile reject_req instead of Profile update_resp or SS-profile reject_req instead of SS-profile update_resp to the ANF-ISIMM, respectively. The ANF-ISIMM shall deliver the Profile reject_ind or SS-profile reject_ind to the group home SwMI MM. Then, the group home SwMI MM shall continue in one of the following ways:

- accept the group attachment by using the predefined migration profile(s).
- the group attachment_req shall be sent with the appropriate migration profile set reference as defined in clause 15.4 under the corresponding case. If exchanged across the ISI, the SS-migration profile(s) shall only be used if the referenced migration profile set does not contain the SS-migration profile of that supplementary service (which is supported for the group in the visited SwMI); or
- reject the group attachment as defined in clause 15.5, and e.g. the Group att reject_req shall be sent.

The Profile reject_req (and the corresponding Profile update_ind) or the SS-profile reject_req (and the corresponding SS-profile update_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the related Group attachment_req or Group attachment_ind;

b) GSSI;

c) profile rejection cause (in the case of Profile reject_req) or SS-profile rejection cause (in the case of SS-profile reject_req), which shall be one of the following (the values can be used only by the visited SwMI MM as the Profile reject_req and the SS-profile reject_req can be sent by the visited SwMI MM only):

   - unknown error, a generic error cause, which shall be used when the other error causes are not applicable;
   - temporary error;
   - service not supported, e.g. service not supported for the subscriber, for his fleet;
   - failed migration profile reception; or
   - SS-migration profile not applicable, if the SS-migration profile is not applicable for the particular supplementary service. Applicable for the SS-profile reject_req and SS-profile reject_ind; and

d) recovery: the value shall be "No recovery"; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the visited SwMI MM is not able to complete the individual subscriber's group attachment in the AI after the exchange of the Group attachment_resp and the Group attachment_conf, the visited SwMI MM shall invoke the group detachment service in order to indicate to the group home SwMI MM that the individual subscriber is not attached to the group in the visited SwMI MM.

15.5.2 Detected by the group home SwMI MM

Upon receipt of the Group attachment_ind from the ANF-ISIMM, the group home SwMI MM may reject the requested group attachment. The reason for the rejection may be e.g. that the individual subscriber is not allowed to attach to the group in the visited SwMI MM or that there is an unrecoverable error in the received Group attachment_ind. The rejection of the group attachment shall take place as defined in clause 15.5.

In addition, the group home SwMI MM may reject the individual subscriber's group attachment upon receipt of the Profile update_conf or the SS-profile update_conf. The migration may be rejected at this time if e.g. the visited SwMI MM does not support a particular basic or supplementary service. The rejection of the migration shall take place as defined in clause 6.6.

15.6 Interactions

In the case of successful or unsuccessful invocation and operation of the group attachment service, the following is valid for the interactions with the other ANF-ISIMM services:

- The group attachment service of different groups for one individual subscriber, i.e. if the individual subscriber is attached to several groups simultaneously: Shall be co-ordinated by the invoking SwMI MM and from the (ANF-ISIMM) group attachment service point of view these group attachment acts shall be invoked and co-ordinated independently across the ISI.

- The group attachment service of the same group for several individual subscribers, i.e. if the individual subscribers are attached to one group simultaneously: Shall be co-ordinated by the visited SwMI MM and from the (ANF-ISIMM) group attachment service point of view these group attachment acts shall be invoked and co-ordinated independently across the ISI. In addition, regardless of what was indicated in the Group attachment_req and _ind, the "First/Subsequent group attachment" information shall indicate whether the group attachment is the first or not in the visited SwMI MM after each successful group attachment and whether it would have been after each unsuccessful group attachment. Note, however, that the exchanged primitives can be received in different order from which they were sent (within a short period of time). Thus, e.g. if the group home SwMI MM receives two Group attachment_confs or one Group attachment_conf and one Group att reject_ind with one indicating "First group attachment" information, the group shall be considered as attached (even if the primitive indicating the "First group attachment" is not received first). However, if after these group attachments, the group detachment service has been successfully completed indicating last group detachment the group shall be considered as detached in the visited SwMI MM.

- The migration or the restricted migration service as defined in clauses 6 and 7, respectively: As defined in clause 15.4 the SwMI MM (visited or group home) that invokes the group attachment service shall verify that the individual subscriber is either migrated or the migration service has been invoked for him.

- If neither the migration nor the restricted migration is granted for the individual subscriber the visited SwMI MM shall reject the group attachment by sending the Group att reject_req (as defined in clause 15.5) if the Group attachment_resp has not been sent yet. If the Group attachment_resp has been sent both SwMI MMs shall remove the group attachment information related to the group attachment, if any, and the visited SwMI MM shall invoke the group detachment service across the ISI if the individual subscriber is the only recorded attached individual subscriber in the group.

- The group detachment service as defined in clause 16: The group attachments and group detachments shall be carried out as their age stamps indicate, if included, or if the age stamp is not included, in the order that they are received. If an age difference can be detected based the age stamp information, the older act is rejected.

- The de-registration service as defined in clause 9: As defined in clause 9, if the individual subscriber is de-registered, all his group attachments shall be removed locally in the group home and the visited SwMI MM. However, in the case of last detachment of the group, the visited SwMI MM shall invoke the group detachment service to the group home SwMI MM in order to indicate that the group is not any more attached in the visited SwMI MM.

The above mentioned rules shall be applicable also when one or both of the following is valid:

- the services are invoked by different SwMI MMs, e.g. one by the group home SwMI MM and one by the visited SwMI MM; and/or

- if co-ordination is needed or can be done for the AI purposes. E.g. if the AI group attachment service is invoked in conjunction with the AI migration (i.e. both services requested in the same U-LOCATION UPDATE PDU) the visited SwMI MM shall be responsible for waiting for the successful result of both services across the ISI before completing the corresponding services in the AI (sending the D-LOCATION UPDATE ACCEPT PDU to the migrating subscriber).

15.7 Dynamic description

Figures 25 and 26 contain the dynamic description of the group attachment service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the group home SwMI; and

- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the group attachment service:

- group attachment_req and Group attachment_ind: The primitives shall be used to request group attachment;

- group attachment_resp and Group attachment_conf: the primitives shall be used to acknowledge the group attachment request;
- group att reject_req and Group att reject_ind: the primitives shall be used to reject the group attachment request;
- profile reject_req and Profile reject _ind: the primitives shall be used to reject the group original basic migration profile;
- profile update_req and Profile update_ind: the primitives shall be used to provide the visited SwMI MM with the group original basic migration profile. In addition, the information flow shall indicate the invoked group home SwMI MM initiated first group attachment, when applicable;
- profile update_resp and Profile update_conf: the primitives shall be used to acknowledge the group original basic migration profile and provide the group home SwMI MM with the temporary original migration profiles, if defined;
- SS-profile reject_req and SS-profile reject_ind: the primitives shall be used to reject a the SS-migration profiles or the group home SwMI MM initiated first group attachment;
- SS-profile update_req and SS-profile update_ind: the primitives shall be used to provide the visited SwMI MM with the group SS-migration profiles; and
- SS-profile update_resp and SS-profile update_conf: the primitives shall be used to acknowledge the group original SS-migration profile and provide the group home SwMI MM with the temporary SS-migration profiles, if defined.

The following states shall be used for the group attachment service:

- IDLE: No group attachment in progress;
- WAIT-FOR-ATT-ACK-H: response to the group home SwMI MM initiated group attachment is expected;
- WAIT-FOR-ATT-H: the group home SwMI MM initiated group attachment request is expected;
- WAIT-FOR-PROFILE-ACK-H: response to basic migration profile is expected (the state is applicable for the group home SwMI MM initiated group attachment);
- WAIT-FOR-SS-PROFILES-H: original SS-migration profiles are expected (the state is applicable for the group home SwMI MM initiated group attachment);
- WAIT-FOR-SS-PROFILE-ACK-H: response to SS-migration profiles is expected (the state is applicable for the group home SwMI MM initiated group attachment);
- WAIT-FOR-ATT-ACK-V: response to the visited SwMI MM initiated group attachment is expected;
- WAIT-FOR-ATT-V: the visited SwMI MM initiated attachment request is expected;
- WAIT-FOR-PROFILE-V: original basic migration profile is expected (the state is applicable for the visited SwMI MM initiated group attachment);
- WAIT-FOR-PROFILE-ACK-V: response to basic migration profile is expected (the state is applicable for the visited SwMI MM initiated group attachment);
- WAIT-FOR-SS-PROFILES-V: original SS-migration profiles are expected (the state is applicable for the visited SwMI MM initiated group attachment); and
- WAIT-FOR-SS-PROFILE-ACK-V: response to SS-migration profiles is expected (the state is applicable for the visited SwMI MM initiated group attachment).

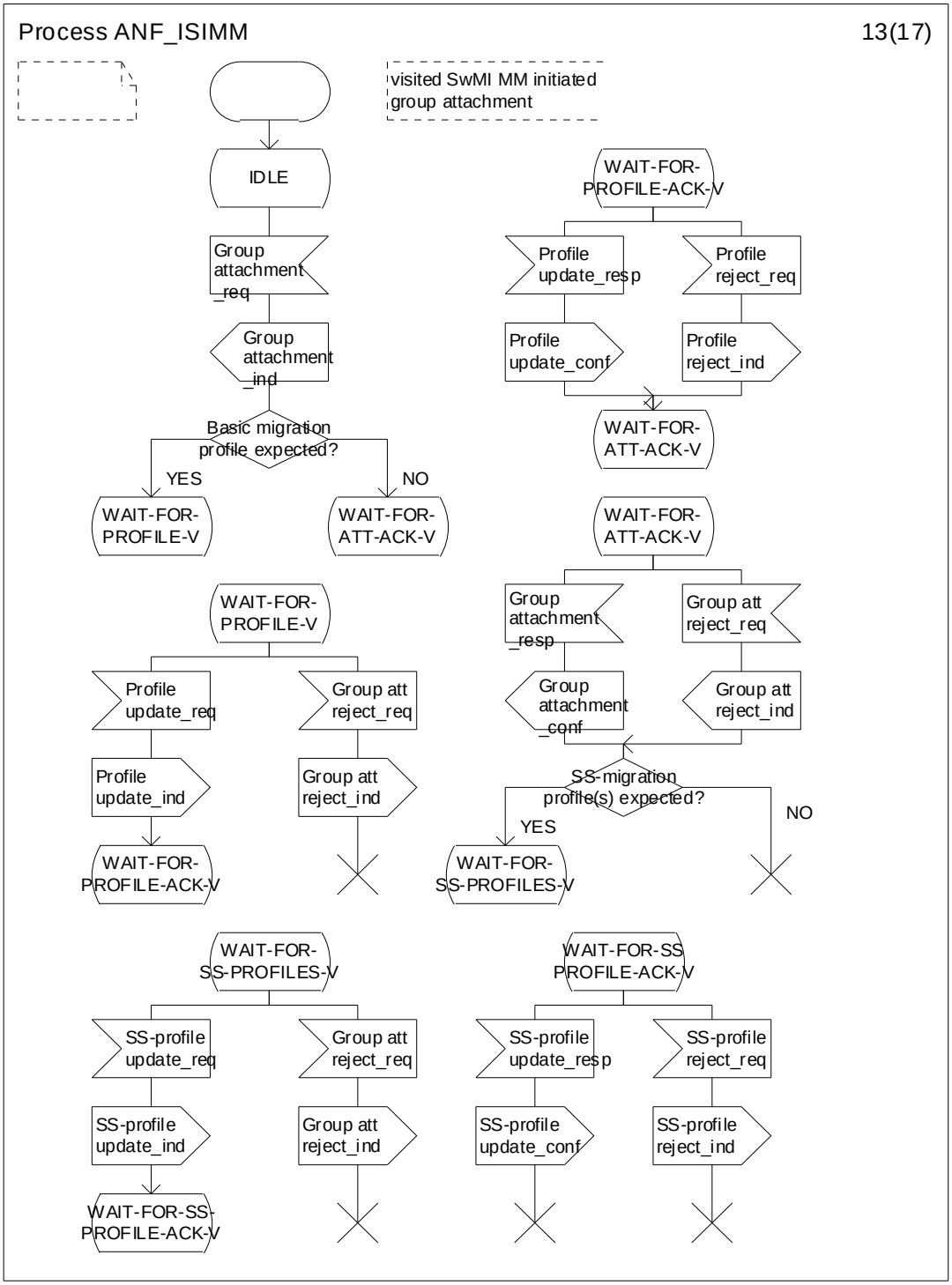


Figure 25: Stage 1 SDL description of the group attachment service when invoked from the visited SwMI MM

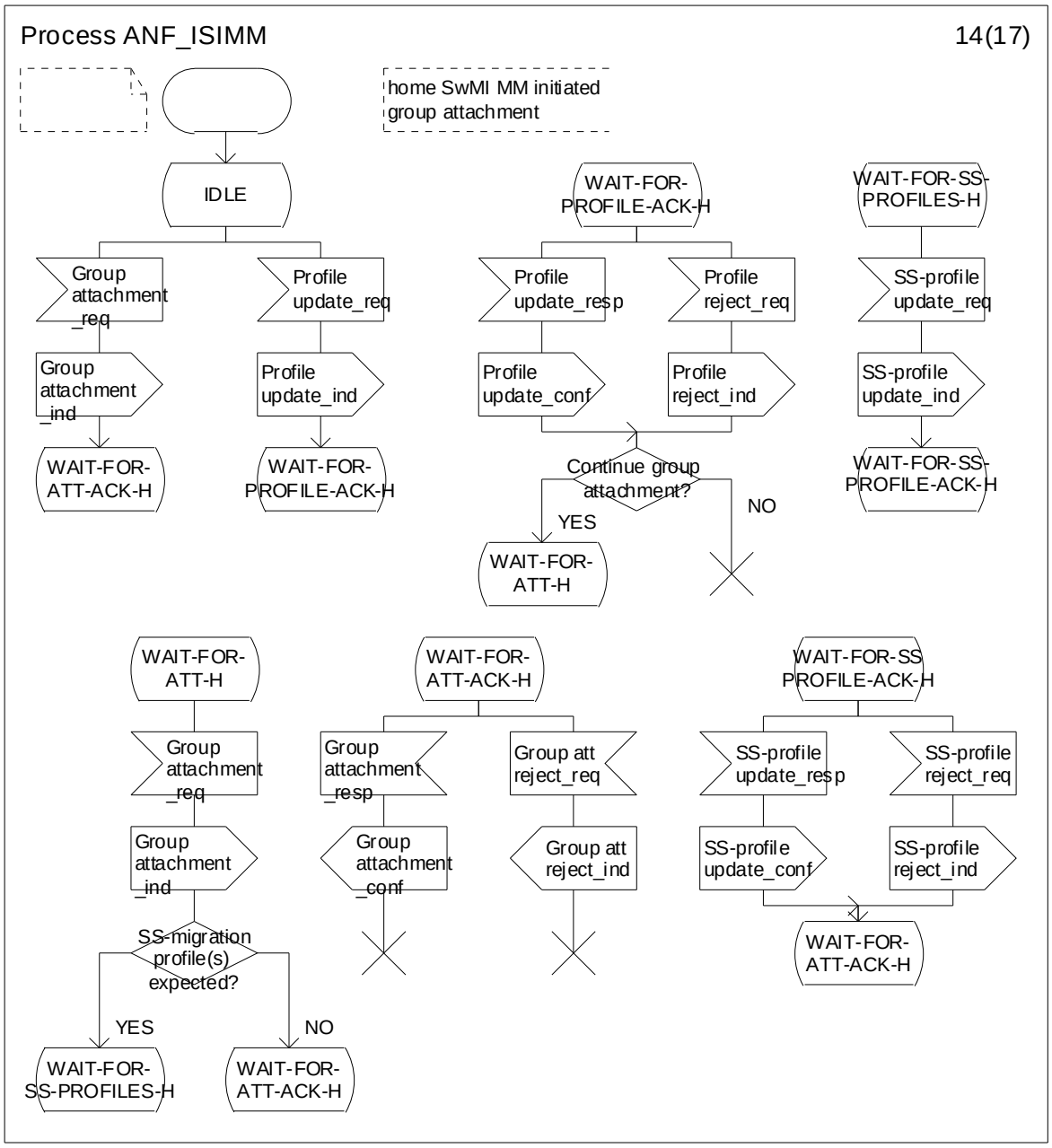


Figure 26: Stage 1 SDL description of the group attachment service when invoked from the group home SwMI MM

16 Group detachment service description (stage 1)

16.1 Service definition

The group detachment service as defined in this clause extends the AI group detachment service, see note 1, across the ISI. Consequently, the service either indicates that a group shall not be extended across the ISI or that a particular subscriber shall not participate the group calls in the visited SwMI or both.

NOTE 1: The term AI group detachment service refers to the attachment/detachment of group identities service and the subservice enabling the group attachment and detachment within the registration service as defined in ETSI EN 300 392-2 [1], clause 15, when these services are used to detach the individual subscriber from the group. The ANF-ISIMM services related to these AI services when they are used to attach the individual subscriber to the group are defined in clause 15.

NOTE 2: The ANF-ISIMM group detachment service removes the group attachments made using the group attachment service as defined in clause 15.

The service is supported between the visited SwMI MM in which the subscriber is or has been migrated and the group home SwMI MM.

NOTE 3: In the group management point of view the "visited SwMI" in clauses 16.1 to 16.7 means a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

16.2 Service description

The ISI group detachment is a conditional service for SwMI MMs. It shall be supported by a SwMI MM if the collocated SwMI CC supports Additional Network Feature - Inter-System Interface Group Call (ANF-ISIGC). If supported, the group detachment service shall be as defined in this clause.

The group detachment service shall enable the migrated subscriber's detachment from the group across the ISI as follows:

- from the visited SwMI MM to the group home SwMI MM:
  - last group detachment: If the group is not attached to any subscribers in the visited SwMI MM after the group detachment, the visited SwMI MM shall invoke the service across the ISI;
  - not last group detachment, if the basic migration profile of the group so indicates. The basic migration profile of the group is created as part of the group attachment service, see clause 15, and it may indicate that certain "not last" group detachments shall be invoked across the ISI, e.g. important group members' group detachments; and
- from the group home SwMI MM to the visited SwMI MM: The group home SwMI MM may invoke the service across the ISI in order to detach a migrated subscriber from the group. The group detachment may be the last or a "not last" group detachment.

For the description of the ISI group detachment the visited SwMI MM shall be any SwMI in which the affected subscriber is located. It may also be the home SwMI of the individual subscriber. Consequently the visited SwMI MM and the group home SwMI MM shall have different MNIs.

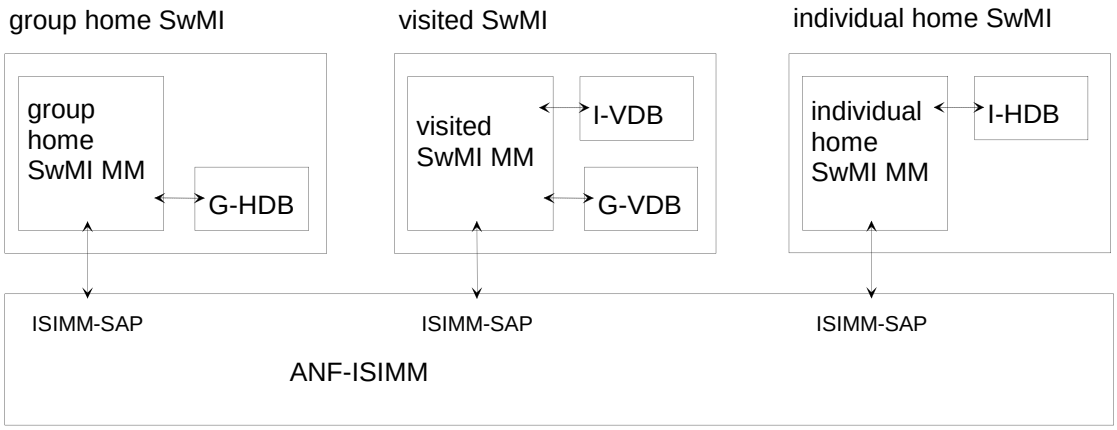
As part of the group detachment service, the migration profile(s) of the group shall be removed when the last subscriber is detached from the group in the visited SwMI MM.

Upon completion of the group detachment service, the group call shall not be invoked:

- in the visited SwMI CC to the subscriber that is detached from the group; and
- across the ISI to the visited SwMI CC after the last group detachment in the visited SwMI.

16.3 Service architecture

Figure 27 illustrates the service architecture of the group detachment service. The individual home SwMI and the group home SwMI may collocate.



NOTE: The arrows illustrate the information exchange routes of the service.

Figure 27: The service architecture of the group attachment service

16.4 Normal procedures

16.4.1 Invocation

16.4.1.0 General

ANF-ISIMM shall be invoked if any of the following takes place:

- the subscriber has requested the (MS initiated) AI group detachment service as defined in ETSI EN 300 392-2 [1], clause 16;
- in addition, when individual subscribers home SwMI and group home SwMI are collocated the individual subscriber's registration status shall be "registered, migrated" or "registered, restricted migration" in the I-VDB and he shall be recorded as attached to that group according to the G-VDB;

NOTE 1: When individual subscriber home SwMI invokes group detachment to a group of another SwMI for its subscriber that is not migrated, the migration service is not applicable.

- when the RSI or de-registration services are invoked, the visited SwMI MM and the group home SwMI MM shall remove the subscriber's group attachments, if any, from the collocated G-VDB and G-HDB, respectively (as defined in clauses 7 and 8). The visited SwMI MM shall invoke the group detachment service for the individual subscriber across the ISI towards the group home SwMI MM, if the subscriber was attached to a foreign group, and the group home SwMI MM shall remove the subscriber's group attachment. The visited SwMI MM shall invoke the group detachment service across the ISI if the group becomes detached in the visited SwMI MM. The group becomes detached when the last individual subscriber is detached from it;
- optionally, the individual subscriber or group home SwMI MM may invoke the group detachment service across the ISI in order to detach a migrated subscriber from the group. In this case, when individual subscriber home SwMI and group home SwMI are collocated the individual subscriber's registration status shall be "registered, migrated" or "registered, restricted migration" in the I-HDB and the associated location information refers to the visited SwMI;
- optionally, the request may be initiated by the visited SwMI MM due to a special agreement made between the group home SwMI and the visited SwMI MM operators. These possible special agreements are outside the scope of the present document.

Upon initiation of the group detachment service, the following cases are identified and the related actions are defined in this clause:

1) a request for group detachment has been initiated in a visited SwMI, and as a result, the group becomes detached in the visited SwMI MM;

2) a request for group detachment has been initiated in a visited SwMI, the migration profile of the group indicates that every group detachment shall be sent to group home SwMI MM;

3) a request for group detachment has been initiated in a visited SwMI, the migration profile of the group indicates that the subscriber is an important member of the group;

4) a request for group detachment has been initiated in the group home SwMI and individual subscriber home SwMI and group home SwMI are collocated and analysis of the individual subscriber's I-HDB record shows that the individual subscriber to be detached from the group shall have the migration or restricted migration service successfully completed. The migration or restricted migration is successfully completed if the registration status is "registered, migrated" or "registered, restricted migration" in the I-HDB and if the associated location information refers to the visited SwMI;

5) a request for group detachment has been initiated in the group home SwMI and analysis indicate that a subscriber or subscribers are attached to that group in the other SwMI.

NOTE 2: In the case 4) the group home SwMI and the individual subscriber home SwMI are the same SwMI.

NOTE 3: In cases 2) to 4), the group detachment may or may not be the last group detachment in the visited SwMI MM.

NOTE 4: In the case 5) the affected subscriber may belong to the group home SwMI or to a foreign SwMI and the other SwMI may be individual subscriber home SwMI or visited SwMI.

If the group attachment service is supported by the SwMI MM, the support of cases 1) to 3) is mandatory; the support of cases 4) and 5) are optional.

16.4.1.1 Void

16.4.1.2 Invocation of ANF-ISIMM

16.4.1.2.1 Cases 1) to 3)

In cases 1) to 3) if the group detachment invocation criteria is met, the visited SwMI MM shall invoke ANF-ISIMM by issuing the Group detachment_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and operation of the service (serving one group detachment act);

b) GSSI of the group;

c) MNI of the group;

d) MNI of the visited SwMI MM;

e) Last/Not last group detachment, which shall be either:

- "Last group detachment" if the group has become detached in the visited SwMI; or

- "Not last group detachment" if the group is still attached to one or more subscribers in the visited SwMI;

f) ISSI of the individual subscriber to be detached from the group and following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

g) recovery: the value shall be "No recovery";

h) conditionally: age stamp, shall be included if the age of the recorded group detachment request is greater than zero, i.e. if the Group detachment_req is not sent immediately upon initiation of the group detachment in the visited SwMI MM. If included, the age stamp shall indicate the time in seconds that has elapsed since the visited SwMI MM received the AI group detachment service request or since it originally invoked the group detachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

16.4.1.2.2 Cases 4) and 5)

In case 4) if the group detachment invocation criteria is met, the group home SwMI MM shall invoke ANF-ISIMM by issuing the Group detachment_req. The primitive shall contain the following information:

a) ANF-ISIMM invoke id: the group home SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and operation of the service (serving one group detachment act);

b) GSSI of the group;

c) MNI of the group;

d) MNI of the visited SwMI MM;

e) Last/Not last group detachment, which shall be either:

- "Last group detachment" if the group will become detached in the visited SwMI; or

- "Not last group detachment" if the group will still be attached to one or more subscribers in the visited SwMI after this detachment;

f) ISSI of the individual subscriber to be detached from the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present (case 5), otherwise it shall be set to "Not present" (case 4);

g) recovery: the value shall be "No recovery";

h) conditionally: age stamp, shall be included if the age of the recorded group detachment request is greater than zero, i.e. if the Group detachment_req is not sent immediately upon initiation of the group detachment in the visited SwMI MM. If included, the age stamp shall indicate the time in seconds that has elapsed since the visited SwMI MM received the AI group detachment service request or since it originally invoked the group detachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

16.4.2 Operation

16.4.2.1 Cases 1) to 3)

Upon receipt of the Group detachment_ind (containing the same information as the corresponding Group detachment_req) from the ANF-ISIMM, the group home SwMI MM shall validate the group detachment. Then, if the group home SwMI MM does not reject the group detachment the group home SwMI MM shall continue the operation of the service as follows:

- if the individual subscriber's group attachment is saved in the G-HDB, remove it. In addition, the individual subscriber's group detachment act and its age information may be saved in the G-HDB. If saved, it may be used, e.g. for the operation and maintenance purposes and in the case of GDR, see clause 17; and

- if the received Group detachment_ind indicated "Last group detachment" and the group is linked and the group home SwMI is the linked participating SwMI, the group linking controlling SwMI shall be informed of the detachment as described in clause 18b before continuing; and

- if the received Group detachment_ind indicated "Last group detachment", the information that the group is attached in the visited SwMI, the visited SwMI MNI and, if any, the visited SwMI PISN number shall be removed from the G-HDB.

Then, the group home SwMI MM shall send the Group detachment_resp to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group detachment_ind;

b) GSSI of the group;

c) Last/Not last group detachment, which shall be either:

- "Last group detachment" if the group has become detached in the visited SwMI; or

- "Not last group detachment" if the group is still attached to one or more subscribers in the visited SwMI;

d) ISSI of the individual subscriber that has been detached from the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

e) recovery: the value shall be "No recovery";

f) conditionally: age stamp, shall be included if the age of the recorded group detachment request is greater than zero, i.e. if the Group detachment_resp is not sent immediately upon completion of the group detachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM completed the group detachment act or since it originally invoked the group detachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the group home SwMI MM shall become idle.

Upon receipt of the Group detachment_conf (containing the same information as the corresponding Group detachment_resp) from the ANF-ISIMM, the visited SwMI MM shall:

- verify that ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Group detachment_req;

- complete the (MS initiated) AI group detachment by granting the group detachment to the individual subscriber as defined in ETSI EN 300 392-2 [1], clause 16;

- remove the individual subscriber's group attachment from the G-VDB, it. In addition, the individual subscriber's group detachment act and its age information may be saved in the G-VDB. If saved, it may be used, e.g. for the operation and maintenance purposes and in the case of GDR, see clause 17; and

- if the group become detached in the visited SwMI, remove the G-VDB record of the group and free the (V)GSSI allocated for the group in the visited SwMI.

Then, the visited SwMI MM shall become idle.

16.4.2.2 Cases 4) and 5)

Upon receipt of the Group detachment_ind (containing the same information as the corresponding Group detachment_req) from the ANF-ISIMM, the visited SwMI MM shall validate the group detachment. Then, if the visited SwMI MM does not reject the group detachment the visited SwMI MM shall continue the operation of the service as follows:

- invoke the (SwMI initiated) AI group detachment and detach the group from the individual subscriber as defined in ETSI EN 300 392-2 [1], clause 16;

- remove the individual subscriber's group attachment from the G-VDB, it. In addition, the individual subscriber's group detachment act and its age information may be saved in the G-VDB. If saved, it may be used, e.g. for the operation and maintenance purposes and in the case of GDR, see clause 17; and

- if the group becomes detached in the visited SwMI and the group is linked and the group home SwMI is the linked participating SwMI, the group linking controlling SwMI shall be informed of the detachment as described in clause 18b before continuing; and

- if the group becomes detached in the visited SwMI the G-VDB of the group shall be removed and the (V)GSSI allocated for the group shall be freed.

Then, the visited SwMI MM shall send the Group detachment_resp to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Group detachment_ind;

b) GSSI of the group;

c) Last/Not last group detachment, which shall be either:

   - "Last group detachment" if the group has become detached in the visited SwMI; or

   - "Not last group detachment" if the group is still attached to one or more subscribers in the visited SwMI;

d) ISSI of the individual subscriber that has been detached from the group and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

e) recovery: the value shall be "No recovery";

f) conditionally: age stamp, shall be included if the age of the recorded group detachment request is greater than zero, i.e. if the Group detachment_req is not sent immediately upon initiation of the group detachment in the visited SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the visited SwMI MM received the AI group detachment service request or since it originally invoked the group detachment across the ISI (if this service invocation is a re-invocation, e.g. due to a temporary error); and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM shall become idle.

Upon receipt of the Group detachment_conf (containing the same information as the corresponding Group detachment_resp) from the ANF-ISIMM, the group home SwMI MM shall:

- verify that ANF-ISIMM invoke id is correct, i.e. the value is the same as in the sent Group detachment_req;

- if the individual subscriber's group attachment is saved in the G-HDB, remove it. In addition, the individual subscriber's group detachment act and its age information may be saved in the G-HDB. If saved, it may be used, e.g. for the operation and maintenance purposes and in the case of GDR, see clause 17; and

- if the received Group detachment_ind indicated "Last group detachment", the information that the group is attached in the visited SwMI, the visited SwMI MNI and, if any, the visited SwMI PISN number shall be removed from the G-HDB.

Then, the group home SwMI MM shall become idle.

16.5 Exceptional procedures

This clause defines the exceptional procedures that shall be applied if the normal operation of the group detachment service fails. These exceptional procedures may be overridden by an additional agreement between the SwMI operators (that cover the exceptional situation).

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM so that the service cannot be invoked over the ISI, if the service cannot be continued over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM etc.

Generally, the group detachment database actions as defined under the normal operation shall be carried out:

- if the Group detachment_resp and the corresponding Group detachment_conf has been exchanged between the group home and the visited SwMI MMs; or

- if the operation of the group detachment service is completed in the visited SwMI MM except that the sending of the Group detachment_resp and/or of the Group detachment_conf fails.
- if neither of the above mentioned conditions is met, the following exceptional procedure shall take place:
  - the SwMI MM that detects the error shall send the Group det reject_req to the ANF-ISIMM which shall deliver the corresponding Group det reject_ind to the group home SwMI MM, if possible; and
  - the database updates as defined under normal operation shall be cancelled.

The Group det reject_req (and the corresponding Group det reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the exchanged Group detachment_req and Group detachment_ind;

b) GSSI;

c) Last/Not last group detachment, which shall be either:
   - "Last group detachment" if the group is currently not attached in the visited SwMI; or
   - "Not last group detachment" if the group is currently still attached to one or more subscribers in the visited SwMI;

d) ISSI and the following conditional element(s) present information element shall be set to "Present", if the MNI of the individual subscriber is also present, otherwise it shall be set to "Not present";

e) group detachment rejection cause, which shall be one of the following:
   - unknown error, a generic error cause, which shall be used when the other error causes are not applicable;
   - unknown individual subscriber e.g. the individual subscriber is not migrated or is not in the visited SwMI, or there is no information of the individual subscriber in the I-HDB or in the I-VDB;
   - unknown group, e.g. the group does not exist in the group home SwMI (detected by the group home SwMI) or the group is not attached in the visited SwMI (detected by the visited SwMI);
   - the individual subscriber is not authorized to detach from the group;
   - unknown SwMI;
   - temporary error;
   - service not supported, e.g. service not supported for the individual subscriber or for the group;
   - the individual subscriber to be detached from the group is not reachable;
   - the individual subscriber rejects the group detachment; or
   - the age of the individual subscriber's detachment request is older than a group attachment related to the same individual subscriber; and

f) recovery: the value shall be "No recovery";

g) conditionally: age stamp, shall be included if the age of the recorded group detachment rejection is greater than zero, i.e. if the Group det reject_req is not sent immediately upon completion of the group detachment rejection in the SwMI MM. If included, the age stamp shall indicate in seconds the time that has elapsed since the SwMI MM completed the group detachment act; and

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, if the exceptional procedure has been carried out the invoking SwMI MM shall re-invoke the service until the service is successfully completed.

If a temporary failure has caused the group detachment service to fail the GDR service should be invoked as described in clause 17 to ensure that the concerned G-VDBs and G-HDBs are consistent.

Upon receipt of the Group detachment_ind, the SwMI MM shall respond positively as defined under normal operation if either of the following take place, by sending:

- if not last group detachment is requested, there is no recorded group attachment in the G-VDB for the requested ITSI; or
- if last group detachment is requested, there is no G-VDB record for the group attachment in the G-VDB for the requested GTSI.

If MNI of the individual subscriber is not known to the visited SwMI MM, if the visited SwMI MM detects an unrecoverable error in the received Group attachment_ind or if the RSI cannot be carried out due to any other reason in the visited SwMI MM, the visited SwMI MM shall reject the service as defined above.

16.6 Interactions

In the case of successful or unsuccessful invocation and operation of the group detachment service, the following is valid for the interactions with the other ANF-ISIMM services:

- The group detachment service of different groups for one individual subscriber, i.e. if the individual subscriber is detached from several groups simultaneously: Shall be co-ordinated by the group home SwMI MMs and from the (ANF-ISIMM) group detachment service point of view these group detachment acts shall be invoked and co-ordinated independently across the ISI.
- The group detachment service of the same group for several individual subscribers, i.e. if the individual subscribers are detached from one group simultaneously: Shall be co-ordinated by the visited SwMI MM and from the (ANF-ISIMM) group detachment service point of view these group detachment acts shall be invoked and co-ordinated independently across the ISI. In addition, regardless of what was indicated in the Group detachment_req and _ind, the "Last/Not last group detachment" information shall indicate whether the group is attached not after each successful or unsuccessful group detachment. Note, however, that the exchanged primitives can be received in different order from which they were sent within a very short period of time. Thus, if the group home SwMI MM receives a Group detachment_conf or Group det reject_ind with "Last group detachment" information, the group shall be considered as detached (even if a Group detachment_conf or Group det reject_ind with "Not last group detachment" information is received after that) unless a group attachment service has been successfully completed after the receipt of the primitive indicating the last group detachment.
- The group attachment service as defined in clause 15: As defined in clause 15.6 the group attachments and group detachments shall be carried out as their age stamps indicate, if included, or if the age stamp is not included, in the order that they are received. If an age difference can be detected based the age stamp information, the older act is rejected.

The de-registration service as defined in clause 9: As defined in clause 9, if the individual subscriber is de-registered, all his group attachments shall be removed locally in the individual subscriber home and the visited SwMI MM. However, in the case of last detachment of the group, the visited SwMI MM shall invoke the group detachment service to the group home SwMI MM in order to indicate that the group is not any more attached in the visited SwMI MM. If the visited SwMI MM identifies that the de-registered subscriber is attached to a group in another than its individual subscriber home SwMI, the visited SwMI shall invoke group detachment of than subscriber to the group home SwMI MM. The above mentioned rules shall be applicable also when one or both of the following is valid:

- the services are invoked by different SwMI MMs, e.g. one by the individual subscriber or group home SwMI MM and one by the visited SwMI MM; and/or
- if co-ordination is needed or can be done for the AI purposes. E.g. if the AI group detachment service is invoked in conjunction with the AI migration (i.e. both services requested in the same U-LOCATION UPDATE PDU) the visited SwMI MM shall be responsible for waiting for the successful result of both services across the ISI before completing the corresponding services in the AI (sending the D-LOCATION UPDATE ACCEPT PDU to the migrating subscriber).

16.7 Dynamic description

Figure 28 contains the dynamic description of the group detachment service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the group home SwMI MM;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI MM.

The following service primitives shall be applicable for the group attachment:

- group detachment_req and Group detachment_ind: the primitives shall be used to request and indicate group detachment;
- group detachment_resp and Group detachment_conf: the primitives shall be used to acknowledge the group detachment request; and
- group det reject_req and Group det reject_ind: the primitives shall be used to reject the group detachment request.

The following states shall be used for the group detachment service:

- IDLE: no group detachment in progress;
- WAIT-FOR-GROUP-DET-ACK-FROM-H: response to the visited SwMI MM initiated group detachment request is expected from the group home SwMI MM; and
- WAIT-FOR-GROUP-DET-ACK-FROM-V: response to the group home SwMI MM initiated group detachment request is expected from the visited SwMI MM.

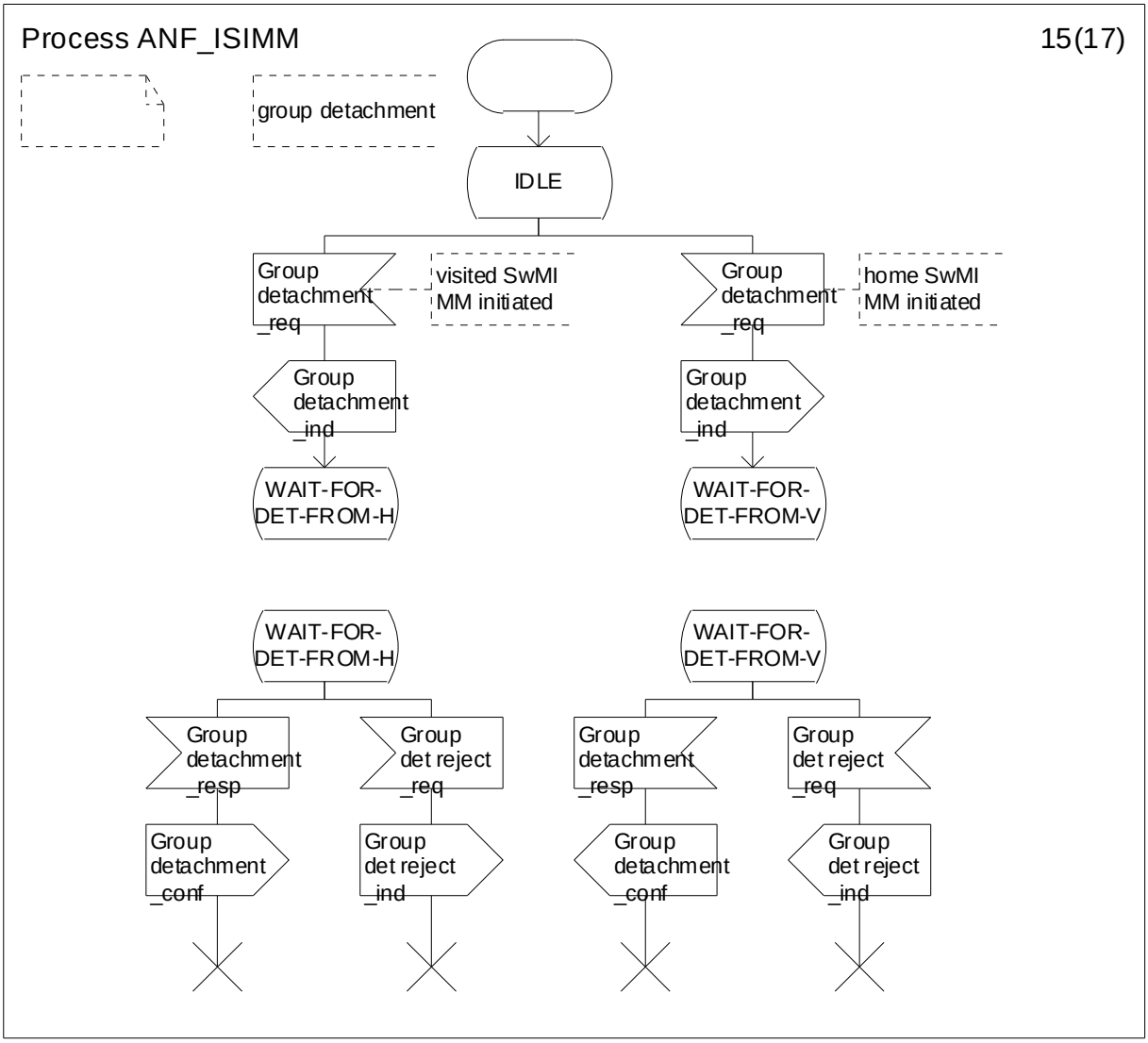


Figure 28: Stage 1 SDL description of the group detachment service

17 Group Database Recovery (GDR) service description - stage 1

17.1 Service definition

The GDR service enables the recovery of the group data in databases between SwMIs.

NOTE: In the group management point of view the "visited SwMI" in clauses 17.2 to 17.6 means a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

17.2 Service description

The GDR service as defined in this clause is a conditional service for SwMI MMs that support ANF-ISIMM. It shall be supported for the SwMI MM if the collocated SwMI CC supports Additional Network Feature - Inter-System Interface Group Call (ANF-ISIGC). If supported, the GDR service shall be as defined in this clause.

NOTE 1: The ANF-ISIGC is defined in EN 300 392-3-3 [16].

The GDR service shall enable both of the following across the ISI:

- The SwMI MM to recover the inconsistent group information in their databases after a faulty situation:
  - The service shall be invoked after a faulty situation which may be a full or partial system, database or connection close-down (crash). It shall be any faulty situation that have affected directly or indirectly the database services so that the group information distributed in the databases in the different SwMIs is not correct.
- The SwMI MM the means to verify (e.g. periodically) that the group information is consistent in the SwMI databases across the ISI.

The service is defined between two SwMI MMs in this clause. These two SwMI MMs shall be the invoking SwMI MM and the invoked SwMI MM and they shall carry out the service as a collaborating pair. There shall be as many of these pairs as there are SwMI MMs connected to the invoking SwMI MM, unless it is certain that the recovery is not needed across certain ISI(s). From the GDR service point of view the different collaborating pairs operate independently from each other.

The service shall comprise both of the following:

- G-HDR service: the service recovers the G-HDB e.g. if it has been affected by a fault situation;
- G-VDR service: the service recovers the G-VDB e.g. if it has been affected by a fault situation.

NOTE 2: It is possible, that the SwMI MM initiates the HMM and the VMM recovery at the same time. This is needed if both the G-VDB and the G-HDB in the SwMI are affected by the faulty situation.

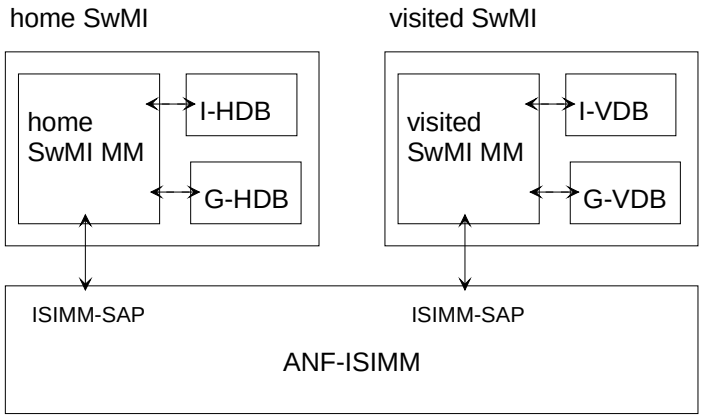
The GDR service shall apply the group attachment and the group detachment services as defined in the present document with the amendments as defined in this clause.

17.3 Service architecture

Figure 29 illustrates the service architecture of the GDR service.

NOTE 1: In the figure 29 the home SwMI is the group home SwMI.

NOTE 2: The group home SwMI contains the I-HDB only, when it is also the individual subscriber home SwMI.



NOTE: The arrows illustrate the information exchange routes of the service.

Figure 29: The service architecture of the GDR service

17.4 Normal procedures

17.4.1 Invocation

17.4.1.1 Invocation criteria

The GDR shall be invoked as defined in the following two cases:

1) G-HDR shall be invoked if both of the following are valid:

   - if there is a need to invoke the service, i.e. if either of the following is valid:

     - if there is a risk that the group information saved in the G-HDB is not consistent with the G-VDB of another SwMI; or

     - in order to verify (e.g. periodically) that the group information in the G-HDB is consistent with the G-VDB of another SwMI; and

   - if the following G-HDB information is available for each group:

     - the group numbers to be recovered (GSSIs);

     - the migration profile(s), basic and SS, of the groups; and

     - either as part of the group profile information or separately: the members of the groups and the group attachment right information.

2) G-VDR shall be invoked if both of the following are valid:

   - if there is a need to invoke the service, i.e. if either of the following is valid:

     - if there is a risk that the group information saved in the G-VDB is not consistent with the G-HDB of the group home SwMI; or

     - in order to verify (e.g. periodically) that the group information saved in the G-VDB is consistent with the G-HDB of the group home SwMI; and

   - if the following G-VDB information is available: At last the copy shall contain at least the GTSIs of the groups and the group attachment information, i.e. the ITSIs of the attached individual subscribers). If possible, the age stamp information of the group attachment acts shall be restored.

As stated before, the GDR service shall be invoked separately between the invoking SwMI MM and every SwMI MMs which share the ISI with the invoking SwMI MM if the above mentioned conditions are met.

17.4.1.2 Invocation of ANF-ISIMM

In case 1) the group home SwMI MM shall start the G-HDR as follows:

- the group home SwMI MM shall prepare the G-HDB ready for the G-HDR. Thus, it shall restore the latest reliable copy of the G-HDB or if such copy is not available the G-HDB records shall be cleared. If the G-HDB records are cleared, they shall be created with the following information: the group numbers to be recovered (GSSIs); the migration profile(s), basic and SS, of the groups; the members of the groups and the group attachment right information (i.e. who is allowed to attach to the group).

NOTE 1: It is assumed that each G-HDB knows its MNI.

However, the group home SwMI MM shall be able to provide the following information in the case of HMM recovery:

- if available, the real age of the migration which has been made in the visited SwMI MM; or
- if the age of the migration is not reliably available in the group home SwMI MM, an age that is "old enough": The "old enough" age shall not be less than the real age, but may be more than the real age if the exact age cannot be determined. If the group home SwMI MM is not able to determine the real age the special "maximum age" shall be used. In other words, the "maximum age" shall be used if nothing else is available;

- the group home SwMI MM shall invoke ANF-ISIMM by issuing the HMM recovery_req with the following information:

  a) ANF-ISIMM invoke id: the group home SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and the operation of the service (carrying out one G-HDR);

  b) recovery type: group, i.e. the recovery recovers group data (opposed to individual subscriber);

  c) MNI of the invoking SwMI: the MNI of the group home SwMI MM;

  d) MNI of the invoked SwMI: the MNI of the visited SwMI MM; and

  e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

In case 2) the visited SwMI MM shall start the G-VDR as follows:

- the visited SwMI MM shall prepare the G-VDB ready for the G-VDR. Thus, it shall restore the latest reliable copy of the G-VDB. The copy shall contain at least the following information of the groups: the GTSI of the group and the group attachment information, i.e. the ITSIs of the attached individual subscribers). If possible, the age stamp information of the group attachment acts shall be restored;

NOTE 2: As the G-VDB is used as starting point to detect whether the individual subscriber is attached to a group a restored copy of the G-VDB is needed. The information in the restored G-VDB need not be fully up-to-date as long as the age or time stamps are valid, see below. Consequently, the G-VDB information is validated and, if needed, corrected during the VMM recovery.

NOTE 3: The G-VDR is able to retrieve the group attachments which are sent to the group home SwMI MM and saved in the G-HDB. Consequently, the visited SwMI MM may complement the G-VDR by the AI actions as defined in ETSI EN 300 392-2 [1], clause 16, e.g. by using the group reporting in order to improve the reliability of its knowledge of the individual subscriber's group attachment(s).

- the visited SwMI MM shall invoke ANF-ISIMM by issuing the VMM recovery_req with the following information:

  a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and the operation of the service (carrying out one G-VDR);

  b) recovery type: recovery type: group, i.e. the recovery recovers group data (opposed to individual subscriber);

  c) MNI of the invoking SwMI: the MNI of the visited SwMI MM;

  d) MNI of the invoked SwMI: the MNI of the group home SwMI MM; and

  e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

17.4.2 Operation

17.4.2.0 General

This clause is applicable for cases 1) and 2) unless otherwise stated.

17.4.2.1 Verification of age information

It is assumed that the SwMI MMs save the age or the time related to the group attachment acts and, optionally, to the group detachment acts in the collocated I-HDB and I-VDB. However, the SwMI MM may need to invoke the GDR when its capabilities to retrieve the age information has been affected, and thus, it may not be able to derive the correct age of some or all of the recorded group attachment acts. However, in the case of G-HDR (case 1)), the group home SwMI MM shall be able to provide the information as follows for each group attachment (which has not been removed):

- if available, the real age of the group attachment which has been made in the visited SwMI MM; or
- if the age of the group attachment is not reliably available in the group home SwMI MM, an age that is "old enough": the "old enough" age shall not be less than the real age, but may be more than the real age if the exact age cannot be determined. If the group home SwMI MM is not able to determine the real age the special "maximum age" shall be used. In other words, the "maximum age" shall be used if nothing else is available.

However, in the case of G-VDR (case 2)), the visited SwMI MM shall be able to provide the information as follows for each group attachment (which has not been removed):

- if available, the real age of the group attachment which has been made in a visited SwMI MM; or
- if the age of the group attachment is not reliably available in the visited SwMI MM, an age that is "old enough": The "old enough" age shall not be less than the real age, but may be more than the real age if the exact age cannot be determined. If the visited SwMI MM is not able to determine the real age the special "maximum age" shall be used.

Depending on the implementation, the ensuring of the correctness of the age stamp information may be done e.g. in one of the following ways:

- if absolute time is saved to indicate the age in the acts, that information shall be used as it is recorded;
- if relative time is used, it shall be ensured that the needed age difference additions shall be made as applicable to ensure that the age information is either correct or not less than the true age of the acts. Thus, the SwMI MM shall ensure that the duration of the faulty situation is included in the time information. In addition, the length of the interval for saving the back up copies may need to be added to the ages, too, if such back up copy is used and if it is likely that the faulty situation did not start imminently after the back up copy was saved.

17.4.2.2 The visited SwMI MM receives the G-HDR indication

This clause is applicable only for case 1).

Upon receipt of the HMM recovery_ind (containing the same information as the corresponding HMM recovery _req) from the ANF-ISIMM, the visited SwMI MM shall record the ANF-ISIMM invoke id and verify that it can support the G-HDR service. The visited SwMI MM shall be able to support the G-HDR service if the G-VDB is in a consistent state.

Then, the visited SwMI MM shall send the HMM recovery_resp to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery_ind;

b) recovery type: group, i.e. the recovery recovers group data (opposed to individual subscriber);

c) MNI (group home SwMI MM): MNI of the invoking SwMI;

d) MNI (visited SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the HMM recovery_conf (corresponding to the HMM recovery_resp) from the ANF-ISIMM, the group home SwMI MM shall consider the G-HDR service as started, and it shall be ready to recover the virtual service primitives of the G-HDR service as defined in this clause.

17.4.2.3 The group home SwMI MM receives the G-VDR indication

This clause is applicable only for case 2).

Upon receipt of the VMM recovery_ind (containing the same information as the corresponding VMM recovery _req) from the ANF-ISIMM, the group home SwMI MM shall record the ANF-ISIMM invoke id and verify that it can support the G-VDR service. The group home SwMI MM shall be able to support the G-VDR service if the G-HDB is in a consistent state.

Then, the group home SwMI MM shall send the VMM recovery_resp to the ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received VMM recovery_ind;

b) recovery type: recovery type: group, i.e. the recovery recovers group data (opposed to individual subscriber);

c) MNI (visited SwMI MM): MNI of the invoking SwMI;

d) MNI (group home SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the VMM recovery_conf (corresponding to the VMM recovery_resp) from the ANF-ISIMM, the visited SwMI MM shall consider the G-VDR service as started.

17.4.2.4 The virtual group attachment and detachment

Before sending the first virtual group attachment, the visited SwMI MM shall set the starting point for the scanning in the G-VDB. The starting point shall indicate the first recovered record in the G-VDB. The starting point may be any record in the G-VDB as the visited SwMI MM may scan the G-VDB in any order. E.g. the GDR may be invoked simultaneously with the IDR (as defined in clause 14), and the group attachments (and detachments) may be sent consecutively for each individual subscriber. However, all group records that have the group home SwMI MM as the group home SwMI MM shall be recovered as defined in this clause once. Thus, the virtual group attachment, i.e. GDR related group attachment, shall be sent for any group attachment that is recorded in the G-VDB. In addition, if the group detachments are saved in the G-VDB, the virtual group detachment may be invoked corresponding to these group detachments.

If the starting point has been selected, the visited SwMI MM shall select the first or next record from the G-VDB (where the group home SwMI MM is the invoking SwMI MM), and according to the record shall either send the virtual group attachment or detachment as follows:

- virtual group attachment:
  - if this is the first virtual group attachment for the group **during the G-HDR**: The service shall take place as defined in case 1) in clause 15.4 with the following exceptions:
    - the service shall be invoked based on the information saved in the G-VDB as it was received from the subscriber in the AI as an AI group attachment request;
    - the exchanged primitives shall contain the following information:
      - recovery: the value shall be "Recovery"; and
      - the age stamp is normally always included in the case of recovery, as it is not likely that the virtual group attachment is sent upon receipt of the original group attachment; and
      - the visited SwMI MM may invoke the (SwMI initiated) AI group attachment service to ensure that the corresponding group attachment information in correct in the MS.

- if at least one virtual group attachment has been sent before this one for the group **during the G-HDR**: as applicable, according to one of the cases 2) to 4) in clause 15.4 with the following exceptions:
  - the service shall be invoked based on the information saved in the G-VDB as it was received from the subscriber in the AI as an AI group attachment request;
  - the exchanged primitives shall contain the following information:
    - recovery: the value shall be "Recovery"; and
    - the age stamp is normally always included in the case of recovery, as it is not likely that the virtual group attachment is sent upon receipt of the original group attachment; and
    - the visited SwMI MM may invoke the (SwMI initiated) AI group attachment service to ensure that the corresponding group attachment information in correct in the MS.

- Virtual group detachment: as applicable, according to one of the cases 1) to 3) in clause 16.4 depending on the invocation criteria. However, the exchanged primitives shall contain the following information:
  - the service shall be invoked based on the information saved in the G-VDB as it was received from the subscriber in the AI as an AI group attachment request, except that the "last/not last group detachment" information shall correspond to the current group detachment situation for the group in the visited SwMI MM;
  - the exchanged primitives shall contain the following information:
    - recovery: the value shall be "Recovery"; and
    - the age stamp is normally always included in the case of recovery, as it is not likely that the virtual group detachment is sent upon receipt of the original group detachment; and
    - the visited SwMI MM may invoke the (SwMI initiated) AI group detachment service to ensure that the corresponding group attachment information in correct in the MS.

17.4.2.5 The iteration

Upon completion of the virtual group attachment or detachment service, the visited SwMI MM shall continue the execution of the recovery service. Thus, the visited SwMI MM shall detect the information of the next recorded attachment or, if saved, group detachment or if all group attachments and detachments in the record have been recovered, the next record shall be selected from the G-VDB as defined in clause 17.4.2.4 and continue as defined in that clause.

Then, visited SwMI MM shall continue the iteration as defined in this clause until the G-VDB is scanned through, i.e. when the virtual group attachments and, if supported, group detachments are carried out for all the group records in the G-VDB that have the peer SwMI MM as the group home SwMI MM.

During the recoveries, the SwMI MMs may control the pace in which the recovery related messages are sent by delaying the sending of the primitives, so that the recovery does not disturb any non-recovery related services. However, if such delays take place, the SwMI MM shall add the delay to value of the age stamp.

17.4.2.6 The completion of the GDR

17.4.2.6.1 G-HDR

In case 1), when the records in the G-VDB have been scanned through the following shall take place:

The visited SwMI MM shall send the HMM recovery completed_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery_ind;

b) recovery type: group, shall indicate that the HMM recovery has recovered the group data;

c) MNI (group home SwMI MM): MNI of the invoking SwMI;

d) MNI (visited SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM shall become idle.

Upon receipt of the HMM recovery completed_ind (containing the same information as the corresponding HMM recovery completed_req), the group home SwMI MM shall verify if it has any recorded group attachments which should have been recovered but which have not. In other words, if there are any group attachments in the G-HDB which are made in the visited SwMI MM that was the invoked visited SwMI MM and for which the virtual group attachment have not been done, the group home SwMI MM shall invoke the group home SwMI MM initiated group attachment for these services as defined in cases 5) or 6), as applicable, in clause 15.4 with the following exceptions:

- recovery: the value shall be "Recovery" in the exchanged primitives; and
- the age stamp is normally always included in the exchanged primitives in the case of recovery, as it is not likely that the virtual group detachment is sent upon receipt of the original group detachment.

17.4.2.6.2 G-VDR

In case 2), when the records in the G-VDB have been scanned through the following shall take place:

The visited SwMI MM shall send the VMM recovery completed_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the send VMM recovery_req;

b) recovery type: group, shall indicate that the VMM recovery has recovered the group data;

c) MNI (visited SwMI MM): MNI of the invoking SwMI;

d) MNI (group home SwMI MM): MNI of the invoked SwMI; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the visited SwMI MM shall become idle.

Upon receipt of the VMM recovery completed_ind (containing the same information as the corresponding VMM recovery completed_req), the group home SwMI MM either becomes idle or it may verify if it has any group attachments and, optionally, group detachments recorded as valid in the invoking visited SwMI MM but which have not been recovered. If any such group attachments exist, the group home SwMI MM may invoke the group home SwMI MM initiated group attachment service for the recorded group attachments as defined in cases 5) or 6), as applicable, in clause 15.4 with the following exceptions:

- recovery: the value shall be "Recovery" in the exchanged primitives;
- the age stamp is normally always included in the exchanged primitives in the case of recovery, as it is not likely that the virtual group attachment is sent upon receipt of the original group attachment.

Optionally, the group home SwMI MM may invoke the group home SwMI MM initiated group detachment service for the recorded group detachments as defined in case 4) in clause 16.4 with the following exceptions:

- recovery: the value shall be "Recovery" in the exchanged primitives; and
- the age stamp is normally always included in the exchanged primitives in the case of recovery, as it is not likely that the virtual group detachment is sent upon receipt of the original group detachment.

17.5 Exceptional procedures

This clause defines the exceptional procedures that shall be applied if the normal operation of the GDR service fails. The exceptional procedures as defined for the GDR services are applicable for the GDR service when these services are invoked as part of the GDR service.

The exceptional procedures as defined in this clause may be overridden by an additional agreement between the SwMI operators (that cover the exceptional situation), see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional situations arising within one SwMI are outside the scope of the present document. Such exceptional cases are e.g. exceptional situations detected within the SwMI MM if the service cannot be invoked over the ISI, if the service cannot be continued or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

Upon receipt of the HMM recovery_ind, the visited SwMI MM shall reject the G-HDR if its own G-VDB is not in a consistent state, i.e. if it considers that the contents of its G-VDB cannot be trusted. If the visited SwMI MM rejects the G-HDR it shall send the HMM recovery reject_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received HMM recovery_ind;

b) MNI (group home SwMI MM): MNI of the invoking SwMI;

c) MNI (visited SwMI MM): MNI of the invoked SwMI;

d) recovery rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI;
- temporary error; or
- own database not consistent; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the G-HDR rejection cause is "unknown SwMI" the group home SwMI MM may re-invoke the service up to two times in order to (try to) complete the service successfully. However, if the G-HDR rejection cause is "temporary error" the visited SwMI MM shall invoke the G-VDR service to recover its G-VDB, and thus, the group home SwMI MM shall not re-invoke the G-HDR service against the visited SwMI MM.

Upon receipt of the VMM recovery_ind, the group home SwMI MM shall reject the G-VDR if its own G-HDB is not in a consistent state, i.e. if it considers that the contents of its G-VDB cannot be trusted. If the visited SwMI MM rejects the G-VDR it shall send the VMM recovery reject_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received VMM recovery_ind;

b) MNI (group home SwMI MM): MNI of the invoked SwMI;

c) MNI (visited SwMI MM): MNI of the invoking SwMI;

d) recovery rejection cause, which shall be one of the following:

- unknown error: a generic error cause, which shall be used when the other error causes are not applicable;
- unknown SwMI;
- temporary error; or
- own database not consistent; and

e) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the G-VDR rejection cause is "unknown SwMI" the visited SwMI MM may re-invoke the service up to two times in order to (try to) complete the service successfully. However, if the G-VDR rejection cause is "temporary error" the visited SwMI MM shall invoke the G-VDR service to recover its G-VDB, and thus, the group home SwMI MM shall not re-invoke the G-HDR service against the visited SwMI MM.

If the sending of the G-HDR completed_req or the G-VDR completed_req fails and the sending SwMI MM detects that it shall re-send it up to two times. If a SwMI MM receives the G-HDR completed_ind or the G-VDR completed_ind which it cannot accept (e.g. fails to decode, or does not recognize the sending SwMI MM), it shall discard the primitive.

17.6 Dynamic description

Figures 30 and 31 contain the dynamic description of the GDR service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the group home SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the visited SwMI.

The following service primitives shall be applicable for the GDR service in addition to the primitives defined for the group attachment and the group detachment services:

- HMM recovery completed_req and HMM recovery completed_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate the completion of the GDR operation;
- HMM recovery _req and HMM recovery _ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to invoke the HMM recovery;
- HMM recovery_resp and HMM recovery_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the invocation indication of the HMM recovery;
- HMM recovery reject_req and HMM recovery reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the invocation of the HMM recovery;
- VMM recovery completed_req and VMM recovery completed_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to indicate the completion of the GDR operation;
- VMM recovery _req and VMM recovery _ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to invoke the VMM recovery;
- VMM recovery_resp and VMM recovery_conf, the information contents of the primitives are as defined in this clause. The primitives shall be used to acknowledge the invocation indication of the VMM recovery; and
- VMM recovery reject_req and VMM recovery reject_ind, the information contents of the primitives are as defined in this clause. The primitives shall be used to reject the invocation of the VMM recovery.

The following states shall be used for the GDR service in addition to the states defined for the group attachment and the group detachment services:

- G-HDR-REQUESTED: G-HDR service requested by the group home SwMI MM;
- GROUP-ATT-INIT-V: the visited SwMI MM initiated group attachment has been invoked;
- G-VDR-REQUESTED: G-VDR service requested by the visited SwMI MM;
- IDLE: no GDR in progress. Shall replace the IDLE state defined for group attachment and detachment services;
- RECOVERY-INITIATED: GDR service in progress;
- WAIT-FOR-GROUP-DET-ACK-FROM-H: response to the visited SwMI MM initiated group detachment request is expected from the group home SwMI MM;
- WAIT-FOR-PROFILE-ACK-V: response to basic migration profile is expected;
- WAIT-FOR-SS-PROFILES-V: original SS-migration profiles are expected; and
- WAIT-FOR-SS-PROFILE-ACK-V: response to SS-migration profiles is expected (the state is applicable for the visited SwMI MM initiated group attachment).

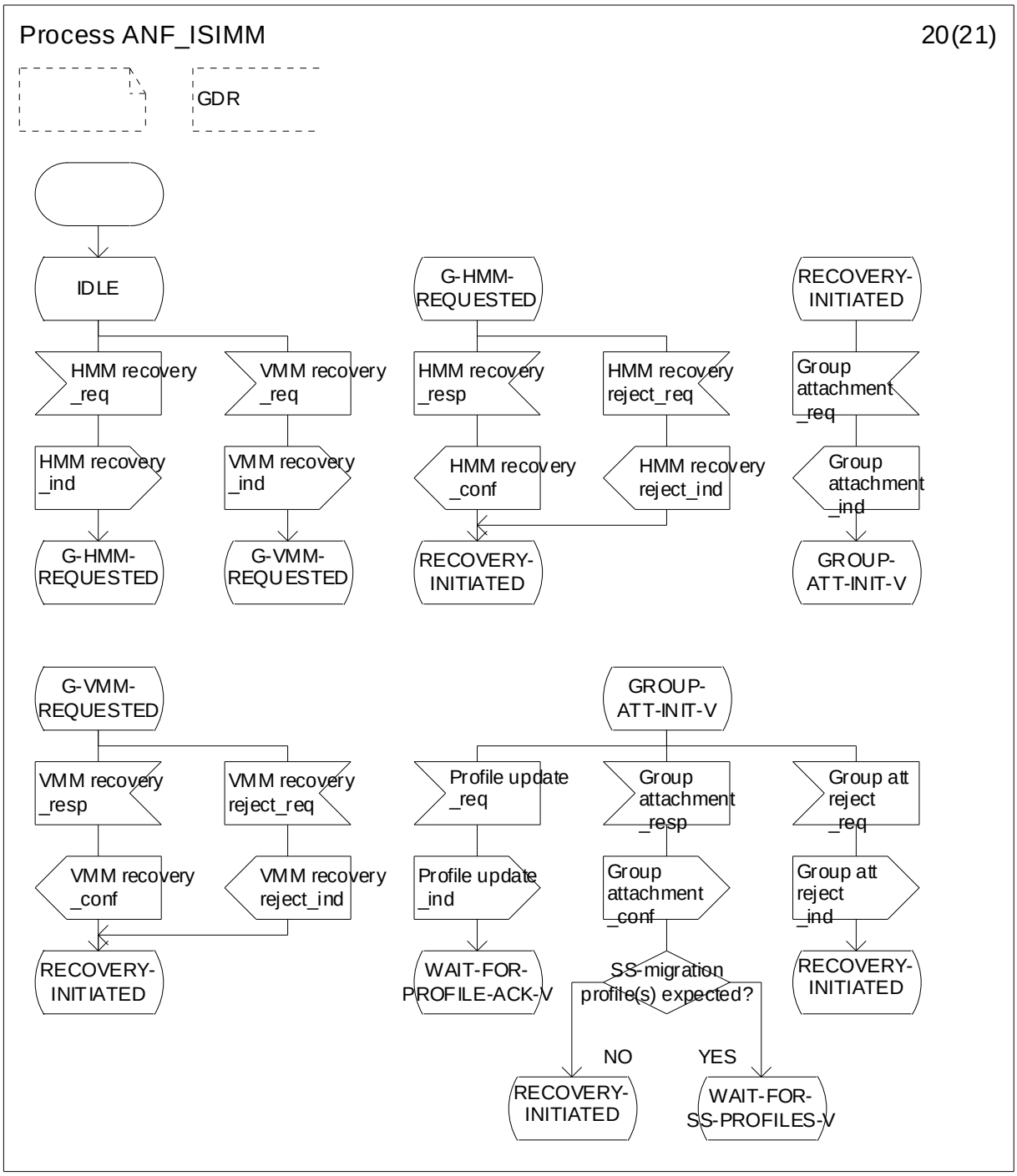
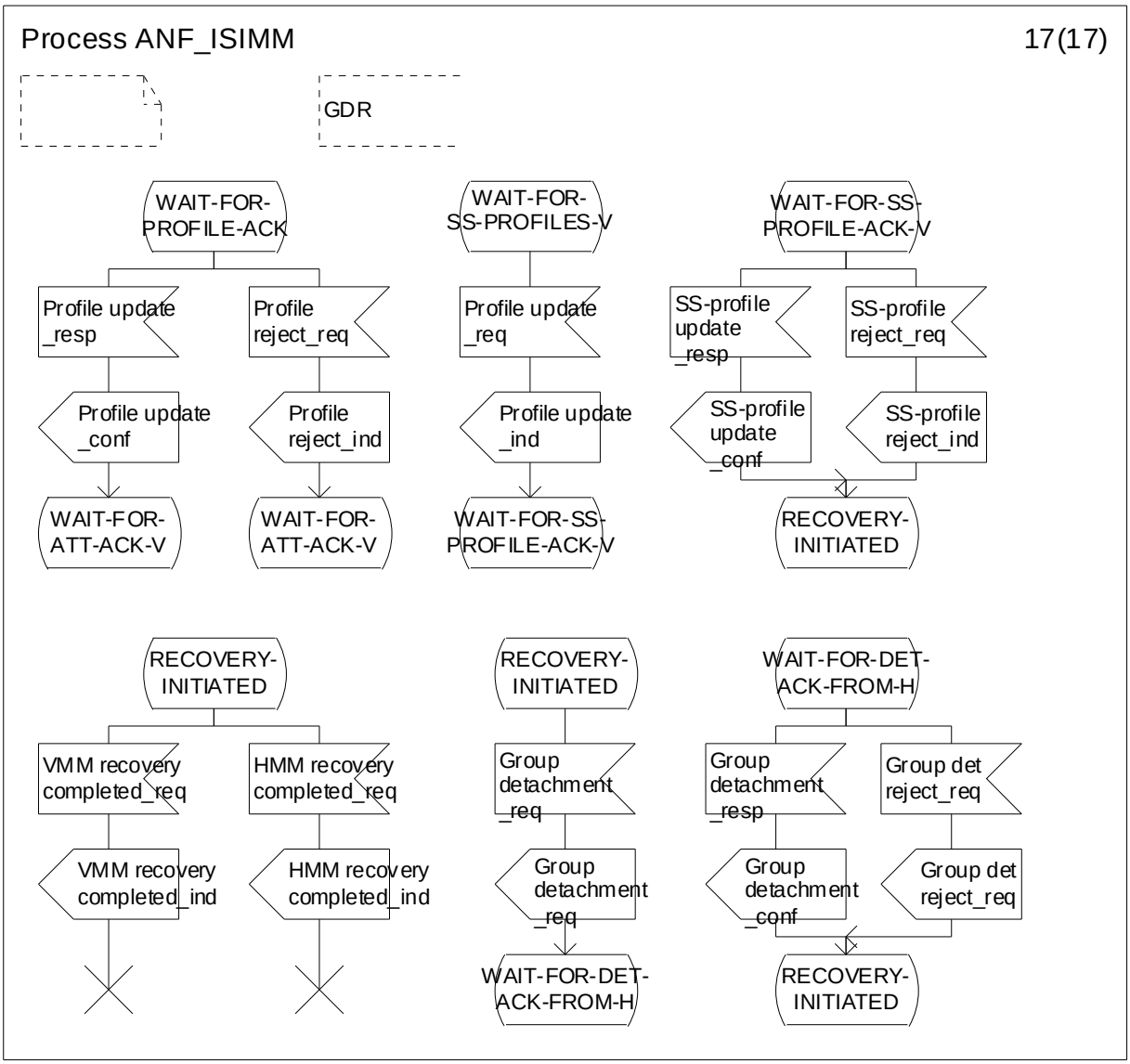


Figure 30: Stage 1 SDL description of GDR service



NOTE: Upon completion of the HMM recovery completed_ind, the group home SwMI MM may invoke the group home SwMI MM initiated group attachment and group detachment services for each group attachment and group detachment that is recorded as valid in the visited SwMI MM but on which the virtual group attachment has not been invoked.

Figure 31: Stage 1 SDL description of GDR service

18 Group linking/unlinking service description - stage 1

18.1 Service definition

The group linking/unlinking service enables the dynamic linking and unlinking of groups across the ISI. Group linking provide the ability that subscribers from different SwMIs can communicate after attachment to groups which are linked with this service. Group unlinking provides the ability to removes the linking of groups when communication between them is no longer required.

NOTE: It is possible to statically link groups based on bilateral agreements, but this is not part of the present document.

Upon forming the group linking, all group calls made to one of the linked groups result in a combined group call consisting of all group members of the linked groups. Upon removing the group linking, the group linking is removed and the group calls to the groups shall be made independently of each other.

18.2 Service description

The group linking/unlinking service is an optional service for SwMI MMs. If supported, the service shall be as defined in this clause.

The group linking/unlinking service shall enable the following across the ISI:

- the linking of groups, i.e. the forming of a group linking in order to join the members of the groups to one combined group call when group calls to any of the groups are invoked; and
- the unlinking of the linked groups, i.e. the removal of a previously made group linking.

NOTE 1: The term group linking refers to a set of groups which are linked together.

NOTE 2: The group call is defined in EN 300 392-3-3 [16].

The group linking act shall originate in the linking controlling SwMI MM. The linking controlling SwMI MM shall co-ordinate and keep track of the group linking amongst the linking participating SwMI MMs. The linking controlling SwMI MM shall be the group home SwMI MM of one of the groups to be linked. In addition, the linking controlling SwMI shall be the controlling SwMI of the combined group calls.

The linking participating SwMI MM shall carry out the group linking of one group in co-operation with the linking controlling SwMI MM. The linking participating SwMI MM shall be the group home SwMI MM of that group. Consequently, there shall be as many linking participating SwMI MMs as there are groups to be linked. In addition, as the ANF-ISIMM shall always be invoked across the ISI, at least two of the linking participating SwMI MMs shall have a different MNI.

The group unlinking act shall either originate in the linking controlling SwMI MM or in any of the linking participating SwMI MMs. The latter is called remote unlinking service in the present document. If the group unlinking act is originated in the linking participating SwMI MM, the remote group unlinking request is routed to the linking controlling SwMI MM.

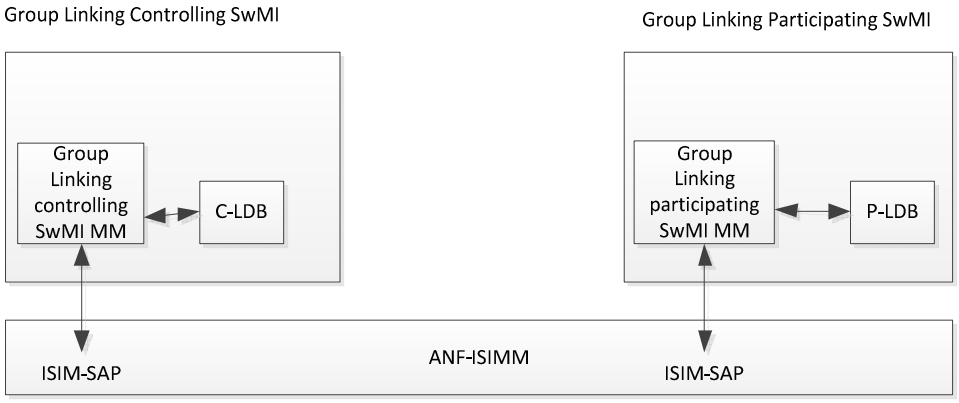
The linking controlling SwMI MM shall co-ordinate the group unlinking amongst the linking participating SwMI MMs. The linking participating SwMI MM shall carry out the group unlinking of the group in the group home SwMI of the group. Consequently, there shall be as many linking participating SwMI MMs as there are groups to be unlinked.

The group linking or group unlinking acts shall not affect any ongoing calls.

A group linking shall contain two to five groups that are linked together. However, one group may be part of at most one group linking at a time.

18.3 Service architecture

Figure 32 illustrates the service architecture of the group linking/unlinking service. The ANF-ISIMM offers group linking/unlinking services between the group linking controlling SwMI MM and the group linking participating SwMI MMs across the ISIs through the ISIMM-SAPs.



NOTE: There shall be one group linking controlling SwMI MM and one to many group linking participating SwMI MMs.

Figure 32: The service architecture of the group linking/unlinking service

18.4 Normal procedures

18.4.1 Invocation

18.4.1.1 Invocation criteria

ANF-ISIMM shall be invoked in one of the following cases:

1) A request for group linking service has been initiated in the linking controlling SwMI MM.

2) A request for group unlinking service has been initiated in the linking controlling SwMI MM.

3) A request for remote group unlinking service has been initiated in a linking participating SwMI MM.

NOTE: The definition of the intra-SwMI requests for group linking, group unlinking and remote group unlinking services are outside the scope of the present document.

In all cases, the service invocation shall involve at least two groups of which the group home is different. E.g. in case 1), at least two groups shall be requested to be linked together and the MNIs of at least two of the groups shall be different.

18.4.1.2 Invocation of ANF-ISIMM

18.4.1.2.1 Case 1) - group linking service

18.4.1.2.1.1 AI security class

Void.

18.4.1.2.1.2 Sending of Linking_req

Upon request for group linking service, the linking controlling SwMI MM shall send the Linking_req to ANF-ISIMM for each group (GTSI) that is to be included in the group linking. The Linking_req shall contain the following information:

a) ANF-ISIMM invoke id: the linking controlling SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and operation of the service, between the linking controlling SwMI MM and one linking participating SwMI MM;

a different ANF-ISIMM invoke id shall be allocated to be used between the linking controlling SwMI MM and one linking participating SwMI MM. The linking controlling SwMI MM shall keep track of the used values and shall be able to associate them to the corresponding group linking instance;

b) GSSI (linked group): the GSSI of the group to be linked;

c) MNI (linked group): the MNI of the group to be linked. The MNI shall also be the MNI of the linking participating SwMI MM;

d) GSSI (linking controlling group): the GSSI of the linking controlling group. The GSSI and the corresponding MNI shall identify the group linking;

e) MNI (linking controlling group): the MNI of the linking controlling group. The MNI shall also be the MNI of the linking controlling SwMI MM;

f) number of other linked groups. the element shall have a value from zero to three (0 to 3). The element shall indicate the number of "Other linked group" elements following this element in the primitive;

g) conditionally: other linked group. The element shall appear as many times as indicated by the element "Number of other linked groups following". Each element shall identify a group that will be included in the group linking. The element shall contain the following sub-elements:

- GSSI (other linked group); and
- MNI (other linked group);

all groups that are included in the group linking shall be included as "Other linked groups" except the groups included already in the primitive;

NOTE: The purpose of the element is to indicate the groups to be included in the group linking to the linking participating SwMI MM.

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

18.4.1.2.2 Case 2) - group unlinking service

Upon request for group unlinking service, the linking controlling SwMI MM shall send the Unlinking_req to ANF-ISIMM for each group (GTSI) that is linked in the group linking. The Unlinking_req shall contain the following information:

a) ANF-ISIMM invoke id: the linking controlling SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and operation of the service, between the linking controlling SwMI MM and one linking participating SwMI MM;

a different ANF-ISIMM invoke id shall be allocated to be used between the linking controlling SwMI MM and one linking participating SwMI MM. The linking controlling SwMI MM shall keep track of the used values and shall be able to associate them to the corresponding group unlinking instance;

b) GSSI (linked group): the GSSI of the group to be unlinked;

c) MNI (linked group): the MNI of the group to be unlinked. The MNI shall also be the MNI of the linking participating SwMI MM;

d) GSSI (linking controlling group): the GSSI of the group linking to be removed;

e) MNI (linking controlling group): the MNI of the group linking to be removed;

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

18.4.1.2.3 Case 3) - remote group unlinking service

Upon request for remote group unlinking service, the linking participating SwMI MMs shall send the Remote unlinking_req to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the linking participating SwMI MM shall allocate a unique value to be used during the service instance, i.e. during the invocation and operation of the service, between the linking controlling SwMI MM and the linking participating SwMI MM;

b) GSSI (linked group): the GSSI of the linked group associated to the linking participating SwMI MM requesting the remote unlinking;

c) MNI (linking participating SwMI MM): the MNI of the linking participating SwMI MM requesting the remote unlinking;

d) GSSI (linking controlling group): the GSSI of the linked group linking controlling SwMI to be removed;

e) MNI (linking controlling group): the MNI of the linked group linking controlling SwMI to be removed;

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

18.4.2 Operation

18.4.2.0 General

The actions defined in this clause for the linking participating SwMI MM shall take place in each linking participating SwMI MM.

18.4.2.1 Case 1) - group linking service

18.4.2.1.1 First phase of group linking service

Upon receipt of the Linking_ind (containing the same information as the corresponding Linking_req) from the ANF-ISIMM, the linking participating SwMI MM shall verify whether the group to be linked (as defined in parameters b) and c) in the received Linking_ind) may be linked. The verification shall consist of at least checking that the group is not linked already.

If the group linking is not rejected, the linking participating SwMI MM shall send the Linking_resp with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Linking_ind;

b) GSSI (linked group): the GSSI of the group to be linked. The value shall be the same as in the received Linking_ind;

c) MNI (linked group): the MNI of the group to be linked. The value shall be the same as in the received Linking_ind;

d) GSSI (linking controlling group): the GSSI of the linking controlling group. The value shall be the same as in the received Linking_ind;

e) MNI (linking controlling group): the MNI of the linking controlling group. The value shall be the same as in the received Linking_ind;

f) number of visiting SwMIs. The element shall have a value from zero to three (0 to 3). The element shall indicate the number of "visiting SwMI" elements following this element in the primitive;

g) conditionally: visiting SwMIs. The element shall appear as many times as indicated by the element "Number of visiting SwMIs". Each element shall identify a SwMI were members of the linked group have migrated and attached too. The element shall contain the following sub-elements:

- MNI (visiting SwMI);
- PISN number (visiting SwMI - optional element);

NOTE 1: The purpose of the element is to indicate all participating SwMIs that are intended to be included when a group call is set-up by the linking controlling SwMI to the linked group.

h) optionally: the length of the PISN number of the linking participating SwMI MM and the PISN number. If included, the linking controlling SwMI MM shall save and use the PISN number for addressing purposes over the ISI; and

NOTE 2: The PISN number may be used to indicate the preferred gateway if the visited SwMI MM has several PISN gateways with different numbers. The different gateways may be used e.g. to traffic load purposes or to optimize distances in the case of a wide area SwMI.

i) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

If the linking participating SwMI MM rejects the group linking it shall reject group linking upon receipt of the Linking_ind (and send Linking reject_req as defined in clause 18.5). In other words, the linking participating SwMI MM may not reject the group linking after sending the Linking_resp.

18.4.2.1.2 Second phase of group linking service

Upon receipt of the Linking_conf (containing the same information as the corresponding Linking_resp) from the ANF-ISIMM for all the sent Linking_reqs, the linking controlling SwMI MM shall verify that there are at least two groups to be linked and that their MNIs are different; if not, the group linking is cancelled (rejected) and the actions shall continue as defined in clause 18.6.

If there are at least two groups to be linked which have a different MNI, the linking controlling SwMI MM shall send the Linking command_req to the ANF-ISIMM corresponding to each group to be linked. The Linking command_req shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent Linking_req;

b) GSSI (linked group): the GSSI of the group to be linked. The value shall be the same as in the sent Linking_req;

c) MNI (linked group): the MNI of the group to be linked. The value shall be the same as in the sent Linking_req;

d) GSSI (linking controlling group): the GSSI of the linking controlling group. The value shall be the same as in the sent Linking_req;

e) MNI (linking controlling group): the MNI of the linking controlling group. The value shall be the same as in the sent Linking_req;

f) number of other linked groups. the element shall have a value from zero to three (0 to 3). The element shall indicate the number of "Other linked group" elements following this element in the primitive;

the value of the element may be equal or less than the value in the Linking_req. The value shall be less if either the linking participating SwMI MM has excluded one of more groups from the group linking or if one or more linking participating SwMI MM has rejected the group linking;

g) conditionally: other linked group. The element shall appear as many times as indicated by the element "Number of other linked groups". Each element shall identify a group that will be included in the group linking. The element shall contain the following sub-elements:

- GSSI (other linked group); and
- MNI (other linked group);

all groups that are included in the group linking shall be included as "Other linked groups" except the groups included already in the primitive;

NOTE: The purpose of the element is to indicate the groups to be included in the group linking to the linking participating SwMI MM.

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon receipt of the Linking command_ind (containing the same information as the corresponding Linking command_req) from the ANF-ISIMM, the linking participating SwMI MM shall create the P-LDB record holding the information that the group is linked. The linking participating SwMI shall then inform each visiting SwMI were its group members have successfully migrated and attached, that the group is now linked. The Linking info_req shall be sent to these SwMI(s). The Linking info_req shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Linking_ind;

b) Linking information: linked;

c) GSSI (linked group): the GSSI of the group to be linked. The value shall be the same as in the received Linking_command_ind;

d) MNI (linked group): the MNI of the group to be linked. The MNI shall also be the MNI of the linking participating SwMI MM. The value shall be the same as in the received Linking_command_ind;

e) GSSI (linking controlling group): the GSSI of the linking controlling group. The value shall be the same as in the received Linking_command_ind;

f) MNI (linking controlling group): the MNI of the linking controlling group. The value shall be the same as in the received Linking_command_ind;

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon reception of the Linking_info_ind from ANF-ISIMM, the visiting SwMI shall store the received linking information in the G-VDB. This information shall be used by the visiting SwMI to direct a group call set-up request to the linked group, to the linking controlling SwMI.

The linking participating SwMI MM shall then become IDLE.

Once all visiting SwMIs have been informed of the group linking, the linking participating SwMI MM shall send the Linking command_resp to the ANF-ISIMM indicating that the group linking has been completed. The Linking command_resp shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Linking_ind;

b) GSSI (linked group): the GSSI of the group to be linked. The value shall be the same as in the received Linking_ind;

c) MNI (linked group): the MNI of the group to be linked. The MNI shall also be the MNI of the linking participating SwMI MM. The value shall be the same as in the received Linking_ind;

d) GSSI (linking controlling group): the GSSI of the linking controlling group. The value shall be the same as in the received Linking_ind;

e) MNI (linking controlling group): the MNI of the linking controlling group. The value shall be the same as in the received Linking_ind;

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the linking participating SwMI MM shall become idle and the group linking shall be effective.

Upon receipt of the Linking command_confs (containing the same information as the corresponding Linking command_resp) corresponding to the sent Linking command_reqs from the ANF-ISIMM, the linking controlling SwMI MM shall create the C-LDB record indicating that the group is linked. Then, the linking controlling SwMI MM shall become idle and the group linking shall become effective.

The group linking act shall not affect any ongoing calls nor the existence of any ongoing calls shall not affect the group linking act.

18.4.2.2 Case 2) - group unlinking service

Upon receipt of the Unlinking_ind (containing the same information as the corresponding Unlinking_req) from the ANF-ISIMM, the linking participating SwMI MM shall unlink the group by removing the P-LDB record of the indicated group. The unlinking of the group does not affect any ongoing calls. The linking participating SwMI shall then inform each visiting SwMI were its group members have successfully migrated and attached, that the group linking has been removed. The Linking info_req shall be sent to these SwMI(s). The Linking info_req shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Linking_ind;

b) Linking information: unlinked;

c) GSSI (linked group): the GSSI of the group to be linked. The value shall be the same as in the received Linking_command_ind;

d) MNI (linked group): the MNI of the group to be linked. The MNI shall also be the MNI of the linking participating SwMI MM. The value shall be the same as in the received Linking_command_ind;

e) GSSI (linking controlling group): the GSSI of the linking controlling group. The value shall be the same as in the received Linking_command_ind;

f) MNI (linking controlling group): the MNI of the linking controlling group. The value shall be the same as in the received Linking_command_ind;

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Upon reception of the Linking_info_ind from ANF-ISIMM, the visiting SwMI shall remove the linking information from the G-VDB. The linking participating SwMI MM shall then become IDLE.

Once all visiting SwMIs have been informed of the group linking, the linking participating SwMI MM shall confirm the group unlinking by sending the Unlinking_resp to ANF-ISIMM with the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Unlinking_ind;

b) GSSI (linked group): the GSSI of the group that has been unlinked. The value shall be the same as in the received Unlinking_ind;

c) MNI (linked group): the MNI of the group that has been unlinked. The value shall be the same as in the received Unlinking_ind;

d) GSSI (linking controlling group): the GSSI of the group linking being removed. The value shall be the same as in the received Unlinking_ind;

e) MNI (linking controlling group): the MNI of the group linking being removed. The value shall be the same as in the received Unlinking_ind;

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the linking participating SwMI MM shall return to idle.

Upon receipt of the Unlinking_resps (containing the same information as the corresponding Unlinking_reqs) from the ANF-ISIMM for all the sent Unlinking_reqs, the linking controlling SwMI MM shall remove the C-LDB record and the group linking shall be considered as removed.

Then, the linking controlling SwMI MM shall return to idle.

18.4.2.3 Case 3) - remote group unlinking service

Upon receipt of the Remote unlinking_ind (containing the same information as the corresponding Remote unlinking_req) from the ANF-ISIMM, the linking controlling SwMI MM shall remove the unlinking by sending the Unlinking_req to all GTSIs that are linked in the group linking. The Unlinking_req shall contain the following information:

a) ANF-ISIMM invoke id. the value shall be:

   - for the linking participating SwMI MM that requested the group linking: The same as in the received Remote unlinking_ind; and

   - for the other linking participating SwMI MMs: The linking controlling SwMI MM shall allocate a new value to be used during the service instance, i.e. during the invocation and operation of the service, between the linking controlling SwMI MM and each linking participating SwMI MM;

b) GSSI (linked group): the GSSI of the group to be unlinked;

c) MNI (linked group): the MNI of the group to be unlinked. The MNI shall also be the MNI of the linking participating SwMI MM;

d) GSSI (linking controlling group): the GSSI of the group linking to be removed;

e) MNI (linking controlling group): the MNI of the group linking to be removed;

f) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

Then, the case 3) shall continue as defined in clause 18.4.2.2.

18.5 Exceptional procedures

18.5.0 General

This clause defines the exceptional procedures that shall be applied if the normal operation of the group linking or group unlinking service fails.

NOTE: All exceptional procedures that take place within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

18.5.1 Case 1) - group linking service

Generally, if the Linking command_resp and the Linking command_conf have been exchanged between the linking participating SwMI MM and the linking controlling SwMI MM the group linking shall be considered as completed, and the group linking shall exist. However, if the operation fails before the exchange of the Linking command_resp and Linking command_conf the group linking act shall be considered as failed, and the group linking shall not exist. In addition, the following shall take place:

- the rejection shall be indicated across the ISI in either of the following ways:

  - upon receipt of the Linking_ind (but before sending the Linking_resp), by the linking participating SwMI MM: The linking participating SwMI MM it shall send the Linking reject_req to the ANF-ISIMM which shall deliver the corresponding Linking reject_ind to the linking controlling SwMI MM, if possible; or

  - upon receipt of the Linking_conf (but before sending the Linking command_req), by the linking controlling SwMI MM: if the rejection is detected by the linking controlling SwMI MM it shall send the Linking reject_req to the ANF-ISIMM which shall deliver the corresponding Linking reject_ind to the linking participating SwMI MM, if possible;

- the database updates as defined under normal operation shall be cancelled in the P-LDB in the C-LDB.

The Linking reject_req (and the corresponding Linking reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the sent or received Linking_ind;

b) GSSI (linked group): the GSSI of the group of which the linking has been rejected. The value shall be the same as in the sent or received Linking_ind;

c) MNI (linked group): the GSSI of the group of which the linking has been rejected. The MNI shall also be the MNI of the linking participating SwMI MM. The value shall be the same as in the sent or received Linking_ind;

d) GSSI (linking controlling group): the GSSI of the requested group linking. The value shall be the same as in the sent or received Linking_ind;

e) MNI (linking controlling group): the MNI of the requested group linking. The value shall be the same as in the sent or received Linking_ind;

f) linking rejection cause, which shall be one of the following as applicable:

- unknown error, a generic error cause, which shall be used when the other error causes are not applicable;
- unknown group, if the group that was requested to be linked does not exist;
- unknown linking controlling group, if the participating SwMI MM does not recognize the linking controlling group;
- not authorized, if the group linking is not allowed for the group;
- unknown SwMI;
- temporary error, the group linking service is not temporarily available; or
- service not supported, e.g. service not supported for the group; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

In the case of the rejection the linking controlling SwMI may re-invoke the service up to two times, e.g. if the rejection cause is unknown group the linking controlling SwMI MM may detect that the GTSI of the group to be linked was not correct.

18.5.2 Case 2) - group unlinking service

Generally, if the Unlinking_resp and the Unlinking_conf have been exchanged between the linking participating SwMI MM and the linking controlling SwMI MM the group linking shall be considered as completed, and the group linking shall not exist. If the operation fails before the exchange of the Unlinking_resp and Unlinking_conf the group unlinking shall still be considered as not existing and the linking shall be removed from the P-LDB and the C-LDB. However, the linking controlling SwMI MM shall try to send up to two times the Unlinking_req to ANF-ISIMM in order to obtain the successful outcome with the particular linking participating SwMI MM.

In general, in the case of rejection of group unlinking act, the rejection is detected by the linking participating SwMI MM upon receipt of the Unlinking_ind (but before sending the Unlinking_resp). furthermore, in this case, The linking participating SwMI MM it shall send the Unlinking reject_req to the ANF-ISIMM which shall deliver the corresponding Unlinking reject_ind to the linking controlling SwMI MM, if possible.

The Unlinking reject_req (and the corresponding Unlinking reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Unlinking_ind;

b) GSSI (linked group): the GSSI of the group of which the unlinking was rejected. The value shall be the same as in the received Unlinking_ind;

c) MNI (linked group): the MNI of the group of which the unlinking was rejected. The MNI shall also be the MNI of the linking participating SwMI MM. The value shall be the same as in the received Unlinking_ind;

d) GSSI (linking controlling group): the GSSI of the group linking. The value shall be the same as in the received Unlinking_ind;

e) MNI (linking controlling group): the MNI of the group linking. The value shall be the same as in the received Unlinking_ind;

f) unlinking rejection cause, which shall be one of the following as applicable:

- unknown error, a generic error cause, which shall be used when the other error causes are not applicable;
- unknown group, if the group that was requested to be unlinked does not exist;
- unknown linking controlling group, if the linking participating SwMI MM does not recognize the linking controlling group;
- not applicable, if the group to be unlinked is not linked;
- unknown SwMI; or
- temporary error, the group unlinking service is not temporarily available; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

18.5.3 Case 3) - remote group unlinking service

If the rejection is detected after the linking controlling SwMI MM has started the group unlinking, the exceptional procedures as defined in clause 18.5.2 shall be applicable. Thus, this clause shall only define the rejection of the remote group linking that is detected by the linking controlling SwMI MM upon receipt of the Remote unlinking_req. In this case, the linking controlling SwMI MM shall send the Unlinking reject_req to the ANF-ISIMM with the following information:

The Unlinking reject_req (and the corresponding Unlinking reject_ind) shall contain the following information:

a) ANF-ISIMM invoke id: the value shall be the same as in the received Remote unlinking_ind;

b) GSSI (linked group): the GSSI of the group corresponding to the linking participating SwMI MM requesting the rejected remote group unlinking. The value shall be the same as in the received Remote unlinking_ind;

c) MNI (linked group): the MNI of the group corresponding to the linking participating SwMI MM that requesting the rejected remote group unlinking. The value shall be the same as in the received Remote unlinking_ind;

d) GSSI (linking controlling group): the GSSI of the group linking. The value shall be the same as in the received Remote unlinking_ind;

e) MNI (linking controlling group): the MNI of the group linking. The value shall be the same as in the received Remote unlinking_ind;

f) unlinking rejection cause, which shall be one of the following as applicable:

- unknown error, a generic error cause, which shall be used when the other error causes are not applicable;
- unknown linking controlling group, if the linking controlling SwMI MM does not recognize the linking controlling group;
- not applicable, if the group to be unlinked is not linked;
- unknown SwMI; or
- temporary error, the group unlinking service is not temporarily available; and

g) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

The linking participating SwMI MM may re-invoke the remote group linking up to two times.

18.6 Interactions

The group linking or group unlinking services have no interactions with any other services. A group shall be defined (shall be created) before it can be linked.

18.7 Dynamic description

Figures 33, 34 and 35 contain the dynamic description of the group linking/unlinking service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

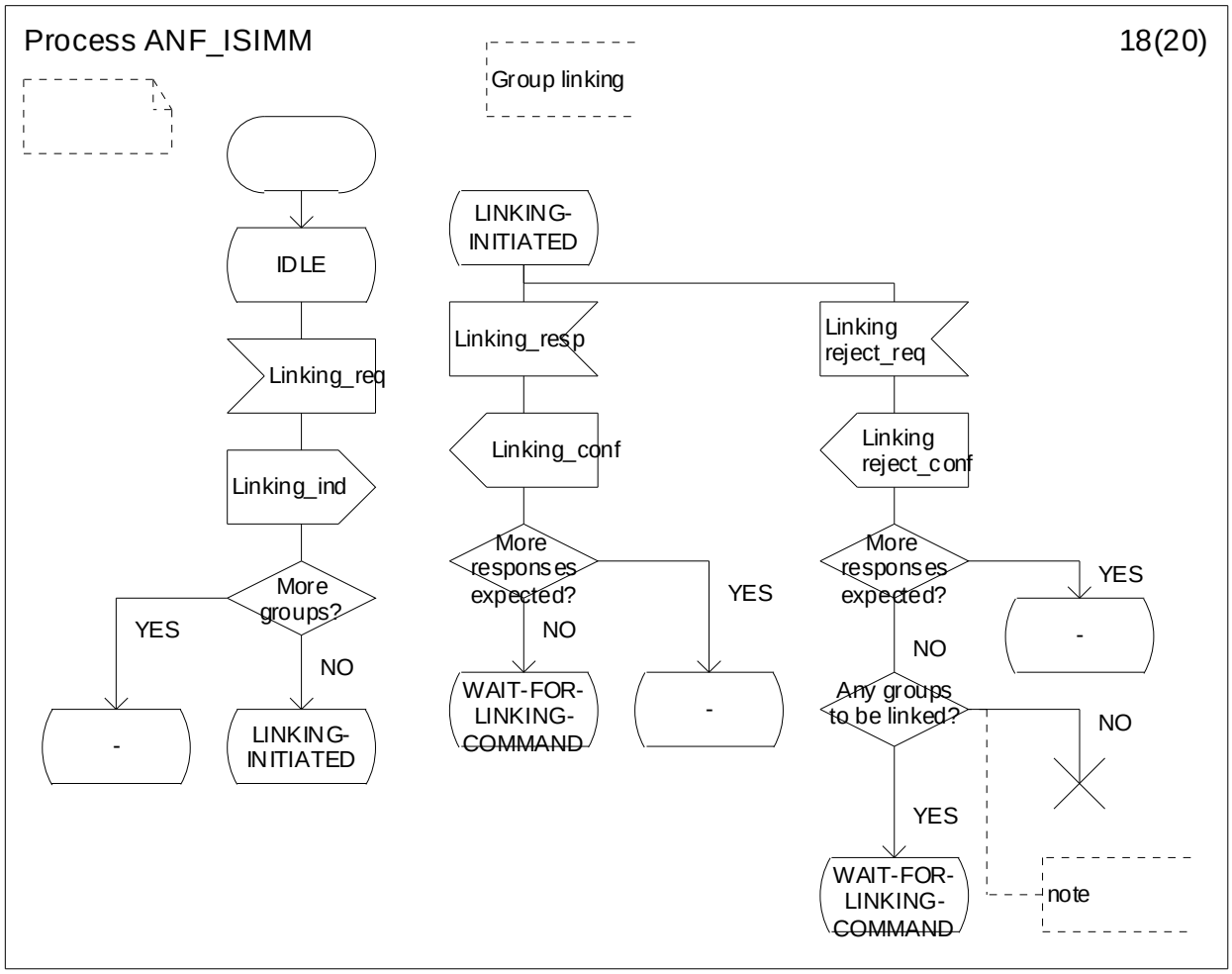
- the input signals from the left and output signals to the left represent primitives from and to the linking controlling SwMI MM; and
- the input signals from the right and output signals to the right represent primitives from and to the linking participating SwMI MMs.

The following service primitives shall be applicable for the group attachment service:

- Linking_req and Linking_ind: the primitives shall be used to request a group to be linked;
- Linking_resp and Linking_conf: the primitives shall be used to acknowledge the Linking_req and Linking_ind;
- linking command_req and Linking command_ind: the primitives shall be used to complete the group linking act;
- linking command_resp and Linking command_conf: the primitives shall be used to acknowledge the Linking command_req and Linking command_ind;
- linking reject_req and Linking reject_ind: the primitives shall be used to reject the request to link a group;
- remote unlinking_req and Remote unlinking_ind: the primitives shall be used to request remote group unlinking;
- Unlinking_req and Unlinking_ind: the primitives shall be used to request a group to be unlinked;
- Unlinking_resp and Unlinking_conf: the primitives shall be used to acknowledge the Unlinking_req and Unlinking_ind;
- unlinking reject_req and Unlinking reject_ind: the primitives shall be used to reject the request to unlink a group or to remove the group linking.

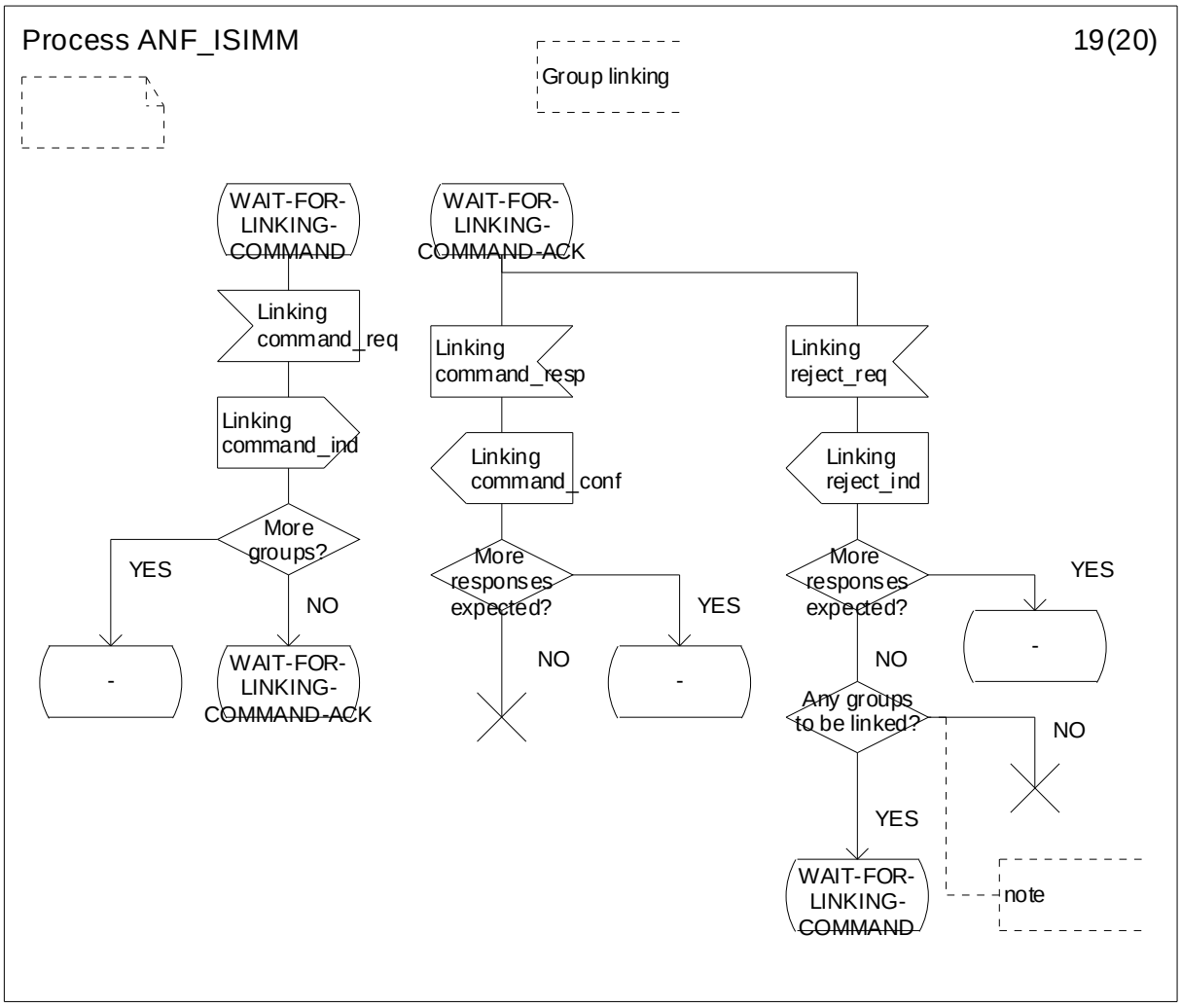
The following states shall be used for the group attachment service:

- IDLE: No group linking/unlinking in progress;
- LINKING-INITIATED: group linking requests have been sent to the linking participating SwMI MMs;
- WAIT-FOR-LINKING-COMMAND: the linking participating SwMI MMs are awaiting the confirmation for the group linking;
- WAIT-FOR-LINKING-COMMAND-ACK: the linking participating SwMI MMs are expected to confirm the group linking;
- REMOTE-UNLINKING: a linking participating SwMI MM has invoked group unlinking; and
- UNLINKING-INITIATED: the linking controlling SwMI MM is awaiting the confirmation for group unlinking.



NOTE: The choice "Any groups to be linked?" may have the value "NO" only if all the linking participating SwMI MMs have rejected the group linking.

Figure 33: Stage 1 SDL description of the group linking service



NOTE: The choice "Any groups to be linked?" may have the value "NO" only if the linking controlling SwMI MMs have rejected the group linking for all the groups.

Figure 34: Stage 1 SDL description of the group linking service

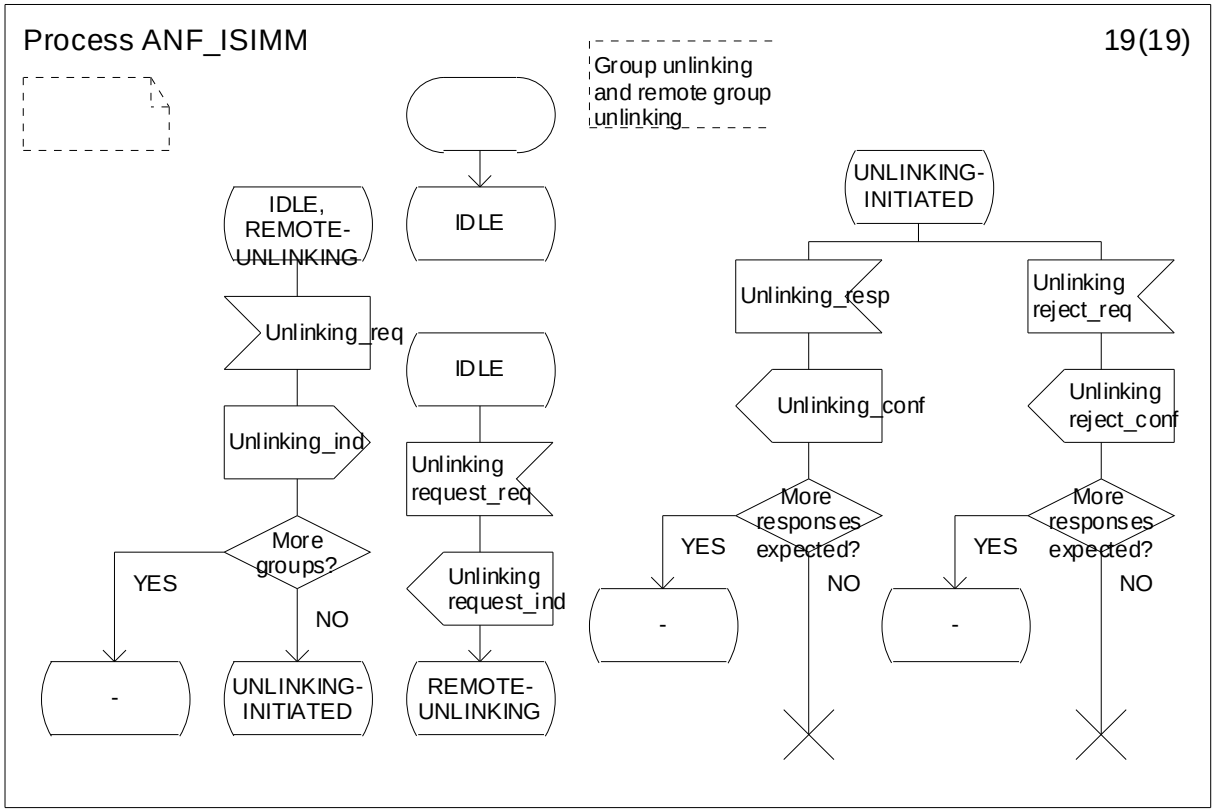


Figure 35: Stage 1 SDL description of the group unlinking service and the remote group unlinking services

18a Linked group attachment service description - stage 1

18a.1 Service definition

The linked group attachment service as defined in this clause is based on the concept of group linking as described in clause 18 in the present document.

The service provides the ability from a group linking participating SwMI to inform the group linking controlling SwMI that at least one subscriber has attached to the linked group.

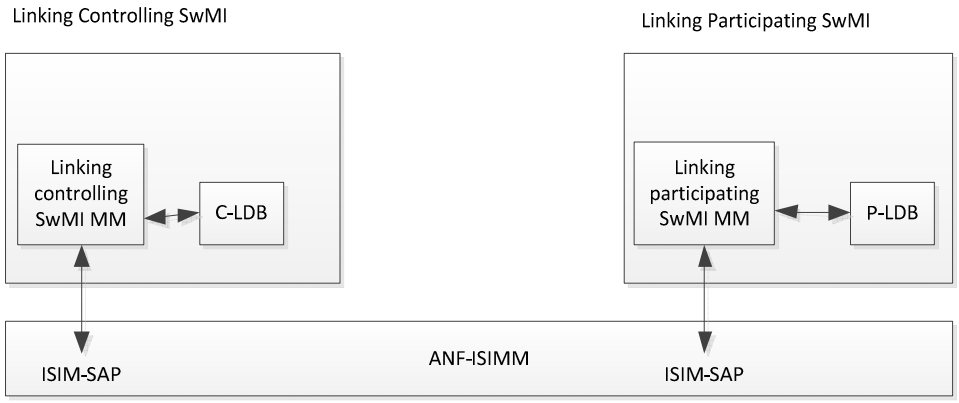
NOTE: In the group management point of view the "visited SwMI" in clauses 18a.1 to 18a.7 means the SwMI in which the subscriber is currently located which might be a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

18a.2 Service description

The linked group attachment service is a conditional service for SwMI MMs. It may be supported by a SwMI MM if the collocated SwMI CC supports Additional Network Feature - Inter-System Interface Group Call (ANF-ISIGC). If supported, the linked group attachment service shall be as defined in this clause.

Group linking can be dynamic as described in clause 18, or it can be statically configured after bilateral agreements. The linked group attachment service provides information to the controlling SwMI that active group members are located in another SwMI. It makes it possible to reduce the ISI resource usage when no group members of the linked groups are located in the other SwMI.

18a.3 Service Architecture



NOTE 1: There shall be one group linking controlling SwMI MM and one to many group linking participating SwMI MMs.
NOTE 2: The arrows illustrate the information exchange routes of the service.

Figure 35a: The service architecture of the linked group attachment service

18a.4 Normal Procedure

18a.4.1 Invocation

18a.4.1.1 Invocation criteria

The linked group attachment service of ANF-ISIMM shall be invoked if the following takes place:

- a subscriber has invoked the (MS initiated) AI group attachment service in this SwMI as defined in ETSI EN 300 392-2 [1], clause 15; **or**

NOTE 1: The AI group attachment invocation is identified in the visited SwMI MM by the receipt of the U-ATTACH/DETACH GROUP IDENTITY PDU or of the U-LOCATION UPDATE DEMAND as described in ETSI EN 300 392-2 [1], clause 16.8.

- a subscriber has invoked the (MS initiated) AI group attachment service in a foreign SwMI as defined in the present document clause 15; **or**

NOTE 2: The subscriber may have invoked the group attachment service as described in clause 15 in the present document. That means that the subscriber is not necessarily present in the group home SwMI.

- a group has been attached during assignment of a group in the SwMI as defined in ETSI EN 300 392-12-22 [19], clause 6.5.3.5; **or**
- a user has invoked group attachment using another interface (e.g. dispatch applications); **and**
- the subscriber is allowed to attach to the group;
- the attached group is (dynamically or statically) linked to a group in an another SwMI;
- the group home SwMI is the group participating SwMI for one of the linked groups.

Upon the initiation of the linked group attachment service the following cases have been identified:

1) The first request for attachment to the linked group is detected.
2) A subsequent request for attachment to the linked group is detected.

18a.4.1.2 Invocation of ANF-ISIMM

18a.4.1.2.1 Case 1

If a subscriber attaches to a linked group and the group home SwMI is the group linking participating SwMI and no other subscribers have attached to the group in the "visited SwMI", the group linking controlling SwMI shall be informed of the new attachment. An Attach_linked_group_req shall be sent to the group linking controlling SwMI with the following information:

a) ANF-ISIMM invoke id: the visited SwMI MM shall allocate a unique value to be used during the invocation and operation of the service;

b) GSSI (attached group): the GSSI of the attached group;

c) MNI (attached group): the MNI of the attached group;

d) GSSI (linking controlling group): the GSSI of the linking controlling group;

e) MNI (linking controlling group): the MNI of the linking controlling group;

f) MNI (visited SwMI): the MNI of the visited SwMI where the MS is located;

NOTE 1: The "visited SwMI" means a SwMI in which the attaching MS is located. The "visited SwMI" of the attaching MS may be the "MS home SwMI" or a SwMI to which the MS has migrated.

g) optionally: PISN number (visited SwMI);

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

NOTE 2: This message is intended to be sent to the group linking controlling SwMI the first time a group member located in the SwMI indicated in "visited SwMI" attaches to a linked group in a group linking participating SwMI.

18a.4.1.2.2 Case 2

If one or more subscribers are already attached to the group in the "visited SwMI" no action shall be performed.

18a.4.2 Operation

Upon reception of the Attach_linked_group_ind (containing the same information as the corresponding Attach_linked_group_req) from the ANF-ISIMM, the group linking controlling SwMI shall validate the linked group attachment. The attachment request may be rejected if the content does not match the information held by the linking controlling SwMI.

If the group linking controlling SwMI does not reject the attachment the it shall continue the operation and shall save the MNI and optional PISN number of the visited SwMI in the C-LDB for the linked group. The group linking controlling SwMI shall respond to the Attach_linked_group_ind with an Attach_linked_group_resp containing the same information as the Attach_linked_group_ind.

Once confirmation (Attach_linked_group_conf) has been received by the group home SwMI, group attachment approval may be sent back to the new visited SwMI.

18a.5 Exceptional cases

This clause defines the exceptional procedures that shall be applied if the normal operation of the linked group attachment service fails. These exceptional procedures may be overridden by exceptional procedures that are included in an additional agreement which is made between the SwMI operators, see note 1.

NOTE 1: The contents of the additional agreements and their applicability in different situations are outside the scope of the present document.

NOTE 2: All exceptional procedures that are applied within one SwMI are outside the scope of the present document. Such exceptional procedures are e.g. exceptional procedures if the service cannot be invoked or continued at some point after invocation over the ISI or if there is no inter-TETRA connection permanently or temporarily available to the peer SwMI MM, etc.

If the Attach_Linked_Group_ind is received with a group where the receiving SwMI is not the controlling SwMI the request shall be rejected with an Attach_Linked_Group_Reject_req with an indication of "Not Controlling SwMI".

If the Attach_Linked_Group_ind is received where the "attached group" and the "controlling linked group" does not match with the dynamic or static group linking then the request shall be rejected with an Attach_Linked_Group_Reject_req with an indication of "Group linking failure".

If the Attach_linked_Group_ind is received with an MNI of a visited SwMI which the receiving SwMI does not have any connectivity with then the request shall be rejected with an Attach_Linked_Group_Reject_req with an indication "No Connectivity".

18a.6 Interactions

Upon reception of the Attach_linked_group_ind from the ANF-ISIMM, the group linking controlling SwMI shall include the visited SwMI (which may be the group linking participating SwMI) in group calls initiated at the linked group. If a group call is ongoing on the linked group the group linking controlling SwMI may start including the visited SwMI (which may be equal to the group linking participating SwMI) in the group call at the operation of the next PTT from any subscriber attached to the linked groups (if not already included), a timeout for Late Entry or any other intermediate action.

18a.7 Dynamic description

Figure 35b contains the dynamic description of the linked group attachment service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the group linking controlling SwMI.

The input signals from the right and output signals to the right represent primitives from and to the group linking participating SwMI.

The following service primitives shall be applicable for the linked group attachment service:

- attach linked group_req and attach linked group_ind. The primitives shall be used to inform the group linking controlling SwMI that the first MS has attached to a linked group;

- attach linked group reject_req and attach linked group reject_ind. The primitives shall be used to inform the group linking participating SwMI that the a failure has occurred and the attach linked group_req has not been accepted; and

- attach linked group_resp and attach linked group_conf. The primitives shall be used to acknowledge to the group linking participating SwMI that the attach linked group_req has been accepted.

The following states shall be used for the linked group attachment service:

- IDLE: No attachment to a linked group in progress;

- WAIT-FOR-RESPONSE: attachment to a linked group is in progress waiting for response from the group linking controlling SwMI MM.

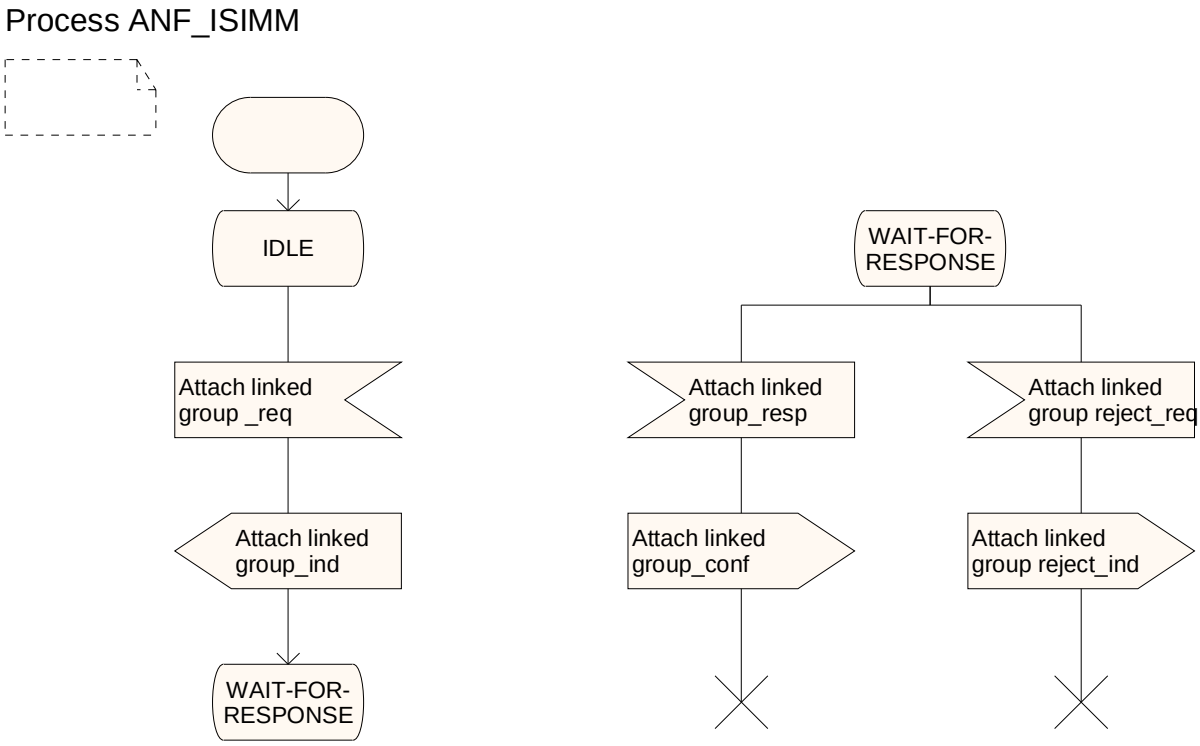


Figure 35b: Stage 1 SDL descriptions of the linked group attachment service when invoked from the group linking participating SwMI MM

18b Linked group detachment service description - stage 1

18b.1 Service definition

The linked group detachment service provides the ability for a group linking participating SwMI or visited SwMI (if this is not equal to the group linking participating SwMI) to inform the controlling SwMI that the last subscriber attached to a linked group at that group linking participating SwMI has detached.

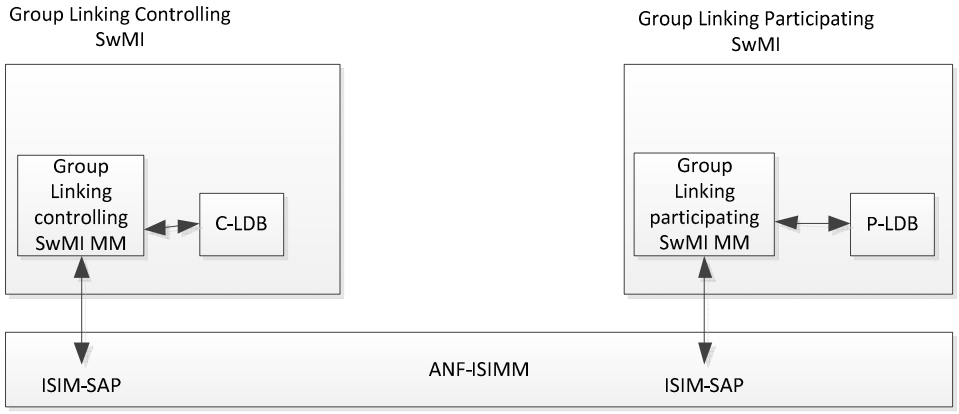
NOTE: In the group management point of view the "visited SwMI" in clauses 18b.1 to 18b.7 means the SwMI in which the subscriber is currently located which might be a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

18b.2 Service description

The linked group detachment service is a mandatory service for SwMI MMs if the linking group attachment service is supported as described in section 18a in the present document.

Group linking can be dynamic as described in clause 18, or it can be statically configured after bilateral agreements. The linked group detachment service provides information to the controlling SwMI that active group members are no longer located in another SwMI. It makes it possible to reduce the ISI resource usage when no group members of the linked groups are located in the other SwMI.

18b.3 Service architecture



NOTE 1: There shall be one group linking controlling SwMI MM and one to many group linking participating SwMI MMs.
NOTE 2: The arrows illustrate the information exchange routes of the service.

Figure 35c: The service architecture of the linked group detachment service

18b.4 Normal procedure

18b.4.1 Invocation

18b.4.1.1 Invocation criteria

The linked group detachment service of ANF-ISIMM shall be invoked if the following takes place:

- a subscriber has invoked the (MS initiated) AI user initiated deregistration service as defined ETSI EN 300 392-2 [1], clause 15; **or**

NOTE 1: The AI group detachment invocation is identified in the visited SwMI MM by the receipt of the U-ATTACH/DETACH GROUP IDENTITY PDU or of the U-LOCATION UPDATE DEMAND as described in ETSI EN 300 392-2 [1], clause 16.8.

- a subscriber has migrated from one SwMI to another and by that has detached from the previously attached group as defined in clause 6 in the present document; **or**

- a subscriber has invoked the (MS initiated) AI group detachment service as defined in clause 16 in the present document; **or**

NOTE 2: The subscriber may have invoked the group detachment service as described in clause 16 in the present document. That means that the subscriber is not necessarily present in the group home SwMI.

- a group has been detached in the SwMI by Deassignment of the group as defined in ETSI EN 300 392-12-22 [19], clause 6.5.3.6; **or**

- a user has invoked group detachment using another interface than the air interface (e.g. dispatch applications); **and**

- the detached group is (dynamically or statically) linked to a group in an another SwMI;

- the group home SwMI is the group participating SwMI for one the linked groups.

Upon the initiation of the linked group detachment service the following cases have been identified:

1) A request for detachment to the linked group is detected but other subscribers are attached to the linked group at the group linking participating SwMI or a visited SwMI (if this is not equal to the group linking participating SwMI).

2) A request for detachment to the linked group is detected and no other subscribers are attached to the linked group at the group linking participating SwMI or a visited SwMI (if this is not equal to the group linking participating SwMI).

18b.4.1.2 Invocation of ANF-ISIMM

18b.4.1.2.1 Case 1

If one or more subscribers in the "visited SwMI" are still attached to the group in the group linking participating SwMI no actions shall be performed.

18b.4.1.2.2 Case 2

If the last subscriber attached to the linked group in a "visited SwMI" detach, the group linking participating SwMI shall inform the group linking controlling SwMI about the detachment.

A Detach_linked_group_req shall be sent to the group linking controlling SwMI with the following information:

a) ANF-ISIMM invoke id: the invoking ANF-ISIMM service instance;

b) GSSI (attached group): the GSSI of the attached group;

c) MNI (attached group): the MNI of the attached group;

d) GSSI (linking controlling group): the GSSI of the linking controlling group;

e) MNI (linking controlling group): the MNI of the linking controlling group;

f) MNI: the MNI of the visited SwMI where the MS is located.

g) optionally: PISN number (visited SwMI);

h) optionally: proprietary information. The content of the proprietary information is outside the scope of the present document.

NOTE: This message is intended to be sent to the group linking controlling SwMI when the last group member detaches from a linked group at the group linking participating SwMI or a visited SwMI (if this is not equal to the group linking participating SwMI).

18b.4.2 Operation

Upon reception of the Detach_linked_group_ind from the ANF-ISIMM, the group linking controlling SwMI shall remove the MNI and the PISN of the visited SwMI in the C-LDB for the linked group. The group linking controlling SwMI shall respond to the Detach_linked_group_ind with a Detach_linked_group_resp containing the same information as the Detach_linked_group_ind.

Once confirmation (Detach_linked_group_conf) has been received by the group home SwMI, group detachment approval may be sent back to the visited SwMI.

18b.5 Exceptional cases

A received Detach_linked_group_ind shall always be responded with a Detach_linked_group_conf independent of the content.

If the content of the Detach_linked_group_ind does not match an existing group linking the content of the request is ignored.

18b.6 Interactions

Upon reception of the Detach_linked_group_ind from the ANF-ISIMM, the group linking controlling SwMI shall stop including the visited SwMI (which may be equal to the group linking participating SwMI) in groups calls initiated to the linked group. If a group call is ongoing on the linked group the group linking controlling SwMI may terminate the established call towards the visited SwMI (which may be equal to the group linking participating SwMI) as described in ETSI EN 300 392-3-3 [16].

18b.7 Dynamic description

Figure 35d contains the dynamic description of the linked group detachment service as provided by the ANF-ISIMM.

The dynamic description is given using the SDL conventions as defined in Recommendation ITU-T Z.100 [9]. In addition, the following conventions are used:

- the input signals from the left and output signals to the left represent primitives from and to the group linking controlling SwMI;
- the input signals from the right and output signals to the right represent primitives from and to the group linking participating.

The following service primitives shall be applicable for the linked group detachment service:

- detach linked group_req and detach linked group_ind. The primitives shall be used to inform the group linking controlling SwMI that the last MS in a SwMI has detached to a linked group;
- detach linked group_resp and detach linked group_conf. The primitives shall be used to acknowledge to the group linking participating SwMI that the detach linked group_req has been handled.

The following states shall be used for the detach linked group service:

- IDLE: No attachment to a linked group in progress;
- WAIT-FOR-RESPONSE: attachment to a linked group is in progress waiting for response from the group linking controlling SwMI MM.

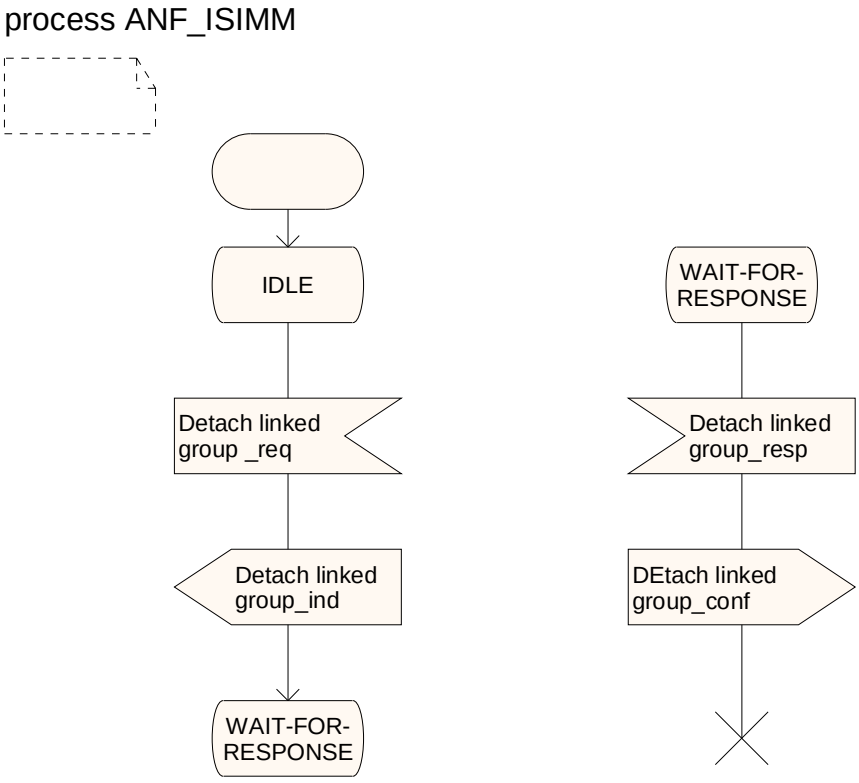


Figure 35d: Stage 1 SDL description of the linked group detachment service when invoked from the group linking participating SwMI

19 ANF-ISIMM stage 2 specification

19.1 General

This clause describes the Functional Entity (FE) model used to specify ANF-ISIMM stage 2 behaviour. The service-specific stage 2 descriptions are given in clauses 19.2 and 19.3.

In stage 2, the internal behaviour of the ANF-ISIMM is specified by breaking it down into a number of Functional Entities (FEs). Thus, stage 2 includes the behaviour of these FEs and the information flows exchanged between them.

19.2 Functional model

The functional model shall comprise the following Functional Entities (FEs):

- FE1 individual subscriber MM control entity in the individual subscriber home SwMI;
- FE2 group MM control entity in the group home SwMI and group linking participating SwMI;
- FE3 visiting individual subscriber and group MM control entity in visited SwMI;
- FE4 visiting individual subscriber and group MM control entity in previous location SwMI;
- FE5 group linking controlling SwMI.

Figures 36 illustrates these FEs and the relationships.

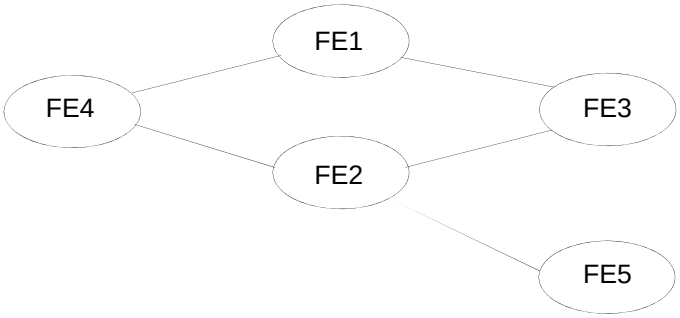


Figure 36: Functional model for ANF-ISIMM

Figure 37: Void

19.3 Information flow diagrams

Clauses 20 to 32 specify the information flow scenarios for the ANF-ISIMM basic operation services. The successful scenarios, i.e. the normal operation, of each service are given first, and they are followed by the exceptional operation scenarios. The exception operation scenarios are related to e.g. unsuccessful operation.

NOTE 1: The exceptional operation scenarios in stage 2 do not cover all possible exceptional operation scenarios.

NOTE 2: The information flow sequences are produced with a MSC editor; however, the scenarios are not MSCs but information flow sequences as defined in Recommendation ITU-T I.130 [8].

NOTE 3: In accordance with the Recommendation ITU-T I.130 [8] the invoking side is placed as the leftmost entity in the information flow sequences.

The stage 3 for ANF-ISIMM provides signalling procedures in support of the information flow sequences specified below. In addition, signalling procedures should be provided to cover other sequences arising from error situations, interactions with basic call, interactions with other supplementary services, different topologies, etc.

In the information flow scenarios, ANF-ISIMM information flows are represented by arrows. Within a column representing an ANF-ISIMM functional entity, the numbers refer to functional entity actions listed in the preceding clause.

ANF-ISIMM information flows shall be conveyed in any PSS1 information flow in which the FACILITY information element may be included, see ISO/IEC 11572 [6] and ISO/IEC 11582 [7].

All ANF-ISIMM information flows are unrelated to any TETRA or PSS1 basic call information flows.

20 Migration - stage 2 information flow sequences

20.0 General

This clause defines the information flow sequences for the migration service as defined in clause 6.

20.1 Normal operation

20.1.1 Migration with pre-defined profile(s)

Figure 38 illustrates the information flow sequence for the migration service that takes place with the pre-defined migration profile(s) as defined in case 1) in clause 6.5.

NOTE: The home SwMI in the figure 38 is the individual subscriber home SwMI.

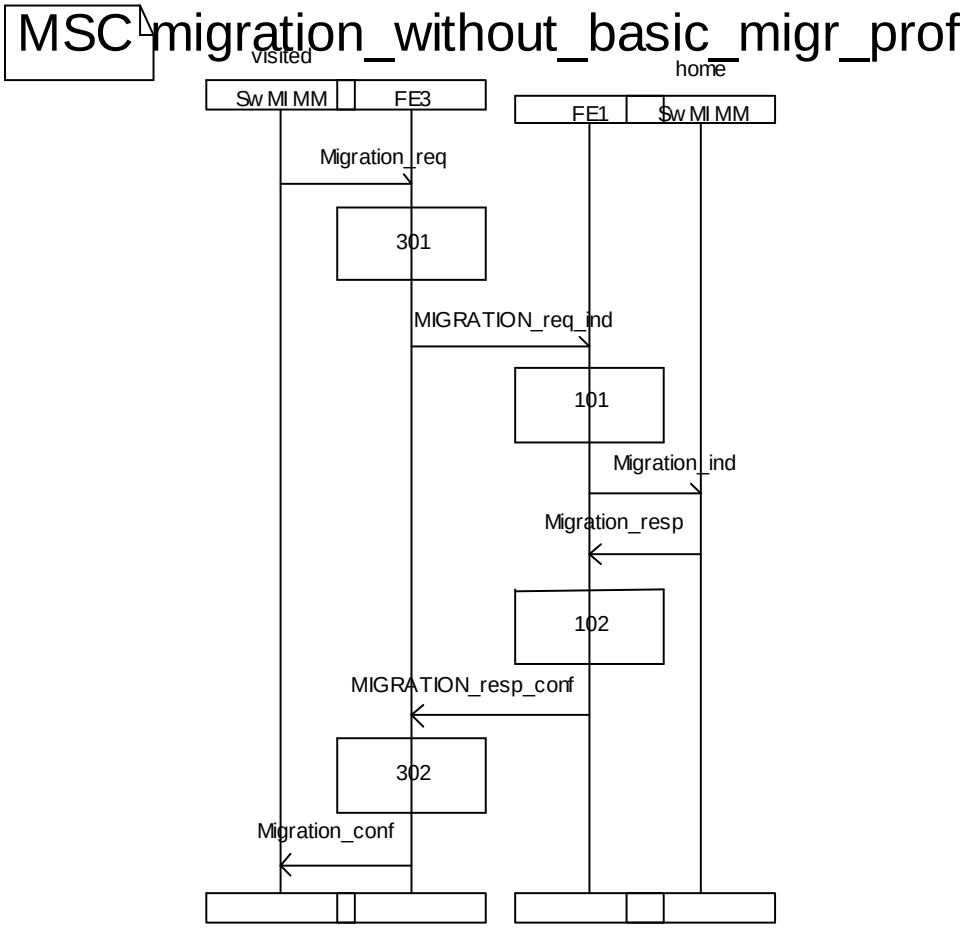


Figure 38: The migration service with the pre-defined profile(s)

20.1.2 Migration with basic migration profile exchange

Figure 39 illustrates the information flow sequence for the migration service that takes place with the basic migration profile exchange as defined in case 2) in clause 6.5.

NOTE: The home SwMI in the figure 39 is the individual subscriber home SwMI.

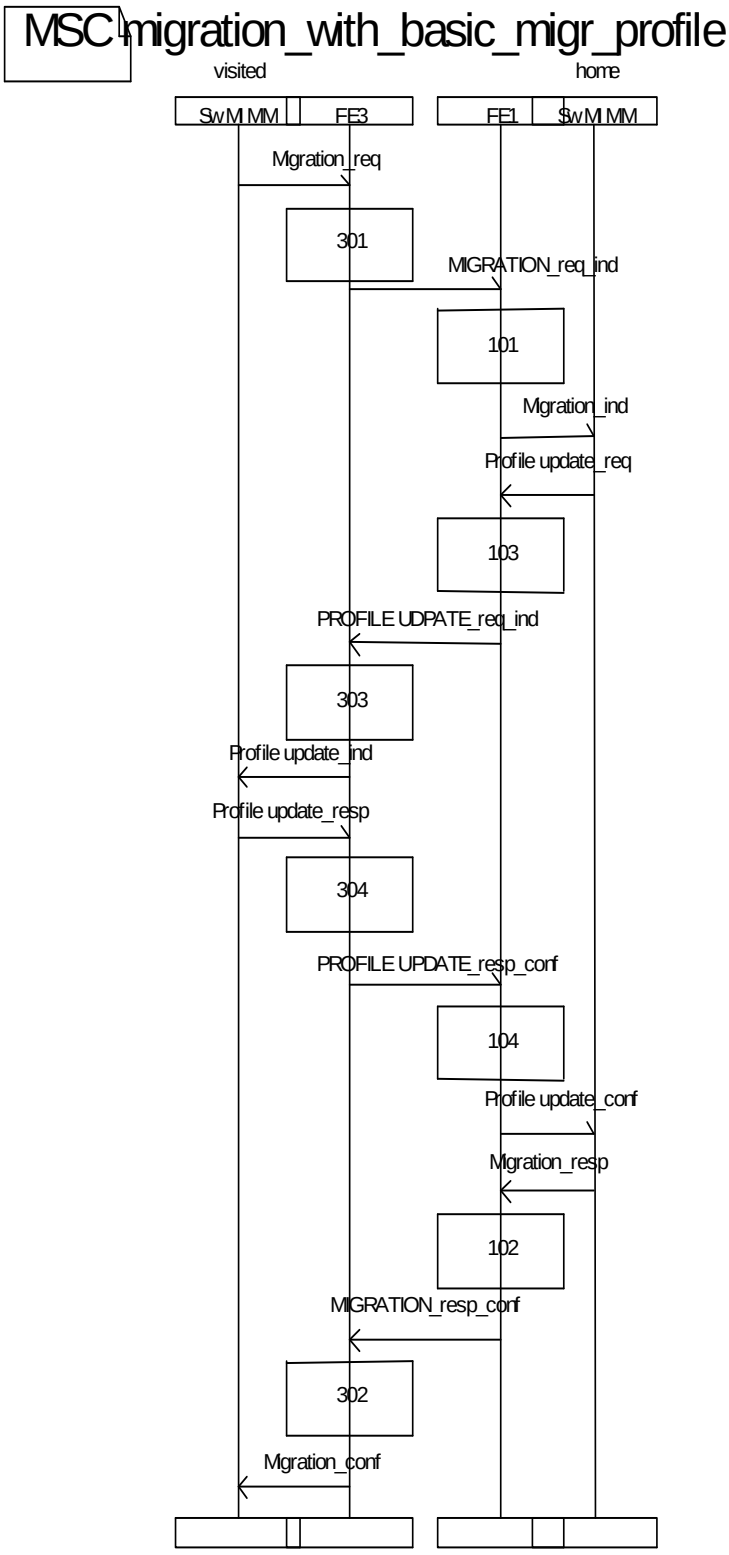


Figure 39: The migration service with the basic migration profile exchange

20.1.3 Migration with basic migration and SS-migration profiles exchange

20.1.3.1 SS-migration profiles exchanged before final migration approval

Figures 40 and 41 illustrate the information flow sequence for the migration service that takes place with the basic and SS-migration profiles exchange as defined in case 3a) in clause 6.5.

NOTE 1: The case 3a) defines the migration service in which the SS-migration profiles exchange takes place before the final migration approval.

NOTE 2: The home SwMI in the figures 40 and 41 is the individual subscriber home SwMI.

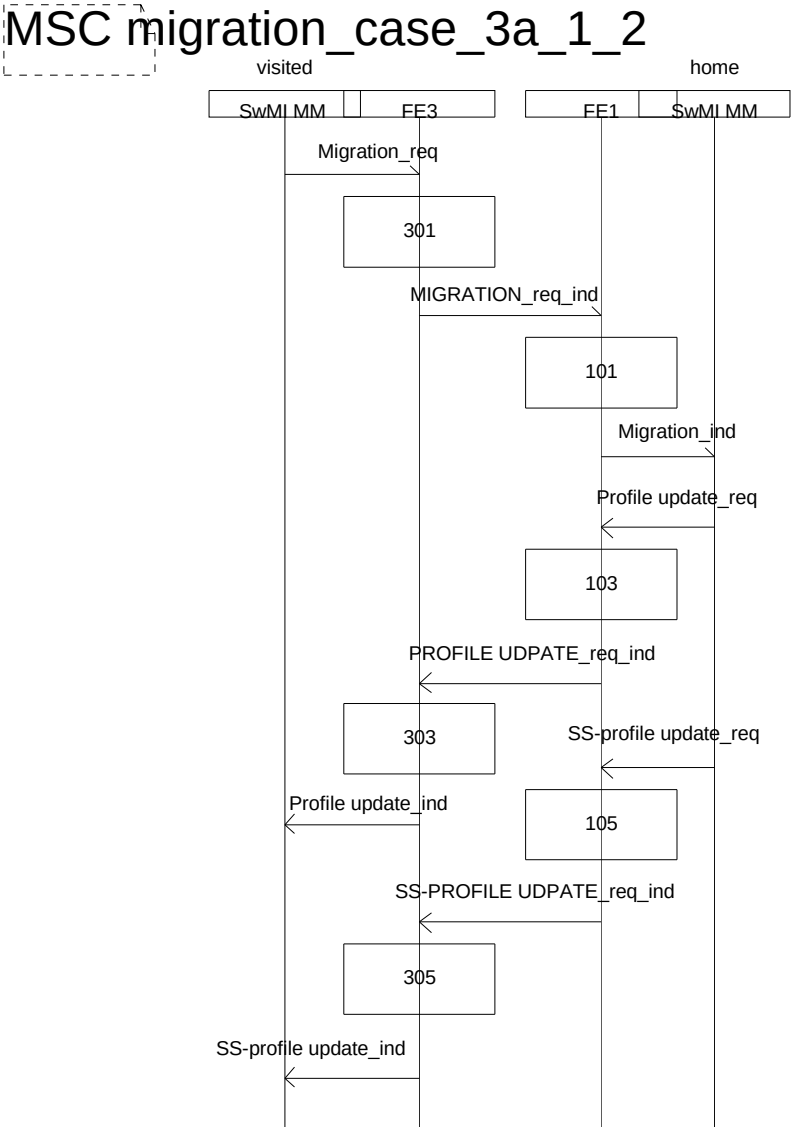


Figure 40: The SS-migration profiles exchanged before the final migration approval

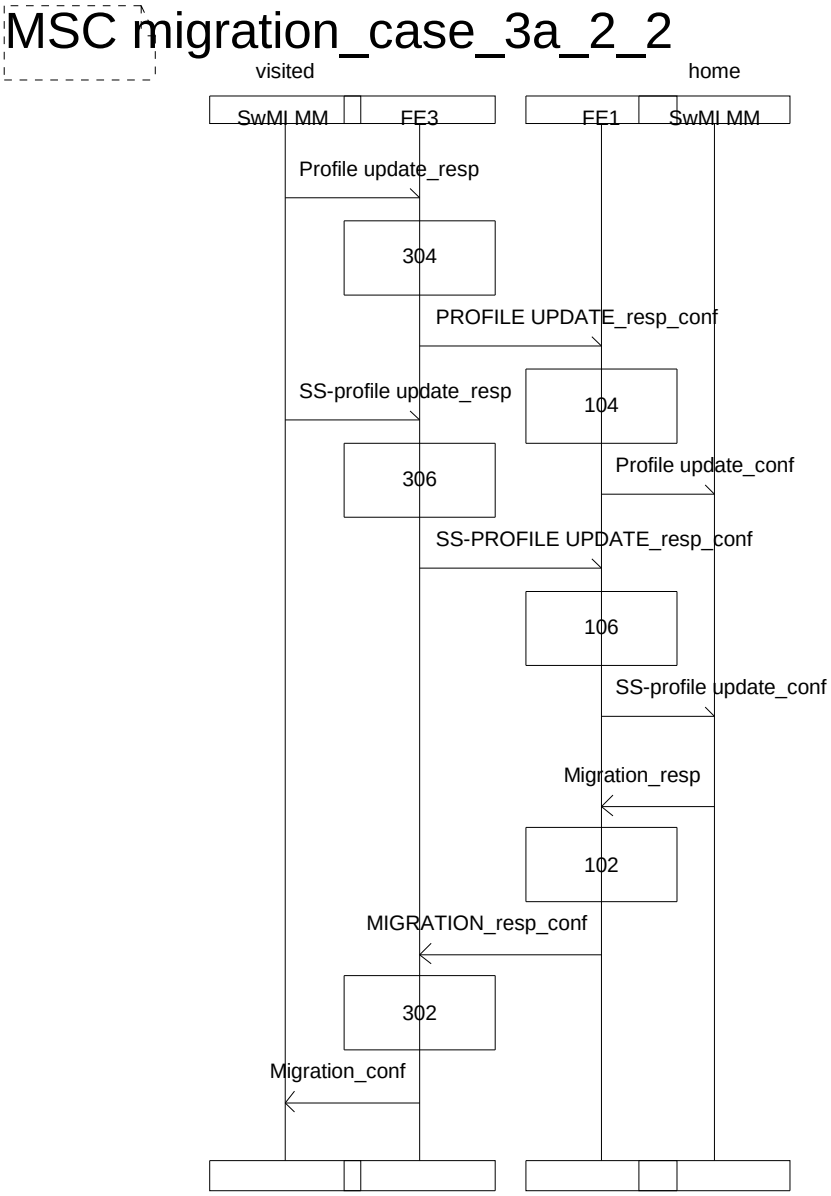


Figure 41: The SS-migration profiles exchanged before the final migration approval

20.1.3.2 SS-migration profiles exchanged after final migration approval

Figures 42 and 43 illustrate the information flow sequence for the migration service that takes place with the basic and SS-migration profiles exchange as defined in case 3b) in clause 6.5.

NOTE 1: The case 3b) defines the migration service in which the SS-migration profiles exchange takes place after the final migration approval.

NOTE 2: The home SwMI in the figures 42 and 43 is the individual subscriber home SwMI.

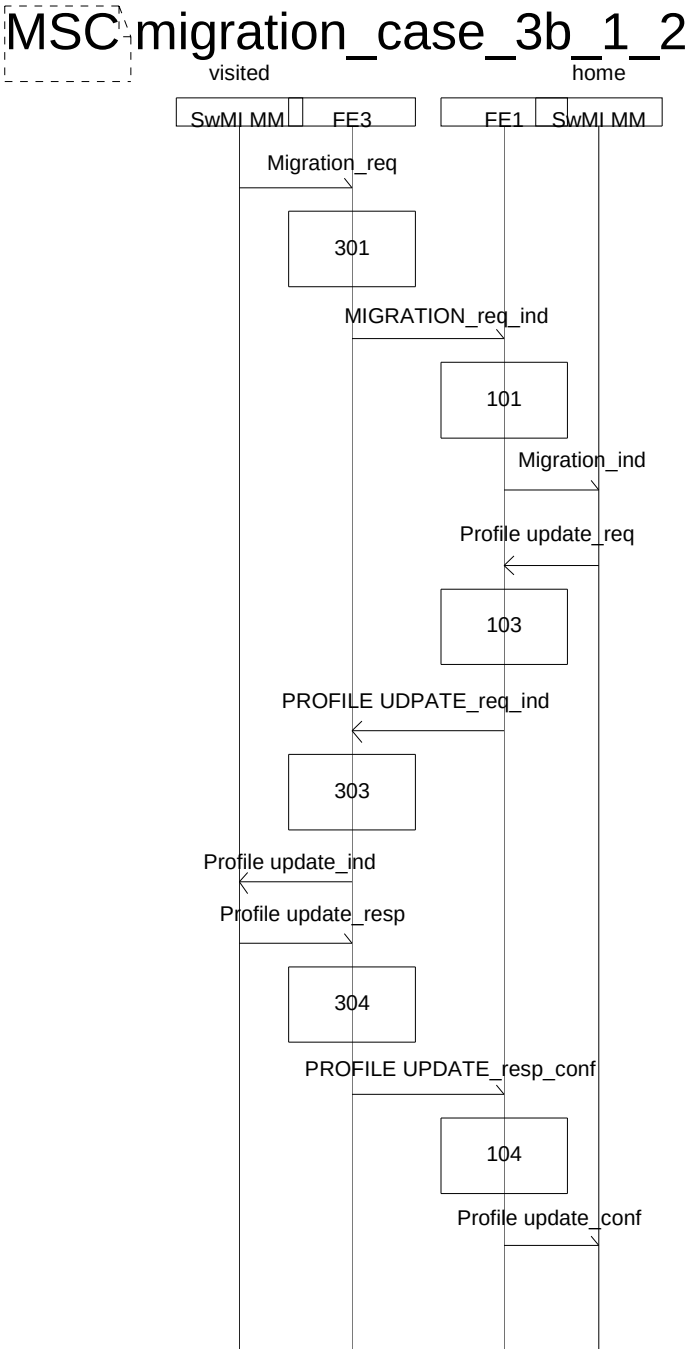


Figure 42: The SS-migration profiles exchanged after the final migration approval

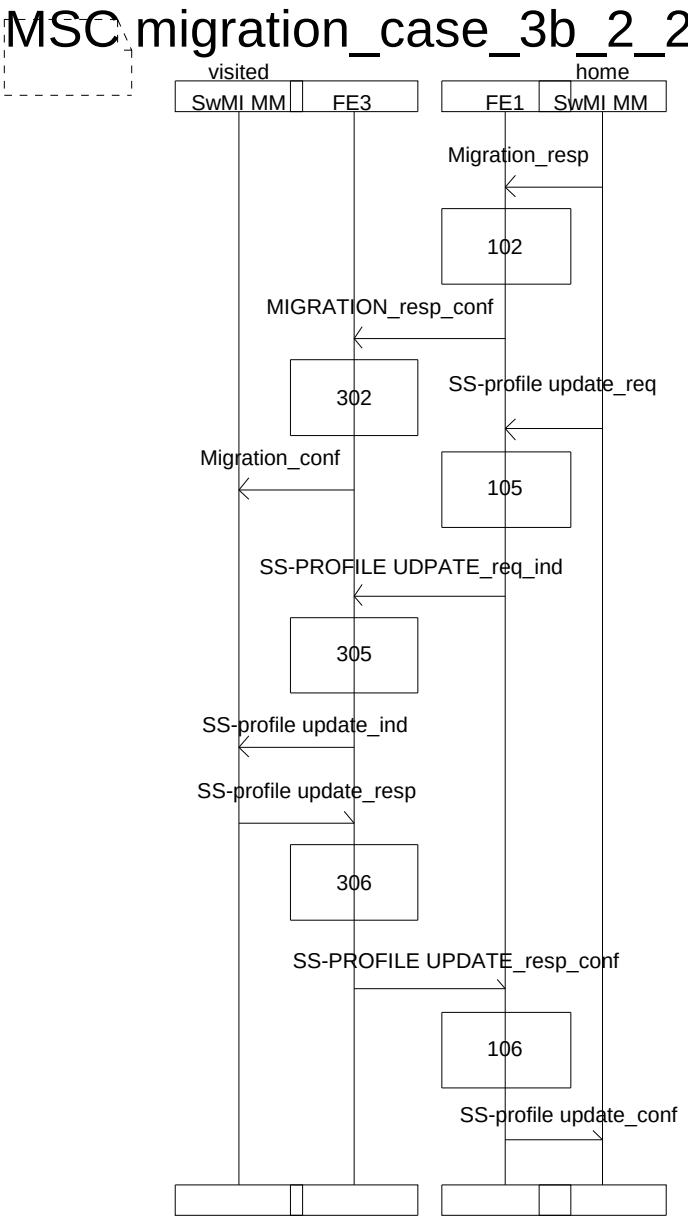


Figure 43: The SS-migration profiles exchanged after the final migration approval

20.2 Exceptional operation

20.2.1 Migration rejection request upon receipt of the Migration_ind

Figure 44 illustrates the information flow sequence for the rejected migration service when the individual subscriber home SwMI MM rejects the service upon receipt of the Migration_ind.

NOTE 1: The exceptional operation can take place if the migration service has been invoked according to any of the cases 1), 2), 3a) and 3b) as defined in clause 6.5.

NOTE 2: The home SwMI in the figure 44 is the individual subscriber home SwMI.

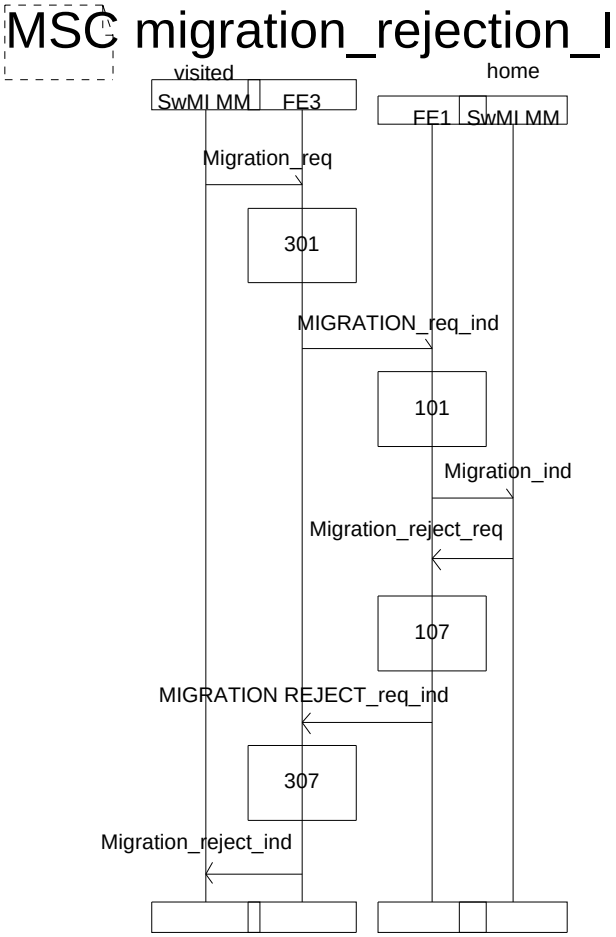


Figure 44: Migration rejection request upon receipt of the Migration_ind

20.2.2 Migration rejection request upon receipt of Profile update_conf and SS-profile update_conf

Figures 45 and 46 illustrate the information flow sequence for the rejected migration service when the individual subscriber home SwMI MM rejects the service upon receipt of the Profile update_conf and the SS-profile update_conf.

NOTE 1: The exceptional operation can take place if the migration service has been invoked according to the case 3a) as defined in clause 6.5.

NOTE 2: The home SwMI in the figures 45 and 46 is the individual subscriber home SwMI.

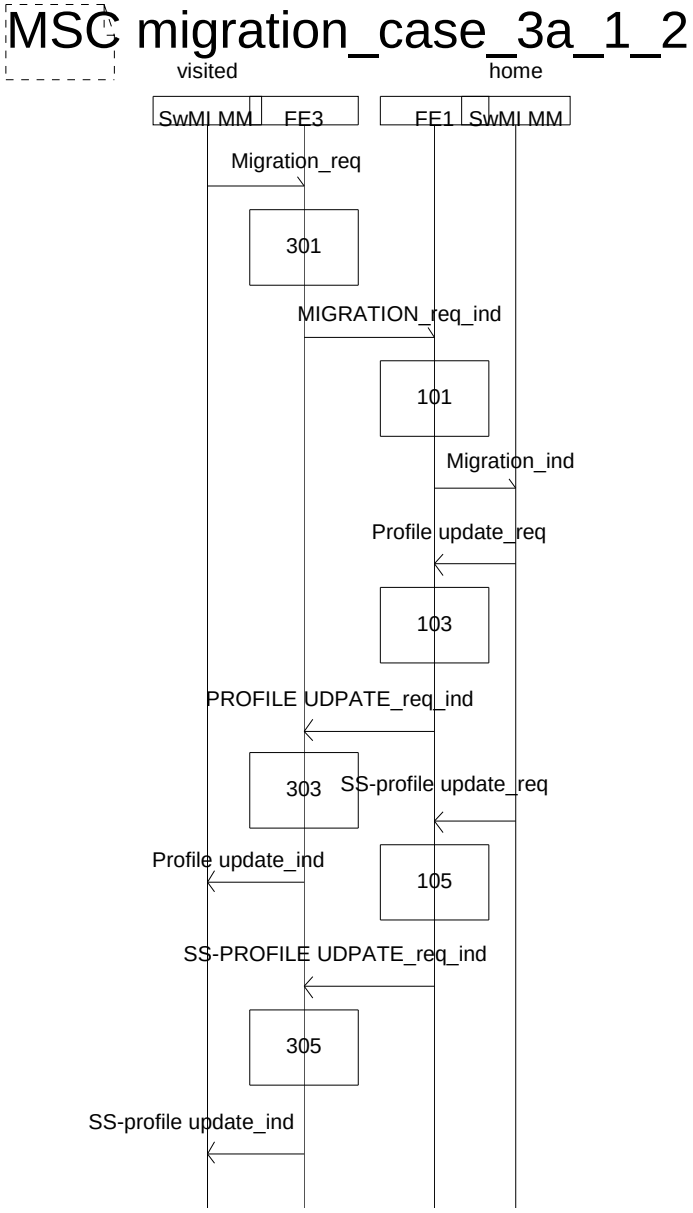


Figure 45: Migration rejection request upon receipt of the Profile update_conf and the SS-profile update_conf

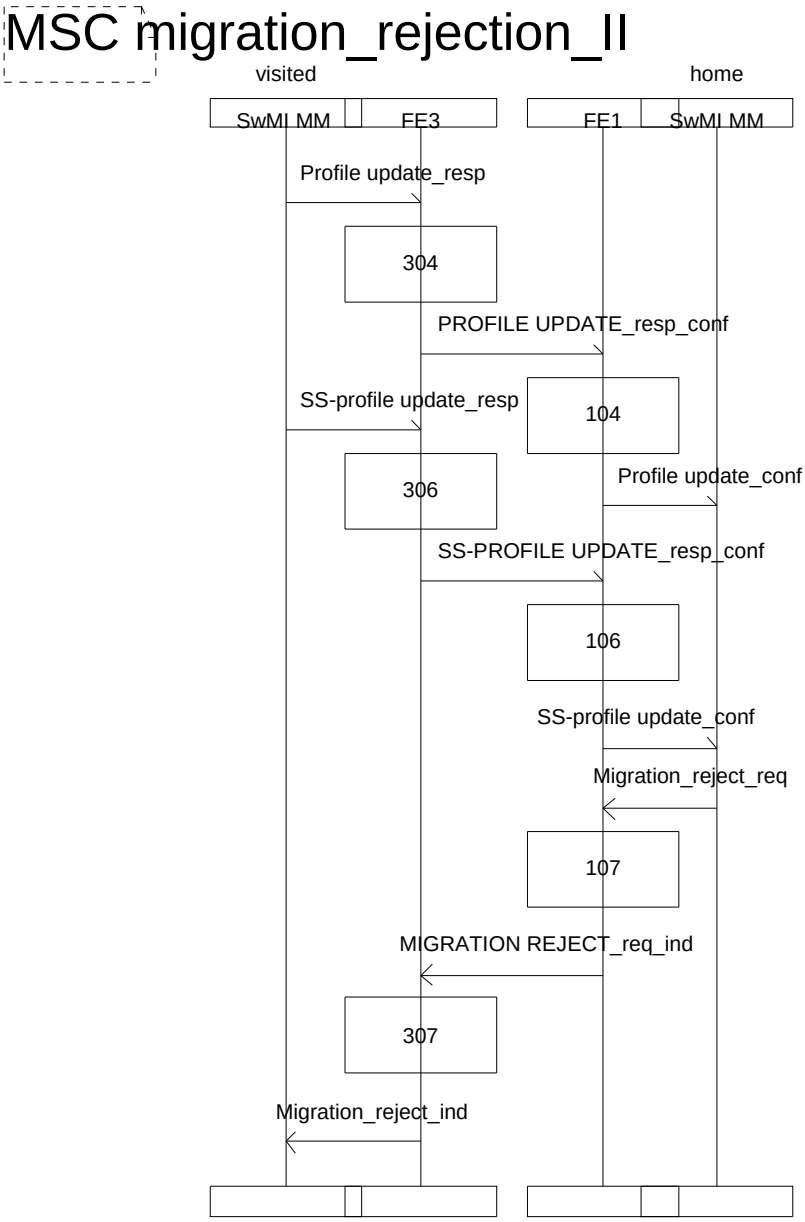


Figure 46: Migration rejection request upon receipt of the Profile update_conf and the SS-profile update_conf

20.3 FE actions for subscriber migration

20.3.1 FE actions of FE1

101 Upon receipt of the MIGRATION_ind requesting the migration, FE1 shall send individual subscriber home SwMI MM the corresponding Migration_ind.

102 Upon receipt of the Migration_resp indicating that the migration is allowed, FE1 shall send FE3 the corresponding MIGRATION_resp.

103 Upon receipt of the Profile update_req containing the individual subscriber's basic migration profile, FE1 shall send FE3 the corresponding PROFILE UPDATE_req.

104 Upon receipt of the PROFILE UPDATE_conf containing the acknowledgement for the basic migration profile and possibly the temporary basic migration profile, FE1 shall send the visited SwMI MM the corresponding Profile update_conf.

105 Upon receipt of the SS-profile update_req containing the individual subscriber's SS-migration profiles, FE1 shall send FE3 the corresponding SS-PROFILE UPDATE_req.

106 Upon receipt of the SS-PROFILE UPDATE_conf containing the acknowledgement for the SS-migration profiles and possibly the temporary SS-migration profiles, FE1 shall send the visited SwMI MM the corresponding SS-profile update_conf.

107 Upon receipt of the Migration reject_req containing the migration rejection cause, FE1 shall send FE3 the corresponding MIGRATION REJECT_req_ind.

The following actions are applicable in the case of migration rejection due to failed authentication:

108 Upon receipt of the MIGRATION REJECT_ind containing the migration rejection cause, FE1 shall send individual subscriber home SwMI MM the corresponding Migration reject_ind.

109 Upon receipt of the Migration reject_resp containing the acknowledgement for the migration rejection, FE1 shall send FE3 the corresponding MIGRATION REJECT_resp.

20.3.2 FE actions of FE3

301 Upon receipt of the Migration_req requesting the migration, FE3 shall send FE1 the corresponding MIGRATION_req.

302 Upon receipt of the MIGRATION_conf indicating that the migration is allowed, FE3 shall send visited SwMI MM the corresponding Migration_conf primitive.

303 Upon receipt of the PROFILE UPDATE_ind containing the individual subscriber's basic migration profile, FE3 shall send the visited SwMI MM the corresponding Profile update_ind.

304 Upon receipt of the Profile update_resp containing the acknowledgement for the basic migration profile and possibly the temporary basic migration profile, FE3 shall send FE1 the corresponding PROFILE UPDATE_resp.

305 Upon receipt of the SS-PROFILE UPDATE_ind containing the individual subscriber's SS-migration profiles, FE3 shall send the visited SwMI MM the corresponding SS-profile update_ind.

306 Upon receipt of the SS-profile update_resp containing the acknowledgement for the SS-migration profiles and possibly the temporary SS-migration profiles, FE3 shall send FE1 the corresponding SS-PROFILE UPDATE_resp.

307 Upon receipt of the FE1 the MIGRATION REJECT_ind containing the migration rejection cause, FE3 shall send visited SwMI MM the corresponding Migration reject_ind.

The following actions are applicable in the case of migration rejection due to failed authentication:

308 Upon receipt of the Migration reject_req containing the migration rejection cause, FE3 shall send FE1 the corresponding MIGRATION REJECT_req.

309 Upon receipt of the MIGRATION REJECT_conf containing the acknowledgement for the migration rejection, FE3 shall send the visited SwMI MM the corresponding Migration reject_conf.

21 Restricted migration - stage 2 information flow sequences

21.1 General

This clause defines the information flow sequences for the restricted migration service as in clause 7.

21.1 Normal operation

21.1.1 Restricted migration requested by visited SwMI MM

The information flow sequence for the restricted migration service as specified in case 1) in clause 7.5 (i.e. the restricted migration that is requested by the visited SwMI MM upon receipt of migration request from the migrating subscriber) is as the information flow sequence defined in clause 20.1.1, except that: the FE actions 101, 102, 301 and 302 are replaced by the FE actions 101, 102, 301 and 302 as defined in clause 21.3, respectively.

21.1.2 Restricted migration requested by individual subscriber home SwMI upon receipt of MIGRATION_ind from the visited SwMI MM

The information flow sequence for the restricted migration service as specified in case 2) in clause 7.5 (i.e. the restricted migration that is invoked by the individual subscriber home SwMI MM upon receipt of the MIGRATION_ind from the visited SwMI MM) is as the information flow sequence defined in clause 20.1.1, the FE actions 102 and 302 are replaced by the FE actions 102 and 302 as defined in clause 21.3, respectively.

21.1.3 Restricted migration requested by individual subscriber home SwMI MM upon receipt of PROFILE UPDATE_ind (and possibly SS-PROFILE UPDATE_ind) from the visited SwMI MM

The restricted migration service as defined in case 3) in clause 7.5 (i.e. the restricted migration service that is invoked by the individual subscriber home SwMI MM upon receipt of the PROFILE UPDATE_ind and possibly of the SS-PROFILE UPDATE_ind from the visited SwMI MM) has three different sub-cases.

The information flow sequences for the sub-cases are as follows:

1) the SS-migration profiles are not exchanged as part of the migration service, i.e. the migration as defined in case 2) in clause 6 is changed to the restricted migration service as defined in case 3) in clause 7.5;

   the information flow sequence is as the information flow sequence as defined in clause 20.1.2 except that the FE actions 106 and 306 are replaced by the FE actions 102 and 302 as defined in clause 21.3, respectively;

2) the SS-migration profiles are exchanged before the final migration approval, i.e. the migration as defined in case 3a) in clause 6 is changed to the restricted migration service as defined in case 3) in clause 7.5;

   the information flow sequence is as the information flow sequence as defined in clause 20.1.2.1 except that: the FE actions 106 and 306 are replaced by the FE actions 102 and 302 as defined in clause 21.3, respectively;

3) the SS-migration profile exchange is cancelled due to the restricted migration, i.e. if the individual subscriber home SwMI MM selected to carry out the migration as defined in case 3b) in clause 6, but the SS-migration profile exchange is cancelled as the restricted migration shall be granted for the individual subscriber. The information flow sequence is as the information flow sequence as defined in clause 20.1.2.2 except that:

   - the FE actions 105, 106, 305 and 306 are omitted; and
   - the FE actions 102 and 302 are replaced by the FE actions 102 and 302 as defined in clause 21.3, respectively.

21.2 Exceptional operation

As defined in clause 20.2.1 except that:

- the FE actions 101 and 301 correspond to those as defined in this clause; and
- the exceptional operation can take place if the restricted migration has been invoked as defined in case 1) in clause 7.5;

NOTE: The exceptional operation that is applicable for the cases 2) and 3) as defined in clause 7.5 is as defined for the migration service as the cases are originally invoked as the migration service.

21.3 FE actions for restricted migration

21.3.1 FE actions of FE1

101 Upon receipt of the MIGRATION_req requesting the restricted migration for the subscriber, FE1 shall send the individual subscriber home SwMI MM the corresponding Migration_ind.

102 Upon receipt of the Migration_resp indicating that the restricted migration is allowed, FE1 shall send FE3 the corresponding MIGRATION_resp.

21.3.2 FE actions of FE3

301 Upon receipt of the Migration_req requesting the restricted migration for the subscriber, FE3 shall send FE1 the corresponding MIGRATION_req.

302 Upon receipt of the MIGRATION _conf indicating that the restricted migration is allowed, FE3 shall send the visited SwMI MM the corresponding Migration_conf.

22 Removal of Subscriber Information - stage 2 information flow sequences

22.0 General

This clause defines the information flow sequences for the restricted migration service as defined in clause 8.

22.1 Normal operation

Figure 47 illustrates the information flow sequence for the RSI service as defined in clause 8.4.

NOTE: The home SwMI in the figure 47 is the individual subscriber home SwMI.

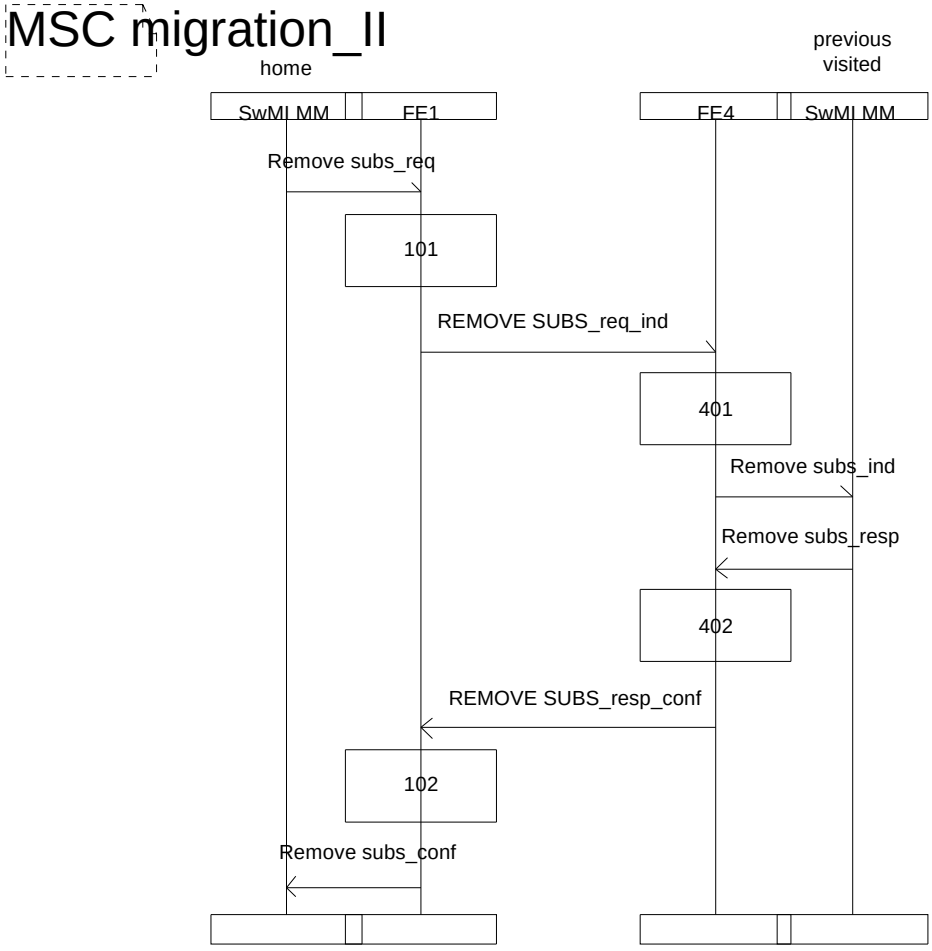


Figure 47: The RSI

22.2 Exceptional operation

Figure 48 illustrates the information flow sequence for the RSI service when the previous visited SwMI MM rejects the service upon receipt of the Remove subs_ind.

NOTE: The home SwMI in the figure 48 is the individual subscriber home SwMI.

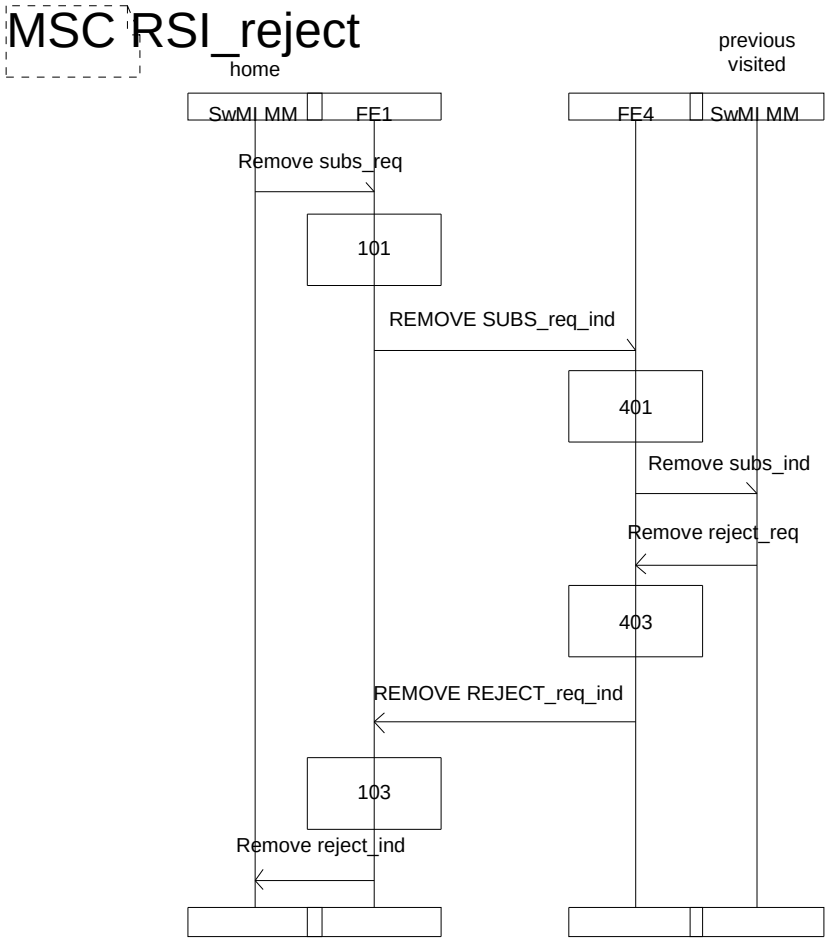


Figure 48: The RSI rejection

22.3 FE actions for subscriber migration

22.3.1 FE actions of FE1

101 Upon receipt of the Remove subs_req requesting the previous visited SwMI MM to remove the subscriber information from the previous visited SwMI, FE1 shall send FE4 the corresponding REMOVE SUBS_req. The individual subscriber home SwMI MM shall re-invoke the service until successfully completed.

102 Upon receipt of the REMOVE SUBS_resp indicating that the previous visited SwMI MM has removed the subscriber information, FE1 shall send the individual subscriber home SwMI MM the corresponding Remove subs_conf.

103 Upon receipt of the REMOVE REJECT_ind indicating that the age stamp of the subscriber's migration in the I-VDB is newer than the age indicated in the REMOVE SUBS_req, FE1 shall send the individual subscriber home SwMI MM the corresponding Remove reject_ind.

22.3.2 FE actions of FE4

401 Upon receipt of the REMOVE SUBS_ind indicating that the previous visited SwMI MM shall remove the subscriber information, FE4 shall send the previous visited SwMI MM the corresponding Remove subs_ind.

402 Upon receipt of Remove subs_resp indicating that the previous visited SwMI MM has removed the subscriber information, FE4 shall send the individual subscriber home SwMI MM the corresponding REMOVE SUBS_resp.

403 Upon receipt of the Remove reject_req indicating that the age stamp of the subscriber's migration in the I-VDB is newer than the age indicated in the REMOVE SUBS_ind, FE4 shall send FE1 the corresponding REMOVE REJECT_req.

23 De-registration - stage 2 information flow sequences

23.0 General

This clause defines the information flow sequences for the de-registration service as defined in clause 9.

23.1 Normal operation

23.1.1 Visited SwMI MM initiated de-registration

Figure 49 illustrates the information flow sequence for the de-registration service as defined in cases 1) and 2) in clause 9.4.

NOTE: The home SwMI in the figure 49 is the individual subscriber home SwMI.

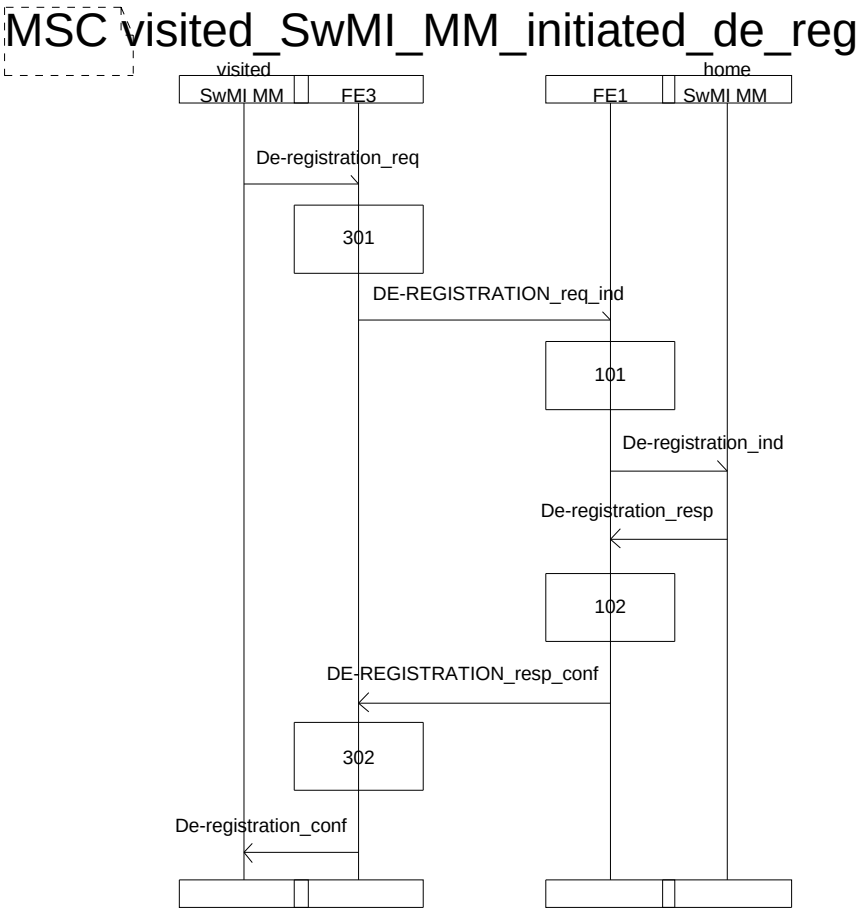


Figure 49: Visited SwMI MM initiated de-registration

23.1.2 Individual subscriber home SwMI MM initiated de-registration

Figure 50 illustrates the information flow sequence for the de-registration service as defined in case 3) in clause 9.4.

NOTE: The home SwMI in the figure 50 is the individual subscriber home SwMI.

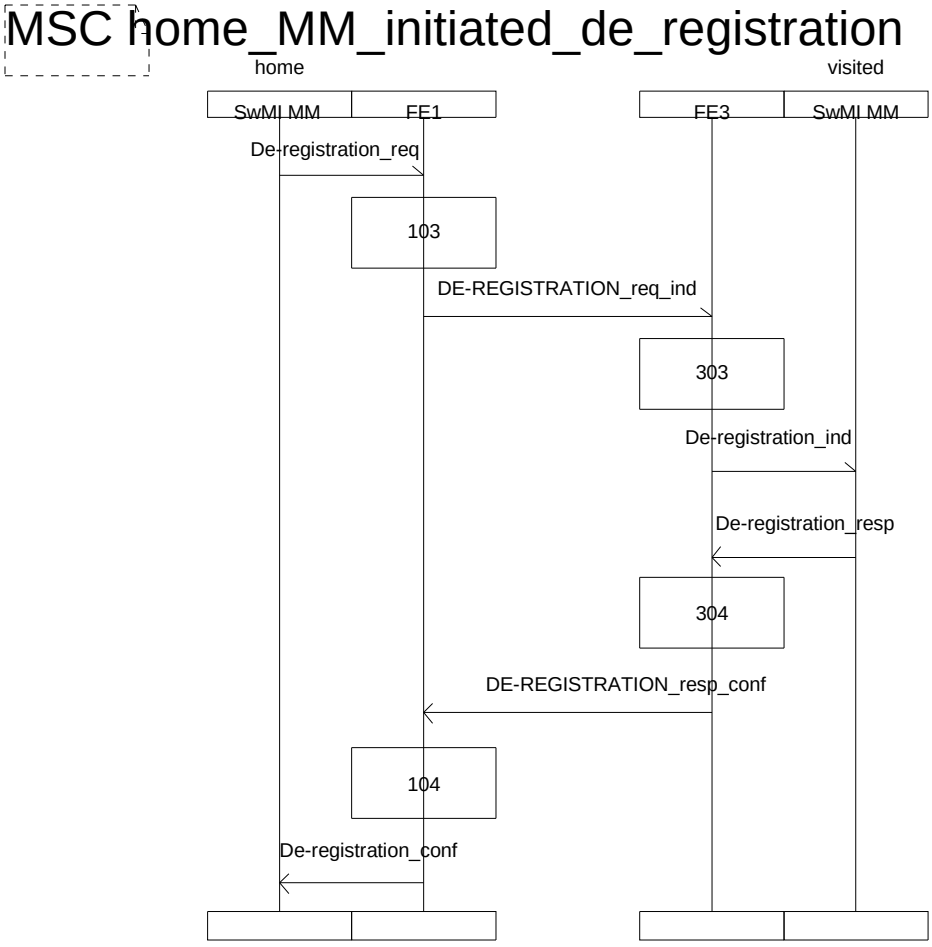


Figure 50: Individual subscriber home SwMI MM initiated de-registration

23.2 Exceptional operation

23.2.1 Visited SwMI MM initiated de-registration rejected

Figure 51 illustrates the information flow sequence for the de-registration service when the individual subscriber home SwMI MM rejects the service upon receipt of the De-registration_ind.

NOTE 1: The exceptional operation can take place if the de-registration service has been invoked according to the cases 1) and 2) as defined in clause 8.5.

NOTE 2: The home SwMI in the figure 51 is the individual subscriber home SwMI.

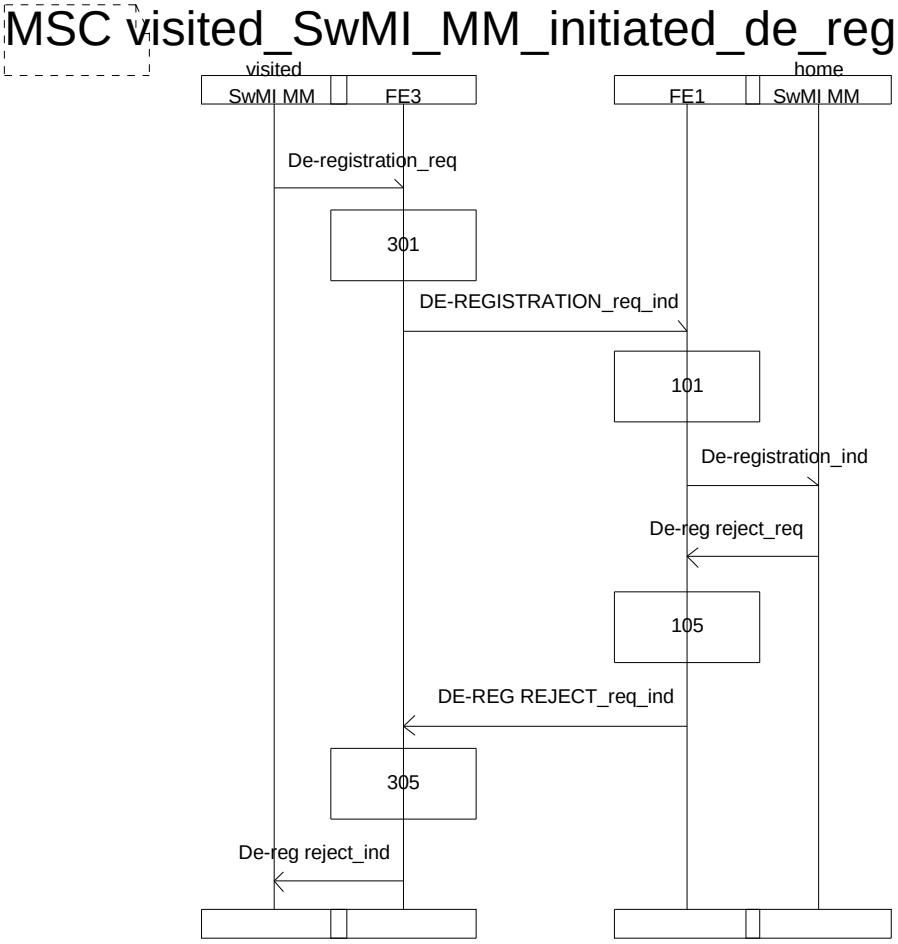


Figure 51: Visited SwMI MM initiated de-registration rejected

23.2.2 Individual subscriber home SwMI MM initiated de-registration rejected

Figure 52 illustrates the information flow sequence for the de-registration service when the visited SwMI MM rejects the service upon receipt of the De-registration_ind.

NOTE 1: The exceptional operation can take place if the de-registration service has been invoked according to the case 3) as defined in clause 8.5.

NOTE 2: The home SwMI in the figure 52 is the individual subscriber home SwMI.

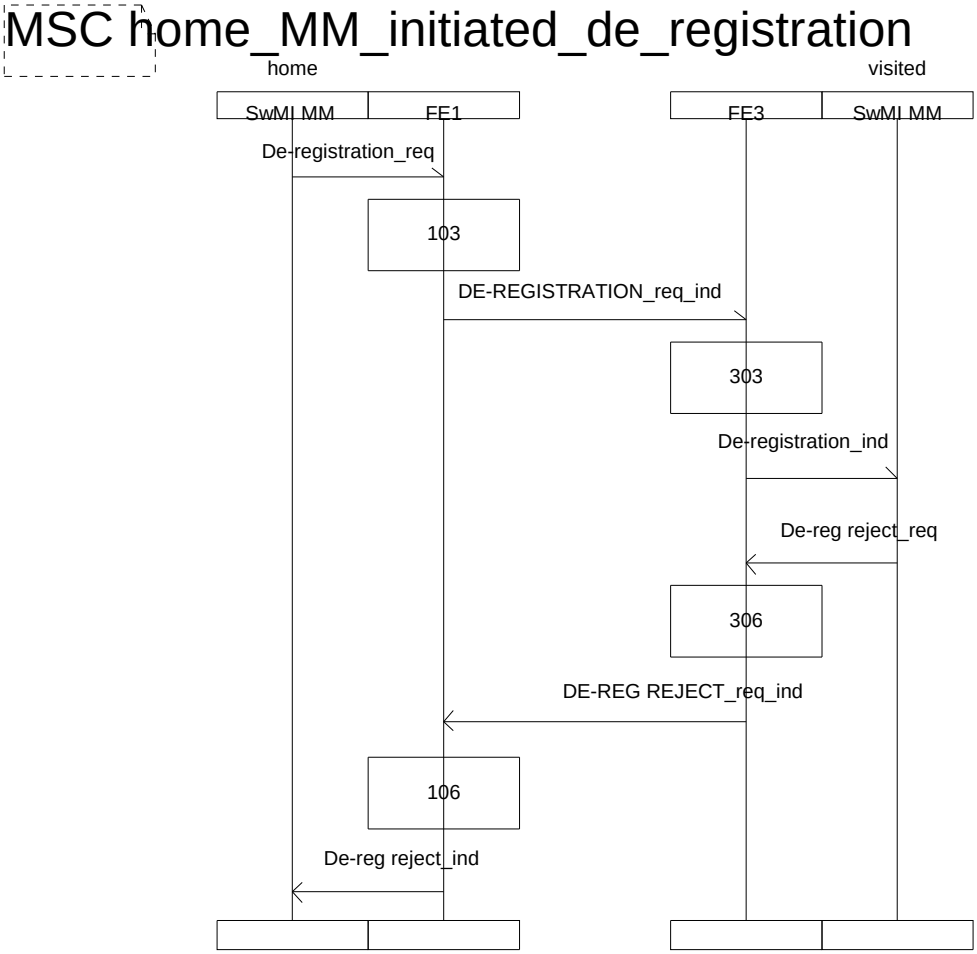


Figure 52: Individual subscriber home SwMI MM initiated de-registration rejected

23.3 FE actions

23.3.1 FE actions of FE1

101 Upon receipt of the DE-REGISTRATION_ind indicating the de-registered individual subscriber, FE1 shall send the individual subscriber home SwMI MM the corresponding De-registration_ind.

102 Upon receipt of the De-registration_resp indicating that the individual subscriber home SwMI MM has recorded the subscriber's de-registration, FE1 shall send FE3 the corresponding DE-REGISTRATION_resp.

103 Upon receipt of the De-registration_req indicating the subscriber to be de-registered, FE1 shall send FE3 the corresponding DE-REGISTRATION_req.

104 Upon receipt of DE-REGISTRATION_conf indicating that the visited SwMI MM has de-registered the subscriber, FE1 shall send individual subscriber home SwMI MM the corresponding De-registration_conf.

105 Upon receipt of De-reg reject_req indicating that the de-registration is rejected, FE1 shall send FE3 the corresponding DE-REG REJECT_req.

106 Upon receipt of DE-REG REJECT_ind indicating that the de-registration is rejected, FE1 shall send individual subscriber home SwMI MM the corresponding de-reg reject_ind.

23.3.2 FE actions of FE3

301 Upon receipt of the De-registration_req indicating the de-registered individual subscriber, FE3 shall send FE1 the corresponding DE-REGISTRATION_req. The visited SwMI MM shall re-invoke the service until successfully completed.

302 Upon receipt of DE-REGISTRATION_conf indicating that the individual subscriber home SwMI MM has recorded the subscriber's de-registration, FE3 shall send the visited SwMI MM the corresponding De-registration_conf.

303 Upon receipt of DE-REGISTRATION_ind indicating the subscriber to be de-registered, FE3 shall send the visited SwMI MM the corresponding De-registration_ind.

304 Upon receipt of the De-registration_resp indicating that the visited SwMI MM has de-registered the subscriber, FE3 send FE1 the corresponding DE-REGISTRATION_resp.

305 Upon receipt of DE-REG REJECT_ind indicating that the de-registration is rejected, FE3 shall send the visited SwMI MM the corresponding De-reg reject_ind.

306 Upon receipt of De-reg reject_req indicating that the de-registration is rejected, FE3 shall send FE1 the corresponding DE-REG REJECT_req.

24 Profile update - stage 2 information flow sequences

24.0 General

This clause defines the information flow sequences for the profile update service as defined in clause 10. The information flow sequences and the FE actions are defined for the profile update service when the service is invoked against an individual subscriber. If the service is invoked against a group, the actions of FE2 shall be equivalent to those of FE1 in this clause.

24.1 Normal operation

Figure 53 illustrates the information flow sequence for the profile update service as defined in clause 10.4.

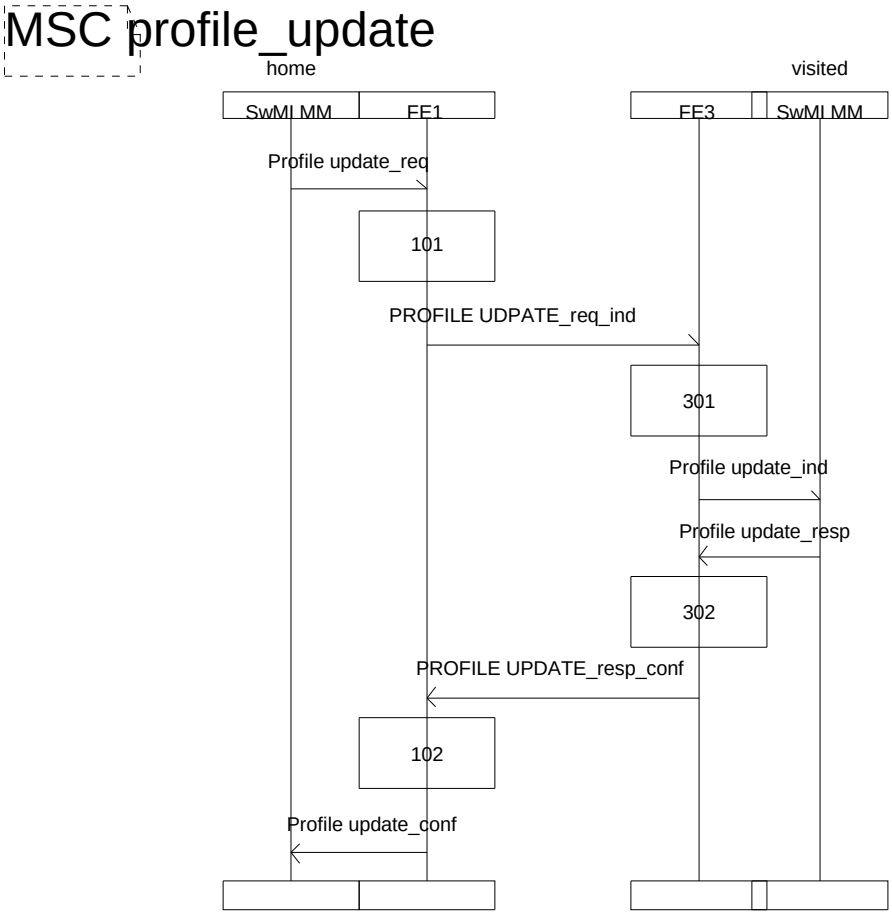


Figure 53: The profile update service

24.2 Profile update rejection

Figure 54 illustrates the information flow sequence for the profile update service when the visited SwMI MM rejects the service upon receipt of the Profile update_ind.

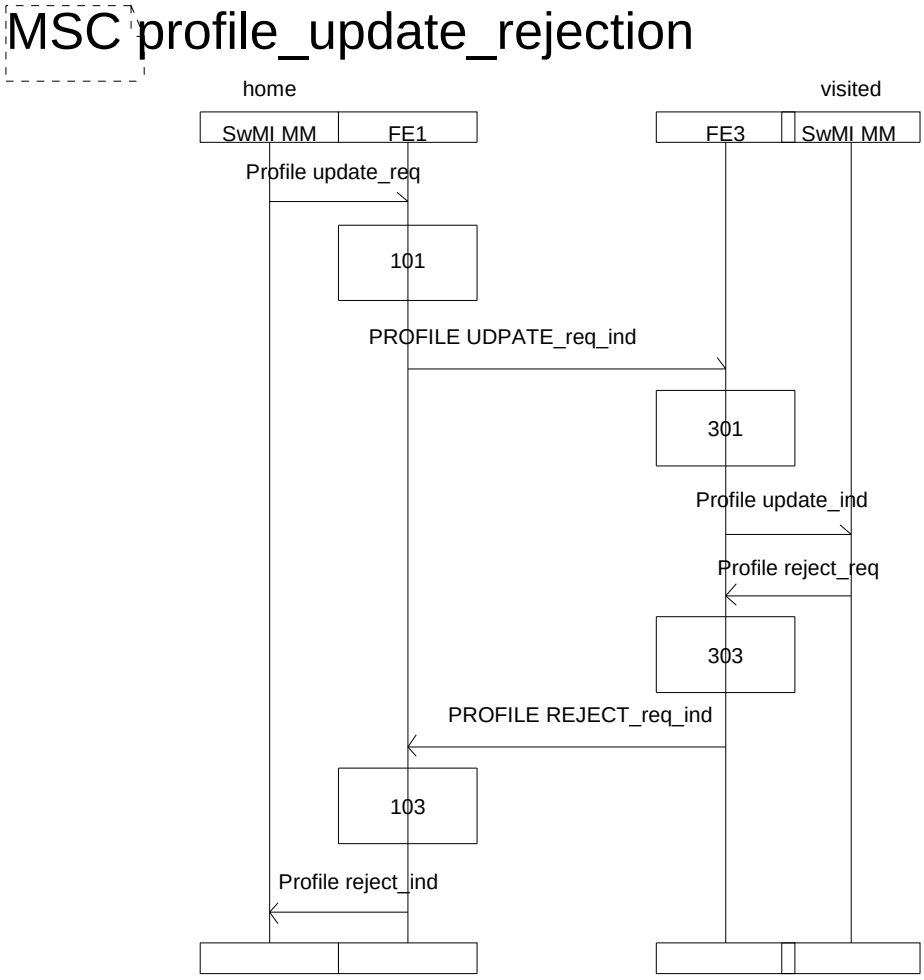


Figure 54: Profile update rejection

24.3 FE actions for Profile update

24.3.1 FE actions of FE1

101 As FE action 103 in clause 20.3.1. The home SwMI MM shall re-invoke the service until successfully completed.

102 As FE action 104 in clause 20.3.1.

103 Upon receipt of the PROFILE REJECT_ind containing the profile update rejection cause, FE1 shall send the corresponding Profile reject_ind to the home SwMI MM.

24.3.2 FE actions of FE3

301 As FE action 303 in clause 20.3.2.

302 As FE action 304 in clause 20.3.2.

303 Upon receipt of the Profile reject_req containing the profile update rejection cause, FE3 shall send FE1 the corresponding PROFILE REJECT_req.

25 SS-profile update - stage 2 information flow sequences

25.0 General

This clause defines the information flow sequences for the SS-profile update service as defined in clause 11. The information flow sequences and the FE actions are defined for the SS-profile update service when the service is invoked against an individual subscriber. If the service is invoked against a group, the actions of FE2 shall be equivalent to those of FE1 in this clause.

25.1 Normal operation

Figure 55 illustrates the information flow sequence for the SS-profile update service as defined in clause 11.4.

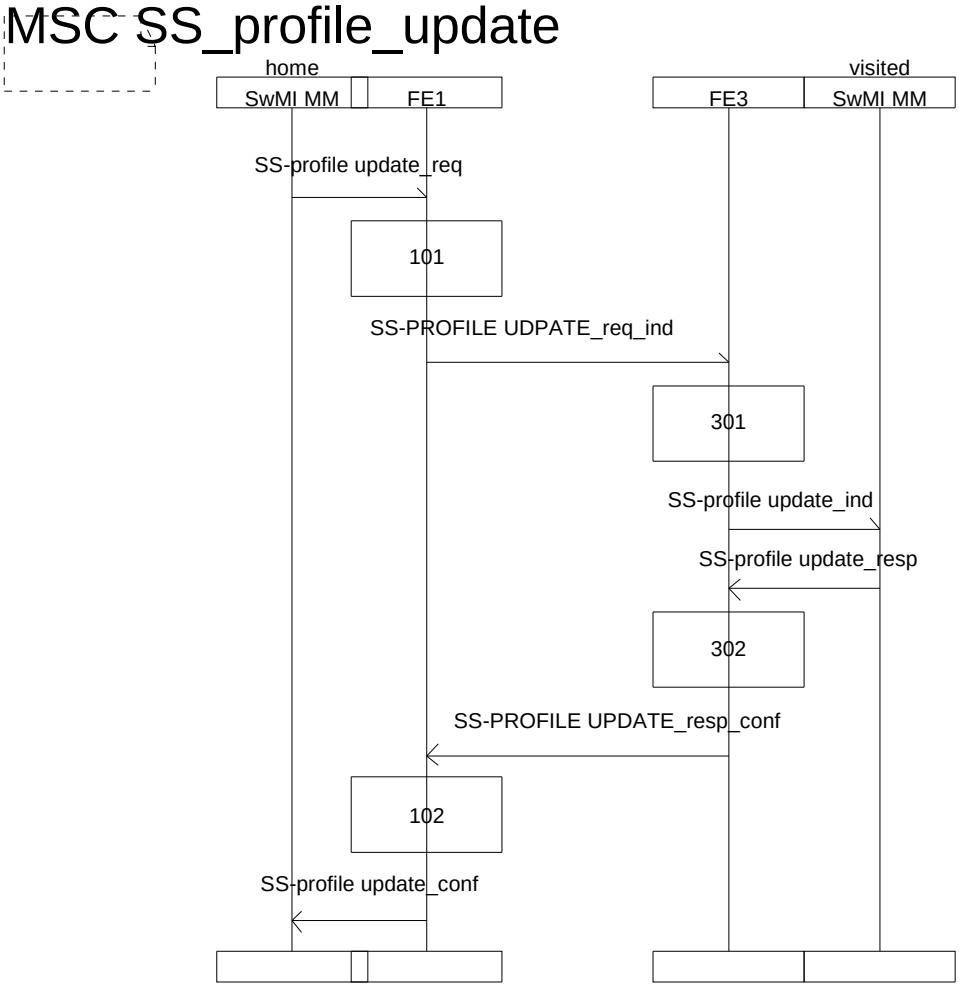


Figure 55: SS-profile update

25.2 SS-profile update rejection

Figure 56 illustrates the information flow sequence for the SS-profile update service when the visited SwMI MM rejects the service upon receipt of the Profile update_ind.

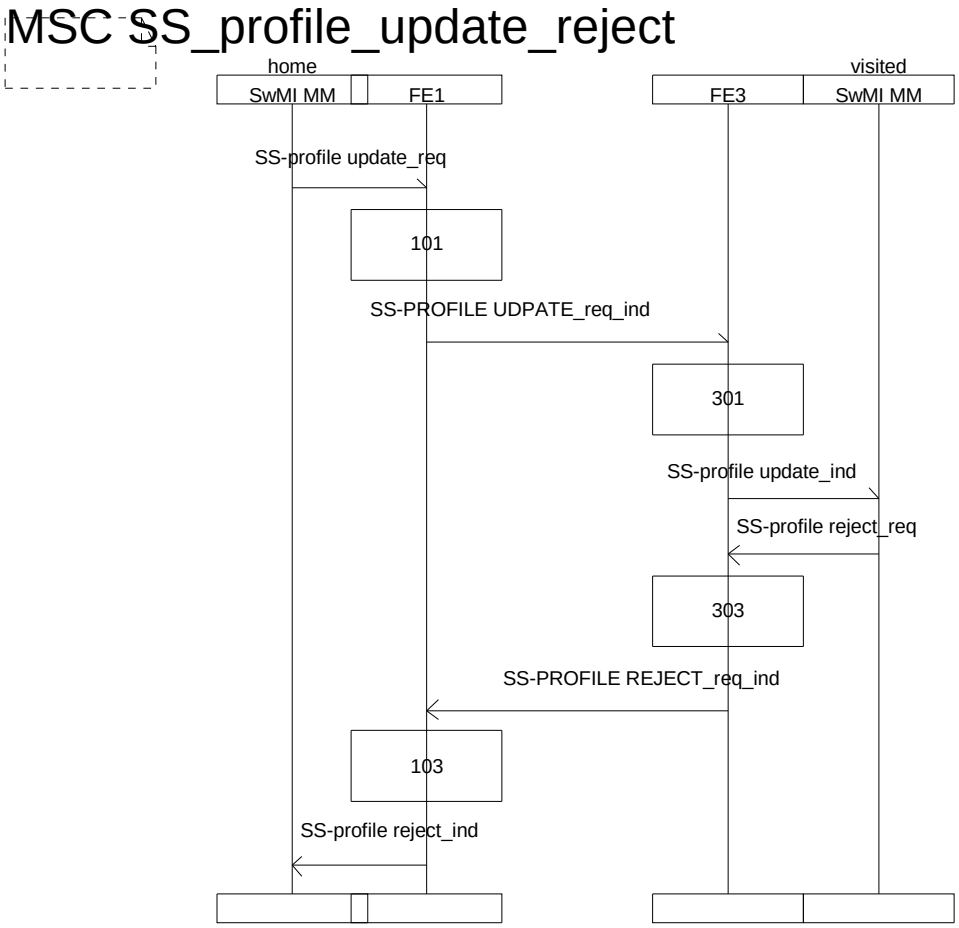


Figure 56: SS-profile update rejection

25.3 FE actions for SS-profile update

25.3.1 FE actions of FE1

101 As FE action 105 in clause 20.3.1. The home SwMI MM shall re-invoke the service until successfully completed.

102 As FE action 106 in clause 20.3.1.

103 Upon receipt of the SS-PROFILE REJECT_ind containing the SS-profile update rejection cause, FE1 shall send the corresponding SS-profile reject_ind to the home SwMI MM.

25.3.2 FE actions of FE3

301 As FE action 305 in clause 20.3.2.

302 As FE action 306 in clause 20.3.2.

303 Upon receipt of the SS-profile reject_req containing the SS-profile update rejection cause, FE3 shall send FE1 the corresponding SS-PROFILE REJECT_req.

26 Authentication - stage 2 information flow sequences

26.0 General

This clause defines the information flow sequences for the authentication service as defined in clause 12.

26.1 Normal operation

26.1.1 Authentication

Figure 57 illustrates the information flow sequence for the authentication service as defined in case 1) in clause 12.5.

NOTE: The home SwMI in the figure 57 is the individual subscriber home SwMI.

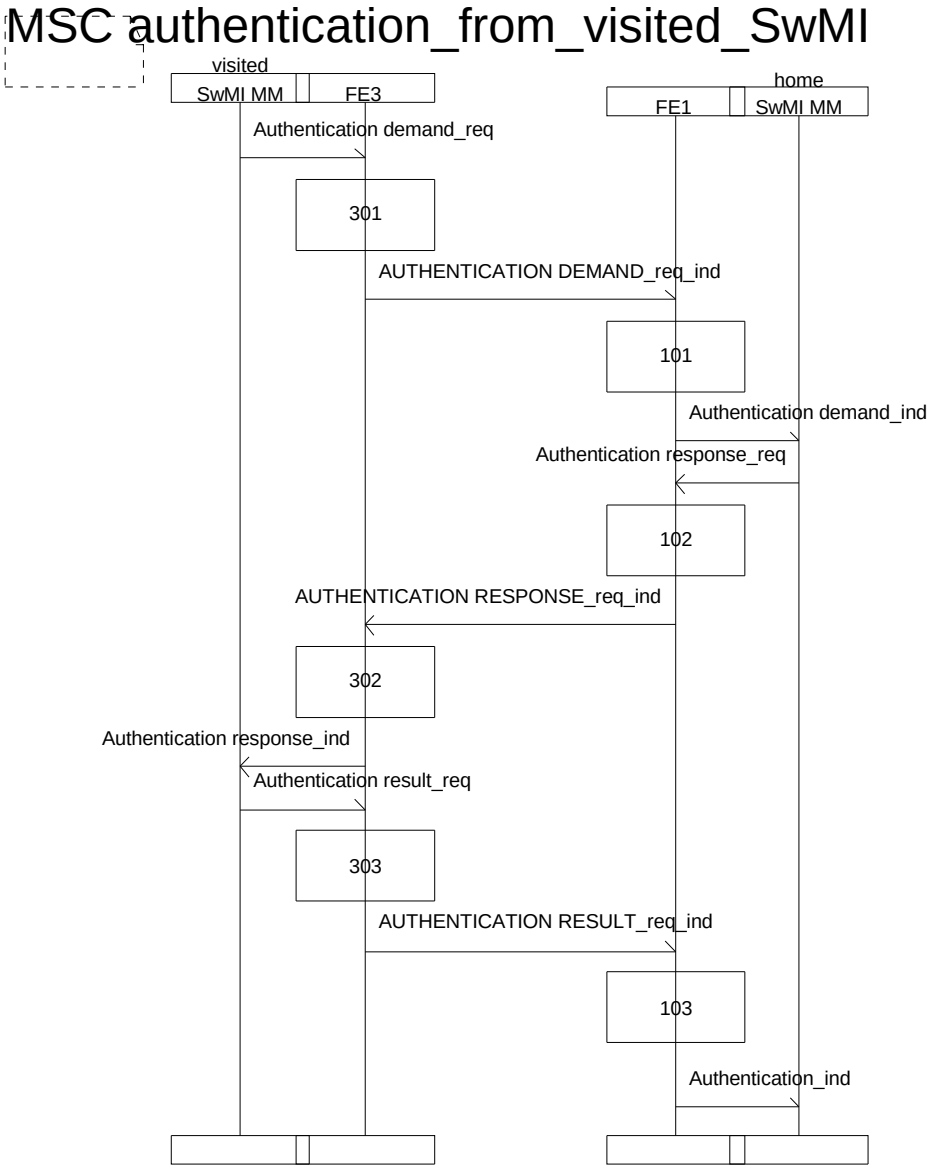


Figure 57: The authentication service

26.1.2 Successful subsequent authentication

Figure 58 illustrates the information flow sequence for the authentication service as defined in case 2) in clause 12.5.

NOTE: The home SwMI in the figure 58 is the individual subscriber home SwMI.

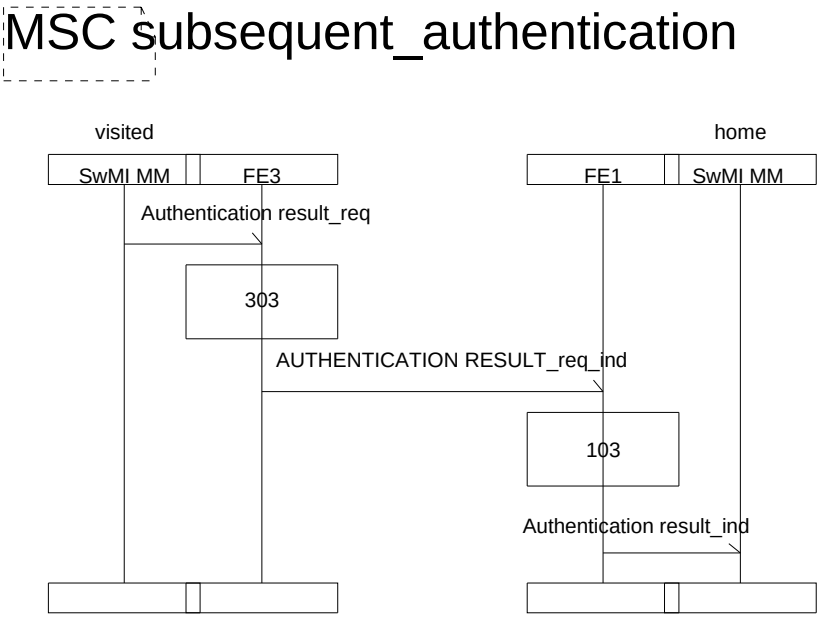


Figure 58: The successful subsequent authentication

26.2 Authentication invoked in conjunction with migration

Figures 59 and 60 illustrate the information flow sequence for the authentication service as defined in case 1) in clause 12.5 when invoked in conjunction with the migration service as defined in clause 6.

NOTE: The home SwMI in the figures 59 and 60 is the individual subscriber home SwMI.

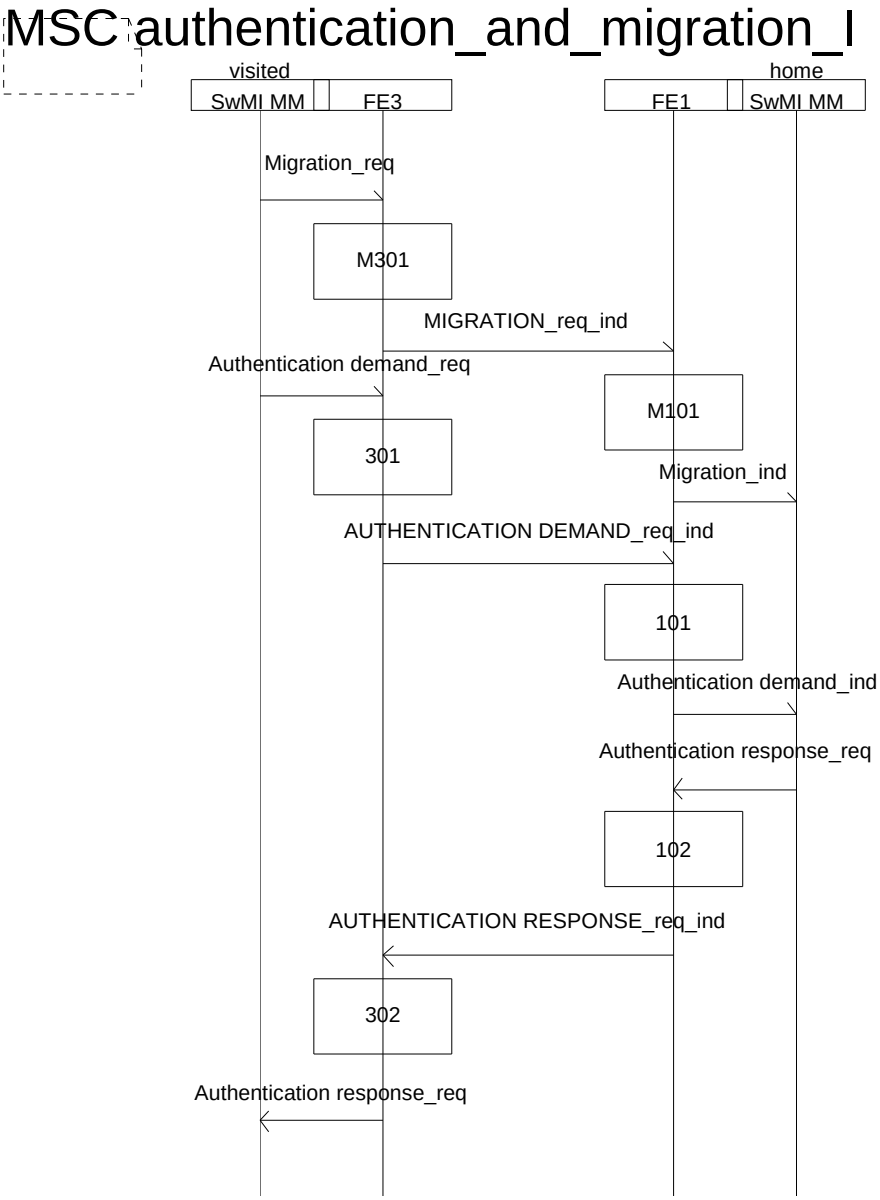


Figure 59: Authentication invoked in conjunction with migration (sheet 1 of 2)

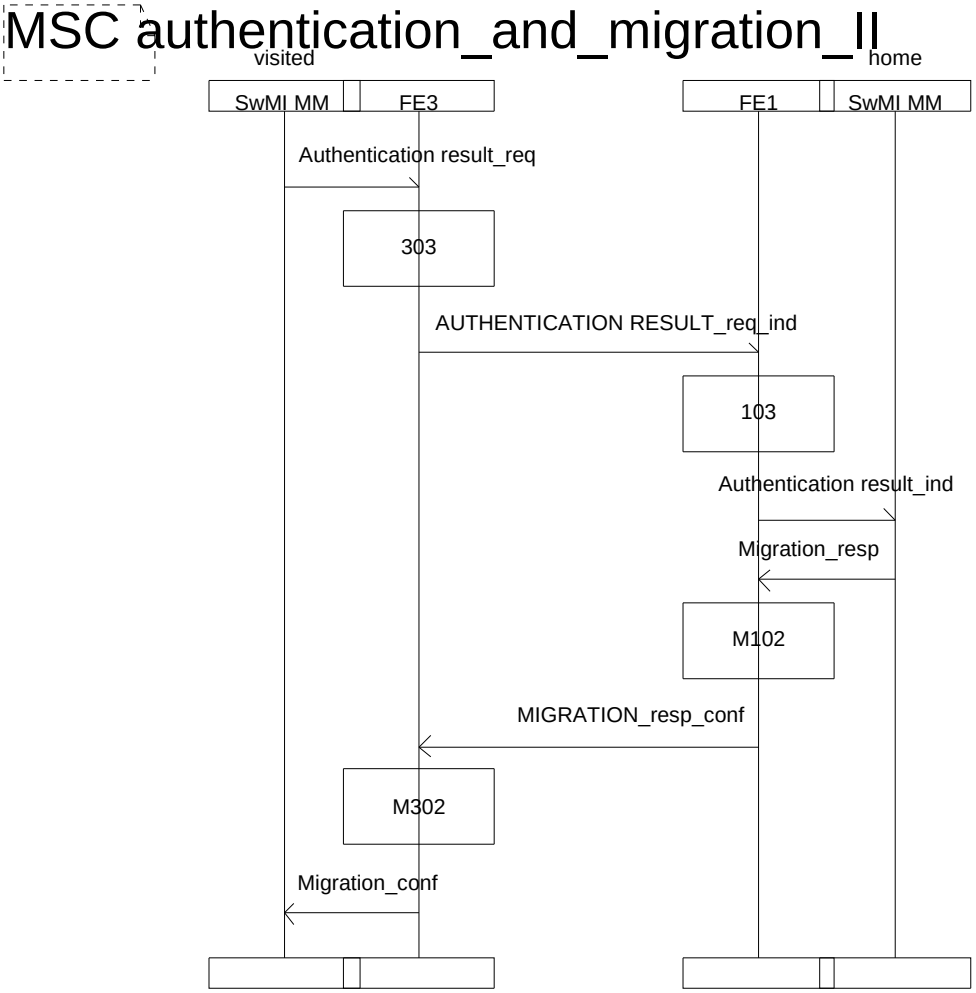


Figure 60: Authentication invoked in conjunction with migration (sheet 2 of 2)

26.3 Exceptional operation

26.3.1 Authentication rejection in the visited SwMI

Figures 61 and 62 illustrate the information flow sequence for the authentication service when the visited SwMI MM rejects the service, e.g. if the authentication fails in the air interface.

NOTE 1: The exceptional operation can take place if the authentication service has been invoked according to the case 1) as defined in clause 12.5. If the authentication as defined in case 2) is rejected, the FE actions 101, 102, 301 and 302 and the related information flows are omitted.

NOTE 2: The home SwMI in the figures 61 and 62 is the individual subscriber home SwMI.

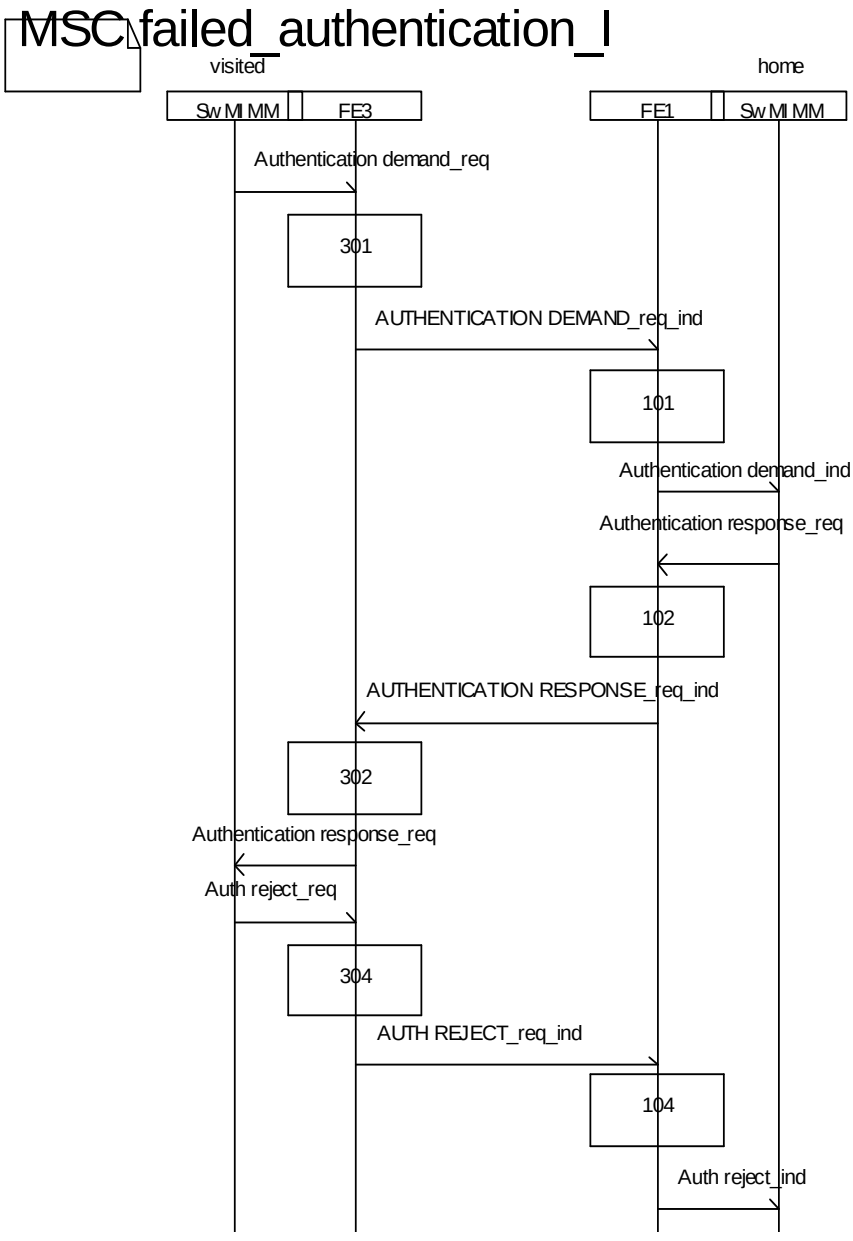


Figure 61: Authentication rejection in the visited SwMI (sheet 1 of 2)

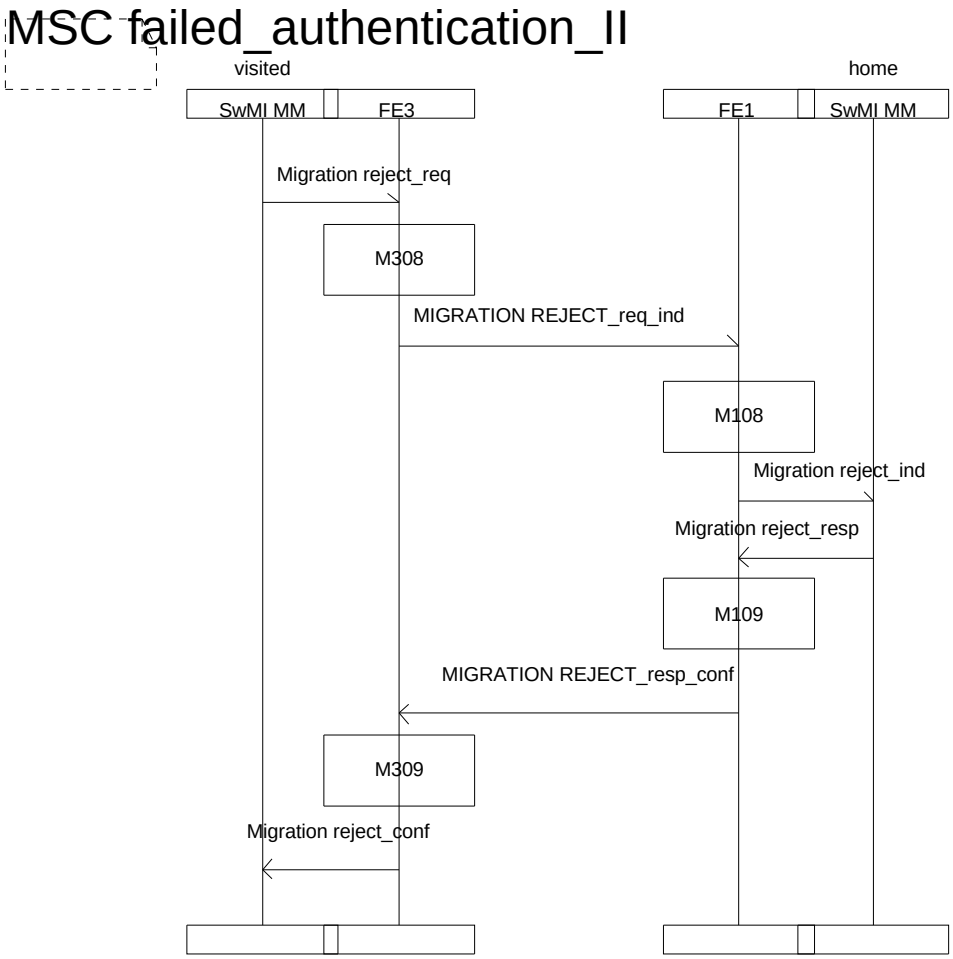


Figure 62: Authentication rejection in the visited SwMI (sheet 2 of 2)

26.4 FE actions for authentication

26.4.1 FE actions of FE1

For FE1 actions M1xx, see clause 20.3.1.

101 Upon receipt of the AUTHENTICATION DEMAND_ind requesting the subscriber's session authentication key parameters, FE1 shall send the individual subscriber home SwMI MM the corresponding Authentication demand_ind.

102 Upon receipt of the Authentication response_req containing the subscriber's session authentication key parameters, FE1 shall send FE3 the corresponding AUTHENTICATION RESPONSE_req.

103 Upon receipt of the AUTHENTICATION RESULT_ind indicating that the authentication has been successfully carried out, FE1 shall send individual subscriber home SwMI MM the corresponding Authentication result_ind. The Authentication result_ind shall contain the authentication result, which shall indicate whether the subscriber or the individual subscriber home SwMI or both have been authenticated.

104 Upon receipt of the AUTH REJECT_ind indicating that the authentication has failed, FE1 shall send the individual subscriber home SwMI MM the corresponding Auth reject_req.

26.4.2 FE actions of FE3

For FE3 actions M3xx, see clause 20.3.2.

301 Upon receipt of the Authentication demand_req requesting the subscriber's session authentication key parameters, FE3 shall send FE1 the corresponding AUTHENTICATION DEMAND_req.

302 Upon receipt of the AUTHENTICATION RESPONSE_ind containing subscriber's session authentication key parameters, FE3 shall send the visited SwMI MM the corresponding Authentication response_ind.

303 Upon receipt of the Authentication result_req indicating that the authentication has been successfully carried out, FE3 shall send FE1 the corresponding AUTHENTICATION RESULT_req. The Authentication result_req shall contain the authentication result which shall indicate whether the subscriber or the individual subscriber home SwMI or both have been authenticated.

304 Upon receipt of the Auth reject_req indicating that the authentication has failed, FE3 shall send FE1 the corresponding AUTH REJECT_req.

27 Over The Air Re-keying (OTAR) - stage 2 information flow sequences

27.0 General

This clause defines the information flow sequences for the OTAR service as defined in clause 13.

27.1 Normal operation

27.1.1 OTAR SCK generation service

Figure 63 illustrates the information flow sequence for the OTAR SCK generation service as defined in case 1) in clause 13.5.

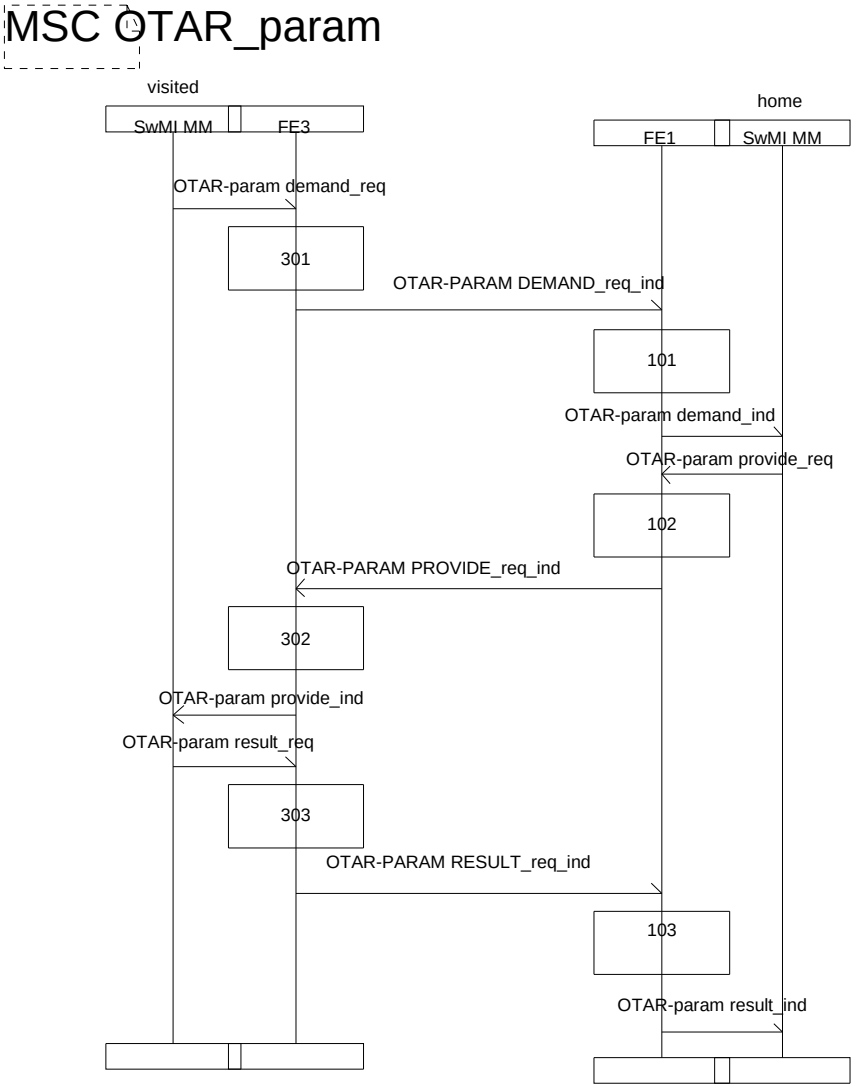


Figure 63: OTAR SCK generation service

27.1.2 Visited SwMI MM initiated OTAR SCK delivery service

Figure 64 illustrates the information flow sequence for the visited SwMI MM initiated OTAR SCK delivery service as defined in case 2) in clause 13.5.

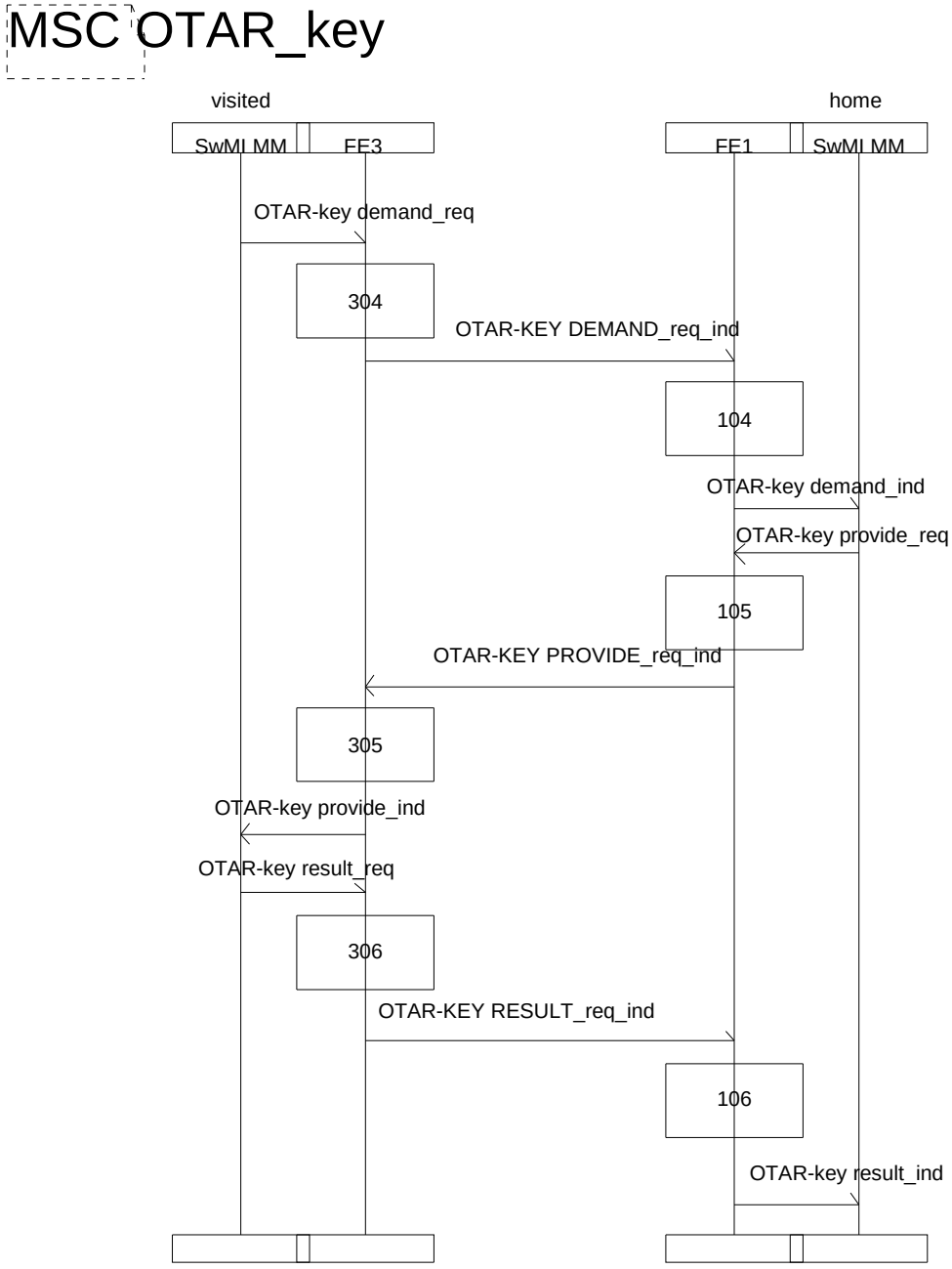


Figure 64: The visited SwMI MM initiated OTAR SCK delivery service

27.1.3 Home SwMI MM initiated OTAR SCK delivery service

Figure 65 illustrates the information flow sequence for the home SwMI MM initiated OTAR SCK delivery service as defined in case 3) in clause 13.5.

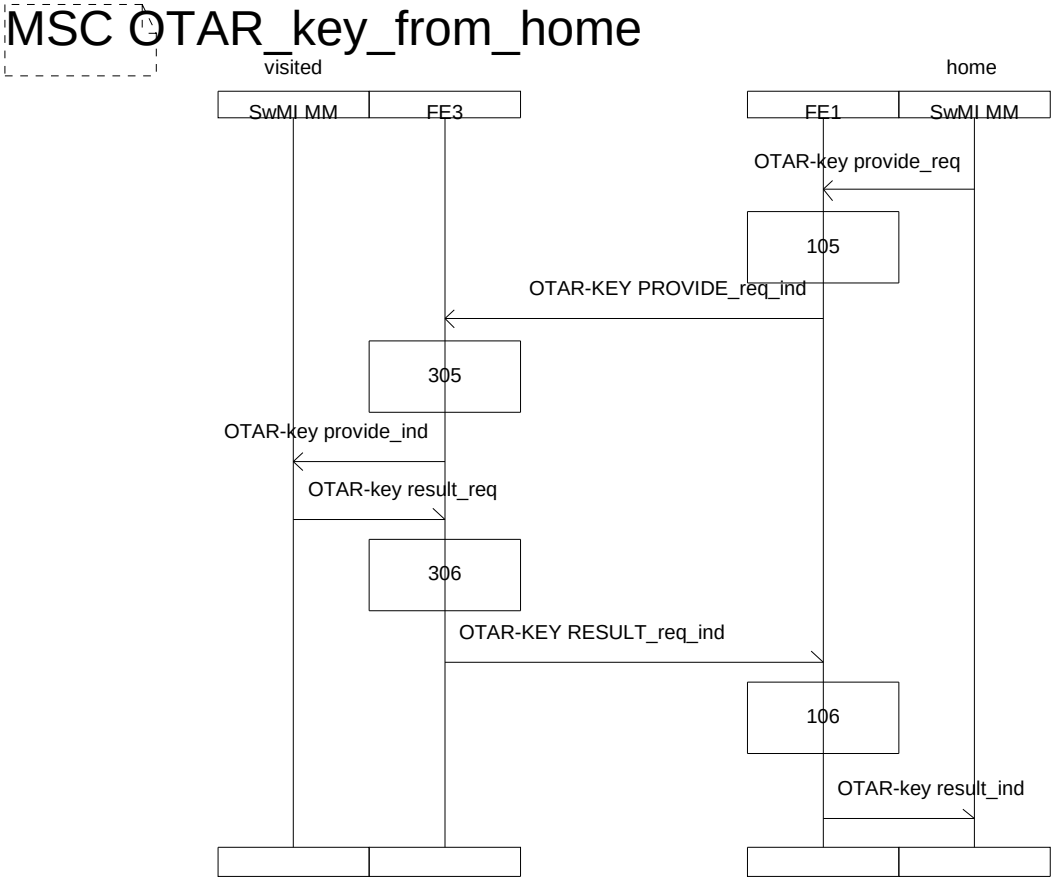


Figure 65: The home SwMI MM initiated OTAR SCK delivery service

27.1.4 OTAR SCK generation service, subsequent use of parameters

Figure 66 illustrates the information flow sequence for the subsequent use of OTAR generator parameters service as defined in case 4) in clause 13.5.

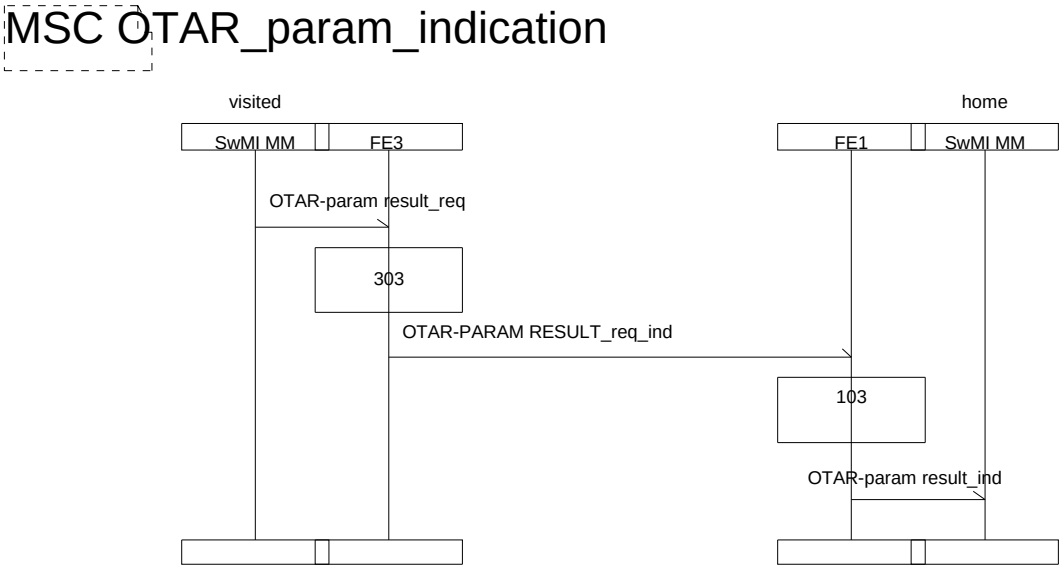


Figure 66: The OTAR SCK generation service, subsequent use of parameters

27.2 Exceptional operation

27.2.1 Failed OTAR SCK generation service

Figure 67 illustrates the information flow sequence for the OTAR SCK generation service when the visited SwMI MM rejects the service.

NOTE: The exceptional operation can take place if the OTAR SCK generation service has been invoked according to the case 1) as defined in clause 13.5.

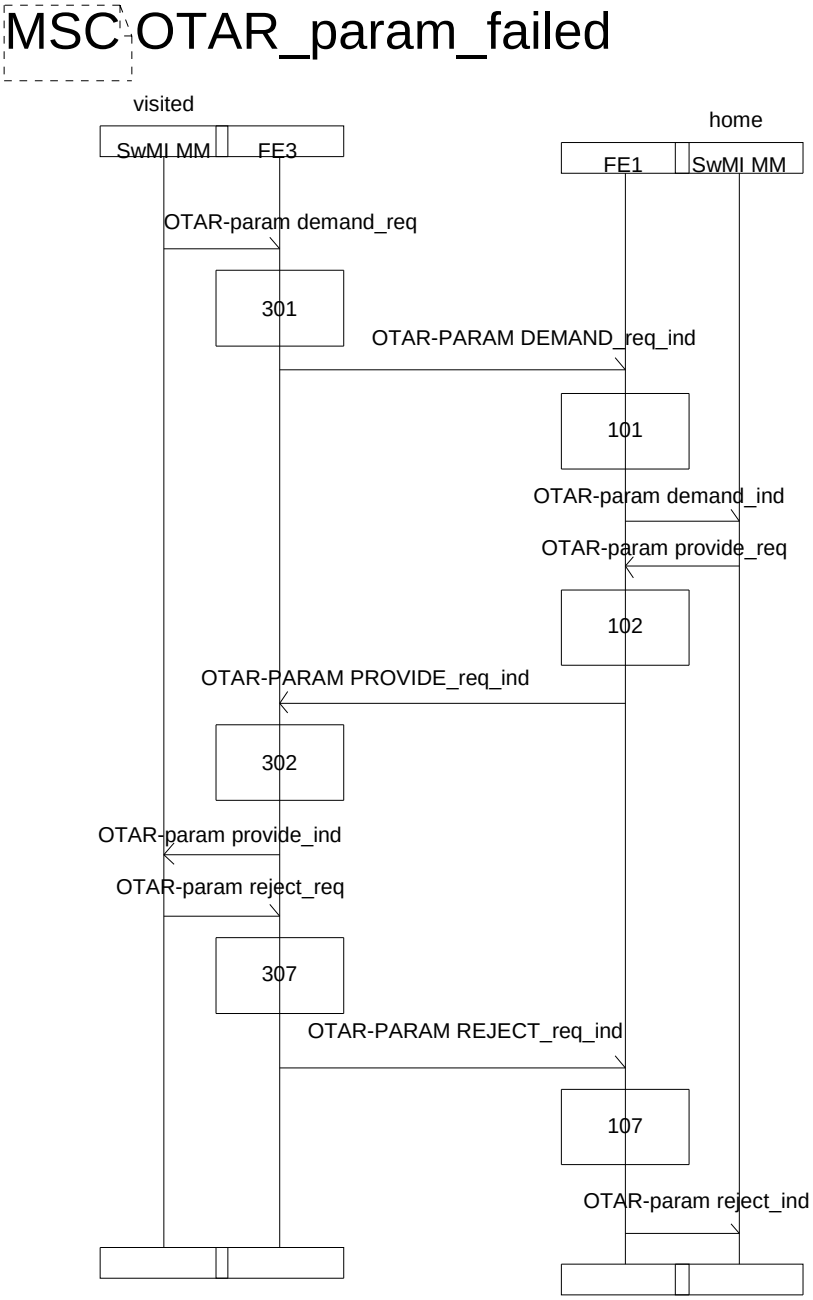


Figure 67: Failed OTAR SCK generation service

27.2.2 Failed visited SwMI MM initiated OTAR SCK delivery

Figure 68 illustrates the information flow sequence for the OTAR SCK delivery service when the home SwMI MM rejects the service.

NOTE: The exceptional operation can take place if the OTAR SCK delivery service has been invoked according to the case 2) as defined in clause 13.5.

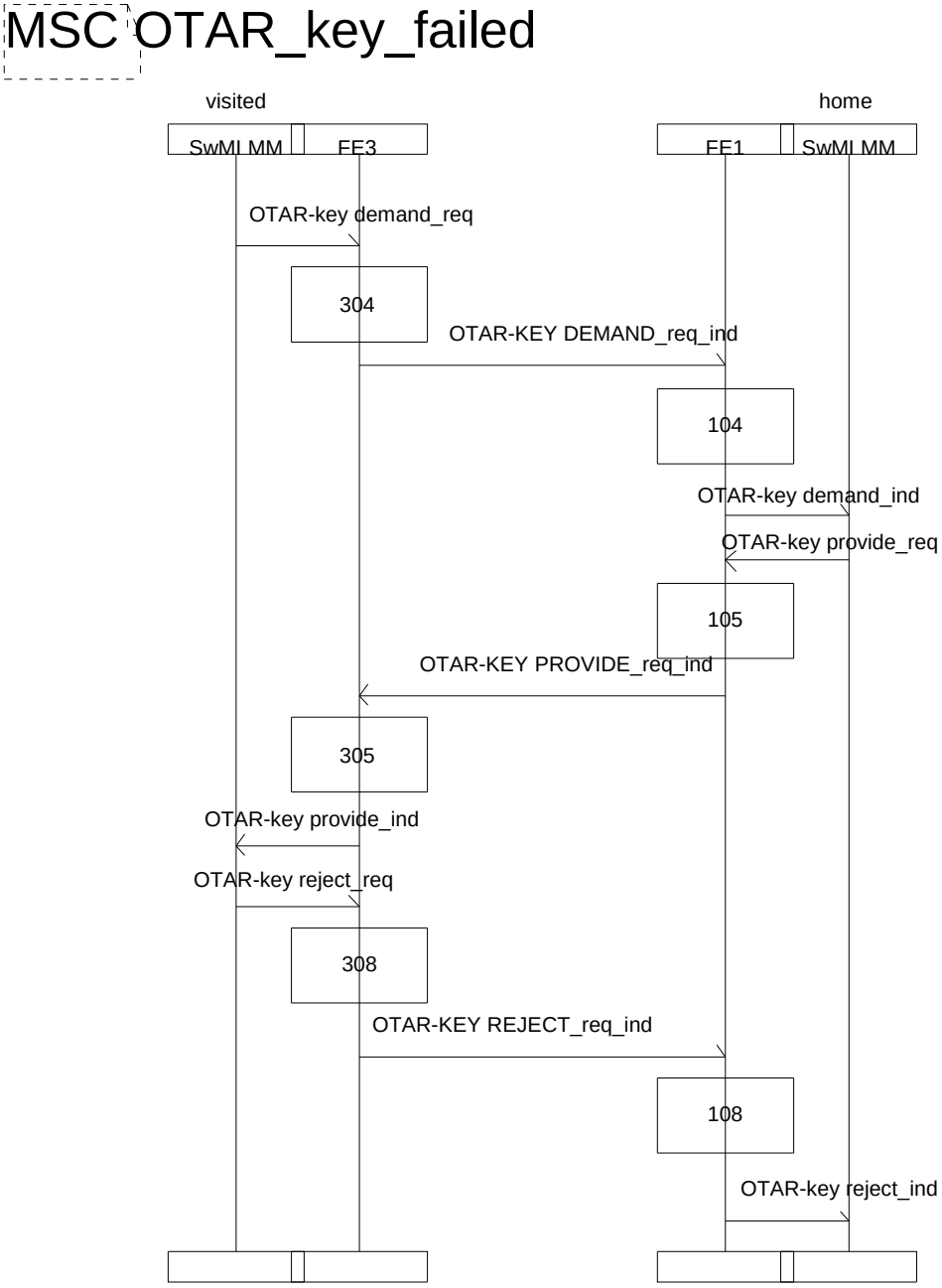


Figure 68: Failed visited SwMI MM initiated OTAR SCK delivery

27.2.3 Failed home SwMI MM initiated OTAR SCK delivery

Figure 69 illustrates the information flow sequence for the OTAR SCK delivery service when the visited SwMI MM rejects the service.

NOTE: The exceptional operation can take place if the OTAR SCK delivery service has been invoked according to the case 3) as defined in clause 13.5.

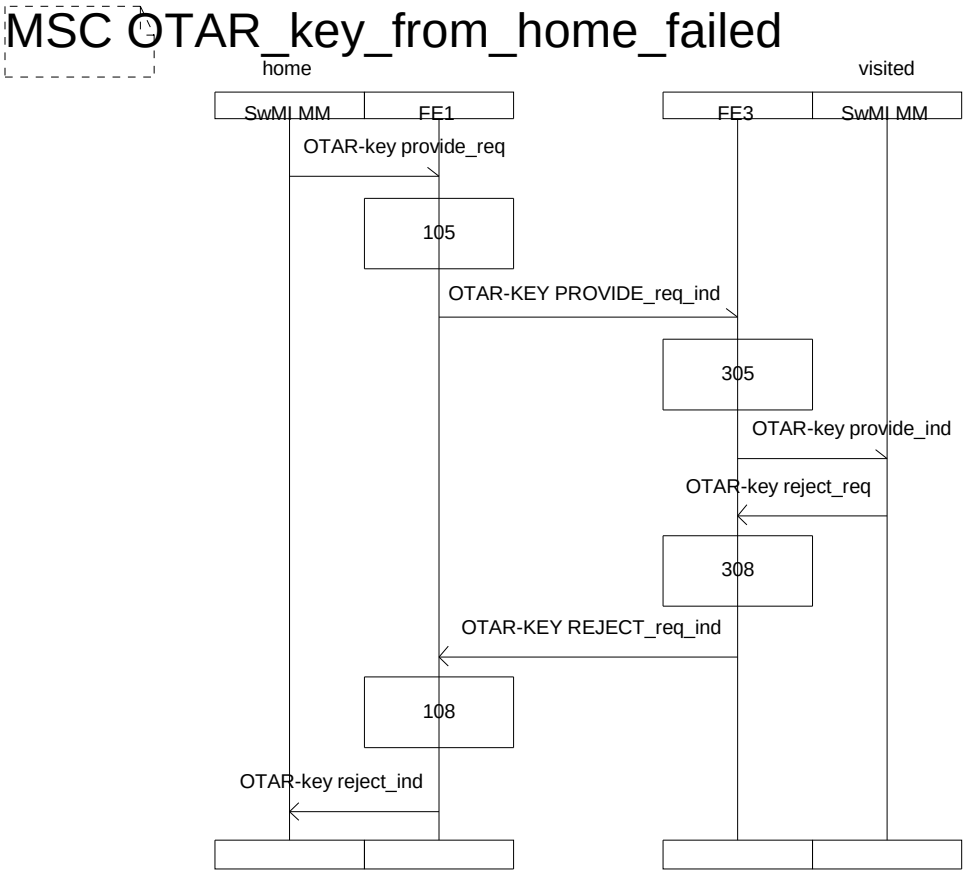


Figure 69: Failed home SwMI MM initiated OTAR SCK delivery

27.2.4 Failed subsequent use of OTAR SCK generation parameters

Figure 70 illustrates the information flow sequence for the OTAR SCK generation service when the visited SwMI MM rejects the service in the case of subsequent use of OTAR SCK generation parameters.

NOTE: The exceptional operation can take place if the OTAR SCK generation service has been invoked according to the case 4) as defined in clause 13.5.

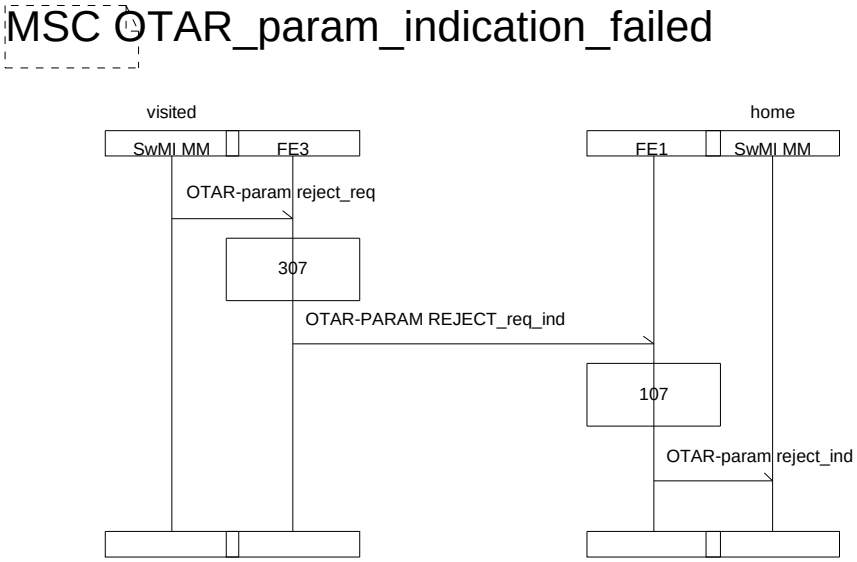


Figure 70: Failed subsequent use of OTAR SCK generation parameters

27.3 FE actions for OTAR

27.3.1 FE actions of FE1

101 Upon receipt of the OTAR-PARAM DEMAND_ind requesting the OTAR SCK generation parameters, FE1 shall send the home SwMI MM the corresponding OTAR-param demand_ind.

102 Upon receipt of the OTAR-param provide_req containing the OTAR SCK generation parameters, FE1 shall send FE3 the corresponding OTAR-PARAM PROVIDE_req.

103 Upon receipt of the OTAR-PARAM RESULT_ind indicating that the operation was successful, FE1 shall send the home SwMI MM the corresponding OTAR-param result_ind.

104 Upon receipt of the OTAR-KEY DEMAND_ind requesting the OTAR SCK delivery parameters, FE3 shall send the home SwMI MM the corresponding OTAR-key demand_ind.

105 Upon receipt of the OTAR-key provide_req containing the OTAR SCK delivery parameters, FE1 shall send FE3 the corresponding OTAR-KEY PROVIDE_req.

106 Upon receipt of the OTAR-KEY RESULT_ind indicating that the operation was successful, FE1 shall send the home SwMI MM the corresponding OTAR-key result_ind.

107 Upon receipt of the OTAR-PARAM REJECT_ind indicating that the operation has failed, FE1 shall send the home SwMI MM the corresponding OTAR-param reject_ind.

108 Upon receipt of the OTAR-KEY REJECT_ind indicating that the operation has failed, FE1 shall send home SwMI MM the corresponding OTAR-key reject_ind.

27.3.2 FE actions of FE3

301 Upon receipt of the OTAR-param demand_req indicating that the OTAR SCK generation parameters are requested, FE3 shall send FE1 the corresponding OTAR-PARAM DEMAND_req_ind.

302 Upon receipt of the OTAR-PARAM PROVIDE_req_ind containing the OTAR SCK generation parameters, FE3 shall send visited SwMI MM the corresponding OTAR-param provide_ind.

303 Upon receipt of the OTAR-param result_req indicating that the OTAR SCK generation parameters operation was successful, FE3 shall send FE1 the corresponding OTAR-PARAM RESULT_req_ind.

304 Upon receipt of the OTAR-key demand_req indicating that the OTAR SCK delivery parameters are requested, FE3 shall send FE1 the corresponding OTAR-KEY DEMAND_req_ind.

305 Upon receipt of the OTAR-KEY PROVIDE_req_ind containing the OTAR SCK delivery parameters, FE3 shall send visited SwMI MM the OTAR-key provide_ind.

306 Upon receipt of the OTAR-key result_req indicating that the OTAR SCK delivery operation was successful, FE3 shall send FE1 the corresponding OTAR-KEY RESULT_req_ind.

307 Upon receipt of the OTAR-param reject_req indicating that the OTAR SCK generation parameters operation has failed, FE3 shall send FE1 the corresponding OTAR-PARAM REJECT_req.

308 Upon receipt of the OTAR-key reject_req indicating that the OTAR SCK delivery operation has failed, FE3 shall send FE1 the corresponding OTAR-KEY REJECT_req.

28 Individual subscriber database recovery - stage 2 information flow sequences

28.0 General

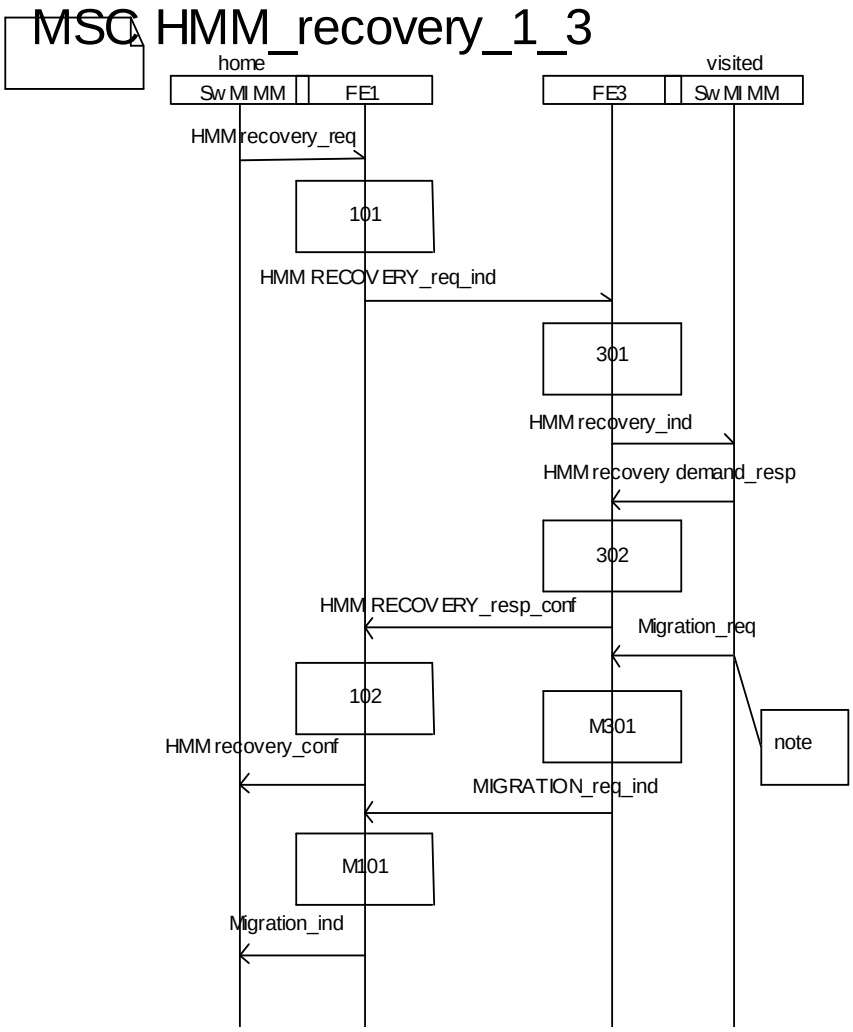
This clause defines the information flow sequences for the IDR service as defined in clause 14.

28.1 Normal operation

28.1.1 HMM recovery

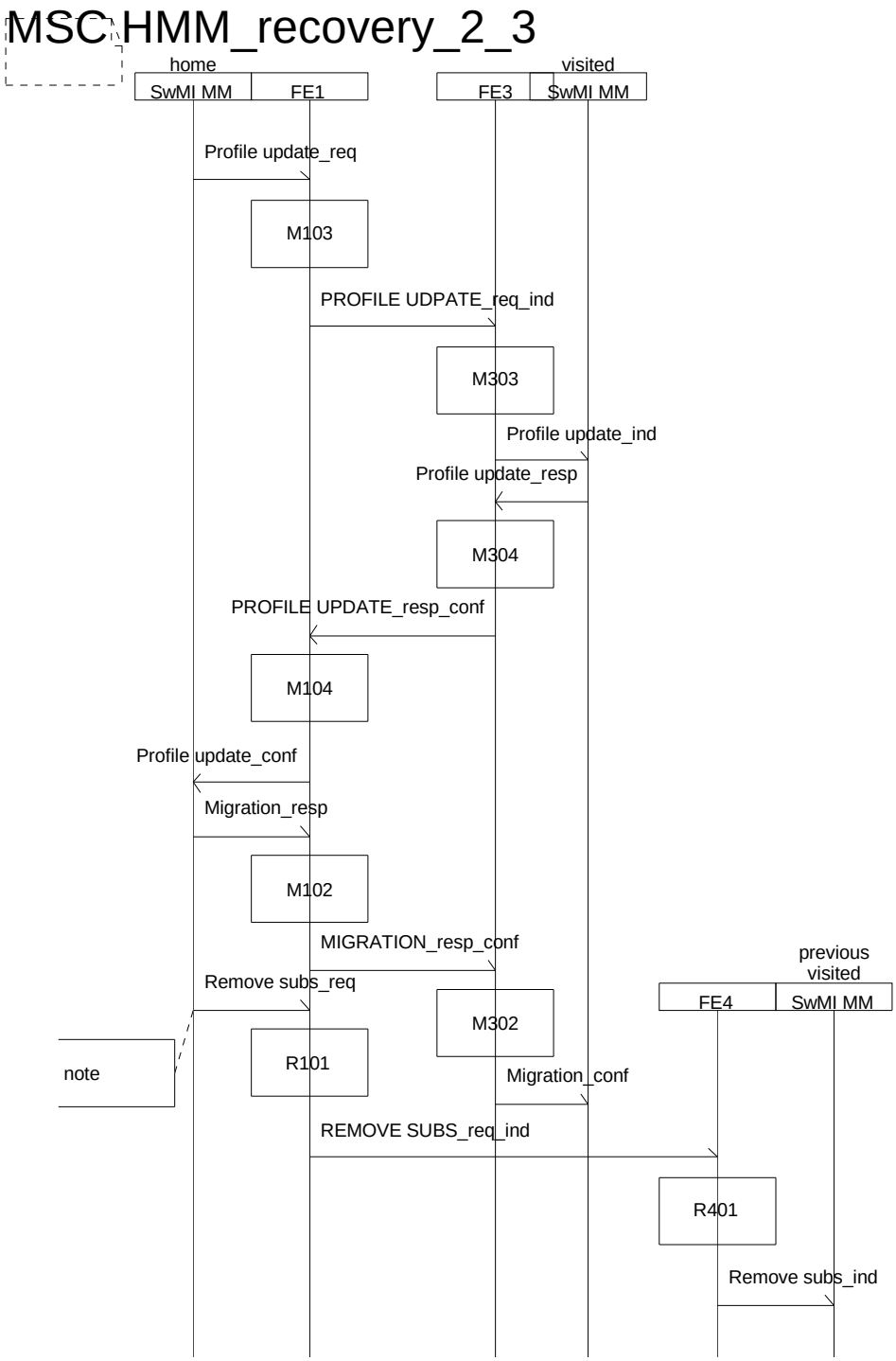
Figures 71, 72 and 73 illustrate the information flow sequence for the HMM recovery service as defined in case 1) in clause 14.4.

NOTE: The home SwMI in the figures 71 to 73 is the individual subscriber home SwMI.



NOTE: The virtual migration or the virtual restricted migration, as applicable and as defined in clauses 6 and 7, respectively, shall be carried out for each individual subscriber that is recorded as migrated in the I-VDB. However, the case 3b) as defined in clause 6.5 shall not be applicable in the case of HMM recovery, i.e. if the SS-migration profiles are exchanged as part of the virtual migration they shall be exchanged before the final migration approval.

Figure 71: The HMM recovery (sheet 1 of 3)



NOTE: The virtual RSI shall be carried out for each recovered individual subscriber if the previous visited SwMI MM exists for the subscriber.

Figure 72: The HMM recovery (sheet 2 of 3)

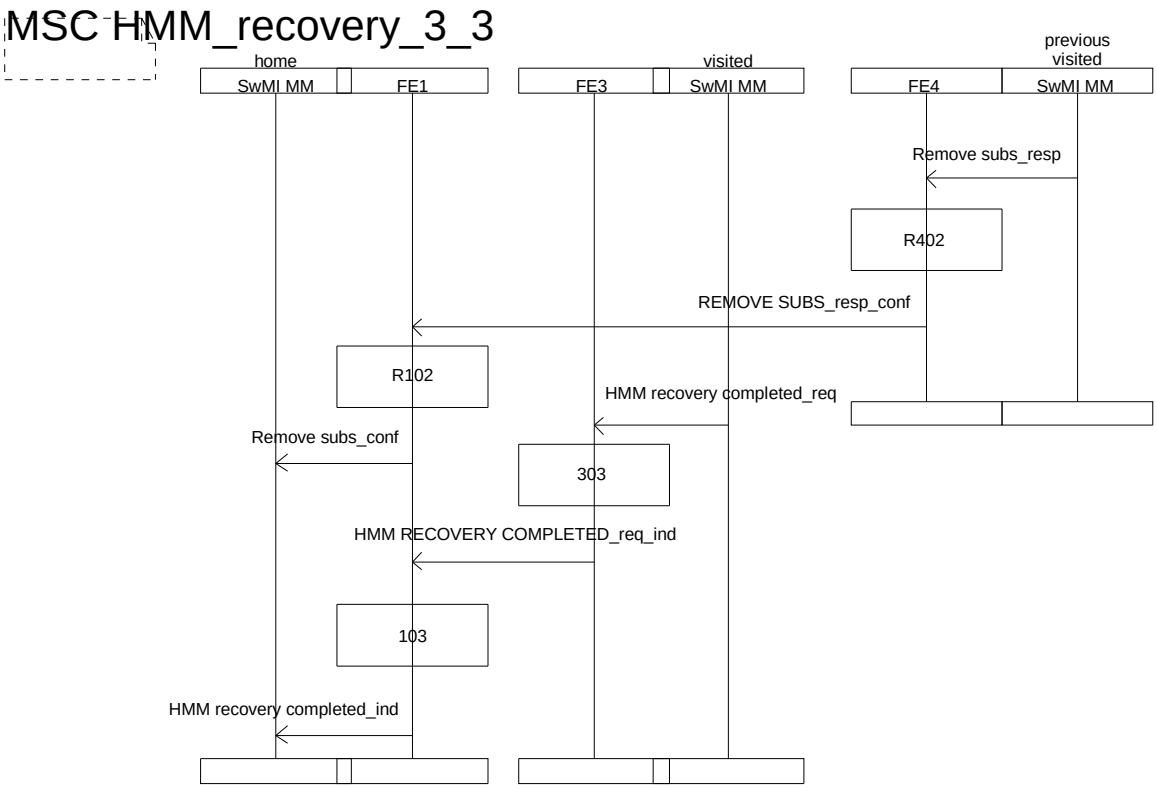
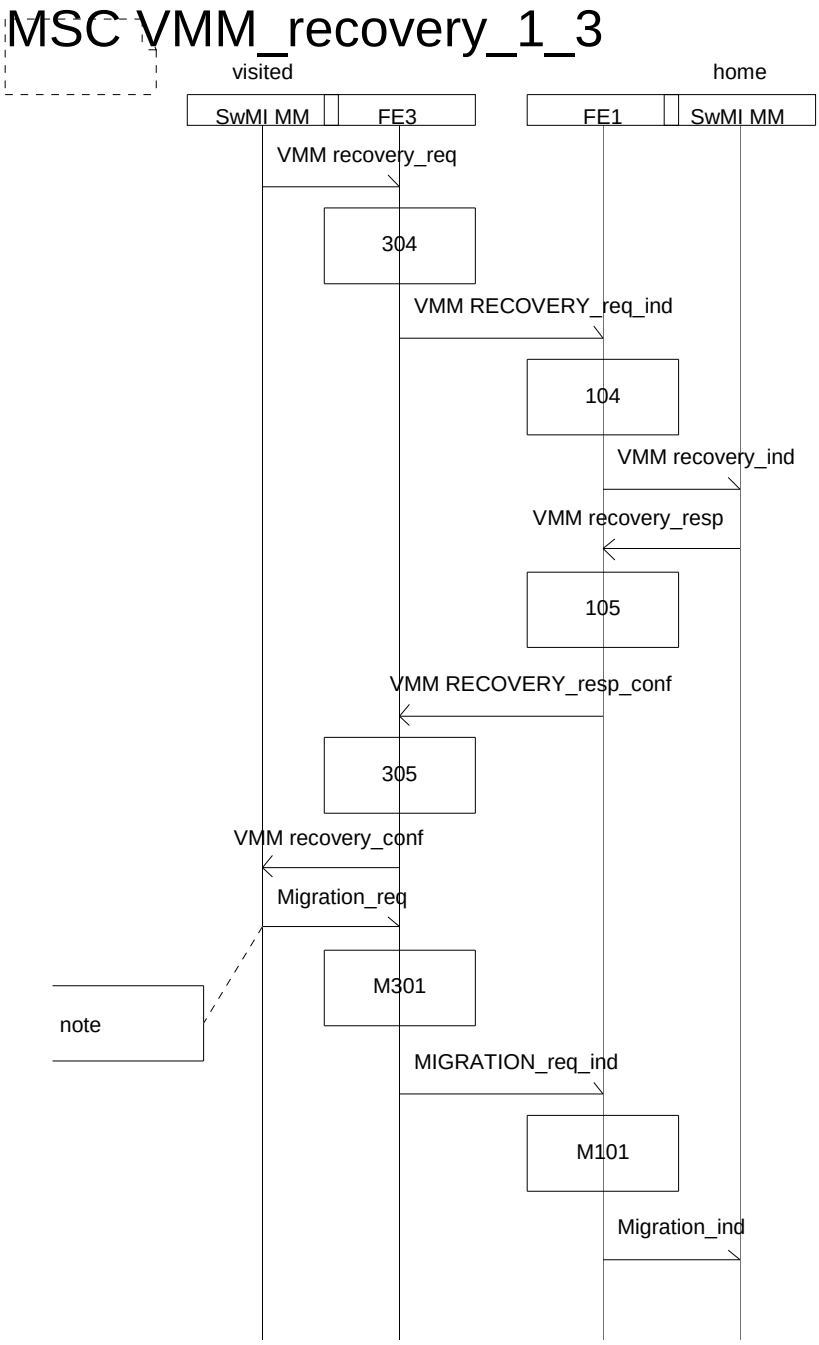


Figure 73: The HMM recovery (sheet 3 of 3)

28.1.2 VMM recovery

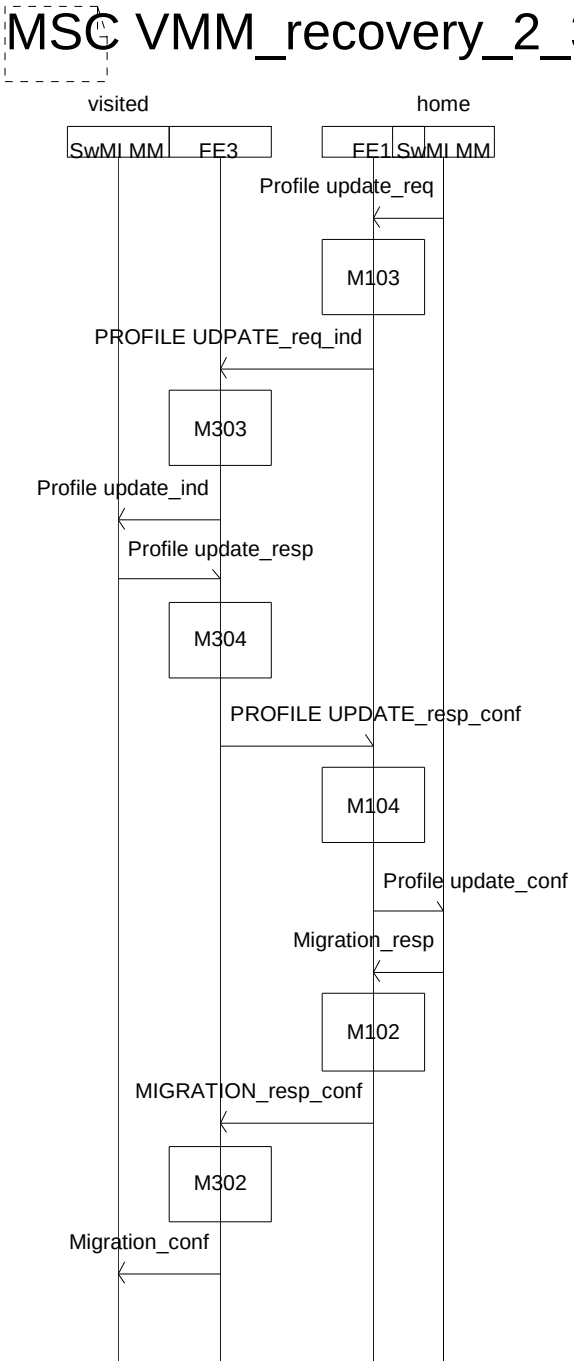
Figures 74, 75 and 76 illustrate the information flow sequence for the VMM recovery service as defined in case 2) in clause 14.4.

NOTE: The home SwMI in the figures 74 to 76 is the individual subscriber home SwMI.



NOTE: The virtual migration or the virtual restricted migration, as applicable and as defined in clauses 6 and 7, respectively, shall be carried out for each individual subscriber that is recorded as migrated in the I-VDB. However, the case 3b) as defined in clause 6.5 shall not be applicable in the case of VMM recovery, i.e. if the SS-migration profiles are exchanged as part of the virtual migration they shall be exchanged before the final migration approval.

Figure 74: VMM recovery (sheet 1 of 3)



NOTE: The virtual RSI shall be carried out for each recovered individual subscriber if the previous visited SwMI MM exists for the subscriber.

Figure 75: VMM recovery (sheet 2 of 3)

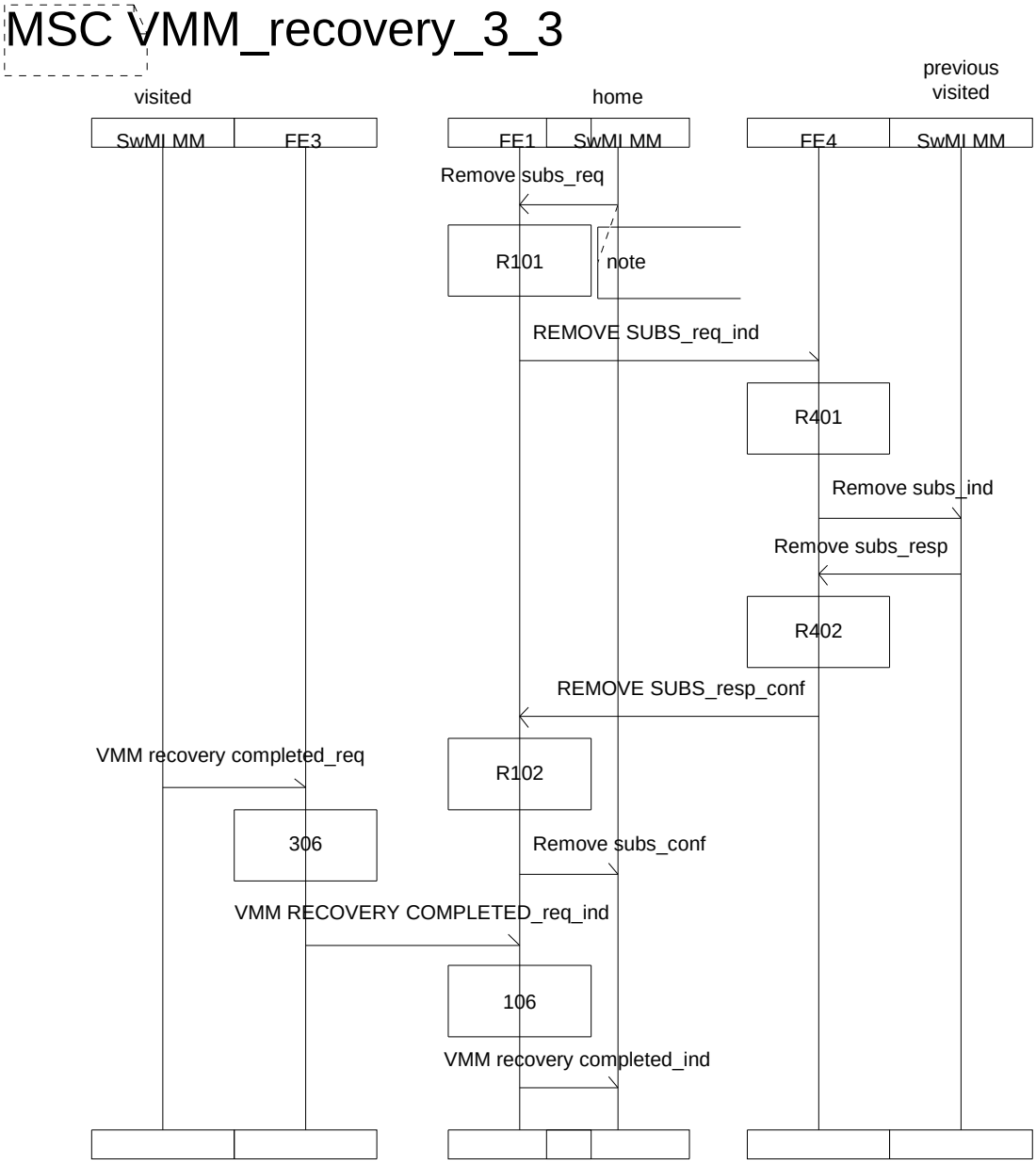


Figure 76: VMM recovery (sheet 3 of 3)

28.2 Exceptional operation

28.2.1 Rejection of HMM recovery

Figure 77 illustrates the information flow sequence for the HMM recovery service when the visited SwMI MM rejects the service.

NOTE 1: The exceptional operation can take place if the service has been invoked according to the case 1) as defined in clause 14.4.

NOTE 2: The home SwMI in the figure 77 is the individual subscriber home SwMI.

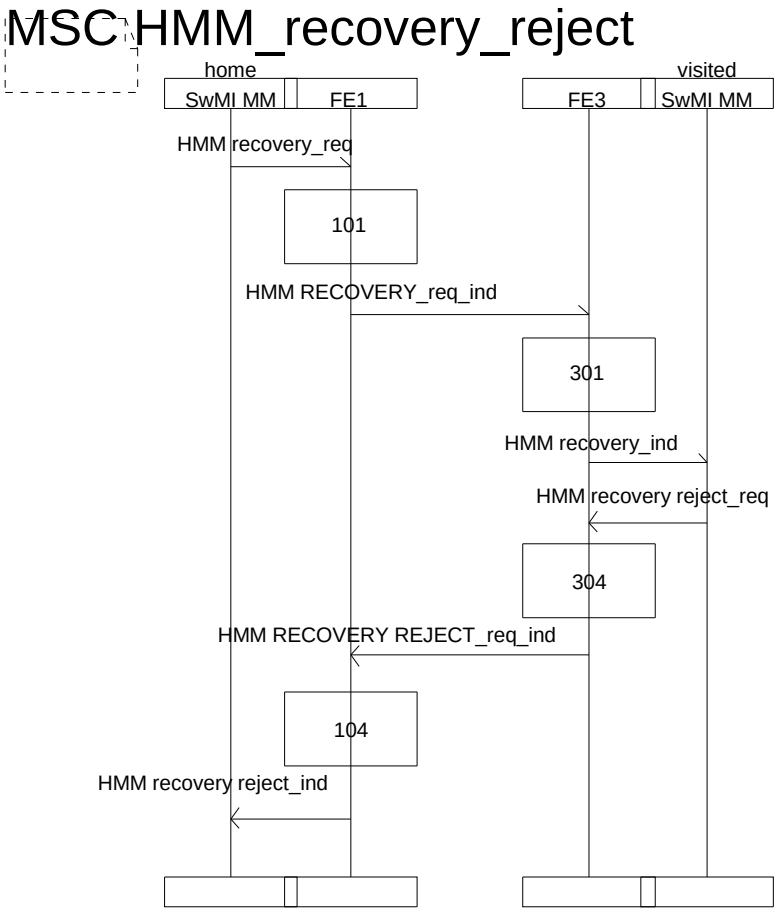


Figure 77: Rejection of HMM recovery

28.2.2 Rejection of VMM recovery

Figure 78 illustrates the information flow sequence for the VMM recovery service when the visited SwMI MM rejects the service.

NOTE 1: The exceptional operation can take place if the service has been invoked according to the case 2) as defined in clause 14.4.

NOTE 2: The home SwMI in the figure 78 is the individual subscriber home SwMI.

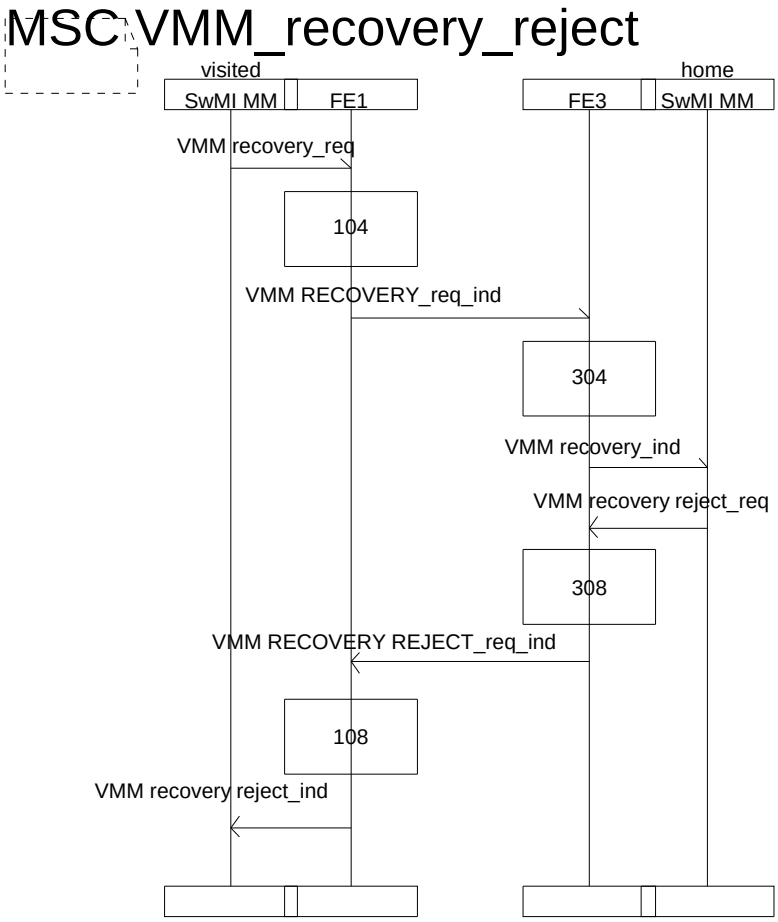


Figure 78: Rejection of VMM recovery

28.3 FE actions

28.3.1 FE actions of FE1

101 Upon receipt of the HMM-recovery_req requesting the invocation of the HMM recovery, FE1 shall send FE3 the corresponding HMM-RECOVERY_req.

102 Upon receipt of the HMM-RECOVERY_conf confirming the invocation of the HMM recovery, FE1 shall send the individual subscriber home SwMI MM the corresponding HMM-recovery_conf.

103 Upon receipt of the HMM-RECOVERY COMPLETED_ind indicating that the completion of the HMM recovery, FE1 shall send the individual subscriber home SwMI MM the corresponding HMM-recovery completed_ind.

104 Upon receipt of HMM-RECOVERY REJECT_ind, indicating that the HMM recovery has been rejected by the visited SwMI MM, FE1 shall send the individual subscriber home SwMI MM the corresponding HMM-recovery reject_ind.

The FE actions M1xx correspond to the actions 1xx as defined in clause 20.3.1.

The FE actions R1xx correspond to the actions 1xx as defined in clause 20.3.1.

28.3.2 FE actions of FE3

301 Upon receipt of the HMM-RECOVERY_ind requesting the invocation of the HMM recovery, FE3 shall send the visited SwMI MM the corresponding HMM-recovery_ind.

302 Upon receipt of the HMM-recovery_resp confirming the invocation of the HMM recovery, FE3 shall send FE1 the corresponding HMM-RECOVERY_resp.

303 Upon receipt of the HMM-recovery completed_req indicating that the completion of the HMM recovery, FE1 shall send FE3 the corresponding HMM-RECOVERY COMPLETED_req.

304 Upon receipt of HMM recovery reject_req, indicating that the HMM recovery has been rejected, FE3 shall send FE1 the corresponding HMM-RECOVERY REJECT_req.

The FE actions M3xx correspond to the actions 3xx as defined in clause 20.3.2.

28.3.3 FE actions of FE4

The FE actions R4xx correspond to the actions 4xx as defined in clause 20.3.2.

29 Group attachment - stage 2 information flow sequences

29.1 Normal operation

29.1.1 Visited SwMI MM initiated group attachment without migration profile exchange

Figure 79 illustrates the information flow sequence for the visited SwMI MM initiated group attachment as defined in clause 15.4 in cases: 1) in which pre-defined migration profile(s) are used, 2), 3) and 4).

NOTE 1: For the purposes of the group attachment the "visited SwMI" means a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

NOTE 2: Home SwMI in the figure 79 is the group home SwMI.

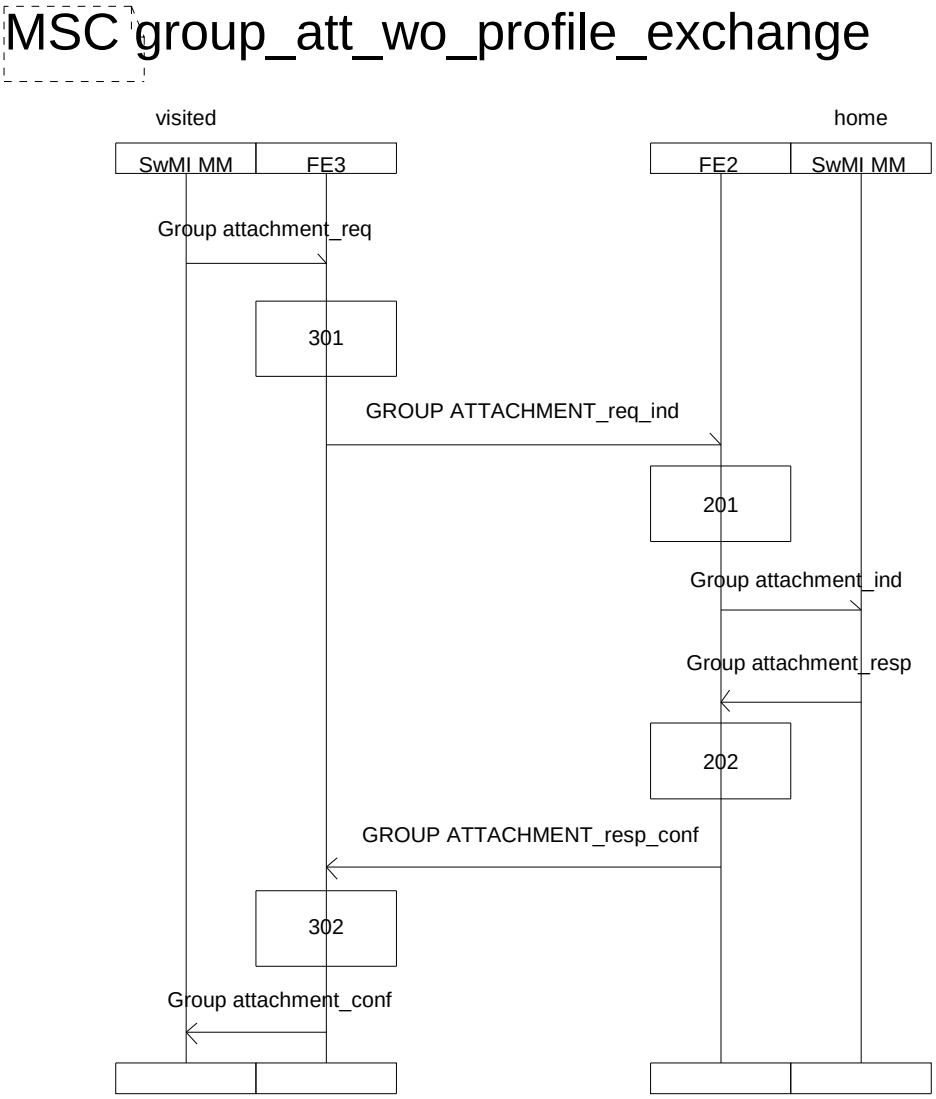


Figure 79: Visited SwMI MM initiated group attachment without migration profile exchange

29.1.2 Visited SwMI MM initiated first group attachment with migration profile exchange

Figures 80 and 81 illustrate the information flow sequence for the visited SwMI MM initiated group attachment as defined in clause 15.4 in cases: 1) in which migration profile(s), both basic and SS-migration profiles, are exchanged across the ISI.

NOTE: Home SwMI in figures 80 and 81 is the group home SwMI.

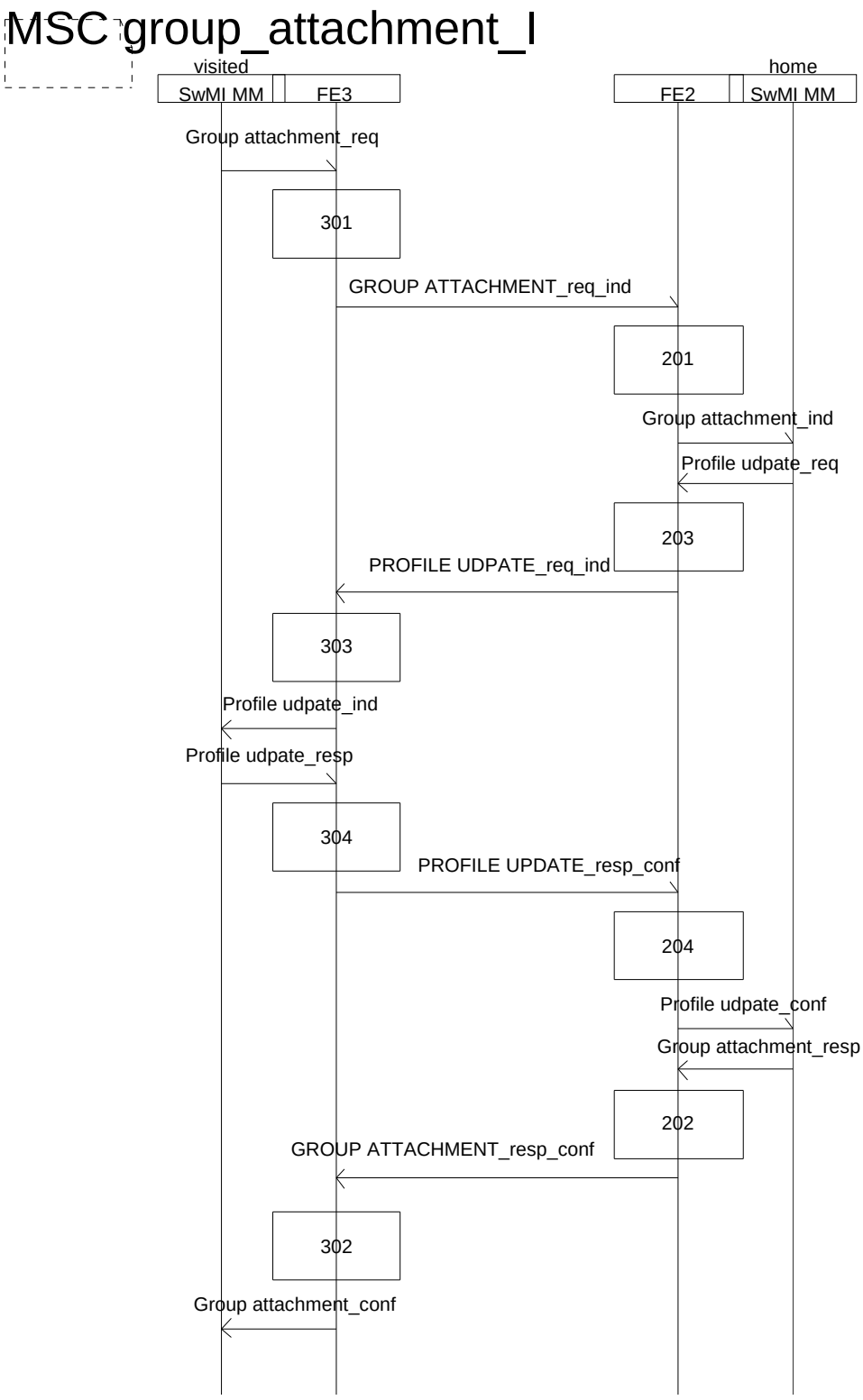


Figure 80: Visited SwMI MM initiated first group attachment with migration profile exchange

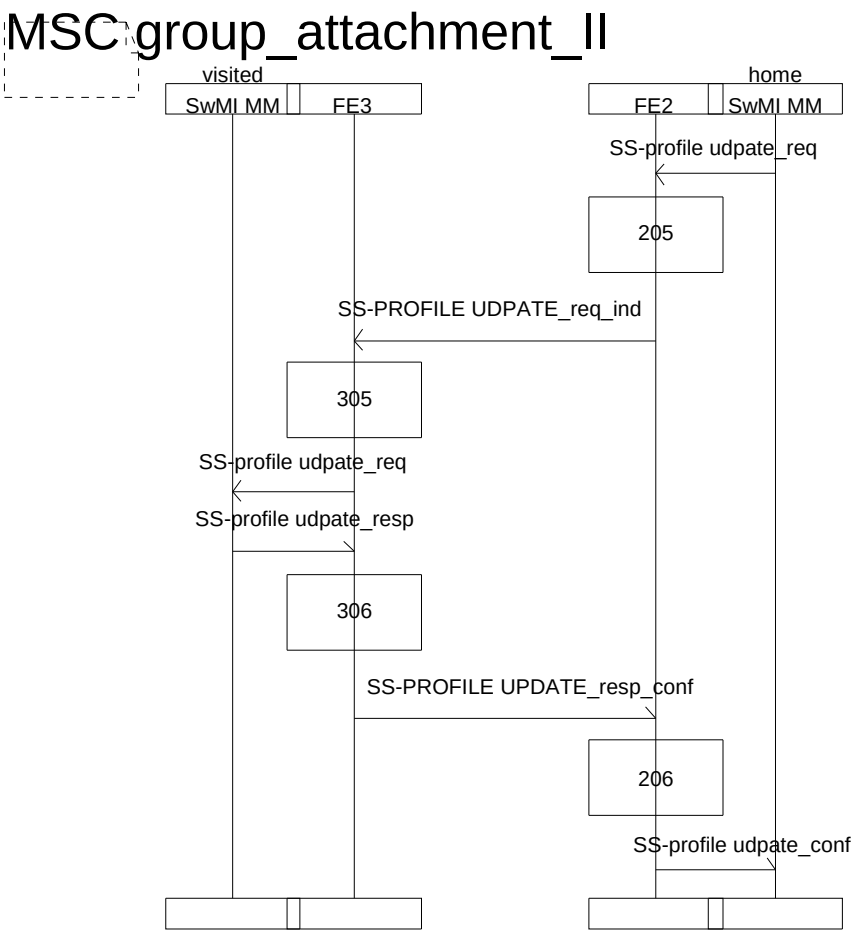


Figure 81: Visited SwMI MM initiated first group attachment with migration profile exchange

29.1.3 Group home SwMI MM initiated group attachment without migration profile exchange

Figure 82 illustrates the information flow sequence for the group home SwMI MM initiated group attachment as defined in clause 15.4 in cases: 5) when pre-defined migration profile(s) are used and 6).

NOTE: Home SwMI in figure 82 is the group home SwMI.

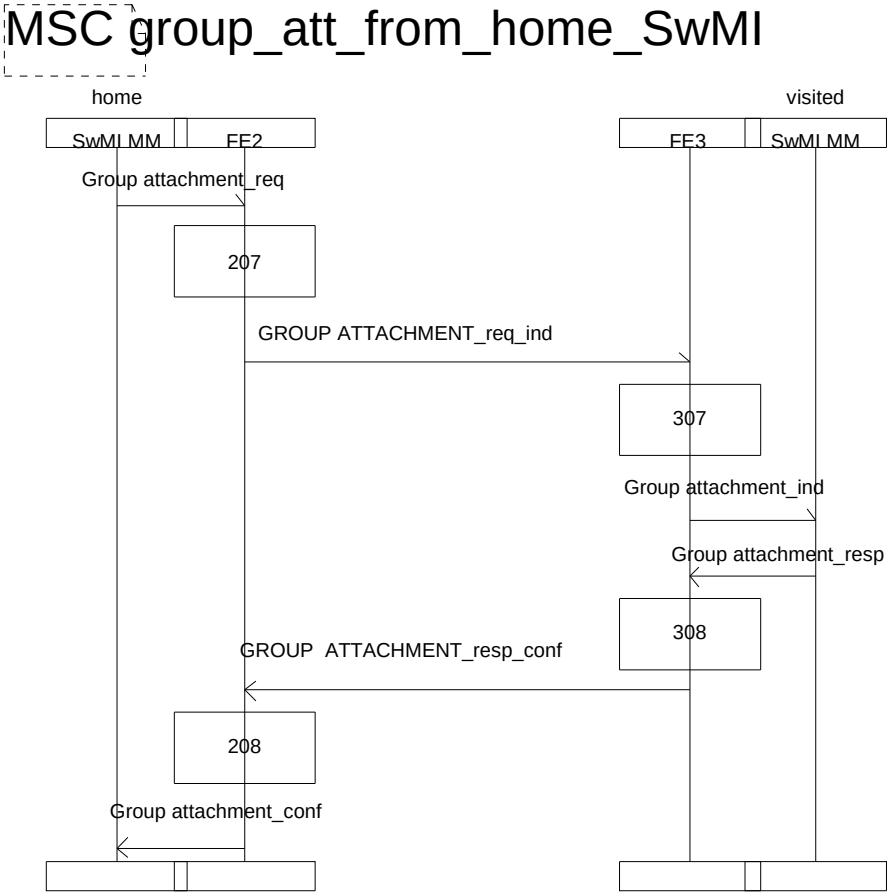


Figure 82: Group home SwMI MM initiated group attachment without migration profile exchange

29.1.4 Group home SwMI MM initiated group attachment with migration profile exchange

Figures 83 and 84 illustrate the information flow sequence for the group home SwMI MM initiated group attachment as defined in clause 15.4 in case: 6) when migration profile(s), both basic and SS-migration profiles, are exchanged across the ISI.

NOTE: Home SwMI in figures 83 and 84 is the group home SwMI.

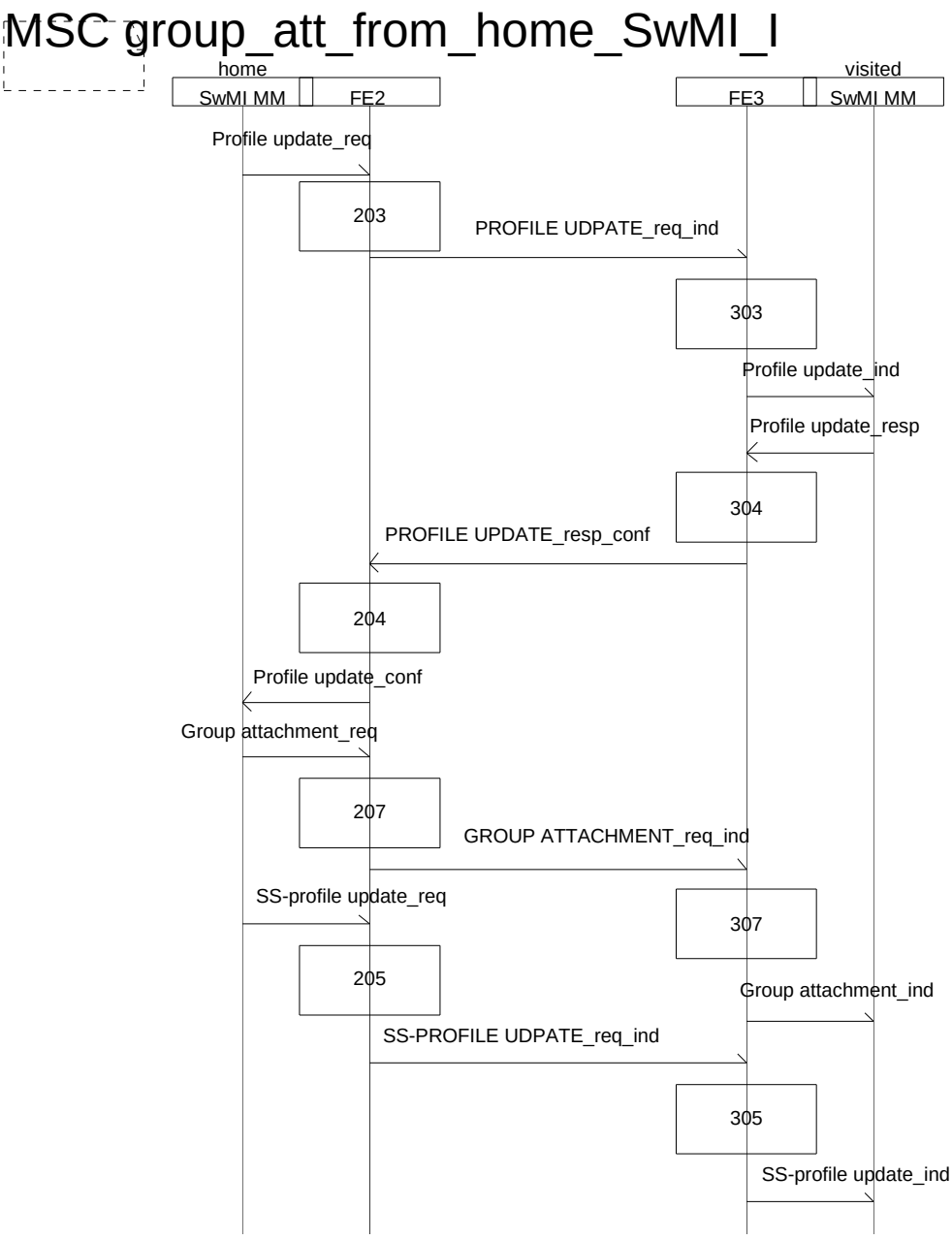


Figure 83: Group home SwMI MM initiated group attachment with migration profile exchange

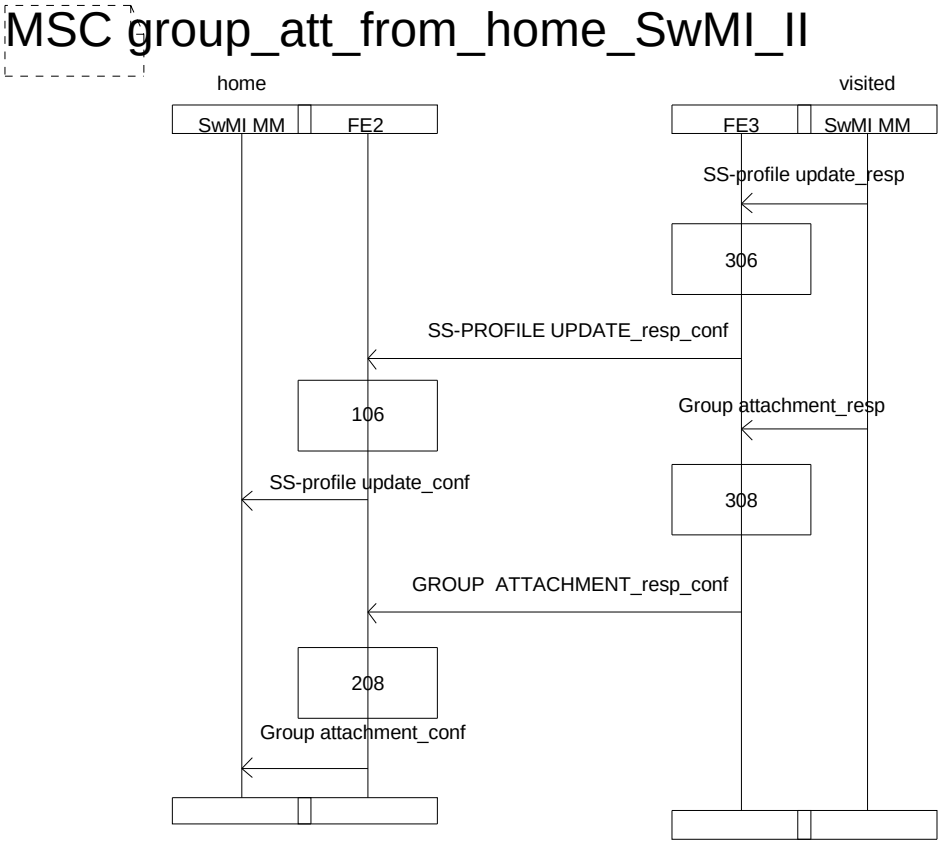


Figure 84: Group home SwMI MM initiated group attachment with migration profile exchange

29.2 Exceptional operation

29.2.1 Rejection of visited SwMI MM initiated group attachment without migration profile exchange

Figure 85 illustrates the information flow sequence for the rejection of the visited SwMI MM initiated group attachment when the group attachment has been initiated as defined in cases 1) to 4) in clause 15.4.

NOTE: Home SwMI in figure 85 is the group home SwMI.

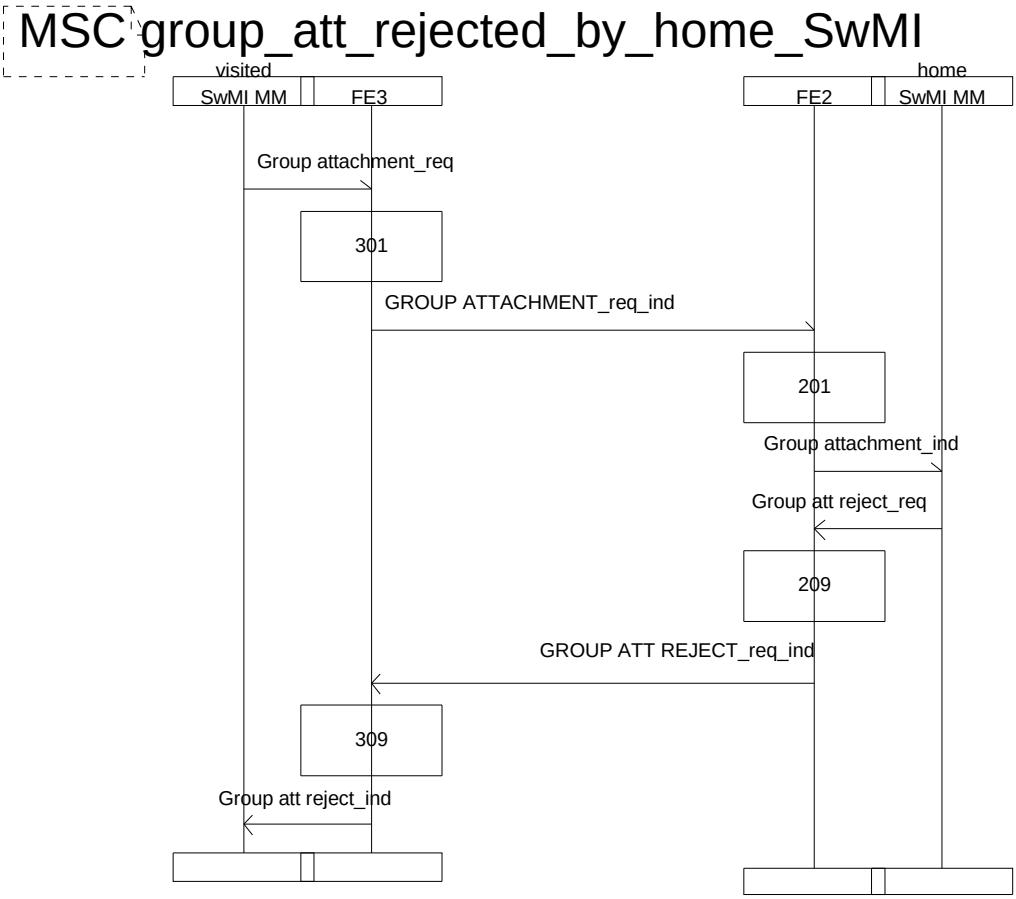


Figure 85: Rejection of visited SwMI MM initiated group attachment without migration profile exchange

29.2.2 Rejection of group home SwMI MM initiated group attachment with migration profile exchange

Figure 86 illustrates the information flow sequence for the rejection of group home SwMI MM initiated group attachment when the group attachment has been initiated as defined in clause 15.4 in case 5) with the migration profile exchange. Note, that depending on the rejection cause the group home SwMI MM may continue the group attachment after the profile rejection by using the pre-defined migration profile(s) for the group.

NOTE: Home SwMI in figure 86 is the group home SwMI.

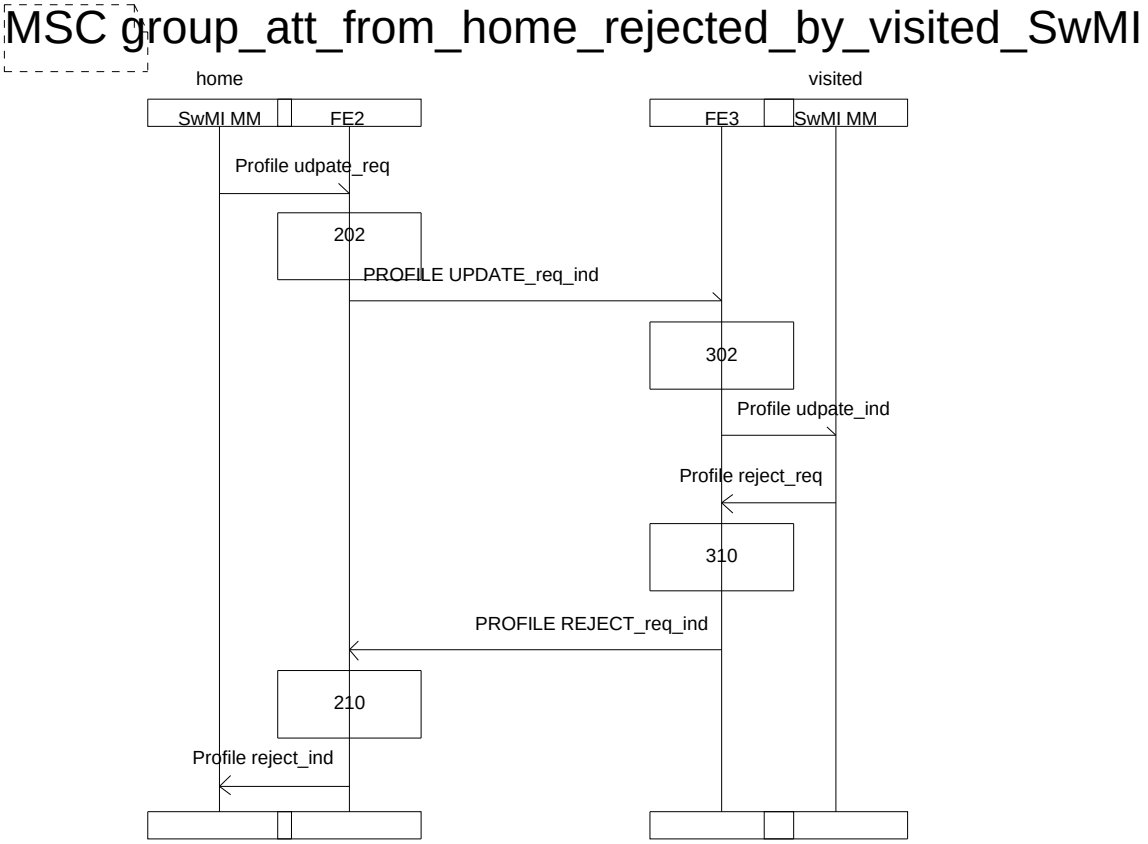


Figure 86: Rejection of group home SwMI MM initiated group attachment with migration profile exchange

29.2.3 Rejection of group home SwMI MM initiated group attachment without migration profile exchange

Figure 87 illustrates the information flow sequence for the rejection of the group home SwMI MM initiated group attachment when the group attachment has been initiated as defined in clause 15.4 in cases: 5) when the pre-defined migration profile(s) are used and 6).

NOTE: Home SwMI in figure 87 is the group home SwMI.

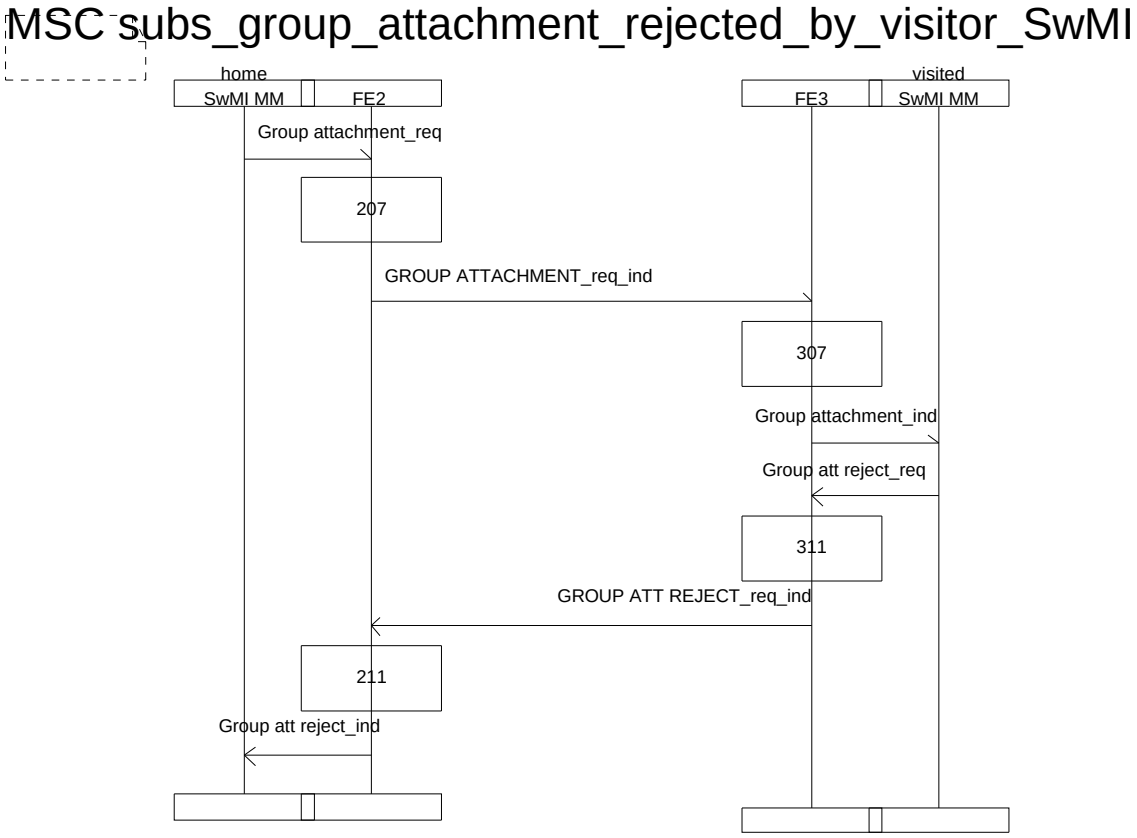


Figure 87: Rejection of group home SwMI MM initiated group attachment without migration profile exchange, rejected by subscriber

29.2.4 Rejection of group home SwMI MM initiated group attachment with migration profile exchange, rejected by subscriber

Figures 88 and 89 illustrate the information flow sequence for the rejection of the group home SwMI MM initiated group attachment when the group attachment has been initiated as defined in clause 15.4 in case 6) when migration profile(s), both basic and SS-migration profiles, are exchanged across the ISI.

NOTE: Home SwMI in figures 88 and 89 is the group home SwMI.

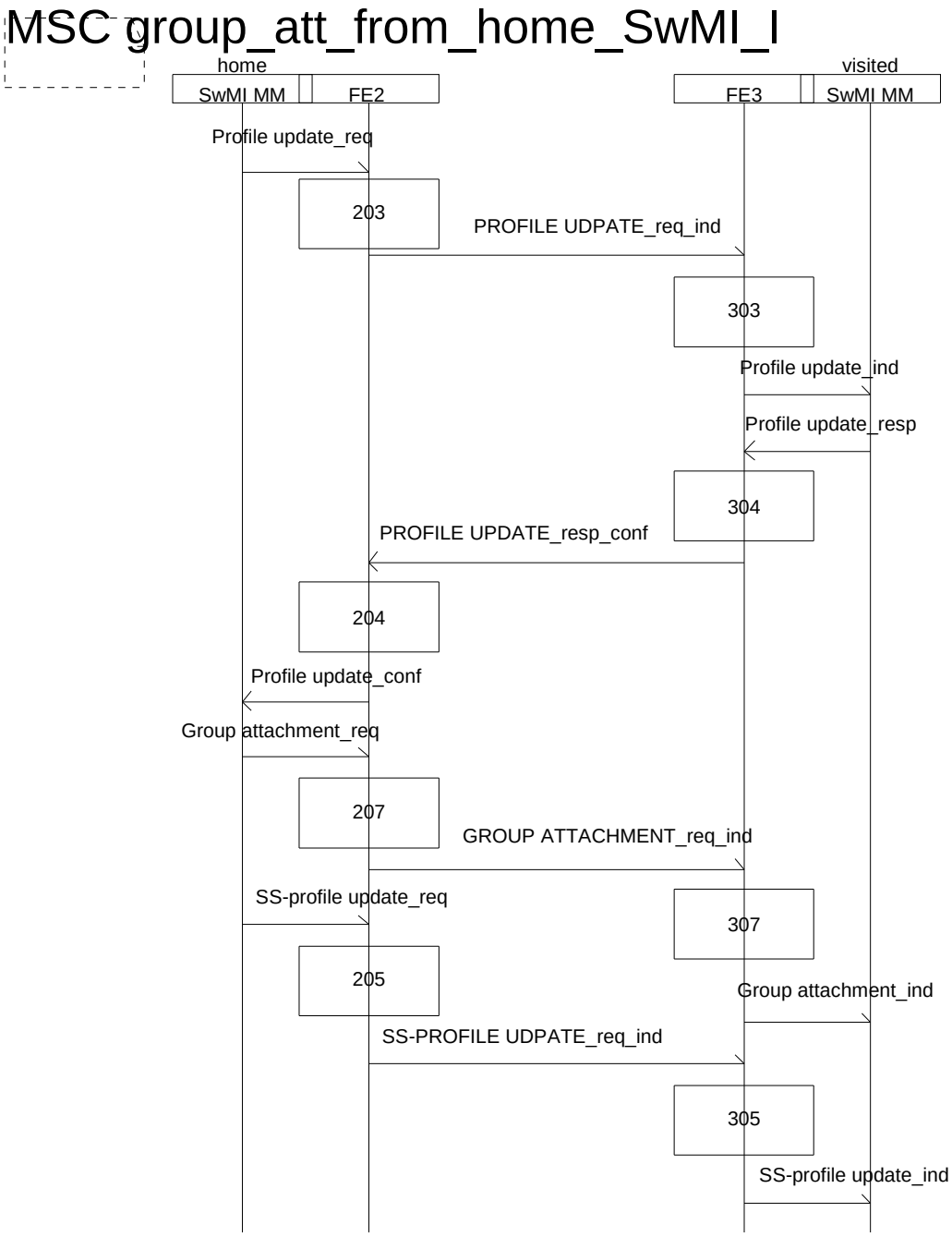


Figure 88: Rejection of group home SwMI MM initiated group attachment with migration profile exchange, rejected by subscriber

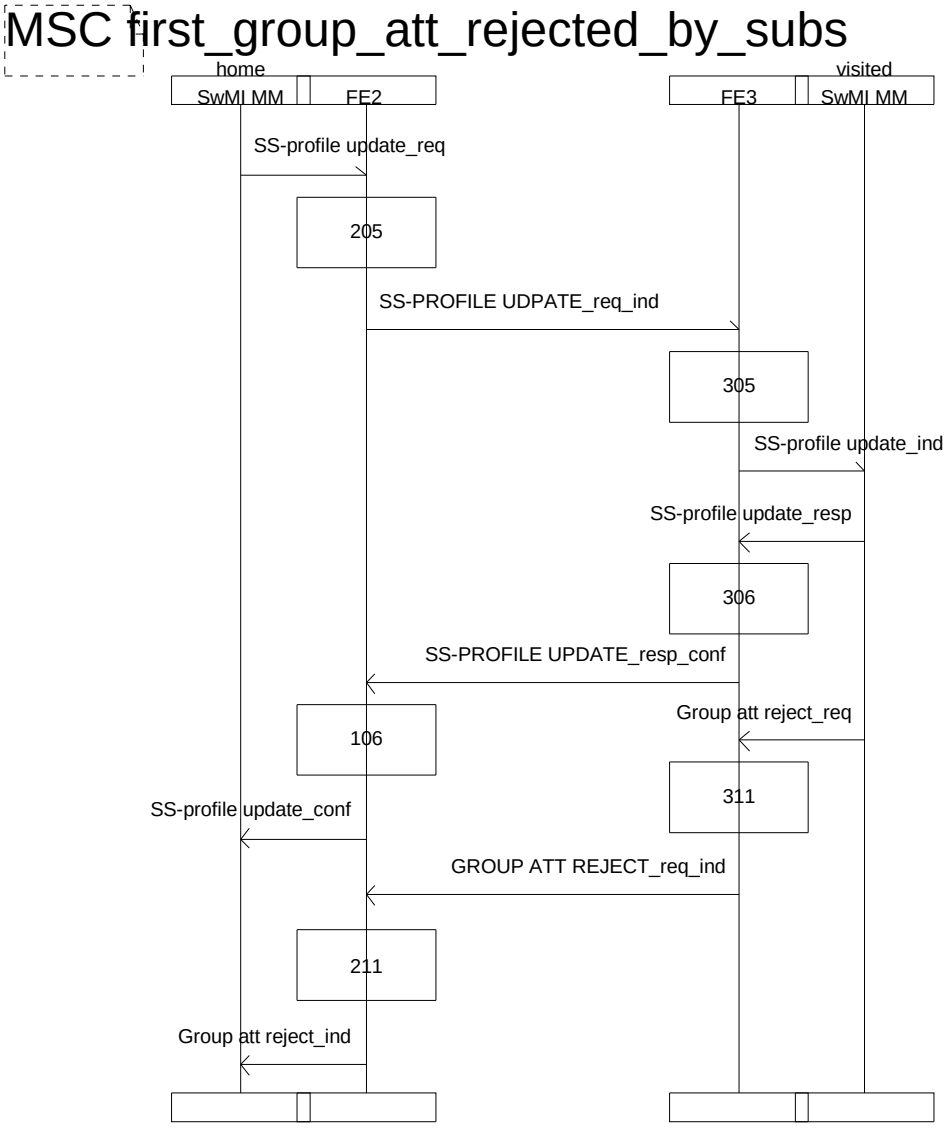


Figure 89: Rejection of group home SwMI MM initiated group attachment with migration profile exchange, rejected by subscriber

29.3 FE actions

29.3.1 FE actions of FE2

201 Upon receipt of the GROUP ATTACHMENT_ind containing the group attachment request, FE2 shall send the group home SwMI MM Group attachment_ind.

202 Upon receipt of the Group attachment_resp indicating that the group attachment has been successfully completed, FE2 shall send FE3 the GROUP ATTACHMENT_resp.

203 Upon receipt of the Profile update_req containing the original basic migration profile of the group, FE2 shall send FE3 the PROFILE UPDATE_req. The group home SwMI MM shall re-invoke the service until successfully completed.

204 Upon receipt of PROFILE UPDATE_conf containing the response to the basic migration profile update of the group, FE2 shall send the group home SwMI MM Profile update_conf.

205 Upon receipt of the SS-profile update_req containing the original SS-migration profile(s) of the group, FE2 shall send FE3 the SS-PROFILE UPDATE_req.

206 Upon receipt of SS-PROFILE UPDATE_conf containing the response to the original SS-migration profile update, FE2 shall send the group home SwMI MM SS-profile update_conf.

207 Upon receipt of the Group attachment_req containing the group attachment request, FE2 shall send FE3 GROUP ATTACHMENT_req. The group home SwMI MM shall re-invoke the service until successfully completed.

208 Upon receipt of the GROUP ATTACHMENT_conf indicating that the group attachment has been successfully completed, FE2 shall send the group home SwMI MM Group attachment_conf.

209 Upon receipt of the Group att reject_req indicating that the group attachment has been rejected, FE2 shall send FE3 the GROUP ATT REJECT_req.

210 Upon receipt of the PROFILE REJECT_ind indicating that the basic migration profile update has been rejected, FE2 shall send the group home SwMI MM the Profile reject_ind.

211 Upon receipt of GROUP ATT REJECT_ind indicating that the group attachment has been rejected, FE2 shall send the group home SwMI MM Group att reject_ind.

29.3.2 FE actions of FE3

301 Upon receipt of Group attachment_req containing the group attachment request, FE3 shall send FE2 the GROUP ATTACHMENT_req. The visited SwMI MM shall re-invoke the service until successfully completed.

302 Upon receipt of GROUP ATTACHMENT_conf indicating that the group attachment has been successfully completed, FE3 shall send the visited SwMI MM the Group attachment_conf.

303 Upon receipt of PROFILE UPDATE_ind containing the original basic migration profile of the group, FE3 shall send the visited SwMI MM the Profile update_ind.

304 Upon receipt of the Profile update_resp containing the response to the basic migration profile update of the group, FE3 shall send FE2 the PROFILE UPDATE_resp.

305 Upon receipt of the SS-PROFILE UPDATE_ind containing the original SS-migration profile(s) of the group, FE3 shall send the visited SwMI MM the Profile update_ind.

306 Upon receipt of the SS-profile update_resp containing the response to the original SS-migration profile update, FE3 shall send FE2 the SS-PROFILE UPDATE_resp.

307 Upon receipt of the GROUP ATTACHMENT_ind containing the group attachment request, FE3 shall send the visited SwMI MM the Group attachment_ind.

308 Upon receipt of the Group attachment_resp indicating that the group attachment has been successfully completed, FE3 shall send FE2 the GROUP ATTACHMENT_resp.

309 Upon receipt of the GROUP ATT REJECT_ind indicating that the group attachment has been rejected, FE3 shall send the visited SwMI MM the Group att reject_ind.

310 Upon receipt of the Profile reject_req indicating that the basic migration profile update has been rejected, FE3 shall send FE2 the PROFILE REJECT_req.

311 Upon receipt of Group att reject_req indicating that the group attachment has been rejected, FE3 shall send FE2 the GROUP ATT REJECT_req.

30 Normal operation for group detachment - stage 2 information flow sequences

30.1 Normal operation

30.1.1 Visited SwMI MM initiated group detachment

Figure 90 illustrates the information flow sequence for the visited SwMI MM initiated group detachment as defined in clause 16.4 in cases 1) to 3).

NOTE 1: For the purposes of the group detachment the "visited SwMI" means a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

NOTE 2: Home SwMI figure 90 is the group home SwMI.

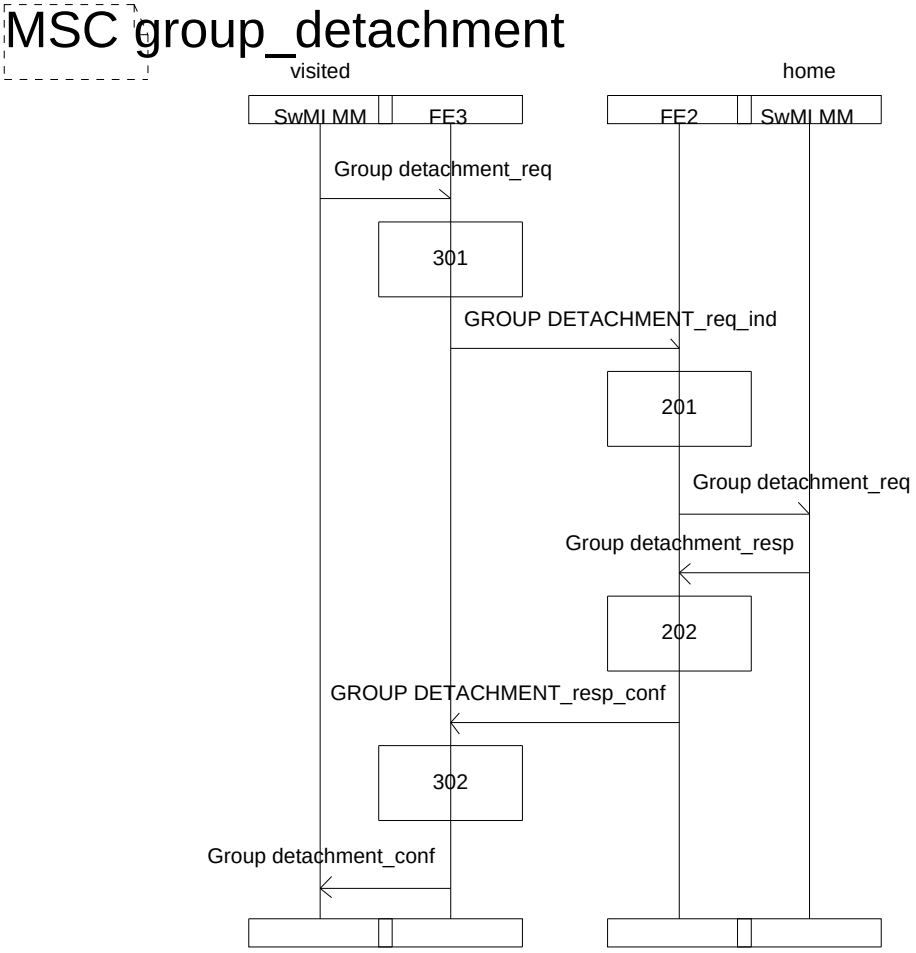


Figure 90: Visited SwMI MM initiated group detachment

30.1.2 Group home SwMI MM initiated group detachment

Figure 91 illustrates the information flow sequence for the group home SwMI MM initiated group detachment as defined in clause 16.4 in case 4).

NOTE: Home SwMI figure 91 is the group home SwMI.

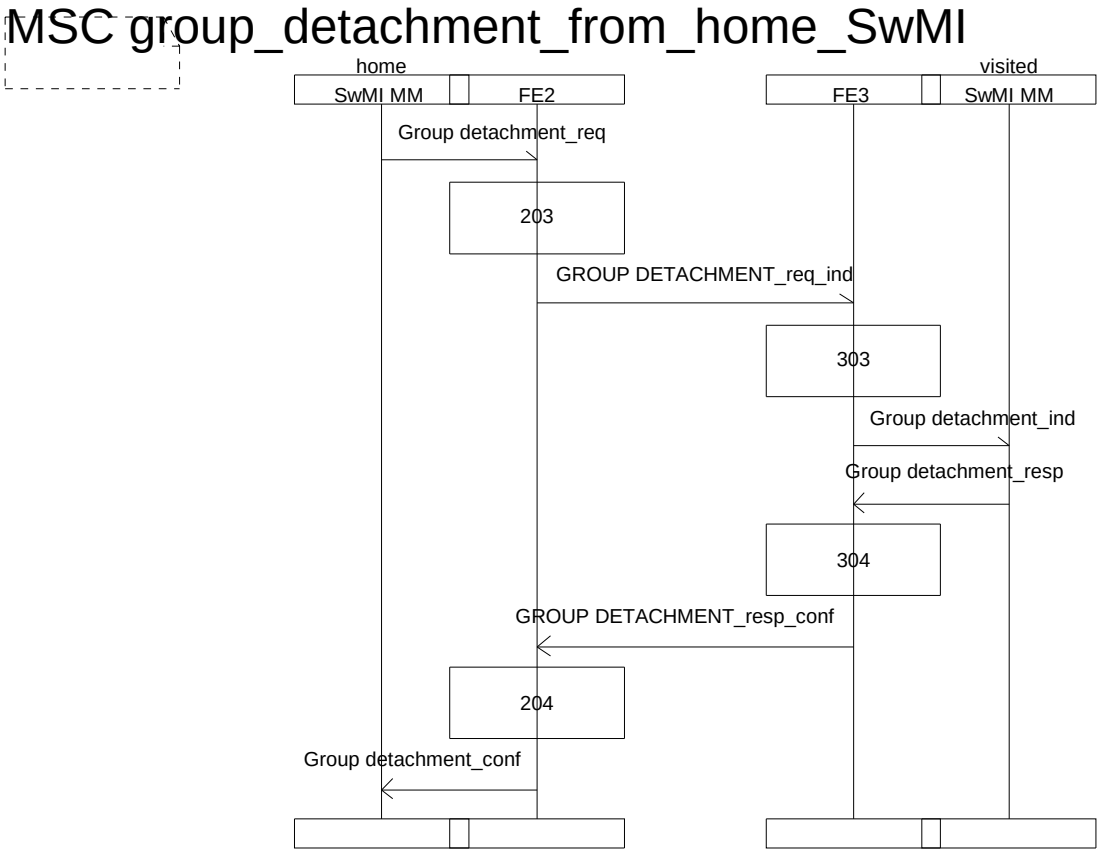


Figure 91: Group home SwMI MM initiated group detachment

30.2 Exceptional operation

30.2.1 Rejection of visited SwMI MM initiated group detachment

Figure 92 illustrates the information flow sequence for the visited SwMI MM initiated group detachment when the group detachment has been initiated as defined in cases 1) to 3).

NOTE: Home SwMI in figure 92 is the group home SwMI of the group.

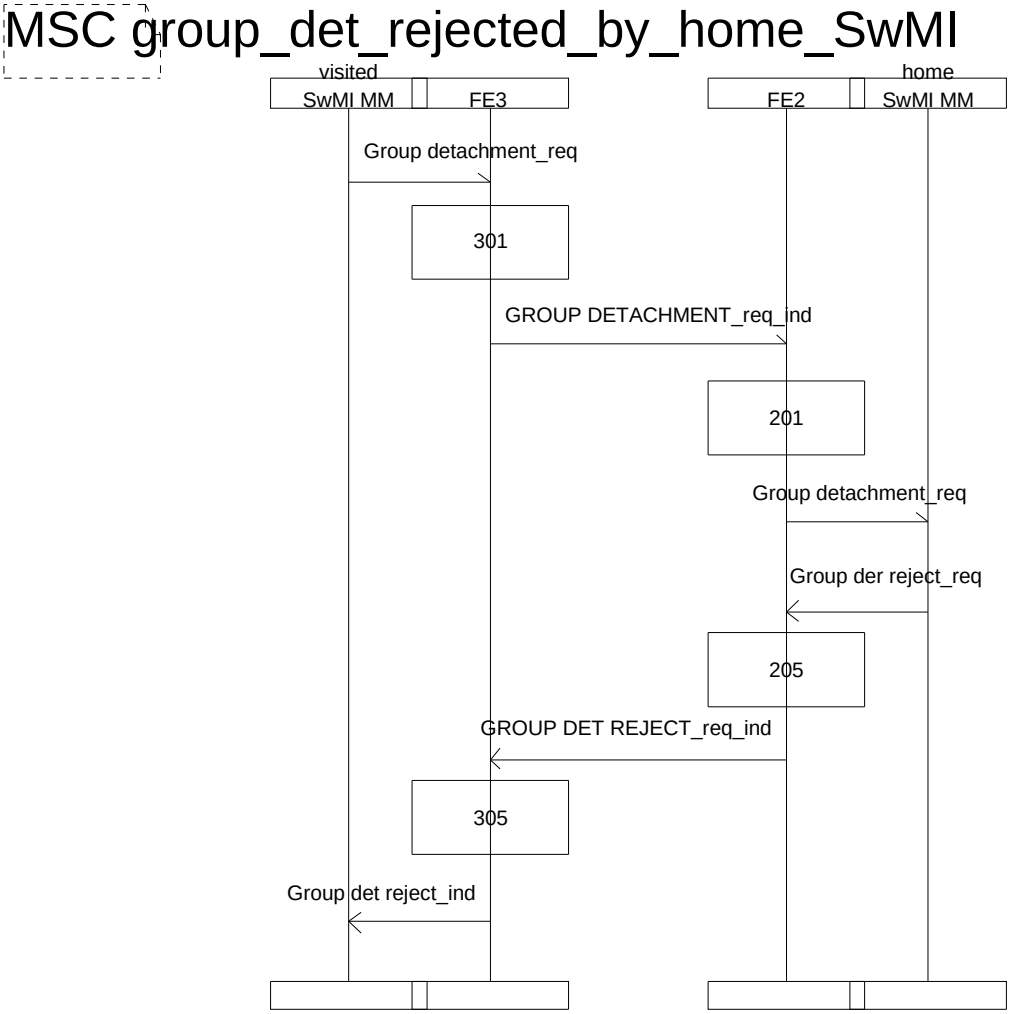


Figure 92: Rejection of visited SwMI MM initiated group detachment

30.2.2 Rejection of group home SwMI MM initiated group detachment rejection

Figure 93 illustrates the information flow sequence for the group home SwMI MM initiated group detachment when the group detachment has been initiated as defined in case 4).

NOTE: Home SwMI figure 93 is the group home SwMI.

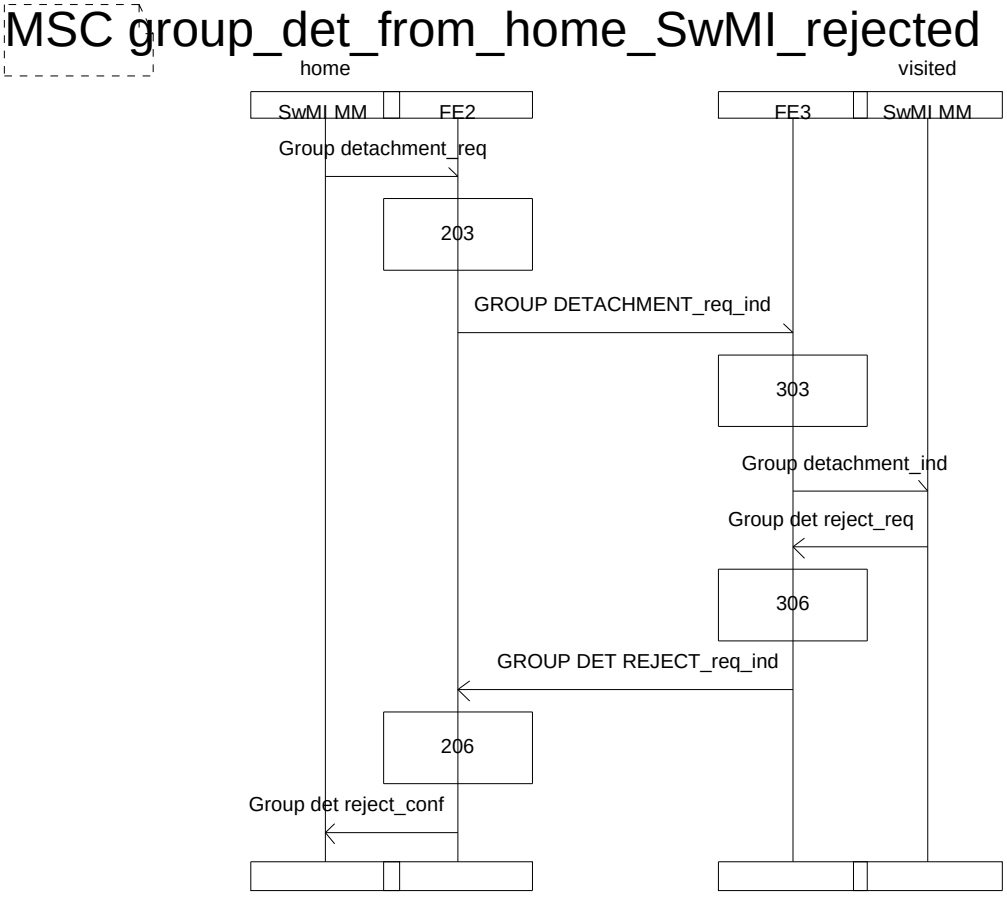


Figure 93: Rejection of group home SwMI MM initiated group detachment rejection

30.3 FE actions

30.3.1 FE actions of FE2

201 Upon receipt of the GROUP DETACHMENT_ind containing the group detachment request, FE2 shall send the group home SwMI MM Group detachment_ind.

202 Upon receipt of the Group detachment_resp indicating that the group detachment has been successfully completed, FE2 shall send FE3 the GROUP DETACHMENT_resp.

203 Upon receipt of the Group detachment_req containing the group detachment request, FE2 shall send FE3 GROUP DETACHMENT_req. The group home SwMI MM shall re-invoke the service until successfully completed.

204 Upon receipt of the GROUP DETACHMENT_conf indicating that the group detachment has been successfully completed, FE2 shall send the group home SwMI MM Group detachment_conf.

205 Upon receipt of the Group det reject_req indicating that the group detachment has been rejected, FE2 shall send FE3 the GROUP DET REJECT_req.

206 Upon receipt of GROUP DET REJECT_ind indicating that the group detachment has been rejected, FE2 shall send the group home SwMI MM Group det reject_ind.

30.3.2 FE actions of FE3

301 Upon receipt of Group detachment_req containing the group detachment request, FE3 shall send FE2 the GROUP DETACHMENT_req. The visited SwMI MM shall re-invoke the service until successfully completed.

302 Upon receipt of GROUP DETACHMENT_conf indicating that the group detachment has been successfully completed, FE3 shall send the visited SwMI MM Group detachment_conf.

303 Upon receipt of the GROUP DETACHMENT_ind containing the group detachment request, FE3 shall send the visited SwMI MM Group detachment_ind.

304 Upon receipt of the Group detachment_resp indicating that the group detachment has been successfully completed, FE3 shall send FE2 the GROUP DETACHMENT_resp.

305 Upon receipt of the GROUP DET REJECT_ind indicating that the group detachment has been rejected, FE3 shall send the visited SwMI MM Group det reject_ind.

306 Upon receipt of Group det reject_req indicating that the group detachment has been rejected, FE3 shall send FE2 the GROUP DET REJECT_req.

31 Group database recovery - stage 2 information flow sequences

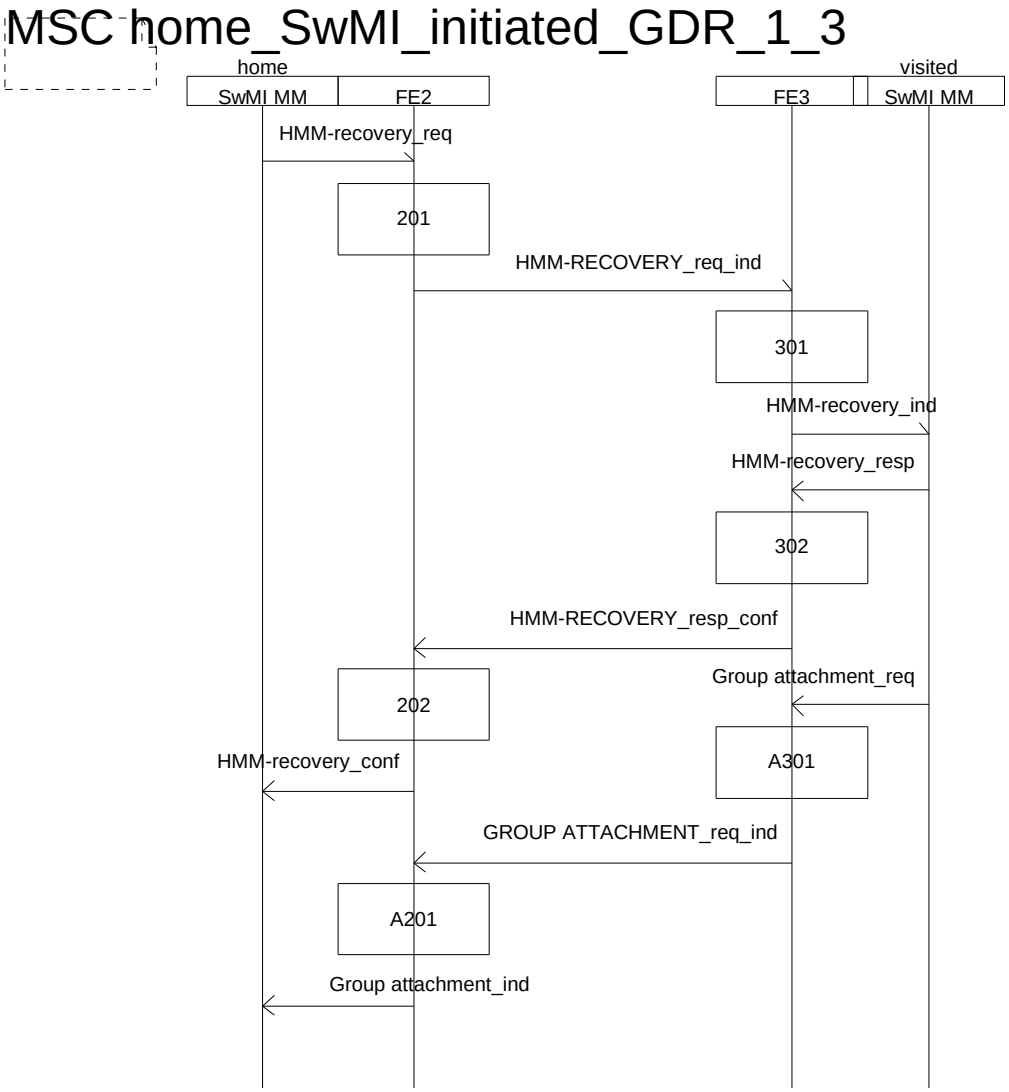
31.1 Normal operation

31.1.1 G-HDR

Figure 94, figure 95 and figure 96 illustrate the information flow sequence for the G-HDR as defined in case 1) in clause 17.4.

NOTE 1: For the purposes of the group database recory the "visited SwMI" means a SwMI other than the "group home SwMI" i.e. also the "individual subscriber home SwMI" is a "visited SwMI".

NOTE 2: The home SwMI in the figures 94 to 96 is the individual subscriber home SwMI.



NOTE 1: The group recovery related group attachment request shall be sent for each subscriber having migration record in the G-VDB, having an attachment to the group and having the invoking SwMI as group home SwMI. For simplicity the group attachment related group recovery sequence in shown only twice.

NOTE 2: In case of group recovery, if the SS profiles are sent, they shall be sent in conjunction with basic migration profiles.

Figure 94: G-HDR (sheet 1 of 3)

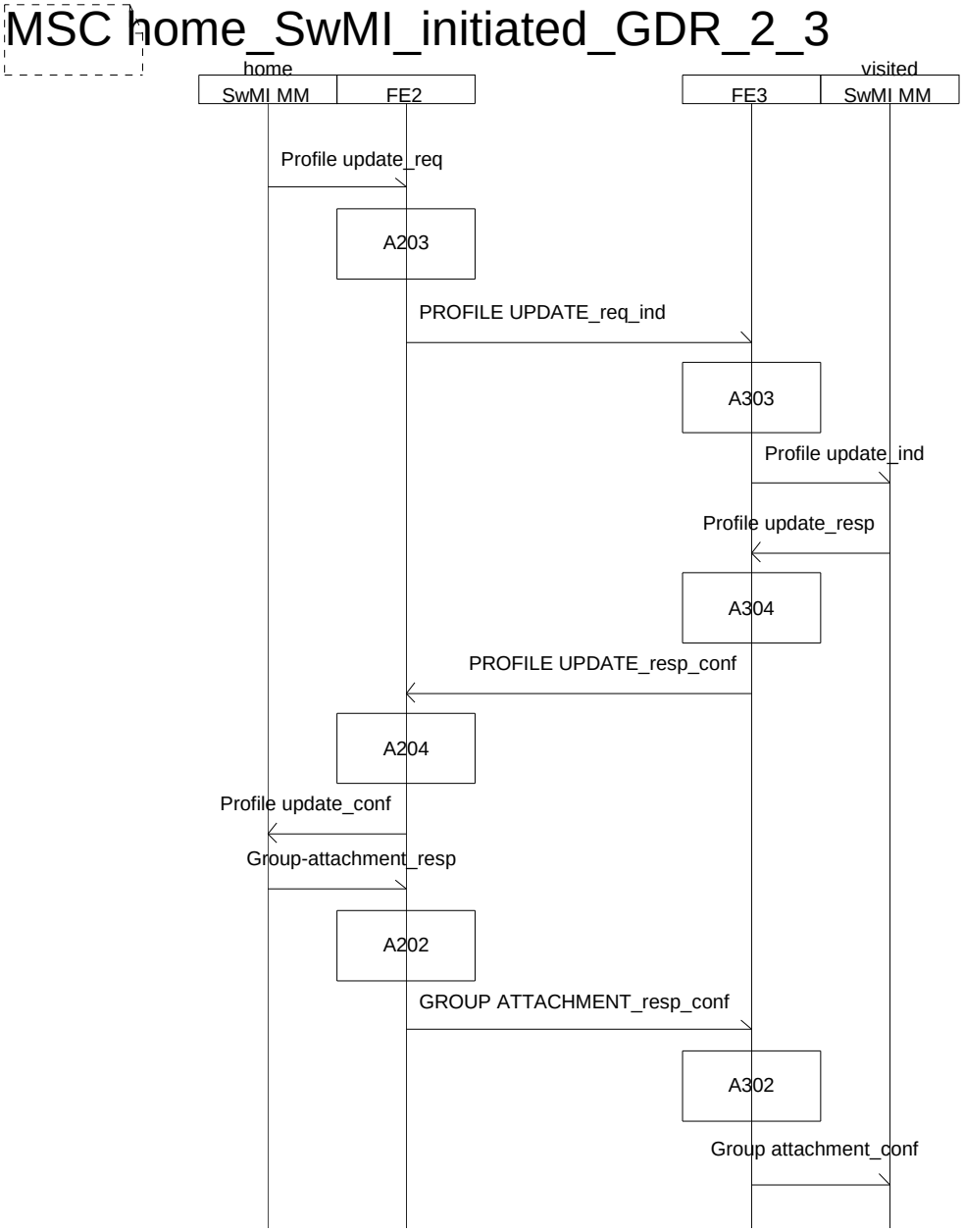
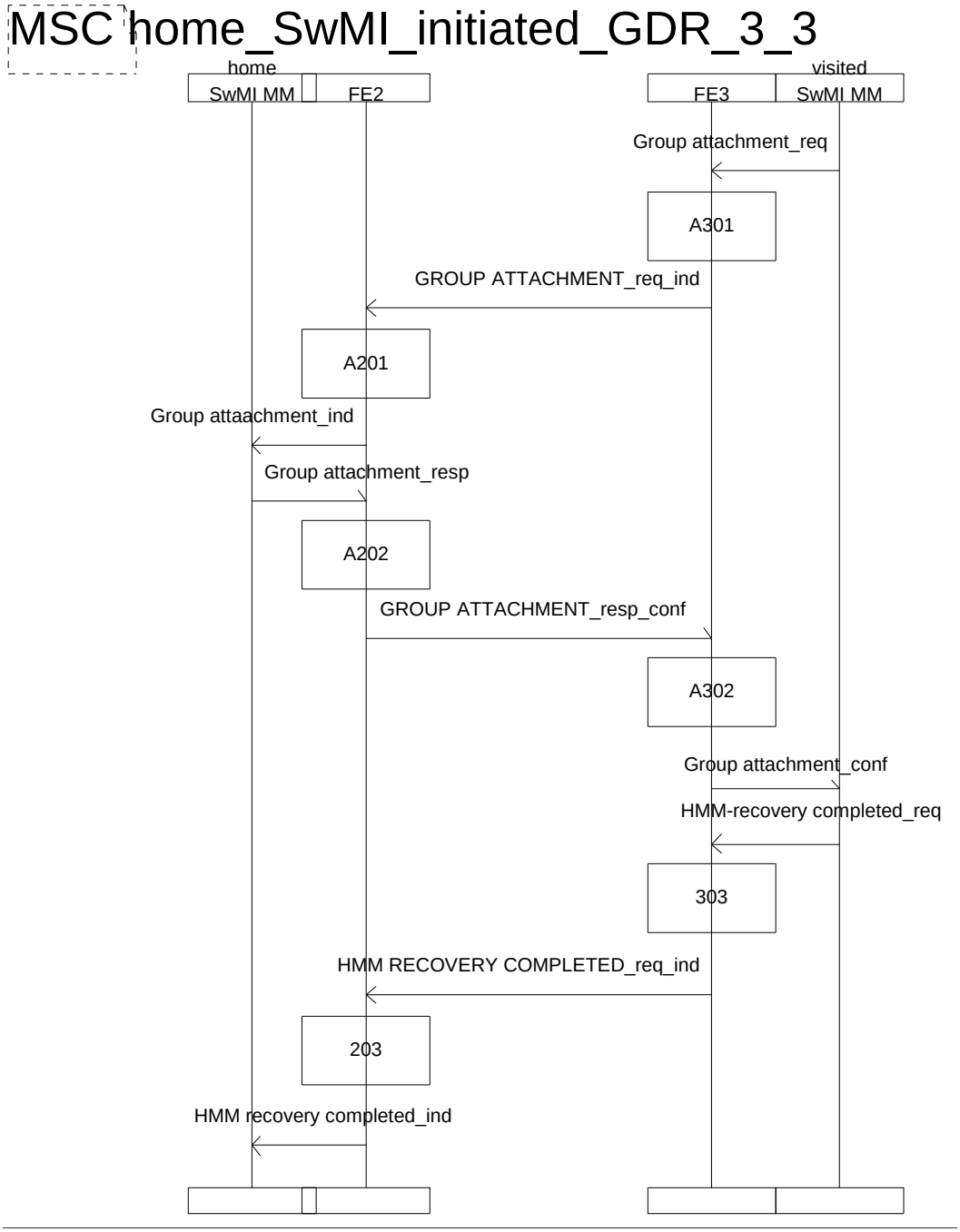


Figure 95: G-HDR (sheet 2 of 3)



NOTE: Upon completion of the HMM recovery completed_ind, the group home SwMI MM may invoke the group home SwMI MM initiated group attachment and group detachment services for each group attachment and group detachment that is recorded as valid in the visited SwMI MM but on which the virtual group attachment has not been invoked.

Figure 96: G-HDR (sheet 3 of 3)

31.1.2 G-VDR

Figures 97, 98 and 99 illustrate the information flow sequence for the G-VDR as defined in case 2) in clause 17.4.

NOTE: The home SwMI in the figures 97 to 99 is the individual subscriber home SwMI.

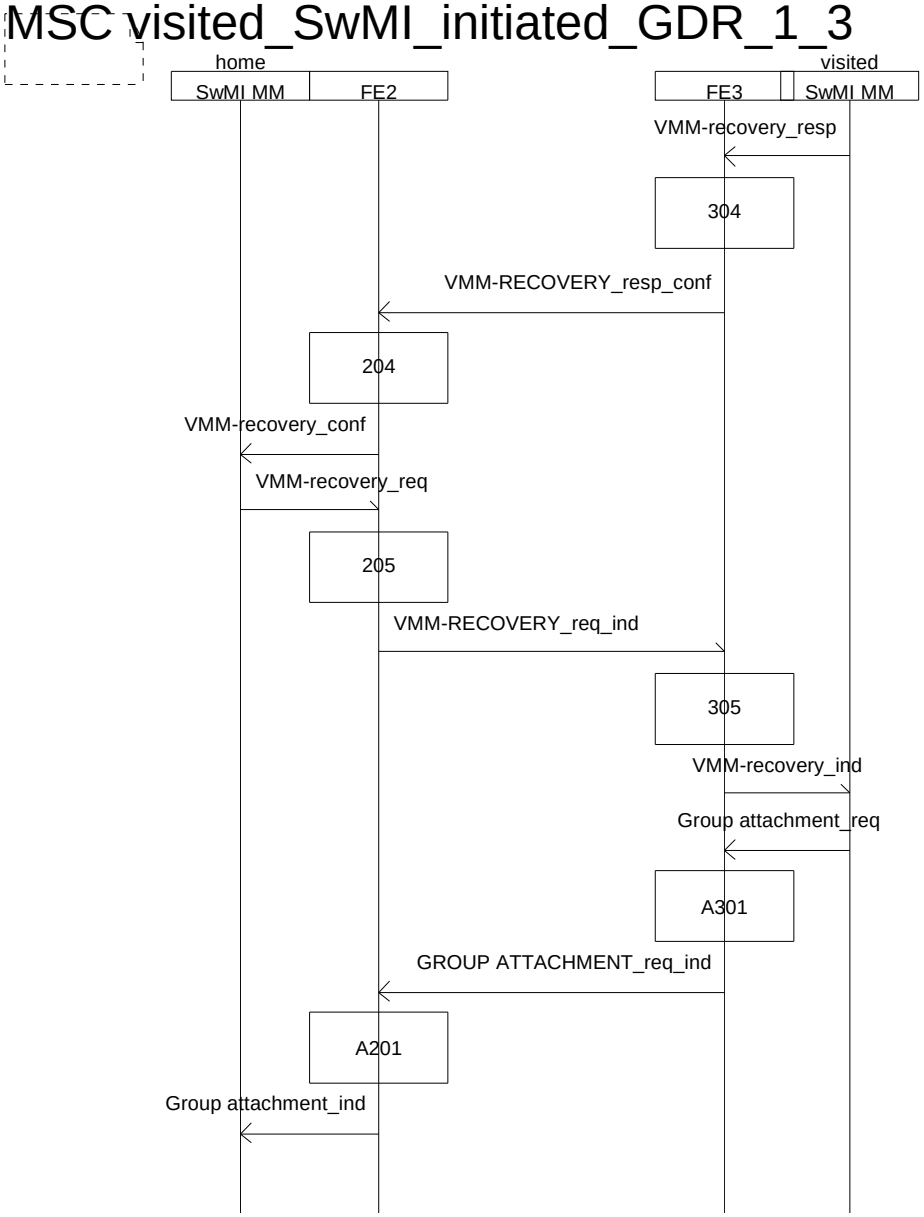


Figure 97: G-VDR (sheet 1 of 3)

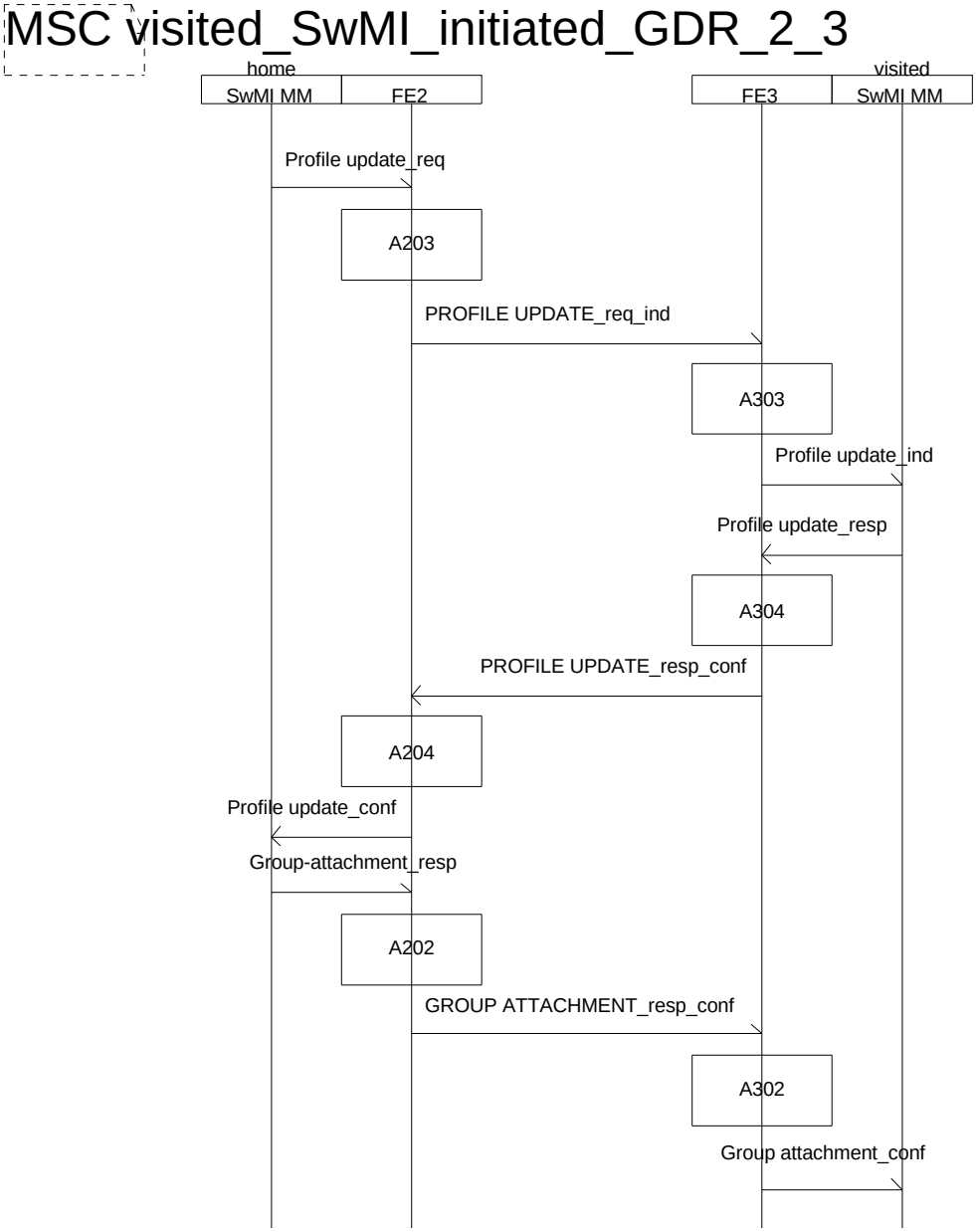
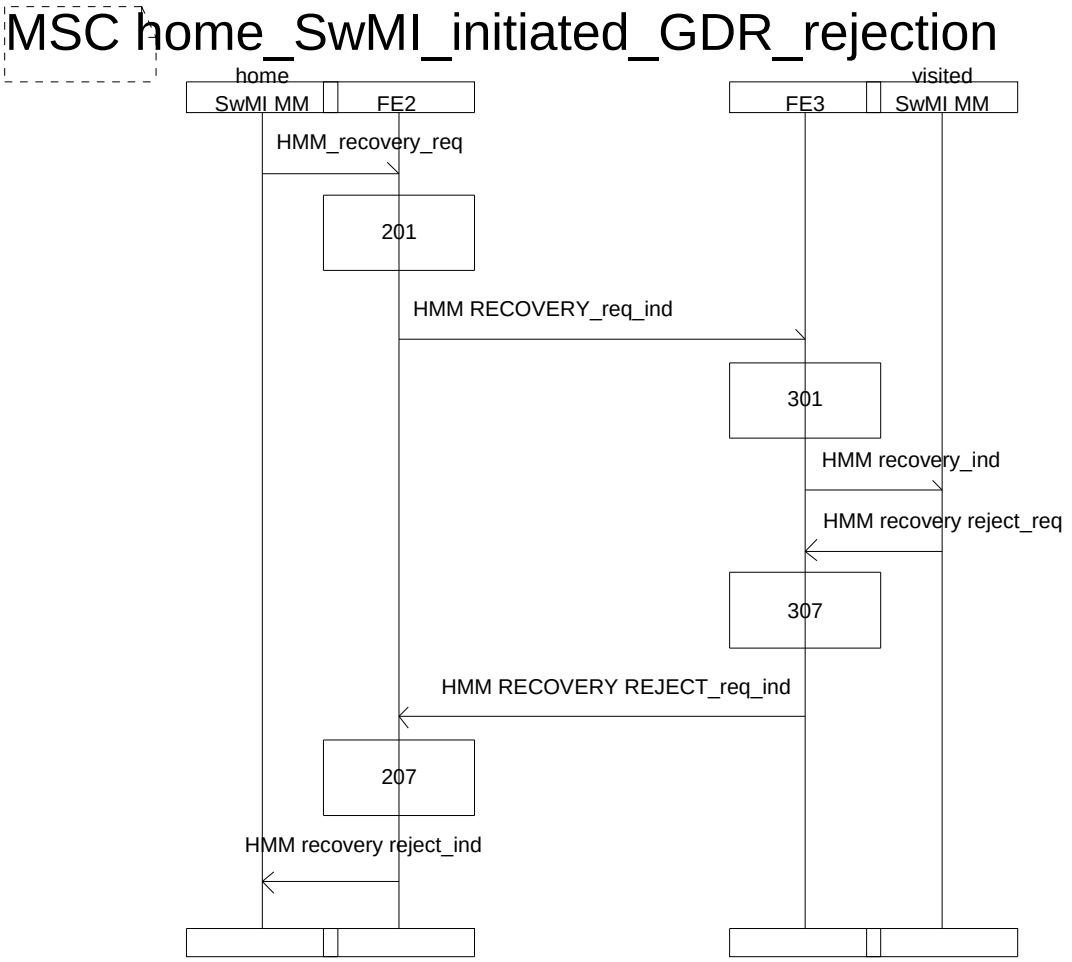


Figure 98: G-VDR (sheet 2 of 3)



NOTE: Upon completion of the HMM recovery completed_ind, the group home SwMI MM may invoke the group home SwMI MM initiated group attachment and group detachment services for each group attachment and group detachment that is recorded as valid in the visited SwMI MM but on which the virtual group attachment has not been invoked.

Figure 99: G-VDR (sheet 3 of 3)

31.2 Exceptional operation

31.2.1 Rejection of G-HDR

Figure 100 illustrates the information flow sequence for the rejection of the G-HDR that has been initiated as defined in case 1) in clause 17.4.

NOTE: The home SwMI in the figure 100 is the individual subscriber home SwMI.

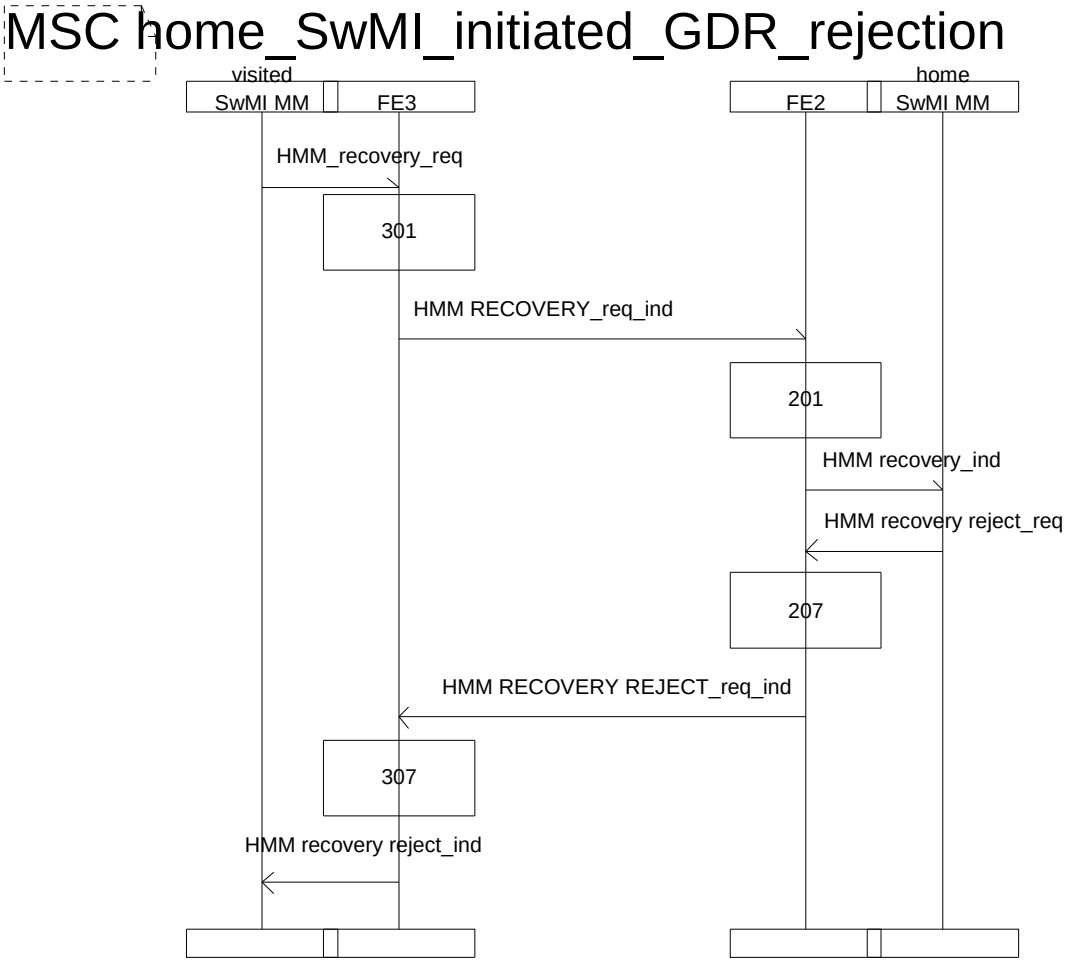


Figure 100: Rejection of G-HDR

31.2.2 Rejection of G-VDR

Figure 101 illustrates the information flow sequence for the rejection of the G-VDR that has been initiated as defined in case 2) in clause 17.4.

NOTE: The home SwMI in the figure 101 is the individual subscriber home SwMI.

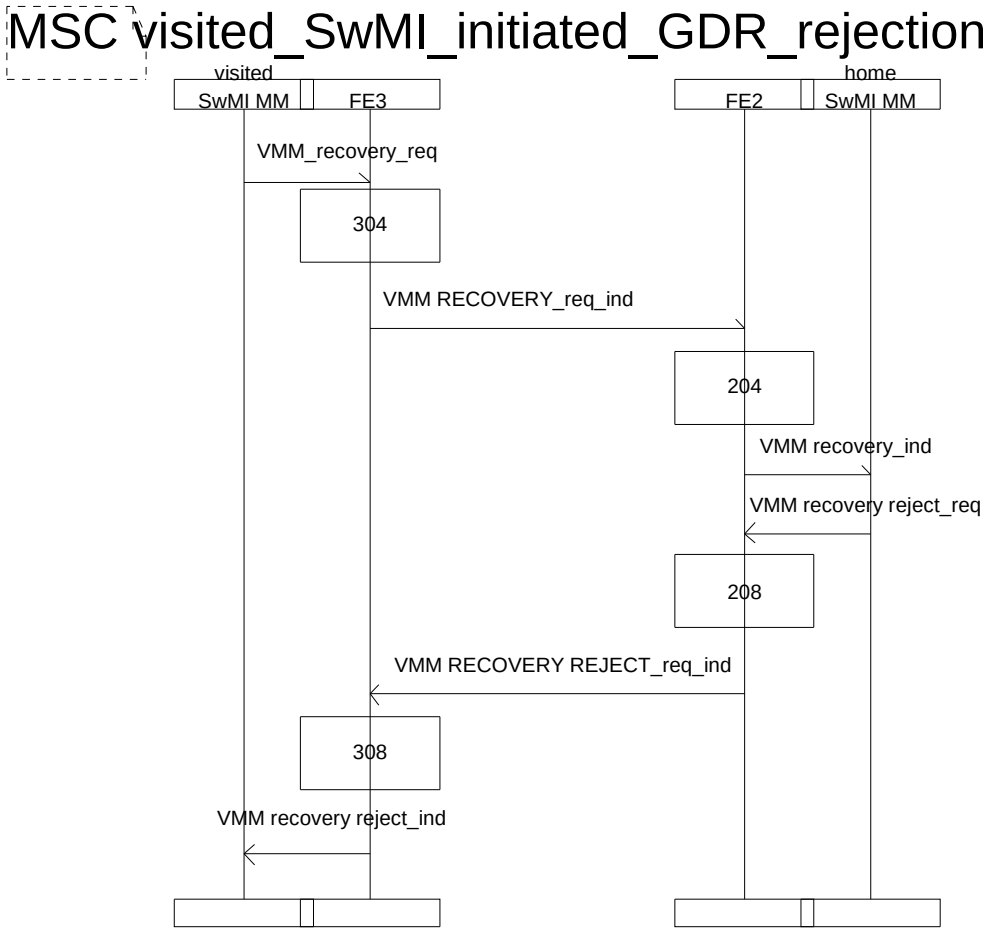


Figure 101: Rejection of G-VDR

31.3 FE actions

31.3.1 FE actions of FE2

201 Upon receipt of the HMM-recovery_req requesting the invocation of the G-HDR, FE2 shall send FE3 the corresponding HMM-RECOVERY_req.

202 Upon receipt of the HMM-RECOVERY_conf confirming the invocation of the G-HDR, FE2 shall send the group home SwMI MM the corresponding HMM-recovery_conf.

203 Upon receipt of the HMM-RECOVERY COMPLETED_ind indicating the completion of the G-HDR, FE2 shall send the group home SwMI MM the corresponding HMM-recovery completed_ind.

204 Upon receipt of the VMM-RECOVERY_ind requesting the invocation of the G-VDR, FE2 shall send the group home SwMI MM the corresponding VMM-recovery_ind.

205 Upon receipt of the VMM-recovery_resp confirming the invocation of the G-VDR, FE2 shall send FE3 the corresponding VMM-RECOVERY_resp.

206 Upon receipt of the VMM-RECOVERY COMPLETED_ind indicating the completion of the G-VDR, FE2 shall send group home SwMI MM the corresponding VMM-recovery completed_ind.

207 Upon receipt of HMM-RECOVERY REJECT_ind indicating the rejection of the G-HDR, FE2 shall send the group home SwMI MM the corresponding HMM-recovery reject_ind.

208 Upon receipt of VMM recovery reject_req indicating the rejection of the G-VDR, FE2 shall send FE3 the corresponding HMM-RECOVERY REJECT_req.

The FE actions A2xx correspond to the actions 2xx as defined in clause 29.3.1.

31.3.2 FE actions of FE3

301 Upon receipt of the HMM-RECOVERY_ind requesting the invocation of the G-HDR, FE3 shall send the visited SwMI MM the corresponding HMM-recovery_ind.

302 Upon receipt of the HMM-recovery_resp confirming the invocation of the G-HDR, FE3 shall send FE2 the corresponding HMM-RECOVERY_resp.

303 Upon receipt of the HMM-recovery completed_req indicating the completion of the G-HDR, FE2 shall send FE3 the corresponding HMM-RECOVERY COMPLETED_req.

304 Upon receipt of the VMM-recovery_req requesting the invocation of the G-VDR, FE3 shall send FE2 the corresponding VMM-RECOVERY_req.

305 Upon receipt of the VMM-RECOVERY_conf confirming the invocation of the G-VDR, FE3 shall send the visited SwMI MM the corresponding VMM-recovery_conf.

306 Upon receipt of the VMM-RECOVERY COMPLETED_ind indicating the completion of the G-VDR, FE3 shall send the visited SwMI MM the corresponding VMM-recovery completed_ind.

307 Upon receipt of HMM recovery reject_req indicating the rejection of the G-HDR, FE3 shall send FE2 the corresponding HMM-RECOVERY REJECT_req.

308 Upon receipt of HMM-RECOVERY REJECT_ind indicating the rejection of the initiated G-VDR, FE3 shall send the group home SwMI MM the corresponding HMM-recovery reject_ind.

The FE actions A3xx correspond to the actions 3xx as defined in clause 29.3.2.

32 Group linking/unlinking - stage 2 information flow scenarios

32.1 Normal operation

32.1.1 Group linking

Void.

Figure 102: Void

Figure 103: Void

32.1.2 Group unlinking

Void.

Figure 104: Void

32.1.3 Remote group unlinking

Void.

Figure 105: Void

32.2 Exceptional operation - group linking rejected by participating SwMI

Void.

Figure 106: Void

Figure 107: Void

32.3 FE actions

32.3.1 FE actions of FE5

Void.

32.3.2 FE actions of FE6

Void.

32a Linked group attachment/detachment - stage 2 information flow scenarios

32a.1 Normal operation

32a.1.1 Visited SwMI MM initiated attachment to a linked group in the linking participating SwMI

Figure 107a illustrates the information flow sequence for linking participating SwMI initiated handling of the first group attachment to a linked group in a SwMI as defined in clause 18a.4.

NOTE 1: In figure 107a, the "participating SwMI MM" is the group linking participating SwMI MM.

NOTE 2: In figure 107a, the "controlling SwMI MM" is the group linking controlling SwMI MM.

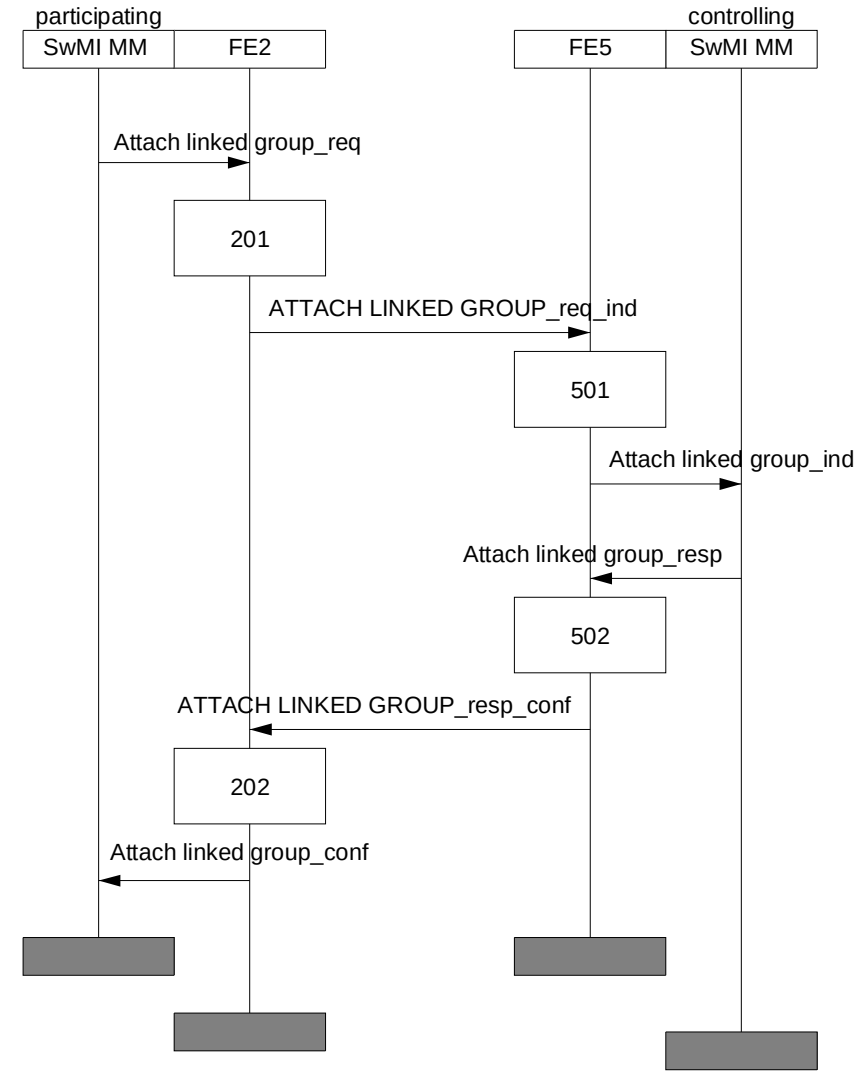


Figure 107a: Visited SwMI MM initiated the first group attachment to a linked group in the linking participating SwMI, accepted by the linking controlling SwMI

32a.1.2 Visited SwMI MM initiated detachment from a linked group in the linking participating SwMI

Figure 107b illustrates the information flow sequence for linking participating SwMI handling the last group detachment to a linked group in a linking participating SwMI as defined in clause 18b.4.

NOTE 1: In figure 107b the "participating SwMI MM" is the group linking participating SwMI MM.

NOTE 2: In figure 107b the "controlling SwMI MM" is the group linking controlling SwMI MM.

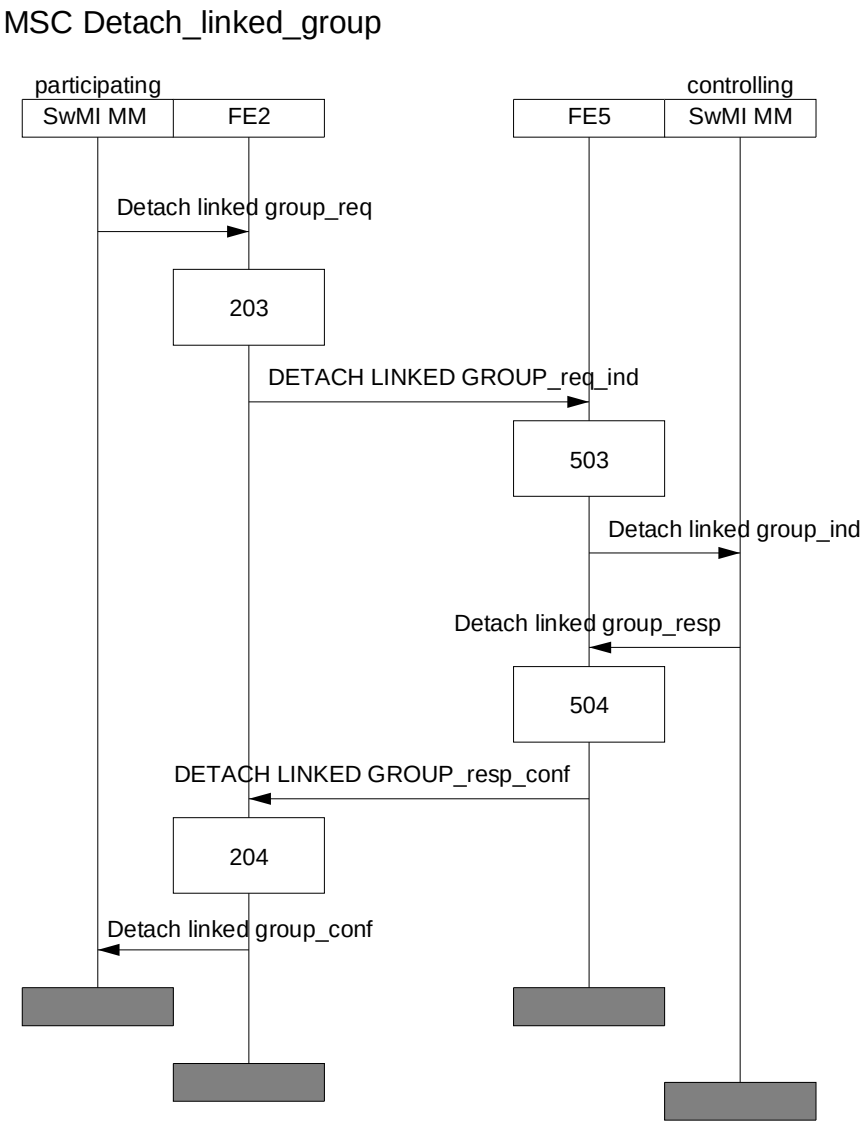


Figure 107b: Visited SwMI MM performed the last group detachment to a linked group in the linking participating SwMI

32a.2 Exceptional operation - attach linked group rejected by linking controlling SwMI

Figure 107c illustrates the information flow sequence for linking controlling SwMI rejection of the first group attachment to a linked group in a linking participating SwMI as defined in clause 18a.4.

NOTE 1: In figure 107c the "participating SwMI MM" is the group linking participating SwMI MM.

NOTE 2: In figure 107c the controlling SwMI MM is the group linking controlling SwMI MM.

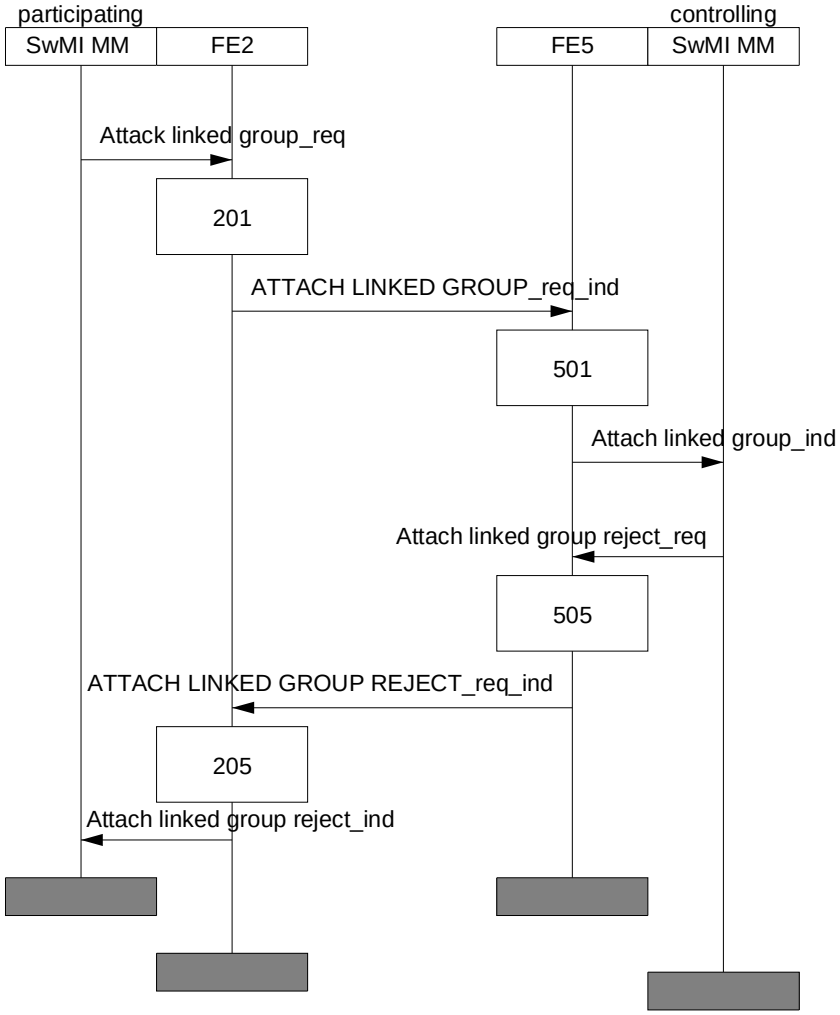


Figure 107c: Visited SwMI MM initiated first group attachment to a linked group in the linking participating SwMI, rejected by the linking controlling SwMI

32a.3 FE actions

32a.3.1 FE actions of FE2

201 Upon receipt of the Attach linked group_req containing the attached group and the linking controlling group FE2 shall send FE5 the ATTACH LINKED GROUP_req. The group home SwMI MM shall re-invoke the service until completed by either an ATTACH LINKED GROUP_conf or an ATTACH LINKED GROUP REJECT_ind.

202 Upon receipt of the ATTACH LINKED GROUP_conf indicating that the service have been successfully completed, FE2 shall send the group home SwMI MM the Attach linked group_conf.

203 Upon receipt of the Detach linked group_req containing the detached group and the linking controlling group FE2 shall send FE5 the DETACH LINKED GROUP_req. The group home SwMI MM shall re-invoke the service until successfully completed.

204 Upon receipt of the DETACH LINKED GROUP_conf indicating that the service have been successfully completed, FE2 shall send the group home SwMI MM the Detach linked group_conf.

205 Upon receipt of the ATTACH LINKED GROUP REJECT_ind indicating that the service have been rejected, FE2 shall send the group home SwMI MM the Attach linked group reject_ind.

32a.3.3 FE actions of FE5

501 Upon receipt of the ATTACH LINKED GROUP_ind with an attached group and a linking controlling group FE5 shall send controlling SwMI MM the Attach linked group_ind.

502 Upon receipt of the Attach linked group_resp containing the attached group and the linking controlling group FE5 shall send FE2/FE3 the ATTACH LINKED GROUP_resp.

503 Upon receipt of the DETACH LINKED GROUP_ind with an attached group and a linking controlling group FE5 shall send the controlling SwMI MM the Detach linked group_ind.

504 Upon receipt of the Detach linked group_resp containing the attached group and the linking controlling group FE5 shall send FE2/FE3 the DETACH LINKED GROUP_resp.

505 Upon receipt of Attach linked group reject_req containing the attached group FE5 shall send FE2/FE3 the ATTACH LINKED GROUP REJECT_req.

33 Definition of stage 2 information flows

33.0 General

The information flow definitions define the information exchange requirements between the FEs in support of the ANF-ISIMM services. Consequently, the information exchange requirements that are due to protocol aspects are not included in the information flows, but are defined in the stage 3 PDU descriptions.

In the tables listing the service elements in information flows, the column headed "_req_ind" or "_resp_conf" indicates which of these service elements are mandatory (M), conditional (C) and optional (O) in the information flows. It the element is conditional, a note specifies when the element is present and when omitted.

33.0a ATTACH LINKED GROUP

ATTACH LINKED GROUP_req_ind and ATTACH LINKED GROUP_resp_conf shall be used to request and indicate a group attachment to a linked group and respond to the request or indication, respectively.

Table 0a: ATTACH LINKED GROUP

Service element	_req_ind	_resp_conf
GSSI (of attached group)	M	M
MNI (of attached group)	M	M
GSSI (linking controlling group)	M	M
MNI (linking controlling group)	M	M
MNI of the visited SwMI MM	M	M
PISN number (visited SwMI)	O	O
Proprietary	O	O

33.0b ATTACH LINKED GROUP REJECT

ATTACH LINKED GROUP REJECT_req_ind shall be used to reject the linked group attachment.

Table 0b: ATTACH LINKED GROUP REJECT

Service element	_req_ind
GSSI (of attached group)	M
MNI (of attached group)	M
Attach linked group reject cause	M
PISN number (visited SwMI)	O
Proprietary	O

33.1 AUTHENTICATION DEMAND

AUTHENTICATION DEMAND_req_ind shall be used to request the authentication parameters.

The information flow shall be sent from FE3 to FE1.

Table 1: AUTHENTICATION DEMAND

Service element	_req_ind
ISSI	M
MNI of the subscriber	M
MNI of the visited SwMI MM	M
Proprietary	O

33.2 AUTHENTICATION RESPONSE

AUTHENTICATION RESPONSE_req_ind shall be used to provide the visited SwMI MM with the authentication parameters.

The information flow shall be sent from FE1 to FE3.

Table 2: AUTHENTICATION RESPONSE

Service element	_req_ind
ISSI	M
Session Key (KSv)	M
Random Seed (RS)	M
Session Key (KSv')	M
Validity time type (once, hours, days, weeks, no limit)	M
Validity time (1..32)	C (note)
Proprietary	O
NOTE: Information shall be present if the value of the Validity time type is "hours", "days" or "weeks".	

33.3 AUTHENTICATION RESULT

AUTHENTICATION RESULT_req_ind shall be used to report the successful outcome of the authentication.

The information flow shall be sent from FE3 to FE1.

Table 3: AUTHENTICATION RESULT

Service element	_req_ind
ISSI	M
Authentication type (Mutual/subscriber/home SwMI MM)	M
Original/Subsequent use of parameters	M
MNI of the subscriber	C (note)
MNI of the visited SwMI MM	C (note)
Proprietary	O
NOTE: The information element shall be included in the case of subsequent use of session authentication key parameters in the visited SwMI.	

33.4 AUTH REJECT

AUTH REJECT_req_ind shall be used to report the rejected authentication or to reject the invoked authentication service.

The information flow shall be sent from FE3 to FE1 or from FE1 to FE3.

Table 4: AUTH REJECT

Service element	_req_ind
ISSI	M
Authentication rejection cause	M
Original/Subsequent use of parameters	M
MNI of the subscriber	C (note)
MNI of the visited SwMI MM	C (note)
Proprietary	O
NOTE: The information element shall be included in the case of subsequent use of session authentication key parameters in the visited SwMI.	

33.5 DE-REGISTRATION

DE-REGISTRATION_req_ind and DE-REGISTRATION_resp_conf shall be used to invoke the de-registration service across the ISI and to report the successful outcome, respectively.

The information flows shall be sent from FE3 to FE1 or from FE1 to FE3.

Table 5: DE-REGISTRATION

Service element	_req_ind	_resp_conf
ISSI	M	M
MNI of the subscriber	M	-
MNI of the subscriber	M	-
De-registration type: Subs initiated; Visited SwMI MM detected; Home SwMI MM initiated.	M	-
Age stamp	M	-
Proprietary	O	O
NOTE: The element shall indicate the age of the de-registration.		

33.6 DE-REG REJECT

DE-REG REJECT_req_ind shall be used to reject the invoked de-registration service.

The information flow shall be sent from FE3 to FE1 or from FE1 to FE3.

Table 6: DE-REG REJECT

Service element	_req_ind
ISSI	M
De-registration rejection cause	M
Proprietary	O

33.6a DETACH LINKED GROUP

DETACH LINKED GROUP_req_ind and DETACH LINKED GROUP_resp_conf shall be used to request and indicate a group attachment to a linked group and respond to the request or indication, respectively.

Table 6a: DETACH LINKED GROUP

Service element	_req_ind	_resp_conf
GSSI (of attached group)	M	M
MNI (of attached group)	M	M
GSSI (linking controlling group)	M	M
MNI (linking controlling group)	M	M
MNI of the visited SwMI MM	M	M
PISN number (visited SwMI)	O	O
Proprietary	O	O

33.7 GROUP ATTACHMENT

GROUP ATTACHMENT_req_ind and GROUP ATTACHMENT_resp_conf shall be used to request and indicate a group attachment and respond to the request or indication, respectively.

Table 7: GROUP ATTACHMENT

Service element	_req_ind	_resp_conf
GSSI	M	M
MNI (of the group)	O	-
MNI (of the visited SwMI MM)	O	-
First/Subsequent group attachment	M	M
Home/Visited SwMI MM initiated	M	M
Profile exchange support	M	-
Subscriber information in group profile support	M	-
ISSI	M	M
MNI (individual subscriber)	O	O
Pre-defined profile set reference(s), preferred set/used set	O	O
Pre-defined profile set reference(s), acceptable set	O	-
Recovery	M	M
Age stamp	O	O
PISN number digits (of the visited SwMI MM)	O	-
PISN number digits (of the home SwMI MM)	-	O
Proprietary	O	O

33.8 GROUP ATT REJECT

GROUP ATT REJECT_req_ind shall be used to indicate the rejection of requested group attachment.

Table 8: GROUP ATT REJECT

Service element	_req_ind
GSSI	M
First/Subsequent group attachment	M
ISSI	M
MNI (individual subscriber)	O
Group attachment rejection cause	M
Recovery	M
Age stamp	O
Proprietary	O

33.9 GROUP DETACHMENT

GROUP DETACHMENT_req_ind and GROUP DETACHMENT_resp_conf shall be used to indicate the group detachment and respond to the indication, respectively.

Table 9: GROUP DETACHMENT

Service element	_req_ind	_resp_conf
GSSI	M	M
MNI (of the group)	M	-
MNI (of the visited SwMI MM)	M	-
Last/Not last group detachment	M	M
ISSI (detached from the group)	M	M
MNI (individual subscriber detached from the group)	O	O
Recovery (recovery/no recovery)	M	M
Age stamp	O	O
Proprietary	O	O

33.10 GROUP DET REJECT

GROUP DET REJECT_req_ind shall be used to indicate the rejection of requested group detachment.

Table 10: GROUP DET REJECT

Service element	_req_ind
GSSI	M
Last/Not last group detachment	M
ISSI	M
MNI (individual subscriber)	O
Group detachment rejection cause	M
Recovery	M
Age stamp	O
Proprietary	O

33.11 HMM RECOVERY

HMM RECOVERY_req_ind shall be sent to invoke the I-HMM and the G-HDR; HMM RECOVERY_resp_conf shall be sent to acknowledge the invocation.

The request/indication information flow shall be sent:

- in the case of I-HMM recovery, from FE1 to FE3; and
- in the case of G-HDR, from FE2 to FE3.

The response/confirm information flow shall be sent:

- in the case of I-HMM recovery, from FE3 to FE1; and
- in the case of G-HDR, from FE1 to FE3.

Table 11: HMM RECOVERY

Service element	_req_ind	_resp_conf
Recovery type (I-HMM or G-HDR)	M	M
MNI of the home SwMI MM	M	M
MNI of the visited SwMI MM	M	M
Proprietary	O	O

33.12 HMM RECOVERY COMPLETED

HMM RECOVERY COMPLETED_req_ind shall be used to report the completion of the I-HMM and the G-HDR.

The request/indication information flow shall be sent:

- in the case of I-VMM recovery, from FE1 to FE3; and
- in the case of G-VDR, from FE2 to FE3.

Table 12: HMM RECOVERY COMPLETED

Service element	_req_ind
Recovery type (ind. subscriber or group)	M
MNI of the home SwMI MM	M
MNI of the visited SwMI MM	M
Proprietary	O

33.13 HMM RECOVERY REJECT

HMM RECOVERY REJECT_req_ind shall be used to reject the I-HMM and the G-HDR.

The request/indication information flow shall be sent:

- in the case of I-HMM recovery, from FE3 to FE1; and
- in the case of G-HDR, from FE3 to FE2.

Table 13: HMM RECOVERY REJECT

Service element	_req_ind
Recovery type (ind. Subscriber or group)	M
MNI of the home SwMI MM	M
MNI of the visited SwMI MM	M
Recovery rejection cause	M
Proprietary	O

33.14 LINKING

Void.

Table 14: Void

33.15 LINKING COMMAND

Void.

Table 15: Void

33.16 LINKING REJECT

Void.

Table 16: Void

33.17 MIGRATION

MIGRATION_req_ind and MIGRATION_resp_conf shall be used to validate the individual subscriber's migration and to grant the requested migration, respectively.

The request/indication information flow shall be sent from FE3 to FE1; the response/confirm information flow shall be sent from FE1 to FE3.

Table 17: MIGRATION

Service element	_req_ind	_resp_conf
ISSI	M	M
MNI (of the individual subscriber)	M	-
MNI (of the visited SwMI MM)	M	-
Migration type	M	M
Restricted migration support	M	-
MNI (of the old visited SwMI MM)	-	O
Pre-defined profile set references	M	M
Profile exchange support	M	-
Group information in subscriber profile support	M	-
Authentication invocation	M	-
Recovery	M	M
Call restoration support	M	-
Age stamp	O	-
PISN number digits (of the visited SwMI MM)	O	-
PISN number digits (of the home SwMI MM)	-	O
Proprietary	O	O

33.18 MIGRATION REJECT

MIGRATION REJECT_req_ind and MIGRATION REJECT_resp_conf shall be used to reject the individual subscriber's migration and to acknowledge the rejection, respectively.

The request/indication information flow shall be sent from FE1 to FE3 or from FE3 to FE1; the response/confirm information flow shall be sent from FE1 to FE3.

Table 18: MIGRATION REJECT

Service element	_req_ind	_resp_conf
ISSI	M	M
Migration rejection cause	M	-
Recovery	M	M
MNI (of the individual subscriber)	O	-
Proprietary	O	O

33.19 OTAR-KEY DEMAND

OTAR-KEY DEMAND_req_ind shall be used to invoke the OTAR SCK delivery service across the ISI from the visited SwMI MM.

The information flow shall be sent from FE3 to FE1.

Table 19: OTAR-KEY DEMAND

Service element	_req_ind
ISSI	M
MNI of the subscriber	M
MNI of the visited SwMI MM	M
SCKN(s)	M
Proprietary	O

33.20 OTAR-KEY PROVIDE

OTAR-KEY PROVIDE_req_ind shall be used to convey the requested OTAR SCK delivery service parameters or to invoke the service across the ISI from the home SwMI MM.

The information flow shall be sent from FE3 to FE1 or from FE1 to FE3.

Table 20: OTAR-KEY PROVIDE

Service element	_req_ind
ISSI	M
RSO	M
SCKN(s)	M (note 1)
SCK-VN(s)	M (note 1)
SSCK(s)	M (note 1)
Home/Visited SwMI MM initiated	M
MNI of the subscriber	C (note 2)
MNI of the visited SwMI MM	C (note 2)
Proprietary	O
NOTE 1: One SCKN, SCK-VN and SSCK shall form a set. NOTE 2: The information shall be present if the OTAR SCK delivery service is invoked by the home SwMI MM.	

33.21 OTAR-KEY REJECT

OTAR-KEY REJECT_req_ind shall be used to reject the invoked OTAR SCK delivery service or to report the unsuccessful outcome of the OTAR SCK delivery service in the visited SwMI.

The information flow shall be sent from FE3 to FE1 or from FE1 to FE3.

Table 21: OTAR-KEY REJECT

Service element	_req_ind
ISSI	M
OTAR SCK key rejection cause	M
Proprietary	O

33.22 OTAR-KEY RESULT

OTAR-KEY PROVIDE_req_ind shall be used to report the successful outcome of the OTAR SCK delivery service.

The information flow shall be sent from FE3 to FE1.

Table 22: OTAR-KEY RESULT

Service element	_req_ind
ISSI	M
SCK number and result	M (note)
Proprietary	O
NOTE: The element may be repeated.	

33.23 OTAR-PARAM DEMAND

OTAR- PARAM DEMAND_req_ind shall be used to invoke the OTAR SCK generation service across the ISI.

The information flow shall be sent from FE3 to FE1.

Table 23: OTAR-PARAM DEMAND

Service element	_req_ind
ISSI of the subscriber	M
MNI of the subscriber	M
MNI of the visited SwMI MM	M
Proprietary	O

33.24 OTAR-PARAM PROVIDE

OTAR-KEY PARAM_req_ind shall be used to convey the OTAR SCK generation service parameters.

The information flow shall be sent from FE1 to FE3.

Table 24: OTAR-PARAM PROVIDE

Service element	_req_ind
ISSI	M
KSOv	M
RSO	M
Validity time (once, hours, days, weeks, no limit)	M
Proprietary	O

33.25 OTAR-PARAM REJECT

OTAR- PARAM REJECT_req_ind shall be used to reject the invoked OTAR SCK generation service or to report the unsuccessful outcome of the OTAR SCK generation service in the visited SwMI.

The information flow shall be sent from FE1 to FE3 or from FE3 to FE1.

Table 25: OTAR-PARAM REJECT

Service element	_req_ind
ISSI	M
OTAR SCK parameter rejection cause	M
SCK number (SCKN)	M
Original/Subsequent use of parameters	M
MNI of the subscriber	C (note)
MNI of the visited SwMI MM	C (note)
Proprietary	O
NOTE: The information element shall be included in the case of subsequent use of OTAR SCK generation parameters in the visited SwMI.	

33.26 OTAR-PARAM RESULT

OTAR- PARAM PROVIDE_req_ind shall be used to report the successful outcome of the OTAR SCK generation service.

The information flow shall be sent from FE3 to FE1.

Table 26: OTAR-PARAM RESULT

Service element	_req_ind
ISSI	M
SCK number (SCKN)	M
Original/Subsequent use of parameters	M
MNI of the subscriber	C (note)
MNI of the visited SwMI MM	C (note)
Proprietary	O
NOTE: The information element shall be included in the case of subsequent use of OTAR SCK generation parameters in the visited SwMI.	

33.27 PROFILE REJECT

PROFILE REJECT_req_ind shall be used to reject the profile update.

The flow shall be sent from FE3 to FE1 or from FE3 to FE2.

Table 27: PROFILE REJECT

Service element	_req_ind
ISSI or GSSI	M
Profile rejection cause	M
Recovery (recovery/no recovery)	M
Proprietary	O

33.28 PROFILE UPDATE

PROFILE UPDATE_req_ind and PROFILE UPDATE_resp_conf shall be used to invoke the profile update service across the ISI and to report the successful outcome of the service, respectively.

The request/indication information flow shall be sent from FE1 to FE3 or from FE2 to FE3; the response/confirm information flow shall be sent from FE3 to FE1 or from FE3 to FE2.

Table 28: PROFILE UPDATE

Service element	_req_ind	_resp_conf
SSI (ISSI or GSSI)	M	M
MNI (of the ind. subscriber or of the group)	O	-
MNI (of the visited SwMI MM)	O	-
Profile type (individual subscriber/group)	M	M
Basic migration profile (original)	M	-
Basic migration profile info	-	M
Basic migration profile (temporary)	-	C (note)
SS-profile update indicator	M	-
Recovery (recovery/no recovery)	M	M
Proprietary	O	O
NOTE: The information shall be present if the value of the "Basic migration profile info" is "Redefined by the visited SwMI MM", otherwise the element shall be omitted.		

33.29 REMOTE UNLINKING

Void.

Table 29: Void

33.30 REMOVE REJECT

REMOVE REJECT_req_ind shall be used to reject the invoked RSI service.

The flow shall be sent from FE3 to FE1.

Table 30: REMOVE REJECT

Service element	_req_ind
ISSI	M
MNI (of the subscriber)	M
RSI rejection cause	M
Recovery	M
Proprietary	O

33.31 REMOVE SUBS

REMOVE SUBS_req_ind and REMOVE SUBS_resp_conf shall be used to invoke the RSI service across the ISI and to report the successful outcome of the service, respectively.

The request/indication information flow shall be sent from FE1 to FE3; the response/confirm information flow shall be sent from FE3 to FE1.

Table 31: REMOVE SUBS

Service element	_req_ind	_resp_conf
ISSI	M	M
MNI (of the subscriber)	M	M
MNI (of the previous visited SwMI MM)	M	-
Migration type	M	-
Call restoration support (of the visited SwMI)	M	-
Forced removal	O	-
MNI (of the visited SwMI)	C (note 1)	-
PISN number (of the visited SwMI MM)	C (note 1)	-
Recovery	M	M
Age stamp	C (note 2)	-
Proprietary	O	O
NOTE 1: The element shall be present if the Migration type is either Migration with call restoration or Restricted migration with call restoration and if the Call restoration support (of the visited SwMI MM) is Supported. NOTE 2: The element shall be included if the age of the recorded migration is not zero.		

33.32 SS-PROFILE REJECT

SS-PROFILE REJECT_req_ind shall be used to reject the invoked SS-profile update service.

The flow shall be sent from FE3 to FE1 or from FE3 to FE2.

Table 32: SS-PROFILE REJECT

Service element	_req_ind
ISSI or GSSI	M
SS-profile rejection cause	M
Recovery (recovery/no recovery)	M
Proprietary	O

33.33 SS-PROFILE UPDATE

SS-PROFILE UPDATE_req_ind and SS-PROFILE UPDATE_resp_conf shall be used to invoke the SS-profile update service across the ISI and to report the successful outcome of the service, respectively.

The request/indication information flow shall be sent from FE1 to FE3 or from FE2 to FE3; the response/confirm information flow shall be sent from FE3 to FE1 or from FE3 to FE2.

Table 33: SS-PROFILE UPDATE

Service element	_req_ind	_resp_conf
ISSI or GSSI	M	M
MNI (of the ind. subscriber or of the group)	O	-
MNI (of the visited SwMI MM)	O	-
Profile type (individual subscriber/group)	M	M
Recovery (recovery/no recovery)	M	M
SS-migration profile(s) (original)	M	-
Not supported SSs	-	C
Temporary SS-migration profile info	-	O (note)
Proprietary	O	O
NOTE: The element may be repeated; one element shall contain information on one temporary SS-migration profile.		

33.34 UNLINKING

Void.

Table 34: Void

33.35 UNLINKING REJECT

Void.

Table 35: Void

33.36 VMM RECOVERY

VMM RECOVERY_req_ind shall be sent to invoke the I-VMM and the G-VDR; VMM RECOVERY_resp_conf shall be sent to acknowledge the invocation.

The request/indication information flow shall be sent:

- in the case of I-VMM recovery, from FE1 to FE3; and
- in the case of G-VDR, from FE2 to FE3.

The response/confirm information flow shall be sent:

- in the case of I-VMM recovery, from FE3 to FE1; and
- in the case of G-VDR, from FE1 to FE3.

Table 36: VMM RECOVERY

Service element	_req_ind	_resp_conf
Recovery type (I-VMM or G-VDR)	M	-
MNI of the visited SwMI MM	M	M
MNI of the home SwMI MM	M	M
Proprietary	O	O

33.37 VMM RECOVERY COMPLETED

VMM RECOVERY COMPLETED_req_ind shall be used to report the completion of the I-VMM and the G-VDR.

The request/indication information flow shall be sent:

- in the case of I-VMM recovery, from FE1 to FE3; and
- in the case of G-VDR, from FE2 to FE3.

Table 37: VMM RECOVERY COMPLETED

Service element	_req_ind
Recovery type (I-VMM or G-VDR)	M
MNI of the visited SwMI MM	M
MNI of the home SwMI MM	M
Proprietary	O

33.38 VMM RECOVERY REJECT

VMM RECOVERY REJECT_req_ind shall be used to reject the I-VMM and the G-VDR.

The request/indication information flow shall be sent:

- in the case of I-VMM recovery, from FE1 to FE3; and
- in the case of G-VDR, from FE2 to FE3.

Table 38: VMM RECOVERY REJECT

Service element	_req_ind
Recovery type (ind. subscriber or group)	M
MNI of the visited SwMI MM	M
MNI of the home SwMI MM	M
Recovery rejection cause	M
Proprietary	O

33.39 Profiles

33.39.0 General

In the tables listing the information elements of the profile, the columns headed "Request/Indication" and "Response/Confirmation" indicate which of these information elements are Mandatory (M), which are Optional (O), which are Conditional (C), and which are not used (-) in the request or response information flow.

33.39.1 Basic migration profiles

33.39.1.1 Group basic migration profile (original and temporary)

Table 39 defines the contents of a basic migration profile (original and temporary) for group.

Table 39: Group basic migration profile (original and temporary)

Information element	Request/Indication	Response/Confirmation
Profile status	M	M
Point-to-multipoint service	M	M
Point-to-multipoint acknowledged service	M	M
Point-to-multipoint broadcast service	M	M
Speech service	M	M
Circuit mode unprotected data service	M	M
Circuit mode protected (low) data service	M	M
Circuit mode protected (high) data	M	M

Interleaving depth	M	M
IP service	M	M
AI encryption state list	M	-
AI encryption state	-	M
End-to-end encryption service	M	M
Group attachment/detachment	M	M
Number of SS-information	M	M
SS information SS type (note 2) SS status (note 2)	C (note 1) M M	-
SS information response SS type (note 3) SS response status (note 3)	-	C (note 1) M M
Default SS information	M	M
SDS profile Pre-defined short message User defined short message User defined Data 1 User defined Data 2 User defined Data 3 User defined Data 4	O M M M M M M	O
Maximum number of timeslots	O	O
Call time-out timer (T310)	O	O
Call time-out set-up phase timer (T301)	O	O
Group priority	O	-
Subscriber information ITSI GTSI Subscriber status Class of usage Proprietary	O (repeatable) M O M M O	-
Subscriber information in group profile not supported	-	O
Proprietary	O	O

NOTE 1: The element shall appear as many times as indicated by the element "Number of SS-information".

NOTE 2: The information element shall refer to a given supplementary service. The SS type field shall indicate to which supplementary service the information element refers, the status shall assume the following values:

- **supported with SS-migration profile:** This value downloaded from home SwMI to the visited SwMI indicates that the given supplementary service shall be applied to the subscriber in the visited SwMI. The corresponding original SS-migration profile will be sent to the visited SwMI.
- **supported without SS-migration profile:** This value downloaded from home SwMI to the visited SwMI indicates that the given supplementary service shall be applied to the subscriber in the visited SwMI. No original SS-migration profile will be sent to the visited SwMI for the supplementary service.
- **not supported:** This value indicates that the home SwMI requests the supplementary service not to be supported for the subscriber in the visited SwMI.

This information element shall be repeatable. If the receiving SwMI does not understand the type of a given SS, it shall ignore the SS-information. It shall be used only in profile replacement or update.

NOTE 3: The information element shall refer to a given supplementary service. The SS type field shall indicate to which supplementary service the information element refers, the response status shall assume the following values:

- **not subscribed:** This value indicate that the given supplementary service is not supported by the visited SwMI to the user.
- **subscribed:** This value indicate that the given supplementary service is supported by the visited SwMI to the user.

This information element shall be repeatable. It shall be used only in profile response.

33.39.1.2 Individual basic migration profile

Table 40 defines the contents of the basic migration profile for an individual subscriber.

Table 40: Individual basic migration profile

Information element	Request/Indication	Response/Confirmation
Profile status	M	M
Point-to-point service	M	M
Point-to-multipoint service	M	M
Point-to-multipoint acknowledged service	M	M
Point-to-multipoint broadcast service	M	M
Speech service	M	M
Circuit mode unprotected data service	M	M
Circuit mode protected (low) data service	M	M
Circuit mode protected (high) data service	M	M
Interleaving depth	M	M
Duplex service	M	M
IP service	M	M
Authentication service	M	M
OTAR SCK generation service	M	M
OTAR SCK delivery service	M	M
AI encryption state list	M	-
AI encryption state	-	M
End-to-end encryption service	M	M
Number of SS-information	M	M
SS-information SS type (note 2) SS status (note 2)	C (note 1) M M	-
SS-information response SS type (note 3) SS response status (note 3)	-	C (note 1) M M
Default SS-information	O	O
SDS profile Pre-defined short message User defined short message User defined Data 1 User defined Data 2 User defined Data 3 User defined Data 4	O M M M M M M	O
Advanced link service	O	O
Maximum number of timeslots	O	O
Call time-out timer (T310)	O	O
Call time-out set-up phase timer (T301)	O	O

Information element	Request/Indication	Response/Confirmation
Group information	O (repeatable)	O (repeatable)
GTSI	M	M
Subscriber status	M	M
Class of usage	M	M
Proprietary	O	O
Proprietary	O	O

NOTE 1: The element shall appear as many times as indicated by the element "Number of SS-information".

NOTE 2: The information element shall refer to a given supplementary service. The SS type field shall indicate to which supplementary service the information element refers, the status shall assume the following values:

- **supported with SS-migration profile:** This value downloaded from home SwMI to the visited SwMI indicates that the given supplementary service shall be applied to the subscriber in the visited SwMI. The corresponding original SS-migration profile will be sent to the visited SwMI.
- **supported without SS-migration profile:** This value downloaded from home SwMI to the visited SwMI indicates that the given supplementary service shall be applied to the subscriber in the visited SwMI. No original SS-migration profile will be sent to the visited SwMI for the supplementary service.
- **not supported:** This value indicates that the home SwMI requests the supplementary service not to be supported for the subscriber in the visited SwMI.

This information element shall be repeatable. If the receiving SwMI does not understand the type of a given SS, it shall ignore the SS-information. It shall be used only in profile replacement or update.

NOTE 3: The information element shall refer to a given supplementary service. The SS type field shall indicate to which supplementary service the information element refers, the response status shall assume the following values:

- **not subscribed:** This value indicate that the given supplementary service is not supported by the visited SwMI to the user.
- **subscribed:** This value indicate that the given supplementary service is supported by the visited SwMI to the user.

This information element shall be repeatable. It shall be used only in profile response.

33.39.2 SS-migration profile (original and temporary)

Table 41 defines the contents of the SS-migration profile (original and temporary) for an individual subscriber or a group.

Table 41: SS-migration profile (original and temporary)

Information element	Request/Indication	Response/Confirmation
SS-type	M	M
Profile status	M	M
SS-ISI-PROFILE (original) (note)	O	-
SS type	M	
SS parameters	M	
SS-ISI-PROFILE (temporary) (note)	-	O
SS type		C
SS parameters		C

NOTE: The contents and use of the Original and Temporary SS-ISI-PROFILEs of each supplementary service shall be defined as part of the supplementary service description, see ETSI EN/ETS 300 392-12 [4].

33.39.3 Relation between subscribers and group

There are two modes to relate subscribers and group over ISI:

- include "Group information" in subscriber profiles; or
- include "Subscriber information" in group profiles.

It is mandatory to support at least one of the two modes. These information elements shall be repeatable. The list of information might not be complete, i.e. only a part of a user's group membership or a group's member might be sent. The visited SwMI may discard information on user-group relations if it finds it unsuitable.

The visited SwMI shall indicate if it supports the respective mode as part of the respective location update and group attachment messages, in order to avoid the sending of unusable information.

If also the group home SwMI supports the same mode as the visited SwMI, it may send information on user-group relations in this mode. In this case, explicit GROUP_ATTACHMENT_req_ind shall be issued to the group home SwMI MM at every group attachment regardless of the type of the individual subscriber, e.g. even if the individual subscriber is not an important member of the group and exchange of group attachments are requested over the ISI for that group for important members only.

34 ANF-ISIMM encoding requirements - stage 3

34.0 Introduction

This clause starts the ANF-ISIMM stage 3 description. The stage 3 description defines the protocol aspects of the services. This clause defines the structure and the encoding of the ANF-ISIMM PDUs and their information elements; the following clause defines the ANF-ISIMM protocol using the SDL conventions and the procedures referred in the SDL descriptions; the last clause defines the ANF-ISIMM specific additions of the ISI GFP.

34.1 ANF-ISIMM PDU description tables

34.1.0 General

Clauses 34.1.0a to 34.1.51 define the ANF-ISIMM PDUs that shall be used for the ANF-ISIMM protocol. The general encoding rules defined for MM PDUs, see ETSI EN 300 392-2 [1], clause 16, shall be applicable for the ANF-ISIMM PDUs. In addition, when a constant length information element is conditional on a type 1 or type 2 information element, then that element is of type 1 and there is no preceding P-bit linked to that element.

NOTE 1: The conditional type 1 element can be also after a type 2 element and the type only defines the PDU encoding not the optionality of the information element.

In the present document some optional information elements are encoded by using a generic identifier "Following conditional element(s) present" followed by the conditional information elements as presented in table 41a. This method is equivalent to type 2 optional information elements, but allows to put optional information elements to any position in the PDU in contrast to type 2 information elements that need to the after all type 1 information elements.

In the first instance in the table 41a there are two conditional information elements conditional on the "Following conditional element(s) present" information element and in the second instance a single one.

NOTE 2: Multiple "Following conditional element(s) present" information elements in a PDU are independent of each other and affect only to the conditional information elements immediately following each one although the same name is used.

Table 41a: Optional information element encoding option

Information element	Length	Type	C/O/M	Remark
Some information element 1	n1	1	M	
etc.	etc.	etc.	etc.	
Some information element 2	n2	1	M	
Following conditional element(s) present	1	1	M	First instance
Conditional information element 1	n3	1	C	note 1
Conditional information element 2	n4	1	C	note 1
Some information element 3	n5	1	M	
etc.	etc.	etc.	etc.	
Some information element 4	n6	1	M	
Following conditional element(s) present	1	1	M	Second instance
Conditional information element 3	n7	1	C	note 2
Some information element 5	n8	1	M	
etc.	etc.	etc.	etc.	
NOTE 1: The information element shall be present if the value of the immediately preceding "Following conditional element(s) present" information element (the first instance) is "Present", otherwise the information element shall be omitted. NOTE 2: The information element shall be present if the value of the immediately preceding "Following conditional element(s) present" information element (the second instance) is "Present", otherwise the information element shall be omitted.				

Each ANF-ISIMM PDU shall correspond to the information flow having the same name, defined in clause 5, except that "_req_ind" is omitted from the PDU name and "_resp_conf" is replaced by "RESPONSE" in the PDU name.

34.1.0a ATTACH LINKED GROUP

The PDU shall be used to invoke the attach linked group service.

Direction: Group linking participating SwMI to group linking controlling SwMI

Response to: none

Response expected: ATTACH LINKED GROUP RESPONSE or ATTACH LINKED GROUP REJECT

Table 41b: ATTACH LINKED GROUP

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI (of attached group)	24	1	M	
MNI (of attached group)	24	1	M	
GSSI (linking controlling group)	24	1	M	
MNI (linking controlling group)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
PISN number length (of the visited SwMI MM)	5	2	O	See note 1
PISN number (of the visited SwMI MM)	4	1	C	See note 2
Proprietary		3	O	
NOTE 1: The information element coding shall be as for External subscriber number length, see ETSI EN 300 392-2 [1], clause 16.3.3.2.5. NOTE 2: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.				

34.1.0b ATTACH LINKED GROUP RESPONSE

The PDU shall be used to report a successful outcome of the attach linked group request.

Direction: Group linking controlling SwMI to group linking participating SwMI

Response to: ATTACH LINKED GROUP

Response expected: none

Table 41c: ATTACH LINKED GROUP

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI (of attached group)	24	1	M	
MNI (of attached group)	24	1	M	
GSSI (linking controlling group)	24	1	M	
MNI (linking controlling group)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
PISN number length (of the visited SwMI MM)	5	2	O	See note 1
PISN number (of the visited SwMI MM)	4	1	C	See note 2
Proprietary		3	O	
NOTE 1: The information element coding shall be as for External subscriber number length, see ETSI EN 300 392-2 [1], clause 16.3.3.2.5. NOTE 2: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.				

34.1.0c ATTACH LINKED GROUP REJECT

The PDU shall be used to report a rejection of the attach linked group request.

Direction: Group linking controlling SwMI to group linking participating SwMI

Response to: ATTACH LINKED GROUP

Response expected: none

Table 41d: ATTACH LINKED GROUP

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI (of attached group)	24	1	M	
MNI (of attached group)	24	1	M	
Attach linked group rejection cause	4	1	M	
MNI (of the visited SwMI MM)	24	1	M	
PISN number length (of the visited SwMI MM)	5	2	O	See note 1
PISN number (of the visited SwMI MM)	4	1	C	See note 2
Proprietary		3	O	
NOTE 1: The information element coding shall be as for External subscriber number length, see ETSI EN 300 392-2 [1], clause 16.3.3.2.5. NOTE 2: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.				

34.1.1 AUTHENTICATION DEMAND

The PDU shall be used to request the authentication parameters.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: AUTHENTICATION RESPONSE

Table 42: AUTHENTICATION DEMAND

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.2 AUTHENTICATION RESPONSE

The PDU shall be used to provide the visited SwMI MM with the authentication parameters.

Direction: home SwMI MM to visited SwMI MM

Response to: AUTHENTICATION DEMAND

Response expected: AUTHENTICATION RESULT or none

Table 43: AUTHENTICATION RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Session Key (KSv)	128	1	M	note 1
Random Seed (RS)	80	1	M	note 1
Session Key (KSv')	128	1	M	note 1
Validity time type	3	1	M	
Validity time	5	1	C	note 2
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: The information element shall be conditional on Validity time type: - Hours, Days, Weeks: present; - Once, No limit: not present.				

34.1.3 AUTHENTICATION RESULT

The PDU shall be used to report the successful outcome of the authentication.

Direction: visited SwMI MM to home SwMI MM

Response to: AUTHENTICATION RESPONSE

Response expected: none

Table 44: AUTHENTICATION RESULT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Authentication type	2	1	M	
Original/Subsequent use of parameters	1	1	M	
MNI (of the subscriber)	24	1	C	note
MNI (of the visited SwMI MM)	24	1	C	note
Proprietary		3	O	
NOTE: The information element shall be present if "Original/Subsequent use of parameters". has the value "Subsequent use", otherwise the element is omitted.				

34.1.4 AUTH REJECT

The PDU shall be used to report the rejected authentication or to reject the invoked authentication service.

Direction: visited SwMI MM to home SwMI MM or home SwMI MM to visited SwMI MM

Response to: AUTHENTICATION DEMAND or AUTHENTICATION RESPONSE

Response expected: none

Table 45: AUTH REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Authentication rejection cause	4	1	M	
Original/Subsequent use of parameters	1	1	M	note 1
MNI (of the subscriber)	24	1	C	note 2
MNI (of the visited SwMI MM)	24	1	C	note 2
Proprietary		3	O	
NOTE 1: The element shall define original/subsequent use of parameters if the Authentication rejection cause information element has the value "ITSI authentication failed", "SwMI authentication failed" or "SwMI and ITSI authentication failed", otherwise the information element shall be set to value "Original". NOTE 2: The information element shall be present if "Original/Subsequent use of parameters" information element has the value "Subsequent use", otherwise the information element shall be omitted.				

34.1.5 DE-REGISTRATION

The PDU shall be used to invoke the de-registration service across the ISI.

Direction: visited SwMI MM to home SwMI MM or home SwMI MM to visited SwMI MM

Response to: none

Response expected: DE-REGISTRATION RESPONSE or DE-REG REJECT

Table 46: DE-REGISTRATION

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
De-registration type	2	1	M	
Age stamp	16	1	M	
Proprietary		3	O	

34.1.6 DE-REGISTRATION RESPONSE

The PDU shall be used to report the successful outcome.

Direction: visited SwMI MM to home SwMI MM and home SwMI MM to visited SwMI MM

Response to: DE-REGISTRATION

Response expected: none

Table 47: DE-REGISTRATION RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Proprietary		3	O	

34.1.7 DE-REG REJECT

The PDU shall be used to report the rejected authentication or to reject the invoked authentication service.

Direction: visited SwMI MM to home SwMI MM and home SwMI MM to visited SwMI MM

Response to: DE-REGISTRATION

Response expected: none

Table 48: DE-REG REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
De-registration rejection cause	3	1	M	
Proprietary		3	O	

34.1.7a DETACH LINKED GROUP

The PDU shall be used to inform about the detach linked group service.

Direction: Group linking participating SwMI to group linking controlling SwMI

Response to: none

Response expected: DETACH LINKED GROUP RESPONSE or nothing

Table 48a: DETACH LINKED GROUP

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI (of attached group)	24	1	M	
MNI (of attached group)	24	1	M	
GSSI (linking controlling group)	24	1	M	
MNI (linking controlling group)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
PISN number length (of the visited SwMI MM)	5	2	O	See note 1
PISN number (of the visited SwMI MM)	4	1	C	See note 2
Proprietary		3	O	
NOTE 1: The information element coding shall be as for External subscriber number length, see ETSI EN 300 392-2 [1], clause 16.3.3.2.5. NOTE 2: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108				

34.1.7b DETACH LINKED GROUP RESPONSE

The PDU shall be used to report the outcome of the detach linked group service.

Direction: Group linking controlling SwMI to group linking participating SwMI

Response to: DETACH LINKED GROUP

Response expected: none

Table 48b: DETACH LINKED GROUP RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI (of attached group)	24	1	M	
MNI (of attached group)	24	1	M	
GSSI (linking controlling group)	24	1	M	
MNI (linking controlling group)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
PISN number length (of the visited SwMI MM)	5	2	O	See note 1
PISN number (of the visited SwMI MM)	4	1	C	See note 2
Proprietary		3	O	
NOTE 1: The information element coding shall be as for External subscriber number length, see ETSI EN 300 392-2 [1], clause 16.3.3.2.5. NOTE 2: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108				

34.1.8 GROUP ATTACHMENT

The PDU shall be used to request group attachment.

Direction: visited SwMI MM to group home SwMI MM and group home SwMI MM to visited SwMI MM

Response to: none

Response expected: GROUP ATTACHMENT RESPONSE or GROUP ATT REJECT

Table 49: GROUP ATTACHMENT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the group)	24	1	C	See note 1
MNI (of the visited SwMI MM)	24	1	C	See note 1
First/Subsequent group attachment	1	1	M	
Home/Visited SwMI MM initiated	1	1	M	
Profile exchange support	1	1	M	See note 2
Subscriber information in group profile	1	1	M	See note 2
ISSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the individual subscriber)	24	1	C	See note 1
Following conditional element(s) present	1	1	M	
Pre-defined profile set reference(s), preferred set	16	1	C	See note 1
Following conditional element(s) present	1	1	M	
Pre-defined profile set reference(s), acceptable sets	16	1	C	See note 1
Recovery	1	1	M	
Age stamp	16	2	O	
PISN number length (of the visited SwMI MM)	5	2	O	See note 3
PISN number digits (of the visited SwMI MM)	4	1	C	See note 4
Proprietary		3	O	

NOTE 1: The information element shall be present if the value of the immediately preceding "Following conditional element(s) present" information element is "Present", otherwise the element shall be omitted.

NOTE 2: The information element shall define its value, if the value of the First/Subsequent group attachment information element is "First group attachment" and if the value of the "Home/visited SwMI MM initiated" information element is "Visited SwMI MM initiated", otherwise the information element shall be set to "Not supported" and discarded at reception.

NOTE 3: The information element coding shall be as for External subscriber number length, see ETSI EN 300 392-2 [1], clause 16.3.3.2.5.

NOTE 4: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.

34.1.9 GROUP ATTACHMENT RESPONSE

The PDU shall be used to acknowledge the group attachment request.

Direction: visited SwMI MM to group home SwMI MM and group home SwMI MM to visited SwMI MM

Response to: GROUP ATTACHMENT

Response expected: none

Table 50: GROUP ATTACHMENT RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI	24	1	M	
First/Subsequent group attachment	1	1	M	
Home/Visited SwMI MM initiated	1	1	M	
ISSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the individual subscriber)	24	1	C	note
Following conditional element(s) present	1	1	M	
Pre-defined profile set reference, used set	16	1	C	note
Recovery	1	1	M	
Age stamp	16	2	O	
Proprietary		3	O	
NOTE: The information element shall be present if the value of preceding "Following conditional element(s) present" information element is "Present", otherwise the information element shall be omitted.				

34.1.10 GROUP ATT REJECT

The PDU shall be used to acknowledge the group attachment request.

Direction: visited SwMI MM to group home SwMI MM and group home SwMI MM to visited SwMI MM

Response to: GROUP ATTACHMENT

Response expected: none

Table 51: GROUP ATT REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI	24	1	M	
First/Subsequent group attachment	1	1	M	
ISSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the individual subscriber)	24	1	C	note
Group attachment rejection cause	4	1	M	
Recovery	1	1	M	
Age stamp	16	1	O	
Proprietary		3	O	
NOTE: The information element shall be present if the value of preceding "Following conditional element(s) present" information element is "Present", otherwise the information element shall be omitted.				

34.1.11 GROUP DETACHMENT

The PDU shall be used to request group detachment.

Direction: visited SwMI MM to home group SwMI MM and group home SwMI MM to visited SwMI MM

Response to: none

Response expected: GROUP DETACHMENT RESPONSE or GROUP DET REJECT

Table 52: GROUP DETACHMENT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI	24	1	M	
MNI (of the group)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
Last/Not last group detachment	1	1	M	
ISSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the individual subscriber)	24	1	C	note
Recovery	1	1	M	
Age stamp	16	2	O	
Proprietary		3	O	
NOTE: The information element shall be present if the value of preceding "Following conditional element(s) present" information element is "Present", otherwise the information element shall be omitted.				

34.1.12 GROUP DETACHMENT RESPONSE

The PDU shall be used to acknowledge the group detachment request.

Direction: visited SwMI MM to group home SwMI MM and group home SwMI MM to visited SwMI MM

Response to: GROUP DETACHMENT

Response expected: none

Table 53: GROUP DETACHMENT RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI	24	1	M	
Last/Not last group detachment	1	1	M	
ISSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the individual subscriber)	24	1	C	note
Recovery	1	1	M	
Age stamp	16	2	O	
Proprietary		3	O	
NOTE: The information element shall be present if the value of preceding "Following conditional element(s) present" information element is "Present", otherwise the information element shall be omitted.				

34.1.13 GROUP DET REJECT

The PDU shall be used to acknowledge the group attachment request.

Direction: visited SwMI MM to group home SwMI MM and group home SwMI MM to visited SwMI MM

Response to: GROUP DETACHMENT

Response expected: none

Table 54: GROUP DET REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
GSSI	24	1	M	
Last/Not last group detachment	1	1	M	
ISSI	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the individual subscriber)	24	1	C	note
Group detachment rejection cause	4	1	M	
Recovery	1	1	M	
Age stamp	16	2	O	
Proprietary		3	O	
NOTE: The information element shall be present if the value of preceding "Following conditional element(s) present" information element is "Present", otherwise the information element shall be omitted.				

34.1.14 HMM RECOVERY

The PDU shall be used to invoke the HMM recovery across the ISI.

Direction: home SwMI MM to visited SwMI MM

Response to: none

Response expected: HMM RECOVERY RESPONSE or HMM RECOVERY REJECT

Table 55: HMM RECOVERY

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (home SwMI MM)	24	1	M	
MNI (visited SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.15 HMM RECOVERY COMPLETED

The PDU shall be used to report the completion of the HMM recovery.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: none

Table 56: HMM RECOVERY COMPLETED

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (home SwMI MM)	24	1	M	
MNI (visited SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.16 HMM RECOVERY REJECT

The PDU shall be used to reject the requested HMM recovery.

Direction: visited SwMI MM to home SwMI MM

Response to: HMM RECOVERY

Response expected: none

Table 57: HMM RECOVERY REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (home SwMI MM)	24	1	M	
MNI (visited SwMI MM)	24	1	M	
Recovery rejection cause	2	1	M	
Proprietary		3	O	

34.1.17 HMM RECOVERY RESPONSE

The PDU shall be used to acknowledge the HMM recovery invocation.

Direction: visited SwMI MM to home SwMI MM

Response to: HMM RECOVERY

Response expected: none

Table 58: HMM RECOVERY RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (home SwMI MM)	24	1	M	
MNI (visited SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.18 LINKING

Void.

Table 59: Void

34.1.19 LINKING COMMAND

Void.

Table 60: Void

34.1.20 LINKING COMMAND RESPONSE

Void.

Table 61: Void

34.1.21 LINKING REJECT

Void.

Table 62: Void

34.1.22 LINKING RESPONSE

Void.

Table 63: Void

34.1.23 MIGRATION

The PDU shall be used to validate the individual subscriber's migration.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: MIGRATION RESPONSE or MIGRATION REJECT

Table 64: MIGRATION

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the individual subscriber)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
Migration type	2	1	M	
Restricted migration support	1	1	M	
Pre-defined profile set reference(s)	16	1	M	supported sets
Profile exchange support	1	1	M	
Group information in subscriber profile	1	1	M	
Authentication invocation	1	1	M	
Recovery	1	1	M	
Call restoration support	1	1	M	note 1
Age stamp	16	2	O	
PISN number length (of the visited SwMI MM)	5	2	O	note 2
PISN number digits (of the visited SwMI MM)	4	1	C	note 3
Proprietary		3	O	
NOTE 1: The information element shall indicate the call restoration support when the Migration type is either "Migration with call restoration" or "Restricted migration with call restoration", otherwise it shall be set to "Not supported" and discarded at reception. NOTE 2: The information element shall indicate how many PISN number digits follow. NOTE 3: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.				

34.1.24 MIGRATION REJECT

The PDU shall be used to reject the individual subscriber's migration.

Direction: home SwMI MM to visited SwMI MM and visited SwMI MM to home SwMI MM

Response to: MIGRATION

Response expected: none or MIGRATION REJECT RESPONSE

Table 65: MIGRATION REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Migration rejection cause	4	1	M	
Recovery	1	1	M	
MNI (of the individual subscriber)	24	2	O	note
Proprietary		3	O	
NOTE: May be used to enforce the ANF-ISIMM invoke id.				

34.1.25 MIGRATION REJECT RESPONSE

The MIGRATION REJECT RESPONSE shall be used to acknowledge the rejection of the individual subscriber's migration.

Direction: home SwMI MM to visited SwMI MM

Response to: MIGRATION REJECT

Response expected: none

Table 66: MIGRATION REJECT RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Recovery	1	1	M	
Proprietary		3	O	

34.1.26 MIGRATION RESPONSE

The PDU shall be used to grant the requested migration.

Direction: home SwMI MM to the visited SwMI MM

Response to: MIGRATION

Response expected: none

Table 67: MIGRATION RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Migration type	2	1	M	
MNI (of the old visited SwMI MM)	24	1	C	note 1
Pre-defined profile set reference(s) (used)	16	1	M	
Recovery	1	1	M	
PISN number length (of the home SwMI MM)	5	1	C	notes 1 and 2
PISN number digits (of the old visited SwMI MM)	4	1	C	notes 1 and 3
Proprietary		3	O	
NOTE 1: This information element is conditional on the "migration type". When the information element "migration type" is set to either "migration with call restoration" or "restricted migration with call restoration" then this element shall be included. NOTE 2: The information element shall indicate how many PISN number digits follow. NOTE 3: The information element shall be present as many times as indicated by the value of PISN number length information element. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.				

34.1.27 OTAR-KEY DEMAND

The PDU shall be used to invoke the OTAR SCK delivery service across the ISI from the visited SwMI.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: OTAR-KEY PROVIDE

Table 68: OTAR-KEY DEMAND

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
Number of SCKs requested	2	1	M	note 1
SCKN(s)	5	1	C	notes 1 and 2
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: The information element shall be repeated as many times as indicated by the information element Number of SCKs requested. The information element shall appear at least once.				

34.1.28 OTAR-KEY PROVIDE

The PDU shall be used to convey the requested OTAR SCK delivery service parameters or to invoke the service across the ISI from the home SwMI MM.

Direction: home SwMI MM to visited SwMI MM

Response to: OTAR-KEY DEMAND or none

Response expected: OTAR-KEY RESULT

Table 69: OTAR-KEY PROVIDE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Random Seed for OTAR (RSO)	80	1	M	note 1
Number of SCKs provided	3	1	M	note 1
SCK key and identifier	141	1	C	notes 1 and 2
Home/Visited SwMI MM initiated	1	1	M	
MNI (of the subscriber)	24	1	C	note 3
MNI (of the visited SwMI MM)	24	1	C	note 3
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: The information element shall be repeated as many times as indicated by the information element Number of SCKs provided. The information element shall appear at least once. NOTE 3: The information element shall be included if the value of the "Home/Visited SwMI MM initiated" is "Home SwMI MM initiated", otherwise the information element shall be omitted.				

34.1.29 OTAR-KEY REJECT

The PDU shall be used to reject the invoked OTAR SCK delivery service parameters or to report the unsuccessful outcome of the OTAR SCK delivery service in the visited SwMI.

Direction: visited SwMI MM to home SwMI MM or home SwMI MM to visited SwMI MM

Response to: OTAR-KEY DEMAND or OTAR-KEY RESPONSE

Response expected: none

Table 70: OTAR-KEY REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
OTAR SCK key rejection cause	4	1	M	
Proprietary		3	O	

34.1.30 OTAR-KEY RESULT

The PDU shall be used to report the successful outcome of the OTAR SCK delivery service.

Direction: visited SwMI MM to home SwMI MM

Response to: OTAR-KEY PROVIDE

Response expected: none

Table 71: OTAR-KEY RESULT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
Number of SCKs requested	2	1	M	note 1
SCK number and result	8	1	C	notes 1 and 2
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: The information element shall be repeated as many times as indicated by the information element Number of SCKs requested. The information element shall appear at least once.				

34.1.31 OTAR-PARAM DEMAND

The PDU shall be used to invoke the OTAR SCK generation service.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: OTAR-PARAM PROVIDE

Table 72: OTAR-PARAM DEMAND

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
MNI (of the visited SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.32 OTAR-PARAM PROVIDE

The PDU shall be used to convey the requested OTAR SCK generation service parameters.

Direction: home SwMI MM to visited SwMI MM

Response to: OTAR-PARAM DEMAND or none

Response expected: OTAR-PARAM RESULT

Table 73: OTAR-PARAM PROVIDE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
KSOv	128	1	M	note 1
RSO	80	1	M	note 1
Validity time type	3	1	M	
Validity time	5	1	C	note 2
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: The information element shall be conditional on Validity time type: - Hours, Days, Weeks: present; - Once, No limit: not present.				

34.1.33 OTAR-PARAM REJECT

The PDU shall be used to reject the request for the OTAR SCK generation service parameters or to report the unsuccessful outcome of the OTAR SCK generation service in the visited SwMI.

Direction: visited SwMI MM to home SwMI MM or home SwMI MM to visited SwMI MM

Response to: OTAR-PARAM DEMAND or OTAR-PARAM PROVIDE

Response expected: none

Table 74: OTAR-PARAM REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
OTAR SCK parameter rejection cause	4	1	M	
SCK number (SCKN)	5	1	M	note 1
Original/Subsequent use of parameters	1	1	M	note 2
MNI (of the subscriber)	24	1	C	note 3
MNI (of the visited SwMI MM)	24	1	C	note 3
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: If the rejection is detected by the home SwMI MM the value shall be "Original use". NOTE 3: The information element shall be present if "Original/Subsequent use of parameters" has the value "Subsequent use", otherwise the information element is omitted.				

34.1.34 OTAR-PARAM RESULT

The PDU shall be used to report the successful outcome of the OTAR SCK generation service.

Direction: visited SwMI MM to home SwMI MM

Response to: OTAR-PARAM PROVIDE

Response expected: none

Table 75: OTAR-PARAM RESULT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
SCK number (SCKN)	5	1	M	note 1
Original/Subsequent use of parameters	1	1	M	
MNI (of the subscriber)	24	1	C	note 2
MNI (of the visited SwMI MM)	24	1	C	note 2
Proprietary		3	O	
NOTE 1: For information element encoding, see ETSI EN 300 392-7 [5], clause 4. NOTE 2: The information element shall be included if the value of the "Original/Subsequent use of parameters" information element is "Subsequent use", otherwise the information element shall be omitted.				

34.1.35 PROFILE REJECT

The PDU shall be used to reject the invoked profile update service.

Direction: visited SwMI MM to home SwMI MM

Response to: PROFILE UPDATE

Response expected: none

Table 76: PROFILE REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
SSI (ISSI or GSSI)	24	1	M	
Profile rejection cause	4	1	M	
Recovery	1	1	M	
Proprietary		3	O	

34.1.36 PROFILE UPDATE

The PDU shall be used to invoke the profile update service across the ISI.

Direction: home SwMI MM to visited SwMI MM

Response to: none

Response expected: PROFILE UPDATE RESPONSE

Table 77: PROFILE UPDATE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
SSI (ISSI or GSSI)	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the ind. subscriber or of the group)	24	1	C	note 1
MNI (of the visited SwMI MM)	24	1	C	note 1
Profile type (individual/group)	1	1	M	
Basic migration profile (original)	variable	1	M	notes 2 and 3
SS-profile update indicator	2	1	M	
Recovery	1	1	M	
Proprietary		3	O	
NOTE 1: The information element shall be present if the value of preceding "Following conditional element(s) present" information element is "Present", otherwise the element shall be omitted. NOTE 2: Based on the SSI the information element shall contain either the original basic migration profile of an individual subscriber or of a group. NOTE 3: Type 1 indicates that there is no additional PDU encoding bits other than those in the basic profile information element itself.				

34.1.37 PROFILE UPDATE RESPONSE

The PDU shall be used to report the successful outcome of the profile update service.

Direction: visited SwMI MM to home SwMI MM

Response to: PROFILE UPDATE

Response expected: none

Table 78: PROFILE UPDATE RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
SSI (ISSI or GSSI)	24	1	M	
Profile type (individual/group)	1	1	M	
Basic migration profile info	1	1	M	
Basic migration profile (temporary)	variable	1	C	notes 1 and 2
Recovery	1	1	M	
Proprietary		3	O	
NOTE 1: The information element shall be present if the Basic profile info has the value "Redefined, sent to the home SwMI MM", otherwise the information element shall be omitted. If included, based on the SSI the information element shall contain the temporary basic migration profile either of an individual subscriber or of a group. NOTE 2: Type 1 indicates that there is no additional PDU encoding bits other than those in the basic profile information element itself.				

34.1.38 REMOTE UNLINKING

Void.

Table 79: Void

34.1.39 REMOVE REJECT

The PDU shall be used to reject the invoked RSI service.

Direction: previous visited SwMI MM to home SwMI MM

Response to: REMOVE SUBS

Response expected: none

Table 80: REMOVE REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
RSI rejection cause	3	1	M	
Recovery	1	1	M	
Proprietary		3	O	

34.1.40 REMOVE SUBS

The PDU shall be used to invoke the RSI service across the ISI.

Direction: home SwMI MM to old visited SwMI MM

Response to: none

Response expected: REMOVE SUBS RESPONSE

Table 81: REMOVE SUBS

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
MNI (of the visited SwMI)	24	1	M	
Migration type	2	1	M	
Call restoration support (of the visited SwMI)	1	1	M	note 1
PISN number length (of the visited SwMI MM)	5	1	C	note 2
PISN number digits (of the visited SwMI MM)	4	1	C	note 3
Recovery	1	1	M	
Forced removal	1	2	O	
Age stamp	16	2	O	
Proprietary		3	O	
NOTE 1: If the Migration type is "Migration with call restoration" or "Restricted migration with call restoration", the information element shall indicate whether the visited SwMI supports individual and/or group call restoration over the ISI, otherwise it shall be set to value "Not supported". NOTE 2: The information element shall be present if the Call restoration support (of the visited SwMI) is "Supported". NOTE 3: The information element shall be present as many times as indicated by the value of PISN number length. The information element coding shall be as for External subscriber number digits information element, see ETSI EN 300 392-2 [1], clause 14.8.20, table 108.				

34.1.41 REMOVE SUBS RESPONSE

The PDU shall be used to report the successful outcome of the RSI service.

Direction: visited SwMI MM to home SwMI MM

Response to: REMOVE SUBS

Response expected: none

Table 82: REMOVE SUBS RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
ISSI	24	1	M	
MNI (of the subscriber)	24	1	M	
Recovery	1	1	M	
Proprietary		3	O	

34.1.42 SS-PROFILE REJECT

The PDU shall be used to reject the invoked SS-profile update service.

Direction: visited SwMI MM to home SwMI MM

Response to: SS-PROFILE UPDATE

Response expected: none

Table 83: SS-PROFILE REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
SSI (ISSI or GSSI)	24	1	M	
Profile rejection cause	4	1	M	
Recovery	1	1	M	
Proprietary		3	O	

34.1.43 SS-PROFILE UPDATE

The PDU shall be used to invoke the SS-profile update service across the ISI.

Direction: home SwMI MM to visited SwMI MM

Response to: none

Response expected: PROFILE UPDATE RESPONSE

Table 84: SS-PROFILE UPDATE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
SSI (ISSI or GSSI)	24	1	M	
Following conditional element(s) present	1	1	M	
MNI (of the ind. subscriber or of the group)	24	1	C	note 1
MNI (of the visited SwMI MM)	24	1	C	note 1
Profile type (individual/group)	1	1	M	
Recovery	1	1	M	
Number of SS-migration profiles	6	1	M	
SS-migration profiles (original)	variable		C	note 2
Proprietary		3	O	
NOTE 1: The information element shall be present if the value of preceding "Following conditional element(s) present" is "Present", otherwise the element shall be omitted. NOTE 2: The information element shall be repeated as indicated by the Number of SS-migration profiles information element. Each information element shall contain the information of one original SS-migration profile.				

34.1.44 SS-PROFILE UPDATE RESPONSE

The PDU shall be used to report the successful outcome of the SS-profile update service.

Direction: visited SwMI MM to home SwMI MM

Response to: PROFILE UPDATE

Response expected: none

Table 85: SS-PROFILE UPDATE RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
SSI (ISSI or GSSI)	24	1	M	
Profile type	1	1	M	
Recovery	1	1	M	
Number of not supported SSs	6	1	M	
Not supported SS	6	1	C	note 1
Number of SS-migration profiles	6	1	M	
SS-migration profile (temporary)	variable		O	note 2
Proprietary		3	O	
NOTE 1: The information element shall be present as many times as indicated by the element "Number of not supported SSs". NOTE 2: The information element shall be repeated as indicated by the Number of SS-migration profiles information element. Each information element shall contain information on one temporary SS-migration profile.				

34.1.45 UNLINKING

Void.

Table 86: Void

34.1.46 UNLINKING REJECT

Void.

Table 87: Void

34.1.47 UNLINKING RESPONSE

Void.

Table 88: Void

34.1.48 VMM RECOVERY

The PDU shall be used to invoke the VMM recovery across the ISI.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: VMM RECOVERY RESPONSE or VMM RECOVERY REJECT

Table 89: VMM RECOVERY

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (visited SwMI MM)	24	1	M	
MNI (home SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.49 VMM RECOVERY COMPLETED

The PDU shall be used to report the completion of the VMM recovery.

Direction: visited SwMI MM to home SwMI MM

Response to: none

Response expected: none

Table 90: VMM RECOVERY COMPLETED

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (visited SwMI MM)	24	1	M	
MNI (home SwMI MM)	24	1	M	
Proprietary		3	O	

34.1.50 VMM RECOVERY REJECT

The PDU shall be used to reject the requested VMM recovery.

Direction: home SwMI MM to visited SwMI MM

Response to: VMM RECOVERY

Response expected: none

Table 91: VMM RECOVERY REJECT

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (visited SwMI MM)	24	1	M	
MNI (home SwMI MM)	24	1	M	
Recovery rejection cause	2	1	M	
Proprietary		3	O	

34.1.51 VMM RECOVERY RESPONSE

The PDU shall be used to acknowledge the VMM recovery invocation.

Direction: home SwMI MM to visited SwMI MM

Response to: VMM RECOVERY

Response expected: none

Table 92: VMM RECOVERY RESPONSE

Information element	Length	Type	C/O/M	Remark
PDU type	6	1	M	
ANF-ISIMM invoke id	16	1	M	
Recovery type	1	1	M	
MNI (visited SwMI MM)	24	1	M	
MNI (home SwMI MM)	24	1	M	
Proprietary		3	O	

34.2 PDU information element encoding

34.2.1 Advanced link

The Advanced link Information element shall indicate whether the advanced link service is supported or not for the individual subscriber.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- The individual subscriber home SwMI shall send its preferred value to the visited SwMI MM.
- On receipt of the value sent by the individual subscriber home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the individual subscriber home SwMI.

Table 93: Advanced link service element contents

Information element	Length	Value	Remark
Advanced link service	2	00_2	Undefined (note)
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.2 Age stamp

The age stamp shall indicate the age of the action in seconds. If there is no significant delay the value shall be zero.

Table 94: Age stamp element contents

Information element	Length	Value	Remark
Age stamp	16	0000000000000000_2	0 second
		0000000000000001_2	1 second
		etc.	etc.
		1111111111111110_2	65 534 seconds
		1111111111111111_2	Maximum age

34.2.3 AI security class (participating SwMI)

The AI security class (participating SwMI) element shall indicate the AI security class of the combined group in the participating SwMI.

Table 95: AI security class (participating SwMI) element contents

Information element	Length	Value	Remark
AI security class (participating SwMI)	2	00_2	Not supported
		01_2	Reserved
		10_2	Supported, not required
		11_2	Supported and required

34.2.4 AI security class (requested)

The AI security class (requested) element shall indicate which is the AI security class required for a group or a group linking.

Table 96: AI security class (requested) element contents

Information element	Length	Value	Remark
AI security class (requested)	2	00_2	Reserved
		01_2	Security class 1
		10_2	Security class 2
		11_2	Security class 3

34.2.5 AI encryption state list

The AI encryption state list element shall indicate all the AI encryption states that the individual subscriber or the group may support (i.e. is able to and allowed to support) in the visited SwMI as defined in table 97. The states are defined in ETSI EN 300 392-7 [5], clause 6.2.

The element shall be a bit map of which the bits shall indicate the support as follows, starting from the right-most (least significant) bit:

- 1st bit: Class 1, shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported";
- 2nd bit: Class 2, shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported";
- 3rd bit: Class 3, shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported";
- 4th bit: Reserved, shall be:
  - "0", shall indicate "reserved";
- 5th bit: Supported states indicated, shall be either:
  - "0": Undefined, the current value in the existing migration profile shall be kept and all class indication bits shall be set to "0". This value shall not be used in a profile replacement and in the response profile of a profile replacement;
  - "1": Defined, the AI encryption state support shall be defined as indicated by the bit map information; or

The support of the states 2, 3a and 3b imply that the AI encryption is supported for the individual subscriber or group.

Table 97: AI encryption state list element contents

Information element	Length	Value	Remark
AI encryption state list	5	00000_2	Undefined
		$xxxx1_2$	Class 1
		$xxx1x_2$	Class 2
		$xx1xx_2$	Class 3
		$x1xxx_2$	Reserved
		$1xxxx_2$	Supported states indicated
NOTE: Bit value "x" indicates any value.			

34.2.6 ANF-ISIMM invoke id

The ANF-ISIMM invoke id shall identify one ANF-ISIMM service instance.

Table 98: ANF-ISIMM invoke id element contents

Information element	Length	Value	Remark
ANF-ISIMM invoke id	16	0000000000000000_2	ANF-ISIMM invoke id 0
		0000000000000001_2	ANF-ISIMM invoke id 1
		etc.	etc.
		1111111111111111_2	ANF-ISIMM invoke id 65535

34.2.6a Attach linked group rejection cause

The Attach linked group rejection cause shall specify the reason for the rejected linked group attachment.

Table 98a: Attach linked group rejection cause

Information element	Length	Value	Remark
Attach linked group rejection cause	4	0000_2	Unknown error
		0001_2	Group linking failure
		0010_2	No connectivity to the visited SwMI
		0011_2 - 1111_2	Reserved
NOTE: The value may be used by the group linking participating SwMI MM.			

34.2.7 Authentication invocation

Authentication invocation element shall indicate whether the authentication service is invoked in conjunction with the migration or the restricted migration service or not.

Table 99: Authentication invocation element contents

Information element	Length	Value	Remark
Authentication invocation	1	0_2	Not invoked
		1_2	Invoked

34.2.8 Authentication rejection cause

Authentication rejection cause shall specify the reason for the rejected or failed authentication.

Table 100: Authentication rejection cause element contents

Information element	Length	Value	Remark
Authentication rejection cause	4	0000_2	Unknown error
		0001_2	Unknown subscriber
		0010_2	Unknown SwMI
		0011_2	Temporary error
		0100_2	Service not supported
		0101_2	ITSI authentication failed
		0110_2	SwMI authentication failed
		0111_2	SwMI and ITSI authentication failed
		1000_2	Acceptable number of authentication parameter requests failed (note)
		1001_2	Obsolete authentication parameters
		1010_2 - 1111_2	Reserved
NOTE: The value may be used by the individual subscriber home SwMI MM.			

34.2.9 Authentication service

The Authentication service element shall indicate if the authentication service (as defined in clause 12) is supported for the individual subscriber.

The support shall be negotiated between the individual subscriber home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the individual subscriber home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the individual subscriber home SwMI.

Table 101: Authentication service element contents

Information element	Length	Value	Remark
Authentication service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.10 Authentication type

Authentication type shall specify the authenticated party or parties.

Table 102: Authentication type element contents

Information element	Length	Value	Remark
Authentication type	2	00_2	Reserved
		01_2	SwMI authenticated
		10_2	ITSI authenticated
		11_2	ITSI and SwMI authenticated

34.2.11 Basic migration profile info

The Basic migration profile info element shall indicate whether the visited SwMI MM has accepted the original basic migration profile as received or whether the visited SwMI MM has created a new temporary migration profile. If created, the temporary migration profile shall be sent to the home SwMI MM.

Table 103: Basic migration profile info element contents

Information element	Length	Value	Remark
Basic migration profile info	1	0	Accepted as received
		1	Redefined by the visited SwMI MM

34.2.12 Call restoration support

Call restoration support shall indicate if the call restoration is supported by the (new) visited SwMI MM.

Table 104: Call restoration support element contents

Information element	Length	Value	Remark
Call restoration support	1	0_2	Not supported
		1_2	Supported

34.2.13 Call time-out set-up phase timer (T301)

The Call time-out set-up phase timer (T301) (see ETSI EN 300 392-2 [1], clause 14) shall indicate the maximum set-up time for the call set-up phase.

If negotiated, the Call time-out set-up phase timer (T301)element shall be negotiated as the Authentication service element.

Table 105: Call time-out set-up phase timer (T301) element contents

Information element	Length	Value	Remark
Call time-out set-up phase timer (T301)	3	000_2	Undefined - note
		001_2	1 second
		010_2	2 seconds
		011_2	5 seconds
		100_2	10 seconds
		101_2	20 seconds
		110_2	30 seconds
		111_2	60 seconds
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.14 Call time-out timer (T310)

The Call time-out timer (T310) (see ETSI EN 300 392-2 [1], clause 14) element shall indicate the value of the timer that shall be applicable to the individual subscriber or to the group in the visited SwMI.

If negotiated, the Call time-out timer element shall be negotiated as the Authentication service element.

Table 106: Call time-out timer (T310) element contents

Information element	Length	Value	Remark
Call time-out timer (T310)	4	0000_2	Undefined - note
		0001_2	30 seconds
		0010_2	45 seconds
		0011_2	60 seconds
		0100_2	2 minutes
		0101_2	3 minutes
		0110_2	4 minutes
		0111_2	5 minutes
		1000_2	6 minutes
		1001_2	8 minutes
		1010_2	10 minutes
		1011_2	12 minutes
		1100_2	15 minutes
		1101_2	20 minutes
		1110_2	30 minutes
		1111_2	Reserved
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.15 Circuit mode protected (high) data service

The Circuit mode protected (high) data service information element shall indicate if this type of call is supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 107: Circuit mode protected (high) data service element contents

Information element	Length	Value	Remark
Circuit mode protected (high) data service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.16 Circuit mode protected (low) data service

The Circuit mode protected (low) data service information element shall indicate if this type of call is supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 108: Circuit mode protected (low) data service element contents

Information element	Length	Value	Remark
Circuit mode protected (low) data service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.17 Circuit mode unprotected speech + data service

The circuit mode unprotected speech + data service information element shall indicate if this type of call is supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 109: Circuit mode unprotected speech + data service element contents

Information element	Length	Value	Remark
Circuit mode unprotected speech + data service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.18 CONS

Void.

Table 110: Void

34.2.19 Default SS-information

The Default SS-information element shall indicate whether TETRA supplementary services of which the support is not explicitly negotiated across the ISI (using the SS-information and possibly the SS-information response elements) are supported or not for the individual subscriber or for the group in the visited SwMI.

The support shall be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 111: Default SS-information element contents

Information element	Length	Value	Remark
Default SS-information service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.20 De-registration rejection cause

De-registration rejection cause shall specify the reason for the failed or rejected de-registration.

Table 112: De-registration rejection cause element contents

Information element	Length	Value	Remark
De-registration rejection cause	3	000_2	Unknown error
		001_2	Unknown subscriber
		010_2	Unknown SwMI
		011_2	Temporary error
		100_2	Service not supported
		101_2	Old age stamp
		110_2	Reserved
		111_2	Reserved

34.2.21 De-registration type

The de-registration type information element shall indicate the type of the de-registration.

Table 113: De-registration type element contents

Information element	Length	Value	Remark
De-registration type	2	00_2	Subscriber initiated
		01_2	Visited SwMI MM initiated
		10_2	Home SwMI MM initiated
		11_2	Reserved

34.2.22 Duplex service

The Duplex service element shall indicate whether the Duplex service is supported or not for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 114: Duplex service element contents

Information element	Length	Value	Remark
Duplex service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.23 End-to-end encryption service

The End-to-end encryption service element shall specify shall indicate if this type of service (i.e. end-to-end encryption) is supported for the individual subscriber or for the group in the visited SwMI.

The value supported shall mean that the end-to-end encryption may be used. The actual use of the end-to-end encryption shall be determined on the invocation of each service instance, e.g. when a call is invoked.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 115: End-to-end encryption element contents

Information element	Length	Value	Remark
End-to-end encryption service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.24 First/Subsequent Group attachment

First/Subsequent group attachment shall indicate if the group attachment is the first or not for the group in the visited SwMI MM.

Table 116: First group attachment element contents

Information element	Length	Value	Remark
First group attachment	1	0_2	Subsequent group attachment
		1_2	First group attachment

34.2.25 Following conditional element(s) present

Following conditional element(s) present shall indicate if the following conditional element or elements are present and following in the PDU.

Table 117: Following conditional element(s) present element contents

Information element	Length	Value	Remark
Following conditional element(s) present	1	0_2	Not present
		1_2	Present

34.2.25a Forced removal

Forced removal shall state that RSI is invoked immediately (e.g. no timestamp comparison done).

Table 117a: Forced removal element contents

Information element	Length	Value	Remark
Forced removal	1	0	Reserved
		1	Forced removal

34.2.26 Group attachment/detachment

The Group attachment/detachment information element shall give the condition in which group attachment and detachment shall be sent to the group home SwMI MM.

Table 118: Group attachment/detachment element contents

Information element	Length	Value	Remark
Group attachment/ detachment	2	00_2	Undefined - note
		01_2	First group attachment and last group detachment
		10_2	First group attachment and last group detachment, and important user group attachment and detachment shall be sent to group home SwMI MM
		11_2	Every group attachment and detachment shall be sent to group home SwMI MM
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement.			

34.2.27 Group attachment rejection cause

Group attachment rejection cause shall specify the reason for the failed group attachment.

Table 119: Group attachment rejection cause element contents

Information element	Length	Value	Remark
Group attachment rejection cause	4	0000_2	Unknown error
		0001_2	Unknown individual subscriber
		0010_2	Unknown group
		0011_2	Unknown SwMI
		0100_2	Not authorized
		0101_2	Subscriber not reachable
		0110_2	Temporary error
		0111_2	Service not supported
		1000_2	Service not provided
		1001_2	Individual subscriber rejection
		1010_2	Age stamp mismatch
		1011_2	Migration profile rejection
		1100_2	Unknown pre-defined profile set reference
		1101_2	Reserved
		1110_2	Reserved
		1111_2	Reserved

34.2.28 Group basic migration profile (original and temporary)

The encoding of the group basic migration profile (original and temporary) shall be as defined in table 120.

Table 120: Encoding of group basic migration profile (original and temporary)

Information element	Length	Type	C/O/M	Remark
Profile status	2	1	M	
Point-to-multipoint service	2	1	M	
Point-to-multipoint acknowledged service	2	1	M	
Point-to-multipoint broadcast service	2	1	M	
Speech service	5	1	M	
Circuit mode unprotected data service	2	1	M	
Circuit mode protected (low) data service	2	1	M	
Circuit mode protected (high) data	2	1	M	
Interleaving depth	6	1	M	
Reserved	2	1	M	Set to "00"
IP service	2	1	M	
AI encryption state list	5	1	M	note 1
End-to-end encryption service	2	1	M	
Group attachment/detachment	2	1	M	
Number of SS-information	6	1	M	
SS-information	8	1	C	note 2
SS-information response	8	1	C	note 3
Default SS information	2	1	M	
SDS profile	6	2	O	
Maximum number of timeslots	3	2	O	
Call time-out timer (T310)	4	2	O	
Call time-out set-up phase timer (T301)	3	2	O	

Information element	Length	Type	C/O/M	Remark
Group priority	2	2	O	
Subscriber information in group profile	1	2	O	
Subscriber information	variable	3	O	notes 4 and 5
Proprietary		3	O	
NOTE 1: The information element shall indicate: - all supported states when the Profile status is "Profile update" or "Profile replacement"; and - the selected state when the Profile status is "Profile Response". NOTE 2: The information element shall only be present if the Profile status is "Profile update" or "Profile replacement" and then it shall be present as many times as indicated by the "Number of SS information". NOTE 3: The information element shall only be present if the Profile status is "Profile response" and it shall be present as many times as indicated by the "Number of SS information". NOTE 4: This information element may be present only when the "subscriber information in group profile" information element indicates "Supported". NOTE 5: The "subscriber information" information element may be repeated inside the type 3 element up to the length of the type 3 information element as sets. There may be also multiple type 3 information elements if the maximum length of type 3 elements would be exceeded.				

34.2.29 Group detachment rejection cause

Group detachment rejection cause shall specify the reason for the failed group detachment.

Table 121: Group detachment rejection cause element contents

Information element	Length	Value	Remark
Group detachment rejection cause	4	0000_2	Unknown error
		0001_2	Unknown individual subscriber
		0010_2	Unknown group
		0011_2	Unknown SwMI
		0100_2	Not authorized
		0101_2	Subscriber not reachable
		0110_2	Temporary error
		0111_2	Service not supported
		1000_2	Service not provided
		1001_2	Individual subscriber rejection
		1010_2	Age stamp mismatch
		1011_2	Migration profile rejection
		1100_2	Unknown pre-defined profile set reference
		1101_2	Reserved
		etc.	etc.
		1111_2	Reserved

34.2.30 Group information

The Group information element shall specify the relation between the individual subscriber and the groups of which the subscriber is a member.

Table 122: Group information contents

Information element	Length	Type	C/O/M	Remark
GSSI	24	1	M	
Subscriber status	1	1	M	
Class of usage	3	1	M	note
Proprietary		3	O	
NOTE: For information element encoding, see ETSI EN 300 392-2 [1], clause 16.10.6.				

34.2.31 Group information in subscriber profile

The Group information in subscriber profile element shall indicate if the visited SwMI MM supports group information in subscriber profile.

Table 123: Group information in subscriber profile element contents

Information element	Length	Value	Remark
Group information in subscriber profile	1	0_2	Group information in subscriber profile not supported
		1_2	Group information in subscriber profile supported

34.2.32 Group priority

This priority is relative to what is internally defined for the visited SwMI MM. It shall be used in the call set up in addition to the call priority element.

NOTE: This priority is not related to the AI call priority.

Table 124: Group priority element contents

Information element	Length	Value	Remark
Group Priority	2	00_2	Low priority
		01_2	Normal priority
		10_2	High priority
		11_2	Emergency priority

34.2.33 GSSI

The group address. For a full definition see ETSI EN 300 392-1 [2], clause 7.

Table 125: GSSI element contents

Information element	Length	Value	Remark
GSSI	24	any	

34.2.34 Home/Visited SwMI MM initiated

Home/Visited SwMI MM initiated shall indicate if the OTAR SCK delivery service has been initiated by the home or by the visited SwMI MM.

Table 126: Home/Visited SwMI MM initiated contents

Information element	Length	Value	Remark
Home/Visited SwMI MM initiated	1	0_2	Home SwMI MM initiated
		1_2	Visited SwMI MM initiated

34.2.35 Independent of authentication service

Independent of authentication service shall indicate whether the authentication service is carried out in conjunction with the migration service or not. In addition, if the value of the element is "Dependent" the individual subscriber home SwMI MM shall not send the migration approval (Migration_resp) until it has received the Authenticated_ind (if the individual subscriber home SwMI MM supports the authentication service).

Table 127: Independent of authentication service element contents

Information element	Length	Value	Remark
Independent of authentication service	1	0	Independent
		1	Dependent

34.2.36 Individual basic migration profile (original and temporary)

The encoding of the individual basic migration profile (original and temporary) shall be as defined in table 128.

Table 128: Individual basic migration profile (original and temporary) contents

Information element	Length	Type	C/O/M	Remark
Profile status	2	1	M	
Point-to-point call service	2	1	M	
Point-to-multipoint call service	2	1	M	
Point-to-multipoint acknowledged call service	2	1	M	
Point-to-multipoint broadcast service	2	1	M	
Speech service	5	1	M	
Circuit mode unprotected data service	2	1	M	
Circuit mode protected (low) data service	2	1	M	
Circuit mode protected (high) data service	2	1	M	
Interleaving depth	5	1	M	
Duplex service	2	1	M	
Reserved	2	1	M	Set to "00"
Reserved	2	1	M	Set to "00"
Authentication service	2	1	M	
OTAR SCK generation service	2	1	M	
OTAR SCK delivery service	2	1	M	
AI encryption state list	5	1	C	note 1
End-to-end encryption service	2	1	M	
Number of SS-information	6	1	M	
SS-information	8	1	C	note 2
SS-information response	8	1	C	note 3
Number of MS-ISDN digits	5	1	M	
MS-ISDN digit	4	1	C	note 4
Length of IP service	11	1	M	
IP service	variable	1	C	notes 5 and 6
Default SS-information	2	2	O	
SDS profile	6	2	O	
Advanced link service	2	2	O	
Maximum number of timeslots	3	2	O	
Call time-out timer (T310)	4	2	O	
Call time-out set-up phase timer (T301)	3	2	O	
Group information in subscriber profile	1	2	O	
Group information	variable	3	C	notes 7 and 8
Proprietary		3	O	

NOTE 1: The information element shall indicate:
- all supported states when the Profile status is "Profile update" or "Profile replacement";
- the selected state when the Profile status is "Profile Response".

NOTE 2: The information element shall be conditional on Profile status as follows:
- "Profile Response": element shall be present;
- "Profile update" or "Profile replacement": element shall not be present;

NOTE 3: The information element shall appear as many times as indicated by the element "Number of SS-information".

NOTE 4: MS-ISDN digit shall be repeated as many times as indicated by the number of MS-ISDN digits information element.

NOTE 5: The of this information element shall be according to Length of IP service information element.

NOTE 6: Refer to ETSI TS 101 747 [17] clause 7 for the usage of this information element.

NOTE 7: This information element may be present only when the "group information in subscriber profile" information element indicates "Supported".

NOTE 8: The "group information" information element may be repeated inside the type 3 element up to the length of the type 3 information element as sets. There may be also multiple type 3 information elements, if the maximum length of type 3 elements would otherwise be exceeded.

34.2.37 Interleaving depth

The interleaving depth information element shall indicate the level of interleaving depth that is supported for the individual subscriber or for the group.

The element shall be a bit map of which the bits shall indicate the support as follows starting from the left-most (most significant) bit:

- 1st bit: Undefined/Defined, shall be as follows:
  - "0": Undefined, the current value in the existing migration profile shall be kept, all interleaving support bit shall be set to "0". This value shall not be used in a profile replacement and in the response profile of a profile replacement; or
  - "1": Defined, the interleaving depth shall be defined as indicated by the following bit map information;
- 2nd bit: No interleaving, shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported";
- 3rd bit: Short interleaving depth (i.e. value "1"), shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported";
- 4th bit: Medium interleaving depth (i.e. value "4"), shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported";
- 5th bit: Long interleaving depth (i.e. value "8"), shall be either:
  - "0", shall indicate "not supported"; or
  - "1" shall indicate "supported".

Table 129: Interleaving depth element contents

Information element	Length	Value	Remark
Interleaving depth	5	00000_2	Interleaving undefined (note)
		00001_2	Long interleaving
		00010_2	Medium interleaving
		00100_2	Short interleaving
		01000_2	No interleaving
		10000_2	Interleaving support indicated
NOTE: The interleaving support bits has no meaning and shall be set to "0".			

34.2.38 IP service

The IP service element shall indicate if this type of service (i.e. Internet Protocol) is supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 130: IP service element contents

Information element	Length	Value	Remark
IP service	2	00_2	Undefined (note)
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.39 ISSI

The individual subscriber address (without the MNI). For a full definition see ETSI EN 300 392-1 [2], clause 7.

Table 131: ISSI element contents

Information element	Length	Value	Remark
ISSI	24	any	

34.2.40 Void

34.2.41 Last group detachment

Last group detachment shall indicate if the group detachment is the last or not.

Table 133: Last group detachment element contents

Information element	Length	Value	Remark
Last group detachment	1	0_2	Last group detachment
		1_2	Not last group detachment

34.2.42 Linking rejection cause

Void.

Table 134: Void

34.2.43 Maximum number of timeslots

The Maximum number of timeslot information element shall indicate the maximum number of timeslots that is supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 135: Maximum number of timeslots element contents

Information element	Length	Value	Remark
Maximum number of timeslots	3	000_2	Undefined (note)
		001_2	Up to one slot
		010_2	Up to two slots
		011_2	Up to three slots
		100_2	Up to four slots
		101_2	Reserved
		111_2	Reserved
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.44 Migration rejection cause

Migration rejection cause shall specify the reason for the rejected or failed migration.

Table 136: Migration rejection cause element contents

Information element	Length	Value	Remark
Migration rejection cause	4	0000_2	Unknown error
		0001_2	Unknown subscriber
		0010_2	Unknown SwMI
		0011_2	Temporary error
		0100_2	Service not supported
		0101_2	Too old age stamp
		0110_2	Migration/restricted migration not allowed
		0111_2	Migration profile rejection
		1000_2	Unknown pre-defined profile
		1001_2	Authentication failed
		1010_2	Reserved
		etc.	etc.
		1111_2	Reserved

34.2.45 Migration type

The migration type shall indicate the type of migration.

Table 137: Migration type element contents

Information element	Length	Value	Remark
Migration type	2	00_2	Migration
		01_2	Migration with call restoration
		10_2	Restricted migration
		11_2	Restricted migration with call restoration

34.2.46 MNI

The MNI element shall be used to indicate the full TSI address. For a full definition see ETSI EN 300 392-1 [2], clause 7.

Table 138: MNI element contents

Information element	Length	Type	C/O/M	Remark
Mobile Country Code (MCC)	10	1	M	
Mobile Network Code (MNC)	14	1	M	

34.2.47 MNIs of SSI and of visited SwMI MM following

The MNIs of SSI and of visited SwMI MM following element shall be used to indicate whether two conditional MNI elements follow this element in the PDU.

Table 139: MNIs of SSI and of visited SwMI MM following element contents

Information element	Length	Value	Remark
MNIs of SSI and of visited SwMI MM following	1	0_2	MNIs do not follow
		1_2	MNIs follow

34.2.48 Not supported SS

Not supported SS shall specify a supplementary service which is not supported to the individual subscriber or to a group in the visited SwMI. The information element encoding shall be as SS-type, see clause 34.2.85.

34.2.49 Number of following elements

The Number of following elements element shall indicate the number of following conditional elements.

Table 140: Number of following elements element contents

Information element	Length	Value	Remark
Number of following elements	3	000_2	0
		001_2	1
		010_2	2
		011_2	3
		100_2	4
		101_2	Reserved
		etc.	etc.
		111_2	Reserved
NOTE: The value "000_2" shall indicate that no elements are following and that the information has not been changed. Consequently, the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.50 Number of not supported SSs

Number of not supported SSs element shall specify the number of not supported supplementary services elements that are included in the PDU.

Table 141: Number of not supported SSs

Information sub-element	Length	Value	Remark
Number of not supported SSs	6	000000_2	0
		000001_2	1
		etc.	etc.
		111111_2	63

34.2.51 Number of SS-information

The Number of SS-information element shall specify the number of SS-information elements that are included in the profile.

The element encoding shall be as the encoding of the Number of not supported SSs element.

34.2.52 Original/Subsequent use of param

Original/Subsequent use of param shall indicate if the parameters are used for the first time (original use) or subsequently, i.e. not for the first time, in the visited SwMI MM.

Table 142: Original/Subsequent use of param element contents

Information element	Length	Value	Remark
Original/Subsequent use of param	1	0_2	Original
		1_2	Subsequent

34.2.53 OTAR SCK delivery service

The OTAR SCK delivery service element shall indicate if this type of service (OTAR SCK delivery service) is supported for the individual subscriber. If the home SwMI MM indicates that the service is supported, the visited SwMI MM shall be able to invoke the service across the ISI for the individual subscriber using the OTAR SCK delivery service as defined in clause 13. If the visited SwMI MM indicates that the service is supported, it may invoke the service across the ISI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 143: OTAR SCK service element contents

Information element	Length	Value	Remark
OTAR SCK service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.54 OTAR SCK generation service

The OTAR SCK generation service element shall indicate if this type of service (OTAR SCK generation service) is supported for the individual subscriber. If the home SwMI MM indicates that the service is supported, the visited SwMI MM shall be able to invoke the service across the ISI for the individual subscriber using the OTAR SCK generation service as defined in clause 13. If the visited SwMI MM indicates that the service is supported, it may invoke the service across the ISI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 144: OTAR SCK generation service element contents

Information element	Length	Value	Remark
OTAR SCK generation service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.55 OTAR SCK key rejection cause

OTAR SCK key rejection cause shall specify the reason for the rejected or failed OTAR sealed key operation.

Table 145: OTAR key rejection cause element contents

Information element	Length	Value	Remark
OTAR SCK key rejection cause	4	0000_2	Unknown error
		0001_2	Unknown subscriber
		0010_2	Unknown SwMI
		0011_2	Temporary error
		0100_2	Assignment fails in air i/f
		0101_2	Subscriber not reachable
		0110_2	Obsolete OTAR SCK key service parameters
		0111_2	Sealed key failed to decrypt
		1000_2	Incorrect SCKN
		1001_2	Reserved
		etc.	etc.
		1111_2	Reserved

34.2.56 OTAR SCK param rejection cause

OTAR SCK param rejection cause shall specify the reason for the rejected or failed OTAR generator parameters operation.

Table 146: OTAR SCK param rejection cause element contents

Information element	Length	Value	Remark
OTAR SCK param rejection cause	4	0000_2	Unknown error
		0001_2	Unknown subscriber
		0010_2	Unknown SwMI
		0011_2	Temporary error
		0100_2	Assignment fails in air i/f
		0101_2	Subscriber not reachable
		0110_2	Obsolete OTAR SCK generator parameters
		0111_2	Reserved
		etc.	etc.
		1111_2	Reserved

34.2.57 Other linked group

Void.

Table 147: Void

34.2.58 PDU type

PDU type shall specify the PDU type.

Table 148: PDU type element contents

Information element	Length	Value	Remark
PDU type	6	000000_2	AUTHENTICATION DEMAND
		000001_2	AUTHENTICATION RESPONSE
		000010_2	AUTHENTICATION RESULT
		000011_2	AUTH REJECT
		000100_2	OTAR-PARAM DEMAND
		000101_2	OTAR-PARAM PROVIDE
		000110_2	OTAR-PARAM RESULT
		001000_2	OTAR-PARAM REJECT
		001001_2	OTAR-KEY DEMAND
		001010_2	OTAR-KEY PROVIDE
		001011_2	OTAR-KEY RESULT
		001100_2	OTAR-KEY REJECT
		001101_2	MIGRATION
		001110_2	MIGRATION RESPONSE
		001111_2	MIGRATION REJECT
		010000_2	MIGRATION REJECT RESPONSE
		010001_2	PROFILE UPDATE
		010010_2	PROFILE UPDATE RESPONSE
		010011_2	PROFILE REJECT
		010100_2	REMOVE SUBS
		010101_2	REMOVE SUBS RESPONSE
		010110_2	REMOVE REJECT
		010111_2	DE-REGISTRATION
		011000_2	DE-REGISTRATION RESPONSE
		011001_2	DE-REG REJECT
		011010_2	GROUP ATTACHMENT
		011011_2	GROUP ATTACHMENT RESPONSE
		011100_2	GROUP ATT REJECT
		011101_2	GROUP DETACHMENT
		011110_2	GROUP DETACHMENT RESPONSE
		011111_2	GROUP DET REJECT
		100000_2	HMM RECOVERY
		100001_2	HMM RECOVERY RESPONSE
		100010_2	HMM RECOVERY COMPLETED
		100011_2	HMM RECOVERY COMPLETED RESPONSE
		100100_2	HMM RECOVERY REJECT
		100101_2	Reserved
		100110_2	Reserved

Information element	Length	Value	Remark
		100111_2	Reserved
		101000_2	Reserved
		101001_2	Reserved
		101010_2	Reserved
		101011_2	Reserved
		101100_2	Reserved
		101101_2	Reserved
		101110_2	SS-PROFILE UPDATE
		101111_2	SS-PROFILE UPDATE RESPONSE
		110000_2	SS-PROFILE REJECT
		110001_2 -	Reserved
		etc.	etc.
		111111_2	Reserved

34.2.59 Pre-defined profile set reference(s)

Pre-defined profile set reference(s) shall indicate:

- when sent from the visited SwMI MM to the home SwMI MM the information shall indicate the set of supported pre-defined migration profile sets that may be used for the subscriber in the visited SwMI MM; and
- when sent from the home SwMI MM to the visited SwMI MM the information shall indicate either:
  - the pre-defined migration profile set that shall be used for the subscriber in the visited SwMI MM; or
  - if the profile exchange takes place between the SwMI MMs all sets shall be indicate as "not supported" to indicate that the exchanged migration profile(s) shall be used.

The contents of the pre-defined migration profile and the correspondence between the references and the profile sets is outside the scope of the present document.

Each bit shall indicate that the corresponding migration profile set is supported/used (bit equals to "1") or that the corresponding profile set is not supported/not used (bit equals to "0"). The leftmost (least significant) bit refers to migration profile set 1; the second leftmost bit refers to migration profile set 2;...; the rightmost (most significant) bit refers to migration profile set 16.

Table 149: Pre-defined profile set reference(s) element contents

Information element	Length	Value	Remark
Pre-defined profile set reference(s)	16	0000000000000000_2	No profile sets
		0000000000000001_2	Profile set 1
		etc.	etc.
		1111111111111111_2	All profile sets

34.2.60 Profile exchange support

Profile exchange support shall indicate if the individual subscriber may migrate using pre-defined profiles.

Table 150: Profile exchange support element contents

Information element	Length	Value	Remark
Profile exchange support	1	0_2	Not supported
		1_2	Supported

34.2.61 Profile rejection cause

Profile rejection cause shall specify the reason for the rejected profile update.

Table 151: Profile rejection cause element contents

Information element	Length	Value	Remark
Profile rejection cause	4	0000_2	Unknown error
		0001_2	Unknown subscriber
		0010_2	Unknown SwMI
		0011_2	Temporary error
		0100_2	Service not supported
		0101_2	Failed migration profile reception
		0110_2	SS-migration profile not applicable
		0111_2	Reserved
		etc.	etc.
		1111_2	Reserved

34.2.62 Profile type

The Profile type element shall indicate whether the migration or SS-migration profile is for an individual subscriber or for a group.

Table 152: Profile type element contents

Information element	Length	Value	Remark
Profile type	1	0_2	Individual subscriber
		1_2	Group

34.2.63 Point-to-multipoint acknowledged service

The Point-to-multipoint acknowledged service element shall specify if this type of calls (i.e. acknowledged group calls) are supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 153: Point-to-multipoint acknowledged service element contents

Information element	Length	Value	Remark
Point-to-multipoint acknowledged service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.64 Point-to-multipoint broadcast service

The Point-to-multipoint broadcast service element shall indicate if this type of group call is supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 154: Point-to-multipoint broadcast service element contents

Information element	Length	Value	Remark
Point-to-multipoint broadcast service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.65 Point-to-multipoint service

The Point-to-multipoint service element shall specify if this type of calls (i.e. group calls) are supported for the individual subscriber or for the group in the visited SwMI.

The support may be negotiated between the home SwMI MM and the visited SwMI MM as follows:

- the home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the home SwMI.

Table 155: Point-to-multipoint acknowledged service element contents

Information element	Length	Value	Remark
Point-to-multipoint acknowledged service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.66 Point-to-point service

The Point-to-point service element shall specify if this type of calls (i.e. individual calls) are supported for the individual subscriber in the visited SwMI.

The support may be negotiated between the individual subscriber home SwMI MM and the visited SwMI MM as follows:

- the individual subscriber home SwMI shall send its preferred value to the visited SwMI MM;
- on receipt of the value sent by the individual subscriber home SwMI MM, the visited SwMI MM shall either use that value or change the value. If the visited SwMI MM changed the value, it may send the new value to the individual subscriber home SwMI.

Table 156: Point-to-point service element contents

Information element	Length	Value	Remark
Point-to-point service	2	00_2	Undefined - note
		01_2	Reserved
		10_2	Not supported
		11_2	Supported
NOTE: The value "undefined" shall indicate that no information for this service is applicable e.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.67 Profile status

The Profile status element shall specify the type of the basic migration profile or that of the original SS-migration profile (given in one SS-migration profile request element). If the original or the temporary migration profile is part of the migration service or the first group attachment service, the value shall be "Replacement".

Table 157: Profile status element contents

Information element	Length	Value	Remark
Profile status	2	00_2	Profile Replacement
		01_2	Profile Update
		10_2	Profile Response
		11_2	Reserved

34.2.68 Proprietary

Proprietary is an optional, variable length element and shall be used to send and receive proprietary defined information appended to the PDUs.

The first 8 bits of the proprietary element shall indicate the Proprietary element owner as defined in table 158, otherwise the use, the size and the structure of the proprietary element is outside the scope of the present document.

Table 158: Proprietary

Information element	Length	Value	Remark
Proprietary element owner	8	variable	Refer to annex H of ETSI EN 300 392-2 [1]
Proprietary information	variable	variable	Contents is outside the scope of the present document

34.2.69 Recovery

The Recovery information element shall indicate if the information flow is sent as part of recovery service.

Table 159: Recovery element contents

Information element	Length	Value	Remark
Recovery	1	0_2	No recovery
		1_2	Recovery

34.2.70 Recovery rejection cause

Recovery rejection cause shall specify the reason for the rejected HMM recovery.

Table 160: Recovery rejection reason element contents

Information element	Length	Value	Remark
Recovery rejection cause	2	00_2	Unknown error
		01_2	Unknown SwMI
		10_2	Temporary error
		11_2	Reserved

34.2.71 Recovery type

Recovery type shall indicate if the recovery operation recovers the individual subscriber or the group information.

Table 161: Recovery type element contents

Information element	Length	Value	Remark
Recovery type	1	0_2	Group
		1_2	Individual subscriber

34.2.72 Restricted migration support

Restricted migration support shall indicate if the visited SwMI MM supports restricted migration service for the individual subscriber.

Table 162: Restricted migration support element contents

Information element	Length	Value	Remark
Restricted migration support	1	0_2	Not supported
		1_2	Supported

34.2.73 RSI rejection cause

RSI cause shall specify the reason for the rejected RSI.

Table 163: RSI rejection cause element contents

Information element	Length	Value	Remark
RSI rejection cause	3	000_2	Unknown error
		001_2	Unknown SwMI
		010_2	Temporary error
		011_2	Too old age stamp
		100_2	Reserved
		etc.	etc.
		111_2	Reserved

34.2.74 SCLNS

Void.

Table 164: Void

34.2.75 SDS profile

The SDS profile element shall indicate the type of Short Data Service (SDS) messages that are supported for the individual subscriber or for the group in the visited SwMI.

If negotiated, the service shall be negotiated as the Authentication service.

Table 165: SDS profile element contents

Information sub-element	Length	Value	Remark
Pre-defined short message	1	0_2	Pre-defined short message not supported
		1_2	Pre-defined short message supported
User defined short message	1	0_2	User defined short message not supported
		1_2	User defined short message supported
User defined Data 1	1	0_2	User defined Data 1 not supported
		1_2	User defined Data 1 supported
User defined Data 2	1	0_2	User defined Data 2 not supported
		1_2	User defined Data 2 supported
User defined Data 3	1	0_2	User defined Data 3 not supported
		1_2	User defined Data 3 supported
User defined Data 4	1	0_2	User defined Data 4 not supported
		1_2	User defined Data 4 supported

34.2.76 Speech service

The Speech service element shall specify which speech services are supported for the individual subscriber or for the group in the visited SwMI. The speech services shall be presented as a bit map as defined in table 166. Each "1" shall indicate the supported speech service and the element value shall be sum of all supported services e.g. indicated TETRA encoded speech shall be "10001_2".

Table 166: Speech service element contents

Information element	Length	Value	Remark
Speech service	4	00000_2	Speech service undefined (see note)
		00001_2	TETRA encoded speech
		00010_2	Reserved
		00100_2	Reserved
		01000_2	Proprietary encoded speech
		10000_2	Speech service support indicated
NOTE: The value "undefined" shall indicate that no speech encoding information is applicable and those bit shall be set to "0". E.g. in a profile update, the sending SwMI MM will encode the element as "undefined" if it has not been changed, and the receiving SwMI MM shall not treat this information element. This value shall not be used in a profile replacement and in the response profile of a profile replacement.			

34.2.77 SS-information

The SS-information element shall indicate if a supplementary service should be supported for the individual subscriber or for the group in the visited SwMI. The SS-information element shall refer to a given supplementary service as indicated by the SS-type information sub-element.

Table 167: SS-information contents

Information sub-element	Length	Type	C/O/M	Remark
SS-type	6	1	M	
SS-status	2	1	M	

34.2.78 SS-information response

The SS-information element shall indicate if a supplementary service is supported or not for the individual subscriber or for the group in the visited SwMI MM. The SS-information element shall refer to a given supplementary service as indicated by the SS-type information sub-element.

Table 168: SS-information response contents

Information sub-element	Length	Type	C/O/M	Remark
SS-type	6	1	M	
SS-response status	2	1	M	

34.2.79 SS-migration profile (original)

The SS-migration profile (original) shall define one original migration profile of a supplementary service for an individual subscriber or for a group. The element shall be sent from the home SwMI MM to the visited SwMI MM. It shall indicate the home SwMI MM's preference contents for the profile.

Table 169: SS-migration profile (original) contents

Information sub-element	Length	Type	C/O/M	Remark
SS-type	6	1	M	note 1
Profile status	2	1	M	
SS-ISI-PROFILE		3	O	note 2
NOTE 1: If the receiving SwMI MM does not understand the SS-type then it shall ignore the SS-ISI-PROFILE. NOTE 2: The contents of SS-ISI-PROFILE shall be as defined, if applicable, for the supplementary service in each supplementary service sub-part of ETSI EN/ETS 300 392-12 [4].				

34.2.80 SS-migration profile response (temporary)

The SS-migration profile (temporary) shall define one original migration profile of a supplementary service for an individual subscriber or for a group. The element shall be sent from the visited SwMI MM to the home SwMI MM. It shall indicate the profile that shall be used for the for the individual subscriber or for the group in the visited SwMI.

Table 170: SS-migration profile (temporary) contents

Information sub-element	Length	Type	C/O/M	Remark
SS-type	6	1	M	note 1
SS-profile response status	2	1	M	
SS-ISI-PROFILE		3	O	note 2
NOTE 1: If the receiving SwMI MM does not understand the SS-type then it shall ignore the SS-ISI-PROFILE. NOTE 2: The contents of SS-ISI-PROFILE shall be defined, if applicable, for the supplementary service in each supplementary service sub-part of ETSI EN/ETS 300 392-12 [4].				

34.2.81 SS-profile response status

The SS-profile response element shall specify the relationship between the original SS-migration profile (received in the SS-profile update_ind) and the created SS-migration profile.

Table 171: SS-profile response status element contents

Information element	Length	Value	Remark
SS-profile response status	2	00_2	Original SS-migration profile accepted as received
		01_2	Original SS-migration profile redefined, contents not sent to the home SwMI MM
		10_2	Original SS-migration profile redefined, contents sent to the home SwMI MM
		11_2	Creation of the SS-migration profile failed

34.2.82 SS-profile update indicator

The SS-profile update indicator element shall indicate whether the SS-migration profiles are exchanged as part of the migration or group attachment service. If sent as part of the migration service, the parameter shall also indicate if they are sent before or after the final migration approval (MIGRATION RESPONSE PDU).

Table 172: SS-profile update indicator contents

Information sub-element	Length	Value	Remark
SS-profile update indicator	2	00_2	Not applicable
		01_2	Sent before final migration approval or Sent as part of group attachment
		10_2	Sent after final migration approval
		11_2	Reserved
NOTE: The value "10_2" is not applicable for groups.			

34.2.83 SS-response status

The SS-response status information element shall indicate whether a supplementary service is supported or not in the visited SwMI MM.

Table 173: SS-response status

Information sub-element	Length	Value	Remark
SS-response status	2	00_2	Not supported
		01_2	Supported
		10_2	Reserved
		11_2	Reserved

34.2.84 SS-status

The SS-status information element shall indicate whether a supplementary service should or should not be supported in the visited SwMI MM.

Table 174: SS-status

Information sub-element	Length	Value	Remark
SS-status	2	00_2	Not supported
		01_2	Supported, with original SS-migration profile
		10_2	Supported, without original SS-migration profile
		11_2	Reserved

34.2.85 SS-type

SS-type shall specify the TETRA supplementary service as defined in ETSI EN 300 392-9 [13], clause 8.1.

34.2.86 Subscriber information

The Subscriber information element shall specify relations between the group (the profile refers to) and subscribers that are member of this group.

Table 175: Subscriber information contents

Information element	Length	Type	C/O/M	Remark
ISSI	24	1	M	See ETSI EN 300 392-2 [1], clause 16
Following conditional element(s) present	1	1	M	
GSSI	24	1	C	See note
Subscriber status	1	1	M	
Class of usage	3	1	M	See ETSI EN 300 392-2 [1], clause 16.10.6
Proprietary		3	O	
NOTE: Shall be conditional on the value of the Following conditional element(s) present information element.				

34.2.87 Subscriber information in group profile

The Subscriber information in group profile element shall indicate if the visited SwMI MM supports subscriber information in the group basic migration profile.

Table 176: Subscriber information in group profile element contents

Information element	Length	Value	Remark
Subscriber information in group profile	1	0_2	Not supported
		1_2	Supported

34.2.88 Subscriber status

The Subscriber status information element shall specify the type of a subscriber which is member of the group.

Table 177: Subscriber status

Information element	length	Value	Remark
Subscriber status	1	0_2	Not important subscriber
		1_2	Important subscriber

34.2.89 Type 3 element identifier

The type 3 element identifier indicates the ANF-ISIMM type 3 information element to be used in the ANF-ISIMM PDUs. The type 3 element identifiers shall be encoded as defined in table 178.

NOTE: The type 3 information element is independent of the one defined in ETSI EN 300 392-2 [1], clause 16.10.51.

Table 178: Type 3 element identifier element contents

Information element	Length	Value	Remarks
Type 3 element identifier	4	0000_2	Reserved
		etc.	etc.
		1010_2	Reserved
		1011_2	Subscriber information
		1100_2	Group information
		1101_2	SS-ISI-PROFILE
		1110_2	Reserved
		1111_2	Proprietary

34.2.90 Unlinking rejection cause

Void.

Table 179: Void

34.2.91 Validity time

Validity time shall specify the number of time units as referred in the validity time type. Validity time shall be applicable for the following validity time types, "Hours", "Days", "Weeks".

Table 180: Validity time element contents

Information element	Length	Value	Remark
Validity time	5	00000_2	1
		00001_2	2
		00010_2	3
		etc.	etc.
		11111_2	32

34.2.92 Validity time type

Validity time type shall specify the maximum time during which the related parameters may be used.

Table 181: Validity time type element contents

Information element	Length	Value	Remark
Validity time type	3	000_2	Once
		001_2	Hours
		010_2	Days
		011_2	Weeks
		100_2	No limit
		101_2 -	Reserved
		etc.	etc.
		111_2	Reserved

35 ANF-ISIMM procedures - stage 3

35.1 General

This clause defines the ANF-ISIMM protocol using the SDL conventions and the generic procedure descriptions. The SDL description and the procedures complement each other and comprise the ANF-ISIMM stage 3 protocol description.

NOTE: The ANF-ISIMM PDUs are defined in clause 34 and the ANF-ISIMM service specific ISI GFP functionality in clauses 8 and 36.

35.2 Generic procedures

35.2.0 General

This clause defines the generic procedures that are part of the ANF-ISIMM protocol. Those procedures are used in the dynamic description in clauses 35.4 to 35.16.

35.2.1 Invoking SwMI

The invoking SwMI MM shall be any SwMI MM which has invoked the ANF-ISIMM, e.g. the visited SwMI MM in the case of migration.

The ANF-ISIMM shall create the ANF-ISIMM protocol instance to carry out the requested ANF-ISIMM service in the invoking SwMI. Then, the ANF-ISIMM shall request the ISI GFP to ensure a transport connection the ISI GFP connection to the peer SwMI to convey the ANF-ISIMM PDUs. The connection shall be established as defined in clause 36.

35.2.2 Receiving SwMI

The receiving SwMI MM shall be the peer SwMI MM of the invoked ANF-ISIMM service, e.g. the individual subscriber home SwMI MM in the case of migration.

The ISI GFP shall request the ANF-ISIMM to create a peer ANF-ISIMM protocol instance to the ANF-ISIMM protocol instance created in the invoking SwMI MM to carry out the requested ANF-ISIMM service.

35.2.3 Clearing of ISI GFP transport connection

ANF-ISIMM shall indicate to ISI GFP that the ISI connection can be cleared.

35.2.4 Convert primitive to PDU

ANF-ISIMM shall covert the received primitive to the corresponding PDU as defined in clause 35.2.6. The PDU shall follow the PDU encoding rules as defined in the stage 3 PDU description tables; the information contents of the PDU shall be those defined for the corresponding primitive in the stage 1 description.

Refer ETSI EN 300 392-3-1 [3] for ROSE Invoke-ID allocation.

35.2.5 Convert PDU to primitive

ANF-ISIMM shall covert the received PDU to the corresponding primitive as defined in clause 35.2.6. The primitive shall follow the conventions as defined for the primitive in the stage 1 descriptions. The information contents of the primitive shall correspond to those of the received PDU.

35.2.6 Correspondence between ANF-ISIMM primitives and PDUs

Table 182 gives the correspondence between the ANF-ISIMM primitives and PDUs. The ANF-ISIMM shall covert the primitives to PDUs and vice versa according to the table.

Table 182: Correspondence between ANF-ISIMM primitives and PDUs

Primitive	PDU
Authentication demand_req, _ind	AUTHENTICATION DEMAND
Authentication response_req, _ind	AUTHENTICATION RESPONSE
Authentication result_req, _ind	AUTHENTICATION RESULT
Auth reject_req, _ind	AUTH REJECT
De-registration_req, _ind	DE-REGISTRATION
De-registration_resp, _conf	DE-REGISTRATION RESPONSE
De-reg reject_req, _ind	DE-REG REJECT
Group attachment_req, _ind	GROUP ATTACHMENT
Group attachment_resp, _conf	GROUP ATTACHMENT RESPONSE
Group att reject_req, _ind	GROUP ATT REJECT
Group detachment_req, _ind	GROUP DETACHMENT
Group detachment_resp, _conf	GROUP DETACHMENT RESPONSE
Group det reject_req, _ind	GROUP DET REJECT
HMM recovery_req, _ind	HMM RECOVERY
HMM recovery_resp, _conf	HMM RECOVERY RESPONSE
HMM recovery completed_req, _ind	HMM RECOVERY COMPLETED
HMM recovery reject_req, _ind	HMM RECOVERY REJECT
Migration_req, _ind	MIGRATION
Migration_resp, _conf	MIGRATION RESPONSE
Migration reject_req, _ind	MIGRATION REJECT
Migration reject_resp, _conf	MIGRATION REJECT RESPONSE
OTAR-key demand_req, _ind	OTAR-KEY DEMAND
OTAR-key provide_req, _ind	OTAR-KEY PROVIDE
OTAR-key reject_req, _ind	OTAR-KEY REJECT
OTAR-key result_req, _ind	OTAR-KEY RESULT
OTAR-param demand_req, _ind	OTAR-PARAM DEMAND
OTAR-param provide_req, _ind	OTAR-PARAM PROVIDE
OTAR-param reject_req, _ind	OTAR-PARAM REJECT
OTAR-param result_req, _ind	OTAR-PARAM RESULT
Profile update_req, _ind	PROFILE UPDATE
Profile update_resp, _conf	PROFILE UPDATE RESPONSE
Profile reject_req, _ind	PROFILE REJECT
Remote unlinking_req_ind	REMOTE UNLINKING
Remove reject_req, _ind	REMOVE REJECT
Remove subs_req, _ind	REMOVE SUBS
Remove subs response_req, _ind	REMOVE SUBS RESPONSE
SS-profile update_req, _ind	SS-PROFILE UPDATE
SS-profile update_resp, _conf	SS-PROFILE UPDATE RESPONSE
SS-profile reject_req, _ind	SS-PROFILE REJECT
VMM recovery_req, _ind	VMM RECOVERY
VMM recovery_resp, _conf	VMM RECOVERY RESPONSE
VMM recovery completed_req, _ind	VMM RECOVERY COMPLETED
VMM recovery reject_req, _ind	VMM RECOVERY REJECT

35.3 SDL descriptions

The following conventions are used in the SDL descriptions:

- input signals from the left and output signals to the left represent primitives from and to the collocated SwMI MM. These primitives are defined as part of the stage 1 description of each service;
- input signals from the right and output signals to the right represent ANF-ISIMM PDUs that are sent to and received from the ISI GFP. The ANF-ISIMM PDUs are defined in clause 34.

Timers are not illustrated in the SDL descriptions. See clause 37.4.

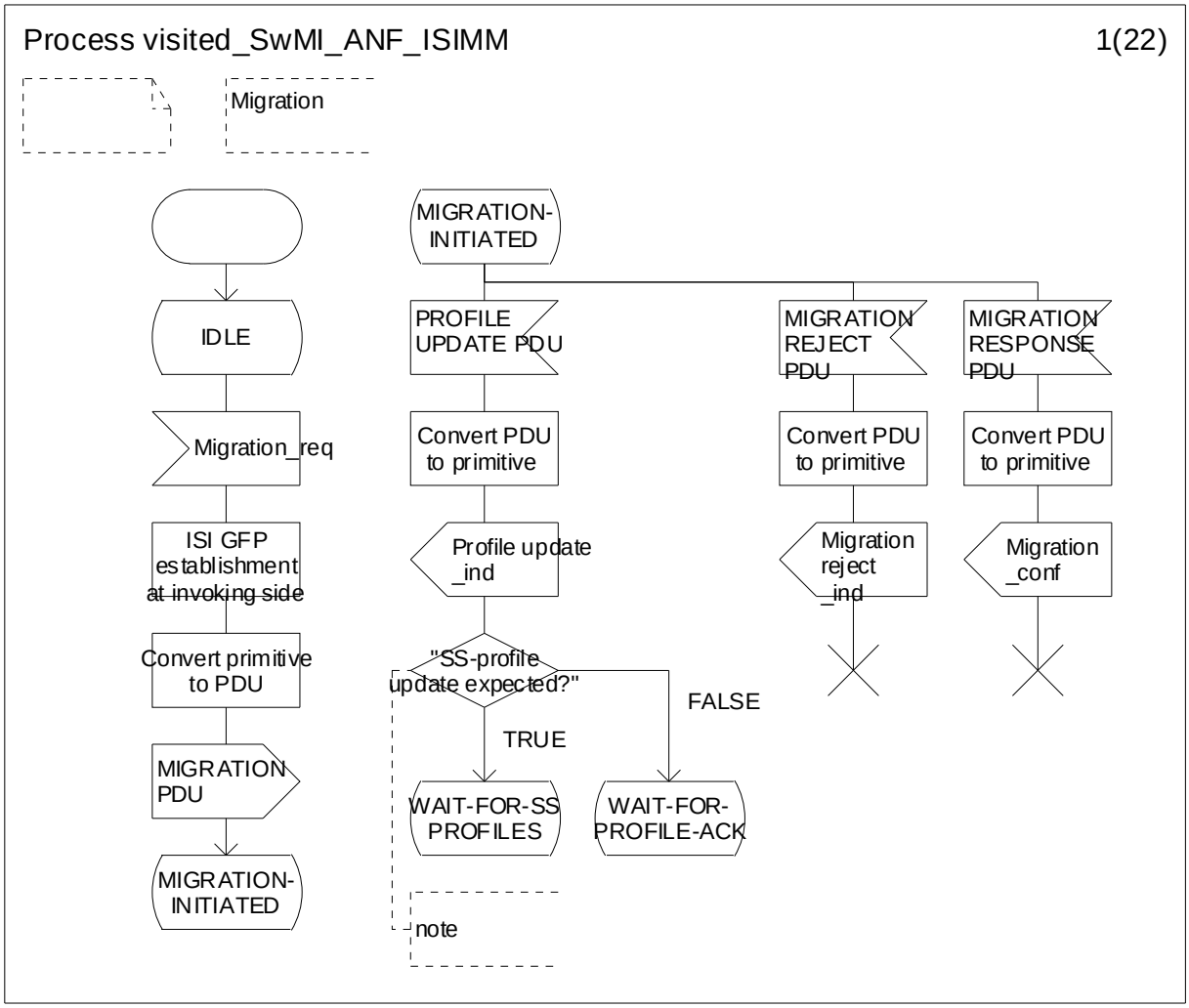
35.4 Migration

35.4.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

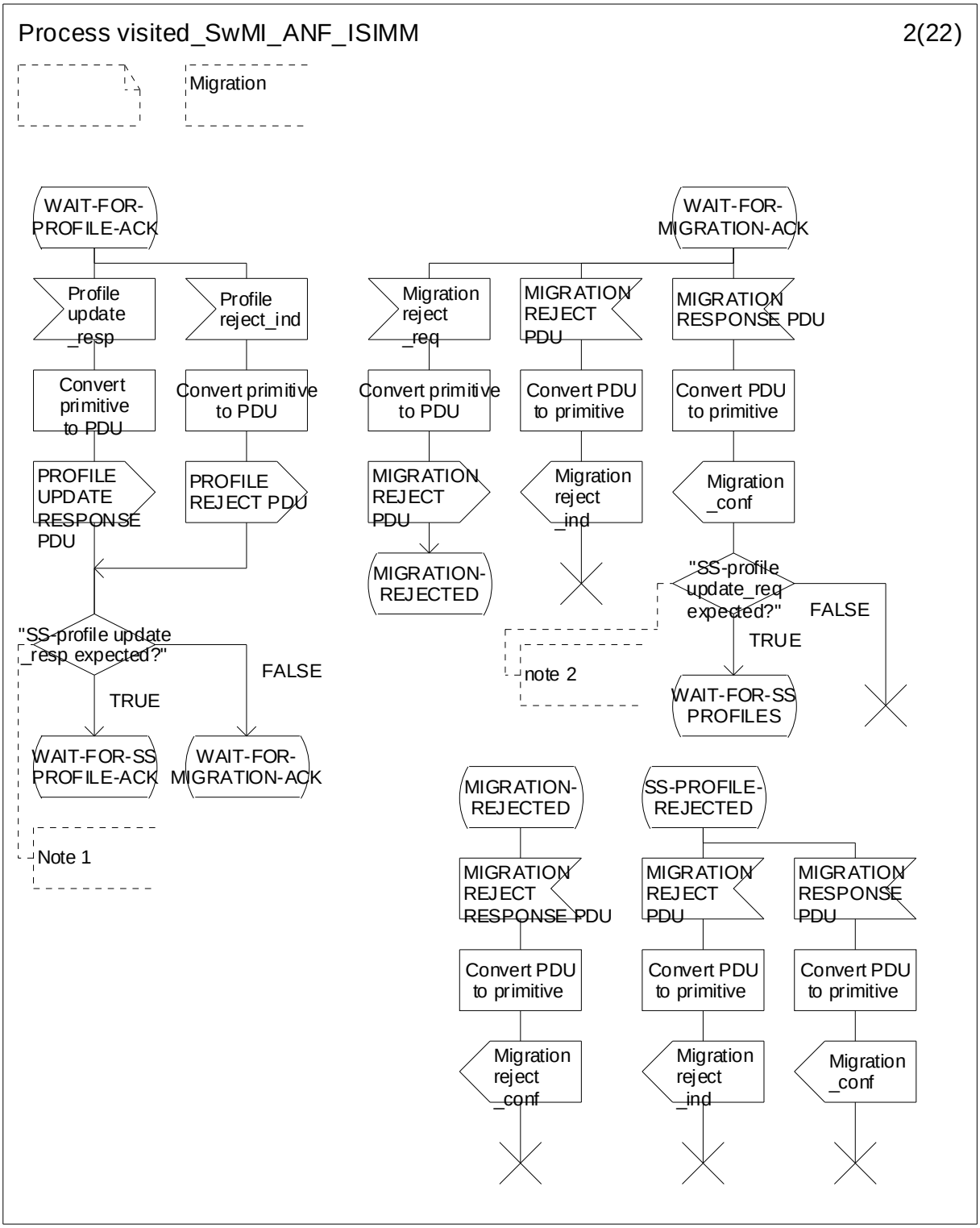
- IDLE: No migration in progress;
- MIGRATION-INITIATED: Migration has been initiated and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- SS-PROFILE-REJECTED: The visited SwMI MM has rejected the received SS-migration profile(s) and the visited SwMI MM ANF-ISIMM is awaiting the response from the ISI GFP;
- WAIT-FOR-MIGRATION-ACK: The visited SwMI ANF-ISIMM is awaiting the migration approval from the ISI GFP;
- WAIT-FOR-PROFILE-ACK: The original basic migration profile has been received from the ISI GFP and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM;
- WAIT-FOR-SS-PROFILE-ACK: The original SS-migration profile(s) has been received from the ISI GFP and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM; and
- WAIT-FOR-SS-PROFILES: The visited SwMI ANF-ISIMM is awaiting the original SS-migration profile(s) from the ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figures 108 to 110.



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE;
- SS-profile update_req not applicable: FALSE.

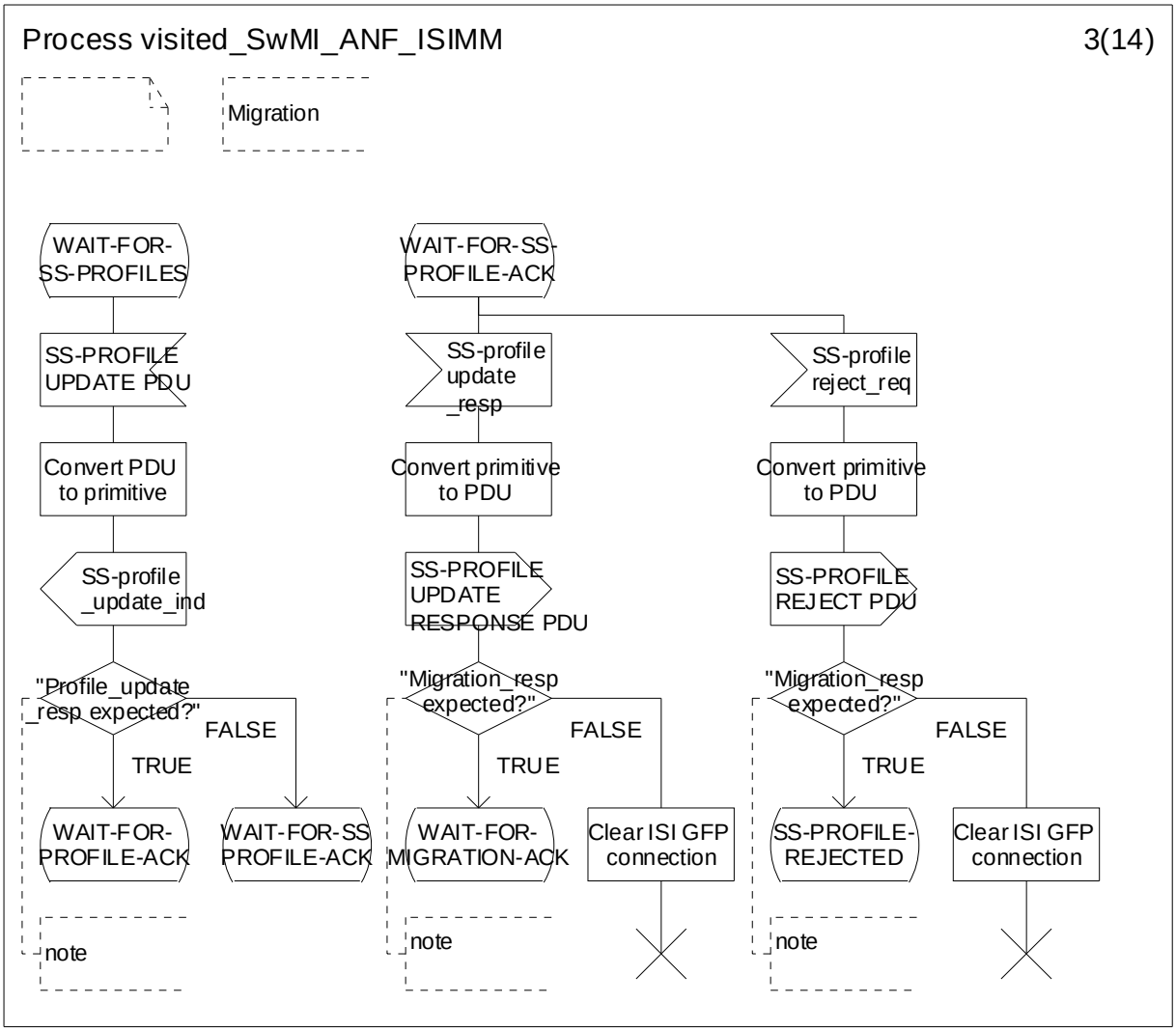
Figure 108: Visited SwMI ANF-ISIMM for migration service (sheet 1 of 3)



NOTE 1: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE;
- SS-profile update_req not applicable: FALSE.

NOTE 2: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE;
- SS-profile update_req not applicable: FALSE.

Figure 109: Visited SwMI ANF-ISIMM for migration service (sheet 2 of 3)



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE;
- SS-profile update_req not applicable: not possible.

Figure 110: Visited SwMI ANF-ISIMM for migration service (sheet 3 of 3)

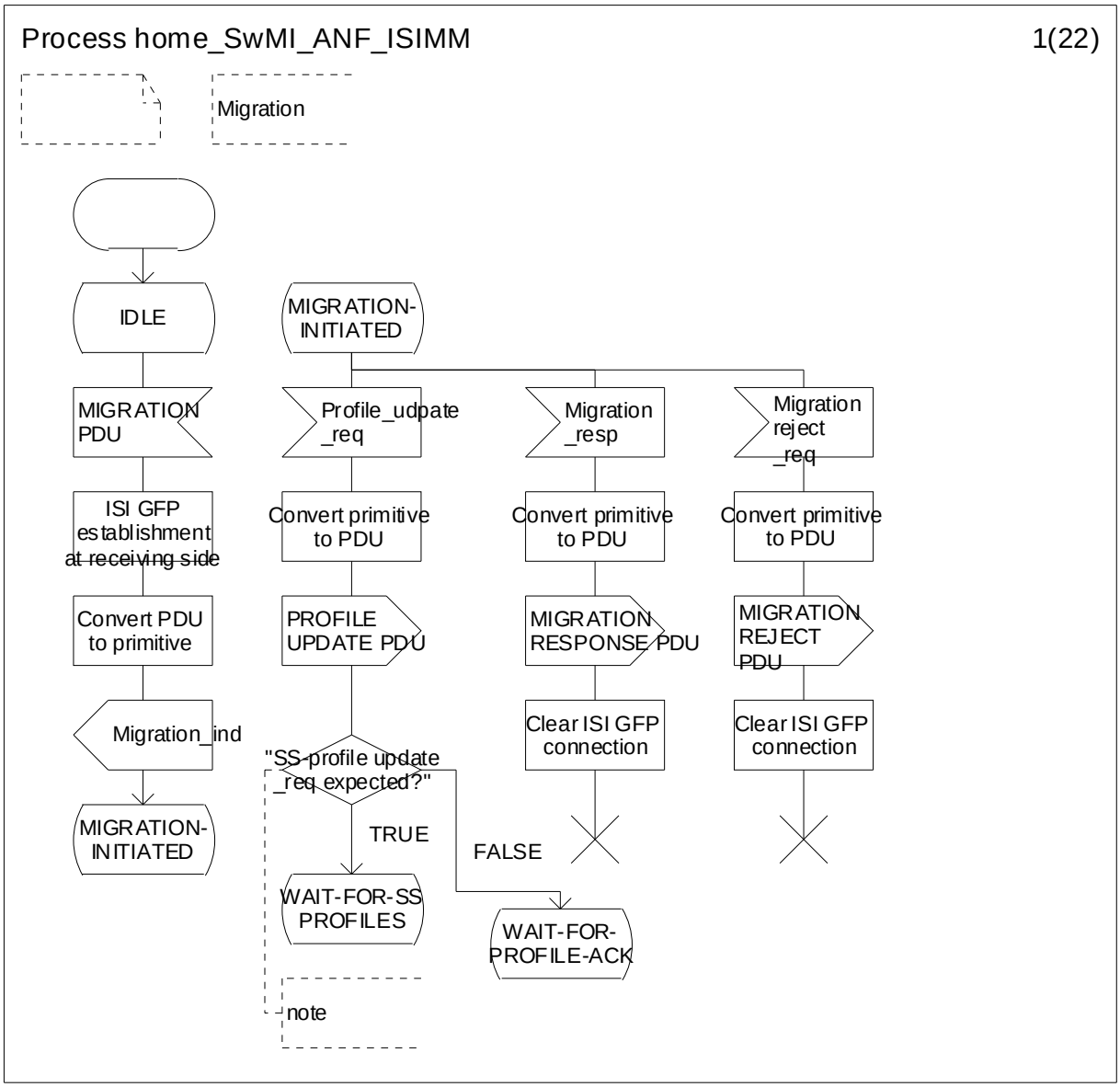
35.4.2 Individual subscriber home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: No migration in progress;
- MIGRATION-INITIATED: Migration has been initiated and the individual subscriber home SwMI ANF-ISIMM is awaiting the response from the home SwMI MM;
- MIGRATION-REJECTION: The migration has been rejected by the visited SwMI MM and the individual subscriber home SwMI ANF-ISIMM is awaiting for Migration reject_resp from the individual subscriber home SwMI MM;
- WAIT-FOR-MIGRATION-ACK: The home SwMI ANF-ISIMM is awaiting the migration approval from the individual subscriber home SwMI MM;
- WAIT-FOR-PROFILE-ACK: The original basic migration profile has been received from the individual subscriber home SwMI MM and the home SwMI ANF-ISIMM is awaiting the response from ISI GFP;

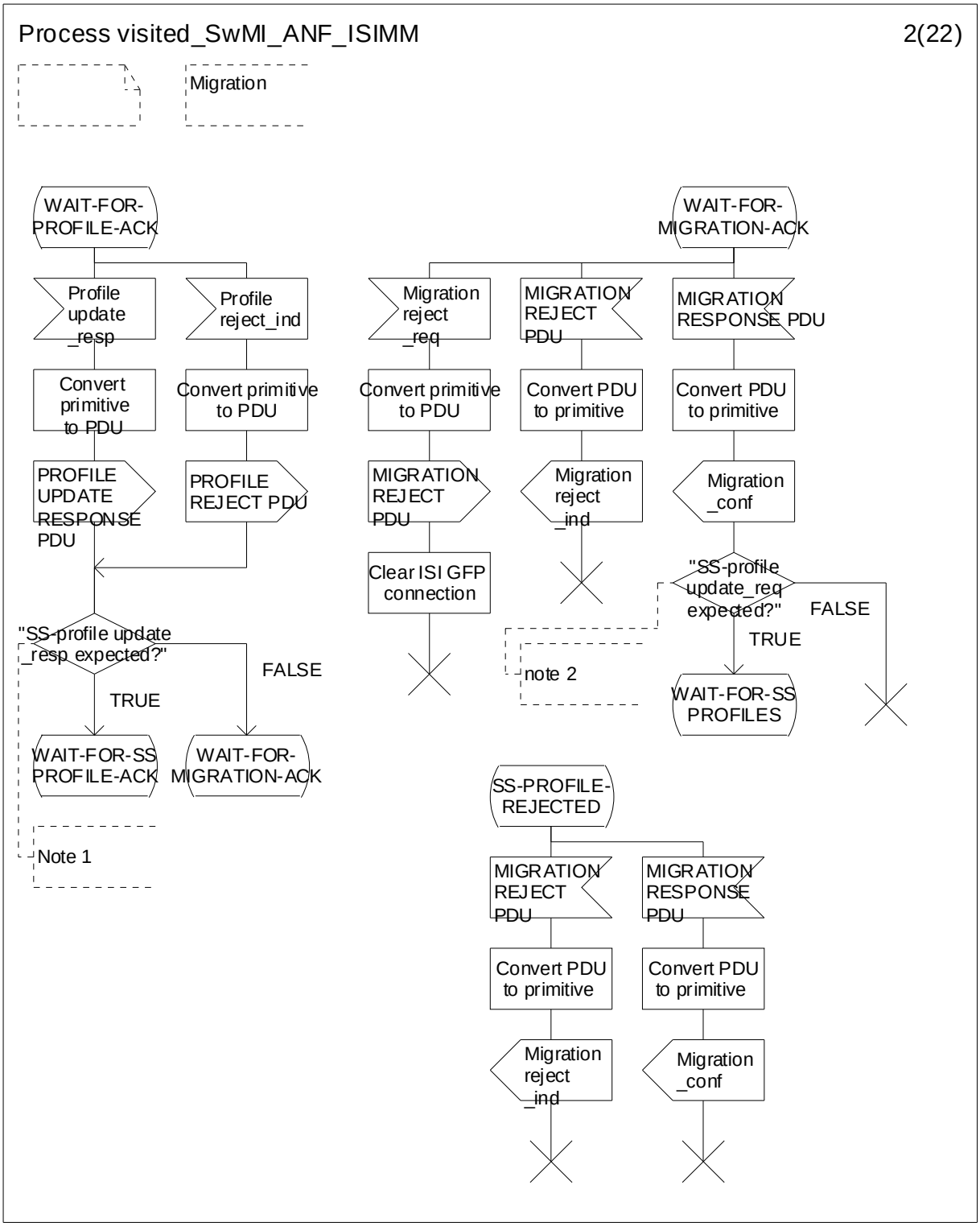
- WAIT-FOR-SS-PROFILE-ACK: The original SS-migration profile(s) has been received by the individual subscriber home SwMI MM and the home SwMI ANF-ISIMM is awaiting the response from ISI GFP; and
- WAIT-FOR-SS-PROFILES: The home SwMI ANF-ISIMM is awaiting the original SS-migration profile(s) from the individual subscriber home SwMI MM.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figures 111, 112 and 113.



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_req as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE.

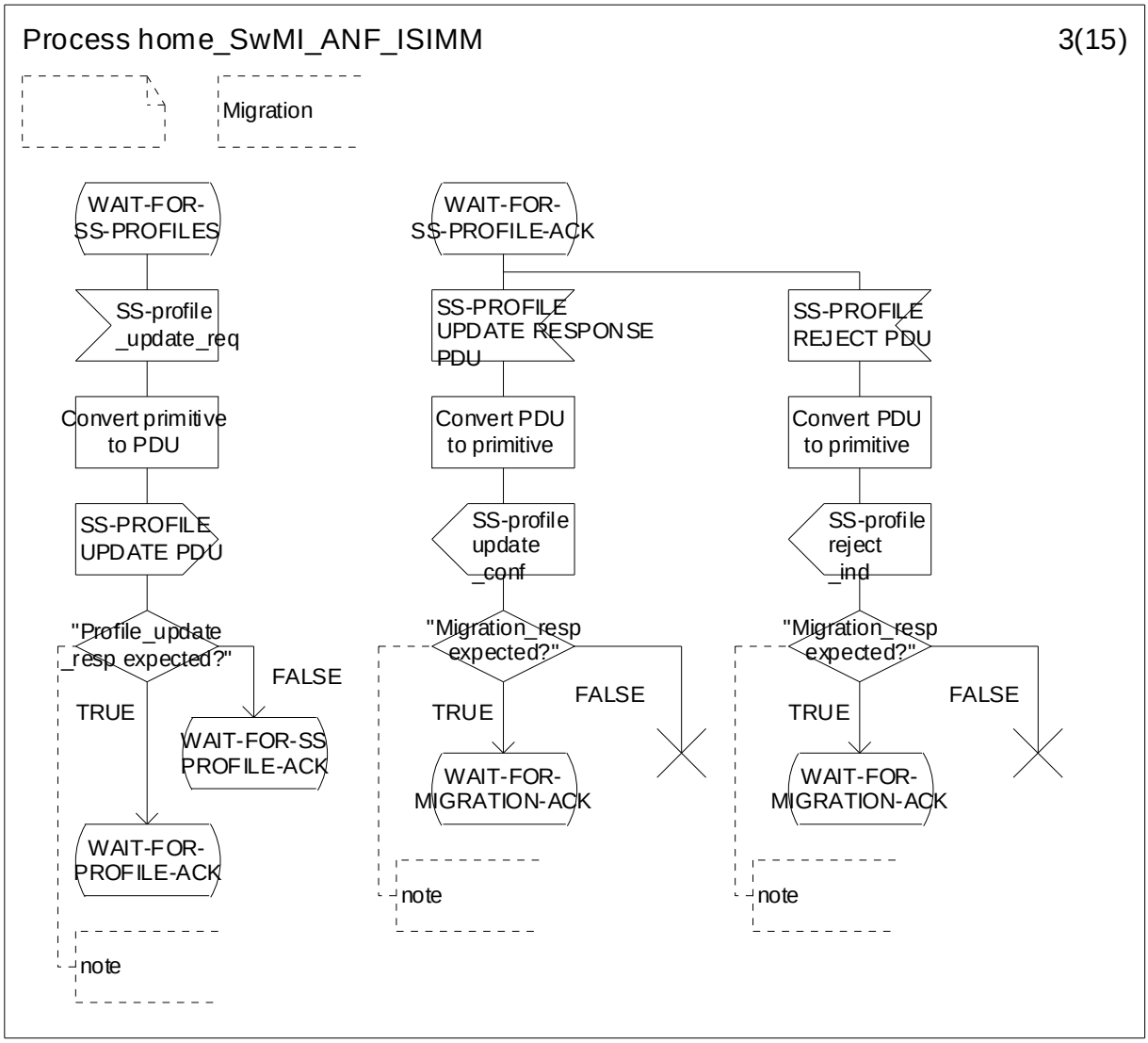
Figure 111: Individual subscriber home SwMI ANF-ISIMM for migration service



NOTE 1: Shall depend on the value of the SS-profile update indicator in the Profile update_req as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE;
- SS-profile update_req not applicable: FALSE.

NOTE 2: Shall depend on the value of the SS-profile update indicator in the Profile update_req as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE.

Figure 112: Individual subscriber home SwMI ANF-ISIMM for migration service



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_req as follows:
- SS-profile update_req sent before Migration_resp: TRUE;
- SS-profile update_req sent after Migration_resp: FALSE;
- SS-profile update_req not applicable: not possible.

Figure 113: Individual subscriber home SwMI ANF-ISIMM for migration service

35.5 Restricted migration

35.5.0 General

In the case of the restricted migration as defined in cases 2) and 3) in clause 7.5, the dynamic description illustrated in this clause contains only the restricted migration service behaviour. Thus, this restricted migration service behaviour complements the dynamic description as defined in clause 35.2. Note, however, that in the case of restricted migration, the states WAIT-FOR-SS-PROFILES and WAIT-FOR-SS-PROFILE-ACK shall not be applicable after the exchange

of MIGRATION_resp and MIGRATION_conf in the individual subscriber home SwMI ANF-ISIMM and in the visited SwMI ANF-ISIMM, respectively.

35.5.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no restricted migration in progress, applicable for case 1) as defined in clause 7.5;
- MIGRATION-INITIATED: the visited SwMI ANF-ISIMM is awaiting the restricted migration approval from ISI GFP, applicable for cases 1) and 2) as defined in clause 7.5; and
- WAIT-FOR-MIGRATION-ACK: the visited SwMI ANF-ISIMM is awaiting the restricted migration approval from ISI GFP, applicable for case 3) as defined in clause 7.5.

Visited SwMI ANF-ISIMM shall behave as defined in figure 114.

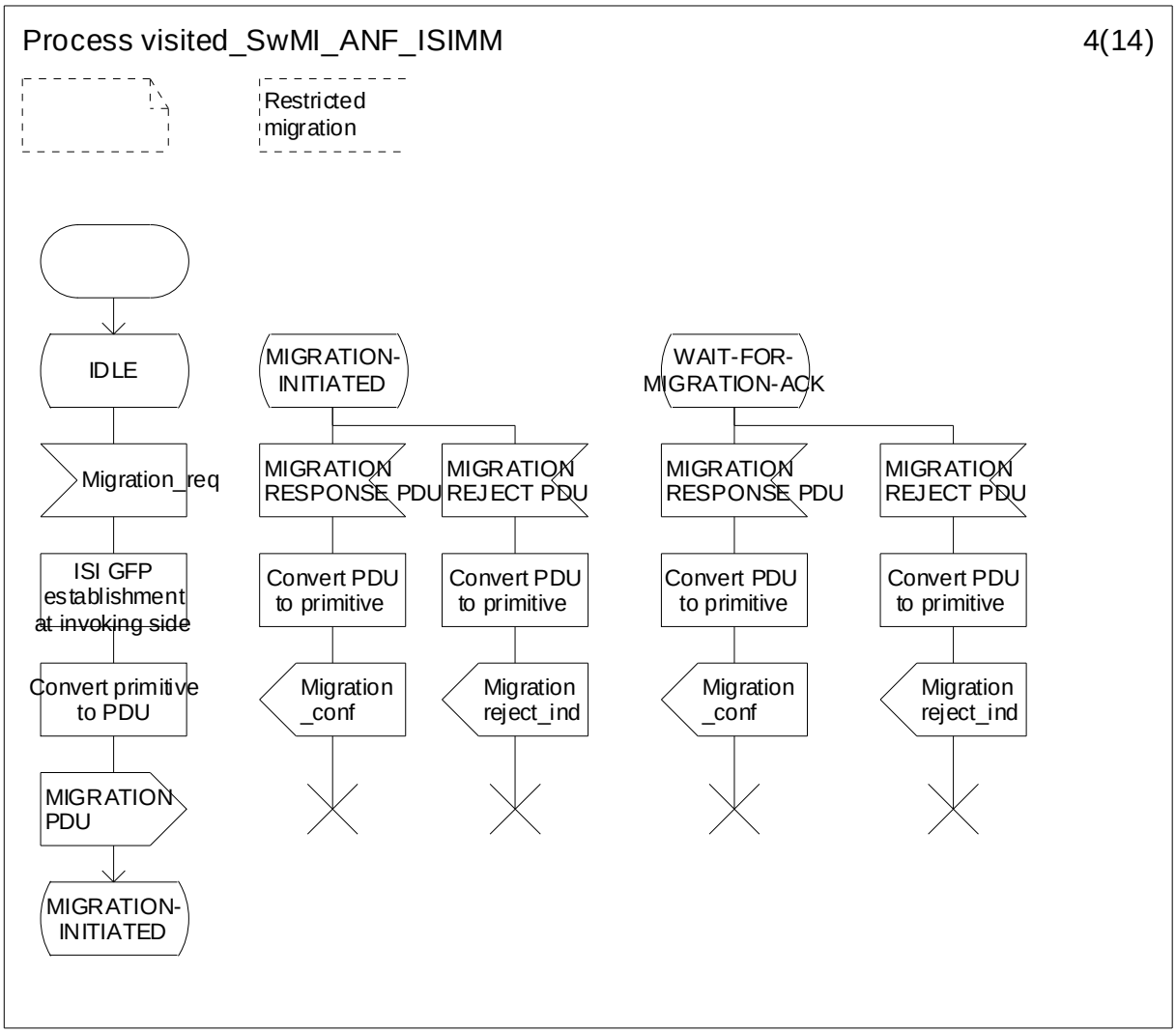


Figure 114: Visited SwMI ANF-ISIMM for restricted migration service

35.5.2 Individual subscriber home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no migration in progress, applicable for case 1) as defined in clause 7.5;
- MIGRATION-INITIATED: the individual subscriber home SwMI ANF-ISIMM is awaiting the restricted migration approval from the individual subscriber home SwMI MM, applicable for cases 1) and 2) as defined in clause 7.5; and
- WAIT-FOR-MIGRATION-ACK: the individual subscriber home SwMI ANF-ISIMM is awaiting the restricted migration approval from the home SwMI MM, applicable for case 3) as defined in clause 7.5.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figure 115.

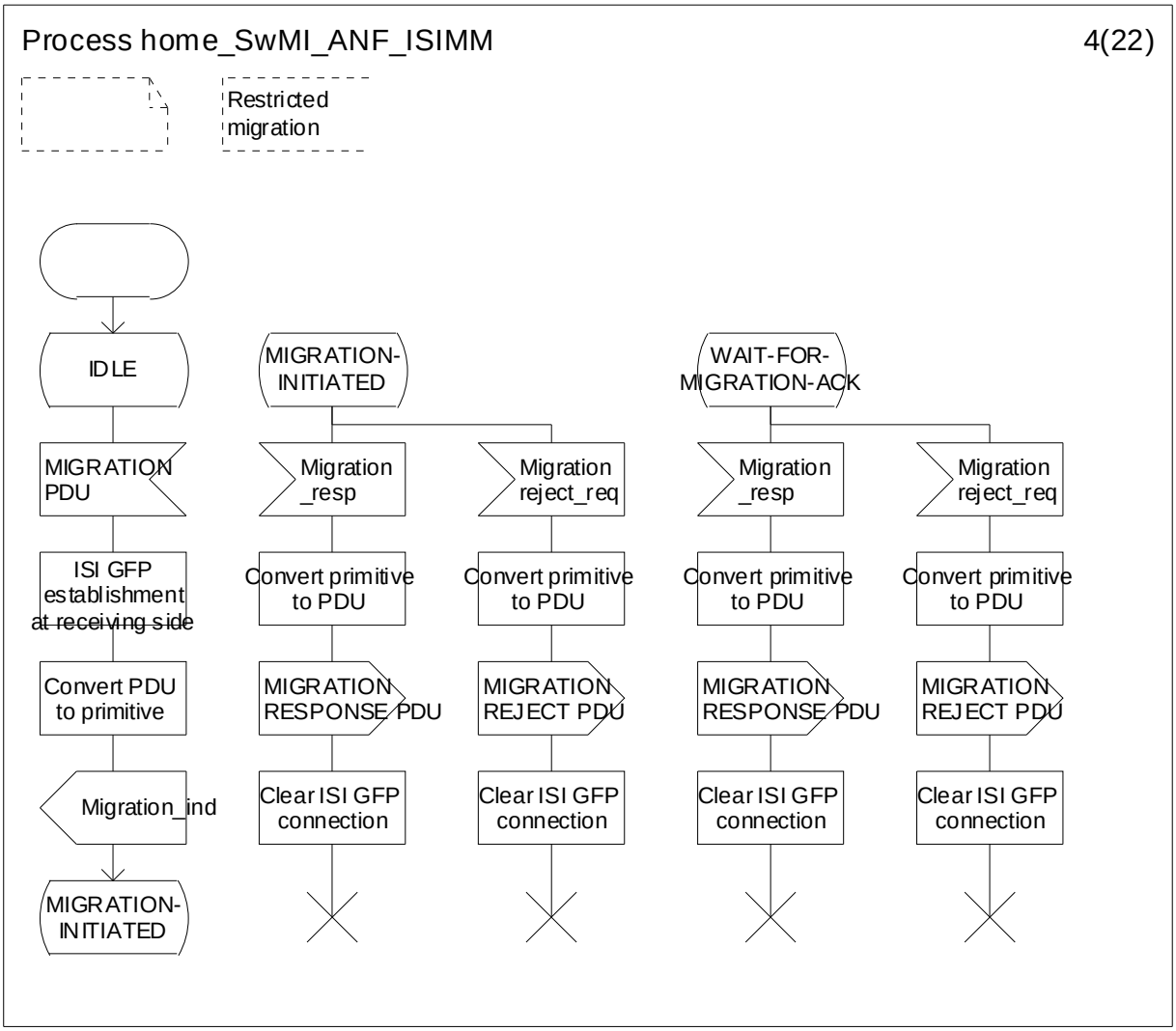


Figure 115: Individual subscriber home SwMI ANF-ISIMM for restricted migration service

35.6 Removal of Subscriber Information

35.6.1 Individual subscriber home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no RSI in progress; and
- REMOVE-SUBS-INITIATED: RSI has been initiated and individual subscriber home SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figure 116.

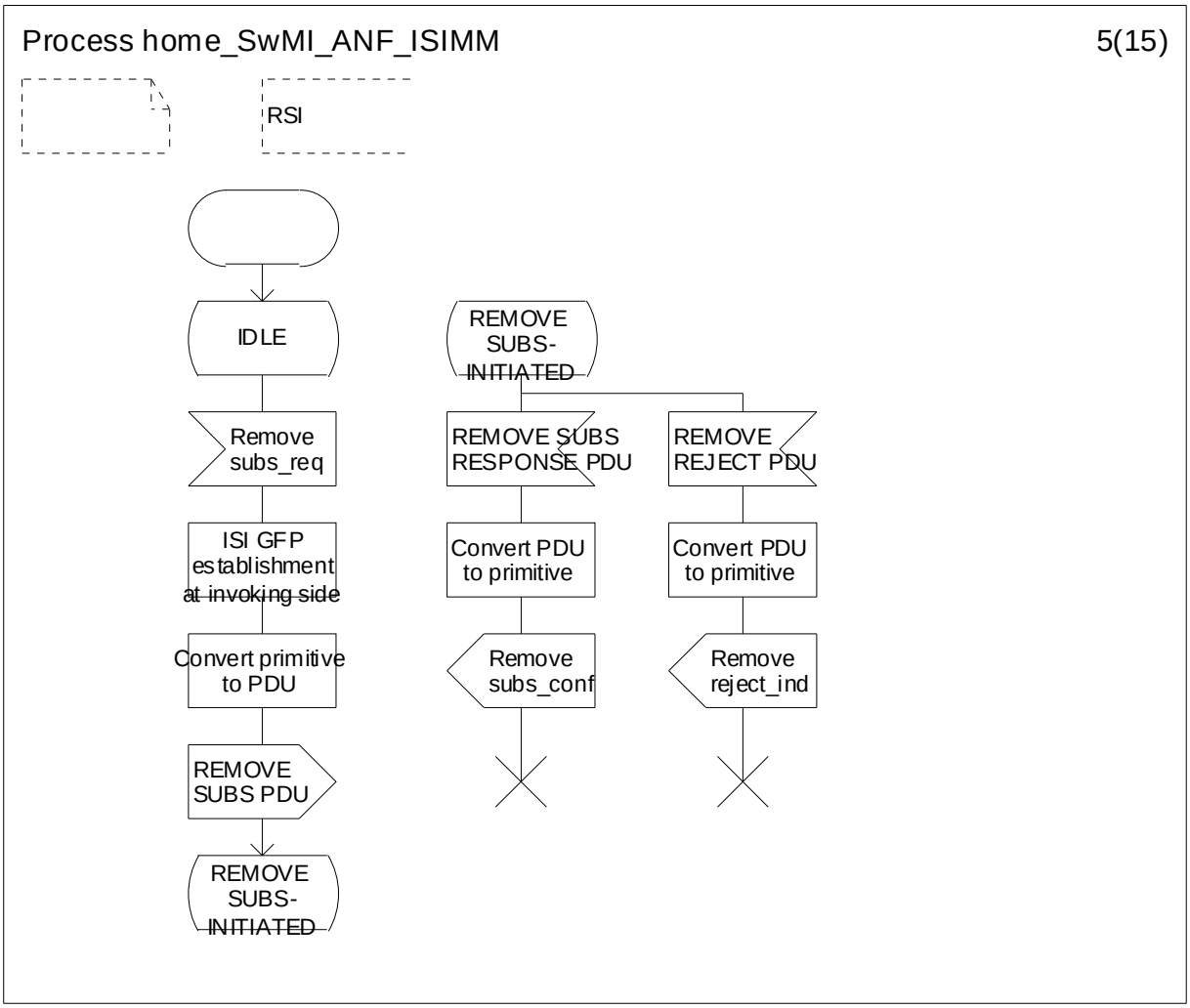


Figure 116: Individual subscriber home SwMI ANF-ISIMM for RSI service

35.6.2 Previous visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no RSI in progress; and
- REMOVE-SUBS-INITIATED: RSI has been initiated and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM.

Previous visited SwMI ANF-ISIMM shall behave as defined in figure 117.

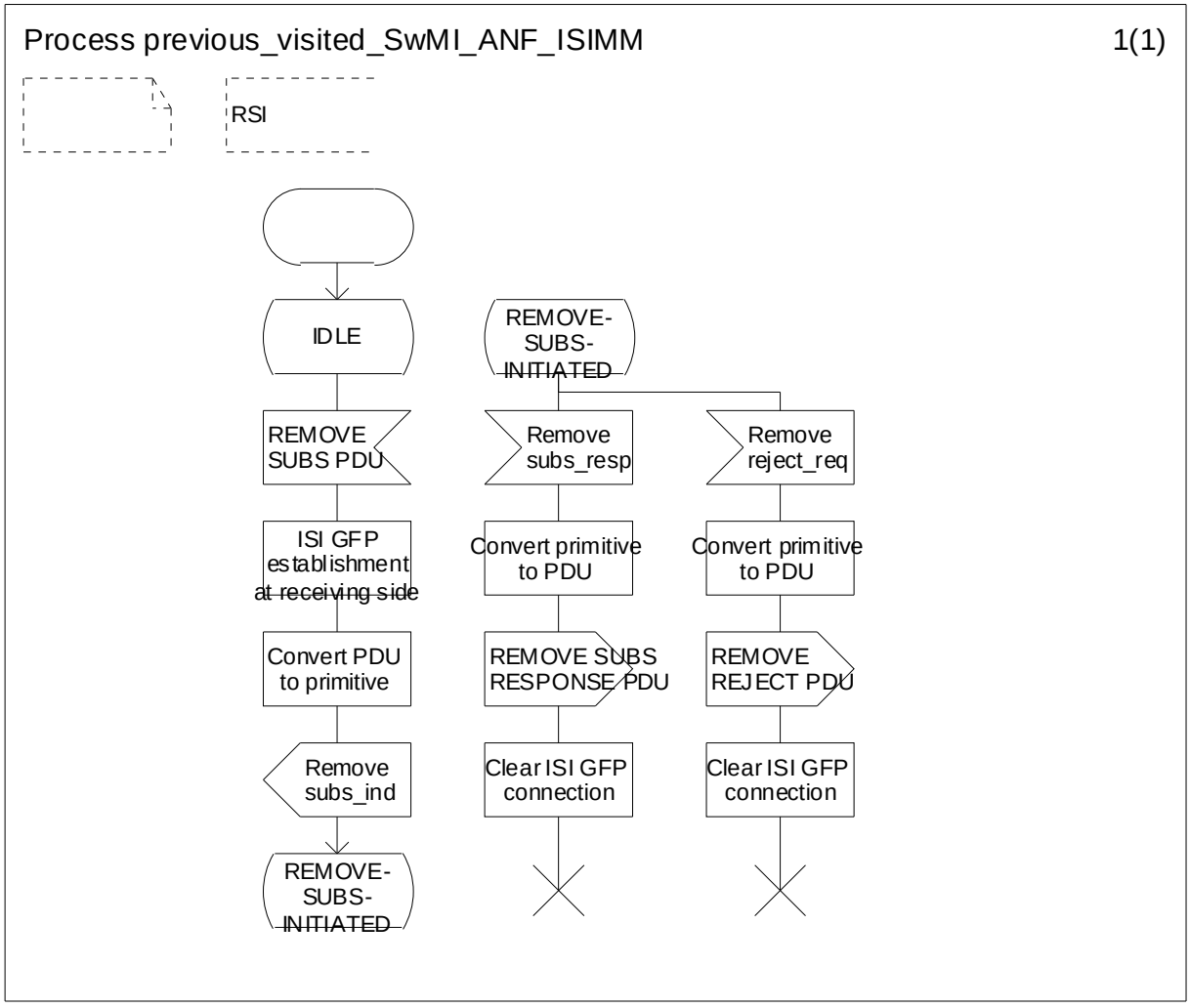


Figure 117: Previous visited SwMI ANF-ISIMM for RSI service

35.7 De-registration

35.7.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no de-registration in progress; and
- DE-REG-INITIATED: de-registration has been initiated and visited SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figure 118.

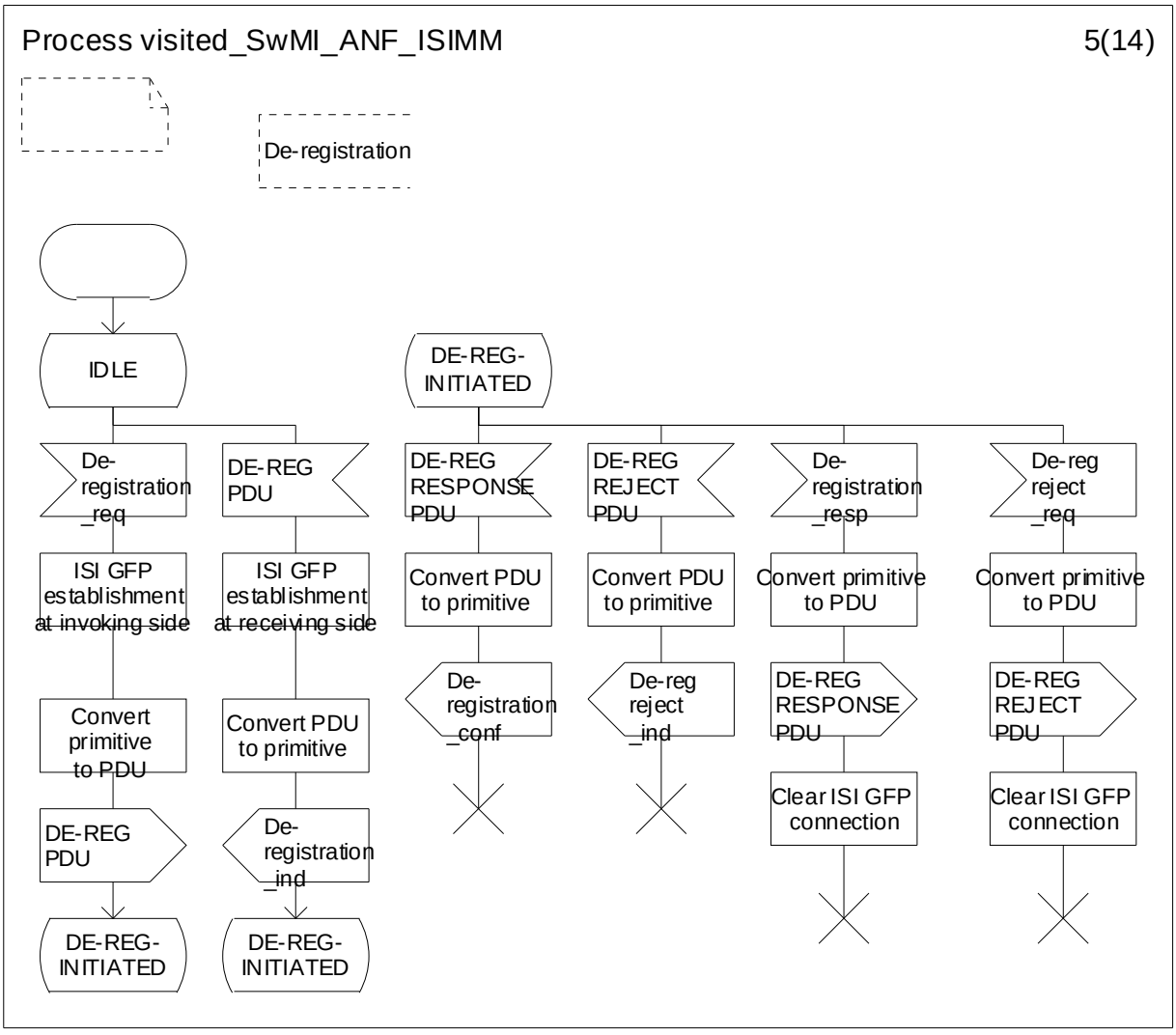


Figure 118: Visited SwMI ANF-ISIMM for de-registration service

35.7.2 Individual subscriber home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no de-registration in progress; and
- DE-REG-INITIATED: de-registration has been initiated and individual subscriber home SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figure 119.

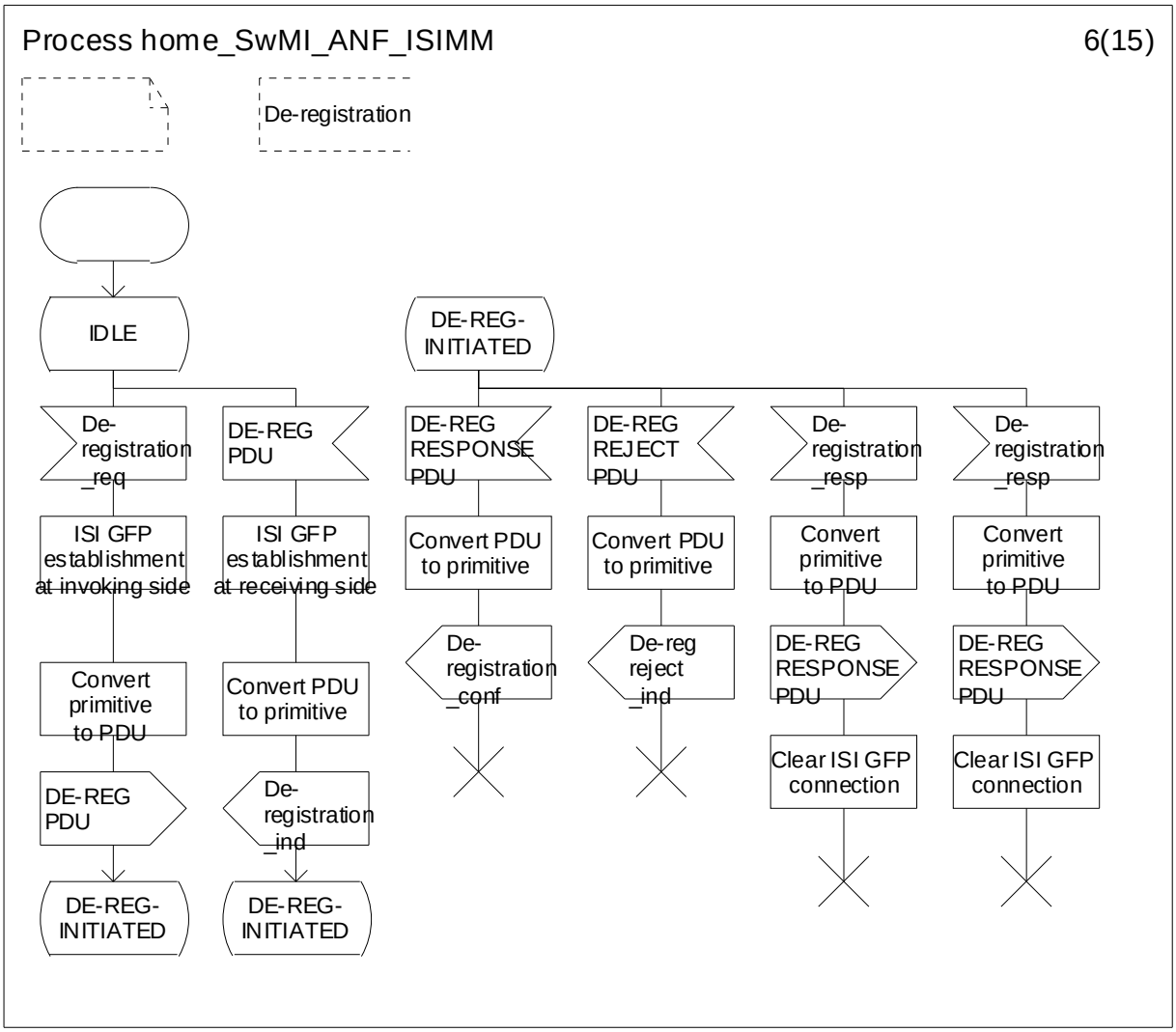


Figure 119: Individual subscriber home SwMI ANF-ISIMM for de-registration service

35.8 Profile update

35.8.1 Home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no profile update in progress; and
- PROFILE-UPDATE-INITIATED: profile update has been initiated and home SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Home SwMI ANF-ISIMM shall behave as defined in figure 120.

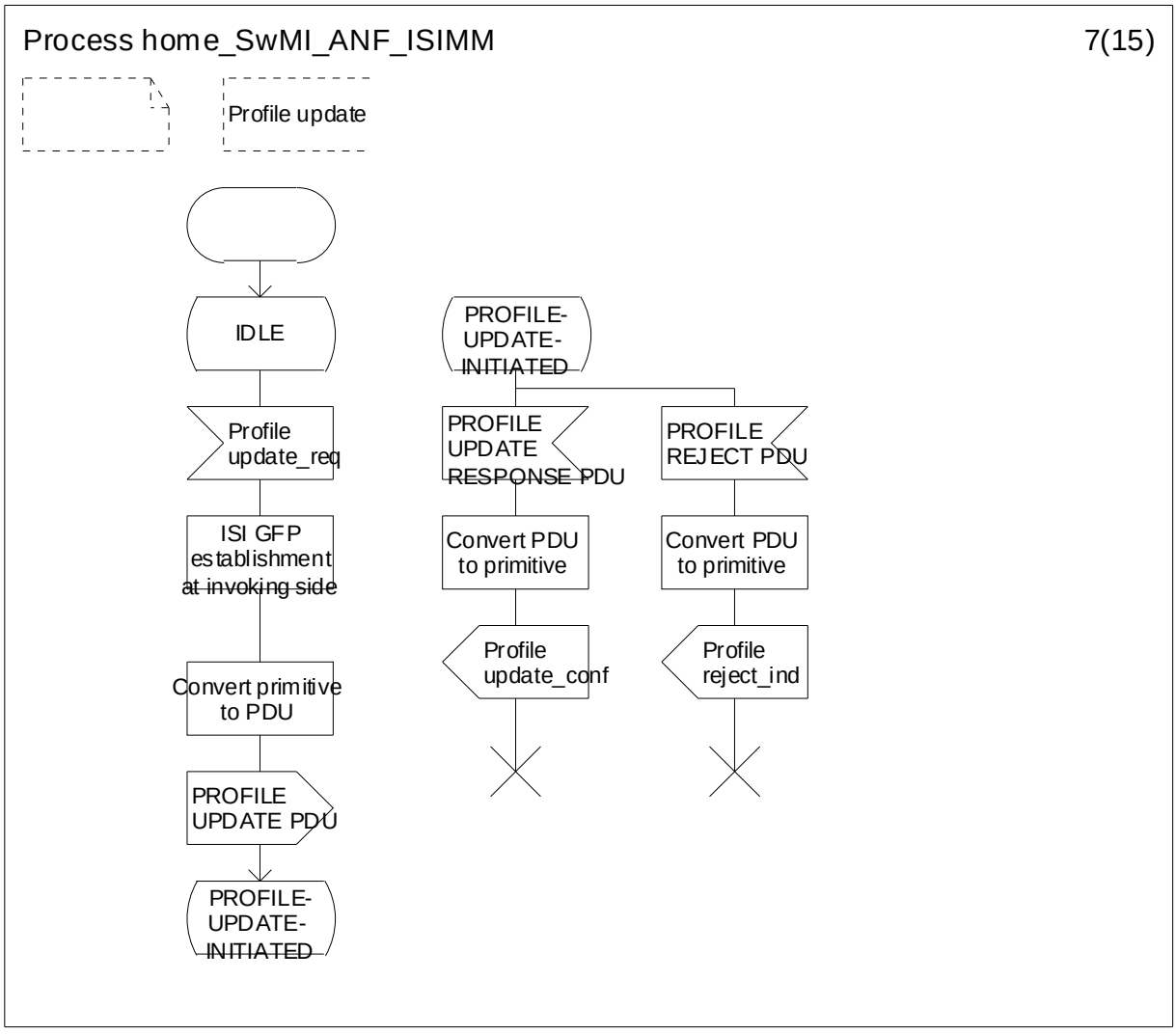


Figure 120: Home SwMI ANF-ISIMM for profile update service

35.8.2 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no profile update in progress; and
- PROFILE-UPDATE-INITIATED: profile update has been initiated and visited SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figure 121.

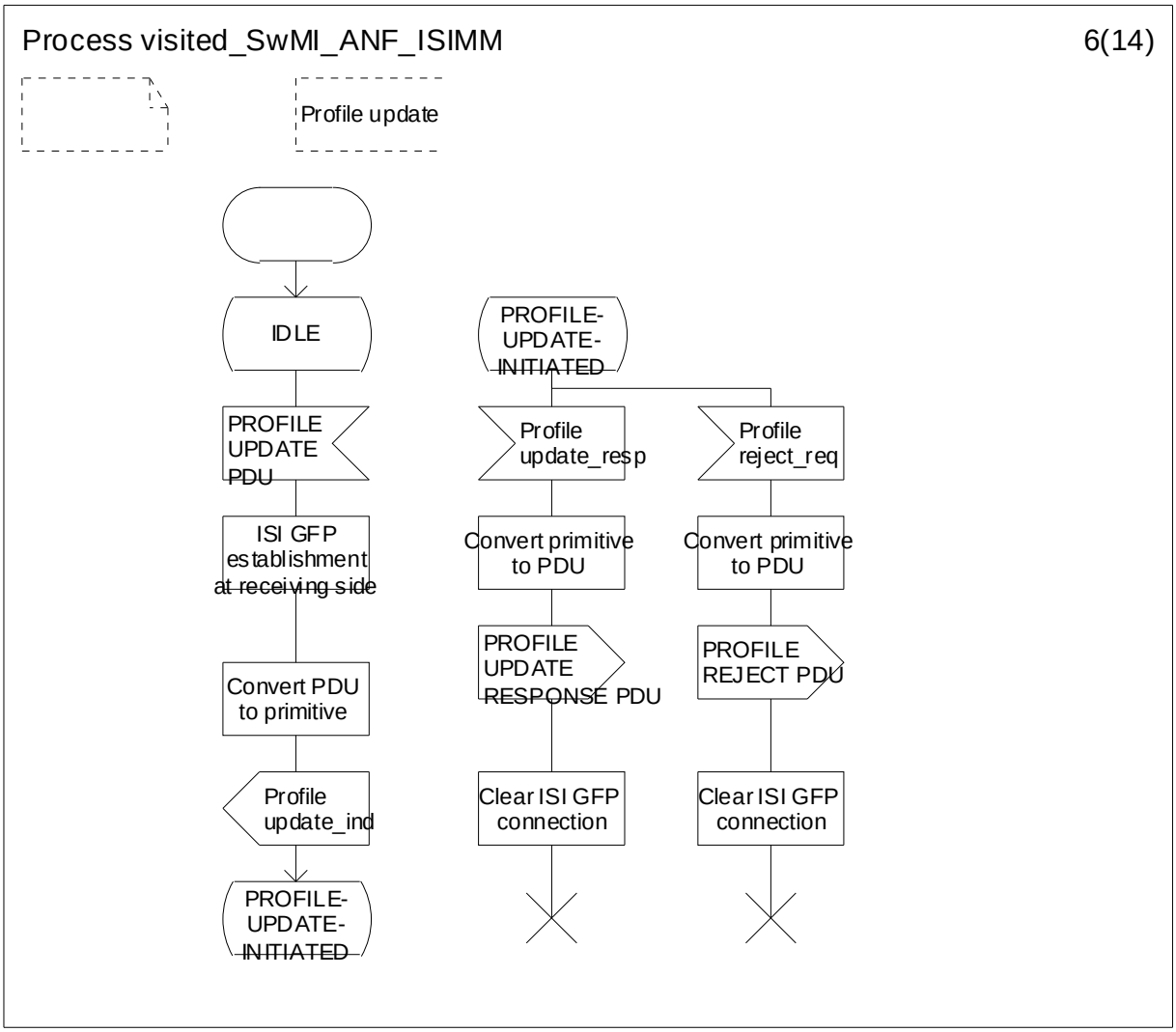


Figure 121: Visited SwMI ANF-ISIMM for profile update service

35.9 SS-profile update

35.9.1 Home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no SS-profile update in progress; and
- SS-PROFILE-UPDATE-INITIATED: SS-profile update has been initiated and home SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Home SwMI ANF-ISIMM shall behave as defined in figure 122.

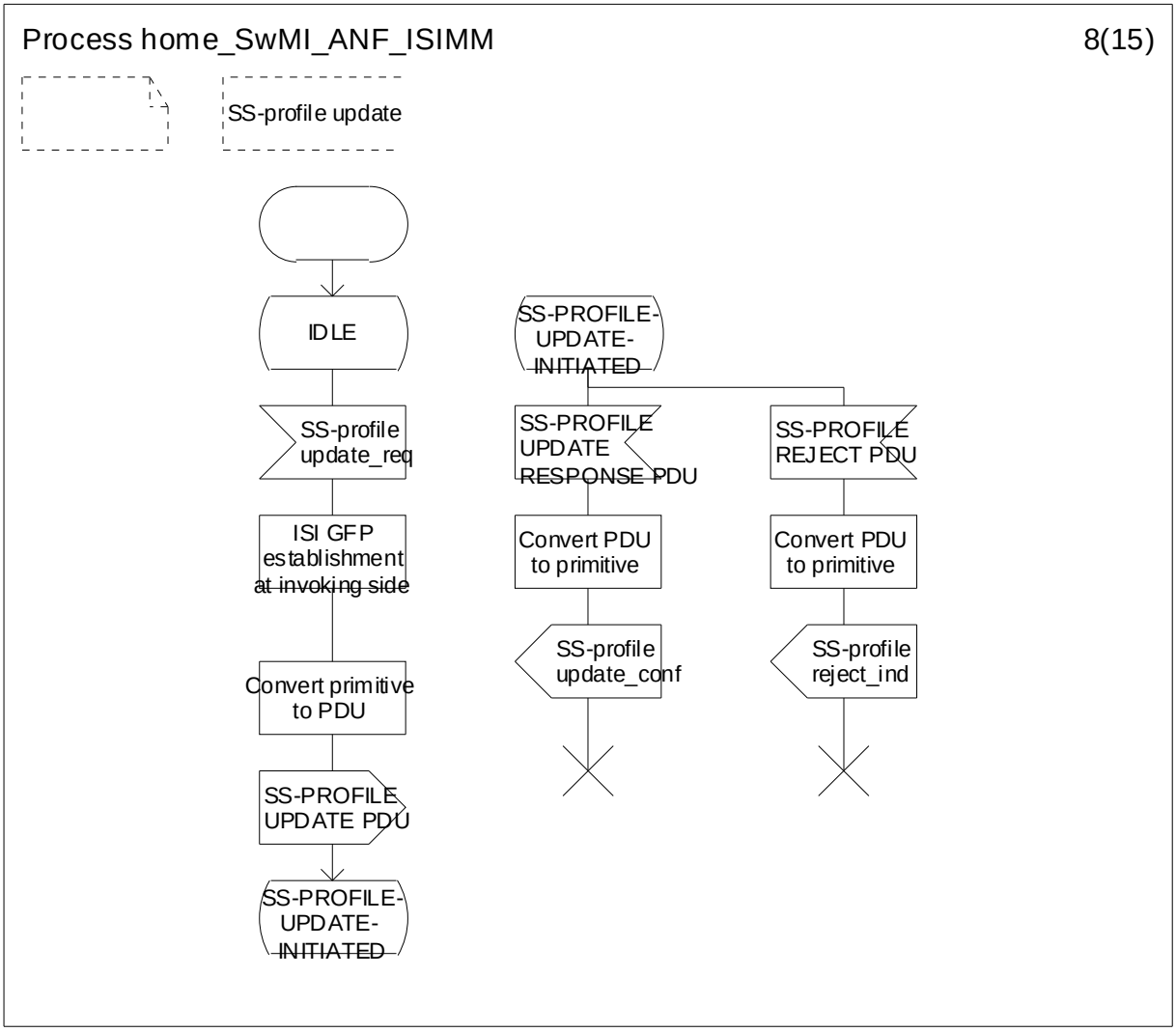


Figure 122: Home SwMI ANF-ISIMM for SS-profile update service

35.9.2 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no SS-profile update in progress; and
- SS-PROFILE-UPDATE-INITIATED: SS-profile update has been initiated and visited SwMI ANF-ISIMM is awaiting the response from ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figure 123.

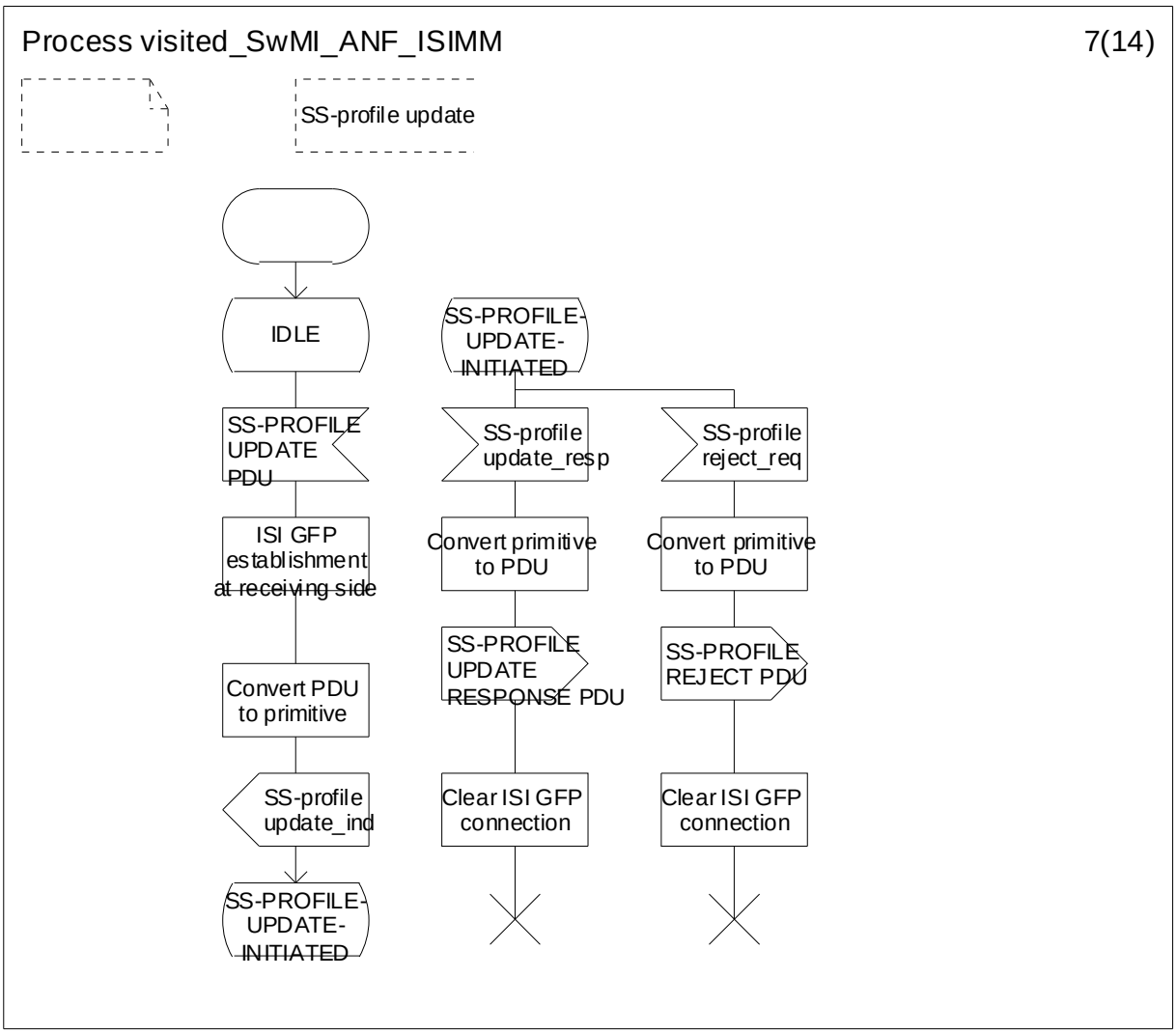


Figure 123: Visited SwMI ANF-ISIMM for SS-profile update service

35.10 Authentication

35.10.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no authentication in progress;
- AUTHENTICATION-INITIATED: authentication has been initiated and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- MIGRATION-REJECTION: the authentication has been rejected (or failed) in the visited SwMI MM and the visited SwMI ANF-ISIMM is awaiting the Migration reject_req from the visited SwMI MM;

- MIGRATION-REJECTION-ACK: the visited SwMI ANF-ISIMM is awaiting the MIGRATION REJECT RESPONSE PDU from the ISI GFP; and
- WAIT-FOR-AUTH-RESULT: authentication parameters have been transported and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM.
- Visited SwMI ANF-ISIMM shall behave as defined in figure 124.

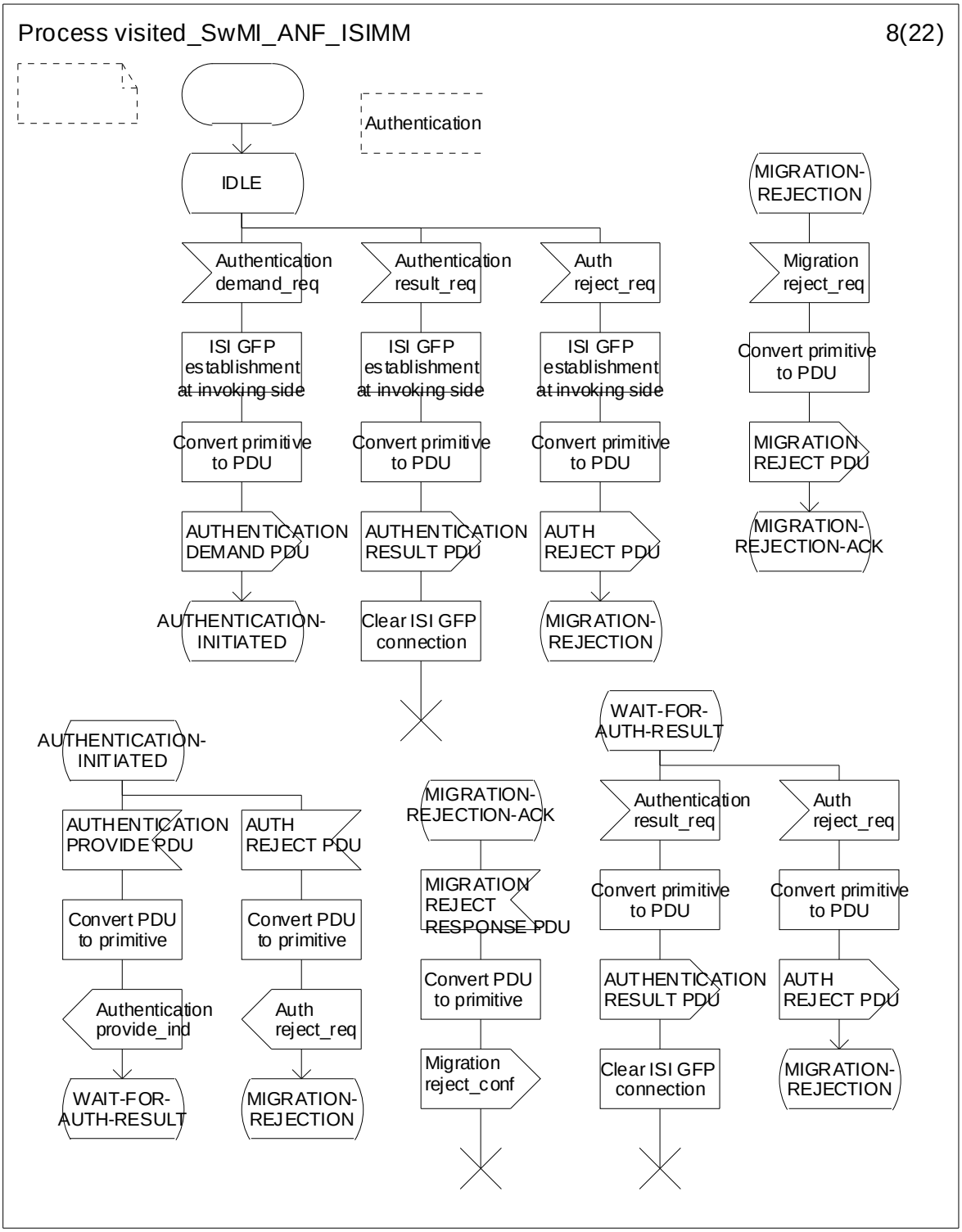


Figure 124: Visited SwMI ANF-ISIMM

35.10.2 Individual subscriber home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no Authentication generation in progress;
- AUHTENTICATION-INITIATED: authentication has been initiated and the individual subscriber home SwMI ANF-ISIMM is awaiting the response from the individual subscriber home SwMI MM;
- MIGRATION-REJECTION: the individual subscriber home SwMI ANF-ISIMM is awaiting the MIGRATION REJECT PDU from the ISI GFP after the failed authentication; and
- WAIT-FOR-AUTH-RESULT: authentication parameters have been transported and the individual subscriber home SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figure 125.

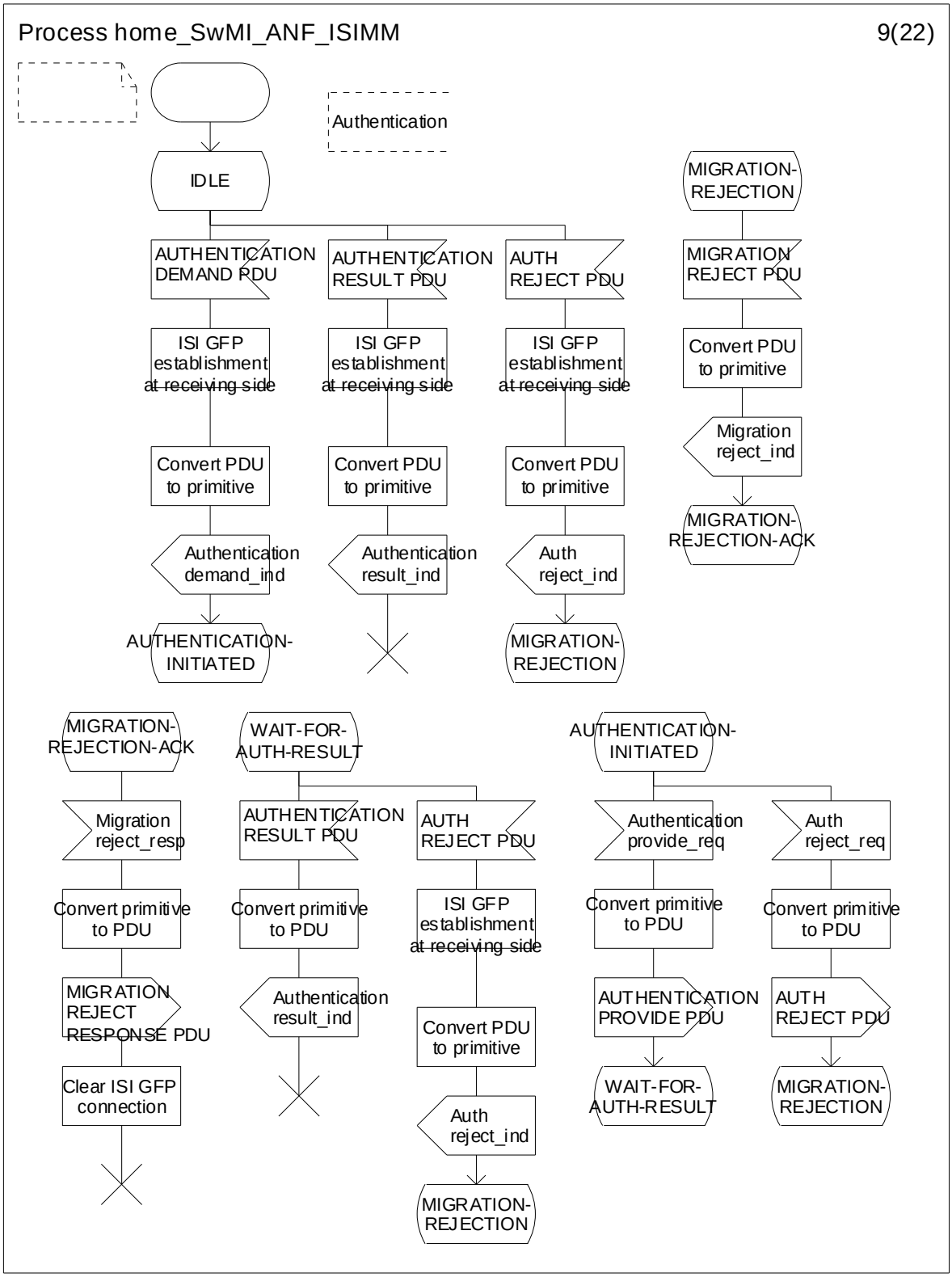


Figure 125: Individual subscriber home SwMI ANF-ISIMM

35.11 Over the air re-keying

35.11.1 OTAR SCK generation

35.11.1.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no OTAR SCK generation in progress;
- OTAR-PARAM-INITIATED: OTAR SCK generation has been initiated and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP; and
- WAIT-FOR-PARAM-RESULT: OTAR SCK generation parameters have been transported and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM.

Visited SwMI ANF-ISIMM shall behave as defined in figure 126.

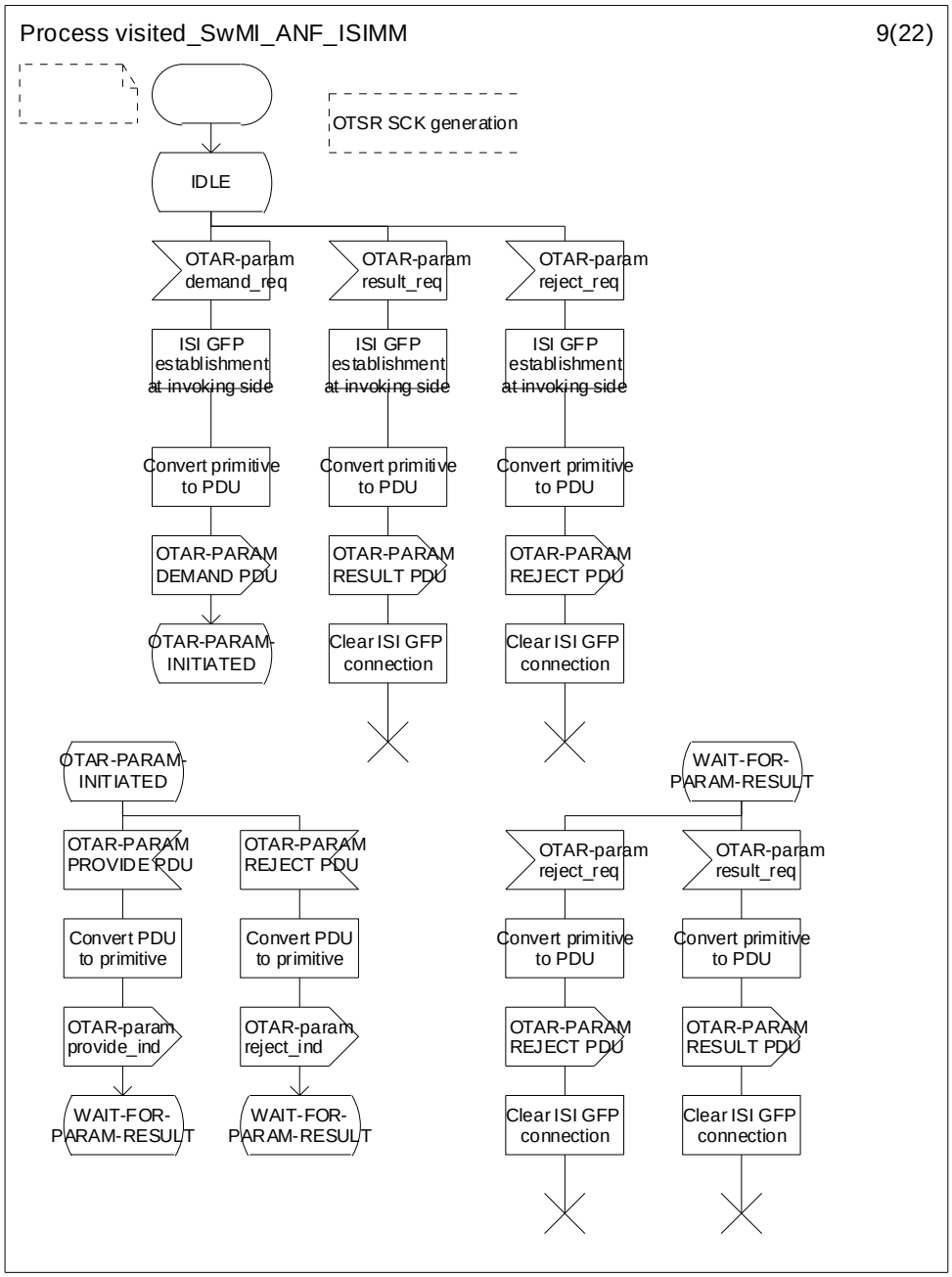


Figure 126: Visited SwMI ANF-ISIMM

35.11.1.2 Home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no OTAR SCK generation in progress;
- OTAR-PARAM-INITIATED: OTAR SCK generation has been initiated and the home SwMI ANF-ISIMM is awaiting the response from the home SwMI MM; and
- WAIT-FOR-PARAM-RESULT: OTAR SCK generation parameters have been transported and the home SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Home SwMI ANF-ISIMM shall behave as defined in figure 127.

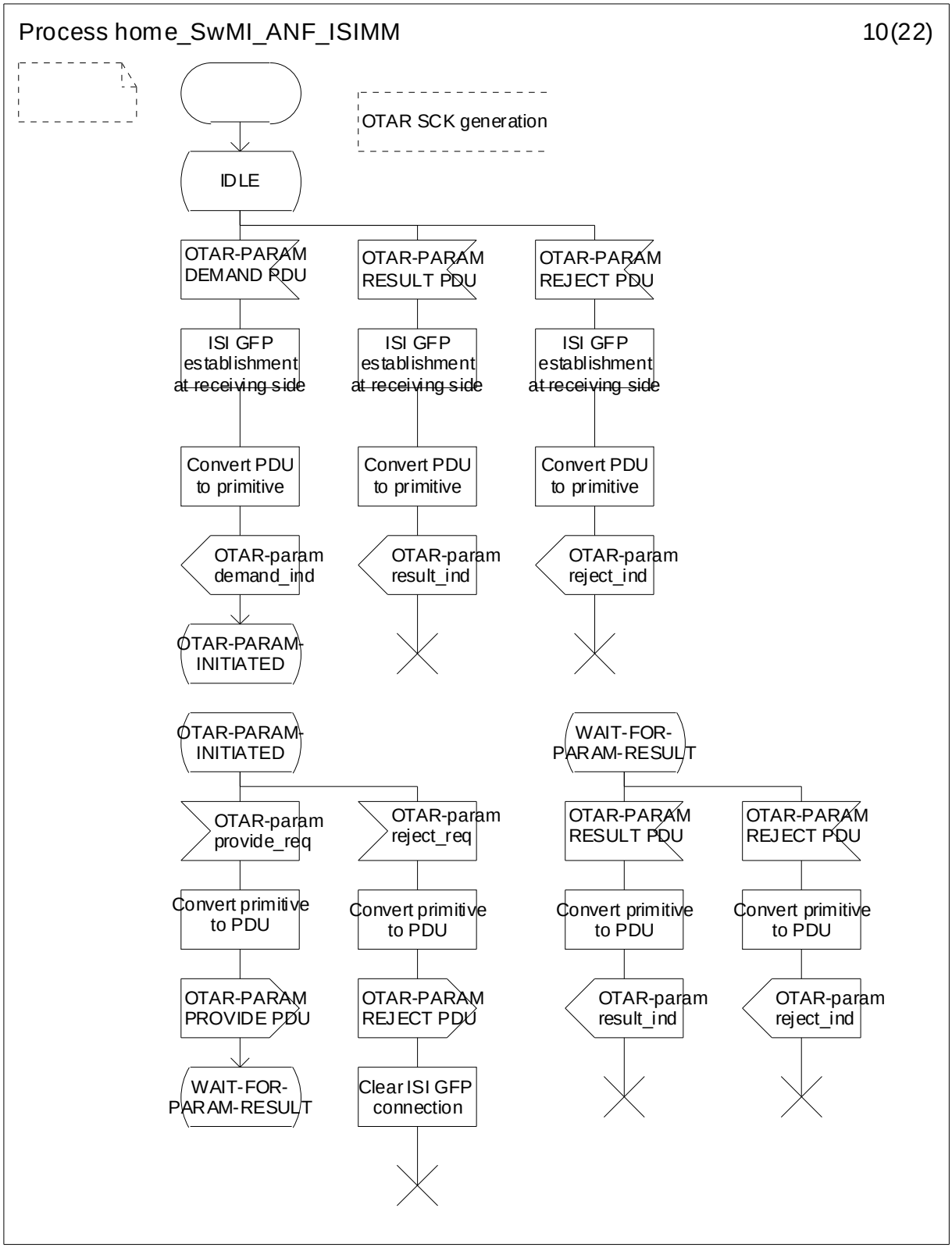


Figure 127: Home SwMI ANF-ISIMM

35.11.2 OTAR SCK delivery

35.11.2.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no OTAR SCK delivery in progress;

- OTAR-PARAM-INITIATED: OTAR SCK delivery has been initiated and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP; and
- WAIT-FOR-PARAM-RESULT: OTAR SCK delivery parameters have been transported and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM.

Visited SwMI ANF-ISIMM shall behave as defined in figure 128.

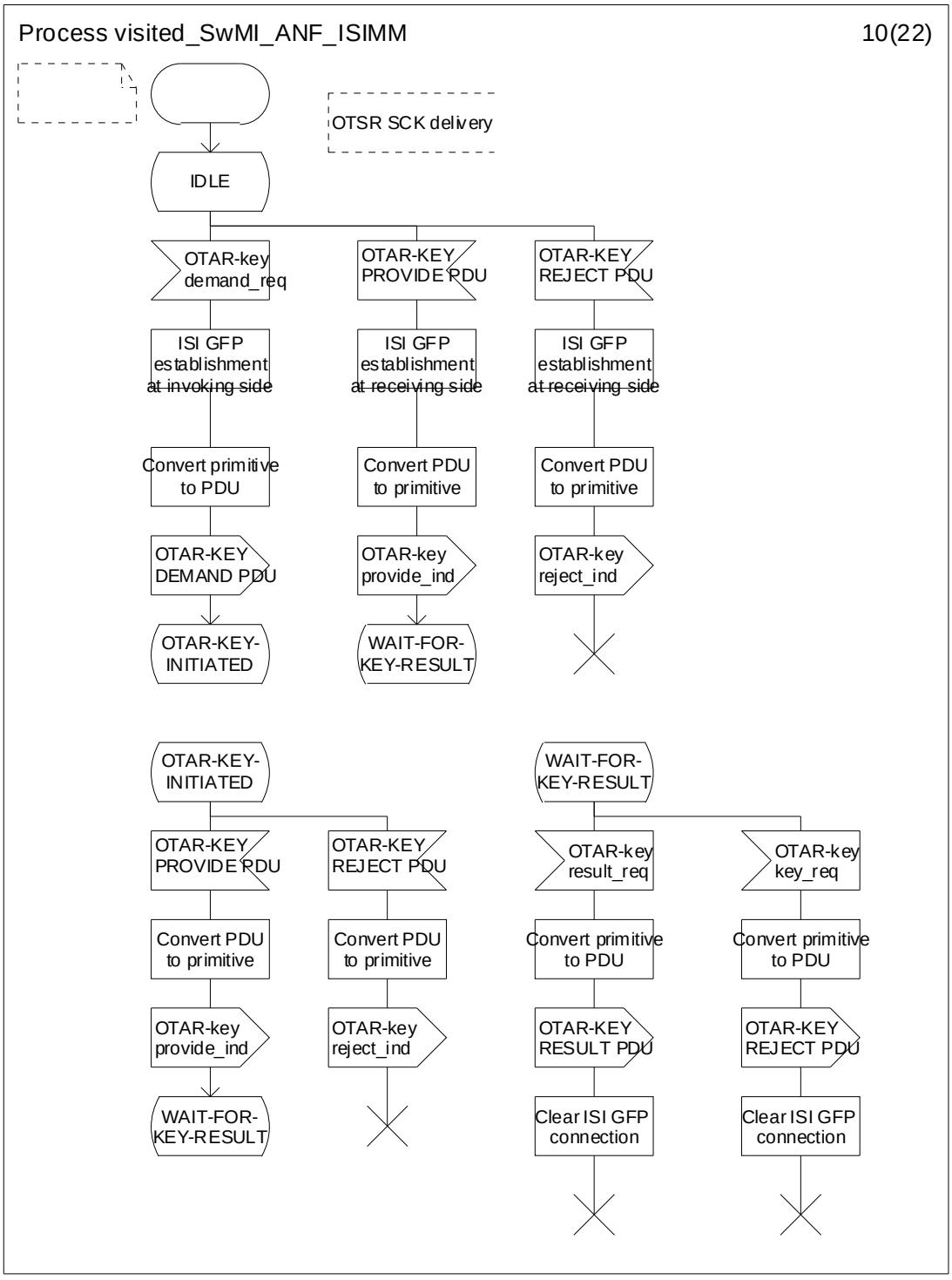


Figure 128: Visited SwMI ANF-ISIMM

35.11.2.2 Home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no OTAR SCK delivery in progress;
- OTAR-PARAM-INITIATED: OTAR SCK delivery has been initiated and the home SwMI ANF-ISIMM is awaiting the response from the home SwMI MM; and
- WAIT-FOR-PARAM-RESULT: OTAR SCK delivery parameters have been transported and the home SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Home SwMI ANF-ISIMM shall behave as defined in figure 129.

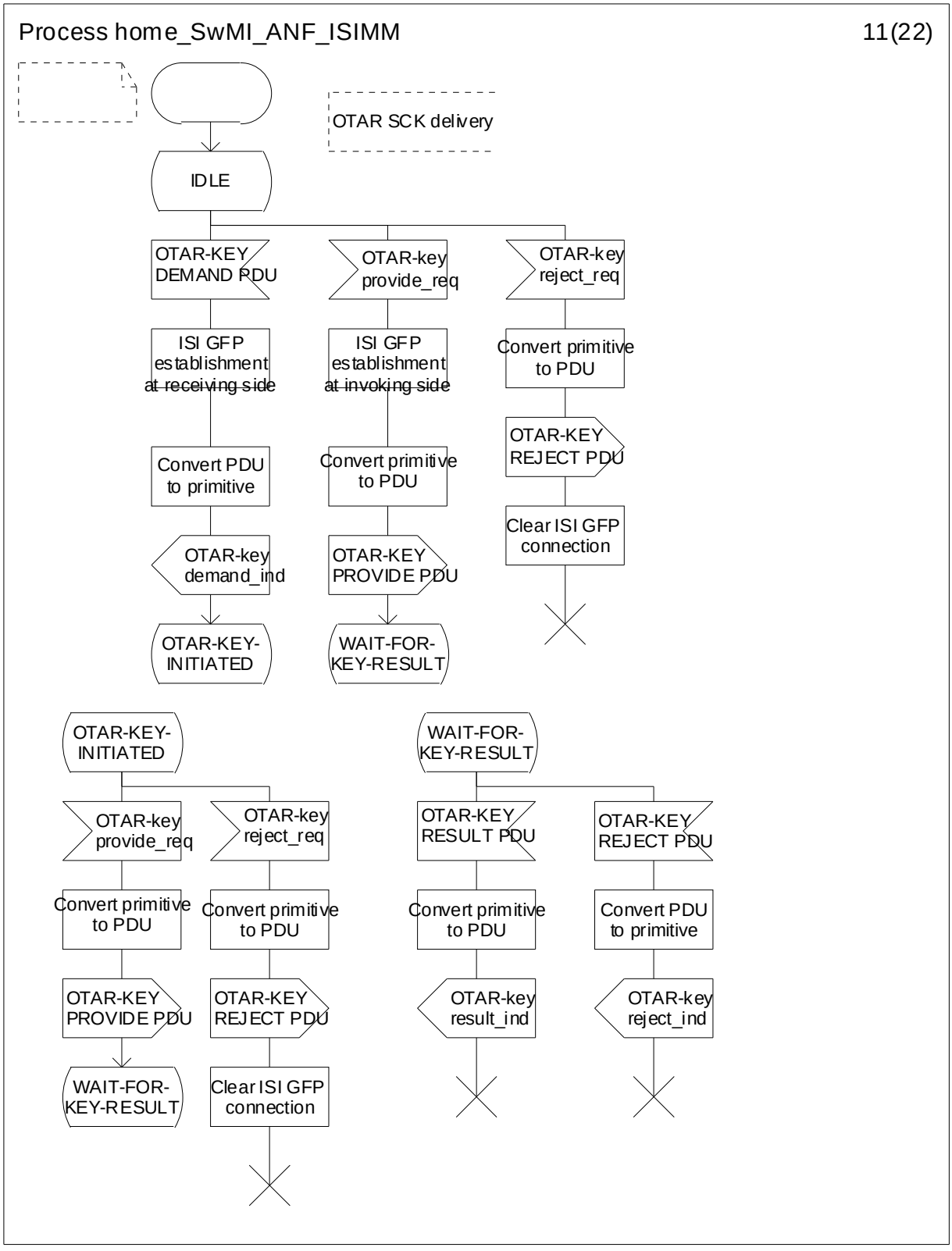


Figure 129: Home SwMI ANF-ISIMM

35.12 Individual subscriber database recovery

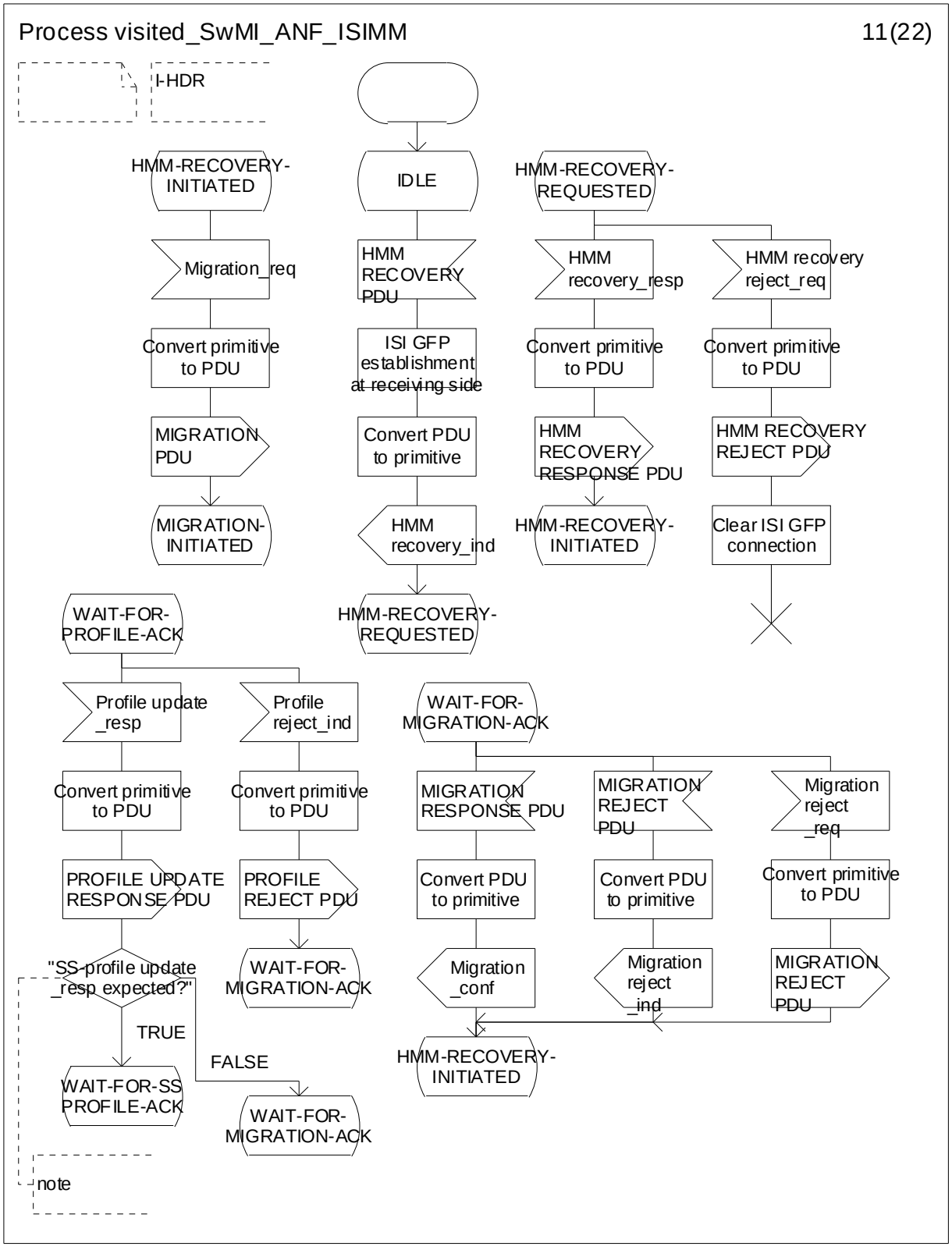
35.12.1 HMM recovery

35.12.1.1 Visited SwMI ANF-ISIMM

The following SDL states are used in addition to the states as defined in clauses 35.4.1 and 35.5.1:

- IDLE: no HMM recovery in progress. This definition shall replace the IDLE states as defined in clauses 35.4.1 and 35.5.1;
- HMM-RECOVERY-REQUESTED: HMM recovery has been requested and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM;
- HMM-RECOVERY-INITIATED: HMM recovery has been initiated and the visited SwMI ANF-ISIMM is awaiting the HMM recovery primitives from the visited SwMI MM; and
- HMM-RECOVERY-COMPLETED: HMM recovery has been completed and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figures 130 and 131.



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_req: TRUE;
- SS-profile update_req sent after Migration_req: not applicable;
- SS-profile update_req not applicable: FALSE.

Figure 130: Visited SwMI ANF-ISIMM

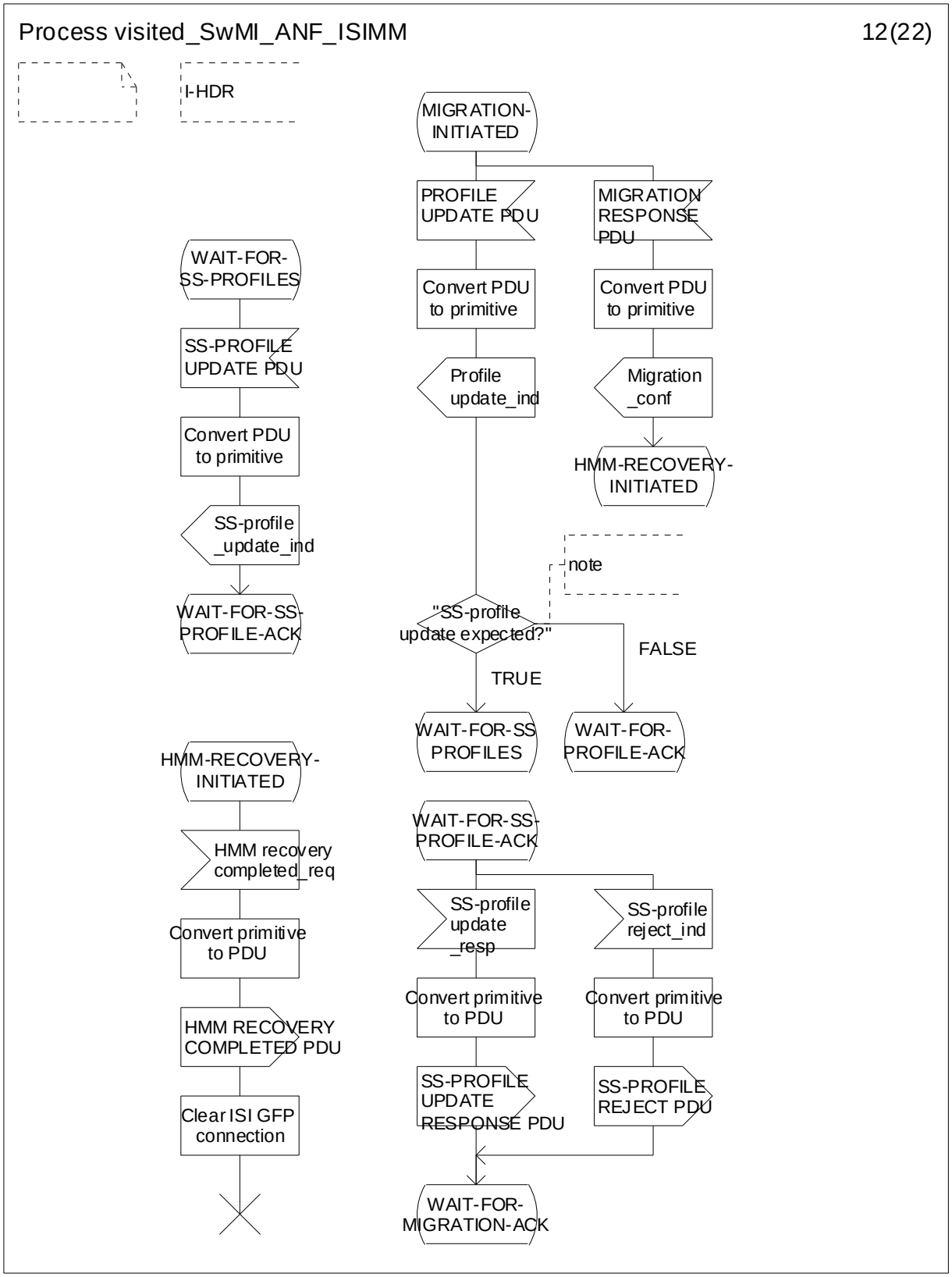


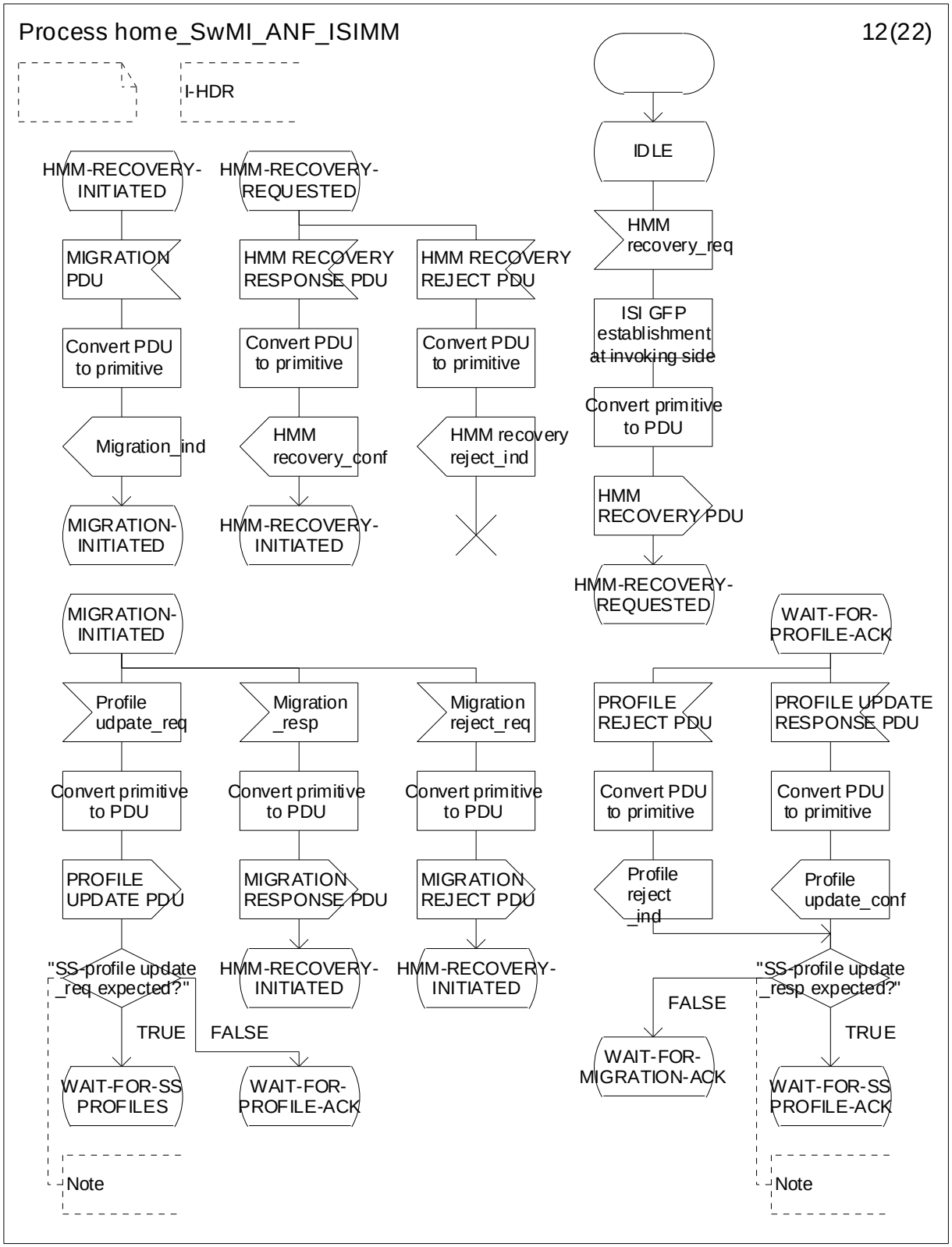
Figure 131: Visited SwMI ANF-ISIMM

35.12.1.2 Individual subscriber home SwMI ANF-ISIMM

The following SDL states are used in addition to the states as defined in clauses 35.4.2, 35.5.2 and 35.6.1:

- IDLE: no HMM recovery in progress. This definition shall replace the IDLE states as defined in clauses 35.4.2, 35.5.2 and 35.6.1;
- HMM-RECOVERY-REQUESTED: HMM recovery has been requested and the individual subscriber home SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- HMM-RECOVERY-INITIATED: HMM recovery has been initiated and the individual subscriber home SwMI ANF-ISIMM is awaiting the HMM recovery PDUs from the ISI GFP; and
- HMM-RECOVERY-COMPLETED: HMM recovery has been completed and the individual subscriber home SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figures 132 and 133.



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_req as follows:
- SS-profile update_req sent before Migration_req: TRUE;
- SS-profile update_req sent after Migration_req: not applicable;
- SS-profile update_req not applicable: FALSE.

Figure 132: Individual subscriber home SwMI ANF-ISIMM

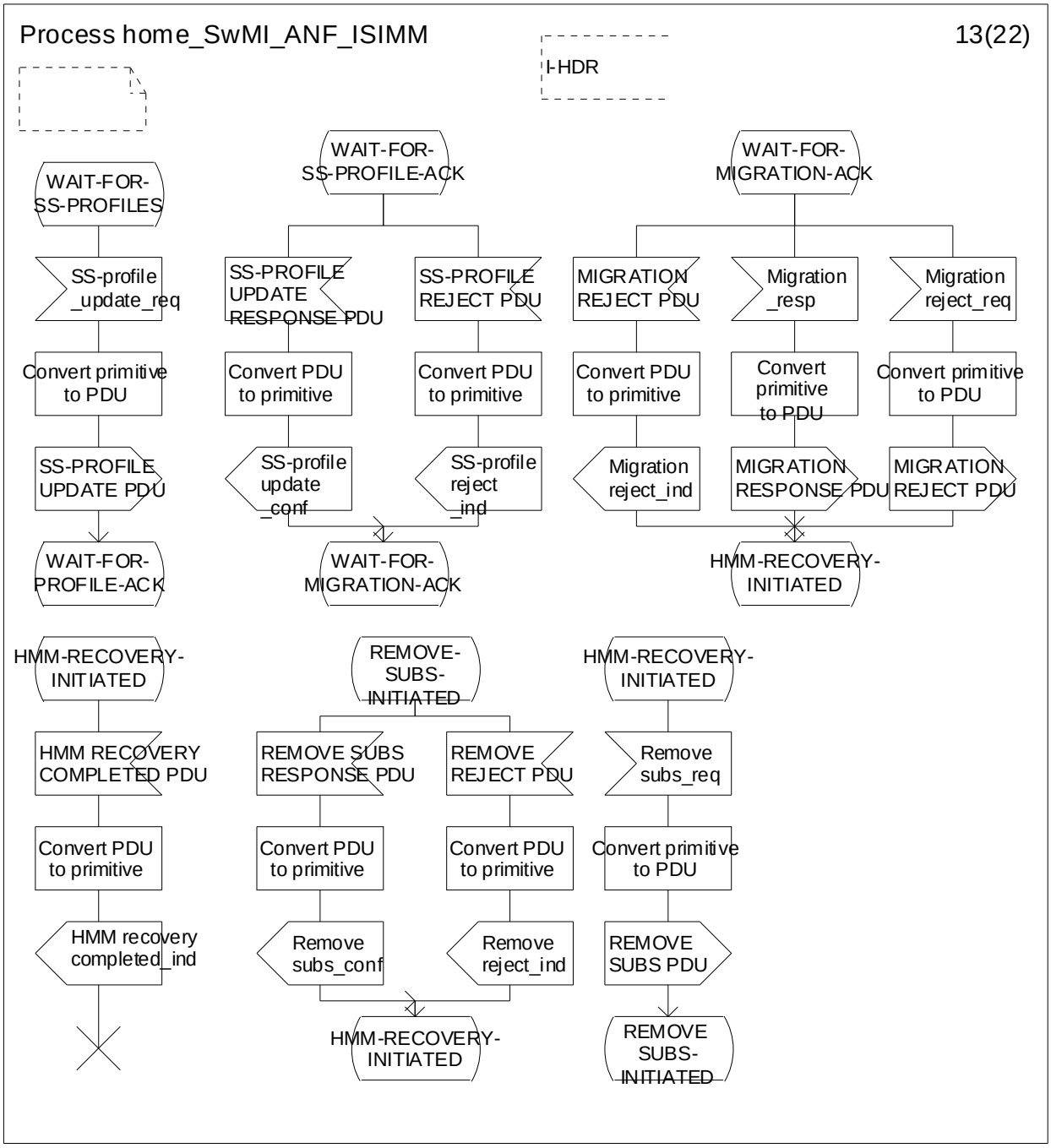


Figure 133: Individual subscriber home SwMI ANF-ISIMM

35.12.1.3 Previous visited SwMI ANF-ISIMM

As in clause 35.6.2.

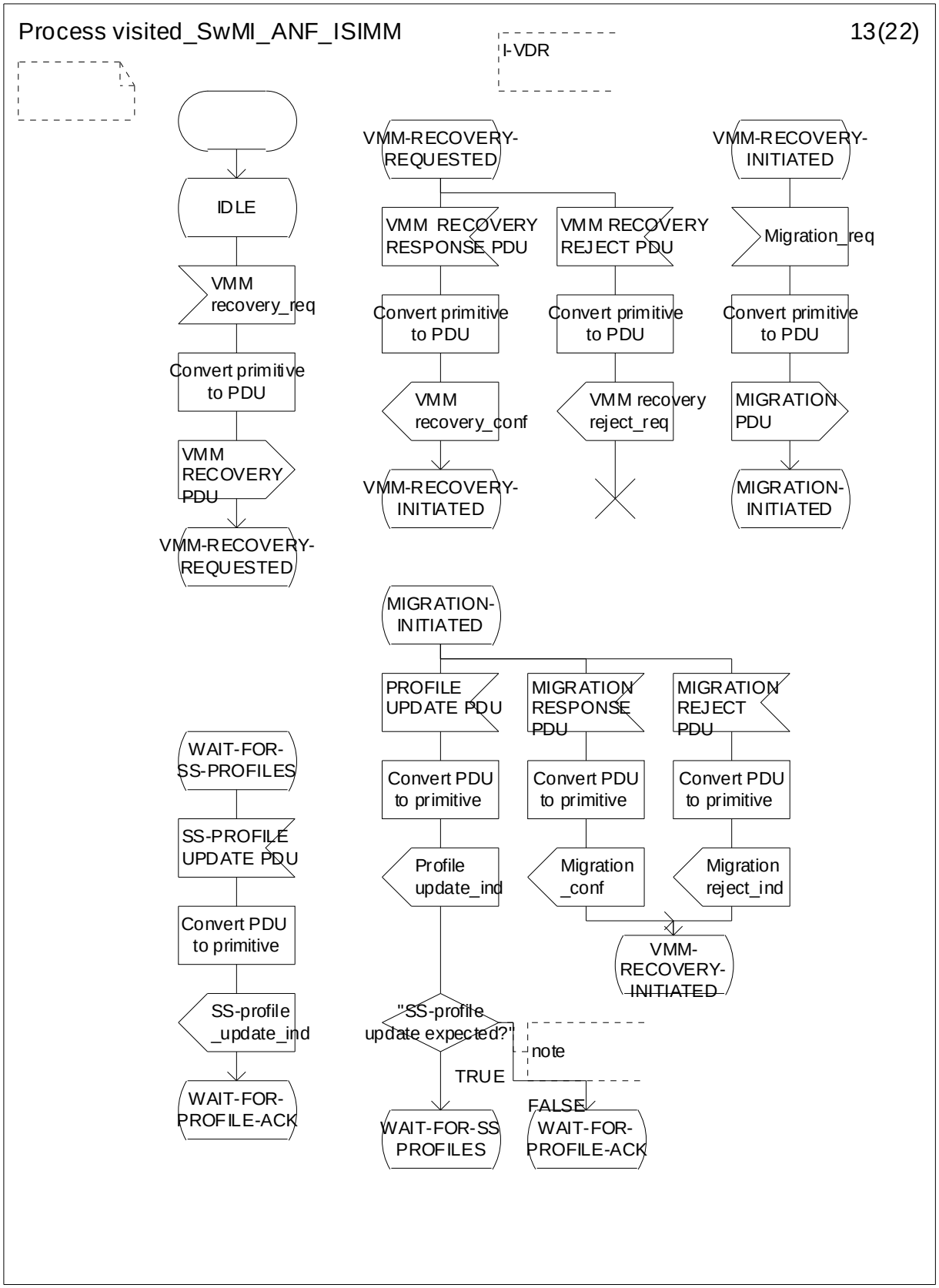
35.12.2 VMM recovery

35.12.2.1 Visited SwMI ANF-ISIMM

The following SDL states are used in addition to the states as defined in clauses 35.4.1 and 35.5.1:

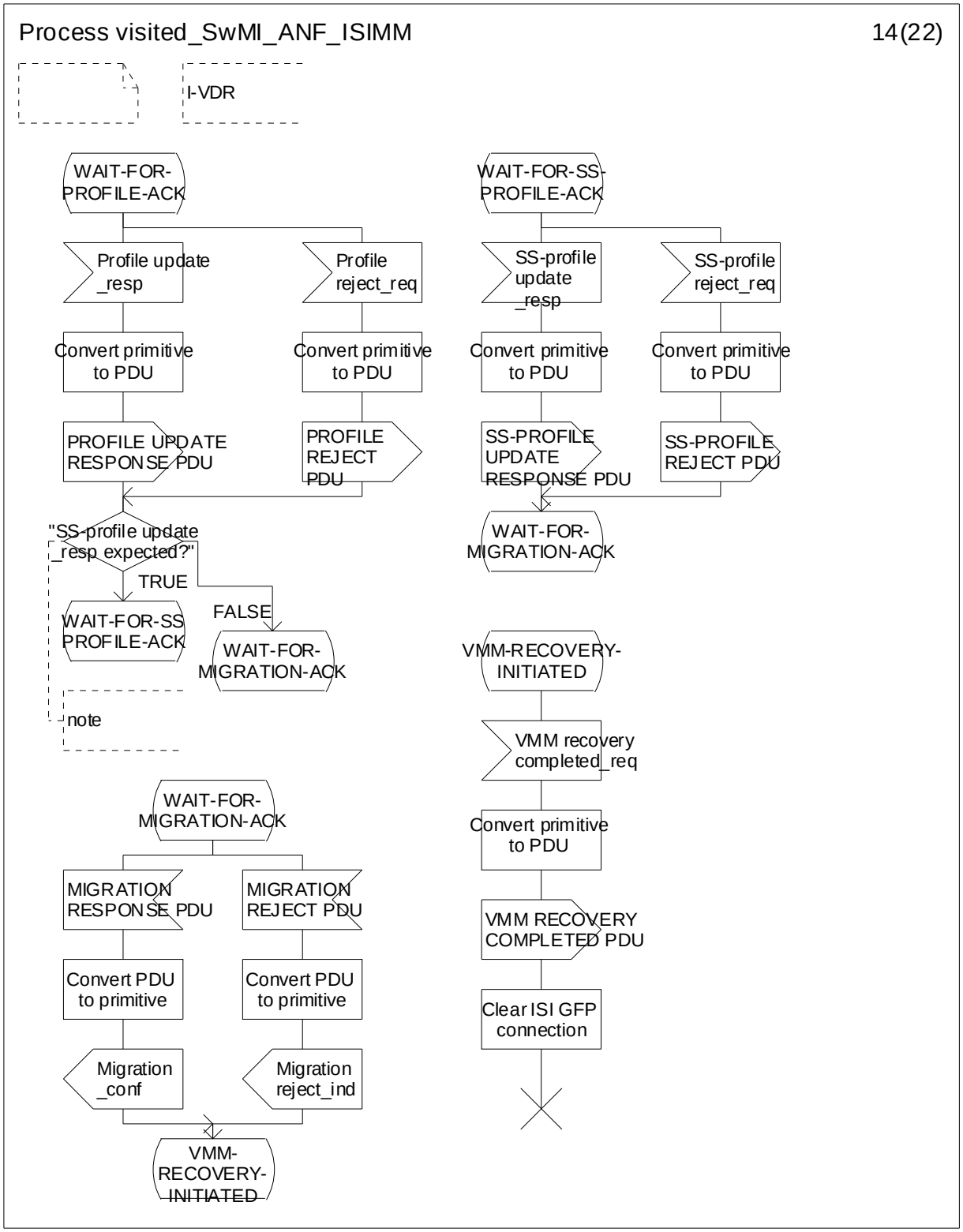
- IDLE: no HMM recovery in progress. This definition shall replace the IDLE states as defined in clauses 35.4.1 and 35.5.1;
- HMM-RECOVERY-REQUESTED: HMM recovery has been requested and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM;
- HMM-RECOVERY-INITIATED: HMM recovery has been initiated and the visited SwMI ANF-ISIMM is awaiting the HMM recovery primitives from the visited SwMI MM; and
- HMM-RECOVERY-COMPLETED: HMM recovery has been completed and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figures 134 and 135.



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_req: TRUE;
- SS-profile update_req sent after Migration_req: not applicable;
- SS-profile update_req not applicable: FALSE.

Figure 134: Visited SwMI ANF-ISIMM



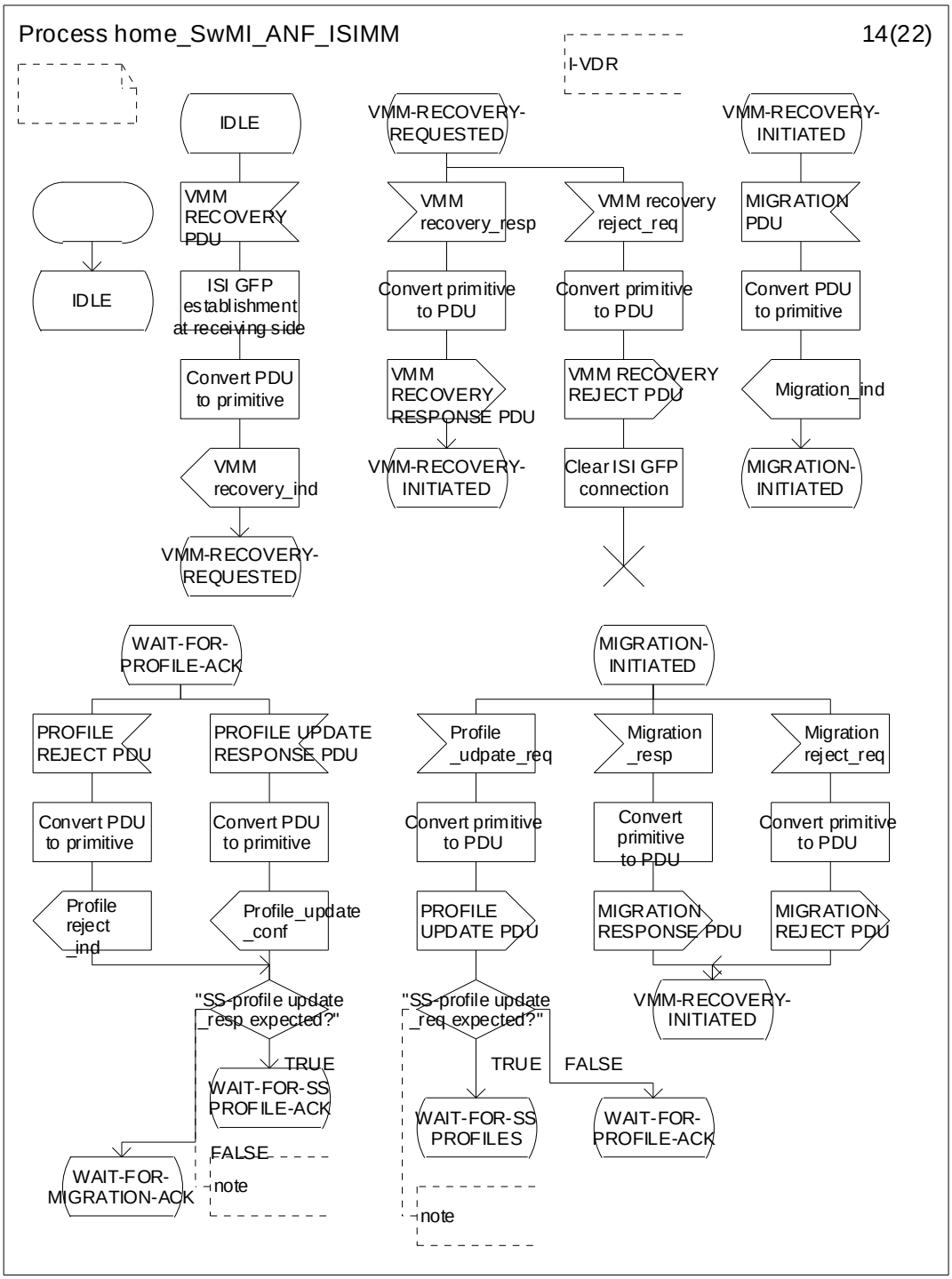
NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_ind as follows:
- SS-profile update_req sent before Migration_req: TRUE;
- SS-profile update_req sent after Migration_req: not applicable;
- SS-profile update_req not applicable: FALSE.

Figure 135: Visited SwMI ANF-ISIMM

35.12.2.2 Individual subscriber home SwMI ANF-ISIMM

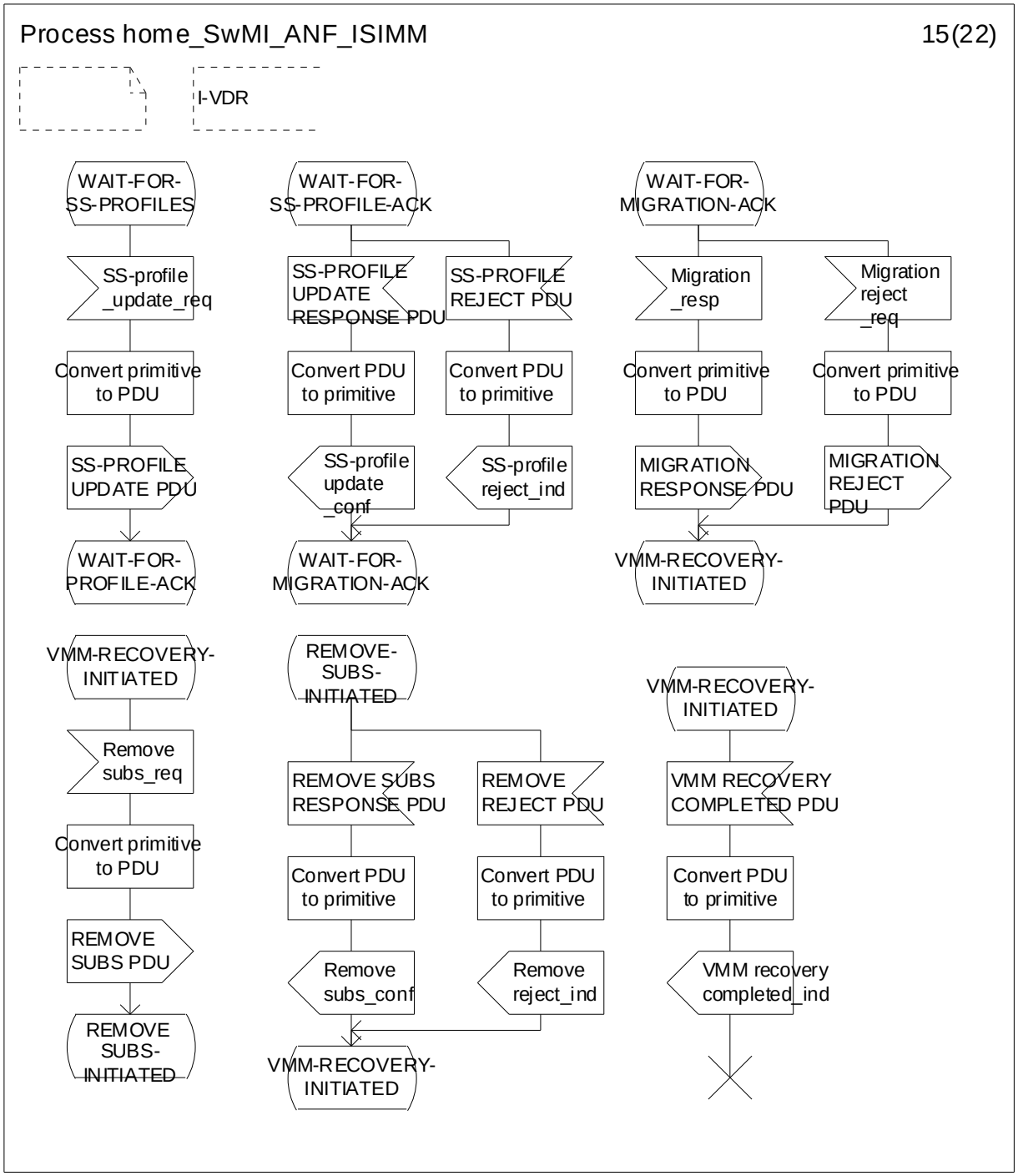
The following SDL state is used in addition to the states as defined in clauses 35.4.2, 35.5.2 and 35.6.1: IDLE: No HMM recovery in progress. This definition shall replace the IDLE states as defined in clauses 35.4.2, 35.5.2 and 35.6.1.

Individual subscriber home SwMI ANF-ISIMM shall behave as defined in figures 136 and 137.



NOTE: Shall depend on the value of the SS-profile update indicator in the Profile update_req as follows:
- SS-profile update_req sent before Migration_req: TRUE;
- SS-profile update_req sent after Migration_req: not applicable;
- SS-profile update_req not applicable: FALSE.

Figure 136: Individual subscriber home SwMI ANF-ISIMM



NOTE: The end of the VMM recovery is not explicitly indicated to the individual subscriber home SwMI MM.

Figure 137: Individual subscriber home SwMI ANF-ISIMM

35.12.2.3 Previous visited SwMI ANF-ISIMM

As in clause 35.6.2.

35.13 Group attachment

35.13.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no Group attachment in progress;

- H-WAIT-FOR-GROUP-ATT: the visited SwMI ANF-ISIMM is awaiting the group home SwMI MM initiated group attachment request from the ISI GFP;
- H-WAIT-FOR-GROUP-ATT-ACK: the visited SwMI ANF-ISIMM is awaiting the response for the group home SwMI MM initiated group attachment request from the visited SwMI MM;
- H-WAIT-FOR-PROFILE-ACK: the basic migration profile has been sent to the visited SwMI MM and the ANF-ISIMM is awaiting the response from the visited SwMI MM (the state is applicable in the group home SwMI MM initiated group attachment);
- H-WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile(s) has been sent to the visited SwMI MM and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM (the state is applicable in the group home SwMI MM initiated group attachment);
- H-WAIT-FOR-SS-PROFILES: the visited SwMI ANF-ISIMM is awaiting the SS-migration profile(s) from the ISI GFP (the state is applicable in the group home SwMI MM initiated group attachment);
- V-GROUP-ATT-INITIATED: the visited SwMI MM initiated group attachment has been invoked and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- V-WAIT-FOR-GROUP-ATT-ACK: the visited SwMI ANF-ISIMM is awaiting the response for the visited SwMI MM initiated group attachment request from the ISI GFP;
- V-WAIT-FOR-PROFILE-ACK: the basic migration profile has been sent to the visited SwMI MM and visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM (the state is applicable in the visited SwMI MM initiated group attachment);
- V-WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile(s) has been sent to the visited SwMI MM and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM (the state is applicable in the visited SwMI MM initiated group attachment); and
- V-WAIT-FOR-SS-PROFILES: the visited SwMI ANF-ISIMM is awaiting the SS-migration profile(s) from the ISI GFP (the state is applicable in the visited SwMI MM initiated group attachment).

Visited SwMI ANF-ISIMM shall behave as defined in figures 138 to 141.

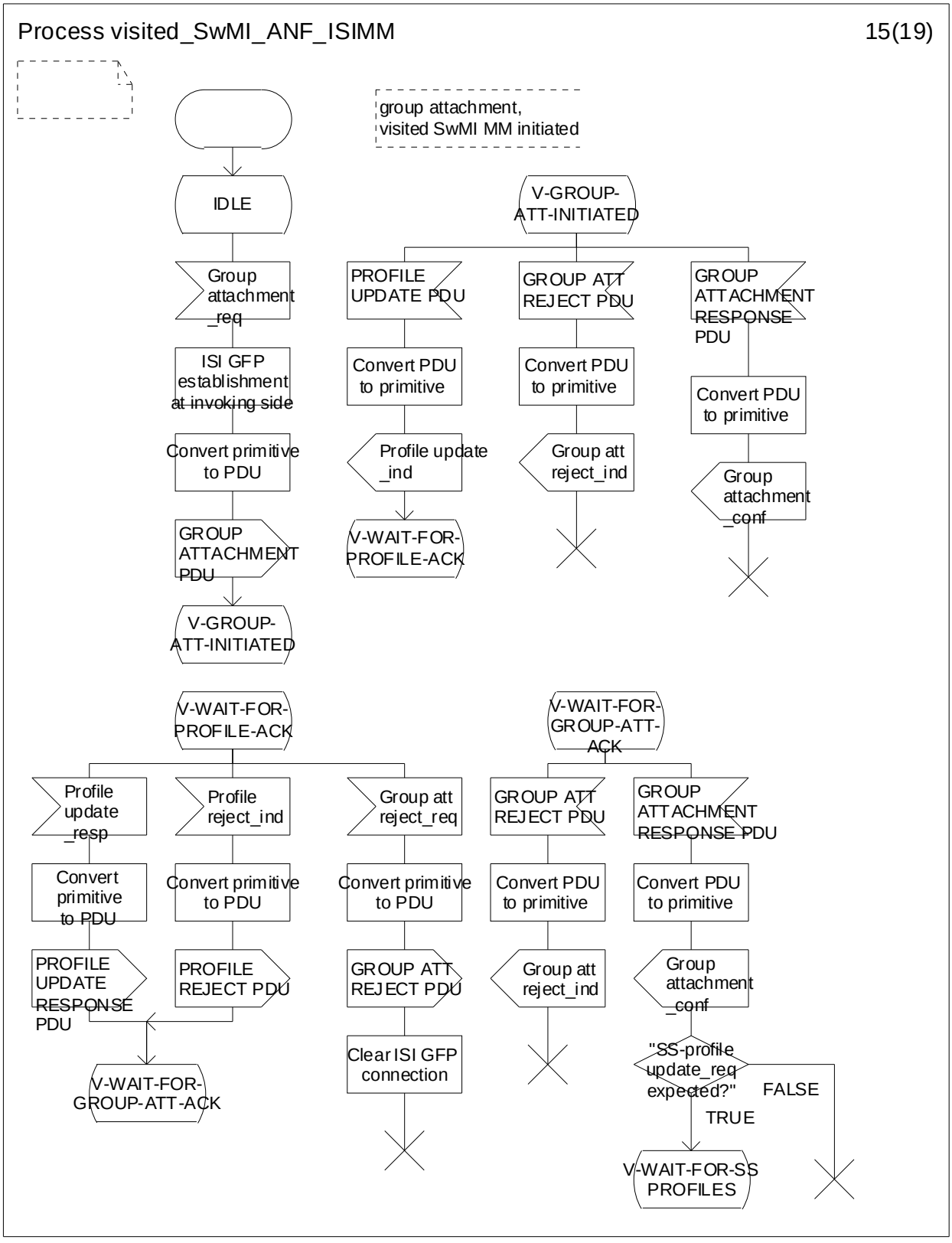


Figure 138: Visited SwMI ANF-ISIMM

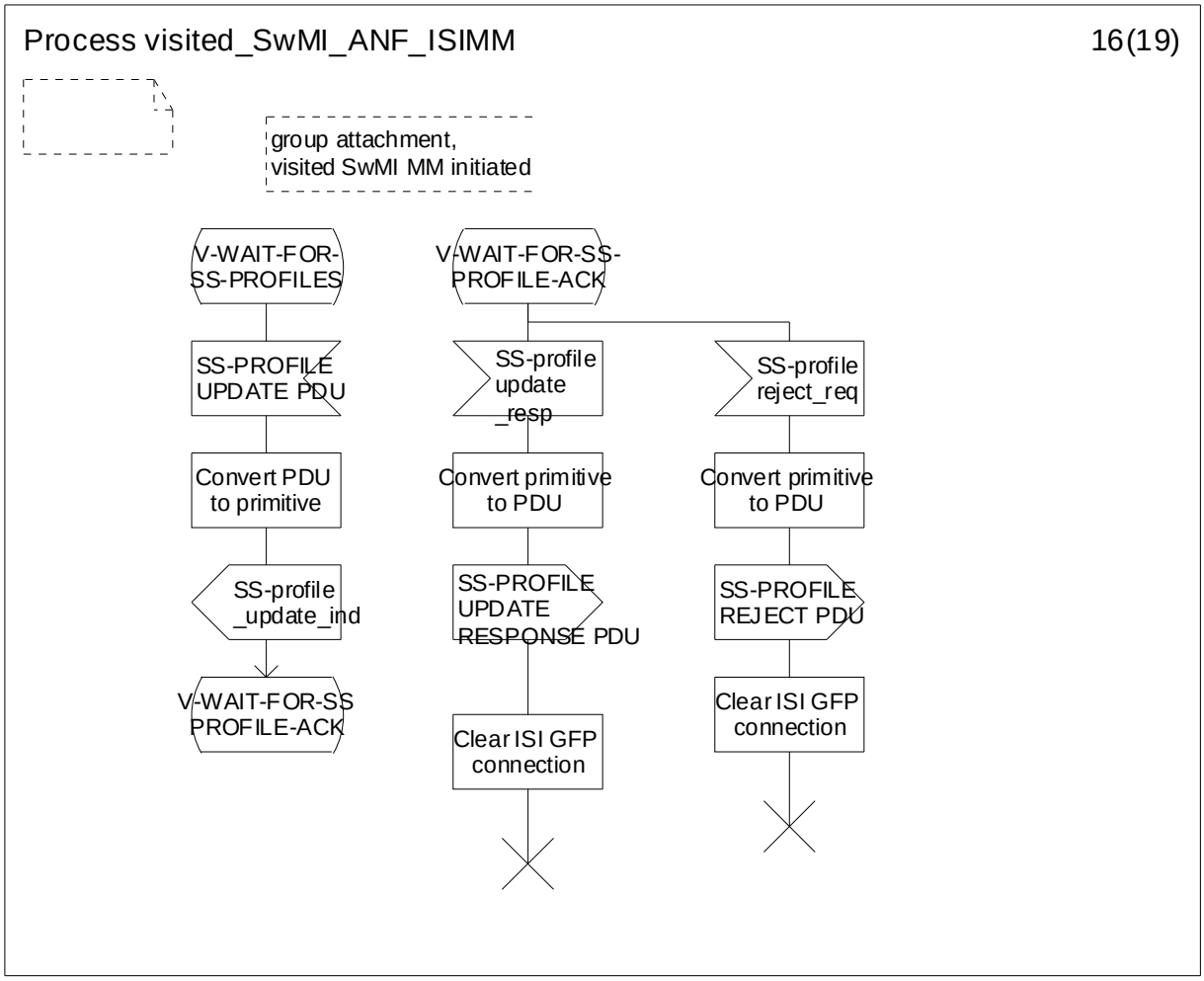


Figure 139: Visited SwMI ANF-ISIMM

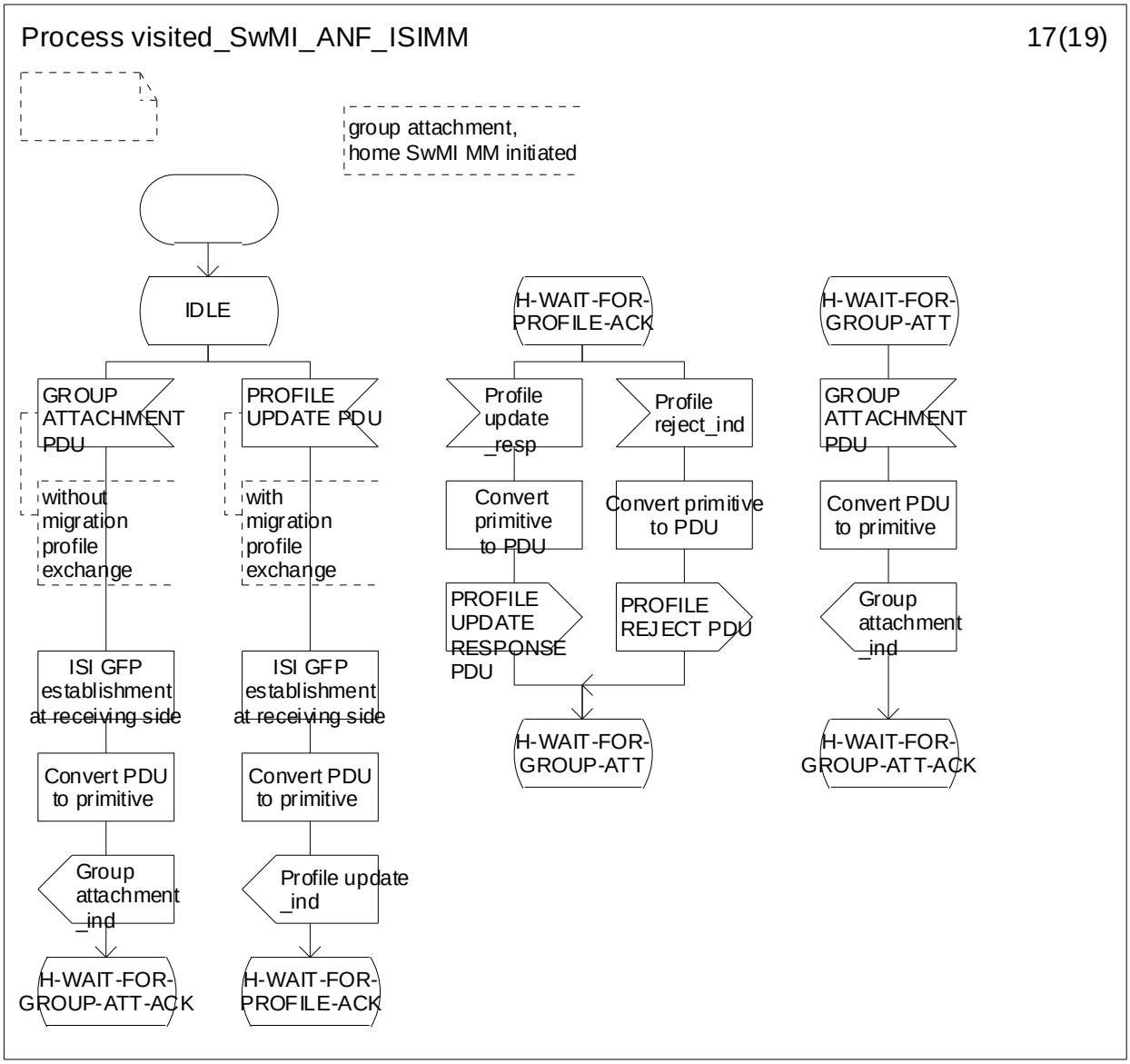


Figure 140: Visited SwMI ANF-ISIMM

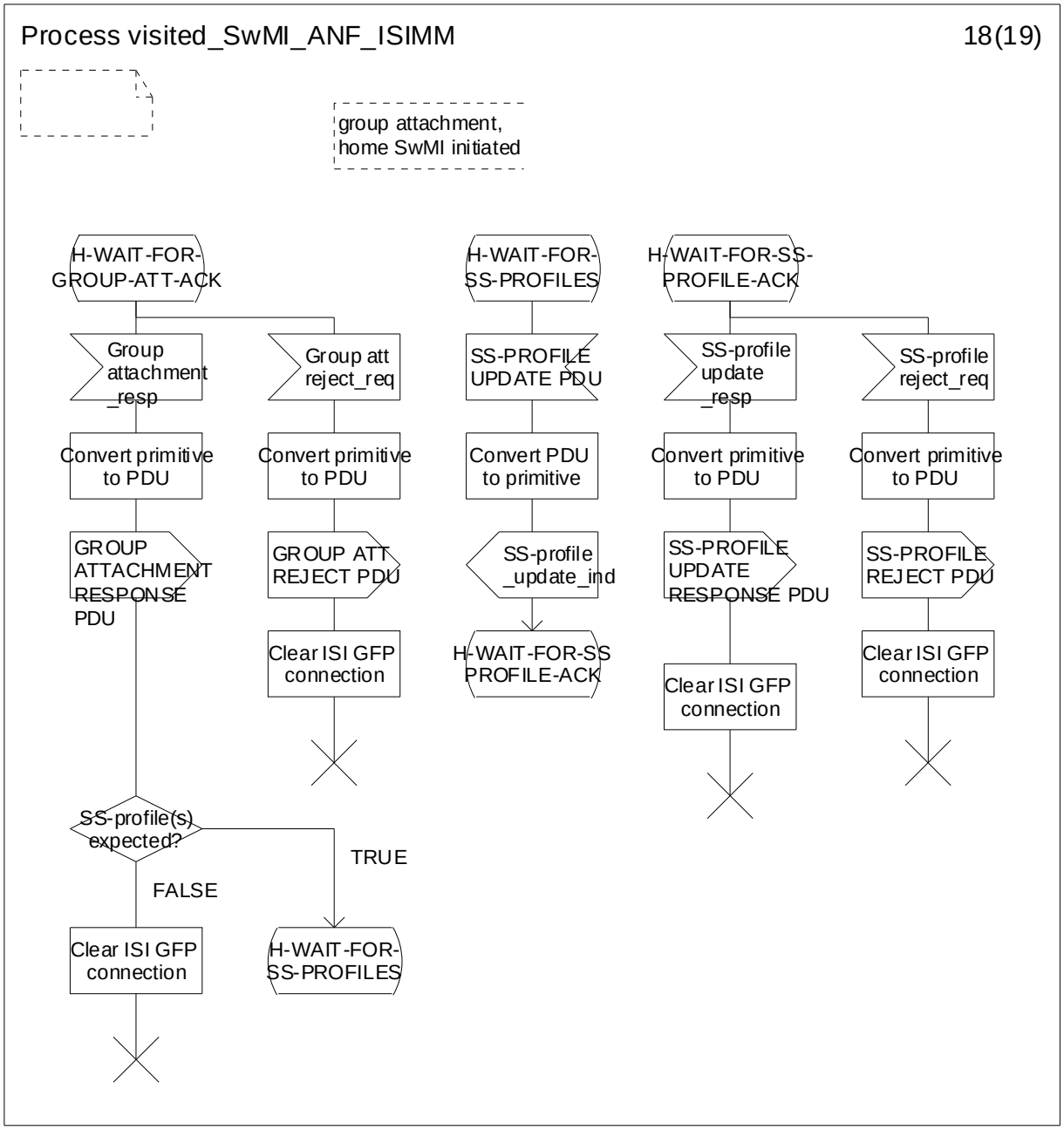


Figure 141: Visited SwMI ANF-ISIMM

35.13.2 Group Home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no Group attachment in progress;
- H-GROUP-ATT-INITIATED: the group home SwMI MM initiated group attachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- H-WAIT-FOR-ATT-REQUEST: the group home SwMI ANF-ISIMM is awaiting the request for the group home SwMI MM initiated group attachment from the group home SwMI MM;
- H-WAIT-FOR-GROUP-ATT-ACK: the home SwMI ANF-ISIMM is awaiting the response for the group home SwMI MM initiated group attachment request from the ISI GFP;
- H-WAIT-FOR-PROFILE-ACK: the basic migration profile has been sent to the ISI GFP and the group home ANF-ISIMM is awaiting the response from the ISI GFP (the state is applicable in the group home SwMI MM initiated group attachment);
- H-WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile(s) has been sent to the ISI GFP and the group home ANF-ISIMM is awaiting the response from the ISI GFP (the state is applicable in the group home SwMI MM initiated group attachment);
- H-WAIT-FOR-SS-PROFILE(S): the group home SwMI ANF-ISIMM is awaiting the SS-migration profile(s) from the group home SwMI MM (the state is applicable in the group home SwMI MM initiated group attachment);
- V-GROUP-ATT-INITIATED: the visited SwMI MM initiated group attachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the group home SwMI MM;
- V-WAIT-FOR-ATT-RESPONSE: the visited SwMI MM initiated group attachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the group home SwMI MM;
- V-WAIT-FOR-PROFILE-ACK: the basic migration profile has been sent to the ISI GFP and the group home ANF-ISIMM is awaiting the response from the ISI GFP(the state is applicable in the visited SwMI MM initiated group attachment);
- V-WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile(s) has been sent to the ISI GFP and the group home ANF-ISIMM is awaiting the response from the ISI GFP (the state is applicable in the visited SwMI MM initiated group attachment); and
- V-WAIT-FOR-SS-PROFILE(S): the home SwMI ANF-ISIMM is awaiting the SS-migration profile(s) from the group home SwMI MM (the state is applicable in the visited SwMI MM initiated group attachment).

Group home SwMI ANF-ISIMM shall behave as defined in figures 142 to 145.

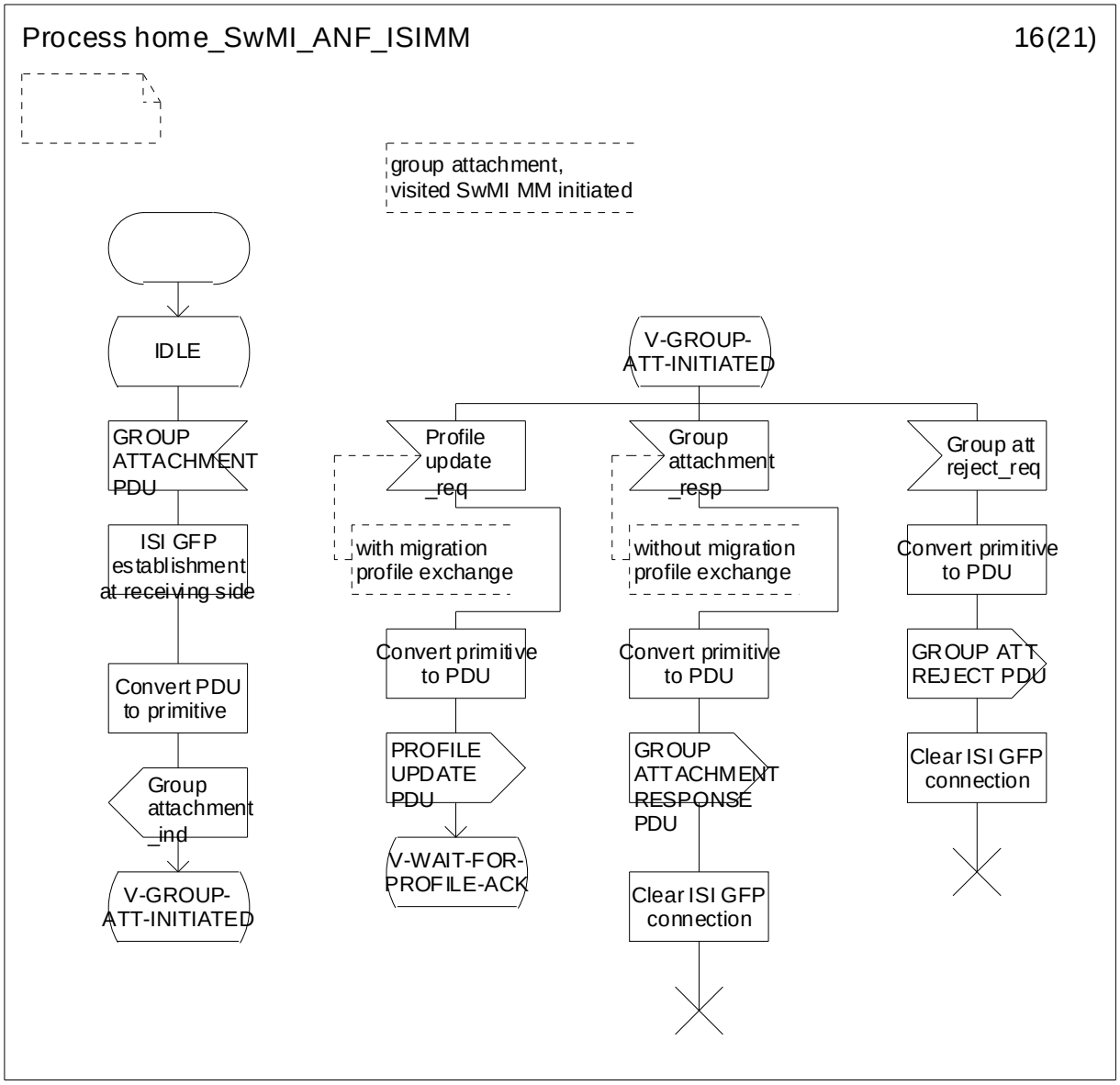


Figure 142: Group home SwMI ANF-ISIMM

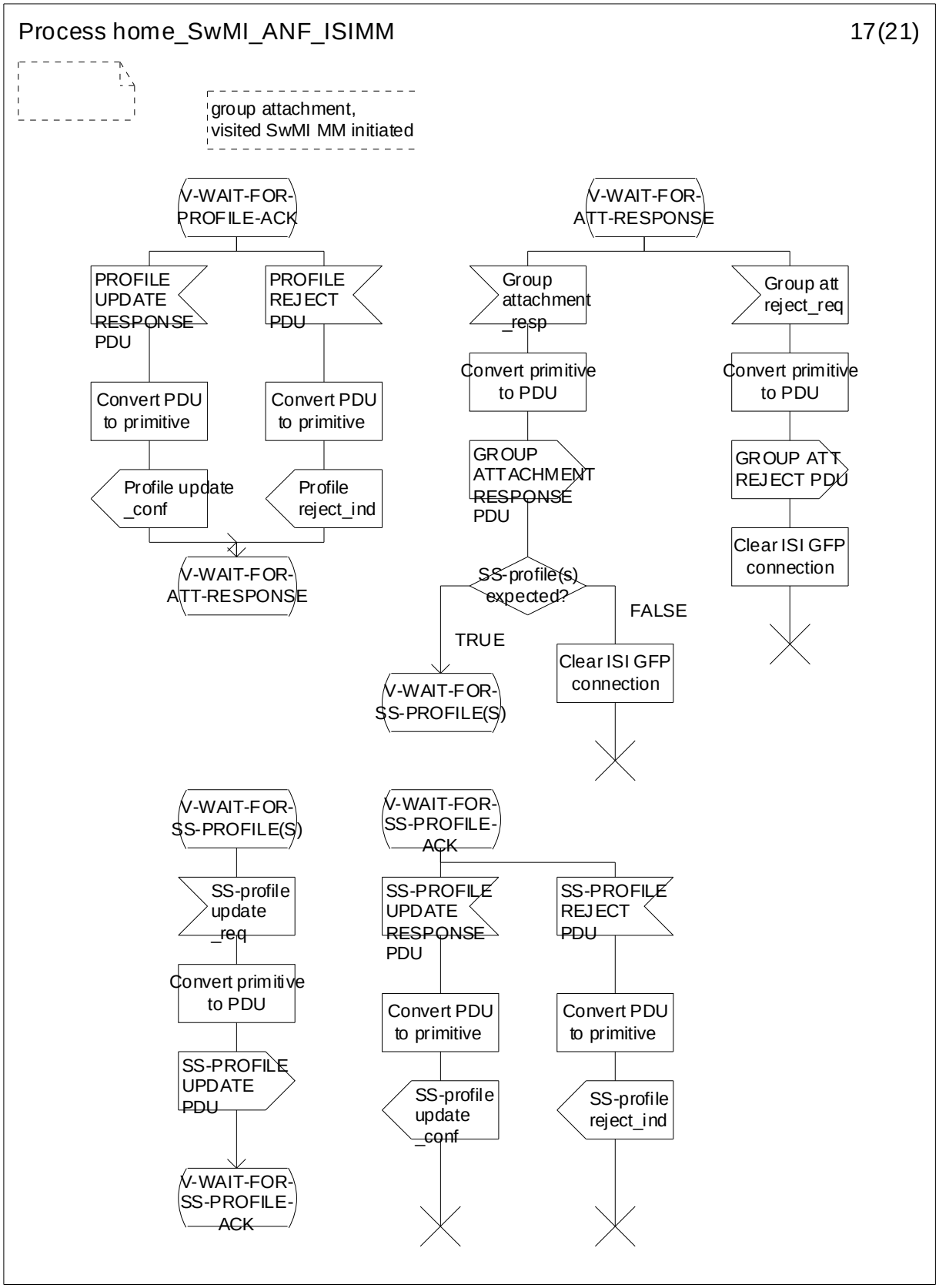


Figure 143: Group home SwMI ANF-ISIMM

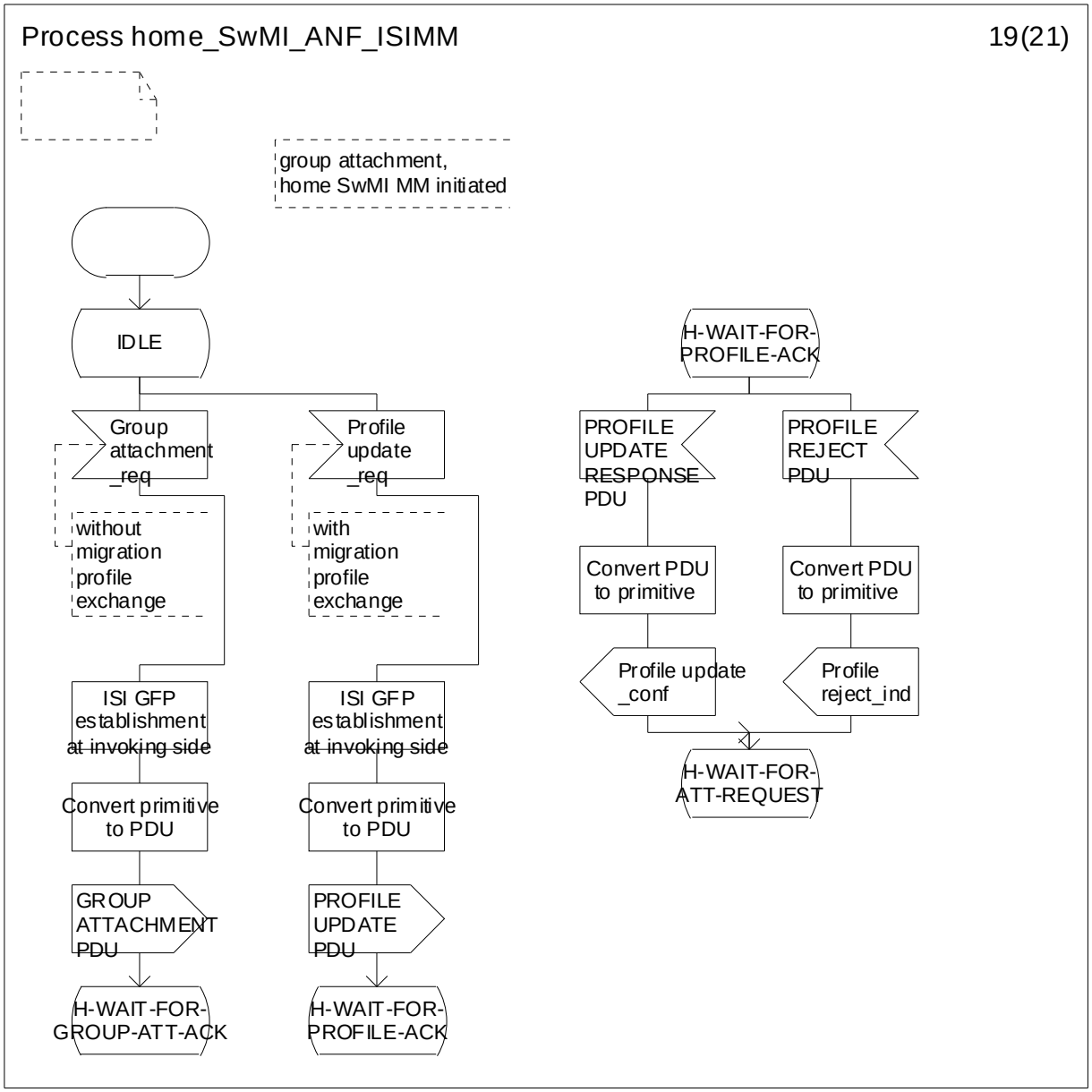


Figure 144: Group home SwMI ANF-ISIMM

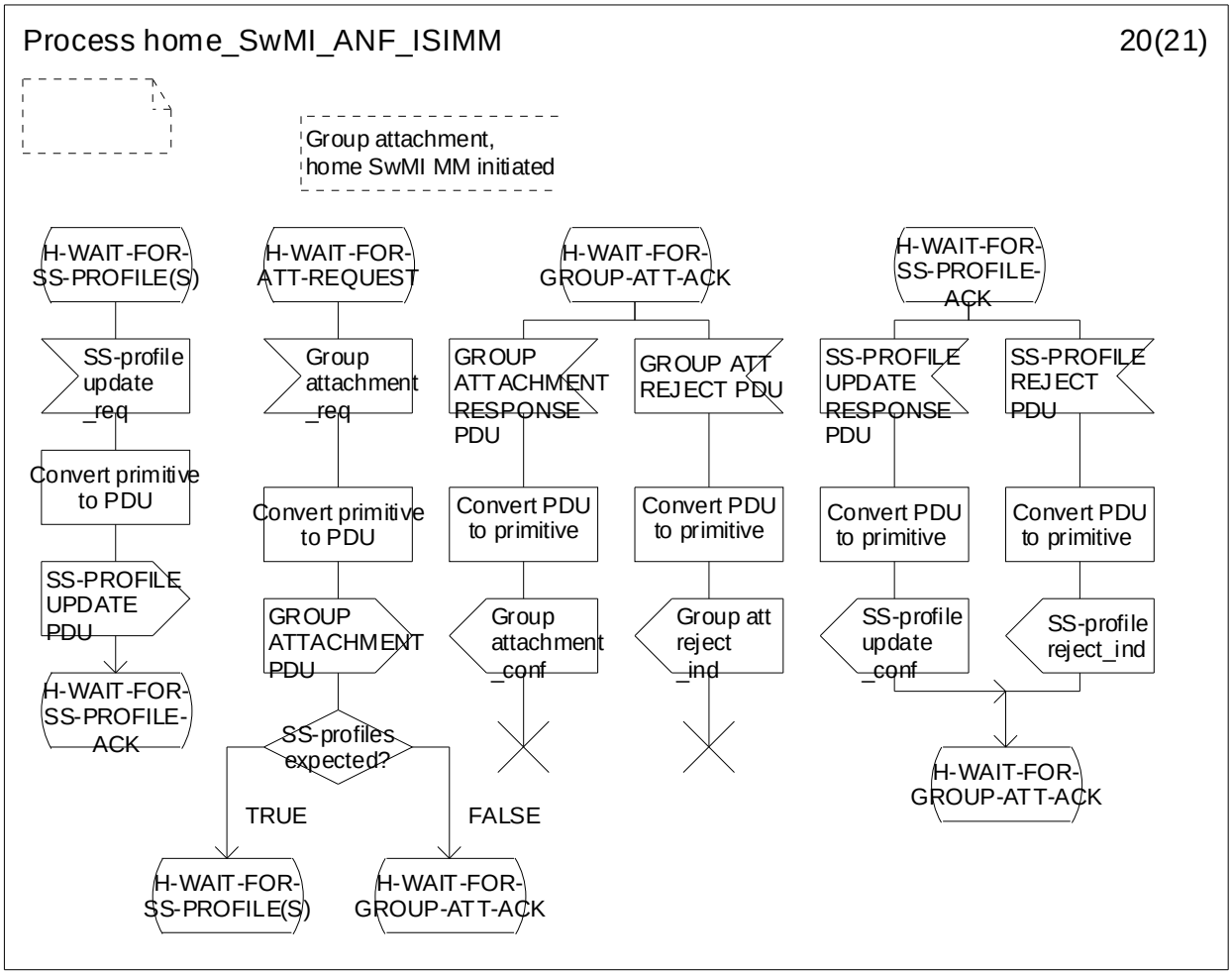


Figure 145: Group home SwMI ANF-ISIMM

35.14 Group detachment

35.14.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no Group detachment in progress;
- H-GROUP-DET-INITIATED: the group home SwMI MM initiated group detachment has been invoked and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM; and
- V-GROUP-DET-INITIATED: the visited SwMI MM initiated group detachment has been invoked and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figure 146.

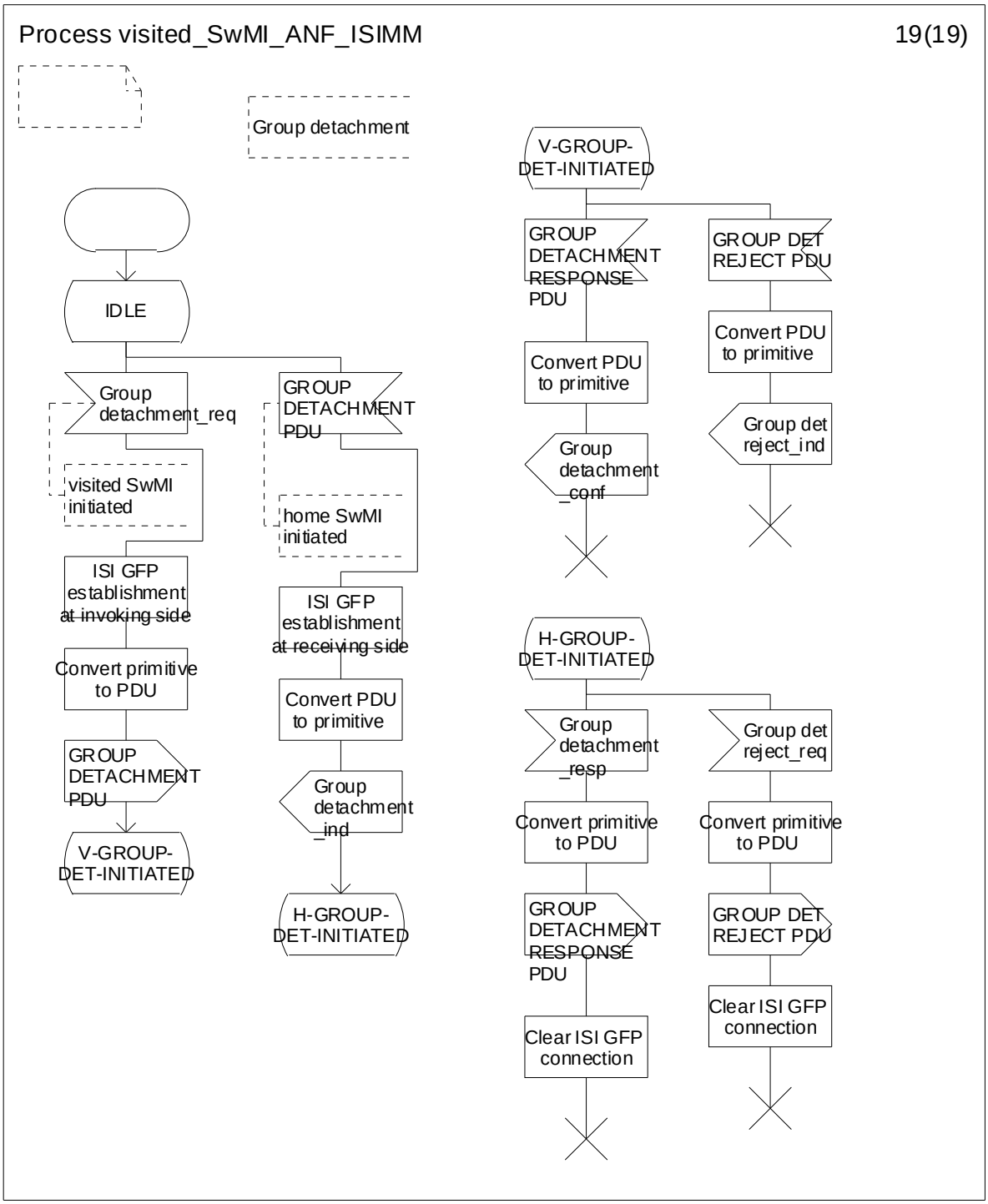


Figure 146: Visited SwMI ANF-ISIMM

35.14.2 Group home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no Group detachment in progress;
- H-GROUP-DET-INITIATED: the group home SwMI MM initiated group detachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the ISI GFP; and
- V-GROUP-DET-INITIATED: the visited SwMI MM initiated group detachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the group home SwMI MM.

Group home SwMI ANF-ISIMM shall behave as defined in figure 147.

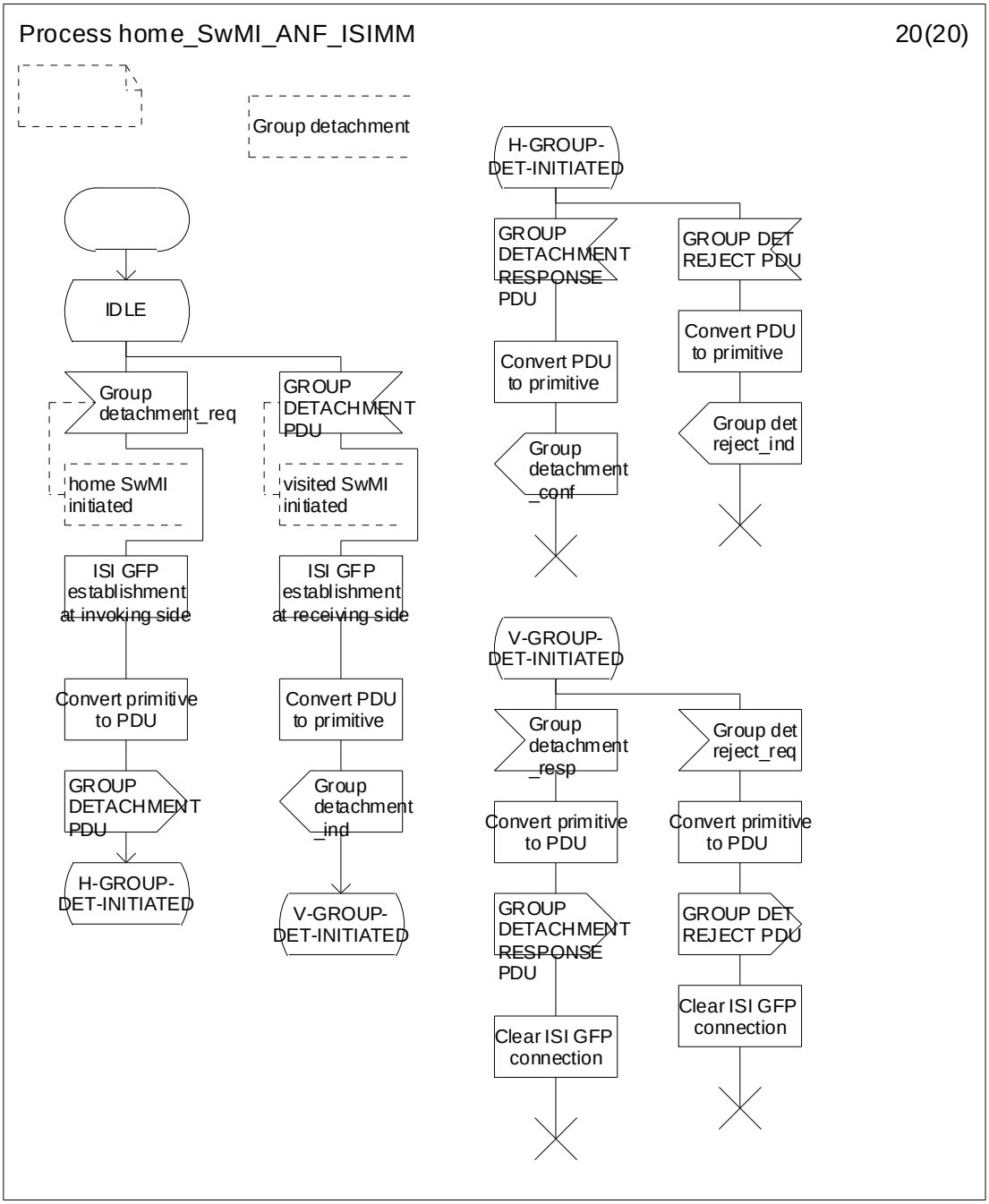


Figure 147: Group home SwMI ANF-ISIMM

35.15 Group database recovery

35.15.1 Visited SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no GDR in progress;
- RECOVERY-INITIATED: the GDR has been invoked;
- V-GROUP-ATT-INITIATED: the visited SwMI MM initiated group attachment has been invoked and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- V-GROUP-DET-INITIATED: the visited SwMI MM initiated group detachment has been invoked and the visited SwMI ANF-ISIMM is awaiting the response from the ISI GFP;
- V-WAIT-FOR-GROUP-ATT-ACK: the visited SwMI ANF-ISIMM is awaiting the response for the visited SwMI MM initiated group attachment request from the ISI GFP;
- V-WAIT-FOR-PROFILE-ACK: the basic migration profile has been sent to the visited SwMI MM and visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM;
- V-WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile(s) has been sent to the visited SwMI MM and the visited SwMI ANF-ISIMM is awaiting the response from the visited SwMI MM;
- V-WAIT-FOR-SS-PROFILES: the visited SwMI ANF-ISIMM is awaiting the SS-migration profile(s) from the ISI GFP;
- WAIT-FOR-HMM-RESPONSE: the visited SwMI ANF-ISIMM is awaiting the response for the G-HDR request from the visited SwMI MM; and
- WAIT-FOR-VMM-RESPONSE: the visited SwMI ANF-ISIMM is awaiting the response for the G-VDR request from the ISI GFP.

Visited SwMI ANF-ISIMM shall behave as defined in figures 148 to 150.

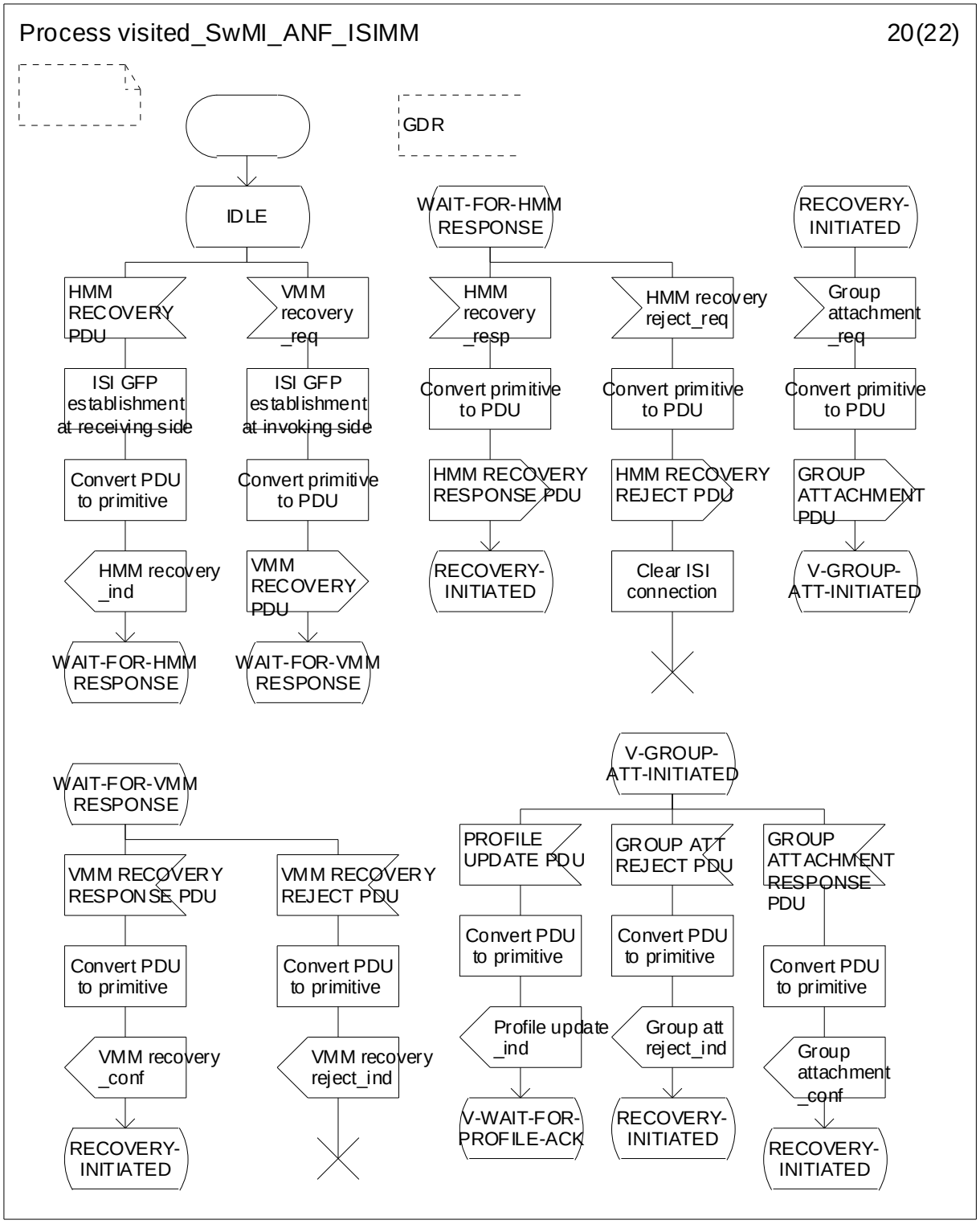


Figure 148: Visited SwMI ANF-ISIMM

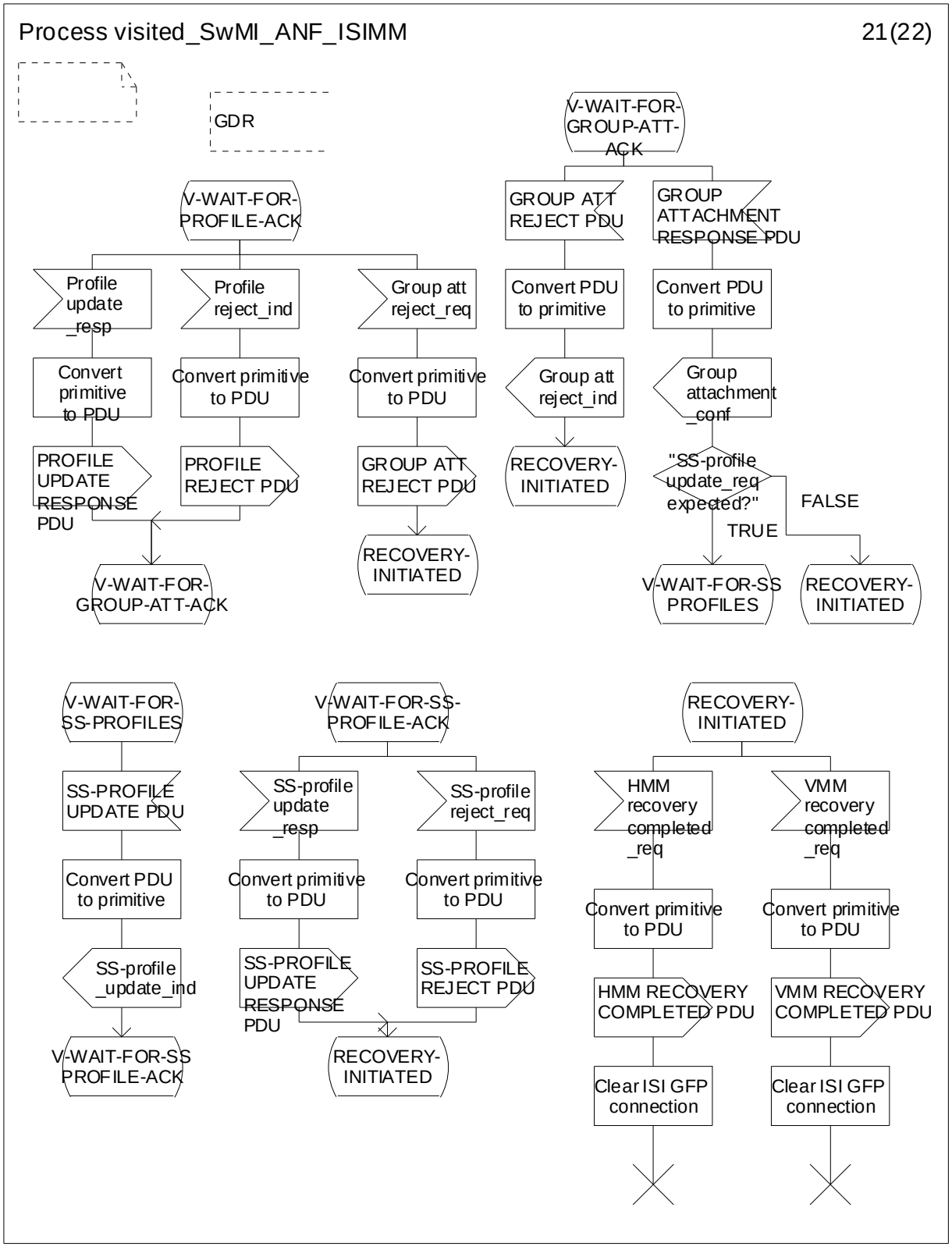


Figure 149: Visited SwMI ANF-ISIMM

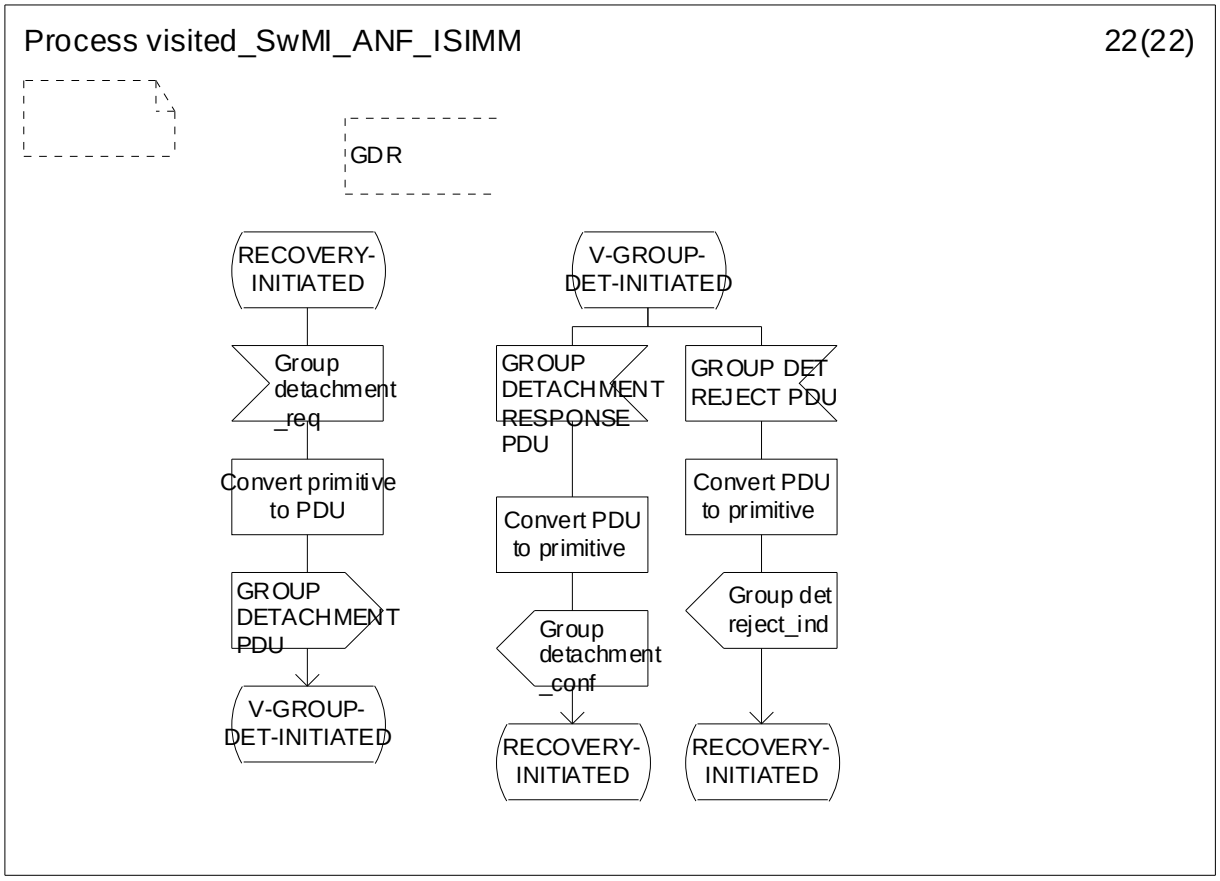


Figure 150: Visited SwMI ANF-ISIMM

35.15.2 Group home SwMI ANF-ISIMM

The following SDL states are used:

- IDLE: no GDR in progress;
- RECOVERY-INITIATED: the GDR has been invoked;
- V-GROUP-ATT-INITIATED: the visited SwMI MM initiated group attachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the group home SwMI MM;
- V-GROUP-DET-INITIATED: the visited SwMI MM initiated group detachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the group home SwMI MM;
- V-WAIT-FOR-ATT-RESPONSE: the visited SwMI MM initiated group attachment has been invoked and the group home SwMI ANF-ISIMM is awaiting the response from the group home SwMI MM;
- V-WAIT-FOR-PROFILE-ACK: the basic migration profile has been sent to the ISI GFP and the group home ANF-ISIMM is awaiting the response from the ISI GFP;
- V-WAIT-FOR-SS-PROFILE-ACK: the SS-migration profile(s) has been sent to the ISI GFP and the group home ANF-ISIMM is awaiting the response from the ISI GFP;
- V-WAIT-FOR-SS-PROFILE(S): the group home SwMI ANF-ISIMM is awaiting the SS-migration profile(s) from the group home SwMI;
- WAIT-FOR-HMM-RESPONSE: the group home SwMI ANF-ISIMM is awaiting the response for the G-HDR request from the ISI GFP; and
- WAIT-FOR-VMM-RESPONSE: the group home SwMI ANF-ISIMM is awaiting the response for the G-VDR request from the group home SwMI MM.

Group home SwMI ANF-ISIMM shall behave as defined in figures 151 and 152.

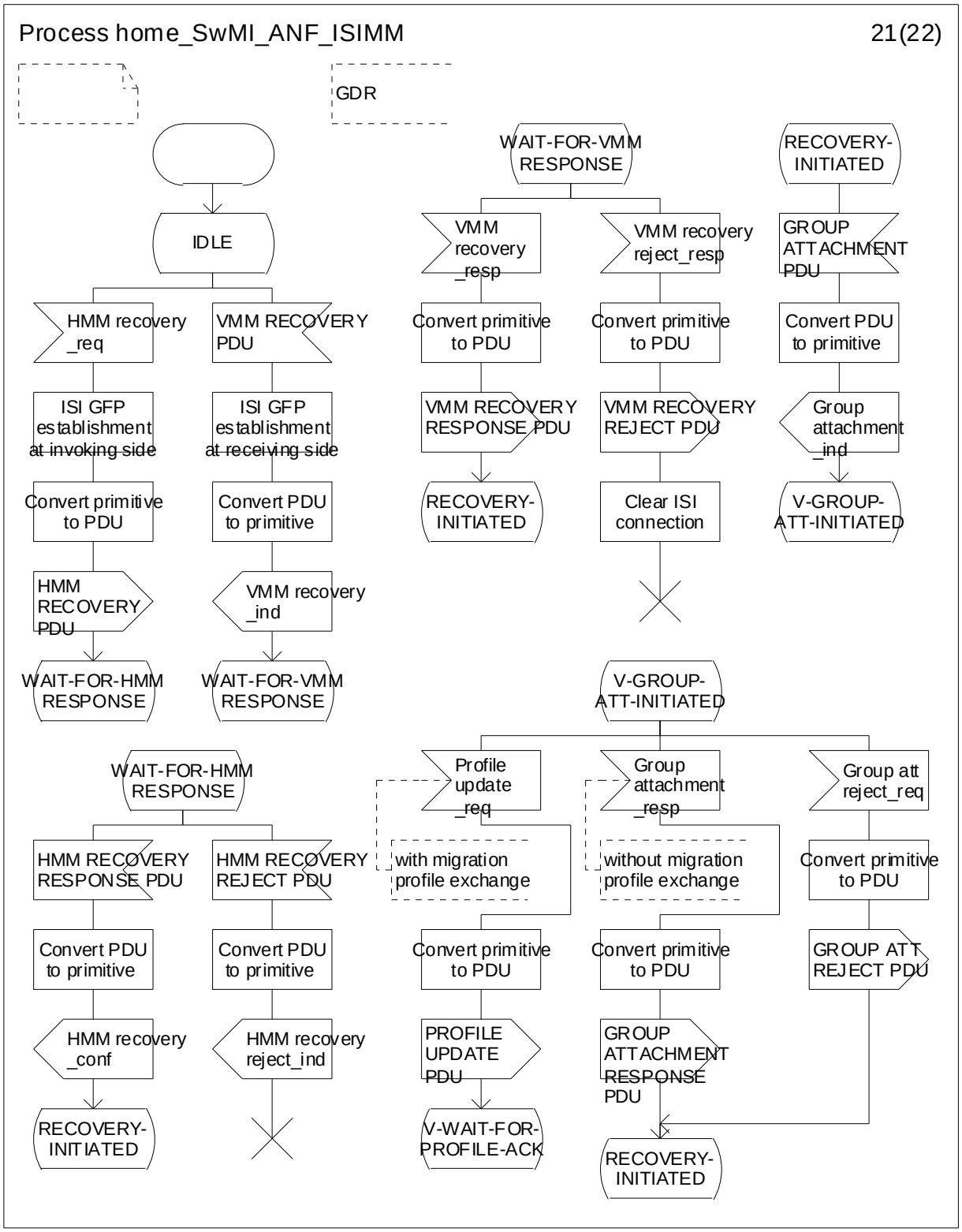


Figure 151: Group home SwMI ANF-ISIMM

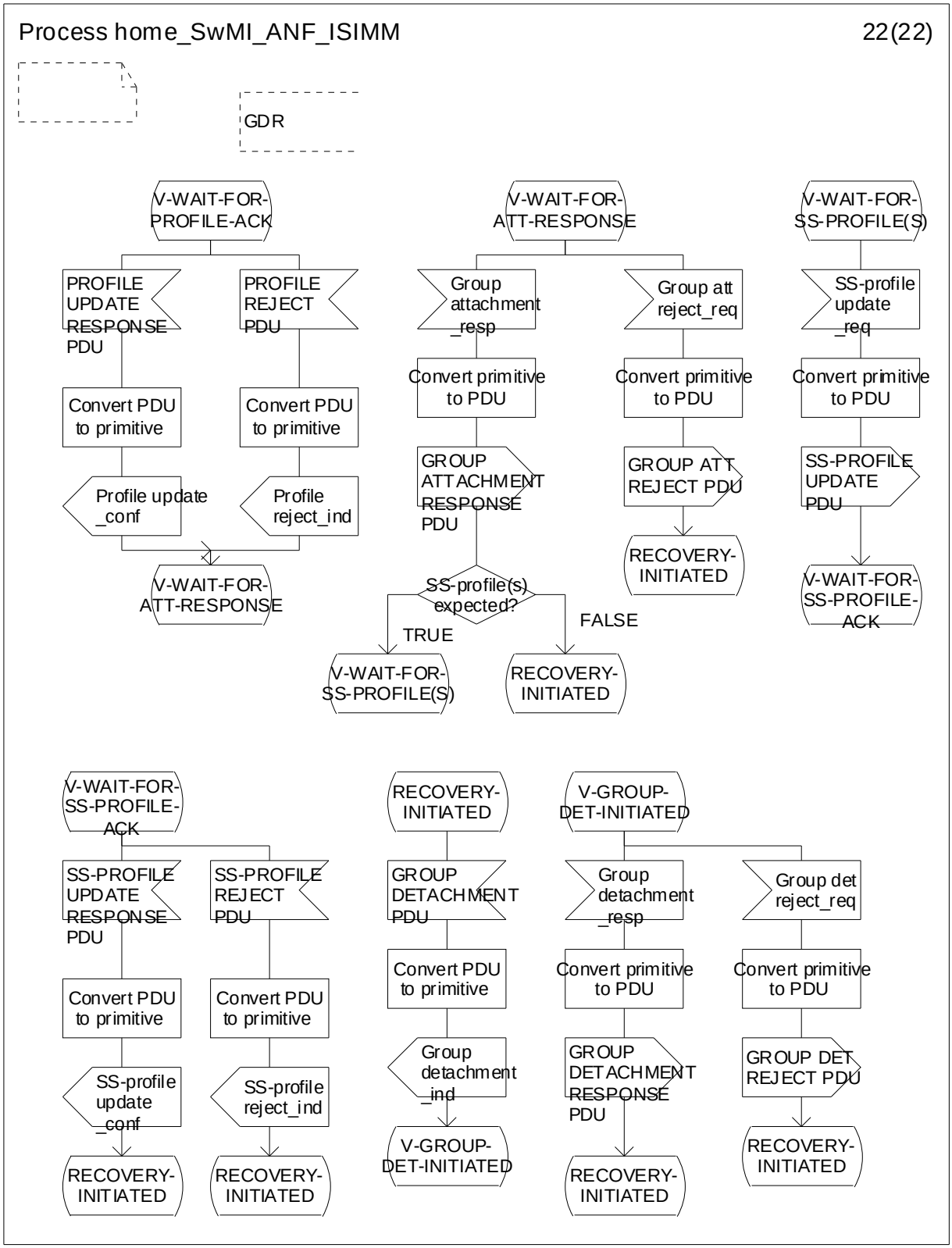


Figure 152: Group home SwMI ANF-ISIMM

35.16 Group linking/unlinking

35.16.1 Linking controlling SwMI ANF-ISIMM

Void.

Figure 153: Void

Figure 154: Void

Figure 155: Void

35.16.2 Linking participating SwMI ANF-ISIMM

Figure 156: Void

Figure 157: Void

36 ANF-ISIMM specific additions to ISI GFP - stage 3

36.0 Introduction

The ANF-ISIMM PDUs shall be transported across the ISI using the ISI GFP as defined in ETSI EN 300 392-3-1 [3] with the additional constraints as defined in this clause.

Since all ANF-ISIMM are call unrelated according to clause 8 of ETSI EN 300 392-3-1 [3], they will be carried by a call independent signalling connection.

36.1 ISI GFP connection

36.1.0 General

When an ANF-ISIMM service in a SwMI is invoked, two possible cases may arise: either no (PSS1) call independent signalling connection exists with the destination SwMI, that connection has thus to be established, or that connection already exists with the destination SwMI: the first case is addressed in clause 36.1.1 and the second in clause 36.1.2.

The ANF-ISIMM service instance is identified by a unique ANF-ISIMM invoke id.

36.1.1 Establishment and clearing of a new ISI GFP connection

When a SwMI invokes an ANF-ISIMM and when the call independent signalling connection has already been established by the ISI GFP with the peer SwMI, the following shall apply:

- the ISI GFP shall request to the co-ordination function to maintain the connection in order to:
  - send the ANF-ISIMM PDUs to the peer ISI GFP across the connection upon request from ANF-ISIMM; and
  - deliver the received ANF-ISIMM PDUs from the peer ISI GFP to the ANF-ISIMM protocol instance;
  - the ISI GFP shall do the mapping between the ANF-ISIMM protocol instance and the ISI call independent signalling connection using the ANF-ISIMM invoke id, e.g. upon receipt of the request to transport an ANF-ISIMM PDU across the ISI;
- the ANF-ISIMM protocol instance which detects that the invoked ANF-ISIMM has been completed shall inform the ISI GFP co-ordination function that it does not need anymore the call independent signalling connection. The ANF-ISIMM protocol instance shall then be cleared, thus shall not be responsible for maintaining information about the service.

NOTE: An ANF-ISIMM protocol instance will detect that the that the invoked ANF-ISIMM has been completed by receiving the RO-RESULT service, see clause 36.1.

36.1.2 Establishment of the call independent signalling connection

When a SwMI invokes an ANF-ISIMM and when the ISI GFP needs to establish the call independent signalling connection with the peer SwMI, the following shall apply in addition to the requirements of clause 36.1.1:

- the ISI GFP shall establish the call independent signalling connection to the ISI GFP in the peer SwMI according to clause 8.3.2 of ETSI EN 300 392-3-1 [3];
- the ISI GFP should include the first ANF-ISIMM PDU to be sent in the PSS1 SETUP message used to establish that call independent signalling connection;
- similarly, the ISI GFP in the peer SwMI may include its first ANF-ISIMM PDU to be sent in the PSS1 CONNECT message used to establish that call independent signalling connection.

36.2 Queuing for the ISI GFP resources

It is assumed that the service providers ensure that the ANF-ISIMM services are allocated the ISI GFP connection resources when needed, i.e. when the transport of any ANF-ISIMM PDUs is needed across the ISI. Consequently, all procedures due to the lack of ISI GFP connection resources are outside the scope of the present document.

However, if the exchange of an ANF-ISIMM PDU is delayed due to the lack of ISI GFP connection resources, the age stamp shall indicate the real age of the event, if applicable, for the PDU.

36.3 Use of ROSE

In support of ANF-ISIMM, the Remote Operations (RO) services offered by ISI GFP shall be used as follows:

1) The RO-INVOKE service shall be used for all successful ANF-ISIMM PDU transports across the ISI. In addition, the RO-INVOKE service shall be used for unsuccessful ANF-ISIMM service operation (error or rejection) when an applicable ANF-ISIMM PDU for rejection is available for the purpose, e.g. to transport a MIGRATION REJECT PDU if the individual subscriber is not allowed to migrate in the visited SwMI MM.

NOTE 1: The reason to use the RO-INVOKE service in the case of SwMI MM detected failure is e.g. the fact that the ANF-ISIMM PDUs may need to be sent consecutively from one SwMI MM to the peer SwMI MM (without a reply from the receiving SwMI MM). The RO services are intended to support the PDU exchange where the sending party sends a PDU, and then, either returns to idle or waits for the acknowledgement (result or error) from the receiving party. Thus, RO-INVOKE and RO-ERROR service conventions do not explicitly support the PDU exchange as required by the ANF-ISIMM services. Under these conditions, it is simplest to use only the RO-INVOKE service to convey all ANF-ISIMM PDUs.

2) The RO-RESULT shall be used to acknowledge the receipt of the last ANF-ISIMM PDU of the ANF-ISIMM service instance.

   The last ANF-ISIMM PDU shall be sent using the RO-INVOKE service. Upon receipt of that ANF-ISIMM PDU the receiving side (of this ANF-ISIMM PDU) shall invoke the RO-RESULT service to acknowledge the receipt of the ANF-ISIMM PDU, and to acknowledge the completion of the ANF-ISIMM service instance.

NOTE 2: The reasons not to use the RO-RESULT service are analogous to the constrains related to the RO-ERROR service, see note 1.

3) The RO-ERROR service shall be used, if applicable, as defined in ETSI EN 300 392-3-1 [3], clause 8.4.3 and if no ANF-ISIMM PDU is applicable for the error.

4) The RO-REJECT-U service shall be used, if applicable, as defined in ETSI EN 300 392-3-1 [3], clause 8.4.4.

5) The linked-operations as defined for RO-INVOKE service shall not be used.

36.4 Allocation of the ROSE Invoke-ID

In accordance with the Recommendation ITU-T X.219 [14] when the RO service is invoked a new ROSE Invoke-ID shall be allocated.

36.5 ROSE APDUs in PSS1 Facility information element

According to clause 8 of ETSI EN 300 392-3-1 [3], ANF-ISIMM will use the ROSE operation tetraIsiMessage defined in table 13 of ETSI EN 300 392-3-1 [3].

NOTE: The RO services will result in ROSE APDUs which will convey the ANF-ISIMM PDUs across the ISI.

The resulting ROSE APDUs shall be sent in a PSS1 facility information element in a PSS1 message (see ISO/IEC 11582 [7]). That PSS1 message will generally be a FACILITY message (see clause 36.1.2 for other possible PSS1 messages).

When conveying the ROSE APDU of the ROSE operation tetraIsiMessage, the sourceEntity and destinationEntity shall be anfIsimm. The destinationEntity data element of the Network Facility extension shall be endPINX.

When conveying the Invoke APDU of the operation tetraIsiMessage, the Interpretation APDU shall be omitted.

When conveying the ReturnResult APDU the tetraMessage shall be the last ANF-ISIMM PDU of the ANF-ISIMM service instance.

In accordance with ETSI EN 300 392-3-1 [3] the ISI entity concerned in the destination SwMI shall send a ReturnError APDU or Reject APDU when an Invoke APDU cannot be accepted. When the ROSE entity in the source SwMI receives this ReturnError APDU or a Reject APDU, it shall pass it to the ANF-ISIMM of this SwMI.

37 General ANF-ISIMM service and protocol principles - stage 3

37.0 General

The service and protocol requirements as defined in this clause shall be applicable for all ANF-ISIMM service and protocol instances.

37.1 ANF-ISIMM invoke id

- when the SwMI MM invokes an ANF-ISIMM service, it shall allocate the ANF-ISIMM invoke id. The value shall be used during the service instance to identify the primitives and the PDUs related to that service instance. The invoking SwMI MM shall allocate a unique, non-used value to the ANF-ISIMM invoke id. Then, the ANF-ISIMM invoke id shall be indicated in the first transported PDU over the ISI and it shall not be changed after that (during the operation of that service instance); or

- when the service instance is cleared the involved SwMI MMs shall de-allocate the ANF-ISIMM invoke id locally within the SwMIs.

ISI GFP shall also use the ANF-ISIMM invoke id (and the invoking party MNI) as unique identifier together with the reference of the call independent signalling connection used for the invoked ANF-ISIMM, see clause 36.1.

37.2 Inclusion of Short Subscriber Identity in PDUs

The ISSI of the individual subscriber or the GSSI of the group shall be included in all ANF-ISIMM primitives and PDUs. This ensures in addition to the ANF-ISIMM invoke id that the ANF-ISIMM information exchange is used for the right individual subscriber or group.

37.3 PISN number exchange between SwMI MMs

In accordance with ETSI EN 300 392-3-1 [3] there may be several PISN numbers corresponding to one MNI. In order to support the dynamic allocation of the PISN numbers to the MNI, the home SwMI MM and the visited SwMI MM may exchange their PISN numbers when the subscriber migrates (including restricted migration, see clause 7). If exchanged, the PISN number should be used to address the visited or participating SwMI. The SwMI MMs should keep the PISN numbers for the time period that the subscriber is migrated in the visited SwMI MM.

37.4 Timers

The timer T101 shall be used for all ANF-ISIMM services as defined in this clause.

When the SwMI MM sends a primitive it shall set the timer T101 to supervise the receipt of the corresponding "response". The response shall be:

- the expected primitive that originates from the peer SwMI MM as defined by the service;
- the RO-RESULT service primitive indicating the completion of the service instance; or
- an error or reject indication, e.g. based on ROSE error or rejection reporting.

The timer shall be reset upon receipt of any of these responses. If the T101 timer expires before a response is received the timer can optionally be restarted once or the corresponding primitive can be resent once (including restart of the T101 timer). After the unsuccessful attempt(s), the service instance shall be cleared.

The timer value shall be within the range of 3 to 5 seconds for all services.

37.5 Bundling of ANF-ISIMM PDUs

The ANF-ISIMM does not explicitly support the bundling of different ANF-ISIMM PDUs when sent across the ISI. PSS1 GFP, hence of ISI GFP, can carry two ROSE APDUs in the same PSS1 FACILITY message as a standard feature.

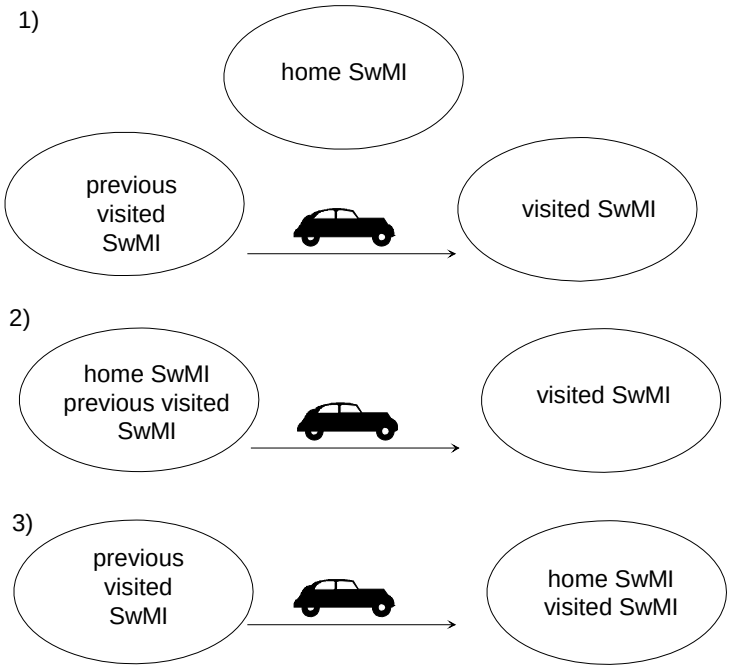
37.6 Exceptional procedures

If the invocation or operation of a service fails, the rejection is reported to the peer SwMI MM and the service related actions in the SwMIs are cancelled. This is applicable also if a transport of a ANF-ISIMM PDU or invocation of a ROSE service across the ISI fails. This implies, that it is the responsibility of the invoking SwMI MM to re-invoke the service in order to complete it successfully. Normally, the re-invocations shall not take place more than twice as it is not likely that any additional re-invocations after that result in successful outcome.

Annex A (normative): The SwMI scenarios and the migration, the restricted migration and the RSI services

When the individual subscriber migrates from the previous visited SwMI to the visited SwMI or in a visited SwMI after power on, the SwMI databases shall be updated accordingly. The concerned databases are collocated with the individual subscriber home SwMI and with the visited SwMI, and if the previous visited SwMI exists with the previous visited SwMI.

However, the migration, the restricted migration and the RSI services shall only be invoked to make the updates when the concerned SwMI and their collocated MMs do not coincide. The different scenarios and the applicability of the ANF-ISIMM services are illustrated in figure A.1.



1) Either the migration or the restricted migration service and the RSI service shall be invoked.
2) Either the migration or the restricted migration service shall be invoked; the RSI service shall not be invoked.
3) The RSI service shall be invoked; neither the migration nor the restricted migration service shall be invoked.

Figure A.1: The different SwMI scenarios and the invocation of the migration, the restricted migration and the RSI services

Annex B (Informative): IDR - dynamic description of the SwMI MMs

B.0 General

This annex contains the dynamic description of the SwMI MMs in the case of IDR service. This description complements the stage 1 description, see clause 14, by illustrating the SwMI MM actions using the SDL conventions.

The purpose of this annex is to clarify IDR service and to highlight the actions that are important from the IDR point of view and from the general understanding of the SDL descriptions. For simplicity, the following deviations are made in the SDL descriptions:

- the procedure and the choice descriptions are only given in natural language in a very general level. Thus, e.g. there is no difference between the migration service with pre-defined profile(s) (as defined in case 1) in clause 6) and the restricted migration service. The complete actions of the SwMI MMs are given in the stage 1 description;
- the possibility to exchange the SS-migration profile(s) after final migration approval (as defined in case 3b) in clause 6) is omitted.

In addition, the following conventions are used in the SDL descriptions:

- the direction of the primitives:
  - the primitives to and from left are sent and received to and from another entity within the SwMI or through the AI; and
  - the primitives to and from right are sent and received to and from the collocated ANF-ISIMM;
- the signs:
  - sign ":=" shall be interpreted as an assignment, i.e. "X := Y" results in X having the value that Y has at the time of the assignment; and
  - sign "=" shall be interpreted as "shall equal", e.g. "X = Y" stands for "the value of X shall equal the value of Y (at that time)";
- the Recovery flag variable:
  - the variable shall be a temporary variable which shall keep its value only during the state in which it has been assigned the value. It shall have three possible values: "Undefined" (if a value has not been assigned in that state), "Recovery" and "No recovery";
  - the variable shall be used to keep track whether the received primitive is part of the IDR service. It shall be used to set the value of the information element Recovery of the sent primitives. In addition, the visited SwMI MM shall use the Recovery flag to fetch the next I-VDB record when the virtual (i.e. IDR related) migration act and, if applicable, the virtual RSI act has been completed for one individual subscriber.

B.1 HMM recovery

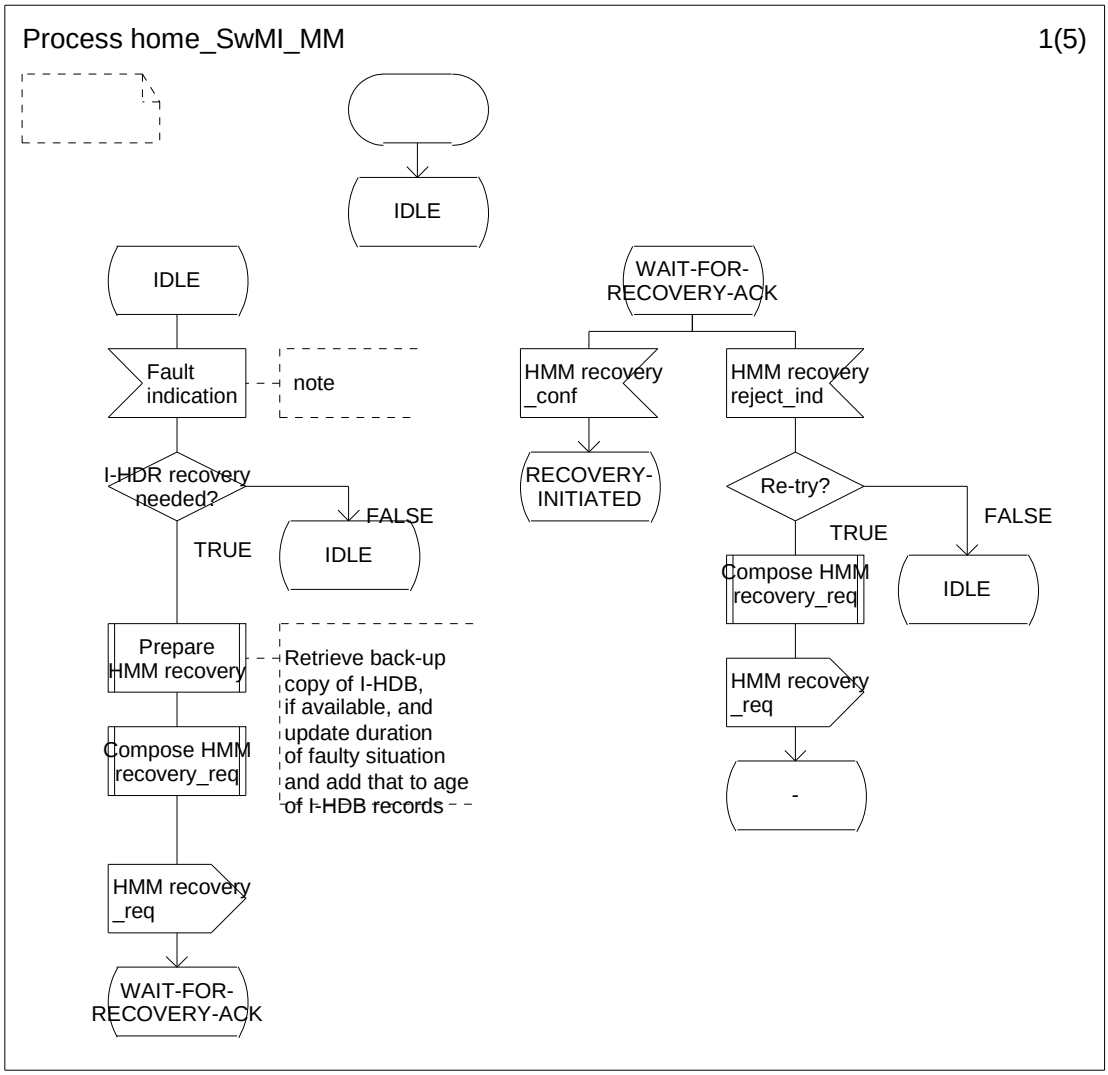
B.1.1 Individual subscriber home SwMI MM

The dynamic description of the individual subscriber home SwMI MM in the case of HMM recovery is illustrated in figure B.1.

The following SDL states are used:

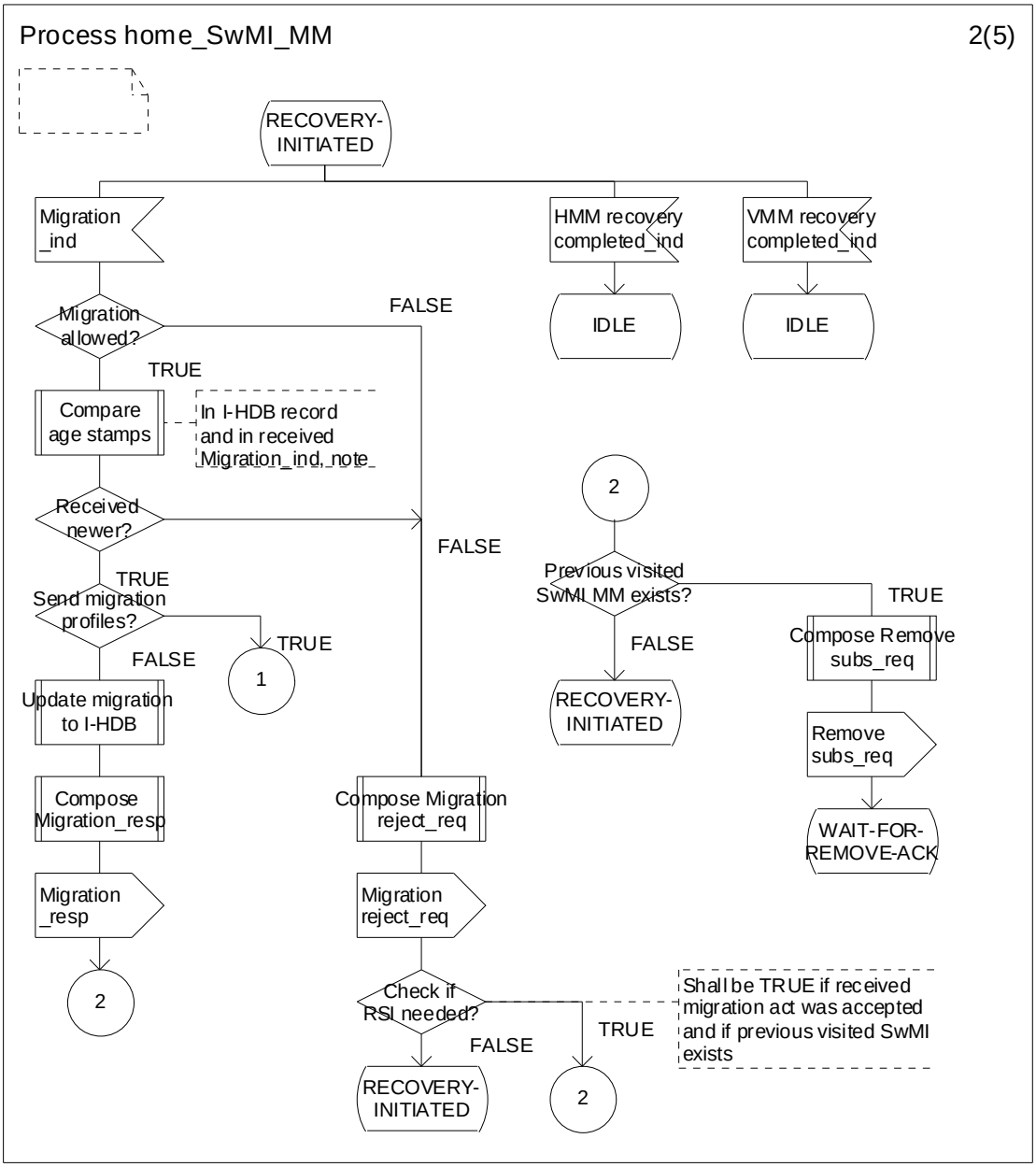
- IDLE: no HMM recovery in progress;
- RECOVERY-INITIATED: recovery has been initiated;

- WAIT-FOR-PROFILE-ACK: the individual subscriber home SwMI MM is awaiting the response for the sent original basic migration profile from the visited SwMI MM;
- WAIT-FOR-RECOVERY-ACK: the individual subscriber home SwMI MM is awaiting the response for the HMM recovery invocation from the visited SwMI MM;
- WAIT-FOR-REMOVE-ACK: the individual subscriber home SwMI MM is awaiting the response for the RSI invocation from the previous visited SwMI MM; and
- WAIT-FOR-SS-PROFILE-ACK: the individual subscriber home SwMI MM is awaiting the response for the sent original SS-migration profile(s) from the visited SwMI MM.



NOTE: Depending on the implementation of the SwMI, the fault indication may be received from various entities in the SwMI.

Figure B.1 (sheet 1 of 5): HMM recovery - dynamic description of the individual subscriber home SwMI MM



NOTE: If the received Migration_ind is part of the HMM recovery, it is possible that there is no I-HDB record for the individual subscriber. If there is no I-HDB record for the subscriber the received Migration_ind shall be considered as newer (i.e. shall not be rejected due to age stamp).

Figure B.1 (sheet 2 of 5): HMM recovery - dynamic description of the individual subscriber home SwMI MM

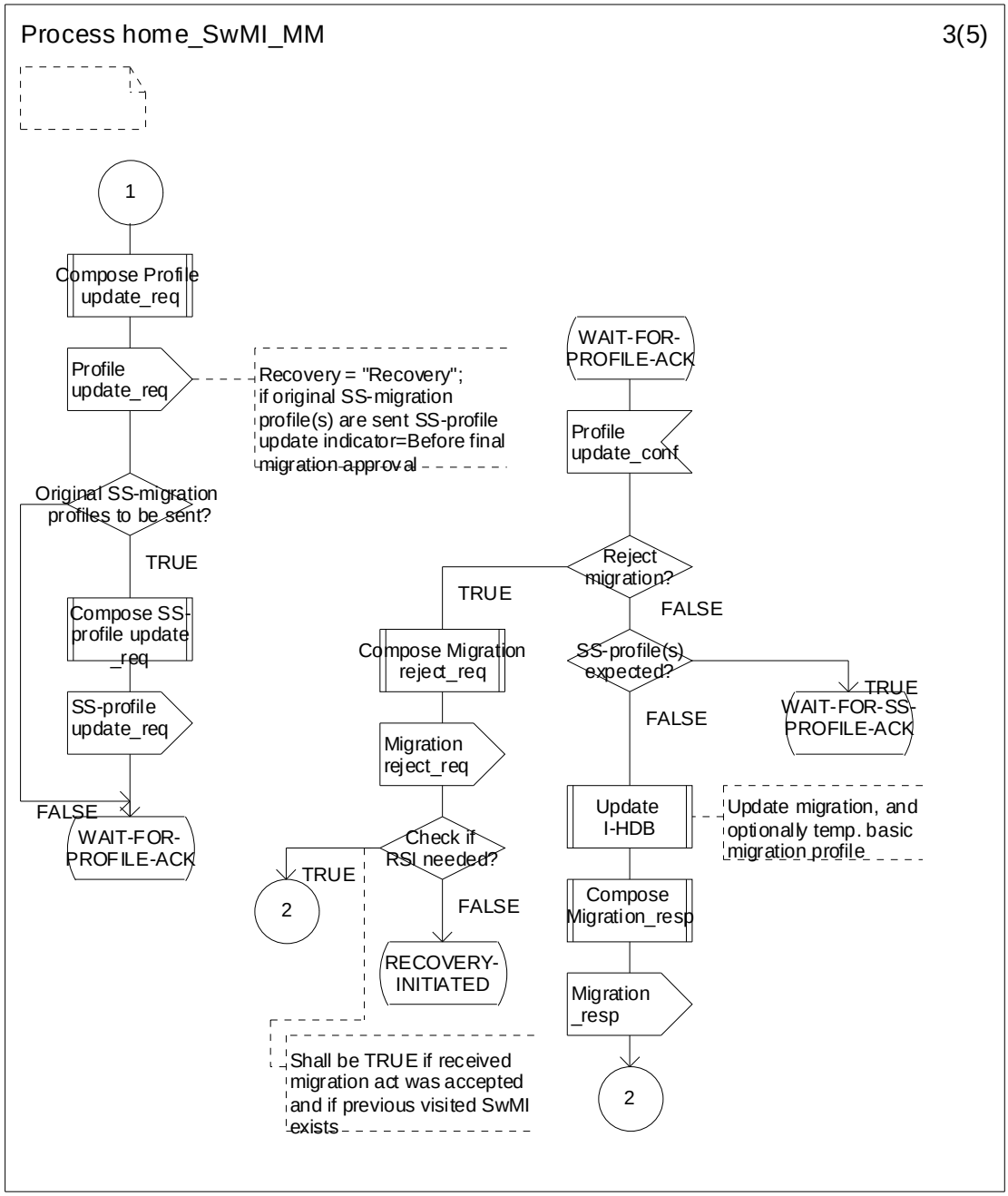


Figure B.1 (sheet 3 of 5): HMM recovery - dynamic description of the individual subscriber home SwMI MM

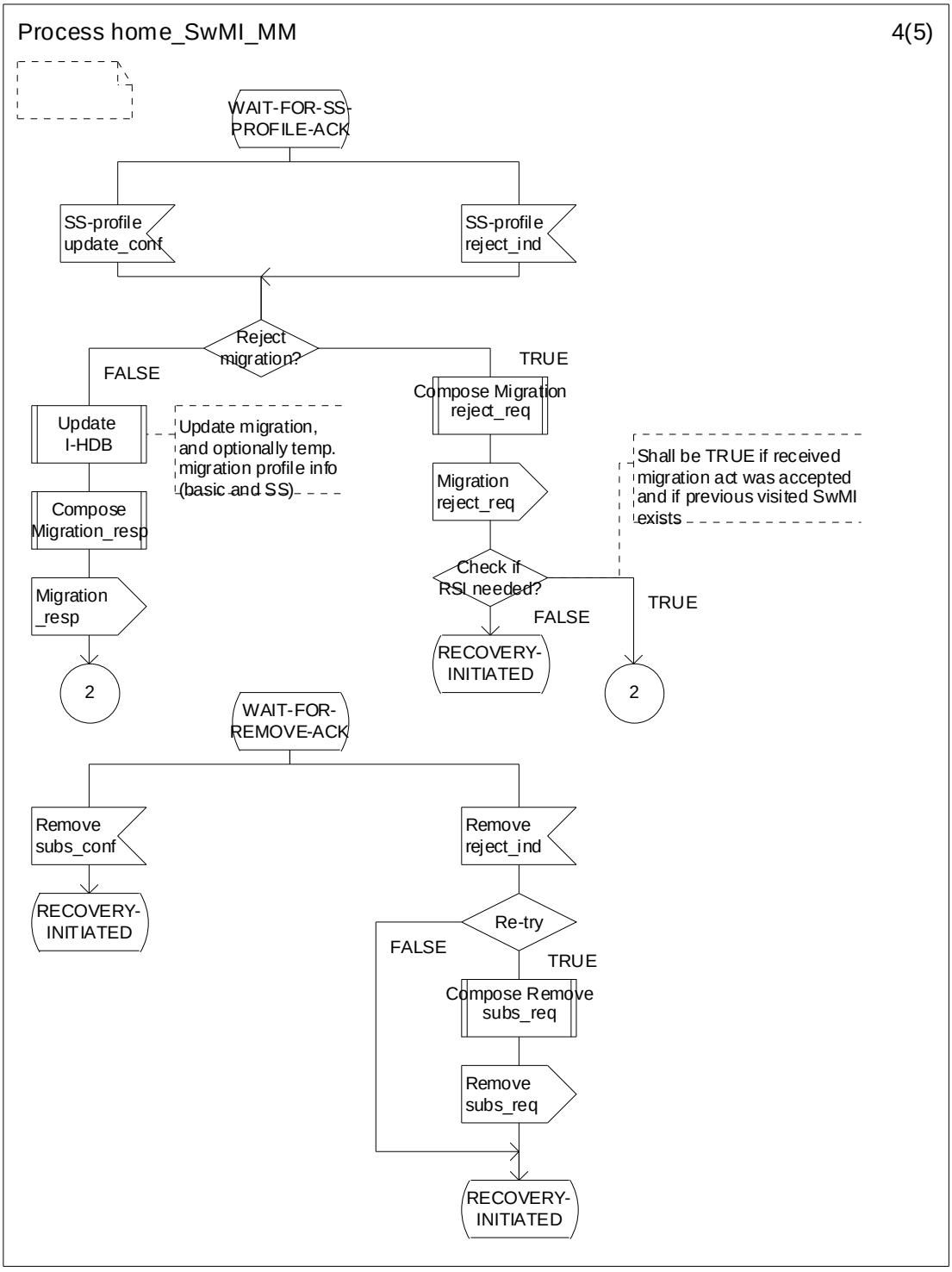


Figure B.1 (sheet 4 of 5): HMM recovery - dynamic description of the individual subscriber home SwMI MM

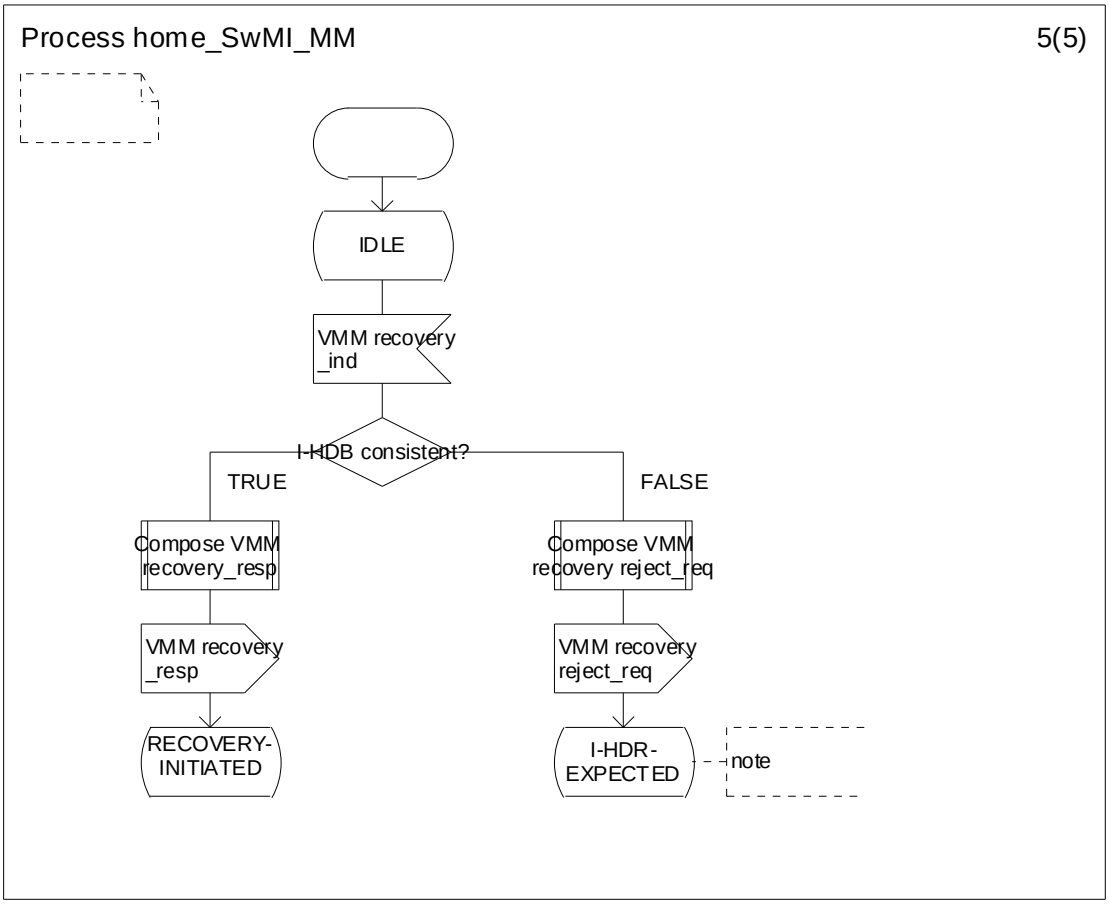


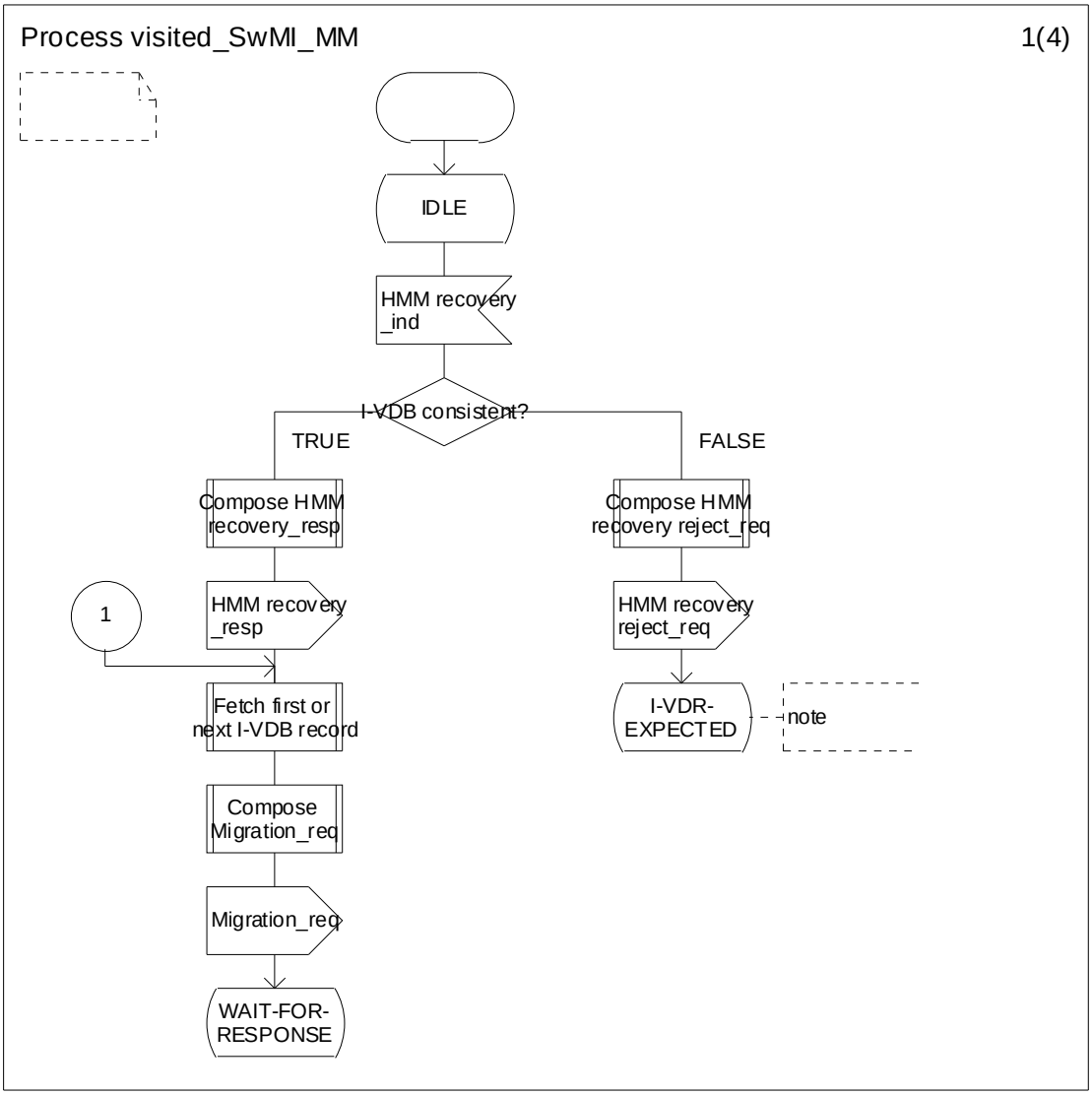
Figure B.1 (sheet 5 of 5): HMM recovery - dynamic description of the individual subscriber home SwMI MM

B.1.2 Visited SwMI MM

The dynamic description of the visited SwMI MM in the case of HMM recovery is illustrated in figure B.2.

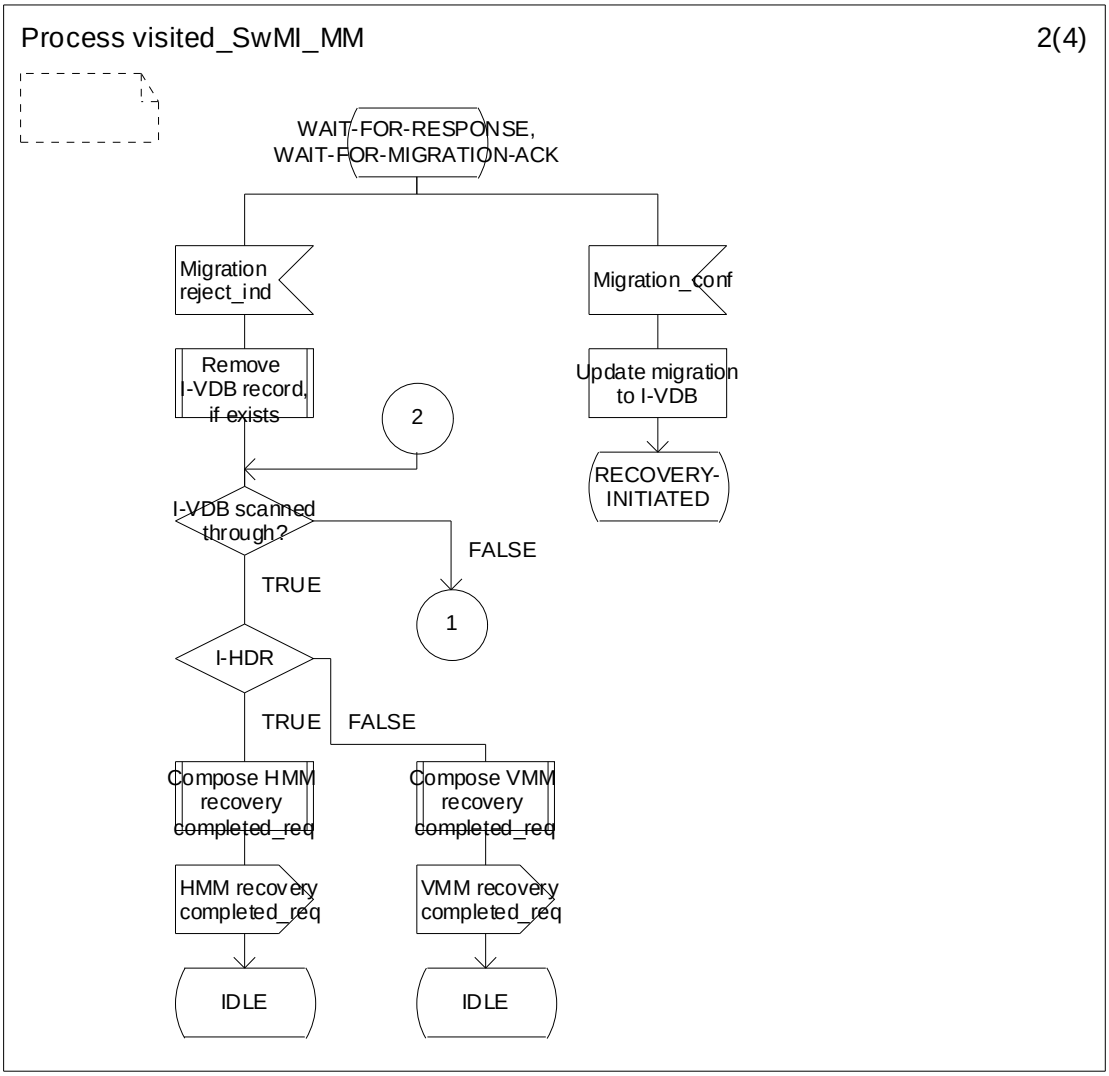
The following SDL states are used:

- IDLE: no HMM recovery in progress;
- RECOVERY-INITIATED: HMM recovery has been initiated;
- WAIT-FOR-MIGRATION-ACK: the visited SwMI MM is awaiting the Migration_conf from the individual subscriber home SwMI MM;
- WAIT-FOR-MIGRATION-REJECTION: the visited SwMI MM is awaiting the Migration reject_ind from the individual subscriber home SwMI MM after the migration or SS-migration profile exchange failure;
- WAIT-FOR-RESPONSE: the visited SwMI MM is awaiting the migration approval or the original basic migration profile from the individual subscriber home SwMI MM;
- WAIT-FOR-SS-PROFILE(S): the visited SwMI MM is awaiting the original SS-migration profiles from the individual subscriber home SwMI MM;
- VMM-RECOVERY-EXPECTED: the visited SwMI MM is expected to invoke VMM recovery as it has detected that its I-VDB is not in a consistent state.



NOTE: If a SwMI MM rejects the recovery because its database is not able to support the recovery (it is not consistent) that SwMI MM shall invoke the recovery in order to recover the database.

Figure B.2 (sheet 1 of 4): HMM recovery - dynamic description of the visited SwMI MM



NOTE: The location update type shall indicate call restoration if the following is valid:
- the location update type in the U-LOCATION UPDATE DEMAND PDU indicated call restoration;
- the migration type in the received Migration_conf indicated call restoration; and
- there is no indication that the previous visited SwMI would not support the call restoration.

Figure B.2 (sheet 2 of 4): HMM recovery - dynamic description of the visited SwMI MM

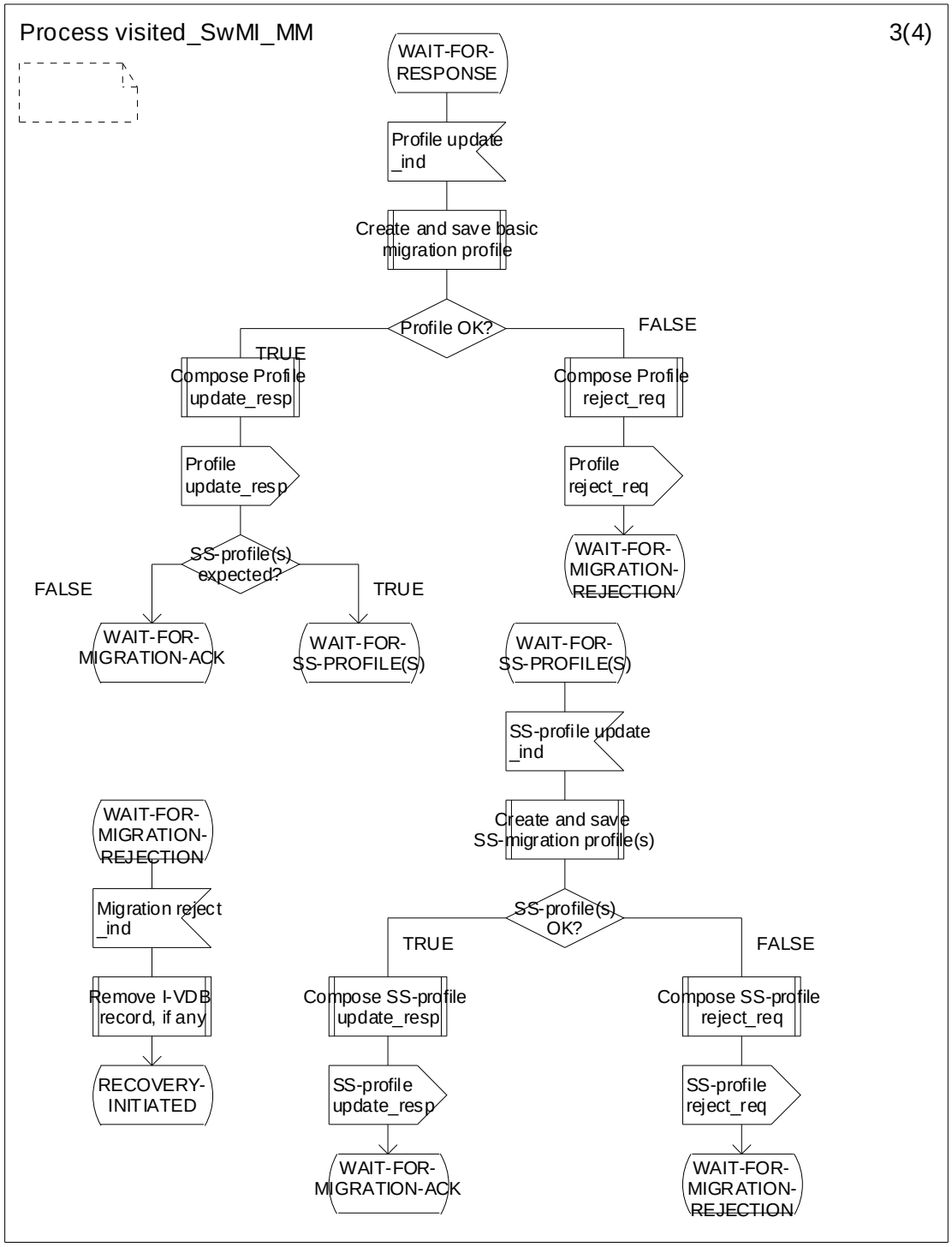


Figure B.2 (sheet 3 of 4): HMM recovery - dynamic description of the visited SwMI MM

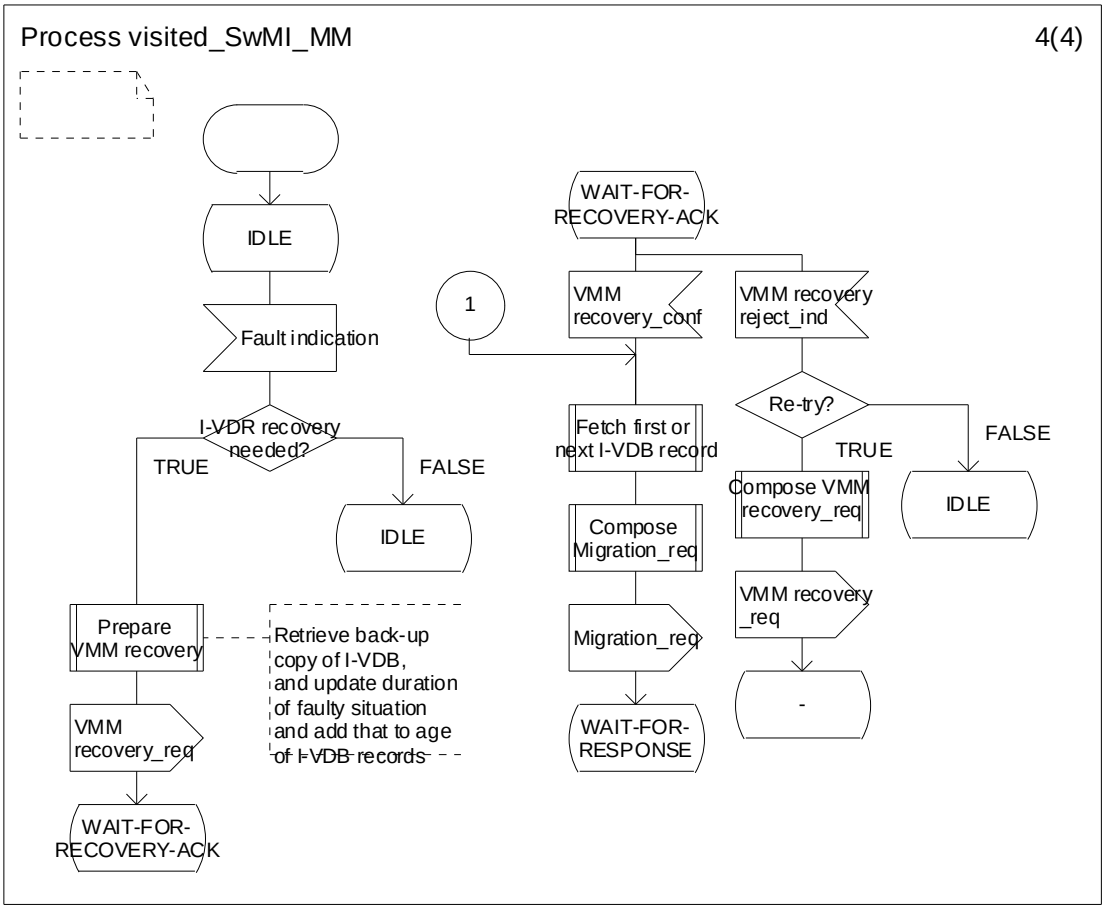


Figure B.2 (sheet 4 of 4): HMM recovery - dynamic description of the visited SwMI MM

B.1.3 Previous visited SwMI MM

The dynamic description of the visited SwMI MM in the case of HMM recovery is illustrated in figure B.3:

- IDLE: no RSI in progress.

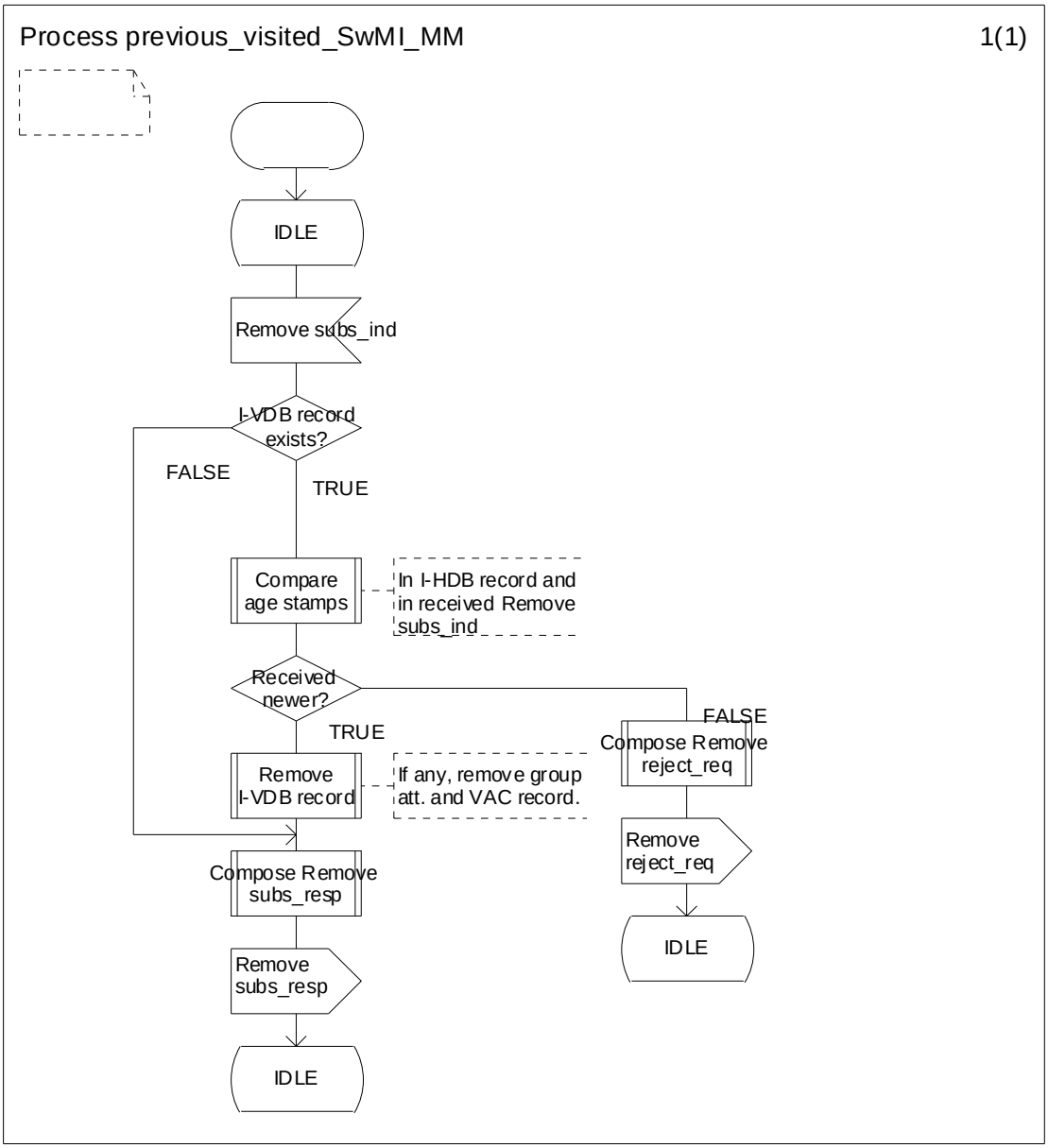


Figure B.3: HMM recovery - dynamic description of the previous visited SwMI MM

B.2 VMM recovery

B.2.1 Individual subscriber home SwMI MM

As HMM recovery in clause B.1.1 with the following exceptions:

- all actions (i.e. the invocation of HMM recovery) in sheet 1 shall be omitted;
- state "RECOVERY-INITIATED" shall be replaced by state "IDLE"; however, the previous state IDLE definitions are still valid; and
- receipt of HMM recovery completed_ind in sheet 2 shall be omitted.

B.2.2 Visited SwMI MM

As HMM recovery in clause B.1.2 with the following exceptions:

- actions in figure B.2 in sheet 1 of 4 shall be replaced by figure B.4; and
- actions Compose HMM recovery completed_req and the sending of the HMM recovery completed_req shall be omitted.

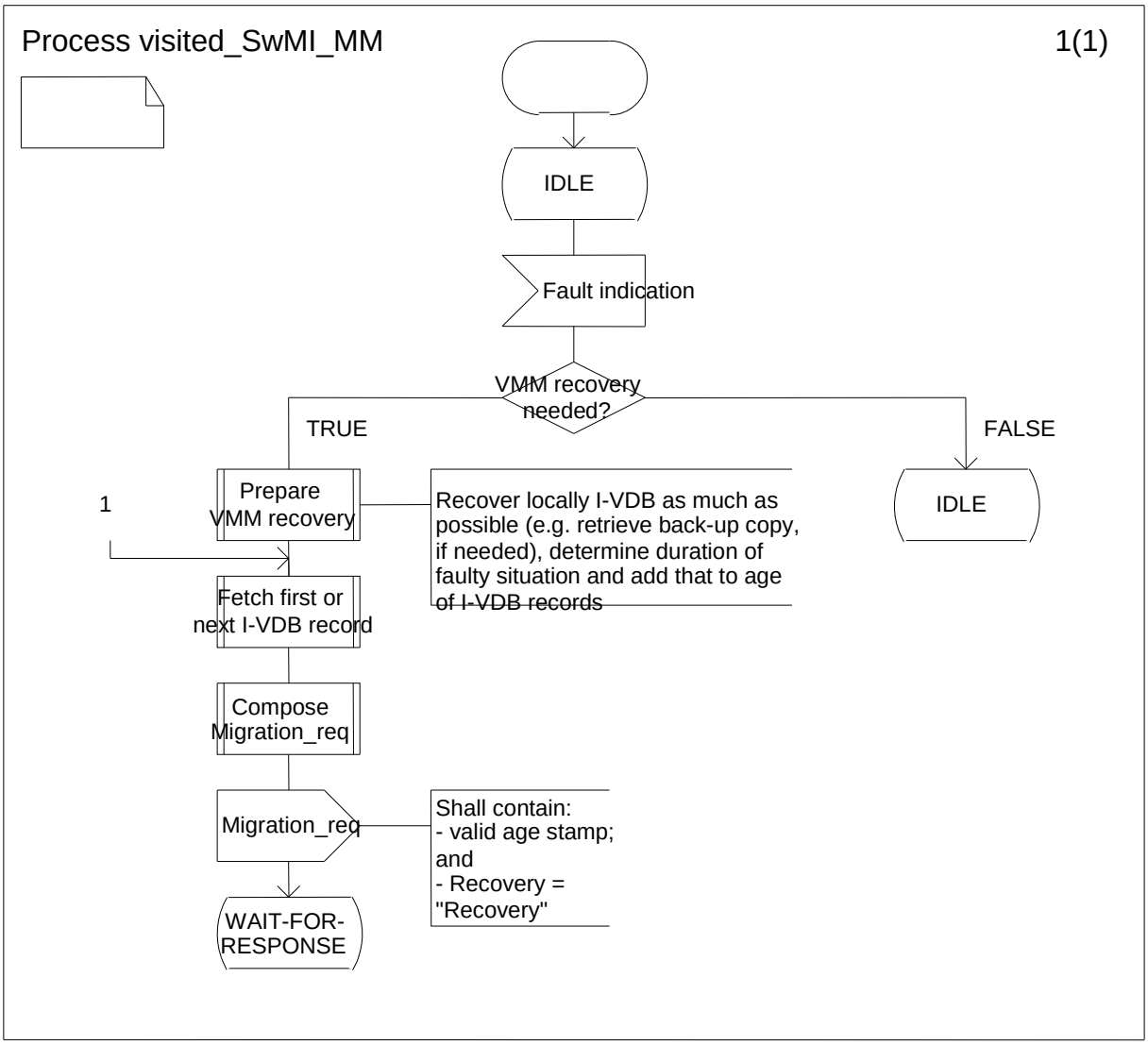


Figure B.4: HMM recovery - dynamic description of the visited SwMI MM

B.2.3 Previous visited SwMI MM

As HMM recovery in clause B.1.3.

Annex C (informative): Example of encoding an ANF-ISIMM MIGRATION PDU in a ROSE Invoke ROSE APDU in a call PISN FACILITY PDU

ETSI EN 300 392-3-1 [3] presents in annex B an example of encoding the ANF-ISIMM MIGRATION PDU in a PISN FACILITY PDU in a call unrelated connection.

Annex D (informative): ANF-ISIMM services requirements for databases

For ANF-ISIMM service purposes, the present document implies the following information contents in the I-HDB for an individual subscriber in his individual subscriber home SwMI:

- mandatory: individual subscriber number, i.e. ISSI;

NOTE: It is implied that each I-HDB knows its MNI.

- mandatory: location information, i.e. location SwMI MM, and the age of the update;
- mandatory: registration status, i.e. registered, migrated, restricted migration or de-registered;
- mandatory: basic migration profile;
- optional: SS migration profiles.

For ANF-ISIMM service purposes, the present document implies the following information contents in the G-HDB for a group in its group home SwMI, if the home SwMI supports the group attachment and the group detachment services:

- mandatory: group number, i.e. GSSI;
- mandatory: activation in the visited SwMI, i.e. attached/not attached;
- mandatory: the subscribers that are attached to the group in the visited SwMI;
- mandatory: basic migration profile, original;
- optional: basic migration profile, temporary;
- optional: SS migration profiles, original;
- optional: SS migration profiles, temporary.

For ANF-ISIMM service purposes, the present document implies the following information contents in the authentication centre related to an individual subscriber in his home, if the individual subscriber home SwMI supports the authentication service:

- mandatory: authentication Key (K), validity time;
- optional: Static Cipher Key (SCK).

For ANF-ISIMM service purposes, the present document implies the following information contents for individual subscribers in I-VDB in the visited SwMI MM when the subscriber is registered or migrated in that SwMI MM (including restricted migration), when applicable:

- mandatory: individual subscriber number, i.e. ITSI;
- mandatory: location information, i.e. located in this SwMI, and the age of the update;
- mandatory: registration status, i.e. registered, migrated, restricted migration or de-registered;
- mandatory: visitor identity ((V)ASSI);
- mandatory: basic migration profile, temporary/original;
- optional: SS migration profile(s), temporary/original.

For ANF-ISIMM service purposes, the present document implies the following information contents for groups in the G-VDB in the visited SwMI when the group is attached to one or more individual subscribers in that visited SwMI, if the SwMI supports group attachment/detachment:

- mandatory: group number, i.e. GTSI;

- mandatory: activation in the visited SwMI, i.e. attached/not attached;
- mandatory: the subscribers that are attached to the group in the visited SwMI and the age of the recorded group attachment;
- mandatory: visitor identity ((V)GSSI);
- mandatory: basic migration profile, temporary/original;
- optional: the group detachment(s);
- optional: SS migration profiles, temporary/original.

For ANF-ISIMM service purposes, the present document may imply the following information contents in the authentication centre for an individual subscriber in the visited SwMI, if the SwMI supports the authentication service:

- mandatory: session authentication keys (KSv, KSv');
- mandatory: Random Seed (RS);
- mandatory: the validity time of the session authentication key and random seed.

For ANF-ISIMM service purposes, the present document may imply the following information contents in the authentication centre for an individual subscriber in the visited SwMI, if the SwMI supports OTAR generator parameters:

- mandatory: session key OTAR (KSOv);
- mandatory: Random Seed for OTAR (RSO);
- mandatory: the validity time of the session authentication key and random seed for OTAR.

The age information may be replaced by a time information; however, it is assumed the SwMI is able to provide the peer SwMI with valid age information for the actions as defined in the present document.

Annex E (informative): Change Requests

The present version of the present document contains Change Requests as presented in the table E.1.

Table E.1: Change Requests

No	CR vers.	Standard Version	Clauses affected	Title	CR Status
001	App	Ed. 1	33.5, 34.1.5, 34.2.20	Addition of age stamp to de-registration information flow and PDU	EPT approved 0308
002	App	Ed. 1	Annex C	Wrong encoding	EPT approved 0308
003	App	Ed. 1	34.2.89	Type 3 element identifier definition wrong	EPT approved 0308
004	App	Ed. 1	34.2.5	Correction to the AI encryption state list	EPT approved 0308
005	App	Ed. 1	15.4.1.2.3, 15.4.2.1.1.2 (new), 15.4.2.1.1.3 ex. 15.4.2.1.1.2, 15.4.2.1.1.4 ex. 15.4.2.1.1.3, 15.4.2.3.1, 15.4.2.3.2.5, 18.4.2.1.1, 18.4.2.1.2, 18.4.2.2	Group linking	EPT approved 0308
101	11	1.2.1	4.2.2, 5.2, 6.3, 6.4, 6.5.1.2, 6.5.2, 6.5.2.1.1, 6.5.2.1.2.1, 6.5.2.1.2.3, 6.5.2.2.1.1, 6.5.2.2.1.2, 6.5.2.2.1.3, 6.5.2.2.1.4, 6.5.2.2.2.1, 6.5.2.2.2.2, 6.5.2.2.2.3, 6.5.2.2.2.4, 6.5.2.2.4.1, 6.5.2.2.5.4, 6.6, 6.6.1, 6.6.2, 6.8, 7.3, 7.5.1.1, 7.5.1.2, 7.5.2.1, 7.5.2.3, 7.6, 7.6.1, 7.6.2, 7.8, 8.1, 8.3, 8.4.1.1, 8.4.1.2, 8.4.2, 8.5, 8.7, 9.2, 9.3, 9.4.2, 9.5, 9.5.1, 9.5.2, 9.6, 10.1, 10.3, 10.4.1.2, 10.4.2, 15.1, 15.2, 15.3, 15.4.1.1, 15.4.1.2.1, 15.4.1.2.2, 15.4.1.2.3, 15.4.1.2.4, 15.4.2.1, 15.4.2.1.1. 15.4.2.1.1.1, 15.4.2.1.1.3, 15.4.2.1.2.1, 15.4.2.1.2.2, 15.4.2.1.2.3, 15.4.2.1.2.4, 15.4.2.1.2.5, 15.4.2.2.1, 15.4.2.2.2, 16.1, 16.2, 16.3, 16.4.1.1, 16.4.1.2.1, 16.4.1.2.2, 16.4.2.1, 16.4.2.2, 16.5, 16.6, 16.7, 19.2, 19.3, 29.1.1, 29.1.2, 29.1.3, 29.1.4, 29.2.1, 29.2.2, 29.2.3, 29.2.4, 29.3.1, 30.1.1, 30.1.2, 30.2.1, 30.2.2, 30.3.1, 30.3.2, 34.1.8, 34.1.9, 34.1.10, 34.1.11, 34.1.12, 34.1.13, 35.13.1, 35.13.2, 35.14.1, 35.14.2	Group attachment to foreign groups	WG3 approved 0703
102	10	1.2.1	34.1	PDU encoding rules	WG3 approved 070320
103	10	1.2.1	34.1.9, 34.1.25, 34.1.26	Errors in type and C/O/M values in some PDUs	WG3 approved 070320
104	10	1.2.1	6.5.2.2.1.1, 10.4.1.2, 10.4.2, 15.4.1.2.3, 15.4.2.1.2.4, 33.39.1.1, 33.39.1.2, 34.2.36, 34.2.18, 34.2.28, 34.2.36, 34.2.74	Removal of CONS and SCLNS services	WG3 approved 070320
201	10	1.3.1	Annex C	Editorial error in Annex C	WG3 approved 080108
202	10	1.3.1	6.2, 6.5.2.1.1, 8.3	Migration services and RSI during Individual Call	WG3 approved 080310
203	10	1.4.1	3.1, 3.2, 12.1, 12.3, 12.5.2.1, 13.1, 13.3, 13.5.1.2.3, 13.5.2.1, 13.5.2.2, 33.2, 33.24, 34.1.2, 34.1.32, Annex D, and other places for terminology change	Inclusion of visited session keys	WG3 approved 141031
204	10	1.4.1	34.2.89	Type 3 element identifier coding	WG3 approved 131112
205	10	1.4.1	2.1, 3.1, 15.1, 15.4.2.1.1.2, 15.4.2.1.1.5, 15.4.2.3.1, 15.4.2.3.2.5, 16.4.2.1, 16.4.2.2, 18.1, 18.3, 18a (New clause), 18b (New clause)	Linked group attachment, stage 1 service description	WG3 approved 140919

No	CR vers.	Standard Version	Clauses affected	Title	CR Status
206	10	1.4.1	19.2, 32a (new clause), 33.0a (new clause), 33.0b (new clause), 33.6a (new clause), 34.1.0a (new clause), 34.1.0b (new clause), 34.1.0c (new clause), 34.1.7a (new clause), 34.1.7b (new clause), 34.2.6a (new clause)	Linked group attachment, stage 2 and 3 service description	WG3 approved 140926
207	20	1.4.1	37.4	Timer T101	WG3 approved 150511
208	10	1.4.1	Annex B, Introductory text	Make SDL diagrams in Annex B informative	WG3 approved 150624
209	10	1.4.2	34.1, 34.1.8, 34.1.23, 34.2.30, 34.2.36, 34.2.40, 34.2.45, 34.2.68, 34.2.86, 34.2.89	Correction of errors in v142	WG3 approved 151027

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