3GPP TSG CN Plenary Meeting #12 **Tdoc NP-010259**
Stockholm, Sweden, 13th - 15th June 2001

Source: TSG CN WG4

Title: CRs on Rel-4 Work Item Security Enhancement

Agenda item: 8.10

Document for: APPROVAL

Introduction:

This document contains 1 CRs on Rel-4 Work Item ”Security”, that have been agreed by TSG CN WG4, and are forwarded to TSG CN Plenary meeting #12 for approval.

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.002	287		N4-010671	Rel-4	Shift MAPsec to Rel-5	C	4.3.0

3GPP TSG-CN WG4 Meeting #08 **Tdoc N4-010671**
Rio Grande, Puerto Rico, 14-18 May 2001

CR-Form-v3

CHANGE REQUEST

⌘ **29.002** **CR** **287** ⌘ rev ⌘ Current version: **4.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Shift MAPsec to Rel-5
Source:	⌘	CN4
Work item code:	⌘	SEC1
Date:	⌘	15. May. 2001
Category:	⌘	**C**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	MAPsec cannot be finalised in time for Rel-4. This CR undoes the modifications done so far to introduce MAPsec in the Rel-4 version of 29.002 (CR 148r4 and CR 152r1).
Summary of change:	⌘	The changes introduced by CR 148r4 and CR 152r1 are undone.
Consequences if not approved:	⌘	inconsistancis in the Rel-4 specification set.

Clauses affected:	⌘	5.1.2, 7.3, 7.3.1, 7.3.7 (deleted), 7.3.8 (deleted), 7.3.9 (deleted), 7.3.10 (deleted), 7.6.1.4, 7.6.12 (deleted), 15 (replacement clause), 16.2.2.4, 16.3 (new), 17.1.5, 17.1.6, 17.2.2.8 (deleted), 17.3.2.8 (deleted), 17.3.3, 17.4, 17.5, 17.6.6, 17.6.9 (deleted), 17.7.7, 17.7.14 (deleted)
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	The entire text and diagrams of clause 15 has been deleted. To save space, the deleted text and diagrams have not been shown struck out.

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.1.2 Overload control for MAP entities

For all MAP entities, especially the HLR, the following overload control method is applied:

If overload of a MAP entity is detected requests for certain MAP operations (see tables 5.1/1, 5.1/2, 5.1/3 and 5.1/4) may be ignored by the responder. The decision as to which MAP Operations may be ignored is made by the MAP service provider and is based upon the priority of the application context.

Since most of the affected MAP operations are supervised in the originating entity by TC timers (medium) an additional delay effect is achieved for the incoming traffic.

If overload levels are applicable in the Location Registers the MAP operations should be discarded taking into account the priority of their application context (see table 5.1/1 for HLR, table 5.1/2 for MSC/VLR, table 5.1/3 for the SGSN and table 5.1/4 for the SMLC; the lowest priority is discarded first).

The ranking of priorities given in the tables 5.1/1, 5.1/2, 5.1/3 and 5.1/4 is not normative. The tables can only be seen as a proposal which might be changed due to network operator/implementation matters.

~~If secure transport is used, the encapsulated application context for the requested dialogue determines the priority for discarding the received MAP operation.~~

****** Next modified section ******

7.3 Common MAP services

All MAP service-users require access to services for performing basic application layer functions:

- for establishing and clearing MAP dialogues between peer MAP service-users;
- for accessing functions supported by layers below the applications layer;
- for reporting abnormal situations;
- for handling of different MAP versions;
- for testing whether or not a persistent MAP dialogue is still active at each side.

For these purposes the following common services are defined:

- MAP-OPEN service;
- MAP-CLOSE service;
- MAP-DELIMITER service;
- MAP-U-ABORT service;
- MAP-P-ABORT service;
- MAP-NOTICE service.~~;~~

~~- MAP-SECURE-TRANSPORT-CLASS-1 service;~~

~~- MAP-SECURE-TRANSPORT-CLASS-2 service;~~

~~- MAP-SECURE-TRANSPORT-CLASS-3 service;~~

~~- MAP-SECURE-TRANSPORT-CLASS-4 service;~~

In defining the service-primitives the following convention is used for categorising parameters:

M the inclusion of the parameter is mandatory. The M category can be used for any primitive type and specifies that the corresponding parameter must be present in the indicated primitive type;

O the inclusion of the parameter is a service-provider option. The O category can be used in indication and confirm type primitives and is used for parameters that may optionally be included by the service-provider;

U the inclusion of the parameter is a service-user option. The U category can be used in request and response type primitives. The inclusion of the corresponding parameter is the choice of the service-user;

C the inclusion of the parameter is conditional. The C category can be used for the following purposes:

- to indicate that if the parameter is received from another entity it must be included for the service being considered;
- to indicate that the service user must decide whether to include the parameter, based on the context on which the service is used;
- to indicate that one of a number of mutually exclusive parameters must be included (e.g. parameters indicating a positive result versus parameters indicating a negative result);
- to indicate that a service user optional parameter (marked "U") or a conditional parameter (marked "C") presented by the service user in a request or response type primitive is to be presented to the service user in the corresponding indication or confirm type primitive;

(=) when appended to one of the above, this symbol means that the parameter takes the same value as the parameter appearing immediately to its left;

blank the parameter is not present.

A primitive type may also be without parameters, i.e. no parameter is required with the primitive type; in this case the corresponding column of the table is empty.

7.3.1 MAP-OPEN service

This service is used for establishing a MAP dialogue between two MAP service-users. The service is a confirmed service with service primitives as shown in table 7.3/1.

Table 7.3/1: Service-primitives for the MAP-OPEN service

Parameters	Request	Indication	Response	Confirm
Application context name	M	M(=)	U	C(=)
Destination address	M	M(=)		
Destination reference	U	C(=)		
Originating address	U	O		
Originating reference	U	C(=)		
Specific information	U	C(=)	U	C(=)
Responding address			U	C(=)
Result			M	M(=)
Refuse-reason			C	C(=)
Provider error				O

Application context name:

This parameter identifies the type of application context being established. If the dialogue is accepted the received application context name shall be echoed. In case of refusal of dialogue this parameter shall indicate the highest version supported.

Destination address:

A valid SCCP address identifying the destination peer entity (see also clause 6). As an implementation option, this parameter may also, in the indication, be implicitly associated with the service access point at which the primitive is issued.

Destination-reference:

This parameter is a reference which refines the identification of the called process. It may be identical to Destination address but its value is to be carried at MAP level. Table 7.3/2 describes the MAP services using this parameter. Only these services are allowed to use it.

Table 7.3/2: Use of the destination reference

MAP service	Reference type	Use of the parameter
MAP-REGISTER-SS	IMSI	Subscriber identity
MAP-ERASE-SS	IMSI	Subscriber identity
MAP-ACTIVATE-SS	IMSI	Subscriber identity
MAP-DEACTIVATE-SS	IMSI	Subscriber identity
MAP-INTERROGATE-SS	IMSI	Subscriber identity
MAP-REGISTER-PASSWORD	IMSI	Subscriber identity
MAP-PROCESS-UNSTRUCTURED-SS-REQUEST	IMSI	Subscriber identity
MAP-UNSTRUCTURED-SS-REQUEST	IMSI	Subscriber identity
MAP-UNSTRUCTURED-SS-NOTIFY	IMSI	Subscriber identity
MAP-FORWARD-SHORT-MESSAGE	IMSI (note)	Subscriber identity
MAP-REGISTER-CC-ENTRY	IMSI	Subscriber identity
MAP-ERASE-CC-ENTRY	IMSI	Subscriber identity

NOTE: Only when the IMSI and the LMSI are received together from the HLR in the mobile terminated short message transfer.

Originating address:

A valid SCCP address identifying the requestor of a MAP dialogue (see also clause 6). As an implementation option, this parameter may also, in the request, be implicitly associated with the service access point at which the primitive is issued.

Originating-reference:

This parameter is a reference which refines the identification of the calling process. It may be identical to the Originating address but its value is to be carried at MAP level. Table 7.3/3 describes the MAP services using the parameter. Only these services are allowed to use it. Processing of the Originating-reference shall be performed according to the supplementary service descriptions and other service descriptions, e.g. operator determined barring.

Table 7.3/3: Use of the originating reference

MAP service	Reference type	Use of the parameter
MAP-REGISTER-SS	ISDN-Address-String	Originated entity address
MAP-ERASE-SS	ISDN-Address-String	Originated entity address
MAP-ACTIVATE-SS	ISDN-Address-String	Originated entity address
MAP-DEACTIVATE-SS	ISDN-Address-String	Originated entity address
MAP-INTERROGATE-SS	ISDN-Address-String	Originated entity address
MAP-REGISTER-PASSWORD	ISDN-Address-String	Originated entity address
MAP-PROCESS-UNSTRUCTURED-SS-REQUEST	ISDN-Address-String	Originated entity address
MAP-REGISTER-CC-ENTRY	ISDN-Address-String	Originated entity address
MAP-ERASE-CC-ENTRY	ISDN-Address-String	Originated entity address

Specific information:

This parameter may be used for passing any user specific information. Establishment and processing of the Specific information is not specified by GSM and shall be performed according to operator specific requirements.

Responding address:

An address identifying the responding entity. The responding address is included if required by the context (e.g. if it is different from the destination address).

Result:

This parameter indicates whether the dialogue is accepted by the peer.

Refuse reason:

This parameter is only present if the Result parameter indicates that the dialogue is refused. It takes one of the following values:

- Application-context-not-supported;
- Invalid-destination-reference;
- Invalid-originating-reference;
- No-reason-given;
- Remote node not reachable;
- Potential version incompatibility~~;~~

~~Secured transport not possible~~.

****** Next modified section ******

7.3.7 MAP-SECURE-TRANSPORT-CLASS-1 service

This service is used for secure transport of a specific confirmed MAP service which is mapped on to a TCAP class 1 operation (i.e. one which can return a result or an error). The service is a confirmed service with service primitives as shown in table 7.3/11.

Table 7.3/11: Service-primitives for the MAP-SECURE-TRANSPORT-CLASS-1 service

Parameters	Request	Indication	Response	Confirm
Security header	M	M(=)	M	M(=)
Protected payload	C	C(=)	U	C(=)
User error			U	C(=)
Provider error				O

Security header:

This parameter carries the security header information required for secure transport of MAP messages. The details of this parameter are given in subclause 7.6.12.

Protected payload:

This parameter represents in protected mode the complete Request, Indication, Response or Confirm primitive of the service which makes use of the MAP_SECURE_TRANSPORT_CLASS_1 service.

User error:

If the application at the responding entity returns an error to be carried in the secure transport envelope, this parameter contains the Secure transport error defined in subclause 7.6.1.

Provider error

For the definition of provider errors see subclause 7.6.1.

7.3.8 MAP-SECURE-TRANSPORT-CLASS-2 service

This service is used for secure transport of a specific confirmed MAP service which is mapped on to a TCAP class 2 operation (i.e. one which can return an error but no result). The service is a confirmed service with service primitives as shown in table 7.3/12.

Table 7.3/12: Service-primitives for the MAP-SECURE-TRANSPORT-CLASS-2 service

Parameters	Request	Indication	Response	Confirm
Security header	M	M(=)	M	M(=)
Protected payload	C	C(=)		
User error			U	C(=)
Provider error				O

Security header:

This parameter carries the security header information required for secure transport of MAP messages. The details of this parameter are given in subclause 7.6.12.

Protected payload:

This parameter represents in protected mode the complete Request, Indication, Response or Confirm primitive of the service which makes use of the MAP_SECURE_TRANSPORT_CLASS_2 service.

User error:

If the application at the responding entity returns an error to be carried in the secure transport envelope, this parameter contains the Secure transport error defined in subclause 7.6.1.

Provider error

For the definition of provider errors see subclause 7.6.1.

7.3.9 MAP-SECURE-TRANSPORT-CLASS-3 service

This service is used for secure transport of a specific confirmed MAP service which is mapped on to a TCAP class 3 operation (i.e. one which can return a result but no error). The service is a confirmed service with service primitives as shown in table 7.3/13.

Table 7.3/13: Service-primitives for the MAP-SECURE-TRANSPORT-CLASS-3 service

Parameters	Request	Indication	Response	Confirm
Security header	M	M(=)	M	M(=)
Protected payload	C	C(=)	U	C(=)
Provider error				O

Security header:

This parameter carries the security header information required for secure transport of MAP messages. The details of this parameter are given in subclause 7.6.12.

Protected payload:

This parameter represents in protected mode the complete Request, Indication, Response or Confirm primitive of the service which makes use of the MAP-SECURE-TRANSPORT-CLASS-3 service.

Provider error

For the definition of provider errors see subclause 7.6.1.

7.3.10 MAP-SECURE-TRANSPORT-CLASS-4 service

This service is used for secure transport of a specific unconfirmed MAP service which is mapped on to a TCAP class 4 operation (i.e. one which can return neither a result nor an error). The service is an unconfirmed service with service primitives as shown in table 7.3/14.

Table 7.3/14: Service-primitives for the MAP-SECURE-TRANSPORT-CLASS-4 service

Parameters	Request	Indication
Security header	M	M(=)
Protected payload	C	C(=)

Security header:

This parameter carries the security header information required for secure transport of MAP messages. The details of this parameter are given in subclause 7.6.12.

Protected payload:

This parameter represents in protected mode the complete Request or Indication primitive of the service which makes use of the MAP-SECURE-TRANSPORT-CLASS-4 service.

****** Next modified section ******

7.6.1.4 User error

This parameter can take values as follows:

NOTE: The values are grouped in order to improve readability; the grouping has no other significance.

a) Generic error:

- system failure, i.e. a task cannot be performed because of a problem in another entity. The type of entity or network resource may be indicated by use of the network resource parameter;
- data missing, i.e. an optional parameter required by the context is missing;
- unexpected data value, i.e. the data type is formally correct but its value or presence is unexpected in the current context;
- resource limitation;
- initiating release, i.e. the receiving entity has started the release procedure;
- facility not supported, i.e. the requested facility is not supported by the PLMN;
- incompatible terminal, i.e. the requested facility is not supported by the terminal.

b) Identification or numbering problem:

- unknown subscriber, i.e. no such subscription exists;
- number changed, i.e. the subscription does not exist for that number any more;
- unknown MSC;
- unidentified subscriber, i.e. if the subscriber is not contained in the database and it has not or cannot be established whether or not a subscription exists;
- unallocated roaming number;
- unknown equipment;
- unknown location area.

c) Subscription problem:

- roaming not allowed, i.e. a location updating attempt is made in an area not covered by the subscription;
- illegal subscriber, i.e. illegality of the access has been established by use of authentication procedure;
- bearer service not provisioned;
- teleservice not provisioned;
- illegal equipment, i.e. the IMEI check procedure has shown that the IMEI is blacklisted or not whitelisted.

d) Handover problem:

- no handover number available;
- subsequent handover failure, i.e. handover to a third MSC failed for some reason.

e) Operation and maintenance problem:

- tracing buffer full, i.e. tracing cannot be performed because the tracing capacity is exceeded.

f) Call set-up problem:

- no roaming number available, i.e. a roaming number cannot be allocated because all available numbers are in use;
- absent subscriber, i.e. the subscriber has activated the detach service or the system detects the absence condition. This error may be qualified to indicate whether the subscriber was IMSI detached, in a restricted area or did not respond to paging;
- busy subscriber. This error may be qualified to indicate that the subscriber was busy due to CCBS and that CCBS is possible;
- no subscriber reply;
- forwarding violation, i.e. the call has already been forwarded the maximum number of times that is allowed;
- CUG reject, i.e. the call does not pass a CUG check; additional information may also be given in order to indicate rejection due to e.g. incoming call barred or non-CUG membership.
- call barred. Optionally, additional information may be included for indicating either that the call meets a barring condition set by the subscriber or that the call is barred for operator reasons. In the case of barring of Mobile Terminating Short Message, the additional information may indicate a barring condition due to "Unauthorised Message Originator".
- optimal routeing not allowed, i.e. the entity which sends the error does not support optimal routeing, or the HLR will not accept an optimal routeing interrogation from the GMSC, or the call cannot be optimally routed because it would contravene optimal routeing constraints.
- forwarding failed, i.e. the GMSC interrogated the HLR for forwarding information but the HLR returned an error.

g) Supplementary services problem:

- call barred;
- illegal SS operation;
- SS error status;
- SS not available;
- SS subscription violation;
- SS incompatibility;
- negative password check;
- password registration failure;
- Number of Password Attempts;
- USSD Busy;
- Unknown Alphabet.
- short term denial;
- long term denial.

For definition of these errors see GSM 04.80.

h) Short message problem:

- SM delivery failure with detailed reason as follows:
  - memory capacity exceeded;
  - MS protocol error;
  - MS not equipped;
  - unknown service centre (SC);
  - SC congestion;
  - invalid SME address;
  - subscriber is not an SC subscriber;
  - and possibly detailed diagnostic information, coded as specified in TS GSM 03.40, under SMS-SUBMIT-REPORT and SMS-DELIVERY-REPORT. If the SM entity which returns the SM Delivery Failure error includes detailed diagnostic information, it shall be forwarded in the MAP_MO_FORWARD_SHORT_MESSAGE and in the MAP_MT_FORWARD_SHORT_MESSAGE response.
- message waiting list full, i.e. no further SC address can be added to the message waiting list;
- Subscriber busy for MT SMS, i.e. the mobile terminated short message transfer cannot be completed because:
  - another mobile terminated short message transfer is going on and the delivery node does not support message buffering; or
  - another mobile terminated short message transfer is going on and it is not possible to buffer the message for later delivery; or
  - the message was buffered but it is not possible to deliver the message before the expiry of the buffering time defined in GSM 03.40;
- Absent Subscriber SM, i.e. the mobile terminated short message transfer cannot be completed because the network cannot contact the subscriber. Diagnostic information regarding the reason for the subscriber's absence may be included with this error.

i) Location services problem:

- Unauthorized Requesting Network
- Unauthorized LCS Client with detailed reason as follows
- Unauthorzied Privacy Class
- Unauthoized Call Unrelated External Client
- Unauthorized Call Related External Client
- Privacy override not applicable
- Position method failure with detailed reason as follows:
    - Congestion
    - Insufficient resources
    - Insufficient Measurement Data
    - Inconsistent Measurement Data
    - Location procedure not completed
    - Location procedure not supported by target MS
    - QoS not attainable
- Unknown or unreachable LCS Client

~~j) Problem detected by an application using secure transport:~~

- ~~Secure transport error. This error indicates that the application using secure transport returned an error. The parameters of the error indicate:~~
    - ~~The security header (see subclause 7.6.12);~~
    - ~~The protected payload, which carries the result of applying the protection function specified in TS 33.102 to the encoding of the parameter of the original error.~~

****** Next modified section ******

~~7.6.12 Secure Transport Parameters~~

~~7.6.12.1 Security Header~~

~~This parameter carries the security header information which is required by a receiving entity in order to extract the protected information from a securely transported MAP message. The components of the security header are shown in table 7.6.12/1.~~

~~See TS 33.102 for the use of these parameters.~~

Table 7.6.12/1: Components of the Security Header

Component name	Presence requirement	Description
Sending PLMN identity	M	The Mobile Country Code and the Mobile Network Code of the PLMN which sent the secure MAP message.
Protection mode	M	The protection mode required for the message – one of: - No protection; - Integrity & Authenticity; - Integrity, Authenticity & Confidentiality.
Encryption algorithm identifier	C	Identifies the encryption algorithm to be used for confidentialityprotection. Shall be present if Protection mode indicates 'Integrity, Authenticity & Confidentiality"; otherwise shall be absent.
Mode of operation	C	The mode of operation for confidentiality protection – one of: - ECB; - CBC; - CFB; - OFB. Modes of operation are defined in ISO/IEC 10116 (1991). Shall be present if Encryption algorithm identifier is present; otherwise shall be absent.
Key version number for Encryption algorithm key	C	The version number of the protection key to be used. Shall be present if Encryption algorithm identifier is present; otherwise shall be absent.
Hash algorithm identifier	C	Identifies the hash algorithm to be used for integrity protection. Shall be present if Protection mode is not 'No protection'; otherwise shall be absent.
Key version number for Hash algorithm key	C	The version number for the key used for the Hash algorithm. Shall be present if Hash algorithm identifier is present; otherwise shall be absent.
Initialisation vector	C	An initialisation vector for the message protection function. Shall be present if the Mode of operation is CBC, CFB or OFB, otherwise shall be absent.
Original component identifier	M	Identifies the type of component to be securely transported – one of: - Operation, identified by the operation code; - Error, defined by the error code; - User information.

****** Next modified section ******

15 Elements of procedure

15.1 Dialogue establishment

The establishment of a MAP dialogue involves two MAP-service-users, one that is the dialogue-initiator and one that is the dialogue-responder.

This procedure is driven by the following signals:

- a MAP-OPEN request primitive from the dialogue-initiator;
- a TC-BEGIN indication primitive occurring at the responding side;

- a MAP-OPEN response primitive from the dialogue-responder;
- the first TC-CONTINUE indication primitive occurring at the initiating side;

and under specific conditions:

- a TC-END indication primitive occurring at the initiating side;
- a TC-U-ABORT indication primitive occurring at the initiating side;
- a TC-P-ABORT indication primitive occurring at the initiating side.

15.1.1 Handling of unknown operations

Unknown operations (i.e. a standard operation introduced in a later version of 09.02 or a private operation) can be introduced in MAP in a backwards compatible way. This means, that the receiver of an unknown operation shall, if the dialogue state allows it, send a TC-REJECT component to the sender of the operation indicating 'unrecognised operation' and continue with the processing of further components or messages exchanged within the dialogue as if the unknown operation had not been received.

The standardised structure of a MAP dialogue shall not be affected by the invocation of unknown operations, i.e. if a dialogue uses only a TC-BEGIN message which is acknowledged by a TC-END message, a TC-CONTINUE message shall not be used to invoke an unknown operation. However the standardised structure of a MAP dialogue may be affected by the rejection of unknown operations, i.e. if a dialogue uses only a TC-BEGIN message which is acknowledged by a TC-END message, a TC-CONTINUE message followed by a TC-END message may be used to carry the rejection of an unknown operation and the response to the standardised operation. The entity which initiated a dialogue whose standardised structure is a TC-BEGIN message which is acknowledged by a TC-END message shall not send any messages in that dialogue after the TC-BEGIN.

Note that if the dialogue structure is affected as described in this paragraph the TC-CONTINUE shall include the dialogue portion required to confirm the acceptance of the dialogue.

Unknown operations can be invoked in the following types of messages (there is no restriction as to how many unknown operations can be invoked in a message):

- TC-BEGIN the component to invoke the unknown operation shall follow the component of the standard operation that is included in this message.
- TC-CONTINUE: the component to invoke the unknown operation may be transported as the only component in a stand-alone message or can be grouped with existing operations. In the latter case a specific sequencing of components is not required.
- TC-END: if the component to invoke the unknown operation is grouped with an existing operation a specific sequencing of components is not required.

The TC-REJECT component may be sent in the following messages:

- TC-CONTINUE or TC-END: either as the only component of the message or grouped with an existing component. The choice is up to the MAP-Service User.

  If the received message contains only unknown operations the MAP-Service User shall send the TC-REJECT components in a TC-CONTINUE message to the peer entity, if the dialogue state allows it.

  If the received message contains unknown operations and standard operations and the standardised structure of the dialogue requires the response to the standard operation to be sent within a TC-END message, then the MAP-Service User may send the response to the standard operations and the TC-REJECT components for the unknown operations in a TC-CONTINUE message followed by a TC-END message. A specific distribution of the components to the TC messages or a specific sequencing of components is not required.

Note that SDLs of chapters 19 - 25 do not show the report to the MAP-Service User about the reception of the unknown operation. This has been done for the sake of simplicity of description; the MAP PM may inform the MAP-Service User.

The sender of the unknown operation shall ensure that there is enough room in the used message for the unknown operation.

15.1.2 Receipt of a MAP-OPEN request primitive

On receipt of a MAP-OPEN request primitive the behaviour of the MAP PM shall be as follows:

The MAP PM shall accept zero, one or several user request primitives until a MAP-DELIMITER request primitive is received.

For each user request primitive, the MAP PM shall request the invocation of the associated operation using the TC-INVOKE service. See subclause 15.6 for a description of the associated SSMs.

On receipt of the MAP-DELIMITER request primitive the MAP PM shall issue a TC-BEGIN request primitive. The application-context-name as well as the user information parameter (if any) shall be mapped to the corresponding TC-BEGIN parameters.

The requesting MAP PM waits for a TC indication primitive and does not accept any other primitive from its user, except a MAP-U-ABORT request or a MAP-CLOSE request.

15.1.3 Receipt of a TC-BEGIN indication

On receipt of a TC-BEGIN indication primitive, the MAP PM shall:

- if no application-context-name is included in the primitive and if the "Components present" indicator indicates "no components", issue a TC-U-ABORT request primitive (note 2). The local MAP-User is not informed;

- if no application-context-name is included in the primitive and if presence of components is indicated, wait for the first TC-INVOKE primitive, and derive a version 1 application-context-name from the operation code according to table 15.1/1 (note 1).

NOTE 1: In some cases, it may be necessary to analyse the operation argument.

Then:

a) if no application-context-name can be derived (i.e. the operation code does not exist in MAP V1 specifications), the MAP PM shall issue a TC-U-ABORT request primitive (note 2). The local MAP-User is not informed.

b) if an application-context-name can be derived and if it is acceptable from a load control point of view, the MAP PM shall:

i) if this primitive requests the beginSubscriberActivity operation, the MAP PM shall check whether more components have been received associated with this operation. If more components are present, the MAP PM shall issue a MAP-OPEN indication primitive with the version 1 application-context-name "networkFunctionalSsContext-v1". The Destination-reference shall include the IMSI taken from the argument of the beginSubscriberActivity operation; the Originating-reference shall cover the originatingEntityNumber.

A beginSubscriberActivity operation that is not associated with any other Component shall be rejected by the MAP PM by issuing a TC-U-ABORT request primitive (note 2). The local MAP-User shall not be informed.

ii) otherwise, the MAP PM shall issue a MAP-OPEN indication primitive with the version 1 application-context-name set according to table 15.1/1. DestinationReference and OriginatingReference must not be included in the MAP-OPEN indication primitive.

Then the MAP PM shall function in a way that the dialogue responding MAP behaves as specified in the GSM phase 1 protocol (latest version of GSM 09.02 phase 1).

NOTE 2: If no AARQ apdu was included in the BEGIN message, TC (Component Sub-layer) will not include an AARE apdu or an ABRT apdu in a TR-U-ABORT request primitive that is to be issued on receipt of a TC-U-ABORT request primitive from the local MAP service provider.

c) if an application-context-name can be derived but if it is not acceptable from a load control point of view, the MAP PM shall ignore this dialogue request and not inform the MAP-user;

- if a version 1 application-context-name is included, the MAP PM shall issue a TC-U-ABORT request primitive with abort-reason "User-specific" and user-information "MAP-ProviderAbortInfo" indicating "abnormalDialogue". The local MAP-user shall not be informed.

- if an application-context-name different from version 1 is included in the primitive and if User-information is present, the User-information must constitute a syntactically correct MAP-OPEN dialogue PDU. Otherwise a TC-U-ABORT request primitive with abort-reason "User-specific" and user-information "MAP-ProviderAbortInfo" indicating "abnormalDialogue" shall be issued and the local MAP-user shall not be informed.

  - if no User-information is present it is checked whether presence of User Information in the TC-BEGIN indication primitive is required for the received application-context-name. If User Information is required but not present, a TC-U-ABORT request primitive with abort-reason "User-specific" and user-information "MAP-ProviderAbortInfo" indicating "abnormalDialogue" shall be issued. The local MAP-user shall not be informed.

- if an application-context-name different from version 1 is received in a syntactically correct TC-BEGIN indication primitive but is not acceptable from a load control point of view, the MAP PM shall ignore this dialogue request. The MAP-user is not informed.

- if an application-context-name different from version 1 is received in a syntactically correct TC-BEGIN indication primitive and if it is acceptable from a load control point of view, the MAP PM shall check whether the application-context-name is supported.

NOTE 3: Unknown application-context-names are treated like unsupported ones.

If it is, the MAP PM shall issue a MAP-OPEN indication primitive with all parameters (application-context-name included) set according to the value of the corresponding parameter of the TC-BEGIN indication primitive.

The MAP PM shall then process any other indication primitives received from TC as described in subclause 15.6. Once all the received components have been processed, the MAP PM shall inform the local MAP service user by a MAP-DELIMITER indication primitive.

If the TC-BEGIN indication primitive is not associated with any component, the MAP PM shall inform the MAP User by a MAP-DELIMITER indication primitive.

Once all the received primitives have been processed, the MAP PM does not accept any primitive from the provider and waits for a MAP-OPEN response primitive from its user.

- if an application-context-name different from version 1 is received in a syntactically correct TC-BEGIN indication primitive and if it is acceptable from a load control point of view but the application-context-name is not supported, the MAP PM shall issue a TC-U-ABORT request primitive with abort-reason indicating "application-context-not-supported". If an alternative application-context-name cannot be offered, the received application-context-name shall be returned in the TC-U-ABORT Req primitive.

In the following cases an alternative application-context can be offered and its name included in the TC-U-ABORT Req primitive:

a) if an application-context of version 2 or higher is requested, but only version 1 application-context supported, then the v1 application context shall be returned;

b) if an application-context of version 3 or higher is requested, but only version 2 application-context supported, then the v2 application context shall be returned.

c) if an application-context of version 4 or higher is requested, but only version 3 application-context supported, then the v3 application context shall be returned.

Table 15.1/1: Mapping of V1 operation codes on to application-context-names

Operation	Application-context-name (note 1)
updateLocation	networkLocUpContext-v1
cancelLocation	locationCancellationContext-v1
provideRoamingNumber	roamingNumberEnquiryContext-v1
insertSubscriberData	subscriberDataMngtContext-v1
deleteSubscriberData	subscriberDataMngtContext-v1
sendParameters	infoRetrievalContext-v1
	networkLocUpContext-v1 (note 2)
beginSubscriberActivity	networkFunctionalSsContext-v1
sendRoutingInfo	locationInfoRetrievalContext-v1
performHandover	handoverControlContext-v1
reset	resetContext-v1
activateTraceMode	tracingContext-v1
deactivateTraceMode	tracingContext-v1
sendRoutingInfoForSM	shortMsgGatewayContext-v1
forwardSM	shortMsgRelayContext-v1
reportSM-deliveryStatus	shortMsgGatewayContext-v1
noteSubscriberPresent	mwdMngtContext-v1
alertServiceCentreWithoutResult	shortMsgAlertContext-v1
checkIMEI	EquipmentMngtContext-v1
NOTE 1: These symbolic names refer to the object identifier value defined in clause 17 and allocated to each application-context used for the MAP.	
NOTE 2: The choice between the application contexts is based on the parameters received in the operation.	

15.1.4 Receipt of a MAP-OPEN response

On receipt of a MAP-OPEN response primitive indicating that the dialogue is accepted, the MAP PM shall build a MAP-Accept PDU if the user-information parameter is included in the response primitive and accept any MAP specific service request or service response until a MAP-DELIMITER request or a MAP-CLOSE request is received from the MAP user. The MAP PM shall process the MAP specific primitives as described in subclause 15.6. The MAP PM shall then issue a TC-CONTINUE request primitive after it receives the MAP-DELIMITER request primitive if no MAP-CLOSE request primitive has been received, otherwise it shall issue a TC-END request primitive. In both cases the MAP-Accept PDU (if any) is included in the user-information parameter of the TC primitive.

If the dialogue is not associated with a version 1 application context, the MAP PM shall include the application-context-name in the TC primitive.

If no MAP-CLOSE request has been received, the MAP PM waits for a request primitive from its user or an indication primitive from TC.

On receipt of a MAP-OPEN response primitive indicating that the dialogue is not accepted, the MAP PM shall build a MAP-Refuse PDU and request its transfer using the TC-U-ABORT req primitive (abort reason = user specific).

15.1.5 Receipt of the first TC-CONTINUE ind

On receipt of the first TC-CONTINUE indication primitive for a dialogue, the MAP PM shall check the value of the application-context-name parameter. If this value matches the one used in the MAP-OPEN request primitive, the MAP PM shall issue a MAP-OPEN confirm primitive with the result parameter indicating "accepted", then process the following TC component handling indication primitives as described in subclause 15.6, and then waits for a request primitive from its user or an indication primitive from TC, otherwise it shall issue a TC-U-ABORT request primitive with a MAP-providerAbort PDU indicating "abnormal dialogue" and a MAP-P-ABORT indication primitive with the "provider-reason" parameter indicating "abnormal dialogue".

15.1.6 Receipt of a TC-END ind

On receipt of a TC-END indication primitive in the dialogue initiated state, the MAP PM shall check the value of the application-context-name parameter. If this value does not match the one used in the MAP-OPEN request primitive, the MAP PM shall discard any following component handling primitive and shall issue a MAP-P-ABORT indication primitive with the "provider-reason" parameter indicating "abnormal dialogue".

Otherwise it shall issue a MAP-OPEN confirm primitive with the result parameter set to "accepted" and process the following TC component handling indication primitives as described in subclause 15.6; then it shall issue a MAP-CLOSE indication primitive and return to idle all state machines associated with the dialogue.

15.1.7 Receipt of a TC-U-ABORT ind

On receipt of a TC-U-ABORT indication primitive in the "Dialogue Initiated" state with an abort-reason parameter indicating "ApplicationContextNotSupported", the MAP PM shall issue a MAP-OPEN confirm primitive with the result parameter indicating "Dialogue Refused" and the refuse-reason parameter indicating "ApplicationContextNotSupported".

On receipt of a TC-U-ABORT indication primitive in the "Dialogue Initiated" state with an abort-reason parameter indicating "User Specific" and without user information, the MAP PM shall issue a MAP-OPEN confirm primitive with the result parameter indicating "Dialogue Refused" and the refuse-reason parameter indicating "Potential Version Incompatibility".

On receipt of a TC-U-ABORT indication primitive in the "Dialogue Initiated" state with an abort-reason parameter indicating "User Specific" and a MAP-Refuse PDU included as user information, the MAP PM shall issue a MAP-OPEN confirm primitive with the result set to refused and the refuse reason set as received in the MAP Refuse PDU.

Receipt of a TC-U-ABORT indication primitive with abort-reason "User Specific" and with user information is described as part of abnormal termination (see subclause 15.4.2).

15.1.8 Receipt of a TC-P-ABORT ind

On receipt of a TC-P-ABORT indication primitive in the "Dialogue Initiated" state with a P-abort parameter indicating "Incorrect Transaction Portion", the MAP PM shall issue a MAP-OPEN confirm primitive with the result parameter indicating "Dialogue Refused" and the refuse reason parameter indicating "Potential Version Incompatibility".

On receipt of a TC-P-ABORT indication primitive in the "Dialogue Initiated" state with a P-abort parameter indicating "No Common Dialogue Portion", the MAP PM shall issue a MAP-P-ABORT indication primitive with the provider reason parameter indicating "Version Incompatibility".

Receipt of a TC-P-ABORT indication primitive with another P-abort parameter value is described as part of abnormal termination (see subclause 15.5.2).

15.2 Dialogue continuation

Once established the dialogue is said to be in a continuation phase.

Both MAP users can request the transfer of MAP APDUs until one of them requests the termination of the dialogue.

15.2.1 Sending entity

The MAP PM shall accept any MAP specific service request or response primitives and process them as described in subclause 15.6.

On receipt of a MAP-DELIMITER request primitive, the MAP PM shall issue a TC-CONTINUE request primitive.

15.2.2 Receiving entity

On receipt of a TC-CONTINUE indication primitive the MAP PM shall accept zero, one or several TC component handling indication primitives and process them as described in subclause 15.6.

15.3 Dialogue termination

Both the dialogue-initiator and the dialogue-responder have the ability to request the termination of a dialogue after it has been established.

The dialogue termination procedure is driven by the following events:

- a MAP-CLOSE request primitive;
- a TC-END indication primitive.

15.3.1 Receipt of a MAP-CLOSE request

On receipt of a MAP-CLOSE request primitive, the MAP PM shall issue a TC-END request primitive and, if applicable, return to idle the associated active SSMs. Note that if the release method parameter of the MAP-CLOSE request indicates "normal" the TC-END request primitive will trigger the transmission of components associated with any user specific request or response primitives which may have been issued after the last MAP-DELIMITER request.

15.3.2 Receipt of a TC-END indication

On receipt of a TC-END indication primitive, the MAP shall accept any component handling indication primitives and process them as described in subclause 15.6.

Once all the received primitives have been processed, the MAP PM shall return to idle the associated SSMs and issue a MAP-CLOSE indication primitive.

15.4 User Abort

Both the dialogue-initiator and the dialogue-responder have the ability to abort a dialogue at any time.

The user abort procedure is driven by one of the following events:

- a MAP-U-ABORT request primitive;
- a TC-U-ABORT indication primitive carrying a MAP-user-abort PDU.

15.4.1 MAP-U-ABORT request

On receipt of a MAP-U-ABORT request the MAP PM shall construct a MAP-user-abort PDU from the user-reason and diagnostic parameters and issue a TC-U-ABORT request primitive. All state machines associated with the dialogue are returned to idle.

15.4.2 TC-U-ABORT ind

On receipt of a TC-U-ABORT indication carrying a MAP-user-abort PDU, the MAP PM shall issue a MAP-U-ABORT indication primitive. The user-reason and diagnostic information elements are mapped to the corresponding parameters of the MAP-U-ABORT indication primitive.

All state machines associated with the dialogue are returned to idle.

15.5 Provider Abort

The MAP has the ability to abort a dialogue at both the dialogue-initiator side and the dialogue-responder side.

The provider abort procedure is driven by one of the following events:

- a MAP PM error situation;
- a TC-P-ABORT indication primitive;
- a TC-U-ABORT indication primitive carrying a MAP-abort PDU.

15.5.1 MAP PM error situation

In the case of an abnormal situation detected at the MAP level during an established dialogue, the MAP PM shall:

- issue a MAP-P-ABORT indication primitive with the appropriate value of the provider-reason parameter;
- construct a MAP-abort PDU from the value of these parameters and request its transfer using a TC-U-ABORT request primitive.

15.5.2 TC-P-ABORT ind

On receipt of a TC-P-ABORT indication, the MAP PM shall issue a MAP-P-ABORT indication primitive.

All state machines associated with the dialogue are returned to idle.

15.5.3 TC-U-ABORT ind

On receipt of a TC-U-ABORT indication carrying a MAP-abort PDU, the MAP PM shall issue a MAP-P-ABORT indication primitive, with the appropriate value of the provider-reason parameter. The source parameter shall indicate "MAP-provider".

All state machines associated with the dialogue are returned to idle.

15.6 Procedures for MAP specific services

This subclause describes the MAP procedures for MAP specific services.

These procedures are driven by the following types of events:

- a MAP specific request or a MAP specific MAP response primitive;
- a component handling primitive from TC.

A Service State Machine is activated on receipt of one of the following signals:

- a MAP request primitive, which activates a requesting SSM;
- a TC-INVOKE indication primitive without linked identifier, which activates a responding SSM.

For component handling primitives there are two types of events:

- events which activate a Service State Machine or which can be related to an existing one;

  The procedure elements driven by these events are described in subclauses 15.6.1 to 15.6.4.

- events which cannot be related to a Service State Machine.

  The procedure elements driven by these events are described in subclause 15.6.5.

15.6.1 Service invocation

The MAP specific procedures are initiated by the MAP request primitives.

On receipt of a MAP request primitive, the MAP PM shall build an operation argument from the parameters received in the request primitive and request the invocation of the associated operation using the TC-INVOKE procedure. If a linked ID parameter is inserted in the primitive this indicates a child service and implies that the operation on which the service is mapped is linked to the operation on which the parent service is mapped.

The mapping of MAP specific services on to remote operations is given in table 16.2/1.

15.6.2 Service invocation receipt

On receipt of a TC-INVOKE indication primitive, the MAP PM shall:

- if the invoke ID is already in use by an active service, request the transfer of a reject component using the TC-U-REJECT request primitive with the appropriate problem code (duplicated invokeID) and issue a MAP-NOTICE indication primitive with a diagnostic parameter set to "abnormal event received from the peer";

- if the operation code does not correspond to an operation supported by the application-context, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (unrecognised operation), and, if the dialogue version is lower than 3, issue a MAP-NOTICE indication primitive with a diagnostic parameter set to "abnormal event received from the peer";

- if a linked ID is included, perform the following checks: If the operation referred to by the linked ID does not allow linked operations or if the operation code does not correspond to a permitted linked operation, issue a TC-U-REJECT request primitive with the appropriate problem code (linked response unexpected or unexpected linked operation);

- if the type of the argument is not the one defined for the operation, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter), and issue a MAP-NOTICE indication primitive with a diagnostic parameter set to "abnormal event from the peer";

- if the type of the argument is correct but the values of the information elements it contains do not permit the type of MAP service being invoked to be determined, request the transfer of an error component using the TC-U-ERROR request primitive with an error code set to "unexpected data value" and issue a MAP-NOTICE indication primitive with a diagnostic parameter set to "abnormal event from the peer";

NOTE 1: These checks are only relevant when there is not a one-to-one mapping between a service and an operation.

- if the type of the argument is correct but information elements required for the service being invoked are missing, request the transfer of an error component using the TC-U-ERROR request primitive with an error code set to "data missing" and issue a MAP-NOTICE indication primitive with a diagnostic parameter set to "abnormal event from the peer";

NOTE 2: These checks are only relevant when there is not a one-to-one mapping between a service and an operation.

- if the type of the argument is correct but contains information elements which are not relevant for the type of MAP service being invoked, request the transfer of an error component using the TC-U-ERROR request primitive with an error code set to "unexpected data value" and issue a MAP-NOTICE indication primitive with a diagnostic parameter set to "abnormal event from the peer";

NOTE 3: These checks are only relevant when there is not a one-to-one mapping between a service and an operation.

- Otherwise, issue the relevant MAP indication primitive to the MAP-service-user. If the service is to be user confirmed, the MAP PM waits for the corresponding response primitive.

15.6.3 Service response

For user confirmed services, the MAP PM shall accept a MAP response primitive and shall:

- if no error indication is included in the primitive and the service maps on to a class 1 or 3 operation, construct a result information element from the parameters received and request its transfer using the TC-RESULT-L service and optionally the TC-RESULT-NL service.

The TC-RESULT-NL services shall be used when the user specific parameters of the response primitives cannot be transferred in a single signalling frame and no segmenting mechanism is available from the underlying layers. The MAP PM shall issue one or several TC-RESULT-NL request primitives followed by a TC-RESULT-L primitive. The user parameters shall be split so that each portion contains sufficient information to construct a value compatible with the type defined for the result of the associated operation.

- if no error indication is included in the primitive and the service response maps on to a class 4 linked operation, construct an operation argument from the parameters received and request its transfer using the TC-INVOKE service for this class 4 linked operation. The operation to be invoked is deduced from the value of the result parameter of the service primitive;

- if an error indication is included in the primitive and the service maps on to a class 1 or 2 operation, either issue a TC-U-REJECT request primitive if the user error parameter indicates "resource limitation" or "initiating release", or construct an error parameter from the parameters received and request its transfer using the TC-U-ERROR request primitive. The error code should be the one associated with the value of the user error parameter of the response primitive.

NOTE: The only user errors that a MAP user can generate in addition to the list of errors attached to the operation which is associated with the service are: resource limitation and initiating release. Any other abnormal situation is detected either by the TC entity or by the MAP entity.

- if an error indication is received and the operation maps on to a class 3 operation, or if no error indication is received but the service maps on to a class 2 operation which has no class 4 linked operation, return the local service state machine to idle without requesting any service from TC.

15.6.4 Receipt of a response

A component handling indication primitive is considered as driving a response for a confirmed service if the invoke ID parameter value matches the one stored for the service, or if the linked ID parameter value matches the one stored for the service and the operation invoked is a class 4 operation. On receipt of a response (except a TC-L-CANCEL indication) for an unconfirmed service the MAP PM shall issue a MAP-NOTICE indication primitive with the appropriate provider error (return result unexpected or return error unexpected).

15.6.4.1 Receipt of a TC-RESULT-NL indication

If the type of the partial result parameter is not compatible with the one defined for the complete result of this operation, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter) and issue a confirm primitive with the provider error parameter set to "invalid response received". The MAP PM shall also issue a TC-U-CANCEL request primitive so that all subsequent result components for this operation are discarded by TC.

Otherwise, store the value of the partial result parameter and wait for subsequent TC-RESULT-NL indication primitives until a TC-RESULT-L indication primitive is received.

15.6.4.2 Receipt of a TC-RESULT-L indication

If the type of the result parameter is not the one defined for the result of this operation, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter), and issue a confirm primitive with the provider error parameter set to "invalid response received".

If the type of the result parameter is correct but does not contain all the information elements required by the service associated with the invocation, issue a confirm primitive with the provider error parameter set to "invalid response received".

NOTE 1: These checks are only relevant when there is not a one-to-one mapping between a service and an operation.

If the type of the result parameter is correct but contains information elements which are not relevant for the service associated with the invocation are missing, issue a confirm primitive with the provider error parameter set to "invalid response received".

NOTE 2: These checks are only relevant when there is not a one-to-one mapping between a service and an operation.

Otherwise, issue a MAP confirm primitive to the MAP-service-user mapping the result parameter of the TC-RESULT-L primitive on to the MAP specific parameters.

If partial results have been previously received, the value of the partial result parameters shall also be taken into account before performing the three previous checks.

15.6.4.3 Receipt of a TC-U-ERROR indication

If the error code is not defined for the MAP or is not one associated with the operation referred to by the invoke identifier, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (unrecognised error or unexpected error), and issue a confirm primitive with the provider error parameter set to "invalid response received".

If the type of the error parameter is not the one defined for this error, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter), and issue a confirm primitive with the provider error parameter set to "invalid response received".

If the type of the error parameter is correct but does not contain all the information elements required by the service associated with the invocation, issue a confirm primitive with the provider error parameter set to "invalid response received".

NOTE 1: In some cases, it may be necessary to analyse the operation argument.

If the type of the error parameter is correct but its value includes information elements which are not relevant for the service associated with the invocation, issue a confirm primitive with the provider error parameter set to "invalid response received".

NOTE 2: In some cases, it may be necessary to analyse the operation argument.

Otherwise, issue a MAP confirm primitive to the MAP-service-user with the user error parameter set according to the received error code. If applicable the error parameter is mapped to the diagnostic parameter.

15.6.4.4 Receipt of a TC-INVOKE indication

A TC-INVOKE indication primitive is considered as carrying a possible response to a specific service if the linked ID refers to an active specific service and the associated operation is a class 4 operation. Note that the presence of a linked ID parameter in a TC-INVOKE primitive requesting a non class 4 operation indicates a child service whose procedures are the same as the procedures for the parent service.

On receipt of a TC-INVOKE indication confirming an active service, the MAP PM shall:

- if the operation code is not defined for MAP and the dialogue version is at least 3, issue a TC-U-REJECT request primitive with the appropriate problem code (unrecognised operation).

- if the operation code is not defined for MAP and the dialogue version is lower than 3, or if the operation referred to by the linked ID does not allow linked operations or if the operation code does not correspond to an allowed linked operation, issue a TC-U-REJECT request primitive with the appropriate problem code (unrecognised operation, linked response unexpected or unexpected linked operation). If the service is confirmed, the MAP shall also issue a Confirm primitive with provider error indication "unexpected response from the peer", otherwise it may issue a MAP-NOTICE indication primitive with an appropriate diagnostic "abnormal event received from the peer".

- otherwise issue a confirm primitive mapping the operation argument parameter to the user specific parameters and setting the result parameter according to the operation code of the linked operation.

15.6.4.5 Receipt of a TC-U-REJECT indication

On receipt of a TC-U-REJECT indication primitive which affects a pending service, the MAP PM shall issue a MAP confirm primitive to the MAP-service-user with the appropriate value of the provider error or user error parameter.

The mapping of TC invoke problem codes on to MAP Provider Error and MAP User Error parameter values is described in clause 16.

15.6.4.6 Receipt of a TC-L-REJECT indication

This event occurs when the local TC detects a protocol error in an incoming component which affects an active specific service.

On receipt of a TC-L-REJECT indicating "return result problem, unexpected return result", the MAP shall issue a confirm primitive with the parameter provider error indicating "unexpected response from the peer".

On receipt of a TC-L-REJECT indicating "return error problem, unexpected error result", the MAP shall issue a confirm primitive with the parameter provider error indicating "unexpected response from the peer".

Note that when the problem code indicates a general problem, it is considered that the event cannot be related to an existing SSM even if the invoke Id is provided by TC. This is because whether the invoke Id refers to a local or remote invocation is ambiguous. The behaviour of the MAP PM in such a case is described in subclause 15.6.5.3.

15.6.4.7 Receipt of a TC-L-CANCEL indication

On receipt of a TC-L-CANCEL indication, the MAP PM shall:

- if the associated operation is a class 1 operation, issue a confirm primitive with the provider error cause indicating "no response from the peer";

- if the associated operation is a class 2 operation and no linked operations are defined for this operation, issue a confirm primitive without parameter (i.e. indicating implicitly the successful completion of the service);

- if the associated operation is a class 2 operation and has linked operations but none of them has been invoked, issue a confirm primitive with the provider error parameter indicating "service completion failure";

- if the associated operation is a class 2 operation and a linked operation invocation has already been received in response to this operation, ignore the primitive;

- if the associated operation is a class 3 operation, issue a confirm primitive with the provider error cause indicating "service completion failure";

- if the associated operation is a class 4 operation, ignore the primitive.

NOTE: When a TC-L-CANCEL ind primitive is received before the dialogue has been confirmed (i.e. no backward message is received by the dialogue initiator node), the MAP PM shall first issue a MAP-OPEN Cnf primitive with the result parameter indicating "accepted" (which means that the dialogue is considered as being implicitly accepted). Then, as indicated above, the TC-L-CANCEL Indication is interpreted according to the class of the operation to which it refers.

15.6.4.8 Receipt of a TC-NOTICE indication

If a TC-NOTICE indication primitive is received before the dialogue has been confirmed (i.e. no backward message is received by the dialogue initiator node), the MAP PM shall issue a MAP-OPEN Cnf primitive with the result parameter indicating Refused and a refuse reason Remote node not reachable”.

If a TC-NOTICE indication primitive is received after the dialogue has been confirmed, the MAP PM shall issue a MAP-NOTICE indication to the user, with a problem diagnostic indicating "message cannot be delivered to the peer".

15.6.5 Other events

This subclause describes the behaviour of the MAP PM on receipt of a component handling indication primitive which cannot be related to any service or which does not affect a pending one. The MAP user is only informed that an abnormal event occurred during the associated dialogue. It is up to the MAP user to abort, continue or terminate the dialogue.

15.6.5.1 Receipt of a TC-U-REJECT

On receipt of a TC-U-REJECT indication primitive which does not affect an active SSM (i.e. indicating a return result or return error problem), the MAP PM shall issue a MAP-NOTICE indication primitive with the diagnostic parameter set to "response rejected by the peer".

This is also applicable for invoke problems related to a class 4 linked operation.

15.6.5.2 Receipt of a TC-R-REJECT indication

On receipt of a TC-R-REJECT indication (i.e. when a protocol error has been detected by the peer TC entity) which does not affect an active SSM, the MAP PM shall either discard this indication or issue a MAP-NOTICE indication primitive with the provider error indicating "abnormal event detected by the peer".

In case of notification, it is up to the MAP user to continue, abort or terminate the dialogue. Note also that for MAP V1 the reject component is received in an END message and therefore the dialogue is terminated anyway.

15.6.5.3 Receipt of a TC-L-REJECT indication

On receipt of a TC-L-REJECT indication primitive (i.e. when a protocol error has been detected by the local TC entity) which cannot be related to an active SSM, the MAP PM shall either discard this indication or issue a MAP-NOTICE indication primitive with the provider error indicating "abnormal event received from the peer".

In case of notification, it is up to the MAP user to continue, or to terminate the dialogue and implicitly trigger the transmission of the reject component or to abort the dialogue.

15.6.6 Parameter checks

As described in the previous subclauses, the MAP PM performs a set of checks to ensure the correctness of the information elements received; these are:

- check if the syntax and encoding (note) of the operation argument, result or error parameter are correct.

NOTE: Depending on the implementation, encoding problems on the TC user portion may be detected at TC level or by the MAP user. In the second case the problem is reported in a similar manner to a syntactical problem.

The syntax shall be considered incorrect if a mandatory information element is missing in any constructed element or if the value of an information element is out of the range defined for the type it is supposed to belong to;

- if there is not a one-to-one mapping between a service and an operation:

  i) check if the value of the information elements (generally a single one) permits the MAP PM to determine the service associated with the operation invocation;

  ii) check that there are no information elements which are irrelevant for the indication or a confirm primitive to be issued;

- check if all the information elements required to build an indication or a confirm primitive are available.

However some additional checks may have to be performed by the MAP user (see clause 18).

15.6.7 Returning state machines to idle

Unlike TC invocation state machines, service state machines exist at both requestor and performer side.

A service state machine at the requestor side is returned to idle when the MAP-specific confirm primitive is issued or when the dialogue terminates.

A service state machine at the performer side is returned to idle on receipt of a MAP-specific response primitive from the MAP user, when the dialogue terminates or at expiry of an implementation dependent watch-dog timer which is started when the state machine is created.

15.6.8 Load control

As stated in the previous subclauses, before issuing a MAP-OPEN indication primitive the MAP PM performs a check to verify if there are sufficient resources to open the dialogue taking into account possible overload conditions.

The decision is based on the priority allocated to the application-context whose name is explicitly included in the TC-BEGIN indication primitive or implied by the first operation invocation when V1 contexts are in use. How a V1 application-context-name is derived from an operation code is described in table 15.1/1.

The priority level allocated to each application-context is described in clause 5, tables 5.1/1 and 5.1/2.

****** Next modified section ******

16.2.2.4 Operation

When mapping a request primitive on to a Remote Operations PDU (invoke), the MAP PM shall set the operation code according to the mapping described in table 16.2/1.

When mapping a response primitive on to a Remote Operations service, the MAP PM shall set the operation code of the TC-RESULT-L/NL primitive (if required) to the same value as the one received at invocation time.

Table 16.2/1: Mapping of MAP specific services on to MAP operations

MAP-SERVICE	operation
MAP-ACTIVATE-SS	activateSS
MAP-ACTIVATE-TRACE-MODE	activateTraceMode
MAP-ALERT-SERVICE-CENTRE	alertServiceCentre
MAP-ANY-TIME-INTERROGATION	anyTimeInterrogaton
MAP-ANY-TIME-MODIFICATION	anyTimeModification
MAP-ANY-TIME-SUBSCRIPTION-INTERROGATION	anyTimeSubscriptionInterrogaton
MAP-CANCEL-LOCATION	cancelLocation
MAP-CHECK-IMEI	checkIMEI
MAP-DEACTIVATE-SS	deactivateSS
MAP-DEACTIVATE-TRACE-MODE	deactivateTraceMode
MAP-DELETE-SUBSCRIBER-DATA	deleteSubscriberData
MAP-ERASE-CC-ENTRY	eraseCC-Entry
MAP-ERASE-SS	eraseSS
MAP-FAILURE-REPORT	failureReport
MAP-FORWARD-ACCESS-SIGNALLING	forwardAccessSignalling
MAP-FORWARD-CHECK-SS-INDICATION	forwardCheckSsIndication
MAP-FORWARD-GROUP-CALL-SIGNALLING	forwardGroupCallSignalling
MAP-MT-FORWARD-SHORT-MESSAGE	mt-forwardSM
MAP-MO-FORWARD-SHORT-MESSAGE	mo-forwardSM
MAP-GET-PASSWORD	getPassword
MAP-INFORM-SERVICE-CENTRE	informServiceCentre
MAP-INSERT-SUBSCRIBER-DATA	insertSubscriberData
MAP-INTERROGATE-SS	interrogateSs
MAP-IST-ALERT	istAlert
MAP-IST-COMMAND	istCommand
MAP-NOTE-MS-PRESENT-FOR-GPRS	noteMsPresentForGprs
MAP-NOTE-SUBSCRIBER-DATA-MODIFIED	noteSubscriberDataModified
MAP-PREPARE-GROUP-CALL	prepareGroupCall
MAP-PREPARE-HANDOVER	prepareHandover
MAP-PREPARE-SUBSEQUENT-HANDOVER	prepareSubsequentHandover
MAP-PROCESS-ACCESS-SIGNALLING	processAccessSignalling
MAP-PROCESS-GROUP-CALL-SIGNALLING	processGroupCallSignalling
MAP-PROCESS-UNSTRUCTURED-SS-REQUEST	processUnstructuredSS-Request
MAP-PROVIDE-ROAMING-NUMBER	provideRoamingNumber
MAP-PROVIDE-SIWFS-NUMBER	provideSIWFSNumber
MAP-PROVIDE-SUBSCRIBER-LOCATION	provideSubscriberLocation
MAP-PROVIDE-SUBSCRIBER-INFO	provideSubscriberInfo
MAP-PURGE-MS	purgeMS
MAP-READY-FOR-SM	readyForSM
MAP-REGISTER-CC-ENTRY	registerCC-Entry
MAP-REGISTER-PASSWORD	registerPassword
MAP-REGISTER-SS	registerSS
MAP-REMOTE-USER-FREE	remoteUserFree
MAP-REPORT-SM-DELIVERY-STATUS	reportSmDeliveryStatus
MAP-RESET	reset
MAP-RESTORE-DATA	restoreData
~~MAP-SECURE-TRANSPORT-CLASS-1~~	~~secureTransportClass1~~
~~MAP-SECURE-TRANSPORT-CLASS-2~~	~~secureTransportClass2~~
~~MAP-SECURE-TRANSPORT-CLASS-3~~	~~secureTransportClass3~~
~~MAP-SECURE-TRANSPORT-CLASS-4~~	~~secureTransportClass4~~
MAP-SEND_GROUP-CALL_END_SIGNAL	sendGroupCallEndSignal
MAP-SEND-END-SIGNAL	sendEndSignal
MAP-SEND-AUTHENTICATION-INFO	sendAuthenticationInfo
MAP-SEND-IMSI	sendIMSI
MAP-SEND-IDENTIFICATION	sendIdentification
MAP-SEND-ROUTING-INFO-FOR-SM	sendRoutingInfoForSM
MAP-SEND-ROUTING-INFO-FOR-GPRS	sendRoutingInfoForGprs
MAP-SEND-ROUTING-INFO-FOR-LCS	sendRoutingInfoForLCS
MAP-SEND-ROUTING-INFORMATION	sendRoutingInfo
MAP-SET-REPORTING-STATE	setReportingState

MAP-SIWFS-SIGNALLING-MODIFY	SIWFSSignallingModify
MAP-STATUS-REPORT	statusReport
MAP-SUBSCRIBER-LOCATION-REPORT	subscriberLocationReport
MAP-SUPPLEMENTARY-SERVICE-INVOCATION-NOTIFICATION	ss-Invocation-Notification
MAP-UNSTRUCTURED-SS-NOTIFY	unstructuredSS-Notify
MAP-UNSTRUCTURED-SS-REQUEST	unstructuredSS-Request
MAP-UPDATE-GPRS-LOCATION	updateGprsLocation
MAP-UPDATE-LOCATION	updateLocation
MAP-NOTE-MM-EVENT	NoteMM-Event

****** Next modified section ******

16.3 SDL descriptions

The following SDL specification describes a system which includes three blocks: MAP-user, MAP-provider and TC.

Such a system resides in each network component supporting MAP and communicates with its peers via the lower layers of the signalling network which are part of the environment.

Only the MAP-provider is fully described in this subclause. The various types of processes which form the MAP-User block and the TC block are described respectively in clauses 18 to 25 of the present document and in CCITT Recommendation Q.774.

The MAP-Provider block communicates with the MAP_USER via two channels U1 and U2. Via U1 the MAP-provider receives the MAP request and response primitives. Via U2 it sends the MAP indication and confirm primitives.

The MAP-Provider block communicates with TC via two channels P1 and P2. Via P1 the MAP-Provider sends all the TC request primitives. Via P2 it receives all the TC indication primitives.

The MAP-Provider block is composed of the four following types of processes:

a) MAP_DSM: This type of process handles a dialogue. There exists one process instance per MAP dialogue.

b) LOAD_CTRL: This type of process is in charge of load control. There is only one instance of this process in each system.

c) PERFORMING_MAP_SSM: This type of process handles a MAP service performed during a dialogue. An instance of this process is created by the instance of the MAP_DSM process for each MAP-service to be performed.

d) REQUESTING_MAP_SSM: This type of process handles a MAP service requested during a dialogue. An instance of this process is created by the instance of the MAP_DSM process for each requested MAP-service.

A process MAP_DSM exchanges external signals with other blocks as well as internal signals with the other processes of the MAP-Provider block. The external signals are either MAP service primitives or TC service primitives.

The signal routes used by the various processes are organised as follows:

a) A process MAP_DSM receives and sends events from/to the MAP_user via signal route User1/User2. These routes use respectively channel U1 and U2.

b) A process MAP_DSM receives and sends events from/to the TC via signal route Tc1/Tc2. These routes use respectively channel P1 and P2.

c) A process MAP_DSM receives and sends events from/to the LOAD_CTRL process via signal route Load1/Load2. These routes are internal.

d) A process MAP_DSM sends events to the PERFORMING_MAP_SSM processes via signal route Intern1. This route is internal.

e) A process MAP_DSM sends events to the REQUESTING_MAP_SSM processes via signal route Intern2. This route is internal.

f) A process MAP_PERFORMING_SSM sends events to the MAP_USER via signal route User4. This route uses channel U2.

g) A process MAP_PERFORMING_SSM sends events to TC via signal route Tc3. This route uses channel P1.

h) A process MAP_REQUESTING_SSM sends events to the MAP_USER via signal route User5. This route uses channel U2.

j) A process MAP_REQUESTING_SSM sends events to TC via signal route Tc4. This route uses channel P1.

09.02 version 6.6.0

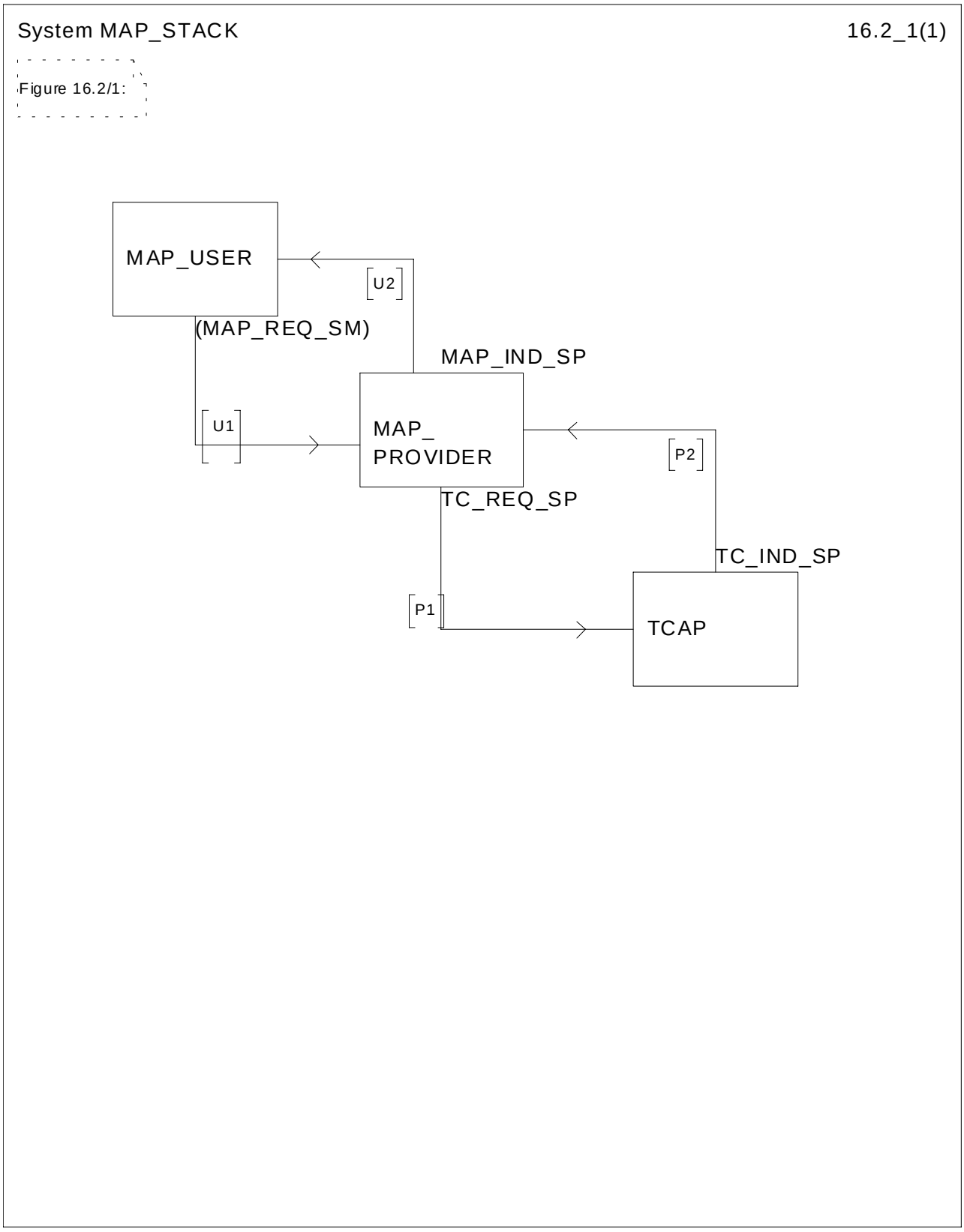

Figure 16.2/1: System MAP_STACK

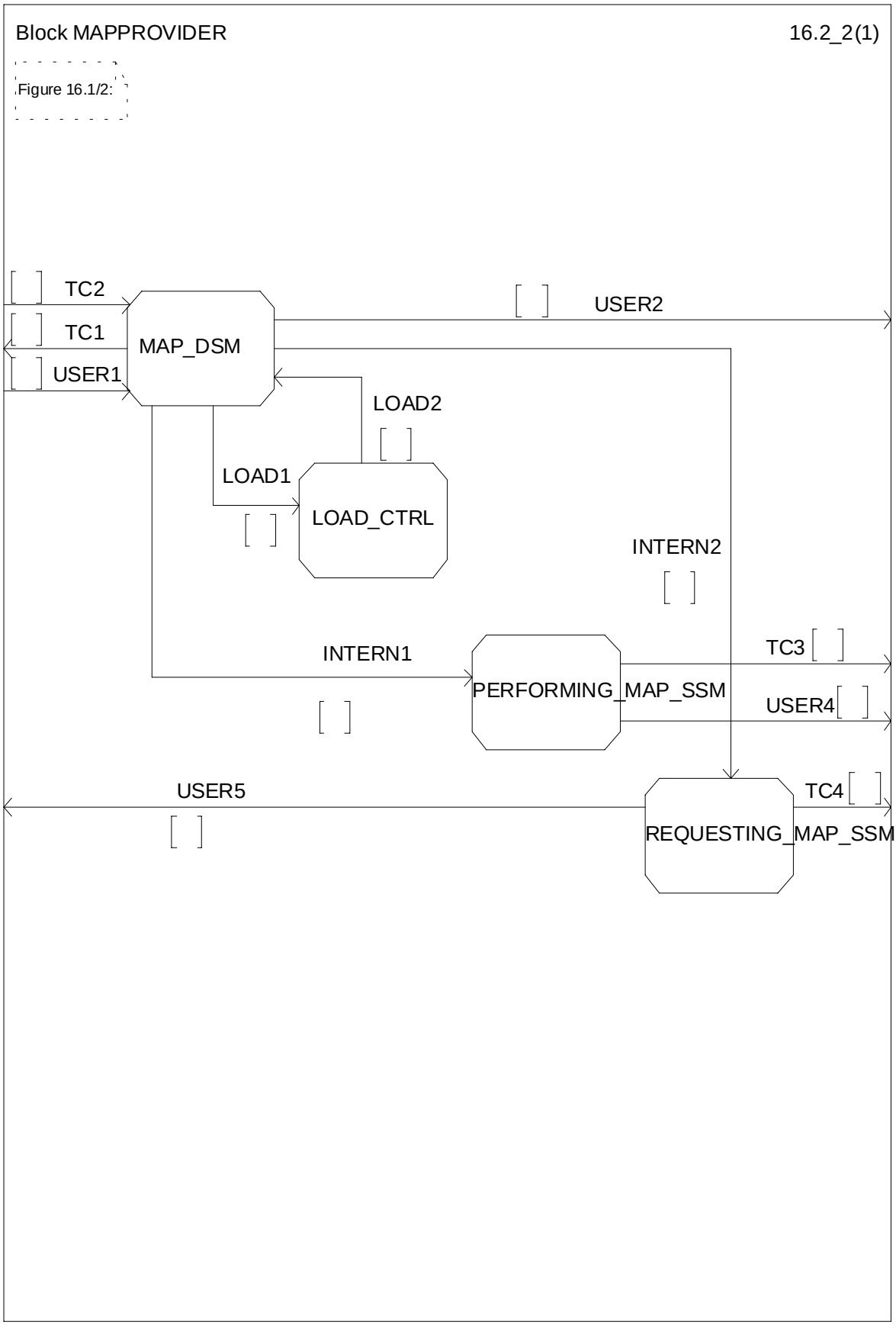

Figure 16.2/2: Block MAPPROVIDER

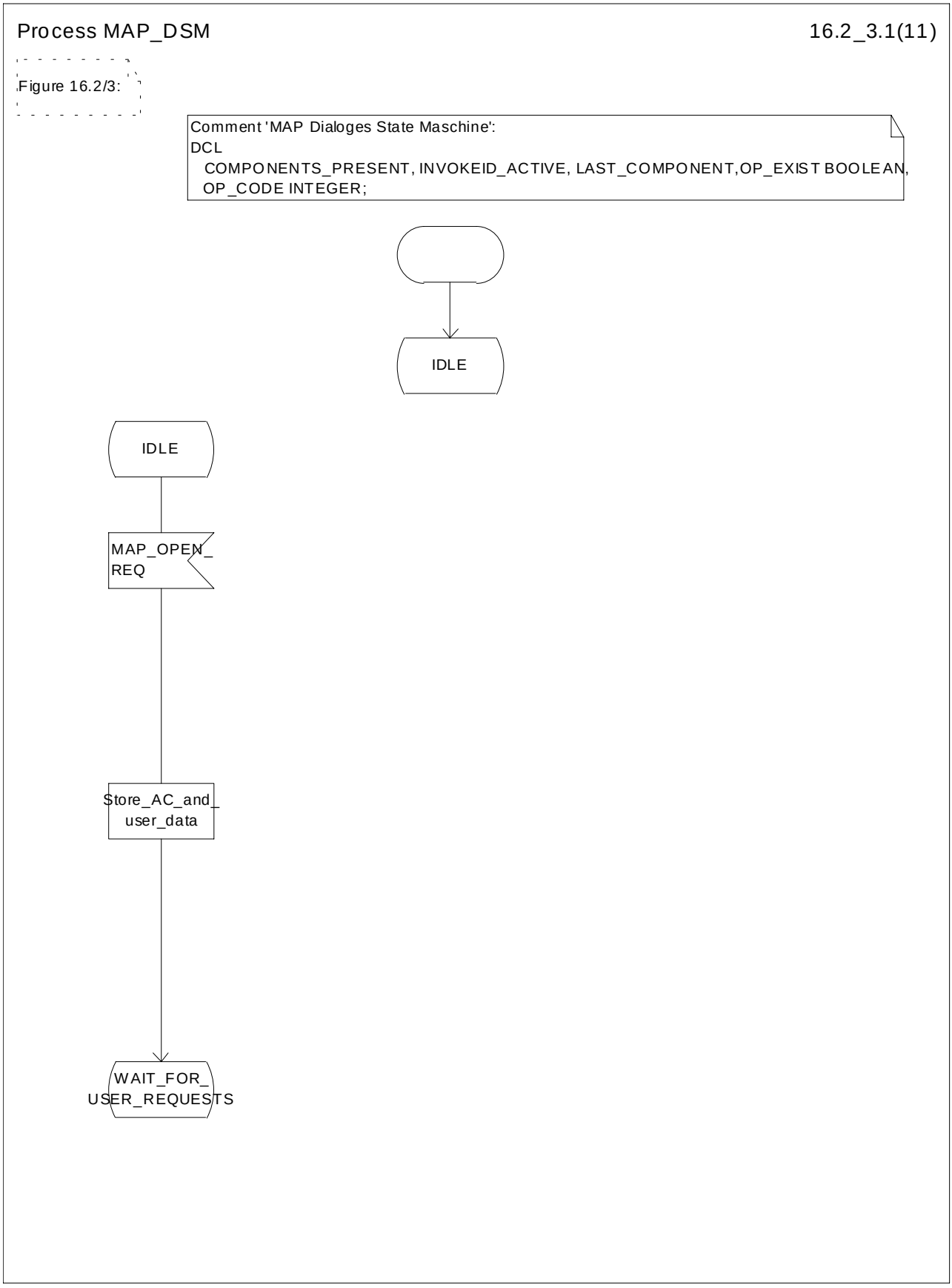

Figure 16.2/3 (sheet 1 of 11): Process MAP_DSM

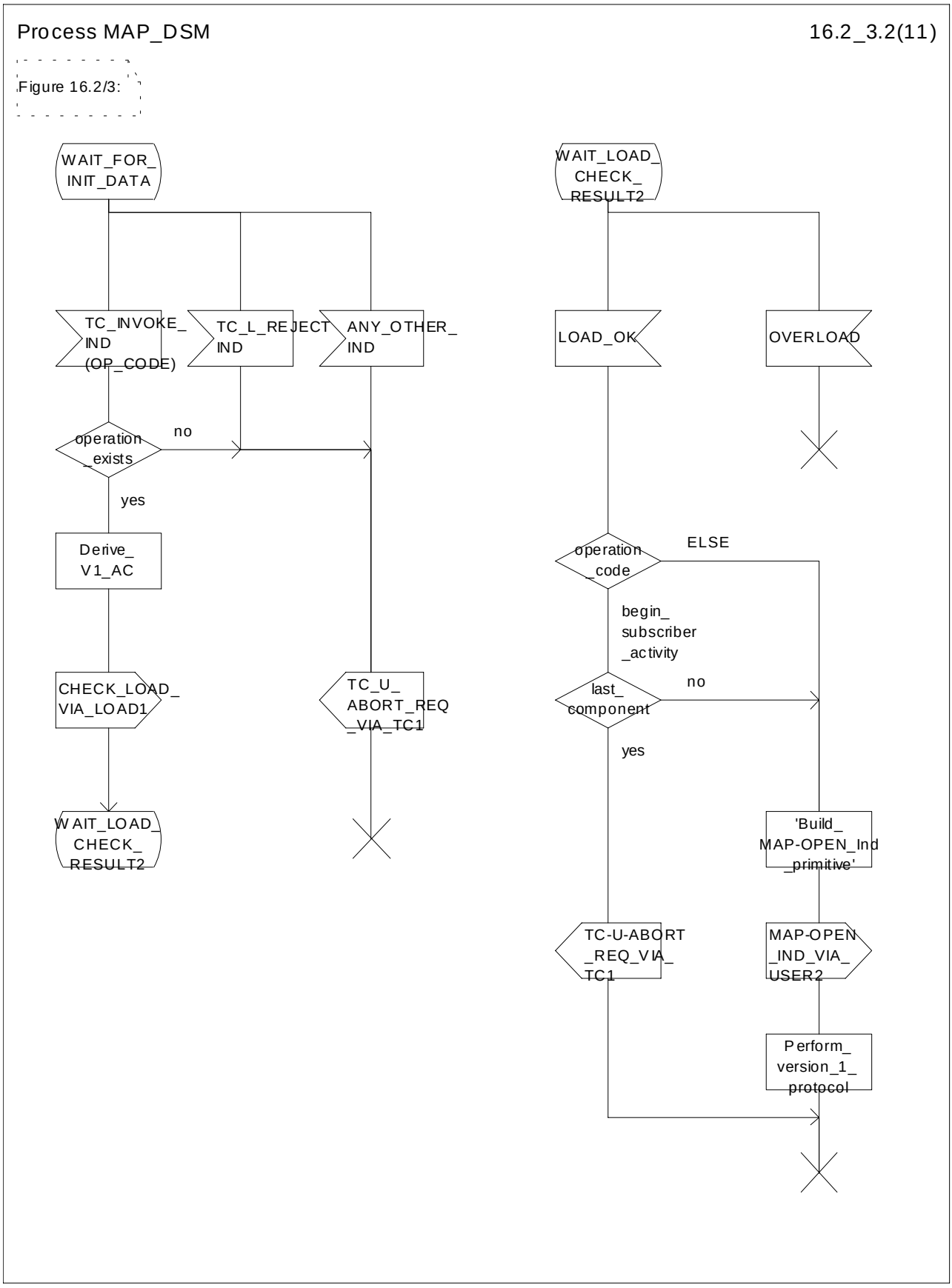

Figure 16.2/3 (sheet 2 of 11): Process MAP_DSM

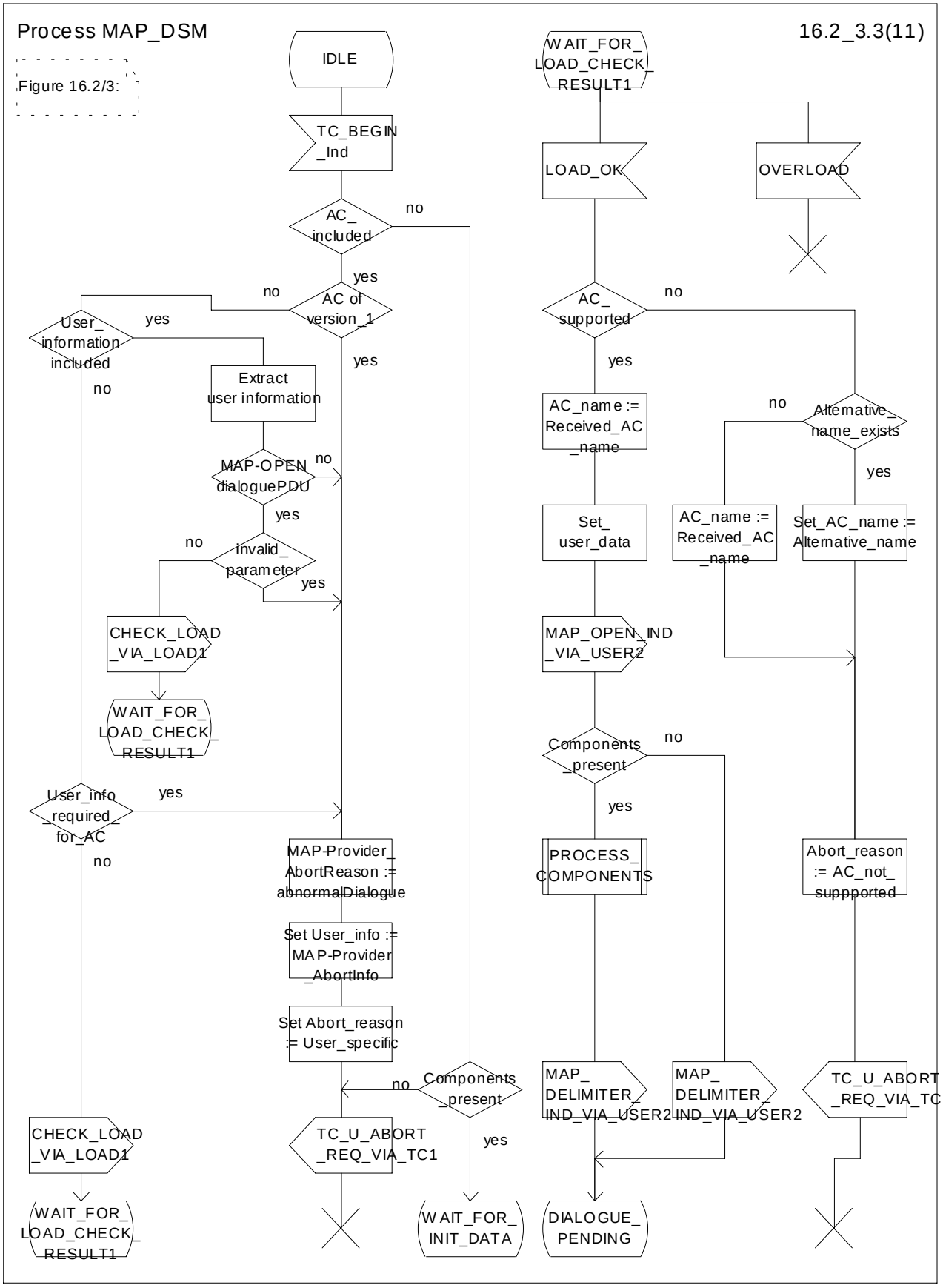

Figure 16.2/3 (sheet 3 of 11): Process MAP_DSM

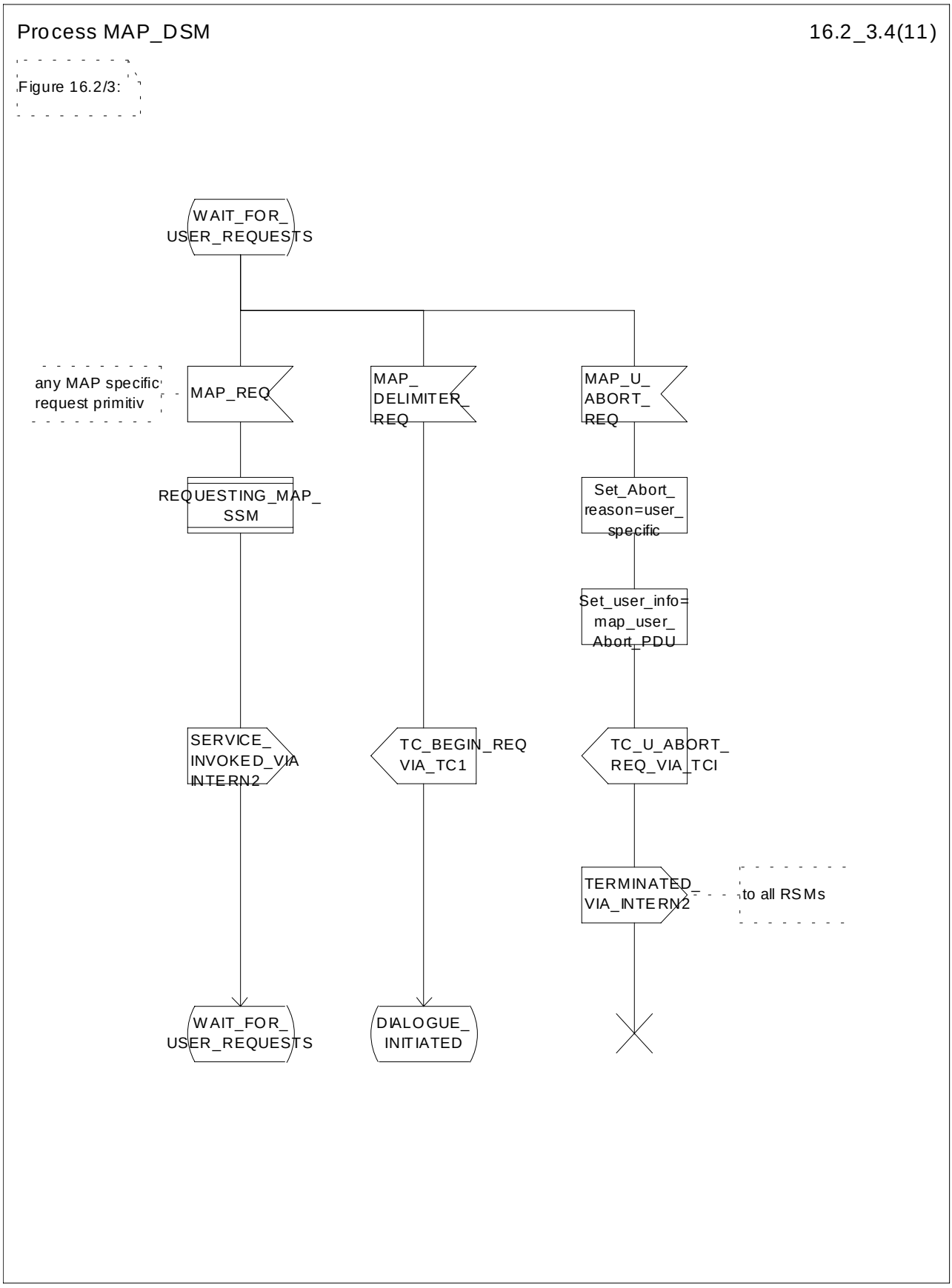

Figure 16.2/3 (sheet 4 of 11): Process MAP_DSM

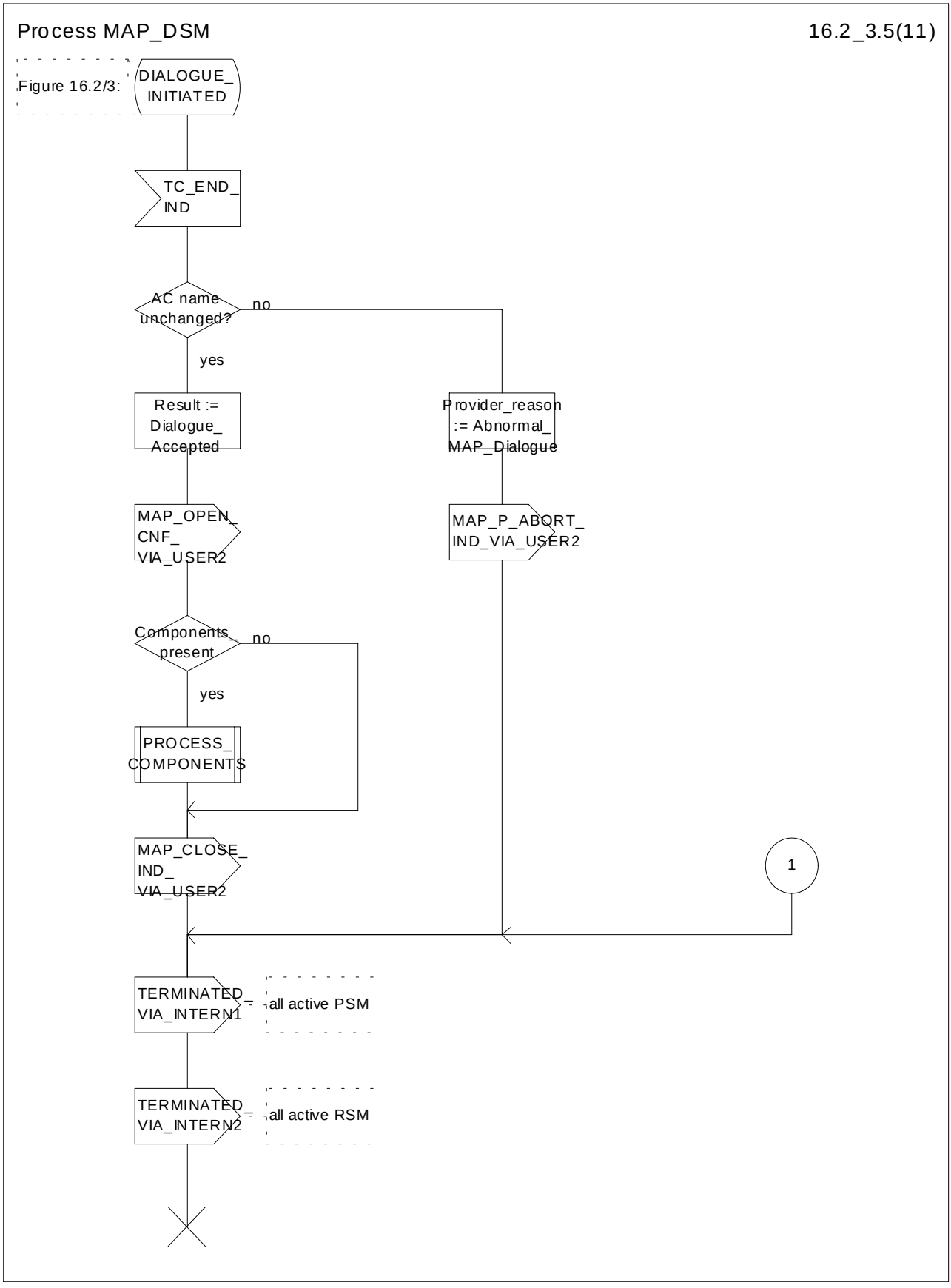

Figure 16.2/3 (sheet 5 of 11): Process MAP_DSM

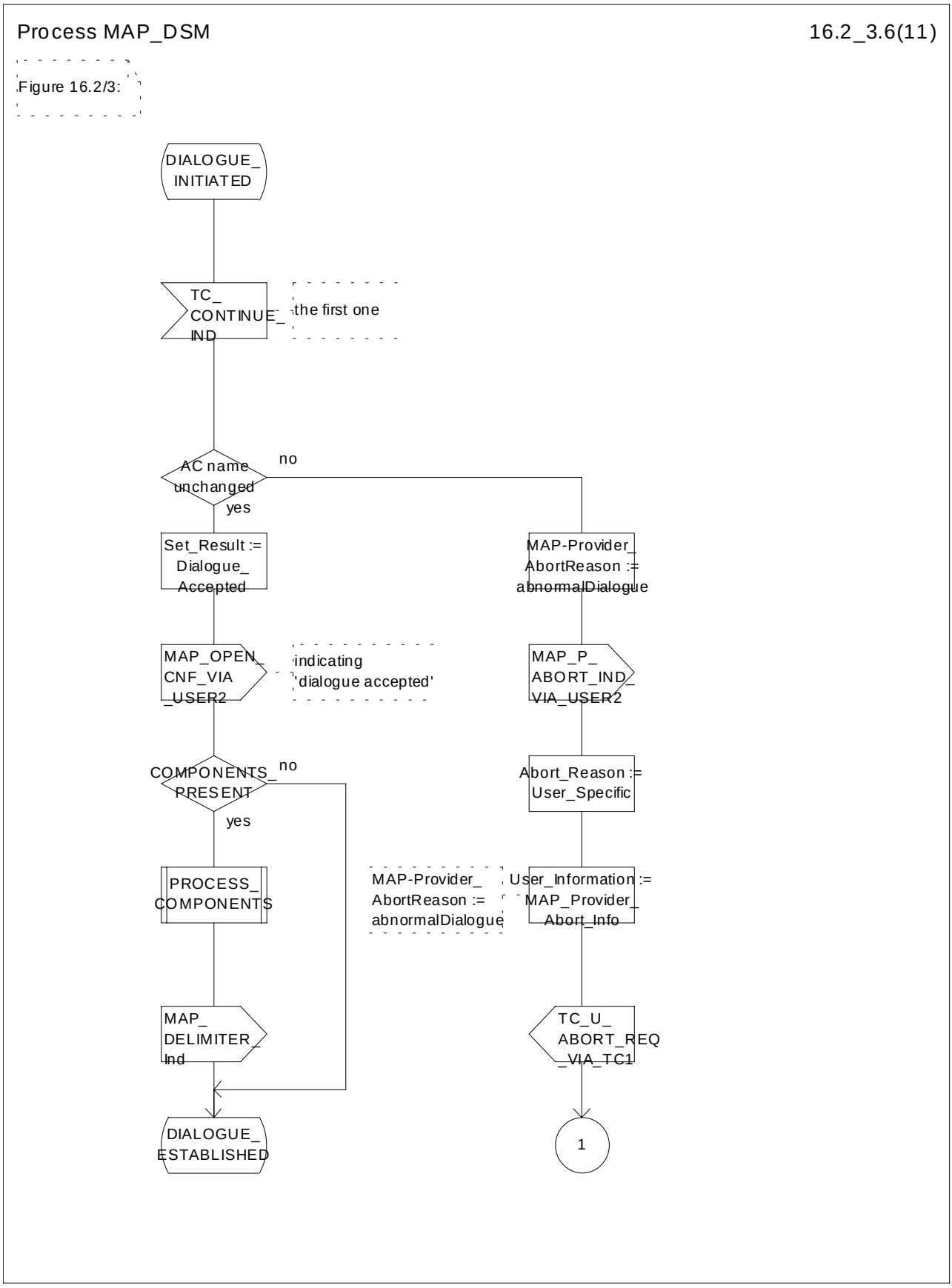

Figure 16.2/3 (sheet 6 of 11): Process MAP_DSM

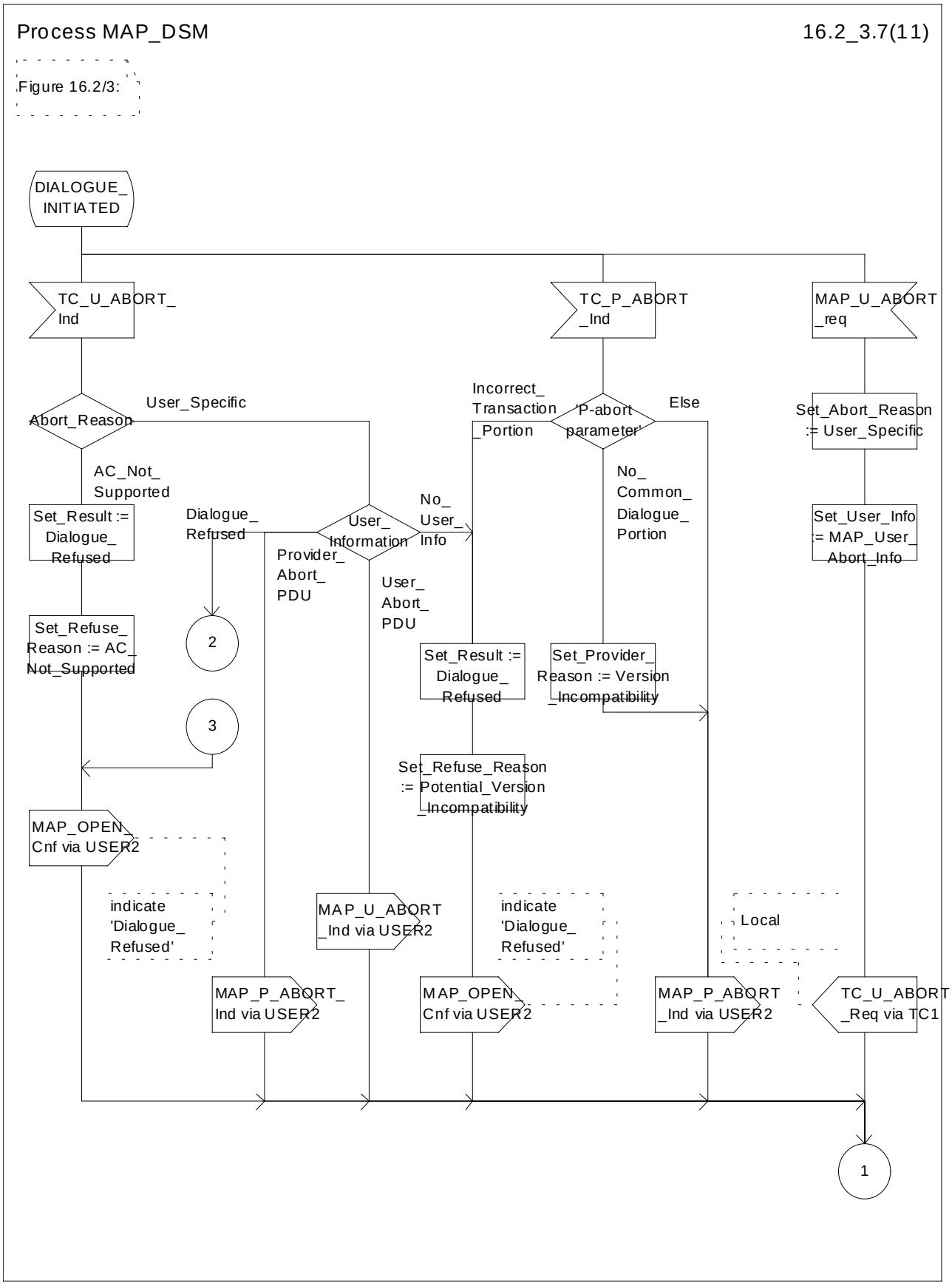

Figure 16.2/3 (sheet 7 of 11): Process MAP_DSM

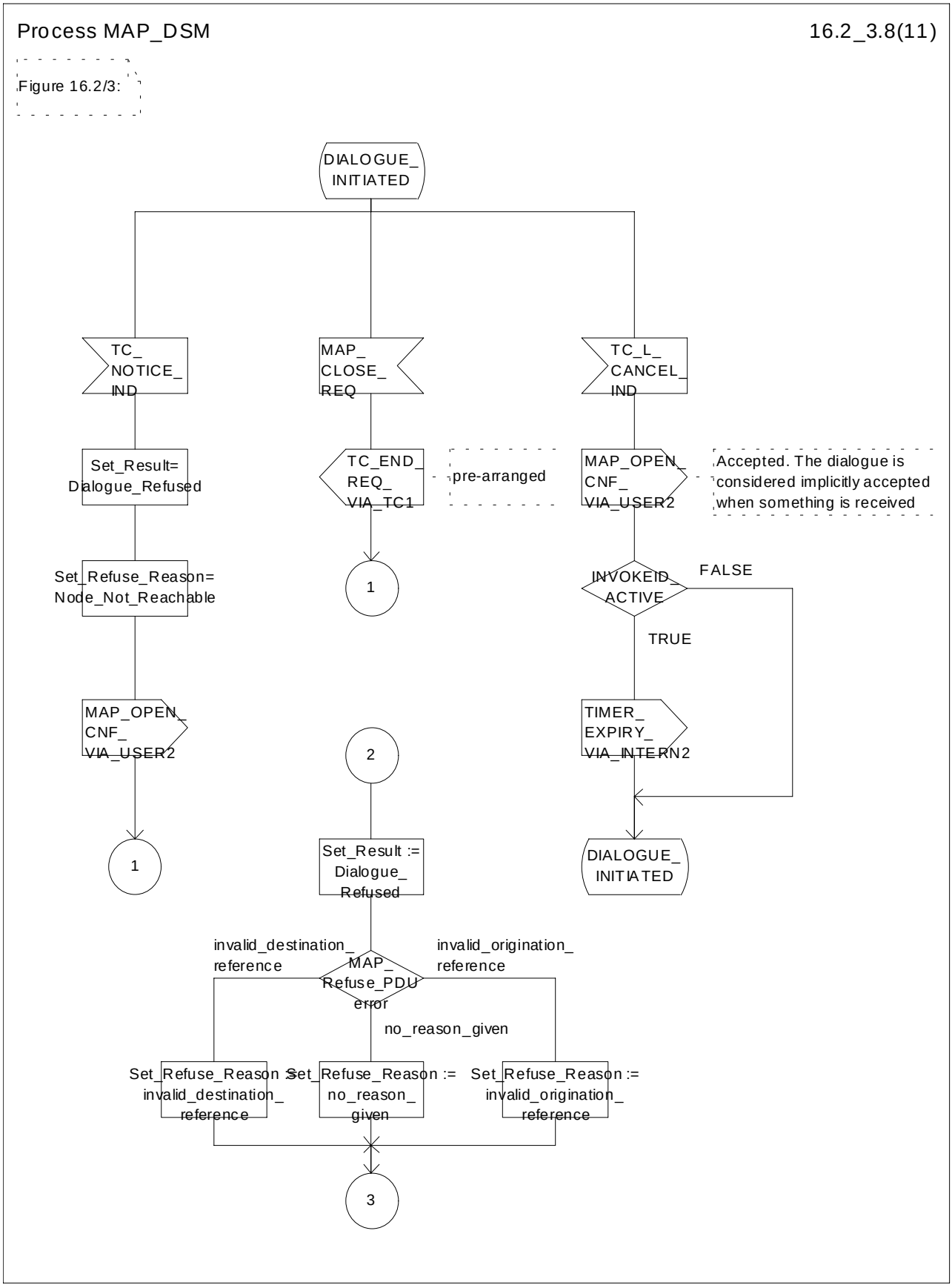

Figure 16.2/3 (sheet 8 of 11): Process MAP_DSM

Process MAP_DSM 16.2_3.9(11)

Figure 16.2/3:

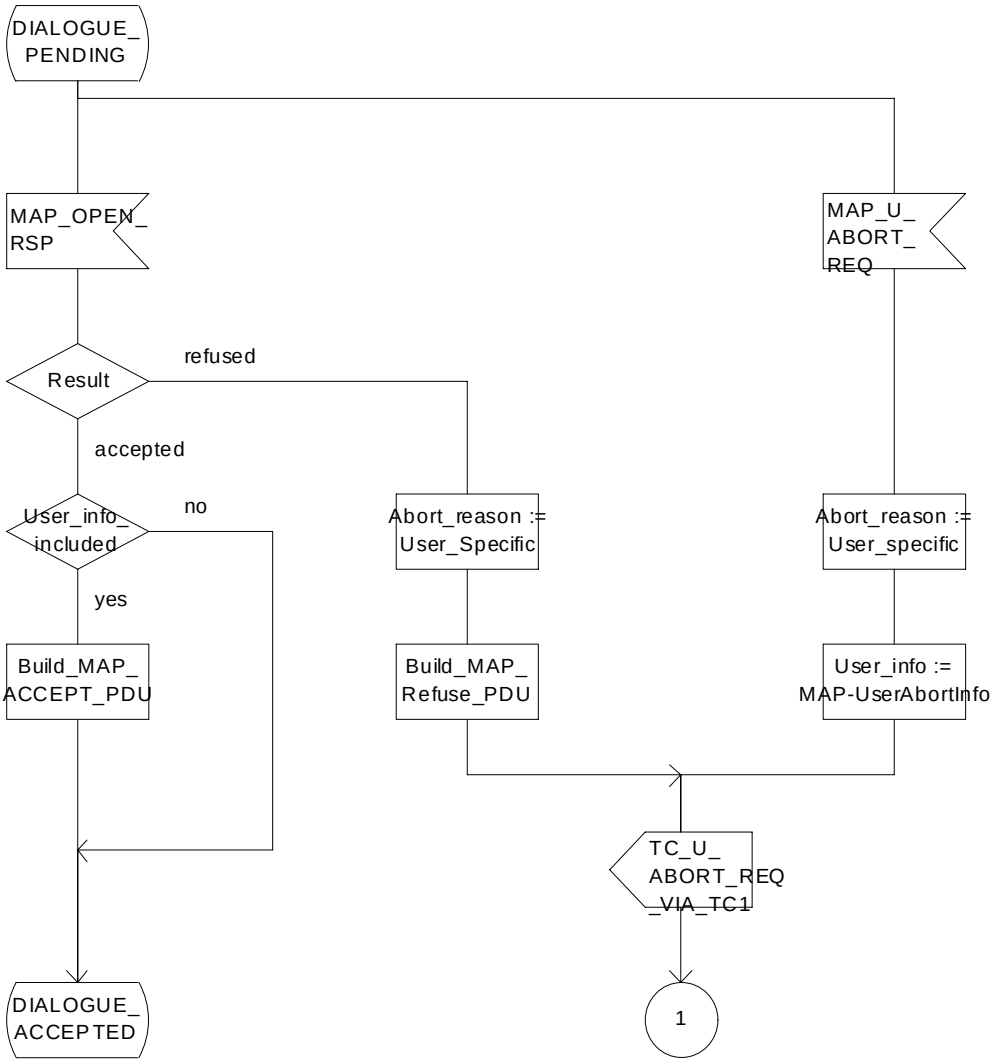

Figure 16.2/3 (sheet 9 of 11): Process MAP_DSM

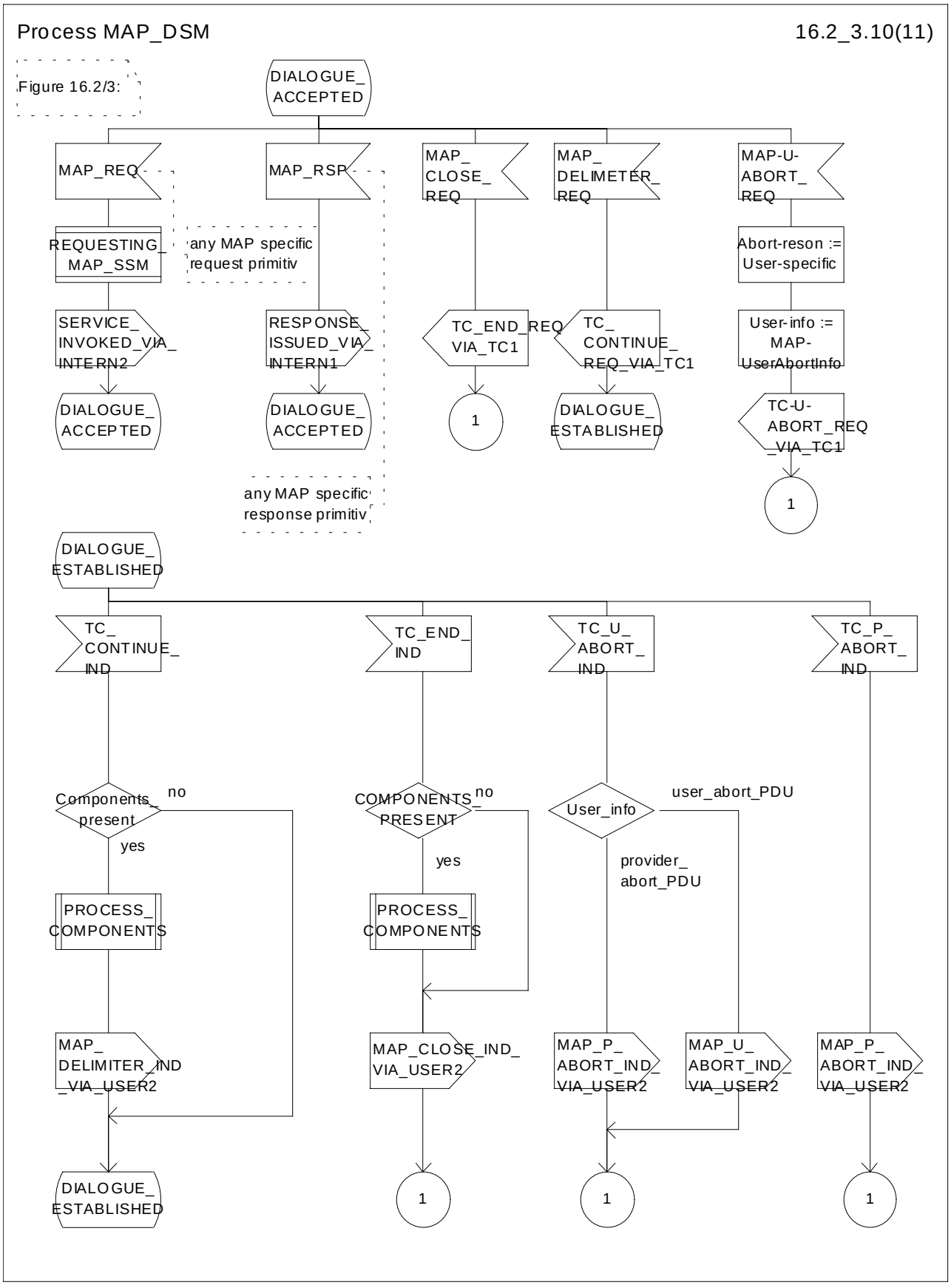

Figure 16.2/3 (sheet 10 of 11): Process MAP_DSM

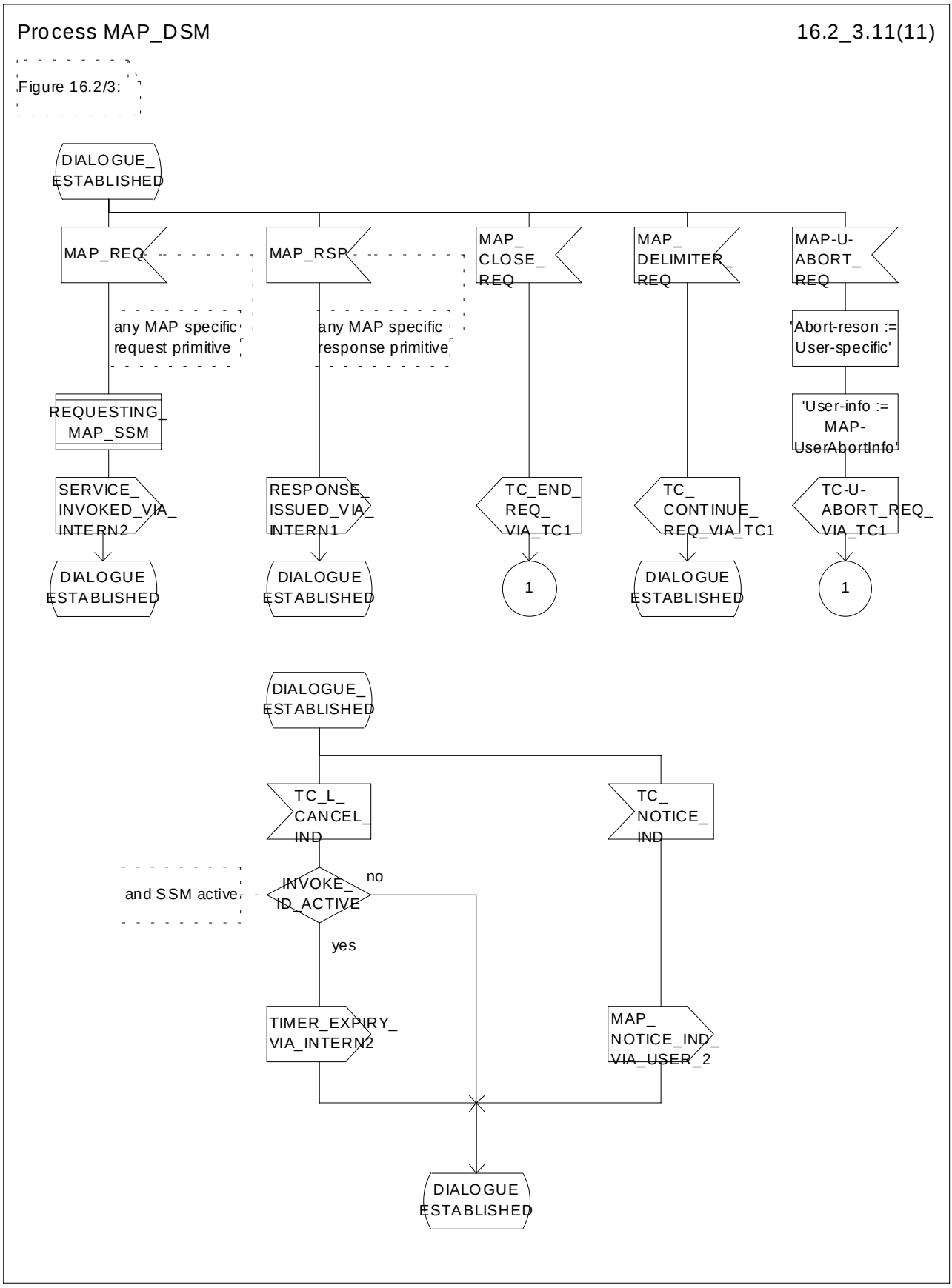

Figure 16.2/3 (sheet 11 of 11): Process MAP_DSM

Procedure PROCESS_COMPONENTS 16.2_4.1(4)

Figure 16.2/4:

Comments: Components from TCAP:
DCL
OP_CODE INTERGER,
OP_EXIST, LAST_COMPONENT, INVOKEID_ASS, LINKEDID_PRES, LINKEDID_ASS BOOLEAN;

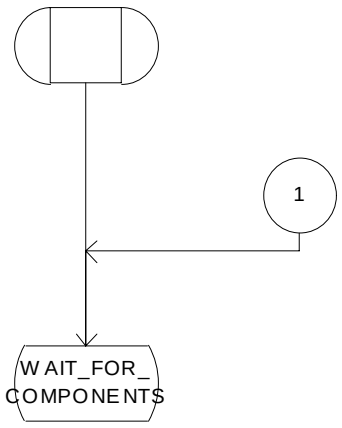

Figure 16.2/4 (sheet 1 of 4): Procedure PROCESS_COMPONENTS

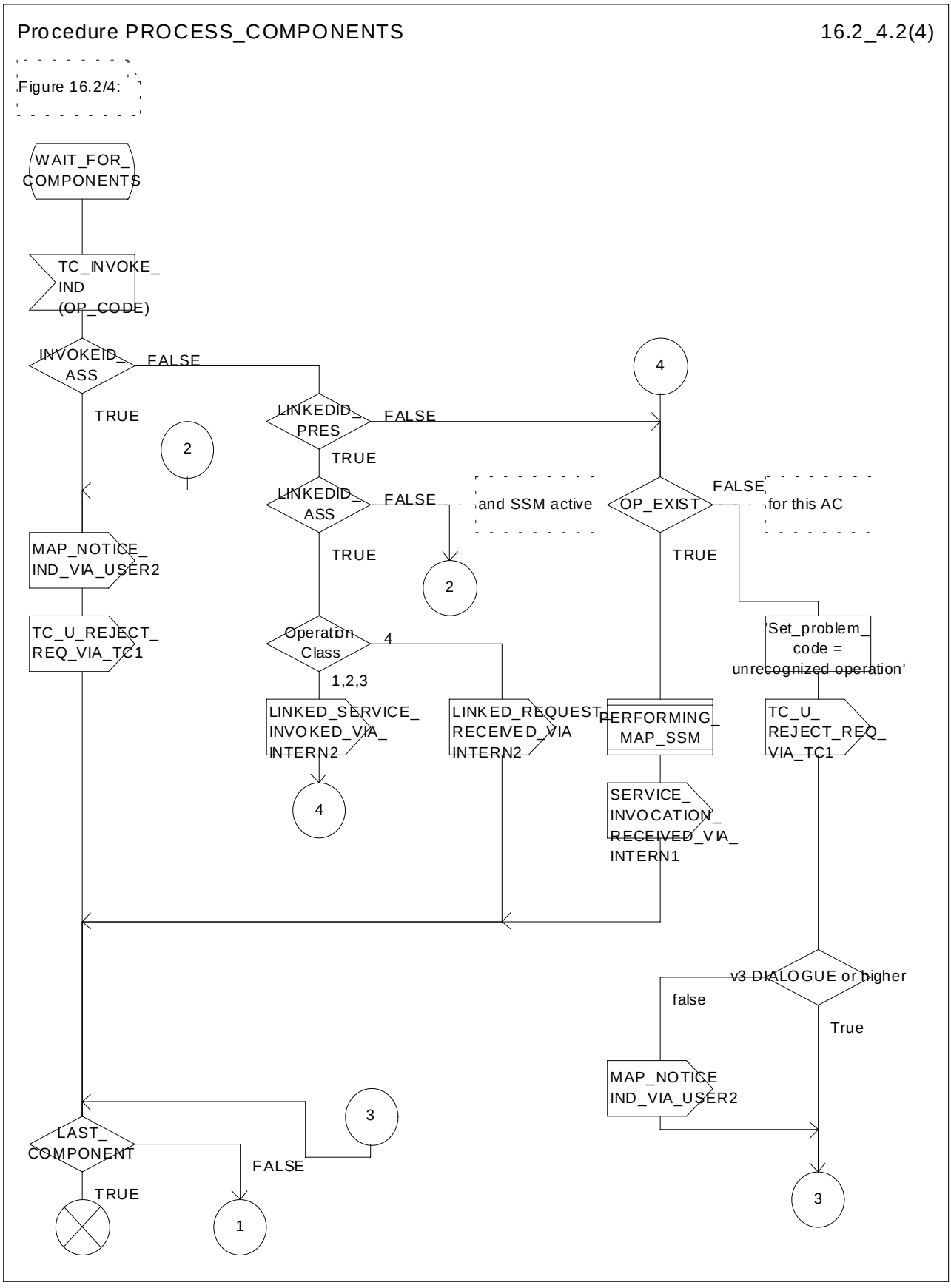

Figure 16.2/4 (sheet 2 of 4): Procedure PROCESS_COMPONENTS

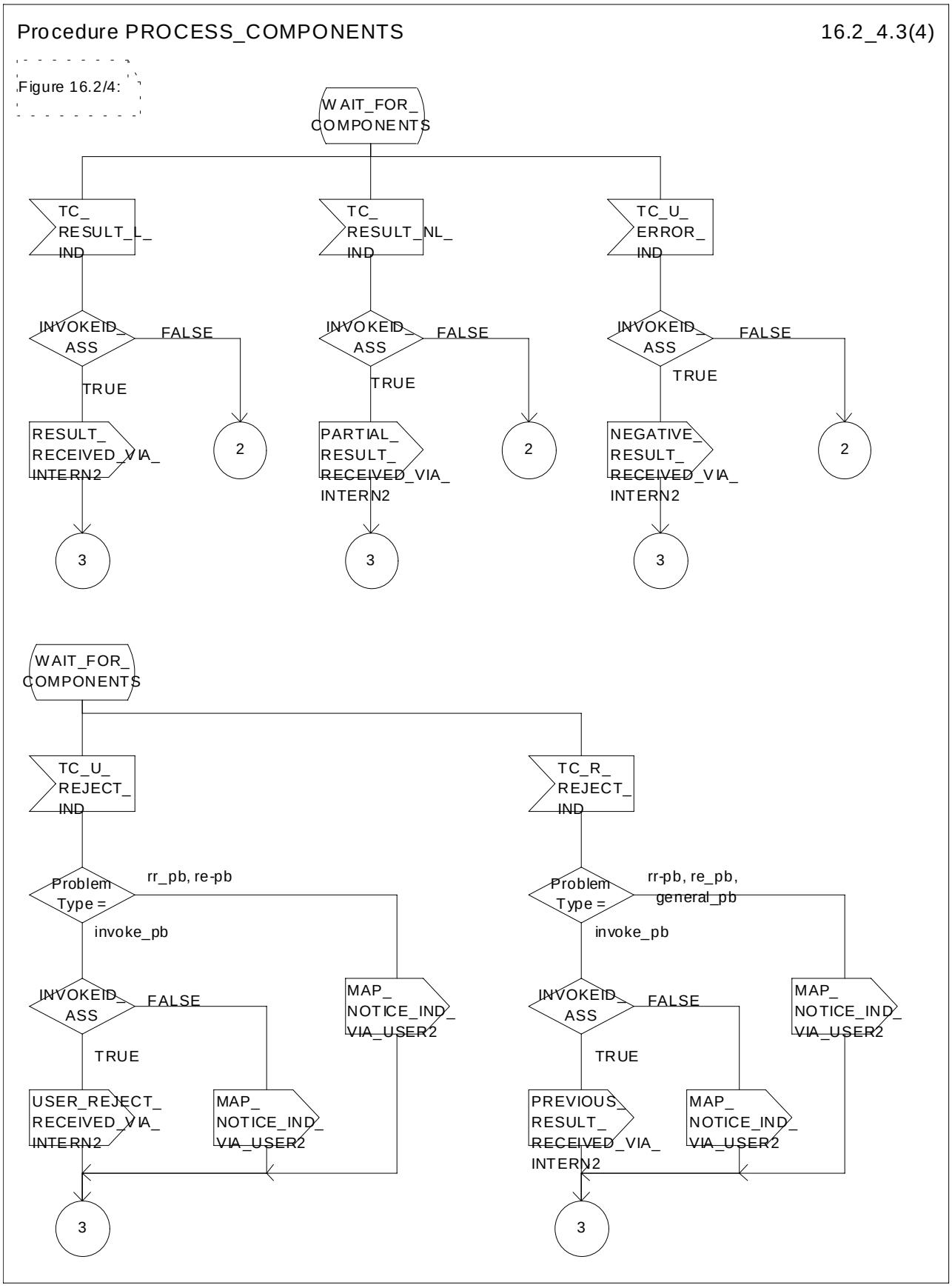

Figure 16.2/4 (sheet 3 of 4): Procedure PROCESS_COMPONENTS

Procedure PROCESS_COMPONENTS 16.2_4.4(4)

Figure 16.2/4:

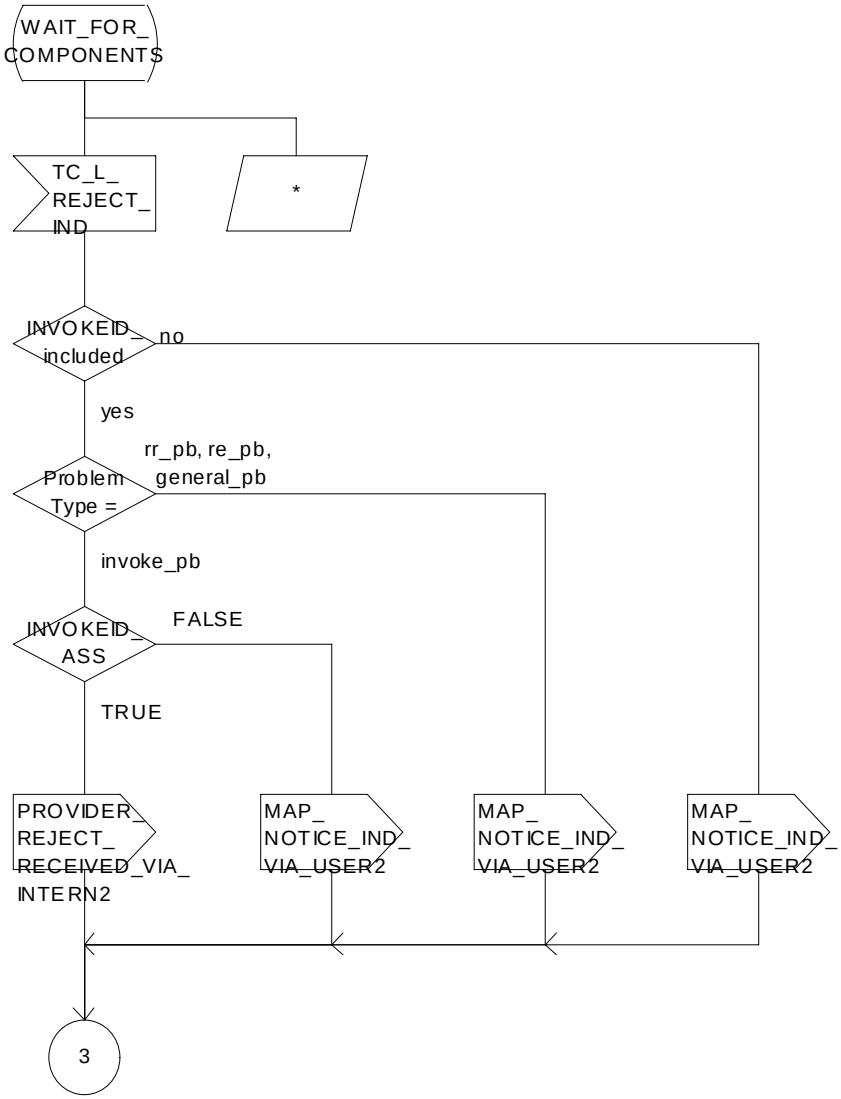

Figure 16.2/4 (sheet 4 of 4): Procedure PROCESS_COMPONENTS

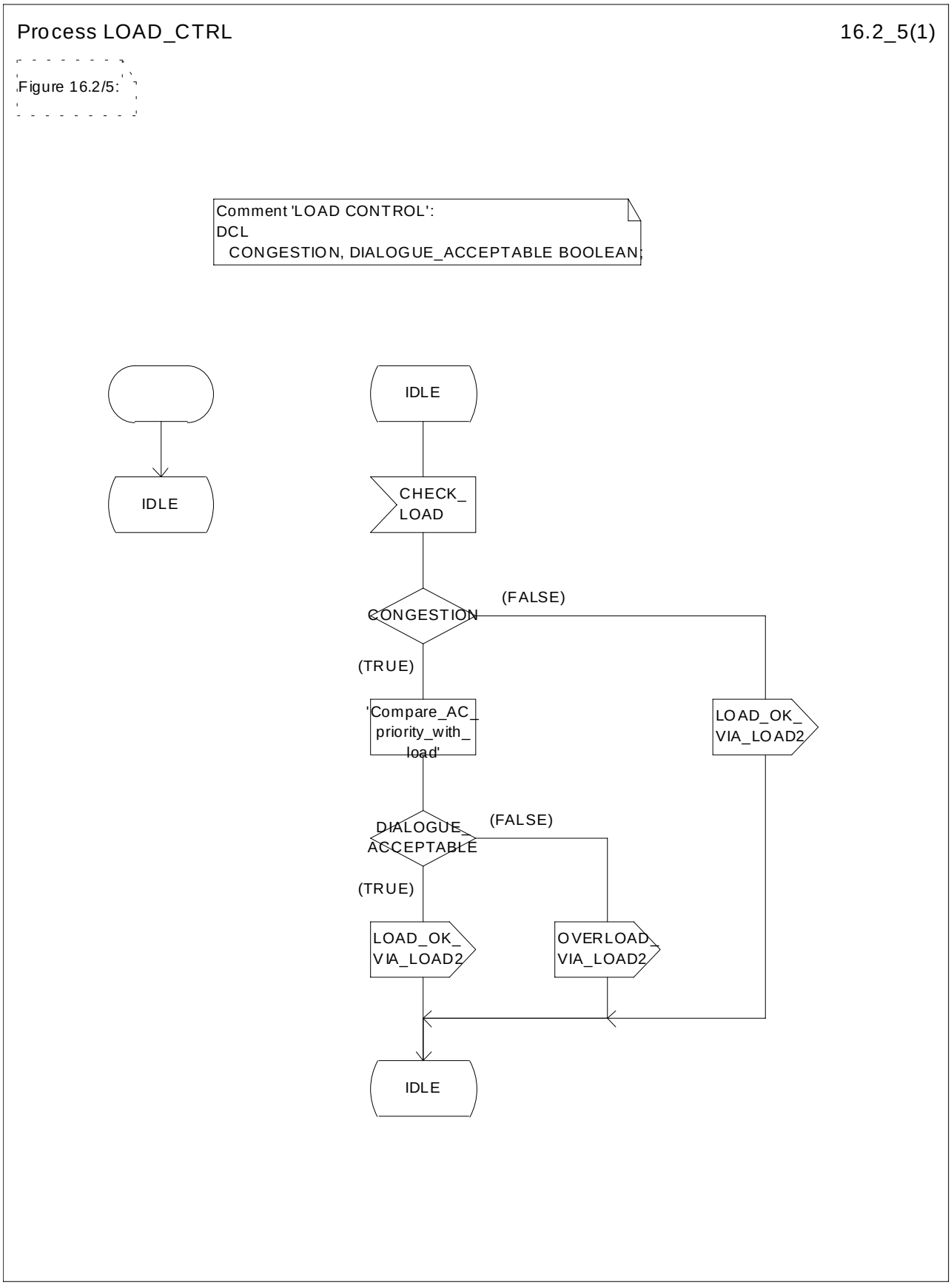

Figure 16.2/5: Process LOAD_CTRL

Process PERFORMING_MAP_SSM 16.2_6.1(3)

Figure 16.2/6:

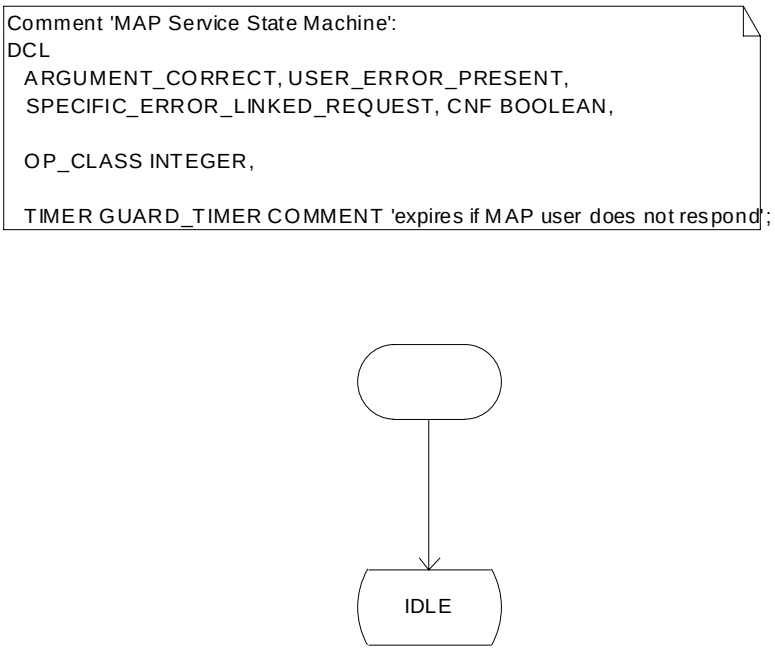

Figure 16.2/6 (sheet 1 of 3): Process PERFORMING_MAP_SSM

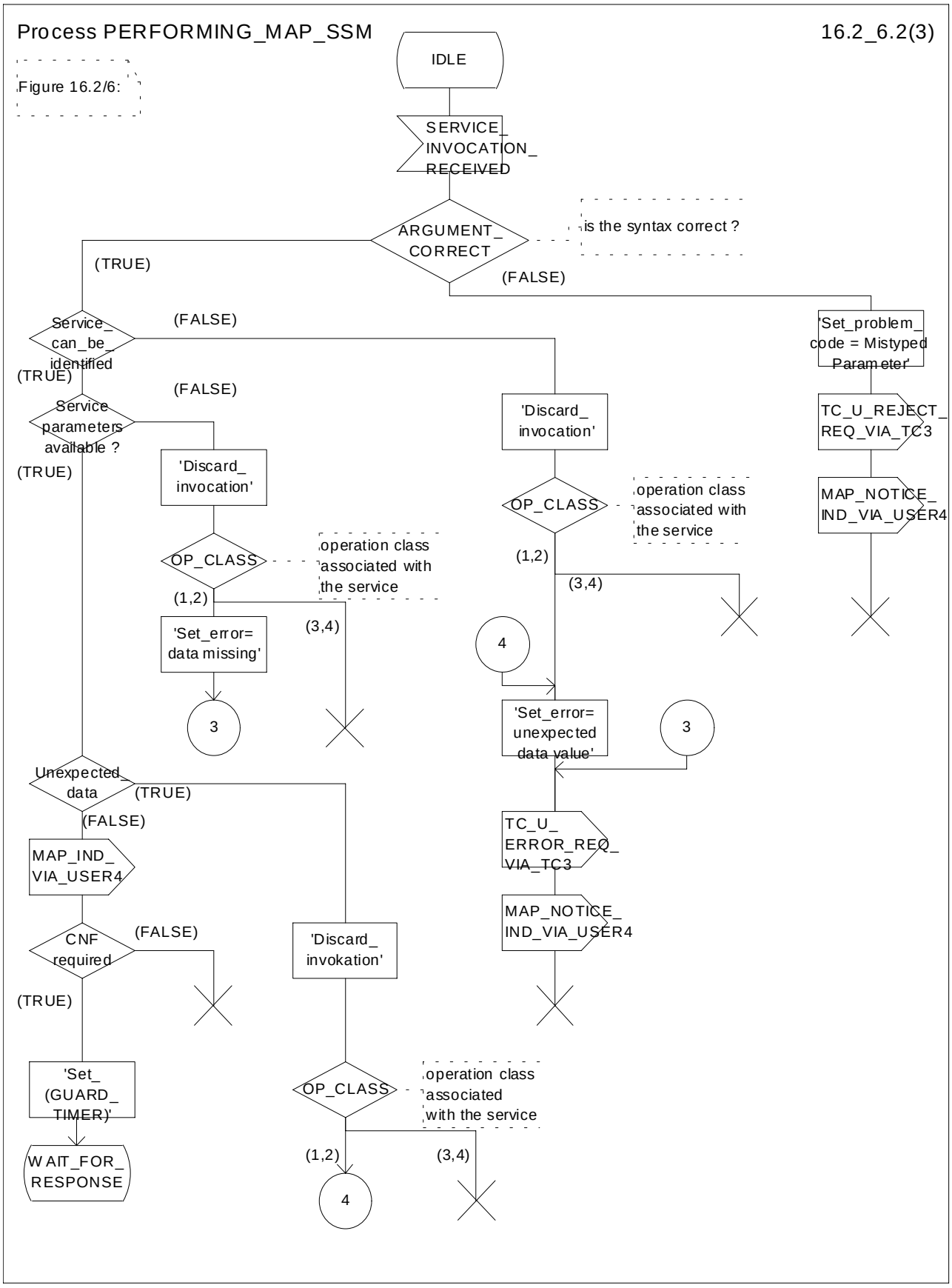

Figure 16.2/6 (sheet 2 of 3): Process PERFORMING_MAP_SSM

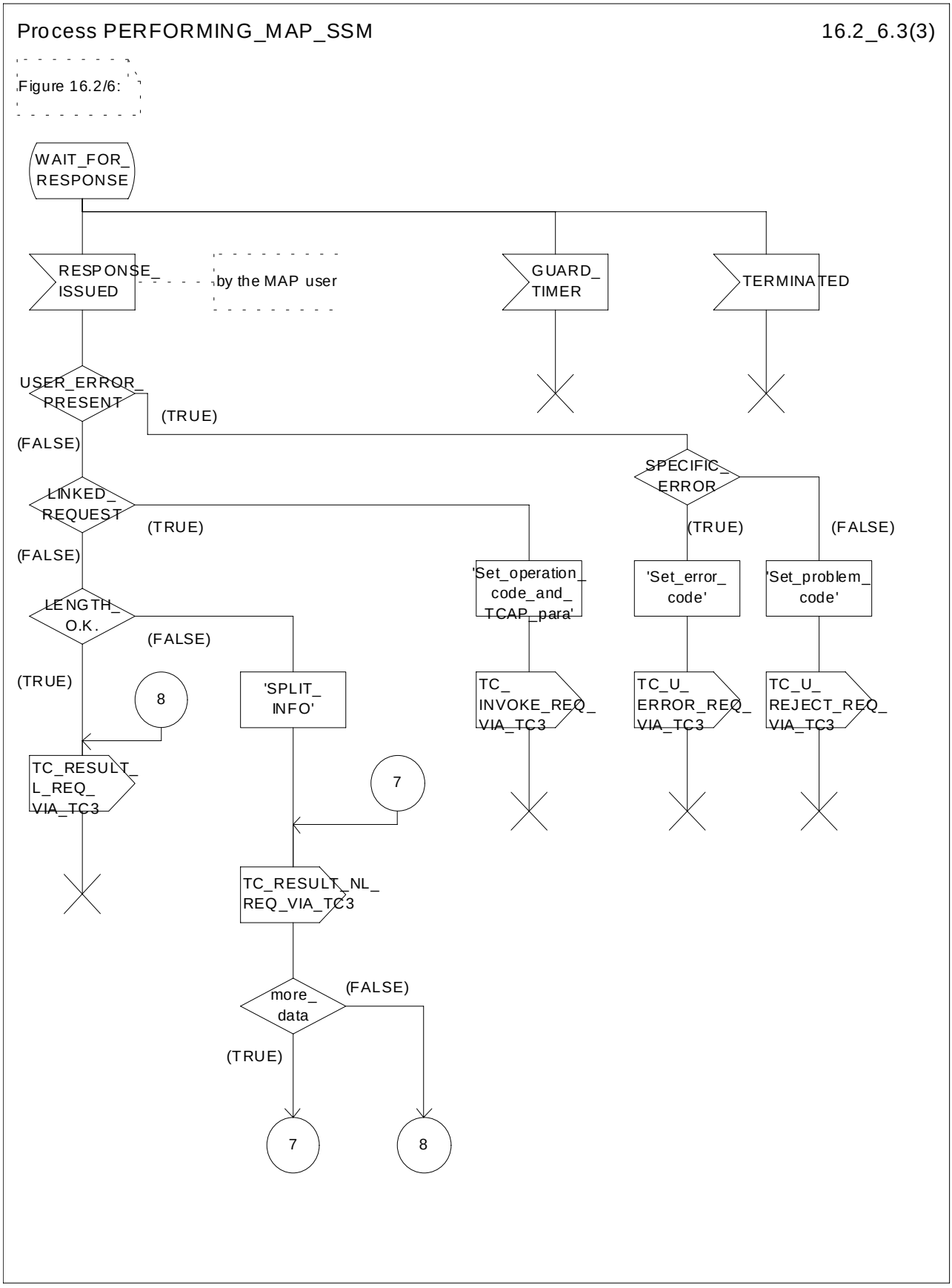

Figure 16.2/6 (sheet 3 of 3): Process PERFORMING_MAP_SSM

Process REQUESTING_MAP_SSM 16.2_7.1(4)

Figure 16.2/7:

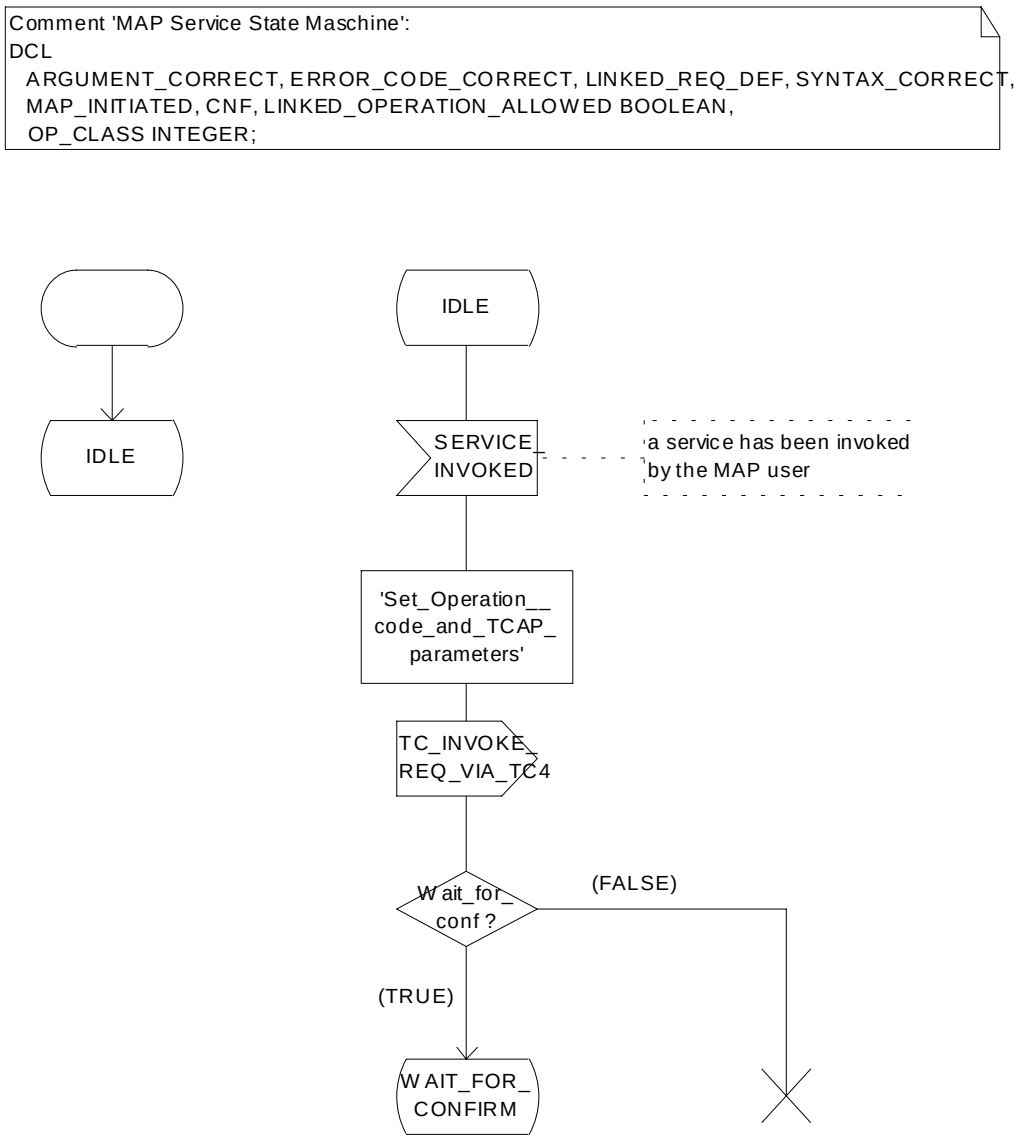

Figure 16.2/7 (sheet 1 of 4): Process REQUESTING_MAP_SSM

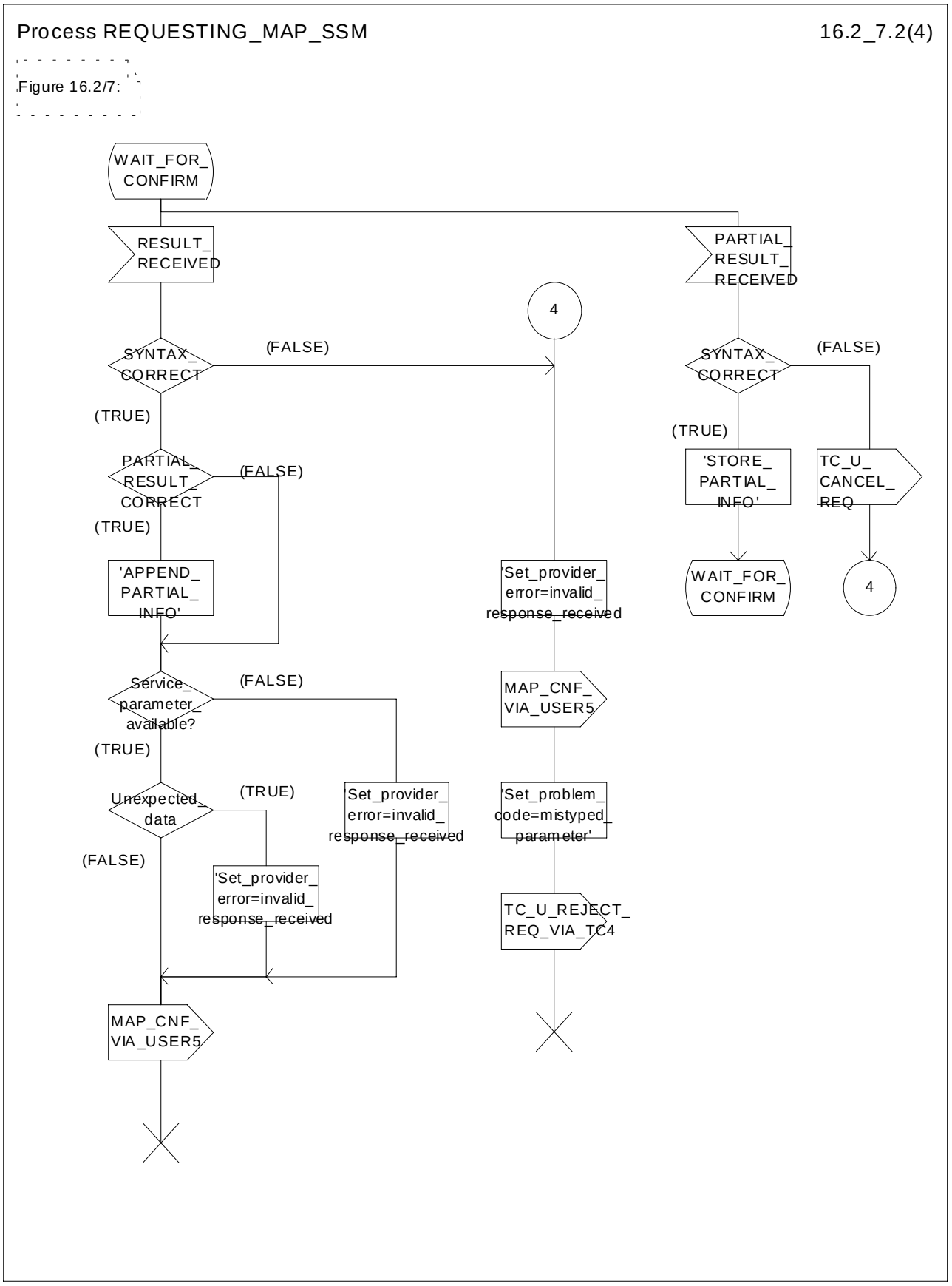

Figure 16.2/7 (sheet 2 of 4): Process REQUESTING_MAP_SSM

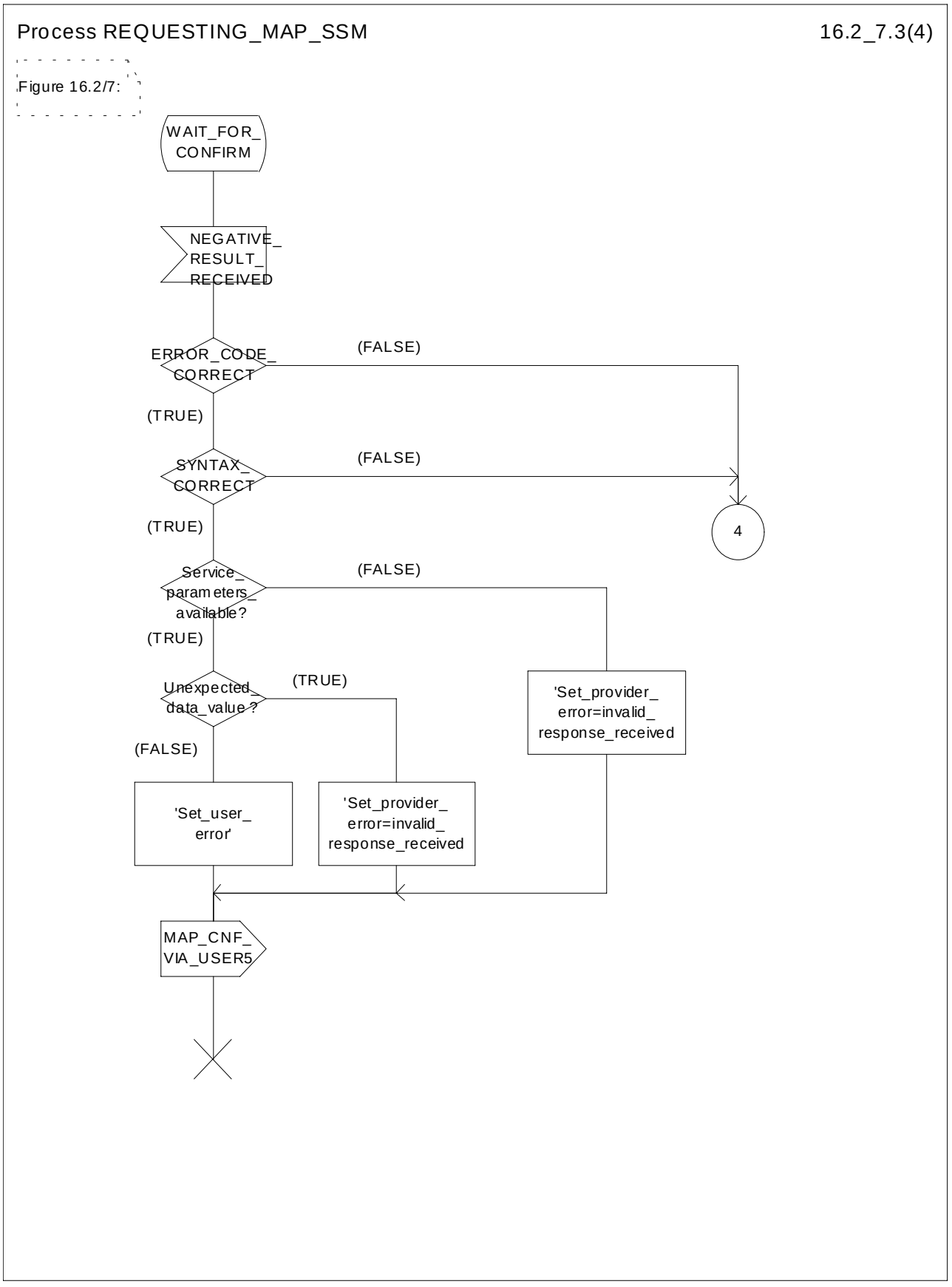

Figure 16.2/7 (sheet 3 of 4): Process REQUESTING_MAP_SSM

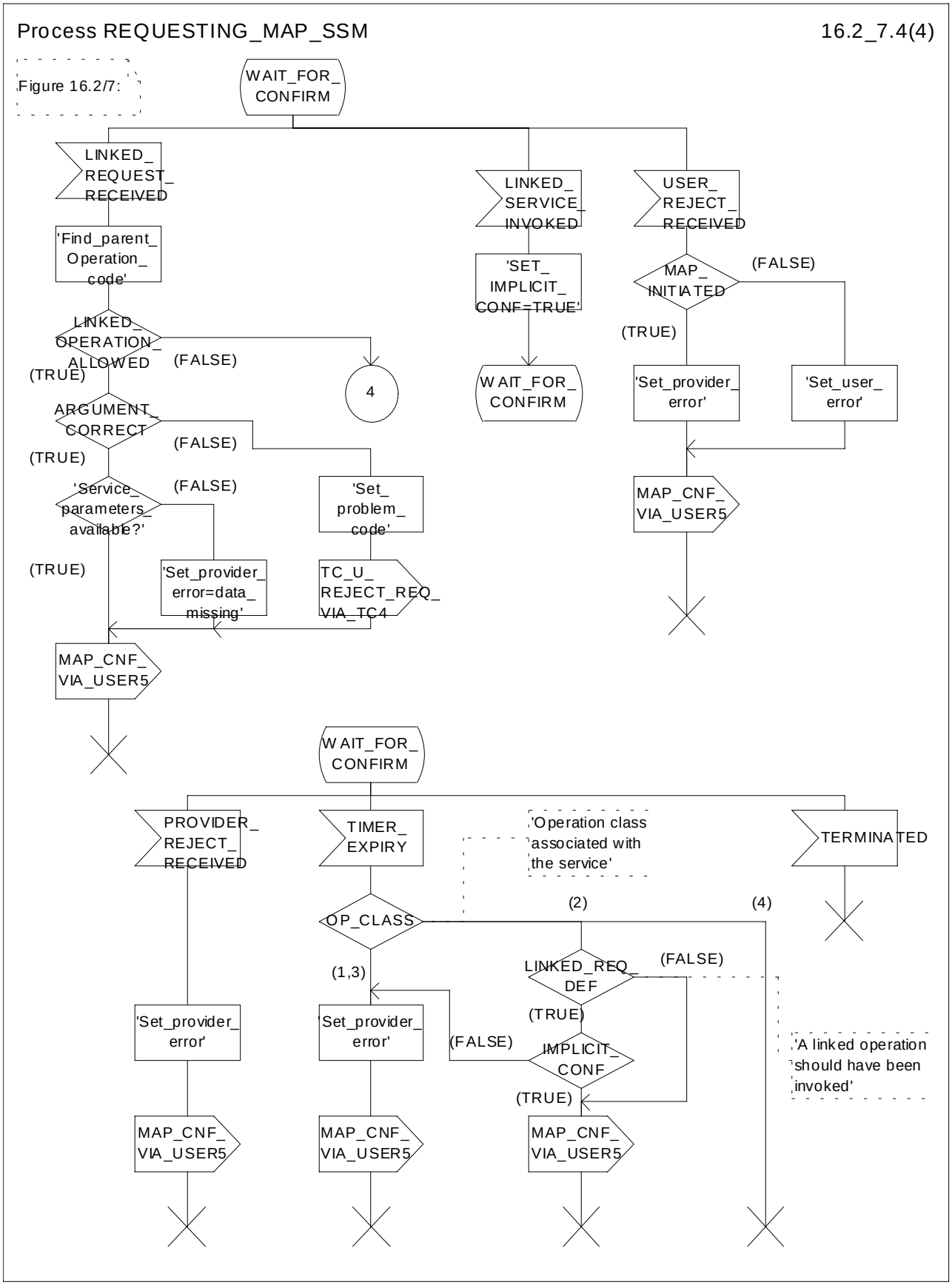

Figure 16.2/7 (sheet 4 of 4): Process REQUESTING_MAP_SSM

****** Next modified section ******

17.1.5 Structure of the Abstract Syntax of MAP

For each MAP parameter which has to be transferred by a MAP Protocol Data Unit (MAP message), there is a PDU field (an ASN.1 NamedType) whose ASN.1 identifier has the same name as the corresponding parameter, except for the differences required by the ASN.1 notation (blanks between words are removed or replaced by hyphen, the first letter of the first word is lower-case and the first letter of the following words are capitalized, e.g. "no reply condition time" is mapped to "noReplyConditionTime"). Additionally some words may be abbreviated as follows:

bs basic service

ch call handling

cug closed user group

ho handover

ic incoming call

id identity

info information

mm mobility management

lcs location services

ms mobile service

oc outgoing call

om operation & maintenance

pw Password

sm short message service

ss supplementary service

~~st secure transport~~

The MAP protocol is composed of several ASN.1 modules dealing with either operations, errors, data types, and, if applicable, split into those dealing with mobile services, call handling services, supplementary services and short message services. For operations and errors no values are assigned, but only the operation and error types in order to allow use of the defined types also by other protocols (e.g. TS GSM 04.80). The values (operation codes and error codes) are defined in a separate module. The ASN.1 source lines are preceded by line-numbers at the left margin in order to enable the usage of the cross-reference in annex A.

The module containing the definition of the operation packages for MAP is:

1. MAP-OperationPackages.

The module containing the definition of the application contexts for MAP is:

2. MAP-ApplicationContexts.

The module containing the data types for the Abstract Syntax to be used for TCAPMessages.DialoguePortion for MAP is:

3. MAP-DialogueInformation.

The module containing the operation codes and error codes for MAP is:

4. MAP-Protocol.

The modules containing all operation type definitions for MAP are:

5. MAP-MobileServiceOperations;
6. MAP-OperationAndMaintenanceOperations;
7. MAP-CallHandlingOperations;
8. MAP-SupplementaryServiceOperations;
9. MAP-ShortMessageServiceOperations;
10. MAP-Group-Call-Operations;
11. MAP-LocationServiceOperations;.

~~12.MAP-SecureTransportOperations.~~

The module containing all error type definitions for MAP is:

12~~3~~. MAP-Errors.

Modules containing all data type definitions for MAP are:

13~~4~~. MAP-MS-DataTypes;

14~~5~~. MAP-OM-DataTypes;

15~~6~~. MAP-CH-DataTypes;

16~~7~~. MAP-SS-DataTypes;

17~~8~~. MAP-SS-Code;

18~~9~~. MAP-SM-DataTypes;

19~~20~~. MAP-ER-DataTypes;

20~~1~~. MAP-CommonDataTypes;

21~~2~~. MAP-TS-Code;

22~~3~~. MAP-BS-Code;

23~~4~~. MAP-ExtensionDataTypes;

24~~5~~. MAP-GR-DataTypes;

25~~6~~. MAP-LCS-DataTypes.;

~~27. MAP-ST-DataTypes.~~

References are made also to modules defined outside of the present document. They are defined in the technical specification Mobile Services Domain and technical specification Transaction Capability respectively:

MobileDomainDefinitions;

TCAPMessages;

DialoguePDUs.

17.1.6 Application Contexts

The following informative table lists the latest versions of the Application Contexts used in this specification, with the operations used by them and, where applicable, whether or not the operation description is exactly the same as for previous versions. Information in sections 17.6 & 17.7 relates only to the ACs in this table.

AC Name	AC Version	Operations Used	Comments *
locationCancellationContext	v3	cancelLocation	
equipmentMngtContext	v2	checkIMEI	
imsiRetrievalContext	v2	sendIMSI	
infoRetrievalContext	v3	sendAuthenticationInfo	
interVlrInfoRetrievalContext	v3	sendIdentification	
handoverControlContext	v3	prepareHandover forwardAccessSignalling sendEndSignal processAccessSignalling prepareSubsequentHandover	the syntax of this operation has been extended in comparison with release 98 version
mwdMngtContext	v3	readyForSM	
msPurgingContext	v3	purgeMS	
shortMsgAlertContext	v2	alertServiceCentre	
resetContext	v2	reset	
networkUnstructuredSsContext	v2	processUnstructuredSS-Request unstructuredSS-Request unstructuredSS-Notify	
tracingContext	v3	activateTraceMode deactivateTraceMode	
networkFunctionalSsContext	v2	registerSS eraseSS activateSS deactivateSS registerPassword interrogateSS getPassword	
shortMsgMO-RelayContext	v3	mo-forwardSM	
shortMsgMT-RelayContext	v3	mt-forwardSM	
shortMsgGatewayContext	v3	sendRoutingInfoForSM reportSM-DeliveryStatus InformServiceCentre	the syntax of this operation has been extended in comparison with release 96 version
networkLocUpContext	v3	updateLocation forwardCheckSs-Indication restoreData insertSubscriberData activateTraceMode	the syntax is the same in v1 & v2
gprsLocationUpdateContext	v3	updateGprsLocation insertSubscriberData activateTraceMode	
subscriberDataMngtContext	v3	insertSubscriberData deleteSubscriberData	
roamingNumberEnquiryContext	v3	provideRoamingNumber	
locationInfoRetrievalContext	v3	sendRoutingInfo	
gprsNotifyContext	v3	noteMsPresentForGprs	
gprsLocationInfoRetrievalContext	v3	sendRoutingInfoForGprs	
failureReportContext	v3	failureReport	
callControlTransferContext	v4	resumeCallHandling	
subscriberInfoEnquiryContext	v3	provideSubscriberInfo	
anyTimeEnquiryContext	v3	anyTimeInterrogation	
anyTimeInfoHandlingContext	v3	anyTimeSubscriptionInterrogation anyTimeModification	
ss-InvocationNotificationContext	v3	ss-InvocationNotification	
sIWFSAllocationContext	v3	provideSIWFSNumber sIWFSSignallingModify	
groupCallControlContext	v3	prepareGroupCall processGroupCallSignalling forwardGroupCallSignalling sendGroupCallEndSignal	

reportingContext	v3	setReportingState statusReport remoteUserFree	
callCompletionContext	v3	registerCC-Entry eraseCC-Entry	
istAlertingContext	v3	istAlert	
ImmediateTerminationContext	v3	istCommand	
locationSvcEnquiryContext	v3	provideSubscriberLocation subscriberLocationReport	
locationSvcGatewayContext	v3	sendRoutingInfoForLCS	
mm-EventReportingContext	v3	noteMM-Event	
subscriberDataModificationNotificationContext	v3	noteSubscriberDataModified	
authenticationFailureReportContext	v3	authenticationFailureReport	
~~secureTransportHandlingContext~~	~~v3~~	~~secureTransportClass1~~ ~~secureTransportClass2~~ ~~secureTransportClass3~~ ~~secureTransportClass4~~	

NOTE (*): The syntax of the operations is not the same as in previous versions unless explicitly stated

****** Next modified section ******

17.2.2.8 Void~~Secure transport~~

~~This operation package includes the operations required for the secure transport of MAP messages between any MAP entities.~~

```
SecureTransportHandlingPackage-v3 ::= OPERATION-PACKAGE
    CONSUMER INVOKES {
        SecureTransportClass1,          -- to be used if the original operation is a
                                        -- TCAP class 1 operation
        SecureTransportClass2,          -- to be used if the original operation is a
                                        -- TCAP class 2 operation
        SecureTransportClass3,          -- to be used if the original operation is a
                                        -- TCAP class 3 operation
        SecureTransportClass4}          -- to be used if the original operation is a
                                        -- TCAP class 4 operation
```

~~This package is v3 only.~~

17.2.2.9 Void

****** Next modified section ******

17.3.2.8 Void~~Secure transport~~

~~This application context is used for the secure transport of MAP messages between any MAP entities.~~

```
SecureTransportHandlingContext-v3 APPLICATION-CONTEXT
    INITIATOR CONSUMER OF {
        SecureTransportHandlingPackage-v3}
::= {map-ac secureTransportHandling(40) version3(3)}
```

~~This application context is v3 only.~~

17.3.2.9 - 17.3.2.10 Void

****** Next modified section ******

17.3.3 ASN.1 Module for application-context-names

```
.
.
subscriberDataModificationNotificationContext-v3  OBJECT IDENTIFIER ::=
     {map-ac subscriberDataModificationNotification(22) version3(3)}

secureTransportHandlingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac secureTransportHandling(40) version3(3)}

.
.
```

****** Next modified section ******

17.4 MAP Dialogue Information

```
MAP-DialogueInformation {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-DialogueInformation (3) version6 (6)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS
   map-DialogueAS,
   MAP-DialoguePDU,
   map-ProtectedDialogueAS,
   MAP-ProtectedDialoguePDU

;

IMPORTS
   gsm-NetworkId,
   as-Id
FROM MobileDomainDefinitions {
   ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)
   mobileDomainDefinitions (0) version1 (1)}

   AddressString
FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network(1) modules (3) map-CommonDataTypes (18) version6 (6)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}

   SecurityHeader,
   ProtectedPayload
FROM MAP-ST-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ST-DataTypes (27) version6 (6)}

;


-- abstract syntax name for MAP-DialoguePDU
```

```
map-DialogueAS  OBJECT IDENTIFIER ::=
    {gsm-NetworkId as-Id map-DialoguePDU (1) version1 (1)}
```

```
MAP-DialoguePDU ::= CHOICE {
    map-open                        [0] MAP-OpenInfo,
    map-accept                      [1] MAP-AcceptInfo,
    map-close [2] MAP-CloseInfo,
    map-refuse                      [3] MAP-RefuseInfo,
    map-userAbort                   [4] MAP-UserAbortInfo,
    map-providerAbort               [5] MAP-ProviderAbortInfo}
```

```
MAP-OpenInfo ::= SEQUENCE {
    destinationReference            [0] AddressString               OPTIONAL,
    originationReference            [1] AddressString               OPTIONAL,
    ...,
    extensionContainer              ExtensionContainer              OPTIONAL
    -- extensionContainer must not be used in version 2
    }
```

```
MAP-AcceptInfo ::= SEQUENCE {
    ...,
    extensionContainer              ExtensionContainer              OPTIONAL
    -- extensionContainer must not be used in version 2
    }
```

```
MAP-CloseInfo ::= SEQUENCE {
    ...,
    extensionContainer              ExtensionContainer              OPTIONAL
    -- extensionContainer must not be used in version 2
    }
```

```
MAP-RefuseInfo ::= SEQUENCE {
    reason    Reason,
    ...,
    extensionContainer              ExtensionContainer              OPTIONAL,
    -- extensionContainer must not be used in version 2
    alternativeApplicationContext   OBJECT IDENTIFIER               OPTIONAL
    -- alternativeApplicationContext must not be used in version 2
    }
```

```
Reason ::= ENUMERATED {
    noReasonGiven  (0),
    invalidDestinationReference     (1),
    invalidOriginatingReference     (2),
    encapsulatedAC-NotSupported     (3)}
    -- encapsulatedAC-NotSupported must not be used in dialogues with an AC
    -- different from secureTransportHandling
```

```
MAP-UserAbortInfo ::= SEQUENCE {
    map-UserAbortChoice             MAP-UserAbortChoice,
    ...,
    extensionContainer              ExtensionContainer              OPTIONAL
    -- extensionContainer must not be used in version 2
    }
```

```
MAP-UserAbortChoice ::= CHOICE {
    userSpecificReason              [0] NULL,
    userResourceLimitation          [1] NULL,
    resourceUnavailable             [2] ResourceUnavailableReason,
    applicationProcedureCancellation [3] ProcedureCancellationReason}
```

```
ResourceUnavailableReason ::= ENUMERATED {
    shortTermResourceLimitation  (0),
    longTermResourceLimitation  (1)}
```

```
ProcedureCancellationReason ::= ENUMERATED {
    handoverCancellation  (0),
    radioChannelRelease  (1),
    networkPathRelease  (2),
    callRelease  (3),
    associatedProcedureFailure  (4),
    tandemDialogueRelease  (5),
    remoteOperationsFailure  (6)}
```

```
MAP-ProviderAbortInfo ::= SEQUENCE {
     map-ProviderAbortReason             MAP-ProviderAbortReason,
     ...,
     extensionContainer                  ExtensionContainer                OPTIONAL
     -- extensionContainer must not be used in version 2
     }

MAP-ProviderAbortReason ::= ENUMERATED {
     abnormalDialogue  (0),
     invalidPDU  (1)}

-- abstract syntax name for MAP-ProtectedDialoguePDU

map-ProtectedDialogueAS  OBJECT IDENTIFIER ::=
     {gsm-NetworkId as-Id map-ProtectedDialoguePDU (3) version1 (1)}

MAP-ProtectedDialoguePDU ::= SEQUENCE {
     encapsulatedAC                      OBJECT IDENTIFIER,
     securityHeader                      SecurityHeader                    OPTIONAL,
     protectedPayload                    ProtectedPayload                  OPTIONAL,
     ...}
     -- The protectedPayload carries the result of applying the security function
     -- defined in 3G TS 33.102 to the encoding of the securely transported
     -- MAP-DialoguePDU

END
```

****** Next modified section ******

17.5 MAP operation and error codes

```
MAP-Protocol {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Protocol (4) version6 (6)}

DEFINITIONS

::=

BEGIN

IMPORTS
.
.
FROM MAP-LocationServiceOperations {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-LocationServiceOperations (24)
   version6 (6)}

SecureTransportClass1,
SecureTransportClass2,
SecureTransportClass3,
SecureTransportClass4

FROM MAP-SecureTransportOperations {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SecureTransportOperations (26)
   version6 (6)}
.
.
   MM-EventNotSupported,
   SecureTransportError

FROM MAP-Errors {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Errors (10) version6 (6)}
;
.
.
-- Mobility Management operation codes

noteMM-Event  NoteMM-Event ::= localValue 89
```

```
-- Secure transport operation codes

secureTransportClass1 SecureTransportClass1 ::= localValue 78
secureTransportClass2 SecureTransportClass2 ::= localValue 79
secureTransportClass3 SecureTransportClass3 ::= localValue 80
secureTransportClass4 SecureTransportClass4 ::= localValue 81

.
.
-- Mobility Management error codes

mm-EventNotSupported  MM-EventNotSupported ::= localValue 59

-- Secure transport error codes

secureTransportError secureTransportError ::= localValue 4

.
.
```

****** Next modified section ******

17.6.6 Errors

```
1  MAP-Errors {
2     ccitt identified-organization (4) etsi (0) mobileDomain (0)
3     gsm-Network (1) modules (3) map-Errors (10) version6 (6)}
4
5  DEFINITIONS
6
7  ::=
8
9  BEGIN
10
11 EXPORTS
12
13 .
14 .
15    -- Mobility Management errors
16    MM-EventNotSupported,
17
18    -- Secure transport errors
19    SecureTransportError
20
21 ;
22
23 IMPORTS
24
25    InformationNotAvailableParam,
26    SecureTransportErrorParam
27
28
29 MM-EventNotSupported ::= ERROR
30      PARAMETER
31           mm-EventNotSupported-Param      MM-EventNotSupported-Param
32           -- optional
33
34    -- Secure transport errors
35
36 SecureTransportError ::= ERROR
37    PARAMETER
38          secureTransportErrorParam       SecureTransportErrorParam
39
40 .
41 .
```

42 ****** Next modified section ******

17.6.9 VoidSecure transport operations

```
MAP-SecureTransportOperations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-SecureTransportOperations (26)
    version6 (6)}

DEFINITIONS

::=

BEGIN

EXPORTS
    SecureTransportClass1,
    SecureTransportClass2,
    SecureTransportClass3,
    SecureTransportClass4
;

IMPORTS
    OPERATION
FROM TCAPMessages {
    ccitt recommendation q 773 modules (2) messages (1) version2 (2)}

    DataMissing,
    SecureTransportError,
    UnexpectedDataValue

FROM MAP-Errors {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-Errors (10) version6 (6)}

    SecureTransportArg,
    SecureTransportRes

FROM MAP-ST-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-ST-DataTypes (27) version6 (6)}
;
```

```
SecureTransportClass1 ::= OPERATION                                    --Timer shall be
the same as for the
                                                                       --securely
transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
    RESULT
        secureTransportRes          SecureTransportRes
    ERRORS {
        SecureTransportError,
        DataMissing,
        UnexpectedDataValue}
```

```
SecureTransportClass2 ::= OPERATION                                    --Timer shall be
the same as for the
                                                                       --securely
transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
    ERRORS {
        SecureTransportError,
        DataMissing,
        UnexpectedDataValue}
```

```
SecureTransportClass3 ::= OPERATION                                    --Timer shall be
the same as for the
                                                                       --securely
transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
    RESULT
        secureTransportRes          SecureTransportRes
```

```
SecureTransportClass4 ::= OPERATION                                    --Timer shall be
the same as for the
                                                                       --securely
transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg

END
```

****** Next modified section ******

17.7.7 Error data types

```
MAP-ER-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ER-DataTypes (17) version6 (6)}

.
.
EXPORTS
.
.
   MM-EventNotSupported-Param,
   SecureTransportErrorParam,
.
.
IMPORTS
.
.
   SignalInfo,
   BasicServiceCode,
   NetworkResource
FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}

   SecurityHeader,
   ProtectedPayload
FROM MAP-ST-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ST-DataTypes (27) version6 (6)}

.
.
MM-EventNotSupported-Param ::= SEQUENCE {
    extensionContainer              ExtensionContainer              OPTIONAL,
    ...}

SecureTransportErrorParam ::= SEQUENCE {
    securityHeader                  SecurityHeader,
    protectedPayload                ProtectedPayload                OPTIONAL
    }
    -- The protectedPayload carries the result of applying the security function
    -- defined in 3G TS 33.102 to the encoding of the securely transported error
    -- parameter

END
```

****** Next modified section ******

17.7.14 VoidSecure transport data types

```
MAP-ST-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ST-DataTypes (27) version6 (6)}

DEFINITIONS
IMPLICIT TAGS
::=
BEGIN

EXPORTS
   SecureTransportArg,
   SecureTransportRes,
   SecurityHeader,
   ProtectedPayload
;

IMPORTS
   IMSI

FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}
;
```

```
SecureTransportArg ::= SEQUENCE {
    securityHeader                  SecurityHeader,
    protectedPayload                ProtectedPayload            OPTIONAL
    }
    -- The protectedPayload carries the result of applying the security function
    -- defined in 3G TS 33.102 to the encoding of the argument of the securely
    -- transported operation
```

```
SecureTransportRes ::= SEQUENCE {
    securityHeader                  SecurityHeader,
    protectedPayload                ProtectedPayload            OPTIONAL
    }
    -- The protectedPayload carries the result of applying the security function
    -- defined in 3G TS 33.102 to the encoding of the result of the securely
    -- transported operation
```

```
SecurityHeader ::= SEQUENCE {
    originalComponentIdentifier     OriginalComponentIdentifier,
    sendingPLMN-Id                  PLMN-Id,
    protectionMode                  [0] ProtectionMode              OPTIONAL,
    encryptionAlgorithmIdentifier   [1] EncryptionAlgorithmIdentifier OPTIONAL,
    modeOfOperation                 [2] ModeOfOperation             OPTIONAL,
    encryptionKeyVersionNumber      [3] EncryptionKeyVersionNumber  OPTIONAL,
    initialisationVector            [4] InitialisationVector        OPTIONAL,
    hashAlgorithmIdentifier         [5] HashAlgorithmIdentifier     OPTIONAL,
    hashKeyVersionNumber            [6] HashKeyVersionNumber        OPTIONAL,
    ...}
```

```
PLMN-Id ::= TBCD-STRING (SIZE (3))
    -- digits of MCC, MNC, are concatenated in this order.
```

```
ProtectedPayload ::= OCTET STRING(SIZE(1..1000)
    -- In protection mode 0 (noProtection) the ProtectedPayload carries the transfer
        -- syntax value of the component parameter identified by the
        -- originalComponentIdentifier.
    -- In protection mode 1 (integrityAuthenticity) the protectedPayload carries 4
        -- octets TVP, followed by the transfer syntax value of the component
        -- parameter identified by the originalComponentIdentifier, followed by
        -- the integrity check value.
        -- The integrity check value is the result of applying the hash algorithm
        -- to the concatenation of TVP, transfer syntax value of the SecurityHeader,
        -- transfer syntax value of the component parameter.
    -- In protection mode 2 (confidentialityIntegrityAuthenticity) the protected
        -- payload carries 4 octets TVP, followed by the encrypted transfer syntax
        -- value of the component parameter identified by the
        -- originalComponentIdentifier, followed by the integrity check value.
        -- The integrity check value is the result of applying the hash algorithm
        -- to the concatenation of TVP, transfer syntax value of the SecurityHeader,
        -- encrypted transfer syntax value of the component parameter.
    -- See 33.102.
    -- The length of the protectedPayload is adjusted according to the capabilities of
    -- the lower protocol layers
```

```
ProtectionMode ::= ENUMERATED {
    noProtection                        (0),
    integrityAuthenticity               (1),
    confidentialityIntegrityAuthenticity (2)}

EncryptionAlgorithmIdentifier ::= INTEGER (1..127)
    -- The encryption algorithm corresponding to each value of the Encryption
    -- Algorithm Identifier type is defined in TS 33.102

HashAlgorithmIdentifier ::= INTEGER (1..127)
    -- The encryption algorithm corresponding to each value of the Hash Algorithm
    -- Identifier type is defined in TS 33.102

ModeOfOperation ::= ENUMERATED {
    ecb                                 (0),
    cbc                                 (1),
    cfb                                 (2),
    ofb                                 (3),
    ...}
    -- Modes of operation are defined in ISO/IEC 10116 (1991)

EncryptionKeyVersionNumber ::= INTEGER (0..127)

HashKeyVersionNumber ::= INTEGER (0..127)

InitialisationVector ::= OCTET STRING (SIZE(8))

OriginalComponentIdentifier ::= CHOICE {
    operationCode                       [0] OperationCode,
    errorCode                           [1] ErrorCode,
    userInfo                            [2] NULL}

OperationCode ::= CHOICE {
    localValue                          INTEGER,
    globalValue                         OBJECT IDENTIFIER}

ErrorCode ::= CHOICE {
    localValue                          INTEGER,
    globalValue                         OBJECT IDENTIFIER}

END
```