

ETSI TC SMG
Released by : ETSI PT12
Release date: February 1992

RELEASE NOTE

Recommendation GSM 04.80

**Mobile radio interface layer 3
Supplementary services specification
Formats and Coding**

Previously distributed version: 3.2.0 (updated release 1/90)
New released version Febr 1992: 3.2.0 (release 92, phase 1)

1. Reason for changes

No changes since the previously distributed version.

ETSI-GSM
Technical
Specification

GSM 04.80

Version 3.2.0

UDC: 621.396.21

Key words: European Digital Cellular Telecommunications System, Global System for Mobile Communications (GSM)

**European digital cellular
telecommunication system (phase 1);
Mobile Radio Interface Layer 3
Supplementary Services Specification
Formats and Coding**

ETSI

European Telecommunications Standards Institute
ETSI Secretariat: B.P.152 . F - 06561 Valbonne Cedex . France
TP. + 33 92 94 42 00 TF. + 33 93 65 47 16 Tx. 47 00 40 F

Copyright European Telecommunications Standards Institute 1992.
All rights reserved.

No part may be reproduced or used except as authorised by contract or other written permission. The copyright and the foregoing restriction on reproduction and use extend to all media in which the information may be embodied.

PREFATORY NOTE

ETSI has constituted stable and consistent documents which give specifications for the implementation of the European Cellular Telecommunications System. Historically, these documents have been identified as "GSM recommendations".

Some of these recommendations may subsequently become Interim European Telecommunications Standards (I-ETSS) or European Telecommunications Standards (ETSS), whilst some continue with the status of ETSI-GSM Technical Specifications. These ETSI-GSM Technical Specifications are for editorial reasons still referred to as GSM recommendations in some current GSM documents.

The numbering and version control system is the same for ETSI-GSM Technical Specifications as for "GSM recommendations".

**Mobile radio interface layer 3
Supplementary services specification
Formats and Coding**

Date: 21 January 1991

<u>List of contents:</u>	<u>page</u>
1. SCOPE.	.2
2. MESSAGE FUNCTIONAL DEFINITIONS AND CONTENTS.	.3
2.1 General	.3
2.2 Messages for supplementary services control	.3
2.3 Facility.	.4
2.4 Hold.	.5
2.5 Hold acknowledge.	.5
2.6 Hold reject	.6
2.7 Register.	.7
2.8 Retrieve.	.8
2.9 Retrieve acknowledge.	.8
2.10 Retrieve reject.	.9
3. GENERAL MESSAGE FORMAT AND INFORMATION ELEMENTS CODING.	10
3.1 General	10
3.2 Protocol discriminator.	10
3.3 Transaction identifier.	11
3.4 Message type.	11
3.5 Other information elements.	12
3.6 Facility information element.	13
4. SUPPLEMENTARY SERVICES OPERATION SPECIFICATIONS.	22
4.1 General	22
4.2 Operation types	23
4.2.1 Operation types ASN.1 specification	23
4.2.2 Operation types description	25
4.3 Error types	27
4.3.1 Error types ASN.1 specification	27
4.3.2 Error types description	27
4.4 Data types and identifiers.	30
4.4.1 General	30
4.4.2 ASN.1 data types.	31
4.4.3 Identifiers definition.	33
4.5 Operations and errors implementation.	36
ANNEX A CAUSE DEFINITIONS FOR SUPPLEMENTARY SERVICES	38

SECTION 1

SCOPE

This recommendation contains the coding of messages necessary for support of supplementary service operations on the mobile radio interface layer 3.

Section 2 gives the functional definitions and contents of messages additional to those given in recommendation GSM 04.08.

Section 3 gives the general message format and coding of the Facility information element.

Section 4 gives the specification of the supplementary service operations.

SECTION 2

MESSAGE FUNCTIONAL DEFINITIONS AND CONTENTS

2.1 General

This section should be read in conjunction with section 9 of recommendation GSM 04.08. All messages are additional to those defined in that section and the following tables should be interpreted according to the introduction of section 9 of recommendation GSM 04.08.

2.2 Messages for supplementary services control

Table 2.1/GSM 04.80 summarizes the messages for supplementary services control.

Messages for supplementary service control	Reference
FACILITY	2.3
HOLD	2.4
HOLD ACKNOWLEDGE	2.5
HOLD REJECT	2.6
REGISTER	2.7
RETRIEVE	2.8
RETRIEVE ACKNOWLEDGE	2.9
RETRIEVE REJECT	2.10

Table 2.1/GSM 04.80
Messages for supplementary service control

2.3 Facility

This message is sent by the mobile user or the network to request or acknowledge a supplementary service. The supplementary service to be invoked, and its associated parameters, are specified in the FACILITY information element. See Table 2.2/GSM 04.80.

For the use of this message, see recommendation GSM 04.10

Message type : FACILITY
 Significance : local (note 1)
 Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
Transaction identifier	3.3	both	MF	
Message type	3.4	both	MF	
Facility (note 2)	3.5	both	MV	6-max

Note 1 : This message has local significance; however, it may carry information of global significance.

Note 2 : The Facility information element has no upper length limit except that given by the limitation of the length indicator to one octet (i.e. 255 octets for the length of contents).

Table 2.2/GSM 04.80
 FACILITY message content

2.4 Hold

This message is sent by the mobile user or the network to request the hold function for an existing call.
See Table 2.3/GSM 04.80.

For the use of this message, see recommendation GSM 04.10

Message type : HOLD
Significance : local
Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
Transaction identifier	3.3	both	MF	
Message type	3.4	both	MF	

Table 2.3/GSM 04.80
HOLD message content

2.5 Hold acknowledge

This message is sent by the mobile user or the network to indicate that the hold function has been successfully performed.
See Table 2.4/GSM 04.80

For the use of this message, see recommendation GSM 04.10

Message type : HOLD ACKNOWLEDGE
Significance : local
Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
Transaction identifier	3.3	both	MF	
Message type	3.4	both	MF	

Table 2.4/GSM 04.80
HOLD ACKNOWLEDGE message content

2.6 Hold reject

This message is sent by the mobile user or the network to indicate the denial of a request to hold a call.
See Table 2.5/GSM 04.80

For the use of this message, see recommendation GSM 04.10.

Message type : HOLD REJECT
Significance : local
Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
Transaction identifier	3.3	both	MF	
Message type	3.4	both	MF	
Cause	10.5.4.8 GSM 04.08	both	MV	4-32

Table 2.5/GSM 04.80
HOLD REJECT message content

2.7 Register

This message is sent by the mobile user or the network to assign a new transaction identifier for non call associated transactions. See Table 2.6/GSM 04.80.

For the use of this message, see recommendation GSM 04.10.

Message type : REGISTER
 Significance : local (note 1)
 Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
Transaction identifier	3.3	both	MF	
Message type	3.4	both	MF	
Facility (notes 2 & 3)	3.5	both	OV	2-max

Note 1 : This message has local significance; however, it may carry information of global significance.

Note 2 : Facility information element included if the network or mobile user provides supplementary service information.

Note 3 : The Facility information element has no upper length limit except that given by the limitation of the length indicator to one octet (i.e. 255 octets for the length of contents).

Table 2.6/GSM 04.80
 REGISTER message content

2.8 Retrieve

This message is sent by the mobile user or the network to request the retrieval of a held call. See Table 2.7/GSM 04.80

For the use of this message, see recommendation GSM 04.10.

Message type : RETRIEVE
 Significance : local
 Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
----- Transaction identifier	3.3	both	MF	
----- Message type	3.4	both	MF	

Table 2.7/GSM 04.80
 RETRIEVE message content

2.9 Retrieve acknowledge

This message is sent by the mobile user or the network to indicate that the retrieve function has been successfully performed. See Table 2.8/GSM 04.80.

For the use of this message, see recommendation GSM 04.10.

Message type : RETRIEVE ACKNOWLEDGE
 Significance : local
 Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
----- Transaction identifier	3.3	both	MF	
----- Message type	3.4	both	MF	

Table 2.8/GSM 04.80
 RETRIEVE ACKNOWLEDGE message content

2.10 Retrieve reject

This message is sent by the mobile user or the network to indicate the inability to perform the requested retrieve function. See Table 2.9/GSM 04.80.

For the use of this message, see recommendation GSM 04.10.

Message type : RETRIEVE REJECT
 Significance : local
 Direction : both

Information elements	Reference	Direction	Type	Length
Protocol discriminator	3.2	both	MF	2
Transaction identifier	3.3	both	MF	
Message type	3.4	both	MF	
Cause	10.5.4.8 GSM 04.08	both	MV	4-32

Table 2.9/GSM 04.80
 RETRIEVE REJECT message content

SECTION 3

GENERAL MESSAGE FORMAT AND INFORMATION ELEMENTS CODING

3.1 General

This section should be read in conjunction with section 10 of recommendation GSM 04.08 and contains the coding of the information elements specifically used by procedures described in this recommendation.

3.2 Protocol discriminator

For general rules, format and coding of the protocol discriminator section 10.2 of recommendation GSM 04.08 is applicable.

For messages used in connection with call related supplementary service procedures the protocol discriminator is coded as for call control.

For messages used in connection with call independent supplementary service procedures the protocol discriminator is coded as for SS messages in Table 10.1/GSM 04.08.

Note: The above rule means that the protocol discriminator excluding the transparency bit in the FACILITY and the RELEASE COMPLETE messages may be coded with "001" or "101" depending on the context (see Table 3.1/GSM 04.80).

Message type	Call related SS	Call independent SS
FACILITY	+	+
REGISTER	-	+
HOLD	+	-
HOLD ACKNOWLEDGE	+	-
HOLD REJECT	+	-
RETRIEVE	+	-
RETRIEVE ACKNOWLEDGE	+	-
RETRIEVE REJECT	+	-
ALERTING	+	-
CONNECT	+	-
DISCONNECT	+	-
RELEASE	+	-
RELEASE COMPLETE	+	+
SETUP	+	-

Table 3.1/GSM 04.80
Messages used in supplementary service procedures

3.3 Transaction identifier

For general rules, format and coding of transaction identifier values, section 10.3 of recommendation GSM 04.08 is applicable.

3.4 Message type

The following additional codings are defined for message type.

8	7	6	5	4	3	2	1	
0	X	0	1	.	.	.	.	GSM 04.08 call information phase message group
		1	0	0	0			- HOLD
		1	0	0	1			- HOLD ACKNOWLEDGE
		1	0	1	0			- HOLD REJECT
		1	1	0	0			- RETRIEVE
		1	1	0	1			- RETRIEVE ACKNOWLEDGE
		1	1	1	0			- RETRIEVE REJECT
0	X	1	1	.	.	.	.	GSM 04.08 miscellaneous message group
		1	0	1	0			- FACILITY
		1	0	1	1			- REGISTER

Note 1 : Bit 8 is reserved for possible future use as an extension bit.

Note 2 : Bit 7 is reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bit 7 is coded with a "0".

Table 3.2/GSM 04.80
Message types

3.5 Other information elements

These information elements are coded according to the general coding rules as defined in section 10 of recommendation GSM 04.08.

Table 3.3/GSM 04.80 contains the codepoints allocated to the information elements defined in this recommendation.

8 7 6 5 4 3 2 1	Reference	Maximum length
0 Type 3 and 4 information elements		(note 1)
0 0 1 1 1 0 0 Facility (note 2)	3.6	2-max
All other values are reserved (note 3)		

Note 1 : The length limits described for the variable length information elements below take into account only the present CCITT and GSM standardized coding values. Future enhancements and extensions to this recommendation will not be restricted to these limits.

Note 2 : The Facility information element has no upper length limit except that given by the limitation of the length indicator to one octet (i.e. 255 octets for the length of contents).

Note 3 : The reserved values with bits 5 to 8 coded "0 0 0 0" are for future information elements for which comprehension by the receiver is required.

Table 3.3/GSM 04.80
Information elements specific to supplementary service control

3.6 Facility information element

The purpose of the Facility information element is to indicate the invocation and operation of supplementary services, identified by the corresponding operation code within the Facility information element.

The Facility information element may be repeated in a given message.

The Facility information element is coded as shown in Figure 3.1/GSM 04.80 and Tables 3.4/GSM 04.80 to 3.20/GSM 04.80.

The Facility is a type 4 information element with no upper length limit except that given by the limitation of the length indicator to one octet (i.e. 255 octets for the length of contents).

8	7	6	5	4	3	2	1	
0	0	0	1	1	1	0	0	octet 1
Facility IEI								
Length of Facility contents								octet 2
Component(s) (Note)								octet 3 etc.

Note : One or more components may be included depending on specific service requirements.

Figure 3.1/GSM 04.80
Facility information element

3.6.1 Component (octet 3 etc)

This section provides the formats and encoding of components in the Facility information element. Formats and encoding methods make use of and is a subset of CCITT recommendation I (Transaction Capabilities formats and Encoding) and T/S 43/BB. The used part of I respectively T/S 43/BB is almost the same as the Component Portion of TCAP messages. The only difference is that returnResultNotLast is not used.

This section is further based on

- CCITT Rec. X.208 (Specification of Abstract Syntax Notation One);
- CCITT Rec. X.209 (Specification of basic encoding rules for Abstract Syntax Notation One);

and is consistent with these recommendations.

The X.208 and X.209 formal description language is not used.

The Parameters in Tables 3.4/GSM 04.80 to 3.6/GSM 04.80 may be one of the following

- A Sequence of Parameters;
- A Set of Parameters;
- A specific Parameter with its own tag (i.e. not part of a Sequence or Set);
- Nothing at all (i.e. absent).

Note : Concerning the general rules for encoding (structure of encoding, identifier octets, length octets, etc.) see X.208 and X.209. For these general rules the same exceptions apply as stated in GSM 09.02. This holds also for Table 3.4/GSM 04.80 - Table 3.7/GSM 04.80.

Invoke component	Reference	Mandatory indication
Component type tag Component length	3.6.2 X.209	M
Invoke ID tag Invoke ID length Invoke ID	3.6.3 X.209 3.6.3	M
Linked ID tag Linked ID length Linked ID	3.6.3 X.209 3.6.3	O
Operation Code tag Operation Code length Operation Code	3.6.4 X.209 3.6.4	M
Parameters	4	O

Table 3.4/GSM 04.80
Invoke component

Return Result component	Reference	Mandatory indication
Component type tag Component length	3.6.2 X.209	M
Invoke ID tag Invoke ID length Invoke ID	3.6.3 X.209 3.6.3	M
Sequence tag Sequence length	3.6.5 X.209	O (Note)
Operation Code tag Operation Code length Operation Code	3.6.4 X.209 3.6.4	O (Note)
Parameters	4	O (Note)

Note : Omitted if the Return Result component does not include any parameters.

Table 3.5/GSM 04.80
Return Result component

Return Error component	Reference	Mandatory indication
Component type tag Component length	3.6.2 X.209	M
Invoke ID tag Invoke ID length Invoke ID	3.6.3 X.209 3.6.3	M
Error Code tag Error Code length Error Code	3.6.6 X.209 3.6.6	M
Parameters	4	O

Table 3.6/GSM 04.80
Return Error component

Reject component	Reference	Mandatory indication
Component type tag Component length	3.6.2 X.209	M
Invoke ID tag (Note) Invoke ID length Invoke ID	3.6.3 X.209 3.6.3	M
Problem Code tag Problem Code length Problem Code	3.6.7 X.209 3.6.7	M

Note : If the Invoke ID is not available, Universal Null (Table 3.10/GSM 04.80) with length = 0 shall be used.

Table 3.7/GSM 04.80
Reject component

3.6.2 Component type tag

The Component type tag is coded context-specific, constructor as indicated in Table 17.8/GSM 04.10.

Component type tag	8	7	6	5	4	3	2	1
Invoke	1	0	1	0	0	0	0	1
Return Result	1	0	1	0	0	0	1	0
Return Error	1	0	1	0	0	0	1	1
Reject	1	0	1	0	0	1	0	0

Table 3.8/GSM 04.80
Coding of Component type tag

3.6.3 Component ID tag

The term Component ID refers to the Invoke ID or the Linked ID. The Component ID tag is coded as shown in Table 3.9/GSM 04.80

	8	7	6	5	4	3	2	1
Invoke ID	0	0	0	0	0	0	1	0
Linked ID (Note)	1	0	0	0	0	0	0	0

Note : This tag differs from the Invoke ID tag, which is coded as a Universal INTEGER, in order to distinguish it from the following tag (Operation Code) which is also coded as a Universal INTEGER

Table 3.9/GSM 04.80
Coding of Component ID tag

The length of a Component ID is 1 octet.

An Invoke Component has one or two Component IDs: an Invoke ID, and if it is desired to associate the Invoke with a previous Invoke, then the Linked ID is provided in addition to the Invoke ID.

Return Result and Return Error Components have one Component ID, called an Invoke ID which is the reflection of the Invoke ID of the Invoke Component to which they are responding.

The Reject Component uses as its Invoke ID, the Invoke ID in the Component being rejected. If this ID is unavailable (e.g. due to mutilation of the message undetected by lower layers), then the Invoke ID tag is replaced with a universal NULL tag as shown in Table 3.10/GSM 04.80. Universal NULL has always length = 0

Any kind of component, except a reject component, may be rejected.

	8 7 6 5 4 3 2 1
NULL tag	0 0 0 0 0 1 0 1

Table 3.10/GSM 04.80
Coding of NULL tag

If an Invoke containing both Invoke and Linked IDs is being rejected, only the Invoke ID is used in the Reject Component.

3.6.4 Operation Code

Each Operation is assigned an Operation Code to identify it. An Operation Code follows an Operation Code tag and Operation Code length. The Operation Code tag is coded as shown in Table 3.11/GSM 04.80.

	8 7 6 5 4 3 2 1
Operation Code tag	0 0 0 0 0 0 1 0

Table 3.11/GSM 04.80
Coding of Operation Code tag

The Operation Codes for the different Operations are defined in section 4.5 and reproduced in Table 3.12/GSM 04.80.

Operation Code	8	7	6	5	4	3	2	1
RegisterSS	0	0	0	0	1	0	1	0
EraseSS	0	0	0	0	1	0	1	1
ActivateSS	0	0	0	0	1	1	0	0
DeactivateSS	0	0	0	0	1	1	0	1
InterrogateSS	0	0	0	0	1	1	1	0
InvokeSS	0	0	0	0	1	1	1	1
NotifySS	0	0	0	1	0	0	0	0
RegisterPassword	0	0	0	1	0	0	0	1
GetPassword	0	0	0	1	0	0	1	0
ProcessUnstructuredSsData	0	0	0	1	0	0	1	1
ForwardCheckSsIndication	0	0	1	0	0	1	1	0

Table 3.12/GSM 04.80
Coding of Operation Codes

3.6.5 Sequence and Set tags

When there is more than one parameter in a Component (applicable to all Component types), they follow the Sequence or Set tag, which are coded universal, constructor as shown in Table 3.13/GSM 04.80.

	8	7	6	5	4	3	2	1
Sequence tag	0	0	1	1	0	0	0	0
Set tag	0	0	1	1	0	0	0	1

Table 3.13/GSM 04.80
Coding of Sequence and set tags

3.6.6 Error Code

Each Error is assigned a value (Error Code) to identify it. An Error Code follows an Error Code tag and Error Code length. The Error Code tag is coded as shown in Table 3.14/GSM 04.80.

	8	7	6	5	4	3	2	1
Error Code tag	0	0	0	0	0	0	1	0

Table 3.14/GSM 04.80
Coding of Error Code tag

The Error Codes for the different Errors are defined in section 4.5 and reproduced in Table 3.15/GSM 04.80.

Error Code	8	7	6	5	4	3	2	1
UnknownSubscriber	0	0	0	0	0	0	0	1
BearerServiceNotProvisioned	0	0	0	0	1	0	1	0
TeleserviceNotProvisioned	0	0	0	0	1	0	1	1
CUG_Reject	0	0	0	0	1	1	1	1
IllegalSS_Operation	0	0	0	1	0	0	0	0
SS_ErrorStatus	0	0	0	1	0	0	0	1
SS_NotAvailable	0	0	0	1	0	0	1	0
SS_SubscriptionViolation	0	0	0	1	0	0	1	1
SS_Incompatibility	0	0	0	1	0	1	0	0
SS_SpecificError	0	0	0	1	0	1	1	0
SystemFailure	0	0	1	0	0	0	1	0
DataMissing	0	0	1	0	0	0	1	1
UnexpectedDataValue	0	0	1	0	0	1	0	0
PasswordRegistrationFailure	0	0	1	0	0	1	0	1
NegativePasswordCheck	0	0	1	0	0	1	1	0

Table 3.15/GSM 04.80
Coding of Error Codes

3.6.7 Problem Code

The Problem Code consists of one of the four elements General Problem, Invoke Problem, Return Result Problem or Return Error Problem. The tags for these elements are coded as shown in Table 3.16/GSM 04.80.

Problem	8	7	6	5	4	3	2	1
General Problem tag	1	0	0	0	0	0	0	0
Invoke Problem tag	1	0	0	0	0	0	0	1
Return Result Problem tag	1	0	0	0	0	0	1	0
Return Error Problem tag	1	0	0	0	0	0	1	1

Table 3.16/GSM 04.80
Coding of Problem tags

The Problem Codes for the different Problems are shown in Tables 3.17/GSM 04.80 to 3.20/GSM 04.80.

	8	7	6	5	4	3	2	1
Unrecognized Component	0	0	0	0	0	0	0	0
Mistyped Component	0	0	0	0	0	0	0	1
Badly Structured Component	0	0	0	0	0	0	1	0

Table 3.17/GSM 04.80
Coding of General Problem Codes

	8	7	6	5	4	3	2	1
Duplicate Invoke ID	0	0	0	0	0	0	0	0
Unrecognized Operation	0	0	0	0	0	0	0	1
Mistyped Parameter	0	0	0	0	0	0	1	0
Resource Limitation	0	0	0	0	0	0	1	1
Initiating Release	0	0	0	0	0	1	0	0
Unrecognized Linked ID	0	0	0	0	0	1	0	1
Linked Response Unexpected	0	0	0	0	0	1	1	0
Unexpected Linked Operation	0	0	0	0	0	1	1	1

Table 3.18/GSM 04.80
Coding of Invoke Problem Codes

	8	7	6	5	4	3	2	1
Unrecognized Invoke ID	0	0	0	0	0	0	0	0
Return Result Unexpected	0	0	0	0	0	0	0	1
Mistyped Parameter	0	0	0	0	0	0	1	0

Table 3.19/GSM 04.80
Coding of Return Result Problem Codes

	8	7	6	5	4	3	2	1
Unrecognized Invoke ID	0	0	0	0	0	0	0	0
Return Error Unexpected	0	0	0	0	0	0	0	1
Unrecognized Error	0	0	0	0	0	0	1	0
Unexpected Error	0	0	0	0	0	0	1	1
Mistyped Parameter	0	0	0	0	0	1	0	0

Table 3.20/GSM 04.80
Coding of Return Error Problem Codes

SECTION 4**SUPPLEMENTARY SERVICES OPERATION SPECIFICATIONS****4.1 General**

This section specifies the abstract syntax for the Supplementary Service protocol using the Abstract Syntax Notation One (ASN.1), defined in recommendation CCITT X.208.

The mapping of OPERATION and ERROR to components is defined in section 3 of this recommendation.

The encoding rules which are applicable to the defined abstract syntax are the Basic Encoding Rules for Abstract Syntax Notation One, defined in recommendation CCITT X.209 with the same exceptions as stated in recommendation GSM 09.02. For each Supplementary Service parameter which has to be transferred by a Supplementary Service 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, the first letter of the first word is lower-case and the first letter of the following words are capitalized (e.g "bearer service" is mapped to "bearerService"). In addition some words may be abbreviated as follows:

ms = mobile subscriber;
ss = supplementary services;
cug = closed user group.

The ASN.1 data type which follows the keywords "PARAMETER" or "RESULT" (for OPERATION and ERROR) is always optional from a syntactic point of view. However, except specific mention, it has to be considered as mandatory from a semantic point of view. When in an invoke component, a mandatory element is missing in any component or inner data structure, a reject component is returned with the problem code "Mistyped Parameter". When an optional element is missing in an invoke component or in an inner data structure while it is required by the context, an error component is returned; the associated type of error is "DataMissing".

When possible operations and errors are imported from recommendation GSM 09.02 (MAP) thereby making the MSC transparent to most of the messages sent to or from the MS. Only the operation NotifySS corresponding to the MAP operation ForwardSsNotification is independently defined in this recommendation as it carries information which is non-transparent in the MSC.

4.2 Operation types

4.2.1 Operation types ASN.1 specification

The following ASN.1 module provides an ASN.1 specification of the operation types defined in this recommendation. Operations from MAP are imported in the SS-Protocol module in section 4.5.

```

SS-Operations DEFINITIONS ::=
BEGIN
EXPORTS
-- exports operation types
-- operations defined in this recommendation
NotifySS;
IMPORTS
OPERATION FROM
TCAPMessages {ccitt recommendation q 773 moduleA(0)}
-- the MAP operations
-- RegisterSS, EraseSS, ActivateSS, DeactivateSS, InterrogateSS
-- InvokeSS, RegisterPassword, GetPassword
-- ProcessUnstructuredSsData, ForwardCheckSsIndication
-- are imported from MAP-Operations in SS-Protocol module
-- imports MAP-data types
IMSI, SS-Code, TeleserviceCode, BearerServiceCode, SS-Status,
IsdnAddressString, SS-UserData
FROM MAP-DataTypes
-- imports SS-data types
SS-Notification, PresentationScreeningIndicator,
ChargingInformation
FROM SS-DataTypes;
-- SS-Operations module is continued on next page

```

```
-- SS-Operations module continued
```

```
-- operation types definition
```

```
NotifySS ::=
  PARAMETER
  imsi [0] IMPLICIT IMSI OPTIONAL,
  ss-Code [1] IMPLICIT SS-Code OPTIONAL,
  teleservice [2] IMPLICIT TeleserviceCode OPTIONAL,
  bearerService [3] IMPLICIT BearerServiceCode
  OPTIONAL,
  ss-Status [4] IMPLICIT SS-Status OPTIONAL,
  ss-Notification [5] IMPLICIT SS-Notification OPTIONAL,
  forwardedToNumber [6] IMPLICIT IsdnAddressString
  OPTIONAL,
  lastForwardingNumber [7] IMPLICIT IsdnAddressString
  OPTIONAL,
  originalServedNumber [8] IMPLICIT IsdnAddressString
  OPTIONAL,
  callingNumber [9] IMPLICIT IsdnAddressString
  OPTIONAL,
  connectedNumber [10] IMPLICIT IsdnAddressString
  OPTIONAL,
  presentationScreeningIndicator
  [11] IMPLICIT
  PresentationScreeningIndicator
  OPTIONAL,
  ss-UserData [12] IMPLICIT SS-UserData OPTIONAL,
  chargingInformation [13] IMPLICIT ChargingInformation
  OPTIONAL}
```

```
END
```

4.2.2 Operation types description

For each operation type this section provides a brief prose description.

4.2.2.1 RegisterSS (MS --> Network)

This operation type is invoked by an MS to register data related to a supplementary service in the Network. When no BasicService parameter is provided, the registration applies to all provisioned basic services.

4.2.2.2 EraseSS (MS --> Network)

This operation type is invoked by an MS to erase data related to a supplementary service in the Network. When no BasicService parameter is provided, the erasure applies to all provisioned basic services.

4.2.2.3 ActivateSS (MS --> Network)

This operation type is invoked by an MS to request the Network for a supplementary service activation. When no BasicService parameter is provided, the activation applies to all provisioned basic services. If this activation causes the deactivation of other supplementary services, an indication is provided to the MS by sending an invoke component for the Notify SS to MS operation.

4.2.2.4 DeactivateSS (MS --> Network)

This operation type is invoked by an MS to request the Network for a supplementary service deactivation. When no BasicService parameter is provided, the deactivation applies to all provisioned basic services.

4.2.2.5 InterrogateSS (MS --> Network)

This operation type is invoked by an MS to request the Network for a supplementary service interrogation. When no BasicService parameter is provided, the interrogation applies to all provisioned basic services.

4.2.2.6 InvokeSS (MS --> Network)

This operation type is invoked by an MS to request the Network for supplementary service invocation.

4.2.2.7 NotifySS (Network --> MS)

This operation type is invoked by the Network to forward a supplementary service notification towards a mobile subscriber.

4.2.2.8 RegisterPassword (MS --> Network)

This operation type is invoked by an MS to register a new password related to the management by the subscriber himself of subscription data in the HLR. The operation "Register password" will be successful if the subscriber can provide the old password, the new password and the new password again as results of 3 subsequent operations "Get password".

4.2.2.9 GetPassword (Network --> MS)

This operation type is invoked by the network to request a password from the mobile subscriber. It may be used to allow the registration of a new password or the management of subscription data by the subscriber himself (e.g. modification of call barring activation status).

4.2.2.10 ProcessUnstructuredSsData (MS --> Network)

This operation type is invoked by an MS to relay unstructured information in order to allow end to end SS operation between the MS and the HLR following specific rules (e.g. embedding of keypad commands).

4.2.2.11 ForwardCheckSsIndication (Network --> MS)

This operation type is invoked by the Network to indicate to the mobile subscriber that the activation status of supplementary services may not be correct in the Network. This applies only if a request for location updating or an operation on a supplementary service have been provided to the Network.

4.3 Error types

4.3.1 Error types ASN.1 specification

The following ASN.1 module provides an ASN.1 specification to be used when errors are defined in the future. For the time being no errors are defined in this recommendation. Errors from MAP are imported in the SS-Protocol module in section 4.5.

```

SS-Errors DEFINITIONS ::=
BEGIN

IMPORTS

ERROR FROM
TCAPMessages {ccitt recommendation q 773 moduleA(0)};

-- the MAP errors
-- UnknownSubscriber, BearerServiceNotProvisioned
-- TeleServiceNotProvisioned, CUG-Reject, IllegalSS-Operation
-- SS-ErrorStatus, SS-NotAvailable, SS-SubscriptionViolation
-- SS-Incompatibility, SS-SpecificError, SystemFailure
-- DataMissing, UnexpectedDataValue
-- PasswordRegistrationFailure, NegativePasswordCheck
-- are imported from MAP-Errors in SS-Protocol module

-- no new errors are defined in SS-Errors module

END

```

4.3.2 Error types description

For each error type this section provides a brief prose description.

4.3.2.1 UnknownSubscriber

This error is returned by the Network when it is requested to perform an operation concerning an unknown subscriber.

4.3.2.2 BearerServiceNotProvisioned

This error is returned by the Network when a registration of a supplementary service is requested for a non provisioned bearer service.

4.3.2.3 TeleServiceNotProvisioned

This error is returned by the Network when a registration of a supplementary service is requested for a non provisioned teleservice.

4.3.2.4 CUG-Reject

This error is returned by the network to indicate that the invocation does not pass the CUG check or that the CUG barring conditions are transgressed. A cause parameter can be included and indicates the following situations:

- incoming call barred;
- non CUG member.

4.3.2.5 IllegalSS-Operation

This error is returned by the Network when it is requested to perform an illegal operation on a supplementary service (eg registration request for a service which must be registered by the administration).

4.3.2.6 SS-ErrorStatus

This error is returned by the Network when it is requested to perform an operation which is not compatible with the current status of the relevant supplementary service. The current status is given as parameter.

4.3.2.7 SS-NotAvailable

This error is returned by the Network when it is requested to activate a supplementary service which is not available in the visited area.

4.3.2.8 SS-SubscriptionViolation

This error is returned by the Network when it is requested to activate a supplementary service, transgressing the subscription restrictions. The nature of the restriction or the transgressed options may be sent as parameters.

4.3.2.9 SS-Incompatibility

This error is returned by the Network when it is requested for a supplementary service operation incompatible with the status of an other supplementary service or with the teleservice or bearer service for which the operation is requested. The code and the status of the relevant service are possibly sent as parameters.

4.3.2.10 SS-SpecificError

This error is returned by the Network to report a specific unsuccessful indication related to a supplementary service operation.

4.3.2.11 SystemFailure

This error is returned by the Network, when it cannot perform an operation because of a failure in the Network.

4.3.2.12 DataMissing

This error is returned by the Network when an optional parameter is missing in an invoke component or an inner datastructure, while it is required by the context of the request.

4.3.2.13 UnexpectedDataValue

This error is returned by the Network when it receives a parameter with an unexpected value, without type violation.

4.3.2.14 PasswordRegistrationFailure

This error is returned when a password registration procedure fails because of abnormal subscriber inputs. A more specific diagnostic may be passed as error parameter and indicates situations such as:

- invalid password format;
- new passwords mismatch.

4.3.2.15 NegativePasswordCheck

This error is returned to indicate the negative result of a password check because the subscriber has not provided the required password or has provided a password which does not match the valid one.

4.4 Data types and identifiers

4.4.1 General

The data types used in the SS protocol specifications are described in the ASN.1 module provided in section 4.4.2, while section 4.4.3 provides an overview of the identifiers used in SS ASN.1 specifications.

Since size constraints are subject to modifications named values have been defined in the following module for the upper boundaries of the value ranges associated to several sub-type specifications. These named values are exported from this module and imported in the modules defining the data types.

```
SS-Constants DEFINITIONS ::=
BEGIN

EXPORTS

max10TimesUnitsPerTime,
max10TimesTimeInterval,
max100TimesScalingFactor,
max10TimesIncrement,
max10TimesIncrementPerDataInterval,
maxNumberOfSegmentsPerDataInterval,
max10TimesInitialTime;

-- value assignment

max10TimesUnitsPerTime INTEGER ::= 1023
max10TimesTimeInterval INTEGER ::= 1023
max100TimesScalingFactor INTEGER ::= 1023
max10TimesIncrement INTEGER ::= 1023
max10TimesIncrementPerDataInterval INTEGER ::= 1023
maxNumberOfSegmentsPerDataInterval INTEGER ::= 1023
max10TimesInitialTime INTEGER ::= 1023

END
```

4.4.2 ASN.1 data types

This section provides an ASN.1 module defining the abstract data types in operations and errors specification. Only data types which are specific for this recommendation are defined. All other data types are imported from MAP together with the import of operations and errors.

```

SS-DataTypes DEFINITIONS ::=
BEGIN
-- exports all data types defined in this module

IMPORTS

-- imports upper boundaries for data types

max10TimesUnitsPerTime,
max10TimesTimeInterval,
max100TimesScalingFactor,
max10TimesIncrement,
max10TimesIncrementPerDataInterval,
maxNumberOfSegmentsPerDataInterval,
max10TimesInitialTime
FROM SS-Constants;

-- data types definition

SS-Notification ::= OCTET STRING (SIZE (1))

-- Bit 8 7 6 5 4   00000 (Unused)

-- Bit 3           Call is forwarded indication to A-subscriber
--                 (calling subscriber)
--   0             No information content
--   1             Outgoing call has been forwarded to C

-- Bit 2           Call is forwarded indication to B-subscriber
--                 (forwarding subscriber)
--   0             No information content
--   1             Incoming call has been forwarded to C

-- Bit 1           Call is forwarded indication to C-subscriber
--                 (forwarded-to subscriber)
--   0             No information content
--   1             Incoming call is a forwarded call

-- SS-DataTypes module is continued on next page

```

```

-- SS-DataTypes module continued

PresentationScreeningIndicator ::= OCTET STRING (SIZE (1))
-- Bit 8          0 (Unused)
-- Bit 7 6
--   0 0          Presentation allowed
--   0 1          Presentation restricted
--   1 0          Number not available due to interworking
--   1 1          Reserved
-- Bit 5 4 3      000 (Unused)
-- Bit 2 1
--   0 0          User provided, not screened
--   0 1          User provided, verified and passed
--   1 0          User provided, verified and failed
--   1 1          Network provided

ChargingInformation ::= SEQUENCE{
    e1          [1] IMPLICIT E1 OPTIONAL,
    e2          [2] IMPLICIT E2 OPTIONAL,
    e3          [3] IMPLICIT E3 OPTIONAL,
    e4          [4] IMPLICIT E4 OPTIONAL,
    e5          [5] IMPLICIT E5 OPTIONAL,
    e6          [6] IMPLICIT E6 OPTIONAL,
    e7          [7] IMPLICIT E7 OPTIONAL}

E1 ::= INTEGER (0..max10TimesUnitsPerTime)
E2 ::= INTEGER (0..max10TimesTimeInterval)
E3 ::= INTEGER (0..max100TimesScalingFactor)
E4 ::= INTEGER (0..max10TimesIncrement)
E5 ::= INTEGER (0..max10TimesIncrementPerDataInterval)
E6 ::= INTEGER (0..maxNumberOfSegmentsPerDataInterval)
E7 ::= INTEGER (0..max10TimesInitialTime)

END

```

4.4.3 Identifiers definition

The parameters which are described in the following subsections correspond to the identifiers used in operation and error types description.

4.4.3.1 bearerService

This identifier refers to a bearer service or a group of bearer services.

4.4.3.2 callingNumber

The callingNumber identifier refers to a calling party address.

4.4.3.3 chargingInformation

The chargingInformation identifier refers to the necessary information for the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.4 connectedNumber

The connectedNumber identifier refers to a connected party address.

4.4.3.5 e1

The e1 identifier refers to 10 times the number of LPLMN units per time interval in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.6 e2

The e2 identifier refers to 10 times the length of the time interval in seconds in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.7 e3

The e3 identifier refers to 100 times the scaling factor to convert from LPLMN units to HPLMN units in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.8 e4

The e4 identifier refers to 10 times the LPLMN increment in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.9 e5

The e5 identifier refers to 10 times the number of LPLMN units incremented per data interval in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.10 e6

The e6 identifier refers to the number of segments per data interval in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.11 e7

The e7 identifier refers to 10 times the length of the initial time interval in seconds in connection with the Advice of Charge supplementary service. See recommendation GSM 02.24.

4.4.3.12 forwardedToNumber

The forwardedToNumber identifier refers to a number where the calls are forwarded to.

4.4.3.13 imsi

The imsi identifier refers to the International Mobile Subscriber Identity. The structure of this identity is defined in GSM recommendation 03.03.

4.4.3.14 lastForwardingNumber

The lastForwardingNumber identifier refers to the number of the last call forwarding subscriber (C-, D-, ... subscriber) indicated to the forwarded-to mobile subscriber (D-, E-, ... subscriber).

4.4.3.15 originalServedNumber

The originalServedNumber identifier refers to the number of the subscriber (B-subscriber) who originally forwarded the call indicated to the forwarded-to mobile subscriber (C-, D-, ... subscriber).

4.4.3.16 presentationScreeningIndicator

The presentationScreeningIndicator identifier refers to the indication given to the mobile subscriber of certain conditions in connection with presentation of CallingNumber and ConnectedNumber.

4.4.3.17 ss-Code

The ss-Code identifier refers to the code which identify a supplementary service or a group of supplementary services.

4.4.3.18 ss-Notification

The ss-Notification identifier refers to one or several supplementary service notifications which have to be forwarded to a mobile subscriber.

4.4.3.19 ss-Status

The ss-Status identifier refers to the status of a supplementary service.

4.4.3.20 ss-UserData

The ss-UserData identifier refers to a set of information which allows end to end operation of supplementary service according to specific operator rules.

4.4.3.21 teleservice

The teleservice identifier refers to a teleservice or a group of teleservices.

4.5 Operations and errors implementation

For the actual implementation of supplementary services, operations and errors have to be defined by value. The following ASN.1 module, imports operation types from the ASN.1 module described in section 4.2 and operation and error types from MAP. It defines operations by allocating operations and errors a local value. For the involved operations and errors the same local values as in MAP are allocated.

```

SS-Protocol DEFINITIONS ::=
BEGIN

IMPORTS

-- imports operation types

-- imports operation types from MAP-Operations
RegisterSS, EraseSS, ActivateSS, DeactivateSS, InterrogateSS,
InvokeSS, RegisterPassword, GetPassword,
ProcessUnstructuredSsData, ForwardCheckSsIndication
FROM MAP-Operations

-- imports operation types from SS-Operations
NotifySS
FROM SS-Operations

-- imports error types

-- imports error types from MAP-Errors
UnknownSubscriber, BearerServiceNotProvisioned,
TeleServiceNotProvisioned, CUG-Reject, IllegalSS-Operation,
SS-ErrorStatus, SS-NotAvailable, SS-SubscriptionViolation,
SS-Incompatibility, SS-SpecificError, SystemFailure,
DataMissing, UnexpectedDataValue, PasswordRegistrationFailure,
NegativePasswordCheck
FROM MAP-Errors;

-- allocation of local values to operations

registerSS          RegisterSS ::= 10
eraseSS            EraseSS ::= 11
activateSS        ActivateSS ::= 12
deactivateSS      DeactivateSS ::= 13
interrogateSS     InterrogateSS ::= 14
invokeSS          InvokeSS ::= 15
registerPassword  RegisterPassword ::= 17
getPassword       GetPassword ::= 18
processUnstructuredSsData ProcessUnstructuredSsData ::= 19
forwardCheckSsIndication ForwardCheckSsIndication ::= 38
notifySS          NotifySS ::= 16

-- SS-Protocol module is continued on next page

```



```
-- SS-Protocol module continued
```

```
-- allocation of local values to errors
```

```
unknownSubscriber           UnknownSubscriber ::= 1
bearerServiceNotProvisioned BearerServiceNotProvisioned ::= 10
teleServiceNotProvisioned  TeleServiceNotProvisioned ::= 11
cug-Reject                  CUG-Reject ::= 15
illegalSS-Operation         IllegalSS-Operation ::= 16
ss-ErrorStatus              SS-ErrorStatus ::= 17
ss-NotAvailable             SS-NotAvailable ::= 18
ss-SubscriptionViolation    SS-SubscriptionViolation ::= 19
ss-Incompatibility          SS-Incompatibility ::= 20
ss-SpecificError            SS-SpecificError ::= 22
systemFailure               SystemFailure ::= 34
dataMissing                 DataMissing ::= 35
unexpectedDataValue         UnexpectedDataValue ::= 36
passwordRegistrationFailure PasswordRegistrationFailure ::= 37
negativePasswordCheck       NegativePasswordCheck ::= 38
```

```
END
```

ANNEX A

(to recommendation GSM 04.80)

CAUSE DEFINITIONS FOR SUPPLEMENTARY SERVICES

A.1 Normal event class

A.1.1 **Cause No. 29 "Facility rejected"**

This cause is returned when a facility requested by the user can not be provided by the network.

A.2 Service or option not available class

A.1.1 **Cause No. 50 "Requested facility not subscribed"**

This cause indicates that the requested supplementary service could not be provided by the network because the user has not completed the necessary administrative arrangements with its supporting networks.

A.3 Service or option not implemented class

A.3.1 **Cause No. 69 "Requested facility not implemented"**

This cause indicates that the equipment sending this cause does not support the requested supplementary service.