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**Signalling interworking for
Supplementary services**

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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-ETTs) or European Telecommunications Standards (ETTs), 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".

**Signalling interworking for
Supplementary Services**

Date : 8 October 1990

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Note: This recommendation is only stable with respect to E1 supplementary services.

Number of pages: 9

SECTION 1

SCOPE

The scope of this recommendation is to provide a detailed specification for interworking between operations on the radio path and operations in MAP for handling of supplementary services.

Reference is made to the following recommendations:

- GSM 02.04 and GSM 02.81 through 02.88 for definition of supplementary services,
- GSM 03.11 and GSM 03.81 through 03.88 for technical realisation of supplementary services,
- GSM 04.10 and GSM 04.80 through 04.88 for radio path signalling procedures for supplementary services,
- GSM 09.02 (MAP).

Useful material is also found in the following CCITT recommendations:

- X.208 and X.209 ASN.1,
- X.219 Remote operation: Service definition,
- X.229 Remote operation: Protocol specification,
- Q.771 through Q.775 TCAP.

SECTION 2

CATEGORIES OF SUPPLEMENTARY SERVICES

Management of supplementary services is classified in two categories:

- Call related supplementary services management.
This type of management may use either of the message types shown in Table 1/GSM 09.11.
- Call independent supplementary services management.
This type of management may use either of the message types shown in Table 2/GSM 09.11.

Table 3/GSM 09.11 summarises the operations defined for supplementary services in Recommendations GSM 04.80 and 09.02 and shows the applicability of these operations to the categories above.

Table 4/GSM 09.11 shows whether or not a mobile user is allowed to operate on a supplementary service in a specific way, and whether this operation is call related or call independent.

Message type	Reference to GSM recommendation
FACILITY	04.80
HOLD	04.80
HOLD ACKNOWLEDGE	04.80
HOLD REJECT	04.80
RETRIEVE	04.80
RETRIEVE ACKNOWLEDGE	04.80
RETRIEVE REJECT	04.80
ALERTING	04.08
CONNECT	04.08
DISCONNECT	04.08
RELEASE	04.08
RELEASE COMPLETE	04.08
SETUP	04.08

Table 1/GSM 09.11
Messages for call related supplementary services management

Message type	Reference to GSM recommendation
FACILITY	04.80
REGISTER	04.80
RELEASE COMPLETE	04.08

Table 2/GSM 09.11
Messages for call independent supplementary services management

Operation name	SS management	
	call related	call independent
Register SS	Not appl.	Applicable
Erase SS	Not appl.	Applicable
Activate SS	Applicable	Applicable
Deactivate SS	Applicable	Applicable
Interrogate SS	Not appl.	Applicable
Invoke SS	Applicable	Not appl.
Get Password	Not appl.	Applicable
Register Password	Not appl.	Applicable
Process Unstructured SS data	Applicable	Applicable
Forward SS Notification	Not appl.	Applicable
Forward Check SS Indication	Not appl.	Applicable

Note: Operation names are the same in 09.02 and 04.80, except for Forward SS Notification (09.02) which corresponds to Notify SS in 04.80.

Table 3/GSM 09.11
Applicability of supplementary services operations

Service or group of services in GSM PLMN	Register	Erase	Activate	Deactivate	Invoke	Interrogate	Register password
Calling line identification presentation	NA	NA	A	A	A	NA	NA
Calling number identification restriction	NA	NA	Per call /A	A	A	Status	NA
Connected number identification presentation	NA	NA	A	A	A	NA	NA
Connected number identification restriction	NA	NA	A	A	A	Status	NA
Malicious call identification	NA	NA	A	A	Per call	Status	NA
Call forwarding services	HLR	HLR	A	A	A	Data req.	NA
Call transfer	NA	NA	A	A	Per call	NA	NA
Mobile access hunting	NA	NA	A	A	A	NA	NA
Call waiting	NA	NA	HLR	HLR	A	Status	NA
Call hold	NA	NA	A	A	Per call	NA	NA
Completion of call to busy subscriber	NA	NA	Per call	Per call	A	Status/ data req.	NA
Three party service	NA	NA	A	A	Per call	NA	NA
Conference call	NA	NA	A	A	Per call	NA	NA
Closed user group	NA	NA	A	A	Per call	NA	NA
Advice of charge	NA	NA	A	A	A	NA	NA
Freephone	HLR	HLR	Per call	Per call	A	Data request	NA
Reverse charging	NA	NA	A	A	Per call	Status	NA
User to user signalling	NA	NA	Per call	A	Per call	NA	NA
Barring of outgoing calls	NA	NA	HLR	HLR	A	Data req./ Status	HLR
Barring of incoming calls	NA	NA	HLR	HLR	A	Data req./ Status	HLR

Table 4/GSM 09.11
Applicability of operations to supplementary services

Terminology for Table 4/GSM 09.11 :

NA = Not Applicable,
A = Administrative or Automatic,
Per call = per call procedures apply, i.e. call related,
HLR = mobile user is allowed to operate on the HLR , i.e. call independent,

SECTION 3

INTERWORKING ARRANGEMENTS

3.1 Call related supplementary services management

Call related supplementary service management is part of call control. Therefore, if management functions are required not only in the MSC but also in the VLR, the interworking is specified in Recommendation GSM 09.02 in relation with the operations for incoming and outgoing call set-up. These interworking arrangements are not considered further here.

3.2 Call independent supplementary services management

For call independent supplementary services management the MSC shall:

- check the components and layer 3 messages received on the radio path for formal errors,
- check the transaction header and the components received in TCAP for formal errors,
- perform mapping of operation codes, parameter tags, parameter values, invoke id and error codes as required (see below),
- interwork between transaction sublayer messages in TCAP and layer 3 messages on the radio path (see below).

On the TCAP connection between the MSC and the VLR supplementary services operations are always sent in dialogues which have been opened by another operation (normally the process access request operation). If a supplementary service message is received on the radio path and there is no suitable dialogue with the VLR, the message shall be rejected. Similarly, a supplementary services operation in TCAP is rejected if there is no radio connection with the MS.

SECTION 4

MAPPING BETWEEN TRANSACTION SUBLAYER MESSAGES AND LAYER 3 MESSAGES

The mapping of transaction sublayer messages to layer 3 messages is shown in Table 5/GSM 09.11; Table 6/GSM 09.11 shows the reverse mapping. Note that the mapping is not symmetric.

Transaction sublayer message	Layer 3 message
BEGIN 1) CONTINUE END ABORT	-- FACILITY/REGISTER 2) RELEASE COMPLETE RELEASE COMPLETE

Note 1 : Use of a BEGIN message corresponds to a procedure error, see section 3.2

Note 2 : CONTINUE is mapped to FACILITY if the "dialogue" on the radio path has been opened by a REGISTER message. Otherwise it is mapped to REGISTER

Table 5/GSM 09.11

Mapping of transaction sublayer messages to layer 3 messages

Layer 3 message	Transaction sublayer message
REGISTER FACILITY RELEASE COMPLETE	CONTINUE 1) CONTINUE END

Note 1 : Mapping is only possible if a TCAP dialogue exists, see section 3.2.

Table 6/GSM 09.11

Mapping of layer 3 messages to transaction sublayer messages

The mapping from Transaction Sublayer messages to Layer 3 messages must include a replacement of the tag and length of the Component Portion in the Transaction Sublayer message with the Information element identifier and length of the Facility Information Element for the Layer 3 message. Similarly for the reverse mapping.

All transaction sublayer messages, except the ABORT message, will normally contain one or more components. If components are included, the conversion algorithm of section 5 applies. If a message does not contain a component, then the corresponding message is also sent without a component: messages shall not be withheld by the interworking function.

If an ABORT message is received in TCAP, a RELEASE COMPLETE message is to be sent on the radio path. The RELEASE COMPLETE message shall not contain any component. If a cause is to be provided to the MS, one of the cause codes of recommendation GSM 04.08 shall be used.

If a layer 3 message or a component in the layer 3 message is rejected by the MSC, the MSC shall:

- return a RELEASE COMPLETE message to the MS. If the reject condition is not associated with a component, one of the cause codes of Recommendation GSM 04.08 shall be inserted. If it is a component (except a REJECT component), a REJECT component with the appropriate problem code shall be inserted in the RELEASE COMPLETE message. If the reject condition concerns a REJECT component the RELEASE COMPLETE message may be empty,
- terminate the transaction with the VLR by use of an ABORT message.

SECTION 5

MAPPING OF OPERATION CODES, ERROR CODES, PARAMETER TAGS AND PARAMETER CONTENT

5.1 Operation codes

The same operation codes are used for equivalent operations in Recommendations GSM 04.80 and GSM 09.02.

5.2 Error codes

The same error codes are used for equivalent error types in Recommendations GSM 04.80 and GSM 09.02, except for forward SS Notification in Recommendation GSM 09.02 which corresponds to NotifySS in Recommendation GSM 04.80.

The RETURN ERROR components are also constructed in the same way on both sides of the interface.

5.3 Parameter tags and parameter values

The same parameter tags and parameter values are used for equivalent parameters in Recommendations GSM 04.80 and GSM 09.02.

