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Technical Specification

Digital cellular telecommunications system (Phase 2+); Unstructured Supplementary Service Data (USSD) - Stage 1 (GSM 02.90 version 8.0.0 Release 1999)

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Foreword

This ETSI Technical Specification (TS) has been produced by the Special Mobile Group (SMG) of the European Telecommunications Standards Institute (ETSI).

This TS defines the stage 1 description of Unstructured Supplementary Service Data (USSD) for use within the digital cellular telecommunications system.

The contents of this TS are subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of this TS it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 8.x.y

where:

8 indicates GSM Release 1999 of Phase 2+

x the second digit is incremented for changes of substance, i.e. technical enhancements, corrections, updates, etc.;

y the third digit is incremented when editorial only changes have been incorporated in the specification.

1 Scope

This Technical Specification (GTS) defines the stage 1 description of Unstructured Supplementary Service Data (USSD) for use in one or a number of GSM Public Land Mobile Networks (PLMNs).

2 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] GSM 02.04: "Digital cellular telecommunications system (Phase 2+); General on supplementary services".

[3] GSM 02.30: "Digital cellular telecommunications system (Phase 2+); Man-Machine Interface (MMI) of the Mobile Station (MS)".

[4] GSM 03.38: "Digital cellular telecommunications system (Phase 2+); Alphabets and language-specific information".

[5] GSM 04.80: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 supplementary services specification Formats and coding".

3 Abbreviations

Abbreviations used in this TS are listed in GSM 01.04 [1].

4 Description

There are two modes of USSD: MMI-mode and application mode. MMI-mode USSD is for the transparent transport of MMI strings entered by the user to the network and for the transparent transport of text strings from the network that are displayed by the mobile for user information.

Application mode USSD is for the transparent transport of data between the network and the mobile station. Application mode USSD is intended to be used by applications in the network and their peer applications in the MS.

The communication over the radio interface takes place on the signalling channels using short dialogues with peak data throughput rate capabilities of up to approximately 600 bits/s outside of a call and 1000 bits/s during a call.

5 Unstructured SS data operations – MMI mode

5.1 Mobile initiated unstructured SS data operations

5.1.1 Initiating action at the Mobile Station (MS)

If the user enters an MMI string that, according to GSM 02.30 [3], should be treated as USSD, the MS shall send this string to the network using the appropriate operation from GSM 04.80 [5].

The mobile initiated operation shall contain an alphabet indicator and language indicator. The alphabet indicator shall indicate the alphabet used in the operation and shall be set to "SMS default alphabet". The language indicator shall indicate "language unspecified".

The MS may initiate an USSD Operation either during a call or out of call.

5.1.2 Action at the network

A network supporting USSD shall examine the alphabet indicator. If the serving network does not recognize the alphabet indicated in the mobile initiated USSD operation, it shall send the operation to the HLR.

On recognition of the alphabet, the network shall examine the contents of the string, and take appropriate action, according to the following rules, depending of the format of the message.

Case a) 1, 2 or 3 digits from the set (*, #) followed by 1X(Y), where X=any number 0-4, Y=any number 0-9, then, optionally "* followed by any number of any characters", and concluding with # SEND:

This case is reserved for HPLMN use. When a serving network receives such a message from a visiting subscriber, it shall pass the USSD message directly to the HPLMN. If it receives it from a home subscriber, it is up to the network to decide whether to treat it locally or to pass it to the HLR.

Case b) 1, 2 or 3 digits from the set (*, #) followed by 1X(Y), where X=any number 5-9, Y=any number 0-9, then, optionally "* followed by any number of any characters", and concluding with # SEND:

This case is reserved for VPLMN use. It is up to the VPLMN to decide how to treat it.

Case c) 7(Y) SEND, where Y=any number 0-9:

This case is reserved for HPLMN use. When a serving network receives such a message from a visiting subscriber, it shall pass the USSD message directly to the HPLMN. If it receives it from a home subscriber, it is up to the network to decide whether to treat it locally or to pass it to the HLR.

Case d) All other formats:

The visited network examines the message. If it is able, it acts upon it. Failing that, it passes the message to the HLR.

If the HLR does not support the alphabet indicated, it shall inform the MS.

The network shall terminate the mobile initiated operation by responding to the request from the mobile with either an error signal, or a text string indicating the outcome of the operation. The response string uses the characters available in the "Default Alphabet" as defined in GSM 03.38 [4]. If no indication to the user is required, the response string may be empty.

The response to the mobile initiated USSD operation shall contain alphabet and language indicators. The selection of values for these indicators is a matter for the network operator.

5.1.3 Mobile initiated USSD cross phase compatibility

In situations of incompatibility the mobile initiated USSD operation will be rejected by a non-supporting network and the attempt will fail. In this situation, if it is possible to encode the content of the USSD message in the IA5 alphabet, the MS shall attempt the operation again using the IA5 format without the alphabet and language indicators.

This procedure is not applicable if an operation failure is due to alphabet support problems, services not supported or network failure problems.

5.1.4 Allocation of service codes (to be noted by network operators)

Service codes for use in control of Supplementary Services are standardized by international agreement, so must not be used by GSM PLMNs unless authorized, except for those codes allocated for PLMN use.

If the message is of the format:

1, 2 or 3 digits from the set (*, #), followed by

NN(N), where N=0-9,

optionally followed by "* and any number of any characters",

and terminating in # SEND:

then NN(N) is known as the service code. Only codes specified in GSM 02.30 [3] and those defined in cases a) and b) above may be used in GSM. All other values are reserved.

Similarly, if the message is of the format:

X(Y) SEND, where X=0-6 or 8-9 and Y=0-9:

the codes X(Y) are standardized. Only codes specified in GSM 02.30 [3] subclause 4.5.5 may be used in GSM. All other values are reserved.

5.2 Network initiated unstructured SS data operation

5.2.1 Initiating actions in the network

At any stage while the MS is registered with a network, the network may send an unstructured string to the MS. This string contains operator determined information that is relevant to the user. If the network is unable to successfully reach the MS, then an error shall be returned to the node that originated the operation.

The network initiated USSD operation shall contain an alphabet indicator and language indicator. The alphabet indicator shall indicate the alphabet used in the operation. The selection of values for these indicators is a matter for the network operator.

5.2.2 Actions at the MS

If the MS is unable to process the network initiated unstructured SS data operation (e.g. the feature is not supported or the user is engaged in another MMI activity) then an error indication shall be returned to the node that originated the operation. If the alphabet indicated by the network is not supported by the MS, the MS shall inform the network.

The network may explicitly indicate to the MS that a response from the user is required. In this case, the next string entered by the user shall be used as the response (and is not interpreted according to normal MMI procedures stated in GSM 02.30 [3]). An MMI command shall be provided to allow the user to terminate the dialogue with a null response. The response string uses the characters available in the "default alphabet" as defined in GSM 03.38 [4]. The response is sent to the node that originated the operation. If the network does not indicate that a response is required, then the normal MMI procedures on the MS continue to apply.

The MS shall include alphabet and language indicators in the response to the network (if any). The alphabet indicator shall indicate "SMS default alphabet". The language indicator shall indicate "language unspecified".

5.3 Network aspects of unstructured SS data operation

Applications that use Unstructured SS Data Operations may be located in either the HPLMN or a roamed to VPLMN.

Network applications using Unstructured SS Data Operations may:

- use several Unstructured SS Data Operations (possibly a mixture of mobile initiated and network initiated) in combination as part of a dialogue with the user. Linkage between separate operations as part of a dialogue is only implemented locally in the network application and does not lead to any special mode of operation in the MS. The network initiated request for a response from the user and the corresponding response is a single operation;
- act on calls in progress, or place new calls, as part of the service the application provides.

Release of the connection used for an unstructured dialogue is normally the responsibility of the network and may be carried out at the request of the application using the Unstructured SS Data Operations. The user may also initiate connection release through an MMI procedure.

6 Unstructured SS data operations – application mode

6.1 General

USSD supports communication between an application (handler) in the MS and a corresponding application (handler) in the network by enabling transparent transfer of binary data between the network and the MS. The applications may use USSD either during a call or out of call.

Application-level addressing is out of scope of this document.

6.2 Mobile initiated transfer

6.2.1 Initiating action at the mobile station

If the MS wishes to send data to the network, it can do so using USSD. It shall be possible for the MS to send data to nodes in the VPLMN and in the HPLMN, i.e. GSM network elements (e.g. MSC, VLR, HLR), MExE servers, CSEs and proxy servers.

6.2.2 Action in the network

The serving network shall pass the received message to its destination node. If the VPLMN cannot route the message to the destination it shall forward the message to the HPLMN.

6.3 Network initiated transfer

6.3.1 Initiating action in the network

If a node in the network wishes to send data to an MS, it can do so using USSD.

If the network is unable successfully to reach the MS, then an error shall be returned to the node that originated the operation.

6.3.2 Action at the mobile station

The MS shall pass the message to the ME, to the SIM or to the TE as indicated in the message.

6.4 External addressing

The USSD dialogue exists inside the GSM network. However, it shall be possible to transport the address of an external node in the USSD message. The address format must be standardised and support at least E.164- and IP-addresses.

When addressing of an MS from an external node the address shall be an MSISDN number. The return address shall be present and in the same format the MS uses to address an external node.

This mechanism for communication between the GSM network and the external node is out of scope of this document.

6.5 Charging aspects

It shall be possible to charge for the use of application mode USSD based on e.g. the destination node.

Charging for the use of an application is out of scope of this document.

6.6 Compatibility aspects

6.6.1 Mobile initiated transfer

If the network does not support application mode USSD, the mobile initiated operation will be rejected and the attempt will fail. The MS shall not attempt automatic fall back to phase 1 USSD or to MMI mode USSD in case of incompatibility. Application-level recovery is outside the scope of this document.

If the network is unable to identify the destination node, it shall forward the message to the HLR.

6.6.2 Network initiated transfer

If the MS is unable to process the network initiated USSD operation, then an error indication shall be returned to the node that originated the operation.

6.7 Interaction with other services

The user or the network operator shall be able to prevent the use of application mode USSD during calls. The use of USSD in parallel with a circuit switched call may have a negative impact on the quality of the speech or data transmission.

6.8 Security

Application-level security is out of scope of this document.

Annex A (informative): Change history

Change history					
SMG No.	**TDoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
SMG#21	97-169	A004	4.1.2, 4.2.2	5.1.0	Clarification of USSD transmission
SMG#28	99-036	A005r1	Addition of new sections: 4 and 6	8.0.0	Use of USSD for application-to-application communication: USSD was originally intended for communication between the network and the user of an MS. The user entered MMI strings on the keypad, and these were sent to the network. Likewise, the network could send strings to be displayed to the user. Recent developments, e.g. mexe, brings intelligence to the MS. Applications have a need to communicate not only with the user, but also with their peer applications in the MS. For this reason, the concept of application mode USSD is introduced. Application mode USSD allows USSD to be used for ME/TE/SIM-based applications for which pure MMI-interaction is not enough.

History

Document history	
November 1996	Publication of Version 5.0.0
March 1997	Publication of Version 5.1.0
March 1999	Creation of Version 8.0.0 (Release 1999)