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Technical Specification

**Universal Mobile Telecommunications System (UMTS);
LTE;
Unstructured Supplementary Service Data (USSD)
using IP Multimedia (IM) Core Network (CN) subsystem IMS;
Stage 3
(3GPP TS 24.390 version 11.0.0 Release 11)**



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Foreword

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1 Scope

The present document describes the procedures for using Unstructured Supplementary Service Data (USSD) operations for mobile initiated MMI mode over IP Multimedia Core Network Subsystem (IMS). MMI mode is for the transparent transport of MMI strings entered by the user to the Application Servers (AS) and for the transparent transport of text strings back to the User Equipment (UE) to be displayed for user information. Support of USSD service is optional and only applicable for an operator's Public Land Mobile Network (PLMN).

The present document is applicable to UE and AS which are intended to support USSD operations over IP Multimedia Core Network Subsystem (IMS) in mobile initiated MMI mode.

2 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.
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- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] IETF RFC 6086 (January 2011): "Session Initiation Protocol (SIP) INFO Method and Package Framework".
- [3] 3GPP TS 24.090: " Unstructured Supplementary Service Data (USSD);Stage 3".
- [4] 3GPP2 X.P0065-0 v1.0: "cdma2000 Unstructured Supplementary Service Data (USSD)".

Editor's note: The above document cannot be formally referenced until it is published as an X.S0065-0 v1.0.

- [5] 3GPP TS 24.080: "Mobile radio interface layer 3 supplementary services specification; Formats and coding".
- [6] 3GPP TS 24.229: "IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".
- [7] IETF RFC 4967 (July 2007): "Dial String Parameter for the Session Initiation Protocol Uniform Resource Identifier".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AS	Application Server
IMS	IP Multimedia core network Subsystem
UE	User Equipment
USSD	Unstructured Supplementary Service Data

4 USSD using IMS

4.1 Introduction

This service provides the support for UE initiated MMI-mode USSD operations, which enables the transparent transport of MMI strings entered by the user to the IM core network and enables the transparent transport of text strings from the IM core network which are displayed by the UE for user information.

4.2 Description

There is no service description.

4.3 Operational requirements

There are no operational requirements.

4.4 Coding requirements

There are no coding requirements over and above these are specified in 3GPP^{TS}24.229^[6].

4.5 Signalling requirements

4.5.1 General

In the IM CN subsystem USSD messages can be transported in SIP INFO requests, SIP INVITE requests and SIP BYE requests, using a application/vnd.3gpp.ussd MIME body.

Figure 4.1 and figure 4.2 give an overview of the supported USSD operations:

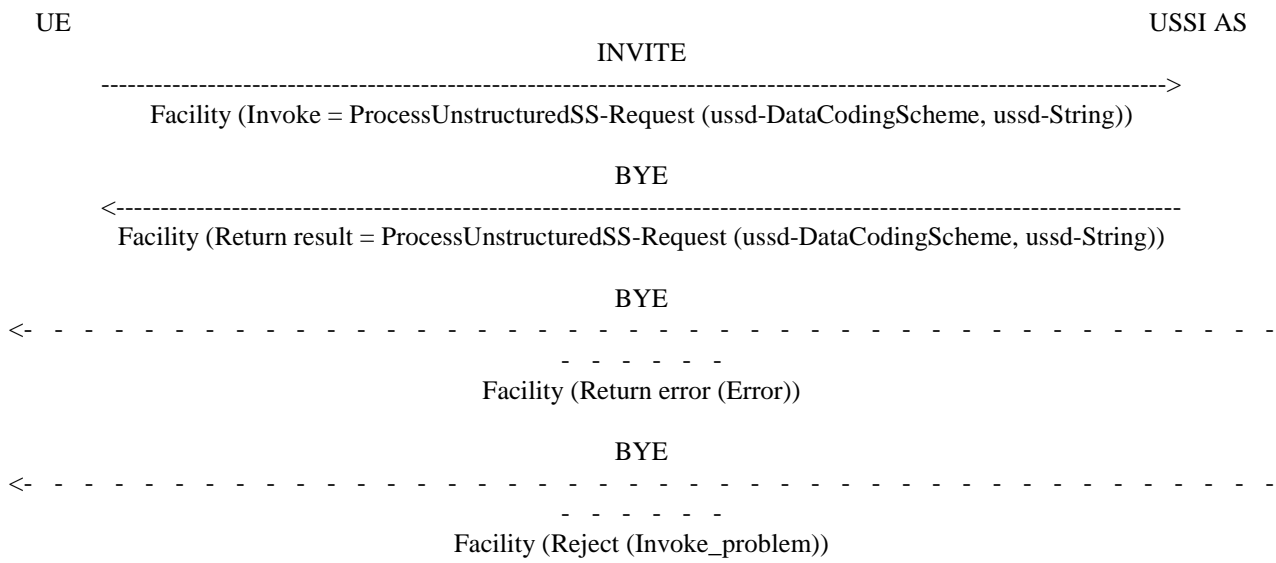


Figure 4.1: UE initiated USSD operation, network does not request further information



Figure 4.2: UE initiated USSD operation, network requests further information

4.5.2 SDP Offer/Answer

When a UE sends an initial INVITE request, in order to establish a USSD session, it shall include an SDP offer with one media description, according to subclause 6.1.2 of 3GPP TS 24.229 [6]. The UE shall add a zero port number value to the media descriptions of the SDP offer, in order to inform network entities that media resources are not requested for the session.

When the USSI AS sends an SDP answer, it shall also add a zero port number value to any media description received in the associated SDP offer.

4.5.3 Activation/deactivation

4.5.4 Invocation and operation

4.5.4.1 Actions at the originating UA

In order to send the initial USSD message, the UE shall send an initial INVITE request, according to 3GPP TS 24.229 [6]. The UE shall populate the request as follows:

- 1) Request-URI set to a SIP URI including the USSD string and a "user" URI parameter set to value "dialstring" as specified in RFC 4967 [7];
- 2) Recv-Info header field containing the g.3gpp.ussd info-package name;
- 3) Accept header field containing the application/vnd.3gpp.ussd, application/sdp and multipart/mixed MIME types;
- 4) the Content-Type header, which shall contain "multipart/mixed";
- 5) SDP offer as described in subclause 4.5.2; and
- 6) application/vnd.3gpp.ussd MIME body as described in subclause 5.1.3 containing a ProcessUnstructuredSS-Request invoke component.

When receiving an INFO request containing application/vnd.3gpp.ussd MIME body containing an UnstructuredSS-Request invoke component, the UE shall:

- 1) if the UE is able to process the received information, send an INFO request within the dialog, according to 3GPP TS 24.229 [6]. The UE shall populate the INFO request as follows:
 - a) Info-Package header field containing the g.3gpp.ussd info-package name; and
 - b) application/vnd.3gpp.ussd MIME body as described in subclause 5.1.3 containing UnstructuredSS-Request return component (see 3GPP TS 24.080 [5]) containing the user's response;
- 2) if the UE is not able to process the received information, send an INFO request within the dialog, according to 3GPP TS 24.229 [6]. The UE shall populate the INFO request as follows:
 - a) Info-Package header field containing the g.3gpp.ussd info-package name; and
 - b) application/vnd.3gpp.ussd MIME body as described in subclause 5.1.3 containing a Return error component (see 3GPP TS 24.080 [5]); and
- 3) if the UE rejects the received information, send an INFO request within the dialog, according to 3GPP TS 24.229 [6]. The UE shall populate the INFO request as follows:
 - a) Info-Package header field containing the g.3gpp.ussd info-package name; and
 - b) application/vnd.3gpp.ussd MIME body as described in subclause 5.1.3 containing a Reject component (see 3GPP TS 24.080 [5]).

When receiving a BYE request containing application/vnd.3gpp.ussd MIME body, the UE shall handle the application/vnd.3gpp.ussd MIME body as defined in 3GPP TS 24.080 [5].

NOTE 1: application/vnd.3gpp.ussd MIME body included in the BYE request can contain a return result component, a return error component or a reject component.

NOTE 2: when a return result component is included in BYE request or when a return error component is included in BYE request, it is not possible to respond to these components with a reject component.

4.5.4.2 Actions at the AS

In addition to the procedures specified in subclause 4.5.3, the USSI AS shall support the procedures specified in 3GPP TS 24.229 [6] for an AS.

Upon receiving an initial INVITE request with Request-URI containing the SIP URI including the USSD string and a "user" URI parameter set to value "dialstring" as specified in RFC 4967 [7], if the application/vnd.3gpp.ussd MIME body contained in the request is accepted by the USSI AS, the USSI AS shall:

- 1) pass the USSD data received in the body of the SIP INVITE request to the USSD application handling and wait for the response of the application;

NOTE 1: How the USSD data are processed at the USSI AS is outside the scope of this specification. The USSI AS can handle the USSD dialogs or forward the USSD requests and responses to/from a legacy USSD server.

- 2) send 200 (OK) response to the request following the procedures specified for AS acting as a terminating UA in 3GPP TS 24.229 [6]. The USSI AS shall populate the 200 (OK) response to the request as follows:
 - a) Recv-Info header field containing the g.3gpp.ussd info-package name;
 - b) Accept header field containing the application/vnd.3gpp.ussd, application/sdp and multipart/mixed MIME types; and
 - c) SDP answer as described in subclause 4.5.2.

Upon receiving an ACK request associated with the INVITE request, the USSI AS shall:

- 1) if the network requests further information in order to perform the USSD operation, send an INFO request within the dialog created by the INVITE request. The USSI AS shall populate the INFO request as follows:
 - a) Info-Package header field containing the g.3gpp.ussd info-package name; and
 - b) application/vnd.3gpp.ussd MIME body as described in subclause 5.1.3 containing an UnstructuredSS-Request invoke component (see 3GPP TS 24.080 [5]);
- 2) if the network successfully performed the USSD information and does not need any further information, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.ussd MIME body, as described in subclause 5.1.3, containing a ProcessUnstructuredSS-Request return component (see 3GPP TS 24.080 [5]);
- 3) if the network informs the UE that the network is unable to process the USSD request, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.ussd MIME body, as described in subclause 5.1.3, containing a Return error component (see 3GPP TS 24.080 [5]); and
- 4) if the network informs the UE that the network rejects the USSD request, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.ussd MIME body, as described in subclause 5.1.3, containing a Reject component (see 3GPP TS 24.080 [5]).

Upon receiving a SIP INFO request with Info-Package header field containing the g.3gpp.ussd info-package and a application/vnd.3gpp.ussd MIME body containing UnstructuredSS-Request return component, the USSI AS shall handle the SIP INFO request following the procedures specified for AS acting as a terminating UA in 3GPP TS 24.229 [6] and generate a SIP response as described in 3GPP TS 24.229 [6]. If the SIP response is a 2xx response, the USSI AS shall:

- 1) pass the USSD data received in the body of the SIP INFO request to the USSD application handling and wait for the response of the application;

NOTE 2: How the USSD data are processed at the USSI AS is outside the scope of this specification. The USSI AS can handle the USSD dialogs or forward the USSD requests and responses to/from a legacy USSD server.

- 2) if the network requests further information in order to perform the USSD operation, send an INFO request within the dialog. The USSI AS shall populate the INFO request as follows:
 - a) Info-Package header field containing the g.3gpp.ussd info-package name; and
 - b) application/vnd.3gpp.ussd MIME body as described in subclause 5.1.3 containing an UnstructuredSS-Request invoke component (see 3GPP TS 24.080 [5]);
- 3) if the network successfully performed the USSD information and does not need any further information, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with

application/vnd.3gpp.ussd MIME body, as described in subclause 5.1.3, containing a ProcessUnstructuredSS-Request return component (see 3GPP TS 24.080 [5]);

- 4) if the network informs the UE that the network is unable to process the USSD request, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.ussd MIME body, as described in subclause 5.1.3, containing a Return error component (see 3GPP TS 24.080 [5]); and
- 5) if the network informs the UE that the network rejects the USSD request, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.ussd MIME body, as described in subclause 5.1.3, containing a Reject component (see 3GPP TS 24.080 [5]).

4.6 Interaction with other services

4.6.1 Originating Identification Presentation (OIP)

There are no interaction requirements with OIP.

4.6.2 Originating Identification Restriction (OIR)

There are no interaction requirements with OIR.

4.6.3 Terminating Identification Presentation (TIP)

There are no interaction requirements with TIP.

4.6.4 Terminating Identification Restriction (TIR)

There are no interaction requirements with TIR.

4.6.5 Communication Diversion (CDIV)

There are no interaction requirements with TIR.

4.6.6 Communication Hold (HOLD)

There are no interaction requirements with HOLD.

4.6.7 Communication Barring (CB)

There are no interaction requirements with HOLD.

4.6.8 Message Waiting Indication (MWI)

There are no interaction requirements with MWI.

4.6.9 Conference (CONF)

There are no interaction requirements with CONF.

4.6.10 Explicit Communication Transfer (ECT)

There are no interaction requirements with ECT.

4.6.11 Advice Of Charge (AOC)

There are no interaction requirements with AOC.

4.6.12 Closed User Groups (CUG)

There are no interaction requirements with CUG.

4.6.13 Three-Party (3PTY)

There are no interaction requirements with CUG.

4.6.14 Flexible Alerting (FA)

There are no interaction requirements with FA.

4.6.15 Communication Waiting (CW)

There are no interaction requirements with FA.

4.6.16 Completion of Communications to Busy Subscriber (CCBS)

There are no interaction requirements with CCBS.

4.6.17 Completion of Communications by No Reply (CCNR)

There are no interaction requirements with CCNR.

4.6.18 Customized Alerting Tones (CAT)

There are no interaction requirements with CAT.

4.6.19 Customized Ringing Signal (CRS)

There are no interaction requirements with CRS.

4.6.20 Personal Network Management (PNM)

There are no interaction requirements with PNM.

4.6.21 Malicious Communication Identification (MCID)

There are no interaction requirements with MCID.

4.6.22 SIP based user configuration

Editor's Note: The procedures for interaction with SIP based user configuration are FFS.

4.7 Service configuration

User self configuration is not applicable to USSD using IMS.

5 Extensions within the present document

5.1 INFO Package for transport of USSD information

5.1.1 Scope

This subclause contains the information required for the IANA registration of info package g.3gpp.usssd in accordance with IETF RFC 6086 [2].

Editor's note: MCC needs to register this info package with IANA when 24.390 is published.

5.1.2 g.3gpp.usssd info package

5.1.2.1 Overall description

3GPP TS 24.390 describes the procedures for using Unstructured Supplementary Service Data (USSD) (3GPP TS 24.090 [3] and 3GPP2 X.P0065 [4]) operations in the IP Multimedia Core Network Subsystem (IMS). SIP INFO requests are used to carry information associated with USSD, using the g.3gpp.usssd info package.

Every SIP INFO request associated with the g.3gpp.usssd info package carries a single application/vnd.3gpp.usssd MIME body.

NOTE: According to the procedures in IETF RFC 6086 [2], the SIP INFO response will not contain a MIME body. A message associated with a USSD operation is always sent in SIP INFO request.

5.1.2.2 Applicability

This package is used to transport USSD information.

5.1.2.3 Info package name

g.3gpp.usssd

5.1.2.4 Info package parameters

None defined.

5.1.2.5 SIP options tags

None defined.

5.1.2.6 INFO message body parts

The MIME type of the message body carrying the information associated with USSD is application/vnd.3gpp.usssd. application/vnd.3gpp.usssd MIME type is defined in 3GPP TS 24.390.

When associated with the g.3gpp.usssd info package, the Content-Disposition value of the message body carrying the information associated with USSD is "info-package".

5.1.2.7 Info package usage restrictions

None defined.

5.1.2.8 Rate of INFO Requests

No maximum rate or minimum rate is defined for sending INFO requests associated with the g.3gpp.usssd info package.

For most USSD usages, normally zero, one, or a few, SIP INFO requests are generated in the SIP session by each participating user agent.

5.1.2.9 Info package security considerations

The security is based on the generic security mechanism provided for the underlying SIP signalling. No additional security mechanism is defined.

5.1.2.10 Implementation details and examples

UAC generation of INFO requests: See 3GPP TS 24.390: "Unstructured Supplementary Service Data (USSD) using IP Multimedia (IM) Core Network (CN) subsystem IMS; Stage 3"

Examples: See 3GPP TS 24.390: "Unstructured Supplementary Service Data (USSD) using IP Multimedia (IM) Core Network (CN) subsystem IMS; Stage 3"

5.1.3 application/vnd.3gpp.ussd MIME type

5.1.3.1 Scope

This subclause contains the information required for the IANA registration of the application/vnd.3gpp.ussd MIME type in accordance with IANA registration procedures.

Editor's note: MCC needs to register the application/vnd.3gpp.ussd MIME type with IANA when 24.390 is published.

5.1.3.2 application/vnd.3gpp.ussd

5.1.3.2.1 Overall description

5.1.3.2.1.1 Overall description: Alternative1

The MIME type is used to carry one or more components (depending on specific service requirements) of a facility information element, as defined in subclause 3.6.1 of 3GPP TS 24.080 [5]. The binary format is the same as the format of the "Component(s)" information element in figure 3.1 of subclause 3.6 of 3GPP TS 24.080 [5].

NOTE^o1: The AS can take the information received in the MIME body, formulate a MAP USSD message and route the message over SS7 to the USSD server via the HSS. Alternatively, the AS can extract the USSD information from the received MIME body, and communicate with USSD server using other protocol.

Usage of operation codes of the operations specified for usage in the Unstructured Supplementary Service Data (USSD) protocol, as defined in 3GPP TS 24.090 [3], is specified for this MIME type. Usage of operation codes of other operations is not specified.

NOTE^o2: 3GPP TS 24.090 [3] specifies usage of processUnstructuredSS-Request, unstructuredSS-Request, unstructuredSS-Notify operations for USSD.

5.1.3.2.1.4 Overall description: Alternative4

The MIME type is used to carry a binary encoded USSD String whose contents depend on a MIME parameter value set to the hexadecimal representation of the USSD Data Coding Scheme value as defined in 3GPP TS 23.038.

NOTE 1: The USSD String corresponds to a value of the ASN.1 USSD-String data type (i.e. BER Type and Length are not included) defined in 3GPP TS 29.002.

NOTE 2: The USSD-DataCodingScheme and USSD-String data types are used in the argument and result of the processUnstructuredSS-Request and unstructuredSS-Request operations for USSD that are imported from 3GPP TS 29.002 into the ASN.1 module defined in clause 4.2 of 3GPP TS 24.080. The component header, operation codes and other argument or result parameters (e.g. MSISDN) are not part of the MIME type.

Editor's note: It is FFS whether the UE is allowed to respond with error/reject information related to a network request for further information after a time (i.e. not immediately). If so, the solution needs to be updated.

Editor's note: after receiving further information from the UE, and if the network decides to terminate the USSD session with error/reject information, it is FFS how the network provides error/reject information.

5.1.3.2.1.4.1 MIME type description

MIME media type name : Application

MIME subtype name : Vendor Tree – 3gpp.ussd

Required parameters : dcs

"dcs": This parameter identifies variants in the encoding of information pertaining to this MIME type. It is encoded as the hexadecimal representation of binary values defined in 3GPP TS 23.038. The four bits appearing first in the binary value MUST be mapped to the first hexadecimal digit and the four subsequent bits in the binary value MUST be mapped to the second hexadecimal digit. When mapping 4 bits to a hexadecimal digit, the bit appearing first in the binary value shall be most significant.

Optional parameters : None

Encoding considerations : binary

This media type may require encoding on transports not capable of handling binary.

Security considerations :

This media type does not make use of any executable content.

This media type may contain customer confidential and network confidential information.

Security mechanisms at the transport layer may thus be needed to provide integrity and privacy of the content.

Interoperability considerations :

N/A

Published specification :

3GPP TS 24.390

Applications which use this media :

Applications using USSD (Unstructured Supplementary Services Data) over the 3GPP IP Multimedia Subsystem (IMS).

Additional information:

1. Magic number(s): none
2. File extension(s): none
3. Macintosh file type code: none
4. Object Identifiers: none

5.1.3.2.1.4.2 Necessary modifications of subclauses in the core specification

This subclause provides the necessary modifications to subclauses 4.5.1, 4.5.4.1 and 4.5.4.2 if alternative 4 is adopted.

5.1.3.2.1.4.2.1 Modification of subclause "4.5.1 General"

If alternative 4 is adopted the text of subclause 4.5.1 should be replaced by the following text:

In the IM CN subsystem USSD messages can be transported in SIP INFO requests, SIP INVITE requests and SIP BYE requests, using a vnd.3gpp.ussd MIME.

Figure 4.1 and figure 4.2 give an overview of the supported USSD operations:

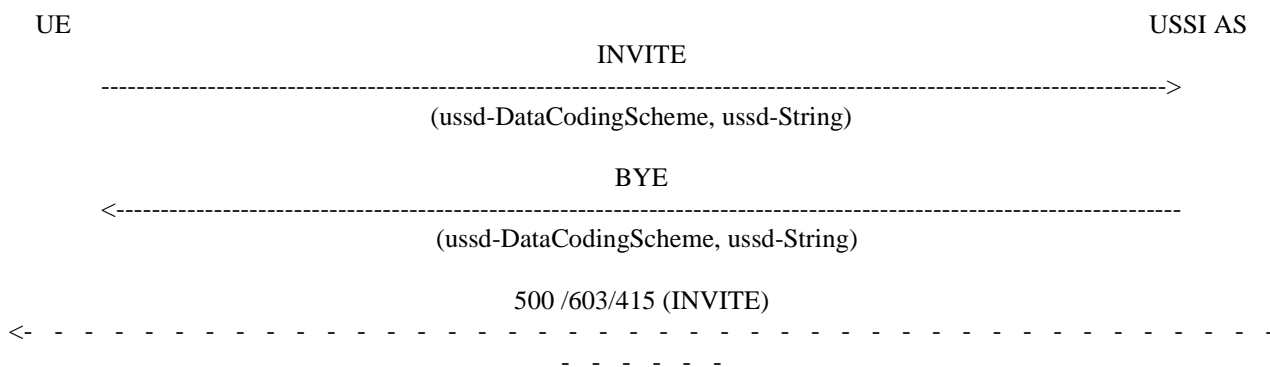


Figure 4.1: UE initiated USSD operation, network does not request further information

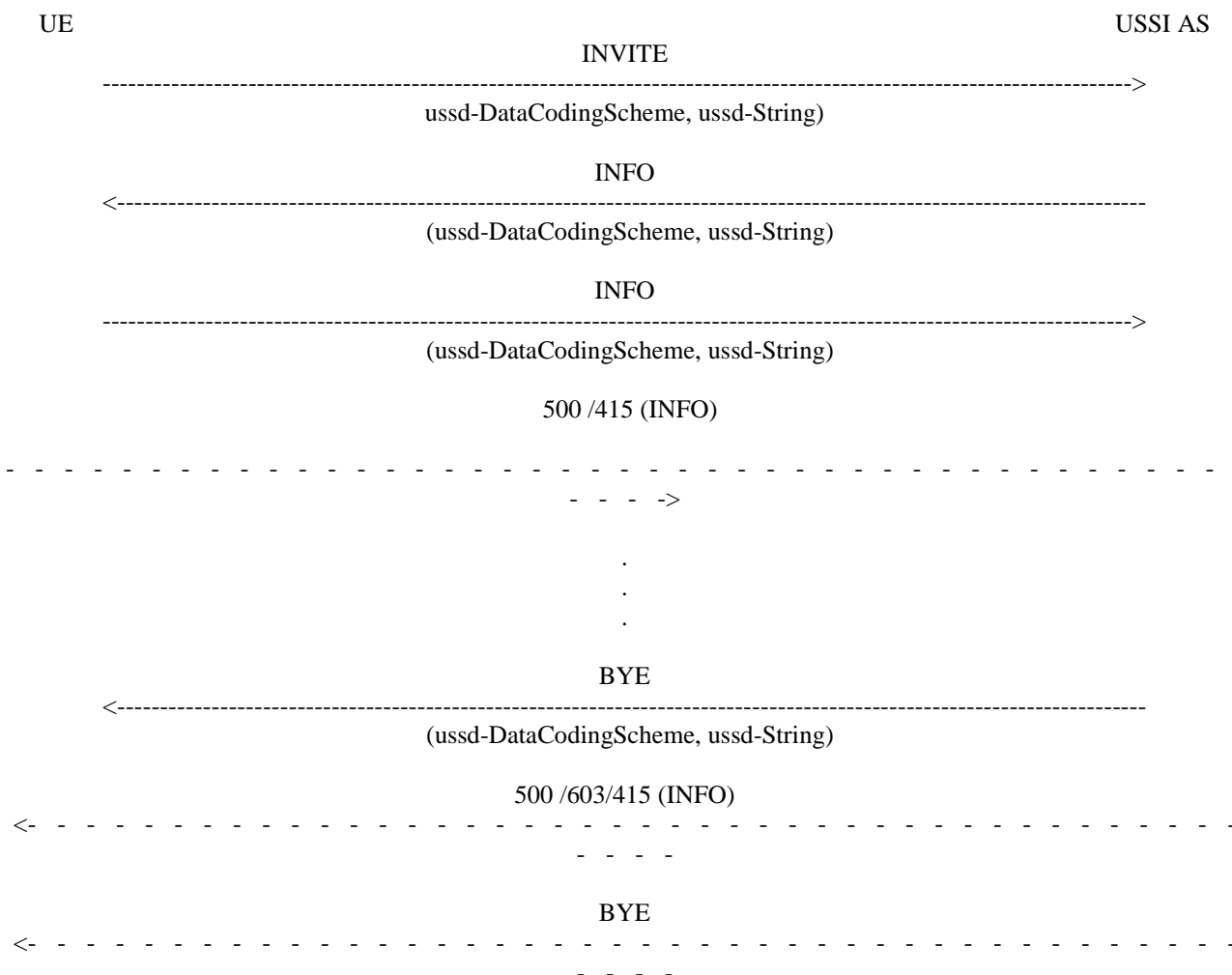


Figure 4.2: UE initiated USSD operation, network requests further information

5.1.3.2.1.4.2.2 Modification of subclause "4.5.4.1 Actions at the originating UA"

If alternative 4 is adopted the text of of subclause 4.5.4.1 should be replaced by the following text:

In order to send the initial USSD message, the UE shall send an initial INVITE request, according to 3GPP TS 24.229 [6]. The UE shall populate the request as follows:

- 1) Request-URI set to a SIP URI including the USSD string and a "user" URI parameter set to value "dialstring" as specified in RFC 4967 [7];
- 2) Recv-Info header field containing the g.3gpp.ussd info-package name;
- 3) Accept header field containing the application/vnd.3gpp.ussd, application/sdp and multipart/mixed MIME types;
- 4) the Content-Type header, which shall contain "multipart/mixed";
- 5) SDP offer as described in subclause 4.5.2; and
- 6) application/vnd.3gpp.ussd MIME body as described in annex B containing.

When receiving an INFO request containing application/vnd.3gpp.ussd MIME body, the UE shall:

- 1) if the UE is able to process the received information, send back a 200 OK response followed by an INFO request within the dialog, according to 3GPP TS 24.229 [6]. The UE shall populate the INFO request as follows:
 - a) Info-Package header field containing the g.3gpp.ussd info-package name; and
 - b) application/vnd.3gpp.ussd MIME body as described in annex B containing. Containing the user's response;
- 2) if the UE is not able to process the received information because the Alphabet is not known, send a 415 (Unsupported Media Type) response to the INFO request. If the UE is not able to process the received information for another reason, send a 500 SIP response (Internal Server Error).

When receiving a BYE request containing application/vnd.3gpp.ussd MIME body, the UE shall answer by a 200 OK response.

5.1.3.2.1.4.2.3 Modification of subclause "4.5.4.2 Actions at the AS"

If alternative 4 is adopted the text of of subclause 4.5.4.2 should be replaced by the following text:

In addition to the procedures specified in subclause 4.5.3, the USSI AS shall support the procedures specified in 3GPP TS 24.229 [6] for an AS.

Upon receiving an initial INVITE request with Request-URI containing the SIP URI including the USSD string and a "user" URI parameter set to value "dialstring" as specified in RFC 4967 [7], if the application/vnd.3gpp.ussd MIME body contained in the request is accepted by the USSI AS, the USSI AS shall:

- 1) pass the USSD data received in the body of the SIP INVITE request to the USSD application handling and wait for the response of the application; then

NOTE 1: The details of USSD application handling are outside the scope of this specification.

- 2) if the network informs the UE that the network is unable to process the USSD request because the Alphabet is not known, send a 415 (Unsupported Media Type) response to INVITE.
- 3) if the network informs the UE that the network is unable to process the USSD request because the UE is not authorized to issue the USSD request (i.e call barred), send a 603 (Decline) response to INVITE.
- 4) if the network informs the UE that the network is unable to process the USSD request for any other reason, send a 500 (Server Internat Error) response to INVITE.
- 5) if the network successfully performed the USSD information and does not need any further information, send a 200 OK to INVITE and after receiving an ACK request associated with the INVITE request send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.ussd MIME body, as described in annex B.
- 6) if the network requests further information in order to perform the USSD operation the AS shall:
 - A) send 200 (OK) response to the request following the procedures specified for AS acting as a terminating UA in 3GPP TS 24.229 [6]. The USSI AS shall populate the 200 (OK) response to the request as follows:

- a) Recv-Info header field containing the g.3gpp.usssd info-package name;
- b) Accept header field containing the application/vnd.3gpp.usssd, application/sdp and multipart/mixed MIME types; and
- c) SDP answer as described in subclause 4.5.2.

B) Upon receiving an ACK request associated with the INVITE request, send an INFO request within the dialog created by the INVITE request. The USSI AS shall populate the INFO request as follows:

- a) Info-Package header field containing the g.3gpp.usssd info-package name; and
- b) application/vnd.3gpp.usssd MIME body as described in annex B.

Upon receiving a SIP INFO request with Info-Package header field containing the g.3gpp.usssd info-package and a application/vnd.3gpp.usssd MIME body , the USSI AS shall handle the SIP INFO request following the procedures specified for AS acting as a terminating UA in 3GPP TS 24.229 [6] and:

- 1) pass the USSD data received in the body of the SIP INFO request to the USSD application handling and wait for the response of the application; then

NOTE 2: The details of USSD application handling are outside the scope of this specification.

- 2) if the network requests further information in order to perform the USSD operation, send a 200 OK response to INVITE followed by an INFO request within the dialog. The USSI AS shall populate the INFO request as follows:

- a) Info-Package header field containing the g.3gpp.usssd info-package name; and
- b) application/vnd.3gpp.usssd MIME body as described in annex B.;

- 3) if the network successfully performed the USSD information and does not need any further information, send a BYE request in order to terminate the dialog. The USSI AS shall populate the BYE request with application/vnd.3gpp.usssd MIME body..

- 4) if the network informs the UE that the network is unable to process the USSD request because the Alphabet is not known, send a 415 (Unsupported Media Type) response to INFO and send a BYE request in order to terminate the dialog.

- 5) if the network informs the UE that the network is unable to process the USSD request for any other reason, send a 500 (Server Internat Error) response to INFO and send a BYE request in order to terminate the dialog.

5.1.3.2.2 Name

Editor's note: The name of the person responsible for the IANA registration needs to be added here.

5.1.3.2.3 Email

Editor's note: The e-mail of the person responsible for the IANA registration needs to be added here.

5.1.3.2.4 MIME media type name

Application

5.1.3.2.5 MIME subtype name

Vendor Tree – vnd.3gpp.usssd

5.1.3.2.6 Required parameters

None

5.1.3.2.7 Optional parameters

None

5.1.3.2.8 Encoding considerations

Binary.

5.1.3.2.9 Security considerations

The content of the MIME type can be used to trigger execution of supplementary services in a network.

5.1.3.2.10 Interoperability considerations

The MIME type allows interoperability of USSD information between mobile networks and other systems.

5.1.3.2.11 Published specification

3GPP TS 24.390

(<http://www.3gpp.org/ftp/Specs/html-info/24390.htm>)

5.1.3.2.12 Applications which use this media

n/a

5.1.3.2.13 Applications that manipulate MIME typed objects (messaging, download etc.)

n/a

5.1.3.2.14 Additional information

1. Magic number(s): n/a
2. File extension(s): n/a
3. Macintosh file type code: n/a
4. Object Identifiers: n/a

5.1.3.2.15 Intended usage

Common.

The USSD is a very common service available on most mobile networks. The registration of the associated MIME type allows the USSD service to be incorporated in messages from other messaging systems.

5.1.3.2.16 Other information/general comment

n/a

5.1.3.2.17 Person to contact for further information

1. Name: TBD
2. Email: TBD
3. Author/Change controller: TBD

Editor's note: The name and e-mail of the person responsible for the IANA registration, and acting as author/change controller, needs to be added here.

Annex <A> (informative): Signalling flows

A.1 UE sending USSD request, no further information required

In the example flow at the figure A.1-1, UE 1 sends a USSD request. The USSD application does not require further information, the USSD operation is successful and the AS hosting the USSD application indicates sends a USSD response towards UE 1.

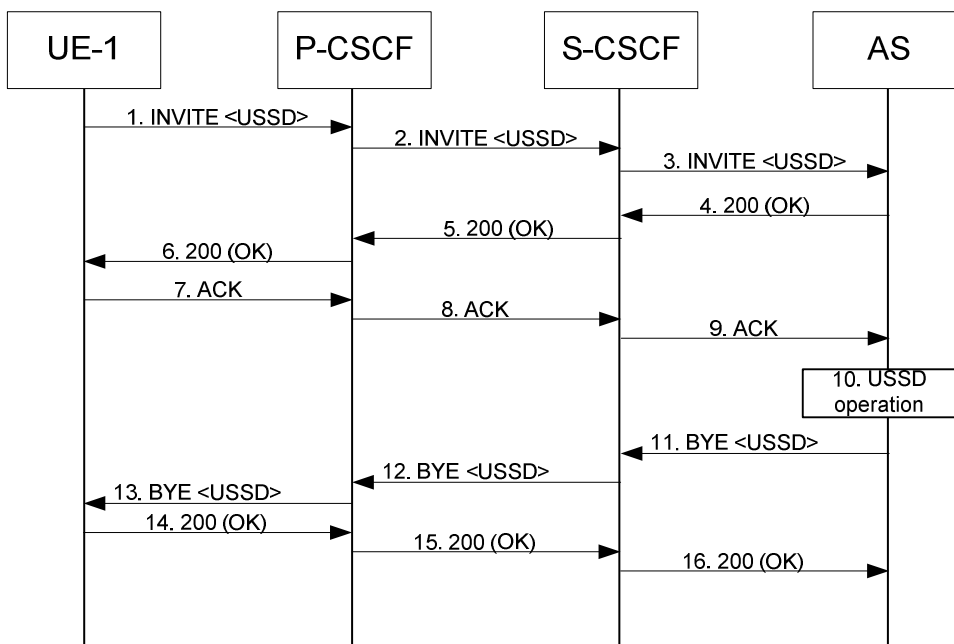


Figure A.1-1: UE sends USSD request

NOTE 1: For clarity, the SIP 100 (Trying) responses are not shown in the signaling flow.

1. UE A sends INVITE request containing the USSD request

UE sends the INVITE request.

By including the Recv-Info header field, the UE indicates its support for the g.3gpp.usssd info package.

Table A.1-1: INVITE request (UE-1 to P-CSCF)

```

INVITE sip:*135%23;phone-context=home1.net;user=dialstring SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr>, <sip:scscf1.home1.net;lr>
Accept-Contact: *;+g.3gpp.icsi-ref="urn%3Aurn-7%3gpp-service.ims.icsi.mmmtel"
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:*135%23;phone-context=home1.net;user=dialstring>
Call-ID: cb03a0s09a2sdfg1kj490333
Cseq: 127 INVITE
    
```

```

Require: sec-agree
Supported: precondition, 100rel, gruu
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg= hmac-sha-1-96; ealg= aes-cbc; spi-c=98765432; spi-
s=87654321; port-c=8642; port-s=7531
Contact: <sip:user1_public1@home1.net;gr-hdg7777ad7aflzig8sf7>; +g.3gpp.icsi-
ref="urn:3Aurn-7%3gpp-service.ims.icsi.mmtel"
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE, INFO
Accept: application/sdp; application/3gpp-ims+xml; application/vnd.3gpp.usssd
Recv-Info: g.3gpp.usssd
Content-Type: multipart/mixed; boundary=outer
Content-Length: (...)

--outer
Content-Type: application/sdp

v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=audio 0 RTP/AVP 97 96
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
--outer
Content-Type: application/vnd.3gpp.usssd

< USSD MESSAGE >

--outer-

```

NOTE: The message example above does not show the content of the message body carrying the USSD message.

Request-URI: in this example, the USSD message is *135#, and is represented as a dialstring.

Application/vnd.3gpp.usssd MIME body: USSD message.

2. INVITE request (P-CSCF to S-CSCF)

The P-CSCF forwards the INVITE request based on the Route header field.

3. INVITE request (S-CSCF to AS)

The S-CSCF forwards the INVITE request containing the USSD message based on iFC to the AS.

4. 200 (OK) response (AS to S-CSCF)

The AS sends a 200 (OK) confirming the receipt of the INVITE and to establish the dialog. The SIP 200 (OK) will contain a Recv-Info header field set to g.3gpp.usssd.

5. 200 (OK) response (S-CSCF to P-CSCF)

The S-CSCF forwards the 200 (OK) along the Via header field.

6. 200 (OK) response (P-CSCF to UE)

The P-CSCF forwards the 200 (OK) along the Via header field to the UE.

7. ACK request (UE to P-CSCF)

The UE responds to the 200 (OK) response with an ACK request sent to the P-CSCF.

8. ACK request (P-CSCF to S-CSCF)

The P-CSCF forwards the ACK request to the S-CSCF.

9. PRACK request (S-CSCF to AS)

The S-CSCF forwards the ACK request to the AS.

10. USSD operation

The AS performs the requested USSD operation. Details of USSD processing are outside the scope of this specification.

In this example the USSD operation is successful and a response indicating success will be sent to the UE.

11. BYE request (AS to S-CSCF) — see example in table A.1-2

Table A1-2: BYE request (AS to S-CSCF)

```

BYE sip:user1_public1@home1.net;gr=hdg7777ad7aflzig8sf7 SIP/2.0
Via SIP/2.0/UDP sip:as1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr>
From: <tel: +1-237-555-3333>;tag=314159
To: <tel:+1-237-555-1111>;tag=171828
Call-ID: cb03a0s09a2sdfg1kj490334
Cseq: 129 BYE

Content-Type: application/vnd.3gpp.ussd
Content-Length:

< USSD MESSAGE >

```

NOTE: The message example above does not show the content of the message body carrying the USSD message.

Application/vnd.3gpp.ussd MIME body: USSD message.**12. BYE request (S-CSCF to P-CSCF)**

The S-CSCF forwards the BYE request to the P-CSCF.

13. BYE request (P-CSCF to UE)

The P-CSCF forwards the BYE request to the UE. The UE recognizes the application/vnd.3gpp.ussd and displays the string.

14. 200 (OK) response (UE to P-CSCF)

The UE sends a 200 (OK) confirming the BYE request.

15. 200 (OK) response (P-CSCF to S-CSCF)

The P-CSCF forwards the 200 (OK) to the S-CSCF.

16. 200 (OK) response (S-CSCF to AS)

The S-CSCF forwards the 200 (OK) to AS.

A.2 UE sending USSD request, further information required from network

In the example flow at the figure A.2-1, UE 1 sends a USSD request. The USSD application requires further information, and UE 1 sends further information in a USSD request. After the USSD operation is successful, the AS hosting the USSD application sends a USSD response towards UE 1.

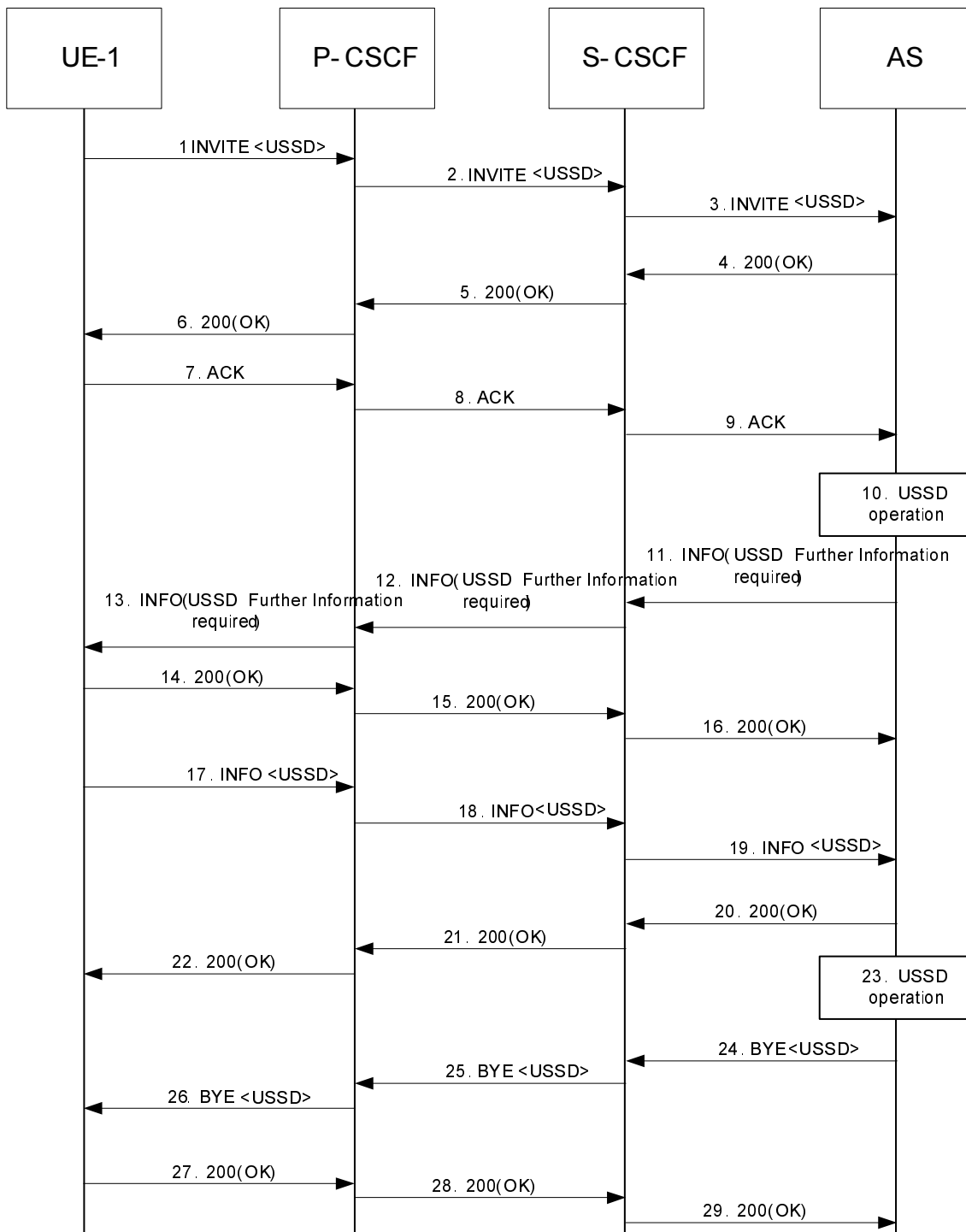


Figure A2-1: UE sends USSD request

NOTE 1: For clarity, the SIP 100 (Trying) responses are not shown in the signaling flow.

1. UE A sends INVITE request containing the USSD request

UE sends the INVITE request.

By including the Recv-Info header field, the UE indicates its support for the g.3gpp.uszd info package.

Table A.2-1: INVITE request (UE-1 to P-CSCF)

```

INVITE sip:*135%23;phone-context=home1.net;user=dialstring SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;branch=z9hG4bKnashds7
Max-Forwards: 70
    
```

```

Route: <sip:pcscf1.visited1.net:7531;lr>, <sip:scscf1.home1.net;lr>
Accept-Contact: *;+g.3gpp.icsi-ref="urn%3Aurn-7%3gpp-service.ims.icsi.mmtel"
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:*135%23;phone-context=home1.net;user=dialstring>
Call-ID: cb03a0s09a2sdfg1kj490333
Cseq: 127 INVITE
Require: sec-agree
Supported: precondition, 100rel, gruu
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg= hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-
s=87654321; port-c=8642; port-s=7531
Contact: <sip:user1_public1@home1.net;gr=hdg7777ad7aflzig8sf7>; +g.3gpp.icsi-
ref="urn%3Aurn-7%3gpp-service.ims.icsi.mmtel"
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE, INFO
Accept: application/sdp; application/3gpp-ims+xml; application/vnd.3gpp.usssd
Recv-Info: g.3gpp.usssd
Content-Type: multipart/mixed; boundary=outer
Content-Length: (...)

--outer
Content-Type: application/sdp
v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=audio 0 RTP/AVP 97 96
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
--outer
Content-Type: application/vnd.3gpp.usssd

< USSD MESSAGE >
--outer-

```

NOTE: The message example above does not show the content of the message body carrying the USSD message.

Request-URI: in this example, the USSD message is *135#, and is represented as a dialstring.

Application/vnd.3gpp.usssd MIME body: USSD message.

2. SIP INVITE request (P-CSCF to S-CSCF)

The P-CSCF forwards the INVITE request based on the Route header field.

3. SIP INVITE request (S-CSCF to AS)

The S-CSCF forwards the INVITE request containing the USSD message based on iFC to the AS.

4. SIP 200 (OK) response (AS to S-CSCF)

The AS sends a 200 (OK) confirming the receipt of the INVITE and to establish the dialog. The SIP 200 (OK) will contain a Recv-Info header field set to g.3gpp.usssd.

5. SIP 200 (OK) response (S-CSCF to P-CSCF)

The S-CSCF forwards the 200 (OK) along the Via header field.

6. SIP 200 (OK) response (P-CSCF to UE)

The P-CSCF forwards the 200 (OK) along the Via header field to the UE.

7. SIP ACK request (UE to P-CSCF)

The UE responds to the 200 (OK) response with an ACK request sent to the P-CSCF.

8. SIP ACK request (P-CSCF to S-CSCF)

The P-CSCF forwards the ACK request to the S-CSCF.

9. SIP ACK request (S-CSCF to AS)

The S-CSCF forwards the ACK request to the AS.

10. USSD operation

The AS performs the requested USSD operation. Details of USSD processing are outside the scope of this specification.

In this example, the AS requires further information from the UE.

11-13. SIP INFO request (AS to UE)

Editor's note: The example for SIP INFO request requiring further information from UE is FFS.

14-16. SIP 200 (OK) response (UE to AS)

The UE sends a SIP 200 (OK) to the AS confirming the SIP INFO request.

17-19. SIP INFO request (UE to AS)

The UE sends the SIP INFO request containing the further USSD information required.

Editor's note: The example for SIP INFO request containing further information is FFS.

20-21. SIP 200 (OK) response (AS to UE)

The AS sends a SIP 200 (OK) to the UE confirming the SIP INFO request.

23. USSD operation

The AS performs the requested USSD operation. Details of USSD processing are outside the scope of this specification.

In this example, the USSD operation is successful and AS sends a response indicating success will be sent to the UE.

24-26 SIP BYE request (AS-UE)

The AS sends a SIP BYE request towards UE containing a USSD response.

Table A.2-2: BYE request (AS to S-CSCF)

```

BYE sip:user1_public1@home1.net;gr=hdg7777ad7aflzig8sf7 SIP/2.0
Via SIP/2.0/UDP sip:as1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr>
From: <tel: +1-237-555-3333>;tag=314159
To: <tel:+1-237-555-1111>;tag=171828
Call-ID: cb03a0s09a2sdfg1kj490334
Cseq: 129 BYE
Content-Type: application/vnd.3gpp.ussd
Content-Length:

< USSD MESSAGE >

```

NOTE: The message example above does not show the content of the message body carrying the USSD message.

Application/vnd.3gpp.ussd MIME body: USSD message.

27-29. SIP 200 (OK) response (UE to AS)

The UE sends a 200 (OK) to AS confirming the BYE request.

Annex (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2011-04					Version 0.0.0 TS Skeleton	0.0.0	
2011-05					<i>Contains agreed P-CRs from CT1#71: C1-112245, C1-112246</i>	0.0.0	0.1.0
2011-07					<i>Contains agreed P-CRs from CT1#72: C1-112934, C1-112935, C1-112956</i>	0.1.0	0.2.0
2011-09					<i>Contains agreed P-CRs from CT1#73: C1-113450, C1-113451, C1-113590,</i>	0.2.0	0.3.0
2011-10					<i>Contains agreed P-CRs from CT1#74: C1-114351, C1-114411</i>	0.3.0	0.4.0
2012-01					<i>Changes the structure of the TS in order to allow for collection of alternative proposals: existing material in main part and Annex A (signalling flows) are shifted to new Annex B.</i> <i>Contains agreed P-CRs from CT1#75: C1-115144, C1-115145, C1-115146, C1-115147, C1-115148, C1-115230.</i>	0.4.0	0.5.0
2012-01					<i>Editorial correction</i>	0.5.0	0.5.1
2012-02					<i>Contains agreed P-CRs from CT1#76: C1-120685, C1-120688, C1-120693, C1-120694, C1-120884</i>	0.5.1	0.6.0
2012-05					<i>Contains agreed P-CR from CT1#77: C1-121624</i>	0.6.0	0.7.0
2012-06					<i>Contains agreed P-CRs from CT1#78: C1-121884, C1-122234, C1-122236, C1-122236, C1-122237</i>	0.7.0	0.8.0
2012-06	CT-56	CP-120281			Version 1.0.0 created by MCC for presentation to CT-56 for information	0.8.0	1.0.0
2012-08					<i>Contains agreed P-CRs from CT1#79: C1-122529, C1-123260, C1-123261, C1-123267, C1-123353, C1-123420</i>	1.0.0	1.1.0
2012-08					<i>Editorial cleanup</i>	1.1.0	1.1.1
2012-09	CT-57	CP-120608			Version 2.0.0 created by MCC for presentation to CT-57 for approval	1.1.1	2.0.0
2012-09	CT-57				Version 11.0.0 created by MCC after approval at CT-57	2.0.0	11.0.0

History

Document history		
V11.0.0	October 2012	Publication