NOBILL™
USSD Gateway

Including possible applications

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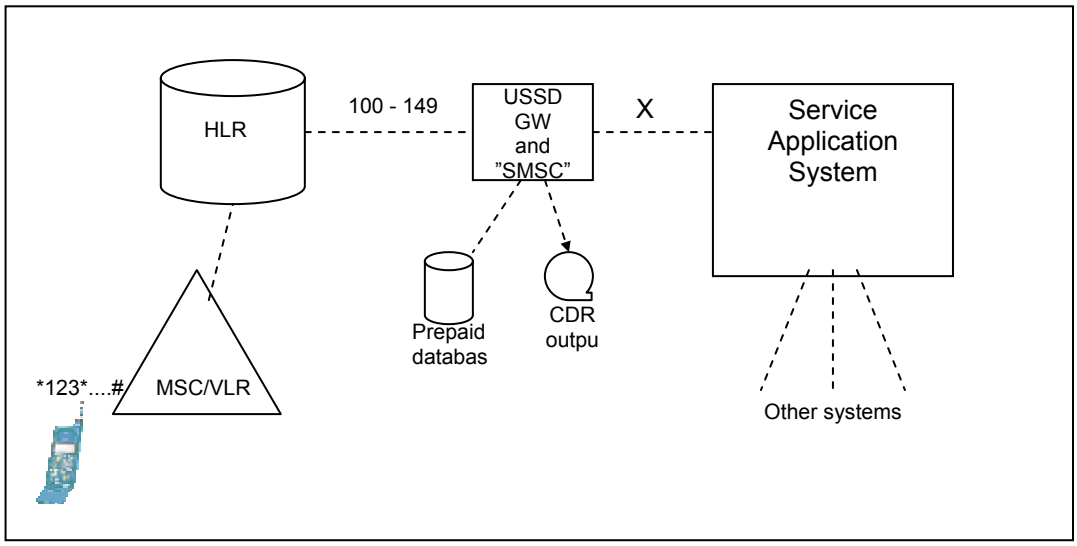
1 Introduction

Unstructured Supplementary Service Data, USSD, is a feature available in GSM networks today. USSD is specified as part of the Mobile Application Part, MAP. USSD is a session-oriented protocol suitable for interactive, menu-driven sessions, where a subscriber requests text/data from the system. Mobile terminals of phase 1 and 2 are ready for USSD. Network originated, or pushed, USSD messages require phase 2 terminals.



A subscriber will send an USSD string to the HLR. The HLR will relay the USSD string to the correct service i.e. the USSD GW.The service codes used will be in the interval 100-149, which makes it possible to use the services in the HPLMN, and when roaming in a VPLMN.

An USSD message can be maximum182 characters long, i.e. comparable to SMS. Delivery of the first USSD request and response is comparable in response time to a SMS. However, the following USSD messages in a dialogue are delivered significantly quicker than SMS. When a session is initiated the radio connection stays open until it is released by either the terminal or by the gateway.

USSD is an asset in the GSM networks that in many cases is not exploited. USSD is in some cases used for loading of prepaid accounts etc, which is a valuable service, but it can be used for much more. USSD can be used to give almost all subscribers a WAP like service without having to change terminals. I.e. the penetration of a new service will be almost all subscribers immediately after introduction in the network. This gives the operator good means of competition and will give short payback time for the new investments.

A USSD session typically starts with the subscriber sending a USSD message like *100# SEND. This message is sent through the GSM network to the USSD Gateway. The USSD gateway interprets the code to a specific request for interaction with a defined application. The application can even be a hyperlink to an Internet site or information stored locally in the Service Application System. Return information is then sent to the USSD Gateway where it is converted to USSD and sent to the mobile terminal.

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The interface X (in image above) can be any suitable standard communication protocol. When the Service Application is accessible from both USSD and a parallel Interactive Voice Response (IVR) system, the X interface protocol can be shared with both systems.

When charging for the service is to be applied, the USSD Gateway can interact with an accessible existing prepaid database or just produce CDR output in accordance with agreed specification.

The USSD Gateway can also send and receive SMS messages if that is to be part of the service application. If the transaction is initiated with an incoming SMS, the USSD Gateway can respond with a USSD session, thereby subscribers from other networks could also use the service application.

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2 Applications using USSD

The below services are in use in one or more GSM networks with a USSD Gateway provided by Symsoft.

2.1 Prepaid

The most common usage of using USSD for direct subscriber interaction is services related to prepaid subscriptions.

- Push account balance information after a call.
- Switching on/off the balance information message; *120*1/0#
- Checking account balance; *120#
- “How long can I talk?”; *112*no I intend to call#. Response is given in sec/min.
- Voucher refill; *125*voucher code#
- Registered credit card refill; *129*value*PIN#
- Registered credit card refill to OTHER subscriber; *129*mobile no*value*PIN#
- Unregistered credit card refill; *126*credit card no*valid to*value#
- Callback when roaming; *111*country-code, local no#. Caller first gets information about how long the call can go on, and then the callback starts.
- Bonus/Interest information; *113#
- Card validity time information; *114#

2.2 Service activation

- Activate/deactivate voice mailbox; *123*1/0#
- Activate/deactivate WAP service; *124*1/0#
- Select language of service messages; *122*language code#

2.3 Televoting

The network operator (operating the USSD/SMS Gateway) provides the service to all subscribers in the country, independent of which network the subscriber belongs to.

1. Subscriber sends SMS; to a mobile number sending the SMS to the SMS Gateway, text: VOTE.
2. The USSD/SMS Gateway picks up the subscriber no.
3. A text-menu with the possible votes is pushed to the subscribers display.
4. Subscriber makes his choice and pushes the SEND/YES button.
5. The USSD Gateway counts the votes.
6. A “Thank You” message ends the dialogue with subscriber.

2.4 M-commerce

http://www.entelpcs.cl/

The cost for these purchases is charged direct to the mobile subscription, both prepaid and postpaid!

Purchase beverages from the local Coke machine:

- Subscriber reads machine ID and drink code on the machine; *140*machine ID*drink code#
- The machine outputs the ordered can/bottle.

Copied from: http://www.entelpcs.cl/servicios/transaccion/cocacola/como.shtml

Beverage	Purchase code
Coca Cola	*140*989*1#
Coca Cola Light	*140*989*2#
Lift	*140*989*3#
Sprite	*140*989*4#
Sprite Light	*140*989*5#
Quatro	*140*989*6#
Fanta	*140*989*7#
Fanta Light	*140*989*8#

Purchase Metro tickets:

- Subscriber reads tariff and ticket printing machine ID on the machine; *tariff (115 – 118)*machine ID#

The machine outputs a printed ticket.

2.5 Information Service

The below service descriptions are directly copied from:

http://www.kcell.kz/en/services/infopark.html

The information is accessed thru a USSD menu-system. It is supporting both Latin and Cyrillic characters.

HOW TO USE THE SERVICE

1. To enter **InfoPark** please dial ***123#** at the display of your mobile (without getting into Menu), then press button **Yes/OK** (depending on the model of your mobile).

2. You will get the **Main Menu** as a response, each point will have the number:

1 Novosti (News)
2 Moj schjot (Balance)
3 INFO
4 Dosug (Leisure)
5 Igry (Games)
6 Nastrojki (Settings)

· You would like to get information on one of the points of the Main Menu - **please confirm your request by pressing «Answer» and Yes/OK (depending on the model of your mobile) > dial the number of the chosen point > send by pressing Yes/OK.**
For example: your choice – Dosug (Leisure), choose **«Answer»>press «4»> press «Yes/OK»**
· After you get the Menu of Dosug (Leisure) choose a sub point.
For example: your choice - Horoscopes, horoscopes are number 1 in the Menu, choose **«Answer»>press «1»> press «Yes/OK»**
· After you get the list of signs of zodiac, choose the one you interested in. For example: you are interested in Dyeva, in the Menu it is number 6. To get horoscope of Dyeva choose **«Answer»>press «6»> press «Yes/OK»**

Attention! If the information consists of more than 160 Latin letters or 70 in Cyrillic, it will be divided in few pages.

To **travel on multi-page text** please use the following commands:
1 **Dalyeye** - choose **Answer>1>OK** - list forward to the next page,
2 **Nazad** - choose **Answer>2>OK** - return to the page you have read.
After reading of the information, independent on the quantity of pages, you will have the following options:
1 **Nazad** - choose **Answer>1>OK** - return to the Menu (here – Horoscope),
2 **Receive SMS** - choose **Answer>2>OK** - receiving SMS, which afterwards can be saved and kept.

Return to the Main Menu by **Answer>*#>OK**

If you know the way to the requested page, you can make **bookmarks in your telephone book** where in series all numbers of Menu and options chosen to get the required page shall be indicated and separated from each other by star mark (*). The number shall be ended with #.
By using the bookmark you get to the required page by skipping submenus.
In the example with Horoscope Dyeva the bookmark will be the following: ***123*4*1*6#**

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3 Nobill™ USSD Gateway

The Nobill™ prepaid system, owned and developed by Symsoft AB, is a complete, IN based, prepaid system. The system is written in Java and takes advantage of modern SW technology, giving a system that is scalable, easy to modify, easy to partition and cost efficient. The system is based on experiences from several generations of IN systems.

The Nobill™ USSD Gateway is a part of the complete Nobill™ system containing the SS7 signaling parts, the user friendly GUI based configuration concept, the comprehensive operation and maintenance functions and the CORBA based interface to systems external to Nobill™. Since implementations of USSD and other SS7 protocols vary between the major vendors of network equipment, the possibility to adapt easily is an important feature in all components in the Nobill™ family.

The USSD gateway can easily be upgraded to also perform the function of a SCP, giving IN capability. This gives possibilities of running valuable services like USSD callback when roaming for Prepaid with charging in real time.

The Nobill™ USSD gateway supports the ETSI MAP USSD, GSM09.02 interface towards the HLR. The interface towards the nodes carrying the services is based on CORBA and uses TCP/IP communication.

The recommended system structure is to let the USSD Gateway perform the interface to the mobile network and convert the USSD to a protocol that is agreed with the maker of the Service Application System. Simple services which only require access to systems internal to an operator, e.g. account balance retrieval for prepaid can naturally be done in the Gateway node.

The Nobill™ USSD Gateway is configured using a modern and simple graphical user interface. The system contains comprehensive operation and maintenance functions with logging of events and possibilities for tracing etc. The system is interfaced from a client on a Windows PC. Since a standard database is part of the system, virtually unlimited possibilities are given for creation of reports and statistics.

The system can be easily adapted to interface with operator specific alarm handling systems.

SW maintenance of the system can be done from remote location thereby reducing lead times and cost.

The Nobill™ USSD Gateway can also be supplied with a billing interface. Configuration databases in both machines and is fully redundant. The capacity per node is approx. 200 USSD requests per second, where each request contains 100 bytes. A link load of 30% is calculated. The recommended system has double this capacity if redundancy is not required.

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