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A Critical Look of USSD Technology Adoption and Benefits

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Abstract: This paper tries to explore benefits that the mobile Telephone users and telecommunication stakeholders can derive from an existing mobile technology called unstructured supplementary service data (USSD).Usage of Mobile Phones has increased so tremendously to the extent that it has become part and parcel of mankind in the recent times. This paper goes further to elaborate to both the technical and non-technical users the primary benefits of USSD applications and also bring out the behind the curtain of this technology.USSD is known to bring out easy way of doing something and therefore this paper aims to exploit the features of USSD at the point of interaction with end users and paint USSD as the best technology to be adopted by telecommunication service providers so that it can accommodate both the illiterate and literate users and people far and beyond without much cost.

Keywords: USSD, Telecommunication, stakeholders, Mobile, Technology.

I. INTRODUCTION

UNSTRUCTURED Supplementary Service Data (USSD) is one of the recent time technologies which is integrated with GSM and has the power and capabilities in transporting information and data via GSM networks channels [1], [2],[3].This technology has made a big difference with the SMS technology where by real time connection is made possible and reality during a session.

Over the past few years technology in particular the telecommunication sector has made many steps forward in making sure that the information and data is transmitted from one end to the other so as to reach as many users as possible in a very fast and reliable way. This has enabled technology being embedded as part of us and also being relied upon by many end users in achieving and fulfilling their daily cores. Adoption and propagation of technology of any nature has become so fascinating and continues to evolve to greater heights and thus contributing in making devices like Mobile Phones, Ipad and computers to be of smaller sizes. In both the stronger thriving economies and third world countries handheld devices like Mobile phones among others is common to the citizens.

This has made various telecommunication players to reach out to more people through the Mobile devices .Putting in mind that technology is one the greatest today's business drivers. USSD through its advantages has brought change and attitude in the world of marketing, Banking ,recruitment and advertisement just to mention a few.USSD is mostly used in sending messages across a GSM network between a mobile client and an application server hosted by the network provider to offer certain services to the clients who are the end users. It operates much like SMS but its session-based and interactive nature distinguishes the two. Unlike SMS, it does not operate by store-and-forward and its turnaround re-sponse time is much shorter for interactive applications than it is for SMS [5], [6], [7]. This makes USSD much faster and very cost effective as it involves simple operations that are also handset independent (old handsets to most recent smart-phones can all access the service). USSD applications are characterized by menu-driven and interactive services and a request is invoked by dialing a number that is composed of asterisks (*) and hashes (#).

SMS technology was probably the first in the telecommunication industry but as the computing industry shifts to providing essential services on the mobile devices in an efficient and faster mannere.g. Mobile account top up, mobile money, USSD is becoming the easiest and quickest way to communicate with the service providers.

USSD technology is now known technologies that have facilitated the revolution and advancement in mobile devices. It has contributed very immensely in covering very large population since it is usable in any whatever mobile platform available. Unstructured Supplementary Service Data (USSD) is a protocol used by GSM cellular telephones to communicate with the service provider's computers. USSD can be used for WAP browsing, prepaid callback service, mobile-money services, location-based content services, menu-based information services, mobile account balance checking and top up, sports scores, and news and weather information and as part of configuring the phone on the network [4].

II. WORKING OF USSD TECHNOLOGIES

Unstructured Supplementary Service Data (USSD) is technology that can be built into GSM phones, and be accessed by end users much like the Short Message Service (SMS) .The sender who is the owner of the mobile phone sends the USSD information directly from his/her mobile gadget to an application platform offering the USSD service. It is worth noting that the USSD service can either be hosted in the sender's mobile gadget or in a visited mobile network providing the connectivity [4].

When this interaction between the sender and the application server is initiated, it allows messages to be exchanged between the sender and service providers or mobile service provider's up to to the end of their interaction when it is terminated [8].In the event that the communication between the sender and service providers is ongoing ,another different call which is active either from the sender or to the sender can also proceed since the two

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services uses different communication channels[7]. None of them will stop or stall for each other to be active.

During the operation of USSD between the user and the USSD application providers there is A real-time "session" which is usually initiated between the mobile user and the USSD application platform when the service is invoked, allowing data to be sent back and forth between the mobile user and the USSD application platform until the USSD service is terminated. This concept of a real-time data session is particularly useful if opting to build an interactive menu-driven application, such as a mobile-initiated "Balance Enquiry and Top Up" application among other services [4]. It is also clear to note that a USSD service could be either initiated by USSD platform or the Mobile user and this can be best described by USSD modes which are classified into two namely; Push service mode and Pull service mode.

The push service mode is where by the mobile network initiates the communication in which the USSD network platform provider sends message towards the Mobile user so long as the Mobile user is registered within the network. The providers then send a USSD string which contains operator determined information that's useful to the user. This string or command can be in the form of a request asking the mobile user to provide some information or notification. If the information is not in a position to reach the USSD platform then an error is returned to the network node that initiated the operation while in pull service mode, is where the mobile user invokes the USSD application provider hosted by a network. This is done when the user dials a certain code that's composed of asterisks (*) and hashes (#) and some digits in between them for example *266# as long as the Mobile user is registered within the network. USSD application providers then sends massage to the user who in turn responds accordingly be pressing an option and this leads to the USSD application provider to release the requested transaction or service to the mobile user as illustrated in figure 1 below. This process can continue if the mobile user is interested in another new service and the USSD application provider can terminate the operation abruptly if an application time expires and when that happens, a new invocation by the user to the provider is to be commenced provided the user is interested in more of the services from the network.

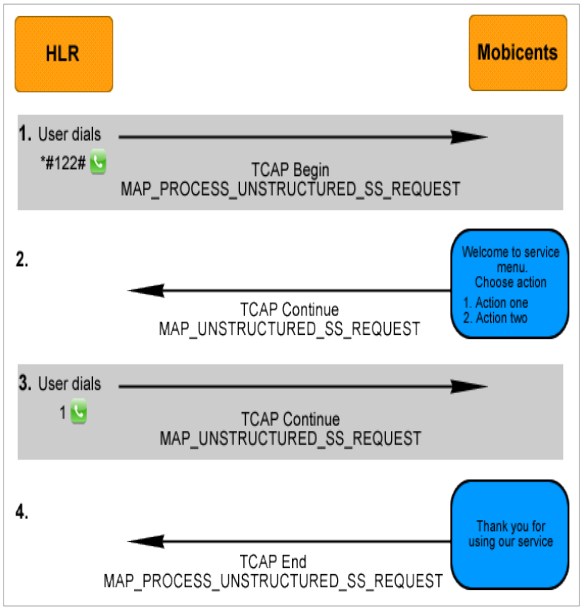

Figure 1: Mobile–initiated USSD operation (Pull operation) Source: www.mobicents.org

III. DATA SECURITY WITH USSD

USSD messages are not always stored in the user's handheld gadget for example a mobile phone making it more secure and data is also encrypted at the USSD gateway located at the network operators thus preventing misuse of the data. It is also worth noting that the GSM communication layer where forward and backward communication between the mobile user and USSD application providers is encrypted hence making the identity of the subscriber hidden. So it can be said that there is data confidentiality, mutual authentication and end–to-end security in all aspects that relates to USSD applications technologies being put to practice [8],[9].

IV. BENEFITS GAINED WHEN USSD TECHNOLOGY IS ADOPTED

Since mobile gadgets are being used by all almost everyone both in the developed and developing countries, it is more than a fact that the telecommunication sector players must now adopt and embrace this technology so that it can cover a wider population bearing in mind that it can be accepted by larger majority of mobile users because of its simplicity and very easy to use.

More services can now be deployed on the handheld gadgets thus making a USSD technology to easily accepted and adopted both service providers and mobile users. Examples of the services that can be rendered to the users on their mobile phones as long as they are registered with a particular network which plays the role of hosting the USSD application are Balance Enquiry and Top Up, bank balance enquiry, sports scores, news and weather information, reservation of trains and movies, voting or polling and currency updates just to mention a few. Some of the benefits that can be enjoyed when USSD technology is widely adopted include the following:

A. cost efficiency:

This is possible because USSD technology uses the existing SS7 protocols; therefore less investment is needed in the network hence, the capital expenditure (CAPEX) and operation expenditure (OPEX) are few. So this makes the adoption and use of USSD technology by service providers to be cost effective

B. Lower customer cost:

Telecommunication Operators can deploy a USSD-based self-care portal with a personalized, text-based menu to access a range of account-related tasks such as balance inquiry, refill account bearing in mind that USSD real time session increases response times and thus bolters higher quality customer interactions.

C. Lower marketing cost:

USSD is also a great marketing tool to the service providers in that it can reach as many users as possible. Operators can use USSD as a cost-effective way to maintain contact with prepaid subscribers, alerting them of new services with the "push" service. Operators can also use the unused character space in the balance inquiry response to deliver targeted marketing messages to prepaid customers in order to cross- and up-sell additional services.

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D. Platform independent:

USSD is neither a phone-based nor a SIM-based feature. It works on almost all GSM mobile phones (from old handsets to new Smartphone's).This enables to accommodate many users despite their position in the society. It is a technology that helps both the poor and the rich.

E. Faster communication between the mobile user and service providers :

USSD allows faster communication between users and network applications because messages are sent directly to the receiver allowing an instant response which is positive effect to the customers/users and can make them to continue using the same service for a longer period of time since there will be customer satisfaction.

F. Anywhere Everywhere technology:

This technology is one where by users can invoke USSD services available on their home network and are also accessible while roaming. Unlike SMS, there are no charges for this.

G. Accommodative and non- hindrance while being used:

With USSD technology, messages services can even be initiated even during calls, thus allowing simultaneous voice and data communication simultaneously to occur.

V. RECOMMENDATION AND CONCLUSION

It is evident that USSD technology is a powerful technology where Mobile users require neither additional software for the handset nor a special Subscriber Identity Module (SIM) card and also being utilized by them at no extra cost. This is a technology that should be used by almost everyone in the society despite the literacy level or social class in the society.

The future of USSD technology looks very bright and promising since any mobile user holding an old phone or smart phone can still enjoy the services of this technology.

Adoption of this technology by service providers enables them to gain competitive advantage over others, maintaining customer satisfaction and reducing the cost of expenditure that usually goes towards marketing and advertisement

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