Next Generation Mobile Care Solution

Jithesh Sathyan and Manesh Sadasivan
Infosys Technologies Limited
(jithesh_sathyan; smanesh) @infosys.com

Abstract
Customer care has evolved over the years. In the pursuit for cost effective options that would result in reducing the cost on maintaining a large customer support team, IVR was developed to provide automated response based on a selection made by the user. Though IVR did reduce the number of support staff, the use of an expensive communication line was not economical. The cost involved in IVR coupled with the need for self care strategies and increase in the number of mobile handset users lead to the development of mobile self care strategies. Current mobile care solutions mimic the IVR scenarios and only provide a mobile application which gives the response which was previously given by the IVR. The only difference is the visual interface rather than the audio response. This type of solution does not utilize the features provided by mobile technology in offering mobile based support.

This paper defines the logical architecture for the next generation mobile care solution that performs event based mobile care and proactive mobile care, in addition to the usual selection based care. Use cases are presented, from enterprise context as well as telecom service provider context on how best to offer mobile care. The paper also details the interactions with enterprise systems and gives an overview on the development of advanced features like voice based selection. The paper concludes with a discussion on the scope of future work, after detailing a strategy for implementation and the key factors to be considered while defining a strategy.

Keywords: Enterprise Mobility, Mobile Care, IVR Systems, Customer Support

I. Introduction

The statement, “Almost everyone has a mobile phone” is now a reality, with 90% penetration in developed countries and more than 50% penetration in others. The increase in popularity of mobile phones has led to enterprises adopting mobility as marketing channel and looking at using the technology to bring out cost reduction by automation of paper based field processes. Mobile care is a recent advancement that utilizes mobile applications to provide self support to the client, in addition to other techniques like IVR, 1-800 support line, e-mail, customer stores, etc.

The current mobile care solutions are more a set of stored datasets which are queried on demand similar to IVR, without any server side intelligence. Rather than a simple mobile app client to server communication, there is much innovation and rich customer experience that can be offered to the user. This paper details the next generation of mobile care solutions that are not heavy from the client side, yet can offer a host of value added features.

The paper is organized as follows to capture the current technique, proposed technique and future roadmap: First a brief description of the existing solutions for mobile care and their drawbacks are discussed. This is followed by describing the overall mobile care solution architecture. The critical factors to be considered while defining a strategy for mobile care are outlined. Several use cases are also discussed in the paper. The paper concludes with planned future work and trend summary.

II. Current Techniques

A. Webpage accessible using PC
Web based support is currently the most popular technique of providing customer care. Support is not limited to offering a help line number or web page to send mail queries. For example, a telecom service provider or an electric energy provider have a website where customers can log-in to see their bills, pay their electricity bills or top-up their subscription, see usage information, get product/service information, checkout offers etc. This gives a unique experience of control to the customer and helps
is getting information which was previously available only from a customer care executive or IVR.

Vendors have innovated on customer support by giving a focused approach to technical support and business support. In addition to web based support, some vendors also provide detailed manuals for customer self care as well as software tools that helps in configuration and troubleshooting. A common example is the configuration of modems from internet service providers. The software provided along with the modem can not only help in self set-up and configuration, but also has functionalities that diagnose the problems and provides the customer with inputs for troubleshooting problems. These type of technical issues usually required a phone call with the support desk or paying a field agent to configure the modem for the technical support service.

The use of technology has thus help in reducing the number of technical and business support staff required, by providing all information the customer requires at their finger tips, and accessible at the click of a mouse button. The support landscape has changed with innovations in mobile technology. The current functionalities available with mobile are discussed in the next section.

B. Mobile Care Solutions

Mobile based solutions are becoming increasingly popular in developing countries, with a majority of consumers also adopting trendy smart phones. Mobile care solutions were initially introduced as an extension of the existing web solutions, where the support pages can be viewed from the mobile device. With more than 58 million American consumers access the web via mobile devices, applying the rendering logic to respond to http request from mobile web browser and respond with a web page that suits the handset capabilities was the first step most enterprises adopted.

The rich look and feel offered by thick mobile applications, turned out to be more attractive to the customer compared to thin clients involving web pages viewed from mobile browser. Thick apps were more user-friendly and now most telecom, energy & utilities service providers and enterprises in different domains are offering mobile care applications.

When credit card transactions are also involved, like paying bills or paying for a product or service, some of the mobile security standards like PCI DSS needs to be followed. Since mobile support solutions are consumer applications that need to be published in App Store and require certification from platform vendor, it is a common practice to develop hybrid applications where the key security functions can be managed from server side with minimal security on mobile device. In hybrid mobile support application, the usually thick client app, which queries the backend web services for regular support capabilities, will embed a thin client web page in the application for entering payment details and doing financial transactions. This way the embedded browser provided by the mobile platform handles security transactions making the service more reliable.

III. Proposed Next Gen Mobile Care Solution

Figure 1: Block view of mobile care solution

The next generation mobile capabilities can be classified under 3 categories:
- Classic Selection based care
- Event based care
- Proactive care

The internal components of the mobile client and mobile server shown in figure 1 are discussed using the three categories of mobile care capabilities and the mobile server integration is discussed separately.
A. Classic Selection based care
The classic selection based care is the current support capability provided by enterprises and telecom operators using mobile applications. This category provides the information that can be usually obtained from IVR. That is the user selects an option to get details about a specific product, or uses some other option on the mobile application to see the account balance, etc. The application works on a pure request-response model, where a single feed/selection or a combination of current and previous selection as in IVR will trigger a query to the mobile middleware server to get the required data.

Next let us look into the component level interaction to make this possible. The “UI Query Manager” on mobile application gets input from the “UI Feed Handler” on the server. The UI Feed given by the server in response to client query can be a standard UI based on user’s last selection or the “UI Feed Handler” can work on multi feeds. The feeds to client can be based on:
• the user’s last selection
• the result of the processing from intelligent center or client on a previous selection from user
• the last selection made by user

The “UI query manager” displays: Options/Data to be entered by user as in classic IVR. Data/Options can be entered using keys, touch or voice. The “UI query manager” sends data to “UI Feed Handler” to exchange data with classic IVR, trigger actions using OSS/BSS or send data to middleware server that interacts with enterprise systems. The data processing, business logic and co-ordination between modules for enabling mobile care based on selection are managed using UI Feed Handler.

B. Event based care
The event based care is a key capability that needs to be implemented in next generation mobile care. It has a range of features that can enhance the customer experience. The basic technique used here is to build an event engine on the server side and an event capturing system on the client side. “Event Manager” on mobile client performs the function of responding to predefined events triggered from “Event Handler” in Server, which handles the business logic for generating triggers. Let us see some sample scenarios on event handling:

• When call is disconnected due to low account balance, the Mobile app launches the App GUI login screen with message of insufficient balance. The message can be text, voice or both
• When an item in the shopping page is out of stock, the Mobile app GUI is launched, giving alternate items that can be shopped, place a pre-order, give details on other stores where same product is available, etc
• When the user spends more than a predefined time in front of an item while in a store, a customized offer/coupon that lures the customer to make an impulse buy of the specific item is presented.

The set of trigger events are customizable on the server using the Server GUI which updates the “Event Feeder”, “Event Feeder” also takes input from external databases for feeding data for cross selling, product marketing, etc which only require scheduling and does not require any context based business logic from “Event Handler”.

Some of the key capabilities that can be offered using event based care are:
• Event based Information as text/voice
• Cross selling
• Product marketing
• Customized experience
• Context based service
• Virtual Assistant

Unlike classic selection based care, event based mobile care does not require the user to make a selection.

C. Proactive care
The distinct feature that makes this third category different from the others is that no selection is required and it is not an immediate response to a pre-defined event. Proactive care is intended to provide corrective / preventive / improvement actions to offer better customer service.

The “Intelligent client” on mobile application collects information about the mobile user’s usage patterns and interests to provide enhanced care to the user. Some of the data collected by the intelligent client and the proactive care that can be offered are discussed below:
• Time spend on a specific page/banner to get product/service information - Can be used to
identify the cross selling options available and to be added as part of event based care.

- Specific products that are of interest to the user as shown from frequent visits – Can be used in planning new product/service strategies or to check the effectiveness of a new promotion
- The functionality in the mobile app that is most frequently used (like balance check) – add a quick check icon to get most frequently queried details
- The area from which most errors are getting reported - might indicate problem in specific gateway or network node

Data collected by intelligent client is feed to the intelligent center, where the data is processed and corrective / preventive / improvement actions are triggered to middleware, IVR or OSS/BSS systems. This is not a completely automated activity. While some level of automation can also be added in data collection as well as processing to present meaningful data for quick decision making. Analysis of data from intelligent client and center will lead to better event and selection management. Proactive care using mobile is also an essential next generation functionality.

D. Mobile Server Integration

Each of the systems with which the mobile server integrates can have a set of subsystems as shown in figure 2. An overview of some of the subsystems in each of the systems is discussed to add clarity of the capabilities that can be utilized in mobile care.

In Telco service system, the SDP (Service Delivery Platform) can provide customer location information, for location based service, it can have a charging engine to get and update account related information. Other examples of subsystem in Telco are SMS and USSD, both of which can be used to provide mobile care. SMS Gateway can be used to send details of product/service offers and USSD can be used for getting message pop-ups like the charges from the last call placed, the amount debited for downloading a song, etc. The subsystems with which the mobile care server has to integrate from Enterprise system is dependent on the product/service for which mobile care is offered. Some of the minimal enterprise subsystems include the web services for mobile commerce transactions for the specific product or service.

Product information, mobile shopping and mobile customer account management are shown as some examples in figure 2. When the mobile care solution supports voice based selection, the IVR service interfaces can be re-used while developing the mobile care solution. The IVR solution offers a tight integration with Contact Center modules which could also be utilized. The OSS/BSS subsystem integration is important to offer event based and proactive care. The customer can have the capability to restart or re-configure a service, or corrective action based on events can be triggered to OSS/BSS systems.

![Figure 2: Mobile Care Server Integration](image)

IV. Mobile Care Strategy

The availability of multiple mobile channels like SMS, USSD, IVR, GPRS, etc gives the telecom service provider a unique opportunity not just to develop mobile care solutions, but also to offer a platform where the service provider’s enterprise customers can develop and deploy mobile care solutions. This mobile care platform offered by the telecom service provider will have capability to develop apps that interface with the different telecom services for rapid development of feature rich apps, which are cost effective for the enterprise and also yield huge revenue to the service provider due to the maturing mobile care market. Such a platform offered by the Telco will also have a huge demand for SMB (Small and Medium Business) segment. 15 key factors
that are critical in strategy definition for Telco and Enterprise mobile based customer care are discussed below. A detailed analysis needs to be performed by aligning these factors to enterprise or Telco service provider requirements.

i. Multi Platform Support
Considering that mobile care solution is a consumer application, multi platform support is an essential functionality. For Telcos it is suggested to target their top 100 mobile handsets or top 80% in the initial launch and for enterprises it is suggested to target iPhone, Android and Blackberry in initial launch. The devices supported needs to be extended over multiple phases to incorporate additional platforms covering at-least 80% of the target consumer segment.

ii. Application Type
The application type needs to be determined as part of the strategy. Thick client, thin client, hybrid, simple SMS or USSD, etc are the application types. The usual approach is to launch all these types, starting with the common SMS and USSD, followed by thin application for view on web browser. This is followed by thick apps or hybrid apps and finally for Telco service providers that provide SIM, STK (SIM Tool Kit) based apps. Combination of these apps is also possible to provide a packaged mobile solution.

iii. Deployment
The typical deployment options are:
- Enterprise Deployed – The mobile middleware infrastructure is owned and maintained by the users itself
- Single Client Hosted – A hosted service provider (can be a Telco) offers a single mobile middleware instance for each enterprise. Subscription based cloud.
- Multi Client Hosted – The A hosted service provider (can be a Telco) uses same mobile middleware instance to support multiple enterprise/SMBs. Subscription based cloud.

The type of mobile application, the platforms to be supported and future enhancement roadmap, plays a key role in deciding the mobile middleware vendor or the cloud service provider selected for implementing the mobile care solution. Since mobile server instance needs to support multiple platforms, a mobile cloud platform is required and not a regular cloud computing platform.

iv. Functionalities
The functionalities that needs to be achieved and when it has to be made available is a key input in defining the strategy. Most mobile care solutions first replicate the selection based approach currently offered in IVR and web based solutions, before adding the capabilities of event based and pro-active care.

v. Comprehensive Security
Security is a key concern especially because the mobile care server integrates with so many critical systems. A comprehensive security framework is suggested. Since the mobile care solution can also involve account recharge and product purchase, all security considerations in mobile commerce are applicable in mobile care security implementation.

Figure 3: Mobile Care Security Components

vi. COTS vs Custom Development
COTs involves use a middleware that supports multi platform development while custom development involves development for specific platforms and porting using cross platform build tools if required. There are several middleware platforms offered by vendors like Sybase, Kony Solutions, Antenna, Netbiscuits, etc as well as tools like J2ME polish, Cognito, Vaultus, etc. The right choice of platform and tool is based on the specific requirements in platforms to support, back-end integration, UI features required, etc. A detailed vendor evaluation based on requirements is to be performed before selecting a specific vendor.

vii. Device Diversity Testing
While middleware solutions address the challenge of multi platform development, device
diversity testing is done either using an in-house lab where specific smart phones categorized based on platform version is used, in which case a staged test strategy for each platform needs to be defined, or multi platform test services offered by vendors like DeviceAnywhere is used. Test platforms like DeviceAnywhere allows testing on a wide variety of handsets without the need to own the devices on which the mobile app is tested

viii. Network Optimization
Mobile thick apps and web solutions need to be optimized to ensure quick delivery of quality content. The issue most mobility architects face is to add mobile as an additional channel when the back-end web based system is already having a lot of latency. Running a separate web server instance for responding to request from mobile devices is a common practice in most enterprise. The backend integration systems also need to be optimized to handle more requests.

ix. On Demand Scaling
The potential for significant increases in mobile content views and request to server needs to be estimated and the middleware hosting / deployment environment should be able to scale to peak demands. For enterprises this may not be a major issue due to limited user per unit of time. However for Telco customers that offer mobile care as a platform for other enterprises, on-demand scaling is a keep factor to be incorporated in the strategy.

x. Leverage Mobile Capabilities
Mobile applications have the capability to work in offline mode when there is no connectivity. The device capabilities like camera, blue tooth print, touch, tilt, scroll etc, needs to be effectively utilized in delivering a unique experience to the customer.

xi. Well Designed UI
Rich UI is a winning for all types of consumer mobile apps and mobile care solution is no exception. Wireframes should be analyzed for look-and-feel, ease of navigation, etc.

xii. System Scalability
The mobile solution should be scalable to support system upgrades involving functionality enhancements or support for additional mobile platforms without changing the overall architecture. The integration interfaces should also ensure re-use.

xiii. Smooth Integration
The mobile server has to integrate with multiple subsystems. This should be a key factor in evaluating the middleware platforms and tools to be used in developing the mobile care solution. Most mobile platforms support integration with interfaces like Web service, Oracle, SAP, etc

xiv. Mobility Roadmap
The mobility roadmap needs to account for technology enhancements, possibility of opening up the mobile care platform for use by other enterprises or partners, possibility of extending the platform to support enterprise apps and customer apps other than mobile care. A short term strategy to achieve current perceived goals and a long term strategy on all possible use cases with the current platform needs to be prepared.

xv. Right Partner
Choosing the right mobile partners for solution development, middleware and defining a business roadmap is also important to address the technology complexity and long term business goals

V. Conclusion
Mobile industry is evolving rapidly and enterprises are coming up with new compelling mobile apps to enhance the customer base and provide better experience. Mobile care solutions are going to be an essential offering from enterprises. This paper presents the next generation of mobile care solutions with functionalities that are to be offered in mobile care, rather than a simple replacement to current IVR solution. As mobile care is still in the stages of early adoption, the essential factors that need to be considered in defining a business strategy acts as a guideline for introduction of mobile as an additional channel for customer care.

REFERENCES
[1] Security Study of Mobile Business Based on WPKI; Longyi Li Lihua Tao Dept. of E-Bus., South China Univ. of Technol., Guangzhou, China; Eighth International Conference on Mobile Business 2009