Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 3, Issue. 1, January 2014, pg.125 – 132

RESEARCH ARTICLE

Mobile Web Services Invocation System Using SMAP

Prof. Deepak Kapgate
Dept. of Computer Science and Engineering
G. H. Raisoni Academy of Engineering and Technology,
Nagpur University,
Nagpur (M.S.), India
deepak.kapgate@raisoni.net

Monali Khune
Dept. of Electronics and Telecommunication Engineering,
G. H. Raisoni College of Engineering,
Nagpur University,
Nagpur (M.S.), India
monalikhune@gmail.com

***Abstract*- This paper presents an experiment relative to the use of short message application protocol (SMAP) to provide framework for mobile applications accessing Web Services. Here author refer to the most common architecture used to invoke Web Services, where a client and a server exchange short message application protocol (SMAP) messages provided by short message service (SMS) technology. To guarantee the independence of the application from the type of communication channel used, the paper deals with the problem of designing a framework allowing a Java application to directly interface Web Services from a mobile device using a short message application protocol (SMAP). In this system author has developed an application server called SMS server to accept end user information via short message service (SMS), access that information for user from internet and send it back in form of short message service (SMS) messages. Application server is connected to internet to access user data and send this information to end user's mobile phone. Sending and receiving short message application protocol (SMAP) is done by SMS server.**

***Keywords* - GSM modem; AT commands; smart phone; Short Message Service (SMS); web service; short message application protocol (SMAP).**

I. INTRODUCTION

The main concept behind this system is to design the framework that would enable to access the web services from a mobile device through a short message service (SMS) technology [10] [11] [12] [13]. In simple words user sends query/commands to server in form of short message application protocol (SMAP) messages and server then sends the appropriate reply of that query/command. As the SMS service is almost free and easily manageable so that can be used anywhere and everywhere. It will mainly reduce the tedious task of reading unwanted data on webpage and getting actual data [18].

© 2014, IJCSMC All Rights Reserved

General working:

- there should be one server and many clients
- SMS Server is used to activate and deactivate SMS services.
- GSM messenger connects GSM modem to main application through the communication port.
- Clients must have to register first to the server.
- Server keeps all the record about user e.g. user id, name, email, mobile no.
- Server keeps proper log record of queries and responds to user according to their request query.
- Server is connected to the internet from where it fetches data.
- Server keeps all record of user according to groups, records or feeds etc.
- Auto response management at server used to implement reply the registered queries which are mostly used by user.
- Server can read incoming messages from user e.g. user login request, query request.

The software framework provides facilities of accessing web services like email, cricket score, surfing data on web etc. to user through short message service (SMS) technology. Server who provides this facility keeps all the record of user, queries and activities performed [16]. Author used the most common architecture used to invoke web services where a client (mobile user) and a server (application server) exchange short message application protocol (SMAP) message using GSM modem as the interfacing device [23] [21] [14].

II. OVERVIEW

In this system author developed an application server to accept end user information via short message application protocol (SMAP) messages, access requested data for user from internet and send it back in form of SMAP messages. The server will accept user id and password from end user. User request particular data by sending appropriate command. If user is not authenticated then reply will not be sent to that user. Sending and receiving short message application protocol (SMAP) messages is done by SMS server (figure 1). Application server is connected to internet to access data like emails, access files, download RSS/XML feeds etc. and send this information to end user's mobile phone. Application server setup is computer interfaced with a GSM modem. This GSM modem will be used to send /receive messages to/from clients. Information contained in incoming messages can be used to access clients account/database. Additional data (i.e. information about first five emails, subject, data, time, size and attachments if any) will be sent to user to decide what must be demanded next. The data to be sent will be broken down into small parts limited to message size (160 char only) and transferred to mobile device. Paper is not using dedicated short message service (SMS) gateway [7] [5] [3] [1], so the overall implementation is very cost effective.

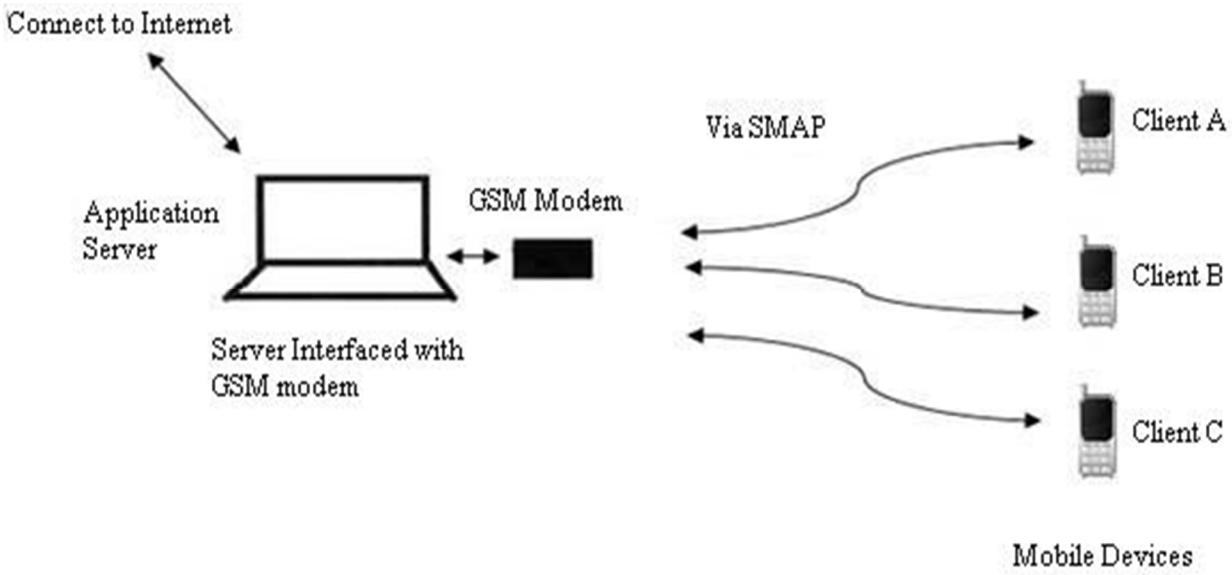

Fig 1: Overview of system

© 2014, IJCSMC All Rights Reserved

III. LITERATURE SURVEY

System acquired a framework allowing mobile device application to directly interface Web Services using a SMS technology. This system makes multiple users can access web services through single server using short message service (SMS) simultaneously. The similar work is done by Vincenzo Auletta et. Al. [22] where they created the system which uses Bluetooth wireless technology to provide network support for midlet applications accessing Web Services, the most common architecture used to invoke Web Services, where a client and a server exchange SOAP messages using HTTP as the transport protocol. In 2010 Lin Shil et. Al. [8] [15] [20] [17] proposed a semantic extension framework for the web service, and shows the matching algorithm of each layer and the expecting factor. Comparing with current OWL-S, WSMO and other frameworks, a new lightweight semantic extension framework for web services were proposed, which is founded on the syntax structure of XML and the 3-layer frame of OWL-S, which can be compatible with the current web service and UDDI.

V. Goyal in [10] stated that asynchronous web services invocation increases efficiency and enhances performance issues, but they are problematic for reaching mobile phone using HTTP. Hence Ranjit Sing et. Al. [11] proposed an efficient asynchronous mobile web service framework by sending the SOAP response to mobile using short message service (SMS). This can be a very good framework assuming that mobile devices can always send and receive SMS messages and the SMS messages will usually not be delayed or lost. In their [11] work they have used short message peer to peer protocol (SMPP) for invocation of web services which is an open industry standard messaging protocol designed to simplify integrating of data application with wireless mobile network such as GSM, TDMA, CDMS and PDC. As SMPP is designed for simplification of integration of data application, the web service invocation over SMPP is tedious and complex process which requires large computing power and battery. As web services required a lot of data to be transformed and received. So, to overcome this author used here short message application protocol (SMAP) [11] as it is a set of abstract XML operations specifically designed for short messaging. The experimental result shows that it reduces an overhead required for large data transfer to great extent.

IV. SOFTWARE REQUIREMENT SPECIFICATION

A. Software Requirements

- Operating System like WINDOWS 7,windows XP, LINUX , MAC OS for application server
- The Sun Java Wireless Toolkit (formerly known as Java 2 Platform, Micro Edition (J2ME) Wireless Toolkit)
- PC based data collection, analysis module.
- IDE to write and program the Trans-receiver assembly for ex. Net-Beans 6.9 (IDE) for Java.
- GUI - AWT & SWING are used for GUI design.

B. Hardware Requirements:

- A machine (PC) with 256 MB memory, HDD, serial ports USB 2.0, etc.
- GSM modem: - GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. A GSM modem exposes an interface that allows applications such as to send and receive SMS messages over the modem interface.
- USB to Serial Cable
- User mobile Handset with subscriber identification module (SIM).

C. AT Commands

AT commands are instructions used to control a modem. AT is the abbreviation of ATtention. Every command line starts with "AT" or "at". Many of the commands that are used to control wired dial-up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state), are also supported by GSM/GPRS modems and mobile phones. Besides this common AT command set, GSM/GPRS modems and mobile phones support an AT command set that is specific to the GSM technology, which include SMS-related commands [19] like AT+CMGS for Send SMS message, AT+CMSS for Send SMS message from storage, AT+CMGL for List SMS messages, AT+CMGR for Read SMS messages, AT+CGM1 for Name of manufacturer, AT+CGMM for model number, AT+CGSN for IMEI number (International Mobile Equipment Identity).

© 2014, IJCSMC All Rights Reserved

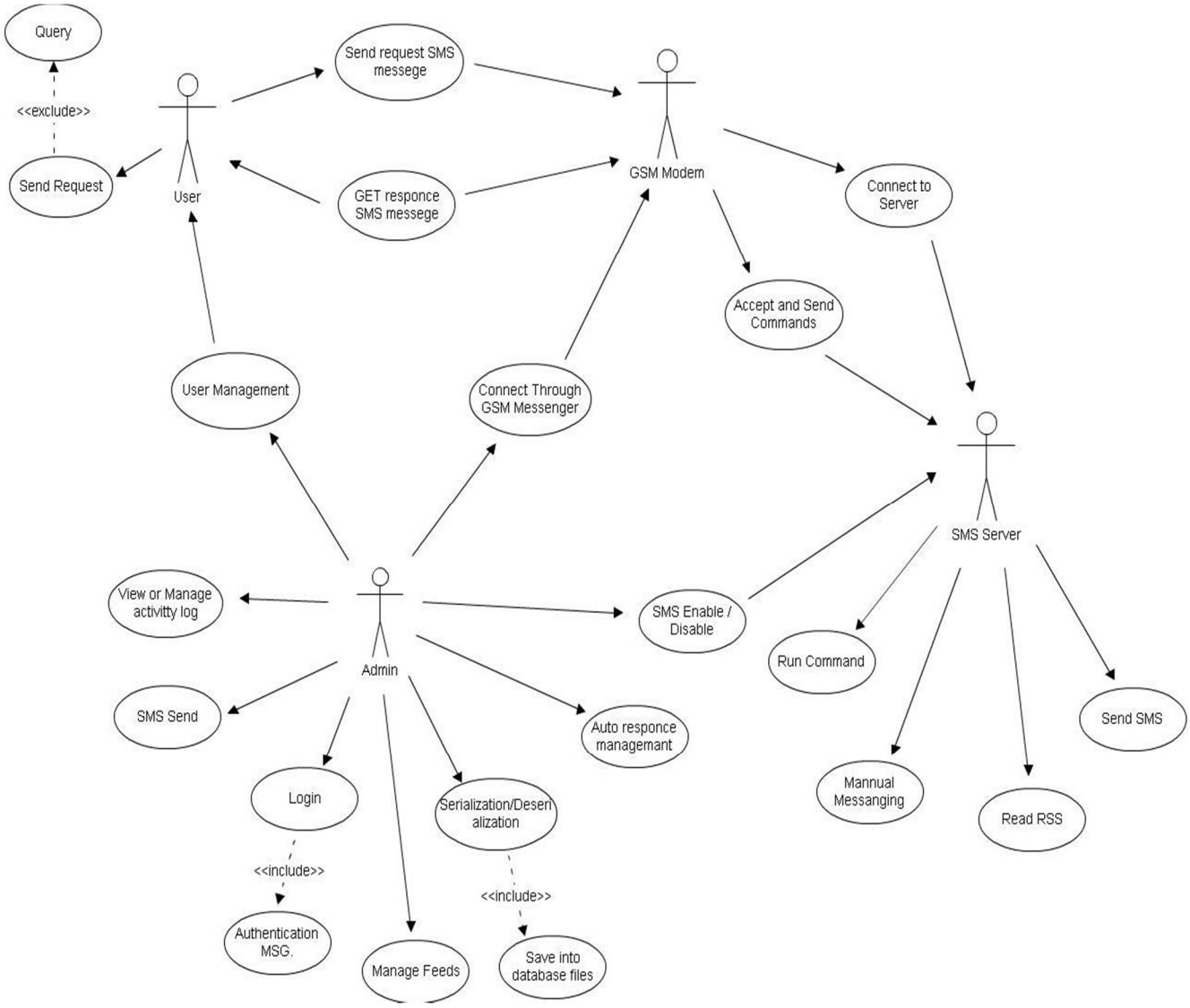

Fig 2: Use Case Diagram

V. ARCHITECTURE

In figure 2, as shown above the user send request for SMAP message to the GSM modem and got response from GSM modem with SMAP message. The users request mostly consists of query. GSM modem is connected to SMS server which is responsible for accepting and sending commands to the SMS server. SMS server is also responsible for running commands, manual messaging, reading RSS and sending SMAP messages. Administrator is a central controller of user, GSM modem and SMS server. Administrator is responsible for management of user logs and account. Administrator controls GSM modem through GSM messenger. Administrator also has right to enable or disable SMS server and he is responsible for activity log management, broadcasting warning messages in the form of SMAP messages to clients, managing feeds, database management and updating and auto response management.

© 2014, IJCSMC All Rights Reserved

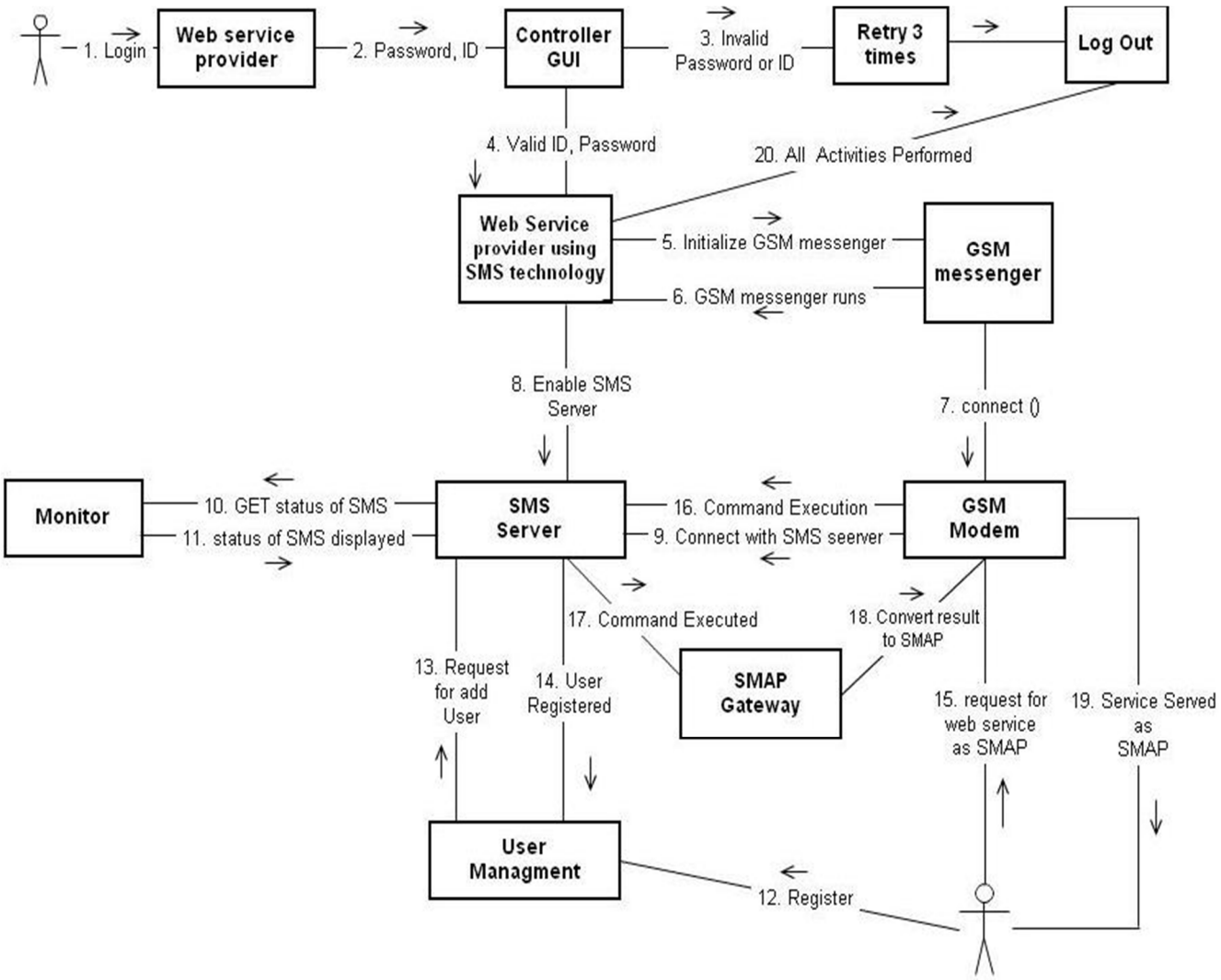

Fig 3: Collaboration Diagram

As shown in (figure 3) the collaboration diagram shows the messages and operations that classes within a system must support in order to perform some desired behavior or functionality and the association that must exist between classes to enable the message flow among them. As shown in the diagram the controller of system resides in the centre. The initialization of system involves initialization of GSM messenger, SMS server and setting communication protocols [9]. Initialization of GSM modem fallows by the execution of 'connect ()' command which in turn starts GSM modem. Then GSM modem connects itself with SMS server. First checking of status of earlier sent messages is done with monitor. The communication between the user and system involves GSM modem, SMS server and SMAP gateway.

VI. IMPLEMENTATION DETAILS

In system implementation application is implemented in following modules:

6.1 Module A:

In first module consist of implementation of Administrator which is the main part of the system which monitors the overall function. Following task are carried out by administrator.

1) Send SMS: - This operation used to send SMAP massages to any mobile No. User has to enter mobile no. and message. If message is long enough i.e. more than 160 char then it is to be sent in multiple messages.

2) Read SMS: - Any incoming Message can be read by this function.

© 2014, IJCSMC All Rights Reserved

3) Auto response management: Special feature of admin, if any query has fixed reply then it must be added to this feature.
4) Mail send test: Used to send email to entered address.
5) Admin mobile numbers: List of admin mobile nos.
6) SMTP server and SMTP ID: Address from where all the mails are sent to the users.
7) Login password: Admin login password is used to login for server.

6.2 Module B:

In this module the construction of GSM Massager is done which carries fallowing functions.

1) Connect administrator and SMS server.
2) Selection of communication port to initialize the connection.
3) 6 stage to initialize :-
    - Initialize AT (Atten)
    - Initialize Check
    - Initialize Signal Strength
    - Initialize Setting text format
    - Initialize Message centre no
    - Initialize Immediate response
4) Use AT command for execution

6.3 Module C:

In this module the construction of SMS server is done which carries fallowing functions.

1) Send to self: - Send SMS message to admin mobile no. used for testing.
2) Monitor: - Display info about status of SMAP messages.
3) Activity Log: - Displays various activities carried out.
4) Commit: - Save all the activities in activity database.
5) Send log:- Log is sent to the admin email ID
6) Enable /Disable: - Enable or disable the SMS server.

6.4 Module D:

In this module user and database management system are developed which carries fallowing functions.

1) User Management:-Manages contacts, groups, feeds, profiles, registration of user.
    a) Manage contacts: - Manage contacts of user registered. Include name, mobile no, email id. Save in user database.
    b) Manage group: - Manages users with formation of groups. Under various groups like college, hometown, family etc.
    c) Register new user: - New user registered, Checks availability of user id, save data in user database.
    d) Manage feeds: - RSS feeds managed by this feature for particular contact.
2) Database Management
    a) User database: - All user information include user ID, Name, Mobile no, Email ID, Password.
    b) Activity Database: - Various activities carried out by the user saved in activity database. Displays date/time, User ID, and activity carried.
    c) Query database: - Query database includes all query information. Both types of queries i.e. user accessible and admin controlled queries.

© 2014, IJCSMC All Rights Reserved

VII. CONCLUSION

This paper presented the concept how short message service (SMS) technology using short massage access protocol (SMAP) can be used to access web services. In this system GSM modem establishes communication between server and mobile clients. AT commands are used to control the modem. In this system it is possible for many clients to access internet services through single server. This leads to boon for the people having less proficiency for accessing internet and for those people who resides in the remote places.

The scenario discussed in this paper is such that there is one fixed server and other mobile devices. The concept presented here may be extended to case where two or more mobile nodes want to access web services of each other. The system can further be enhanced to overcome limitation of the SMS size. Future work may include use of short message service for invocation of multimedia web services on mobile devices.

VIII. ACKNOWLEDGEMENT

The author is thankful to Dr. Preeti Bajaj, Director G. H. Raisoni College of Engineering, Nagpur for moral encouragement and providing necessary facilities.

REFERENCES

[1] Zhenyu Wu, Timo Itälä, Tingan Tang, Chunhong Zhang, Yang Ji, Matti Hämäläinen and Yunjie Liu, "A web-based two-layered integration framework for smart devices" , EURASIP Journal on Wireless Communications and Networking 2012 Springer , 2012 : 150, pp. 1-12, 2012.

[2] Byoung-Dai Lee, "A Framework for Seamless Execution of Mobile Applications in the Cloud", Recent Advances in Computer Science and Information Engineering Lecture Notes in Electrical Engineering, , Volume 126, pp. 145-153, 2012.

[3] David Corsar, Alison Chorley and Wamberto W. Vasconcelos, "Web Service Composition via Organisation-Based (Re)Planning" , Declarative Agent Languages and Technologies IX Lecture Notes in Computer Science, Volume 7169, pp. 128-148,2012.

[4] Ma. Kevin J., Xu. Jianguo, Ng. Tung, Nair Raj, Lin Ichang, Li Man, "LIVE STREAMING MEDIA DELIVERY FOR MOBILE AUDIENCES" ,United States Patent Application 20120011267,Application Number: 13/233831, Publication Date: 01/12/2012, Filing Date: 09/15/2011.

[5] Priya, R.; Dhavachelvan, P., "Assessment schemes for information availability in Mobile based Web Service environment", IEEE International Conference on Recent Trends in Information Technology, pp. 531 – 536, 2012.

[6] Dejan Kovachev, Yiwei Cao and Ralf Klamma, "Building mobile multimedia services: a hybrid cloud computing approach" , Multimedia Tools and Applications,2012.

[7] Norfizah Mat Nor, Muriati Mukhtar, Yazrina Yahya, "User Satisfaction of the mySMS Service: A Value Co-Creation Approach", International Conference on Electrical Engineering and Informatics, Indonesia, 17-19 July 2011.

[8] Lin Shi; Yu-quan Zhu; Hao Xue; Shou-kun Xu; Ning Li; Zheng-hua Ma, "A lightweight semantic extension framework for web services", IEEE International Conference on Intelligent Computing and Intelligent Systems (ICIS), Volume: 2, pp. 138 – 142, 2010.

[9] AlShahwan, F.; Moessner, K., "Providing SOAP Web Services and RESTful Web Services from Mobile Hosts", International Conference on Internet and Web Applications and Services, pp.174 - 179, 9-15 May 2010.

[10] Varun Goyal, "Web Services in Mobile Devices", technical report, computer notes, Computer Science Department Rochester Institute of Technology Rochester, NY, USA.

[11] Ranjit Singh, Shakti Mishra, and D. S. Kushwaha, "An Efficient asynchronous Mobile web service framework", SIGSOFT Softw. Eng., Volume no - 34, issue - 6, pp. 1-7, 2009.

[12] Yeon-Seok Kim and Kyong-Ho Lee, "A lightweight framework for mobile web services", springer Web-Services - Architecture and Infrastructure, volume – 24, issue – 4, pp. 199-209, 2009.

[13] Chaoxiang Chen, Jianlong Ding, Guanping Hua, Yourong Chen, "Design and Implementation of SMS Employment Agent Based on Ontology", IEEE World Congress on Software Engineering, pp. 489-492, 2009.

© 2014, IJCSMC All Rights Reserved

[14] Jiang, M.; Zhihui Yang; Athale, A, "A Model-Based Approach to Implementing Real—Time Mobile Services", IEEE International conference on Computer Software and Applications, pp. 1193 - 1198, July 28 2008.

[15] Jing Li, Dianfu Ma, Lusong Li, Hong Zhu, "AADSS: Agent-based Adaptive Dynamic Semantic Web Service Selection", IEEE International Conference on Next Generation Web Services Practices, pp. 83 - 89, 2008.

[16] Samir Saklikar and Subir Saha, "Identity Federation-based Mobile Messaging", IEEE CCNC, pp. 122-126, 2008.

[17] Zhao, Wenbing, "A Lightweight Fault Tolerance Framework for Web Services", IEEE/WIC/ACM International Conference on Web Intelligence, pp. 542 – 548, 2007.

[18] Yeon-Seok Kim and Kyong-Ho Lee, "A Light-weight Framework for Hosting Web Services on Mobile Devices", IEEE European Conference on Web Services, pp. 255-263, 2007.

[19] Chaitali Gupta, Rajdeep Bhowmik, Michael R. Head, Madhusudhan Govindaraju, Weiyi Meng, "A Query-based System for Automatic Invocation of Web Services", IEEE International Conference on Web Services, 2007.

[20] Changho Lee, Jinhan Kim, Jaejeong Lee and Byungjeong Lee, "Evolving Web Service Applications using UML and OWL-S", IEEE International Conference on Convergence Information Technology, pp. 1247- 1252, 2007.

[21] Tergujeff, R.; Haajanen, J.; Leppanen, J.; Toivonen, S., "Mobile SOA: Service Orientation on Lightweight Mobile Devices", IEEE International Conference on Web Services, pp. 1224-1225, 9-13 July 2007.

[22] Auletta, V.; Blundo, C.; De Cristofaro, E.; Raimato, G., "A Lightweight Framework for Web Services Invocation over Bluetooth", International Conference on Web Services, pp. 331 – 338, 2006.

[23] Zheng Li, Yan Jin, Jun Han, "A Runtime Monitoring and Validation Framework for Web Service Interactions", IEEE Australian Software Engineering Conference, 2006.

© 2014, IJCSMC All Rights Reserved