

Data Communication in Ad-hoc Network: The challenges and issues

Mr. Nitin V. Wankhade¹, Dr. S. P. Deshpande²

Assistant Professor (P.G.D.C.S.T., D.C.P.E., H.V.P.M., Amravati-MS, INDIA)¹

Associate Professor and Head (P.G.D.C.S.T., D.C.P.E., H.V.P.M., Amravati-MS, INDIA)²

ABSTRACT: The mobile users are increasing with a tremendous speed and users of mobile are expecting extensive value added services apart from the basic communication between the mobile users. Data communication in mobile has many challenges and the effective data communication shall support the mobile users in exploiting the different facilities through this ad-hoc network. This paper presents the different approaches for data communication in ad-hoc network used for mobile and also presents the threats, challenges and issues in this type of data communication.

Keywords: Data Communication, mobile database, mobile database communication, mobile ad-hoc network.

I. INTRODUCTION

Ad-Hoc network is a self-organizing multi-hop wireless network, which relies neither on fixed infrastructure nor on predetermined connectivity. The mobiles in current state of technology use ad-hoc wireless networks. It supports wireless communication and the mobile users are roaming from cell to cell. The switching centre located centrally takes care of the data communication in this network. The data accessed through mobile devices is mainly from the database stationed at permanent site located centrally and accessed through Mobile Switching Centre; this database is called Mobile Database.

The term “mobile database” does not necessarily mean that the database itself is mobile. Actually there exist a centralized and distributed mobile database architecture where some data is present at the central server and other data is present at mobile nodes [1].

A mobile database is a database that can be connected to by a mobile computing device over a mobile network. The client and server have wireless connections [9]. The mobile database can be defined as a database that is portable and physically separate from a centralized database server but is capable of communicating with server from remote sites allowing the sharing of data [10]. In current state of technology the database are accessed by providing Basic setup of a mobile environment can be thought of as consisting of a Mobile Service Station (MSS) and a number of Mobile Hosts (MH) which acts as clients. Each MSS has a physical area that it can serve, called its cell. Mobile hosts connect to MSS which in turn connects to the actual database server for answering queries [4]. In this data communication there are two

serious issues 1. The database is located centrally at a permanent site, 2. The database engine works at the database server. The mobile user send his request generally through either application or SMS to the database server, which forms a query to incorporate and serve the user requirements, executes it and satisfy the request [11].

As the mobile users are expecting many different types of services through the mobile network, many researchers have undertaken this problem for study and devised different approaches for data communication in mobile networks to empower the mobile as powerful device several services. The database used in such application is called Mobile Database but do not possess mobility in the network. The database system developers have developed light versions of database management systems which reside in mobile device and thus possess mobility in the network; this has experienced many challenges such as small amount of disk storage and memory.

II. RELATED WORK

The authors during study of different approaches used in data communication in ad-hoc network referred following different papers.

A research in mobile network in modern era is directed towards location aware computing which means to provide services to user taking in to consideration the location of the user in the space. In the paper Location-aware information services platform for mobile users in NIGERIA [13] author have devised a mechanism used in CDMA network by providing a system architecture called LAISP for providing the services based on client location. The working of this system is as shown below.

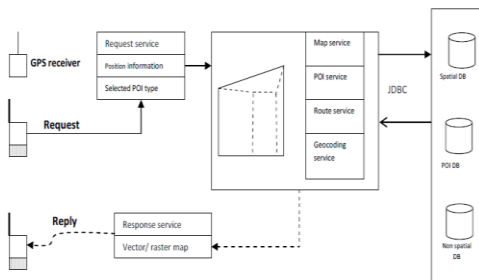


Figure 1: Physical layout of the proposed service procedure [13]

The author has described the design and implementation details of a mobile application supporting news access and virtual community interactive services, based on open technologies with the goal to create an easy to use, mobile, interactive, flexible, including a portable Android client and a Web portal access to the content. A mobile application that connects to a portal, providing news access from external and virtual community services implemented with open source technologies such as latest mobile software Android, Java programming language, Android libraries, MySQL database and PHP.

The application provides the feature for reading and writing blogs, sending and receiving messages adding friends. Authorized users can read news create blog, Send/Receive message. The news is read automatically [6].

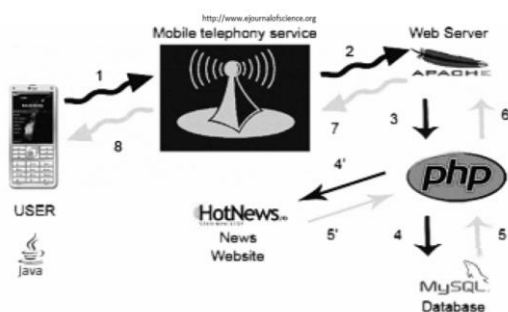


Figure 2: A simplified informational flow of the overall mobile application [6]

An implementation of a distributed mobile database system built on Pocket PCs that inter-communicate over Bluetooth without going through an access point. The goal of the implementation is to allow Pocket PC users to tap into the disparate data that may be present on mobile databases running on neighboring mobile devices. An application is developed to implement a federated mobile database in MANET environment making use of Bluetooth communication to achieve connectivity between different PDAs to provide data availability within

a short range with low power consumption. The architecture contains a Database Directory (DD) which stores the schemas of Data Base Nodes (DBN) in the network. A Requesting Node (RN) will only have to send its request to DD in answering the query. The query is fragmented and sent to the respective DBNs for result. A system of three applications, a GUI based RN, and DD, DBN application running in background. Experimental results were obtained from running different types of queries on a group of PDAs focused on the query response time and network traffic which are practically acceptable [3].

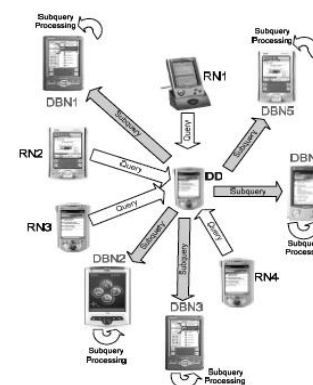


Figure 3: An Illustrative Example of the Proposed System and the Schema Structure [3]

A prototype for 24/7 personalized heart monitoring system using smart phones and wireless (bio) sensors are discussed. Presented personalize heart monitoring application using Smart phones developed on Microsoft's windows Mobile Pocket PC platform having easy access to lower level APIs needed for the sensor manager module. The heart monitoring system consist of various wireless wearable sensors such as ECG monitor, Oximeter, Blood Pressure monitor connected to Smart Phone via Bluetooth. The application running Smart Phone receives and stores the readings of various wireless sensors and gives alerts to the patient as well as to Health Care Centre and to ambulance in case of emergency with patient's location.

The application can be configured by cardiologist as per the patient's present health condition and parameters for alerts can be set as per requirement. The patient gets relaxed as he is monitored 24/7 by heart monitoring system at healthcare centre. Important features are the analysis of the sensor data on the local device, facility to call for external help and locate the patient in case of emergency, data and settings synchronization at both on Smart Phone as well as Healthcare Centre [7].



Figure 4 : Architecture of the Heart monitoring system [7]

A complete integrated solution developed for the user for sending information from web to mobile number and reverse from mobile to web. The paper represents how information can be send to web server and to the different clients using web server in terms of SMS. Introduced a web based messaging framework to send, receive and process messages. Framework comprises of a MSSQL database server and a IIS web server on Windows 2003 server connected with a mobile phone with SIM card, connection may be via Bluetooth, WIFI or data cable. The application/system running on the web server will be triggered to process, store and respond to the request message received on mobile phone. Bulk dynamic SMS can also be to different mobile users from database through mobile connected to the server [12].

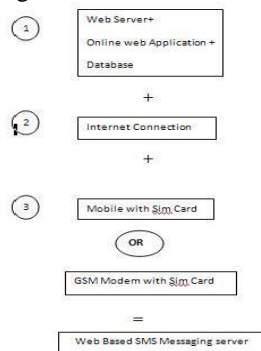


Figure 5 : Web based SMS Messaging Server [12]

A method invented for accessing a database through SMS /MMS is explained with the help of Hotel reservation system example. A client can send a message in terms of SMS/MMS with its location to the service center. The message is processed at the service center and the registered participating remote servers are determined necessary in answering the query. The list of determined servers and processing charges are sent back to the user in SMS/MMS and first level communication information is stored at the service center databank. Then the user can reply with new SMS/MMS with the selected option to the service center. Upon receipt of the second level communication message from the same client, the service

center communicates to the participating server selected in SMS/MMS by user to answer the query. Participating server processes the request and sends the result to the service center with more detailed options which then will be sent to user and stored at databank. Finally user replies with the desired option to the service center, service center request confirmation to participating server and upon confirmed the confirmation SMS will be sent to the user. The system cannot manage further requests of a user until and unless the first request has been processed [10].

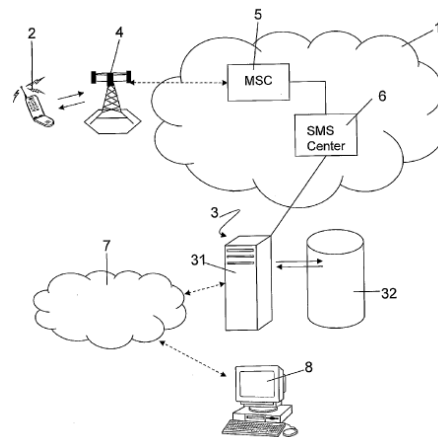


Figure 6 : Method for accessing databases through SMS/MMS [10]

III. THE THREATS, CHALLENGES AND ISSUES

After this study, the threats, challenges and issues identified are given below...

Wireless bandwidth and client's battery power are the two scarcest resources; we need an efficient way to measure these resources. In a mobile environment, upstream queries are more resource-consuming than the downstream queries, so there is a need to reduce the number of trips made to the server, the caching techniques used for traditional database models can not be applied as it is. Wide variations and rapid changes in network conditions and local resource availability when accessing remote data have far less computing power and memory capacity. They are different from traditional client server database applications due to low bandwidth in the wireless environment and frequent disconnects from the server.

IV. CONCLUSION

This study shows the advancement in data communication is essentially required in the mobile network. The mobile databases required to be made more powerful and the database management systems like SQLite, Microsoft's SQL Server CE, Cellica and Memento are essentially required to develop so that the



purpose of objective of mobile database will be satisfied. The performance security issues are required to be enhanced. The mobile clients are yet not developed for these database management systems, which is a need of time.

Amravati University, Amravati. His area of interest includes Software Engineering, Data base, Data Warehousing and Data Mining.

REFERENCES

- [1] P. Sistla, O. Wolfson, S. Chamberlain and S. Dao., "Modeling and Querying Moving Objects.", Proceedings of the International Conference on Data Engineering 1997, Birmingham, UK, pp. 422-432.
- [2] Sunguk Lee, Creating and Using Databases for Android Applications, International Journal of Database Theory and Application June, 2012, Vol. 5, No. 2,
- [3] H. Artail, H. Safa, M. Shihab, Implementation of a Federated Database on Bluetooth-Enabled Mobile Devices, ICPS'08, July 6–10, 2008, Sorrento, Italy.
- [4] R. Rathore, R. Prinja, An Overview of Mobile Database Caching, CiteSeerX, doi=10.1.1.100.9481
- [5] D. Barbara, "Mobile Computing and Databases—A Survey", IEEE Trans. Knowledge and Data Eng., Jan./Feb. 1999, vol. 11, no. 1.
- [6] L. Ashwin Kumar, Mobile Application for News and Interactive Services, ARPN Journal of Science and Technology, January 2012, VOL. 2, NO. 1, ISSN 2225-7217
- [7] P. Leijdekkers, V. Gay, Personal Heart Monitoring and Rehabilitation System using Smart Phones, International Conference on Mobile Business, 26-27 June 2006, Copenhagen
- [8] A. Sripriya, Dr. R. Dhanapal, A Cache Operation in Mobile Database Using Genetic Algorithm International Journal of Recent Trends in Engineering, November 2009, Vol 2, No. 4
- [9] A. Ahmed, P.D.D.Dominic, A. Abdullah, H. Ibrahim, A New Optimistic Replication Strategy for Large-scale Mobile Distributed Database Systems, International Journal of Database Management Systems (IJDMMS), November 2010, Vol.2, No.4
- [10] G. Rizzi, United States Patent Application Publication, Feb 25, 2010, US 2010/0048229 A1
- [11] S. Ganesh, M. Vijaylaxmi, A. Kannan, Intelligent Agent Based Approach for transaction processing in MDS, The International Arab Journal of Information Technology, April 2007, Vol. 4, No. 2
- [12] Dr. S. O. Khanna, Concept of web based SMS messaging server with mobile, International Journal of Advance Research in Computer Science and Engineering, December-2011, Vol. 1, Issue-1, ISSN 2277 128X
- [13] S. E. Nnebe, S.C. Chiemekwe, Location-aware information services platform for mobile users in Nigeria, Journal of Engineering and Technology Research, March 2011, Vol. 3(3), pp. 54-61

Biography

Mr. Nitin V. Wankhade received his M.C.A. Degree in Engineering and Technology From SGB Amravati University, Amravati. At present working as an Asst. Professor in P. G. Department of Computer Science and Technology, D.C.P.E., H.V.P.M., Amravati- MS, INDIA

Dr. Shrinivas P. Deshpande is currently working as Associate Professor in MCA at P. G. Department of Computer Sc. And Technology, DCPE, HVP M, Amravati – MS, India. He did MCA and M.Sc.(Phy) from S. G. B. Amravati University, Amravati and received Ph.D in Computer Science and Engineering from S. G. B.