Administrative Protocol for Controlling Wireless Network through Mobile Device Using GPRS / 3G

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Abstract—In the world of increasing mobility, mobile service is one of the emerging services due to the explosive increase in the number of mobility device and control the status of the PC. There by expectations of consumers who use mobile and small computing devices are high and they demand quick response time compatibility with companion services and full featured applications in a small device. Consumers expect the same software and capabilities found on their desktop and laptop computers to be available on their cell phones and personal digital assistants which gave an idea to design secure protocol in a mobile handset with the 3G / GPRS. With this system, a network administrator or user will have an effective remote control over the network. There is usually a trade-off between security strength and computing power in a real time monitoring system. In addition to controlling and monitoring of network, security adoption scheme which allows to automatically change the encryption algorithm to use, depending on the size of the input data and some other network parameters, so as to minimize the consumption of CPU utilization. However, available cellular networks with protocols like 3G, GPRS, EDGE or UMTS are highly unreliable due to frequent connection interruptions and high bandwidth variations for data traffic. Administration of intranet in university/colleges is one of the emerging services in telecommunication. Solutions for mobile admin are varied, ranging from the use of Wireless Transport Layer Security, Security Socket Layer, or application-layer based options however security at the application layer is a good choice for e-administration, using it in a mobile device presents several advantages such as low energy consumption and hence a secure energy-efficient e-administration solution for mobile devices[1].

Keywords—Mobile Ad-hoc networks, GPRS/3G, Secure protocol, Wireless Communication.

1. INTRODUCTION

Wireless communication is one of the biggest research areas among recent technologies providing various facilities to consumers of mobile and small computing devices made them to expect high performance from mobile devices. They demand quick response time, compatibility with companion services and full-featured applications in a small device. Consumers expect the same software and capabilities found on their desktop and laptop computers to be available on their cell phones and personal digital assistants. To meet these expectations, developers have to rethink the way they build a mobile device and need to harness the power of existing front-end and back-end software found on business computers and transfer this power onto small, mobile and wireless computing devices. J2ME enables this transformation to occur with minimal modifications, assuming that applications are scalable in design so that an application can be custom- fitted to resources available on a small computing device. Developers must determine the minimum client processing that will meet the end user’s expectations of quick response time that is feasible within the limited resources available on the small computing devices.

Today there is need of monitoring the network remotely because, it has been observed that most of the employee in an organization or students in institutes having access to the computer are goofing off on the internet or playing games etc. reducing productivity and the overall development. Thus it has become essential to monitor the remote machines in LAN so that the company or institutes can redirect the work force and get the best out of the institute members. This requires the organization to keep a track of the user activities in remote machine so as to get full benefit of their talent and time. If we see today’s LAN controlling and monitoring system, administrator has to sit in front of his/her server in the premises of their organization and see the activities performed by users. Suppose administrator wants to go somewhere at this time, he cannot force all clients to shut down the systems, hence there is a need for control and monitor all clients even though administrator is physically not present at server. At most administrator stores all information about activities done by clients when he is not present at server and see clients work afterwards. But this is not flexible solution so here we are trying to provide facilities to administrator to control and monitor the network using mobile devices.

It has been observed that 80% of the employees in an organization or students in a college/institute having access to the computer are goofing off on the internet or playing games etc. reducing productivity and the overall development. Thus it has become essential to monitor the remote machines in LAN so that the company or institutes can redirect the work force and get the best out of the institute members. This
requires the organization to keep a track of the user activities in remote machine so as to get full benefit of their talent and time.

Our proposed work will help administrator who will receive data remotely from different locations in network, some textual information about current work of clients, accounting information of each clients depending on requests of administrator and accordingly take action to control client work and to provide maximum details about the network through a mobile device remotely by managing computer network through mobile by functioning as the eyes and ears of the network. The system is designed for mainly monitoring and controlling the Intranet or Local Area Network only from the place where it is installed or from where the network node extends and exists from a remote location using mobile device enabled with GPRS [2].

2. RELATED WORK

Mobile communications are rapidly becoming more and more necessary for everyday activities. With so many more users to accommodate, more efficient use of bandwidth is a priority among cellular phone system operators. Mobile banking is one of the emerging services in telecommunications due to the explosive increase in the number of mobile customers around the world. Solutions for mobile banking are varied, ranging from the use of Wireless Transport Layer Security, Security Socket Layer, or application-layer based options [1]. In real time health monitoring system, the performance of several cryptographic protocols for different data sizes applied on the system in different network condition and a security protocol adoption scheme allowing to automatically to change the encryption algorithm to use, depending on the size of the input data and some other network parameters[3][4][5].

Some of the wireless technologies are as described below.

A. Bluetooth:

Bluetooth is an open wireless technology standard for exchanging data over short distances (using short length radio waves) from fixed and mobile devices, creating personal area networks. The Bluetooth radio system began as an idea of Ericsson Mobile Communications in 1994, but today, it is the result of the joint effort of many large companies (Ericsson, Intel, IBM, Toshiba, Nokia, Microsoft, Lucent, etc).

B. CDMA:

CDMA is one method for implementing a multiple access communication system. Multiple accesses is a technique where many subscribers or local stations can share the use of the use of a communication channel at the same time or nearly so despite the fact originate from widely different locations. A channel can be thought of as merely a portion of the limited radio resource, which is temporarily allocated for a specific purpose, such as someone’s phone call. A multiple access method is a definition of how the radio spectrum is divided into channels and how the channels are allocated to the many users of the system.

C. GSM:

GSM (Global System for Mobile Communications) is the most popular standard for mobile telephony systems in the world. GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network macro, micro and umbrella cells. The coverage area of each cell varies according to the implementation environment.

D. GPRS:

GPRS (General Packet Radio Service) is rapidly becoming a global standard for sending and receiving high-speed data across the GSM network. GPRS differs from GSM by being a packet based technology which is always on and available on demand to subscribers. It’s a radio technology for GSM networks that adds packet-switching protocols, shorter set-up time for ISP connections, and is billed by the amount of data sent and received, rather than conventional Circuit Switched Data services on GSM networks, which are billed by the connection time.

GPRS can support flexible data transmission rates typically up to 20 or 30 Kbps (with a theoretical maximum of 171.2 Kbps), as well as continuous connection to the network. As GSM is already the most broadly deployed digital wireless standard in the world, with over 850 million users in over 195 countries and with service provided by over 400 operators, GSM represents over 70% of today's digital wireless market. The infrastructure and technology for connecting mobile devices, for global deployment and the billing arrangements and tariff already exist making it an ideal platform for Machine to Machine applications (M2M).

GPRS extends the GSM circuit switched data capabilities and makes the following services possible:

- "Always on" internet access
- Multimedia messaging service (MMS)
- Internet applications for smart devices through wireless application protocol (WAP)
- Point-to-point (P2P) service: inter-networking with the Internet.

E. Advantages of using GPRS:

1. Faster connection speed: The GPRS enabled device breaks the information down into "packets" and sends them over multiple channels (up to eight). Each packet travels by the quickest available route to the recipient, where it is reassembled into the original message. Sending packets by several different channels increases the speed of transmission and cuts down on signal errors.

2. The second big advantage with GPRS is the fact that it is a Radio Service. Like a radio, a GPRS enabled device is "always on", so as long your equipment in switched on, you have an open channel for sending and receiving data. Once you have logged on you won’t have to log on again thus speeding up the

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process of communicating and exchanging data with your host server.

3. OVERVIEW OF PROPOSED SYSTEM

The proposed protocol provides the facility to remotely monitor and controlling of all the nodes of an intranet using GPRS/3G. With this system, a network administrator will have effective remote control over the network connection framework which makes use of J2ME, sockets and RMI technologies and security for the messages and energy required for the transferring data. Authentication of users for the system is ensured by initial authentication which is performed which verifies the user is intended one. When the administrator starts the application, username, password and IP address are to be entered by him/her which is required for logging into the system and further activities as required will get start functioning. Some of the services provided are reading, executing and killing services, chat, broadcast, compile, word pad, broadcast client and shut down etc. and provide maximum details about the network through a mobile device remotely as shown in Figure. 1.

The architecture of our model is as illustrated in fig 2. Android mobile device or PDA plays the role of as an Administrator Server and control all the activities of the intranet network remotely is made through mobile device. Here we have proposed secure protocol to monitor process of the node such as start, reading, executing, kill the process services. The proposed system would be implemented by developing application for a mobile device using J2ME, designing the interface between a mobile device and sever using connection framework, GPRS/3G and Tomcat Web server, establishing connection between a mobile device and clients on the intranet using RMI and Sockets server[2].

Figure. 2. Architecture of proposed model

To start with administrator has to do the initial authentication by filling the information through secure web access. Once the initial authentication done, administrator start the application in the MID, Welcome screen display on his MID for few second and then login screen appears on the MID. After giving user-id, password and proper IP address of server, administrator gets connected to the server which is present in the network as “Administrator server”. After logged in menu list appears on the MID screen is as shown in fig 3.

Figure. 3. Menu list On MID

All the nodes which are running are displayed on MID as shown in Figure. 4 when administrator click on the “1. Nodes in network”.

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When administrator selects the client1, should get list of processes running on client1 and accordingly he/she can start, execute or kill the process. Similarly other service functionalities like chat, broadcast, client messaging, compile and shutdown will be provided.

4. APPLICATIONS

Wireless communication is one of the fastest growing research areas where handheld devices such as a mobile phone require certain applications and services for efficient utilization of the device. Since mobile phones, as the name indicates are mobile in nature, services related to monitoring and remote controlling of local area network will be more useful. Some of the applications where proposed system can be used are described as below.

Personal area networks (PAN): It is useful in controlling all nodes which are present in the personal area network, which gives mobility to the owner of the network administrator due to the proposed protocol and also gives the security to intranet network in PAN.

Military operation: In the military operations, it is obvious that the data sensed or disseminated is of a private nature and is required to remain the same. Enemy tracking and targeting are among the most useful applications of wireless or networks in military.

Agriculture field: In agriculture, it is useful for getting information about the temperature, humidity and plant condition so as to get better crops in the field.

Thus our work will be not only applicable to the above application and it is very much useful in places like hospitals, banks, educational institutes and corporate offices. Hence it will not only benefit single naïve user but also sophisticated user like corporate officers, defence service people or medical staff. Wherever a LAN exists, this proposed work will be useful.

5. CONCLUSION

Monitoring and Controlling is an important aspect of any network. Lots of monitoring or controlling tools are available and to operate them, administrator has to sit in front of his server and do the monitoring and controlling, but still have to face challenges in developing software which will monitor, schedule the jobs, as well as control the computer network from any location in local area network or intranet. Initially, it was very difficult for administrator to control client activities remotely however our proposed work will enable the administrator to not only monitor the network remotely but also control various activities of particular user and also serve the various requirements of the administrator. The main objective of this work is to provide maximum details about the network to the administrator on their mobile phone, when he/she is away from office / goes out station and to control and monitor the local area network from mobile phone. It is useful for teachers to address students for class schedules, exam time table, test results etc. They can easily monitor and control the activities of students. It is also useful in managing staff in an office by remotely watching over employee activities, which helps in increasing productivity of work.

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