Redefining Connectivity: Unifying mobile Communication with the Internet

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Abstract

The objective of our implementation is to develop a s/w package that will transfer voice packets and data packets over a peer to peer network which includes cellular phones (GPRS Enabled) and Internet connected computer terminals using J2SE & J2ME.

Our system aims to provide real-time transmission of data packets over a p2p network. We have also implemented mail box services for all the users.

1. Introduction

Our implementation of the system defines a communication system for mobile devices that enables mobile users to communicate with desktop users. By using the packet switched capabilities of wireless data networks, the service is not restricted geographically, unlike conventional two-way radio systems such as private mobile radio (PMR). Concurrently the essential service of a mobile, i.e., voice transmission has to be really cheap in order to gather a vast market share. Most importantly, though, our application would enable the end user to remove the distance factor in the present day billing scenario. One of the fundamental differences between our service and conventional phone calls is the 'always-on' connection between two people and/or within a group of people.

2. Advantages of present implementation

The advantages of our system are enumerated below:

1. One of the most obvious advantages of our system over PMR is perhaps the coverage area provided by the GSM/GPRS network.

2. Based on IP technology, the solution uses network resources efficiently, reserving them only for the duration of talk spurts instead of for an entire call session. This enables a profitable implementation of the service over the GSM network.

3. This service would limit the charges to the calls to just the GPRS rates charged by the service provider as opposed to the extremely high rates of long distance calls.

3. Target Enterprises

Our implementation shall complement the rich service portfolio of GSM/GPRS network. One of the fundamental differences between our service and conventional phone is the "always-on" connection between two people and within a group of people. While setting up a conference call, for example, requires several phone calls to be made, the "always-on" connection provided by cellular n/w allows talk group members to start conversation almost instantly, with just a press of a key.

The direct connection enforces efficient and spontaneous communication, especially when there is a need to be in contact with a certain group of people frequently during a longer period of time, such as a working day. Some of the groups which could be targeted are:
1. Small business
2. Leisure groups and communities
3. Corporate users

4. Prerequisites for the application to run

There are only 2 deciding factors for the application to run:-
1. Requirement of a J2ME enabled cell phone.
2. A network that offers GPRS service (and not to forget network coverage…)
3. The system which we propose to control must be on the Internet.

5. Structure of the Application

The application is implemented using a client-server model in which the client works in two different environments viz. the mobile and the desktop. The application has the following modules:
1. Server Module.
2. Desktop Edition of Client Module
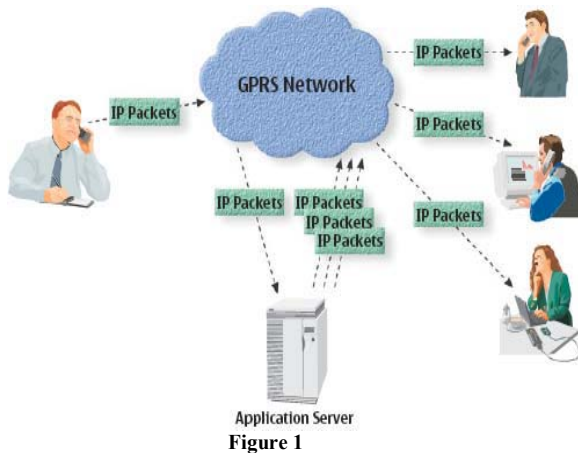3. Mobile Edition of Client Module

Figure 1

We shall explain the rough structure and functions of the different modules.

1. Server Module

    The server is based on multi/unicasting. Each sending handset sends packet data traffic to a dedicated server and in case of a group call, the server duplicates the traffic to all the recipients, as can be seen in Fig 1. The server module takes care of the session control and in storing temporary messages if the user is not presently logged in to the network. The figure below (Figure 2) shows the 2 different ways the server can handle requests.

2. Client

    The client module handles the connectivity to the server. And the transfer of information from the server to the local machine. There are two kinds of modules that can be called clients. One is a MIDlet that runs on a J2ME enabled cell phone and the other is a traditional JAVA application that runs on a desktop.
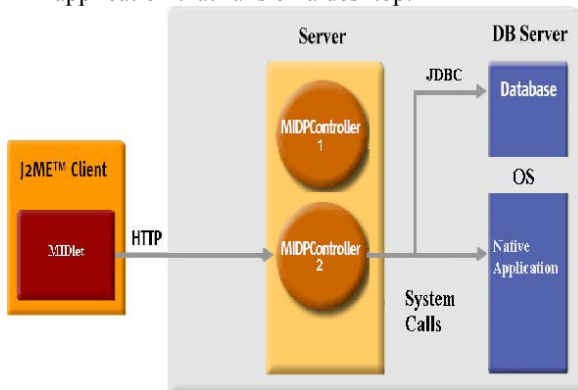

Figure 2

The application that runs on the client side is called a MIDlet. The device we have used for the present application is a Nokia 7610 (which is a MIDP 2.0 and CLDC 1.0 device), which also has GPRS connection is used to connect to the server and other

clients. The MIDlet shows the users presently logged in with the server. The user can then choose and initiate a communication channel with any of the users. In order to capture audio, the MMAPI is to be used. The mobile Media API is specified under the J.S.R. 135 ([2]). In addition to this the user can also send a plain text message of an MMS to other users presently logged in. Incase the user is not logged in the message gets stored onto the server and then is given to the target user as soon as he is logged in.

6. Testing and Results

The application when tested mobile network worked very well for both text messages and Multi-media messages specifically, the time lag between transmission and reception was hardly noticeable. However when the same application was attempted for the real time voice calls there was a noticeable time lag of around 2 sec. Since 3G services are just about to be introduced in the Indian market, we expect this crunch in the required bandwidth will not be felt.

This solution can be completely ported to any J2ME enabled mobile device and can be used to transfer real time text messages which can be a completely free solution to SMSs provided by the mobile service provider, also added advantage being that users can use both the computers and their mobile devices.

7. Conclusion

The ability of the J2ME enabled devices to connect to FTP, HTTP or to low-level sockets using high bandwidth connections has given these phones the power to be truly integrated with IP networks. Our application gives a user a viable solution to SMSs which can reach a broader customer base too. The application was created to demonstrate the ability of mobile clients in engaging in real time voice chatting over a G.P.R.S. connection. This has been successfully implemented. Though the present bandwidth right now does leave some untapped potential, with the eminent introduction of EDGE or other 3G service this application will become a very handy to use in every ones life.

8. References

[1] S. Kulkarni, S. Diwan, N. K. Bhansode "Device Independent Mobile Application Controller For Remote Administration Of A Server Over A J2ME enabled Mobile Phone", INDICON-2005 , Kharagpur, India , December-2005, pp. 498-500.
[2] *JAVA Specification Request 135*