Multimedia Networking on Handheld Devices for Working Groups

Project ID: WA4-02
Supervisor: Albert Wong

Signature: _______

Group Members:
Lau Kai Lam, Lucy  00056827
Lau Siu Fat, Alpha   00264620
Lo Ming Kin         00188084
Tse Shui Man, Michelle 00220753

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A large market for handheld computer devices is developing due to the increasing popularity of such devices and advances in wireless system technologies. The hand-held device allows us to be constantly connected to the Internet. In order to increase the efficiency of the network communication, a latest network protocol called SIP (Session Initiation Protocol) can be used. It allows communication carried by any transport layer protocol, both the TCP and UDP.

This project is about multimedia networking capabilities on handheld devices for workgroups’ applications. A suite of software tools based on SIP architecture for enterprises was developed. A SIP stack for Pocket PC and all the functions of the software suite based on this SIP stack were implemented.

The software suite consists of two parts: client software, which runs on Pocket PC and server software called Siemens SIP Proxy Server, which runs window operating system. The functions it provides are as follows:

- Instant Messaging
- Voice Messaging
- Broadcast
- Reminder
- Status Mode
- Buddy List
System Block Diagrams

Client-to-Server communication and Client-to-Client communication are established using wireless LAN 802.11b.

Communication Methods and Procedures:

1) Client registers to the server
2) Client-to-Client communication are handled by server
3) With the help of the server, voice messages between clients are established point to point.
4) Client log out from the server

Embedded Visual C was chosen as the developing tool for socket programming on PocketPC and MFC dialog based programming was chosen to build the interface.

Software System Flow
In the project, we have successfully built a SIP stack and SIP based workgroup application on PocketPC 2002. Based on the SIP stack, the application can successfully register to the server, add buddy through the server, sending an instant message, broadcast message, sending a reminder message and voice message. With this application, users can use their PocketPCs to have a real time communication with their buddies.

Some Graphical User Interfaces

We also understood the working principles of SIP messages and the ways to generate these SIP messages by analysing the message log.

SIP Message Log File

**Subscribe a user**

```
SUBSCRIBE sip:user2.domain.com SIP/2.0
Via: SIP/2.0/UDP 192.168.1.1:5061
To: sip:user2.domain.com
From: user1 <sip:user1.domain.com>;tag=6928c2b41ed1abc1;scid=ch
Call-ID: 78694c4b6b388b70a34edee2d800e9
CSeq: 1172479961 SUBSCRIBE
Max-Forwards: 70
Expires: 3600
Contact: sip:192.168.1.1:5061
Event: presence
User-Agent: SCSA v3.1.12.33
```

**Send a message**

```
MESSAGE sip:user2.domain.com SIP/2.0
Via: SIP/2.0/UDP 192.168.1.1:5061
To: sip:user2.domain.com
From: user1 <sip:user1.domain.com>;tag=b8b6be99f132690
Call-ID: 9882f6d4b137e17bac23459b776302a
CSeq: 644035.974 MESSAGE
Max-Forwards: 70
Contact: sip:192.168.1.1:5061
Content-Length: 8
Content-Type: text/plain
User-Agent: SCSA v3.1.12.33
```

testing.