An Emergency Communication System Based on Soft Phone Technology

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ABSTRACT

Emergency communication systems should provide real time multi-access communications, high speed data transmission, and low transmit power capability between fixed-line phones and mobile smart phones under emergency environment. This paper proposes an emergency communication system based on soft phone technology. This technology can connect the fixed-line phone, mobile smart phone smoothly. The results show that this technique can be applied to emergency communication systems without additional costs.

INTRODUCTION

Emergency communication systems which bear construction of ubiquitous networks have been developed and applied in various application fields\(^1\)\(^2\). A emergency communication system which does not break off smoothly between mobile units like mobile phones, and telephones can build a network flexibly and this system is strongly demanded to apply to the further various services, such as multi-channel remote control of mobile units, data transmission during an instant with a high-speed mobile unit, and a mobile network system which can connect with mobile units dynamically\(^3\)\(^4\). Since cell phones can have a good communications without the heavy investment of fixed-line telephone technology. However, the present emergency communication standards are unsuitable for the above applications from viewpoints of simultaneous multiple access with frequency utilization efficiency\(^5\).

With the rapid development of information technology, network based on the multimedia communication has become the focus and the IP based network technology has entered into the telecommunication area. IP phone is one of the multimedia services provided by VoIP (Voice over IP)\(^6\)\(^7\). In the traditional telephone network, the telephone which is used by families and small businesses usually use twisted pair wires to directly connect telephone lines of telecom operators. Enterprise, institutions and schools generally choose a professional PBX to build an internal telephone system. Either the traditional telephone line or group telephone, when telephone access to computer CTI (Computer Telephony Integration) software, we should add additional expansion card or external USB device in the computer. Though the traditional client development CTI technology (TAPI, AT&T TSAPI)\(^8\)\(^9\)\(^10\) can be used to achieve the corresponding functions, the standard of ancient and complex learning cost is very high.
VoIP technologies are currently a subject of great interest in emergency communication system. However, amongst the results of above references it is shown that when the phone access to computer, additional hardware and software are needed. Therefore, the hardware cost is too high, so VoIP technologies have not been applied for emergency communication system. If an emergency communication system with simple designed, the emergency communications will provide a network system that has not been realized until now.

In this paper, an emergency communication system based on soft phone technology is proposed. As a result, this emergency communication system without additional costs can be used to provide a variety of voice services including the single-call, group-call, and play an important role in the emergency rescue.

THE EMERGENCY COMMUNICATION SYSTEM

The design of emergency communication system based on soft phone technology is shown as figure 1. In this scheme, using the related configuration of mobile phone and soft phone to realize intercommunication with other terminals is studied here. This system can be applied in the case of unbelievable telecommunication signals covered when a disaster occurred.

![Figure 1. A block diagram of emergency communication system based on soft phone technology.](image)

The emergency communication system is composed of the fixed-line phones, the IPX switches, the IP phones, the switches, the smart phones, the computers and the intelligent 4G /LTE router. In this system, the function of the soft phone is realized by using the technology of VoIP, which connects the terminal equipments such as the smart phones and fixed-line phones.

CONFIGURATION OF THE EMERGENCY COMMUNICATION SYSTEM

The standardization of computer network and software technology is used in this system. The realization of the "telephone" also can be processed as a software "data" into a unified IP network communication environment. The traditional telephone communication is constrained by the "telephone line" short comings are resolved, as long as the network can be connected. As shown in figure 2, IP phone communication can be archived.
Ethernet communications, such as Ethernet cable, Wi-Fi wireless LAN, 3G/4G mobile Internet, satellite and optical communication in special industries, have covered almost all the world\textsuperscript{11,12}. And at the same time, the biggest change is the integration of communication in this system: the “call” is treated as "data" into the IP network. As a result, the interoperability gate of the phone and software can be opened, the cost and the complexity of the software can be greatly reduced, therefore telecommunications telephone network and Internet can be seamless connected.

**EXPERIMENTAL PROCESS**

VC++ development environment is used to write the source engineering files. Copy the SDK program sdk.exe to the demo program target compilation and output path. Click the SDK and run the programs: sdk.exe, then select the configuration to open the configuration interface, the integration communication devices such as the fixed-line phones, the IP switches, the IP phones, the switches, the smart phones, the computers and the intelligent 4G/LTE routers are connected. Each device is bound to the pre assigned extension account and the SDK program can be successfully configured the account, just like an ordinary telephone extension work, therefore the number of every device can direct dialogue with the extension. When the phone is turned on, we can use the computer, smart phone and the telephone to make direct two-way full duplex voice calls. The computer will automatically restore the IP packets from the telephone's voice encoded on the NIC to the audio signal, and send it out through the computer loudspeaker. The computer will also automatically receive the voice signal from the microphone, which is encoded as IP packet sent by the phone. The main program codes are shown in figure 3.

The functions of voice services are tested in LTE networks and Internet networks. Corresponding to these voice services, the emergency communication system with soft phone technology is suitable for emergency communications.
CONCLUSION

In summary, this paper designed a new emergency communication system without additional costs and this design showed a way to interconnect PC application software quickly by converged communication SDK, and achieve the communications between software, IP phones, cell phones and fixed-line telephones.

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