

Intelligent Voice Convergence Solutions for Emergency Communications

Fanlei Gong¹, Guojun Bo², Jizheng Chu¹ and Qi Wang³

¹Dept. of Automation, Beijing Univ. of Chemical Technology, Beijing 100029, China

²Dept. of Electronics & Information Eng. Huazhong Univ. of Sci. & Technol. Wuhan 430074, China

³Beijing Raycomm Digital Technology Co. Ltd. Beijing 100085, China

E-mail: zhuifsn2005@163.com; 1007491751@163.com; chujz@mail.buct.edu.cn; wangqi@rdtcom.com

Abstract. Analyzes the status quo of environment of emergency communication, points out the characteristics of emergency communication system should have design an emergency communications system solutions, and points out its characteristics and advantages.

Keywords: Emergency Communications; Intelligent Voice; Mobile Communications; Hierarchical coordination Dispatch;

1. Forward

With accelerative industrialization and urbanization, people flow, material flow and information flow are highly gathered. Emergency and disaster events occurred frequently because of natural factors, technical reasons and personal factors. As a result, the damage and political influence is enormous. So emergency and disaster events management (including prevention, early warning and quick response and disposal, recover) is very important. In responding to the weather upheavals, power in an emergency, military coups and other kinds of emergencies, we need emergency communications services for powerful guarantee. Therefore, it is urgent to establish emergency communication network effectively and quickly.

The particularity of all kinds of emergencies Requests emergency voice communication system has the following features:

- Response capability: in case of emergency, the system can instantly participate in command scheduling.
- Stability and reliability: in the process of scheduling, system performance remains stable to ensure dispatching information reliable, and keeps real-time transmission.
- High call quality: in an emergency, environmental noise requires that the system has higher call quality to ensure the integrity and accuracy of information transmission.
- Wide coverage range: the signal transmission system can fully cover the entire region of emergency rescue to
- Ensure that all dispatchers can receive scheduling information from higher authorities in any location of the region.
- By 2M satellite links, mobile portable emergency command system can exchange with military command center data, and communicate with military network phone system for free.
- Multiple communication links selection: according to the scene, it selects E1/IP / fiber link rapidly to establish communication link, ensuring timeliness of all data, voice communications.

In this case, reliable and broad coverage of the emergency dispatch system became the main schedule.

This paper introduces a new set of intelligent voice fusion emergency communication system, which makes network (E1 / IP/fiber) as the foundation, telephone communications system as the link, command scheduling as the core, integrating traditional telephone, VOIP, GSM/CDMA, WiFi, wireless radio and

satellite microwave communication into an organic whole. It improves the technological equipment and dispatching center work efficiency largely in command scheduling, and meets the demand of real-time control and accuracy. It not only satisfies the daily needs of dispatching, but also the unexpected events and emergency situations in real-time large-scale integrated Dispatching requirements. Consequently, it shortens the response time and improves emergency response capabilities. Therefore, the system can be widely used for police, fire, military, airports, coal mines and other fields.

2. System design and features

2.1. System components

The system consists of converged communication platforms for intelligent voice, a variety of terminal equipments such as handsets, PDA, Wi-Fi terminals, telephones, and wireless communication networks composed of traditional telephone communication network, satellite communication network, GSM / CDMA network and so on. In this system, communication equipment and communication networks work together effectively to ensure the reliability and stable operation of the whole system. System components are shown in Figure 1.

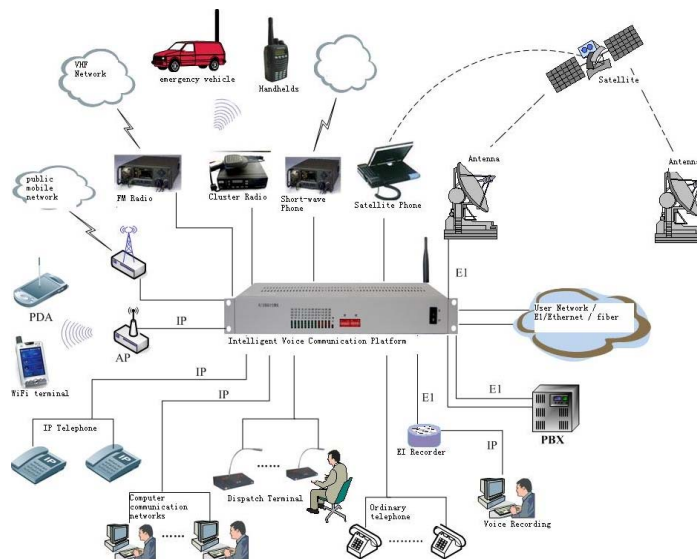


Fig.1. System Schematic

2.2. Programme features

2.2.1. Rich voice scheduling

Voice scheduling within the network between the private telephone in command center and the scheduling unit / staff can be achieved by the traditional telephone network. While voice scheduling between wired communication networks and wireless communication networks can be achieved by traditional telephone network, satellite communication networks, and GSM / CDMA networks.

For example, basic call functions can be achieved between the army private telephone and the on-site portable emergency communication systems and emergency communications vehicles. Phone incoming / outgoing, call forwarding, call smart match, CDR detailed call record, click to dial, outside to outside function by which the calls to command center can be directly switched to other phones or mobile phones in the command center as well as some other functions are included in the basic call functions. In addition, full recording can be realized by setting the recording function on each extension and transporting the voice streams to a specified server.

2.2.2. Double scheduling on site and from the command center

When dealing with emergencies, both the emergency dispatchers on site and the remote command center can operate the scheduling, which means that operation such as reporting and ordering can be done at the first time according to the site conditions.

The dispatch system supports different priority levels of the call permission. High-level phone users can demolish, override, monitor, forbid other phones and can issue orders quickly by means of broadcasting, multicast, conference, etc, so it is possible to achieve more points working together, which improves the efficiency of ordering and ensures the effectiveness of handling emergency events. Site and command center can demolish, override, monitor, forbid, broadcast, multicast, and make a conference according to the requirements.

2.2.3. Means of communication security

The system focuses on the function of wired voice transmission and wireless voice transmission and combines wired communication with wireless communications in emergency dispatch to fully guarantee the emergency communication capability of the scheduling system. It provides users with different types of voice access terminals for choice in accordance with their requirements.

Ordinary analog telephones (POTS): Cheap, easy to use, need simple maintenance, widely used in the scheduling system. Achieve the function of remote scheduling through a converged communication platform for intelligent voice to get ordinary telephone access.

IP Phone: IP phone is another kind of user access terminal widely used in the scheduling system. It can receive short messages in Chinese, and can be used as an end-user access device if there are instructions with text message format needed to be issued. The feature of auto answer will meet the needs of users inconvenient to answer the call.

Wireless Terminal: Customers who need to move office can use satellite phones, Wi-Fi phones, PDA and mobiles as mobile terminals.

Satellite channel: It has two ways to achieve voice communication, one is by satellite phone, and the other is by microwave E1 channel.

Wi-Fi phone: It is the same as the use of ordinary mobile phones.

PDA: Integration of the dispatch terminal and the customer service system.

Mobiles: Including cluster radio, shortwave radio, FM radio and so on. Used in conjunction with Wi-Fi, SCDMA or satellites, and other wireless communication networks.

1) Vehicle dispatching telephone

Vehicle dispatching telephones are installed in the emergency communication vehicles of the system. A vehicle dispatching telephone with the function of auto pick-up and auto answer can be set to automatically answer to high-priority calls such as dispatcher-initiated conference calls, multicast, etc.

So the auto answer feature avoids the site personnel using both hands after receiving orders from their superiors. Besides, the hotline feature is also supported to achieve automatic call and convenient field use.

2) Capability of on-site mobile communication

Wireless AP and Wi-Fi phones can be configured in the field to achieve on-site mobile communication. The wireless phone can communicate with scheduling phone calls in vehicles and the remote telephone calls in real time within the wireless coverage and can accept the dispatch scheduling.

3) Group meetings

When a group is set by the administrator, conferences can be initiated not only by the dispatcher but also directly by the terminals in permission. In this way, it benefits the users who can not operate the dispatcher. IP phones within the system, mobiles, handhelds, fixed and mobile phones all can be council members.

4) group-cooperative scheduling

It is allowed that emergency communication system merged with intelligent voice have multiple dispatcher, the level and enable users of which can be set. The dispatcher can work together to meet the command and dispatch need of the multi-level, and multi-monitor.

5) Dynamic grouping management

The system support group settings. When use the function of phone conference or cluster meetings, only the users in one group can talk to each other, while the others can communicate through a single call. Dispatcher can change the members of the group or create a new group at any time, and meanwhile, the other special terminal equipment such as car station and handsets can dynamically switch between the groups.

6) *Optional encrypted communication*

To meet the requirements of data security in army, police and other industry, the network can use specialized algorithm, according to needs of users, to encrypt voice and data communications.

7) *Digital recording function*

The system, related to the most advanced application technology such as digital voice compression, digital storage, network and so on, is a new concept of E1_IP digital voice recorder. It has the function of Synchronized Recording, real-time monitoring, the query and replaying, statistics and a variety of formats radio (car sets / radio) and wired telephone recording. Furthermore, it can total record and each extension can set the recording function, and save voice stream to a computer hard drive or transmitted to the specified server. Radio recording consist of car radios recordings, Taiwan recordings, base stations recording.

Either Incoming calls or outgoing calls can be digital recorded, Multiple radio and telephone can simultaneously recording:

- System automatically store the voice message calls to the large capacity storage hard disk.
- To facilitate future inquiry, the voice is totally recording and have time marking.
- Meeting or internal scheduling phone calls can be digital recording.
- By setting permissions we can use computer to inquires or playback telephone recording.
- Wired telephone start the recording when you hook the phone, while automatically stop recording when you hang up. Meanwhile it can memorize outgoing and incoming caller ID. On the other side, wireless station start recording automatically with a voice whose sensitivity can be adjusted, while stop recording when the voice disappears.
- Each recording sessions provide AGC (automatic gain control) functions, which can adjust the volume of calls between the two sides appropriate and clear.
- Any recording can be noted with comment text.
- Compound inquiry and fuzzy query is suggested, according to the date, time, channel number, call number, for outgoing calls and so on.
- Automatic backup and delete fuction.
- Voice prompt alarm function.
- The function of remote telephone playing

8) *log storage*

System can record all kinds of operation and alarm, and it can also record the call, save the video, picture and text. The recorded data can be replayed by administrators and it would be the important basis of Command scheduling process

3. The advantage of the solution

The system introduced in the paper has the absolute advantage as following in the field of business realization and test, operations and maintenance and so on.

3.1. Simple to Realize the Business

Intelligent voice fusion communication platform can easily access to an existing voice phone network INTERNET network or GSM/CDMA network and composition emergency command scheduling system with rich mobile wireless terminals such as WiFi, handset and so on. Then the dispatching centre control terminals and substation, which can communicate directly to realize real-time transmission of information.

3.2. Simple to Maintenance and operation

The system don't need to maintain in principle because it can manage the business and control the substation in command centre.

The system is in stable state when tested in a network simulation in some company in Haidian entrepark and the network is trouble-free. The system can meet the scheduling of real-time online video or audio and transmission of related data. Test results prove the system has a great advantage in function realization and test and can be applied to various situations.

4. Conclusion

Emergency command scheduling system introduced in paper is composed of emergency communication system merged with intelligent voice and other peripheral .It has the advantage of great communication capability, convenient organizing network and stable performance and can meet the need of voice dispatching. The system also has a perfect logging data, including the operation of administrators, CDR ,alarming , telephone recording through audio server and so on. The data is the base of review the operation of administrators and make it possible to Recreate scene picture.

5. References

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