

ZTE's ZXPCS10.0 Personal Wireless Communication System

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As we know, the future generation communication system is on the way to be digitalized, integrated, broadband, intelligent, standardized and customized, and the personal wireless communication system meets the demands.

ZTE's personal wireless communication system (ZXPCS) is based on the personal handset system (PHS) and deployed in more than 110 cities in China. It is working well and widely accepted by the carriers, which makes great contributions to the local economy and telecom industry.

1 New Services with ZXPCS10.0 System

Besides providing the basic and optional services that are based on the voice service, ZXPCS can also provide the high-speed data service, short message service (SMS), mobile intelligent network service, positioning service,

blind spot calling service, wireless group subscribers switch service (Centrex), district limitation service, virtual home location register (HLR), one number for 2 lines service, and one line with 2 numbers service.

1.1 Data Service

Data terminal equipment such as computers and PDAs can use handsets or network-side devices of a personal communication system to implement functions such as digital communication, Internet access and fax.

The ZXPCS data service has the following features:

(1) High Capability of Anti-Interference

By using the PIAFS Protocol (specification of Internet access established by Japan PHS Communication Committee), high speed data transmission can be ensured in tough situations such as high error bit rate and severe interference.

(2) High Speed Transmission and Intelligent Speed Control

Currently the speed of data transmission can be 32 kbit/s and 64 kbit/s. Cell stations can auto-select data speed according to the traffic of the channels. In the future it will be able to provide 128 kbit/s data transmission service.

(3) Wireless Surfing on the Internet

The users can surf on the Internet by PCS handsets.

1.2 Short Message Service

The ZXPCS10.0 system's short message center is based on ZTE's mature and stable short

message platform, which can provide a total short message solution for PCS and fixed networks. Because the short message centers of ZXPCS10.0, GSM and CDMA are based on the unified platform, they can interconnect smoothly.

By connecting external short message entities with the standard SMPP (v3.3) protocol, ZXPCS10.0 can introduce value-added services such as manual paging, auto-paging, voice mail notification, information on demand, billing service, mobile banking, mobile securities, Internet service, Email service, positioning service and etc.

The air interfaces specification of short message adopted by the ZXPCS system has been referred to the end-to-end short message protocol adopted by Japanese counterparts, and enables short message services on the basis of user-to-user information element (U-UIE) and is compatible with other types of short message terminals.

The short message center interoperates with external short message entities through SMPP agents, connects independent content providers through short message interconnect gateways and interworks with other telecom carriers, and splits revenue as well.

1.3 Intelligent Service

By introducing the cutting-edge technology of mobile intelligent network and customized application of mobile enhancement logic (CAMEL) protocol, the ZXPCS10.0 system can make good use of the features of PHS networks and create and implement multiple new services quickly, flexibly, economically and efficiently. By installing the mobile intelligent network platform, the ZXPCS10.0 system can provide services such as pre-pay, virtual mobile private network, and intimate numbers services.

The pre-pay service (PPS) is one of the most concerned services by wireless local telephone carriers. The ZXPCS10.0 system enables a typical pre-pay service, i.e., "pay in advance, and use later". When a subscriber has applied the pre-pay service, the operator will allocate a unique account corresponding to his phone number. His phone bill will be paid through this account. During a calling

process if the account balance is not sufficient, the user will get voice notification. If the balance is run out by the call, the network will disconnect the link and refused to provide further service until the user deposits enough money into this account. Moreover, it can set the limitation of daily phone expense or monthly phone expense for users to control their communication expense.

Through the real-time control mechanism and effective billing function of the mobile intelligent network, the pre-pay service can prevent malicious overdraft so as to protect the benefit of carriers and reduce the operation risks. At the same time it will bring considerable profit margin for carriers. Therefore, by introducing reasonable charging policies, the operators can attract more subscribers and improve the efficiency of the network and receive the early return of their investment.

1.4 One Number for Two Lines Service

By adding fixed-line switch units to the ZXPCS10.0 system, the interconnect gateway (IGW) can be a switch center with both fixed-line and wireless ports, and it can implement "one number for two lines service": one is a fixed phone and the other is a ZXPCS phone.

A subscriber can select the PCS phone or fixed-line phone as the called party by special operation on the subscriber's terminal, and the fixed-line phone can interconnect with the ZXPCS phone too.

1.5 Other New Services

The ZXPCS10.0 system can also provide the following new services:

(1) Fast Access Service

The ZXPCS10.0 system can provide fast access for some special telecom services such as fire alarm (119), criminal alarm (110) and ambulance (120). The ZXPCS10.0 system can also enable the users to access the closest service center.

(2) Wireless Centrex Service

The ZXPCS10.0 system can deploy the wireless central exchange (Centrex) service by using the close user group (CUG) technology. Each user belongs to one Centrex group, and users in the same group can dial each other with short numbers. Flexible charging policies

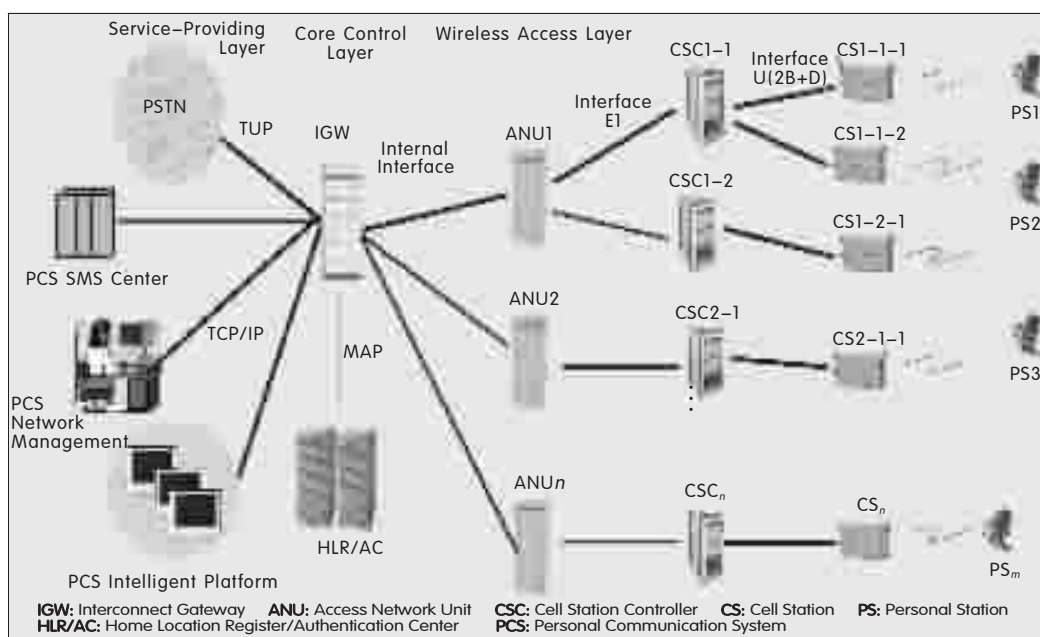


Figure 1. The integrated solution of ZXPCS10.0 for fixed-line and wireless networks.

can be introduced in the same Centrex group. There are multiple contract-based options to control incoming and outgoing calls.

(3) Virtual HLR Function

To satisfy different management requests for different districts, the home location register (HLR) can administrate the users according to the zone and the range of management. The virtual HLR numbers can be configured flexibly based on the system capacity and the demand of the management.

(4) Positioning Service

The ZXPCS system is based on microcellular technology with features of low-power cell station and small coverage area ranging from 50 to 500 m according to different cell stations and environments. Therefore, the system can locate the position of the user by determining which cell station is processing the call. The relatively precise positioning feature makes position-based value-added services possible.

The network management system of ZXPCS at the accessing side can locate and trace a handset and dynamically display its track on the electric map. Positioning service can be used in 110, 119, 120 emergency services, to search for lost people, and schedule and trace members in team activities.

(5) Blind Spot Calling Service

In order to prevent ZXPCS users from losing incoming call information when users enter

blind spots or the handsets are powered off, the blind spot calling service is needed to increase the put-through rate. The implementation of this service depends on the support of the short message center. When the subscriber is not in the service zone or the handset is powered off, IGW transforms the incoming phone number into a short message and delivers it to the short message center; as soon as the user is accessible, ZXPCS10.0 system will notify the subscriber of unanswered

calls by short message or voice notification.

(6) Call Limitation Service

The service can limit subscribers' calls within a certain range, so the services of local call access and intra-province call access can be deployed. According to the size of the permitted range, charging policies can be flexibly set. At the same time the level of roaming can be raised or lowered freely through a subscriber calling to the service center. This may provide users with more options and meet a variety of demands from users.

This service can also be used by groups such as schools and government departments. It is used to limit the users to call only in a certain range, even in a single unit such as a school or in a building.

(7) One Line With Two Numbers Service

With this service, a user can use one line for two phone numbers, for example, one as office number and the other for private use. If the user does not set which number to answer a call, he can be called on any one of the two. Of course, the user can set one number as his answer number, based on his needs. As a calling party, he can also choose any one of the two to make a phone call.

2 The Integrated solution of ZXPCS10.0

As shown in Figure 1, the ZXPCS10.0 system

provides an integrated solution for the fixed-line and wireless personal communications, which efficiently integrates the fixed-line module, wireless module and original access equipment, and meets a different group user's individual requirements. This solution has the following characteristics:

(1)The system integrates the wireless module, fixed-line module and original access module.

(2)In the system, the fixed-line and wireless terminals enjoy a single phone number. The wireless CENTREX and fixed-line CENTREX can be integrated, and the wide-area CENTREX is also enabled.

(3)The system is combined with mobile intelligent networks and short message services to provide services such as wireless CENTREX, high-speed data surfing, short message, wireless positioning, call range limitation and one line with two phone numbers.

(4)The system possesses functions such as team call, group call, IP supermarket, PS addressing at a foreign cell, preset long-distance call, displaying caller ID, detailed list for local call, urging payment.

(5)The system provides integrated data interfaces of ADSL, DDN, and 10 M/100 M Ethernet to meet group users' requirements.

(6)The system meets the telephone service demands for LAN users, such as campus network, business network, hotel network, etc.

A typical application of the ZXPCS10.0 system is showed in Figure 2. The system can provide the following applications for carriers in large or middle-sized cities.

(1)Serve group users, and provide the "one number for two lines" service (one number for an office phone and a PCS handset).

(2)Provide wireless coverage across cells. For example, when a university has Campus A and Campus B, then a cell station controller will control cell stations deployed in the area so as to provide users with wireless mobile services.

(3)Limit user terminals from getting services within a certain area or set no limitations on roaming users.

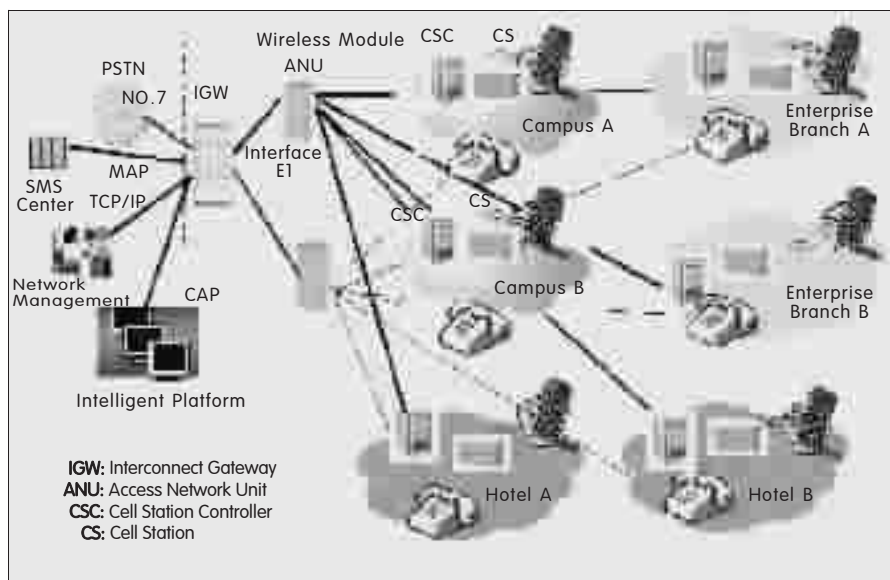


Figure 2. A case application of ZXPCS10.0.

(4)Both wireless and fixed-line network users can use the short number dial-up service.

(5)Because the interconnect gateway provides a large-capacity platform for wireless and fixed-line network users, the expansion of the wireless network coverage can be flexibly realized when in demand.

(6)Within a company or organization, call limitations can be set according to one's limits of authority and rank.

(7) In hotels or holiday villages, the mobile phone renting service can be provided to guests at a rational tariff rate in order to improve service quality and increase the user's satisfaction index.

ZTE Corporation has been making great efforts in the research of PCS and developing more advanced technologies and new value-added services to meet the ever-changing needs of the market. The integrated solution proposed by ZTE Corporation for fixed-line and wireless personal communications has already been put into large-scale commercial use. The research of integrating the short message services for both fixed-line and PCS users into a unified platform on PSTN is also under ZTE's research. During the first half-year of 2003, ZTE will develop the packet data i-mode service for PCS terminals to access the Internet at the speed of 128 kbit/s, by means of upgrading software on the currently operating networks.