

Research and Development of the Thin Terminal Technology of Broadband Computer

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Abstract

With the increasingly expanding and perfecting of the construction and application of the information networking, the cost, technology, security, and management of the information networking are facing big risk and challenge. The thin terminal technology of broadband computer is the information service system based on the C/S system computing platform, which could fully utilize the broadband network technology, with low cost, high efficiency, high security, and easy management, and sufficiently dig the computing function of the server, and effectively solve various risks and challenges in the construction of the information networking.

Keywords: Broadband, Thin terminal technology, Internet, Server

1. Introduction

With the advance of the national network convergence of China, many special groups which are very important for the development of broadband potential, and many service demands with large potential such as the binding of broadband computer and the application of network computer occur more and more obviously in the market through relative surveys about the construction and the application of the broadband market, to match with the strategic disposition of the scale development of broadband. At present, the popularizing rate of personal computer restricts the scale of the broadband number allocation to some extent, and especially in the construction and application of the information networking in many enterprises, and many problems such as the computer purchasing cost, the network charge, the network technical talent, the information maintenance, the security and management exist universally, and in the survey, quite proportional potential clients want to use the network computer terminal product and relative software which have low price and can fulfill their daily demands in surfing the internet. Many enterprises with increasingly reduced budget base want to acquire more computer networking resources, the broadband operator can adopt many payment forms such as binding sales or payable by installments to provide these terminal products for those users without personal computer, so these users can put the broadband into operation and possess the network terminal only by paying less charge.

The key of those successful enterprises is to acquire the changing information quickly, seize the business opportunity, and accordingly strengthen the competitive advantages, so the thin terminal is thought as the ideal solution to push the enterprise informationization.

The research and development of this technology is implemented by the Guangdong Research Institute of China Telecom Co. Ltd, and the intention of this technical solution is to provide a kind of cheap and easy form to surf the internet for users who can enjoy abundant network applications and network storage spaces, same to the local computer.

2. Technology and advantages of the broadband computer thin terminal

2.1 Concept

The thin terminal is also called as “thin client”, and it is a simple terminal machine or other operation device

based on the standard of PC industry, and it is the server to link the storage with various application programs and data, and its main components include professional embedded processor, small local flash memory, and simplified operation system (Qian, 2010, P. 27-28). Only by using this new-generation operation mode, various devices could reduce the cost, transfer relative applications more quickly, and update their own technologies to satisfy the increasing information demands.

The broadband thin terminal technology includes the thin terminal and the background system service. The thin terminal is the simple computer with small volume, simple hardware allocation, customized operation system, basic networking function, and remotely using of background application. The main function of the background system service is to provide abundant application programs and storage spaces for users, and all these application programs run in the background system, and the background only transmits the changing information of the image to the thin terminal, and the thin terminal only transmits the changing information of mouse and keyboard, without any logic operations about the application. The background system services include the service management platform, the application capacity platform, the user data storage center, and the interface system.

2.2 Advantages

The thin terminal has following advantages, i.e. low cost, software license management, high data secrecy, reliable and durable terminal user device, quick and easy software deployment, easily application running and data storage, centralized processing maintenance and technical support.

3. Overall framework of the research and development system

By studying the terminal technologies including the thin client and the network computer, and the operation model technologies based on the server such as the independent computation framework and the window terminal service, the sample product of the broadband thin terminal for the broadband user of China Telecom is researched and developed.

3.1 Overall framework

The overall framework of the system is seen in Figure 1.

3.2 Characteristics of the overall framework

(1) Advanced characteristic. The system is based on the advanced technology and the new product, and the technical level could achieve the domestic and international leading level to guarantee that the system could satisfy the technical requirements of system management in several future years.

(2) Mature characteristic. The product adopted is the mature product through the test of the market, with big market share, and the original manufacture can provide good technical support.

(3) Expandability. The system structure and the product type should have good expandability to satisfy the expanded requirements of the system in several future years.

(4) Reliability. The system management tool should reduce the influence on the system efficiency and reliability as more as possible, and it should run very stably as the same time.

(5) Integration. To realize the target of unified supervision, various system management tools should be integrated with the system management platform, and the management tools should be operated by the same mode, and the event information from various management tools should be collected to the control platform of the system management platform.

(6) Usability. The system management tool should be used easily, and avoid the complexity brought by excessive products to reduce the difficulty of the project implementation and the management maintenance.

(7) Standardized and opening characteristic. The system structure and product should accord with the industrial standard, with good opening characteristic, and provide good application interface for the second development.

(8) Management characteristic. The system should manage the operation, except for operator management, system management, user management, and business management, it should have the function of report table management.

3.3 Logic model

The logic model (seen in Figure 2) mainly includes four logic function modules, i.e. the thin terminal remote desktop client, the service management platform of the background system, the application ability platform of the background system, and the user data storage center of the background system.

3.4 Terminal demand

The terminal demand is the important part of the research and development of the broadband computer thin terminal technology, and the definition of the inputs and outputs is one key step in the research and development of the system.

3.4.1 Input demand

(1) The remote desktop client software of the thin terminal transmits the user's request of the operation identification, and the account and password of the operation identification are the account and password of the broadband access of the user.

(2) The remote desktop client software of the thin terminal transmits the user's identification request for logging in the remote desktop, and the account and password of the identification are the interior account and password in the background system, and for user, this identification is transparent and completed by the system automatically, and user needs not remember the account and password.

(3) In the mode of application navigation, the remote desktop client software of the thin terminal transmits the transfer request for certain one remote application to the application navigation software of the background system.

(4) In the mode of remote desktop, the remote desktop client software of the thin terminal transmits the transfer request for certain one remote application to the background system.

(5) In the remote application, the remote desktop client software of the thin terminal transmits the changing information of user's mouse and keyboard to the background system.

3.4.2 Output demand

(1) The background system transmits the operation identification request to the 163 broadband identification background, and after the identification result is acquired, the result is returned to the remote desktop client software of the thin terminal.

(2) The background system returns the identification result that the domain user logs in the remote desktop to the remote desktop client software of the thin terminal.

(3) In the mode of application navigation, the background system transmits the window interface when the remote application runs to the remote desktop client software of the thin terminal.

(4) In the mode of remote desktop, the background system transmits the window interface when the remote application runs to the remote desktop client software of the thin terminal.

(5) In the remote application, the background system responses the changing information of user's mouse and keyboard, and transmits the changing information of the window interface when the application runs to the remote desktop client software of the thin terminal.

3.5 Structure type of public data

The definition of the structure type and the storage mode of the public data, and the definitions, the initial values, the possible value range and corresponding physical meanings of various elements in the type are very important for the system design. The public data structures used in this system include (1) user information data structure, (2) application authority data structure, (3) user group data structure, and (4) charging information data structure.

4. Functions and technical supports of the research and development system

The implementation of the system functions is the main target of the research and development of the system, and to achieve the design target, the selection of the application technology is very important, or else the system functions could not be realized or achieve the requirements.

4.1 Main functions

The thin terminal technology mainly include following functions.

4.1.1 Platform of client

(1) Providing the user login interface. When the user inputs the same account and password with the broadband access, the operation identification finishes, and the remote desktop can be logged in automatically, and the remote application can be used immediately.

(2) In the login interface, user can log in system under the application navigation mode or the remote desktop mode. In the application navigation mode, the application navigation interface displays after successful logging,

and in the remote desktop mode, the same interface with the usual Windows desktop environment.

(3) After user logs in the system successfully, he can use the applications of the remote server like local applications.

(4) Through the remote RDP protocol, the remote desktop client transmits the changing information of mouse and keyboard to the background system, and displays the changing window images transmitted from the background.

(5) User can copy the information and documents of the local operation system of the thin terminal, and paste the data to the remote desktop of the background system by the remote desktop client software, and in reverse, user can copy the information and documents of the remote desktop of the background system and paste the data to the local operation system of the thin terminal.

(6) After connecting the remote desktop, the full screen display mode and the non-full screen display mode can be selected.

4.1.2 Platform of service management

(1) Providing convenient and fast management functions such as account application and cancel, operation open and close.

(2) Managing all users' operation identification, system operation authority, application running authority, storage share, and uniform allocation strategies by the domain controller.

(3) Applying uniform system maintenance functions such as the software installation, updating, and allocation.

(4) DNS analysis functions for the domain controller, the domain server, and users' domain names.

4.1.3 Platform of application

(1) Accepting the management of the domain controller.

(2) Providing many basic Windows applications such as Office, Outlook, IE explorer, and image editing.

(3) Installing various kinds of CP/SP software on the application server, and selectively let users to run various third-party applications by managing the authority of application running.

(4) According to the opened application characteristics and the capacity planning, adopting the loading share strategy to deploy multiple application servers, and serve users in divided area respectively.

(5) Supporting multi-standard terminal interview protocols such as RDP and ICA, linking with the terminal directly.

(6) Accepting the identification request of the terminal.

(7) Backup the data by the Raid technology for the application server.

(8) Running the software of application navigation.

(9) Supporting the reorientation function of media, remote video documents, and local decoding play.

4.1.4 Data storage center

(1) Accepting the management of the domain controller.

(2) Providing certain storage space for users according to the storage share strategy in the domain controller.

4.2 Technical support

Following technologies are applied in the system to realize various functions of the system.

(1) Object oriented technology.

It could ensure the reuse of the program codes and the infinite expandability of functions.

(2) XML technology.

XML is a kind of extensive markup language, and the markup of XML is simple label for computer, and it points to the data which should be processed by the computer, and the data are stored in the embedded structure tidily to provide bigger flexibility for the data exchange (B'Far R, 2005). XML can be used to display the content, the file information, the grouping information, and simple list of the database, and apply the definition of recursive data structure. Comparing with other exchange formats, XML has more powerful functions and wider adaptability (Liu, 2009, P. 266-268).

(3) J2EE technology.

J2EE can provide a platform-independent, transplantable, multi-user, secure, and standard-based enterprise-level platform for the Java technical development server to simplify the development, management, and deployment of enterprise application. Various platform developers respectively develop different J2EE application servers which are the deployment platforms for the enterprise-level application of J2EE, according to the J2EE regulation (Yin, Zhaolin. (2005). Because they all follow the J2EE regulations, the enterprise-level application developed by the J2EE technology can be deployed in various J2EE application servers.

(4) Multilayer-distributed technology.

Three-layer C/S structure is to divide the application function into the presentation layer, the application layer, and the data layer.

In three-layer or N-layer structure, the middleware is the most important component. The middleware (Wayne Wolf, 2005) is a software layer defined by API, and it is the distributed software management framework with strong communication ability and good expandability. Its function is to transmit data between the client and server or between two servers and realize the communication between the client group and the server group.

(5) RAP protocol technology.

RAP protocol (Zheng, 2001) is the terminal protocol of the communication between the server and the client, and this technology mainly realizes the complete separation between the application of computer logic and the application of human-computer interaction logic, and only transmits changing vector data between server and client, and interview large application program safely and quickly under the lowest bandwidth of 3 Kbps. By this technology, the server could manage all application programs centrally, the access is convenient, and the bandwidth requirement of network is not strict.

5. Conclusions

The technology studied in this article can realize many functions such as remote application navigation, remote desktop application, remote dialog load balance, remote dialog security, centralized storage of user data, local decoding of remote media, united identification of 163 and AD, and system interface support. The cheap and simple sample of thin terminal is customized, and the running result of the operation system shows that the thin terminal can interview the background application system, which is practical for those entry-level broadband users and enterprise clients who only need surf the internet.

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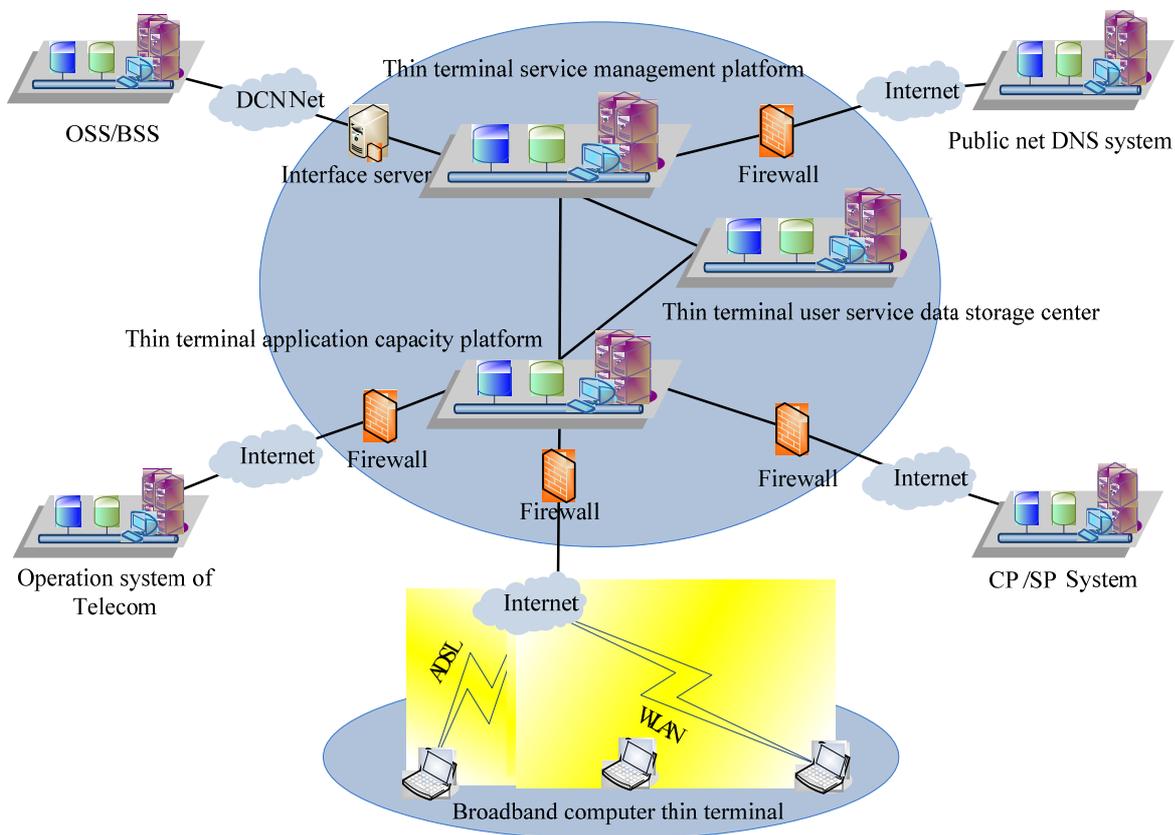


Figure 1. System Framework of the Broadband Computer Thin Terminal Technology

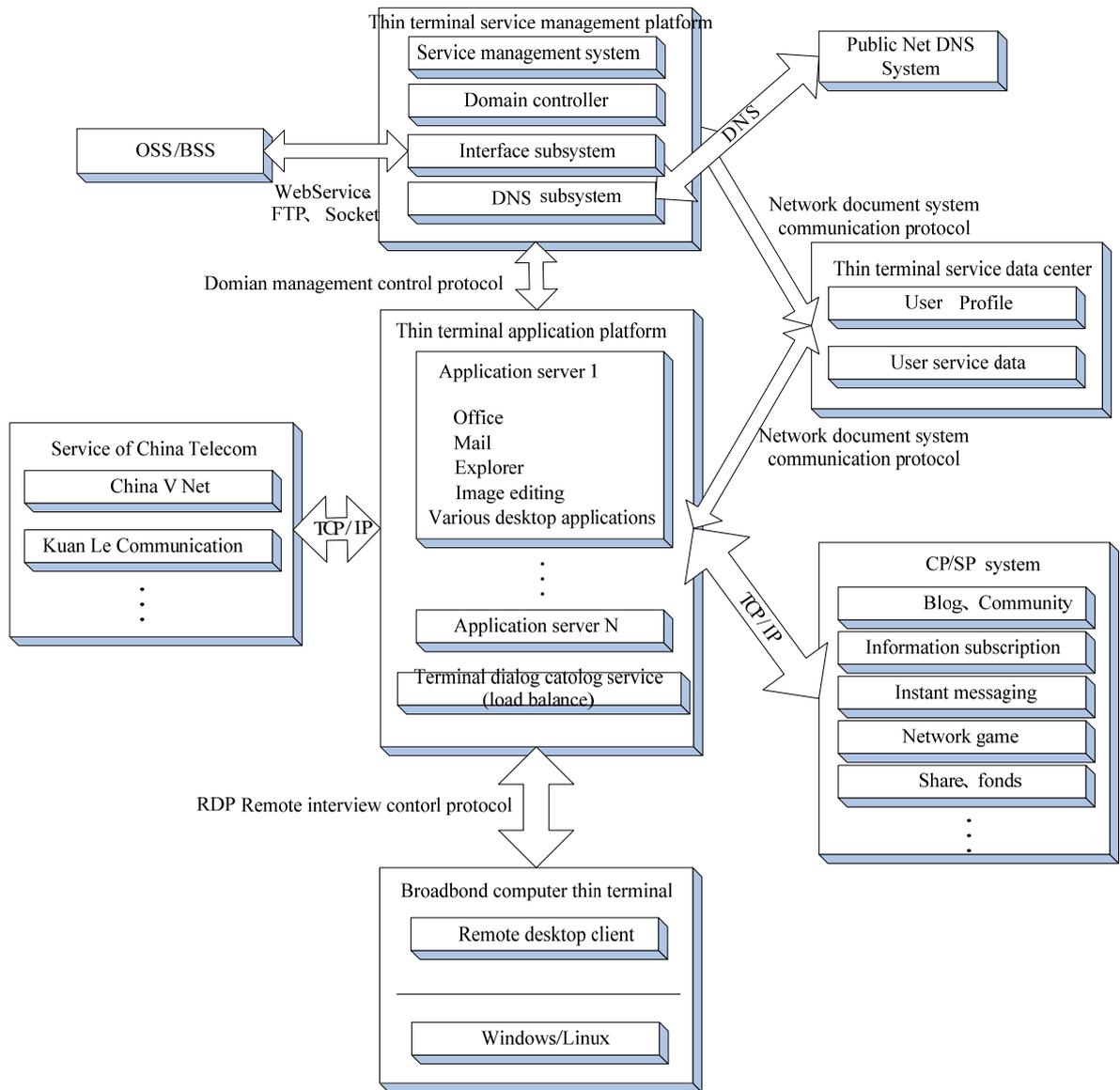


Figure 2. Logic Model of the Broadband Computer Thin Terminal Technology