

Case Study of the Mobile IP Centrex

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Abstract

At the initial stage of mobile phone penetration, cell phones were often used for business. As the class of users expanded, there has been increasing demand from the mobile phone market for entertainment functions to be added to handsets. However, the functions demanded by business users differ from those seeking entertainment. In 2004, a handset was released with a wireless LAN function, and mobile phones came to be incorporated into the ICT solution.

Now, Mobile IP Centrex is one of the most popular ICT solutions for utilizing mobile phones. Therefore, in this paper, we will introduce a manufacturing company as the latest example of an enterprise providing an ICT solution using mobile phones. With the adoption of the mobile phone, the office environment was restructured. In addition, the increasing use of mobile phones changed the way people worked. Progressing from the introduction of the example, we consider the construction of a communication network for business as a result of the increasing use of mobile phones.

Keywords

ICT solution, mobile phone, IP Centrex, cloud computing

1. INTRODUCTION

Three changes have occurred in the mobile communication environment for business. The first is enhancement of mobile terminal performance as represented by the appearance of cheap netbooks. Mobile phones can now operate at frequencies greater than 1.0 GHz with memory that exceeds 16.0 GB. This is the same level as a PC manufactured several years ago.

A netbook is a small portable laptop computer designed for wireless communication and access to the Internet. Primarily used for web browsing and e-mail, the netbook relies on remote access to web-based applications. The mobile phone and the PC are converging.

Another change is information security. The use of mobile phones by corporations means that on a day-to-day basis, customer contact information is stored on the handset in memory. Since the enactment of the personal information protection law in April 2005, however, businesses that store personal customer information in a virtual phonebook are obliged to handle this information under the terms of the law and give consideration to security. This need for organizational measures to manage corporate behavior is what lies behind the advances in corporate mobile phone contracts.

The last change is the cost of communications. Amendments to the telecommunications business law in April 2006 led to implementation of certain regulations that enable service conditions that can be decided through consultation between mobile network operators and corporate users. This was expected to bring about changes that would meet the needs of corporate users, who differ from individuals in that they transfer significant quantities of data and voice communications. Consequently, conventional fee plans and services are not suited to the needs of corporate users.

There have been massive new developments within the corporate user environment. In response, mobile network operators have introduced smart phones, which can be easily integrated into a company's computer network, and have provided an internal phone line solution compatible with wireless LAN systems. The increased use by business of ICT solutions is worthy of attention.

2. RELATED WORKS

Business management and technology are necessary when considering such ICT solutions as Mobile IP Centrex. Nolan et al. explained the strategy by referring to a matrix consisting of four domains when a company introduces ICT solutions (2005). This matrix consists of a axis of need for reliable information technology and an axis of need for new information technology. For example, a company with a high need for new information technology and low need for reliable information technology is characterized by the following. The introduction of an ICT solution aims to improve business processes, reduce costs significantly, and produce a gain in performance. In other words, such a company adopts an ICT solution in order to address management issues. On the other hand, a company with a low need for new information technology and high need for reliable information technology will adopt ICT solutions to improve its bottom line. Mobile IP Centrex has low reliability because it is a non-redundancy system. Its novelty is high because of outsourcing. Therefore, the solution is considered a management issue according to this matrix.

In addition, Gump et al. presented the Mobility-M framework to introduce mobile technology applications into current business processes (2005). This framework consists of two pillars made up of Mobile Added Value (MAV) and Informational Added Value (IAV). First, a company has to examine its business processes and the mobile technologies available. MAV has to generate process enhancements compared to existing business processes. The employment of MAV leads to the realization of IAV through financial calculations of the potential ROI with regard to investments. The results of this evaluation lead to the final decision. In Mobile IP Centrex, managerial decisions should be made by following similar steps.

On the other hand, technical papers on mobile technology have presented the following: Matoba et al. introduced a system function that had been developed and which used a dual W-CDMA / Wi-Fi mobile terminal to provide IP Centrex services (2000). The paper describes two functions that are needed for the development of the Mobile IP Centrex Service. The first is conversion of the IP address, and the second is derivation of charge area information. It proposes concrete basic sequences, protocol stacks, and system configuration.

In addition, Morinaga et al. explained the function of the terminal needed to use the Mobile IP Centrex (2001). The report states that the development of many functions (QoS, function development of power-saving, call admission control, high-speed handover and UPnP) is necessary. Now, these functions that were suggested in two papers have been implemented. It is thought that the technical problems have been almost settled. Therefore, I confirm how the management issues have been handled with this paper.

3. IP CENTREX AND FMC

The FMC (Fixed Mobile Convergence) service is one area of development. In a consumer market, as the infrastructure for public wireless LANs (Wi-Fi) becomes more widespread, the potential increases for the use of IP phones in the mobile environment. Making IP phone calls across public wireless network environments is possible using notebook computers and PDAs.

For example, Skype is an installed software application that allows many users to make phone calls over the Internet.

On the other hand, IP Centrex is used by major companies for business. In general, IP Centrex is an IP phone service for enterprises that uses an IP network to provide PBX functions. Call forwarding is essential for business. Internal calls between offices are free. The external call service makes it possible to reduce voice communication costs due to the inexpensive billing plan for domestic outgoing calls. In addition, it is also possible to use data communication services such as the internet.

However, there are some hurdles in using a mobile phone as an IP phone. The three major hurdles are a Wi-Fi area design in the office, forwarding to the outside, and control of multiple phone numbers. Wi-Fi area design know-how must achieve seamless handover between access points in the office. Control by the mobile phone operator is essential in forwarding calls to the outside using one phone number. Therefore, the largest system integrator offering Mobile IP Centrex ICT solutions is a mobile phone operator at present.

4. COMPANY T

Company T offers the core products of petrol dispensing pumps and labor-saving information technology devices for petrol stations. The company has more than a 60% share of the Japanese market in equipment for petrol dispensing pumps. Its products include car washes, underground tank-related devices, delivery-related devices, eco-energy-related devices, and devices for oil plants. In addition, the company develops OA equipment for gas stations and designs hazardous material storage facilities.

Established in 1911 by several staff, the company soon developed the first petrol dispensing pump in Japan. The founder established the Yokohama plant (near Tokyo), increased the number of research and development engineers, and set up an after-sales services subsidiary. The manufacture and maintenance of products take place throughout Asia. With the Yokohama plant as the main factory, production sites are expanding to regions around the world. The products are in use globally (Asia, Europe, the Middle East, Oceania, and Africa) with a sales and maintenance network extending to every corner of the world. The network is dedicated to providing a thorough, quick response.

As a result of these activities, the company now employs a staff of approximately 2,000, forms a conglomerate of another six overseas joint venture companies, and has about 80 branch offices besides the main office in Japan. Today, the company has the top position in the domestic industry and has become one of the world's three largest manufacturers of petrol dispensing equipment. For this case study, I interviewed the following four informants: a proposer from a customer company, the customer's system integrator, a mobile phone operator's system developer, and a salesman.

5. MOBILE SOLUTION

5-1. Management issue

Company T has a market share greater than 60% for petrol dispensing pumps in Japan. However, petrol stations are decreasing rapidly. There were more than 50,000 petrol stations at the peak. Now, there are 40,000 petrol stations. Because automobile fuel consumption efficiency has improved, the number of times refueling vehicle has to be refueled has decreased. Lifestyles are changing such that people are avoiding the use the privately owned automobiles; the

company predicts that the number of petrol stations will fall to 30,000.

On the other hand, many petrol stations adopted customer self-service. Optional functions at the petrol dispensing pump are in demand by customers. The additional functions include operation guidance or advertising presentations on the screen and payment via electronic funds or credit card. The flagship factory in Yokohama develops products that include such optional functions. The products made at this factory are shipped primarily to the Japanese market. Some factories in Asia, where labor costs are less expensive, make older model products in large quantities. The Asian factories compete with high quality, cheap products in the overseas market. If the company cannot develop value-added expensive products, it may become involved in price competition in the Japanese market, which may result in a decline in the power of innovation.

Thus, a support network to supply various products is important in order to remain competitive. Cost reductions in the indirect section are necessary while the domestic market is saturated. Before introduction of the Mobile IP Centrex, the General Affairs sections of each office managed the telephone equipment in the office. Mobile IP Centrex for all offices was introduced after a directive from the president to create an information system section.

5-2. System integration

Generally, IP Centrex solutions are built by installing PBX (private branch exchange) systems in each office and adding modules for IP phones. The target is free internal calls within the organization, offer of a videoconferencing service, and common use of a line for both data and voice.

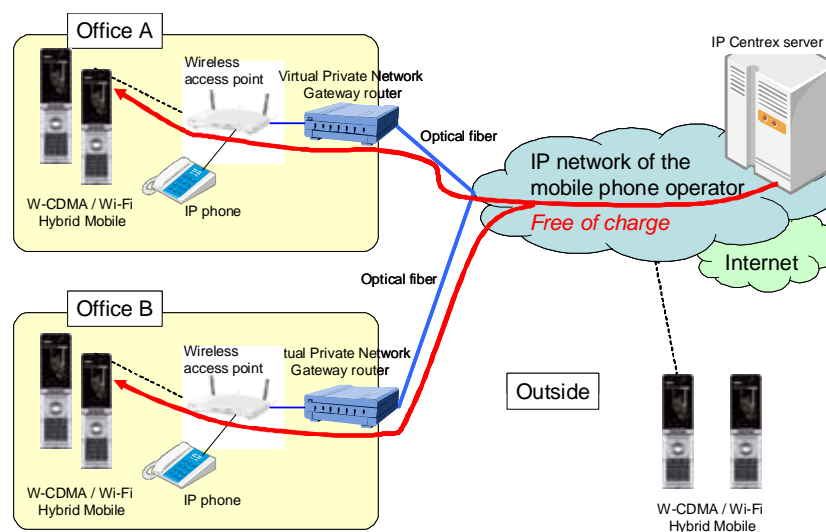


Figure 1. All Constituents of Mobile IP Centrex at Company T

On the other hand, the design policy for Mobile IP Centrex differs greatly because of two ideas. One is the idea for the one number service giving a unique phone number to each individual. The other is the idea of cloud computing. Cloud computing is where resources are provided as a service over the network. Of course, there are videoconferencing services and telephony functions in conjunction with employee use of personal computers. However, the major characteristic is executing address inquiries with the server of a mobile phone operator without having PBX systems in the office. Figure 1 is of the components of the Mobile IP Centrex in Company T. This

system enabled message preservation, message notices for mobile phones, and voice mails sent to personal computers.

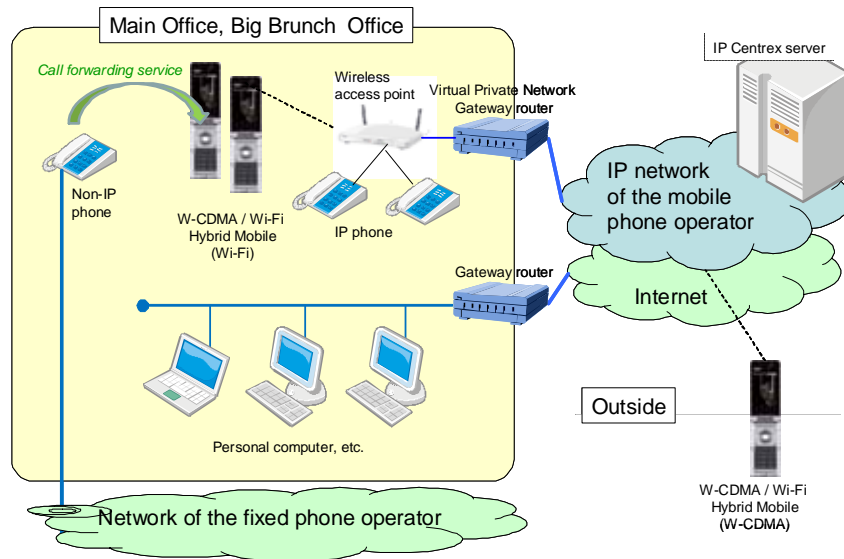


Figure 2. Main Office's Constituents

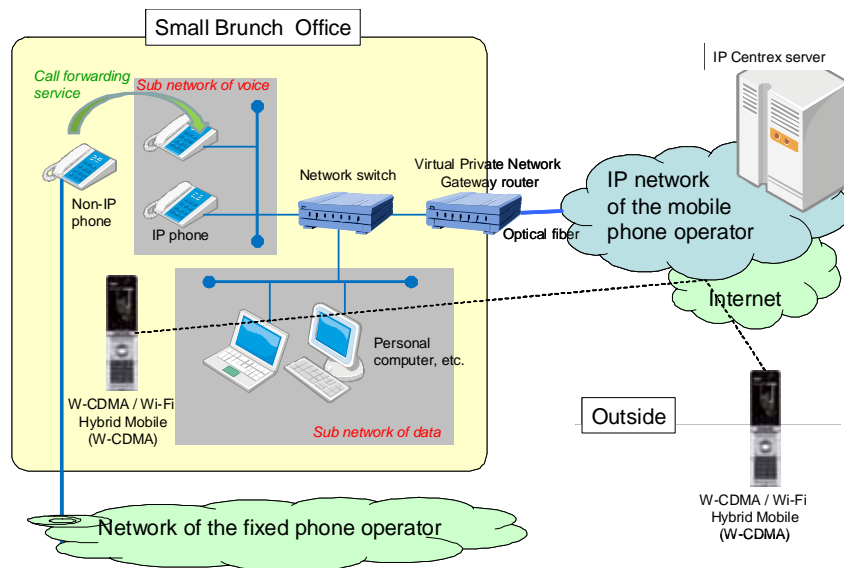


Figure 3. Small Branch Office's Constituents

In the main office and large branch offices, the company built systems using the components illustrated in figure 2. Large offices have many employees. Therefore, they maintain reliable, consistent communications by separating the data and voice lines. The phone number is retained from the old days for the convenience of regular customers. Therefore, the service forwards incoming calls to a pre-registered telephone number. In addition, the office can easily change the layout anytime because wireless access points are installed in the ceiling.

The small branch offices built systems with the components illustrated in figure 3. Small offices

have few employees. Therefore, common use of one line for data and voice reduced costs. The information system section did not install the access points, but wrote the settings manual, which was sent to the small branch offices along with the machines. Next, staff went to the small branch offices and built that system.

5-3. Evaluation by Company T

At the time of introduction, some problems with the wireless system occurred. However, the problems have been resolved. The vice director of the information systems division says, "The advantages of the initial cost and the reduction in operating costs is greater than the problems." Before system introduction, employees called the office reception desk. However, employees can now directly call the key person for the work. Employees are connected to each other, improving the work speed. In addition, organizational changes and employee transfers are now easy.

6. Future predictions

In future, Company T will elaborate on a plan by the information system section for use of the system from the outside the office. The vice director is considering how employees can use netbooks and mobile phones to take advantage of the security features. Companies that use mobile solutions have a high need for new information technology. In the case of Company T, trends in system integration influenced management decisions significantly. The company aimed to generate process enhancements compared to existing business processes. In addition, the company achieved effects that were not anticipated from the mobile solution.

Mobile phones differ from ordinary commercial materials and services in the fact that they allow users to connect to one another, and thereby produce external effects and potential profit. When mobile phones can connect to optical fiber networks (as in FMC), can be integrated into the system, or when mobile IP phone connection services supplied only to mobile network operators can include an open Internet culture by playing a crucial role in non-communication services, such as non-contact IC, the potential for use increases dramatically. Such uses may be the most significant change ever seen in business information communications media, and in response, industry will change significantly as well. This also represents a significant business opportunity.

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