

Corporate Internal Mobile Centrex System Using IP CONVERGENCE[®] Server SS9100/A8700

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The term “ubiquitous” is becoming a common and widely used expression. This term is used to describe all sorts of things connected via networks, making it possible to exchange necessary information with any type of equipment at “any time”, “anywhere” and for “anyone”. Services provided by the so-called mobile networks can definitely be characterized as being ubiquitous. Seamless connections between networks, particularly between corporate and public networks, are sought after.

On the other hand implementation of corporate internal IP Centrex is drawing an increased amount of attention as a reduction in communication costs can be expected with the adoption of IP telephones in the networks of businesses and local governments, due to IP conversions in recent years and due to the rapid progress being made with regards to broadband conversions. Furthermore, the need for a corporate internal Mobile Centrex is on the rise as this makes it possible to utilize mobile phone handset terminals in corporate networks, not only for the cost aspect but also for improving convenience and productivity. Interest concerning VoWLAN (Voice over Wireless LAN) expressed by corporate users has been extremely strong since the launch of the N900iL (FOMA[®]¹⁾ / wireless LAN dual terminal) product by NTT DoCoMo at the end of 2004.

Incidentally, the VoIP (Voice over IP) for corporate internal IP Centrex has already been widely recognized by users and is utilized with numerous products, such as VoIP gateways (VoIP-GateWay), which are represented by the BV series of products we offer, or IP-PBX, IP telephone sets, etc. Further, the VoWLAN used with FOMA dual terminals realizes a flexible work style that does not bind workers to desks, allowing innovative work styles as well as business reforms through the utilization of corporate intranets that take advantage of high-speed communications made available by wireless LAN and a selection of optimum communication tools appropriate to particular situations.

The available environment allows a sales person working in the field to stop by a hotspot[®]²⁾ and use his laptop computer (notebook personal computer) to connect to the corporate network back in the office and enter the results of his sales activities or to verify a preview of the information regarding a customer he needs to visit, or initiate a call to talk to someone in the office by using the software phone integrated into his laptop computer. Furthermore, communication methods

that are ubiquitous in nature are sought after, such as connecting from home to a corporate network via an ADSL (Asymmetric Digital Subscriber Line) service to enable a person to work at home and talk to people in the office using a software phone.

This paper will introduce collaborative solutions that offer a wide variety of services not limited to phone services by combining the IP CONVERGENCE[®]³⁾ Server SS9100 and the AS8700 (hereinafter referred to as “SS9100” and “AS8700”), software phones (Com@WILL[®]⁴⁾) and FOMA dual terminals.

Background of FOMA Dual Terminal

Mobility and convenience have so far been provided by personal handyphone systems (PHS), which feature a dual mode for public switched networks and enterprise networks. Due to the successive withdrawal and termination of the public PHS services by telecommunications carriers there is now demand for a solution to replace PHS. While this is ongoing an environment for providing a new solution using VoIP technology and wireless LAN has now been made available. Furthermore, serviced areas have been expanded for wireless LAN services (hotspot services) provided by telecommunications carriers as part of the public communication infrastructure, as well as the popularization of broadband networks due to the expansion of broadband communication services that use ADSL and optical cables.

NTT DoCoMo, KDDI and Vodaphone all offer corporate internal Mobile Centrex services against this backdrop, each with vastly different mechanisms and strategies.

First of all, the Mobile Centrex offered by NTT DoCoMo is a SIP (Session Initiation Protocol) phone when used with wireless LAN in a corporate internal environment, whereas it becomes a mobile phone using FOMA in an external environment. The terminal currently used to receive this dual mode service is a FOMA dual terminal.

Corporate internal Mobile Centrex offered by KDDI, on the other hand, does not use a dedicated mobile phone but can be used with any au terminal available in the market. There is no need for a wireless LAN facility, but rather, the installation of an exchange machines is required for connections of mobile phone networks to

*1) FOMA is a registered trademark of NTT DoCoMo, Inc.
*2) Hotspot is a registered trademark of NTT Communications Network, Inc.
*3) CONVERGENCE is a registered trademark of Oki Electric Industry Co., Ltd.
*4) Com@WILL is a registered trademark of Oki Electric Industry Co., Ltd.

existing PBX systems or the installation of a base station indoors. Coexistence with internal lines from an existing PBX system is possible and a call can be made to a phone connected to an existing internal extension line from a mobile phone on an internal extension line.

Corporate internal Mobile Centrex offered by Vodafone does not use a dedicated mobile phone either, but rather, it is a solution that uses Vodafone terminals readily available on the market. The feature of the service includes the fact that it can be implemented in offices anywhere within the coverage of Vodafone signals and the installation of wireless LAN or dedicated mobile phone stations indoors is not necessary.

The solution of Oki Electric for corporate internal Mobile Centrex systems is the same dual mode method as the one used by NTT DoCoMo. This method makes it possible to provide group services with ordinary phones, as is the case with conventional PHS services for enterprise networks. It also makes it possible to offer new services, such as the exchange of presence information with all terminals on extension lines that not only include other mobile phones but also all ordinary phones as well. Furthermore, mobile phones can collaborate easily with corporate internal phone directories that are under integrated management and they are not limited to the phone directory of a mobile phone handset itself. It is also a solution that can appeal to customers with a convenience made possible by integrating the mobile phone and phone for internal extension lines into one unit.

Summary of IP CONVERGENCE® Server SS9100/AS8700 System¹⁾

Collaboration with IP-PBX functions and enterprise system application servers is realized with the SS9100

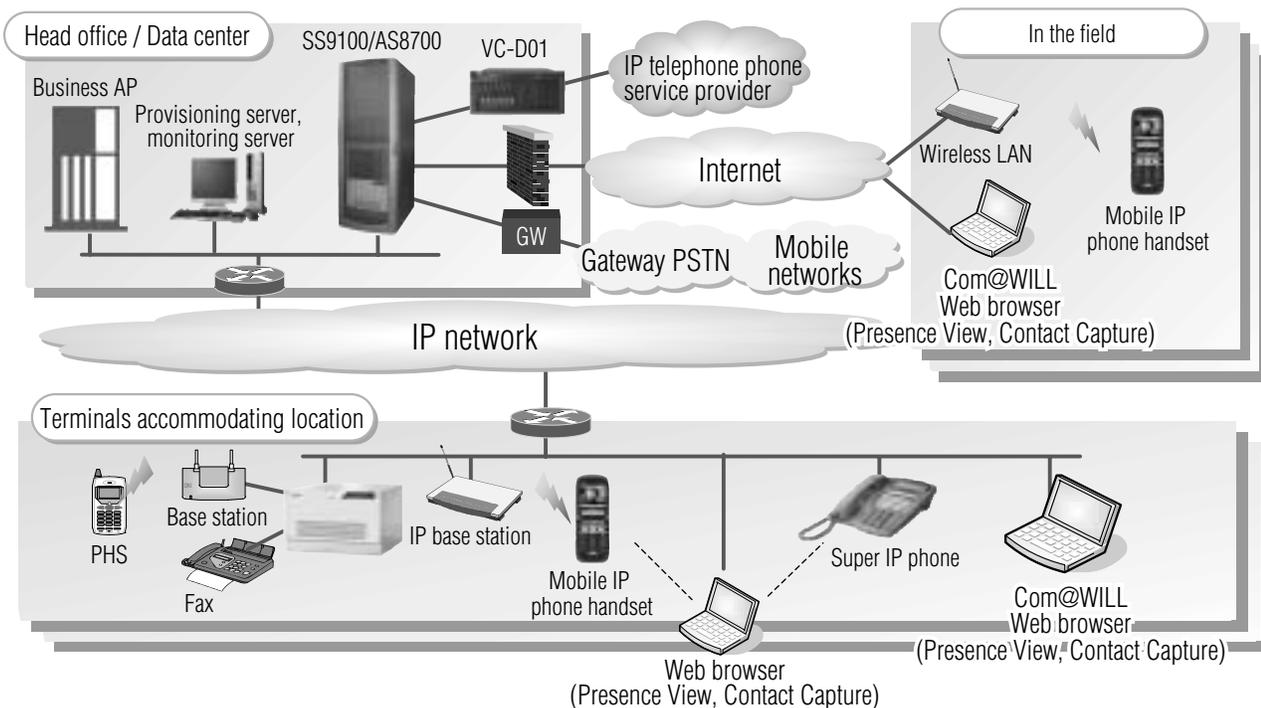


Fig. 1 SS9100/AS8700 System Summary

with the adoption of Microsoft.NET. A system summary of a corporate internal Mobile Centrex system realized using the SS9100/AS8700 is shown in **Figure 1**. Furthermore, major services provided by combining the FOMA dual terminals and personal computers are shown below.

(1) Characteristic Services Provided by FOMA Dual Terminals

1) Telephone Services

Basic services are provided for phones connected to internal extension lines, such as call initiation, call reception, call hold and call transfer. Since the priority control for voice packets in wireless transmissions is vital for the assurance of sound quality, the use of wireless LAN access points is required for which priority control is available.

2) Presence Service

It becomes possible to use a phone at any time and anywhere with the use of mobile phones. The operating efficiency is expected to improve, however, making a call without any regard as to the condition of the receiving parties does not necessarily constitute an improvement in operating efficiency, particularly when the receiving parties are included in the equation. For this reason there is a need to include verification on the status or condition of the receiving party and therefore, the presence service is offered by combining the SS9100 with the AS8700. A user can set his or her own status or condition (online, off-line, busy, absent, etc.) from the screen of a FOMA dual terminal so that any parties attempting to contact the user can be notified of his or her status or condition.

3) Phone Directory Collaboration Service

A FOMA dual terminal has its own phone directory function in the terminal itself. The phone directory function is an overwhelmingly popular and essential service for mobile phones. Nowadays, however, it is becoming necessary to implement countermeasures against information leaking from a personal information protection perspective. With the SS9100/AS8700 it is possible to directly reference phone number information available internally in companies on corporate personnel information systems by using the LDAP (Light Directory Access Protocol) and a FOMA dual terminal. Examples of the LDAP search screen display and search results screen on FOMA dual terminals are shown in **Figure 2**. A more secure operation is possible because with this feature it is no longer necessary to store telephone number data in the phone directory functions of individual FOMA dual terminals.



Fig. 2 Examples of LDAP search screen and search results screen on FOMA dual terminals

4) FOMA Dual Terminal Applications

It is possible to use a wireless LAN browser for use indoors and an i-mode^{®5)} browser for use on public switched telephone networks. Characteristic features of the Mobile Centrex system for corporate internal use offered by Oki Electric include PresenceView^{®6)}, a web-based application that displays various kinds of information, based on the presence information. Examples of PresenceView[®] screen displays on FOMA dual terminals are shown in **Figure 3**.

Other than the FOMA dual terminals, software phones (Com@WILL[®]) are also terminals on which notifications and the display of presence information can be made. Besides the integrated management of presence information notified by FOMA dual terminals and software phones, it is also possible with PresenceView[®] to input one's own present location from a browser and notify other members. This makes it possible to verify the presence and absence as well as whereabouts of other members by using the i-mode browser installed in FOMA dual terminals even if outside the office and conduct communications in an efficient manner. Furthermore, it is possible to initiate a call to a person who is being referenced with regards to the



(1) Examples of login screen and main menu screen



(2) Examples of presence display and personal information display



(3) Examples of message reception and message transmission

Fig. 3 Examples of PresenceView[®] screen displays on FOMA dual terminals

presence status on the web screen, who is present at the time, regardless of the type of terminal (FOMA dual terminal or software phone), with just a click dial. Messages can be left to members who are absent at the time by entering such messages from a web browser. These services are available not only from the i-mode browser but also from a wireless LAN browser when used indoors. One of the major features of the corporate internal Mobile Centrex offered by Oki Electric is the realization of a highly efficient communication style for persons in the field, which provides applications that utilize the browser functions of FOMA dual terminals.

*5) i-mode is a registered trademark of NTT DoCoMo, Inc.

*6) PresenceView is a registered trademark of Oki Electric Industry Co., Ltd.

(2) Communication by Mobile PC

With the popularization of wireless LAN hotspot communications, access to corporate internal network environments from external locations by using IP-VPN and the like is about to become common practice. Using ordinary corporate internal extension numbers as the phone numbers of software phones is possible with the software phone offered by Oki Electric, even if such phones are being used to access the network from an external location using a mobile PC. The parties receiving such calls will not be aware of the location of the callers but they will be able to communicate as if everyone involved were all located inside the company. Furthermore, it is possible for each party of a call to verify the status of the other party through the exchange of presence information and as needed, it is also possible to communicate using the most optimum of means, including such devices as phone, chat, messaging (text or voice), etc. This solution responds to the mobile service needs of the ubiquitous network era by supporting work style innovations and business reforms through the provision of communication services that realize communications with which all parties appear to be located in the same office, but in reality users can be working at home, calling from the field or on a business trip, using the functions made available by the corporate internal Mobile Centrex system offered by Oki Electric.

Implementation Example in Corporate Internal Networks at Oki Electric²⁾

The operation of corporate internal networks using the SS9100/AS8700 started at major locations in 2004, with successive expansion and collaboration with business applications proceeding.

The operation of the corporate internal Mobile Centrex (accommodating FOMA dual terminals) in corporate internal networks started from January 2005, following the launch of FOMA dual terminals in the market. The number of users has since continually increased up to the present time. The following examples can be cited with regards to the effects of implementing FOMA dual terminals and mobile PCs into corporate internal networks:

- By carrying a FOMA dual terminal an identical internal extension number can be used to initiate or receive calls even when the user has moved to another location, making it possible to communicate with other parties without concern for their location.
- PresenceView® can be used to verify the status or destination of other parties and communicate with optimum means, including messaging when other parties are absent.
- By linking up with the LDAP, phone numbers of other parties can easily be searched on the screen displayed on FOMA dual terminals, raising the level of operational efficiency.
- Unauthorized terminals connections can be eliminated and security assured by conducting authentications using a RADIUS server for communications with FOMA dual terminals and mobile PCs.

Conclusion

Descriptions on corporate internal Mobile Centrex systems, realized through the collaboration of the SS9100/AS8700 with FOMA dual terminals and mobile PCs, were provided in this paper and we expect to see the advent of various VoWLAN terminals in the future. A terminal for accelerating wireless transmission speeds, a terminal for providing full browser support, or wireless IP telephone handsets dedicated for indoor use can all be considered examples. Systems and solutions that respond to the changes of work styles will be provided by realizing corporate internal Mobile Centrex systems required for the ubiquitous environment and through the collaboration of these terminals and the SS9100/AS8700 it will be possible to communicate at “any time”, “anywhere” and with “anyone”.

References

- 1) Katsunori Endo, Kazuyuki Takagi, Shinichiro Nishida, Yuji Kawasaki, Noboru Okura and Keiji Hanai: “IP Telephony and Business Application Integrating Solution”, Oki Technical Review, Issue 201, Vol. 72, No. 1, January 2005.
- 2) Nobutaka Suzuki, Minoru Nirei, Taketo Marui and Hiromichi Koike: “Summary of IP-Centrex System Corporate Implementation Project”, Oki Technical Review, Issue 201, Vol. 72, No. 1, January 2005.

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TIPS Basic Glossary

Corporate Internal IP Centrex

Systems and services that facilitate calls made on internal extension lines as well as outside lines within a location or between locations without the need to install numerous PBX systems at multiple locations of a business enterprise.

Corporate Internal Mobile Centrex

Systems and services that use mobile phone handset terminals as the internal extension line terminals of a corporate internal IP Centrex system instead of internal telephone sets.