

IP Telephony and Business Application Integrating Solution

- Development of the IP CONVERGENCE® Server SS9100/AS8700 -

Katsunori Endo Kazuyuki Takagi Shinichiro Nishida
Yuji Kawasaki Noboru Okura Keiji Hanai

As IP conversions of corporate networks take place, the degree of efficiency in integrating the communication functions represented by the telephone and the information processing functions that provide enterprise AP (applications) attracts the attention of business management. Further, while investments in IT continue with corporations, there is a raised level of enthusiasm toward making mobile and wireless investments. At Oki Electric we believe that improvements in the operating efficiency through the integration of information and teletelecommunications, as well as the transformation of the quality of communications through dramatic improvements in the quality of sound, are essential factors for the evolution of enterprise networks in the future.

Oki Electric has been providing the market with VoIP products for businesses, such as the Voice over Internet Protocol (VoIP) gateways and Internet Protocol-Private Branch Exchange (IP-PBX), that reduce corporate network communication and maintenance costs. The IP CONVERGENCE®¹⁾ Server SS9100/AS8700 (hereinafter referred to as "SS9100/ AS8700") have been developed to provide better business operations and communication environments by integrating communication environments for these businesses with the information environments, which include business applications. This was based on the information and communication integrating solution concept of Oki Electric's "AP@PLAT®¹⁾", which is intended to create new values and new businesses for customers by

integrating information and telecommunications (refer to the first special article in this special issue¹⁾ regarding details of the "AP@PLAT®").

This paper will provide a summary and describe the service functions of the SS9100/AS8700 and introduce implementation examples.

Summary of the IP CONVERGENCE® Server SS9100/AS8700

The SS9100/AS8700 systems that have been created through the integration of information and telecommunications intended for office communication requirements are based on the AP@PLAT®, our information and communication integrating solution concept (Figure 1). The SS9100 realizes the integration of IP-PBX functions with enterprise applications by adopting the .NET of Microsoft®. By linking up with the AS8700, however, it has been possible to realize the "Adaptive Communications™²⁾", which is an information and communication integrating application group that makes even more sophisticated office communications possible. Through various services provided by the SS9100/AS8700 products, including the Adaptive Communications™, business people are released from the conventional work style with a fixed desk or cubicle, making it possible to implement new kinds of work styles, such as mobile workers and teleworking.

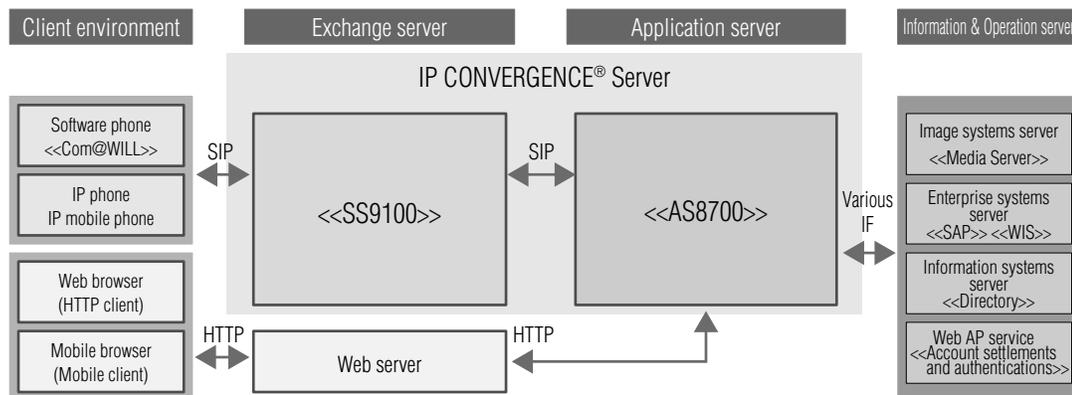


Fig. 1 Configuration of the SS9100/AS8700

*1) IP CONVERGENCE and AP@PLAT are registered trademarks of Oki Electric Industry Co., Ltd.
*2) Adaptive Communications is a trademark of Oki Electric Industry Co., Ltd.

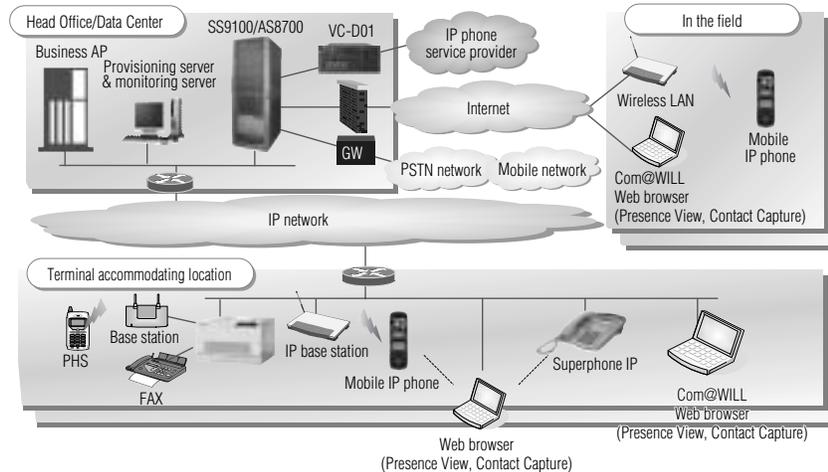


Fig. 2 Image of the SS9100/AS8700 system

The SS9100 is a product capable of supporting various requirements in a flexible manner, as it inherits service functions and reliabilities of the IP-PBX, which we have been providing for many years, as well as VoIP products, with which we have a long history with a considerable number of implementations. The product is capable of accommodating service functions that support, in particular, the uniquely Japanese corporate feature of group working (group receptions, voice transfers, proxy responses, executive secretary functions, multiple lines and multiple stations) as well as connections for a diverse range of circuit lines (analog, digital and IP) and terminals (analog telephone units, multi-functional telephone units, personal handyphone systems [PHS], IP phone units, software phones and e-Sound IP phones). Further, enhancement and expansion of functions for conventional IP-PBX products have also been realized.

The AS8700 is an application server intended to provide sophisticated office communications that realize innovative work styles by integrating communication functions and business applications by linking up with the SS9100.

The image of the SS9100/AS8700 system is shown in Figure 2, while its features are described below.

(1) Support of mobile Centrex

A mobile Centrex environment for offices is realized by using mobile IP phones supporting wireless LAN and an IP-CS(IP-based PHS Cell Station) that supports conventional indoor PHS.

(2) A variety of communications

A communication environment that surpasses communication methods and communication tools, such as telephone, fax, mobile phone or electronic mail, is provided with a unified messaging function²⁾ that makes it possible to listen to an electronic mail message over the telephone, etc.

(3) Enhancing maintenance and operational functions

Enhancement of maintenance and operational functions are provided through the use of system

monitoring server functions that centrally manage equipment and terminals at various locations and provisioning server functions, an enhancement of reliability through the use of survival server functions with the support of Power of Ether (PoE, IEEE 802.3af), a standard power supply method for telephone terminals.

(4) Substantiating various terminals

Aside from the terminals of the conventional IP-PBX, terminals that can realize optimum communications that accommodate a diverse range of infrastructure environments, business lines and operating conditions are also available.. An overview of various types of terminals is shown in Photo 1, while their features are described in Table 1.

TIPS Basic Glossary

Mobile Centrex

Systems and services that involve the use of mobile phone terminals instead of internal telephone units, without the installation of multiple PBX machines at numerous locations throughout a corporation.

Provisioning server function

This server function configures and manages the SS9100 system. The function stratifies the operational management system, providing optimal functional configuration environments for system administrators, organizational managers and employees according to their authority and the operating conditions.

Survival server function

The survival server function secures internal and external communications when faults and failures occur in the network and at the data center.



Photo 1 An overview of the terminals



Photo 2 Overview of the e-Sound IP Phone

Table 1 Features of various terminals

Product name	Features
Superphone IP	<ul style="list-style-type: none"> An economically priced IP phone unit that comes equipped with functions required by businesses (hold, call forwarding, etc.). Session Initiate Protocol (SIP) has been adopted as the control protocol. PoE (IEEE 802.3af) requires no power adapters. LCD can display 16 digits of Japanese Kana characters and alphanumeric characters. Functions can be assigned freely to the five flexible keys. Telephone directory function can be used to register up to 100 call destinations.
WSP-500	<ul style="list-style-type: none"> An economically priced wireless IP phone unit that comes equipped with functions required by businesses (hold, call forwarding, etc.). Session Initiate Protocol (SIP) has been adopted as the control protocol. IEEE 802.11b has been adopted as the wireless interface and the WEP has been adopted for the encryptions and supports the WPA. Supports the IEEE 802.1x to assure the security required by businesses. Continuous call duration (planned): 4 hours; Continuous standby duration (planned): 100 hours.
Mobile IP phone (FOMA ^{*3}) Dual (N900iL)	<ul style="list-style-type: none"> Dual mode terminal is equipped with FOMA and wireless IP phone functions (DoCoMo brand services). Session Initiate Protocol (SIP) has been adopted as the control protocol. IEEE 802.11b has been adopted as the wireless interface and the WEP has been adopted for encryptions and supports WPA. Supports the IEEE 802.1x to assure the security that is required by businesses. Continuous call duration (planned): 2.5 hours; Continuous standby duration (planned): 230 hours (when in independent wireless LAN mode). Linking up with various application servers through the built in browser function.
Com@WILL™	<ul style="list-style-type: none"> Software phone is equipped with functions required by businesses (hold, call forwarding, etc.). Session Initiate Protocol (SIP) has been adopted as the control protocol. Communications are possible using various media such as video, audio, conferencing, electronic mail and instant messaging. Communications accommodate the condition of the communicating partner by the use of "Presence". Realizes support functions (memo messages, display of locations, office news, etc.) for the free-address workers. Compatible OS: Microsoft® Windows®*4 2000, Microsoft® Windows® XP

(5) Call quality with realistic sensations

The e-Sound IP Phone™, which realizes a stable and superior quality IP phone call service is accommodated through Oki Electric's proprietary sound processing algorithm³). Features that are available only with IP phones, are provided combined with a superior sound quality that supersedes that of conventional telephone calls, achieving comfortable and clearly audible phone conversations, while making it possible to pick up the subtle nuances of expression and conduct information transmissions at a conversational level, rather than on the level of a mere phone call (Photo 2).

(6) Application server platform

The SipAs™ on WebLogic Embedded Edition limits its functions to the equipment embedding of SipAs™ on WebLogic^{*5}), which is the information and communication integrating platform from Oki Electric. This makes it possible to create information and communication integrating applications based on the Java 2 Platform Enterprise Edition (J2EE) that can be used to manipulate SIP terminals from web applications.

Services provided by Adaptive Communications™

Adaptive Communications™, an application group provided by the SS9100/AS8700, offers a means to facilitate smooth communications in business operations by integrating the information systems represented by enterprise applications and voice systems represented by telephones. More specifically, the application group is composed of three applications, (1) a sophisticated software phone, "Com@WILL™^{*6}", (2) a browser communicator with telephone linkup, "Presence View™^{*6}" and (3) a business application integrating the communication portal frame, "Contact Capture™^{*6}".

(1) Com@WILL™

Com@WILL™ is a software phone that provides sophisticated IP telephony functions by linking up with the SS9100/AS8700. It is equipped with various collaboration functions, such as teleconferencing, application sharing, file exchanging and instant messaging (conversations through text messages). Further, PBX functions, such as call forwarding, park hold and pickup can also be used (Figure 3).

*3) FOMA is a registered trademark of NTT DoCoMo.

*4) Microsoft Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

*5) BEA WebLogic is a registered trademark of BEA Systems, Inc.

*6) Com@WILL, Presence View, Contact Capture and SipAs are trademarks of Oki Electric Industry Co., Ltd.

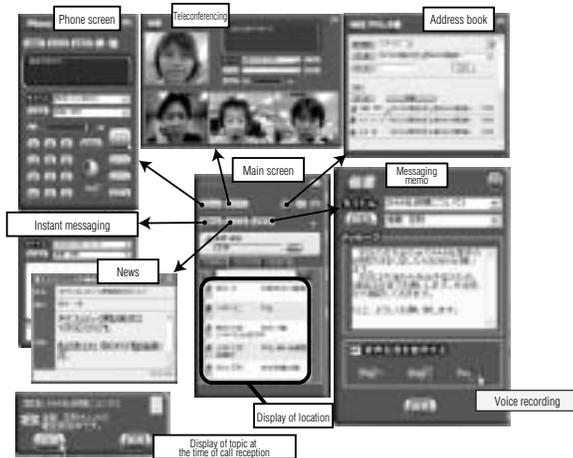


Fig. 3 A Com@WILL™ screen image

1) Topic display on calls

Com@WILL™ makes it possible for a caller to display arbitrary messages on the receiver's terminal at the time the call is made.

This makes it possible for the caller to convey messages (such as "Urgent") while the receiver can determine the urgency of the call as an "urgent matter" or a "case where a call back later will be sufficient" before taking the call. This makes it possible to determine whether or not to answer a call during a meeting for example, thus preventing any delay in responding to urgent matters while preventing interruptions by calls with a relatively low priority.

2) Automatic update display of user location

Conventional location displays using the web required the information to be updated by the users themselves. The address book, which also provides a location display function, is managed by the server. When Com@WILL™ is activated, the information relating to the location (example: "Meeting Room 1, 3rd Floor, Osaka Branch Office") and the status of the user ("on the phone", "busy", etc.) are updated automatically by the server. Further, arbitrary comments (example: "On call [returning at 14:00]") can be added to the location display by the user.

This makes it possible to communicate with people at the right time by verifying the status of the receiver and with the appropriate media (telephone, instant messaging or messaging memos).

3) Messaging memo and office news

It is possible to register text or voice messaging memos on the server. Such memos can be verified or replied to at any time. Messages that were registered when the receiver was unavailable are delivered by the server when Com@WILL™ is activated. Further, it is also possible to register a number of people as a group and to broadcast messages (such as office news, etc.) to all members of a group.

(2) Presence View™

Presence View™ is a web application that offers

browser-based communications through a linkup of the SS9100/AS8700 and a telephone.

By clicking on the address book multi-function telephones, indoor PHSs and mobile phones can be designated as terminals for use with initiating calls.

This makes it possible to utilize click call initiations from the address book under a variety of circumstances, for example using the address book on a shared personal computer and initiating a call with one's own internal extension terminal (such as an indoor PHS).

Further, since this is not limited to voice communications, verifications and replies for messaging memos addressed to the user, the replaying of voice messages as well as the changing of location displays, can all be taken care of from a browser in the same manner as Com@WILL™.

Through this, it is possible to communicate by first verifying the location and status (such as "busy" or "on the phone") of the desired office member from the browser of a personal computer or a mobile phone prior to executing a click call initiation, just as one would do if he or she was in the office, or even in transit and between locations. Further, since calls can be made by first entering the topic prior to the click call initiation, voice communications using the topic display function, similar to receiving calls with Com@WILL™, can be conducted (Figure 4).

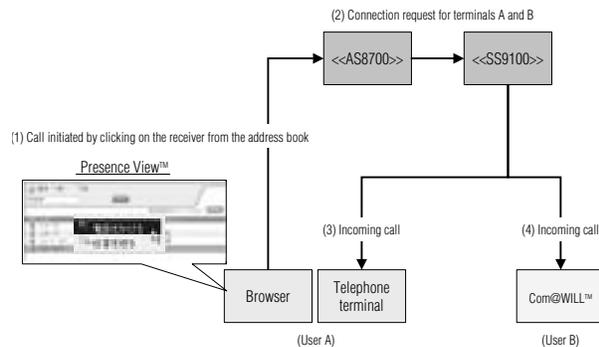


Fig. 4 Outline of the Presence View™

(3) Contact Capture™

Contact Capture™ is a web application that can add frames for communications to the web clients of business applications.

After the user install Contact Capture client into the personal computer, he/she can make a call simply by select-and-clicking names or phone number on the web browser, without implementing any changes to the existing business application. Further, integrated management of logs of this click call initiation can be performed on the server for each business application, making it possible to perform click call initiations from logs as well.

By using this application, it will be possible to contact the person responsible or contact person to ascertain the content very quickly without losing the operability of the business application. Further, when it is necessary to determine the appropriate person to contact for a matter at hand or when the corresponding clerk or person

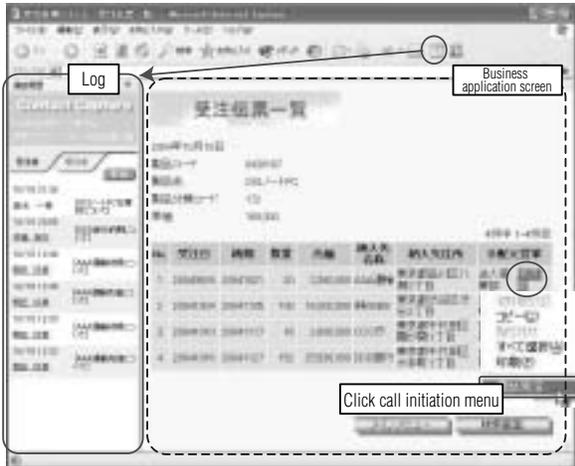


Fig. 5 A Contact Capture™ screen image

responsible for the content needs to contact a user, communications can be made even more smoother by using the log to perform a click call initiation (Figure 5).

Implementation example of the SS9100/AS8700

An example of an implementation of the SS9100/AS8700 system at a large corporation is introduced here. This system has been in operation since October 2004 at major locations, while subsequent expansions at other locations as well as expansions of the scope for linkups with business applications, are ongoing.

(1) Network prior to system implementation

The network before implementation of the system was composed of an IP network that used VoIP-GW (H.323) between locations, while PBX and key telephone units were installed at locations nationwide. The following issues for communications between employees using this network were evident:

- Losses arising from communications
Since it was not possible to determine the location of the intended communicating partner, time and effort were required to make contact with the intended person for communications. This was particularly relevant when attempting to make contact with someone who was frequently in transit and between locations.
- Need to improve communication quality
Communicating with conventional telephones simply was not good enough as it was necessary to conduct communications while sharing the same information among persons from sales, system engineer and development division.

(2) Implementation of the SS9100/AS8700 and its effects

Figure 6 shows the implementation of the SS9100/AS8700 in the aforementioned network. The SS9100/AS8700 and peripheral servers (monitoring, account settlement, provisioning, etc.) were installed at the Data Center, while software phones (Com@WILL™) and wireless IP phones were configured as terminals with mobile Centrex. The effects obtained were as follows.

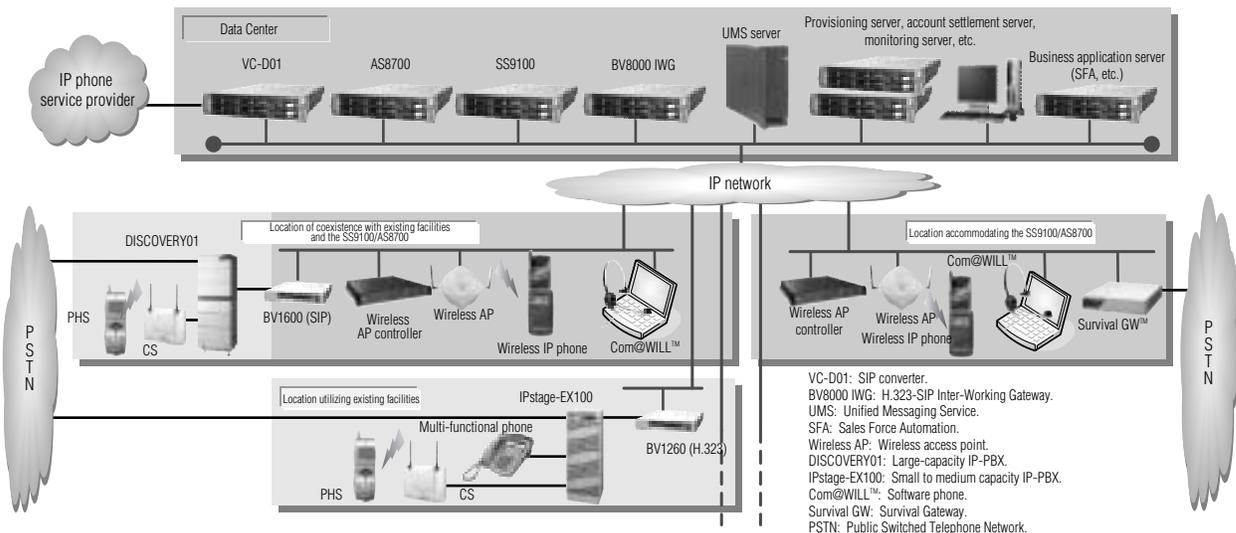


Fig. 6 Network configuration

- It has become possible to engage in communications without being aware of the whereabouts of the communication partner, since connection can be established from Com@WILL™ or wireless IP phones by using an identical number even when the person has moved to a different location.
- It has become possible to verify the location of the communication partner by using Com@WILL™ and to conduct communications using the most optimal means, such as a messaging memo, when the other party is not available.
- It has become possible to conduct even closer communications by using Com@WILL™ through the sharing of applications, teleconferencing, etc.
- It has become possible to establish connections with existing VoIP networks (H.323) by using the Inter-Working Gateway (BV8000 IWG), thereby enabling the effective use of existing assets.
- It has become possible to curb new facility investments on locations where existing facilities have deteriorated by directly accommodating the location with a data center equipped with a Survival GW, rather than upgrading outdated PBX machines.
- It has become possible to facilitate a linkup of business applications, such as the Sales Force Automation (SFA) and telephony functions to improve the efficiency of business operations in the sales department

The implementation example shows the migration that was conducted with consideration for connections with existing networks. The SS9100/AS8700 possess a variety of communication functions and a scalability that can accommodate the full-IP conversion of a network. A major feature of the system is that users themselves are able to determine in a flexible, customized manner, how the system should be implemented while accommodating the network configurations and architectural policies.

Conclusion

Oki Electric has until now been contributing to reductions in equipment implementation costs, public and corporate internal communication costs as well as maintenance and operation costs by delivering to customers, product groups that lead the industry and technologies, with VoIP as the core offering in the communication field. Aiming to create a new communication style that will revolutionize the work styles and business, we have developed the solution, which integrate information and communication; IP CONVERGENCE® Server SS9100/AS8700. We will continue to substantiate the solutions to contribute the flexible and yet speedy corporate activities that can instantly adapt the change of the times.

References

- 1) Shinya Ito, Osamu Nakazawa, Masafumi Imai and Kosho Shigeta: "Application Platform that Integrates the Web and VoIP", Oki Technical Review, Issue 197, Vol. 71, No. 1, pp. 18-21, January 2004.
- 2) Shigeo Otsuki: "CTstage Integrated-type Multiple Tenant Service System - A CTstage Solution for

Telecommunication Service Providers -", Oki Technical Review, Issue 195, Vol. 60, No. 3, pp. 44-47, July 2003.

- 3) Shinji Usuba, Hiromi Aoyagi: "High Grade IP Telephony Technology - The Background of Development and Technology of the e-Sound IP Phone™ -". Oki Technical Review, Issue 200, Vol. 71, No. 4, pp. 34-37, October 2004.

Authors

Katsunori Endo: IP Solutions Company, Solution Development Div., Enterprise Network Solution Development Dept.-3

Kazuyuki Takagi: IP Solutions Company, Solution Development Div., Enterprise Network Solution Development Dept.-3

Shinichiro Nishida: IP Solutions Company, Solution Development Div., Enterprise Network Solution Development Dept.-3, General Manager

Yuji Kawasaki: IP Solutions Company, Solution Development Div., Enterprise Network Solution Development Dept.-1, Team Leader

Noboru Okura: IP Solutions Company, Solution Development Div., Enterprise Network Solution Development Dept.-1, General Manager

Keiji Hanai: IP Solutions Company, Solution Development Div., Enterprise Network Solution Development Dept.-1, Assistant General Manager