# Information and Teleommunications Converged Application Developed Using the SIP Built-in Application Server "SipAs™ on WebLogic®"

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Since 2004 competition for converting IP communications has been intensifying on a global scale with overseas and domestic telecommunication carriers of fixed lines as well as mobile phones announcing the conversion of existing communication lines into IP lines. While attempting to reduce overall costs in the communication infrastructure to cope with competition for low communication prices telecommunication carriers are also trying to improve revenue by differentiating their services with added value. Such efforts may result in the creation of a market for a new line of business where information and telecommunications are converged.

This paper will show that it is necessary to have an application server that supports the Session Initiation Protocol (SIP) in order to provide such new services at a low cost yet in a speedy manner. It will then introduce the features and architecture of the application server supporting SIP that has been developed by Oki Electric, "SipAs™*1) on WebLogic*2)". This will be followed by a description on the development method of the information and telecommunications converged application on SipAs.

## Intensification of competition for the development of new services among telecommunication carriers due to the IP conversion of telecommunications

While relocating the network infrastructure to wide area IP networks telecommunication carriers have been changing their business model from telecommunication services that existed around the voice transmissions into those providing added value for services through the effective use of networks. For example, an overseas long distance telecommunication carrier offers a web call management service at an additional cost as an optional service for their IP telephone service. This service provides a communication log that summarizes calls with IP telephones, fixed line telephones and mobile phones as well as the recording of voice messages, designations of the call forwarding and incoming call blocking settings, which can be set from the web. A virtual telephone number starting with "050" that offers call forwarding services to mobile phones and fixed line telephones as well as mobile phone call charge reduction services for businesses through the Click-to-Call, are about to be made available domestically in Japan. Furthermore, with the IP conversion of communications, Internet service providers such as portal site providers are starting to break into the telecommunication service segment. With the spread of IP conversions as described above, competition accelerates and telecommunication carriers and portal site providers must be able to develop new services quickly while offering them for a low cost.

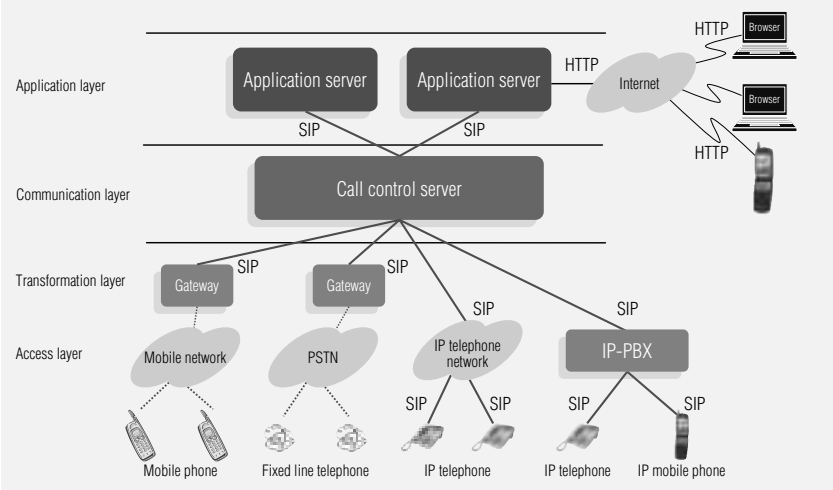


**Fig. 1 Implementation architecture for the new application of telecommunication carriers**

*1) SipAs is a trademark of Oki Electric Industries Co., Ltd.
*2) BEA WebLogic is a registered trademark of BEA Systems, Inc.

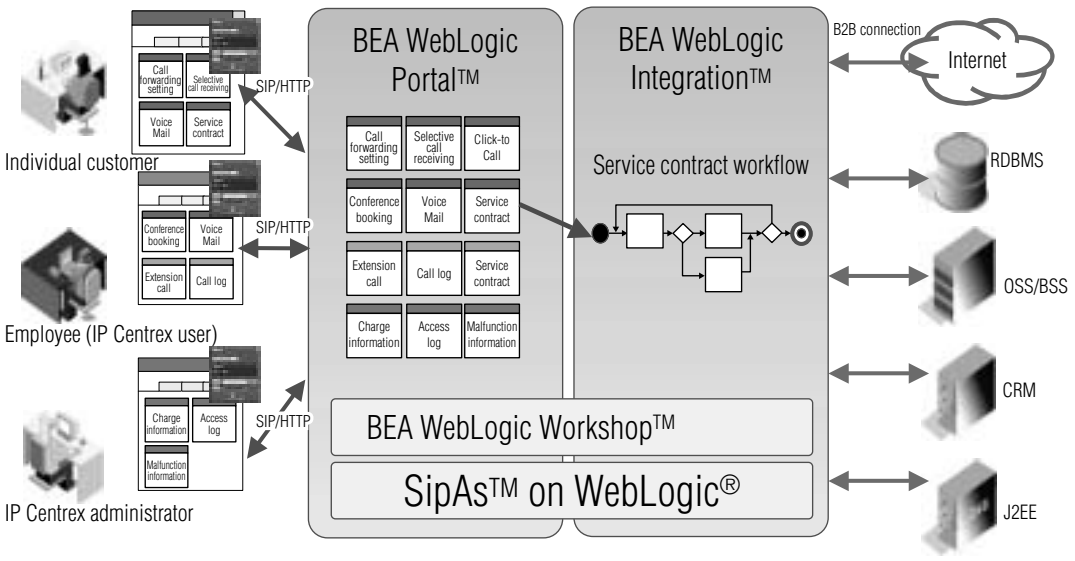


**Fig. 2 Provision of a new service that is integrated with a portal for customers and existing systems.**

## Implementation architecture for new services

An example of architecture to provide the new services of a telecommunication carrier is shown in Figure 1. Applications for telephones so far have been structured as individual systems and therefore, completely independent. The answering machine service, for example, is a service provided separately for mobile phones and fixed line telephones installed in the system of telephone exchange machines and developed with a dependency on the telephone exchange machines. To provide more convenient new services in the future, such as hybrid services linking with internet services that also offer multiple means of communication, it will be necessary to develop applications that are open and use application servers without any dependency on a particular exchange machine or vendor. Communication services must be controlled from such application servers and to achieve this progress is being made to adopt SIP as the standard protocol. The call controls of IP telephones and videophones are already being offered with SIP. New services that will be provided with the next generation mobile phones and Wireless-Fidelity (Wi-Fi) phones using wireless LAN will also be built in with SIP. Further, various means of communication, including IP telephones and existing fixed line telephones, will be integrated by the interface of SIP on the communication layer as shown in Figure 1.

The following benefits are available with this architecture. Firstly, it is possible to develop applications without depending on a means of communication. Therefore, when services are implemented for the new Wi-Fi phones, which will be made available in the future, new development will not be necessary. Secondly, new services can be provided one after another by adding on new application servers without the need to change the call control server.

## Features of the "SipAs™ on WebLogic®" J2EE application server with built-in SIP

At Oki Electric we decided that the development environment of Java would be the optimum method for the rapid provision of highly convenient new services that are linked up with the Internet since there are numerous developers and the environment is properly established. BEA WebLogic Server®*3) (hereinafter referred to as "WebLogic Server") has the biggest share of Java 2 Enterprise Edition (J2EE) application servers and a long favorable history in the communication and financial markets due to its high performance and reliability. Oki Electric collaborated with BEA Systems, Inc., of the United States to jointly develop "SipAs™ on WebLogic®", which integrates SIP application server functions with a WebLogic® Server. SipAs™ has the following features.

### (1) Speedy development by utilizing existing assets

Since SipAs™ complies with standards such as SIP (RFC3261) and SIP Servlet (JSR116), it is possible to make effective use of the numerous Java engineers (approximately three million). It is possible to use existing assets, such as existing applications and operations monitoring tools as well as development tools available on a WebLogic Server just as they are. Further, controls and sample applications that can be used immediately are also being provided.

### (2) Expandability of system

It is possible to easily add functions that link up with communication services, such as VoIP to web applications, by replacing the WebLogic Server already in operation with SipAs™. Further, it is possible to seamlessly connect with the existing Customer Relationship Management (CRM) or the Operation Support System (OSS) by making use of the Enterprise Application Integration (EAI) and Business Process

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

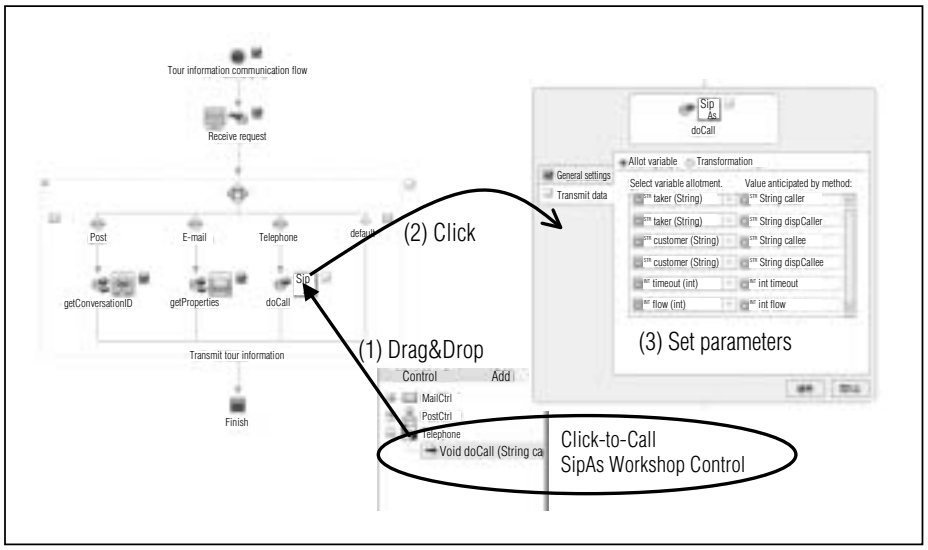


**Fig. 3 Application development using the SipAs Workshop control**

Management (BPM) features since it is possible to upgrade to the BEA WebLogic Portal™*4) (hereinafter referred to as "WebLogic Portal) and the BEA WebLogic Integration™*4) (hereinafter referred to as "WebLogic Integration). For this reason, self-service portal sites that are personalized for individual persons or corporate customers can be built quite easily (Figure 2).

**(3) High reliability in line with system needs**

A clustering function for SIP and HTTP applications has been achieved by SipAs™, the first in the world. This clustering function is integrated with the proven clustering function of the WebLogic Server, replicating in real-time the session information of both HTTP and SIP to realize speedy switchovers.

**(4) Architecture achieves high-speed**

SipAs™ integrates the J2EE application server function with the SIP application server function to execute both J2EE and SIP applications within the same process. It is possible therefore, to execute applications in which both SIP and HTTP have been integrated, at a high speed. Further, since the cluster of services that combine SIP and HTTP can be configured in a simple manner high-speed switching is possible in the event of a malfunction.

**(5) Provision of integrated development environment**

"BEA WebLogic Workshop™*4)" (hereinafter referred to as "WebLogic Workshop"), a GUI-based integrated development environment can be used as a common development environment for both the web and SIP. As shown in Figure 3 communication service-related functions can be added to existing web applications simply by dragging and dropping them with the control of the Workshop. Besides reusing the Workshop control it is possible to develop, debug, maintain and document web and SIP applications. As a result vastly greater improvements in productivity are possible when compared with applications built from scratch. The WebLogic Workshop can not only develop web and SIP applications but also application integration systems that use EAI, BPM or Portal middleware all in a single environment. Further, a software phone and SIP server for development (proxy server, registrar and location server) are both provided as a standard package with SipAs™ making it possible to start the development of applications with SipAs™ alone.

## Development of the information and telecommunications converged application with SipAs™ on WebLogic®

The functional configuration from the perspective of a SipAs™ application developer is shown in Figure 4. In order to present a function for improving efficiency in new service developments, we shall first introduce the application components provided by SipAs™, followed by a description of the integrated SIP and the HTTP application development framework along with actual examples of the developments.

**(1) Application component**

SipAs™ provides the following four types of application components to improve the efficiency of new service developments.

- Web and SIP integrated application (SipAs™ Workshop control)
  This is an application that uses both HTTP and SIP. Control groups of Workshop are provided, such as Click-to-Call.
- SIP Servlet application
  This application provides call control functions that use the SIP protocol, such as third party call control (3PCC) and call forwarding.

*4) BEA WebLogic Portal, BEA WebLogic Integration and BEA WebLogic Workshop are all trademarks of BEA Systems, Inc.

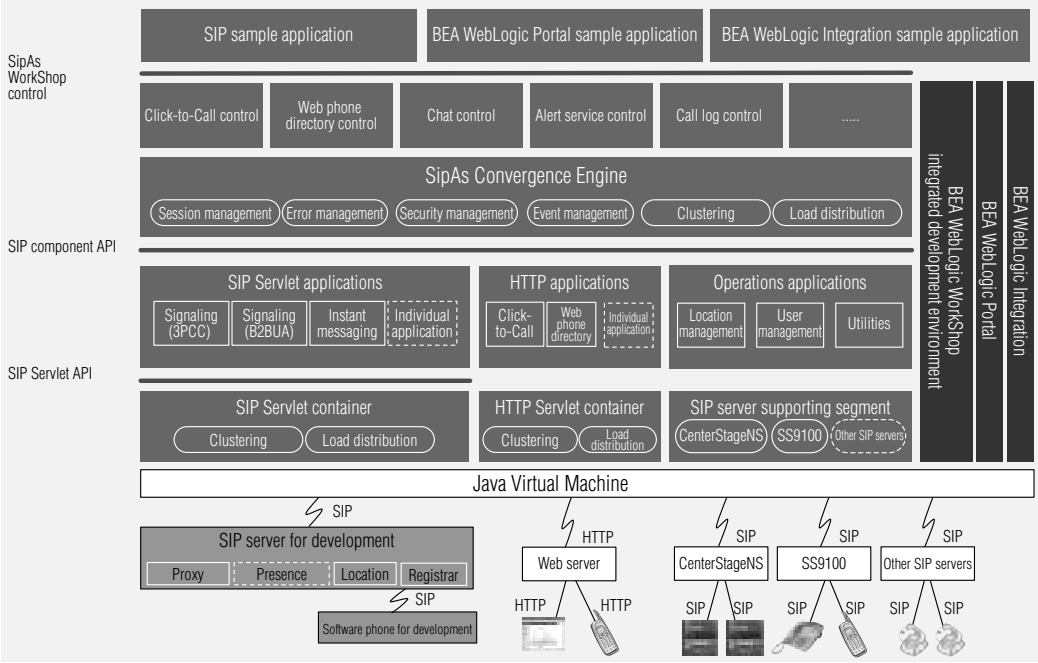


**Fig. 4 Functional configuration diagram of SipAs™ on WebLogic®**

- HTTP application
  The HTTP application is a screen component for a VoIP linkup application using HTML and HTTP. Examples include web screen displays for Click-to-Call and a web screen display for indicating the status of the SIP call control.
- Operations applications
  Functions necessary for using a VoIP server, such as user registration, search function and location management, are provided. These functions are provided for each VoIP server as they are not stipulated by SIP.

With SipAs™, it is possible to develop one application and then develop services that use multiple means of communication at a rapid pace. SipAs™ defines and has an SIP component API built-in. This API is made of an API for an SIP application, HTTP application and an operations application, providing an identical API to that of upper level applications of various VoIP servers. By unifying the API, it is possible to simplify the development of applications and raise the reuse rate of developed applications. It is possible for a telecommunications carrier or portal service provider to provide a full compliment of proprietary application components on SipAs™ by using the API and the application framework, which will be described later.

### (2) Application framework

The SipAs™ Convergence Engine is a framework that provides basic functions necessary to operate web applications and SIP applications linked up on SipAs™. By using this framework session management between web applications and SIP applications, security linkups, application clustering linkups and other such linkups, between web and SIP applications, are integrated. This makes it possible to raise the productivity as web applications, SIP applications and applications that integrate the two types of applications, which can each be developed independently or in parallel. Further, it is possible for developers to add on load distribution and clustering functions by using this framework without a special API call.

### (3) Development examples of SipAs™ applications

A development example of a web call management application resulting from a combination of SipAs™ and a WebLogic Portal is shown in Figure 5. A WebLogic Portal is reused in a component unit known as a “portlet”. The following three portlets were developed on this occasion.


**Fig. 5 Example of a web call management application**

- "Call Log Portlet"
  This function logs calls made to multiple phone numbers and records messages, conducts Click-to-Call from call logs, makes recorded messages available to be heard on personal computers and forwards messages by e-mail.
- "Incoming Call Blocking Portlet"
  This function blocks incoming calls according to the days or time when the user does not wish to receive any phone calls.
- "Call Forwarding Portlet"
  This function transfers a maximum of five calls to other telephone units. Both simultaneous and sequential forwarded calls are possible.

## Conclusion

Web segments of a screen display flow, a user interface and user authentication functions were developed using functions for the Portal of a WebLogic Workshop. On the other hand SIP applications for answering functions, incoming call blocking and forwarding were developed on a SIP servlet. The Workshop control of SipAs™ was reused for the Click-to-Call function. Finally, these individual functions were consolidated using the SipAs™ Convergence Engine to complete the application.

In this manner the project was completed within a development period of approximately two months for a developer in the information field by utilizing the distributed development of web and SIP applications, reusing existing controls as well as using development environments of the WebLogic Portal and WebLogic Workshop.

In the future we hope to cooperate with others, not only those people within our corporate organizations, but also other third parties wanting to participate in increasing SipAs™ Workshop controls for the development of new services.

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