A SoftBridge with Carrier Grade Reliability Using JAIN SLEE

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Abstract— we have built a SoftBridge prototype within a JAIN (Java APIs for the Integrated Network) SLEE (Service Logic Execution Environment). A SoftBridge is a semi-synchronous multimodal IP (Internet Protocol) -based communication system and the first prototype has been built for deaf telephony. This research addresses service life-cycle management for a SoftBridge with carrier grade reliability. An approach is proposed that carrier grade reliability support for a SoftBridge is provided by moving it into a JAIN SLEE. A JAIN SLEE is a general application server, which provides execution and management environment for telecommunication services. An empirical evaluation methodology is adopted to verify that JAIN SLEE enables carrier grade support for a SoftBridge. This work includes the development of functions of a SoftBridge and life-cycle management of a SoftBridge within a JAIN SLEE. Current work is busy in developing multimodal media adaptation functions of the SoftBridge prototype. System test, experiments with PBX (Private Branch Exchange)/PSTN (Public Switched Telephone Network) and evaluation of the SoftBridge prototype will be carried out in the next steps. Carrier grade reliability enables a SoftBridge to access the PSTN. A highly reliable SoftBridge could bring more new value-added services for telecom providers. Using a SoftBridge as an example, we also can learn how to go about carrier grade enhancement for IP-based communication applications in the telecoms domain.

Index Terms— Application Server, Carrier Grade, Instant Messaging, JAIN and SLEE, SoftBridge

I. INTRODUCTION

With the convergence between IP (Internet Protocol) networks and PSTN (Public Switched Telephone Network), many IP-based communication applications trend towards access the PSTN and bring more new value-added services for telecoms providers. This research addresses service life-cycle management in the enhancement of carrier grade reliability to a SoftBridge [1] [2] [3]. An approach is proposed that high reliability support is provided for a SoftBridge by moving it into a JAIN SLEE.

II. BACKGROUND

A SoftBridge is a semi-synchronous multimodal communication system. The first SoftBridge prototype was built using Jabber to carry text and voice with modality adaptation for Deaf Telephony [1] [2] [3].

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JAIN technology [4] is a set of Java technology based APIs (Application Programming Interfaces), that enable the rapid development of Next Generation telecom products and services on the Java platform. The JAIN APIs bring service portability, convergence, and secure network access to telephony and data networks.

The Session Initiation Protocol (SIP) [5] is an IETF (The Internet Engineering Task Force) standard signaling protocol that can be used to establish, modify and terminate sessions in IP networks. SIMPLE (SIP for Instant Messaging (IM) and Presence Leveraging Extensions) [6] [7] [8] is a set of extensions to SIP to support presence and instant messaging.

III. RELATED WORK

As a telecommunications middleware, a general Application Server (AS) can deliver the necessary performance, scalability and reliability required for carrier grade services. Therefore, AS mode is adopted by most telecoms providers as a support environment for carrier grade services. There are two main ASs, JAIN SLEE and IBM's WebSphere for Telecom.

JAIN Service Logic Execution Environment (SLEE) [9] is an AS that allows the provision and life-cycle management of these services being deployed into it. The JAIN SLEE specification defines how telecommunication services are built, managed and executed. Its specification has been designed explicitly to enable vendor products to address carrier grade requirements in a standard call-signaling environment.

IBM WebSphere AS for Telecom [10] Enables rapid service-application development and deployment for telecommunications equipment manufacturers, independent software vendors and service providers. Comparing with JAIN SLEE, it focuses on the integration of e-business applications with the capabilities of the telecom network.

IV. METHODOLOGY

Of our system, the evaluation is carried out in a laboratory experiment. It involves basic requirements for carrier grade service, especially reliability. Evaluation cases include service life cycle management, down time per month or per year, bombarded requests and traffic. Through evaluation results in form of data and graph, it is expected to show that JAIN SLEE is palatable to telecom providers as a reliability support platform for a SoftBridge.

V. TECHNICAL OVERVIEW

Moving a SoftBridge into JAIN SLEE includes two aspects: development of functions of a SoftBridge; deployment and life-cycle management to a SoftBridge within a JAIN SLEE.

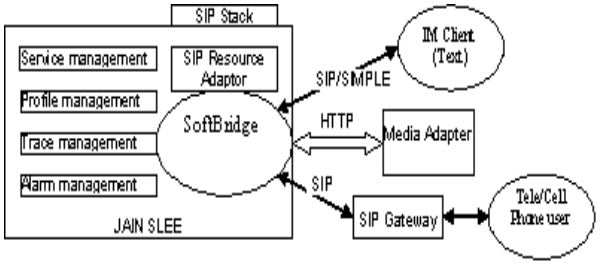

Figure 1 shows system architecture, including a JAIN SLEE, a SoftBridge, Media Adaptor, IM Clients with text capability, and telephone/cellphone users via a SIP gateway. More details as follows:

Based on SIP/SIMPLE, main functions of a SoftBridge include Proxy, Registrar, and Presence and the control of multimodal media adaptation. These functions are able to process the request from SIP or SIMPLE clients with different media capabilities.

JAIN-SIP-Proxy-Presence Server [11] is an open source project provided by NIST (National Institute of Standards and Technology). It is built on top of the JAIN-SIP-1.1 API. Coding the basic functions of a SoftBridge is based on this system. A SoftBridge is designed according to SBB (Service Building Block) model defined in JAIN SLEE specification [12]. The coding of this part has been finished; debug and improvement are on-going.

Multimodal media adaptation function is implemented by Media Adapter. It is outside JAIN SLEE and independent to control part of a SoftBridge. Using TTS (Text to Speech) and ASR (Automatic Speech Recognition) technology, Media Adapter communicates with control part of a SoftBridge through HTTP protocol. Work on this part is in process.

A SIP Resource Adapter (RA) is involved when a SoftBridge uses a SIP stack API that is external to a JAIN SLEE. After a SIP RA and a SoftBridge are deployed into a JAIN SLEE, the SoftBridge can be executed and managed. Through JAIN SLEE management Web Interface, service life-cycle management is provided, which includes installing, starting, stopping, uninstalling and updating a SoftBridge. A JAIN SLEE also can offer other functions as:

- Profile management: create, modify and delete attributes of a SoftBridge through profile management interface.
- Trace and log facilities: set trace level and view trace and log file through trace and log management interface.
- Alarm facility: alarm notification through alarm interface.

RHINO 1.3 [13] is used to deploy and manage a SoftBridge. It is a fully functioning JAIN SLEE that can be used to build and deploy JAIN SLEE services. It is provided by Open Cloud, which is the co-lead of the specification and implementation of JAIN SLEE. RHINO 1.3 includes a SIP RA based on JAIN-SIP-1.1 API.

VI. NEXT STEPS

The work in the next steps is planed as follows:

A. Testing the system with SIMPLE client

After accomplishing the SoftBridge prototype, basic functions test will be done using IM client with different media capabilities.

B. Access to telephones in PSTN through a SoftBridge

Via SIP Gateway, an IM client can communicate with a telephone user in PBX (Private Branch Exchange) through a SoftBridge. For the telephone user, a text message from the IM client can be converted into voice message automatically. For the IM client with text capability, a voice message from the telephone client can be converted into text message automatically. Further, the experiment between a SoftBridge and PSTN will be done.

C. Evaluating of the SoftBridge prototype

The evaluation should cover different aspects of carrier grade reliability, including manageability, call handling capability and availability.

VII. CONCLUSION

We have built a SoftBridge prototype within a JAIN SLEE. An empirical evaluation methodology is proposed to prove that JAIN SLEE enables enhancement of carrier grade reliability for a SoftBridge. A SoftBridge with carrier grade reliability could access the PSTN and provide multimodal bridging communication services for telecom providers. Meanwhile, using a SoftBridge as an example, we can learn how to go about carrier grade enhancement for IP-based communication applications to apply to telecom domain.

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