

BACK-TO-BACK USER AGENT (B2BUA) SIP SERVERS POWERING NEXT GENERATION NETWORKS

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

NOTICE

© 2007 RADVISION Ltd. All intellectual property rights in this publication are owned by RADVISION Ltd. and are protected by United States copyright laws, other applicable copyright laws, and international treaty provisions. RADVISION Ltd. retains all rights not expressly granted.

This publication is RADVISION confidential. No part of this publication may be reproduced in any form whatsoever or used to make any derivative work without prior written approval by RADVISION Ltd.

RADVISION Ltd. reserves the right to revise this publication and make changes without obligation to notify any person of such revisions or changes. RADVISION Ltd. may make improvements or changes in the product(s) and/or the program(s) described in this documentation at any time.

Unless otherwise indicated, RADVISION registered trademarks are registered in the United States and other territories. All registered trademarks recognized.

For further information contact RADVISION or your local distributor or reseller.

USA/Americas

17-17 State Highway 208
Suite #300
Fair Lawn, NJ,
07410-2819 USA
Tel +1 201 689 6300
Fax +1201 689 6301
infoUSA@radvision.com

EMEA

Abbey House
450 Bath Road
Longford
Heathrow UB7 0EB
Tel: +44 (0) 20 8757 8817
Fax: +44 (0) 20 8757 8818
infoUK@radvision.com

Asia/Pacific

Suite 2901 29/F
China Resources Building
26 Harbour Road, Wanchai,
Hong Kong
Tel +852 3472 4388
Fax +852 2801 4071
infoapac@radvision.com

About This Document

SIP Back-to-Back User Agent (B2BUA) Servers are probably one of the most important and powerful types of SIP Servers. B2BUA servers are commonly used to develop and offer value added features.

The difference between Proxy server and B2BUA server is sometimes not fully understood, but effectively B2BUA servers are much stronger and intelligent entities that can perform actions which Proxy servers cant.

B2BUA servers are gaining more focus as they become ubiquitous throughout the industry. They provide a flexible solution for a wide range of applications and services and are becoming the primary engine for more and more SIP Servers in NGN and IMS networks.

This white paper provides managers in the VoIP and real-time multimedia industry an overall understanding of B2BUA servers. Better understanding of B2BUA servers can help managers understand the value, and the tradeoffs, of choosing a B2BUA server as the framework for developing a wide range of SIP applications and SIP services.

Table of Contents

About This Document	1
B2BUA Overview	4
B2BUA: Definition and Market Needs	5
B2BUA Servers vs. Proxy Servers	5
B2BUA for Managing Point-to-Point Calls	5
Differences between B2BUA servers and Proxy Servers	6
B2BUA Servers used as Proxy Servers (Transparent B2BUA)	8
B2BUA Server: Unique Capabilities	8
3 rd Party Call Control (3PCC) Features	8
Inter-working Function (IWF) for Interoperability	10
Multi-point Call Management	12
B2BUA Servers in the Industry	13
B2BUA Servers in IMS	14
B2BUA Servers and High Availability	14
B2BUA Server Framework Challenges and Requirements	16
Modular application building block architecture for increased flexibility, abstraction and short delivery time	16
Challenge	16
Requirements	17
Benefits	17
Conformance and interoperability for rapid integration and successful assimilation	18
Challenge	18
Requirements	18
Benefits	18
Flexible customization for rapid development of proprietary features	19
Challenge	19
Requirements	19
Benefits	19
High availability and redundancy support for continuous service	19
Challenge	19
Requirements	19
Benefits	19
RADVISION SIP Server Platform & B2BUA Application Framework (B2BAF)	21
Overview	21
B2BAF Architecture	22
B2BAF Services	22
B2BAF Core Runtime Engine	24
B2BAF Service Library	25
B2BAF Service Stringing	26
B2BAF HA & Redundancy Support	27
B2BAF Value Proposition Summary	27
Acronyms	28
References	29

List of Figures

Figure 1 - B2BUA Point-to-Point Call Scenario	5
Figure 2 - Point to point B2BUA Server Relay vs. Proxy Server Relay control flow and architecture outline	6
Figure 3 - Schematic outline of B2BUA server offering 3PCC functionality	10
Figure 4 - Schematic outline of a B2BUA Inter-working Function	10
Figure 5 - B2BUA Multi-Point Call Scenario	12
Figure 6 - Typical high capacity redundant server farm architecture	15
Figure 7 - Traditional architecture of a B2BUA framework	16
Figure 8 - B2BUA Framework offering modular application development environment compatible with SOA concepts	17
Figure 9 - B2BUA Framework enabling interoperability and conformance features for the application	18
Figure 10 - B2BAF Module - part of RADVISION SIP Server Platform	21
Figure 11 - A B2BAF Service is a self-contained modular state-machine	22
Figure 12 - Services customization methods	23
Figure 13 - Invocation of a B2BAF Service by the B2BAF Core RTE	24
Figure 14 - Stringing multiple services to obtain a new high level Service	26

List of Tables

Table 1 - Key differences between the functionality B2BUA servers and Proxy servers capabilities	7
Table 2 - 3rd Party Call Control (3PCC) service examples	9
Table 3 - B2BUA Servers in the Industry	13

B2BUA Overview

SIP Back to Back User Agents (B2BUA) Servers are the most powerful types of SIP servers. Their power is derived mostly from the fact that they are not confined to conform to any specified standard. However, this same characteristic is the root of its inherent complexity, and a source of controversy.

B2BUA servers are used to provide value added features for point-to-point calls and manage multi-point calls.

When developing a SIP network element server, a common question that is often asked is "Do I need a SIP proxy server or a B2BUA server?"

As we will illustrate, a B2BUA server is an ideal choice for the development of many types of SIP servers, such as:

- Online-billing/prepaid functions
- Multi Point Conferencing servers
- IVR Servers
- PBX Applications and Soft-switches
- Application Layer Gateways (ALG)
- FW/NAT Traversal applications
- Privacy Servers
- 3rd Party Call Control Applications (3PCC)
- Service Creation Environment (SCE) runtime engines
- Session Boarder Controller (SBC)
- Interconnection Border Control Function (IBCF)
- IMS S-CSCF, P-CSCF, I-CSCF
- SIP Inter-work Function (IWF) Gateway
- Security Gateway (SEG)

B2BUA: Definition and Market Needs

IETF standard (RFC 3261) defines a back-to-back user agent as “a logical entity that receives a request and processes it as a user agent server (UAS). In order to determine how the request should be answered, it acts as a user agent client (UAC) and generates requests. Unlike a proxy server, it maintains a dialogue state and must participate in all requests sent on the dialogues it has established.”

The standard definition concludes with this: “Since it is a concatenation of a UAC and UAS, no explicit definitions are needed for its behavior.”

This concise definition is the source of both its flexibility and power, and at the same time, great confusion and a lack of consensus about its inherent capabilities.

B2BUA Servers have capabilities that far exceed those of other types of SIP Servers, and answer the need for developing sophisticated value added SIP applications that can not be implemented as Proxy applications.

B2BUA Servers vs. Proxy Servers

B2BUA for Managing Point-to-Point Calls

In point-to-point call scenarios, a B2BUA server processes incoming requests from originating Customer Premise Equipment (CPE) User Agent Clients (UAC) as a User Agent Server (UAS) using its UAS-Leg. It interacts with terminating CPE UAS to determine how the request should be answered, by acting as a UAC using its UAC-Leg.

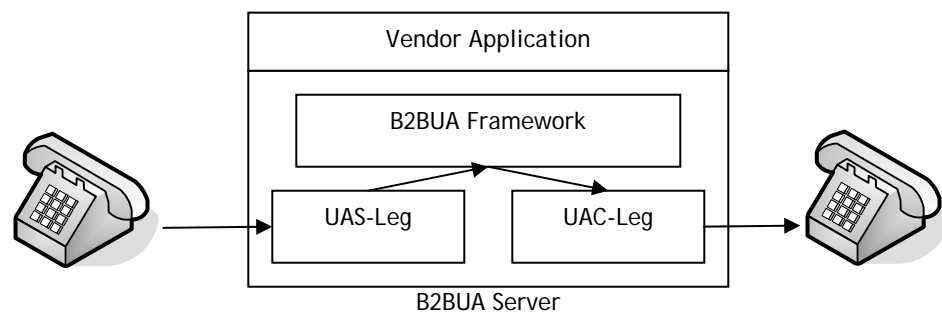


Figure 1 - B2BUA Point-to-Point Call Scenario

This capability, of processing incoming requests as a user agent, is also commonly referred to as “network termination of a dialogue” or “call termination.”

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

At first glance, this B2BUA server may appear to be a proxy server. In fact, a proxy server can indeed connect a point to point call by using its routing capabilities. However, the B2BUA's capabilities far exceed those of a Proxy. For example, a Proxy server can not "decide" to disconnect an active call or conceal the caller identity. Doing so would violate the transparency of the proxy and not allow the parties to connect.

Differences between B2BUA servers and Proxy Servers

So while at first glance, SIP Proxy servers and SIP B2BUA servers may appear to provide similar functionality in terms of call relay, there are very important differences between the architecture and capabilities of each. A B2BUA server maintains independent sessions towards the end-points, while the architecture of a Proxy allows performing limited processing activities on transactions which traverse through the Proxy. This makes the B2BUA server that is much more "intelligent" than a Proxy server.

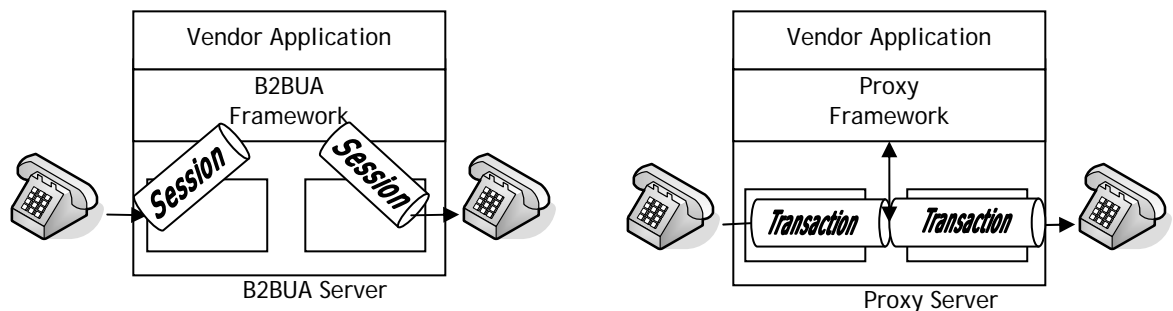


Figure 2 - Point to point B2BUA Server Relay vs. Proxy Server Relay control flow and architecture outline

When referring to a Proxy as "stateful," the intention is to describe the proxy as "transaction-stateful." An application developed on top of a proxy framework can maintain session information, but can not actively affect the session once it is established. Proxy servers are helpful in establishing sessions but have a passive role once they are established. A Proxy server may or may not require all session transactions to be routed through it after the session was established (AKA record routing).

A B2BUA server is inherently "session stateful" since it acts as a terminating user agent end-point and holds ad-hoc mapping between the different sessions. For that reason, all transactions must always traverse through the B2BUA server.

The table below summarizes the key differences between the capabilities of B2BUA servers and Proxy servers.

Category	SIP Proxy Server	SIP B2BUA Server
Primary function	Route SIP request to connect call and communicate messages between the two end-points	Connect between two or more end-points by maintaining an independent session towards each of the end-points
Ability to manipulate a connected call, including 3PCC capabilities	Not possible (e.g. cant disconnect)	Unlimited
Statefulness	Proxy core is either (Transaction) stateless or Transaction-Stateful Application can be Call/Session-Stateful	Call/Session-Stateful
Message processing capabilities	Basic. Restricted to RFC limitations. More towards routing and passive listening.	Unlimited. From Proxy-like behavior to a gateway behavior that handles different legs separately.
Inter-work functionality	Very limited	Unlimited
Run-time Memory consumption	Transaction-Stateless < Transaction-Stateful < Call-Stateful	Usually equals to a call-stateful proxy application
Processing Performance	Transaction-Stateless > Transaction-Stateful == Call-Stateful	Usually equals to Transaction-stateful proxy
Framework Architecture	Hooks for message processing.	Framework for adding advanced value added features/services.
SIP Body (e.g. SDP) Processing	No allowed	Unlimited

Table 1 - Key differences between the functionality B2BUA servers and Proxy servers capabilities

B2BUA Servers used as Proxy Servers (Transparent B2BUA)

A B2BUA server can be implemented to act like a Proxy. In this type of implementation, the B2BUA transparently copies the message from the inbound leg to the outbound leg. This B2BUA functionality is sometimes referred to as "transparent B2BUA."

The benefit of having a transparent B2BUA implementation over a Proxy implementation for a SIP server that is required to perform SIP routing, lies mostly in the flexibility to introduce extended capabilities in the future, such as inter-work functionality, any 3PCC capability, etc.

The downside of transparent B2BUA implementations is that the performance of a B2BUA server is usually lower compared to the performance of a Proxy server, both in terms of memory consumption and processing power. However, if the Proxy application requires tracking call state or maintaining transaction state, these performance differences narrow substantially and sometimes cease to be present at all.

B2BUA Server: Unique Capabilities

There are several capabilities that are unique to B2BUA servers.

3rd Party Call Control (3PCC) Features

3rd Party Call Control (3PCC) refers to the ability of an entity (usually a controller) to set up and manage communication between two or more parties. 3PCC is often used for operator services and conferencing.

Disconnecting an active call by an operator is an example of a 3PCC action. 3PCC actions are important capabilities, exclusive to B2BUA servers since "passive" elements, such as Proxy servers, can not initiate these types of activities.

Some examples of 3PCC services:

Application/Feature	Scenario
Online-billing/Prepaid	Disconnect an active call by online-billing/prepaid servers when credit expires
Resource Prioritization/Quality of Service	Disconnect an active call when there are no available resources to admit a call which has high priority and requires high quality of service
Call Transfer	Transfer a call from one destination to different destination
Click to dial	Connect the phone of a customer to a sales representative, when the customer clicks a link
Mid Call Announcement Service	Send a message from the server to members of an active call

Table 2 - 3rd Party Call Control (3PCC) service examples

3PCC actions can be initiated automatically by B2BUA server applications, e.g. disconnect a call following credit expiration in an online-billing system. Or it can be initiated by remote administrative control, e.g. invite parties to a multi-point conferencing session.

Parlay/Parlay-X API is an example of a simple set of APIs that includes a definition of an API standard for invocation of 3PCC services.

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

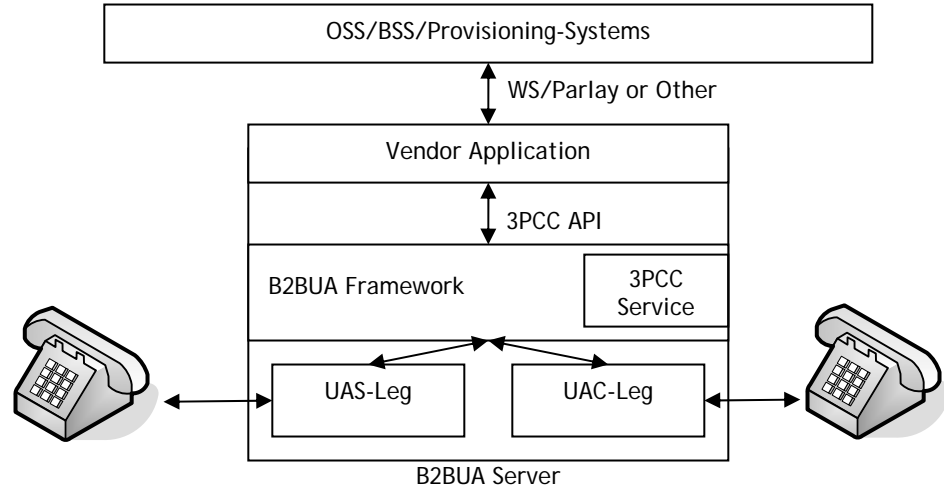


Figure 3 - Schematic outline of B2BUA server offering 3PCC functionality

Inter-working Function (IWF) for Interoperability

SIP was designed as a highly flexible and extendible protocol. As we said earlier, the very strength of this flexibility is also an inherent weakness, since the vast array of client types in the market still need to connect. This resolves any interoperability issues resulting from the different set of capabilities they support.

B2BUA Inter-working Functions (IWF) defines a wide range of powerful SIP servers that connect SIP clients that “speak” in different protocol dialects, or support different capabilities. SIP IWF servers are very important in enabling connectivity between clients with different capabilities and/or protocol dialects, or between clients and networks. In the latter case the IWF server is actually an access device.

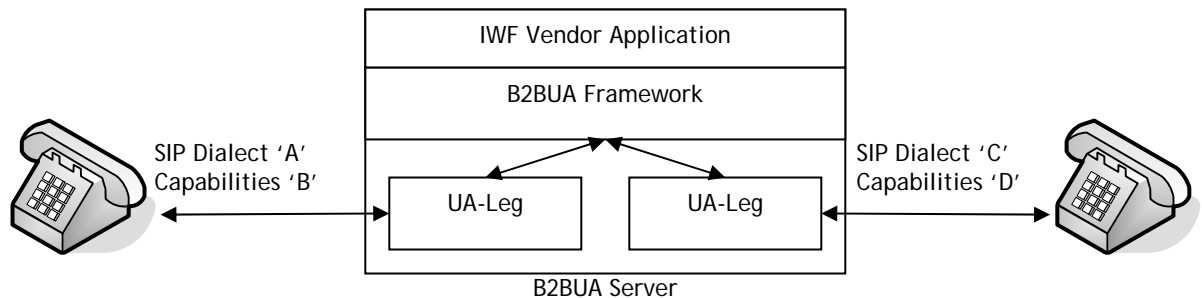


Figure 4 - Schematic outline of a B2BUA Inter-working Function

Examples of SIP IWF include:

- SIP to IMS IWF for connecting a SIP client to the IMS network
Adds and removes IMS SIP protocol extensions (AKA P-Headers) that are essential for connecting to the IMS network.
- SIP session-timers (ST) IWF for connecting clients with different ST settings
Mechanism used by clients and servers for monitoring connectivity state. Since different clients can support different settings of timers, an IWF can play a vital role of connecting clients with different ST settings.
- B2BUA IWF for connecting clients with different media capabilities
Different clients support different sets of media capabilities. Each client describes its capabilities using Session Description Protocol (SDP) messages. A B2BUA server can facilitate in connecting clients with distinct SDPs by relaying between the two types of control sessions.
- B2BUA IWF for SIP Transport Relay
B2BUA servers can connect to different types of networks (e.g. IPv4, IPv6) and support for different transport types, such as TCP/UDP/SCTP/TLS). This allows connection between clients that support different types of networks, transport and encryption protocols.

Multi-point Call Management

B2BUA servers can also multi-point call scenarios. In a multi-point calls scenario, multiple CPEs connect to the B2BUA, and the B2BUA provides services to all of CPEs.

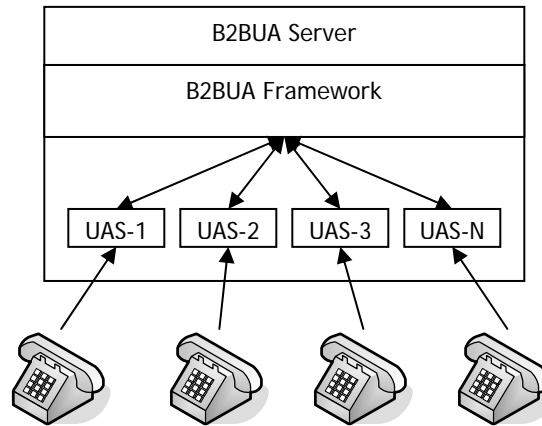


Figure 5 - B2BUA Multi-Point Call Scenario

B2BUA Servers in the Industry

B2BUA Servers are widely used in the communications industry. The table below includes several examples of servers based on B2BUA architecture:

Server Type	Reason for B2BUA architecture
Online-billing/prepaid functions	Requires the server to disconnect an active call when there is no more credit
Servers supporting Resource Prioritization (RP) and/or Quality of Service (QoS) features	Requires the server to preempt or queue low priority sessions in cases of resource depletion
Multi Point Conferencing servers	Requires termination of multiple endpoints
IVR Servers	Requires call termination, including transfer, etc.
PBX Applications and Soft-switches	Requires call termination, including transfer, etc.
Application Layer Gateways (ALG)	Usually requires manipulation of wide range of message processing capabilities which is not allowed with a Proxy
FW/NAT Traversal applications	Requires address translation which is not allowed with a Proxy
Privacy Servers	Requires address translation and message processing capabilities which is not allowed with a Proxy
3rd Party Call Control Applications (3PCC)	Requires call termination
Service Creation Environment (SCE) runtime engines	Requires an architecture that supports running a wide variety of value added services
Session Boarder Controller (SBC)	Usually requires call termination capabilities for SIP inter-work functionality and call control
IMS S-CSCF, P-CSCF, I-CSCF	Requires call termination capabilities for 3PCC capabilities, such as network initiated, disconnect, THIG (Topology Hiding Inter-Network Gateway)
SIP Inter-work Function (IWF) Gateway	Require loose coupling of the connected endpoints
Security Gateway (SEG)	Require security translation between different networks (AKA to MD5, TLS to IPSEC)
Voice Call Continuity (VCC) Servers	Require maintaining an independent session with the VCC client and the remote party

Table 3 - B2BUA Servers in the Industry

B2BUA Servers in IMS

B2BUA servers play an important role in IMS. Recent releases of 3GPP IMS specifications (3GPP TS 24.229 V8.0.0) indicate that an increasing number of IMS network element servers, such as P-CSCF, IBCF, SBC etc., are B2BUA servers.

IMS services, developed on Application Servers (AS), are usually based on B2BUA frameworks. The reason for this is that value added services are usually session stateful, and feature capabilities that go beyond basic call proxying. Applications written on top of B2BUA Application Servers fulfill several roles, such as SIP User Agents, SIP Proxy Servers and SIP Registrars.

IMS servers are required support for QoS features in order to provide differentiated service quality and emergency call support. B2BUA servers allow writing applications that perform call preemption, call queuing and even negotiated call quality degradation in overload conditions.

IMS was designed as a network for converged telecommunications. In order to connect to a wide array of clients with different sets of capabilities that move between different networks, B2BUA IWFs, SBC and VCC Servers provide solutions for IMS-related interoperability, inter-domain communication and call handoff issues.

B2BUA Servers and High Availability

The issue of high-availability is very important for IMS and NGN SIP servers. This topic is complex and requires an understanding of the different system architectures and the service availability level each of the different architectures offers.

The term high-availability in and of itself is a bit ambiguous, in that it is subjective relative to the type of service offered. Core network servers are expected to deliver 99.999% availability, which translates to five minutes downtime per year. They are also expected to provide service continuity, which means that in case there is server unavailability, active calls which were managed by the unavailable server will not get disconnected.

High-availability requirements are a function of revenue-related commercial issues, and regulatory and government agency requirements, such as emergency calls. Continuous service equals uninterrupted revenues and lower maintenance costs. Issues related to customer satisfaction and customer retention are also factors in the equation.

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

B2BUA servers are intrinsically stateful because they maintain a stateful connection (dialogue) to one or more end-points and have an ad hoc logical association between these separate call legs.

In order to maintain a highly-available B2BUA server, the server should have a run-time state replication mechanism that enables server redundancy. Deploying a high-capacity redundant B2BUA server farms also requires following a set of important server farm message-routing rules that are mandatory to deliver valid server farm behavior.

An example for a B2BUA server farm message-routing rule can be seen when performing a switchover following a failure of one B2BUA server. The set of User Agents which the failing B2BUA server managed should be given as a whole to a dedicated backup server for handling, and not distributed among the remaining active servers.

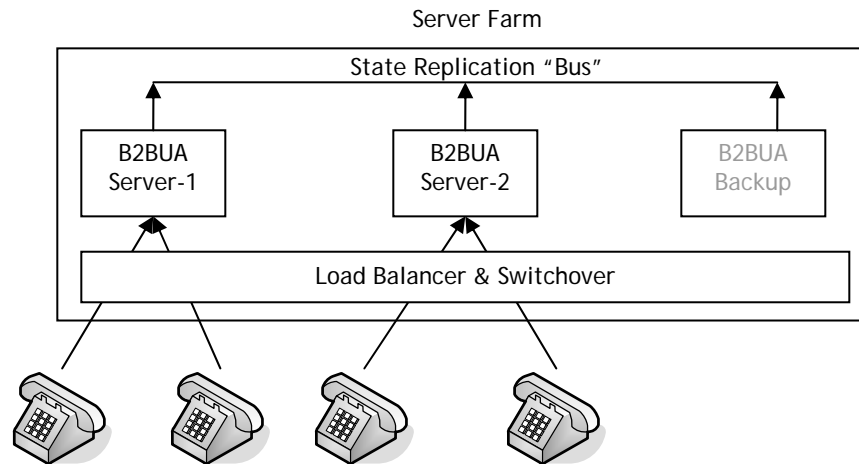


Figure 6 - Typical high capacity redundant server farm architecture

B2BUA Server Framework Challenges and Requirements

B2BUA application developers face many challenges. Some of the more difficult challenges include:

- Time-to-market
- Conformance and interoperability
- Customization to offer proprietary services
- Support for HA and redundancy

A valuable B2BUA framework can help developers overcome these major challenges by delivering these characteristics:

Modular application building block architecture for increased flexibility, abstraction and short delivery time

Challenge

Developing complex B2BUA applications requires expertise and is time consuming. Traditional B2BUA framework architectures feature a single configurable state machine which is controllable through a set of API functions and callbacks.

The following figure outlines the traditional architecture of a B2BUA framework:

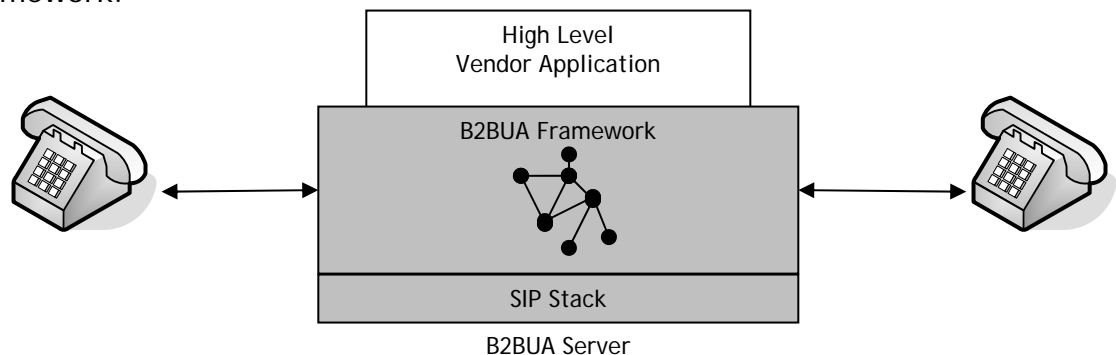


Figure 7 – Traditional architecture of a B2BUA framework

The traditional architecture is not flexible enough for the development of B2BUA servers that offer multiple types of services, since the structure of internal state-machine is relatively fixed.

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

Requirements

A B2BUA framework should facilitate developing B2BUA applications by flexibly linking “pluggable” high-level Modular Application Building Blocks (MABB). Developers should have the ability to combine these MABBs as a means of developing their proprietary application. These MABBs’ architecture should be designed in a way that allows developers to further customize their behavior if needed. This type of architecture complies with contemporary Service Oriented Architecture (SOA) concepts. A B2BUA server that complies with SOA concepts can be used as a tool for powering flexible business communication platforms.

Examples of MABBs that facilitate building a PBX include an MABB that responds to an incoming call request, a MABB for disconnecting a call, a MABB for transferring a call, etc.

Benefits

A modular architecture that conforms to these requirements can save months of work. With a set of MABBs in hand, developing the application is a matter of combining existing MABBs to produce the required business logic. This type of abstraction reduces delivery time. Implementing the application is a matter of stringing and customizing existing MABBs. In addition, this type of architecture improves development efficiency; development of new MABBs can be done concurrently.

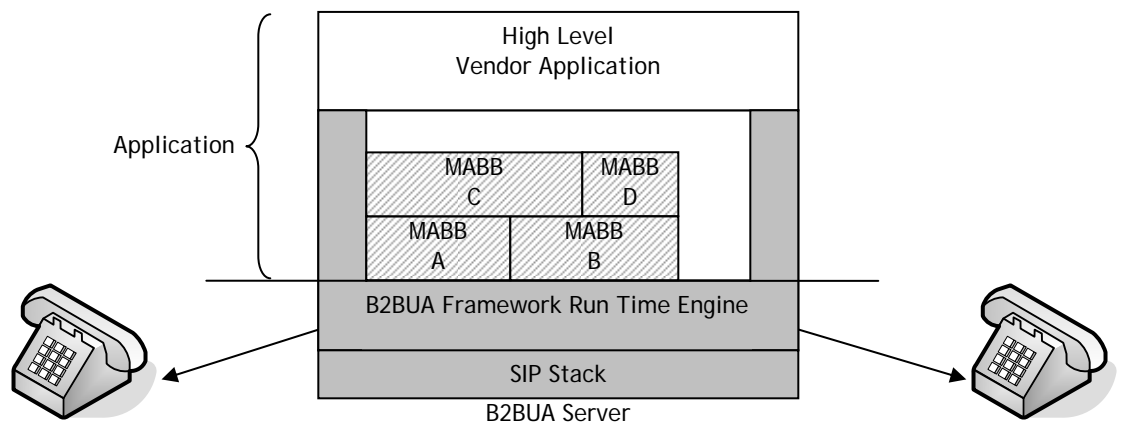


Figure 8 - B2BUA Framework offering modular application development environment compatible with SOA concepts

Conformance and interoperability for rapid integration and successful assimilation

Challenge

Developing fully conforming and interoperable B2BUA applications is highly complex and time consuming, as is developing support for standard features, such as authentication and session-timers. In addition, this does not introduce any differentiating product qualities. Moreover, interoperability issues may arise only when the product is actually deployed, introducing a real risk to commercial viability.

Requirements

A B2BUA framework should facilitate developing applications that fully conform to standards and are interoperable. This requirement should not restrict developers from customizing the protocol behavior for special cases. And even more, it should conform for non-standard implementations, as well as to mediate between two versions of the same standard.

Benefits

Frameworks that facilitate full conformance and interoperable application allow developers to focus on their proprietary application, which deliver conformant features, with the confidence that their final application will be fully interoperable.

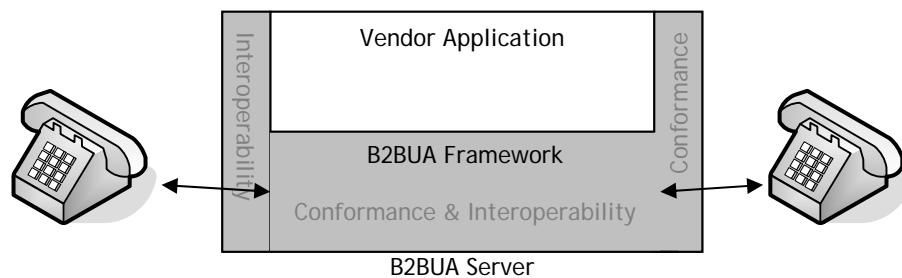


Figure 9 - B2BUA Framework enabling interoperability and conformance features for the application

Flexible customization for rapid development of proprietary features

Challenge

B2BUA applications are usually based on basic, yet complex, control flow templates. For example, applications such as online billing, privacy, topology-hiding, NAT traversal and others are basically built on a Transparent B2BUA control flow template.

Requirements

B2BUA frameworks should provide the ability to configure, amend and replace application building blocks as a means of creating proprietary features.

Benefits

With the ability to configure, amend and replace application building blocks, developers can maximize the use of existing code to offer required features - significantly reducing development time, shortening testing cycles, and reducing overall time-to-market.

High availability and redundancy support for continuous service

Challenge

High availability and redundancy are gradually becoming standard features for SIP networks elements and Application Servers. HA is especially important for NGN/IMS networks which must deliver continuous 99.999% service availability. B2BUA applications which are inherently stateful are required to provide continuous service in the event of scheduled or unscheduled outages.

Requirements

B2BUA frameworks should automatically replicate the application and B2BUA framework run-time state to a redundant server. The redundant server would then be able to take over and provide continuous service in the event of an outage. The framework should allow developers to flexibility customize this automatic run-time state replication engine for proprietary use cases.

Benefits

Having an automatic run-time state replication engine allows developers to continue focusing on the development of the application or service while

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

the framework takes care of making the application or service highly available.

High availability allows for uninterrupted revenue flow, lower maintenance costs and enhanced customer satisfaction.

RADVISION SIP Server Platform & B2BUA Application Framework (B2BAF)

Overview

RADVISION's B2BUA Application Framework (B2BAF) is a unique and highly flexible Application Creation Framework for the development of high performance B2B applications and services.

The B2BAF module is a part of the RADVISION SIP Server Platform. The RADVISION SIP Server Platform is a SIP Server software framework that offers the essential building blocks for the development of a wide variety of high performance SIP and IMS servers. The rich set of components and modules can be flexibly combined to match customers' requirements for developing SIP servers that offer both standard and advanced SIP services.

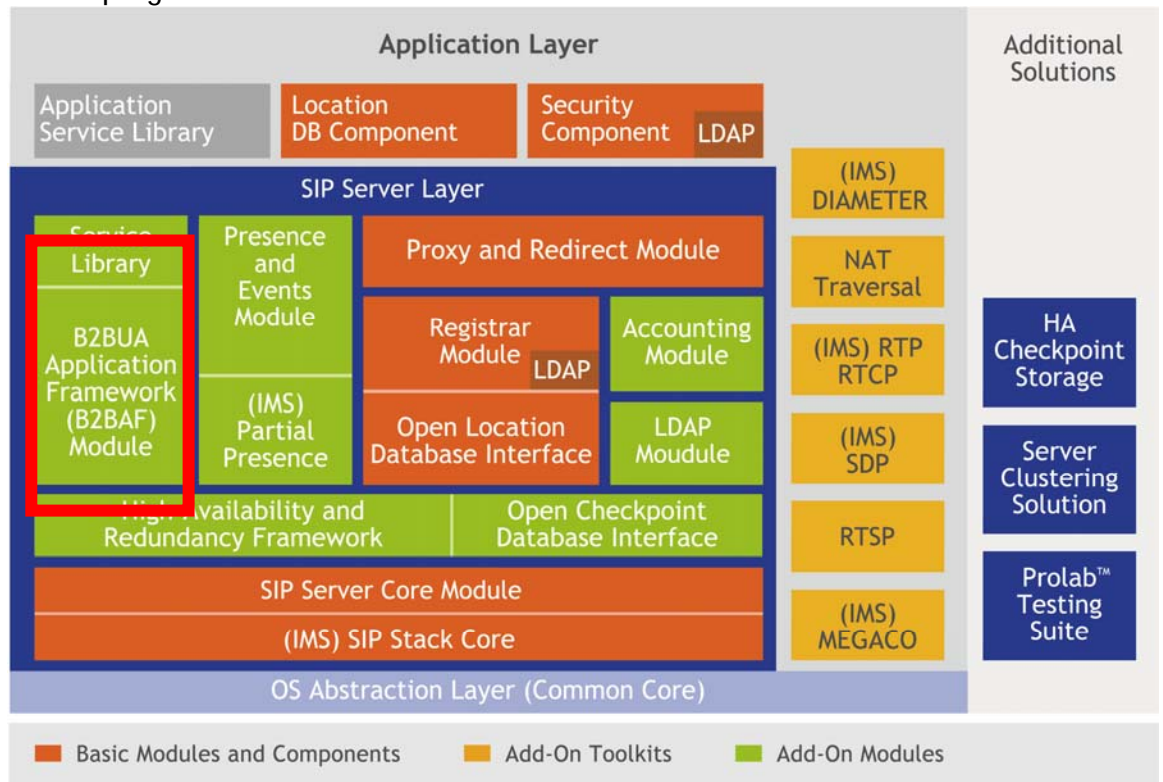


Figure 10 - B2BAF Module - part of RADVISION SIP Server Platform

B2BAF Architecture

B2BAF architecture was designed to adhere to Service Oriented Architecture (SOA) design concepts.

Applications written on top of the framework are developed by combining customizable modular application building blocks, also referred to as "Services." B2BAF Services are effectively large chunks of functionality that can be strung together to form ad-hoc applications. This type of architecture allows developers to focus on the high-level business logic and use building blocks that hide low-level details.

The B2BAF is comprised of the *B2BAF Core Runtime Engine (RTE)* and a collection of *B2BAF Services* that are executed by the B2BAF Core RTE.

The architecture of the B2BAF allows for:

- Reduced time to market developing B2BUA applications
- Conformance and interoperability
- Flexible customizability for proprietary applications
- Automatic high-availability and redundancy support

B2BAF Services

A B2BAF Service is a self-contained modular state-machine that implements some SIP telecom business-logic functionality. B2BAF Services are effectively large chunks of functionality that can be strung together to form ad-hoc applications. Each Service can communicate with multiple clients, and can be configured and enhanced.

The following figure illustrates the modular state-machine which a service represents:

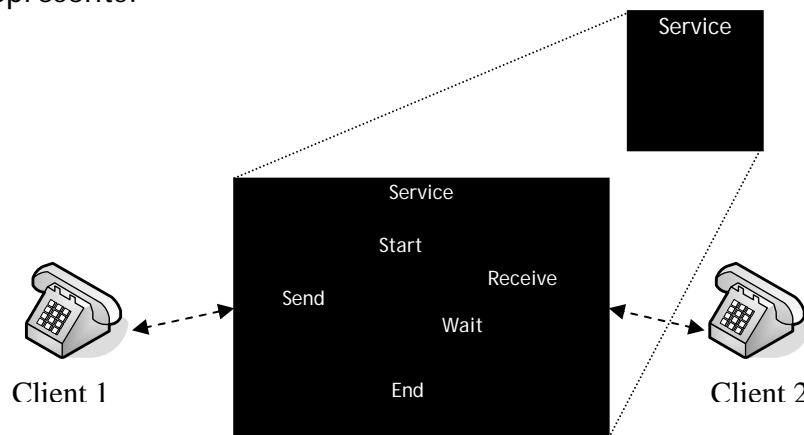


Figure 11 - A B2BAF Service is a self-contained modular state-machine

A Functional and Architectural Look At Back-To-Back User Agent (B2BUA) SIP Servers

Examples of the functionality that B2BAF Services offer are:

- Point to Point call management
- Multipoint call management
- SIP to IMS Inter-work Function
- Credit Control

Although each Service hides the low-level SIP control flows, developers can still flexibly customize the Service by overriding default event implementation and change its state machine or extend it. In addition, the behavior of each Service can be configured through its configuration API.

The different ways Services can be used:

- As-is
- Customized to create different Service variants
- To handle flow parts of the application
- Strung as building blocks to develop more compound Services
- As reference for a rapid kick start of different Services

The following figure illustrates the different methods for service customization:

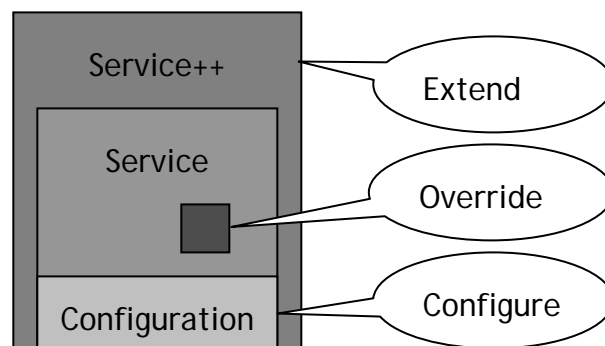


Figure 12 - Services customization methods

B2BAF Core Runtime Engine

The B2BAF core runtime engine drives the B2B application. It dispatches SIP messages, routes events to the relevant Services and orchestrates the operation of the application.

The following figure illustrates the invocation of a B2BAF Service by the B2BAF Core RTE.

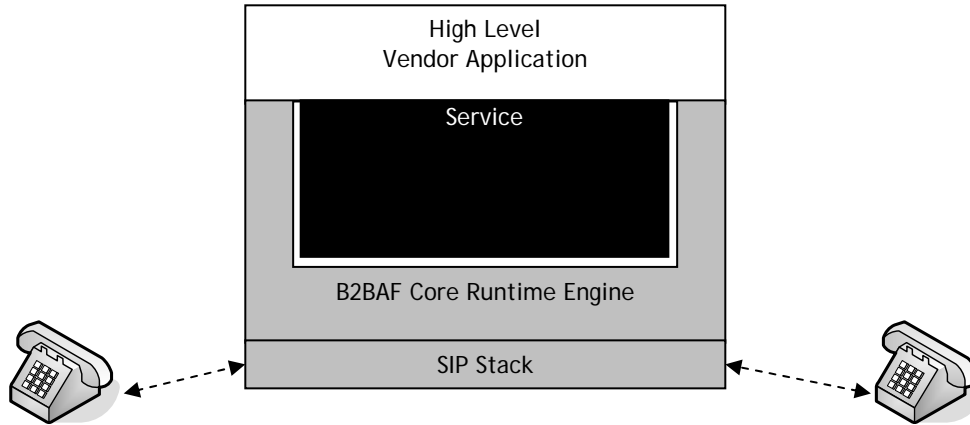
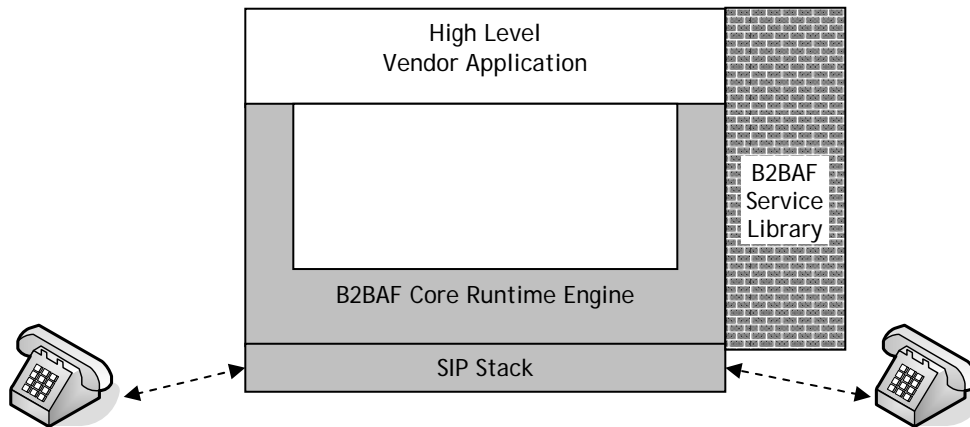


Figure 13 - Invocation of a B2BAF Service by the B2BAF Core RTE

B2BAF Service Library

The B2BAF Service Library is a collection of off-the-shelf Services developed on top of the RADVISION SIP Server Platform B2BUA Application Framework. This repository is used by the application and the B2BAF Core to retrieve Service templates and instantiate those to handle different call scenarios.

Using the services offered as part of the Service Library, developers can significantly shorten the time to market when developing proprietary services.



B2BAF Service Stringing

Multiple Services can be strung together to create higher level compound Services with a compound state-machine. This makes developing new high level services a work of stringing existing services, and reduces development time significantly.

The following figure illustrates the concept of stringing multiple services to obtain a new high level Service.

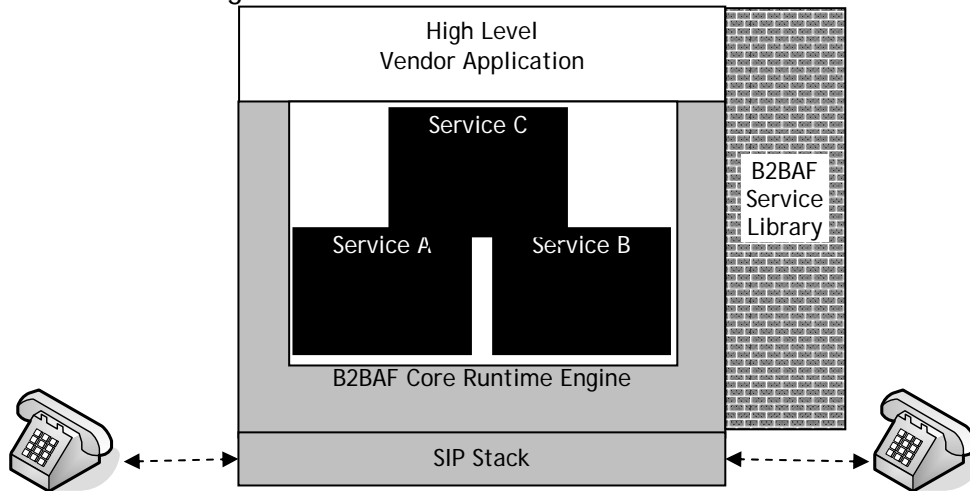


Figure 14 - Stringing multiple services to obtain a new high level Service

For example, creating a basic point-to-point Call Management service (Service C) which manages the life-cycle of a simple point-to-point call is a matter of stringing the Connect service (Service A) and Disconnect service (Service B).

This capability is also valuable for solving interoperability issues and adapting services to handle operator specific protocol variants: The B2BAF architecture allows creating low level “adapter” services that can be used to abstract the low level vendor specific communication tweaks of different vendors and allow high-level business logic services to work agnostically in different operator environments. For example, Service-A, which is used to connect a call for carrier-A, can be replaced with Service-B that is customized to connect a call for carrier-B.

B2BAF HA & Redundancy Support

When used in conjunction with the RADVISION SIP Server HA & Redundancy Framework, the B2BAF automatically replicates the run-time state of the different Services and B2BAF core. In the event of a server outage, a redundant server takes over seamlessly and provides uninterrupted service continuity.

This capability is important for integrating high availability capabilities to an existing application incrementally without a need to rewrite the application.

B2BAF Value Proposition Summary

- Significantly reduces time to market developing proprietary B2B applications by using off-the-shelf highly customizable B2BAF Services
- Focuses on the business logic and hides low level operator communication intricacies by using high-level B2BAF Services
- Delivers off-the-shelf conformance and interoperability by using B2BAF Services developed on top of RADVISION's interoperable B2BAF server and stack engines
- Enables rapid development of applications that can interoperate with different vendors by developing low level interoperability adapters
- Enables adding high-availability features easily when needed by enabling the automatic state replication mechanism integrated into the B2BAF
- Take advantage of additional add-ons offered as part of the SIP Server Platform, including Registrar, Location Database, Proxy, Presence, IMS Diameter, RTP, MEGACO and many more
- Take advantage of additional Service Library packages developed by RADVISION on top of the B2BAF Core RTE, to enhance applications and retain a competitive advantage

For more information about RADVISION B2BUA Application Framework and SIP Server Platform.

Acronyms

SIP - Session Initiation Protocol
B2BUA - Back to Back User Agent
B2BAF - Back to Back User Agent Application Framework
MABB - Modular Application Building Block
HA - High Availability
3PCC - 3rd Party Call Control
UA - User Agent
SDP - Session Description Protocol
UAC - User Agent Client
UAS - User Agent Server
NGN - Next Generation Network
CPE - Customer Premise Equipment
IMS - IP Multimedia Subsystem
IWF - Inter-working Function
ST - Session Timer
THIG - Topology Hiding Inter-Network Gateway
SEG - Security Gateway
QoS - Quality of Service
RP - Resource Prioritization
VCC - Voice Call Continuity
SOA - Service Oriented Architecture

References

3GPP TS 24.229 V8.0.0 - 3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (Release 8)

RFC 3261 - SIP: Session Initiation Protocol

RFC 3275 - Best Current Practices for Third Party Call Control (3PCC) in the Session Initiation Protocol (SIP)

The 3G IP Multimedia Subsystem, Gonzalo Camarillo, Miguel A. Garcia Martin, Wiley

Contact RADVISION at <http://www.radvision.com/Corporate/OfficesWorldwide/>