

**Leveraging SOA and SIP to Deliver Next-  
Generation Services Over Fixed and  
Wireless Networks**

**A joint whitepaper offered by  
Cantata Technology and BEA Systems**



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## overview

Today's telecommunications services landscape is becoming increasingly similar to the World Wide Web as application developers and carriers are leveraging standards-based information technologies to create a new era of converged, real-time communications. Operators must deliver services that drive revenue growth and attract new subscribers. End users' appetites for services are high, but their loyalties are low. In order to thrive, fixed and wireless carriers must create new generations of services in Internet time in order to capture the hearts, minds and loyalties of an increasingly fickle subscriber base.

This white paper discusses how telecom services of today and tomorrow can be swiftly developed and deployed using standards-based development processes and protocols that are spawned from the IT and the Web services domains rather than the traditional telecom world. It shows how carriers are developing and deploying IP multimedia communications across service-centric network architectures that leverage interoperable, standards-based infrastructure and the Web services development framework to increase revenue and market share.

It also discusses how BEA Systems, the industry's premier developer of Web application services and Service-Oriented Architecture (SOA) infrastructure, and Cantata Technology, the leading provider of real-time, any-to-any communications, enabling technologies, are providing carriers with critical foundation elements for delivering high-value services across both fixed and wireless networks.

## real-time communications and the web

Today, carriers have the opportunity to offer new bundles of real-time communications services for distinct market segments and lifestyles. These services are increasingly being built in the same paradigm as traditional Web services by leveraging SOA.

SOA is an application development paradigm and an application architecture that relies on a set of services that can be shared and reused across application development initiatives, giving developers greater flexibility in the service creation process. Developers can coordinate services instead of large applications, and they can decouple applications from the underlying infrastructure. SOA abstracts development from underlying detail and complexity, and it relies on loosely coupled and self-contained services that enable greater flexibility. Applications are built by combining-and recombining-discrete services, allowing carriers to swiftly develop and evolve new telecommunications service offerings.

In this new era, Session Initiation Protocol (SIP), a protocol based on HTTP, allows network operators to combine standalone services such as messaging or conferencing with more of the Web model of service composition. They can structure these individual services as a series of application components that are rapidly assembled and reassembled using the SOA model into new types of blended multimedia services to accommodate market demands.

As development methodologies are transitioning to more flexible standardized processes running across interoperable platforms to speed service creation, the underlying telecom network architectures are also shifting to allow carriers to swiftly deploy these new applications and services. The IP Multimedia Subsystem (IMS) provides a unified architecture to deliver a wide range of traditional telephony and new packet-based multimedia services across fixed and wireless network topologies. IMS is an application-driven network architecture that leverages Internet-based technologies that mirror the SOA development paradigm to accelerate the delivery of new telecommunications services.

The convergence of the Web and the telecommunications worlds presents carriers with new opportunities and challenges. Subscribers are hungry for new Internet-style applications and carriers need to quickly and reliably deliver real-time services. By leveraging SOA, SIP and the IMS architecture, carriers can deliver new services over traditional circuit switched networks as well as over IP fixed and wireless networks.

## **bundled services and the shift to VoIP 2.0**

First-generation Voice over IP (VoIP) services relied on a centralized, softswitch-oriented architecture that was designed to reduce operational costs and deliver transport-oriented voice services more economically than by delivering them over the PSTN. These "VoIP 1.0" services allowed many providers to transform the core of their networks to IP but provided them with little flexibility or capability for delivering new types of services.

Just as the first-generation of VoIP services focused on reducing operating costs, the second generation of VoIP services, "VoIP 2.0", will lead to service bundles that create incremental revenue and allow carriers to offer voice services that are seamlessly integrated with Web-based applications. VoIP will lead to a distributed architecture with increased intelligence and more efficient service delivery capabilities. The following are some of the key standards required to support bundled voice and multimedia services:

- SIP
- Voice XML
- Media Server Control Mark-up Language (MSCML)

### ***delivering innovative service bundles with SIP***

SIP is rapidly becoming the de facto underlying session control protocol that service providers and network operators are using as the foundation for next-generation services. SIP is an application-layer signaling protocol developed by the IETF for initiating, modifying and terminating an interactive user session that involves multimedia elements such as:

- Video
- Voice
- Instant messaging

The convergence of SIP and J2EE technologies is a natural convergence of IT and communications technologies and is enabling real-time multimedia services. SIP offers the necessary protocol mechanisms that enable enhanced services. For example, SIP is used to support click-to-dial services or Web-driven conferences.

To deliver innovative bundles of multimedia services, network operators rely on SIP. For certain applications such as conferencing, additional functionality not contained in SIP is required. For example, SIP provides the basic tools for simple conferencing functionality but more advanced call control functionality is required for large-scale applications.

### ***using VoiceXML for adding IVR for web applications***

VoiceXML is the standard for presenting user interfaces that use voice, touch tones and speech to interact with the user. Its major goal is to bring the advantages of Web-based development and content delivery to Interactive Voice Response (IVR) applications. Just as HTML is commonly used for creating graphical Web applications, VoiceXML can similarly be used for creating interactive telephony applications.

However, VoiceXML was never designed for advanced call control features. It was designed as a dialogue language; it manages the presentation of media and the handling of input in the context of a dialogue. It uses a model based on the concept of a form and defines rules for how these forms control interactions with the user. This model works well for telephony user interfaces; however, it is ill-suited to deal with call control concepts and events that can occur at any time. More advanced call control functionality is required for large-scale applications.

### ***supporting advanced multimedia collaboration applications with MSCML***

MSCML is used in conjunction with SIP to enable the delivery of advanced multimedia conferencing services over IP networks. It provides the conferencing control functions that allow application servers to make use of enhanced features available on media servers. MSCML adds value to SIP applications by providing developers with the tools to offer more advanced features for SIP conferencing and multimedia collaboration applications.

It enables new converged applications, mixing the rich media IVR experience of VoiceXML with enhanced conferencing and collaboration facilities. MSCML is a SIP-based development and control language for IP-enhanced conferencing services. It is used in conjunction with SIP to provide advanced conferencing and IVR functions. MSCML was authored by Cantata and is in the IETF RFC Queue, and it is expected to be assigned a number shortly.

SIP, MSCML and VoiceXML are key protocols for supporting migration to VoIP 2.0 services and delivering real-time multimedia services to both enterprise and residential subscribers over wired or wireless networks.

## joint solutions from BEA and Cantata

BEA Systems and Cantata Technology work closely together to allow carriers to develop applications in Internet time and deploy media-rich services. BEA, a premier application infrastructure provider, and Cantata, the world's leading independent provider of enabling communications technology, partner together to help network operators deliver next-generation multimedia services for fixed and mobile networks.

The two companies have completed interoperability testing for Cantata's SnowShore IP Media Server™ and the BEA WebLogic SIP Server™, the converged Java Enterprise Edition (EE)-SIP-IMS application server component of the BEA WebLogic Communications Platform™ product family, which also includes the BEA WebLogic Network Gatekeeper™. The combined solution based on these products are designed to allow Web application developers to rapidly build familiar and emerging applications for VoIP and IMS networks, such as:

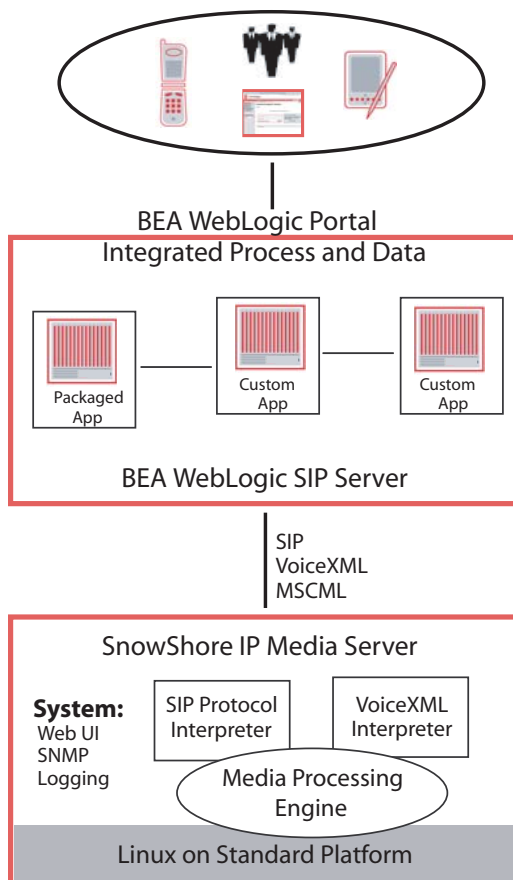
- Voice
- Video messaging
- Video ring back clips
- Voice conferencing
- Video conferencing
- IVR
- Streaming video
- Click-to-call
- Unified messaging
- Multimedia real-time conferencing
- Multi-player gaming with voice

Carriers can rely on rapid creation and delivery of robust multimedia services to create lasting bonds with subscribers that lead to recurring revenue streams.

## converging IP and telecom solutions from BEA and Cantata

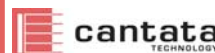
For many network operators, the barriers are coming down between network operations and IT departments. As these two critical functions merge, carriers see an opportunity to deliver new revenue-enhancing services more quickly.

BEA offers the leading infrastructure for SOA, and offers powerful, standards-based platforms for building applications and managing SOAs even in heterogeneous IT environments. The BEA WebLogic Communications Platform is the first converged IT and telecom platform providing full-service lifecycle capabilities in a carrier-class environment. It enables service



### BEA WebLogic SIP Server

- A Unified, Simplified Application Platform Suite
- Accelerates New Services
- Lower Development Costs
- Improves Deployment Time
- Increases ROI



### Cantata SnowShore IP Media Server

- High Performance, Carrier-Grade
- Media Processing
- Open Software Architecture
- Extensive Feature Support
- Full SIP/VoiceXML/MSMCL Support

*Telcos can develop and deploy multimedia applications using products and solutions from BEA and rely on the Cantata SnowShore IP Media Server for multimedia services*

providers to increase revenues by enhancing their ability to conduct a wide variety of digital content and video services over wireless and wireline networks.

## **BEA WebLogic SIP Server**

The BEA WebLogic SIP Server is a high-performance Java EE-SIP-IMS application server that provides an integrated SIP, HTTP and Enterprise Java Beans (EJB) container to enable swift development and delivery of next-generation, converged multimedia communications services. Through very strong technical integration and optimization with the industry's leading Java EE application development and deployment platform-BEA WebLogic Server®-the BEA WebLogic SIP Server delivers the following key features:

- Integrated Java EE-SIP-IMS application container
- Industry standards support based on SIP, SIP Servlets, Java EE and Web Services
- Industry-leading, carrier-grade performance
- Proven high availability, reliability and scalability
- Multi-network interoperability
- Rapid creation of innovative services
- Mission-critical manageability

The BEA WebLogic SIP Server is designed to operate as the core converged application container at the service control plane of the operator's network, providing SIP-based session control capabilities to next-generation, converged IP communications services. It is a converged application container platform on which network operators can standardize the services layer of their next-generation networks.

### ***BEA Workshop***

BEA Workshop™ provides an Eclipse-based development experience for SOA enablement. It is a full-featured Java development environment that allows developers to visually build and assemble Web applications and Web services that are optimized for SOA. Carriers and applications developers can leverage BEA Workshop to swiftly build new services and applications that can be deployed on the BEA WebLogic SIP Server.

### ***BEA WebLogic Network Gatekeeper***

BEA WebLogic Network Gatekeeper provides a carrier-grade, industry standards-based platform for automated partner management, flexible billing management, policy-based network protection and application access control. It protects access to network resources and allows operators to increase revenues by prioritizing premium traffic.

BEA WebLogic Network Gatekeeper allows network operators to open their networks to third-party application and content providers without having to worry about malicious or erroneous usage of network bandwidth and resources by providing fine-grained, run-time network access control based on Service Level Agreements (SLAs).

It uses standards-based Telecom Web Services to provide third-party partners with a comprehensive portfolio of simple, high-level Web services Application Programming Interfaces (APIs). The Telecom Web Services interfaces in BEA WebLogic Network Gatekeeper are abstracted from a flexible and extensible southbound network resource adapter framework, which is responsible for integration with any type of telecom network elements.

### ***BEA AquaLogic Service Bus***

BEA AquaLogic Service Bus™ is a key element in the BEA AquaLogic™ family of products, delivering service infrastructure for increased agility, efficiency and control. BEA AquaLogic Service Bus seamlessly delivers the intelligent, high-performance integration and mediation capabilities of a service bus with operational service management and support for service life-cycle governance in a single, unified software product. It accelerates configuration and deployment, and simplifies management of integrated shared services across the SOA.

### ***BEA WebLogic Portal***

BEA WebLogic Portal® connects people to services and simplifies the production and management of custom service portals. It includes a rich, graphical environment for developing

portals, and browser-based assembly tools.

### ***AquaLogic BPM Suite***

The AquaLogic Business Service Interaction™ product line features the AquaLogic BPM Suite, an integrated collection of products used to support the complete lifecycle of today's most intense business process challenges, including process development, process execution and process optimization.

### ***putting it all together***

Service providers can leverage SOA and standards-based software technologies using the BEA solutions, but they still need a powerful application-enabling delivery infrastructure for delivering multimedia services. Media Servers and signaling and media gateways are complementary network elements that support BEA Systems' application infrastructure suite.

The BEA WebLogic SIP Server provides the necessary call setup and session management, but carriers also need advanced media processing capabilities with standards-based interfaces that offer proven interoperability with BEA solutions so service providers can offer scalable voice, video and multimedia services. They also need media gateways to enable any-to-any connectivity across multiple networks. Cantata partners with BEA Systems and delivers proven interoperability with the BEA WebLogic SIP Server, and carriers can rely on the Cantata SnowShore IP Media Server and the Cantata Integrated Media Gateway 1010 for delivering voice and multimedia services across both fixed and wireless networks.

## **Cantata SnowShore IP Media Server**

Cantata's SnowShore IP Media Server™ is the industry's premier software-based, carrier-grade IP media server supported by a wide range of industry standard hardware platforms running on Red Hat Linux. It leverages the simplicity, openness and flexibility of SIP, VoiceXML and MSCML to provide a cost-effective and scalable IP media server solution that powers a broad range of voice and video services for next-generation wireline, wireless and broadband networks.

Cantata pioneered the SIP-based media server and delivered the industry's first software-only product. The SnowShore IP Media Server offers a highly optimized, carrier-grade architecture that makes it an ideal choice for delivering media-rich, next-generation IP services. It provides:

- Advanced voice processing
- Advanced video processing
- Rich multimedia processing
- Industry-standard SIP/XML interfaces
- Carrier-grade operations
- Flexibility to run on industry-standard servers

The SnowShore IP Media Server utilizes industry-standard server platforms and standards-based

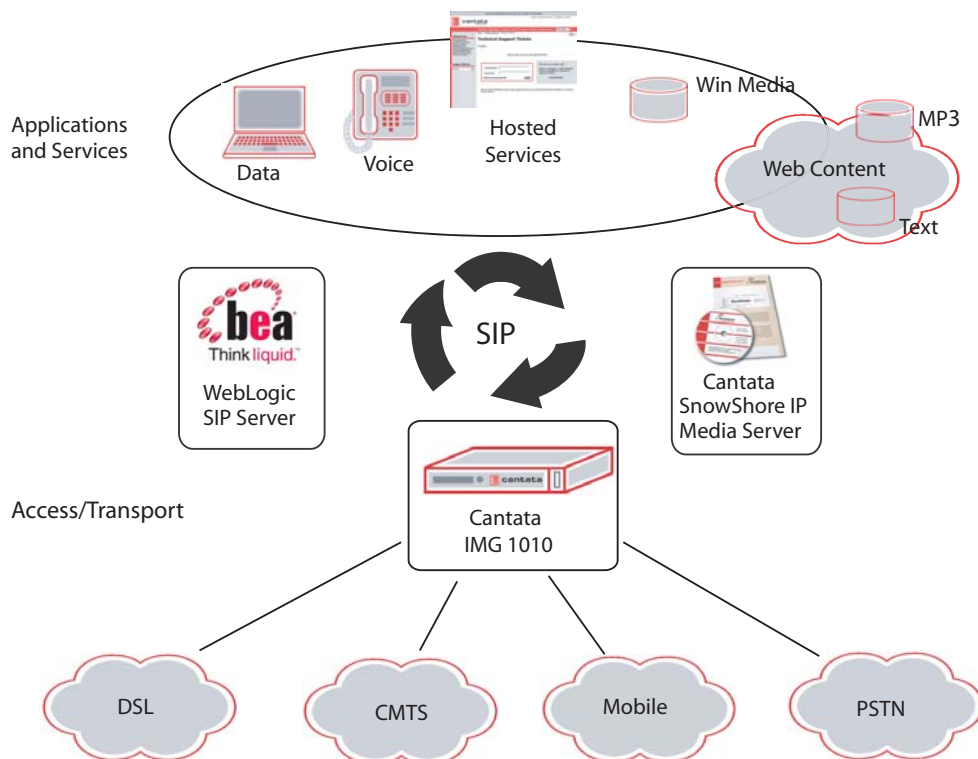
IP protocols, and it leverages the ongoing evolution of network architectures and processor technology to deliver a future-proof media processing solution for next-generation IP applications. It provides software-based media processing resources that can support a broad range of applications, from basic messaging and multi-party conferencing to prepaid services and video mail.

Carriers can flexibly scale media processing capabilities to meet the highest levels of demand using a scalable server architecture already proven in the world's busiest Web server implementations. Cantata has brought the advantages of massive industry investments in server technology, open source development and Moore's Law to the IP media server market so telcos can capitalize on the CAPEX, OPEX and scalability advantages of carrier-class open systems servers while continuing to leverage innovations in media server software.

## Cantata Integrated Media Gateway 1010

Cantata's Integrated Media Gateway 1010 (IMG 1010™) is an integrated media and signaling gateway that provides any-to-any voice network connectivity, enabling delivery of SIP services into legacy SS7/PRI networks, as well as IP-to-IP transcoding for IP network peering applications.

With its compact, high-density, 1U package, integrated SS7 termination, software licensing for in-service capacity expansion and graphical user interface-based element management system, the IMG 1010 is a carrier-grade VoIP gateway and transcoder that enables service providers to quickly add new IP-based services while providing a clear migration path to an all-VoIP network. It can be deployed by service providers at the edge of the access/transport network to provide connectivity to the PSTN as well as to mobile, DSL or cable networks.



*Solutions from BEA Systems and Cantata allow carriers to deliver multimedia services across diverse network infrastructure.*

## developing real-time services

Solutions from BEA and Cantata allow network operators to swiftly develop multimedia services. For example, BEA recently developed a demonstration showcasing a voice and video conferencing application. A pair of developers wrote this application in about ten days and it was shown at a VON Conference. Carriers can similarly accelerate the delivery of multimedia services by relying on industry standards, powerful tools and advanced SIP servers and media servers.

In this application, a user establishes a multimedia conferencing session. The conference follows the familiar business conferencing paradigm from carrier-based voice conferencing. However, it uses Web-based graphical interactions for the user to establish the conference times and the list of participants to invite. Moreover, the application distributes an email that provides the contact information for the conference. The application leverages the advanced multimedia capability of the Cantata SnowShore Media Server to provide a rich multimedia experience for the conference participants.



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### Create a Conference

You are logged in as: weblogic

[Conference Desktop](#) > Create Conference

Enter Conference Information

Conference Host:

Email:

*Participants can easily create a multimedia conference from an easy-to-use graphical interface.*

The application was written using BEA WebLogic Workshop, and it runs on the BEA WebLogic SIP Server. Users establish conferences via an easy-to-use graphical interface presented by the BEA WebLogic Portal.

In the application, the BEA WebLogic SIP Server communicates with the Cantata SnowShore IP Media Server using SIP, and the application uses MSCML to control media processing features. The MSCML is generated and parsed by the application using XMLBeans, an open source XML binding project sponsored by BEA. The BEA WebLogic Workshop tools make it easy for developers to create these blended applications that leverage the Web-oriented SIP and XML interfaces pioneered by the SnowShore Media Server.



*Conference panels can be easily established and monitored. The active legs of the conference can be muted, unmuted and terminated from the Web user interface. Clicking on an action causes a corresponding MSCML message to be sent to the media server.*

This demonstration application was quickly hardened for the commercial market and is being operated in mixed fixed-line and mobile 3G environments. Since the initial development of this demonstration application, BEA has extended it by exposing the controls of the media server so they could be utilized by other applications in SOA environments. For example, a portal application could add services like "click-to-dial" or "establish a conference."

Multimedia conferencing is just one example of the many types of real-time services that can be offered. Other examples include click-to-call services; interactive, voice-enabled gaming; video surveillance; IVR; and converged call center applications. More information about this conferencing application can be found at :

<http://dev2dev.bea.com/pub/a/2006/05/media-server.html>.

## **best of breed solutions for real-time multimedia services**

Carriers can transform their business models from voice-driven to service-driven businesses and create a better environment for building and delivering high-value multimedia services. BEA offers best of breed applications and infrastructure solutions while Cantata offers best of breed media servers and gateways.

By selecting solutions from BEA and Cantata, carriers can leverage standards-based solutions to create and deliver converged multimedia services across any network-and to any end point.

They can incorporate presence and location into their service offerings, and they can also deliver highly scalable multimedia services, since the BEA WebLogic SIP Server supports both SIP Servlet Engine clustering as well as Java EE clustering, and the Cantata SnowShore IP Media Server is a software-based scalable media server platform that can easily expand to support more users and new services.

Both the BEA WebLogic SIP Server and the Cantata SnowShore Media Server can be deployed on highly reliable, carrier-grade server platforms so that carriers can offer highly reliable services. Clustering capabilities in BEA WebLogic SIP Server and BEA WebLogic Server enable massive scalability and can allow multiple SnowShore Media Servers to support high-demand multimedia services. BEA offers tight integration between Web-based portal interfaces and SIP, VoiceXML and MSCML protocols, allowing service providers to offer easy-to-use multimedia services that can be accessed through portal interfaces by enterprise customers.

By leveraging its tiered SIP Servlet Engine deployment architecture, BEA WebLogic SIP Server offers industry-leading performance, and Cantata offers the highest-density media server commercially available today. For most carrier configurations, the Cantata media server is twice the density of proprietary hardware-based offerings.

With solutions from BEA and Cantata, network operators can provide more subscriber-centric offerings and deliver Voice 2.0 service bundles that create incremental revenue. They can shorten the time to market for new services and features and evolve to service-driven architectures and support for the IMS architecture.

### **about BEA Systems**

BEA Systems, Inc. (NASDAQ: BEAS) is a world leader in enterprise infrastructure software. BEA delivers the unified SOA platform for business transformation and optimization in order to improve cost structures and grow new revenue streams.

### **about Cantata Technology**

Cantata Technology, established in 2006 through the combination of Brooktrout Technology and Excel Switching Corporation, provides enabling communications hardware and software that empowers the creation and delivery of any time, anywhere IP-based communications applications. Leveraging more than 20 years of experience, Cantata offers the broadest range of products, along with a worldwide network of partners that allows service provider and enterprise customers to develop new products, introduce new services and cost effectively transition networks to IP.



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