



WHITE PAPER

VeriSign Billing and OSS



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“The market simply will not wait for companies to catch up with its needs. As we’ve seen with the growth of wireless customization, downloadable content, and enterprise VoIP systems, the market will find its own solutions if carriers won’t provide them fast enough.”

Stratton Sclavos
VeriSign, Inc.
Chief Executive Officer

Purpose

This white paper provides a perspective on the rapidly changing communications industry and outlines the expected impact of these changes on communication service providers’ (CSPs) business and operational support systems (BSS/OSS). It also introduces the VeriSign® Billing and OSS solution, part of the VeriSign end-to-end Intelligent Communications, Commerce, and ContentSM (IC^{3SM}) strategy for enabling CSPs to address the continuing evolution of the industry.

Industry Landscape

+ Communications Marketplace

The last several years have seen a dramatic change in the nature and definition of the telecommunications industry. As shown in Figure 1, services and technologies that were just emerging or did not exist several years ago are now multi-billion-dollar industries. The emergence of new technologies such as Voice-over-Internet Protocol (VoIP) and Third-generation (3G) mobile is enabling a new wave of next-generation providers offering voice, data, and video services. A fundamental transformation is taking place, resulting in a blurring of the traditional lines between telecommunications services and information services. This transformation will be shaped by the legacy of telephony as we have known it for over a century and by the newer influences of Internet and mobile technologies.

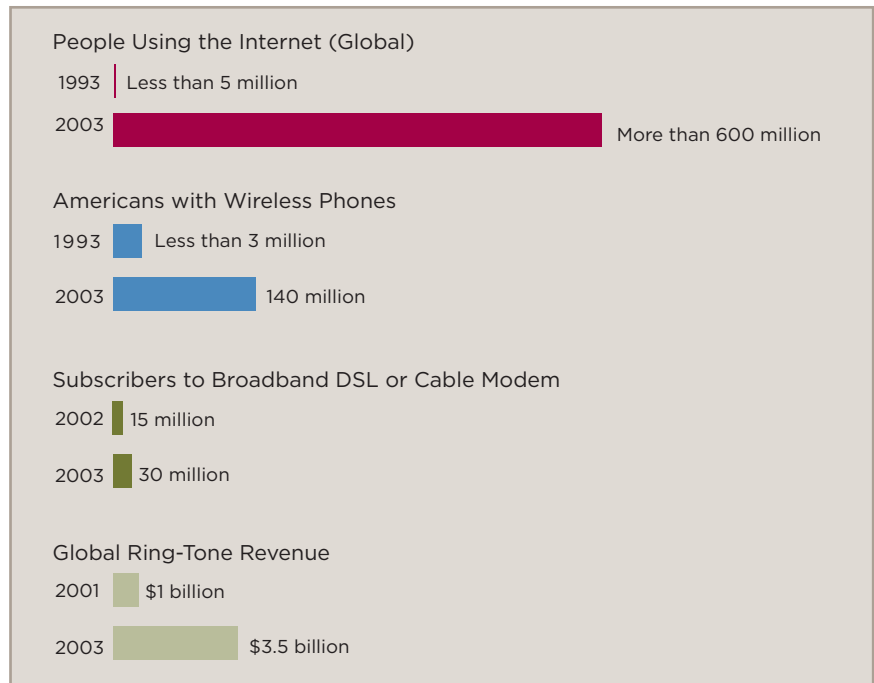
The assumptions that shaped the industry’s approach to technology, business models, user behavior, competition, and deployment over the past five decades are being fundamentally altered. CSPs including traditional and nontraditional carriers, that recognize the potential of this evolution are shifting their operations to address these transformations. They are positioning themselves to take advantage of the emerging opportunities in commerce and content as well as communications.

It is no longer simply about “reaching out and touching someone”; CSPs in the evolving communications era must enable end users to find, connect, secure, and transact using a variety of devices over a variety of networks.

To survive the dramatic changes in communications and flourish in a new landscape, CSPs must evolve from the models they have employed in the past. While they are managing ongoing issues related to regulation, security, and globalization, CSPs also must squarely address the following five key areas of transformation:

- Technology
- Business model
- User behavior
- Deployment model
- Competition

Figure 1: Rapid Changes in Telecommunications



Technology

The growth of new communications technologies has created a complex landscape for CSPs. While the convergence of these disparate technologies presents a major challenge to CSPs, it also offers a unique opportunity to transform the end-user experience. The promise of converged technologies goes far beyond superimposing voice services over IP networks. It involves unifying voice and data, wireless and wireline, and public and private networks into an integrated, end-to-end infrastructure for service delivery. It is important that these complex hybrid networks become enablers of services, as opposed to services themselves. Ultimately, customers care much more about the services delivered than the underlying technology used to deliver those applications.

Business Model

For the past two decades, carriers have been able to drive their economic engines primarily through delivery of bandwidth and connections. However, as both supply and demand factors cause bandwidth and connections to become commoditized, carriers must alter their business models to make money on the delivery of content, commerce, and richer communications.

The traditional business model, typically based on time and distance pricing, is being replaced by more flexible subscription and transaction models. The subscription model collects fees for access to bundles driven by customer preference and provides the right to use services on one or more networks, via a variety of devices. More and more, commoditized services are being sold under flat-rated subscription models. The transaction model will drive new value to CSPs by allowing users on-demand access to any network service they wish to

use. High-value services such as content, commerce, and multimedia are being sold on a per transaction model. It is imperative that CSPs constantly provide new high-value services to keep their revenues from stagnating and their margins from disappearing.

User Behavior

More than ever, market demands are driving the innovation in telecommunications. While convergence is beginning to occur at the network level, customer demands are calling for a new definition of convergence as the integrated delivery of services to the device or individual-convergence at the end-user level. Whether it's a teenager downloading a ring tone to his cell phone, a businesswoman text-messaging her assistant, or a mobile employee retrieving email on his PDA, consumers and businesses are demanding mobility, access, and ease of use at the user level—and increasingly at the device level. They want real-time access to their information and the ability to order and provision their preferred features. In short, customers want more control over selection and management of their services. CSPs must continually work to enhance user loyalty by providing these capabilities.

Deployment Model

Most carriers have traditionally been highly vertically integrated in their service-delivery model, owning and operating virtually everything that lies between the subscriber handsets. However, this model has begun to shift due to deregulation, capital-constrained financial structures, the need for rapid deployment of services, the limited useful life span of many new services, and the raft of new skill sets required for emerging services. With the decoupling of the network from the services infrastructure, CSPs no longer have to own the physical connection to the subscriber in order to successfully deliver services. The emergence of mobile virtual network operators (MVNOs) and nonaligned content providers is evidence of this change.

For a deployment model to successfully address rapid development of new applications—rather than rigid management of infrastructure—the primary goal is not simply cost avoidance but also enhancement of the CSP's ability to quickly provision new services to endusers. The solutions cannot be completely deployed by the CSP, nor completely outsourced to a third party; therefore, CSPs are extending the use of managed services from primarily back-office functions to customer-facing functions such as partner management, product development, service creation, and provisioning.

This shift requires a new breed of partner (the “enabler”) who empowers the CSP to provision competitive, revenue-producing services quickly and seamlessly—without capital expense. These services will form the core of the CSP deployment model in the future and will enhance the ability of CSPs to provide connectivity, control, and customization to both business and consumer markets. An important component of the new multipartner deployment model is a heightened emphasis on security, authentication, and revenue accounting to ensure that services are provided safely, reliably, auditably, and profitably.

Competition

In the past, it was easy to identify a telecommunications provider. They were companies that owned and operated switches, bandwidth, and services to enable subscribers to make and receive phone calls. Today, that definition is blurring, and traditional phone providers are finding new competitors entering the market from every direction. Competition now comes from large and small wireless providers as well as national and local virtual operators (such as MVNOs) that can provide wireless capabilities via a bundle (the so-called triple or

quadruple play). In order for companies to thrive, differentiation must be achieved through the variety of services offered and customer service, rather than purely through pricing and technology. With the advent of local number portability (LNP), customers can now easily change providers, making differentiation and customer loyalty more important than ever.

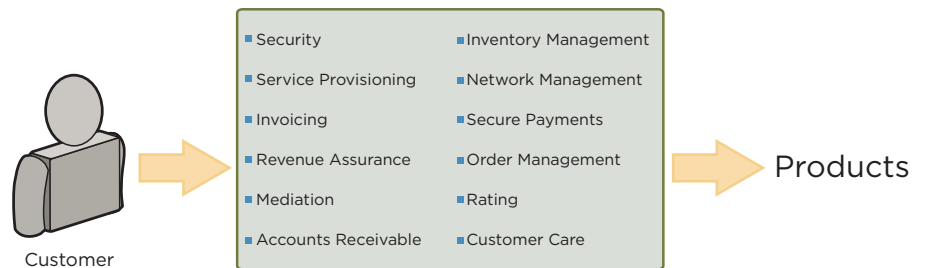
Summary

In summary, CSPs are facing significant changes in every facet of their business. Those that are able to provide a variety of services tailored to customer needs, intelligently use partners to supplement their own capabilities, and understand their customer’s desire for choice, control, and management of their own services will be able to differentiate themselves and will emerge as winners in the next generation of the telecommunications industry.

+ Billing Environment

The changes in the communications landscape will have a profound effect on the billing environment and subsequently business and operations support systems (BSS/OSS). Most existing BSS/OSSs are rigid and create barriers between customers and products, leading to slow, high-cost product delivery. In this current model, CSPs control the customer experience reactively with their legacy systems acting as the control point.

Figure 2: Traditional BSS/OSS



The new BSS/OSSs must instead adapt to support the introduction of new services, thereby enhancing the CSP’s ability to quickly provision new offerings to business and consumer end users. As illustrated in Figure 3, next-generation BSS/OSSs need to provide an open door between customers and products by empowering consumers, not inhibiting them—creating a seamless, order-to-cash environment. Next-generation systems are an alignment opportunity with the network, pushing intelligence to the end user, driving costs down, increasing speed of product delivery, and enhancing the customer experience.

Figure 3: Next-Generation BSS/OSS



The next-generation service-enabling BSS/OSS includes several new and expanded capabilities over the legacy systems.

Content and Content-Provider Management

Offering information and rich media services will require integration with potentially large numbers of content providers. An important component of the next-generation BSS/OSS is the ability to manage the relationship with all content providers that are part of the CSP's deployment model. In addition to tracking content providers, the content-provider-management component must maintain, calculate, and report revenue sharing and settlement agreements, manage content maintenance and use, and, most importantly, must be able to guarantee the security and authenticity of those accessing the content and of the content itself.

Payment and Balance Flexibility

CSPs will need to offer a variety of payment models to their customers and the next-generation BSS/OSS must support those options and manage the various associated account balances. Payment options will include standard prepay and postpay models along with hybrid models (for example, advance pay). Different payment models could be applied to separate accounts for the same customer (college child vs. parent) or to different balances for the same account (content vs. voice). Multiple payment vehicles (handset, internet, ATM, etc.) must also exist to make it convenient for customers to pay or update balances in a secure manner.

Real-Time Processing and Network Integration

Real-time functions that have historically been associated only with prepay systems will be a standard part of next-generation BSS/OSS. More functionality will be integrated with the CSP or partner's network. This process will require mediation, authentication, authorization, rating, and possibly settlements to be performed more often in a real-time or near-real-time mode. Inquiry and update of account limits and balances by customers or network applications must also be managed in real time.

Increased Customer Control

Customers want more control over management, provisioning, and reporting of their accounts. A robust customer self-care capability is an essential part of the next-generation

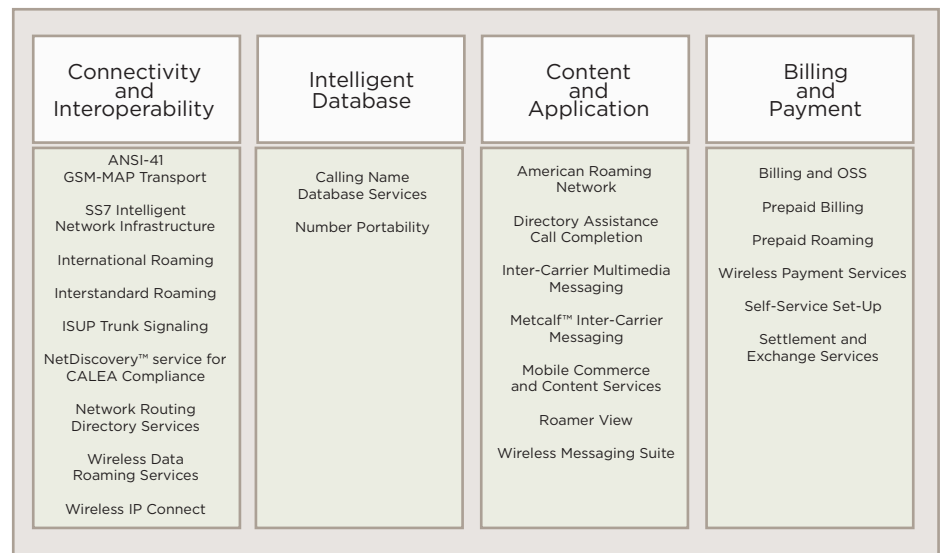
BSS/OSS. Web-based, intuitive access to real-time information needs to be provided. Where possible, customers should be able to add or change services, manage/modify their minute or content balances, and review their billing information. Real-time access to current usage balances is required. A strong customer self-care capability not only allows customers to feel in control of their accounts but also significantly reduces CSP customer-service costs.

The VeriSign IC³ Strategy

CSPs are in need of a new breed of partner to help them thrive in the dynamic new era of communications—a partner that can deliver a set of capabilities and expertise to carriers, along with supporting services that help monitor, bill, and report on them. To address this need, VeriSign has identified a new model of IC³ Services. This model articulates the VeriSign strategy of amassing the various services needed to deliver a complete, next-generation, communications-support solution enabling carriers to maximize their existing investments and take advantage of new revenue opportunities in content, commerce, and communications.

To date, VeriSign has assembled a broad product portfolio of communication services, easily the industry’s most comprehensive solution set. According to the Yankee Group (2004), “VeriSign has emerged as the best-positioned mobile-telecommunications service provider in the industry,” offering solutions for mobile messaging, mobile content, settlement, prepay and postpay billing, and secure payments. VeriSign IC³ Services include Connectivity and Interoperability, Intelligent Database, Content and Application, and Billing and Payment.

Figure 4: VeriSign Wireless IC³ Services



“The data world has created one of the most significant challenges in the billing space. A data transaction could represent many different types of traffic—a video conference, for example, or a song clip—and all should be billed differently.”

America's Network
November 1, 2003

+ Connectivity and Interoperability Services

VeriSign operates the largest, private Signaling System 7 (SS7) network in the world, with 15 STP pairs and over 300 access points. A leader in intelligent networks, signaling, and database services, VeriSign is a trusted provider of innovative communication services that support reliable and secure interconnection, interoperability, roaming, and messaging.

+ Intelligent Database Services

VeriSign delivers the high-quality, reliable database services that customers demand, and the competitive edge carriers need. A pioneer in intelligent networks, VeriSign offers solutions that make connections seamless and reliable by supporting the convergence of IP and the public switched telephone network (PSTN) while offering flexibility for changing standards.

+ Content and Application Services

VeriSign's unmatched expertise in Internet, security, and telecommunications helps carriers retain customers and increase revenue with exciting new services and seamless interoperability. CSPs can save capital expense and quickly implement the latest services such as multimedia messaging, secure mobile messaging, and seamless Short Message Service (SMS).

+ Billing and Payment Services

As delivery of services and content becomes more complex, VeriSign® Billing and Payment Services help improve the accuracy and timeliness of settlements, billing, and receipts. VeriSign offers comprehensive, integrated billing and payment solutions that provide intelligence for effectively operating their business.

VeriSign Billing and OSS

In the next-generation environment, as evolving technology enables rapid advances in the communication of voice and data services, providers will differentiate themselves and build market share on the delivery of superior, end-user products and services. As a result, carriers will need a billing solution that can quickly adapt to changing market conditions, creating an order-to-cash environment supporting the delivery of data-rich content and mobile commerce.

+ System Overview

VeriSign Billing and OSS is an integrated business- and operations-support solution that enables the wireless delivery of next-generation communication, commerce, and content services. Leveraging VeriSign's unmatched portfolio of IC³ Services, VeriSign Billing and OSS offers a seamless order-to-cash environment at a low total cost of ownership (TCO), increasing speed of product delivery and enhancing the customer experience. VeriSign Billing and OSS consists of six functional components, each addressing a key stage in the customer lifecycle from point of sale to customer care.

Figure 5: VeriSign Billing and OSS



Content and Applications

The Content and Applications component is a comprehensive content and partner-management solution enabling providers to quickly bring new products and services to market to maintain a differentiating, product/service portfolio that attracts and retains subscribers. Key features and benefits include:

- **Ready-to-Sell Content**—Integrated with the VeriSign® Mobile Content solution to deliver a one-stop-shop mobile content delivery and management solution allowing carriers to immediately begin generating new revenue by selling content to their subscribers through a content library of up to 200,000 items of popular music, graphics, games, and applications.
- **Content Provider Management**—Integrated with the VeriSign Mobile Content solution, which provides access to over 400 content providers, for which VeriSign absorbs the responsibility and complexity of managing the mobile-content value chain, including the partnership (rights management, copyright clearing, revenue settlement, etc.).
- **Bundling and Promotions**—Allows carriers to capitalize on their business knowledge and on consumer trends by bundling products to create attractive product offerings and promotions.
- **Calling Name and Storage**—Integrated with VeriSign® Calling Name Services allowing carriers to generate new revenue streams by providing their subscribers with Caller ID to their wireless device and allowing VeriSign to house subscriber data in its Calling Name database.

Provisioning

The Provisioning component is a comprehensive order-management, inventory-management, and service-activation solution, enabling providers to quickly activate new products and services across a variety of network elements and platforms. Key features and benefits include:

- **Web-based POS interface**—User-friendly interface ensures ease of use so that every step of the point-of sale (POS) and start-of-service process, from initial entry of customer information to the creation of the receipt, is quickly executed.
- **Electronic Signature**—Integrated into the POS application—electronic signature capture and storage on contracts and receipts.

- **Real-time**—Vast library of existing application-programming interfaces (APIs) provide real-time direct communication with a multitude of network elements for real-time provisioning, order, and inventory management, expediting the activation of services and helping to ensure the accuracy of account and inventory information.
- **Supports Current and Emerging Technologies**—Provisions AMPS, TDMA, CDMA, GSM, UMTS, EDGE, 1xRTT, SMS, MMS, OTA, WAP, AAA Radius, and content platforms (for example, Jamster! and BREW).
- **Help Functions**—Service-provisioning help functions are available to end users to provide network access for inquiry and trouble shooting.
- **Monitoring**—Automated monitoring provides real-time visibility of all service provisioning for the entire network infrastructure. Each and every transaction can be viewed in real time for total visibility of all service provisioning.
- **Agent Activations**—Supports providers' ability to allow third-party vendors to sell services on their behalf.
- **Wireless Number Portability**—Integrated with the VeriSign wireless-number-portability (WPN) solution to streamline the FCC-mandated WNP process.

Mediation Component

The Mediation component is a comprehensive network-management solution enabling event mediation across a variety of network elements and platforms, optimizing system performance and revenue retention. Key features and benefits include:

- **Single Event Record**—Captures and converts multiformat usage data (CDRs, SDRs, AMA, CIBER/TAP, IXC, and MDRs) into a unified format, creating a single, universal data record (UDR) for maximum rating flexibility.
- **Supports Current and Emerging Technologies**—Mediates AMPS, TDMA, CDMA, GSM, UMTS, EDGE, 1xRTT, SMS, MMS, OTA, WAP, AAA Radius, and content platforms (for example, Jamster! and BREW).
- **Roaming**—Supports advanced roaming requirements for roaming revenue assurance—accepts, processes, edits, and validates all versions of TAP and CIBER.
- **System Management**—Complete system monitoring, revenue assurance, security, and error/fraud management to maximize operational efficiency and minimize revenue leakage.

Pricing and Billing

The Pricing and Billing component is a comprehensive, rules-based rating and invoicing system enabling providers to perform event-based rating printed on a converged bill. Key features and benefits include:

- **Innovative Rate Plans**—Event-based rating on multiple definitions (duration, quantity, type, locations, etc.) allows carriers to create innovative rate plans and pricing structures.
- **Rules-based**—Rules-based system logic creates a highly flexible system in which new rules can be created to achieve desired functionality and swift speed to market and ensuring adaptability to rapidly changing technologies and business needs.
- **Supports Current and Emerging Technologies**—Rates voice, data, and other content-based transactions for a variety of technologies.
- **Consolidated Bill**—Supports a multipartner, converged, and customizable bill produced in hard copy or electronic format and for Advance Pay subscribers via SMS.

- **Core Functionality to Support Additional Verticals**—Core rating and database functionality to accommodate integration of wireline, cable, and broadband industries.
- **Bill Cycle Independence**—Ability to run and post bill cycles across markets and customer types and to complete billing “test runs” to test the billing cycle prior to the actual bill run, enhancing invoicing accuracy.

Secure Payments

The Secure Payments component is a comprehensive payment solution enabling multiple payment models and methods, as well as secure commerce, protecting subscriber payment information and allowing service providers to quickly receive payment for their service offerings. Key features and benefits include:

- **Converged Payment Models**—Integrated with VeriSign prepaid billing service, SmartPaySM Service, offering converged prepay, postpay, and advance-pay functionality via a single customer interface, allowing carriers to effectively define and develop targeted marketing plans for maximum payment flexibility.
- **Multiple Payment Methods**—Accepts cash, credit card, debit card, bank draft, gift certificate, gift card, and electronic check.
- **Secure Commerce**—Integrated with VeriSign[®] Payment Services, allowing subscribers at the point of sale to securely pay via credit card or electronic check, protecting subscriber and payment information by handling real-time payment authentication, authorization, and charging.
- **Automated Collections Procedures**—To effectively gather payments, collect on delinquent accounts, and accurately handle revenue flow.

Customer Care

The Customer Care component is a comprehensive customer-management solution, enabling proactive and efficient account management and customer care. Key features and benefits include:

- **Web-based Interface**—User-friendly, Web-based graphical user interface provides ease of use by making subscriber information readily available to system users and subscribers, improving carrier/subscriber interaction and enhancing issue resolution.
- **Account Management**—Complete account maintenance, service-order management, and self-care.
- **Self-care**—Empowers subscribers to manage their account, answer questions, and resolve issues on their own, improving customer satisfaction and issue resolution and reducing call center expense.
- **Secure EBPP**—Allows subscribers to view and, via integration with VeriSign Payment Services, securely pay their bill online, reducing fulfillment costs and increasing customer satisfaction.

Architecture

VeriSign Billing and OSS is built on a modern architecture that enables the features and functions of the individual application components. A rules-driven approach lowers the cost of maintenance and puts the power of the system in the hands of the business users, while

the open architecture allows ease of integration with other VeriSign components and external third-party systems. Key features and benefits include:

- **N-Tier Architecture**—Provides a highly flexible, scalable, and secure software solution that quickly adapts to new business needs, supporting the functional requirements of today but designed for the changing needs of tomorrow. Each tier operates independently, on separate security protocols, thereby impeding system breach and strengthening system integrity.
- **Open System Standards**—Facilitates systemwide communication and information transfer between components. Requisite data is exchanged using eXtensible Markup Language (XML) formatted messages via APIs. These are deployed as plug-and-play interfaces, enabling multiple components to participate in a single transaction, allowing for transparent, real-time, system interaction.
- **Business Rules-Driven**—Provides extreme flexibility and ensures adaptability to rapidly changing technologies, customization to business-specific needs, and the quick introduction of products, services, and system modifications. The rules-driven approach allows business users to control not only system parameters and values, but also when and how processes are used during information flow in the system.

+ Unique Value Proposition

Integrated Solution—Increases Value and Reduces Cost and Complexity Offered at a low TCO, VeriSign Billing and OSS seamlessly interoperates with VeriSign’s unmatched portfolio of IC³ Services, creating a unique value proposition to increase value for providers while removing the complexity of managing multiple vendor relationships. VeriSign Billing and OSS is integrated with:

- **VeriSign® Prepay Services**—for converged prepay/postpay functionality
- **VeriSign Mobile Content Services**—for original content and content provider Management
- **VeriSign Calling Name Services**—for wireless Caller ID services
- **VeriSign Payment Services**—for secure electronic payments
- **VeriSign® Wireless Number Portability (WNP)**—for the FCC mandated WNP process

Pay As You Grow

VeriSign Billing and OSS is available as an on-site or hosted service-bureau solution with flexible payment terms, such as per subscriber pricing, to help offset large capital expenditures while aligning costs with revenue growth.

Leading Billing Provider—An Experienced Partner

VeriSign Billing and OSS is the preferred solution for many U.S. carriers, and has proven expertise with start-ups and mobile-virtual-network-operators (MVNOs), as evidenced by the tremendous success of its Advance Pay providers, among the fastest-growing carriers in the United States. Every day, VeriSign’s product portfolio enables more than 14 billion internet interactions, 3 billion telephony interactions, and \$100 million in e-commerce revenue as well as provides the services that help over 3,000 enterprises and over 450,000 Web sites operate securely, reliably, and efficiently.

VeriSign—A Strong Partner

- One of the largest and most experienced billing and payments vendors in the world
- One of the largest independent integrators of roaming records in the United States, processing nearly one billion records annually

- Strongest consumer brand among billing providers—83 percent of consumers recognize the VeriSign brand, and the majority of consumers associate it with trust and security (TNS Study, July 2004), encouraging subscribers to transact and utilize low-cost online channels
- “VeriSign has emerged as the best positioned mobile-telecommunications service provider in the industry” (Yankee Group, 2004)
- Awarded 2005 Frost and Sullivan Telecommunications Provider of the Year Award

About VeriSign

VeriSign (NASDAQ: VRSN), delivers Intelligent Infrastructure Services that make the Internet and telecommunications networks more intelligent, reliable, and secure. Every day VeriSign helps thousands of businesses and millions of consumers connect, communicate, and transact with confidence. VeriSign services create a trusted environment through three core offerings: security services, communications services, and naming and directory services. Every VeriSign solution is powered by an unmatched global infrastructure that manages billions of daily network connections and transactions.

+ About VeriSign® Communications Services

VeriSign® Communications Services offers a unique, intelligent solution strategy for communications, commerce, and content known as IC³. IC³ is a comprehensive service portfolio helping to solve today's business challenges of cost, complexity, and compliance across all service-provider segments. VeriSign IC³ Services include connectivity and interoperability services, intelligent-database services, content and application services, and billing and payment services. Additionally, VeriSign is uniquely positioned to deliver the next wave of global services that support innovation, interoperability, and efficiency in the emerging communications markets for premium messaging and content, mobile commerce, and voice-over-IP (VoIP).

+ About VeriSign Billing

VeriSign operates Intelligent Infrastructure Services that enable businesses and individuals to find, connect, secure, and transact across today's complex global networks. VeriSign billing and payment solutions provide unique, order-to-cash capabilities for communication service providers. The VeriSign infrastructure enables more than 14 billion internet interactions, 3 billion telephony interactions, and \$100 million in e-commerce every day and provides the services that help over 3,000 enterprises and 450,000 Web sites operate securely, reliably, and efficiently.

VeriSign is one of the largest billing vendors in the world and one of the largest integrators of roaming records in the United States. VeriSign adheres to the Advance Pay billing model, one of the fastest-growing carrier models in the United States. Leveraging its integration with VeriSign Payment Services, VeriSign Billing has the strongest consumer brand image of any billing vendor in the world—83 percent of online shoppers are familiar with the VeriSign Secured™ Seal, more than any other mark; and the VeriSign Secured Seal rates best overall worldwide among endorsement programs in terms of consumer trust (60 percent); consumers indicate they believe the seal represents security, protection, verification, and reputation (TNS Study, July 2004).

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