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# Achieving Business Transformation Through Application Service Providers



- Section 1: How to Keep IT Moving at the Speed of Business**
- Section 2: Application Service Providers**
- Removing the Complexity and Cost in Today's Computing Environments
  - What is an ASP?
- Section 3: Understanding the Business Need for ASPs – Extending the Reach of Applications**
- Reach            ■ Predictability
  - Speed            ■ Cost
- Section 4: The ASP Value Proposition – Mind your Business, Not your IT**
- Benefits of ASP**
- Independence   ■ Predictability
  - Reach            ■ Cost
  - Speed
- Who Stands to Benefit from ASP?**
- Large Enterprises
  - Small to Medium-Sized Enterprises
  - Consumers
- Section 5: Real World Solutions**
- New IT Flexibility
  - Faster Time to Impact
  - Increased Revenue
- Section 6: Understanding the ASP Value Chain**
- Connectivity: Network Service Providers
  - Delivery: Application Service Providers
  - Expertise: Application Specialists
- Section 7: Enabling the ASP Market – Citrix: The Cornerstone Technology for Application Hosting**
- What is Server-Based Computing?  
The Citrix Advantage
- Top-line Growth
  - Bottom-line Profitability
  - Maximum Brand Impact
- Section 8: Server-based Computing Key Features and Benefits**
- Broadest Market Reach for Top-Line Growth
  - Enterprise-Scale Management for Bottom-Line Profitability
  - Seamless User Experience for Maximum Brand Impact
  - Server-based Computing and the Internet: You can be Thin *and* Rich
- Section 9: The Future of ASP – Crossing the Digital Divide**
- In the Home   ■ In the Hands of Mobile Workers
  - In Schools     ■ In your Car
- Section 10: When to Consider Application Outsourcing**
- Type of Organization
  - Type of Application
  - Type of User

## How to Keep IT Moving at the Speed of Business

Information technology (IT) has become the strategic weapon of market leaders everywhere for supporting, influencing and transforming the way companies do business. In today's Internet-driven economy, business success is tied directly to the speed with which new business initiatives can be launched against an existing IT infrastructure. Today's business imperative can be stated:

**Time to launch a business-driven IT initiative = time to build the platform + time to build the application + the time to deploy the application**

While the above equation seems simplistic in nature, in reality, resource, technology and manpower gaps often exist to prevent execution against it. Organizations face tremendous challenges in aligning IT infrastructures in support of new business initiatives: including perpetual technology churn, increasing computing diversity, never-ending capital and resource constraints, and continual risks surrounding IT projects. The complexity and cost of delivering business-critical applications to today's worker at the right times and in the right places have simply become overwhelming. As a result, organizations often pay the opportunity cost of delaying or not taking advantage of new business opportunities because of IT infrastructure limitations.

The key to successful use of information technology as a competitive weapon is a flexible, adaptable infrastructure that empowers an organization to move at the speed of business, before the competition. A new breed of information technology service provider has arisen to address the dissonance that exists between business imperatives and IT realities in today's global business landscape.

Application Service Providers (ASPs) host software from centralized data centers, renting access over dedicated, high-speed networks or the Internet. Representing a new competitive weapon in information technology, application service providers maximize time-to-market on new business innovations through scalable IT resources and infrastructure.

Driven by market necessity, ASPs make world-class applications and IT best practices accessible and affordable for organizations of all sizes. Application service providers offer organizations "Digital Independence™" — the ability to leverage virtually everything in their computing environments to reach more users, with more applications, in more locations at record speeds. As a result, application service providers can minimize the risks, costs and complexities of implementing new business initiatives, while increasing an organization's flexibility to quickly capitalize on changing business conditions.

The ASP market represents a convergence of IT and telecommunications in a way not seen before. While the availability of static data across the Internet found its being through the World Wide Web, the deployment of powerful applications and interactive services across wide area telecom networks is a milestone development with far-reaching implications.



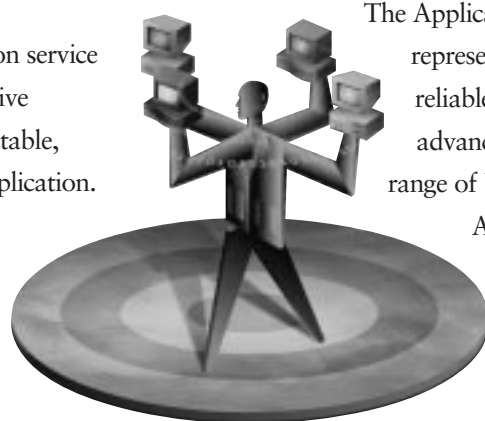
## Application Service Providers

### Removing the Complexity and Cost in Today's Computing Environments

What if telephone systems were as complicated as today's computing environments? Think of how frustrating it would be if requesting a simple new service, such as call waiting, required the phone company to send a technician to your home to install new software on all your phones. Some of your phones might require more memory, and others might have to be replaced with a newer model. Imagine the technician spending hours to reconfigure each phone for optimum performance, only to conclude that you really need a complete wiring upgrade for the system to work properly.

It sounds ridiculous. Yet thousands of organizations suffer through this procedure every day when trying to install and manage the applications their users require to be productive and competitive. And countless others are effectively denied access to the business advantages of enterprise applications because they cannot afford the software, the computing infrastructure, or IT talent to run them.

These are the very reasons application service providers (ASPs) have emerged: to give organizations of any size fast, predictable, affordable access to virtually any application. As a result, organizations are free to focus on the speed and competitiveness of their operations, unencumbered by hardware, software, database, network and peopleware



constraints. Under the ASP computing model, even the smallest, most resource-constrained companies can access best-of-breed technology solutions to level the competitive playing field in today's global, networked economy. Fundamentally, the ASP movement is about business transformation.

#### What is an ASP?

Enterprise acceptance of server-based computing, along with mass adoption of the Internet, increases in server capacity, and broad availability of cost-effective bandwidth are fueling the emergence of the application service provider market. Industry analyst group Forrester Research projects the application hosting market will reach \$6.4 billion by 2001, creating new opportunities for suppliers and end-user organizations alike.

According to the ASP Industry Consortium, an independent international advocacy group dedicated to fostering greater understanding of and guidelines for the fast-emerging ASP segment of the computer industry, an ASP is defined as:

*“An Application Service Provider (ASP) manages and delivers application capabilities to multiple entities from a data center across a wide area network.”*

The Application Service Provider community represents a new global industry devoted to reliable, predictable and efficient delivery of advanced application services to a broad range of businesses and individual consumers.

Application services range from enterprise resource planning (ERP) systems, customer relationship management solutions and vertical applications, to groupware, personal

productivity suites, and full desktop and printing services. Through application hosting, application service providers remove the burden of day-to-day IT management by assuming total responsibility for application roll-out, updates and on-going maintenance and support. As a result, organizations are free to focus on core business objectives, rather than arduous IT issues.

There are many types of application service providers. Some focus on augmenting in-house enterprise IT professionals with best practices, such as document management; while others provide enterprise-class software services to small- and medium-sized organizations; still other ASPs offer specialist software packages to vertical markets, such as education or healthcare. Typically, the application service provider charges the end-user organization a fixed, monthly fee based on application usage and services rendered, such as additional requirements in hardware, service and support, maintenance and upgrades.

### **Extending the reach of applications to new markets in new ways**

Application service providers represent a model for extending the reach of applications to new markets in new ways by removing the cost and complexity barriers that prevent more than 95 percent of the world's population from computing today. The future holds the promise for application services that are as ubiquitous, easy-to-use and affordable as the telephone. New applications can be "turned on" as conveniently as call forwarding, call waiting and caller ID services. And in a connected world of application services, the potential to extend applications to every consumer and business is limitless.

## Understanding the Business Need for ASPs

### Extending the Reach of Applications

Of all the resources available to the business community, applications are the most critical. Applications enable organizations to generate revenue, offer new and better services, increase levels of user knowledge, and enhance overall productivity. Organizations that can extend the reach of business applications, whenever and wherever they're needed, and however they may be needed — from wireless to the web — are developing a strategic advantage in the networked economy. Applications make it easier for organizations to:

- Generate revenue through new sales vehicles such as e-commerce and customer resource management (CRM), to customer billing and sales force automation applications.
- Provide better customer service through on-line ordering/tracking and customer self-service, to call centers, order entry and help desk applications.
- Enhance organizational knowledge through intranets, email and groupware that streamline communications and collaboration, to data warehousing, data mining and decision support solutions.
- Increase user productivity through personal productivity suites and contact management, to enterprise-class ERP and supply chain optimization applications.

However, there are many internal and external barriers that prevent organizations from fully leveraging important business applications, including reach, speed, predictability and cost.

- **Reach.** Organizations today compete in more places and countries around the world than ever before, serving an increasingly extended workforce that requires 7x24 access to the same set of applications as available at headquarters. Multiple device types, operating platforms and connectivity types must be supported. Additionally, IT organizations are scrambling to meet strategic business mandates and Internet imperatives including e-commerce, customer care and supply chain integration. To conduct business faster, with greater convenience and cost-effectiveness, organizations must provide customers, partners and vendors with reliable, high-performance, secure access to business critical applications.
- **Speed.** The time to deploy an application determines just how quickly the organization can benefit from it. Unfortunately, large and complex implementations can take months or years to complete, especially when IT professionals are in short supply, users are located around the world, and disparate new business units must be brought on-line. Organizations are finding they simply cannot upgrade infrastructures or adopt technology fast enough to keep pace with today's technology churn. Furthermore, such projects consume already limited IT resources that could be used to pursue more strategic business goals.

- **Predictability.** Uncertainty is a hallmark of IT projects: as many as 70 percent are not completed on-time, on-budget, or at all. Applications, particularly those that are business-critical, must reliably perform the function for which they are needed, to the level of service that is required. However, shortened technology release cycles and overnight obsolescence often mean new business applications are incapable of running within an existing technology infrastructure. Additionally, mission-critical applications encounter frequent uptime, security and performance challenges, which can mean downtime, lost customers and millions of dollars.
- **Cost.** The ability to run the latest applications can require significant capital expenditures to whole-scale upgrades in hardware and networks, as well as extensive application development costs. According to Forrester Research:

*“When implementing new packaged applications, companies rely on outside help, consultants and system integrators, spending roughly \$17 billion on these services in 1997. But when it comes to operating and maintaining the apps over their lifetime, most companies take on the ongoing management and support themselves - at an annual cost and resource commitment equaling 75% of that implementation.”*

A study conducted by independent consulting organization The Tolly Group revealed that the initial and recurring costs of providing applications can exceed \$10,000 per-user, per-year. Hardware costs comprise less than 15 percent of this total. The remaining 85 percent include costs of network and communications infrastructure; the cost of personnel required to develop or acquire, maintain and update applications; and on-going technical support.



## The ASP Value Proposition

### Mind Your Business, Not Your IT

To answer the computing challenges of reach, speed, predictability and cost, as well as business imperatives such as Y2K-compliance, “Webification” initiatives, and increasing emphasis on customer care,

organizations of all sizes are turning to application service providers for assistance.

Specifically, application service providers can deliver the following business benefits:



- **Independence.** Application service providers can reduce the amount of time, money and attention spent on information technology, allowing organizations to channel those resources back into their core businesses and to focus on more strategic IT goals to deliver a competitive advantage.
- **Reach.** Application service providers can level the competitive playing field by giving organizations that have limited IT staff, budget or infrastructure access to big-ticket applications and IT best practices at low cost to deliver greater organizational responsiveness.
- **Speed.** Application service providers enable IT to move at the speed of business, unencumbered by hardware, software, network and people constraints. As a result, organizations can focus on the speed and competitiveness of their operations for faster time-to-impact. The ASP model is well suited to rapid scaling; applications are quickly pushed out to new users as needed, giving organizations the flexibility to expand operations without waiting for their IT infrastructure to catch up. Organizations can simply “turn on” new applications as they are needed.

- **Predictability.** Application service providers offer freedom from technology churn, while supplying more predictable and reliable IT operations than many organizations can achieve internally. Today, ASPs are delivering service level agreements for 99.7% application and system uptime, helping organizations avoid the opportunity costs of system downtime.
- **Cost.** Application service providers can deliver the lowest total cost of application ownership possible. According to The Gartner Group, application outsourcing can reduce TCO by 50 percent or more. ASPs act as technology aggregators, allowing organizations to capitalize on economies-of-scale of a shared data center, network and management services. ASPs also provide cost-avoidance, freeing organizations from capital investments, upgrade and ongoing management costs.

### Who Stands to Benefit from ASP?

Application service providers offer a fast, cost-effective and reliable way to provide more applications, to more people, in more locations. Organizations of all sizes and individual consumers can benefit from this new computing paradigm:

- **Large Enterprises.** Application service providers can augment in-house IT resources by relieving them of routine maintenance work, so they are free to focus on more strategic IT initiatives, such as e-commerce, customer care or supply chain integration. Additionally, ASPs can make it easier for global, distributed organizations to provide consistent application services to branch offices, mobile workers and telecommuters, while bringing disparate acquisitions on-line faster across diverse platforms and networks for maximum impact.



- **Small- and Medium-Sized Enterprises.** Application service providers increase the competitiveness of risk-adverse and resource-constrained SMEs who could not otherwise afford the high-cost, technical staff training and support for initial rollout and on-going maintenance of enterprise technologies, such as ERP and HR. By renting world-class applications rather than purchasing low-cost alternatives, the ASP computing model gives these organizations an edge. Additionally, ASPs offer an immediate solution for Y2K-compliance. According to International Data Corporation's Year 2000 survey, nearly one-third of U.S. companies with revenues of less than \$100 million have not evaluated the Y2K problem in their organizations.
- **Consumers.** Application service providers promise to widen the reach of computing to people who have never before used it. Consumers who want software access without the associated cost and maintenance challenges of personal computing can contract with an ASP, just as they would sign-up for Internet access or cable programming, and gain access to the latest applications using modern information appliances like PDAs, screenphones and set-top TV boxes.



## Real World Solutions

### New IT Flexibility

A few years ago, Atlanta-based Premiere Technologies, a \$444 million communications services provider, acquired more than 100 companies throughout the world.

Its goal: to become a leading provider of value-added communications services, including conference calling, messaging and Internet-based services.

Central to its aggressive growth strategy, Premiere Technologies implemented a PeopleSoft ERP system – a soup-to-nuts software suite that would provide information vital for running nearly all aspects of Premiere’s business. The ERP system would integrate Premiere’s business processes and far-flung offices. Employees would then be able to share information company-wide, resulting in cost efficiencies, productivity growth and intelligence gains.



ERP systems are notoriously difficult to implement and run. As a result, Premiere Technologies decided to outsource the day-to-day management of its ERP system to Atlanta-based TransChannel Inc., whose Internet Enabled ERP (iE2) outsourcing solution delivers comprehensive PeopleSoft support, maintenance and deployment for a fixed monthly fee.



Within two months’ time, TransChannel brought the entire PeopleSoft ERP suite

on-line (versus an estimated 18 months for internal deployment). Premiere Technologies also saved millions of dollars through capital cost-avoidance by not having

to purchase the platform infrastructure and upgrade all the client hardware necessary for rolling out the ERP system internally. The bottom-line result: enormous gains in efficiency, productivity, company-wide communication and worker satisfaction through increased application reach, reliability and flexibility.

### Faster Time to Impact

BG Affiliates, a Boston-based private equity investment firm, makes its living acquiring, managing and growing mid-market companies with promising futures. Currently, BG Affiliates owns six companies in industries ranging from basic manufacturing to business and financial services.

How does BG Affiliates transform a promising mid-market company into a thriving concern with a booming market valuation? It often calls upon application service provider (ASP) Panoptic Technology Services. Under the ASP computing model, BG Affiliates provides its portfolio companies with cutting-edge capabilities rarely seen in mid-market companies.

As a result, BG Affiliates is able to quickly provide a uniform, cost-effective IT service throughout the new acquisition to drive top-line growth and fuel the investment return that stakeholders seek. Case in point: Berkshire Mortgage Finance, a quickly growing commercial real estate lender, mortgage-banking firm and largest Fannie Mae DUS lender in the U.S.





Panoptic hosts Berkshire Mortgage's enterprise financial and human resources applications as well as its loan servicing application. Typically, a mid-sized company like Berkshire Mortgage would find high-end enterprise applications too costly to run. The company would have to invest millions of dollars in hardware, software and IT staff, then mount a complex, expensive and time-consuming implementation.

With the ASP computing model, though, all users can enjoy the full functionality of these world-class applications without the expense of a complex network implementation. BG Affiliates estimates total cost savings of 50 percent or more for a single, company-wide implementation. However, the benefits of the ASP computing model don't end with cost savings.

Berkshire Mortgage is in an aggressive state of expansion, seeking to add new branch locations. Currently, the company maintains ten offices from Boston to Seattle. When a new office comes on-line, Berkshire Mortgage can quickly get it up and running in less than a week's time for faster time-to-impact.

### **Increased Revenue**

Founded in Canada in 1995, Enerline Restorations, Inc. is a dynamic business on the move, delivering innovative solutions and products to the pipeline industry. Major oil and gas producers, water utilities, and municipalities rely on Enerline Restorations for its fast, cost-effective method of lining steel pipes to protect them from corrosion.

Through a simple strategy, Enerline Restorations is achieving triple-digit growth and rapid expansion, most recently opening its doors to new business opportunities with Canadian and international clients as far and wide

as Mexico, France and Nigeria. Enerline's strategy: to focus on its unique core competencies in pipeline technology and services, while outsourcing its information technology requirements to application service provider (ASP) FutureLink.



Before signing on with FutureLink's ASP service, Enerline Restorations had only one computer in its Calgary office that was shared between all staff members. Due to its lagging IT infrastructure, even basic tasks, such as generating inventory reports or checking customer delivery schedules, were slow and cumbersome. As a result, Enerline faced serious time-to-market challenges brought on by the lack of a centralized information infrastructure that was easily accessible by all employees.

In order to sustain its top-line growth, it became very clear that the company either had to make a significant capital investment in desktop and server hardware and software and hire a dedicated staff for IT deployment and support, or look for outside help.

The ASP computing model helped Enerline solve a number of tough business problems: the most important being the improvement to its competitive market position by allowing it to take on new, larger and more geographically dispersed customers than was possible before.

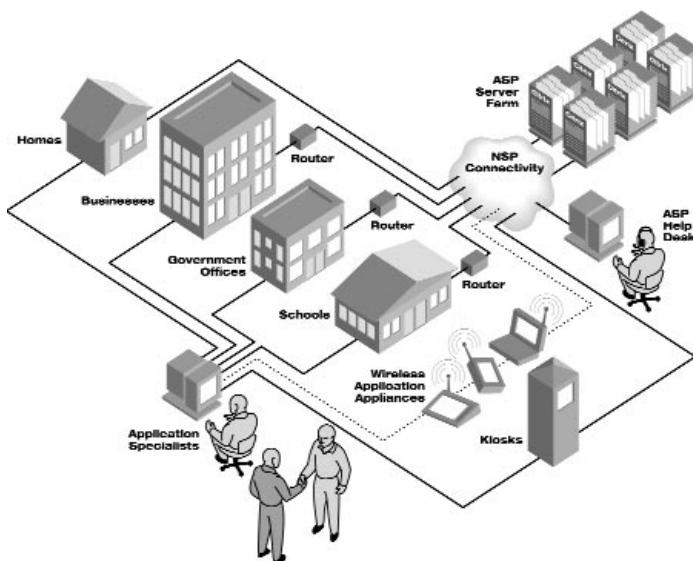
Enerline was recently awarded a project in Nigeria that begins in the year 2000, and the company believes this is only the beginning. New opportunities have surfaced that will take the company into important new markets all over the world. "These opportunities wouldn't have been available to us without following the ASP approach — we just don't have the time, money or resources needed to keep pace with today's technology churn."

## Understanding the ASP Value Chain

### Delivering a Better Business Solution Through Partnering and Core Competencies

Application service providers are emerging as an active, on-line applications channel that is altering the technology industry's commercial practices for selling software products and services. The application hosting model combines an ASP data center, the bandwidth of a Network Service Provider (NSP), the application-specific expertise of consultants, value-added resellers, system integrators and independent software vendors (ISVs) with enabling infrastructure technologies, such as Citrix® MetaFrame™ application server software, to extend best-of-breed solutions to the end-customer.

Because there are many starting points from which to enter this market, a wide range of companies are building full application hosting solutions by enlisting partners to complement their core competencies. An organization may choose to play one, two or all three roles, depending upon its core competencies, business objectives and capital resources.



### Connectivity: Network Service Providers

Network service providers are comprised of telecommunications companies and data carriers, wireless-communications service providers, Internet service providers and cable operators offering high-speed Internet access. These companies provide customers with bandwidth and network connectivity, ensure maximum network availability and performance, and create multiple points of presence for easy access.

For NSPs, the opportunities are considerable because application hosting creates a strategic new use for the network. It also can translate into a new revenue stream because many ASPs are co-locating their facilities with NSPs to maximize bandwidth, scalability and performance.

### Delivery: Application Service Providers

Application Service Providers include a new generation of companies emerging to develop and manage high-availability data centers that deliver application hosting services. These data centers are provisioned with enabling application serving technologies such as Citrix MetaFrame, as well as Citrix Load Balancing™, Citrix Installation Management and Citrix Resource Management Services. ASPs provide vital business-support functions such as security, service level management, backup services, customer service centers, help desks and customer billing.

Since this business model is based on monthly recurring charges, ASPs realize a predictable, compounding revenue stream as their customer base grows. And ASPs can partner with application specialists to offer a new delivery channel for application solutions, with network connectivity provided through an NSP.

**Expertise: Application Specialists**

Application specialists are content experts who include consultants, independent software vendors (ISVs), systems integrators and value-added resellers.

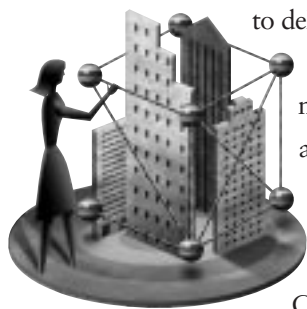
They provide application development, customization or consulting services for business processes, change management and implementation. Application specialists leverage their expertise to sell and implement ERP, customer billing, customer relationship management, e-commerce, patient management and a myriad of other applications. They develop and maintain relationships with end-customers and may also implement and maintain on-premise elements of the solution, such as terminals, routers and local area networks.

By partnering with ASPs, application specialists can capture a recurring monthly payment for each new customer. And they can deliver services today, without having to add overhead or invest in technology infrastructure. These companies can spend more time on value-added services with shorter solution sales-cycles. And they can penetrate new markets, providing best-of-breed application solutions for small and medium-sized customers.

## Enabling the ASP Market

### Citrix: The Cornerstone Technology for Application Hosting

The acceptance of server-based technologies has helped propel the development of the application service provider market. In the last decade, server-based computing has led the return to centralized computing, as provided by the mainframe model, without sacrificing the availability of rich, graphical applications introduced by the PC era. Server-based computing has successfully overcome many of the bandwidth and management limitations that have historically caused high expense and degradation in providing extensive connectivity over wide area networks. It has also proven

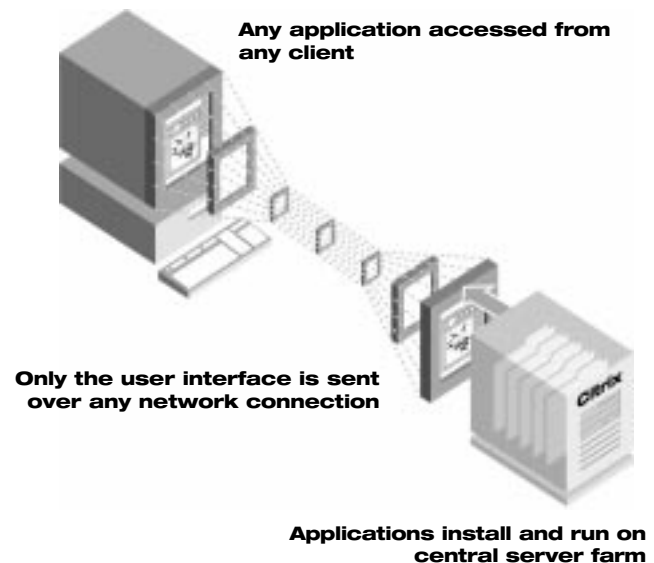


to deliver a robust server-side infrastructure, optimized for managed application delivery and Quality of Service (QoS) in mission-critical computing environments.

Citrix is the pioneer and market leader in server-based computing. For over a decade, Citrix has been the trusted name in application server software. Thousands of Citrix customers, including 98 of the Fortune™ 100 companies, and 80% of the Fortune 500, use Citrix software products to achieve “digital independence” — the ability to leverage virtually everything in their computing environments to reach more users, with more applications, in more locations at record speeds. Citrix software has become a de facto standard in enterprise computing, supporting over 15 million users. Today, Citrix application server solutions are being broadly adopted as cornerstone enabling technology for the ASP market.

### What is Server-based Computing?

Server-based computing enables applications to be deployed, managed and supported 100% from a server. It incorporates a multi-user operating system that allows multiple, concurrent users to log on and run applications simultaneously in separate, protected sessions on a single server. Server-based computing also utilizes a remote presentation services protocol, such as Citrix Independent Computing Architecture (ICA®), which is capable of processing an application’s user interface independently from its logic. Citrix ICA centralizes application processing on the server and sends only keystrokes, mouse clicks and screen updates across the network, dramatically reducing required bandwidth to approximately 13 kilobytes-per-second. As its name indicates, server-based computing also centralizes all system, application and user management on the server for greater management ease and lower total cost of application ownership.



### The Citrix Advantage

Competitive advantage in the application hosting market will be won or lost by an ASP's ability to meet demand for the broadest range of applications that are both "thin" for deployability and "rich" for usability. And with the performance and reliability customers expect — all at the lowest possible cost.

While other approaches for deploying, managing and supporting business-critical applications across the extended enterprise have been introduced, only the server-based computing model developed and refined by Citrix over the past decade is proven to provide today's emerging application service providers with the tools and capabilities they need to be successful. Citrix's innovative software enables application service providers to experience:

- **Top-line Growth.** Citrix enables ASPs to reach the broadest addressable market by delivering any application, to any client, over any network, anywhere, in the fastest time possible. Citrix allows ASPs to serve the richest range of business and productivity applications, including the latest Windows-based, client/server, mainframe, Internet, HTML and Java-based applications. Users can access these applications from virtually any device, including Intel x86- and Pentium-based PCs, Macintosh computers, Windows-based terminals, UNIX workstations, wireless devices and information appliances.

And with Citrix Application Launching and Embedding (ALE) and new Citrix Program Neighborhood™ application browser, you can extend virtually any application instantly across the web to any standard Web browser, without rewriting a single line of code.

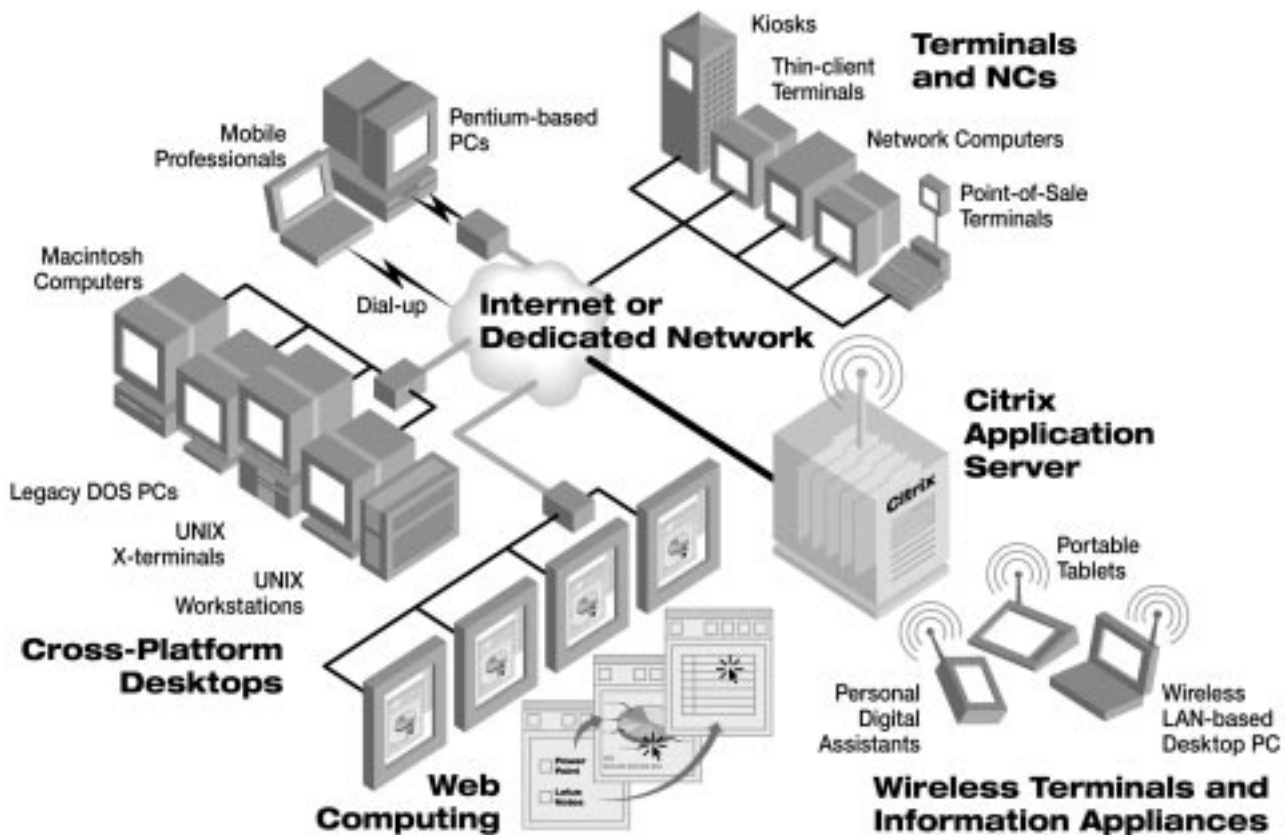
- **Bottom-line Profitability.** Citrix provides robust enterprise-scale management, giving ASPs the full-range of tools needed to deliver the highest, most predictable service levels at lowest cost. Whether ASPs need to serve hundreds of enterprise customers or tens of thousands of users over the Internet, Citrix application server software solutions provide the scalability, reliability and security needed.

Citrix provides centralized, single-point deployment and management of applications. Load Balancing Services extends this capability across multiple MetaFrame servers throughout the entire data center. Additional servers can simply be added to these groups for unlimited scalability, while Installation Management Services enables new applications to be deployed and replicated quickly and easily across the server farm from a single point.

Server-based computing addresses the issue of security by ensuring sensitive corporate applications and data remain on the server, rather than traveling over the network. Resource Management Services provides the vital information needed to track system usage for accurate account management and billing. And Session Shadowing allows ASP helpdesks to easily troubleshoot applications and train users remotely, rather than traveling to company sites



- Maximum Brand Impact.** Citrix software enables ASPs to deliver highest customer satisfaction by providing digital independence from technology deltas and complexities. Citrix application server software provides seamless desktop integration of the user's local and remote resources and applications with exceptional performance. Citrix Program Neighborhood gives users their own desktop "application portal," so they can easily browse and access all published applications hosted on Citrix server farms from a single window from their desktop or browser. Citrix software delivers LAN-like performance even when accessing the "fattest" applications over dial-up Internet connections. And applications running remotely from the ASP data center look and feel as if they were running locally with access to local printers, peripherals and audio.





## Server-based Computing Key Features and Benefits

### Reach the Broadest Addressable Market for Top-line Growth

For ASPs interested in making the fullest range of applications — from Windows to Web — available to

all users, server-based computing enables an organization to leverage its existing infrastructure, yet still provide the best application fit for both users and the enterprise.

This type of approach supports all types of hardware, operating platforms, network connections and LAN protocols. As a result, ASPs can deliver the same set of applications to virtually any client device, anywhere, with exceptional performance.

### The Citrix Approach Extends to Heterogeneous Computing Environments

Feature	Description	Benefit
<b>Any Client Device</b>	<p>Extends the reach of applications to virtually any client device including 286, 386, 486, and Pentium PCs, Windows-based terminals, Network Computers, wireless devices, and information appliances such as set-top boxes, screenphones, and kiosks.</p> <p>Supports ActiveX controls and plug-ins to deliver full-function, rich applications to web browsers.</p> <p>Supports all types of Windows clients, including Windows 3.X, Windows for Workgroups, Windows 95, Windows NT Workstation and Windows CE.</p> <p>Also supports non-Windows clients including DOS, UNIX, Linux, OS/2 Warp, Mac OS and Java as well as a broad range of embedded operating systems.</p>	<p>ASPs can deliver the same set of applications to virtually any client device without rewriting a single line of code, changing client hardware or adjusting client system configurations for fast time-to-market and top-line growth.</p>
<b>Any Network Connection</b>	<p>Connects users to the network through standard telephone lines, WAN links (T1, T3, 56kb, X.25), broadband connections (ISDN, Frame Relay, ATM) and wireless connections as well as over the Internet, corporate Intranets or VPNs. Supports all LAN and WAN protocols, including TCP/IP, IPX, SPX, NetBIOS and direct asynchronous connections.</p>	<p>Ideal for ASPs that need to extend applications to users everywhere — regardless of connection type or available bandwidth. For companies with multiple networks and file servers, it's a convenient and efficient way to get enterprise-wide application deployment.</p>
<b>Any Application</b>	<p>Users can access the full range of business and personal productivity applications including the latest N-tier, distributed-object, Windows-based, client/server, HTML, Java and mainframe applications, from a universal client, regardless of available horsepower or operating system.</p>	<p>ASPs can reduce the total cost of application ownership by leveraging their customers' existing technology investments. Applications can be quickly extended over the Web in a thin and rich manner without costly rewrites.</p>

## Enterprise-Scale Management Tools

### Robust Tools for Highest Quality of Service (QoS) and Bottom-Line Profitability

ASPs building application deployment systems will want the added benefits of server-based computing system

software to gain robust management tools that help scale systems and support applications and users enterprise-wide. With these tools, ASPs can significantly reduce the costs and complexities of deploying, managing and supporting business applications across customer sites, while providing the highest levels of service and predictability.

### The Citrix Approach Delivers Enterprise-Scale Management Tools

Feature	Description	Benefit
<b>Application Launching and Embedding (ALE)</b>	Application Launching & Embedding allows full-function, Windows-based applications to be launched from, or embedded into HTML Web pages, without rewriting a single line of code. The application can be accessed via an ActiveX™ Control for Microsoft Internet Explorer, a plug-in for Netscape Navigator® or in a Java applet for any Java-enabled device.	ASPs can instantly integrate “rich” Windows-based applications (together with HTML) into the user’s desktop. As a result, IT professionals can extend the reach of business applications across the Web in a “thin,” manageable manner while saving time and money. The launched or embedded application looks, feels and performs as if it were running locally, even though it is executing on the server.
<b>ALE Wizard</b>	The ALE Wizard is an administrative utility that can automatically generate all HTML code required to effectively deploy applications using ALE.	The ALE Wizard simplifies the deployment of applications throughout customer sites.
<b>Application Publishing</b>	Applications can be accessed as simply as other resources on the network, such as printers or file shares. A published application contains all of the information needed to connect and interact with applications on the server. This includes application registration, user access control and authorized server lists.	Application publishing tools make it easy for ASPs to deploy applications across multiple servers from a single point. Using these tools, ASPs simply click to assign applications on any server to any user.
<b>Automatic Client Update</b>	The automatic client update utility provides for automatic updates of the Citrix ICA client from the Citrix server. This tool provides an ASP with the ability to install the latest version of the client software, then schedule the download and installation of that software to a client’s device.	ASPs can automatically update the ICA client without having to touch every desktop throughout customer sites.

## The Citrix Approach Delivers Enterprise-Scale Management Tools (continued)

Feature	Description	Benefit
<b>Anonymous User Support</b>	Designed primarily for ALE applications published on the Internet or Intranet, anonymous users are configured and administered as a single group. Access rights and system permissions apply to all anonymous users equally.	The use of anonymous accounts eases the administration of a published application when the exact identity of a user is not known or required, e.g., the Web.
<b>Enterprise Management Scope</b>	Enterprise Management Scope provides the ability to manage license pools and even load balance and publish applications across subnets.	ASPs can load balance, pool licenses and even publish applications without the limitation of subnet boundaries. Systems and applications are even more scalable enterprise wide.
<b>ICA Browser Manager</b>	With the new ICA browser manager, ASPs have the ability to control browser parameters such as backup ICA browsers, ICA gateways, update and refresh intervals. They can also configure which servers always attempt to become the master ICA browser.	The ICA browser manager simplifies browser administration through an intuitive user interface for better systems scaling and management.
<b>Installation Management Services</b>	The Installation Management Services option gives ASPs the ability to centrally manage software replication across Citrix server farms. An ASP can simply run an application's installation routine just once, then deploy the application to each server in the farm automatically.	This innovative system services option for MetaFrame and WinFrame offers ASPs an excellent alternative to manually installing and configuring the same application on multiple Citrix servers. They can now more easily and cost-effectively deploy applications to thousands of users across customer sites.
<b>License Pool Recovery</b>	Citrix has introduced a new backup licensing feature to better manage pooled licenses across the server farm. With this feature an ASP can define the number of backup servers to which user licensing data will be replicated.	This new addition to Citrix license pooling provides for a greater level of availability across multiple Citrix servers.
<b>Load Balancing</b>	The optional Load Balancing Services allows ASPs to group multiple MetaFrame and WinFrame servers into scalable "server farms." It dynamically routes users to the least-busy server to deliver the best application performance and server resource utilization.	ASPs can more easily and cost-effectively scale application servers to support thousands of users across multiple servers. This feature allows for the single-point management, access and control of all MetaFrame and WinFrame servers in a load-balanced server farm.

## The Citrix Approach Delivers Enterprise-Scale Management Tools (continued)

Feature	Description	Benefit
<b>Load Balancing cont'd</b>	Single-point management features such as application publishing, can be used in conjunction with Load Balancing to manage and configure the parameters for all load-balanced servers from a single location.	
<b>Program Neighborhood™</b>	Citrix's Program Neighborhood application browser introduces a new metaphor for user application access. Citrix Program Neighborhood gives users their own desktop "application portal," so they can easily browse and access published applications hosted on Citrix server farms by ASPs. With Program Neighborhood, server-based applications now can be pushed to the Program Neighborhood client and also be integrated into the local 32-bit Windows desktops or pushed directly into the "Start" menu programs.	Program Neighborhood provides a new paradigm for rapid "application provisioning" and total administrative control of applications by providing users with dynamic access to published applications. Not only do users have an enhanced server-based application experience but client configuration is not required. Program Neighborhood provides for complete administrative control over application access and local desktop integration.
<b>ReadyConnect™ Client</b>	For rapid, mass deployment of applications throughout the enterprise, this feature allows the Citrix ICA client to be pre-defined with phone numbers, IP addresses, server names and connection options prior to first time installation.	All connection options are already defined. Users simply point and click to access predefined applications.
<b>SecureICA</b>	To help protect network data, the optional SecureICA Services for MetaFrame and WinFrame offers end-to-end RSA RC5 encryption for the ICA data stream. Both North American (128-bit) and international (40-bit) encryption levels are available.	SecureICA provides a higher, more efficient level of security between the Citrix client and the server. Organizations can ensure that data being sent over the network — even to the most remote locations — is secure and manageable.
<b>Session Shadowing</b>	Administrators and help-desk employees can remotely join or take control of another user's session to see the display on the screen or control the mouse and keyboard.	This feature makes remote support, diagnosis and training easy. This feature is ideal for ASP help desk support and on-line interactive teaching—especially for introducing users of non-Windows clients (such as Mac and UNIX) to Windows-based applications.

## Seamless Desktop Integration

### Deliver the Richest User Experience for Maximum Brand Impact

With server-based computing, end users of both Windows and non-Windows desktops gain an enhanced

computing experience through broadened application access with exceptional performance that is bandwidth-independent, as well as complete access to local system resources — even though applications are running remotely from the server. Lets face it, the ASP brand is driven and dictated through the end-user experience. Citrix is the way to deliver the greatest customer satisfaction for maximum brand impact.

### The Citrix Approach Provides Users with Seamless Desktop Integration

Feature	Description	Benefit
<b>Audio Support</b>	Audio compression for low-bandwidth connections allows users to extend their desktop audio schemes to remote applications running on the server.	Users have the ability to control the quality of the audio on the client desktop to maximize bandwidth utilization.
<b>Business Recovery Client</b>	The Citrix ICA client includes the additional intelligence to support multiple sites (such as a primary and hot backup) with different addresses for the same published application name.	This feature provides for the consistent connection to published applications in the event of a primary server disruption. User's have an even higher level of fault tolerance and seamless user experience.
<b>Client Print Manager</b>	This new client-printing enhancement allows users to define which client printers can be configured on their client device. It provides a means to store printer properties on a per-client basis while simplifying printer configuration for non-Windows clients.	This feature provides for an even higher level of seamless experience giving users additional flexibility and access to local system resources.
<b>Drive Mapping</b>	Allows information derived from a server application to be saved to a user's local hard drive. Users can also drag-and-drop to copy files. Drive letters are configurable and long filenames are supported.	This feature provides a seamless user experience by giving the user more flexibility and access to all local system resources including fixed and removable disk drives.
<b>ICA Client Enhancements</b>	ICA Client enhancements include Windows 32-bit TAPI support, TAPI emulation for DOS and 16-bit Windows desktops, Windows COM Port Redirector, international keyboard support and 256-color DOS client support.	These features provide a seamless user experience, giving users more flexibility and access to all local systems and resources.
<b>Local/Remote Clipboard</b>	Users can cut, copy and paste information via the Windows clipboard between applications running remotely on the server or locally on the desktop. This feature also supports Rich Text Format.	Local/Remote Clipboard provides the familiarity of a local desktop, minimizing end-user training requirements while maximizing productivity. Additionally, the Rich Text Format preserves formatted text (e.g., bold and underline).

## The Citrix Approach Provides Users with Seamless Desktop Integration (continued)

Feature	Description	Benefit
<b>Port Mapping</b>	Utilizing COM ports on the client device just as if they were on the server, Port Mapping enables peripheral devices, such as point-of-sale scanners, to be accessed by applications running remotely from a server.	With this feature, mobile users have the ability to access local printers to print remotely, regardless of location.
<b>Printer Mapping</b>	Users can transparently access their local printers. Client printers are configured automatically for Windows-based clients and are added to the Print Manager.	Mobile users can print remotely, regardless of location.
<b>Seamless Windows</b>	The Citrix ICA client for 32-bit Windows desktops enables seamless integration of remote applications into a client's local Windows desktop. Within a single session, a user can gain access to multiple applications, have fully functional local keyboard controls (such as ALT-TAB), switch between local and remote applications on the local taskbar, define remote application icons on the local desktop, and even tile and cascade local and remote application windows.	These unique ICA features allow the user to fully integrate local and remote application windows, providing a true, seamless user experience. A user no longer needs to access an entire remote desktop to run multiple, remote Windows-based applications in the same session.
<b>SpeedScreen™ 2</b>	SpeedScreen 2 builds upon intelligent agent technology that reduces the transmission of frequently repainted screens. In comparison with earlier versions of this technology, Speedscreen 2 bandwidth consumption is on average reduced by 25-30%, and total packets transmitted cut by up to 60%—resulting in significant improvements in measured speed on restricted bandwidth connections.	SpeedScreen 2 furthers the user experience with consistent performance regardless of network connection by reducing latency and improving the feel of the server-based application.
<b>Video Ready</b>	The video-ready capabilities of MetaFrame 1.8 or WinFrame 1.8 software enable the production and deployment of custom video applications to 32-bit Windows ICA clients using an innovative intelligent compression and a streaming extension to the ICA protocol. An optional Citrix product is required for this functionality.	By integrating video technology into a Citrix server farm, administrators can now deploy custom video applications to any 32-bit Windows desktop—on demand—while maintaining consistent performance across any network connection, regardless of available bandwidth.

## Server-based Computing and the Internet

### Web Application Deployment Challenges

A key component of any application is its user interface. Application developers are constantly challenged to deliver improved functionality and ease-of-use to customers. At the same time, developers must ensure the user interface will run on as many different client machines as possible, with minimal installation, configuration, and validation efforts in order to reduce development and support costs. Striking the right balance between these two design goals makes a significant impact on the effectiveness of the developers' systems and on the competitiveness of the organizations that deploy them.

In recent years, the mass adoption of the Internet and the relative ubiquity of browsers have lead many application developers to investigate use of web-based technology to deliver the “end result” of their application - or the user interface. The pressure to consider redeveloping the front-end of applications to take advantage of a “web-based” delivery model has been strengthened through enterprise adoption of intranets for publishing internal information across an organization. As a result, web browsers have become as commonplace in enterprise computing as they have for individual consumers of the external Internet.

### Thin Application Delivery

However, as application developers investigate the technicalities of web-based application delivery, they quickly encounter a number of challenges. The cause of these challenges lies in the very nature of the HTTP protocol itself, which underlies the web-based delivery model.

The HTTP protocol and HTML — the associated language for describing how web pages should look — were designed for the efficient publishing of “static” information.

The presentation of web pages can be very complex, as it involves the transmission of graphical material as well as text. The degree of interaction the user is allowed to have with information is strictly limited in order to publish information to large numbers of end-users with the appearance of simultaneous access. As a result, the HTTP protocol is said to be “stateless” because no contextual or “state” information about individual users is maintained at the server. If any user interaction is to be understood by the server, all relevant information must be transmitted to the server from the client on each message exchange.

HTTP technology thus may be described as a “thin” client-server implementation that performs well for its intended function and has very good manageability, accessibility and TCO characteristics. However, HTTP technology does not provide for a “richly” interactive user experience.

### Rich Application Delivery

Many applications, such as those used in everyday enterprise computing, require a level of interaction that is simply beyond HTTP in order to deliver the required end result, including application “richness” and high levels of interactivity.

Much effort has been spent in attempting to overcome web-based interactivity limitations by extending the HTTP protocol. Additionally, new technologies have been introduced to the web environment including the “mobile code” technologies, such as Java or ActiveX

controls. The effect of these attempts has, up to now, inevitably resulted in the introduction of potential richness at the expense of achieving the properties of “thinness.”

As a result, attempts to redevelop existing client/server applications to render them “web deliverable” have often failed, either because the resulting application functionality has been “dumbed down” so much to make use of the HTTP protocol that the end-user experience is no longer acceptable, or because the performance, manageability and security of the application deployment was compromised.

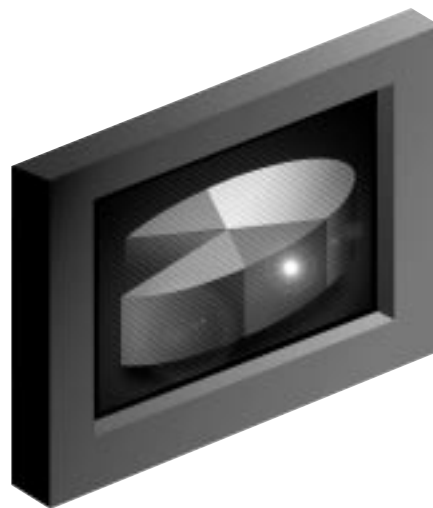
#### **With Citrix, You Can be Thin and Rich!**

Server-based computing can overcome the limitations of HTTP and other web delivery mechanisms. A unique advantage of Citrix application server solutions is its ability to deliver the full richness and interactivity of client/server applications over the Web or VPNs, while ensuring a thin-client footprint — all without the cost and time required to rebuild the interface through HTML, Java or custom, “roll your own” programming.

The Citrix ICA® protocol is a “stateful” protocol designed specifically to allow a high-degree of user interaction to occur between a “thin” client and “rich” server-based applications. The ICA protocol can be delivered across the Internet, even when bandwidth is limited and latency (round trip response time) is variable in a high-performance manner. The ICA client is also available in a number of forms that integrate well with browser technology, including browser plug-in and ActiveX controls as well as Citrix Program Neighborhood.

Citrix enables ASPs to deploy today and tomorrow’s applications over the web without costly modification, degraded performance or functionality. Server-based computing combines all of the advantages of thin-client computing with the richness of Windows client/server, delivered to any computer platform or device, in the fastest time possible.

It is possible to have the best of both worlds. Using Citrix application server solutions, you can be both “thin” and “rich.”





## The Future of ASP

### Crossing the Digital Divide

Although the information technology revolution has created a profound impact on business and a certain segment of consumers, a persistent issue remains: its unavailability to the vast majority of the world.

Information “have-nots,” estimated at more than 95 percent of the world’s population, are barred from participation through cost, complexity and lack of access. The rise of “rental” applications and the development of simple, inexpensive information appliances promise to break down the walls between the information “haves” and “have nots.”

These two trends go hand-in-hand to deliver ease-of-use, low-cost and reliable information access to consumers, small businesses and other groups that lack the resources to implement personal or business computing solutions. Application service providers have the potential to make applications as easy, inexpensive and fast to obtain as “pay-per-view” television programs, cable packages or phone services, such as call waiting or voice mail. Users are spared the cost and difficulties of licensing, installing, upgrading and maintaining their own software, or paying for PCs to run it on.

The other half of the solution, information appliances, will be instrumental in delivering on the promise of the “information revolution.” Simple, reliable, fixed-function devices — which may include cellular phones, information kiosks, set-top boxes and terminals — contain no moving parts to modify, replace or upgrade because all application functionality is based on a central server and delivered via server-based computing technology over cable, phone lines, the Internet, etc. Accessing an application will be as simple as turning the device on and pushing a button or two.

Application Service Providers provide a bridge to the future of computing by transforming the network into the heart of the system and the client into a simple device that is as interchangeable and maintenance-free as a telephone. The result is a new paradigm of ubiquitous computing that breaks the cycle of upgrades, provides high-performance access to thousands of new and existing applications, and reduces cost and complexity so that more people and organizations can reap the benefits of information technology.

### What does the future look like?

- At home, you’ll use simple screenphones to access home banking and ATMs from a central server farm residing in the ASP data center. You’ll be able to download electronic cash to your credit card, access your financial information, pay bills, and make stock transactions. In addition, home network terminals and television sets will be connected to extensive information services. Communication, education, shopping, and entertainment will be available, at your fingertips, 24-hours a day. The home will be “appliance-enabled,” with single-purpose information appliances to serve the needs of anyone, anywhere.



appliances to communicate with other service personnel. They will be able to access repair manuals, review service records, and check parts inventories using applications delivered via the ASP data center. Customers will get better, faster service, and their service providers will get a competitive edge.



- Information appliances in your automobile will update you on traffic conditions, help you navigate, allow you to review entertainment options, restaurants, shopping, hotels and more — all while you are on the road. Every new function will be delivered, managed, monitored and billed from the server.



- Educators will be able to focus on teaching again, instead of managing computing environments. Students, teachers and administrators will all be connected to application service centers that offer the latest software programs, education information and learning resources, whether at school, on a field trip or right at home. The power of computing will at last be available to everyone, regardless of socio-economic status or school location.



## When to Consider Application Hosting

There are a number of scenarios in which application outsourcing can provide measurable benefits to an organization. Following are criteria to consider:

- **Type of organization:** In general, small and medium-sized organizations with limited budgets and/or IT staff can reap significant benefits from the ASP model because it provides economical access to hitherto unaffordable world-class technology, at a set monthly price. Also, rapidly growing companies and emerging industries with great or unpredictable scalability needs may find it easier to extend application access via an ASP, which can quickly and easily scale to meet growth.
- **Type of application:** Outsourcing non-critical services and applications can help organizations focus limited IT resources on more strategic projects rather than routine maintenance. ASP services may be the ticket if software pilot programs and upgrade deployments are unacceptably burdensome, or if saving on up-front capital expenditures in hardware and software are a priority. Through the Citrix server-based computing model ASPs can also provide fastest time-to-impact on extending the reach of existing and future applications across the Web, for e-commerce, supply chain integration and customer care initiatives — without rewriting a single line of code.
- **Type of user:** Companies with large numbers of remote, mobile and branch office users, especially those running a variety of client devices, can benefit from outsourcing in terms of cost reduction (eliminating the need for local servers and client upgrades or replacement) and performance. Further, the ASP model can enable rapid deployment of applications to new units or acquisitions. And it can easily extend specified solutions outside the organization to partners, customers and vendors. Through the use of low-cost, fixed-function information appliances, ASPs also promise to extend the reach of applications to educational institutions, SoHo workers, consumers and emerging nations.





## About Citrix iBusiness

Citrix iBusiness is an Internet business unit whose pioneering leadership, industry partnerships and advanced application server software solutions are powering the growth of the Internet and providing the infrastructure that has become a pillar of the new Application Service Provider (ASP) computing paradigm. For over a decade, Citrix has been the trusted name in application server software. Today, Citrix's application serving technology is at the heart of the ASP solution, enabling organizations of all sizes to achieve "Digital Independence" — the ability to reach more users, with more applications, in more locations at record speed. As a result, Citrix customers are discovering greater application reach, speed and predictability for a competitive advantage, while reducing total cost of ownership by 50 percent or more.

## About Citrix

Founded in 1989, Citrix Systems, Inc. is a world leader in system software for server-based computing. The MetaFrame and WinFrame® product lines and Independent Computing Architecture (ICA) technology give organizations the independence, speed, and flexibility needed to extend any application to anyone, anywhere. The company's server-based computing solutions are marketed through a worldwide business alliance of value-added resellers, system integrators, OEM licensees and industry associates. Citrix is based in Fort Lauderdale, Florida and is traded on the Nasdaq National Market under the symbol CTXS. For more information, please visit the Citrix website at <http://www.citrix.com>.



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