

Remote Access Solutions

How to provide secure, efficient connectivity to critical business information from virtually anywhere



One Sprint. Many Solutions.™

Voice/Data

PCS Wireless

Internet Services

E-Business Solutions

Managed Services

Executive Summary

During the past several years, the landscape of the global workplace has changed substantially. In an effort to keep pace with economic pressures, many organizations are now competing with fewer capital and human resources. Employees now dedicate more time to work — from checking e-mail and voice mail before leaving for work to taking unfinished assignments home — at a time when most seek a better balance between their workday and their personal life. The end result is a workforce that relies on various technologies to deliver secure, efficient access to critical business information from any location and at any time of the day. These technologies make up the Sprint Remote Access Solutions.

The purpose of this white paper is to introduce enterprise customers to the benefits that remote access can deliver to both the enterprise and its employees, the network components that make up a total remote access solution and the Sprint approach to remote access.

Market and technology highlights

The demand for remote access. Several important trends have emerged from the introduction of remote access into the workplace. Organizations around the world are providing employees with the flexibility to access important company data without having to be in the office. Creating more flexible work conditions yields company benefits such as reduced costs, improved productivity, better employee retention rates and improved communications between geographically dispersed work groups.

Consider these points:

- IDC, a global IT market intelligence and advisory firm, estimates that the number of U.S. mobile workers will grow by almost 13 million, from 91.8 million to 104.5 million individuals between 2002 and 2006. This increase that is almost twice that of the U.S. worker population in general. In Western Europe, the mobile worker population is

expected to increase from 80.6 million in 2002 to 99.3 million in 2007¹

- In-Stat MDR, a major market research firm, calculates that the United States has more than 78 million remote and mobile workers, roughly 55 percent of whom work for corporations²
- Employees using broadband to telecommute once a week report an average 33 percent increase in productivity. When added to the potential real estate savings that employers can realize by reallocating office space, the benefits of having a telecommuting policy translate to an average cost savings to the enterprise of \$5,000 per teleworker³

¹ U.S. Mobile Worker Population Forecast and Analysis, 2002 - 2006 (IDC #27374) and Western European Mobile Working Forecast and Analysis, 2002 - 2007 (IDC #28548)

² Working the Wide Area: Perceptions of Internet & Wireless Accessible Applications Among Mobile & Remote Workers, Part Two: The Corporate Market (In-Stat MDR #OC0108MD)

³ The 2003 Telework America Survey by Joanne H. Pratt & Assoc.

The impact of an effective remote access policy is clear for many companies:

- Nortel Networks saves \$40 million on annual real estate costs while reporting consistently high employee satisfaction and company loyalty⁴
- By allowing its workforce to telecommute, a large services company saved \$5 million a year

The technology behind the solution. The hardware, software and network infrastructure available today make virtually anywhere, any-time access a viable solution for organizations. Laptops are now enabled for mobility and portability. Wireless phones are smaller, smarter and Internet-ready while personal digital assistants (PDAs) are evolving into multi-functional devices capable of functioning as both a phone and a data device.

Security has also improved greatly in recent years. Through virtual private network (VPN) and security services, end users can connect to a corporate LAN using the latest encryption technology. IT administrators have a greater array of tools available for network monitoring, authentication and security.

Businesses now have several solutions that deliver network access across a variety of work settings. In the office, wired Ethernet LANs, wireless LANs and wireless messaging devices provide high-speed, flexible, cost-effective connectivity. Wireline broadband has been adopted by hotels, restaurants, convention centers, airports and homes using digital subscriber line (DSL) and cable modem services. And wireless networking touches all of these locations with the advent of 3G and wireless LAN coverage in key business centers around the world.

⁴ Nortel Networks Case Study: Nortel Networks Home Workers

Definition of terms

Code division multiple access (CDMA).

A form of digital, spread-spectrum technology that transmits encoded speech bits over the air and reassembles the bits to their original speech format.

3G. A third-generation wireless standard based on CDMA 2000 that increases the speed, efficiency and feature functionality of mobile communications.

Virtual private network (VPN). A private communications network that uses a shared network and traffic separation, tunneling or encryption technologies to offer the appearance and functionality of a dedicated private network at a reduced price.

IP VPN. An IP security (IPSec)-based VPN that uses encryption and authentication to offer the appearance and functionality of a private data network over a shared IP network such as the Internet. In this paper, IP VPN will be discussed in terms of both Sprint premises-based and network-based IP VPNs.

Spread spectrum. A security technique used in wireless transmissions where data is packetized, mixed with frequency-modulated "noise" and spread over a wider range of bandwidth than the content of the original data stream requires, making transmission eavesdropping or jamming nearly impossible.

Wireless LAN (WLAN). A local area network that delivers major benefits, the biggest being the ability to configure and reconfigure the LAN quickly and cheaply, as wires need not be installed and moved.

Wi-Fi. The popular term for a high-frequency wireless LAN. Wi-Fi, WLAN and 802.11 are often used interchangeably to describe high-speed wireless networking.

Sprint is one of the only service providers which can deliver a comprehensive remote access strategy: wireless, wireless LAN and secure, high-speed wireline connectivity.

When selecting a service provider to deliver a wide variety of the network and software solutions behind remote access, it is important to look for a provider that has expertise in providing all of the components of a total remote access solution, not just one piece of the equation.

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Sprint networks: the power behind remote networking and mobility

Long before ubiquitous access became a business necessity, Sprint provided a way for remote, wireline-based networking by building the first 100 percent native IP network from the ground up. Instead of site-to-site connectivity, such as frame relay or private line networking, IP technology can allow connections to be routed through the public Internet, increasing the scalability and accessibility of a company's network. In short, IP provides the foundation for mobile connectivity.

The public Internet is not inherently secure, however. To deliver enterprise-grade security to IP technology, Sprint relies on IP-based VPNs. IP VPNs provide the tunneling and encryption required for business users to safely access their critical applications.

Sprint also pioneered wireless networking by developing the first all-digital, CDMA-based

wireless network in the United States. Today, Sprint has the most complete all-digital wireless network in the nation providing exceptional technology, coverage and speed. Wireless business professionals now have unsurpassed access to company data and Internet resources, allowing for improved levels of productivity beyond the traditional confines of the enterprise network.

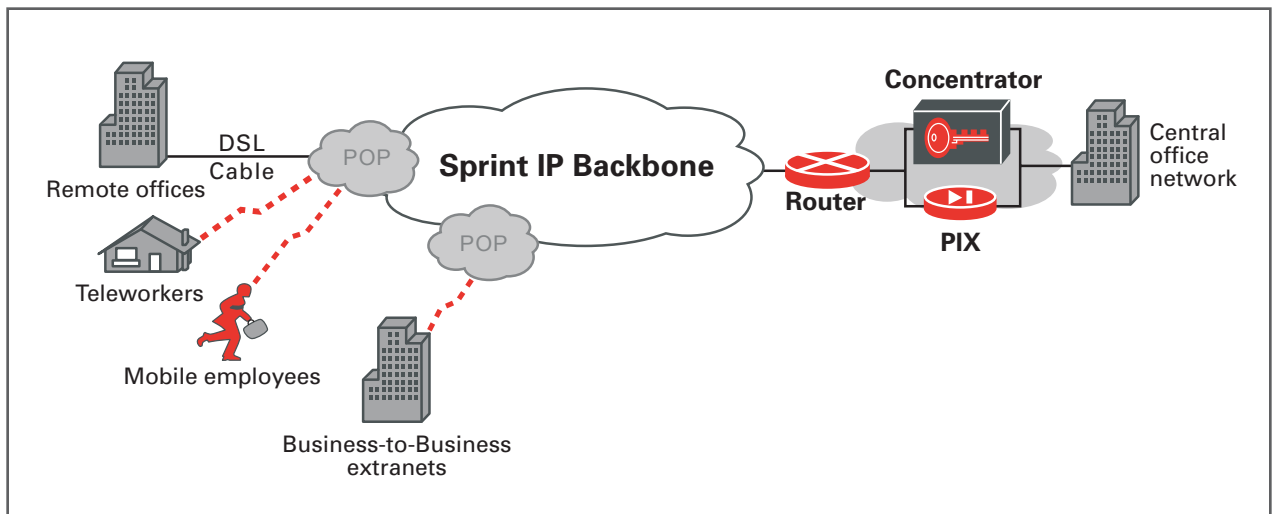
Sprint IP and IP VPNs

Sprint has received numerous awards for the reliability and performance of its global native IP backbone. The Sprint IP network can deliver OC-192 capacity throughout the United States, Europe and Asia — reaching more than 100 countries. Dedicated Internet access provides enterprises with reliable, high-performing connectivity to the Internet with a wide range of access bandwidths, industry-leading service level agreements, quality of service and an array of value-added products and services.

The flexibility and ubiquity of the Internet has made it a logical substitute for the private lines or other wide area network (WAN) solutions that many companies use today to connect their remote locations. To accomplish communication across an IP network without sacrificing privacy, however, enterprises are turning to IP-based VPNs that use security measures specifically developed for the Internet. IP VPNs use a protocol known as IP security, or IPSec, to ensure the privacy of data traveling over the public Internet. The Internet Engineering Task Force (IETF) developed this protocol to authenticate and encrypt data within an IP network.

At the most basic level, all VPNs serve the same purpose — they permit organizations to securely share data with key stakeholders.

Sprint can provide industry-leading IP VPN security standards for our enterprise users



Common Uses of an IP VPN

Branch offices, telecommuters and mobile employees typically use an IP VPN to gain access to the company intranet. Authorized suppliers, distributors and customers often use it to gain access to the company's extranet. Access methods range from traditional dial-up and wireless to DSL.

through the implementation of the following three components:

- **Authentication** — the first step to delivering security is to ensure that network users are who they claim to be. Authentication provides authorization to users based on certain credentials and verifies that data sent between two users has not been altered by a third party
- **Encryption** — encoding data before it is transmitted and delivering it in a way that can be quickly deciphered by the authenticated receiver forms the second critical element to network security. Encryption allows sensitive information to traverse a public network without compromising the confidentiality of the data
- **Access control** — this security measure complements IPSec. This concept focuses on blocking unwanted users from gaining access to an internal network. Access control is typically achieved through authentication for IPSec traffic

As businesses support more remote users, VPNs can be designed to support high network avail-

ability to ensure that mission-critical data arrives on time. Moreover, IP-based VPNs can be deployed and integrated easily with existing network infrastructures, enabling enterprises to scale operations to meet the expanding demand for remote access.

Delivering 3G wireless network technology

In the wireless world, Sprint can deliver the network capacity and security that can meet the needs of existing and future mobile applications. Sprint uses CDMA technology to provide secure, reliable data communications.

CDMA has several important features:

- **Improved security and privacy** — CDMA's digitally encoded, spread-spectrum transmissions resist eavesdropping. Designed with 4.4 trillion codes, CDMA virtually eliminates unauthorized usage of another person's phone account — known as cloning — and call interception
- **Voice clarity and call quality** — CDMA filters out background noise, cross talk and interference so customers can enjoy crystal-

clear calls, greater privacy and enhanced call quality

- Fewer dropped calls — CDMA's patented "soft handoff" method of passing calls between cells sharply reduces the risk of disruption or dropped calls during a handoff. A handoff occurs when a user moves between the radio towers that relay cellular signals
- Greater capacity — CDMA allows the largest number of customers to share the same radio frequencies, up to 10 to 20 times the capacity of analog equipment and more capacity than other digital platforms

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traffic travel through six levels of encoding and encryption before reaching their destination:

1. Source coding — the network compresses and digitizes voice calls and breaks down data transmission into small packets
2. Channel coding — data units are encoded with redundant information that more than doubles their size. At this stage, the observed bits bear no resemblance to the original input
3. Interleaving — the network breaks down data units into smaller segments and interleaves —or intermixes — these segments with each other. The resulting string of bits, with each subsequent bit coming from a different segment, protects the source information from errors and further complicates any attempts at recovering source information
4. Encryption — next, data units are scrambled randomly according to a long-code sequence that is synchronized with the receiving device and then combined with a secret value known only by the enhanced Sprint nationwide PCS network and the mobile device
5. Spreading — the network then replaces each bit in the encrypted data units with one of 62 possible 64-bit Walsh codes. The source information at this point has been spread to such a size that it requires the full 1.25 megahertz of CDMA bandwidth, which it shares with other users. Mathematical characteristics of the Walsh code allow each receiving device to recover its own information from among others transmitted simultaneously, based on the device's knowledge of its assigned Walsh code
6. Modulation — the spread data units are combined with other user traffic and control channels and modulated or shifted onto two 1.25 MHz bandwidth radio carriers with the same frequency but 90 degrees out of phase.

The data is further scrambled by a 32,768-bit short code during the modulation process

These six security phases make interception by unintended recipients nearly impossible. The processing steps are unique to CDMA technology. Alternatively, technologies such as global systems for mobile (GSM) or time division multiple access (TDMA), assign a user's voice or data session to a particular time slot on a frequency where the user's traffic is easier to intercept.

Someone attempting to intercept wireless CDMA traffic would not only be faced with undoing the complex processing steps, but would also need to know certain information codes known only by the network and the targeted user's mobile device. A would-be hacker without this information would have to try all 4.4 trillion possible codes. Additionally, potential hackers would have to correctly reverse all processing steps before learning if they had made the right guesses at the different stages along the way, since all content is unrecognizable until reaching its destination.

Sprint broadband: transforming business through DSL and wireless LANs

High-speed Internet access — popularly known as broadband — has finally become a mainstream source of connectivity for remote workers. According to Faulkner Information Services and the DSL Forum, the market for DSL service is expected to reach 200 million users worldwide by 2005, of which one-third will come from the United States.⁵ More than 70 percent of companies with 5,000 or more employees with remote access to the corporate LAN support DSL access.⁶

Sprint DSL service has become a viable option for enterprises seeking to establish a broadband

Internet connection for their employees or satellite offices. It is robust enough to support Internet access, corporate connectivity via VPNs and extra voice channels.

DSL is an "always-on" technology that carries voice and data over existing copper telephone lines. It utilizes unused frequencies on these lines to transport traffic at multi-megabit speeds. The service supports applications that are bandwidth-intensive, such as streaming video, application programs and video conferencing. The technology is advantageous in that the user can leave an Internet connection on, but still use the phone line for voice calls.

Sprint DSL operates at peak speeds greater than a regular modem connection — at speeds up to 1.5 Mbps versus 56 Kbps for regular dial-up connections — and is available in more than 60 U.S. metropolitan areas. Data traffic travels over the Sprint IP backbone and service is backed by top-tier customer support and service assurance. Finally, Sprint provides IP VPN and firewall services to all DSL users.

Where copper lines end, wireless broadband begins. Sprint Wi-Fi services, built on wireless local area network technology, provide users with access speeds that are faster than wireline broadband methods like DSL in the public space, without the need to be tied to network lines.

Demand for wireless services is forecasted to grow rapidly, with more than 5.5 million people expected to use WLANs in public spaces such as restaurants, hotels, convention centers and airports by 2006.⁷

⁵ Digital Subscriber Line (DSL) Market Trends (Faulkner Information Services #00016504)

⁶ 2002 U.S. WAN Manager Survey (IDC #28965, Volume 1)

⁷ U.S. WLAN Hotspot Forecast and Analysis, 2002-2007: Islands in the Storm (#29487)

For enterprises adopting wireless technologies for use in private office environments, wireless LANs provide a way for businesses to easily scale their operations to better meet market conditions. When businesses grow or move, the Sprint wireless LAN infrastructure can deliver productivity and scalability by allowing users to access mission-critical data when and where they need it while lowering costs to the enterprise of IT management and wired-build-outs.

Hybrid wireless LANs allow enterprises to leverage their network investment to create value-added services for customers.

Sprint offers three types of wireless LAN deployments to meet a variety of customer requirements:

- **PCS Wi-Fi Access** — this Sprint service can provide wireless coverage in concentrated public spaces in situations where users are more likely to be in a particular location for an extended period of time and where they have the greatest need for high-speed access to bandwidth-intensive applications. In addition to corporate campus environments, PCS Wi-Fi Access users can also take advantage of the service in more than 800 public locations, such as airports, convention centers and hotels — at peak speeds of up to 11 Mbps. PCS Wi-Fi Access is expected to be available from more than 2,100 compatible Wi-Fi ZONE™ locations by the end of 2003
- **Private wireless LANs** — Sprint can provide wireless high-speed connectivity for businesses within a corporate complex or campus. Sprint has already worked with Cisco

Systems to deploy wireless solutions to major hotel chains and university campuses

- **Hybrid solutions** — this offering combines public and private wireless LANs. Enterprises could use the wireless LAN for their employees to access company-specific data while also allowing customers, visitors and others to use the network for Internet access while at their location. As an example, an airline carrier may use the wireless LAN to conduct day-to-day business activities that include making flight reservations and handling baggage. At locations within an airport where these activities take place, a business traveler may use the airline's wireless LAN to e-mail documents, connect to a corporate VPN or surf the Internet. Hybrid wireless LANs allow enterprises to leverage their network investment to create value-added services for customers

Dial-up access: reliable network connectivity

If broadband technology represents the rising star of the remote access world, dial-up connectivity is its reliable workhorse. Most business users would prefer to have the speed of broadband wherever they go. But what happens when a broadband or wireless connection is unavailable? Dial up is still used by more than 95 percent of companies with 5,000 or more employees with remote access to the corporate LAN.⁸

Sprint Dial IPSM can provide enterprises with essential Internet and intranet access through more than 16,000 points of presence in more than 140 countries. The service includes authentication and encryption capabilities that fully integrate with Sprint VPN and security services, providing an end-to-end solution that can provide protection for customer data.

⁸ 2002 U.S. WAN Manager Survey (IDC #28965, Volume 1)

Moreover, the Sprint advanced SS7 network technology can deliver fast expansion into new service areas, fast deployment of additional capacity and a scalable path for leading IP technologies to be added to an existing network platform. This means customers can count on having the connectivity they require through an ever-growing network.

Finally, the Sprint remote access software client provides one platform to access the Internet through multiple devices and connectivity options. All of this adds up to ubiquitous, dependable Internet access for enterprise customers when they need it most: a critical component to any remote access solution.

PCS Clear Wireless WorkplaceSM

Beyond the power and stringent security measures built into the enhanced Sprint nationwide PCS network, Sprint has redefined the environment for mobile productivity by developing specific solutions to meet enterprise needs.

Business professionals now benefit from:

- Exceptional clarity — 3G network technology can provide fast transmission speeds, robust graphics and clear signals
- Advanced data products — integrated phone and PDA products deliver multiple business functions through one device
- Account management tools — secure Web-based usage reports allow customers to review and customize PCS billing information based on their structure and reporting requirements
- Pricing and corporate discounts — pricing plans are designed specifically to meet enterprise cost management requirements

All of this translates into a more agile workforce, supplied with the devices, network and

security to access mission-critical applications while on the go.

The PCS Clear Wireless Workplace is a full suite of wireless products and services designed to meet the needs of the mobile workforce.

Sprint offers a range of advanced voice products, management solutions and, with PCS VisionSM, a new standard of integrated multimedia devices and services using the enhanced Sprint nationwide PCS network. This range includes the following service components:

- PCS Business ConnectionSM — most employees would find it difficult to determine which is more vital to their productivity: e-mail or phone service. So when Sprint developed PCS Business Connection, it created a system for wireless e-mail that took the needs of the business customer seriously. PCS Business Connection can be deployed to suit any corporate IT philosophy, both as a managed service or as an IT managed server that resides behind a firewall. There's even a personal edition that enables individual employees to retrieve their e-mail right from their desktop computers — no IT staff intervention required. And e-mail can be sent and retrieved from a broad range of devices, whatever suits the needs of your employees
- PCS Data LinkSM — this service is for mobile employee's who need to take their entire network on the road with them. By establishing a secure, private connection between the employees' network and the Sprint PCS network, remote workers can gain access to their intranet, e-mail, business applications and shared drives as well as controlled access to the Internet
- PCS Wi-Fi Access — wireless LAN deployments in public spaces are becoming a phenomenon in the United States and abroad. Historically, the service has been offered by

disparate “hot spot” providers, delivering an inconsistent user experience from one location to the next. PCS Wi-Fi Access allows users to seamlessly toggle between PCS Vision, using their PCS phone or PDA, and Wi-Fi service, using their laptop computer. PCS Wi-Fi Access provides a single, integrated software client that provides customers with a consistent user experience and billing model throughout all Wi-Fi zones

- **Wireless web** — for employees who rely on Web access, PCS Vision can deliver that, too. Mobile employees need never be away from the online resources that their office-bound colleagues depend on every day
- **Messaging** — for those times when short-text messaging or Web-based e-mail is the medium of choice, Sprint Messaging is available across the enhanced Sprint nationwide PCS network
- **Advanced voice services** — PCS Voice CommandSM provides hands-free dialing to personal and business contacts; PCS Integrated OfficeSM integrates multiple office and personal phone and voice mail accounts into one; and PCS International Roaming enables employees to be in touch across multiple time zones

Conclusion

The notion that the ideal workplace is built exclusively out of a wired, single location is quickly disappearing as technologies emerge to meet the dual business challenge of lowering costs while increasing employee productivity. Enterprises and workers both stand to gain as dispersed wireline connectivity, wireless LAN and mobile access to critical information become the standard protocols for doing business. As companies consider service providers to deliver integrated, enterprise-wide remote access solutions, Sprint should rank at the top of their lists. Sprint is a service provider that owns all of the components of an effective remote access strategy:

- Wireless voice
- Wireless LANs
- Dial-up IP access
- Broadband connectivity
- IP VPNs
- Global reach

Please contact your Sprint Sales Representative or Authorized Sales Agent

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