

Novell Remote Access Solution

Technical White Paper

Overview

There is no question that enterprise IT organizations are facing forced change when it comes to accommodating mobile and remote users. Across the board, industry analysts predict that the demand for access to internal information and applications from home, hotels, customer sites, remote offices and locations around the world is increasing with no sign of plateau or decline in sight. A few industry intelligence facts quantify this trend:

- IDC reported 39.2 million mobile US workers in 2000 and predicts growth to 55.4 million in 2004
- Gartner Group more than doubles that estimate predicting that 137 million workers will be involved in some sort of remote work by 2003
- The International Telework Association (ITAC) indicated a 20.6% growth in the number of telecommuters from 1999 to 2000.
- Cahners In-Stat estimates 28% of the total workforce will telework by 2004

Given this irreversible trend to distributed work points, the challenge becomes how to provide comprehensive, secure, and easy access to information and applications inside a company from any location. This challenge becomes particularly acute for enterprise organizations with remote and branch offices, traveling sales/support/project personnel, or distributed networks of partners, suppliers and customers that require access to internal corporate resources.

To address this challenge, Novell provides a comprehensive and secure solution that simplifies remote access for both users and administrators. Novell Remote Access is a low-cost, secure, global data access solution for enterprises with corporate travelers, home office workers, or small remote offices. Novell Remote Access allows users to connect to the Internet using their network username and password, and then access corporate data using a VPN connection. Novell Remote Access also allows for connection usage itemization and accounting which helps identify and track costs.

Novell's Remote Access solution greatly simplifies the process of remote access by providing users with a single interface for connecting from anywhere in the world. Remote access connections are highly secure with encrypted VPN sessions and strict authentication processes based on Novell's award winning eDirectory technology. Using Novell Remote Access, users can access the Internet and corporate data using dialup, DSL, cable modems, and ISDN to access files, applications, devices, e-mail and other secure data.

Novell Remote Access provides an enterprise-class solution to accommodate mobility while at the same time significantly reducing costs. Using the Internet as a communications infrastructure makes it possible to eliminate modem banks, communication servers, WAN equipment, and telecomm charges. In addition to lower equipment and connection charges, administrative and management costs are reduced due to the benefits of a directory-based solution—tedious and redundant administrative tasks are eliminated.

An added benefit is that Novell's Remote Access solution includes logging and accounting capabilities which make it possible to track remote access usage and allocate the true costs of remote access to departments or individuals.

The Problems

Since the arrival of the modem, enterprise IT organizations have struggled with several significant issues when it comes to connecting remote users to internal data. Simplified access is always a complex; security is always a risk; and costs are always escalating with the increased demand for remote services and the need to update to the latest equipment.

The Access Problem - Providing simplified access for remote users is a difficult challenge. If a user is mobile, they must find local access numbers for local offices and service providers or configure credit card or phone card access codes. The problem is compounded and costs increase with international locations and hotel surcharges. Users will often resort to the least complicated option for connection which often is not the least expensive. Reconfiguring dialers, linking dialers with Web browsers or e-mail, keeping accurate lists of providers in various areas—all of these activities challenge the patience and sometimes the technical competence of even the most valiant road warrior. Access is often needed in the most critical situations on the road where technical support or IT staff are not available.

The Security Problem - In today's enterprise company, corporate data and digital resources are strategic and valuable assets that must be protected. Access from the outside can only be allowed if those accessing are positively identified and if the connection session is secure. In large enterprises, providing for positive identification can quickly become a complex task given that rights for access can depend on roles, group membership, areas of responsibility, temporary assignment, relationships, and a host of other identity variables that define who a person is and what they have rights to access. The optimal identity management solution is a full directory service where all relationship and identification factors are integrated to a single, centralized identity management system. Multiple user databases or shared username and password lists not only leave open the possibility of identity theft but create windows of opportunity for security breach during times when information is not synchronized. The most serious security problem with current remote access solutions is the requirement to share usernames and passwords with service providers or ISPs. This information is difficult, if not impossible, to control and keep current once it is out of the physical control of internal IT.

The Management Problem - Current remote access solutions include significant implementation and management problems. Management resources are required to track and often manually coordinate multiple user databases; changes in status or location in one directory often require manual updates to others. Support costs are high with the constant need to accommodate new users and added locations. Hardware administration issues exist with the need to manage and update large modem banks and expensive communications servers. In addition, integrating a remote access solution with existing systems and ensuring that other assets are not compromised in the implementation process can be a complex and risky undertaking.

The Cost Problem - Enterprise companies that have implemented remote access solutions are experiencing skyrocketing costs. With the average increase in teleworkers growing at over 20% per year and the increasing demand for remote access by employees in some companies as high as 300%, keeping a lid on escalating costs is difficult. Modems require upgrades to higher bandwidths, more modem banks are required, and often additional load balancing hardware or communication servers are required. Additional IT staff resources are then required which increase costs or take away from other possible productive tasks.

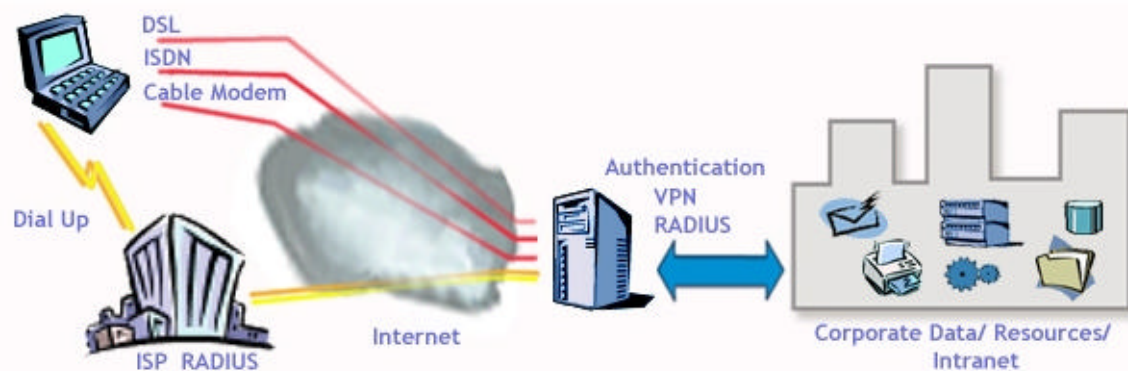
The major expense of a remote access solution is often connection costs. Toll-free calls are not really without cost (contrary to what remote users may think); long distance charges, access fees and hotel surcharges are often buried in travel expense reports; and, dedicated line or WAN charges can be extremely high.

What is needed to overcome these problems is a solution that is completely integrated from connection to billing. Identity management and security are combined with a state-of-the-art directory service and the best encryption available. Access and secure connections to internal resources are based on a comprehensive identity management that factors in organization and resource relationships. Expenses are minimized or eliminated by taking advantage of the Internet as an existing communications infrastructure and local access capability. And, management and administration activities are consolidated and made more efficient through use of a full directory service.

The Solution

Novell, the leading provider of net business solutions, has developed a complete and comprehensive remote access solution for enterprise companies. The Novell Remote Access Solution delivers anytime, anywhere access with VPN (or SSL) connection and secure directory authentication. Novell Remote Access provides the following features and benefits:

- *Simple, Reliable Global Access* - A company's users can browse the Internet and access corporate data including files, applications, devices, databases and more from virtually any location in the world. Access is fast and simple using Web browser and dialer client software. Directories of local access options are included making it possible for authorized users to have full access from any place by simply selecting their location and logging in.
- *Secure Connections* - Novell Remote Access provides the industry's best security to ensure that corporate data and digital assets are not compromised. The use of a single directory service—eDirectory—for Internet and VPN authentication eliminates the security risks introduced with multiple sets of usernames and passwords and sharing these with a service provider. VPN connections through Novell products such as BorderManager are also based on the highest security and encryption standards and are only established once identity credentials are authenticated through eDirectory.
- *Accurate Tracking and Allocation of Costs* - The cost of remote access is often difficult to accurately assess because it is buried in hotel fees, 800 numbers, roaming fees, credit cards and travel expense accounts. Novell Remote Access effectively aggregates all of these costs to a single point and provides detailed billing for individuals or department cost centers.
- *Lower Remote Access Costs* - The use of the Internet as a remote access communications infrastructure eliminates costly WAN connections and dedicated line fees. Connection costs are also significantly reduced through the use of a global service provider with local call access from any city.



Novell Remote Access provides flexible and secure access to corporate resources from any location.

What Users Can Do?

Novell Remote Access provides users with full access to corporate IT resources from virtually any location. Here's a short list of the activities that are available to a remote user connected through Novell Remote Access:

- *Browse the Internet* - Once a connection is established, users can browse/search the Web through a company's own controlled Internet connection. This is particularly valuable if a company provides accelerated caching or restricts access to objectionable sites.
- *Access the Intranet* - Most companies post company and employee specific information to an internal Web site; Novell Remote Access allows mobile users to access this information as if they were behind the firewall.
- *Access Applications* - Company applications that are Web-enabled such as Human Resources, Enterprise Requirements Planning, Customer Service Management, Inventory Planning, etc. can all be accessed securely using Remote Access. Java servlets and other applications such as mainframe and legacy databases and tools are available remotely.
- *File Access* - File storage of all types is available across the Internet.
- *E-mail* - Enterprise mail/calendaring/scheduling applications can also be securely accessed using Novell Remote Access.

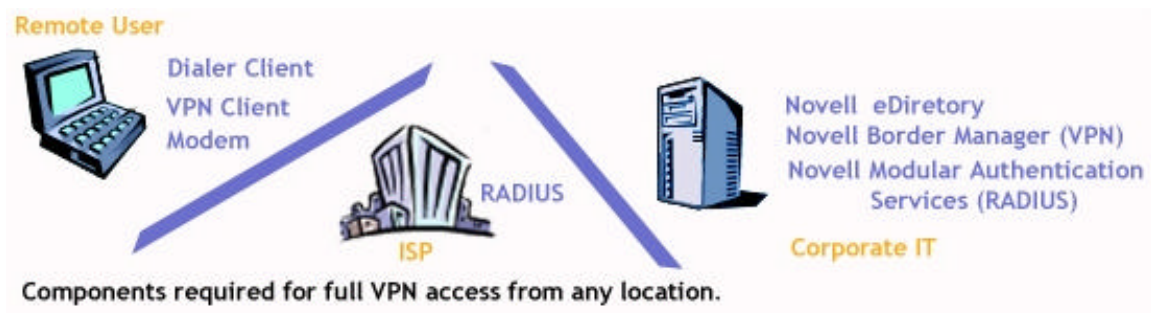
All of these capabilities are available to remote or mobile users regardless of whether they are connected to the Internet via dialup, DSL, ISDN, or cable modem. Novell eDirectory authenticates the user and, if desired, a VPN connection is established for a secure session.

How Novell Remote Access Server Works

The following elements are part of the Novell Remote Access solution. Depending on a company's environment, existing Internet or networking configurations and any telecom partnerships, some or all of these elements may be required. Novell Remote Access includes client, RADIUS, VPN, portal and directory technology but the solution is also designed flexibly to be integrated with offerings from other vendors. With Novell Consulting, Novell can also provide a complete turn-key solution using the elements listed below.

Element	Description
Global Telecom Access - UUNET or other Provider	Novell has partnered with UUNET/WorldCom to provide global access to the Internet. UUNET has points of presence (POPs) in thousands of cities throughout North America, South America, Europe, Africa, and Asia Pacific which enable users to access the Internet from anywhere in the world using, in many cases, a local telephone number. In locations where local access is not available, UUNET or one of its gateway partners provide toll-free access through the nearest POP. Customers of Novell Remote Access can take advantage of Novell's existing relationship with UUNET for global access or use other providers where existing relationships may already exist.
Dialer Client	Users can access the Internet through the most convenient and effective means. If a dialup connection is to be used, a dialer client is installed on the remote workstation. The software is a combination dialer and phone book containing local access numbers by location. Using Novell self-service portal technology, the dialer can be downloaded and installed through the Internet.
Directory Service - Novell eDirectory	The critical piece to any secure authentication solution is a true directory service. Novell eDirectory is at the heart of the Novell Remote Access Solution providing a secure, scalable, reliable, and industry standard directory service. Novell eDirectory maintains user identity information including username, password, identity profiles and—most important—relationship information that determines who has access to what under what conditions and in what context.

RADIUS Authentication - Novell Modular Authentication Services	Novell Modular Authentication Services (NMAS) provides authentication using the Remote Authentication Dial-In User Service (RADIUS) protocol. RADIUS is an industry standard for authentication supported by almost every ISP. NMAS also enables additional methods of security verification such as smart cards or biometrics and allows graded authentication where access to resources is based on the strength and combination of login methods used.
Directory Synchronization - Novell DirXML	User information is often already available in existing application or legacy network directories. Novell's DirXML enables user information stored in any other application or directory to be bi-directionally synchronized through eDirectory for use with Remote Access. In instances where consolidating user info to a central point isn't feasible, DirXML provides the next best thing.
Virtual Private Network (VPN) - Novell BorderManager	Novell's BorderManager enables virtual private networking (VPN), the ability to establish secure, encrypted communication sessions through a company's firewall. In addition to client-to-site VPN capabilities, Novell BorderManager provides for site-to-site VPN allowing the connection of independent LAN segments, and even partner network segments, into a cohesive WAN over the Internet. BorderManager is tightly integrated with Novell eDirectory and only establishes a VPN connection once proper authentication credentials have been supplied. With a VPN session, any corporate network resource can be accessed including files, applications, devices and other resources. Encryption algorithms used include Data Encryption Standard (DES), 3DES, Internet Protocol Security (IPSEC), RC2, RC5, SKIP and 128-bit encryption is available where allowed.
VPN Client - BorderManager VPN Client Software	To establish a VPN connection from the remote client, a VPN client is required. This software can be downloaded and installed using the self-service portal technology.
Self-Service Portal - Novell Portal Services	Company portals provide Web access to information and applications inside and outside the organization. Novell Portal Services can be implemented to enable self-service for remote access, including dialer/phonebook updates, user accounting, and tools for user education. The Remote Access portal provides all necessary client software, a customized tutorial, and user frequently asked questions (FAQs). Novell's portal solution is also tightly integrated with eDirectory which handles user authentication through the portal and ensures that the information, applications and services available through the portal are only available based on the user's identity, profile and relationships.
Billing	The Novell Remote Access Solution includes audit and logging capabilities that can be leveraged through charge-back mechanisms for billing to individuals, departments, or locations. This reporting capability can be used to track and analyze usage and/or distribute costs to users and organizations. This type of detailed information is not generally available through ISPs. If the Novell/UUNET option is taken, companies can elect to receive a monthly itemized bill directly from Novell.
Tutorial	Novell Remote Access includes a tutorial program that illustrates how to use the custom dialer and the VPN client software using detailed, screen by screen instructions. Also included are guidelines for selecting the access locations and methods that will be most cost effective.
Optional Hardware	Optional hardware may be required depending on configuration and processing capability. To provide portal services, a Web server is required. If usage is high, a load balancing switch may be required.



Implementing Novell Remote Access can be simple or complex depending on the existing environment and current use of Novell products such as eDirectory, BorderManager and NMAS. The following table outlines the implementation requirements.

Requirement	Description
Integration Services	It is not required but highly recommended that Novell Consulting be retained for implementing the Novell Remote Access Solution. Novell Consulting has extensive experience in integrating disparate directories, establishing Web and e-commerce solutions, and integrating complex solutions that are seamless and rock solid secure.
Hardware Requirements	At least one server is required at the enterprise site for directory services, RADIUS authentication, and VPN services. These services may be added to existing servers that are not at full capacity or separately installed on new servers. Additional servers may be desired for Web and portal technologies as well as load balancing if demand is significant.
Software Requirements	All of the elements of the Novell Remote Access Solution are cross platform and compatible with the major operating systems including Microsoft Windows NT/2000, Sun Solaris, Linux and Unix, Compaq Tru64 and IBM AIX. The actual Remote Access Solution components required from the elements list above will depend on a company's existing environment and desired implementation.
Global Access Provider	Any global access provider can be utilized as long as they have POPs in adequate locations and the RADIUS protocol for authentication. Novell's existing partnership with UUNET/WorldCom provides excellent global coverage with premium service and low rates.
Maintenance & Support	Also available from Novell are ongoing support services. Procuring a Novell Premium Support contract provides for technical support, self-help tools, upgrades and enhancements and even specialized engineering.

The ultimate success of any remote access product hinges on a successful user experience. The following table outlines the process steps in establishing a fully secure VPN connection from a user perspective.

Step	Process
Remote Access Client	The user accesses the Internet by whichever method is most

	convenient and cost effective (dialup, DSL, cable modem, ISDN, etc.). If the selected method is dialup, the user opens the remote access client (dialer) and selects the current location from a list. If the location is not found, a toll-free number is provided.
Login	Login screen is presented and user enters a remote access password. Authentication uses Challenge Handshake Authentication Protocol (CHAP) so usernames and passwords are encrypted.
Authentication Handoff	Authentication credentials are passed through the ISP RADIUS server to a corporate RADIUS server (Novell BorderManager).
Authentication	Using eDirectory, DirXML or another LDAP method, the user's right to access services is confirmed and the username and password are authenticated.
Internet Access Available	Once authenticated, the user is connected to the Internet via Novell Remote Access service. Web browsing and access to any resource that is published to the Internet is available.
VPN Established	To access secure corporate systems, the user initiates a VPN connection, typically using Novell BorderManager VPN client software. At this point, all resources (including Web portals, applications, files, peripheral devices, storage, etc.) to which the user is authorized are available.

1. User selects current location from client dialer list and connects to ISP



2. ISP submits user credentials via RADIUS protocol through Internet to corporate RADIUS server



3. On authentication, remote user can establish VPN tunnel



4. Corporate resources are now available to remote client



Tangible Benefits

The Novell Remote Access solution provides tangible value for both users and administrators as well as a quantifiable return on investment. The benefits gained from implementing a global remote access solution include the following:

Simplified User Access Across the Globe - The primary beneficiary from implementing Novell Remote Access is the mobile user. The complexity of determining a feasible connection and then establishing contact is significantly reduced. Novell Remote Access enables access to a corporate network regardless of the method of Internet access (dialup, DSL, cable modem, ISDN, etc.). Users simply identify their current location and the rest of the process of authentication and connection to relevant resources is handled automatically. There's no need to locate and key in numbers, enter credit cards or codes, remember multiple user ID and password sequences, or manually map and establish connections to specific resources. The process can be as simple (and familiar) as logging in to a desktop at the office. Users can be more mobile if needed, more flexible in location, and more effective or creative in accessing internal resources while away from the office. In simple terms, Novell Remote Access enables individuals to work anytime, anywhere—simply and effectively.

Higher Productivity - Novell Remote Access makes connecting to corporate data fast and easy. The hassles of finding or maintaining lists of local access numbers, time spent in entering credit or phone card numbers, inconsistency in dealing with multiple interfaces, and other inconveniences are all eliminated. Users can consistently and securely access corporate networks without tedious, error prone or confusing steps. The result is higher productivity and more efficient use of mobile time.

Reduced Costs - Implementing Novell Remote Access cuts costs in three major areas—reduced equipment needs, lower implementation and management costs, and lower remote access charges. Many of today's enterprises have significant investment in and continue to support extensive modem banks. With Internet connections, modems, communication servers, and telecom equipment for multiple incoming lines can all be eliminated or at least significantly reduced. WAN hardware and maintenance can be reduced or eliminated in favor of lower-cost, Internet-based access.

Management and support costs are significantly reduced. Less hardware and centralized user administration reduces IT management costs. Self-service and simplified connection processes lower the need for expensive support and help desk services to mobile users.

Using the Internet as a VPN infrastructure is far less costly than dedicated private connections with one fifth to one half of connection charges being eliminated. In addition, remote access charges can be aggregated and reduced through use of special rates from a global carrier. Individual charges from long distance, credit card, phone card, hotel surcharges, and broadband access charges can all be eliminated and replaced with one itemized charge from a single provider where prices are reduced based on negotiated contract and volume. There is no need to maintain costly 800 or other toll-free numbers for remote dial-up access. In some cases, 90% cost reduction can be realized across infrastructure, connection, and management costs.

Reduced Administration and IT Support - The largest single factor in reducing administration is the elimination of multiple user directories. Practically all current implementations for remote access maintain one database with usernames and passwords for remote connectivity and another for network resource authentication. The Novell Remote Access Solution centralizes user information to a single point—eDirectory. In addition to remote access user info, eDirectory provides a single identity instance for authentication to any other network application, resource, information base, peripheral, connection or access point. Establishing a

user identity once provisions them for all other authorized resources. Modifying or updating user information once through eDirectory updates it for every authorized resource—including the designated service provider or ISP. There is no further need to maintain separate/duplicate user repositories for remote access or manually update and share user credentials with a service provider.

IT hardware administration is also reduced as modem banks, communication servers and supporting telecom equipment is eliminated. Maintaining, servicing, or replacing remote access equipment is not necessary and staff hours used in these activities can be applied to other areas which are more mission critical.

Support costs are also reduced as users can often provision themselves without IT intervention. Using familiar, Web-browser based screens users can install the remote client software and authenticate with existing network credentials. The process is intuitive, easy and generally requires no help desk support.

Better Security - A primary security benefit is that user authentication information virtually exists in only one location. There is no need for an in-house directory for network access and another at the ISP or service provider. Changes such as user adds, deletes or modifications are made once and immediately reflected for use by all resources including connection providers. Users can be immediately barred from or granted internal and external access with one simple operation.

Quantifiable Results - Implementing Novell Remote Access yields immediate and quantifiable results. An enterprise company with 5000+ employees discovered remote access costs ballooning with the increased demands for mobile access. After implementing Novell Remote Access, the company achieved a 75% cost savings (\$900,000 per year) just in telecom fees while at the same time experiencing a 300% increase in usage. And this figure doesn't include the less quantifiable benefits such as the elimination of hardware maintenance and infrastructure costs or the increased user satisfaction due to improved access.

Tracking 'real' remote access costs can also be a significant benefit. Novell Remote Access makes it possible to easily track and allocate costs by user, group or department. This contributes to positive results in two ways. First, a quantified real cost helps users understand the expense of remote access and make decisions on connection methods that are cost effective. And second, quantified remote access costs can be charged to individuals or departments, or at a minimum be used to justify IT budgets. In an actual case, Novell Remote access implemented in an organization of 3500 employees with 700 regular remote workers paid for itself in three months, delivering a 224% ROI in the first year.

Summary

For enterprise organizations that are focused on enabling remote access for mobile clients from various locations, Novell Remote Access is an ideal solution. Users are securely connected to internal corporate resources from any location on the planet with only a local phone connection. The client user experience is simple, intuitive, eliminates support headaches and can even be implemented through self-service. eDirectory ensures that only authorized and credentialed users are able to access internal resources and BorderManager's VPN capabilities provide a highly secure, encrypted connection session. Remote users can access multiple types of corporate resources or the Internet including intranets, e-mail, files, applications databases, and peripheral devices.

Using Novell Remote Access lowers IT costs by eliminating the need for hardware and cutting connection charges. WAN charges can be eliminated and dialup fees aggregated and reduced.

A common directory also simplifies the management of remote user identities by eliminating manual update and coordination activities.

In summary, combining the capabilities of Novell Remote Access with the communications infrastructure of the Internet provides a complete, comprehensive and cost efficient solution for effectively handling the demands of today's mobile and remote users.