# Understanding Remote Computing

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# Understanding Remote Computing

## Can the Remote Workplace Improve Profits?

Can remote technologies make better use of the systems you already have in place? Can they make more efficient workers? Can they manage the allocation of resources? Can they lower overhead? Can they improve profits?

In the pages that follow, we will give you a firm foundation on the technical issues of remote access in your terms — the broad perspective of a business manager focusing on business decisions and potential for profits.

Explore the critical issues of remote computing today: increasing reliance on network services, a growing mobile sales force, abundant use of laptop computers, a trend in work-at-home employees, and telecommuting as a way to decrease environmental pollution.

Consider the advantages of remote access to a corporate network for mobile salespeople, consultants, and engineers who can use remote offices to do work best completed on the customer’s site but with the resources of the corporate network. Telemarketers, support personnel, writers, accountants, and planners who can work at home if they can be linked to office automation and corporate databases. CEOs, division heads, and managers who can stay informed and make decisions through electronic mail and other tools on the road or from home. And branch workers who can function from the field with all the sales, marketing, inventory, and application resources of headquarters.

Several specific recommendations and examples of successful remote implementations are included as well, to help you determine if remote LAN access is a viable option for you.

# Understanding the Opportunity

## A New Paradigm for Work

What people accept as natural, commuting to work in the city, in fact is a routine of the recent past. One hundred years ago, few people worked in factories or at central offices. Shopkeepers, farmers, and tradesmen — the bulk of the working world — lived on the same property where they worked. Home and office held no separate distinction.

Then came a new paradigm. Enabling technologies such as the automobile, and later the airplane, could overcome great distances and collect people in factories and offices to concentrate their efforts and enable them to work more efficiently. People changed to accommodate this new style of working.

Today, we stand on the threshold of another paradigm shift — a shift brought on by technology which can collect people and machines without travel. In one way it will take us back 100 years to the time when the distinction between one's place of dwelling and one's place of business was unimportant. In another, it will take us ahead to the day when places themselves are altogether irrelevant.

The remote workplace links people to their work in a way unimagined even a few years ago. We will show you how this new concept can make you money and extend your resources, or do just the opposite, sapping capital and time, if applied incorrectly.

There are around 300,000[1] remote offices in the United States today, many more around the world. Salespeople, claims adjusters, analysts, consultants, traders, reporters, managers, and executives log onto corporate networks regularly. They do so because of three important enabling shifts: new technology, new organizations, and new regulations.

### New Technologies

One of the fastest growing computer technologies is that of the portable PC. The portable PC currently accounts for 24% of the total PC market. That number is expected to increase to almost 55%[2] this year. Never before have so many had the opportunity to be so mobile.

Additionally, advances in modem technology have fueled the possibility of remote access. Not only have modems become more portable, but faster and cheaper too, with built-in compression techniques that make the concept of remote access a viable option. As you will see, modem speed is the critical link in many remote chains.

The emergence of Integrated Services Digital Networks (ISDN) also brightens the future of remote computing. This transmission technology approaches network speed and reliability. A dedicated ISDN also circumvents a tangled and often expensive web of national phone carriers such as those in Europe.

Perhaps more important than the technology itself is the perception of the technology. The most significant change has occurred within corporate MIS organizations. When computing began, the mainframe was a very complex and controlled piece of equipment. Then, as local area networks and inter-networks developed, MIS organizations had to shift their emphasis away from control and toward access. With the advent of remote computing, MIS duties shifted full circle to managing the flow of information from one person to another.

### New Organizations

In response to economic pressures, corporations are migrating toward a decentralized, distributed organization to achieve shorter product development cycles, greater responsiveness to customer needs, and faster reactions to a rapidly changing marketplace.

A trend toward branch offices, cottage offices (home or 2 to 3 user offices), and fewer layers of management is chiselling away at the headquarters-based corporation of the recent past. When a company distributes its work force, talent can be selected from a greater number of regions, and with the ability to offer a “home-office” program, it can attract better and retain more employees. The net result is a company structure quicker to respond to changes in market conditions by placing more representatives in more regions.

### New Regulations

Assorted state and federal legislation will have an enormous impact on client-to-LAN and telecommuting technologies. But none more than the 1994 amendments to the Clean Air Act which target regions with excessive ozone and carbon-monoxide pollution, the type of emissions commonly caused by automobiles.

The Clean Air Act encourages companies to promote carpooling, mass transit, company-arranged transportation — even bicycle riding and working at home. Government officials hope to eliminate about 20 to 25 percent of the automobiles involved in daily commute traffic. Typical telecommuter jobs would be sales and marketing, field service and support engineers, programmers, and those people where a home “virtual office” basically duplicates all the requirements and business tools found at work.

1 The Emerging Remote Access Market. Infonetics Research, Inc.,1994.

2 Forrester Research, 1992.

## Corporate Networks — The Foundation Of Business

According to the *Wall Street Journal*[3], networks have had more to do with recent changes in corporations than any other factor. Networks have let people share information and resources and exchange messages quickly without being tethered to a telephone. This enables companies to redefine the workplace, disperse employees, and bring together remote company outposts.

Networks shift corporations from a geographical-based entity to an increasingly knowledge-based one. What this means is that the corporation is no longer contained in a building. It is instead the sum total of its stored information. Thus, leveraging information, or "knowledge assets," is the key strategic focus of the future for most enterprises. Already the network contains customer histories, inventories, accounting information, engineering designs, e-mail systems, planning instruments, market encyclopedias, documents, applications, and the like — all information which can be leveraged to make better business decisions.

Information contained in mainframe applications and databases can be extremely valuable if applied to the right situations. Client/server applications that can retrieve legacy data into more familiar graphical desktop applications are especially valuable.

In fact, so much of day-to-day business is related to computers and networks that if the network goes down, people often cannot work. Or, to take things one more step, being away from the office (and the network) is tantamount to the network being down for you.

Conversely, if you have at home or on the road what you have at work, then you can be at work. Looking at things this way, it is clear that "time management" needn't depend upon "place management." And you need not be any place special to get work done.

The component parts of remote computing are much the same, regardless of the technology used. For instance, each technology starts with a remote PC and each can transmit over various devices and carriers. It is the ultimate destination of the transmitted data that determines the benefits and limitations of each technology. In this section we will show you what different remote technologies have in common, and what makes them unique.

3 Technology, The Wall Street Journal Reports, November 14, 1994.

# Understanding the Technology

The component parts of remote computing are much the same, regardless of the technology used. For instance, each technology starts with a remote PC and each can transmit over various devices and carriers. It is the ultimate destination of the transmitted data that determines the benefits and limitations of each technology. In this section we will show you what different remote technologies have in common, and what makes them unique.

## Origination

### Remote PC

The remote PC can be an IBM® compatible running DOS, Windows,® or OS/2;® or a Macintosh® computer. It can be a laptop or a desk model. It can incorporate the latest, fastest chip, or operate with slower, older technology depending on the demands of the application or destination computer.

## Connection Devices and Carriers

### Modem

A modem is used to convert digital information as it is circulated in a computer, to analog information as it needs to be to cross a phone line, and then back to digital information again on the other end of the connection.

The modem is usually the slowest link in the remote chain, determining the speed limit to the remote network. For instance, a typical Ethernet LAN connection is 160 times faster than a 14.4 modem (see speed comparison on page 7). Still, the faster, the better. Modem vendors are constantly increasing throughput on their modems by adopting new standards and by utilizing their own proprietary technology. Updating a modem can be the easiest way to increase throughput for the remote connection. The 14,400 bps (bits per second) modem, now commonplace, is rapidly being replaced by a new standard which will operate at 28,800 bps. (To realize maximum throughput, a 16550 or better UART is required in the PC.) Each speed gain increases network efficiency on a logarithmic scale.

### Telephone Lines

Today, traditional analog (asynchronous) lines are the most popular communication method for remote users for a number of reasons:

- Widespread telephone service is readily available.
- Analog Public Switched Telephone Service (PSTN) tariffs are inexpensive.
- The technology is mature and well understood by companies such as application developers, security vendors, Internet service providers, and others.

Nevertheless, analog also suffers from several drawbacks:

- Transmission of data is slow — currently it’s maxed out at V.fast speeds (28.8 Kbps)
- The connections are occasionally unreliable or of poor quality.
- The system offers limited scalability to build large networks.

## X.25

Generally an X.25 network is a set of private lines dedicated to one company’s use. X.25 actually refers to the protocol, or agreed upon system of transfer, in use on such a network. However, the appellation “X.25” is casually applied to the whole network.

Essentially there are two ways to access an X.25 network, either through a modem and a telephone line, or directly through an X.25 card in the PC. The former system occurs often in North America where the price and quality of telephone lines are consistent. In Europe and elsewhere, the latter is common. When data leaves the computer via a modem, it travels a relatively short distance as analog information en route to the X.25 network. At the gateway to the X.25 network, a PAD (Packet Assembler/Dissembler) converts this analog signal to a digital one and sends it off over the X.25 network. This same result is gained directly with the X.25 card in typical European applications of X.25. In either case, the data reaches the X.25 network “cloud” and travels to its destination where a server with an X.25 card unloads the data to a LAN.

You might think of the X.25 approach as similar to walking to your car (PC to modem), driving to the airport (modem to PAD), flying across country (X.25 network), getting in a taxi (server with X.25 card), and arriving at your hotel (the LAN).

X.25 networks are generally implemented as a solution to cost or quality constraints. Typically, parts of the X.25 network operate at 9,600 bps, the same speed as many older modems. Necessarily, the entire network is only as fast as its slowest link. Thus, X.25 does not offer speed or data throughput as advantages. It does, however, offer cost and reliability advantages since the X.25 network is entirely within the auspices of the corporation. In Europe, X.25 networks can span several national telephone systems, saving switching costs and quality loss. In North America, on-line services such as CompuServe,® offer X.25 value-added networks to corporate clients for competitive flat rates plus usage costs.

## ISDN

An Integrated Services Digital Network (ISDN) does not need a modem. An ISDN terminal adapter on the PC sends data out in digital form to travel across phone, fiber optic, or high bandwidth lines to another computer without the need for modulation to analog signals. This keeps the transmission running as fast and error-free as possible.

ISDN will offer affordable, fast, high quality transmission of data, voice and video when universally available. For instance, standard voice lines today can carry up to 28 Kbps. ISDN dramatically increases throughput up to 128 Kbps. ISDN also offers the opportunity to compress the data using one of many standard compression systems. This effectively increases speed by sending more information over the same time constraint. By coupling ISDN with data compression, remote users will be able to achieve exceptional data throughputs, up to 384 Kbps, making ISDN one of the most likely connection methods of the future.

Cellular

A cellular transmission simply adds another link to the communications chain.

Any cellular connection is simply a radio call to a transmission station, called the cell, where that signal is picked up and relayed to another station, eventually arriving at a hard wire and continuing on via the network of choice, be it a leased line or X.25.

A cellular modem converts the digital information to analog information in order for it to be carried on the radio waves to the cell much like a standard modem converts digital data from a computer to analog data to travel over phone lines. In either case, the data is carried on waves, whether through the air or on a wire.

One note, cellular data calls work exactly like cellular *voice* calls except they cannot reliably switch cells (which happens when traveling). So data cellular calls are best completed when stationary, for example from a *parked* car.

Soon, cellular calls will also be digital. This technology, called cellular digital packet data (CDPD), breaks data files into digital units, called packets, and sends them on upgraded cellular voice networks. Within the next decade CDPD will emerge as the standard for cellular transmissions.

## The Destination

Remote PCs can access a variety of destinations including other PCs, mainframe computers, and LANs. While the capabilities of PCs and mainframes are more obvious, the LAN serves much the way streets within a neighborhood help you access the homes there. The network provides “streets” to files, printers, applications like e-mail, and access to host computers. Each PC, indeed each device on the network, is like a home in the neighborhood. To reach the network is to reach all of the devices hooked up on that network. There are two common types of LANs: Ethernet and token ring. When connected to the LAN the remote user can do anything locally attached PCs do. A mainframe computer, for instance, could be accessible via a gateway on the LAN. Any network-mapped resource could be accessed, including special PCs dedicated to running network applications, such as file servers or application servers.

## Connection Technologies

Now that the pieces and options for remote access are clear, let’s organize them by the way they work, into groups of options selected. We’ll call these groups of options connection technologies.

The first two connection technologies, mainframe remote terminal and remote control, are an outgrowth of the original way computing was conceived. Both of these technologies treat the remote PC as a “dumb” device. Using these techniques, the remote PC is stripped of any processing obligation and functions only as a control and display device similar to the way a remote control changes channels on a television set. The third technology, remote node, treats the remote PC differently, as an extension of the LAN. Remote node treats both the remote PC and whatever it accesses as a viable processor and depends on each, to a certain extent, to do the work of computing.

Mainframe Remote Terminal

Essentially this technology connects a remote PC to a mainframe over a phone line, using a protocol like TN3270. When connected to the mainframe, the remote PC then emulates a terminal — issuing keyboard commands and displaying character-based applications that are running on the mainframe computer. Minimal processing takes place on the remote computer; it only relays instructions and displays results. This is true even if the mainframe is connected in another way to a LAN. The remote user cannot go beyond the mainframe.

On a small scale, for a small number of remote users who only need mainframe applications, this system proves very efficient. But, on a large scale, mainframe connections are limiting and can be redundant to other connections already configured in the corporation. They also make no use of lap top processing power.

## Remote Control

Remote control technology enables a PC to link to another PC using a modem and a telephone line. Under remote control, the destination PC processes the application receiving *input from the remote keyboard and mouse, and sending screen output to the remote monitor.* The remote computer handles no processing. This system would be like literally stretching the keyboard and monitor cable from a bus station in Bangkok (or wherever you call from) to the home office in Bangor (or wherever you call to). This means the user *must* work on the hard drive of the destination PC. All files and applications reside there and remain there, as does access to the network. Examples of this technology include Carbon Copy and PC Anywhere.®

This technology was invented to handle character-based applications with relatively small input and output demands. When Windows-based applications became widespread, the technology bogged down because graphical-based input and output required more information to be passed over the modems and phone line. However, recent advances in reducing the necessary load of data for Windows application input and output have renewed its workability. Several problems still persist in the practical use of remote control:

- There typically has to be a dedicated PC for each user dialing in, making equipment costs very high
- The user must be connected to run an application; users have no independent functionality despite having applications at the remote PC.
- Access is not transparent (applications run within applications adding to complexity and confusion).
- Performance of the remote PC is *always* dictated by the PC it is connected to.
- User entry into corporate computers is on an individual, unmonitored, andunsecured basis.

With remote control technology, each user multiplies the potential for security and management breeches. In fact, once the remote user reaches a destination PC on a network, the remote user can direct his hard drive to all networked devices, gateways, and ultimately to corporate hosts. With so many potential points of access to the network, security is unmanageable.

## Hybrid Remote Control Technologies

Multiprocessing is one way to address the cost/performance concerns of remote control. Essentially, multiprocessing is a way of dividing one PC into many sub-PCs each of which can run separate versions of remote control software, concurrently. This can be done with hardware, or virtually, by tricking the PC with special software to think it has many different CPUs.

Another hybrid is the *remote control server*, a PC on the network which is pre-loaded with programs remote users need to use. The server sends screen information and receives keyboard and mouse information from the remote user. Actual processing takes place on the LAN-based remote control server, so it is ideal for data-intensive applications like database programs. One possible drawback is that the remote control server usually must have all the programs each user needs, already loaded. Users will not be able to process files on their remote computers, they actually work on the server.

Another way to efficiently process data-intensive applications is an *application server*. The application server directs a remote computer’s demand for an application to a file server where that application is stored. Then the file server sends the program to the application server and, in turn, it returns the

screen info to the remote computer. While this may sound more complicated than the remote control server, this system actually makes better use of existing LAN resources and is not limited by the memory capabilities of the remote control server described above. The file server is already on the LAN with the applications needed for those LAN users and now can be accessed by the remote user as well. An example of this kind of technology is RLN® Application Server, from Attachmate.®

Application servers are very powerful and since they do the processing, they can give remote PCs a CPU-like upgrade. So, a 286 remote PC could get the speed and processing power of a Pentium-based application server by dialing in. Better yet, multiple users can execute application programs on the server. A multitasking environment is used to support multiple remote users from a single microcomputer directly attached to the LAN.

Application server technology has become a key component in solving many of the problems previously inhibiting the deployment of network remote access solutions. However, the remote PC still must be connected to the network to run applications.

### Application-Specific Technology

Many software vendors have developed ways to access their own products remotely. A common example of such application-specific remote technology is found in e-mail software. Unfortunately, this kind of remote access technology cannot be used to access anything except a specific vendor's software product. This, therefore, offers only a narrowly defined solution to remote access and makes incomplete use of the network infrastructure. However, application-specific products are precursors to a more open, remote node technology, detailed below.

### Remote Node

Using remote node technology a user dials into the LAN instead of into a specific PC. This extends the LAN to the remote PC enabling the user to do anything offered by that LAN, including e-mail, mainframe access, applications like groupware, and network printing. Attachmate's RLN is an example of one product employing this technology.

Under this technology the remote user runs applications and saves files at the remote PC. Input commands from the keyboard and mouse do not travel over remote lines, they work locally. So there is no potential for a bottleneck. However, by extending the LAN across remote lines, it no longer works at Ethernet or token ring speeds; it works at modem or ISDN line speeds. Typically this is not a problem until large files must be transferred across the remote connection. Consequently, passing large files, like database files, across this link can make remote node technology unsuitable unless used in conjunction with an application server.

In terms of feasibility, remote node makes best use of the network infrastructure already in place. There is no longer the need to maintain a 1:1 ratio of field to office computers since the remote users can log into the network on a server, a device which extends entry to the LAN to multiple users.

One caveat: Node access products provided by some network and modem vendors favor a particular and proprietary network operating system. Using such a system for remote access can preclude access to environments where several operating environments are expected to coexist. Banyan,® Novell,® and Microsoft® all provide remote solutions specifically tuned to their own preferred network operating system.

Conversely, a node solution that is transparent and non-proprietary can access different networks and their distinct protocols and operating systems. And it offers the best opportunity to manage and secure access because all entry to corporate computers is through a server located on the LAN.

# Understanding the Issues

Let’s take a look at the ramifications of the choices in technology.

## Openness — Hardware and Software

Whether using a Windows-based computer at home, an Apple® PowerBook® laptop from the field, or a Unix workstation at the corporate LAN, users expect the same procedures and level of network service. In turn, a small branch office will demand high performance, dial-in and dial-out security, ease of administration, central network management, and a future pathway to client/server applications. A successful remote LAN access architecture must deliver client-level access to users even when the network computing infrastructure is unpredictable.

The typical network computing infrastructure combines multiple platforms from different vendors, employs differing network operating systems, physical-layer access methods (such as Ethernet, token ring and all their emerging bandwidth variations) and network protocols (TCP/IP, IPX,™ NetBIOS, NetBEUI, SNA, AppleTalk,® etc.).

Solutions that conform to industry-specified, non-proprietary standards stand the best chance of surviving technological changes. Some examples of such “open” standards are Point-to-Point Protocol, Simple Network Management Protocol, NDIS, and ODI programming interfaces.

Openness also pertains to applications. The optimal solution should be able to handle all corporate computing needs — even some which are difficult to anticipate. This means a non-proprietary system that can handle both data-intensive and graphical applications, word processing and spreadsheet software, e-mail, groupware, and mission critical client/server applications.

## Costs

If cost were no object, anyone could put together a perfectly functioning system. But often, cost is the main object. While a complete cost decision tree is beyond the scope of this paper, we can give you an idea of what to consider when selecting remote access components, at right.

Of course, there are many additional factors to consider. For instance, will added phone lines put you over your current PBX limit? Such factors will vary individually. For a more tailored analysis, use our remote access cost worksheet.

## Security

After access, security is the foremost consideration. Having all of your information systems — and, for that matter, all your information — accessible from a single point of entry is a major security benefit. Although it may be unrealistic to expect a totally impregnable environment, the solution that you choose should extend multiple layers of security. You should be allowed to select as much or as little security as your organization’s needs dictate.

Theft, disruption, and malicious intrusion by hackers are obvious problems for any corporation but even unintentional intrusion can cause an enterprise-wide network crash. Network administration of remote branch offices, employees with offices at home, customer/supplier “guest” accounts, or mobile computing users add to the burden. Required, then, is bulletproof dial-in security given the potential for an unpredictable network access. Conversely, it is imperative that network security operates within each site without undue hassle to legitimate users and network administration.

## Management

Information managers are asking for a remote solution which lets them configure, monitor, and troubleshoot from any PC on the LAN; includes a single access server as a primary entry point for all remote user information; provides an easy way to organize their users into logical groups; and provides a way to track remote users and their LAN usage.

## Reliability

Of the utmost importance is the reliability of a product. Any viable solution must include a hot backup feature in case of a remote access server failure to preserve access to the LAN and valuable data.

## Support

Putting together a corporate-wide solution can be complicated. When evaluating a solution, be sure to evaluate the company behind the product. Select an organization that is knowledgeable, willing, and able to help you through any early growth and implementation stages. Once in place, your selected solution should be easy to manage.

# Understanding the Paradigm

According to the Gordon Report[4], controlling expectations can be the key to successful implementation of the remote workplace. Often legitimate purposes are confused with more general goals which cannot be addressed by remote products. These pitfalls are outlined below.

Remote access is not a panacea for corporations. It is a tool which solves problems and should be applied in the situations which merit it. To succeed, remote access must be part of an overall plan to accomplish specific goals. The column on the left highlights several legitimate goals and shows that implementing these goals comes from a combination of sound technology and management. To be accepted, remote access must benefit both employees and corporations, producing more income and reducing workloads.

4 Gordon Report, 1992.

## Remote Demands

Demand for a remote workplace typically starts with mobile employees. Sales and other client-intensive occupations greatly benefit from the transfer of activities such as filing paperwork, completing applications and orders, and checking inventories from plaza lobbies or automobiles. Eliminating a 20 minute drive to and from the office, even a branch office could add another 100 sales calls per year per salesman. Generally, the mobile worker offers little resistance to this paradigm because it pays off in higher sales.

The next tier is executives and managers away from the office. When an executive is on the road, it is important to retain the opportunity to use that person as an expert. Remote access permits professionals to reference e-mail and research files from anywhere they must travel. What professional wouldn't rather apply billable hours during downtime in a hotel suite to save precious time for other activities?

Finally, eliminating a worker's daily commute can raise output. Often the noise, the interruptions and the endless meetings that take place at work are peacefully absent at home or on the road.

## Remote Distractions

The remote workplace is not without distractions. For many employees being forced to work at home is subtly demoralizing. Plus, the change of venue shifts many burdens to the individual. Where once corporations endured the pilfering of pens and Post-It notes from work, today the employee is faced with a subtle hike in electricity, insurance, and other company-caused costs. A plan for compensation should be part of the corporate benefits package. And regularly scheduled meetings, whether weekly, quarterly, or even less frequent, help refuel determination.

Another concern is keeping workers on task. The temptation runs high in some to clean the house at the sight of a dust bunny in the corner. The network itself can be a labyrinth of toys which sap time from important tasks. And then there's the TV, the refrigerator, and the exercise bike. Plus many parents attempt to watch their children while working. The best policy is to keep employees away from household responsibilities while on the job.

The kind of people who do best in remote computing are people who have been in their jobs long enough to solve problems on their own. Those who demonstrated self-discipline and self-motivation in the office will likely exhibit similar behaviors at home.

Beware, too, of workers who cannot stop working. Employees are captive in their remote offices, able to receive phone calls or faxes deep into the night. Despite working 90 hour weeks, many untethered workers may actually feel they are falling short because there is little feedback. Although toiling at home, remote users should be subject to the same performance metrics as office-bound workers. Telecommuters need a well-defined list of objectives and checkpoints and a timetable that's regularly reviewed.

## Methods of Collaboration

Teamwork is another part of work disturbed by the remote paradigm. Although day-to-day contact with co-workers is lost, a new type of collaborative work has emerged to replace it. This networked electronic form of collaboration is a new software genre known as groupware. Groupware products permit remote and traditional workers to log onto a server and ideas.

Attachmate’s OpenMind™ is one such product. It enables corporations to set up a collaborative workspace, an in-house information service similar to an online service but dedicated to corporate needs. Through groupware like OpenMind, workers separated by distances can still work together on documents and have discussions threaded like conversations. The product saves a tremendous amount of travel but more importantly adds collaboration to the list of tasks which can take place outside of the traditional office walls.

# Understanding RLN

## Real-life Solutions

Today many corporations find themselves in an evolutionary posture, evaluating and implementing client/server and remote access solutions to comply with corporate or regulatory edicts.

## Complex connections

*Faced with stringent regulations, one such company met industry regulations with Attachmate's RLN. Chosen for its ability to work with various types of networks and hosts, RLN permitted a score of developers to work at home with no loss of productivity. The setup was complex, requiring support for a DEC ® PATHWORKS™ LAN and three different host types, DEC VAX,® IBM AS/400,® and IBM mainframe. Some users log on for 8 to 10 hours per day.*

The remote node approach is a very flexible architecture that is not tied to any particular transport technology. It offers open, seamless integration into existing infrastructure, with the best potential for management and security. Remote node technology also insulates users from emerging trends and allows administrators the flexibility to migrate to whichever transport best suits their overall enterprise strategy. Administration is also flexible as to location.

### Always in touch

*For instance, a leading insurance company now uses Attachmate's RLN and laptop computers to manage its corporate network. Network administrators no longer languish through sixteen hour days. Instead they keep banker's hours and a beeper in case of emergency. When there is a problem, the support person answers the beeper by dialing into the system on RLN. From there he or she can troubleshoot the entire network.*

Remote node addresses all the remote user tasks, making this technology the most efficient access method of choice. Since remote node turns portable PCs into actual nodes on the network, your remote users have the option of running any application over a transparent communications link. The remote user simply dials into the LAN and works just as if they were locally connected.

### Hazardous duty

*This sort of solution is in practice on offshore production platforms. The unmanned platforms are hooked to a LAN hundreds of miles away via Attachmate's RLN. The LAN allows offshore operators to coordinate the flow of oil and natural gas into pipelines and to monitor the status of wells and production equipment, often located on unmanned platforms. Close a valve? Operators with Windows-based controls simply point-and-click with a mouse. Back on shore, the LAN helps managers make fast business decisions by providing real-time data on flow rates and customer usage.*

However, for data intensive applications, remote control works best. Use of the RLN Application Server solves many of the problems associated with remote control.

### Instant background

*For instance, a major TV network installed RLN Application Server so its field reporters could access a corporate electronic database and use e-mail to obtain background information for their news stories. This means a field reporter with a 286 notebook in Little Rock can compose a news item and transparently file and distribute the story in New York.*

Typically, the best solution is to put remote node technology in place with an application server on top if the applications require it.

## Why You Should Choose RLN

RLN is the only integrated remote node and multi-user application server (remote control) solution available today. This means you can get optimal performance for applications suited for either remote node or remote control technology in one product. Better yet, using RLN's unique integrated technology is entirely transparent. It's configured to run applications optimally — users do nothing extraordinary, simply clicking on icons as they would at an office-based PC. It is easy to deploy, open to any network protocol, any hardware configuration, and works with any software application.

### Transparent Access

With RLN, the remote user dials into a server which puts the remote PC transparently onto any LAN. It works with virtually any modem, even cellular ones, via an X.25 cloud or ISDN. The RLN Application Server software is installed on a separate network PC and uses award-winning Citrix® core technology to enhance the performance of data-intensive applications on Novell and TCP/IP networks over dial-up connections. Once connected, remote users can do everything local users do: check e-mail, access mainframe information, run groupware applications or use a network printer. Remote users can also reach the RLN Application Server, located on the LAN, to run data-intensive applications.

### Access to Any LAN, Any Data, Any Application

RLN and the RLN Application Server provide open, efficient access to any LAN, any device on the LAN, and any application running on those devices. For instance, multiple users can run data-intensive programs loaded on a file server. The users only receive screen and keyboard updates on their PCs — the most efficient way to operate such programs remotely. Speed and performance improve dramatically. Response time is often up to 300% faster than conventional setups. Users can also hot-key from one application to another to speed up remote use of network resources.

No other remote access product offers the protocol versatility of RLN. Each remote user can accomplish the full range of his or her computing needs regardless of where he or she is located, anywhere in the world. At the same time you protect your current investment and maintain flexibility for future growth regardless of emerging platforms, environments, and protocols.

### The Fastest Path to Information

What if your applications are mixed? The RLN client software can be set up to detect when to use remote node or remote control (application server) technology. It's easy to configure and gives users the most efficient pathway to information automatically. For example, a groupware application, such as Attachmate's OpenMind, will not likely need improved RLN Application Server performance when running remotely. But a non-distributed database application, such as Paradox, will. The client software will know which technology to apply to an application transparently. Only RLN can claim efficient performance with any and all applications.

### Lower Cost

From a cost perspective, RLN requires less hardware than other solutions because there's no need for a 1:1 field PC/office PC ratio. This means RLN can get the work you need done remotely at a lower cost per remote user.

Unlike traditional remote control software, RLN Application Server supports multiple remote users from a single server PC and provides the scaleability, security and administrative features needed for extending the LAN to a large number of remote users. This feature can save a lot of hardware, and a lot of money.

### Ease of Use

RLN can be so transparent that you don't even have to know it is actively at work. First off, you can automate routine tasks, so a lengthy log-on sequence can be accomplished with a single keystroke. Better yet, you can embed RLN into an application. By simply starting that application, the remote user will automatically dial directly into the network. So, a user could dial and connect to the network from within a sales automation system without ever opening the RLN client user interface. This can greatly reduce the need for training.

### Versatility

Should you also need to provide remote users access to your mainframe or midrange computers, RLN is optimized to work with Attachmate's complete line of host information access software for IBM, DEC, HP,® UNIX, and Unisys® platforms.

### Security

Ease of access is important for authorized users. But it is imperative to deny access to unauthorized ones. As a single point of entry for all of your information systems (and all of your information), RLN offers you multiple layers of security and works with third-party security devices should you want to customize your security further. Security features include:

- Password aging
- Connection-time restrictions
- Dial-back
- Data encryption
- Remote Security Adapter
- Third-party security compatibility
- Challenge Handshake Authentication Protocol
- TACACS protocol

With the RLN Application Server, you never have to worry about unprotected data because an additional multi-level security system is included. Plus, if a communications link unexpectedly terminates, the RLN Application Server saves the work and protects it with a password. Then a user can immediately resume working where he left off once the connection is re-established. (For more information on security refer to Attachmate's White Paper entitled "Remote Network Security.")

## Management

RLN's management features make it easy to implement across the enterprise. Using the Standard Network Management Protocol (SNMP), you can add and remove users, configure comm ports and monitor communications from any LAN PC — even one remotely connected via RLN. Plus RLN is compatible with third-party SNMP products that you may wish to add.

RLN offers several other more technical features which are outlined in our brochures and product profiles such as server hierarchy and domain segmentation. These features let you quickly distribute, duplicate, and re-route information to remote users in the event of equipment or line failures. Such features protect not only your data, but also your productivity potential. Plus you can organize users into logical groups to better configure, monitor, and track usage for billing purposes, for instance.

Maintaining and administering software is a hidden, on-going cost you might not have considered. RLN can minimize this cost much better than competitive products with its client-build utility. Remote users just install the disk that you've preconfigured with the needed applications and they're ready to connect.

## Configuration Options

RLN is the only product available as a software-only solution or pre-configured server hardware ready right out of the box.

### RLN Server Software

LAN-attached PC software that lets remote users access all network functionality.

### RLN Access Server

RLN Server software and cards pre-installed on a custom Pentium® PC.

### RLN Application Server

Optional server software for processing data-intensive applications sending only screen and keyboard commands to the remote RLN client.

### RLN Client Software

Software that's loaded on a remote PC that connects the remote user to the RLN Server and allows remote users to function as nodes on the network.

Remote access is a complex subject which may require additional study. If this paper raises unanswered issues regarding remote access, or if you'd like more information about RLN, call Attachmate at 800-426-6283 for additional assistance.



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