Directions in Mobile Computing: IBM's 8235 Dial In Access to LANs (DIALs) Server A Technical White Paper

Abstract

In this paper, we discuss how the remote use of telecommunications services is changing the way we live and work today. Mobile professionals need the ability to work as easily and effectively from any remote location as they can from the central office.

We then discuss how the IBM 8235 DIALs Server can be used as part of an end-to-end solution for remote users. DIALs supports both ISDN and analog technology and provides manageability, connectivity, and security features.

Introduction: Could a Laptop Have Changed the Outcome at Waterloo?

Who knows when and where the virtual-office revolution began? Maybe it started one evening in 1805 when Napoleon lugged home a saddlebag full of battle plans, spread maps and papers over Josephine's dining room table, and worked through the night.

As dawn broke, the sleepless Bonaparte no doubt would have traded a wing of his palace for a ThinkPad and modem that, in an instant, could transmit new troop-deployment diagrams to his field marshals in their muddy dugouts.

Today's bank presidents, insurance adjusters, editors, teachers, sales people, and yes, the generals as well—all of them want real-time communication with their teams. And they're doing just that from cars, planes, trains, hotel lobbies, and dining room tables.

Remote Users of Various Stripes

The remote user is anyone who spends significant time away from the office and has a daily need to access people, tools, and data via the company communication system. Most remote users fall into one of three major categories.

The *mobile* employee is the insurance adjuster, circuit court judge, salesperson, UPS driver—the user already versed in use of the ThinkPad computer, pager, and cellular phone. In a perfectly fashioned mobile environment, mobile employees can work anywhere, any time, and still be as in touch as people in the central office.

The telecommuter is an *office* employee who splits the work week between a traditional office and an at-home office. This user typically uses stationary technology—desk phone, desktop workstation, full-size printer. Telelcommuting is a lifesaver for a single parent, a person recovering from illness, or the urban salesperson whose home is across the city from the central office.

An *alternate work site* employee spends the day at an established work location that is outside the home but not at the company's central office. More and more employees are setting up alternate work sites in productivity centers strategically positioned near main highways or airports. Such centers provide shared desks, team-meeting rooms, office supplies, copying equipment, and clerical support.

All three of these categories are mushrooming. Already there are more than 300,000 remote offices in the U.S., and the white-collar worker's emancipation from desks, time sheets, and computer cables has barely begun. A recent survey indicates that 92% of executives whose firms offer telecommuting options agree that the trend benefits companies as well as employees. A State of California pilot program found that telecommuting increases productivity by 10 to 30%. Moreover, some employers have experienced a reduction of office-space needs by as much as 33%.

For *road warriors,* the benefits of remote computing are obvious: no more notes scrawled on legal pads; goodbye to waiting for that thick data readout to be delivered tomorrow via Federal Express. With remote computing, road warriors can

double their effectiveness by combining face-to-face customer contact with easy access to real-time data on factors such as deliveries, prices, market trends, inventories, and ship dates.

Recent national legislation has indirectly but effectively encouraged employers and workers to jump on the remote-user bandwagon. The Clean Air Act amendments of 1990 require 13 key cities to achieve drastic reductions in commuter traffic. The legislation specifically requires those cities' employers with more than 100 employees to develop plans for improving their passenger-per-vehicle commuting ratios. To comply with these statutes, one Fortune 500 company already is requiring its New York City-area employees to work at their homes at least one day per week.

The Family and Medical Leave Act is another strong motivater. Employees on maternity leave or recovering from illness no longer have to remain out of touch with the workplace for months at a time. With ThinkPads and modems they can make a part-time contribution while their bodies are recovering and get up to speed much faster once they return to work.

Atlanta, which expects half a million guests for the 1996 Olympics, has warned local commuters that they'll have a tough time driving to work during peak Olympic-activity days. Telecommuting offers a simple, effective solution that's a lot more attractive than sitting in gridlocked traffic or spending the night at the office.

Throughout our matrix of business, government, and industry, one thing is clear: If you need to be on the LAN but you can't be in the office, it's time to telecommute.

Working the Kinks out of Virtual Togetherness

We've come a long way from the days when we bragged about our 1200-baud modems. The problem is that the complexity of the transmitted data keeps growing faster than current technology can move it. Photos, diagrams, voice, real-time and multimedia traffic—all of these must-haves are chewing up bandwidth and challenging our traditional, PC-based dial servers.

Your users don't want to hear about system limitations or budget squeezes. They want to sit in motel rooms or their living rooms and enjoy full LAN service as if they were back in the office. There is a solution.

The IBM 8235 DIALs Solution

Install an IBM 8235 Dial In Access to LANs Server (DIALs), and your remote user is no longer the system stepchild. The 8235 DIALs makes the system think that those laptops in Peoria and Oswego are sitting on the LAN.

The 8235 DIALs is a high-performance, multiprotocol, multiport remote LAN access server. It supports dial-in from remote sites, dial-out to off-site services, and LAN-to-LAN dial-up connections.

The 8235 DIALs combines remote access, dial-up routing, and modem pooling in a single device that's simpler and less expensive and that requires less space than is required by multiple-device solutions.

The 8235 DIALs Looks Great to the User

The IBM 8235 DIALs server operates so transparently that few of your remote users will even notice it's there. What they will notice is the increased productivity supported by DIALs. It's the consummate, remote-access device, enabling users to transfer files, print documents, access e-mail and Internet, and even run applications or gather information from a central database. And users call up all of these operations through the familiar commands of their desktops or ThinkPads.

DIALs also performs many continuous, invisible tasks. It filters and buffers download traffic to eliminate superfluous network maintenance talk. (If the data isn't specific to a user's immediate application demands, the 8235 DIALs doesn't pass it to the user.) To streamline this process, DIALs uses leading-edge, data compression techniques that maximize the bandwidth of analog or digital telephone lines.

The 8235 DIALs Looks Great to the System Manager

The 8235 DIALs server isn't one of those devices that gives users what they want at the expense of more headaches for system managers. It offers manageability, connectivity, and security at an affordable cost.

Connectivity

The 8235 DIALs operates remote-to-LAN, LAN-to-LAN, or LAN-to-dial-out (modem pooling and fax-out). The client driver interface is compatible with NDIS and ODI. Protocols include NetBIOS, NetBEUI, TCP/IP, IPX, SNA, 802.2, and AppleTalk (Ethernet).

For WANS, DIALs supports ASYNC and ISDN. For LANS, DIALs supports token ring and Ethernet. In addition, DIALs can be integrated into an IBM Intelligent Hub equipped with an ATM backplane, to provide remote access to a high-speed, ATM LAN.

Accounting

DIALs incorporates an activity log that can be processed to provide usage information. The log can be set to automatically and periodically write its information to the 8235 Management Facility, thereby reporting information on user connects and disconnects, network events, beaconing, and soft errors.

Security

DIALs offers both device and network security. The 8235 DIALs can be managed with the 8235 Management Facility or a trusted SNMP management station. UserIds and passwords are required in both cases.

The 8235 offers multiple solutions for network security, including base security, Novell NetWare Bindery Security, Security via SecurID, and Blockade systems.

Base security features of the 8235 DIALs include:

- IDs, passwords, and encrypted passwords
- Callback support (including roaming callback)
- Password authentication function
- Aged, user-managed passwords
- TACACS client for DCE Kerberos server support
- Management Facility (administrator) ID and password
- Banner for informational or warning messages

In 1996, the 4.0 Server Refresh product will support the following additional security features:

- Digital Pathways Defender Server
- TACACS+ protocol (authentication only)
- RADIUS protocol (authentication only)
- SPAP Security Dialog

Managing and Configuring

The 8235 DIALs server can be configured and managed using any one of three methods: 8235 Management Facility, SNMP Management Station, or Operating System Shell.

8235 Management Facility: The 8235 DIALs server is best configured and managed by the 8235 Management Facility, a Windows-based application that allows an administrator to configure and manage single or multiple 8235s on the LAN from any authorized, LAN-attached workstation.

Installation of the 8235 Management Facility requires a LAN-attached, DOS/Windows workstation loaded with the NetWare 3.x client code. (The client shell is unnecessary if there are no Novell servers on the network.)

The Management Facility uses either IP or IPX to communicate with the 8235s. When IPX is running, the 8235s broadcast their presence on the network via Novell IPX protocol SAPs. Internally, the 8235 DIALs server has a virtual LAN that all remote workstations dial into as virtual on-LAN nodes. This virtual LAN has an IPX and IP router and a bridge for NetBIOS and 802.2-protocol network traffic.

SNMP Management: The 8235 DIALs provides full SNMP support. Working with BOOTP, the 8235 DIALs can be configured and managed by an SNMP Network Management station.

Operating System Shell: All 8235 DIALs parameters can be set via the operating system shell, accessible through any of the 8235 DIALs' serial ports via an ASCII terminal (or dial-up). This interface can be used in special situations (for example, at times when the LAN management network is unavailable). This parameter-set capability can be disabled on a per-port basis for security reasons. The operating system also can be accessed via a Telnet session to the 8235 DIALs server.

Modem Support: The 8235 DIALs supports more than 200 IBM and OEM modems.

Good News for the Hub Club: The full 8235 DIALs function also is available on a module that fits into your IBM 8250 or 8260, multiprotocol hub. Each 8235 module provides eight asynchronous ports; up to 14 modules can be installed in a single hub. This allows you to serve as many as 112 concurrent users from a single, rack-mounted 8250 or 8260.

How They're Using Our Products

An Earthshaking Development (True Story)

During major emergencies, remote access may be the only way for the team to stay connected. For example, a California telecommunications engineer awoke one morning in 1994 dreading another two-hour commute to his office in Orange County. Suddenly, with a mighty rumble, an earthquake wiped out Interstate 5 and surrounding highways, making the drive to work impossible. Telecommuting kept him in business during the weeks of earthquake recovery.

In fact, it worked so well for the engineer "and" his employer that he never spent another day in his old office. Even after the roads were repaired, he continued to telecommute, saving four hours a day and getting a lot more productivity out of his PC than he ever got from his car radio. Furthermore, this former commuter isn't exactly disappointed with the savings in travel expense—about $7000 a year.

Siren Song for Remote Computing (True Story)

The Buffalo, NY police department made a giant leap from a primitive teletype system to state-of-the-art remote LAN communication when it installed 8235 DIALs servers a couple of years ago. Now stolen-car reports, duty rosters, and fugitive descriptions speed across the city between 10 remote sites and police headquarters.

At the beginning of each shift, officers can review a binder containing up-to-the-minute printouts of all local and city-wide bulletins and special orders. One police-department technician says, "It's just as if we had a central computer in each district. But we don't—it's all done through our communications system."

Police Commissioner R.G. Kerlikowske says, "I use the system to dial into the office with my laptop. It allows me to stay involved and updated even when my schedule dictates otherwise."

Good Medicine (A Scenario)

The medical field offers numerous opportunities for remote-user applications. In Hong Kong, Dr. Wu is on call at home this weekend, but she's covering for Dr. Fong, who is relaxing aboard his sailboat. One of Fong's elderly patients calls in to report a numb feeling down her left side. Ordinarily, the covering physician would have to drive across town to the clinic and search for the patient's record before pronouncing a diagnosis or prescribing treatment. Dr. Wu downloads the patient's complete medical history to her ThinkPad and immediately prescribes treatment.

Virtual Library (A Scenario)

Harry, a college physics major, is pulling an all-nighter trying to make the deadline on a major term paper. Discovering a problem with his data, he bemoans the fact that the library won't open until 9 a.m. Then, he remembers that his roommate is in the virtual LAN program. He shakes Jim awake; they go online, access the library ROM, and the data is on-screen within seconds.

Whirlwind of Activity (A Scenario)

A midnight tornado tore the roof off the Daltons' house. The frantic family was pleased when Fred, the insurance adjustor, pulled into their driveway early next morning. Opening his ThinkPad on the hood of his car, Fred asked a few questions, filled out some on-screen forms, and zapped the claim to his home office. The check that came two days later resulted in a happy customer. The paperless claim transaction also greatly benefited the insurance company's bottom line. Win-Win.

School Daze (A Scenario)

Tom, the teenager, is in trouble with dad again. "You don't know what your math assignment is? Well, no, you aren't going to call Freddie and wake his family up at this hour! Anyway, if Freddie can remember the assignment, why can't you?"

This could be a non-problem if dad only knew that Tom's teacher posts homework assignments daily on the school's LAN server. With his ThinkPad and modem, Dad could set things right in a couple of minutes.

The moral of these stories and scenarios is: If your information is on the LAN, you can have it on your screen almost as quickly as you turn on the TV and get the evening news. One important difference: You must watch the news at the network's convenience, but you can access your information 24 hours a day.

Here Comes ISDN

In the immediate future, telecommuters won't just be dreaming of faster modems; they'll be eyeing ISDN transmission. Traveling on a T1 trunk, Basic Rate ISDN (BRI) transmissions race down the line on bandwidth totaling 128 Kbps or an apparent rate of up to 640 Kbps with built-in compression.

But there's a lot more to BRI than rapid data and reliable document movement. BRI is the remote user's ticket to a new spectrum of activities such as distance learning, sound transfer, affordable videoconferencing, collaborative CAD/CAM creativity, and interactive publishing.

BRI establishes a three-channel, ISDN-to-user connection on a single phone line. Two channels handle the flow of voice or data transmissions to computer, telephone, or fax. A third channel handles network setup information.

Maxing ISDN Power with the IBM 7845

Savvy remote users are using the IBM 7845 ISDN Network Terminator Extended to exploit the full power of ISDN. The 7845 creates a duplex plug-in situation that allows a user to transfer data at 64 Kbps while carrying on an analog phone conversation (or receiving a fax) on the second B channel.

The 7845 supports virtually any remote personal computer or workstation equipped for BRI. And of course it can be switched to devote the ISDN phone line's entire 128-Kbps bandwidth to the remote workstation.

The 7845 operates in concert with the IBM WaveRunner terminal adapter (digital modem), which converts the extra channel into a standard analog interface for connection to telephone and facsimile instruments. WaveRunner (a small adapter

easily installed in a PC) is a cost-effective, ISDN-connectivity solution for a small office, remote branch, or a telecommuter's home office. WaveRunner is available in both ISA and Micro Channel, and PCMCIA laptop versions. It manages ISDN B channel and analog communications with ease and also provides MNP 4/5 data compression. Thanks to its digital signal processor, it also supports a number of additional features including multimedia communications, video and data conferencing, image transmission, and high-speed file transfer.

You Ain't Seen Nothin' Yet

Primary rate ISDN (PRI) is coming on strong. In 1996, IBM will introduce a new remote-access server dedicated to PRI transmission for data flow via LAN-to-telecommuter, LAN-to-LAN, or data dial-out. ISDN (PRI) integrates twenty-three, 64-Kbps B-channel sessions per server connection. By aggregating (bonding) a multiple of these primary B-channel sessions, ISDN provides much greater bandwidth than is available with a single, basic-rate or asynchronous (analog) connection.

ISDN offers more robust performance, better connection reliability, and more precise link management of line rates and bandwidth.

Telecommuting: Major Lifestyle Trend of the Decade

Ever since the day when the first portable computer hit the retail market, the telecommuting age has been a certainty. After a couple of decades of talking about it, we have—almost overnight—embraced it as a major change in lifestyle.

Telecommuting beckons to network planners and managers alike. It offers enormous new opportunities for serving users; it also brings new challenges having to do with technology selection and security concerns.

There are scores of vendors offering workable pieces of the telecommunications and remote user puzzle. There is only one vendor, however, who supplies hardware, software, and service for your entire system. IBM provides everything: desktops, ThinkPads, and complementary adapters for moving data via either asynchronous or ISDN digital lines. At the central location, IBM supplies the 8235 DIALs server (in rack-mount or hub configuration) to connect to your choice of token ring, Ethernet, switched token ring, or switched Ethernet.

Every piece of IBM-solution hardware and software is designed to work seamlessly with other IBM components today, and to harmonize with pace-setting future offerings. IBM has anticipated the challenges of telecommuting and the enormous possibilities offered by ISDN. IBM and its hundreds of business partners offer you the industry's most forward-looking, end-to-end solutions for the exciting demands of the age of remote computing.

Summary

Remote use of telecommunications services is changing business styles and life-styles throughout the world. Despite the limitations of conventional phone lines, remote users want function as full as if they were at the central office operating directly on the LAN.

To help system managers and planners meet these needs, IBM offers end-to-end solutions including the 8235 DIALs Server. DIALs provides superior manageability, connectivity, and security features, all of which are transparent to the user and affordable in cost. DIALs Server supports advanced ISDN technology as well as conventional analog transmission. This versatility makes it the optimal solution for dealing with today's realities while preparing for tomorrow technological leaps.