REMOTE DIAL-IN ACCESS AND THE AS/400 MAKING SENSE OF YOUR CHOICES

A Perle Systems Discussion Paper.

perle

Essential Network Connectivity

CONTENTS

OVERVIEW

This discussion paper addresses the implications of open standards computing in relation to the remote AS/400 dial-in user. We will examine the history of AS/400 Remote Access by taking a look at AS/400-specific solutions, before focusing on today's more open and distributed approach to data-retrieval. In the context of the open systems environment, we will discuss the effects of the move to TCP/IP as a universal protocol, the e-business revolution and the issues surrounding browser-based host access. We'll present the facts about Internet access and the use of VPN technology. And we'll introduce you to the combination of Web browser and RAS, which we believe offers one of the most effective Remote Access Solutions for today's AS/400 user.

THE REMOTE ACCESS REVOLUTION

We'll spare you the statistics because we'd just be stating the obvious. You only have to look to your own circle of friends, family and business acquaintances to know, without a shadow of a doubt, that the requirements for Remote Access services have exploded. The population of this planet becomes more mobile by the minute, constantly pushing back the boundaries of Remote Access, as we know it. Now, just about anyone can dial-in from just about anywhere to access or send data and applications that equip us to make more informed decisions in all aspects of our daily lives. It seems that the pre-millennium business environment belongs to multiplying cohorts of road warriors. However, the speed of this Remote Access revolution and the choices it has spawned have left many of us with more questions than answers.

A FORK IN THE ROAD

There was a time when AS/400 Remote Access simply referred to the relationship between a branch office and its corporate headquarters. A method of providing groups of people in fixed locations with access to central data and applications via permanent leased lines. Today, however, Remote Access solutions must cater to a much more dynamic marketplace. One that has grown significantly to meet the requirements of home office, as well as the needs of individual and mobile users, who require dial-in access to central information from a variety of (frequently unpredictable) locations.

The demand for fast, easy and economical remote dial-in connectivity has never been greater. As a result, the market has seen a dramatic increase in the number of Remote Access product solutions available. No single connectivity solution will suit everyone, so customers must make choices. These choices will be based on circumstances and needs.

This discussion paper aims to make sense of the Remote Access choices available to today's AS/400 dial-in user. To simplify matters, we will divide our document into two separate sections:

1. AS/400–Specific Access Solutions
  - ASCII Workstation Controller, Dial-In Server/Protocol Converter, SNA Dial-Up

2. Open Standards Solutions
  - PPP Clients, SOHO Routers, Internet Access, Remote Access Servers & Switches, Web Browser/RAS Combination

1. AS/400-SPECIFIC ACCESS SOLUTIONS

In the beginning, there were proprietary Remote Access solutions. A natural enough response to a market in which users focused on single suppliers to handle the traffic of corporate communication. As a result, first-generation AS/400 Remote Access solutions involved the use of proprietary software and the mere thought of common interface support was still decidedly distant.

Today's more open marketplace paints a remarkably different picture, as the proportion of users requiring direct dial access to a solitary host diminishes. Although AS/400-specific access solutions are increasingly viewed as legacy applications, there are still certain circumstances in which they could be relevant to an AS/400 user:

Either…
  - The AS/400 system operates as a stand-alone because no LAN exists.
  - The AS/400 isn't yet integrated into the existing corporate LAN.

Or…
  - AS/400 traffic needs to be isolated from the LAN for reasons of security or bandwidth allocation.

The evolution of direct dial access for remote users has been a three-stage process. At its most basic, the first stage involved the use of an ASCII workstation controller, while the second made use of a protocol converter and added flexibility, features and functions. Both of these solutions allowed ASCII devices (remote PCs) to dial-up and access the AS/400. The third method, often referred to as SNA dial-up, involved PC-based 5250 emulation hardware and software, which enabled the user to dial directly into an AS/400 communications port from a serial port on a remote client.

i. THE ASCII WORKSTATION CONTROLLER

This offers low-cost, no-frills AS/400 access from a remote ASCII device, such as a PC. By emulating twinax workstations, the controller allows ASCII printers, display stations and PCs to take advantage of AS/400 programs and interactive operations. IBM supplies the ASCII Workstation Controller as an optional feature of the AS/400.

What's Hot!	What's Not!
• Direct-dial • Simple • Cost-effective	• Limited Dial-up Speed • Limited Emulation Support • No Modem Compression Support • No Multi-session • Unsophisticated Security • Closed-System Access Only

ii. DIAL-IN SERVER/PROTOCOL CONVERTER

Gateway devices, such as the Interlynx®/400Plus from Nlynx, the IBM 5308 ASCII to twinax protocol converter, or Perle's Model 3i, offer a more flexible and fuller-featured approach to AS/400 dial-in access from a remote PC via a telephone line and a unit with a local twinax connection on the host.

What's Hot!	What's Not!
• Speedier Connections • No Need for Emulation Cards • Complete 5250 Terminal Emulation Support • Modem Compression Support • Multi-session Capabilities • Scalability	• Security Limitations • Closed-System Access Only

iii. SNA DIAL-UP

Using PC-based 5250 emulation hardware and software, the user is able to dial directly into an AS/400 communications port from a remote PC, which identifies itself to the host system as a controller. The emulation board allows the remote PC to emulate 5250 display stations, printers and a control unit. Micro Integration's 5250 Remote is a typical example of this type of product.

What's Hot!	What's Not!
• Not A Lot!!	• Uses 1 Comms Port per Dial-up User • Hardware Required for each PC • Feature Limitations • Closed-System Access Only

2. OPEN STANDARDS SOLUTIONS

The Remote Access solutions we have just examined rightly focus squarely on the AS/400 as a self-sufficient system. And in an environment that was dominated by proprietary solutions they served their purpose well. However, the single most constant and reliable factor about information systems is that they will change. In the world of computer technology, the term 'status quo' is about as welcome as a new acronym because, throughout the marketplace, evolution turns rapidly to revolution. As competition in this environment has increased, the emphasis has shifted from single supplier solutions to a more holistic, multi-platform approach to the exchange of data and applications; one that is driven by the requirement for universal access and by a users' business needs, rather than by the idiosyncrasies of supplier architecture. Supporting the habit of the information junkies, this more open and distributed approach to data-retrieval has made partnerships out of historical rivalries, led to the development of common user interfaces and even to the unthinkable - IBM unconditionally adopting a 'foreign' network architecture in the shape of TCP/IP. But, where did it all come from and where is it leading? Let's take a look at the origins of this open movement and some of the more significant developments that it has generated.

TCP/IP

No discussion of open systems would be complete without a look at TCP/IP. Named after its two core protocols (Transmission Control Protocol and Internet Protocol), TCP/IP is a five-layer communications standard, made up of hundreds of lower-level service and utility protocols, the most visible of which is probably TELNET. The origins of TCP/IP can be traced back over thirty years to the creation of ARPANET, which was designed to allow employees at the American Advanced Research Projects Agency (ARPA) to share resources across their growing number of computer systems. Later, TCP/IP also served as the network architecture for the Internet and for the majority of UNIX systems. However, at the time, the Internet was largely unknown and unused and UNIX was not widely distributed. The scope of TCP/IP consequently remained limited for years. With the growth of the UNIX operating system and the explosion in Internet popularity, prompted by the advent of the Internet and World Wide Web, TCP/IP has since matured into its current position as the de facto standard for multi-vendor interoperability, evolving from a limited range of transport services to a full protocol suite for local and wide area network traffic.

TCP/IP is an undeniable fact of life in today's global village community. No longer questioned as the network architecture of choice, the client/server-oriented architecture of TCP/IP is being embraced wholeheartedly by vendors and users alike. The issue is no longer whether to take the plunge and make the move, but

when to do it. IBM has demonstrated its commitment to this architecture (albeit belatedly) by building it directly into the AS/400, instead of offering TCP/IP as an add-on communications package. Which only goes to show that the effect of TCP/IP popularity now extends way beyond the desktop. But IBM is not alone. Other major networking vendors, including Microsoft and Digital have also reflected the universal popularity of TCP/IP in their own product initiatives.

OPEN FOR BUSINESS

A considerable distance has already been covered in the move to a more extroverted style of computing. But just how far does it go? Now that the lines of communication are well and truly open and the issue of interoperability has been mastered, AS/400 users are setting their sights on expanded business horizons. Before we review the options available for remote AS/400 dial-in via open systems connections, let's take a look at two of the more prominent developments that have come about as a result of this open systems revolution. Two developments can be classed as the driving force behind this technology:

- **E-BUSINESS**

  We've been using electronic media to conduct business for some time but, with the advent of e-business, there has certainly been a change in pace. The widespread use and universal acceptance of intranets, extranets and the Internet has served to open up a global marketplace for goods and services. E-business must have been made for the remote dial-in user because it has the ability to wipe out the limitations of remote location, uniting the entire world in a single community with communication capabilities that are not challenged by hardware or software conflicts.

  Basically, e-business combines EDI (Electronic Data Interchange), VANs (Value Added Networks), e-mail and Internet/intranet/extranet applications in order to exchange information and to process business data. It is estimated that e-business transactions are currently in excess of $500 billion annually. And the inclusion of full TCP/IP support in the AS/400 places IBM squarely in the center of e-business communications. IBM has invested considerably in developing the AS/400 as the e-business platform of choice. The support for native Lotus Domino, the commercialization of network computers (which reduce the cost and complexity of e-business), the development of more sophisticated host security features and the adoption of Java as a native AS/400 programming language clearly indicate the direction in which IBM is moving. In an e-business environment, the AS/400 is designed to handle the nuts and bolts of corporate transactions, leaving the company's personnel to concentrate on business expansion, free of geographical constraints.

Typically, e-business is associated with the Internet, where transactions and information exchange takes place in real-time, as opposed to the batch-job, time-delayed approach that has been associated with VAN-based EDI. However, a VAN (which offers synergy by uniting a group of parties with a common focus) has the virtually guaranteed ability to predict traffic flows, response times and traffic patterns. A far cry from the interruptions and bottlenecks of the Internet as it stands today. Consequently, many organizations have not embraced the Internet-based approach to e-business as enthusiastically as one might have imagined. Instead, they are taking a pick-and-mix approach to their e-business, combining the best of Internet capabilities with VAN or intranet solutions.

- **BROWSER-BASED HOST ACCESS**
  The world of e-business has prompted the marketplace to take a closer look at the issue of host connectivity. Now that usage of the World Wide Web has reached that all-important critical mass, the easy point-and-click approach of Web browsers has become widely popular. The simpler and more familiar our tools, the more likely we are to use them again. So, Web browsers are now viewed as a common user interface and their widespread adoption offers significant reductions in the need for interface training and end-user support. According to International Data Corporation (IDC), browser-based client licenses will account for more than 80% of all host access products shipped by 2002, replacing traditional 5250 emulation software. Browser-based host access is compatible with all the open solutions we examine in the following pages. However, evidence suggests that the best host access solution results from the marriage of Web Browser and RAS (see page 10).

CHOOSING AN OPEN SOLUTION

An open Remote Access solution will allow the LAN or WAN user to dial into a network to enable open system access to all the attached servers, including the AS/400.

Today, the AS/400 manager is faced with four main dial-in access choices.
- The open systems equivalent of the ASCII Workstation controller, whereby dial-in to the comms port is achieved via a PPP (point-to-point-protocol) client, represents RAS at its most basic;
- SOHO (Small Office Home Office) Routers address the dial-in dilemma of cost-effective Remote Access for users who work from home or from small remote offices;
- Internet access and VPNs (Virtual Private Networks) offer easily accessible, low-cost open systems access, although performance and security still remain questionable;

- Remote Access Servers extend the corporate LAN to multiple, simultaneous remote dial-in users, offering high levels of performance, reliability and security.

i. PPP CLIENTS

PPP clients can be used for AS/400 dial-in via a comms port. Using point-to-point protocol for dial-in TCP/IP connections to an AS/400 comms port offers a reasonably reliable and secure method of remote dial-in access (both directly to the AS/400 and from there to the LAN or an ISP). Supporting both modem and ISDN connections, PPP offers a basic, if unsophisticated, set of robust error detection and correction features. Examples of PPP client suppliers include Microsoft Windows®, Stampede and Trumpet.

What's Hot!	What's Not!
• Open Systems Solution - allows access to other LAN servers (via AS/400) • Simple Set-up • ISP Dial-in • Cost-effective	• Limited Dial-on-command Support • Limited Dial-out Capabilities • Requires one Comms Port per Active Session • Limited Security Protocol Support (CHAP)

ii. SOHO ROUTERS

Aimed at the smaller branch office, the SOHO Router is used by the Small Office/Home Office user or telecommuter. Designed to enable the small office to function as if directly connected to the central LAN, the SOHO Router aims to offer secure, reliable, high-speed connections at an acceptable cost. However, two main limitations exist:
- Firstly SOHO Routers do not provide any functionality that allows for user mobility. So users who wish to access a remote AS/400 can only do so from their office-based workstation;
- Secondly, SOHO Routers can only handle a limited amount of traffic as they usually only support one analogue or one ISDN connection.

What's Hot!	What's Not!
• Open Systems Solution • High-speed, Low-cost ISDN Connections • Multi-user Access	• Costly POTS Support • Security Features can be Lightweight

iii. INTERNET ACCESS

The Net-based approach to Remote Access, which involves a direct connection between the AS/400 and the Internet, sets out to simplify networking tasks and, at the same time, reach out to a more comprehensive group of users. The universal nature of Internet access goes well beyond corporate boundaries and extends to groups such as clients, business partners and suppliers. The prime argument in favor of Internet-based Remote Access is of course financial. The Internet is a low-cost option (through the elimination of long-distance charges) and it is ubiquitous, so an Internet presence offers the potential to make an application instantly accessible from almost anywhere on earth. The universal nature of the Internet is also attractive to those who are looking to reduce network complexity. Despite the attractions, QoS (Quality of Service) concerns relating to the levels of reliability and security on this public network as it stands today are causing some to hesitate before choosing the Internet as their primary method of access to centralized resources. However, the recent emergence of VPN (Virtual Private Network) technology, which goes some way to addressing the issue of private information protection across public networks, has led to a re-examination of the opportunities for Internet access.

VPNs

The advocates of Internet-based VPNs suggest that they capitalize on all the cost-saving benefits offered by a public network, while achieving the security advantages that the privacy of an intranet or extranet brings. A VPN appears to its users to have all the attributes of a private network, when in reality communications are taking place over the Internet, within a protective shield. Whereas Remote dial-in Access is routed to the central site, the VPN-based Remote Access call terminates at the local POP (Point Of Presence), which is the point of access into the IP network. The elimination of long-distance and toll-free phone charges as a result of local ISP (Internet Service Provider) dial-in leads to obvious savings. VPNs work best where Remote Access is required by large numbers of users spread across a significant number of sites and where bandwidth requirements are relatively conservative. To date most VPN activity has been centered on the mass consumer market, providing customers, business partners and mobile employees with on-line access to corporate resources. An airline would be a typical example of such an application.

The critics of IP VPNs contend that their positive points have been over-exaggerated and warn against the dangers of using this method as an IP backbone for mission-critical applications, which require high reliability, consistent low latency and minimum bandwidth guarantees between locations. They suggest that

service providers will also have to sharpen their services before considerable numbers of corporations will be persuaded to shift their business applications to the Internet. In certain geographical locations, such as North America, cost-saving claims should also be carefully examined; public IP network flat-rate access charges can make VPNs more expensive than dial-in options when usage levels are high and users call from the same area as the central site.

It may be that the most sensible solution for many businesses today lies in a combination of two technologies. By using VPNs for the transfer of information where speed of transfer and security are not critical, companies can reap the benefits of cost-saving. Dial-in access, however, is more likely to remain the

What's Hot!	What's Not!
• Open Systems Solution • Low-cost Option • Simple • Scaleable • Ubiquitous	• Initial Hardware Investment • Unpredictable Performance • Bandwidth Concerns • Connection Latency Issues • Questionable Security • ISPs Remain Consumer-oriented

number one choice for mission-critical business.

iv. REMOTE ACCESS SERVERS

Remote Access Servers offer transparent LAN access to the remote user across the Public Switched Telephone Network (PSTN), in a consistent and highly secure manner. In the case of **Remote Access Servers**, users can dial-in using either normal PSTN connection via analogue modems with line speeds of up to 33.6 Kbps, 56 Kbps – V.90, or ISDN connection via terminal adapters up to 64 Kbps (and 56 Kbps - V.90 also can be done - i.e. 833). Typically, a Remote Access Server will support between 2 and 16 users and usually has fixed-ports, which means that it is non-scalable. This method of remote access is most commonly used by small to medium-sized businesses or for departmental/workgroup applications.

Some RAS support a larger number of simultaneous dial-in users. They achieve this through the deployment of high capacity T1/E1/PRI pipes or ISDN BRI connections and telephony switching technology. The higher port density provided by RAS products simplifies management and security issues because the network manager is dealing with a single point of access to open systems resources for all remote users. Remote Access Servers are generally scalable, to accommodate future growth and will invariably support both ISDN and analog calls on the same T1/E1/PRI or BRI line (including 56 Kbps - V.90, V.34 - digital modem support).

In a rapidly evolving marketplace, the RAS solution is invariably the most cost-effective choice for the enterprise user.

These types of remote access solution effectively grant access to all the tools and technology of the open systems environment (Java, Domino, Web Browsers),

What's Hot!	What's Not!
• Open Systems Solution • Open Tools & Technology Access • Reliable • Secure • Flexible & Scaleable	• Initial Hardware Investment • Potential Expense of Long-distance Access

without any of the QoS and security issues associated with the other forms of remote dial-in access.

WEB-BROWSERS & RAS
The Ideal Combination For Universal AS/400 Access
Commonly referred to as "Web-to-host" access, browser-based connectivity is often mistakenly assumed to be exclusively tied to Internet access. Although Web-to-host browser clients can, and often do, access the host via the Internet, these clients are in fact defined as 'any software that gives users access to host and application software through a browser'. So, however remote your users may be, it is possible for them to contact your host using a simple Web browser (usually pre-installed on today's desktops). Customers can make on-line purchases or reservations; extranet partners can check latest shipment details or stock status (from anywhere in the world, whatever the time of day or night) and intranet members can perform familiar tasks without cluttering their desktops with client software. By making use of this common interface, users are able to obtain all the data and applications they require to do their job through a single source. The benefits to the organization come in the shape of reduced costs and maintenance as well as greater simplicity.

Based primarily on client/server technology and TCP/IP standards, a browser can run either on a PC or on a network computer and be used as the interface with a host system. Originally Web-to-host required access to be made via an intermediary server. Now, from the RAS point of view, with the arrival of support for Web technologies on AS/400 hosts, access can be made directly from the desktop to host.

Authorization and authentication protocols allow access to the relevant layers of host information and, by sticking within the protective walls of an intranet, security procedures are much the same as for existing fat or thin connectivity software.

The combination of user-friendly browser technology with the reliability, security and flexibility of RAS, provides the ideal remote access solution for remote users in an open systems environment.

As a long-standing supplier of remote access solutions to the AS/400 marketplace, Perle Systems is ideally placed to offer such a solution to AS/400 users.

By using a simple Web browser in conjunction with a Perle 833 or a Perle 833AS/Perle 833IS Access Server, remote users can take advantage of direct dial-in access to an on-line source. Access to AS/400-based information is achieved using the 5250 HTML Workstation Gateway on the AS/400, which can be configured quickly and easily, and provides transparent 5250 web browser terminal emulation*. Because this solution is not Internet-based, it offers users the ability to

What's Hot!	
• Out-of-the-box Solution	• No Keyboard Mapping
• Familiar Web Browser Interface	• High-performance - no Congested ISPs
• Multi-platform Solution	• Not Vulnerable to Security Attacks
• No need for Proprietary Solutions	• Dial-out for LAN users also available

access real-time information round-the-clock in a secure environment that delivers constant performance.

* From OS/400 Version 3, Release 2 and up

THE NEXT MOVE

The demand for fast, easy and economical remote dial-in connectivity has never been greater. As a result, the market has seen a dramatic increase in the number of Remote Access product solutions on offer. No single connectivity solution will suit everyone, so customers must make choices. These choices will be based on circumstances and needs and will have to make sound business sense. As an AS/400 user, you may not yet have moved towards LAN-integration, or you may need to isolate your AS/400 traffic from the LAN for reasons of security or bandwidth allocation. In which case, you will still be looking at an AS/400-specific access solution in the shape of an ASCII Workstation Controller, a Dial-in Server/Protocol Converter, or PC-based Emulation Software.

If, like many, you are searching for an Open Standards solution you will be looking at one of the four main options outlined in this document, depending on the size and structure of your business and the nature of your remote user needs. The chances are that, in order to keep up with changing trends and increasing numbers of remote users, you will be focusing your research on the two main options that present themselves today: Internet-based access and RAS. If your remote users require access to mission-critical business data and applications, you will have to weight the financial benefits of Internet against the serious QoS concerns of reliability and security. While the Internet may well be an appropriate vehicle for the spread of your publicly-consumable corporate information, you are likely to want to look towards the more secure, reliable and flexible arena of Remote Access

PRODUCT BRIEF - PERLE ACCESS SERVERS

Perle Systems offers a comprehensive range of Remote Access Servers for open systems access.

Perle 833 Access Server

The Perle 833 is an award-winning, full-function Remote Access Server for both Ethernet and Token-Ring LANs, available in 2, 4, or 8 high-speed serial port models.

This Remote Access Server supports a full range of third party PPP clients, as well as all major protocols, desktop and LAN Operating Systems. It also offers multi-level security, supporting User ID and password, call back authentication and PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol), as well as external authentication standards and two-factor authentication.

The Perle 833 offers superior dial-out modem pooling functionality, which brings auto-queuing and auto-dial features to the LAN-based user. And with Windows®-based manager software, the Perle 833 Access Sever can be easily installed and managed from a PC attached to the LAN, or remotely via high-speed modems.

Servers (particularly in combination with a Web Browser) for your core business transactions.

PERLE 833AS & PERLE 833IS ACCESS SERVERS

High-Speed, Reliable Dial-In Access

The Perle 833AS and the Perle 833IS Access Servers are designed to provide the fastest dial–in access speeds for a growing user load and to expand in line with the growth of a remote dial–in population. These RAS solutions from Perle provide a consistently reliable link to corporate LAN resources across 56 Kbps analog or ISDN lines, using BRI or PRI connections. And because these are integrated features, there is no need for external modems and cables. System cards are available with or without 56 Kbps-V.90 (and V.34) DSP modems, to allow for the most cost-effective match of remote ISDN and analog modem users. The high-speed access offered by the Perle 833AS & 833IS results in less time spent on-line, saving money and increasing user productivity.

AS or IS?

Perle's Access Servers are based on a modular design, for maximum flexibility. The Perle 833AS is ideally suited to larger pools of remote users, supporting a dial–in population of between 12 to 92 T1/PRI or 120 E1/PRI concurrent dial–in users. The Perle 833IS carries an entry–level price tag and a lower total cost of ownership and with a 16-port ceiling, supports a dial–in population of 8 to 16 concurrent dial–in users. Both models allow plenty of room for expansion via the cost-effective addition of system cards (available in both Ethernet and Token-Ring versions).

Watertight Security

The Perle 833AS & Perle 833IS both offer multi-level security and security management features (filtering can act as a firewall). As well as, their own server-level security features, both Perle RAS products support the major network security standards (e.g. RADIUS and NetWare Bindery), along with third party token authentication systems. The Perle 833AS & Perle 833IS are also the only Remote Access Serves to offer direct dial–in user authentication on a Windows®NT Domain Server as a fully integrated standard feature.

The Value of Experience

By making remote access its sole focus, Perle is able to guide its customers through the entire purchase process, from pre-sales planning through installation, configuration and post-sales support.

If you would like to know more about what Perle' Access Servers can do for your business, please visit our Web site at www.perle.com

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