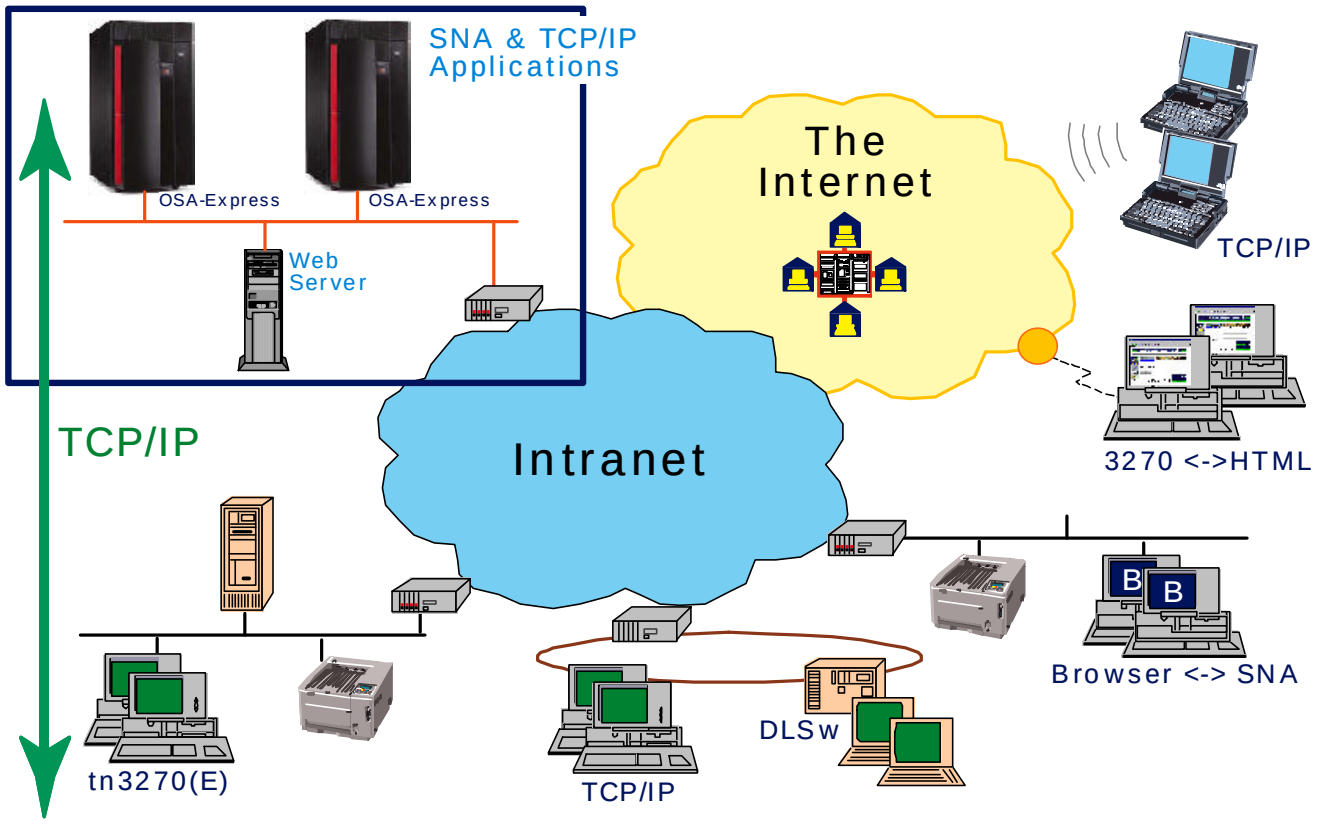
Gracefully Transitioning the Network to eBusiness

Why, How, and When?

A White Paper



By: Anura Gurugé

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About the Author

Anura Gurugé is an Independent Technical Consultant who specializes in all aspects of contemporary IBM networking. He has first hand, in-depth experience in SNA-capable i•nets, SNA / APPN / HPR / AnyNet, Frame Relay, Token-Ring switching, ATM, System Management, and the nascent *x*DSL technologies. He was actively involved with the Token-Ring switching pioneer Nashoba Networks which was acquired by Cisco Systems in 1996.

Over the last eight years he has worked closely with most of the leading bridge / router, intelligent hub, FRAD, Token-Ring Switching and Gateway vendors, and has designed many of the SNA-related features now found on bridge / routers and 'gateways'. He has also helped large IBM customers to re-engineer and totally overhaul their old, SNA-only networks.

He is the author of *"Integrating TCP/IP i·nets with IBM Data Centers"* [pp 420, 1999], *"Reengineering IBM Networks"* [pp 600; 1996], the best selling "*SNA: Theory and Practice*" [pp 570; 1984], as well as several other books on SNA, APPN and SAA. He co-edits Auerbach's handbooks on: "*Communications Systems Management"* and "*Web-to-Host Integration"*

He has published over 270 articles and is the author of the Business Communications Review (BCR) supplements on "*BCR's Guide to SNA Internetworking*" and "*Beyond SNA Internetworking*".

He conducts technical and sales training seminars worldwide on a regular basis and has conducted one-day workshops for Networld+InterOp since 1992.

In a career spanning 24 years he has held senior technical and marketing roles in IBM, ITT, Northern Telecom, Wang and BBN. He can be contacted at (603) 293-5855 or guruge@cyberportal.net.

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When evaluating the merits and implications of transitioning to a TCP/IP centric IT infrastructure, it helps to reflect on the tale of the Great King Canute of England and Denmark [c. 1016] who tried to demonstrate to his adoring subjects that there were powers that even he could not control by showing them that he was powerless to stop the tide from coming ashore. Just as was the case with PCs and LANs in the past, TCP/IP is now an unstemmable technological tide; possibly even a tidal wave. Whether we like it or not, relish it or fear it, TCP/IP is here to stay – and will dominate worldwide computing for at least the next two decades, thanks to the endorsement and kudos it gets on a daily basis for being the sustaining force behind the Internet miracle. **E-business**, the possibility of doing highly-secure, reliable and high-speed, bi-directional financial transactions across the Internet with customers, suppliers and business partners is the predominant force reshaping the scope and dynamics of worldwide commerce.

Traditional companies such as AmTrack, General Motors and American Airlines are joining forces with the new Internet companies such as Amazon.com and eToys.com, to ensure that it is now possibly to buy anything from a railway ticket to a top of the line Cadillac online. E-business, which will exceed *one trillion dollars per year* by 2002, is totally and unequivocally contingent on TCP/IP. Current electronic business-to-business schemes, such as Electronic Data Interchange (EDI) and Electronic Data Transfer (EDT), are already in the process of being updated to be a part of E-business and as such be TCP/IP-based.

Mainframe 'shops', today, cannot claim unfamiliarity with TCP/IP. Without exception, corporations that use mainframes for their MIS now have a TCP/IP based intranet in addition to their traditional SNA/APPN or multiprotocol oriented enterprise network. Most, furthermore, already have a presence on the Internet in the form of a home page, and many are actively exploring the possibilities of using the Internet for electronic commerce, customer support, public relations, product promotions, and global remote access. Not missing out on the tantalizing potential of **e-Commerce** over the Internet, now that Y2K is history, is indubitably the most pressing MIS issue that is being discussed at the highest levels of corporations, starting at the Board Room. In parallel, intranet-to-intranet communications via extranets for applications such as just-in-time supply chain management, are being viewed as the most effective means of streamlining and expediting enterprise-to-enterprise transactions. All of this intranet and Internet [i.e. **i•net**] activity means that TCP/IP is already being widely used alongside mainframe based computing systems.

Installing TCP/IP on a mainframe, these days, is not a difficult, nerve-racking, or laborious undertaking. Extensively proven, extremely efficient, highly scalable, and extremely reliable TCP/IP stacks for mainframes are readily available from IBM [i.e. **OS/390 Comms. Server**] and Sterling Software [i.e. **TCPaccess**]. With IBM's

WebSphere, which is an integral component of OS/390 Comms. Server, you can have a full-function **Web Server** as well as a feature-rich **Java**-compliant Application Server on a mainframe. IBM claims that more than **65%** of mainframes running MVS or OS/390 already have TCP/IP installed. Installing TCP/IP on a mainframe facilitates its integration with intranets or the Internet; permits fast, high-speed bulk data transfers with TCP/IP clients or other systems; and moreover positions it as a data server for Web based applications.

Once TCP/IP is installed you could, if required, even have the mainframe acting as a high-capacity **Web Server**. There are companies, such as the $9.5B Lafayette Life Insurance [Lafayette, Indiana, USA], who already have Web Servers running on their mainframes – which in the case of Lafayette happens to be a IBM **9672-R24**, 3rd generation CMOS based S/390 Parallel Enterprise Server.

There are significant strategic and tactical advantages to going ahead and installing TCP/IP on a mainframe and moving toward a TCP/IP centric computing environment. For a start, it provides you with a solid basis for any and all e-Commerce related initiatives. It can also reduce, sometimes quite significantly, overall capital and operational costs. For example, the **Browser based access to SNA** solutions that are now readily available from over 40-odd credible vendors for providing unrestricted SNA terminal access across i•nets, totally eliminate the considerable cost associated with installing, managing and periodically upgrading SNA/3270 emulation software on each and every PC/workstation that needs access to SNA applications.

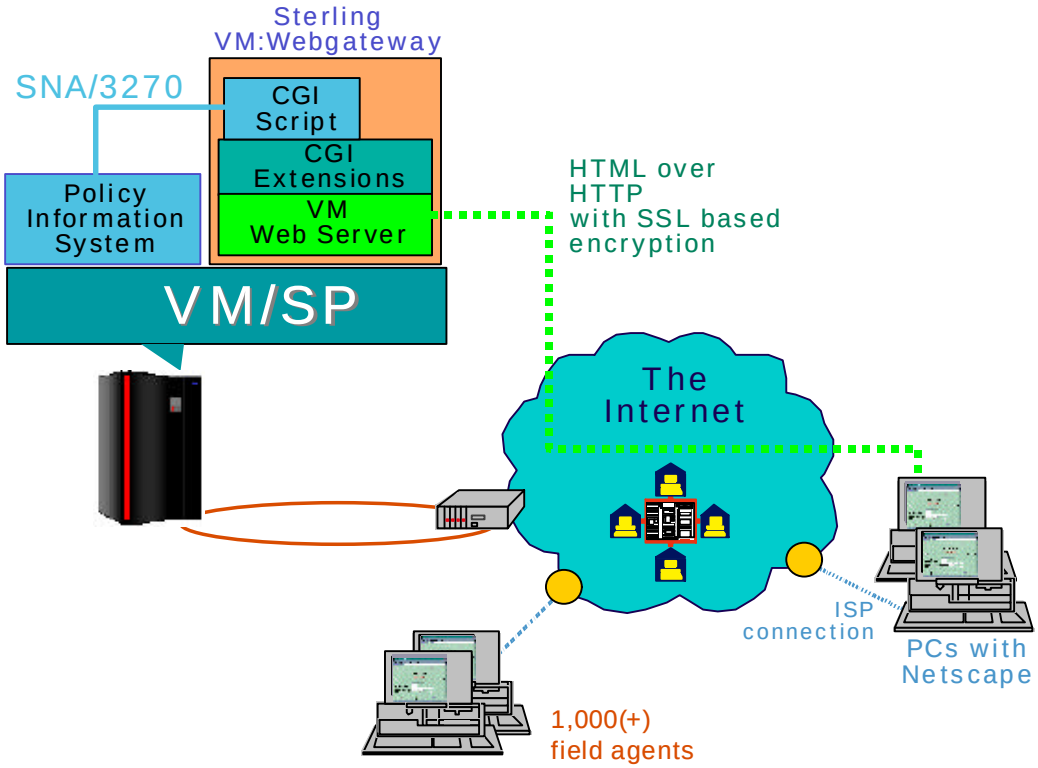

Fig. 1:
Lafayette Life Insurance uses a Web Server on its mainframe to ensure that field agents can get fast and cost-effective access to the mainframe application over the Web

Using TCP/IP all the way into the mainframe, and then performing SNA conversion at the mainframe per the **tn3270(E) standard**, also ensures that you no longer need highly expensive, SNA-oriented communications controllers like the 3745 or the 3746-950. Instead you can profitably utilize, high-performance, low-cost, channel-attached solutions such as IBM's revolutionary 2.6Gbps capable **OSA-Express**, IBM's 2216-400,

Cisco's 7500/CIP or Cisco's 7200/CPA as the means of interconnecting your mainframe to your network. Then there are networking related cost savings. With a TCP/IP centric infrastructure you can, albeit with the appropriate security measures [e.g. **Firewalls**, Sterling Software's **SOLVE: Netmaster for TCP/IP Access Control Option** and **Secure Sockets Layer (SSL)** based authentication and encryption], gainfully use the Internet as a way to realize extremely cost-effective remote access for your far-flung remote offices, agents, telecommuters and overseas distributors. Intranets, given that they are based on widely available 'commodity' technology, are also invariably less costly to implement than comparable SNA/APPN or multiprotocol networks.

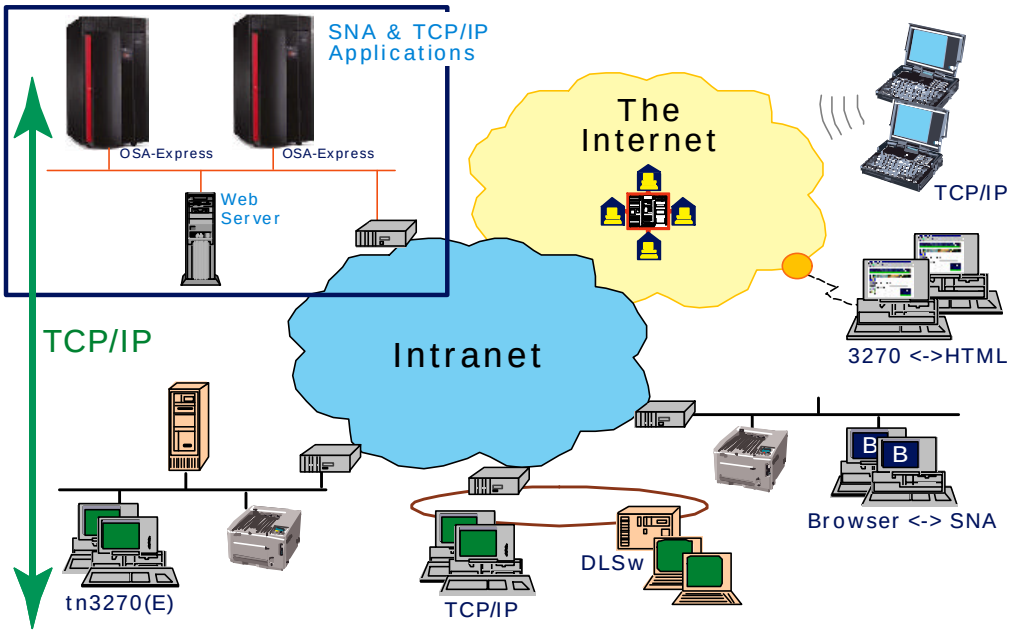

Fig. 2: TCP/IP centric environment where clients have access to both TCP/IP and SNA resources across an intranet as well as the Internet

Dispelling Your Concerns

Before the advantages of moving to a TCP/IP centric infrastructure, with TCP/IP on the mainframe, are articulated any further it is best to allay any concerns you may have about moving away from SNA.

- **Security** is no longer the road-block it used to be with highly proven, bullet-proof TCP/IP specific security solutions for mission-critical commercial computing systems such as Sterling Software's **SOLVE: Netmaster for TCP/IP Access Control Option** and SSL-based end-to-end encryption with the new SSL security feature on many tn3270(E) Servers – including mainframe resident tn3270(E) Servers.

- Total unencumbered access to mission-critical **SNA/APPN applications** running on mainframes or AS/400s is in no way compromised, jeopardized, or even inconvenienced by the installation of TCP/IP on a mainframe and the standardization on a TCP/IP centric infrastructure. There is a plethora of well-established, standards based SNA-to-TCP/IP integration technologies, such as **tn3270(E)**, **Data Link Switching (DLSw)** and **APPN/HPR in IP Networks** [referred to by IBM as **Enterprise Extender** and by Cisco as **SNA Switching Services**], that ensure unrestricted SNA access and end-to-end SNA transport across TCP/IP networks.

- Installing TCP/IP on a mainframe and using a TCP/IP centric i•net for all of your mainframe access does not prevent you from having **ACF/VTAM** on that same machine as well. Therefore, you can continue to have the same level of **APPN/HPR** support that you have on your mainframe today to guarantee that your mission-critical SNA/APPN applications will continue to work without any problems.

- Today's TCP/IP stacks for mainframes [e.g. Sterling's TCPaccess] deliver exceptional **throughput** and are highly optimized to maximize **efficiency** and **scale**, easily, to support tens of thousands of concurrent users. TCP/IP is not the CPU hog that it was portrayed to be a few years ago. Mainframe TCP/IP is so efficient these days that some corporations run, without any difficulty or degradation in overall performance, multiple stacks on the same mainframe to gain added throughput and ensure that different applications [e.g. FTP and tn3270(E)], can each have its own dedicated stack.

- Incisive, sophisticated, and comprehensive TCP/IP based **Network, Application, TCP/IP-stack, and System management** is now possible with mainframe resident management systems such as Sterling Software's **SOLVE: Netmaster for TCP/IP**. SOLVE: Netmaster for TCP/IP delivers TCP/IP-centric management tools and facilities, including Browser based access and management, for: problem determination; performance management and access control.

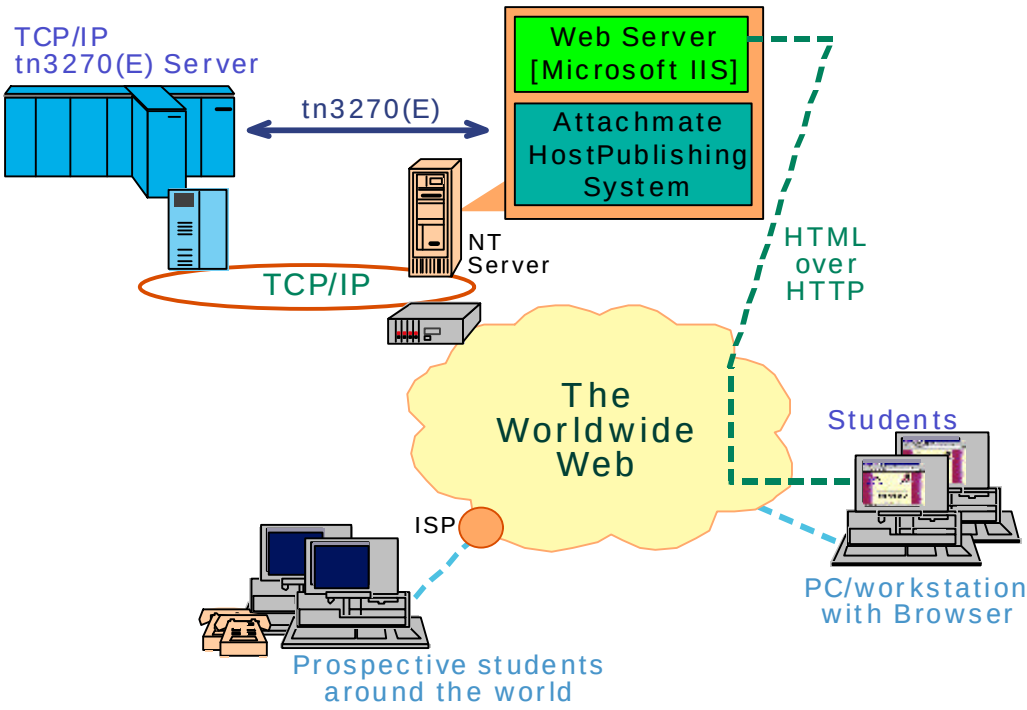

Fig. 3: ***Ohio State University,*** **where they provide existing and prospective students with access to mainframe-resident SNA applications over the Web using a totally TCP/IP centric infrastructure, including TCP/IP and tn3270(E) Server on the mainframe**

- With today's mature router technology from the likes of Cisco, it is now possible to realize TCP/IP based networks that are resilient and robust enough to provide you with **high-availability networking** with uptimes in excess of 98(+)%. Today's TCP/IP centric networks are significantly more reliable and stable than the bridge/router based multiprotocol networks most of you currently use for transporting your SNA/APPN traffic.

- **Traffic prioritization** between different classes of applications, vis-à-vis the TCP/IP network, is no longer an issue with today's router software offering functions such as **Quality of Service (QoS)**, Bandwidth **Reservation Protocol (RSVP)**, and highly customizable queuing schemes [e.g. Cisco's **Custom Queuing**]. For those few situations where there is a need to support SNA **LU 6.2's Class-of-Service (COS)** prioritization on an end-to-end basis, IBM and Cisco offer a scheme known respectively as Enterprise Extender and SNA Switching Services that permits unencumbered APPN/HPR routing across IP.

- The continued presence of ACF/VTAM on the mainframe alongside TCP/IP ensures *total, uncompromised support for* **Parallel Sysplex** operation – including **Multi-Node Persistent Sessions (MNPS)**, **Workload Balancing**, and **Generic Resources**. In addition, Sterling Software and Cisco together offer a capability known as Sysplex Workload Agent that delivers transparent and highly-effective and efficient load-balancing across Sysplex – in TCP/IP mode.

- High-performance, highly-efficient, full-duplex **TCP/IP transfers across ESCON** channels is not a problem with the TCP/IP-specific **'CLAW'** protocol that permits two sub-channels to be grouped together for high-throughput and simultaneous bi-directional communications. If anything, TCP/IP channel transfers are significantly faster than SNA/APPN transfers with both IBM or Cisco channel-attached solutions such as the IBM OSA-Express, IBM 2216-400 and the Cisco 7500/CIP! Moreover, Sterling SOLVE: Netmaster for TCP/IP has explicit features and functionality for monitoring and managing TCP/IP-based data transfers across ESCON channels.

- Mainframe based **TCP/IP printing** is not an impediment with tn3270(E) now supporting host print, and with products such as IBM's Print Services Facility (PSF) and Sterling Software's **SOLVE:EPS.**

Case Against a Last Minute SNA Revival

Despite the daily mounting evidence to the contrary, there are still some who believe that IBM will not allow SNA/APPN to succumb to IP, and that there will be a concerted attempt to reestablish SNA/APPN based networking. IBM recognizes that SNA/APPN's role in the future will be restricted to the mainframe in the context of mission-critical applications and that TCP/IP, unassailably, will be the networking fabric of the future. The following four examples alone should convince you that IBM is not just reconciled to, but in reality one of the greatest advocates of, TCP/IP centric networking.

1. The 2.6Gbps OSA-Express, which totally redefines the speed-capability, efficiency and mechanics of network-to-mainframe interconnection, only supported TCP/IP when it was unveiled by IBM in March 1999. Though IBM has now added support for SNA and APPN/HPR, a highlighted feature of the OSA-Express, which is now a no-charge option on all new S/390 mainframes, is **'IP Assist' (IPA)** a TCP/IP 'off-load' feature to increase the throughput and efficacy of IP-based data transfers.

2. IBM's strategic and over-arching blueprint for new application development is known as the **"Application Framework for e-business"**. This is a totally TCP/IP and Web centric model that does not mention SNA or APPN/HPR in any way or form.

3. IBM is avidly promoting the notion of APPN/HPR-over-IP routing with its 'Enterprise Extender' [Cisco 'SNA Switching Services'] technology which is now available on the Cisco and IBM bridge/routers. Nortel, 3Com and others are expected to also support this capability. By promoting the notion of routing APPN/HPR-over-IP, which the exact opposite of the routing scheme employed by the 2217 Nways Multiprotocol Concentrator that IBM has discontinued, IBM is making it very clear that the ***only*** WAN networking role it sees for APPN/HPR in the future is within the context of it being used on top of IP.

4. In August 1999, IBM and Cisco announced a $2B strategic alliance in which Cisco agreed to purchase a variety of IBM components and patents and also help IBM jointly market applications and services to Cisco's captive Internet Service Provider (ISP) customer base. In return, IBM will phase out the development and marketing of its internetworking hardware products; e.g. IBM 2216-400. One of the key and underlying rationales behind this deal was the recognition and acknowledgement by IBM that enterprise networking, around the world and without exception, is inescapably becoming TCP/IP-based. Cisco is the undisputed leader in TCP/IP networking and moreover has proven and scalable mainframe integration technology such as the Cisco Channel Interface Processor (CIP). With this deal, IBM in essence signaled the capitulation of SNA based networking to TCP/IP.

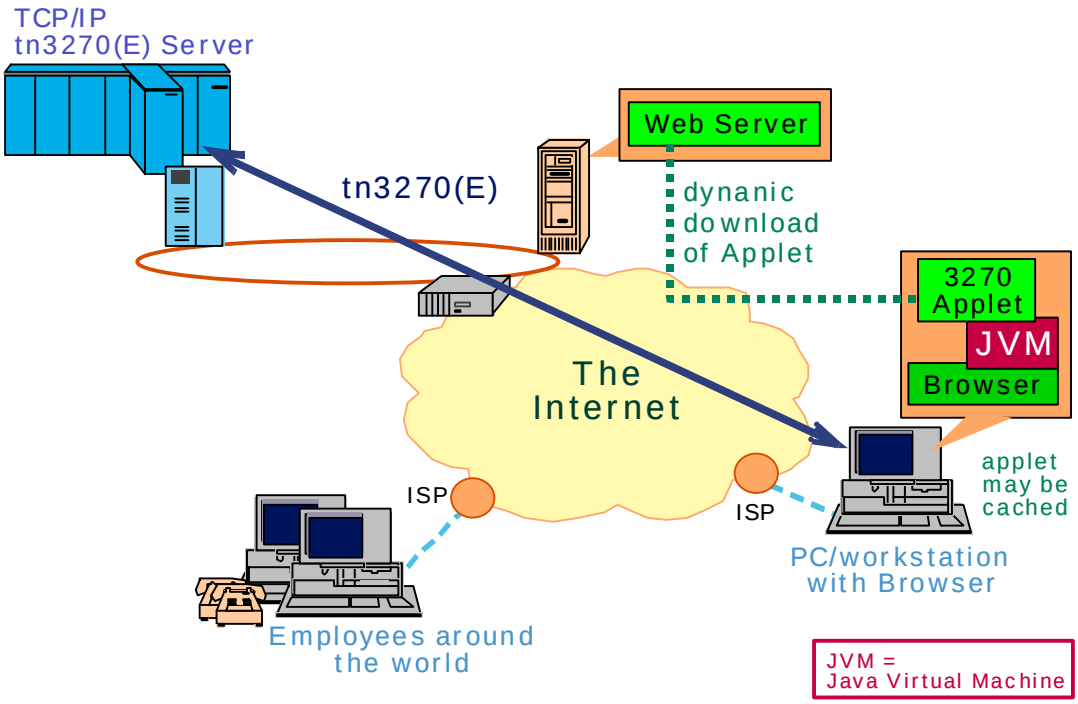

Fig. 4:
A totally TCP/IP based system currently being tried out by a $18B US conglomerate to ensure that telecommuters and mobile users around the world have access to mainframe resident SNA applications across the Internet

The Primary Advantages of Moving to Mainframe IP

✓ Enables you to seamlessly integrate your fast growing **intranet** with your mainframe, given that at least 70% of the corporate data your in-house intranet users require are still on a mainframe rather than on a Web Server, NT Server or Unix system.

✓ Decisively positions you to exploit all the rich potential of **e-Commerce** over the Internet by ensuring that all of the applications and data you may require to

enable such commerce is now TCP/IP-ready and can be easily integrated with the necessary Web technology. Business-to-business e-Commerce over the Internet is expected to be in excess of **$1T** by the year 2002.

✓ Permits you to exploit the Internet as an extremely low-cost means of realizing **global remote access** to your mainframe applications, including all of your mission-critical SNA applications, as shown in Figures 1 to 3. In addition to Browser based access, extremely secure SSL, **Virtual Private Networking (VPN)** and access control solutions, such as those provided by Sterling's SOLVE: Netmaster for TCP/IP Access Control Option, can be used to realize enterprise specific remote access over the Internet.

✓ Facilitates and expedites the **File Transfer Protocol (FTP)** based file downloads and uploads that you most likely now doing on a daily basis with all of your distributed servers.

✓ Allows you to quickly open up your mainframe applications for new, Internet based services such as **Home Banking**, **On-Line Investment**, Personal Travel Reservation, and Web-based status checking [e.g. querying the status of an expedited mail item or a cargo shipment].

Fig. 5: An actual 'screen-shot' of a rejuvenated 3270 user interface used by a mainframe centric, Internet based, Home Banking system realized using Browser based access in the form of 3270-to-HTML conversion

✓ Greatly minimize the **cost of SNA access** by being able to use a tn3270(E) or Browser-based access to SNA solution. The Browser-based access solutions will eliminate the considerable costs associated with installing, managing and regularly updating SNA/3270 emulation software on individual PCs/workstations by using either an applet-based scheme, where the applet is dynamically downloaded from a Web Server, or a **3270-to-HTML conversion** scheme as shown in Fig. 1 and 3 which only requires a Browser to be present within the client PC/workstation.

- ✓ Enables you to quickly phase out the very expensive, SNA-oriented IBM 3745 or IBM 3746 **communications controllers** in favor of high-performance, low-cost channel-gateways such as the IBM OSA-Express, IBM OSA-2 and Cisco 7000s.

- ✓ Permits you to use your mainframe as a high-capacity, very low cost per user **Web Server** for intranet, extranet or even Internet applications.

- ✓ Greatly simplifies the integration of mainframe data with the new **Web applications** that are being developed using tools such as **NetDynamics 4.0**, **Bluestone Sapphire/Web**, and **ColdFusion**.

- ✓ Eliminates the need for external, low-capacity **tn3270(E) gateways** such as Microsoft's SNA Server by using integrated, highly-scalable mainframe resident tn3270(E) Servers such as the one included within Sterling's TCPaccess TCP/IP software.

- ✓ Gain better **channel throughput** by using TCP/IP across the channel to a mainframe resident tn3270(E) Server – especially with the 2.6Gbps capable OSA-Express.

- ✓ Phase out the cost and complexity of doing business-to-business transactions using **SNA Network Interconnection (SNI)** by moving toward a secure, low-cost **extranet** scheme.

Proven technology to facilitate the transition from SNA to IP

The good news is that highly proven and stable technology, from over 40 credible vendors including Sterling Software, Cisco, IBM, Attachmate, NetManage, Eicon Technology, Novell, Bus-Tech, Farabi Technology, Jacada, Intelligent Environments, and others is now readily available to facilitate TCP/IP on the mainframe and the standardization on a TCP/IP centric networking infrastructure – even though you still rely on quite a few mainframe resident, mission-critical SNA applications. The technologies available will enable you to integrate your current SNA/APPN based environment with the new TCP/IP centric world in a *seamless and synergistic* manner.

Though it may feel like it, you will not be a lone pioneer beating across hitherto uncharted territory. The move from SNA to IP is happening, with accelerating pace, around the world. In reality this transition has been happening for the last few years. Enterprises around the world, such as: GM, FedEx, Sabre/American Airlines, The Library of Congress, Ohio State University, Royal Jordanian Airlines, Nestles, The Chickering Group, National Van Lines, State of Idaho, Lafayette Life, Lincoln National Reinsurance, Swiss Air, Al Rajhi Banking & Investment Corp. [Saudi Arabia's largest bank], and Gazprom [a $30B natural gas company in Russia] to name but just a few have already started to integrate their data center resources with TCP/IP centric i•nets.

To be of use to you, the technology that enables you to transition from SNA to IP needs to be able to accommodate an extremely broad and disparate population of client equipment and functionality. Just some of the entities that need to be dealt with vis-à-vis this transition include: PCs; Unix workstations; coax-attached 3270/5250 terminals; printers; mini-computers; SNA applications that communicate program-to-program using LU 6.2 or **LU-LU Session Type 0** based protocols; SNA-only devices

[e.g. IBM 4700 Financial Systems] and 'legacy' control units. The PCs, the workstations and printers at your remote sites may work in either SNA or TCP/IP mode. Consequently, you will need SNA Access technologies to deal with TCP/IP clients, in particular PCs and workstations, and SNA Transport technologies to deal with SNA-only clients. *This is not a problem*. Today there is a wealth of solid, well-established, field-tested technologies to realize both SNA Access as well as SNA Transport in the context of mainframe TCP/IP – and a totally TCP/IP based network.

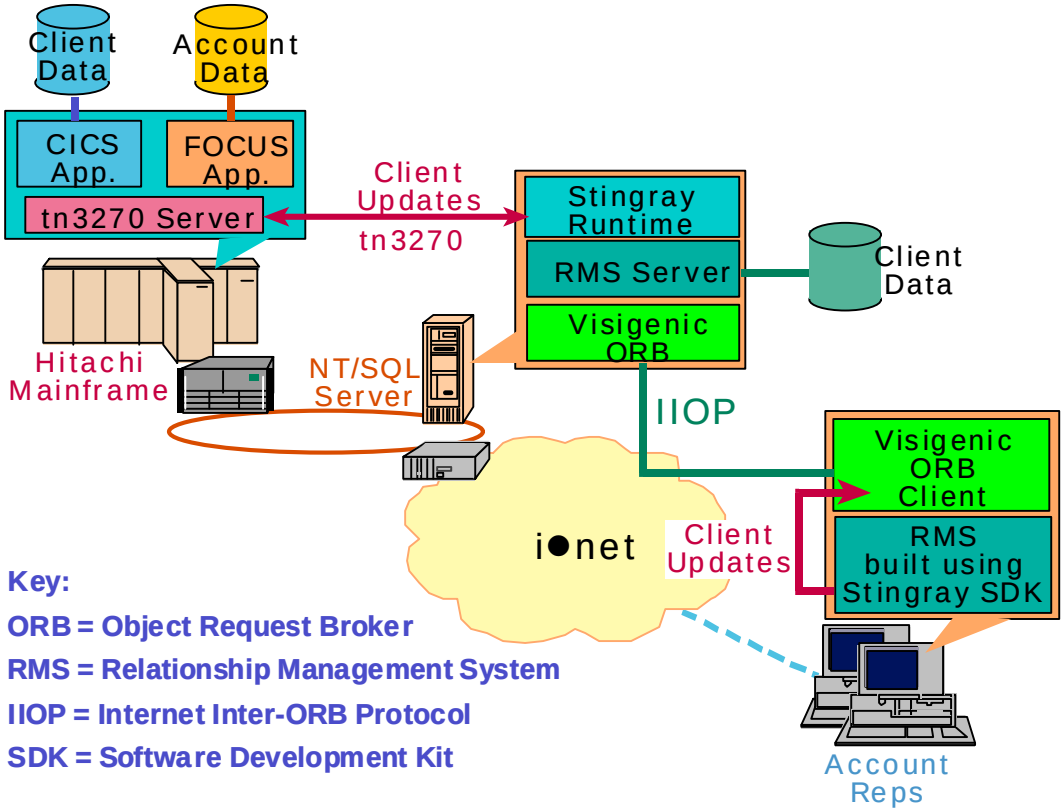

Fig. 6: Mainframe TCP/IP based system being used by Lincoln National Reinsurance Companies, one of the largest reinsurers in the world, to provide its account reps with up to-date client information across the Web

Some of the key technologies that will permit you to easily transition from SNA to IP include:

- **tn3270(E):** widely used, nearly 10 year old **IETF standard** based access scheme, that enables low-cost TCP/IP clients to access SNA applications via a mainframe resident tn3270(E) Server. Today, tn3270(E) is being used by over 10 million SNA users! Tn3270(E) clients are ubiquitously available from all of the traditional SNA/3270 emulation vendors. All of the examples shown in Figures 3, 4 and 6 utilize tn3270(E) in some form.

- **Browser-based access with 3270-to-HTML Conversion:** this is a 'thin-client' solution, as shown in Figures 1 and 3, where a server resident 'SNA-Web' gateway performs 3270 datastream-to-HTML conversion, replete with some amount of user interface rejuvenation, so that mainframe SNA applications can be accessed directly from a Browser across an i•net. The rejuvenated user interface for Home Banking, shown in Fig. 5, was realized using 3270-to-HTML Conversion. Secure Sockets Layer (SSL) based authentication and **encryption**,

as available with contemporary Browsers, is used with this scheme to provide end-to-end data encryption.

- **Browser invoked Java or ActiveX applets:** dynamically downloadable applets, which can optionally be cached on a PC/workstation hard-disk, that provide tn3270(E) client emulation. This was the technique that is used in the system shown in Fig. 4. User interface rejuvenation, as well as end-to-end data **encryption**, is also possible with this technique.

- **Application specific Web solutions:** such as IBM's CICS Web Interface, Sterling's VISION: Webaccess, Sterling's VM: Webgateway OfficeVision and IBM's CICS Gateway for Java that expeditiously integrate mainframe resident applications with the Web.

- **Programmatic** [or Middleware] **Solutions:** such as IBM's MQSeries, Blue Stone's Sapphire/Web or Inprise Application Server etc. that permit mainframe applications to be interfaced with TCP/IP or Web applications.

- **Data Link Switching:** this, like tn3270(E), is a ubiquitous, IETF standard encapsulation scheme, performed by bridge/routers, that permits any kind of SNA/APPN traffic, independent of session type, to be transported end-to-end across a TCP/IP WAN. DLSw ensures that any kind of 'legacy' SNA device or application can be non-disruptively and gracefully accommodated within a TCP/IP based infrastructure

- **High Performance Routing-over-IP:** this is an alternative to DLSw, championed by IBM and Cisco, where by APPN/HPR oriented routing is performed across IP. This scheme has the advantage over DLSw in that it can permit APPN based routing between multiple data centers, and is capable of supporting LU 6.2 COS prioritization on an end-to-end basis over an IP network.

By using one or more of the above technologies, you will be able to gracefully transition from SNA to IP without losing the services of any of your current mission-critical SNA/APPN applications, sacrificing any functionality, or compromising security or reliability.

Bottom Line

With the rapid growth of intranets and the daily increasing significance of the Internet as the next frontier for commerce, TCP/IP's hold on commercial sector networking continues solidify. Even IBM has acknowledged that the role of SNA, APPN and HPR are going to be relegated to the mainframe, as the basis for mission-critical applications. Many of the concerns that MIS professionals had in the past about TCP/IP, such as its security, reliability and efficiency, are no longer germane. Solid and highly prove TCP/IP solutions are now available from multiple vendors for all aspects of mainframe oriented computing – whether it be TCP/IP stacks, tn3270(E) servers, security packages, management platforms, applications, channel gateways, or network infrastructures. There really are no impediments to transitioning from SNA to IP. Thousands of companies around the world have already started to standardize on an end-to-end, mainframe-to-PC, TCP/IP fabric. An increasing number have already started to use the Internet for remote access and information dissemination. The technology required to successfully and gracefully transition from SNA to IP,

such as tn3270(E), Browser based access and DLSw, is here, is widely available, is cost effective, and remarkably solid. E-Commerce beckons. *What are you waiting for?*

Selected Glossary

ActiveX	Microsoft's applet technology. ActiveX applets can control any aspect of a PC [e.g. write to a hard-drive], and can moreover be cached on a PC to preclude the need for repetitive down-loads. Unlike Java, not available across all platforms
applet	Java or ActiveX based software that can be dynamically down-loaded from a Web-Server
APPN	Advanced Peer-to-Peer Networking, the plug-and-play, peer-to-peer version of SNA widely used in AS/400 environments
AS/400	Highly popular IBM mini-computer family
CICS	Customer Information Control System – a widely used IBM Transaction Processing system
CIP	Cisco's Channel Interface Processor that enables Cisco 7000 and 7500 family bridge/routers to be channel-attached to a mainframe
CLAW	Common Link Access for Workstations – a highly efficient, full-duplex capable protocol used for transferring TCP/IP traffic across a channel
CPA	Cisco's Channel Port Adapter, a lower cost version of the CIP specifically for the Cisco 7200 bridge/routers
DB2	IBM's highly popular relational Database system
DLSw	Capability, widely available on bridge/routers, for encapsulating SNA/APPN traffic within TCP/IP packets. Also supports 'SDLC-to-LAN' conversion. Is an IETF standard
Enterprise Extender	IBM's name for the technology of transporting HPR over IP
Firewalls	Security technology to control external access to your network by blocking unauthorized users
HPR	High Performance Routing architecture that is the latest incarnation of the SNA/APPN family of networking architectures
HTML	HyperText Markup Language which is used to describe the format and content of Web Pages
IETF	Internet Engineering Task Force that among other things sets the 'industry standards' for i•net technologies
IMS	IBM's Information Management System for database management
ip3270/ip5250	Using TCP/IP to communicate between traditional 3270/5250 emulators and traditional SNA-LAN Gateways
Java	Sun Microsystems' pioneering, platform independent, applet technology
LU	SNA Logical Unit which acts as the 'port' through which end users gain access to an SNA network
LU 6.2	SNA mechanism for program-to-program communications. Also referred to as APPC – Advanced Program-to-Program

	Communications
OSA-2	Integrated I/O adapter on S/390 mainframes that supports LAN or ATM based connections
OSA-Express	Latest. 2.6Gbps-capable version of the OSA adapter that supports Gigabit Ethernet and connects directly to the internal bus of S/390 mainframes
Proxy Server	A Firewall related technology that monitors and controls the flow of traffic between your network and an external network [e.g. the Internet]
PU	SNA Physical Unit which is *a software component* within an SNA Node that controls and manages physical entities such as links associated with that node
Session	End-to-end connections à la SNA and APPN
SET	Secure Electronic Transactions a security standard advocated by major credit card companies for e-Commerce over the Internet
SNASwitch	Cisco's variant of HPR-over-IP
SNMP	Simple Network Management Protocol that is used by TCP/IP for network management applications
SSL	Secure Sockets Layer which can be used to provide authentication and data encryption between a Web Server and Web Browser or a down-loaded applet
tn3270(E)	Strategic, industry standard based client-server mechanism that permits TCP/IP clients to access SNA applications
VPN	Virtual Private Networking – a scheme, replete with security and encryption, that enables a company to use the Internet as a means of remote office interconnection and remote access