

## **IBM eNetwork Communications Server Overview Presentation Script - 4/24/97**

### **Chart 1: Energize your business network**

This presentation is an overview of IBM eNetwork Communications Server product line.

### **Chart 2: Abstract**

### **Chart 3: Agenda**

### **Chart 4: Old Solutions are no longer sufficient...**

Networking today offers a number of challenges. Network administrators need to leverage their investment in existing applications with the flexibility to add new applications like Internet access and support for mobile and multimedia. You can't afford to be limited by previous networking decisions and all of this must be done while controlling management and operational costs.

It is critical that you have a network that lets you get ahead of emerging applications and technology so you are ready for whatever the future has to offer.

As the evolution continues through client/server to network-based computing, the demands on the network increase. Emerging applications like multimedia and collaborative computing place higher demands on the network. Users want to be able to access information running on different networks and from different platforms. This can only be accomplished with a well controlled network that allows networks, operating systems, and applications to truly interoperate.

Our Enterprise Communications products were designed to answer these problems, giving you the flexibility to support all your end user applications while keeping costs down.

### **Chart 5: IBM Software Servers**

Before we get started with our overview of the Communications Server family of products, I'd like to spend a moment explaining how this product family relates to the IBM Software Server announcements. First, let me make it clear that the Communications Servers for OS/2 Warp, Windows NT, and AIX are proud members of the IBM Software Servers.

The IBM Software Servers today offer integrated offerings for the OS/2 Warp and AIX platforms with a statement of intent to offer IBM Software Servers on the NT platform. Some of the servers are available on NT today, with others delivering code to customers within the next year. The Software Servers are integrated offerings including these servers: Communications, DB2, Directory and Security, Transaction, Lotus Notes, Tivoli Management, and Internet Connection.

With the IBM Software Servers we simplified a large number of stand-alone products into a set of integrated offerings that offer the greatest depth and breadth of application services for the OS/2, AIX, and NT operating environments. The Software Servers are based on open technologies available on all leading server platforms. They have been tested for compatibility with IBM and non-IBM systems. The Software Servers are easy to buy, install and use, with built in growth paths for the future.

### **Chart 6: Enterprise Communications Solutions**

These products should be of interest to customers who want to run multiple protocols in their network. Or for people who plan to consolidate or change their wide area backbones. You can extend the reach of your SNA applications like IMS or DB2 to your TCP/IP users, or run Sockets based applications like Web browsers on your SNA desktops. These products should also be considered by customers who want to improve network availability and performance, or who are interested in running new resource demanding applications like multimedia or collaborative processing.

### **Chart 7: What is a Communications Server?**

IBM has long been a leader in communications software. Customers need reliable and powerful networking support to enable workstations to communicate with other workstations and with host computers over today's leading networking technologies.

IBM's Communications Server provides a powerful multifunction gateway function for any product using industry standard 3270 display and printer protocols. It also delivers the capability to integrate SNA and TCP/IP networks, enabling SNA and sockets applications on any platform and from any vendor to be transported across connected SNA and TCP/IP networks. NetBIOS and IPX LANs can also be integrated into either SNA or TCP/IP environments. And TN3270E server function provides SNA 3270 access to host systems for TCP/IP users with TN3270 emulators.

The Communications Server product line includes solutions for OS/2, AIX, Windows NT, OS/390 and NetWare server environments, and is fully interoperable with OS/400 networks.

Leading open, industry standard, network technologies are incorporated to enable the integration of diverse network types, optimize performance, and facilitate the use of 3270 displays and emulators in APPN networks.

### **Chart 8: SNA Gateway to Host Applications**

Communications Server delivers industrial strength SNA gateway function, supporting both SNA, TCP/IP and NetWare IPX/SPX client/server applications. Communications Server uses standard open interfaces and protocols between client and server, unlike some communications servers or gateways on the market today. It does not rely on proprietary interfaces and protocols, so it does not lock the customer into a restricted set of products and platforms, and can be used

by any client on any platform that supports SNA or TCP/IP. Supported clients include:

- SNA based 3270 or 5250 emulators, such as IBM Personal Communications products which run on OS/2, Windows 3.1, Windows 95 and Windows NT, as well as virtually any emulator product from other vendors.
- TCP/IP based 3270 emulators, conforming to the TN3270 and TN3270E standards, also available in the IBM Personal Communications products and from many other vendors
- SNA gateways, including any workstation gateway that uses SNA for its upstream connection, and including the IBM 3174 range and other SNA terminal controllers
- any SNA client/server application, together with application servers such as the IBM Transaction Server and Database Servers
- TCP/IP client/server applications, including Telnet, FTP, NFS, and many others
- NetWare IPX/SPX applications, supported with Novell NetWare for SAA

The number of clients and applications that can be supported concurrently is equally impressive. Communications Server for OS/2 Warp, for example, can support 2000 simultaneous downstream workstations, with up to 20,000 sessions to as many as 16 central computers; the number of independent sessions (APPC) is limited only by the memory available in the server workstation. In addition, due to the scalability characteristics of the RS/6000 and AIX platform, Communications Server for AIX is capable of supporting an even greater number of sessions. The sessions are limited by memory and processor capacity of the underlying system, up to a maximum of 50,000 sessions per server.

### **Chart 9: Multiprotocol Gateway**

Communications Server is also a powerful multiprotocol gateway, enabling the integration of diverse network types in many flexible configurations. SNA, TCP/IP, NetBIOS, and IPX applications can communicate from remote offices or branch LANs over either an SNA or TCP/IP backbone network. Later in the presentation we'll get into some specific multiprotocol scenarios so you'll be able to better see the various options. No other vendors offers multiprotocol support as diverse as IBM's solutions for LAN to LAN internetworking over SNA or IP, Internet and intranet communications over SNA and TCP/IP. or LAN to host communications.

### **Chart 10: Communications Servers plus Personal Communications Equals Solutions**

In April 1996 we launched a new line of Communications Servers and Personal Communications clients. In October we announced enhancements to these products that improve multiprotocol connectivity, system availability, and performance, including Windows NT beta versions of these products.

The Communications Server is a multi-function gateway that supports integration of diverse networks and applications. The Personal Communications client provides connectivity and emulation for a broad range of client platforms.

These products span the enterprise from desktop to mainframe with solutions for OS/2, Windows, NetWare, NT, AIX, and OS/390 operating environments.

These products give you the flexibility to choose applications without regard for the underlying network, providing seamless integration of current and new business applications, regardless of whether the underlying network is SNA or TCP/IP. For example, you can use these products to provide connectivity for SNA and TCP/IP users to access corporate information on an internal intranet server, or on the Internet.

These products are based on open technologies, designed to interoperate. We've incorporated advanced routing technology that ensures maximum throughput and efficiency.

All of this is provided while eliminating the need to run parallel networks and while reducing management and operational costs.

### **Chart 11: IBM eNetwork Software**

These are the members of the IBM eNetwork product line. The Communications Server is available on OS/2, AIX and OS/390, and a beta program is in progress for Windows NT. In addition, the NetWare for SAA product is jointly developed between IBM and Novell for communications in a NetWare environment. Common to all of our servers is the move from SNA gateways to multi-function gateways supporting a mix and match of SNA and TCP/IP applications and networks.

The Personal Communications client is a suite of application development, communication, connectivity and emulation software all provided on a single CD ROM. With PCOMM, users are guaranteed the same interface whether they are in the office, at home, or on the road.

And a new commercial strength TCP/IP client, Internet Connection for Windows, provides TCP/IP users an easy and inexpensive entry into the world of TCP/IP networks and the benefits of electronic communications, information access, and resource sharing.

### **Chart 12: Enterprise-wide Communications**

These products cover the spectrum from desktop to host, giving you the flexibility to choose your configuration, choose your network type, and choose your applications independently. Remote branch configurations are supported, as are centralized and distributed. We can provide communications within your enterprise, or between enterprises - as well as connectivity between your internal network and the Internet. More and more customers are building internal intranets for information sharing within the enterprise. These products can be the basis of connectivity for

this intranet, allowing rapid deployment of new intranet applications quicker and cheaper. We've got industry leading support for remote or mobile connections, so users can be supported whether they are in the office, at home, or on the road on a wide variety of platforms.

### **Chart 13: Yes! IBM Supports It!**

We're not going to go through this chart in detail. But I want to draw your attention to the broad array of network connectivity that is available with these products. Pretty much whatever you want, you've got it. All major LAN and WAN protocols are supported. All major platforms and operating systems. All major APIs and connectivity types -- even channel attachment.

Both Sockets and SNA applications are supported over the network of your choice -- whether SNA or TCP/IP. And you can have ready access to the Internet for all of your users, even those running only SNA - without requiring multiple protocols to do it.

### **Chart 14: Built on Advanced Technologies**

We've integrated several key technologies with a focus on consistency across the product line. AnyNet technology, which was previously available separately, has been integrated in to the Communications Server and Personal Communications product line. AnyNet separates the choice of application (whether Sockets or SNA) from the choice of network (whether SNA or TCP/IP), expanding the reach of your applications and offering greater flexibility.

The AnyNet gateway support in Communications Server connects two or more unlike networks and causes them to function as a single network. SNA applications such as CICS, IMS, DB2, DDOS, emulator, or printer programs can run over SNA and TCP/IP. TCP/IP sockets applications such as FTP, SAP R/3, SNMP, Lotus Notes, and web browsers can run over SNA and TCP/IP.

For example, the Communications Server can be the communications gateway between your internal network and the Internet, bringing Internet connectivity to all of your users, whether they are running SNA or TCP/IP. Networks can be integrated and new applications added without impacting your existing users, and without requiring any new hardware.

High Performance Routing is the next generation of APPN and brings together the best qualities of SNA and TCP/IP. HPR is geared to provide exceptionally high throughput and availability with automatic routing around failures and no impact to the end user or application.

Dependent LU Requester, or DLUR, allows older SNA LU types (such as LU0 and LU2) to have their control sessions routed across the APPN network.

And all of our enterprise communications products are designed to take advantage of their operating environment. For example, the Communications Server takes advantage of the Parallel Sysplex and SMP hardware in the OS/390 and AIX environments for the ultimate in performance and capacity.

## **Chart 15: Advanced Multiprotocol Support**

As we talked about briefly before, distributed applications are typically bound to the underlying protocol. This either limits your choice of application to those running on currently installed protocols, or requires that you run multiple networks in parallel to support all the applications required. This increases network complexity as well as management and operational costs. Under heavy traffic conditions, the different protocols have different procedures for handling congestion. In addition, traffic prioritization becomes more difficult in a multiprotocol environment.

Communications Server and PCOMM eliminate the need to run parallel networks by allowing Sockets applications to run over SNA networks and SNA applications to run over TCP/IP networks.

AnyNet, based on the Multiprotocol Transport Networking (MPTN) technology, an open industry standard, has been integrated into our Communications Server and Personal Communications product line. Communications Server and PCOMM eliminate the need to run parallel networks by allowing Sockets applications to run over SNA networks and SNA applications to run over TCP/IP networks. NetBIOS and IPX applications are also supported in LAN to LAN internetworking configurations over either an SNA/APPN or TCP/IP backbone.

AnyNet access nodes (top graphic) let new types of applications run on your existing network, without adding communications lines and equipment and without rewriting applications. You can run all your SNA and TCP/IP applications over the protocol of your choice.

The Communications Server gateway can connect two or more unlike networks and cause them to function as a single network, allowing a variety of configuration options for LAN/WAN internetworking.

A single gateway (middle graphic) allows any vendor's native system on one network to communicate with a matching application on a different network. For example, using a Sockets over SNA gateway configuration, which connects SNA and TCP/IP networks, users on SNA workstations with access node software can access the World-Wide-Web (WWW) using Sockets applications such as popular Web browsers.

Paired gateways (bottom graphic) allow users in remote branch offices to communicate over an existing backbone network. For example, an SNMP agent on a TCP/IP network can communicate across an SNA network to an SNMP manager on another TCP/IP network through AnyNet gateways. Or, an IPX or NetBIOS application could run over an SNA or IP backbone to a similar application on another LAN. Similarly, an SNA based application, such as CICS or DB/2, running on an SNA network can communicate across a TCP/IP network to a like application on another SNA network. All of this is accomplished without requiring any new hardware and without re-writing your applications, so you can roll out new applications quicker.

The number of protocols can be reduced, saving you time and money because there are fewer networks to maintain and your network is easier to configure.

**This multiprotocol support offers a number of advantages:**

***For the end user:***

Communications Server and PCOM expand the scope of existing applications and gives the end user a wider choice of new applications. Now an application can be chosen based on its merits, since the choice is no longer restricted to the set of applications that can run over the installed protocols.

***For the administrator:***

Selection of the protocol can be based on the merits of the protocol, not the applications available for that protocol. Networks can be consolidated, and the number of protocols to be managed reduced, while still supporting all user applications. It is less expensive to maintain one network, compared to the cost of maintaining parallel networks. Configurations are less complicated, and maintenance costs are reduced.

***For the application provider:***

Application writers can select the API they use based on the functions the API provides, not the API supported by currently installed protocols. Existing applications can be run over additional network types, expanding the market for those applications. This way, application providers can concentrate on improving their product rather than on developing different versions of their product to run on different protocols.

Communications Server and PCOM break the binding between application and protocol, reducing the number of protocols installed while supporting existing applications, unchanged. This simplifies application selection, network design, and operation, while reducing maintenance costs by eliminating the need to maintain parallel networks.

SNA applications rely on SNA functions that are lacking in an IP network, such as Session Outage Notification, pacing, and expedited data. The AnyNet technology available in Communications Server and PCOM provides compensations for these functions that are missing in IP. Similarly, AnyNet provides compensations for Sockets applications running across an SNA network.

**Chart 16: High Performance Routing**

As I said before, High Performance Routing really brings together the best qualities of SNA and TCP/IP. Geared to provide 100% network availability with maximum throughput and efficiency, HPR prepares SNA networks for the high speed applications of the future.

***Non-disruptive rerouting*** automatically reroutes around a network failure, without impact to the end user or application.

***Application-specific prioritization*** insures that interactive sessions take precedence over batch traffic. As a result, response times are minimized while link utilization is kept high.

***Adaptive, rate-based congestion control*** throttles incoming data in the case of congestion while at the same time, ensuring maximum link utilization by keeping the throughput at the knee of the congestion curve.

***Dynamic, deterministic routing*** means that the data flow between two end points always takes the same pre-determined path. This is required to guarantee the quality and performance of network demanding applications like multimedia. ATM was designed to be connection oriented. HPR's deterministic routing is complementary to ATM's architecture, and while HPR picks up some of the connectionless features of IP routing, it retains the deterministic nature of SNA, and is thus well positioned to take advantage of ATM networking down the road.

In fact, HPR has been endorsed by Cisco, Bay Networks, and 3Com and was selected by the 41-vendor APPN Implementor's workgroup for SNA over ATM.

APPN/HPR has ***plug-and-play*** capability. A user can literally pick up his workstation, move to another location across the country or the world, plug into the network, and have immediate access to other users and applications across the network. This is in contrast with TCP/IP where the domain name server must be manually updated to reflect the user's new network address before he can be reached by another application or user.

HPR is capable of running efficiently on a wide variety of platforms, coexisting with other protocols, and exploiting existing and newly emergent technologies, such as ISDN, frame relay, and ATM.

### **Chart 17: Dependent LU Requester**

Dependent LU Requester is an architecture that provides dependent LU support in an APPN network. It provides a migration strategy for dependent LU devices from a subarea environment to APPN.

Communications Server for OS/2 Warp and Communications Server for AIX provides Dependent LU Requester (DLUR) end-node and network-node support for workstations, allowing them to take advantage of the enhanced SSCP support provided by a Dependent LU Server (DLUS). The DLUS function is provided by VTAM V4R2 and later releases. With the use of this support, traditional SNA dependent LUs, such as emulators and printers, can gain the many advantages of an APPN network.

A few of these benefits are:

- dependent LUs (LU0, LU1, LU2, LU3, independent LU6.2) can reside on nodes that are non-adjacent to the host
- APPN search logic is used to provide the best path for LU-LU sessions

The DLUR and DLUS nodes establish an LU6.2 pipeline that SSCP-PU and SSCP-LU sessions are setup over. The LU-LU sessions are then routed independently of the location of the owning SSCP thereby taking advantage of APPN search logic.

In this chart, the DLUS function is provided by the owning SSCP VTAM A at the top left. The dependent LUs are supported by the DLUR function in the EN at the bottom. The primary LU is in VTAM B. Note that the LU-LU session is setup over a different route than the SSCP-LU session. That is, the LU-LU session is not setup via the owning VTAM A, but rather by connecting directly with the target VTAM B over the APPN cloud. This has several benefits:

- increased speed (only goes over one link)
- decreased cost (one NCP traversed, not two)
- increased reliability (if VTAM A goes down, the LU-LU session with VTAM B is unaffected).

Several other DLUR benefits:

- with CS/2, SNA over TCP/IP support allows dependent LU sessions serviced by DLUR/DLUS to be established over a TCP/IP network.
- backup DLUS support: When the connection to the primary DLUS fails or does not become active, Communications Server will automatically try to establish a connection with the backup DLUS.
- Multi-subnet support: This support allows the DLUR, DLUS, and node containing the application all to be in different APPN subnetworks.

### **Chart 18: Communications Server Family Technology Highlights**

This chart summarizes the industry-leading SNA and multiprotocol support delivered in the Communications Server family.

### **Chart 19: Platform Overviews**

Now we'll start to look at the Communications Server functions and benefits on Windows NT, OS/2 Warp, AIX, OS/390, and also NetWare.

### **Chart 20: Host On-Demand - Internet to SNA Solution**

Host on-Demand is an Internet- to- SNA connectivity solution that provides 3270 application discovery and access via the World Wide Web. Communications Servers are leading the evolution to network computing by being the first multiprotocol gateway to provide seamless integration between 3270 SNA applications and web-centric end-users.

Web-users needing host applications, such as public catalogs, software applications, databases, or other resources, can use Host on-Demand from inside their web browsers to access central computer data. For web users with occasional need to access central SNA computer applications or databases, Host on-Demand provides an alternative to installing a terminal emulation product on the desktop. Host on-Demand brings network computing to the web by enabling web users to seamlessly access non-web based content and services.

Host on-Demand uses the Java environment and native TN3270 and Internet protocols to provide platform independent host access from within a web browser window. Java-enabled Host on-Demand clients are dynamically downloaded from a standard web server on your intranet or in the Internet.

No programming is needed to implement Host on-Demand. Simply install it and specify a URL for the Host On-Demand server you wish to access. Host on-Demand function is available on Communications Servers on OS/2 Warp V4.1, AIX 4.2, Windows NT, CS/MVS, as well as NetWare V2.2. IBM intends to provide a follow-on release that will expand the types of host systems supported by providing 5250 support for AS/400 host access. IBM also plans to enhance the security capabilities of Host on-Demand with support for Secure Sockets Layer.

### **Chart 21: Communications Server for Windows NT**

Responding to customer demands for industrial strength communications solutions on Windows NT, IBM announced in October a beta program for its Enterprise Communications Server for the Windows NT operating system. Communications Server for Windows NT (CS/NT) combines the industry's best SNA gateway with multiprotocol gateway support to allow a mix-and-match of SNA and TCP/IP applications and networks, plus LAN-to-host, LAN-to-LAN, and LAN-to-Internet communications -- all in one product.

### **Chart 22: Communications Server for Windows NT SNA Function**

CS/NT provides industry-leading SNA support including full APPN Network Node and End Node capabilities. Our CS/NT product provides high availability and great throughput through the use of technologies such as HPR. We can support all of your needs for Dependent LUs through our DLUR support. Our Discovery server allows CS/NT, which operating as an EN, to search for a Network Node Server over any LAN (802.2) connection. When CS/NT is operating as a NN, we will answer discovery requests from ENs looking for a Network Node Server.

All APPN load balancing and route calculations will provide the best path for your network traffic. Because CS/NT is a member of the Communications Server family, it can work as peer to our other servers. This means that your LAN workstations can be routed as easily through an AIX, OS/2, or NT gateway. These multiplatform servers can also provide alternative routes and share topology when configured as Network Nodes. Only IBM can deliver this kind of multiplatform support.

CS/NT ships the leading SNA applets including APING, AFTP, and APPC3270. As always, these applets interoperate with SNA applets on all of the Communications Servers. We offer a wide range of connectivity options and client choices. We support a wide range of industry client stacks and emulators. Most existing SNA devices and emulators should attach to CS/NT with no configuration changes. (FMI emulator API is not supported on the server and will require a config change to the emulator to be supported. Also, existing Microsoft SNA Server clients will require a config change to the emulator to be supported.)

You can connect your server to the network or your clients to the server via SDLC, Token Ring, Ethernet, X.25, and twinax. We are also looking at channel attachment options and would be interested in understanding your interest here.

The industry standard APIs such as the common LUA interface: RUI and APPC and CPI-C. Our APPC and CPI-C APIs are binary compatible with Microsoft's APIs.

### **Chart 23: Remote API Client Support**

The Communications Server SNA API client support allows TCP/IP attached clients to access SNA APIs without requiring SNA protocols to flow between the clients and the server. This allows most SNA configuration to take place at the central server.

Communications Server for Windows NT supports SNA API clients on Windows 95, Windows NT, Windows 3.1, and OS/2. The SNA clients provide support for CPI-C APPC, ENHAPPC, and LUA RUI API interfaces. These clients are shipped as part of the server but are actually installed and configured at the client.

### **Chart 24: OS/2 Product Evolution**

We're getting ready to move into a little more product-specific detail. But first I'd like to talk to you about customer migration in the OS/2 environment. We've evolved from basically three products. AnyNet was sold as a stand-alone set of products on a wide variety of platforms to provide multi-protocol networking. Communications Manager/2 provided SNA gateway support, a wide variety of APIs and terminal emulation. And PCOMM provided simple terminal emulation.

What we've done here is much more than a simple re-packaging of these products. We've simplified the product line, and enhanced it. We've integrated several key technologies, and added significant new function.

The decision was made to split Communications Manager because we found that it really appealed to two different types of users. The emulator function was primarily of interest to end users - features such as end user interface and common look and feel were their primary requirements. The gateway capability, on the other hand, was of primary interest to network administrators. The gateway environment needed to be optimized for rapid application deployment, support for a mixed networking environment, with high reliability and availability. So the products were split, to ensure optimization for target markets.

The Communications Server builds on the SNA gateway capability in Communications Manager but we've also integrated the AnyNet multiprotocol support, added HPR and significant new APPN function.

With PCOMM, we've integrated an extremely broad array of API's, enhanced the end user interface, added multi-protocol client support and added support for HPR.

### **Chart 25: Communications Server for OS/2 Warp**

Now let's go through the Communications Server for OS/2 in more detail. As I said before, Communications Server /2 is much more than a simple re-packaging of CM/2. CS/2 provides full APPN support including HPR, and we've integrated AnyNet multiprotocol support to support integration of SNA and TCP/IP networks.

Communications Server/2 is a very cost competitive solution. There is a one-time-charge with no per-seat or per-session charges. So now a customer can add workstations without additional end user costs and with much less network administration required.

The gateway enables multiple LAN or WAN attached workstations including OS/2, Win 3.1, WIN95, Win NT, DOS, NetWare for SAA or Apple SNA workstations.

As part of CS/2 we offer two free-standing components that can be purchased and installed separately, to support application development in the OS/2 and Windows environment. The OS/2 and Windows Access Features provide multiprotocol support, SNA services, and application programming interface support for applications that execute on an OS/2 or Windows workstation.

The OS/2 access feature provides 32-bit API support, LAN and WAN connectivity, SNA and multi-protocol services. The multi-protocol support enables Sockets and SNA applications to run unchanged over either an SNA or TCP/IP network.

The Windows Access feature provides APPC programming support and enables APPC applications to run unchanged over either an SNA or TCP/IP network.

Clients are available separately with our PCOMM products.

### **Chart 26: CS/2 Key New Features**

**Integrated multiprotocol support:** With the multiprotocol support integrated into Communications Server, we can now expand application access to end users without regard for the network protocol. Communications Server allows you to roll out new applications quickly and cheaply, regardless of the network they were designed to use. SNA and TCP/IP networks can be integrated and new applications added without impacting existing users and without requiring new hardware.

CS/2 4.0 includes Sockets over SNA and SNA over TCP/IP access node and gateway support.

CS/2 4.1 multiprotocol enhancements include:

- Four new LAN gateways to allow LAN-to-LAN internetworking between popular client/server

applications without disrupting your wide-area network. IPX and NetBIOS applications on a branch LAN can communicate across your TCP/IP or SNA networks to like applications on another branch LAN, with no change to the application required.

- A TN3270E server which provides a simple way for your TCP/IP workstations to access host 3270 applications and print services without complicated and costly host or network changes.

**Connectivity:** We've really increased the capacity of the gateway. We support up to 2,000 clients and more than 20,000 simultaneous sessions. Communications Server is scalable from small customers to very large enterprise environments. We can now support up to 16 SDLC sessions and full-duplex communication for simultaneous two-way conversations.

CS/2 supports a wide range of local and wide area network connectivity options. These include leased and switched telephone lines, Token Ring and Ethernet LANs, ATM, FDDI, SDLC, X.25, ISDN, IDLC and frame relay protocols. This gives you flexibility in selecting connections that best suit your business needs. And with the ability to support up to 2 Mbps, CS/2 can help reduce the cost of communicating over wide area networks. T1 lines are supported as well as European E1 lines for frame relay and ISDN.

CS/2 now supports both ISA and microchannel - shallow and deep adapters with an open NDIS interface. This means that most industry adapters are supported, and the solution is open.

There are also mobile computing capabilities. Applications that use X.25, SDLC, and Asynchronous communications protocols can now be taken on the road with laptop computers and PCMCIA and Hayes AutoSynch compatible modems. Remote PCs can be connected to a CS/2 via modem to provide access to host computers and LAN attached PCs. This extra degree of freedom allows you to use existing applications in a new, mobile environment.

CS/2 provides both 16 and 32-bit APIs. The 32-bit API support makes it an ideal communications and networking platform for application developers. You'll find API support for LUA, APPC, CPI-C, X.25, ISDN, and ACDI. There's also network node and end node support for APPN. These combine to make CS/2 an excellent communications platform for distributed and client server applications.

CS/2 4.1 enhancements include:

- Integrated frame relay support that allows customers to take advantage of low cost frame relay connections
- Automatic backup to complement high performance routing with superior availability. Now if a line goes down, a backup link can be automatically activated so communications will not be interrupted if connections fail.

**Chart 27: IPX/SNA, NB/SNA, IPX/IP, NB/IP Gateways**

OS/2 AIX 4.1 added 4 new gateway functions for LAN-to-LAN internetworking:

- IPX over SNA
- IPX over TCP/IP
- NetBIOS over SNA
- NetBIOS over TCP/IP

These gateways, implemented in pairs, allow NetWare IPX or NetBIOS applications running on one LAN to communicate over either an SNA or TCP/IP WAN to like applications running on another LAN. No applications changes are required.

These LAN gateways appear to the SNA network as an LU6.2 applications program. In APPN networks, all LAN gateway configurations can use network qualified names. No other configuration of the SNA network is required. In subarea networks, a LAN gateway can be configured using VTAM and Communications Server definitions.

The LAN gateway can be configured in an IP WAN using either IP addresses or host names, but host names are preferred. Each LAN gateway appears as a host on the IP network.

All gateways fully protect the SNA and IP backbones by filtering IPX and NetBIOS broadcasts.

Name qualifiers are required for NetBIOS LANs and are optional for IPX LANs. When 2 gateways establish connections, they exchange name qualifier lists.

If the LAN gateway supports more than 100 active workstations or simultaneously connects to more than 20 remote sites, consider configuring a dedicated workstation for the LAN gateway. The dedicated workstation only processes traffic for remote LANs. The gateway and most OS/2 applications can coexist on the same workstation if the LAN gateway simultaneously supports 100 or fewer workstations. It's recommended that the LAN gateway be equipped with at least 33MHz 486 processor.

### **Chart 28: Sockets over SNA Gateway Backup and Load Balancing**

The Sockets over SNA gateway connects TCP/IP and SNA/APPN networks. In this chart we have an example of a "double gateway" implementation, where remote IP LANs are connected via gateways over a backbone SNA/APPN network to a central site IP LAN via parallel gateways.

With this configuration, TCP/IP applications such as FTP, Telnet, Lotus Notes, and SAP R/3 running on native TCP/IP client workstations can communicate with each other over the WAN with no new hardware or without any modification to the applications. In addition, the TCP/IP applications can benefit from SNA networking features such as traffic prioritization, data compression, and congestion prevention. Our performance tests on MVS/ESA, AIX, OS/400, and OS/2 consistently show that TCP/IP applications run faster over SNA than over native TCP/IP when large file sizes are used.

This gateway has been shipped for several years as the AnyNet/2 Sockets over SNA Gateway. Enhancements have been made to the gateway, and are shipped in CS/2 4.1 where a number of multiprotocol gateways are integrated. Some of the enhancements include:

*Increasing the connection limit from 250 to 2000 connections per gateway*

#### *Backup and load balancing*

The backup and load balancing option provided by Sockets over SNA can improve the reliability of your network by allowing parallel gateways to service the same site. This option provides a solution for large networks with multiple branch or remote sites that are serviced by a single central site. Using parallel gateways in a central site provides:

- backup, so that connectivity is assured even if one of the gateways fails
- load balancing, so that traffic is routed even if a single gateway is not powerful or fast enough to handle its traffic at peak times

Remote gateways define default routes through each of the parallel gateways.

Parallel gateways use the Routing Information Protocol (RIP) to monitor the status of partner parallel gateways. RIP enables parallel gateways to periodically broadcast the contents of their routing tables to partner parallel gateways when changes occur.

In this chart, the 3 gateways on the left are parallel gateways servicing the central site IP network. The gateways on the left service the remote site IP LANs. These gateways in the remote sites must explicitly define three default routes to the parallel gateways.

Initially, each parallel gateway services approximately one-third of the remote sites. This partitioning is done by the parallel gateways during startup. If one of the parallel gateways fails, the other parallel gateways take over the failed gateway's remote sites. Connection-oriented applications must be restarted. Connectionless applications continue to run, but data will be discarded until the backup gateway takes control. When the original gateway recovers, applications running through a backup gateway continue to run until completion.

#### **Chart 29: TN3270E Server**

CS/2 now provides TCP/IP users easy access to 3270 applications with its new TN3270E server function. Customers can connect TCP/IP clients on OS/2, DOS, Windows, Windows 95, and Windows NT to their SNA or APPN network.

TN3270E support will allow TN3270 or TN3270E clients on a TCP/IP network to access host 3270 SNA applications. With the new extensions of TN3270E, users can print to their workstations or printers in their TCP/IP network. Also, requesting a resource (LU or pool of LUs), responses, Attention and System Request keys are supported. TN3270E support is compliant with industry standard Request for Comments (RFCs) 1576, 1646, and 1647. Any TN3270 or TN3270E client which adheres to these RFCs are supported.

The TN3270E server enables SNA/APPN connectivity to the host and TCP/IP connectivity to the clients. TCP/IP connections are mapped to SNA sessions and passed through the 3270 datastream.

Since the TCP/IP connections are mapped to SNA sessions, the customer can take full advantage of SNA/APPN on the host side of the network, with no TCP/IP required on the mainframe. The 3270 datastream that comes out of the TN3270 client can be transported using Dependent LU Requester (DLUR). By using DLUR/DLUS, the customer can benefit from APPN networking. Also, the customer can use high performance routing (HPR) from the CS/2 TN3270E server all the way to the mainframe, delivering non-disruptive session routing.

### **Chart 30: CS/2 Outperforms Microsoft in SNA Gateway Tests**

IBM commissioned The Tolly Group to compare the efficiency of Communications Server for OS/2 Warp V4.1 3270 SNA gateway with Microsoft SNA Server Version 2.11 Service pak 1 in several PC platforms and gateway configurations. The Tolly Group measured gateway transaction throughput and corresponding CPU utilization and response time of each product while it serviced up to 448 LU sessions in a LAN environment.

The Tolly Group tested the gateways on 486 and multiprocessor Pentium platforms, as well as with full stack and split stack 3270-to-gateway communications.

The results showed that CS/2 delivers superior transaction throughput and faster response time while requiring less CPU resources than SNA Server. This indicates that CS/2 can provide, with lower hardware cost, comparable or better performance relative to SNA Server.

### **Chart 31: CS/2 and Microsoft SNA Server SNA Gateway: CPU Utilization vs. Total Gateway Throughput**

This chart shows that CS/2 is more efficient with a single Pentium processor (1PCS2 FULL) than SNA Server with a single, dual, and quad processors (1PSNA FULL, 2PSNA FULL, 4PSNA FULL). Further, CS/2 is more efficient with a single 486 processor (486 CS2 FULL) than SNA Server with single and dual Pentium processors.

CS/2 on a single Pentium platform clearly delivered more throughput with lower CPU utilization than SNA Server running on both single- and dual-Pentium platforms. Total throughput of CS/2 full stack ranged from 331.2 to 651.5 transactions per second (t/s) with CPU utilization from 55.1% to 94.01%. In contrast, SNA Server running on a dual-Pentium platform, also full stack, turned in throughput of 77.4 to 279.6 t/s while its utilization ranged from 37.95% until both processors peaked at 100%. CS/2 throughput, with one processor at nearly peak usage, is more than double SNA Server's throughput with dual processors in peak usage. CS/2 uses adapters more completely, leaving CPU availability for other applications.

### **Chart 32: CS/2 and Microsoft SNA Server SNA Gateway:**

### **Response Time vs. Total Gateway Throughput**

CS/2 running on a single Pentium platform has lower (better) response time than all configurations of SNA Server. Additionally, CS/2 on a 486 platform has lower response time than all configurations of SNA Server and comparable response time to SNA Server running quad-processors and full stack clients.

### **Chart 33: CS/2 Clearly More Efficient**

This is a summary of the two previous performance charts.

### **Chart 34: CS/2 Branch Extender for Large APPN Networks - Direction**

APPN can support between 2 and 400 NNs in a large network. Several large customers need networks with many more NNs, for example from 1500-5000 NNs. APPN is limited in the number of NNs it supports because of limits on the topology database. IBM's large APPN network strategy is based on border nodes which allow customers to subdivide a large network into topology subnetworks of manageable size. However border nodes do not solve the requirement of supporting thousands of NNs because border nodes create extra traffic and intermediate node computing.

Branch Extender (BE) is designed to address these problems by reducing topology database NN storage requirements in the network and by reducing information flows. BE is aimed at interconnecting branch offices to an APPN WAN backbone network. BE is an NN which typically has LAN and WAN interfaces, DLUR, and HPR. BE knows the topology of its own domain, but not its uplink topology. BE reduces traffic on the WAN by not passing its topology information on to the rest of the network, and by resolving the requests for network services that it can and passing on the requests that it cannot resolve.

The number and types of links over which BE provides network node services to its domain are unrestricted. Although a typical BE domain is a single LAN, a PA's domain may consist of any combination of one or more of the following:

- LANs: Ethernet, Token Ring, FDDI, ATM LAN emulation
- one or more WANs: SDLC, SDLC multipoint, X.25, frame relay, ISDN channel

The number and type of links over which BE supports receiving network node services from an uplink NN server are unrestricted but BE never has more than one NN server at a time.

### **Chart 35: What's New with Communications Server for AIX V4**

Communications Server family for AIX provide enterprise networking solutions for integration of SNA and TCP/IP networks. Users can access any application, distribute mainframe processing to other platforms and move to open systems.

There are several key features introduced with Communications Server for AIX V4. It includes additional language support, enhanced packaging, and common installation to be consistent with other IBM Software Servers for AIX. AnyNet multiprotocol support is expanded to include gateways for both Sockets over SNA and APPC over TCP/IP. APPN support is enhanced to include HPR intermediate node support, as well as dependent LU requester (DLUR) support. Enhancements have been made to the application programming interfaces including non-blocking APPC APIs. We also are including a single session of IBM's 3270 Host Connection (HCON) for administrative use. This is a single session emulator for administrative use. The multi-session emulator can be purchased in the HCON product.

### **Chart 36: Communications Server for AIX Version 4 and SNA Client Access for AIX**

Communications Server for AIX (CS/AIX) provides industry leading SNA communications capabilities as well as multiprotocol network server functions for SNA and TCP/IP network integration. Connections can be made over LANs, WANs or direct-attached channel.

#### **Full function communications server:**

##### *3270 and SNA gateway:*

CS/AIX supports SNA connectivity in traditional hierarchical subarea networks and in peer-to-peer networks. The SNA gateway function allows many SNA clients to share a single physical connection to one or more centralized computers. It also allows clients to dynamically access a backup computer that shares the workload and improves the availability of resources.

In this graphic, SNA clients in the lower left LAN are using CS/AIX as an SNA gateway to access host SNA applications.

Availability and reliability are probably your top networking concern. Businesses rely on having applications and information available at all times. If availability to host resources is imperative for your business, the SNA gateway function enables you to define a backup host. When the primary host goes down, users will automatically be given a session on the backup host thereby maximizing their productivity.

##### *APPN:*

CS/AIX has the most advanced APPN on a UNIX platform. APPN provides topology, directory, and route selection services that enable APPN to dynamically learn the connectivity of the network and dynamically learn where a resource is located. APPN substantially reduces network administration costs by providing dynamic and simplified configuration. Full APPN Network Node and End Node support is provided,

With CS/AIX 4.2, we are also introducing support for high performance routing (HPR) intermediate node support, which allows customers to design networks with improved performance and reliability. HPR provides maximum throughput and efficiency with automatic re-routing around network failures so users don't feel the

impact at their desktops if a problem occurs somewhere in the network. Support is also added for Dependent LU Requester (DLUR) which enables dependent LUs to operate unchanged in an APPN network.

*Internet Access for SNA Users:*

With the new Sockets over SNA gateway in CS/AIX 4.2, CS/AIX can connect your SNA network to the Internet, allowing SNA clients to cruise the Internet or Internet users to access a web server on your SNA network.

*TCP/IP applications over SNA networks and vice-versa:*

As with our other servers, CS/AIX really expands the reach of your applications and provides integration of SNA and TCP/IP networks. AnyNet technology for TCP/IP Sockets over SNA and APPC over TCP/IP is integrated into CS/AIX giving expanded application access and allowing customers to select the best SNA- or TCP/IP-based business applications for their enterprise.

For example, customers with SNA/APPN networks can now use CS/AIX to connect their SNA users to the Internet, allowing web browsing across SNA and TCP/IP networks. Or, companies who use SAP R/3 can run R/3 on an AIX server and use the CS/AIX on the same RS/6000 to connect R/3 clients over an SNA/APPN network.

*Very high capacity, reliability, and manageability:*

CS/AIX is optimized for performance, stability, and scalability. It provides the ultimate in fault resilience with features such as automatic switchover, hot standby, load balancing, and backup host capability.

SNA Client Access for AIX offers a robust solution for controlling and balancing the workload across gateways. Load balancing maintains the operation during server failures by automatically rerouting clients to an available server. You can provide backup support so your TCP/IP clients are not impacted by their gateway going down or being overloaded. They will automatically be routed to the server that is best able to give them the best availability and response time.

Communications Server for AIX product line enables off-loading and rehosting to free up mainframe processing. With SNA Client Access for AIX, you have the ability to front-end all TCP/IP TN3270 terminal traffic thereby saving mainframe cycles and optimizing the mainframe for other mission-critical SNA and TCP/IP applications. With the channel connectivity of Communications Server for AIX, you can also have a high-speed TN3270 offload capability.

*SMP efficient:*

To maximize performance, CS/AIX has been integrated into the AIX Kernel.

CS/AIX provides virtually unlimited scalability, limited only by hardware resources. Tens of thousands of sessions can be supported while providing subsecond response time. The RISC

hardware platform offers unmatched performance and scalability, from cost-effective desktop workstations through the highly scalable POWERParallel systems. CS/AIX takes advantage of the symmetrical multiprocessor (SMP) technology by exploiting the parallel processors on the hardware. A 3.3 time performance improvement was realized on a 4-way processor. Due to tighter processor controls, we also improved the performance on the uniprocessor (UP) platforms.

*Channel connectivity:*

If your mainframe server is running at capacity and you can't expand, you need a way to offload central computer activity to free up application processing. The SNA Channel Attachment

feature of Communications Server for AIX supports a direct attached connection from your mainframe to your RS/6000 or RS/6000 SP system.

The channel feature of CS/AIX rapidly moves data between the host and AIX applications. Both ESCON and Block Multiplexor channel attachment can be supported. This feature opens up new opportunities for distributing processing from the mainframe to AIX platforms. Increased channel speeds allow host applications to be placed on the AIX system.

*Application Programming Platform*

CS/AIX includes a broad array of application programming interfaces (APIs) including LU0, LU1, LU6.2, CPI-C, and APPC. The APPC Toolkit, a set APPC programs, enables execution of simple network tasks consistently across different systems. CS/AIX also includes an APPC

interactive application generator called SNAPI, which is an excellent tool for creating and testing

APPC applications.

*Easy management and administration lowers ownership costs:*

With CS/AIX and SNA Client Access for AIX, there are several options for managing and viewing information on resources. CS/AIX provides an X-windows, motif based usability tool, Xsna, which provides an easy to use, point-and-click interface to display information on SNA and TCP/IP resources and manage SNA resources. Users can be dynamically added, SNA line status, session status, and connected client status can be viewed.

SNA Client Access, in combination with the NetView Performance Monitor (NPM), provides end-to-end response time measurement all the way to the TCP/IP client. Now you can extend response time measurement beyond SNA boundaries to TCP/IP clients, and utilize the data to identify problem areas and improve overall system performance.

**Offload TN3270 and TN5250 from mainframe:**

SNA Client Access for AIX Version 1.2 is the AIX family member best suited to get your TCP/IP clients talking to your SNA network. SNA Client Access functions as a TN3270E and TN5250 server, supporting a wide range of multivendor TCP/IP clients. A key benefit of SNA Client Access is the ability to offload TN3270 and TN3270E traffic from the

mainframe, freeing up the host for other SNA and TCP/IP processing.

In this graphic, TCP/IP clients on the LAN in the lower right corner are using CS/AIX and SNA Client Access for AIX to access host SNA applications and print services over the connected IP and SNA networks. We'll look at this function more closely in a few charts.

### **Chart 37: SNA Client Access for AIX**

We've already talked about SNA Client Access quite a bit. Let me give you some additional key functions and show you a network configuration with SNA Client Access. This graphic shows CS/AIX with SNA Client Access channel attached to a host. SNA Client Access is an optional licensed program that runs with Communications Server for AIX. The program provides access to SNA networks from TCP/IP client workstations. SNA Client Access functions as a TCP/IP Telnet server, providing SNA network access to client applications running anywhere in the TCP/IP internetwork.

#### *Client support:*

You can now connect your TCP/IP clients on OS/2, DOS, AIX, Windows, Windows NT, HP, and Sun operating systems to your SNA network. The multiple client functions supported include

TN3270E, TN3270, TN5250, 3270, 5250, and 3287 printer emulation, APPC, and 3770 remote job entry (RJE).

#### *Save mainframe cycles and optimize mainframe for other SNA and TCP/IP applications:*

With CS/AIX and SNA Client Access you have the ability to boost the capacity of an existing S/390 or AS/400 by having your RS/6000 assume the burden of TN3270 and TN5250 processing. By moving TN3270 processing off the mainframe onto one or more RS/6000s, your host gets more processing power for the critical business applications and data that are the foundation of your business.

#### *Host print support on local printer:*

The TN3270E server functions include extensions that allow users to print from mainframe applications to printers attached to their workstations or to printers on their TCP/IP network.

### **Chart 38: Communications Server for OS/390 and MVS/ESA**

In order to remain competitive, businesses today require access to a broad base of applications, cross-network communications with suppliers and consumers, and interoperability between diverse computing environments.

Addressing these needs requires networking solutions that support mission critical, business-to-business, and business-to-consumer communications across LANs, enterprise WANs, intranets, and the Internet. Communications Server for OS/390 and MVS/ESA has the technologies to address these various communications needs.

Communications Server for OS/390 release 3 and Communications Server for MVS/ESA release 2 allow you to reap the benefits of a combined TCP/IP V3R3 and VTAM V4R4 features.

The new releases of Communications Server updates VTAM to V4R4 as well as integrating universal any-to-any multiprotocol support. Additionally, TCP/IP V3R2 recent enhancements include RIP V2 and Open Transaction Management Access (OTMA) support. Communications Server provides a powerful, open, communications gateway that combines SNA, TCP/IP, and multiprotocol networking technologies into a single solution.

### **Chart 39: Communications Server for OS/390 and MVS/ESA**

Communications Server for OS/390 Release 3 and Communications Server for MVS/ESA release 2 includes the latest release of TCP/IP (V3R2) updated with these enhancements:

#### *High performance native sockets:*

TCP/IP for MVS V3R2 uses high-performance native sockets (HPNS), a new infrastructure to improve performance and serviceability for applications written to the following APIs: C, Macro, Callable, CICS, and IMS. Route D is HPNS enabled for better performance.

*Virtual IP addressing (VIPA)* has been added to improve the reliability and stability of TCP/IP in the presence of a network or interface failure. The term VIPA is used to refer to a number of related functions, including enhanced dynamic route update server (RouteD) processing.

*Routing Internet Protocol (RIP) Version 2* with variable subnet masking support permits more efficient use of IP addresses, more flexibility in TCP/IP network design, as well as greater interoperability with other routers in the network.

*Open Transaction Management Access (OTMA)* is now supported to allow any TCP/IP client to access IMS without modification to the IMS application.

*Enhanced industry standard Unix (OpenEdition) application interface* makes writing TCP/IP applications easier. It represents Berkeley Sockets Domain (BSD) level 4.3 with enhancements for CICS, IMS, and DB2.

#### *Enhanced National Language Support:*

TCP/IP for MVS V3R2 enhances NLS support for File Transfer Program, Network Print Facility, ISPF panels, etc.

#### *Improved serviceability:*

TCP/IP now exploits OS/390 component trace, IPCS, and other OS/390 serviceability facilities to improve serviceability for TCP/IP.

### **Chart 40: Communications Server for OS/390 and MVS/ESA**

Significant enhancements to the TCP/IP function used in the OS/390 OpenEdition environment provide improvements in performance, reliability, serviceability, network management, and national language support.

*New TCP/IP stack for improved performance for OS/390 OpenEdition:*

The TCP/IP function in the Communications Server for OS/390 has been designed for native MVS to improve its performance and reliability. It will capitalize on OS/390's enhanced MVS services and will have multiprocessing capability.

Communications Server for OS/390 Release 4 users will benefit from improved performance for their OpenEdition applications while being able to continue running their non OpenEdition applications. In a subsequent release, these benefits will be available to both non OpenEdition and OpenEdition applications on a converged, TCP/IP protocol stack in OS/390.

*Exploitation of VTAM DLC's for improved RAS and performance*

TCP/IP will use MVS CTRACE for improved serviceability.

The trace facility will be changed to trace more than 256 bytes per record.

The new TCP/IP OpenEdition stack will support dynamic stack configuration to allow the deletion of definitions while TCP/IP is active. This enhances the S/390 servers' ability to provide 24 hour, 7 day a week availability.

*Early availability:*

Though these new TCP/IP facilities for the OpenEdition user of OS/390 will be fully integrated into Release 4, we are pleased to announce an early availability of this code for April 25, 1997. Referred to as OS/390 TCP/IP OpenEdition, it will be available in a kit, containing the code and related publications, as an optionally orderable feature of OS/390 Release 3. It will be limited to OS/390 Release 3 customers utilizing the standard base and will be available only until the general availability of OS/390 Release 4.

**Chart 41: Enhanced VTAM Functions**

Communications Server for OS/390 Release 3 includes VTAM V4R4, with significant benefits for those needed industrial strength, enterprise network computing.

*Availability support for S/390 Parallel Sysplex: \_\_\_\_*

The very important aspect of high availability for mission critical applications in the network is addressed in the Communications Server through Multi-Node Persistent Sessions (MNPS) function. It allows applications to be recovered on alternate processors in a sysplex upon application or system failure, minimizing impact on end users as well as network overhead.

*HPR extended:*

High performance routing is expanded to benefit a broader range of network configurations. With CS for OS/390 release 3, HPR session end-points can reside in different APPN networks and subnetworks so HPR performance and availability benefits are truly end-to-end.

*Single systems image capability extended to TSO/E SNA users:*

Another capability that addresses high availability for mission critical applications in the network is provided in Communications Server through the extension of generic resource support to TSO/E. TSO/GR not only extends generic resource support to TSO/E, but also provides the capability to balance session distribution across TSO systems in the sysplex via the coupling facility. TSO/GR can greatly enhance usability for end-users of the S/390 Parallel Sysplex servers.

*Asynchronous Transfer Mode:*

The natural place for a high speed, high capacity server for an ATM network is the S/390. The Communications Server for OS/390 release 3 provides an ATM Forum User-to-Network Interface (UNI) compliant, 155 Mb/second native ATM capability for the S/390 server.

APPN HPR class of service (COS) will be mapped to ATM quality of service (QOS) combining native ATM with the power of the S/390 server. Therefore, applications require no changes to use these new high speed connections as they are added to the network.

*High Performance Data Transfer (HPDT) for APPC applications*

To better capitalize on high-speed networking, Communications Server introduces HPDT services and an HPDT interface to optimize performance for APPC applications - particularly those that transfer large blocks of data.

*Additional enhancements:*

Additional enhancements include:

- cryptographic enhancements
- reduced VTAM definitions for sysplex
- APPC enhancements for improved performance, usability and security

#### **Chart 42: NetWare for SAA 2.2**

IBM and Novell jointly develop, support, and market the entire NetWare for SAA product family. This agreement between Novell and IBM includes the NetWare for SAA, HostPrint and HostPrint/400 products. NetWare for SAA: AS/400 Edition is the first product offering to come out of this relationship.

NetWare for SAA 2.2 seamlessly integrates NetWare networks with IBM mainframe and AS/400 systems. Developed as a set of NetWare Loadable Modules (NLMs), NetWare for SAA is fully integrated with NetWare Directory Services for administration, security, and management. NetWare for SAA configurations can range from small branch offices with 16 sessions to large data center servers with up to 3,500 concurrent users.

NetWare for SAA provides reliable host connectivity without adding to the complexity of the network. Administration is easy, and network managers can manage NetWare for SAA from the same ManageWise console used to manage other NetWare resources.

NetWare for SAA add-on NLM products fully integrate host and NetWare print services. NetWare HostPrint and NetWare HostPrint/400 provide server-based host printer emulation that reduces network traffic and simplifies administration, improving the performance and reliability of host-to-NetWare printing.

Leading software companies provide more than 100 value-added applications for NetWare for SAA, making it the platform of choice for NetWare-to-host integration. Some of the applications built on NetWare for SAA include host printing, software distribution, database access, centralized data backup, network management, and integrated security. Software development tools are available for creating custom LU6.2 and LU0 applications for the OS/2, MS Windows, DOS and NetWare platforms.

NetWare for SAA is a flexible product that can be used for very large data center installations as well as small branch office sites. When located at a data center, the user capacity, load balancing and server-based Hot Standby features of NetWare for SAA enable it to provide consistent performance and reliable host connectivity to large numbers of users.

For department or branch office locations, end users can access centralized NetWare for SAA servers using IPX/SPX, TCP/IP and AppleTalk, or NetWare for SAA can run on remote servers and connect directly to host systems using SNA protocols.

Even mobile users can connect to mainframe and AS/400 systems using NetWare Connect with NetWare for SAA. Flexible NetWare for SAA packaging makes it cost effective for any of these environments.

NetWare for SAA connects over multiple data link types, including channel attachment. NetWare for SAA supports a full range of LU types for display, printer, file transfer, and program-to-program communications. Virtually any 3270 or TN3270 terminal emulator is supported with NetWare for SAA.

NetWare for SAA includes the ManageWise-based NetWare for SAA Services Manager application, which enables network managers to graphically analyze usage trends, and to configure, monitor, and maintain multiple NetWare for SAA servers over local or wide area network connections. NetWare for SAA supports the configuration, administration, and management of any NetWare for SAA Server from a single workstation.

#### **Chart 43: NetWare for SAA - AS/400 Edition**

NetWare for SAA: AS/400 Edition is a cost-effective software solution specifically designed to meet the needs of the networked AS/400 environment. NetWare for SAA: AS/400 Edition is jointly developed and supported by Novell, who brings you NetWare, and by IBM, who brings you the AS/400 and SNA. It supports a broad range of third-party applications, so it integrates smoothly with existing computing environments.

The AS/400 Edition is a set of NetWare Loadable Modules (NLMs) that runs on NetWare 3 and 4 servers. NetWare servers can be installed on PCs or on an AS/400 Integrated PC Server (formerly FSIOP).

NetWare for SAA: AS/400 Edition's easy software licensing allows incremental license upgrades from five to 200 users.

NetWare for SAA: AS/400 Edition is fully integrated with NetWare administration, security and management. It is designed for configurations ranging from five to 200 users. For larger environments, NetWare for SAA 2.2 is the perfect solution.

Administration and management utilities ensure that support personnel can provide high-quality service from a single, centralized workstation. AS/400 Edition administrators use NetWare for SAA Administrator, an intuitive and easy-to-use Windows-based utility to configure any AS/400 Edition server in the network. NetWare managers can administer AS/400 Edition conveniently with the NetWare for SAA Services Manager, a graphical management program that is part of the NetWare for SAA: AS/400 Edition package. NetWare for SAA Services Manager can be run under the ManageWise console or as a stand-alone application.

The AS/400 Edition provides comprehensive host connectivity without adding to the complexity of the network. Administration is easy - existing NetWare users, groups, and other bindery and NetWare Directory Services objects can be assigned to host communication resources.

NetWare for SAA: AS/400 Edition provides complete access to IBM AS/400 data, applications and services. DOS and Windows workstations connect to AS/400 Edition servers using IPX/SPX or TCP/IP over any NetWare-supported LAN topology.

Add-on NLMs fully integrate AS/400 and NetWare print services. With the addition of Novell's NetWare HostPrint/400 product, users can take advantage of standard LAN-based printers to handle print jobs from their AS/400 applications. Printers can be anywhere on the NetWare network, making printing more flexible and convenient. NetWare HostPrint/400 provides server-based AS/400 printer emulation that reduces network traffic and simplifies administration, improving performance and reliability of AS/400-to-NetWare printing. Instead of configuring each workstation individually, the administrator can configure and manage all printer sessions and print jobs from the network using familiar NetWare utilities.

#### **Chart 44: Solutions for Network Integration**

#### **Chart 45: What kind of customer problems are solved with multiprotocol solutions?**

#### **Chart 46: Transportation Industry: Internet/intranet access using SNA**

Here's an example that I think is on everyone's mind. How can I get access to the Internet or an internal SNA/APPN intranet for my users - even those connected via an SNA network? With the

Communications Server Sockets over SNA gateway capability, you can connect your internal SNA network to the Internet.

In this example, a transportation corporation mandated that all departments reduce paper use by 25%. So the Director of Customer Service searched for ways to improve document distribution to the representatives, while maintaining their access to the reservations system at the SNA central site.

With the high visibility of Internet technology, the Director saw a corporate intranet as a logical distribution avenue. The company could publish documentation on a Web site at the central office. Communications Server for MVS/ESA would allow their mainframe to run TCP/IP based Web server over their SNA network. The interactive, searchable web site would improve access by the service reps and reduce their transaction time. The service reps at TCP/IP-based branches

had access to the SNA intranet via Communications Server at their location. And customers on the Internet could access an external web site and avoid needless customer service calls. A Communications Server on the boundary of the SNA intranet and Internet provides this connectivity.

Using a corporate intranet enhanced productivity, reduced costs, and strengthened customer service.

SNA clients on the intranet could also access the mainframe server of the Internet. Clients running Communications Server OS/2 Access Feature or PCOMM OS/2 can run a Sockets-based web browser and access information on the Internet. Your users stay connected to their SNA networks. No TCP/IP is required.

In this scenario, TCP/IP applications benefit from the performance advantages of SNA like class-of-service and congestion control.

#### **Chart 47: Zahid Tractors Implements Lotus Notes over SNA**

Zahid Tractors and Heavy Machinery, Ltd. in Saudi Arabia is the leading supplier of equipment, machinery, and auxiliary products to a wide cross-section of industries in Saudi Arabia. Zahid had an enterprise-wide IBM AS/400 APPN network running business applications. They implemented a new quality system associated with ISO 9000 accreditation on a Lotus platform. Since Lotus Notes runs on NetBIOS or TCP/IP, they required a multiprotocol solution that could allow Notes to run over their AS/400 APPN network. This solution would enable Notes replication over their existing leased line SNA network.

Zahid Tractors installed Sockets over SNA Gateways (available in CS/2) in their central and branch offices. On the LANs, Notes clients communicated with Notes servers using NetBIOS. Over the APPN backbone, Notes servers replicated data using the sockets over SNA gateways. to connect their remote and central offices.

SNA's class of service for TCP/IP sockets applications running over SNA was used. A "batch" class of service was specified for Notes traffic so existing backbone 5250 interactive traffic was not impacted by the solution.

The primary benefit was savings in dial-up line costs. Another benefit: the ease of deployment. The solution was deployed without disruption to the existing network, without upgrading OS/400 software or disrupting the APPN network.

Zahid's entire APPN network is now Internet enabled, meaning that any TCP/IP sockets-based application, including Internet applications, can run from the branches over the backbone APPN network.

#### **Chart 48: Customer Quotes**

#### **Chart 49: Filiadata: SAP R/3 over SNA**

Filiadata is a large drugstore chain with sites throughout Europe. They needed to connect their remote IP LANs across an SNA backbone to access an AIX server running SAP R/3. The SNA backbone network is provided by IBM Global Network. In addition to SAP R/3, their users needed to share OS/2 print servers on the LANs.

The problem was that they have no IP skill and besides, they are convinced that SNA has better line utilization. This was a concern because they had low speed 9600 baud connections to eastern Europe.

They were able to install Communications Server Sockets over SNA gateways to connect their IP networks to the SNA backbone. Their TCP/IP applications now benefit from SNA by taking advantage of class-of-service and traffic prioritization.

They were able to use existing skills and roll out this new application quicker and cheaper than any other alternative. And they didn't have to install any new hardware to do it.

#### **Chart 50: Customer Quotes**

#### **Chart 51: Additional capabilities with LAN internetworking over SNA/APPN/HPR**

These capabilities apply to both the Zahid Tractors "Notes over APPN" and the Filiadata "SAP R/3 over SNA" scenarios.

#### **Chart 52: TN3270E Manufacturing Industry**

This automobile manufacturer wanted to improve its "just-in-time" manufacturing processes by providing better ways for more workers at remote auto-parts manufacturing sites to coordinate timely delivery of parts to assembly sites. Mainframe applications at the central site maintain order information, assembly schedules, and bill-of-materials. By providing access to this

information for many remote users, production cycle time has been reduced and employees now have the information they need to understand and resolve problems.

The solution used TN3270E server function provided by Communications Server for AIX with SNA Client Access to support 30,000 TN3270E users who needed access to central site applications and data. CS/AIX with SNA Client Access was installed on three RS/6000s located in the US central site and one RS/6000 located in Europe.

Load balancing across the four servers was used to provide the best possible service to all users. The load is balanced among the various servers based on all the critical factors: host LU availability, link speed, client/host connection load, overall system load, and processor speed.

The Response Time Monitoring feature allowed network administrators to easily trouble shoot performance problems all the way from the host to the TN3270E client - without relying on other applications!

### **Chart 53: Additional capabilities of TN3270E server solution**

Major advantages to this solution include:

- *maximize mainframe application performance*  
More MIPS are available on the mainframe for SNA and TCP/IP applications and data (transaction processing, FTP, etc.)
- *scalability*: As more TN3270E users are added, the capacity of this solution can be incrementally increased. When user growth warrants the addition of another RS/6000, the load-balancing feature will automatically balance the workload from all user sessions, maximizing the performance and user satisfaction

### **Chart 54 - 55: Customer Quotes**

### **Chart 56: Communications Servers = Your Decision**

We have now completed our discussion of the Communications Servers. The Communications Server is available today on OS/2, AIX, and OS/390 platforms, as well as the Windows NT beta. The Communications Server provides an exceptionally flexible solution which enables rapid applications deployment - regardless of whether your underlying network is SNA, TCP/IP or a combination. They can be the basis of connectivity for your internal intranet, or for connectivity to the Internet - again whether you are running SNA or TCP/IP.

Communications Server incorporates advanced routing technology which enables support for today's network demanding applications and migration to new ATM based applications of tomorrow.

All of this with the broadest array of connectivity, platform and applications support, based on open technologies and designed to interoperate. These products don't just meet requirements, they put you in a leadership position in anticipation of the future with a solution that is exceptionally flexible and complete.

**Chart 57 - 58 Home Page listings and Brochures**