IBM Communications Server for OS/2 Warp Script

Chart 1: IBM Communications Server for OS/2 Warp: Energize your business network

This presentation is an overview of the IBM Communications Server for OS/2 Warp product.

Chart 2: Abstract

With the introduction of Communications Server for OS/2 Warp, the next phase of IBM communications support is here! Communications Server is a high-performance multiprotocol gateway, incorporating the comprehensive SNA support provided on Communications Manager/2 as well as several open advanced technologies. Communications Server offers greater opportunities than ever to exploit the power of their networks and to increase significantly the efficiency and productivity of every desktop user.

Chart 3: Trademarks

Chart 4: Acronyms

Chart 5: Agenda

First, I will take you through the product evolution of where we were yesterday and today. I want to make sure everyone understands our new desktop communications strategy and packaging.

Then, we will introduce new key functions in Communications Server, as well as reemphasize some existing functions. This section includes customer scenarios. Then, we'll take a look at prices, competition, and where to go for technical assistance and resources.

Chart 6: 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.

Chart 7: IBM Software Server Family

Before we get started with our overview of the Communications Server, I'd like to spend a moment explaining how this product announcement relates to the IBM Software Server announcements. First, let me make it clear that the Communications Servers for OS/2 Warp 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 by the end of this year. The Software Servers are integrated offerings including these servers:

Communications, DB2 Database, 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.

The IBM Software Servers address the multiple application requirements at the servers. These integrated offerings provide a powerful set of solutions on these servers. The Enterprise Communications product line provides end-to-end, scaleable solutions with the richest set of communications function in the industry.

Chart 8: eNetwork Communications Server Branding

eNetwork Communications Servers are positioned to provide the key benefits that customers demand from IBM networking software.

Chart 9: Introducing Communications Server

To maintain a competitive edge in today's business environment, information technology users require access to more applications, data, and networks than ever before and from wherever they happen to be - at home, in the office, or on the road. Everyone wants the ability to move to new or different environments, while protecting investments in existing applications. That's why the Communications Server for OS/2 Warp (Communications Server) is so important. It provides flexible, reliable communications services that enable OS/2, Windows 3.1, Windows95, Windows NT, and DOS based PCs to communicate with S/390 and AS/400 hosts and other PCs.

The Communications Server is a powerful multiprotocol gateway. The SNA gateway function supports 2,000 connections and 20,000 LU6.2 sessions. It also includes Sockets (TCP/IP) over SNA gateway and SNA over TCP/IP gateway capability and IPX and NetBIOS over SNA and TCP/IP. You can mix and match SNA and TCP/IP based network protocols as you expand or combine networks. Sockets, SNA, IPX, or NetBIOS applications can run without change on mixed network backbones. You have lots of capacity and flexibility in adapting network support to your changing needs.

Communications Server also provides 32 bit API support that 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 Advanced Peer to Peer Networking (APPN). These combine to make the Communications Server an excellent communications platform for distributed and client server applications.

The Communications Server supports a wide range of local and wide are 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. This gives you flexibility in selecting connections that best suite your business needs. And, with the ability to communicate at

speeds up to 2 Mbps, Communications Server can help reduce the cost of communications over wide area networks.

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 AutoSync compatible modems. Remote PCs can be connected to a Communications Server 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.

The OS/2 and Windows Access Features provide multiprotocol support, SNA services, and application programming interface support for desktop PCs. Access Features, packaged with the Server, are optionally installable and separately priced.

Chart 9: Communications Server, A Complete Mulitprotocol Engine!

We're not going to cover this chart in detail but I did want to draw your attention to the broad array of function, connectivity, and APIs that are available to the customer to solve their network needs. Whatever you want, you've got it! All major LAN and WAN protocols, APIs, and connectivity types are supported.

Sockets, SNA, IPX, and NetBIOS 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 10: Communications Server -- member of the eNetwork family

The OS/2 communication server delivers the VALUES specified on the chart.

Chart 11: eNetwork Software

The eNetwork family consists of servers , clients, wireless offerings.

Chart 12: Product Evolution: Existing Desktop Communications Products

In the next couple of charts we will be discussing the product evolution of the Communications Server. One important message I want to leave with you today is our new desktop communications software directions.

Prior to our recent announcements, we offered the following desktop communication products. In one package, Communications Manager provides 3270 and 5250 terminal emulation, a powerful SNA gateway, APPN network node and end node support and a rich set of application programming interfaces.

No other product offers the level of product function and capability for the price of CM/2. CM/2 is still being marketed today. In fact, IBM has extended service support until the end of December 1997. In many cases, this package meets the needs of the customer. For the users who require 3270 and 5250 full function emulation support for OS/2 and DOS/Windows environments, IBM offered the Personal Communications family of products which provided PC-to-mainframe and PC-to-AS/400 connectivity.

And for users with multiprotocol requirements, IBM offered several standalone AnyNet workstation products on OS/2 and Windows.

Chart 13: Backup chart

Chart 14: Product Evolution

Backup chart

Chart 15: Product Evolution: Simpler and More Flexible

The decision was made to split the terminal emulator function from the Communications Server because we found that CM/2, which provided both terminal emulation and SNA gateway capability, really appealed to two different types of users. The emulator function is primarily of interest to end-users - features such as end user interface and common look and feel were of primary interest to them. The gateway capability, on the other hand, is of more interest to the network administrators. The gateway 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 of function for the different target markets.

Communications Server and PCOMM clients provide significantly new function over the predecessor products. We've made a fundamental change from SNA-only gateways and clients, to multiprotocol, multi-function gateways and clients that are designed for interoperability. These products support the broadest array of networking functions and connectivity available, all based on industry standards and optimized for the platform of choice.

With the introduction of Communications Server, the next phase of IBM communications support for multiprotocol gateway and APPN network node is here! Communications Server is the natural path for Communications Manager/2 customers who need advanced gateway with all-in-one multiprotocol support and other SNA enhancements described later in the presentation.

As indicated on the chart, Communications Server now incorporates the SNA Gateway, APIs, and connectivity of Communications Manager/2 plus the SNA over TCP/IP and Sockets over SNA function from the AnyNet product family along with additional SNA enhancements. The terminal emulators previously provided in CM/2 has been removed. Terminal emulation for administrative use at the server is provided by PCOMM 3270 and AS/400 Entry level emulator.

Communications Server offers enterprises greater opportunities than ever to exploit the power of their networks and to increase significantly the efficiency and productivity of every workstation user. Communications Server now provides customers with the power and capability to turn their PC into a multiprotocol communications server/gateway, not just a SNA gateway like Communications Manager/2.

As part of the Communications Server, we offer two freestanding components that can be purchased and installed separately, to support applications development in the OS/2 and Windows environments. The OS/2 and Windows Access features provide multiprotocol support, SNA services, and APIs for applications that execute on an OS/2 or Windows workstation.

You can upgrade configurations from a previous installation of CM/2. The configuration of communication features and applications that currently exist on your workstation is maintained.

Chart 16: Consultant Quotes

Chart 17: Communications Server for OS/2 Warp

This chart shows migration from the existing environment (on the left) to the new Communications Server and PCOMM product offerings (on the right). Moving from the top and going counterclockwise:
- For multifunction gateway support or APPN Network Node capability, Communications Server is used.
- The node with 3270 and APPC support requires PCOMM V4.1.
- For 3270 emulation alone, PCOMM V4.1 is all you need.
- And finally, if a node requires APPC or APPN support, the Communications Server Access feature is all that is required.

And now we will go into more detail on the product.

Communications Server provides significant new function over the predecessor product. We have made a fundamental change from SNA only gateways to multiprotocol, multi-function gateways that are designed for interoperability.

Communications Server has incorporated the versatile SNA over TCP/IP and Sockets over SNA functions from the AnyNet product family. In addition, we have added support for LAN gateway function which allows IPX and NetBIOS applications running on one LAN to communicate over SNA or TCP/IP wide area network (WANs) with like applications running on another LAN. You can mix and match SNA and TCP/IP based network protocols as you expand or combine networks. Applications written to SNA, Sockets, IPX, or NetBIOS can run without change on mixed network backbones. Also, we have provided TN3270E Server support which allows clients in a TCP/IP network easy access to 3270 applications and print services.

Communication Server is a very cost competitive solution for your enterprise networking needs. 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 OS/2, Windows 3.1, Windows 95, Windows NT, and DOS desktops, or NetWare for SAA and Apple SNA ps gateways. The OS/2 Access Feature is optionally installable and separately licensed and priced. The Access Feature is intended to provide a low cost API and connectivity support for OS/2 workstations attached to the server and LAN and WAN environments.

The OS/2 Access Feature provides 32 bit API support, LAN and WAN connectivity, and SNA services. These are enhanced releases of similar services currently available in Communications Manager/2. The Access Feature also has multiprotocol support that enables applications that are written to Sockets (TCP/IP), APPC, CPI-C, and LUA APIs to run unchanged over either SNA or TCP/IP local and wide area networks.

The Windows 3.1, Windows 95/NT Access Feature is a bundle of four products. They provide APPC programming
support and enable APPC applications to run unchanged over either SNA or TCP/IP local and wide area networks. The products are:

- APPC Networking Services for Windows Version 1.0
- AnyNet APPC over TCP/IP Access Node for Window Version 1.0

Clients are available separately with our PCOM AS/400 and 3270 family of products.

Chart 18: New, All-in-one Packaging

The Communications Server for OS/2 is available on CD-ROM only. The product CD-ROM contains the following:
- product files and diskette images
- the entire publications library
- productivity aids
- sample response files
- API support files
- adapters device drivers
- access features
- PCOMM 3270 and AS/400 Entry level

The product package also includes the hard copy publication "Communications Server for OS/2 Warp Up & Running". The Up & Running guide covers topics such as product overview, planning, installation and configuration guides.

The CD-ROM contains the publications in BookManager, PostScript, and OS/2 INF view formats.

CS/2 provides the IBM Personal Communications 3270 and AS/400 for OS/2 Entry level emulator for administrative use at the server. It is not be distributed to workstations attached to the server. The PCOMM Entry emulator supports up to two display sessions via Communications Server APPC/LUA support. The functions provided by this emulator are a subset of the functions provided by the IBM Personal Communications 3270 and AS/400 for OS/2 emulator. For customers who need a full function emulator, the Personal Communications (PCOMM) Family of emulators is the recommended migration path.

The license for the IBM Communications Server for OS/2 Warp, Version 4.1 includes:
o The IBM Communications Server for OS/2 Warp, Version 4.1
o One Distributed Feature license for OS/2 Access Feature for OS/2 V2.11 or OS/2 Warp (Version 4.0 or Version 4.1) or the Windows Access Feature Version 4.1
o The IBM Personal Communications 3270 and AS/400 for OS/2 Entry Level emulator for use on the IBM Communications Server for OS/2 Warp, Version 4.1.

The license for the IBM Communications Server for OS/2 Warp, Version 4.1 only includes the Windows Access Feature when it is ordered.

Chart 19: Simplified, Graphical Configuration

Communications Server provides graphical interface with configuration examples to simplify configuration and reduce training. A quick configuration path is available for your use. Default values are provided for as many of your configuration parameters as possible. The hardware detection feature of Communications Server makes a default connection type selection for you.

You may access the advanced configuration path, bypassing the beginner configuration, to set your specific configuration. Help screens and dialogues are available for your assistance.

Chart 20: Key Functions

Here is an overview of the main part of this presentation - the key new functions and enhancements of Communications Server.

Connectivity
Communications Server has several connectivity enhancements. Frame Relay support has now been integrated in Communications Server and enables the transport of frames over public or private high-speed digital lines. This provides support for IEEE 802.5 (SNA and TCP/IP), and HPR over Frame Relay. We'll look at these in more detail on the next chart.

SNA Gateway

Branch Extender is a new function delivered in V5.0. Branch Extender reduces the topology updates associated with APPN networks and allows greater bandwidth for data traffic to flow. Additionally, Branch Extender allows for larger APPN networks- usually found in larger banking and insurance environments.

Communications Server provides a rich, cost effective SNA gateway. Dependent LU Requester (DLUR), in conjunction with VTAM's dependent LU server (DLUS) function, enables dependent LUs (LU 0, 1, 2, 3 and dependent LU 6.2) to operate unchanged in an APPN network, without changing applications.

Self-Defining Dependent LUs (SDDLU)
Communications Server can now dynamically identify its dependent LUs to VTAM and eliminate the requirement for a static definition of dependent LUs in VTAM (eg. no VTAM SYSGEN is required).

Backup Link
This complements existing HPR capabilities to ensure maximum network availability. Now if a connection to the Communications Server goes down, it can automatically dial an alternate line and keep the session intact.

Integrated Multiprotocol Support
With the multiprotocol support integrated into the Communications Server, we can now expand application access to end users without regard to the network protocol. The choice of network can be separated from the choice of the application. Communications Server breaks the protocol binding, allowing you to roll out new applications quickly and economically, 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 or requiring new hardware.

Networks too can be readily integrated with Communications Server. Two or more unlike networks can be connected to function as a single network. For example, Communications Server can act as a gateway between an internal network and the Internet, bringing Internet access to users, whether they are on a SNA or TCP/IP network.

LAN Gateway (IPX and NetBIOS)
The LAN Gateway function, working in paired gateway configurations, allows Novell NetWare Internet Packet Exchange (IPX) applications and NetBIOS applications running on one LAN to communicate over SNA or TCP/IP WANs with like applications running on another LAN.

TN3270E Server
Telnet 3270 Extended (TN3270E) Server support provides a simple way for TCP/IP workstations to access host 3270 applications and print services without complicated and costly host or network changes.

Performance

Data Compression
SNA data compression, compatible with S/390 and AS/400 implementations and available for all LU Types, provides increased data transfer capabilities across communication links.

SNA Transmission Priority
Communications Server provides the capability to prioritize SNA traffic for LU 0, 1, 2, 3, and 6.2 sessions over LAN and WAN connections so the right traffic gets priority once data starts flowing.

High Performance Routing (HPR)
Communications Server provides support for HPR, the advanced, open technology that quickly and smoothly routes data across a network.

Ease of Use
New in V5.0 is the remote web-based server administration that allows customers to dynamically perform administration and configuration using a web browser.

Also, new in the V5.0 release is the client access support for Windows 95 and Windows NT clients.

Wide Area Support
New in the V5.0 release is MLTG support. Allows customer to dynamically combine multiple low speed links into one large speed link for transferring large files.

Chart 21: Connectivity Enhancements

- Communications Server supports non programmable 'shallow' and programmable 'deep'
- adapters for ISA, Micro Channel, and PCI-bus PCs using a set of open APIs. These APIs allow IBM and other OEMs to provide connectivity for Communications Server for a variety

of protocols (SDLC, X.25, Frame Relay, IDLC...) over a variety of connection types (Leased, Switched, ISDN, Async...).

The following companies provide device drivers on the Communications Server CD-ROM:

- IBM
- ARN Informatique
- Eicon Technologies Corp.
- MicroGate Corp.
- Synaptel

- Communications Server has now integrated parts of RouteXpander/2 to support Frame Relay. This will help customers take advantage of the low-cost frame relay connections.
- WAN line speed has been increased up to 2.0M bps (T1/E1) or greater.
- SDLC now supports up to 16 or more upstream and downstream physical connections, and two-way simultaneous full-duplex communications.
- Communications Server can now act as the multipoint primary control for downstream workstations. This support is for workstations and device connected to the server over SDLC, on a multi-drop line over synchronous adapters such as the IBM WAC, MPA, and ARCTIC.

Chart 22: Connectivity Anywhere

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 for Communications Server. Whatever you want, you've got it. All major connectivity types are supported.

Chart 23: SNA Gateway

Chart 24: Branch Extender

APPN can support between 2 and 400 NN in a large network. Several large customers need networks with many more NNs, for example form 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 base 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 thousand of NNs because border nodes create extra traffic and intermediate node computing.

Branch Extender is designed to address these problems by reducing topology database NN storage requirements in the network and by reducing information flows. Branch Extender is aimed at interconnecting branch offices to an APPN WAN backbone network. Branch Extender is an NN which typically has LAN and WAN interfaces, DLUR, and HPR**.** Branch Extender knows the topology of its own domain, but not its uplink topology. Branch Extender reduces traffic on the WAN by not passing its topology information onto 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.

Chart 25: SNA Gateway

SNA gateway enables multiple LAN or WAN attached OS/2, Windows 3.1, Windows 95, Windows NT, or DOS workstations to access multiple System/390 hosts through one or more physical connections to one or more hosts. The gateway is optimized to provide cost effective host connectivity by sharing communications resources such as adapters and physical connections.

Communications Server SNA gateway has been enhanced in these areas:

- Self-defining Dependent LUs (SDDLU) support for downstream workstations
- Dependent LU Requester (DLUR) support for downstream workstations
- Dedicated PU (NetView visibility of downstream workstation Pus)

In addition, when used with the SNA over TCP/IP gateway, Communications Server becomes a multiprotocol gateway for SNA sessions. The multiprotocol enhancements are described in the next major section of this presentation.

SNA gateway function supports 2,000 connections and 20,000 LU6.2 sessions. It also includes Communications Server supports SNA gateway function in subarea, APPN, or HPR networks. LUs defined in the gateway can be dedicated to a particular PC or pooled among multiple PCs. Pooling allows PCs to share common LUs, which increases the efficiency of the LUs and reduces the configuration and startup requirements at the host. You can also define multiple LU pools, each pool associated with a specific application. When a link is defined through the gateway between a PC and host, the LU is activated when the session is established and returned to the pool for access by other PCs when the session is ended.

Automatic host backup link enables each primary link to be defined with a secondary or backup link. This backup link is automatically activated when the primary link fails.

Chart 26: Dependent LU Requester in SNA Gateway

DLUR, in conjunction with VTAM's dependent LU server (DLUS) function, enables dependent LUs (LU 0, 1, 2, 3 and dependent LU 6.2) to operate unchanged in an APPN network, without changing applications. DLUR protects your current investment in 3270 emulation and other dependent LU applications while migrating new applications to LU6.2 and APPN.

As a gateway, Communications Server provides Dependent LU Requester support for the downstream workstations that are using the services of the gateway for 3270 host access. The gateway depends on a VTAM to provide the Dependent LU Server (DLUS) portion of the client to server relationship.

When the DLUR gateway is located on the boundary of an APPN network, full 3270 support can be delivered to downstream workstations over APPN. The SSCP-PU and SSCP-LU sessions between the DLUR gateway and VTAM are encapsulated in LU6.2 sessions to take advantage of APPN routing. However, the LU-LU sessions are not encapsulated and they flow native in an APPN network.

If there is a need for more than 255 LUs in a gateway, use multiple PUs. By using DLUS/DLUR, multiple PUs can use the same physical connection to one host.

Chart 27: Greatly Simplified Administration with Self-defining LUs

Dynamic Definition of Dependent LUs (DDDLU) support has been available in several IBM products such as 3174 and PCOMM. Communications Server joins the ranks of these products by providing SDDLU support for downstream devices when Communications Server is configured as a SNA gateway.

Chart 28: Integrated Multiprotocol Support

We'll now take a more in-depth look at the AnyNet multiprotocol functions integrated into Communications Server for OS/2 Warp.

Chart 29: AnyNet: Application Choice, Network Independence

Today's networks are very diverse. With the growth of networking and local area networks, most large networks now run multiple networking protocols.

AnyNet solutions were developed in response to customer requirements for better support of multiprotocol networks. These solutions are now integrated into Communications Server. AnyNet delivers application choice and network independence, giving a great deal of flexibility to the two major consumers of information technology: application providers and network providers. Application providers now can focus on doing the best job of serving end users.

The first benefit of this approach is that the current investment in applications can be protected, even if the networks they depend on are undergoing change. Further, those current applications can now be used to serve more end users in more locations, since the constraints of network protocol dependence can be removed. Application developers, whether in-house or ISVs, can use the standard APIs and services to create much more portable applications, which can now operate across a much wider range of network configurations.

Network providers can now concentrate on solving their problems, without constantly struggling to keep from impacting users who are dependent on access to certain applications and data. They can now begin to extend the reach of their networks to more users, thus providing better service; the ability to install and run nonnative applications on existing networks will relieve network administrators from some of the difficulty of migrating their networks to achieve cost savings. Similarly, being able to consolidate networks, and reduce the number of transport protocols to be managed, without changing the installed user applications, should allow for much more cost-effective networks to be developed.

Chart 30: Advanced Multiprotocol Support

Distributed applications are typically bound to the underlying protocol. This either limit 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.

AnyNet technology, based on the industry standard MPTN architecture, is now integrated into

the Communications Server product line. Communications Server for OS/2 Warp eliminates 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 application support over SNA and TCP/IP are now integrated into Communications Server.

AnyNet access nodes (top graphic) let new types of applications run on your existing 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 to connect TCP/IP and SNA networks, users on SNA workstations with access node software can access the World Wide Web (WWW) using any vendor's sockets-based web browser.

Paired gateways (bottom graphic) allow users in remote branch offices to communicate over an existing backbone network. For example, a Lotus Notes server on an IP LAN can communicate across an SNA network to another Lotus Notes server on an IP LAN through AnyNet gateways. Similarly, an SNA application, such as CICS or DB2, 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 rewriting your applications, so you can roll out new applications quicker.

Chart 31: IPX/SNA, NB/SNA, IPX/IP, NB/IP Gateways

The LAN gateway supports the most popular client/server applications without disrupting wide area traffic. The LAN Gateway function, working in paired gateway configurations, allows Novell NetWare Internet Packet Exchange (IPX) applications and NetBIOS applications running on one LAN to communicate over SNA or TCP/IP WANs with like applications running on another LAN. The gateways eliminate unnecessary chatter associated with IPX and NetBIOS protocols, reducing the amount of network traffic and improving cost-efficiency for low- and moderate-speed WANs.

Chart 32: TN3270E Server

Telnet 3270 Extended (TN3270E) Server support provides a simple way for TCP/IP workstations to access host 3270 applications and print services without complicated and costly host or network changes. With the extensions of TN3270E Server, users can print to their workstations or to printers in their TCP/IP network, request a resource (LU or pool of LUs), receive SNA responses, and support 3270 Attn or SysRq keys. 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.

In addition, Communications 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 TN3270E Server all the way to the mainframe, delivering non-disruptive session routing.

Chart 33: Multiprotocol Concentration Advantages

Single backbone protocol concentration eliminates the complexity of multiple protocol stacks. With multiple protocol stacks, each packet flowing in the network has different structures and each protocol needs to be managed differently. By concentrating multiprotocol protocols over a single networking protocol, the network is simpler to manage and customer skills are effectively used. When AnyNet is used to run an application over a networking protocol that it wasn't designed to run over (a nonnative protocol), the application data transfer can take advantage of features of the underlying network protocol.

Non-SNA applications running over SNA benefit from SNA networking features. A single protocol enables value-adds to be available to all protocols. When the backbone is SNA, the value-adds include:

- Cost-effective bandwidth utilization and predictable response times:
  Non-SNA applications benefit from the steady throughput and predictable response time of SNA networks, achieved through SNA's flow control prevention algorithms. For example: Performance tests on AIX, OS/2, OS/400 and MVS have shown that for large file sizes, Sockets applications running over SNA may outperform Sockets applications running over native TCP/IP.

- Traffic prioritization:
  The configuration of AnyNet "over SNA" combinations allows the association of Class of Service (COS) and priority for well known TCP/IP applications such as FTP and TELNET. So interactive applications such as Telnet can be configured to have a higher priority than batch or file transfer traffic such as FTP.

- Data compression:
  Data compression reduces the amount of data being exchanged between partners, thus improving response time and improving data rates over the network.

- APPN Dynamics:
  AnyNet extends to benefits of APPN by allowing additional application types, such as Sockets applications, to communicate over APPN networks. So AnyNet increases the number of applications that can communicate over APPN networks. APPN works on any combination of APPN and subarea networks.

Non-TCP/IP applications running over TCP/IP benefit from TCP/IP networking features:
- Router-based networks create a TCP/IP backbone.
  Routers are a very popular approach, because they are meant to adapt to whatever protocols exist in the networks being connected. Routers provide a large set of encapsulated protocol combinations over TCP/IP.

Chart 34: Sockets over SNA - Intranet

With Sockets over SNA support, sockets applications can communicate over SNA networks, or over connected SNA and TCP/IP networks, without changes to the applications. In addition, Sockets over SNA users on TCP/IP can benefit from advantages built into SNA networks such as cost-effective bandwidth utilization, and predictable response times. As an example, a user can use sockets applications, such as FTP, Lotus Notes, SAP R/3, and Telnet, across an SNA network, without having TCP/IP connectivity on the network.

In this scenario, an organization wishes to do collaborative Web server development via hypermedia on an SNA network.

Using Sockets over SNA access node function and an vendor's web browser on the client workstations, and Sockets over SNA and any vendor's web server on the server, developers can use HTML to create web pages for the Internet. The web server can be IBM Internet Connection Server for OS/2 Warp, AIX, or MVS/ESA. No TCP/IP communications stack is needed on the clients or server!

Chart 35: Browse WWW from Your SNA Workstation!

Here's an example that I think is on everyone's mind. How can I get access to the Internet for my users - even those connected via an SNA network? Current options require that you run TCP/IP on everyone's desktop to run a web browser. But with Communications Server Sockets over SNA gateway capability, you can connect your internal SNA network to the Internet. Clients running Communications Server access feature or PCOMM can run a sockets-based web browser and access information on the Internet. Your users stay connected to their SNA networks. Or, users on the Internet can access a Web Server in the SNA network.

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

Chart 36: Sockets over SNA Gateway

Sockets applications on TCP/IP networks can communicate over an existing SNA network using Communications Server configured as Sockets over SNA Gateways. Each Sockets over SNA gateway can support up to 2,000 simultaneous connections. For example, FTP, Telnet, or SAP R/3 applications could be used between the TCP/IP LANs traversing the SNA backbone network. Backup and load balancing capability enables multiple (or parallel) gateways to service the same site. Note that in these scenarios the SNA network can be configured as a SNA, APPN, or HPR network.

With Sockets over SNA, users on TCP/IP can take advantage of features of SNA networks, like cost-effective bandwidth utilization and predictable response times. Sockets over SNA allows TCP/IP traffic to take advantage of class of service (COS) and priority. Thus, your existing SNA traffic can meet response times while adding mulitprotocol traffic.

In addition, data compression can be used to run Sockets applications over a SNA network. This reduces the amount of data being exchanged between partners, which improves response time and provides higher data rates at lower cost.

Chart 37: 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 Communications Server for OS/2 Sockets over SNA Gateways 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.

The ability to use 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 benefits: 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 38: Customer Scenario - 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 39: SNA over TCP/IP

The SNA over TCP/IP multiprotocol combination allows all SNA applications including APPC, emulator, and printer applications to communicate across TCP/IP networks without any modification. With this function, existing LU2 terminal emulator applications or LU1/LU3 printer applications can be used across TCP/IP networks. Other techniques for handling SNA terminal-to-host traffic over TCP/IP lack equivalent printer support. The dependent LU SNA application support is provided by the VTAM AnyNet Feature DLUS function and by Communications Server DLUR function.

Examples of SNA applications which can now run over TCP/IP networks, include CICS, DB2, IMS, DCAF, and TSO. APPC and SNA applications which were primarily confined to SNA networks are able to communicate with end users in a TCP/IP network, and the application does not need to be changed. With APPC over TCP/IP, the engineer or scientist at a workstation in a TCP/IP network now has easy access to database applications in SNA hosts.

In this configuration, the SNA over TCP/IP combination in the client is provided by Communications Server OS/2 Access Feature. The DLUR function is provided by Communications Server gateway.

TCP/IP access node function in the OS/2 Access Feature to give them the ability to run their SNA application over TCP/IP. Their user-written application used the relational database in DB2/2. The Communications Server for OS/2 "server" is located in Atlanta where their VTAM host is. The OS/2 Access Features are installed in workstations in London, Amsterdam, and Los Angeles, and soon will be rolled out to other worldwide locations such as Hong Kong, Mexico City, and Paris.

Chart 40: SNA over TCP/IP Paired Gateways

This chart shows two gateways connecting multiple SNA and TCP/IP networks. As with the single gateway configuration, matching SNA applications communicate with each other over TCP/IP.

A single gateway supports up to 1500 connections. In this example, each branch office has 1 Communications Server gateway connecting the SNA branch traffic over the IP backbone. At the SNA central site, parallel gateways increase the number of SNA connections allowed over IP. The SNA traffic is carried over TCP/IP using the Multiprotocol Transport Networking (MPTN) open architecture, which is a protocol conversion technique rather than encapsulation.

An MPTN-based data transfer has a potential performance advantage over encapsulation since two full protocol stacks do not have to be traversed. Also, since the SNA lower layers are not required, definitions such as SNA routing tables are not needed.

Chart 41-42: Customer Quotes

The next several charts are a number of quotes that have been offered in support of using multiprotocol Sockets over SNA and SNA over TCP/IP functions in the Communications Server. I think you will find as you look through them that people are really impressed with the flexibility and performance that we provide.

Chart 43: Multiprotocol Customer References

Here is a list of customers using multiprotocol functions from a variety of industries and geographies.

Chart 44: Performance

Chart 45: Data Compression

SNA data compression (RLE or LZ9), compatible with S/390 and AS/400 implementations and available for all LU types, provides increased data transfer capabilities across communications links. This allows you to transfer more data in less time across your WAN, resulting in reduced costs associated with line usage.

Chart 46: Transmission Priority

Transmission priority is an integral part of class of service (COS). Both APPN and subarea networks may utilize transmission priority to prioritize data transmission across a transmission group. The implementation of transmission priority is particularly important on busy networks, where the likelihood of network congestion resulting in data queuing is high. APPN architecture defines 4 transmission priorities: network, high, medium and low. Communications Server and OS/2 Access Feature fully implements transmission priority for LU types 0, 1, 2, 3 and 6.2.

Chart 47: High Speed, Dynamic Routing - HPR

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 predetermined 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 48: Customer Scenario: International Finance Company

This customer scenario is a large international finance company who is using Communications Server for OS/2 Warp, Communications Server for AIX, and PCOMM. This customer has remote IP workstations that need to access a central RS/6000 over their SNA network. These workstations also require 3270 access and printing.

They previously had implemented an AnyNet Sockets over SNA gateway in the central site and at each remote branch to enable access to the central RS/6000 and to allow SNMP management of their branch hubs. They wanted better link prioritization and were concerned that a failure in the SNA backbone would disrupt all TCP/IP traffic out of the branch.

The solution was to upgrade to HPR in their 6611s and through upgrade to Communications Server for OS/2 Warp, Communications Server for AIX, and PCOMM. This enables all APPN traffic to dynamically reroute upon link outage and enables traffic prioritization. The workstations requiring TCP/IP access to the central RS/6000 implement HPR and Sockets over SNA access node support in Communications Server for OS/2 Warp and PCOMM. With this solution, the loss of a branch router is no longer disruptive as HPR enables the choice of an alternate router and link.

The RS/6000 implements Sockets over SNA capability in CS/AIX. This is used along with a Sockets over SNA gateway in Communications Server for OS/2 Warp (at the branches) to allow WAN access to SNMP hubs.

The 3270 gateway upgraded to DLUR in Communications Server for OS/2 Warp, allowing the 3270 traffic to take advantage of the HPR network.

They are thrilled with their solution and have said that they got "an extremely resilient and cost-effective network with minimal upgrade costs... the network will be an application facilitator rather than an inhibitor".

Chart 49: APIs

Chart 50: APIs

The versatility of Communications Server extends to the types of applications that can be supported. Communications Server supports a wide variety of application programming interfaces (APIs) and protocols that are ideal for client/server applications and distributed processing. The following APIs are now available as native 32-bit APIs:

- Advanced Program-to-Program Communication (APPC)
- Common Programming Interface for Communications (CPI-C)
- Conventional LU Application (LUA)
- Common Services
- Communications Server Kernel Interface

- System Management
- X.25 API

Communications Server continues to support the 16-bit APIs available in Communications Manager/2 V1.11. Communications Server has tested and provides header files for the following programming languages for use with the 32-bit APIs:

- IBM C Set++
- Borland C++

Chart 51: Other Enhancements

Chart 52: Other Enhancements

Programming Support

Communications Server supports the CPI Communications API for Win-OS/2, enabling the use of a Windows 3.1 CPI-C application in a Win-OS/2 session. Windows CPI-C applications that use Networking Services for Windows are binary compatible with Communications Server's Win-OS/2 CPI-C support.

OS/2 has a block of storage that applications share. The user control of unlocked shared storage limit support allows users to control how much of the OS/2 storage Communications Server uses and reduces the default amount to 4MB.

Smaller Footprint

Communications Server can now be installed in as little as 5MB. If you have a stable configuration and limited hard drive space, you can reduce the amount of storage Communications Server requires by removing the components that enable you to change your configuration or the functions you have installed. If you later need to change the configuration you will need to reinstall Communications Server.

Emulator Support

Communications Server includes the IBM PCOMM AS/400 and 3270 - APPC/LUA Entry level (Entry-Level emulator) for administrative use. This emulator provides 3270 and 5250 entry level emulator functions for PCs using OS/2 Warp Connect or OS/2 Warp. This emulator provides a subset of the features and functions in the full-function IBM PCOMM family of products.

Chart 53: Competition

Chart 54: Why IBM

The Communications Server provides an exceptionally flexible solution which enables rapid application deployment - regardless of whether your underlying network is SNA, TCP/IP, IPX, NetBIOS 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 and application support, based on open technologies and designed to interoperate.

Communications Server doesn't just meet requirements, it puts you in a leadership position in anticipation of the future with a solution that is exceptionally flexible and complete.

Chart 55: CS/2 and Routers

There are a variety of techniques used to achieve interoperability in multiprotocol situations such as MPTN, multiprotocol routers, and encapsulation (enveloping).

These techniques need to be looked at in terms of the network configurations that give rise to customers' needing multiprotocol technologies.

Communications Server is a software solution. Routers are a hardware solution. A lower cost software solution may be more attractive than a higher cost hardware solution. AnyNet reduces the number of network protocols in the network. AnyNet products carry application data from different application types over a single protocol network. This is very different from the multiprotocol router environment, where many protocols are routed across the network concurrently, with considerably more WAN complexity and overhead.

Routers are a very popular approach, because they are meant to adapt to whatever protocols exist in the networks being connected. The difficulty associated with this type of solution is that routers do not reduce the number of protocols in the overall network. Even though they can enable consolidation of physical resources in the backbone network, (i.e. reduce the number of lines and boxes) the exterior networks (and their workstations or end nodes) continue to require full support for all protocols that their applications require.

Communications Server currently provides multiprotocol combinations over SNA, TCP/IP, IPX, and NetBIOS. Routers provide a large set of encapsulated protocol combinations over TCP/IP.

Communications Server solutions address more configurations than routers do. Communications Server and routers both are capable of joining like networks via a backbone network, for example, LAN internetworking. Communications Server addresses additional configurations that routers do not, e.g. running a web browser over an SNA intranet or joining two unlike networks with different backbone protocols via a a single gateway, e.g., joining two merged companies with different protocols.

Chart 56: Make An Informed Decision - Beware Myths Heard Around the Network

Microsoft would like our customers to believe that their solution is easier and less expensive. That everyone is consolidating on TCP/IP and moving away from SNA, that their method of depending on the underlying router network to encapsulate SNA over TCP/IP networks is the optimal way to support SNA over a TCP/IP backbone, that their LEN node only support is adequate, that their solution is the most scalable solution in the industry, and that channel attaching Microsoft SNA Server is an alternative to front end processors and is a great solution for host offload.

The truth of the matter is that these things just aren't true. Our products are clearly superior -in

terms of performance, flexibility, and scalability. In the charts that follow, we will discuss these claims and show IBM's clear superiority.

Chart 57 - Dispel the Myths

Split-stack SNA clients are easier and less expensive for LANs than full-stack SNA.

Testing shows that Microsoft SNA Server is significantly slower than IBM's solution. As network congestion increases, APPC applications become unresponsive when running with Microsoft SNA Server. In addition, clients can not be seen by NetView with Microsoft's solution. All alerts appear to come from the server, not the clients. No corrective actions via RUN command can be sent to clients.

Moving from SNA to TCP/IP is inevitable.

Most customers are not ripping out their SNA networks in favor of TCP/IP. In fact, there are over 50,000 SNA networks that currently exist. About 61 percent of all network traffic is SNA, 17 percent is TCP/IP, and the remainder comprises other protocols (CIMI reports).

IBM's solution does not require a single protocol backbone.

Each communications protocol has its own advantages and disadvantages in terms of network performance, cost, security, ease of management and availability of applications. We aren't trying to dictate what protocol you should use. Our answer is to let the customer choose his protocol based on its merits and the needs of his business while supporting all the applications he requires.

DLSw is necessary to avoid time-outs and inconsistent response times from running SNA applications over an IP network.

DLSw lacks in the areas of response time predictability, processing overhead, lack of SNA priority and congestion control, management visibility, and scaleability compared with traditional SNA solutions. DLSw requires extra overhead and puts extra processing pressure on the routers. It does not scale well to large networks, because it requires virtual connections between each PC and the router. Encapsulation techniques like those used by Microsoft are conceptually simple, but require complete execution of both protocol stacks. This means that both networks must be managed separately and both networks must be configured completely.

Configuration and management are much simpler with our MPTN based solution.

Only the transport provider network must be configured completely and in most cases, integrated management can be applied across the multiple protocols. MPTN can manage non-SNA traffic, which appears to SNA management systems as SNA sessions. MPTN provides compensations to prevent the clashes between dissimilar protocols since they simulate record delimiting, flow control, and other mechanisms required by applications. The ability to allow connectivity between like applications attached to different network types (i.e. one station to an HPR network and another to an IP network) can not be done using encapsulation techniques such as DLSw.

SNA LEN node is all you need

There is a long list of reasons why full APPN capability, including HPR, are far superior to LEN node capability. Dynamic routing, Directory Services, Flow and Congestion control are just a few of the many reasons for migrating to APPN. Microsoft's solution is not adaptive to network congestion. Also, with their solution, the client establishes a proprietary connection

with an available SNA server. If the session fails, then the application is interrupted. Certain well behaved applications, like emulators, will try to autoconnect, but the user must still log on again.

Customer written applications just fail - the user has to restart the application.

MS SNA Server has higher capacity and performance than any other SNA Gateway Microsoft claims 15,000 sessions with 5000 users. However, to support this number of users, Microsoft requires 4 times more servers than the IBM solution. IBM can support 20,000 sessions - and this number is tested and true. When HPR is added to the equation, our performance is unparalleled.

Using MS SNA Server to replace controllers and offload your mainframe is a great way to improve host performance

There are a number of problems inherent with Microsoft's strategy of replacing SNA FEPs with their split-stack implementation running over a router based TCP/IP network. Their solution just doesn't perform well, especially under heavy loads. Our CS/AIX product provides host offload capability (through Application Access) and can be channel attached. Load balancing and hot backup round out the picture for optimum reliability and performance.

Not a myth: You may be able to do tomorrow with MS SNA Server what you can do with IBM Communications Servers today.

Chart 58: Broader, More Comprehensive - Better!

This chart is a comparison based on certain key functions required in a Communications Server.

Microsoft can not route IP natively. A separate router is required. AnyNet allows Sockets and SNA applications to run over the protocol of choice, and puts in compensations to support different application requirements over a single network of your choice.

Microsoft depends on routers to encapsulate SNA over IP. This technique does not perform well, is difficult to manage, and is not optimized for SNA traffic. Our solution uses protocol conversion, does not require multiple protocols in parallel, and compensates for differences in protocols.

Microsoft's APPN support is minimal. We have a full APPN implementation, including HPR support.

Microsoft's solution is significantly slower, especially when the network is congested.
The only way for SNA clients to get connected to the Internet with Microsoft SNA Server is to install a parallel TCP/IP stack. Our solution brings Internet access to everyone's desktop -regardless of whether they are running SNA or TCP/IP.

Microsoft uses a proprietary, NT-specific API. We support the broadest range of SNA APIs in the industry, along with AnyNet capability - which is an open industry standard - to support existing Sockets or SNA applications unchanged.

We support a broader range of terminals and with our Application Access product 3270

devices can access TCP/IP and UNIX.

Microsoft provides server level security only. Our solution provides server, client, and session level security. In addition, we support encryption. With Microsoft SNA Server, all data flows in the clear (passwords, credit card numbers, etc.).

Microsoft administration is tied to NT. In addition, we enable remote configuration through CID using response files.

Microsoft SNA Server has management to the server only. We can manage all the way to the client.

Microsoft claims 15,000 sessions with 5,000 clients supported but our testing shows that all clients can not be actively sending data. We support 20,000 concurrent sessions.
We have a more comprehensive range of protocols, interfaces and equipment that are supported. We support both Block Multiplexor and ESCON channel attachment, we bring Internet connectivity to SNA clients, have a full APPN implementation including HPR, support both Sockets and SNA applications natively over either an SNA or TCP/IP network, provide integration of SNA and TCP/IP networks, support SNA over Asynch connections, 3270 to UNIX, and support for high speed ISDN and Frame Relay networks.

Chart 59: SNA Gateway CPU Utilization vs. Total Gateway Throughput 16 Mbit/s Token Ring Environment

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

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

Communications Server 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 Communications Server 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%. Communications Server throughput, with one processor at nearly peak usage, is more than

double SNA Server's throughput with dual processors in peak usage.

Chart 60: SNA Gateway Response Time vs. Total Gateway Throughput 16 Mbits/s Token Ring vs. Environment

Communications Server running on a single Pentium platform has lower (better) response time than all configurations of SNA Server. Additionally, Communications Server 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 61: EASE OF USE

Chart 62: Web-Based Administration

Communications Server for OS/2 V5.0 now offers remote web-based administration to remotely configure and administer the communications server from a web browser**.** Customers can dynamically make configuration changes from virtually anywhere - in the office, on the road or even at home when connected to the Internet -- with this new feature.

Chart 63: Wide Area Support

Chart 64: Mutilink Transmission Group

Communications Server for OS/2 V5.0 provides a new function called MLTG. This feature allows customers to dynamically combine multiple low speed links into one higher-speed link for transmitting volumes of data. Customers example might be -- during the day they would have set up individual links for online traffic -- then a night would combine the low speed links into one higher speed link to send large chunks of batch data.

Chart 66: CS/2 Clearly More Efficient

Communications Server proved superior to Microsoft SNA Server in head-to-head tests conducted by The Tolly Group, an independent test lab.

As you know, throughput and response time are crucial benchmarks for companies that rely on networks in their businesses. In today's network environment and the more data-intensive applications, enterprises want reliability and scalability to handle their network loads, without impacting their configurations.

In the Tolly Group testing, IBM Communications Server clearly outperformed Microsoft SNA Server in throughput and response time, while using lower hardware requirements, in all tests conducted. This means that in addition to product superiority, IBM Communications Server provides customers with an overall lower cost of ownership.

Key highlights of The Tolly Group Test Summary Report include the following:
- Communications Server for OS/2 Warp delivers better throughput with lower CPU consumption than Microsoft SNA Server 2.11 in all configurations tested
- Communications Server delivers lower response time under all load conditions than Microsoft SNA Server in all configurations tested.

The report is available on The Tolly Group World Wide Web site at http://www.tolly.com or on the Communications Server for OS/2 Warp World Wide Web site at http://www.raleigh.ibm.com/cm2/cm2prod.html.

Chart 67: OS/2 Product Comparisons 1996

This chart shows product comparison details and specific functions for Communications Server, Communications Manager/2 and PCOMM.

Chart 68: Migration/Installation Sequence

You can upgrade configurations from a previous installation of OS/2 Extended Edition, Extended Services for OS/2, or Communications Manager/2. The configuration of communication features and applications that currently exist on your workstation is maintained.

If you choose not to replace the previous installation, you can install Communications Server on a different disk drive. However, both installations cannot be available simultaneously. The new installation becomes the operational one. The recommended steps for upgrading various back-level product versions are:

- Upgrade the operating system (if appropriate)
- Upgrade LAPS using MPTS shipped with Communications Server (or later version of MPTS)
- Upgrade LAN Server or LAN Requester (if appropriate)
- Upgrade Database Manager from Extended Services for OS/2
- Upgrade from Communications Manager/2 to Communications Server or OS/2 Access Feature.

Chart 69: Enterprise Communications Family Prices

The next charts contain pricing information on the Communications Server for OS/2 Warp, Version 4.1 and the PCOMM family of products. Refer to the product announcement letters for specific pricing and ordering information.

Chart 70: Where to go for more information

There are multiple ways to get more information. First, we have a very extensive home page for our product. I have also included other home pages for your information. In addition, we have brochures, spec sheets, and white papers that describe our products including key benefits and networking solutions. And if you want to talk to other users or get answers to technical questions, seek out our forums.