

Communications Server for AIX

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This presentation addresses communication in the AIX environment and how the Communications Server family for AIX can be used to provide enterprise networking solutions. The Communications Server Family for AIX provides a variety of solutions to enable you to integrate your SNA and TCP/IP networks so users have access to any application, distribute mainframe processing to other platforms and move to open systems.

(Page 5, IBM Software Servers)

Communications Server for AIX is included in the industry's most comprehensive software server family, the IBM Software Servers. There are seven modular application servers available. The servers are available on multiple platforms providing you the widest choice of operating systems and clients and have been tested together.

(Page 6, IBM eNetwork Software)

IBM eNetwork Software is a family of software that provides enterprise-class, universal connectivity and information access for network computing. This chart lists the primary eNetwork server and client products from IBM.

(Page 8, Communications Server for AIX)

This chart lists several examples of how Communications Server for AIX provides solutions for key customer needs. These include the freedom to make application decisions based on business needs, not network protocols; the ability to connect users to the internet or intranet with your existing network; leverage their current investments and run SNA applications over TCP/IP networks and vice versa; improve their network's availability, efficiency and performance; and be positioned for the applications and networks of the future.

(Page 9, Communications Server for AIX)

Communications Server for AIX is the cornerstone of the family. Communications Server provides SNA communications capability for the AIX platform thereby giving AIX user's access to the riches of SNA. It provides peer-to-peer connectivity into APPN networks and connectivity

into subarea (wide area networks or mainframe networks). Communications Server for AIX does more than provide SNA capabilities for the AIX platform. It moves the AIX platform from being an end point to an important networking node moving information through your network. With the addition of High Performance Routing (HPR) intermediate node support, Communications Server for AIX can now help provide the most reliable and best performing network possible, and positions you for the high-speed networks of the future such as ATM. You can also support your dependent LU devices such as 3270 terminals across an APPN network with the introduction of Dependent LU Requester (DLUR), providing the advantages and performance of APPN to these devices. DLUR works in conjunction with Dependent LU Server(DLUS) in VTAM V4R3.

The SNA Gateway function of Communications Server for AIX enables many SNA clients to go through a single communication server to one or more hosts without requiring a direct physical link from each client workstation to each host. This saves you from buying many parallel communications lines and adapter cards.

The AnyNet software solution shatters the limitation of applications being bound to their native networks thereby eliminating the need for parallel TCP/IP and SNA networks. With Communications Server for AIX, end users can mix and match sockets or SNA based applications without regard to underlying protocols without impacting existing users or requiring new hardware. 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.

There are two ways an application can run on the SMP hardware, SMP safe and SMP efficient. When running in SMP safe mode, an application can successfully run on the SMP hardware but only utilizes one processor. This mode does not take full advantage of the power of the SMP hardware. When running in SMP efficient mode, an application splits the processing across the available processors. Appropriate locking must be added to the product to ensure that data is correctly shared. Communications Server for AIX is the first SNA protocol product on the AIX 4.1 operating system to fully exploit the parallel processing capabilities of the SMP hardware.

The Channel features of Communications Server for AIX rapidly moves data between the host and AIX applications. 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. The Channel Attachment feature of SNA Server along with the ESCON Channel Connectivity for AIX and Block Multiplexer Channel Connectivity for AIX products now provides SNA and TCP/IP support for direct, high speed, channel connection from a RS /6000 to an IBM host system running the AIX 4.1 operating system. The performance of our channel connectivity has been significantly increased with the introduction of Multi-path Channel (MPC) support, provided in a recent service update. Use of this feature can provide data transfer rates of over four million bits per second(Mbps).

Communications Server for AIX is also an application platform. It provides a variety of APIs to enable application development. To develop APPC applications that utilize your APPN network, the APPC and CPI-C APIs are provided. The Management Services API is provided to enable development of management applications for APPN networks.

To make end users more productive, Communications Server for AIX provides a toolkit called the APPC Application Suite for AIX, a set of programs that communicate over APPC sessions. These common applications increase the value of both traditional SNA and peer APPN networks. By having these applications available across the APPC platforms, SNA users have the ability to execute simple network tasks consistently across different systems including interactive APPC and CPI-C application generation, APPC based 3270 emulation, file transfer, connectivity testing, messaging, remote command execution and name server.

Communications Server for AIX now comes with a single session of the IBM 3270 Host Connection (HCON) emulator to give you immediate access to your mainframe applications. If more than one host SNA session is needed, two IBM solutions are available: purchasing the multi-user 3270 Host Connection Program for AIX or using SNA Client Access for AIX as a telnet server ... but more on SNA Client Access later.

(Page 10, What's New with Communications Server for AIX V4)

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. Our AnyNet support has been expanded to include gateways for both Sockets over SNA and APPC over TCP/IP. Our APPN support has been enhanced to include high performance routing (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 Program (HCON) for administrative use.

(Page 11, SNA Gateway)

SNA gateway enables multiple LAN or WAN attached OS/2, Windows 3.1, Windows 95, Windows NT, or DOS workstations, as well as LAN-attached 3270 terminals to access multiple System/390 or AS/400 hosts through one or more physical connections. 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:

- Dependent LU Requester (DLUR) support for downstream workstations
- Dedicated PU (NetView visibility of downstream workstation PUs)

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.

Communications Server for AIX supports up to a total of 50,000 concurrent sessions, depending on types of sessions and hardware resources available.

(Page 12, APPN)

APPN provides topology, directory and route selection services. These features 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. Communications Server for AIX provides the most comprehensive APPN support on the AIX platform with Network Node and End Node support as well as the APPC Application Suite. The latest in APPN technology, DLUR and HPR, are now supported.

(Page 13, High Performance Routing (HPR))

Communications Server for AIX now provides HPR intermediate node support, and will provide rapid transport protocol (RTP), which supports end nodes, in the future.

High Performance Routing (HPR) brings together the best qualities of SNA and TCP/IP. Geared to provide 100% network availability with maximum throughput and efficiency, HPR is the next generation of APPN and prepares SNA networks for the high speed networks of the future.

Non-disruptive rerouting automatically re-routes around a network failure, without impacting the application or end user.

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

Congestion control throttles incoming data in the case of congestion to prevent data loss, while the same time, insuring maximum link utilization by keeping the throughput at the knee of the congestion curve.

Deterministic routing says that the data flow between two end points always takes the same predetermined route. This is required to guarantee the quality and performance required in tomorrow's high speed networks. 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.

(Page 14, Dependent LU Requester (DLUR) 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.

(Page 15, Integrated multiprotocol support)

Communications Server for AIX provides a wide breadth of multiprotocol solutions through AnyNet technology. AnyNet allows you to choose the applications that meet the needs of your business, regardless of what transport protocol is used in central or remote sites.

The need for this technology arises from the diversity of today's networks. With the growth of networking and local area networks in particular, most large networks now run multiple networking protocols. Also, many more alliances are being formed that cause you to seek inter-enterprise network interconnection. To better support multiprotocol networks, standards-based AnyNet technology provides solutions for adding new application types independent of the existing network protocol; reducing network costs by consolidating and simplifying multiprotocol networks while protecting the investment of existing applications; and extending the reach of applications across multiple networks... giving any user access to any application anywhere.

Communications Server for AIX provides a full complement of functions to integrate TCP/IP and SNA, including APPC over TCP/IP and Sockets over SNA access nodes, as well as APPC over TCP/IP and Sockets over SNA gateways.

SNA Client Access for AIX is an option for providing SNA 3270 access to TCP/IP clients, but more on that later....

(Page 16, 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 AIX eliminates the need to run parallel networks by allowing sockets applications to run over SNA networks, and APPC applications to run over TCP/IP networks.

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 APPC 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 rollout new applications quicker.

(Page 17, Response Time/Performance)

Communications Server for AIX provides virtually unlimited scalability, limited only by the hardware resources. Tens of thousands of sessions can be supported while providing sub-second response time.

The RS/6000 hardware platform offers unmatched performance and scalability, from cost-effective desktop workstations right up through the highly-scalable POWERParallel systems. Communications Server for AIX takes advantage of the symmetrical multiprocessor (SMP) technology by exploiting ALL of the parallel processors on the hardware. A 3.3 times improvement was realized on a 4-way processor. Due to tighter processor controls, we also improved the performance on the uniprocessor (UP) platforms!

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

The SMP exploitation and integration into the AIX kernel along with the reliability and scalability of the AIX platform, make Communications Server for AIX a high performance networking solution for ALL customers.

(Page 19, SNA Client Access for AIX)

SNA Client Access for AIX enables you to connect a wide range of TCP/IP clients on DOS, OS/2, AIX, Sun, Windows NT and Windows platforms to SNA networks. With SNA Client Access, you can protect your investment in SNA technology by extending access to business-critical data and applications on IBM host systems to TCP/IP users.

SNA Client Access for AIX uses Communications Server for AIX for its SNA connectivity to the host. TCP/IP clients can be connected using any network connectivity provided by AIX TCP/IP.

SNA Client Access supports multiple client functions across major vendor operating systems, providing enterprise SNA network access for TCP/IP clients. SNA Client Access provides Telnet server functions to the TN3270E, TN3270 and TN5250 clients. It provides the functionality to convert Telnet client traffic to SNA format for communications to the host system and converts SNA traffic to Telnet format for communications to the clients.

SNA Client Access also supports APPC and LU0 applications, and RJE support from the TCP/IP client in conjunction with the OEM clients provided by CNT/Brixton.

(Page 20, TN3270E Support)

With the latest release made available in February, SNA Client Access 1.2 now supports the industry standard TN3270E clients, including our own Personal Communications Family of products! TN3270E greatly expands the printing solutions available to clients accessing SNA applications who want to print to locally attached printers. When I issue a print request from my host session, I like to be able to send it to the local printer in the office next to mine - not the SNA printer on the other side of the building. With SNA Client Access 1.2, users can print from mainframe applications to printers attached to their workstations or to printers in their TCP/IP networks. These users can be traditional SNA users using non-programmable devices or SNA emulators or they can be TN3270 or TN3270E clients. The printer needs to be associated with a TN3270E client. In my example I show a printer attached to a workstation with a TN3270E client. The printer does not need to be directly attached, it just has to be TCP/IP addressable to the TN3270E client.

SNA Client Access can also pass responses on printing which allows end-to-end printer confirmation. It's always nice to receive these warm fuzzies that your print job is successful.

SNA Client Access TN3270E support is compliant with the recently published industry standard Request for Comment (RFC) 1647. The SNA Client Access implementation is also compliant with industry standard Request for Comment (RFC) 1646 which means we can support 3287 clients.

(Page 21, Load Balancing)

SNA Client Access for AIX offers a robust solution for controlling and balancing the workload across gateways. This function can be used to increase the response time, reliability and availability of host SNA applications to your TCP/IP users. Load balancing maintains the operation during server failures by automatically rerouting clients to an available server.

When we were determining how to best load balance across multiple servers, we wanted to look at a variety of server information to determine which was the best server to route requests to. First we wanted to look at Host LU availability, it doesn't make sense to send a request to a server that does not have any Host LUs available. We then follow our analysis based on link speed, client/host connection load, and overall system load. And when all of these are equal, we will route to the machine with the highest processor speed.

We use an IBM product, LoadLeveler for AIX, which queries the server machines and, based on parameters outlined above, routes the request to the appropriate server. In the example, I show LoadLeveler separately but it can reside on the same machine as SNA Client Access. LoadLeveler also has backup capabilities so it is not a single point of failure.

(Page 22, Response Time Monitoring)

With this feature, network administrators can easily use the NetView Response Time Monitoring function to troubleshoot performance problems all the way from the host to the TN3270 (or TN3270E) client -- without relying on other applications. It provides the network administrator with response time measurements from the host to the client, from the host to the server and from the server to the client. With these pieces, the network administrator can easily determine where the performance bottle necks are.

(Page 23, LU Pooling)

The ability to assign groups of resources (LUs) eases system management and administrative tasks. Pools can span servers, which essentially guarantees access to users even if a system fails. It is easy to add new users and new resources.

(Page 24, TN3270 Offload)

Is your mainframe running at capacity? Are you performing TN3270 Server capability on the mainframe? Are you looking for options to offload mainframe processing to other platforms? SNA Client Access for AIX offers you the ability to front-end all the 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.

(Page 25, Security)

SNA Client Access for AIX 1.2 provides increased security and usability through enhanced configuration capabilities. It extends the security support you get for SNA clients to the TCP/IP clients. SNA Client Access limits, manages and restricts access to SNA resources. With the previous release of SNA Client Access 1.1, TCP/IP client access could only be restricted to specific hosts for specific clients. SNA Client Access 1.2 extends this access to a much more granular level. Access can be restricted by host or specific LU or LU pools. The security can be specified for a specific user or for a pool of users.

SNA Client Access for AIX also has the ability to tie a LU to a specific terminal ID or IP address.

(Page 26, Enterprise Gateway)

With the combination of Communications Server for AIX and SNA Client Access for AIX, you now have a powerful enterprise gateway for giving tens of thousands of SNA and TCP/IP clients access to mainframe applications. The Communications Server family for AIX supports a broad range of SNA and TCP/IP clients. This gateway can be channel connected, using either ESCON or block multiplexer, to the host. We provided the first ESCON Channel attached enterprise gateway on an AIX/UNIX platform in the industry. We worked closely with the VTAM developers to ensure that we had an optimal channel solution.

In the next charts, I will be discussing both Communications Server for AIX and SNA Client Access for AIX.

(Page 27, Networking Connectivity)

As I stated earlier, Communications Server for AIX provides APPN network node and end node support, as well as support for HPR and DLUR.

Communications Server for AIX provides connectivity using SDLC (up to 512KB), X.25 or direct attached Channel, Token Ring, Ethernet, and FDDI. For connecting TCP/IP clients, SNA Client Access for AIX supports any of the numerous connectivity types supported by AIX.

Communications Server for AIX supports a broad range of SNA applications including 3270 Emulation, 5250 Emulation, LU0, 1, 2, 3, APPC and CPI-C applications.

SNA Client Access has access to all of the communication protocol support that Communications Server for AIX provides. SNA Client Access supports TN3270E, TN3270 and TN5250 Emulation, APPC and LU0 application support, and RJE support.

(Page 28, Availability and Reliability)

Availability and Reliability are probably your top networking concern. Your businesses rely on having applications and information available at all times.

There are several characteristics of the Communications Server for AIX and SNA Client Access for AIX, along with complementary products such as HACMP for AIX, that enable fault resilience.

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.

Communications Server for AIX will be rolling out HPR shortly (ANR then RTP). HPR is an extension to SNA and APPN with improved availability and support for high-speed, multi-protocol distributed networks, including ATM.

The load balancing capabilities of SNA Client Access for AIX allows you to more efficiently and effectively utilize the capabilities of all of your AIX gateways. 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.

HACMP for AIX is another powerful IBM product that can provide automatic switchover and hot standby functionality.

(Page 29, Manageability and Control)

With Communications Server for AIX and SNA Client Access for AIX, there are several options for managing and viewing information on resources.

Communications Server for AIX provides a 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.

You can continue to use NetView from the host to manage your SNA resources. The APPN subagent shipped with Communications Server for AIX to enables APPN information to be sent to NetView for AIX.

SNA Client Access, in combination with the licensed NetView Performance Monitor (NPM), provides end-to-end response time measurement all the way to the TCP/IP client. What does this mean? In a homogeneous SNA environment, we're able to measure performance anyway we want. When TCP/IP clients were added to the environment, our response time visibility ended at the SNA boundaries. With SNA Client Access' new response time monitoring and NPM, we can now measure from the host to the server, host to the client and server to client. Systems administrators can utilize the response time data for analyzing system response times, identifying problem areas, and improving overall system performance.

(Page 31, IBM Host On-Demand)

(Page 32, IBM Host On-Demand -- Key Features)

(Page 33, IBM Host On-Demand -- Availability)

(Page 35-37, Sample Scenarios)

These charts show 3 sample scenarios showing typical examples of a central office solution, branch office solution, and a services industry solution using Communications Server for AIX to provide solutions to common problems.

(Page 38, Summary)

In summary, Communications Server for AIX is the premier multifunction gateway for the AIX environment. Key advantages include reducing costs by enabling network consolidation; solid, reliable software to provide mission critical end-to-end solutions; better ease of use and any-to-any network integration; and IBM's excellence in service and support.

(Page 39, Where to go for Additonal Information)

Information Resources