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International Technical Support Organization

AS/400 AnyNet Scenarios

April 1996





International Technical Support Organization

AS/400 AnyNet Scenarios

April 1996

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Second Edition (April 1996)

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Abstract

This redbook is unique in its detailed coverage of AnyNet/400. It focuses on providing configuration information and configuration examples for AS/400 AnyNet scenarios. These scenarios cover not just AnyNet/400-to-AnyNet/400 connections and Client Access/400 AnyNet connections, but also AnyNet/400-to-AnyNet/2 connections and AnyNet/400-to-AnyNet/MVS connections. Also included is a 5494 scenario showing how this remote workstation controller can be connected to an AS/400 via a TCP/IP network. Information is provided about the AS/400 configuration steps required to implement Sockets over SNA, APPC over TCP/IP, APPC over IPX and Sockets over IPX. Information is also provided about the Client Access/400 configuration steps for APPC over TCP/IP on Client Access/400 for Windows 3.1 and Client Access/400 Optimized for OS/2. The document also includes information on AS/400 APING.

This book was written for customers and IBM technical professionals. Some knowledge of TCP/IP and APPN is assumed.

(357 pages)

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Special Notices

This publication is intended to help customers and IBM technical professionals who are in the process of or planning to implement AnyNet/400. The information in this publication is not intended as the specification of any programming interfaces that are provided by Operating System/400, Operating System/2 or MVS. See the PUBLICATIONS section of the IBM Programming Announcement for the above products for more information about what publications are considered to be product documentation.

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Preface

This document is intended to give customers and IBM technical professionals a quick start in the implementation of AnyNet/400. It contains information that will help the reader understand the steps necessary to implement AnyNet/400 in both a totally AS/400 environment and a mixed (AS/400 - non-AS/400) environment. Sockets over SNA, APPC over TCP/IP, Sockets over IPX and APPC over IPX are covered.

How This Document is Organized

The document is organized as follows:

"AnyNet Introduction"

This introduction chapter gives a general overview of AnyNet and the functions provided by the AnyNet family of products.

• "Networking Blueprint"

This chapter gives an overview of the IBM Networking Blueprint. AnyNet products implement the MPTN (Multiprotocol Transport Networking) architecture. MPTN is a component the networking blueprint.

• "Multiprotocol Transport Networking (MPTN) Architecture"

This chapter gives an overview of the MPTN (Multiprotocol Transport Networking) architecture.

"AnyNet Product Family"

This chapter gives an overview of the members of the AnyNet product family.

"AnyNet/400 Sockets over SNA"

This chapter discusses AnyNet/400 Sockets over SNA. It includes configuration information and configuration examples for various Sockets over SNA scenarios.

• "AnyNet/400 APPC over TCP/IP"

This chapter discusses AnyNet/400 APPC over TCP/IP. It includes configuration information and configuration examples for various APPC over TCP/IP scenarios.

• "AnyNet Gateways"

This chapter describes how AnyNet/400 can be used in conjunction with AnyNet Gateways. It includes configuration examples for various Sockets over SNA and APPC over TCP/IP scenarios.

"AnyNet/400 APPC over IPX"

This chapter discusses AnyNet/400 APPC over IPX. It includes configuration information in the form of a configuration example.

"AnyNet/400 Sockets over IPX"

This chapter discusses AnyNet/400 Sockets over IPX. It includes configuration information and configuration examples for Sockets over IPX scenarios.

• "Client Access/400 for Windows 3.1 over TCP/IP"

This chapter describes how AnyNet can be used by Client Access/400 for Windows 3.1 to provide Client Access/400 connectivity over a TCP/IP network. It includes configuration information in the form of a configuration example.

• "Client Access/400 Optimized for OS/2 over TCP/IP"

This chapter describes how AnyNet can be used by Client Access/400 Optimized for OS/2 to provide Client Access/400 connectivity over a TCP/IP network. It includes configuration information in the form of a configuration example.

Appendix A, "Communications Traces"

This chapter provides formatted communications trace examples for both Sockets over SNA and APPC over TCP/IP.

Appendix B, "APING"

This chapter discusses the APING test tool.

Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

- AS/400 TCP/IP Configuration and Reference, SC41-3420
- AS/400 Communications Configuration, SC41-3401
- AS/400 APPC Programming, SC41-3443
- AS/400 Sockets Programming, SC41-3422
- AS/400 APPN Support, SC41-3407
- AS/400 International Packet Exchange Support, SC41-3400
- Client Access/400 for Windows 3.1 TCP/IP Setup, SC41-3580
- Client Access/400 Optimized for OS/2 Getting Started, SC41-3510
- Multiprotocol Transport Networking (MPTN) Architecture: Technical Overview, GC31-7073
- Multiprotocol Transport Networking (MPTN) Architecture: Formats. This manual is part of the Networking Architectures Overview Online Library, which may be obtained by ordering the IBM Online Library Networking Systems Softcopy Collection Kit, SK2T-6012.

International Technical Support Organization Publications

- MPTN Architecture: Tutorial and Product Implementations, SG24-4170
- AnyNet/2: Sockets over SNA and NetBIOS over SNA, Installation and Interoperability, GG24-4396
- AnyNet: SNA over TCP/IP, Installation and Interoperability, GG24-4395
- Inside Client Access/400 Optimized for OS/2, SG24-2587

A complete list of International Technical Support Organization publications, known as redbooks, with a brief description of each, may be found in *International Technical Support Organization Bibliography of Redbooks*, GG24-3070.

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AnyNet Introduction

AnyNet is a family of software products designed to make it easier for customers to choose the applications that meet the needs of their business, regardless of what transport protocol is used in their local or wide area network. AnyNet products implement the Multiprotocol Transport Networking (MPTN) architecture. Members of the AnyNet family make it possible for these communications paths on various platforms:

- APPC over TCP/IP
- APPC over IPX
- · SNA over TCP/IP
- · Sockets over SNA
- · Sockets over IPX
- Sockets over NetBIOS
- NetBEUI over SNA

- Note -

OS/400 Version 3 Release 1 provides support for APPC over TCP/IP, Sockets over SNA, APPC over IPX and Sockets over IPX.

In addition to the above access node solutions, the following gateway solutions are also currently available:

- SNA over TCP/IP Gateway
- Sockets over SNA Gateway
- IPX over SNA Gateway

- Note -

OS/400 Version 3 Release 1 provides no gateway support.

An example of a customer solution provided by AnyNet is: A customer may like TCP's File Transfer Program (FTP) which runs on TCP/IP, but their transport network is SNA. AnyNet Sockets over SNA would allow them to use FTP across their SNA network. Thus, they can choose FTP as an application without having to introduce another logical network to the enterprise or extend the reach of an existing network.

AnyNet products are based on the Multiprotocol Transport Networking (MPTN) architecture, which allows applications to be enabled in mixed protocol networks. The industry standard MPTN solution is part of the Networking Blueprint framework introduced in 1992 by IBM. MPTN is an architecture for the common boundary between the application support and transport network layers. The common boundary can be used for application enablement and network integration.

The customer requirements satisfied by AnyNet products fall into two areas:

Application: Application providers can now focus on best meeting the end user's needs. The current investment in applications is protected, even if the network they depend on changes. Further, current applications can now be used to serve more end users in more locations, since the constraints of network pro-

tocol dependence can be removed. By selecting from a much wider range of standard applications, without concern for the network implications, more users can be given more solutions sooner. Application developers, whether in-house of ISVs, can use standard APIs and services to create much more portable applications, which can now operate across a much wider range of network configurations.

Network: Network providers can now concentrate on solving their problems without constantly struggling to keep from impacting users who are dependant on access to certain applications and data. They can now begin to extend the reach of their networks to more users, thus providing a better service; the ability to install and run non-native applications on existing networks will relieve network administrators from some of the difficulty of migrating their networks to achieve cost savings. Being able to consolidate networks and reduce the number of transport protocols to be managed, without changing the installed user applications, should allow for more cost-effective networks to be developed. Where there are now completely separate networks serving different sorts of users, which have grown to become largely parallel and redundant, it will be possible to more easily consolidate their traffic onto a single transport network without impacting the existing users.

The AnyNet products will be attractive to customers who:

- Have SNA application solutions that they want to extend to TCP/IP network end users
- Are interested in adding support for sockets applications and/or NetBIOS applications on SNA networks
- Want to allow remote IPX and/or TCP/IP branch locations to be managed over an existing SNA network at the customer central site
- · Want to provide SNA connectivity over TCP/IP networks
- · Want to consolidate or change network backbones

APPC over TCP/IP

APPC over TCP/IP allows APPC applications to communicate over TCP/IP networks. LU 6.2 APPC or CPI-C applications can be added to an existing TCP/IP network.



Figure 1. APPC over TCP/IP

APPC over IPX

APPC over IPX allows APPC applications to communicate over IPX networks. LU 6.2 APPC or CPI-C applications can be added to an existing IPX network.



Figure 2. APPC over IPX

SNA over TCP/IP

SNA over TCP/IP broadens the above APPC over TCP/IP support to include other LU types. This allows, in addition to APPC over TCP/IP, LU2 emulator and LU1/LU3 printer sessions to communicate across TCP/IP networks.



Figure 3. SNA over TCP/IP

Sockets over SNA

Sockets over SNA allows sockets applications to communicate over SNA networks. Applications written to the sockets interface can be added to an existing SNA network.



Figure 4. Sockets over SNA

Sockets over IPX

Sockets over IPX allows sockets applications to communicate over IPX networks. Applications written to the sockets interface can be added to an existing IPX network.



Figure 5. Sockets over IPX

Sockets over NetBIOS

Sockets over NetBIOS allows sockets applications to communicate over NetBIOS networks. Applications written to the sockets interface can be added to an existing NetBIOS network.



Figure 6. Sockets over NetBIOS

NetBEUI over SNA

NetBEUI over SNA allows NetBIOS-based applications (for example Lotus Notes, IBM's LAN Server) to communicate across SNA networks.





SNA over TCP/IP Gateway

An SNA over TCP/IP Gateway provides SNA application connectivity across SNA and TCP/IP networks. Applications on existing SNA systems can communicate through the gateway to SNA applications on TCP/IP networks.



Figure 8. SNA over TCP/IP Gateway
Multiple SNA over TCP/IP Gateways can also be linked to provide communications between native SNA systems over a TCP/IP network.



Figure 9. Multiple SNA over TCP/IP Gateways

AnyNet/MVS also provides an SNA over TCP/IP Gateway function.

Sockets over SNA Gateway

A Sockets over SNA Gateway provides socket application connectivity across TCP/IP and SNA networks. Applications on existing TCP/IP systems can communicate through the gateway to TCP/IP applications on SNA networks.



Figure 10. Sockets over SNA Gateway

Multiple Sockets over SNA Gateways can also be linked to provide communications between native TCP/IP systems over an SNA network.



Figure 11. Multiple Sockets over SNA Gateways

IPX over SNA Gateway

An IPX over SNA Gateway provides IPX application connectivity across IPX LANs and SNA networks. End users on IPX LANs can access and communicate with other IPX LANs across SNA networks.



Figure 12. IPX over SNA Gateway

Networking Blueprint

The Networking Blueprint framework was introduced by IBM in 1992. AnyNet products implement the Multiprotocol Transport Networking (MPTN) architecture. MPTN is a component of the Common Transport Semantics layer of the Networking Blueprint.



Figure 13. The IBM Networking Blueprint

The Blueprint puts forth a framework for integrating applications using different types of communications protocols into a single network. In this way customers can concentrate on productivity enhancing applications to strengthen their business' competitiveness without being constrained by networking issues.

The Application and Enablers layer represents the applications that make use of the underlying capabilities of the network. These applications may be customer applications or they may be application services, such as distributed database, print, store-and-forward messaging services, etc. that are commonly used by applications.

The API (Application Programming Interfaces) boundary serves the application process and application services. One purpose of this boundary is to make the application process and supporting application services independent of the underlying system architecture. This boundary currently includes three common application programming interfaces for conversations, remote procedure calls and message queuing. In the Blueprint, any application or application service can use one (or more) of these interfaces to obtain appropriate communications support.

The Application Support layer represents the range of application interfaces and services in use today. Typically, these interfaces and services are only able to operate in a specific network environment. For example, Remote Procedure Call (RPC) would only operate in a TCP/IP environment. The Blueprint contains a structure for extending the reach of many different types of applications throughout many different networking environments.

The Common Transport Semantics (CTS) boundary is below the application support layer. The purpose of this boundary is to give the application, with its end-to-end application support facilities, the opportunity to use alternative transport service providers below this boundary. MPTN (of which AnyNet is an implementation) delivers a CTS function.

The Multiprotocol Networking layer represents the variety of networking protocols in use today for sending and exchanging information throughout the network. The Blueprint contains a structure to build a single network that will support all these protocols.

The Subnetworking layer represents a piece of a larger network, for instance a bridged local area network, or a frame relay network. It is in this layer where dramatic change to high speed cell/packet switching will occur.

The Systems Management entity represents a comprehensive management capability encompassing all the elements of the Blueprint.

Open Blueprint

Introduced by IBM in 1994, the Open Blueprint is IBM's technical approach for integrated, open, client/server and distributed computing across systems plat-forms. The structure includes industry-standard interfaces, protocols and formats, and IBM extensions to provide the flexibility to accommodate new technologies as they emerge in today's dynamic open computing environment.

The Open Blueprint incorporates the lower layers and Systems Management backplane of the Networking Blueprint and provides more detail and structure to the software components in the Application Enabling services. In the future, the Networking Blueprint and Open Blueprint will be converged. The Open Blueprint will be used to position new networking technologies in the same way as the Networking Blueprint has been used.

Multiprotocol Transport Networking (MPTN) Architecture

The MPTN architecture is defined in the terminology of the Networking Blueprint. AnyNet products implement the MPTN architecture. In Figure 14, the arrows depict the way the MPTN architecture, by delivering CTS (Common Transport Semantics) function, allows applications designed to run over one transport network to run over another. The arrows depict APPC applications over TCP/IP, sockets applications over SNA and NetBEUI applications over SNA.



Figure 14. IBM Networking Blueprint - MPTN Implementations

In Networking Blueprint terminology, the term Transport User means application programs and application support functions. The term Transport Provider means a provider of communication service at the transport layer. A transport provider uses one transport protocol to govern the exchange of information between nodes, thus providing a transport network of that type. The terms native and non-native describe a vertical relationship between a transport user and a transport provider. Application programs, designed assuming a particular transport provider, are native to that transport provider. At the same time, they are nonnative to another transport provider. A native node is a node with no MPTN capability. For example, a node with SNA application programs running over an SNA transport is a native node.

- Note -

OS/400 Version 3 Release 1 provides support for: APPC over TCP/IP, Sockets over SNA, APPC over IPX and Sockets over IPX.

Common Transport Semantics (CTS) in the Networking Blueprint divides the protocol stacks at layer 4, the Transport layer. The applications, APIs and application support layers, are above the CTS while the transport network is below the CTS.



Figure 15. IBM Networking Blueprint - Common Transport Semantics (CTS)

CTS includes all of the functions in the underlying transport providers in the Networking Blueprint. If needed functions are missing from any of the transport providers, CTS itself provides those functions. CTS functions can be achieved in different ways depending on the following situations:

- 1. Where the installed application program is native to a transport protocol, CTS does not interfere with the native flows.
- CTS function can be achieved using industry standard compensation methods for particular transport-user/transport-provider combinations, such as a Request for Comment (RFC) 1006 for OSI over TCP/IP and RFCs 1001 and 1002 for NetBIOS over TCP/IP.
- 3. The MPTN architecture formats, and protocols deliver CTS function where the installed application programs are not native to the installed transport protocol. For example, the MPTN architecture defines how SNA can be the transport provider for sockets applications and how TCP/IP can be the transport provider for CPI-C applications.

Figure 16 illustrates the three situations.



Figure 16. Common Transport Semantics (CTS) Example

Function Compensation in MPTN

Every transport provider lacks some functions supported by other transport providers. For example, SNA, NetBIOS and OSI all support a record model which is lacking in TCP/IP, while TCP/IP supports a stream model which is lacking in SNA, NetBIOS and OSI. In order to support multiple transport users over a common transport provider, MPTN provides function compensation when a transport user requests services that are not provided by the transport provider.

Address Mapping in MPTN

Address mapping is required when the transport user (application) and the transport provider (network protocol) have different addressing schemes.

For example, APPC applications use SNA fully qualified LU names to communicate with each other. If the transport provider is TCP/IP, MPTN needs to perform some address mapping.



Figure 17. MPTN Address Mapping

In MPTN, there are three architected approaches to address mapping:

1. Algorithmic

MPTN uses an algorithm to generate a transport provider address based on the transport user address. This approach is appropriate when the user's address space is smaller than the provider's address space. Sockets over SNA uses algorithmic mapping with IP host addresses mapped to SNA LU names.

2. Extended protocol-specific directory

This is the extending of a protocol-specific directory to handle transport addresses of other formats. This approach is appropriate when the transport providers directory supports the registration of different address types. APPC over TCP/IP and SNA over TCP/IP support this form of addressing: the TCP/IP domain name server can be used to support SNA names. For example, NETA.LU1 could be registered in the domain name server as LU1.NETA.SNA.IBM.COM.

3. Address mapper

This is basically a database which holds the transport user to transport provider mappings. This is the most general approach but also the most costly. Figure 18 illustrates the three mapping methods.



Figure 18. MPTN Address Mapping Examples

The algorithmic example shows how, for Sockets over SNA, the TCP/IP address is mapped into an SNA network-qualified name. This is a two step process. First, by using a mask, the TCP net ID is determined and then mapped to an SNA network name via table lookup. Next, an algorithm is used to determine the LU name from the host ID which is the remaining portion of the TCP/IP address.

The second part of the example illustrates the method used by an extended native directory to generate the TCP/IP address. The TCP/IP domain name server (DNS) is extended to store the user address and protocol identifier. DNS is used to support SNA name types and provide IP addresses for these names when requested. Thus, when the SNA network-qualified name NETID.LU is presented to the name server for address resolution, the SNA name is used as an index into an address mapping table. In this case, the user address portion of the IP address is simply the bit reversed form of the network-qualified SNA name, LU.NETID, and the protocol identifier is preset, in this case, to SNA.IBM.COM.

The third part of the example illustrates the method used by an MPTN address mapper. In this case, the transport user and transport provider association is registered in the address mapper. This occurs dynamically each time a transport user registers a transport-user address, causing a (user-provider) address pair to flow to the address mapper for registration. Thus, when the netBIOS name is presented to the MPTN address mapper for resolution, the associated SNA name, NETID.LU, is returned.

MPTN Data Transport

For data to be routed over a non-native transport network, the data must be formatted such that header information is added appropriate to the transport network over which the data is to be routed. In Figure 19 we can see that when the transport network is *native* to the transport user, SNA in our example, then the data bypasses any MPTN function. However, when the transport network is *non-native* to the transport user, TCP/IP in our example, then an MPTN header and a transport provider header are added to the data.



Figure 19. MPTN Data Transport Example

MPTN Network Management

Multiprotocol networks represent a set of heterogeneous networks for the network administrators to manage. MPTN uses *existing* network management protocols in their native environments. For example:

- · SNA Management Services (MS) for Alerts in SNA
- SNMP (Simple Network Management Protocol) in TCP/IP
- · CMIP (Common Management Information Protocol) in OSI

In the future, MPTN network management will include providing a single user interface to manage not only the native environment but also the following:

- The association between the transport users and the transport provider in the MPTN access node.
- The association between concatenated transport connections at each MPTN gateway.

MPTN Access Node

The MPTN access node is a component that allows application programs to run on a non-native transport network. For example, a node that allows APPC to run over TCP/IP is an MPTN access node.





Figure 20 shows two MPTN access nodes attached to the same transport network. An MPTN access node can also interoperate with a native node through an MPTN gateway (Figure 21 on page 18).

MPTN Gateway

An MPTN transport gateway connects two dissimilar networks to provide an endto-end service over their concatenation. Figure 21 shows a single MPTN gateway providing communication between an MPTN access node and a native node. Figure 22 shows two MPTN gateways providing communication between two native nodes. No changes are required at the native nodes in either case.



Figure 21. MPTN Transport Gateway



Figure 22. Multiple MPTN Gateways

AnyNet Product Family

The AnyNet family of solutions makes it easier for new applications to be added to existing networks and for multiprotocol networks to be simplified. Each member of the AnyNet family will work in conjunction with another member of the family within the same family group (APPC over TCP/IP, Sockets over SNA, etc.). For example, AnyNet/2 Sockets over SNA will work in conjunction with AnyNet/400 Sockets over SNA. The current members of the family are as follows:

APPC over TCP/IP

- AnyNet/2
- AnyNet/MVS
- AnyNet/400
- Client Access/400
- AnyNet/6000
- · AnyNet for Windows

APPC over IPX

• AnyNet/400

SNA over TCP/IP

- AnyNet/2
- AnyNet/MVS

SNA over TCP/IP Gateway

- AnyNet/2
- AnyNet/MVS

Sockets over SNA

- AnyNet/2
- AnyNet/MVS
- AnyNet/400
- AnyNet/6000

Sockets over IPX

- AnyNet/2
- AnyNet/400

Sockets over NetBIOS

AnyNet/2

Sockets over SNA Gateway

AnyNet/2

NetBEUI over SNA

AnyNet/2

IPX over SNA Gateway

AnyNet/2

AnyNet/2 SNA over TCP/IP

AnyNet/2 Version 2.0 SNA over TCP/IP provides support for all LU types (LU 0, 1, 2, 3 and LU 6.2). This provides total SNA connectivity across TCP/IP networks. For example, LU2 terminal emulation and LU1/3 printer emulation in addition to APPC are supported over TCP/IP. The terminal and printer emulation support gives users on TCP/IP workstations access to host applications. Any SNA application that runs with Communications Manager/2, such as CICS OS/2, DB/2, and terminal emulators, can communicate across a TCP/IP network without change.

AnyNet/2 Sockets over SNA

AnyNet/2 Version 2.0 Sockets over SNA provides support for BSD (Berkeley Software Distribution) 4.3 sockets applications on existing SNA networks. Most sockets applications such as FTP, TELNET and NFS can use this support to run across any combination of APPN or subarea networks without change to the application programs.

AnyNet/2 Sockets over IPX

AnyNet/2 Version 2.0 Sockets over IPX allows sockets applications to communicate over an IPX network to other AnyNet Sockets over IPX access nodes.

AnyNet/2 Sockets over NetBIOS

AnyNet/2 Version 2.0 Sockets over NetBIOS allows sockets applications to communicate over a NetBIOS network to other AnyNet sockets over NetBIOS access nodes.

AnyNet/2 NetBEUI over SNA

AnyNet/2 NetBEUI over SNA Version 1.0 allows NetBIOS applications to be added to exiting SNA networks. Applications such as Lotus Notes and IBM LANServer can be used across any combination of APPN or SNA subarea networks without requiring any application changes.

AnyNet/2 Sockets over SNA Gateway

AnyNet/2 Sockets over SNA Gateway Version 1.1 can be used to either connect SNA and TCP/IP networks or connect TCP/IP networks across an SNA network. When used to connect SNA and TCP/IP networks, most BSD 4.3 sockets applications (such as FTP, TELNET and NFS) on systems in the TCP/IP network can, without change, communicate with like sockets applications running on AnyNet Sockets over SNA systems in the SNA network. When used to connect TCP/IP networks across an SNA network, sockets applications in one TCP/IP network can communicate with sockets applications in the another TCP/IP network without change across an SNA network.

AnyNet/2 SNA over TCP/IP Gateway

The AnyNet/2 SNA over TCP/IP Gateway can be used to connect TCP/IP and SNA networks or to connect SNA networks across a TCP/IP network. When used to connect TCP/IP and SNA networks, APPC applications on systems in the SNA network can, without change, communicate with like applications running on AnyNet APPC over TCP/IP systems in the TCP/IP network. SNA emulators and printers can communicate from an AnyNet/2 SNA over TCP/IP system through the gateway to a VTAM Version 4 Release 2 host. When used to connect SNA networks across a TCP/IP network, SNA applications in one SNA network can

communicate with SNA applications in the other SNA network without change across a TCP/IP network.

AnyNet/2 IPX over SNA Gateway

The AnyNet/2 IPX over SNA Gateway provides IPX connectivity across SNA networks. To the IPX network, the IPX over SNA gateway has the appearance of a NetWare router. It provides the service and routing information protocols required to participate in IPX connectivity. The IPX over SNA gateway fully protects the SNA backbone by firewalling IPX broadcasts. It automatically learns the locations of local servers and sends information about changes to partner gateways only as needed. It also uses data compression and traffic prioritization (COS) available in Communications Manager/2 to provide bandwidth beyond rated links for the backbone network. All of the traditional benefits of a SNA network, such as reliability and predictable response time, become available to IPX traffic routed through the AnyNet IPX over SNA gateway.

AnyNet for Windows

With the AnyNet APPC over TCP/IP for Windows product, Windows workstations can access CPI-C or APPC applications via a TCP/IP network.

AnyNet/MVS

The AnyNet feature for VTAM Version 4 Release 2 includes support for SNA over TCP/IP, Sockets over SNA, and SNA over TCP/IP Gateway. It also includes a downloadable copy of AnyNet/2 Version 2 and AnyNet/2 Sockets over SNA Gateway Version 1.1. See the previous sections for information on these.

AnyNet/MVS SNA over TCP/IP provides support for all LU types (LU 0, 1, 2, 3 and LU 6.2). This provides total SNA connectivity across TCP/IP networks. For example, LU2 terminal emulation and LU1/3 printer emulation in addition to APPC are supported over TCP/IP. The terminal and printer emulation support gives users on TCP/IP workstations access to host applications.

AnyNet/MVS Sockets over SNA provides support for BSD (Berkeley Software Distribution) 4.3 sockets applications on existing SNA networks. Most sockets applications, such as FTP, TELNET and NFS, can use this support to run across any combination of APPN or subarea networks without change to the application programs.

The AnyNet/MVS SNA over TCP/IP Gateway can be used to either connect TCP/IP and SNA networks or connect SNA networks across a TCP/IP network. When used to connect TCP/IP and SNA networks, APPC applications on systems in the SNA network can, without change, communicate with like applications running on AnyNet APPC over TCP/IP systems in the TCP/IP network. When used to connect SNA networks across a TCP/IP network, SNA applications in one SNA network can communicate with SNA applications in the other SNA network, without change across a TCP/IP network.

AnyNet/6000 - APPC over SNA and Sockets over SNA

The AnyNet/6000 features of AIX SNA Server/6000 Version 2 Release 1.1 provide support for APPC over TCP/IP and Sockets over SNA.

With AnyNet/6000 APPC over TCP/IP, TCP/IP users can gain access to APPC or CPI-C applications without adding a separate SNA network.

With AnyNet/6000 Sockets over SNA, SNA users can gain access to BSD (Berkeley Software Distribution) 4.3 sockets applications without adding a separate TCP/IP network.

AnyNet/400 - APPC over SNA and Sockets over SNA

AnyNet/400 is shipped with the base OS/400 operating system and includes support for APPC over TCP/IP and Sockets over SNA. OS/400 Version 3 Release 1 Modification 0 or higher is required.

With AnyNet/400 APPC over TCP/IP, TCP/IP users can gain access to APPC or CPI-C applications without adding a separate SNA network. Client Access/400 for Windows 3.1 and Client Access/400 Optimised for OS/2 can use AnyNet to support the use of Client Access/400 across TCP/IP networks. The required portion of AnyNet APPC over TCP/IP is shipped as part of the Client Access/400 product and downloaded to the workstation as part of the installation of Client Access/400.

With AnyNet/400 Sockets over SNA, SNA users can gain access to BSD (Berkeley Software Distribution) 4.3 sockets applications without adding a separate TCP/IP network.

AnyNet/400 - APPC over IPX and Sockets over IPX

Base OS/400 Version 3 Release 1 provides support for APPC over TCP/IP and Sockets over SNA. The OS/400 V3R1 Network Extensions feature (5733-SA1) adds support for APPC over IPX and Sockets over IPX.

When using AnyNet/400 APPC over IPX, CPI-C and APPC applications can run, with no changes, over an IPX network.

The AnyNet/400 Sockets over IPX support allows AF_INET sockets applications to run, unchanged, between systems over an IPX network.

AnyNet/400 Sockets over SNA

This chapter presents the process of defining and verifying AnyNet/400 Sockets over SNA at the International Technical Support Organization in Raleigh.

Along with the AnyNet/400 environments, the AnyNet/2 implementation will also be used in some of the scenarios.

The information is presented in the following sections:

- 1. Introduction to OS/400 Sockets over SNA
- 2. Using AnyNet/400 Sockets over SNA
- 3. Configuring AnyNet/400 Sockets over SNA
- 4. Sockets over SNA Scenarios
 - Sockets over SNA Scenario 1: AS/400 to AS/400 Same Subnetwork
 - · Sockets over SNA Scenario 2: AS/400 to AS/400 Different Subnetworks
 - Sockets over SNA Scenario 3: AS/400 to PS/2 Same Subnetwork
 - Sockets over SNA Scenario 4: AS/400 to Various Algorithmic Mapping
- 5. Verifying the Scenarios

For further information on AnyNet/400 Sockets over SNA refer to *AS/400 Sockets Programming*, SC41-3442.

Introduction to OS/400 Sockets over SNA

In today's computing world, the consumer is able to choose from a vast number of application programs to help run and maintain their businesses. However, these applications are normally developed to run on a specific transport protocol. For example, the File Transfer Protocol (FTP) application was written to be used with the TCP/IP protocol. Similarly, Systems Network Architecture Distributed Services (SNADS) runs over SNA. A company running SNA on their network would need to use an application developed for SNA protocols. A problem arises if this company finds that the FTP application is better suited to their file transfer needs than the SNADS application. This was a problem in the past, but with the announcement of the AnyNet family of products, they can use the FTP application across their SNA network. AnyNet allows a company to choose the application programs that best meet the needs of their business without having to worry about the transport protocol they are using over their network.

AnyNet/400 is one member of the AnyNet family of products. AnyNet/400 is included with the base OS/400 Version 3 Release 1 Modification 0 or higher. Support is provided to allow APPC applications to run over TCP/IP and sockets applications to run over SNA. In addition, Network Extensions (5733-SA1) provides AnyNet/400 support to allow APPC applications to run over IPX and sockets applications to run over IPX. Support is also provided to allow Client Access/400 to run over TCP/IP. In this chapter we look at sockets applications over SNA.

AnyNet/400 Sockets over SNA can be used by those customers who:

Want to add support for sockets applications on their existing SNA network

Want to simplify their network by reducing the number of protocols being used

Specifically, Sockets over SNA support in AnyNet/400 allows sockets application programs to communicate between systems over an SNA network. Sockets over SNA support can also be used to communicate with systems in a TCP/IP network. This, however, requires an AnyNet gateway between the SNA and TCP/IP networks. The AnyNet gateway is covered in "AnyNet Gateways" on page 141.

AnyNet/400 Sockets over SNA makes it possible to add BSD (Berkeley Software Distribution) sockets applications to existing SNA networks. This allows OS/400 users to use most sockets applications (for example, FTP, SMTP and SNMP) across an SNA network.

Using AnyNet/400 Sockets over SNA

The AnyNet/400 Sockets over SNA code is part of the base OS/400 V3R1M0 code. There are no special installation requirements.

Once AnyNet/400 Sockets over SNA has been configured, you will be able to run sockets applications over your existing SNA network. At the time that this book was written, the following sockets applications were supported under AnyNet/400:

- File Transfer Protocol (FTP)
- Remote Printing (LPD and LPR)
- Simple Network Management Protocol (SNMP)
- Simple Mail Transfer Protocol (SMTP)
- AS/400 DCE Base Services/400
- PING Server
- Any customer application written to AF_INET using sock_stream or sock_dgram (see below)

The following were not supported:

- TELNET Still written in PASCAL interface
- · PING client Written to sock_raw

So, TELNET and PING client are not supported by AnyNet/400.

— PING client –

An OS/400 V3R1 PTF is now available that makes it possible to use the OS/400 PING client with AnyNet. The PTF number is SF25273.

AF_INET sockets applications using either the sock_stream or sock_dgram socket types will work but not those that use the sock_raw interface. The characteristics of a socket are determined by the following:

- Socket type
- Address family
- Protocol

The AS/400 sockets API will support the following three type of sockets:

Sock_stream

- Sock_dgram
- Sock_raw

The AS/400 will also support the following two address families:

- AF_INET
- AF_UNIX

When we say AF_INET over SNA, we mean any AF_INET sockets application that uses sock_stream or sock_dgram will be supported by AnyNet/400. Note that sock_raw is *not* supported at this time.

The running of these applications is transparent to the user regardless of what transport protocol is being used. The user may, however, notice a performance degradation when using a sockets application via AnyNet/400 as opposed to running the same application natively under TCP/IP. Applications running on their native protocols may run faster than those running on a non-native protocol. The flexibility of the AnyNet/400 product should, however, outweigh any performance degradation. The sockets data will, however, benefit from the following when running over an SNA network:

- From the flow control mechanisms provided by SNA. For large file sizes this may mean that Sockets over SNA will actually run faster than native TCP/IP.
- SNA traffic prioritization via Class of Service. This allows, for example, interactive data to be given a higher priority than file transfer data.
- From the data compression available with APPC/SNA allowing for higher link utilization.

It is important to note that if your system implements AnyNet/400 (the Network Attribute ALWANYNET is set to *YES), any sockets applications running natively over TCP/IP will run slower.

All of these points need to be considered when deciding whether to use the AnyNet/400 support. If not using AnyNet, ALWANYNET should be set to *NO.

— Note -

To use AnyNet/400 Sockets over SNA it is not necessary to have the TCP/IP Connectivity Utilities (5763-TC1) installed on your system. However, it is necessary to have this licensed program installed before we can use the FTP, LPD/LPR and SMTP TCP/IP applications. To see if this licensed program is installed on your system, enter the command G0 LICPGM and take option 10.

Configuring AnyNet/400 Sockets over SNA

In order to run Sockets over SNA on your AS/400, the following OS/400 configuration steps are required:

- 1. Establish an SNA/APPC configuration between the systems.
- 2. Change the Network Attribute ALWANYNET to *YES.
- 3. Assign an IP address to your system for Sockets over SNA.
- 4. Define routes (if necessary) to the system(s) to which you will communicate.
- 5. Establish IP address to LU name mapping.
- 6. Map the IP over SNA type of service to an SNA mode.

7. Verify the IP address to LU name mapping.

- Note

Configuring AnyNet/400 Sockets over SNA can be a simple three-step process. In many situations steps 2, 3 and 5 only will be required.

The user ID, under which the Sockets over SNA configuration is created, must have sufficient authority to access the relevant commands. Some of the commands require the user ID to have the IOSYSCFG authority. The examples shown here were created using a profile with QSECOFR authority.

1. Establish an SNA/APPC configuration between the systems

A prerequisite for Sockets over SNA is an SNA configuration between the systems. In this step we will show the basic steps to establishing an SNA configuration between two systems. If your system already has an SNA configuration to the remote system with which you want to communicate via Sockets over SNA, then you can skip this step and proceed to step 2 on page 29 in this section.



Figure 23. Two Systems Connected Using SNA (Systems Network Architecture)

Here we will create the SNA configuration for RALYAS4A in Figure 23. The configuration steps for RALYAS4B would be the same using the different Remote control point name and the different adapter (LAN) addresses.

The following panels show the line and controller descriptions for the AS/400 system RALYAS4A for a token-ring connection. If you require help in establishing an SNA configuration over another type of interface, refer to the redbook *AS/400 Communication Definitions Examples* GG24-3449.

Network Attributes

The AS/400 Network Attributes define system-wide configuration parameters. The following panel shows the first Network Attributes display for system RALYAS4A.

System:	RALYAS4A
Current system name	
Pending system name	
Local network ID USIBMRA	
Local control point name RALYAS4A	
Default local location RALYAS4A	
Default mode	
APPN node type	
Data compression *NONE	
Intermediate data compression *NONE	
Maximum number of intermediate sessions: 200	
Route addition resistance	
Server network ID/control point name : *LCLNETID *ANY	
	More

Figure 24. Initial display of Network Attributes for System RALYAS4A

From this display you should note the Local network ID, Local control point name, and APPN node type. You will need these values when creating the SNA configuration on any system that is to connect to this system.

Line Description

The AS/400 line description defines the physical interface to the network. If an appropriate line description does not already exist (they can be shared), you need to create one. Here we use the CRTLINTRN command to create a token-ring line description.

Create Line Desc	c (Token-Ring)	(CRTLINTRN)
Type choices, press Enter.		
Line description > Resource name > Online at IPL > Vary on wait	L41TR LIN041 *YES *NOWAIT 40 4M 1994 400010020001 *SYSGEN	Name Name, *NWID, *NWSD *YES, *NO *NOWAIT, 15-180 (1 second) 1-256 4M, 16M, *NWI 265-16393, 265, 521, 1033 400000000000-7FFFFFFFFFFF 05600000-056FFFFF, *SYSGEN
Source service access point . SSAP maximum frame SSAP type	*SYSGEN 4M Token Ring	02-FE, *SYSGEN *MAXFRAME, 265-16393 *CALC, *NONSNA, *SNA, *HPR line description for LIN041
F3=Exit F4=Prompt F5=Refresh F13=How to use this display	F10=Additiona F24=More keys	Bottom 1 parameters F12=Cancel

Figure 25. Create Token-Ring Line Description - System RALYAS4A

Controller Description

The AS/400 controller description defines the remote system. Use the CRTCTLAPPC (Create APPC Controller Description) command to create an APPC controller description. In this example we create a LAN APPC controller description.

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > RALYAS4B
                                               Name
Link type . . . . . . . . . > *LAN
                                               *ANYNW, *FAX, *FR, *IDLC...
Online at IPL .....
                                  *YES
                                               *YES, *NO
                                               *YES, *NO
APPN-capable . . . . . . . . .
                                  *YES
Switched line list . . . . . > L41TR
                                               Name
              + for more values
                                  *LINKTYPE
                                               265-16393, 256, 265, 512...
Maximum frame size . . . . . .
                                  *NETATR
Remote network identifier . . .
                                               Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > RALYAS4B
                                               Name, *ANY
                                               0000000-FFFFFFF
Exchange identifier . . . . . > 05615533
Initial connection . . . . . .
                                  *DIAL
                                               *DIAL, *ANS
Dial initiation . . . . . . .
                                  *LINKTYPE
                                               *LINKTYPE, *IMMED, *DELAY
LAN remote adapter address . . . > 400010020002
                                               00000000001-FFFFFFFFFFF
                                  *YES
APPN CP session support . . . .
                                               *YES, *NO
                                               *ENDNODE, *LENNODE...
                                  *NETNODE
APPN node type . . . . . . . . .
                                  *YES
                                               *YES, *NO
APPN/HPR capable . . . . . . .
                                                                    More...
```

Figure 26. Create Controller Description for System RALYAS4A

The Switched line list parameter should match the line description created above. The Remote network identifier should match the remote system's local network identifier (*NETATR indicates that the value in network attributes should be used because the local system and remote system have the same network ID) and the Remote control point name should match the remote system's local control point name. The LAN remote adapter address should match the local adapter address at the remote system.

The device description will be automatically created when the link is activated (VARIED ON). To vary on the controller, use the command WRKCFGSTS *CTL RALYAS4B and take option 1.

The established SNA connection can be verified by checking the status of the controller. The following display shows the result of entering the command WRKCFGSTS *CTL RALYAS4B.

	Work with	Configuration Status 11/18.	RALYAS4A /94 16:45:29
Position to	•	Starting characters	
Type options, press Ed 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work us	with job 8=Work with descript	ion
Opt Description L41TR RALYAS4B RALYAS4B	Status ACTIVE ACTIVE ACTIVE	Job	
Parameters or command			Bottom
F3=Exit F4=Prompt	F12=Cancel	F23=More options F24=More key	/S

Figure 27. Establishment of SNA Connection - System RALYAS4A

The establishment of CP (Control Point) sessions between the systems results in the ACTIVE status.

2. Change the network attribute ALWANYNET to *YES

Now we start the AnyNet specific configuration steps. First we must change the ALWANYNET network attribute to *YES. Changing this attribute will allow Sockets over SNA, APPC over TCP/IP, Sockets over IPX, and APPC over IPX to run on your system. The default for this value, when V3R1 is initially installed, is *NO. Use the DSPNETA command to see what your system is set to. If it is set to *NO, use the following command:

CHGNETA ALWANYNET(*YES)

After changing this attribute, you can verify the change by entering the DSPNETA command. The resulting displays are shown next.

Display Network Attributes		
	System:	RALYAS4A
Current system name	RALYAS4A	-
	USIBMRA	
Local control point name	RALYAS4A	
Default local location	RALYAS4A	
Default mode	BLANK	
APPN node type	*NETNODE	
Data compression	*NONE	
Intermediate data compression	*NONE	
Maximum number of intermediate sessions:	200	
Route addition resistance	128	
Server network ID/control point name	*ICINETID *ANY	
		More
Display Network Attributes		
	System:	RALYAS4A
Alert status	*ON	-
Alert logging status	*ΔI I	
Alert primary focal point	*VES	
Alont default focal point	*NO	
Alert backup foool point	NU	
	- NONE	
Network ID	*NONE	
Alert focal point to request	RAK	
Network ID	USIBMRA	
Alert controller description	*NONE	
Alert hold count	0	
Alert filter	AS400NET	
Library	OALSNDA	
	OSYSOPR	
library	29720	
	ODDINT	
LIDrary	VGPL ★FTLF	
	^FILE	Мажа
		More
Display Network Attributes		
Display Network Attributes	System:	RALYAS4A
Maximum hop count	16	
	~UBJAU1	
Default ISUN network type	0000000	
Default ISDN connection list	QUCCNNLANY	
Allow ANYNET support	*YES	
Network Server Domain	RALYAS4A	
		Bottom
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 28. AS/400 Network Attributes - System RALYAS4A

3. Assign an IP address to your local system for Sockets over SNA

We have to define a logical internet address on the system for use with Sockets over SNA. We do this by entering the CFGIPS command and taking option 1.

CFGIPS Configure IP over SNA System: RALYAS4A Select one of the following: 1. Work with IP over SNA interfaces 2. Work with IP over SNA routes 3. Work with IP over SNA locations 4. Work with IP over SNA type of service 20. Convert IP address into location name 21. Convert location name into IP address Selection or command ===> <u>1</u> F3=Exit F4=Prompt F9=Retrieve F12=Cancel (C) COPYRIGHT IBM CORP. 1980, 1994.



	Wo	ork with IP over	SNA Interfaces	Suct on .	
Type option 1=Add 2	s, press Enter =Change 4=Re	r. emove 9=Start	10=End	System:	KALYAS4A
Int Opt Add <u>1 xxx</u> (No inter	ernet ress xxx.xxx.xxx faces)	Subnet Mask	Interface Status		
F3=Exit F12=Cancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCF	P/IP inter	Bottom faces

Figure 30. AS/400 Work with IP over SNA Interfaces (1 of 2)

Add an entry by entering 1 in the option field and typing in an IP address for Sockets over SNA. Your system administrator should help you determine what IP address to give to the system for use with Sockets over SNA.

— Note –

Your IP over SNA IP addresses must use a separate network (or subnetwork) to any other networks (or subnetworks) that you use. For example, if already have a native TCP/IP network, Sockets over SNA must be allocated a separate network (or subnetwork) to this. After entering the IP address, you will be prompted for a Subnet mask.

Figure 31. AS/400 Add IP over SNA Interface

Here again, your system administrator should be able to help you determine what subnet mask to use for your Sockets over SNA IP network.

In our case, we have chosen to use 9.67.60 for our Sockets over SNA IP network (subnet mask 255.255.255.0). Our system has a native TCP/IP connection to network 9.24.104 (subnet mask 255.255.255.0). The native TCP/IP address can be seen using the CFGTCP command and taking option 1.

Shown in the following figure is the AS/400's IP over SNA interface. After creating this interface, it is automatically started and shows a status of ACTIVE.

		Wo	rk with IP over S	SNA Interfaces	Sustam.	ραι νας πα
Type op 1=Ado	ptions d 2=	s, press Enter Change 4=Re	move 9=Start	10=End	System.	KAL I AJ4A
Opt	Inte Addr	ernet ress	Subnet Mask	Interface Status		
_	9.67	.60.20	255.255.255.0	Active		
F3=Exi F12=Car	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCP	P/IP inter1	Bottom Taces

Figure 32. AS/400 Work with IP over SNA Interfaces (2 of 2)

Along with adding a new interface, the panel above allows you to either change, remove, start or end an existing interface.

There can be multiple IP over SNA interfaces defined; up to eight can be active concurrently.

This interface defines a logical interface and not a physical interface. It is not associated with any line description or network interface. This is illustrated in Figure 33 on page 33. The second entry represents our systems' IP over SNA interface. Unlike the native TCP/IP interface (9.24.104.56), there is no line description associated with the IP over SNA interface (9.67.60.20). The value of *IPS indicates that this interface is used by IP over SNA.

NETSTAT Interface Information

The NETSTAT command gives network status information for all network types (native TCP/IP and Sockets over SNA). NETSTAT option 1 (Work with TCP/IP Interface Status) gives interface information for all interfaces (native TCP/IP and Sockets over SNA). The panel also shows whether or not the interface is active.

		Work with TCP	/IP Interface Sta	atus	Svstem:	RALYAS4A
Type 5= 12	options, press E Display details =Work with config	nter. 8=Display ass juration status	ociated routes	9=Start	10=End	
Opt 	Internet Address 9.24.104.56 9.67.60.20 127.0.0.1	Network Address 9.24.104.0 9.67.60.0 127.0.0.0	Line Description L41TR *IPS *LOOPBACK	Interfac Status Active Active Active	e	
F3=E F13=	xit F4=Prompt Sort by column	F5=Refresh F24=More keys	F11=Display line	informat	ion F12 [:]	Bottom =Cancel

Figure 33. Work with TCP/IP Interface Status - System RALYAS4A

From this display you can start or end any of the interfaces listed. This screen is a quick way of viewing the status of both your TCP/IP interfaces and your IP over SNA interfaces.

IP over SNA Interface CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage IP over SNA interfaces:

- ADDIPSIFC Add IP over SNA interface
- CHGIPSIFC Change IP over SNA interface
- · RMVIPSIFC Remove IP over SNA interface
- STRIPSIFC Start IP over SNA interface
- ENDIPSIFC End IP over SNA interface

4. Define routes (if necessary) to the systems to which you will communicate

It may be necessary to define a route to the remote system for Sockets over SNA.

As with native TCP/IP, a route definition is required when the remote system is in a different network to the local system. You need to define a route when either of the following is true:

- The remote system is in a different network (or subnetwork) to that of the local system.
- The remote system is reached via an AnyNet Sockets over SNA gateway.

The system automatically builds a route that gives access to systems that are in the same network as the local system.

A route is assigned by entering the CFGIPS command and taking option 2.

		Work with IP ove	er SNA Routes	System:	RALYAS4A
Type opt 1=Add	ions, press Ente 4=Remove	r.		Ū	
0pt <u>1</u>	Route Destination xxx.xxx.xxx.xxx	Subnet Mask	Next Hop		
(No Ro	utes)				
F3=Exit F12=Canc	F5=Refresh el F17=Top	F6=Print list F18=Bottom	F10=Work with TCF	P/IP routes	Bottom



The Route Destination can be the address of a network, subnetwork or a specific host. For example, a Route Destination for all hosts in the 112.2.3 subnetwork would be identified by entering 112.2.3.0 for the Route destination with a Subnet Mask of 255.255.255.0. A Subnet Mask value of *HOST indicates that the internet address value specified in the Route Destination field is a host address; the Subnet Mask value is calculated to be 255.255.255.255. If the Internet address value specified for the Route Destination field is the address of a network or subnetwork, you must specify a value other than *HOST for the Subnet Mask field.

— Note -

Where the dominant network is Sockets over SNA or where there is Sockets over SNA on a system with no native TCP/IP interface, it is possible to use the default route entry (*DFTROUTE) for Sockets over SNA.

Remote System in a Different Network to Local System

In Figure 35, the remote system is in a different Sockets over SNA network (subnetwork) to the local system, it is therefore necessary to define a route to that system.



Figure 35. Two Systems Connected Via SNA - Using Different IP over SNA Subnets

The following displays show the route entries that should be entered on both systems. These routes will enable each system to access the other, via Sockets over SNA. Route entry for local system:

Type c 1=Ac	options 1d 4=	s, press Enten =Remove	Work with IP ove	r SNA Routes	System:	LOCALSYS
Opt _ _	Rout Dest 9.67	te tination 7.65.0	Subnet Mask 255.255.255.0	Next Hop 9.67.64.24		
F3=Exi F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCI	P/IP routes	Bottom

Figure 36. IP over SNA Route Entry for Local System

The above entry allows the local system to communicate with any host in the 9.67.65 network. We could have used a Route Destination of 9.67.65.25 with a Subnet Mask of *HOST, but this would only allow this system to communicate with the single remote system.

Route entry for remote system:

Type o 1=Ad	option: 1d 4	s, press Enter =Remove	Work with IP over : ^.	SNA Routes	System:	REMOTSYS
0pt 	Rou Des 9.6	te tination 7.64.0	Subnet Mask 255.255.255.0	Next Hop 9.67.65.25		
F3=Ex F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F F18=Bottom	10=Work with TC	P/IP routes	Bottom

Figure 37. IP over SNA Route Entry for Remote System

The above entry allows the remote system to communicate with any host in the 9.67.64 network. We could have used a Route Destination of 9.67.64.24 with a Subnet Mask of *HOST, but this would only allow this system to communicate with the single remote system.

Note that in both cases the Next Hop is the local IP over SNA interface internet address.

Remote System Reached via an AnyNet Sockets over SNA Gateway

In Figure 38, the remote system is reached via an AnyNet Sockets over SNA gateway, it is therefore necessary to define a route to that system.



Figure 38. Two Systems Connected via an AnyNet Sockets over SNA Gateway

The following panel shows the route entry that should be entered on the local system. This route will enable the local system to access the remote system, via Sockets over SNA.

Туре о	options	s, press Enter	Work with IP oven	SNA Routes	System:	LOCALSYS
1=Ad Opt	dd 4= Rout Dest	Remove te tination	Subnet Mask	Next Hop		
-	9.24	1.104.0	255.255.255.0	9.67.64.01		
F3=Ex F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TC	P/IP routes	Bottom

Figure 39. IP over SNA Route Entry on LOCALSYS for Remote System Via an AnyNet Sockets over SNA Gateway

The above entry allows the local system to communicate with any host in the 9.24.104 network. We could have used a Route Destination of 9.24.104.189 with a Subnet Mask of *HOST, but this would only allow this system to communicate with the single remote system.

Note that the Next Hop is the internet address of the AnyNet Sockets over SNA gateway.

In this example the remote system is a native TCP/IP system. The system has no AnyNet and therefore no IP over SNA configuration. It would, however, require a TCP/IP route entry to allow it to reach systems in the 9.67.64 network. A suitable route entry would be:

Route	Subnet	of	Next
Destination	Mask	Service	Нор
9.67.64.0	255.255.255.0	*normal	9.24.104.178

IP over SNA Route CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage IP over SNA routes:

- · ADDIPSRTE Add IP over SNA route
- RMVIPSRTE Remove IP over SNA route

5. Establish IP address to LU name mapping

We now map the logical Sockets over SNA internet addresses to SNA LU (location) names. To do this, take option 3 from the CFGIPS menu, to work with IP over SNA locations.

Type o 1=Ad	Wor ptions, press Enter. d 2=Change 4=Rem	∿k with IP o nove	ver SNA Loc	cations	System:	RALYAS4A
0pt <u>1</u>	Remote Destination <u>xxx.xxx.xxx.xxx</u>	Subnet Mask <u>xxx.xxx.x</u>	<u>xx.xxx</u>	Remote Network ID	Locatior Template	1
F3=Exi (C) CO	t F5=Refresh F6= PYRIGHT IBM CORP.19	Print list 80, 1994.	F12=Cance	el F17=Top	F18=Bot	Bottom tom

Figure 40. AS/400 Work with IP over SNA Locations

This display is used to map IP over SNA internet addresses to SNA LU (location) names. IP over SNA internet addresses can be mapped to SNA LU names in one of two ways. The simplest method is to use one-to-one mapping where there is an entry for each system to which IP over SNA will be used. The other method uses algorithmic mapping where the system builds the LU name from the remote destination host ID using a location template.

You will need to have entries for both:

- · The local system
- Any remote systems you require to communicate with using Sockets
 over SNA

– Remember –

For SNA to be able to activate the sessions, both the location (LU) names generated algorithmically from the location template entries and those directly entered (one-to-one mapping entries) must be defined to SNA. If the local location (LU) name being used for Sockets over SNA is not the default local location name or local control point name (see Figure 24 on page 27) of your system, an entry must be added to the an APPN local location list. This is covered in more detail in step 7 on page 43.

One-to-One IP to LU Mapping

In simple environments, IP over SNA internet addresses can be mapped to SNA LU names on a one-to-one basis.

Туре с	W ptions, press Ente	ork with IP ov r.	ver SNA Locatio	ons	System:	RALYAS4A
1=Ac	ld 2=Change 4=R	emove				
			Remo	ote		
	Remote	Subnet	Netw	work	Location	
0pt	Destination	Mask	ID		Template	
-	9.67.60.20	*HOST	*NE	TATR	RALYAS4A	
_	9.67.60.21	*HOST	*NE	TATR	RALYAS4B	
F3=Fxi	t F5=Refresh F	6=Print list	F12=Cancel	F17=Top	F18=Bot	Bottom
(C) CC	PYRIGHT IBM CORP.	1980, 1994.		11, 100	110 000	

Figure 41. AS/400 Work with IP over SNA Locations - One-to-One Mapping

With one-to-one mapping there is an IP over SNA Locations entry for *each* remote system to which Sockets over SNA will be used. If you decide to use one-to-one mapping addresses, enter the remote system's internet address in the Remote Destination address field and specify *HOST in the Subnet Mask field. Enter the remote system's SNA network ID in the Remote Network ID field and its LU (location) name in the Location Template field. A value of *NETATR indicates that the value in the network attributes should be used. When *HOST is specified in the subnet mask field, the subnet mask value is calculated to be 255.255.255.255.

Algorithmic IP to LU Mapping

In more complex environments, algorithmic mapping can be used to map IP over SNA internet addresses to SNA LU names.

Type o 1=Ac	W options, press Ente dd 2=Change 4=R	ork with IP over SNA r. emove	Locations	System: RALYAS4A
Opt	Remote Destination	Subnet Mask	Remote Network ID	Location Template
- - -	9.67.60.20 9.67.60.0	*HOST 255.255.255.0	*NETATR *NETATR	RAL0000M RAL?????
F3=Ex ⁻ (C) C0	it F5=Refresh F DPYRIGHT IBM CORP.	6=Print list F12=Ca 1980, 1994.	ncel F17=Top	Bottom F18=Bottom

Figure 42. AS/400 Work with IP over SNA Locations - Algorithmic Mapping

With algorithmic mapping, a single IP over SNA Locations entry can map multiple IP over SNA internet addresses to SNA LU names. The LU names are algorithmically generated from the host ID portion of the remote system's internet address using the location template. Question marks (?) in the Location Template entry determine which characters are to be algorithmically generated. Algorithmic mapping can only be used where the LU names in the IP over SNA network follow a pattern. For example, if all of the LU names in an IP over SNA network begin with the characters RAL, RAL????? could be used as the location template as in the example in Figure 42 on page 39. The system will then generate these characters using the host ID portion of the internet address. The Subnet Mask is used to determine the host ID portion of the internet address. Thus for algorithmic mapping, a value other than *HOST must be specified in the subnet mask field. All systems in a Sockets over SNA network must use the same location template.

While it is possible, in some cases, for the IP over SNA Locations entry for the local system to be algorithmically generated, the recommendation is to have a one-to-one entry for this system as shown in Figure 42 on page 39. Using a location name of RAL0000M for the local system allows remote systems to use an algorithmic entry when accessing this system. RAL0000M is the name that would be algorithmically generated for a remote destination of 9.67.60.20 from the algorithmic entry shown. An algorithmically generated name can be determined via option 20 from the CFGIPS menu (see step 7 on page 43 for more details).

With algorithmic mapping, the LU name is built from the host ID part of the internet address. The system must therefore have sufficient room (question marks) to allow it to generate an LU name for each possible host ID for a given host ID field length. The longer the host ID field, the more question marks that are required. The subnet mask determines the subnet ID for a given internet address, the remaining part of the address is the host ID. The MPTN rules for the possible number of user-specified characters in the location template is dependent on the number of bits in the subnet mask as shown in Table 1.

Table 1. MPTN Conditions for Defining a Location Template					
Number of bits in Subnet Mask	Subnet Mask Example	User Specified Charac- ters	Minimum # of System Generated Characters		
8-11 (includes class A)	255.0.0.0	1-3	5		
12-16 (includes class B)	255.255.0.0	1-4	4		
17-21		1-5	3		
22-26 (includes class C)	255.255.255.0	1-6	2		
27-31		1-7	1		
32	255.255.255.255 •	1-8	0		

Note: • Only value possible.

The rules implemented by AnyNet/400 V3R1 are, however, slightly different from the above. The rules implemented by OS/400 V3R1 are dependant on the network class rather than the subnet mask as shown in Table 2 on page 41.

Table 2. AnyNet/400 V3R1 Conditions for Defining a Location Template				
Class of Network (and size)	Range of first byte	User Specified Charac- ters	Minimum # of System Generated Characters	
A (large)	0 - 127	1 - 3	5	
B (medium)	128 - 191	1 - 4	4	
C (small)	192 - 223	1 - 6	2	

The difference between these two sets of rules must be taken into account when deciding on a location template for a Sockets over SNA network where that network will contain AnyNet/400 V3R1 systems: the AnyNet/400 V3R1 rules should be followed by *every* system in the Sockets over SNA network. It can be seen from the above tables that the AnyNet/400 V3R1 rules fall within the MPTN rules.

Remember that the first byte of an internet address signifies the network class as follows:

If the first byte of an internet address is in the range 0 to 127, it is a class A network. The first byte of the internet address is the network ID.

If the first byte of an internet address is in the range 128 to 191, it is a class B network. The first two bytes of the internet address is the network ID.

If the first byte of an internet address is in the range 192 to 223, it is a class C network. The first three bytes of the internet address is the network ID.

IP over SNA Location CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage IP over SNA locations:

- ADDIPSLOC Add IP over SNA location
- CHGIPSLOC Change IP over SNA location
- RMVIPSLOC Remove IP over SNA location

6. Map the IP over SNA type of service to an SNA mode

AF_INET socket applications can select the IP type of service to be used for their connections. AnyNet/400 Sockets over SNA allows us to choose the SNA mode that this IP type of service is mapped to. The default is to map each to the default mode specified in the network attributes.

	Wo	ork with IP over	SNA Type of Serv	ice System:	ΔΙ νας πα
Type optio 2=Change	ns, press Er	iter.		System.	VAL I A 34A
Opt Typ - * - * - * - * - * - *	e of Service MINDELAY MAXTHRPUT MAXRLB MINCOST NORMAL	2	SNA Mode *NETATR *NETATR *NETATR *NETATR SNACKETS		Bottom
F3=Exit F12=Cancel (C) COPYRI	F5=Refresh GHT IBM CORF	F6=Print list P. 1980, 1994.	F10=Work with M	ode Descriptions	

Option 4 from the CFGIPS menu is used to change this mapping.

Figure 43. AS/400 Work with IP over SNA Type of Service

This screen allows each IP type of service to be associated with an SNA mode. Any mode can be used with Sockets over SNA. SNACKETS is the default mode AnyNet/2 Sockets over SNA will use.

If necessary, use option 2 to change the SNA Mode entry.

If the mode being used is not already defined to OS/400 (SNACKETS is not currently a system-supplied mode), use the CRTMODD (Create Mode Description) command to create an APPC mode description. A PTF (SF22357) is available that makes SNACKETS a system-supplied mode. To create a mode, enter the command CRTMODD and press F4.

Create Mod	e Description	(CRTMODD)
Type choices, press Enter.		
Mode description	SNACKETS 30 2 CALC 7 *CALC *CALC *NETATR *RLE *RLE Mode for Any	Name 1-512 1-512 0-512 0-512 1-32767, *CALC 0-63 0-63 241-32768, *CALC 1-2147483647, *NETATR *RLE, *LZ9, *LZ10, *LZ12 *RLE, *LZ9, *LZ10, *LZ12 VNet Sockets over SNA
		Bottom
F3=Exit F4=Prompt F5=Refresh F13=How to use this display	F10=Addition F24=More key	al parameters F12=Cancel 's

Figure 44. AS/400 Create Mode Command

The above mode parameters match those used by SNACKETS under AnyNet/2.
- Note

When deciding the session limits associated with any mode to be used for Sockets over SNA, consideration should be given to the number of sessions that some applications (for example, FTP) can use. See *Configuration Advice* in "AnyNet/400 Sockets over SNA Verification" on page 74.

7. Verify the IP address to LU name mapping

Two options are provided to allow you to verify the IP address to LU name mapping on your system. One option allows you to verify the mapping of an IP address to an LU name and the other allows you to verify the mapping of an LU name to an IP address.

Looking back at Figure 42 on page 39, we can use option 20 (Convert IP address into location name) from the CFGIPS menu to verify the LU name that would be generated for an internet address of 9.67.60.20.

Convert IF	P Address (CVTIPSIFC)
Type choices, press Enter.	
Internet address	<u>9.67.60.20</u> **,*PRINT
F3=Exit F4=Prompt F5=Refresh F24=More keys	Bottom F12=Cancel F13=How to use this display

Figure 45. Converting an IP Address into Location Name (1 of 2)

Press Enter and you will get the following panel.

Convert IP Address	Suctor	
Internet address 9.67.60.20	system:	KALTAS4A
Network identifier : *NETATR Location name : RALOOOOM		
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 46. Converting an IP Address into Location Name (2 of 2)

If RAL0000M was the Sockets over SNA name of the local system and it was not the default local location name or local control point name of that system (see Figure 24 on page 27), then it will be necessary to add an APPN local location list entry of RAL0000M on that system. We can use the command DSPCFGL QAPPNLCL to display the local location list. If you need to add an entry, use the command CHGCFGL *APPNLCL.

Change Configuration List RALYAS4A 12/14/94 10:44:11 Configuration list QAPPNLCL Configuration list type : *APPNLCL Local cfg list : ----APPN Local Locations---------APPN Local Locations-----Local Local Location Text Location Text RALYAS4A RAL0000M More... Press Enter to continue. F3=Exit F12=Cancel F17=Top F18=Bottom

Figure 47. Local Configuration List for System RALYAS4A

The APPN local location list entry will be added to the APPN directory at the local system. This will allow an APPN search request received by this system for this LU name to be responded to positively, the SNA session for Sockets over SNA can then be established.

The Configure IP over SNA (CFGIPS) panel's option 21 (Convert location name into IP address) can be used to verify the LU name to IP address mapping.

Figure 48. AS/400 Convert Location Name into IP Address Panel (1 of 2)

Press Enter and you will get the following panel.

```
Convert Network ID / Location

System: RALYAS4A

Network identifier .....: USIBMRA

Location name .....: RAL0000N

Internet Addresses

9.67.60.21

Press Enter to continue.

F3=Exit F12=Cancel
```

Figure 49. AS/400 Convert Location Name into IP Address Panel (2 of 2)

Convert IP Address/LU Name CL Commands

For those users that prefer to use CL commands, the following is a list of CL commands that can be used to convert an IP address to an LU name and an LU name to an IP address:

- CVTIPSIFC Convert IP Address
- CVTIPSLOC Convert Network ID / Location

With all of the configuration steps completed, you are now ready to use the Sockets over SNA support of AnyNet/400. The next section shows specific Sockets over SNA configuration scenarios.

Sockets over SNA Scenarios

This section presents the scenarios we used to verify the different Sockets over SNA implementations. Each scenario contains a diagram showing the actual environment, AS/400 and/or PS/2 configuration displays and a matching parameters list.

The following scenarios will be covered in this section:

- · Sockets over SNA Scenario 1: AS/400 to AS/400 Same Subnetwork
- · Sockets over SNA Scenario 2: AS/400 to AS/400 Different Subnetworks
- Sockets over SNA Scenario 3: AS/400 to PS/2 Same Subnetwork
- · Sockets over SNA Scenario 4: AS/400 to various Algorithmic Mapping

Sockets over SNA Scenario 1: AS/400 to AS/400 - Same Subnetwork

This configuration is the simplest and likely to be the most common. It is also an example of a configuration that should be set up prior to moving on to a more complex configuration.

Shown in the following figure are the two systems used in this scenario and their respective IP over SNA internet addresses. An SNA configuration is already in place between the systems using the network ID and CP names shown.



Figure 50. Systems and Addresses Used for Sockets over SNA Scenario 1

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RALYAS4B systems. They illustrate the configuration steps required for this Sockets over SNA scenario.

First we must check that Allow ANYNET Support is set to *YES in the network attributes of each system. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

		Wo	ork with IP over	SNA Interfaces	System:	RALYAS4A
Type o 1=Ad	ptions d 2=	s, press Enter =Change 4=Re	: emove 9=Start	10=End		
0pt	Inte Addr	ernet ress	Subnet Mask	Interface Status		
	9.67	7.60.20	255.255.255.0	Active		
						Bottom
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCI	P/IP inter [.]	faces

Next, we configure an IP over SNA interface on RALYAS4A.

Figure 51. Scenario 1: Work with IP over SNA Interfaces - System RALYAS4A

The subnet mask of 255.255.255.0 indicates that the first three bytes of the internet address (9.67.60) is the network ID.

In the following panel we configure an IP over SNA interface on RALYAS4B.

_

		Wo	rk with IP over	SNA Interfaces	System:	RALYAS4B
Type o 1=Ad	options Id 2=	, press Enter Change 4=Re	move 9=Start	10=End		
Opt	Inte Addr	ernet ess	Subnet Mask	Interface Status		
	9.67	.60.21	255.255.255.0	Active		
						Bottom
F3=Exi F12=Ca	t incel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCP	/IP interf	aces

Figure 52. Scenario 1: Work with IP over SNA Interfaces - System RALYAS4B

No routes are required in this scenario; both systems are in the same Sockets over SNA network (9.67.60).

	W	ork with IP ov	ver SNA Locations	System:	RAI YAS4A
Type o 1=Ad	options, press Ente dd 2=Change 4=R	r. emove		5950011	
Opt	Remote Destination	Subnet Mask	Remote Network ID	Location Template	
- - -	9.67.60.20 9.67.60.21	*HOST *HOST	*NETATR *NETATR	RALYAS4A RALYAS4B	
				-10	Bottom
F3=Ex ⁻ (C) C(it F5=Refresh F DPYRIGHT IBM CORP.	6=Print list 1980, 1994.	F12=Cancel F17=Top	F18=Bot	tom

In the following panel we configure the IP over SNA locations.

Figure 53. Scenario 1: Work with IP over SNA Locations - System RALYAS4A

The IP over SNA locations for RALYAS4B has identical entries to those shown in Figure 53 for RALYAS4A.

Assuming the network attributes on each system show the same default mode (normally mode BLANK), we can leave the CFGIPS option 4 values at the defaults (each IP Type of Service mapped to SNA Mode *NETATR). Unless, of course, we want the IP Type of Service values mapped differently.

Shown next are the matching parameters between systems RALYAS4A and RALYAS4B.



Figure 54. Sockets over SNA Scenario 1: Matching Parameters Table

Sockets over SNA Scenario 2: AS/400 to AS/400 - Different Subnetworks

In this scenario, two AS/400s communicate with each other via Sockets over SNA but from different Sockets over SNA networks (subnetworks).

Shown in the following figure are the two systems used in this scenario and their respective IP over SNA internet addresses. An SNA configuration is already in place between the systems using the network ID and CP names shown.



Figure 55. Systems and Addresses Used for Sockets over SNA Scenario 2

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RALYAS4B systems. They illustrate the configuration steps required for this Sockets over SNA scenario.

First we must check that Allow ANYNET Support is set to *YES in the network attributes of each system. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

		Wo	ork with IP over	SNA Interfaces	System:	RALYAS4A
Type o 1=Ad	ptions d 2=	s, press Enter =Change 4=Re	: emove 9=Start	10=End		
0pt	Inte Addr	ernet ress	Subnet Mask	Interface Status		
	9.67	7.60.20	255.255.255.0	Active		
						Bottom
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCI	P/IP inter [.]	faces

Next, we configure an IP over SNA interface on RALYAS4A.

Figure 56. Scenario 2: Work with IP over SNA Interfaces - System RALYAS4A

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.60) of the internet address is the network ID.

Next, we configure an IP over SNA interface on RALYAS4B.

		Wo	ork with IP over S	SNA Interfaces	System:	RALYAS4B
Type o 1=Ad	ptions ld 2=	, press Enter Change 4=Re	move 9=Start	10=End		
Opt	Inte Addr	ernet ess	Subnet Mask	Interface Status		
	9.67	.61.20	255.255.255.0	Active		
						Bottom
F3=Exi F12=Ca	t Incel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCP	?∕IP interf	aces

Figure 57. Scenario 2: Work with IP over SNA Interfaces - System RALYAS4B

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.61) of the internet address is the network ID.

In this scenario RALYAS4A and RALYAS4B are in different Sockets over SNA networks (subnetworks). We must therefore define a route on each system.

Type o 1=Ad	ptions, d 4=R	, press Enter Remove	Work with IP ove	er SNA Routes	System:	RALYAS4A
Opt	Route Desti	nation	Subnet Mask	Next Hop		
	9.67.	61.0	255.255.255.0	9.67.60.2	0	
						Bottom
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with T	CP/IP routes	

First we configure an IP over SNA route on RALYAS4A.

Figure 58. Scenario 2: Work with IP over SNA Routes - RALYAS4A

In the following panel we configure an IP over SNA route on RALYAS4B.

Type of 1=Ado	otions d 4=	s, press Enter Remove	Work with IP ove ••	r SNA R	outes	System:	RALYAS4B
Ont	Rout Dest	e ination	Subnet Mask		Next Hop		
- -	9.67	2.60.0	255.255.255.0	1	9.67.61.20		
							Bottom
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Wo	rk with TCP	/IP routes	

Figure 59. Scenario 2: Work with IP over SNA Routes - RALYAS4B

The route examples shown allow each system to communicate with any system in the remote Sockets over SNA network. Instead of the examples shown, we could have entered specific entries that *only* allowed communications between the two systems shown. These specific entries would have the following values:

RALYAS4	Α		
	Route	Subnet	Next
	Destination	Mask	Нор
	9.67.61.20	*HOST	9.67.60.20
RALYAS4	В		
	Route	Subnet	Next
	Destination	Mask	Нор
	9.67.60.20	*HOST	9.67.61.20

Type c 1=Ad	ptions, press E Id 2=Change	nter. 4=Remove			<i></i>	
	Remote	Subnet	Remot	te	location	
Opt	Destination	Mask	ID		Template	
_	9.67.60.20	*HOST	*NET/	ATR	RALYAS4A	
-	9.67.61.20	*HOST	*NETA	ATR	RALYAS4B	
						Botto
F3=Fxi	t F5=Refresh	F6=Print list	F12=Cancel F	-17=Top	F18=Bot	tom

Lastly we configure the IP over SNA locations on each system.

Figure 60. Scenario 2: Work with IP over SNA Locations - System RALYAS4A

The IP over SNA locations for RALYAS4B has identical entries to those shown in Figure 60 for RALYAS4A.

Assuming the network attributes on each system show the same default mode (normally mode BLANK), we can leave the CFGIPS option 4 values at the defaults (each IP Type of Service mapped to SNA Mode *NETATR). Unless, of course, we want the IP Type of Service values mapped differently.

Shown next are the matching parameters between systems RALYAS4A and RALYAS4B.



Figure 61. Sockets over SNA Scenario 2: Matching Parameters Table

Sockets over SNA Scenario 3: AS/400 to PS/2 - Same Subnetwork

Shown in the following figure are the two systems used in this scenario and their respective IP over SNA internet addresses. An SNA configuration is already in place between the systems using the network ID and CP names shown.



Figure 62. Systems and Addresses Used for Sockets over SNA Scenario 3

The following series of panels show the AS/400 and PS/2 configuration screens taken from the RALYAS4A and RALYPS2B systems. They illustrate the configuration steps required for this Sockets over SNA scenario.

Please note that only the key AnyNet/2 configuration displays are shown in this section. For further AnyNet/2 configuration help, refer to *AnyNet/2: Sockets over SNA and NetBIOS over SNA, Installation and Interoperability* GG24-4396.

PS/2 Software Installed

The following software was installed on RALYPS2B:

- OS/2 Version 2.1
- CM/2 Version 1.11 with AnyNet/2 support installed (additional functions)
- TCP/IP Version 2.0 for OS/2 Base kit plus CSD UN64092
- AnyNet/2 Version 2.0, Sockets over SNA plus the fix for APAR IC07730

The software was installed in the above order.

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

		Wc	ork with IP over	SNA Interfaces	System:	RAI YAS4A
Type op 1=Ado	ptions d 2=	, press Enter Change 4=Re	emove 9=Start	10=End	5,5 000	
Opt	Inte Addr	ernet	Subnet Mask	Interface Status		
	9.67	.60.20	255.255.255.0	Active		
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCF	P/IP interf	Bottom aces

Next, we configure a Sockets over SNA interface on RALYAS4A.

Figure 63. Scenario 3: Work with IP over SNA Interfaces - System RALYAS4A

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.60) of the internet address is the network ID.

No routes are required in this scenario; both systems are in the same Sockets over SNA network (9.67.60).

In the following panel we configure the IP over SNA locations on RALYAS4A.

	W	ork with IP ov	er SNA Locat	ions	System:	RALYAS4A
Type o 1=Ac	options, press Ente Id 2=Change 4=R	r. emove			Ū	
Opt	Remote Destination	Subnet Mask	Rer Net ID	note twork	Location Template	
- - -	9.67.60.20 9.67.60.24	*HOST *HOST	US: US:	I BMRA I BMRA	RALYAS4A RALYPS2B	
F3=Exi (C) CC	t F5=Refresh F)PYRIGHT IBM CORP.	6=Print list 1980, 1994.	F12=Cancel	F17=Top	F18=Bott	Bottom com

Figure 64. Scenario 3: Work with IP over SNA Locations - System RALYAS4A

— Note —

A Subnet Mask of *HOST results in an actual mask of 255.255.255.255 and therefore is the same as the Address Mask used in the AnyNet/2 Local Node and Remote Node definitions in this scenario.

By default, AnyNet/2 will use mode SNACKETS for Sockets over SNA. We therefore map the IP Type of Service we want to use (*NORMAL) to the SNA Mode SNACKETS.

	Work with IP over	· SNA Type of Service	
Type 2=Cl	options, press Enter. hange	System	: RALIAS4A
Opt	Type of Service	SNA Mode	
_	*MINDELAY	*NETATR	
_	*MAXTHRPUT	*NETATR	
_	*MAXRLB	*NETATR	
_	*MINCOST	*NETATR	
_	*NORMAL	SNACKETS	
			Bottom
F3=Ex F12=C	it F5=Refresh F6=Printlist ancel	F10=Work with Mode Descript	ions
(C) C	OPYRIGHT IBM CORP. 1980, 1994.		

Figure 65. AS/400 Work with IP over SNA Type of Service

Mode SNACKETS with the parameters shown in Figure 44 on page 42 should be added to RALYAS4A.

RALYPS2B Configuration

The Communications Manager/2 setup is not shown here. An end node - to network node server configuration was created via the APPC APIs through Token-Ring CM/2 menu option. The AS/400 APPC controller and device descriptions were auto-created when this CM/2 configuration was started.

Select the **Configure AnyNet/2 Sockets over SNA** icon to access the configuration screens on the PS/2. The folder icon should be displayed on the OS/2 desktop if the AnyNet/2 code has been installed correctly.



Figure 66. AnyNet/2 Sockets over SNA Folder

The first AnyNet/2 Sockets over SNA configuration screen defines the local system (local node).

AnyNe	t/2 Configuration		
	Configure Sockets ov	ver SNALocal Node automatically	Soc/SNA
	IP Address for SNA: Address Mask: LU Template: SNA Network Name:	9.67.60.24 255.255.255.255 RALYPS2B USIBMRA	
<u>U</u> r Enter th ▼ <u>L</u> ocal n	ndo Help ne LU template for your SNA i ode Remote nodes <u>S</u> t	Save Page 1 of 5 network.	

Figure 67. Scenario 3: Sockets over SNA Local Node Definition for RALYPS2B

The AnyNet/2 local node definition defines both the local Sockets over SNA interface address and the mapping of that address to an LU name. Unlike AnyNet/400, with AnyNet/2 there is not a separate Sockets over SNA interface definition. The address mask of 255.255.255.255 denotes that the LU template is a one-to-one template entry and hence is the same as *HOST in the AnyNet/400 IP over SNA locations entries.

The second AnyNet/2 Sockets over SNA configuration screen defines the remote systems (remote nodes).

AnyNet/2 Configuration		
Configure Sockets over S	SNARemote Nodes	Soc/SNA
Address 1 of 1		
IP Network ID:	9.67.60.20	
Address Mask:	255.255.255.255	
LU Template:	RALYAS4A	
SNA Network Name:	USIBMRA	
	Delete	
Undo Help	Save Page 2 of 5	
Local node Remote nodes Start	t options Define modes	

Figure 68. Scenario 3: Sockets over SNA Remote Node Definition for RALYPS2B

The final AnyNet/2 Sockets over SNA configuration screen allows the SNA mode used for Sockets over SNA to be changed. Configuration screens 3 and 4 are not shown here.

AnyNet/2 Configuration	
Configure Sockets over SNAModes	h. Soc/SNA
Default mode for all ports: SNACKETS	
∟Set default modes for individual ports:	
<u>N</u> ew Edit <u>D</u> elete	
Help Defaults Save Page 5 of 5 Enter the default mode name for all Sockets over SNA traffic.	
Forge and Beaute modes Start obtions	

Figure 69. Scenario 3: Sockets over SNA Modes Definition for RALYPS2B

The AnyNet/2 Sockets over SNA configurator produces a command file (sxstart.cmd) based on the information in the AnyNet/2 Sockets over SNA configuration screens. This command file will be used when AnyNet/2 Sockets over SNA is started. System RALYPS2B has the following sxstart.cmd file:

@REM Sockets over SNA startup file

@REM First, start the Snackets program.

start snackets logfile 100000 sessions 30

@REM Next, tell Sockets over SNA how to map IP addresses to LU names. @REM Wait for Sockets over SNA to get set up before continuing. sxmap -w add 9.67.60.24 255.255.255.255 USIBMRA RALYPS2B

sxmap add 9.67.60.20 255.255.255.255 USIBMRA RALYAS4A

@REM Use IFCONFIG to define the local address ifconfig sna0 9.67.60.24 route add 9.67.60.24 9.67.60.24 0 route add 9.67.60.20 9.67.60.24 0

Shown next are the matching parameters between systems RALYAS4A and RALYPS2B.



Figure 70. Sockets over SNA Scenario 3: Matching Parameters Table

Sockets over SNA Scenario 4: AS/400 to Various - Algorithmic Mapping

In this more complex scenario we use algorithmic mapping between three systems. These systems are located in two Sockets over SNA networks.

Shown in the following figure are the three systems used in this scenario and their respective IP over SNA internet addresses. SNA configurations are already in place between the systems using the network ID and CP names shown.



Figure 71. Systems and Addresses Used for Sockets over SNA Scenario 4

We will use RAL as the location (LU) template for Sockets over SNA systems in the Raleigh network and TOR as the location (LU) template for Sockets over SNA systems in the Toronto network.

The following series of panels show the AS/400 and PS/2 configuration screens taken from the RALYAS4A, TORAS4B and RALYPS2B systems. They illustrate the configuration steps required for this Sockets over SNA scenario.

```
- Note
```

The software installed on RALYPS2B is the same as scenario 3.

Please note that only the key AnyNet/2 configuration displays are shown in this section. For further AnyNet/2 configuration help, refer to *AnyNet/2: Sockets over SNA and NetBIOS over SNA, Installation and Interoperability* GG24-4396.

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Next, we configure an IP over SNA interface on RALYAS4A.

			Wor	∙k w	ith IP over S	SNA Int	terfaces	System·	RΔΙ ΥΔSΔΔ
	Type opt 1=Add	tions 2=0	, press Enter. Change 4=Ren	iove	e 9=Start	10=Enc	1	5,5 0011	
	Opt	Inte Addre	rnet ess	S M	ubnet lask		Interface Status		
	_	9.67	.60.23	2	255.255.255.0		Active		
									Datter
									BOLLOW
	F3=Exit F12=Cano	cel	F5=Refresh F17=Top	F6= F18	Print list B=Bottom	F10=Wo	ork with TCP	/IP interfa	ces

Figure 72. Scenario 4: Work with IP over SNA Interfaces - System RALYAS4A

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.60) of the internet address is the network ID.

In this scenario the systems are in different Sockets over SNA networks (subnetworks). We must therefore define a route on each of the AS/400s. Here we configure the IP over SNA route on RALYAS4A.

Type c 1=Ac	options 1d 4:	s, press Enter =Remove	Work with IP ove r.	r SNA Routes	System:	RALYAS4A
Opt	Rou Des	te tination	Subnet Mask	Next Hop		
_	9.62	7.61.0	255.255.255.0	9.67.60.23		
						Bottom
F3=Exi F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TC	P/IP routes	

Figure 73. Scenario 4: Work with IP over SNA Routes - System RALYAS4A

1=A0	1d 2=Change 4=F	emove			
Opt	Remote Destination	Subnet Mask	Remote Network ID	Location Template	
- - -	9.67.60.0 9.67.60.23 9.67.61.0	255.255.255.0 *HOST 255.255.255.0	USIBMRA USIBMRA USIBMRA	RAL????? RAL0000Q TOR?????	
					Botto

Next, we configure the IP over SNA locations on RALYAS4A.

Figure 74. Scenario 4: Work with IP over SNA Locations - System RALYAS4A

In both Figure 74 and Figure 80 on page 66, entries representing the actual IP over SNA address for each system are included in the list. Although these specific entries may not be necessary for the correct operation of this scenario, it is still *recommended* that they be included in the IP over SNA locations. Using the location template names RAL0000Q and TOR0000M allows the algorithmic entries RAL???? and TOR????? to be used when communicating between the systems. Having entered the algorithmic entries, CFGIPS option 20 (Convert IP address into location name) can be used to determine the specific entries to be added as shown in the following panel.

Convert IP Address	Curtan	
Internet address 9.67.60.23	System:	KALYAS4A
Network identifier : *NETATR Location name : RAL0000Q		
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 75. Scenario 4: Converting the IP Address at RALYAS4A

In this scenario, the LU name used for Sockets over SNA on each of the systems is neither the local location name nor local control point name of that system. We must therefore add an entry to the APPN local location list on each system.

Display Configuration List RALYAS4A 11/29/94 15:30:49 QAPPNLCL Configuration list Configuration list type: *APPNLCL Text Local cfg list ----APPN Local Locations----------APPN Local Locations-----Local Local Location Text Location Text RALYAS4A RAL0000Q Loc. for Scenario 4 Bottom Press Enter to continue. F3=Exit F12=Cancel F17=Position to

Shown following is the APPN local configuration list for RALYAS4A with Sockets over SNA name RAL0000Q added.

Figure 76. Scenario 4: Local Location List - System RALYAS4A

By default, AnyNet/2 will use mode SNACKETS for Sockets over SNA. We therefore map the IP Type of Service we want to use (*NORMAL) to the SNA Mode SNACKETS.

W Type options, press E 2=Change	ork with IP over nter.	SNA Type of Service	System: I	RALYAS4A
Opt Type of Servic - *MINDELAY - *MAXTHRPUT - *MAXRLB - *MINCOST - *NORMAL	e	SNA Mode *NETATR *NETATR *NETATR *NETATR SNACKETS		Bottom
F3=Exit F5=Refresh F12=Cancel (C) COPYRIGHT IBM COR	F6=Print list P. 1980, 1994.	F10=Work with Mode	Descriptions	

Figure 77. AS/400 Work with IP over SNA Type of Service

Mode SNACKETS with the parameters shown in Figure 44 on page 42 should be added to RALYAS4A.

TORAS4B Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of TORAS4B. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

In the following panel we configure an IP over SNA interface on TORAS4B.

		WC	ork with IP over	SNA INTERTACES	System:	TORAS4B
Type o 1=Ad	ptions ld 2=	s, press Enter €Change 4=Re	°. emove 9=Start	10=End		
Opt	Inte Addr	ernet ess	Subnet Mask	Interface Status		
	9.67	.61.20	255.255.255.0	Active		
						Bottor
F3=Exi F12=Ca	t incel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCF	P/IP interf	aces

Figure 78. Scenario 4: Work with IP over SNA Interfaces - System TORAS4B

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.61) of the internet address is the network ID.

In the following panel we configure the IP over SNA route on TORAS4B.

			Work with IP over	r SNA Koutes	System:	TORAS4B
Type o 1=Ac	options 1d 4=	s, press Ente =Remove	r.			
	Rout	te	Subnet	Next		
0pt	Dest	tination	Mask	Нор		
_	9.67	7.60.0	255.255.255.0	9.67.61.20	1	
						Botto
F3=Exi F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TC	P/IP routes	

Figure 79. Scenario 4: Work with IP over SNA Routes - System TORAS4B

19pe o 1=Ac	options, press Ente Id 2=Change 4=F	er. Remove			
Opt	Remote Destination	Subnet Mask	Remote Network ID	Location Template	
- - -	9.67.60.0 9.67.61.20 9.67.61.0	255.255.255.0 *HOST 255.255.255.0	USIBMRA USIBMRA USIBMRA	RAL????? TOR0000M TOR?????	
					Botto

Now we configure the IP over SNA locations on TORAS4B.

Figure 80. Scenario 4: Work with IP over SNA Locations - System TORAS4B

CFGIPS option 20 was used to determine the specific location address to be entered for the local system.

Convert IP Address						
Internet address 9.67.61.20	system:	TUKA34B				
Network identifier : *NETATR Location name : TOROOOOM						
Press Enter to continue.						
F3=Exit F12=Cancel						

Figure 81. Scenario 4: Converting the IP Address at TORAS4B

Display Configuration List TORAS4B 11/29/94 15:30:18 Configuration list QAPPNLCL Configuration list type : *APPNLCL ----APPN Local Locations----------APPN Local Locations-----Local Local Location Text Location Text TORAS4B TOR0000M Loc. for Scenario 4 Bottom Press Enter to continue. F3=Exit F12=Cancel F17=Position to

Next, we update the APPN local location list on TORAS4B.

Figure 82. Scenario 4: Local Location List - System TORAS4B

By default, AnyNet/2 will use mode SNACKETS for Sockets over SNA. We therefore map the IP Type of Service we want to use (*NORMAL) to the SNA Mode SNACKETS.

~				
	Work with IP over	SNA Type of Serv	ice System:	TORASAR
Type options, press 2=Change	Enter.		5,5000	
Opt Type of Serv	ice	SNA Mode		
*MINDELAY		*NETATR		
- *MAXTHRPUT		*NETATR		
		*NETATR		
- *MINCOST		*NETATR		
- *NORMAL		SNACKETS		
_				Bottom
F3=Exit F5=Refres F12=Cancel	n F6=Print list	F10=Work with Mo	ode Descriptions	5
(C) COPYRIGHT IBM C	ORP. 1980, 1994.			

Figure 83. AS/400 Work with IP over SNA Type of Service

Mode SNACKETS with the parameters, shown in Figure 44 on page 42, should be added to TORAS4B.

RALYPS2B Configuration

The Communications Manager/2 setup is not shown here. An end node - to network node server configuration was created via the APPC APIs through Token-ring CM/2 menu option; this connected RALYPS2B with RALYAS4A. This CM/2 configuration was then modified via Advanced Configuration to add a link to TORAS4B. The AS/400 APPC controller and device descriptions were auto-created when this CM/2 configuration was started.

Select the **Configure AnyNet/2 Sockets over SNA** icon to access the configuration screens on the PS/2. The folder icon should be displayed on the OS/2 desktop if the AnyNet/2 code has been installed correctly.

🔬 AnyNet/2 Sockets over	SNA – Icon View	
Start AnyNet/2 Sockets over SNA	Configure AnyNet/2 Sockets over SNA	

Figure 84. AnyNet/2 Sockets over SNA Folder

The first AnyNet/2 Sockets over SNA configuration screen defines the local system (local node).

AnuNet/2 Co	nfiguration		
	Configure Sockets over S	6NALocal Node	Soc/SNA
2	Start Sockets over SNA aut	omatically	
IP /	Address for SNA:	9.67.60.24	
Ade	dress Mask:	255.255.255.0	
LU	Template:	RAL	
SNA	A Network Name:	USIBMRA	
	9		
	Help	<u>S</u> ave Page 1	of 5
Enter the IP a	ddress of your local node.		
1 <u></u>	Tremore nodes Ztart	options Define modes	

Figure 85. Scenario 4: Sockets over SNA Local Node Definition for RALYPS2B

The AnyNet/2 local node definition defines both the local Sockets over SNA interface address and the mapping of that address to an LU name. Unlike AnyNet/400, with AnyNet/2 there is not a separate Sockets over SNA interface definition. The address mask is *not* 255.255.255.255; therefore this is an algorithmic entry. The address mask of 255.255.255.0 with the IP address 9.67.60.24 denotes that this entry can be used to build LU names for Sockets over SNA systems in the 9.67.60 network. The second AnyNet/2 Sockets over SNA configuration screen defines the remote systems (remote nodes).

AnyNet/2 Configuration	
Configure Sockets over SNARemote Nodes	Soc/SNA
Address 1 of 1	
IP Network ID: 9.67.61.0	
Address Mask: 255.255.255.0	
LU Template: TOR	
SNA Network Name: USIBMRA	
<u>N</u> ew <u>D</u> elete	
Help Save Page 2 of 5	
Enter the IP network ID for this node.	
Local node modes part options Define modes	

Figure 86. Scenario 4: Sockets over SNA Remote Node Definition for RALYPS2B

Unlike AnyNet/400, AnyNet/2 does not have a separate route entry. The remote node definition above will give access to Sockets over SNA systems in the 9.67.61 network. LU names for Sockets over SNA systems in the 9.67.61 network will be built from this entry.

The final AnyNet/2 Sockets over SNA configuration screen allows the SNA mode used for Sockets over SNA to be changed. Configuration screens 3 and 4 are not shown here.

AnyNet/2 Configuration	
Configure Sockets over SNAModes	Soc/SNA
Default mode for all ports: SNACKETS	
∟Set default modes for individual ports:	
<u>N</u> ew	
<u>D</u> elete	
Help Defaults Save Page 5 of 5	
Enter the default mode name for all Sockets over SNA traffic.	
Local node Remote nodes Start options Define modes	

Figure 87. Scenario 4: Sockets over SNA Modes Definition for RALYPS2B

The AnyNet/2 Sockets over SNA configurator produces a command file (sxstart.cmd) based on the information in the AnyNet/2 Sockets over SNA configuration screens. This command file will be used when AnyNet/2 Sockets over SNA is started. System RALYPS2B has the following sxstart.cmd file:

@REM Sockets over SNA startup file

@REM First, start the Snackets program.

start snackets logfile 100000 sessions 30

@REM Next, tell Sockets over SNA how to map IP addresses to LU names. @REM Wait for Sockets over SNA to get set up before continuing. sxmap -w add 9.67.60.24 255.255.255.255 USIBMRA RAL

sxmap add 9.67.61.0 255.255.255.0 USIBMRA TOR

@REM Use IFCONFIG to define the local address ifconfig sna0 9.67.60.24 route add 9.67.60.24 9.67.60.24 0 route add 9.67.61.0 9.67.60.24 0

- Note -

Changes were required to the sxstart.cmd file that is shown above because of the level of the installed AnyNet/2 code. Be aware that your configuration may also require a change to the sxstart.cmd file.

We had to edit the last line of sxstart.cmd. *Note the difference between the last lines of these files.* If your configuration is similar to this scenario, then you may also need to edit the sxstart.cmd file. The changed file is as follows:

@REM Sockets over SNA startup file

QREM First, start the Snackets program.

start snackets logfile 100000 sessions 30

@REM Next, tell Sockets over SNA how to map IP addresses to LU names. @REM Wait for Sockets over SNA to get set up before continuing. sxmap -w add 9.67.60.24 255.255.255.255 USIBMRA RAL

sxmap add 9.67.61.0 255.255.255.0 USIBMRA TOR

@REM Use IFCONFIG to define the local address ifconfig sna0 9.67.60.24 route add 9.67.60.24 9.67.60.24 0 route add net 9.67.61 9.67.60.24 0 To start AnyNet/2 Sockets over SNA, do one of the following:

- Enter the SXSTART command from an OS/2 prompt.
- Open the Start AnyNet/2 Sockets over SNA icon (see Figure 84 on page 68).

AnyNet/2 Sockets over SNA requires the OS/2 Communications Manager to be active. If this is not yet active, Sockets over SNA will wait 10 minutes for it to become active. If after 10 minutes OS/2 Communications Manager is not active, Sockets over SNA will shut itself down.

When AntNet/2 Sockets over SNA is started, the sxstart command file is run. Once initialized, AnyNet/2 Sockets over SNA will run in a window named snackets.exe.

snackets.exe					
AnyNet/2 Sockets over SNA Version 2.00					
Copyright: Licensed Materials - Property of IBM					
5622-321 (C) Copyright IBM Corp. 1993, 1994 All rights reserved.					
S0009: AnyNet/2 Sockets over SNA initialization complete S0026: IP address 9.67.60.24 assigned to sna0; LU name is	RAL0000R				

Figure 88. Scenario 4: AnyNet/2 Sockets over SNA Gateway Initialization on RALYPS2B

AnyNet/2 Sockets over SNA can be stopped by pressing Ctrl-C in the OS/2 window session where the snackets.exe program is running - the window shown in Figure 88.

Communications Manager/2 will dynamically update its local LU table when the sxstart command is run at AnyNet/2 startup, in this example to include the LU name RAL0000R. This location name will then be registered at RALYAS4A via the End node - Network node CP session between RALYPS2B and RALYAS4A. With an APPN connection between RALYAS4A and TORAS4B, TORAS4B will be able to FIND RALYPS2B via RALYAS4A.

With AnyNet/2 Sockets over SNA running, we can use the SXMAP AnyNet/2 command to verify the AnyNet/2 IP address to SNA LU name mapping.

```
OS2 C:\>sxmap
sxmap: Version 2.00
usage: sxmap [-w] (add | delete | get | flush | convert | qmap) argument(s)
sxmap add ip_number mask netname template
sxmap convert ip_number mask template
sxmap convert startip endip mask template
sxmap delete ip_number
sxmap flush
sxmap get
sxmap qmap ip_number
-w: optional parameter causing sxmap to delay until snackets is
started. Waits up to 30 seconds. (Doesn't apply to convert.)
example: sxmap add 128.109.0.0 255.255.0.0 USIBMSER NR
OS2 C:\>sxmap qmap 9.67.60.23
IP address maps to: USIBMRA.RAL0000Q
```

Figure 89. AnyNet/2 Sockets over SNA SXMAP Command Output

Prior to starting AnyNet/2 Sockets over SNA, SXMAP can be used with the convert option to determine the SNA address that would be generated from a given IP address, mask and template.

Shown next are the matching parameters between systems RALYAS4A, TORAS4B and RALYPS2B. For simplicity, only the Sockets over SNA configurations are shown.

	AS/400 RALYAS4A ******	AS/400 TORAS4B ********
	IP OVER SNA LOCATIONS	IP OVER SNA LOCATIONS
	RMTDEST 9.67.60.0 SUBNETMASK 255.255.255.0 RMTNETID USIBMRA LOCTPL RAL?????	RMTDEST 9.67.61.0 SUBNETMASK 255.255.255.0 RMTNETID USIBMRA LOCTPL TOR?????
	RMTDEST 9.67.61.0 ◀ SUBNETMASK 255.255.255.0 RMTNETID USIBMRA LOCTPL TOR?????	► RMTDEST 9.67.60.0 SUBNETMASK 255.255.255.0 RMTNETID USIBMRA LOCTPL RAL?????
	RMTDEST 9.67.60.23 SUBNETMASK *HOST RMTNETID USIBMRA →LOCTPL RAL0000Q	RMTDEST 9.67.61.20 SUBNETMASK *HOST RMTNETID USIBMRA LOCTPL TOROOOOM ◀━━━
	IP OVER SNA ROUTES	IP OVER SNA ROUTES
PS/2 RALYPS2B *******	RTEDEST 9.67.61.0 ← SUBNETMASK 255.255.255.0 ►NEXTHOP 9.67.60.23	→ RTEDEST 9.67.60.0 SUBNETMASK 255.255.255.0 NEXTHOP 9.67.61.20 ←
LOCAL NODE DEFINITION	IP OVER SNA INTERFACES	IP OVER SNA INTERFACES
IP ADDR 9.67.60.24 ADDRESS MASK 255.255.255.0 LU TEMPLATE RAL	→INTNETADR 9.67.60.23 ◄ SUBNETMASK 255.255.255.0	► INTNETADR 9.67.61.20 ← SUBNETMASK 255.255.255.0
SNA NEL.NAME USIBMRA	CONVERT IP INTO LOC (OPT 20)	CONVERT IP INTO LOC (OPT 20)
IP NETID 9.67.61.0 ADDRESS MASK 255.255.255.0 LU TEMPLATE TOR	INTNETADR 9.67.60.23	→ INTNETADR 9.67.61.20 NETID USIBMRA → IOCNAME TOROOOOM ←
SNA NET.NAME USIBMRA	DSPCFGL QAPPNLCL	DSPCFGL QAPPNLCL
	LCLLOC RALYAS4A RAL00000 ←	LCLLOC TORAS4B

Figure 90. Sockets over SNA Scenario 4: Matching Parameters Table

Verifying the Scenarios

In order to prove that the Sockets over SNA connection is working, we can follow a step-by-step verification process. In a failing environment, this step-by-step process should help identify the failing area. Verification is included for the following:

- AnyNet/400 Sockets over SNA
- AnyNet/2 Sockets over SNA

AnyNet/400 Sockets over SNA Verification

The verification of Sockets over SNA should be carried out in the following stages:

- AS/400 SNA Verification
- · AS/400 Sockets over SNA Verification

– Note –

The verifications shown in this section were carried out from RALYAS4A in Sockets over SNA scenario 4.

AS/400 SNA Verification

AnyNet/400 Sockets over SNA requires an SNA configuration between the systems. This SNA configuration is established as if it were to be used by native APPC applications; there are no special SNA configuration requirements to allow Sockets over SNA to use the SNA configuration. Before we verify the Sockets over SNA configuration, we should verify the native SNA configuration. This can be done in many ways. In our examples where the remote system was either another AS/400 or an OS/2 system, verification will take place when the link is activated. The reason being that in both cases a CP (Control Point) session is established between the systems. Assuming the connection is via a LAN, this CP session activation will result in the target AS/400 controller and device descriptions being autocreated.

The following figure shows the autocreated AS/400 LAN configuration.

Work with Configuration St	atus RALYAS4A
-	11/30/94 11:40:12
Position to Starting cha	aracters
Type options, press Enter. 1=Vary on 2=Vary off 5=Work with job 8=Wor 9=Display mode status	rk with description
Opt Description Status L41TR ACTIVE RALYPS2B ACTIVE RALYPS2B ACTIVE	Job
Parameters or command ===>	Botton
F3=Exit F4=Prompt F12=Cancel F23=More option	ns F24=More keys

Figure 91. WRKCFGSTS of Active Sockets over SNA Configuration

To further verify the configuration, if the remote system is an AS/400, the STRPASTHR command can be used. An AS/400 command that can be used to verify *any* LU 6.2 configuration is STRMOD. For example, the following STRMOD command was used to verify an LU 6.2 configuration between an AS/400 and an OS/2 system.

STRMOD RMTLOCNAME(RALYPS2B) MODE(SNACKETS) Command STRMOD completed successfully for mode SNACKETS device RALYPS2B. The STRMOD command completed successfully for all modes.

The STRMOD command results in a CNOS (Change Number of Sessions) LU 6.2 command flowing to the remote system.

Once we are satisfied that the SNA configuration is working fine, we can move on to verify the Sockets over SNA configuration.

AS/400 Sockets over SNA Verification

Having verified the native SNA configuration to the remote system, we can now verify the Sockets over SNA configuration.

Before we can use an AS/400 TCP/IP application with Sockets over SNA, we must start the server for that application on the AS/400. To start the FTP application server (the application we use in this verification), enter the command:

STRTCPSVR SERVER(*FTP)

Alternatively we can start TCP/IP on the AS/400. To do this, enter the command STRTCP. In the examples that follow we have used the STRTCP command. By default, STRTCP will start the FTP server.

The NETSTAT (Network Status) command can be used to display the status of Sockets over SNA interfaces, routes and connections in addition to native TCP/IP network status. We can use NETSTAT option 1 (Work with TCP/IP Interface Status) to verify that the Sockets over SNA interface is active.

Work with TCP/IP Interface Status System: RALYAS4A Type options, press Enter. 5=Display details 8=Display associated routes 9=Start 10=End 12=Work with configuration status						
Opt	Internet Address 9.24.104.56 9.67.60.23 127.0.0.1	Network Address 9.24.104.0 9.67.60.0 127.0.0.0	Line Description L41TR *IPS *LOOPBACK	Interfac Status Active Active Active	e	
F3=E F13=	xit F4=Prompt Sort by column	F5=Refresh F11 F24=More keys	.=Display line	informat	ion F12	Bottom =Cancel

Figure 92. NETSTAT Work with TCP/IP Interface Status

Figure 92 shows the status of both the native TCP/IP interface (9.24.104.56) and the Sockets over SNA interface (9.67.60.23). From this display we can verify that the local IP over SNA interface is active and hence available for use. If not available (Inactive), we can use option 9 to make it available.

NETSTAT option 2 (Display TCP/IP route information) gives route information for all routes (native TCP/IP and Sockets over SNA). The display also shows whether or not the route is available.

C					
		Display TCP/IP	Route Informat	ion	
Type 5=	e options, press E Display details	nter.		Syst	CIII. NALTAJ4A
Opt _ _ _ _ _	Route Destination 9.67.60.0 9.24.104.0 9.67.61.0 127.0.0.0 *DFTROUTE	Subnet Mask 255.255.255.0 255.255.255.0 255.255.255.0 255.0.0.0 *NONE	Next Hop *DIRECT *DIRECT 9.67.60.23 *DIRECT 9.24.104.1	Route Availabl *YES *YES *YES *YES *YES	e
F3=E F13=	:xit F5=Refresh Sort by column	F6=Print list F17=Top	F11=Display r F18=Bottom	oute type	Bottom F12=Cancel

Figure 93. NETSTAT Display TCP/IP Route Information

The NETSTAT option 2 example in Figure 93 is from a system with both a native TCP/IP configuration and a Sockets over SNA configuration. The first two entries were automatically added when the native TCP/IP and Sockets over SNA interfaces were added (a native TCP/IP interface with an internet address of 9.24.104.56 and a subnet mask of 255.255.255.0, a Sockets over SNA interface with an internet address of 9.67.60.23 and a subnet mask of 255.255.255.0). These entries give access to systems in the same network as the local system. Note that the next hop for these entries is *DIRECT, go use the local interface. The third entry is the result of adding a Sockets over SNA route with a route destination of 9.67.61.0, subnet mask of 255.255.255.0 and next hop of 9.67.60.23. Note that the next hop for this entry is the address of the local IP over SNA interface. The fourth entry is the loopback entry. The last entry is the default route on the system; in this example, the default route is for native TCP/IP with a next hop of 9.24.104.1. We can use this display to verify that a route is available to the remote system with which we want to communicate using Sockets over SNA.

– Note –

The NETSTAT option 2 route information above is how the system will decide whether to use native TCP/IP or Sockets over SNA for a connection. For the system to use Sockets over SNA, the route selected must have a next hop that specifies either *DIRECT where this maps to *IPS (as in the 9.67.60.0 route destination in Figure 93, NETSTAT option 1 can be used to verify that this route destination maps to a network address against which *IPS is specified), the address of local IP over SNA interface (as in the 9.67.61.0 route destination in Figure 93) or the address of an AnyNet Sockets over SNA gateway. When choosing a route to use, the system will select the most specific entry. You should *not* have duplicate route entries.

Having verified that the local IP over SNA interface is active and that a route is available to the remote system, we can now try to establish a Sockets over SNA session to that system. Under native TCP/IP we would normally use the PING application to initially test a configuration. However, under OS/400 Sockets over SNA, PING server only is supported. This, therefore, does not make a good test tool to use in this environment. Since the FTP (File Transfer Protocol) application is universally supported by TCP/IP systems, we have used this application here to verify the Sockets over SNA configurations.

— PING client -

An OS/400 V3R1 PTF is now available that makes it possible to use the OS/400 PING client with AnyNet. The PTF number is SF25273.

We must first make sure that Sockets over SNA and any application we want to use are started on the remote system. In the example that follows we will use FTP to an OS/2 system. We therefore need to start AnyNet/2 Sockets over SNA and the FTP application server on the OS/2 system. To start AnyNet/2 Sockets over SNA we use the SXSTART command (see "AnyNet/2 Sockets over SNA Verification" on page 82).

In Figure 94 we have used the following command to access an OS/2 system via Sockets over SNA:

ftp '9.67.60.24'

```
File Transfer Protocol
Previous FTP subcommands and messages:
  Connecting to remote host name 9.67.60.24 using port 21.
  220 as4ps2 IBM TCP/IP for OS/2 - FTP Server ver 12:58:07 on Mar 16 19
   ready.
  215 OS/2 operating system
> anyuser
  331 Password required for anyuser.
  230 User anyuser logged in.
Enter an FTP subcommand.
===>
            F6=Print
F3=Exit
                           F9=Retrieve
                         F21=CL command line
F17=Top
           F18=Bottom
```

Figure 94. FTP Via Sockets over SNA to an OS/2 System

- Note

We could, of course, have added 9.67.60.24 to the local TCP/IP host table (or to the name server being used) which would have allowed us to use a host name rather than the internet address with the FTP command.
Having established a Sockets over SNA connection, if we now look at the AS/400 configurations status via the WRKCFGSTS command, we see the following:

	Work with Configura	tion Status	11/30/94	RALYAS4A 10:44:11
Position to	Start	ing charact	ers	10.11.11
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work with job us	8=Work wi	th description	
Opt Description L41TR RALYPS2B RALYPS2B RAL0000R	Status ACTIVE ACTIVE ACTIVE ACTIVE		Job	
	ACTIVE/SOURCE	DSP01	ANYUSER	010193
Parameters or command				Bottom
===> F3=Exit F4=Prompt	F12=Cancel F23=More	options	F24=More keys	

Figure 95. WRKCFGSTS of Active Sockets over SNA Session (1 of 3)

The connection was from AnyNet/400 to AnyNet/2, hence mode SNACKETS is being used. RAL0000R is the algorithmically generated name for the AnyNet/2 session; the device for this session has been autocreated.

If, instead, the AS/400 was the target of the Sockets over SNA FTP connection, WRKCFGSTS would show the following:

	Work with Configura	tion Status	RALYAS4A
Position to	Start	ing characters	10.40.14
Type options, press Er 1=Vary on 2=Vary o 9=Display mode statu	nter. off 5=Work with job us	8=Work with description	
Opt Description L41TR RALYPS2B RALYPS2B RAL0000R	Status ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE	Jop	
SNACKETS	ACTIVE/TARGET	QTFTP12215 QTCP	015161
Parameters or command ===>			Bottom
F3=Exit F4=Prompt	F12=Cancel F23=More	options F24=More keys	

Figure 96. WRKCFGSTS of Active Sockets over SNA Session (2 of 3)

NETSTAT option 3 (Work with TCP/IP Connection Status) will show this active session from an IP address perspective, as can be seen from Figure 97.

		Work with	TCP/IP Conn	ection Stat	us System:	RALYAS4A
Loca	l internet addr	ess		.: *ALL	-	
Type 4=	options, press End 5=Display	Enter. details				
	Remote	Remote	Local			
0pt	Address	Port	Port	Idle Time	State	
•	*	*	ftp-con >	000:04:36	Listen	
	*	*	telnet	000:05:14	Listen	
	*	*	lpd	000:04:41	Listen	
	9.67.60.24	ftp-con >	1025	000:00:01	Established	
F5=R	efresh F11=Di	splay byte co	ounts F13=	Sort by col	umn	Bottom

Figure 97. NETSTAT Work with TCP/IP Connection Status (1 of 2)

If, instead, the AS/400 was the target of the Sockets over SNA FTP connection, NETSTAT option 3 would show the following:

		Work with	n TCP/IP Connection Status	ραι νας 4α
Loca	l internet addr	ess	••••••••••••••••••••••••••••••••••••••	NAL IAJ HA
Type 4=	options, press End 5=Display	Enter. details		
	Remote	Remote	Local	
0pt	Address	Port	Port Idle Time State	
	*	*	ftp-con > 000:04:36	
	*	*	telnet 000:05:14 Listen	
	*	*	lpd 000:04:41 Listen	
	9.67.60.24	1034	ftp-con > 000:04:24 Established	
F5=R	efresh F11=Di	splav byte o	counts F13=Sort by column	Bottom
F14=	Display port nu	mbers F22=	Display entire field F24=More keys	

Figure 98. NETSTAT Work with TCP/IP Connection Status (2 of 2)

Note: ftp-con = port 21 (see CFGTCP option 21). Port 21 is the well-known port for FTP.

Configuration advice

In the above example we see a single SNA session being used to carry the FTP connection. This will not always be the case; FTP establishes one connection called a control connection which is maintained all the time the connection is up. If a request is made to transfer a file, a second connection called a data connection is established as can be seen in Figure 99. If the connection is via or to a product which uses twin-opposed half-duplex conversations for Sockets over SNA (for example, an AnyNet Sockets over SNA Gateway), then two sessions will be used for the control connection and two for each transfer. You should be aware of these points when deciding the session limits associated with modes that will be used for Sockets over SNA.

	Work with Configurat	tion Status	11/30/94	RALYAS4A
Position to	Start	ing characte	rs	10.43.12
Type options, press Er 1=Vary on 2=Vary c 9=Display mode statu	iter. iff 5=Work with job is	8=Work with	n description	
Opt Description L41TR RALYPS2B RALYPS2B RAL0000R	Status ACTIVE ACTIVE ACTIVE ACTIVE		Job	
	ACTIVE/SOURCE ACTIVE/TARGET	DSP01 DSP01	ANYUSER ANYUSER	010193 010193
Parameters or command				Bottom
F3=Exit F4=Prompt	F12=Cancel F23=More	options F2	24=More keys	

Figure 99. WRKCFGSTS of Active Sockets over SNA Session (3 of 3)

AnyNet/2 Sockets over SNA Verification

- Note -

The verifications shown in this section were carried out from RALYPS2B in Sockets over SNA scenario 3.

To check whether Communication Manager/2 is running, we can use the CMQUERY command which displays the following panel:

```
OS2 C:\>cmquery
           Communications Manager Query Services
   Workstation Type
                   : Single User
   Default configuration : RALYPS2B
   Active configuration : RALYPS2B
   Service
                             Status
   CM Kernel
                           ACTIVE
    SNA Services
                           ACTIVE
                            *** Stopped ***
    SRPI
                            *** Stopped ***
    X.25
                            *** Stopped ***
    SNA Phone Connect
                            *** Stopped ***
    ACDI
    3270 Emulator
                            *** Stopped ***
                            *** Stopped ***
    5250 Emulator
                                      ------
   -----
   Thursday, 02/23/95 15:53:45 End of Program - CMQuery
```

Figure 100. Communications Manager/2 CMQUERY Command Output

To start AnyNet/2 Sockets over SNA, we should do the following:

- 1. Start Communication Manager/2
- 2. Start AnyNet/2 Sockets over SNA

AnyNet/2 Sockets over SNA can be started by either opening the **Start AnyNet/2 Sockets over SNA** icon or by entering the SXSTART command.



Figure 101. AnyNet/2 Sockets over SNA Folder

If you plan to use an OS/2 TCP/IP application (for example, FTP), then it is also necessary to start that application on the OS/2 system.

When AnyNet/2 Sockets over SNA is started, the sxstart command file is run. The following is an example of the output of the sxstart.cmd file:

```
OS2 C:\>sxstart

OS2 C:\>start snackets logfile 100000 sessions 30

OS2 C:\>sxmap -w add 9.67.60.24 255.255.255 USIBMRA RALYPS2B

OS2 C:\>sxmap add 9.67.60.20 255.255.255.255 USIBMRA RALYAS4A

OS2 C:\>ifconfig sna0 9.67.60.24

OS2 C:\>route add 9.67.60.24 9.67.60.24 0

add host 9.67.60.24: router 9.67.60.24 0

add host 9.67.60.20: router 9.67.60.24 0
```

Figure 102. AnyNet/2 sxstart Command Output

Once initialized, Anynet/2 Sockets over SNA will run in an OS/2 window session named snackets.exe.

AnyNet/2 Sockets over SNA Version 2.00	
Copyright: Licensed Materials - Property of IBM	
5622-321 (C) Copyright IBM Corp. 1993, 1994 All rights reserved.	
SOS0009: AnyNet/2 Sockets over SNA initialization complete SOS0026: IP address 9.67.60.24 assigned to sna0; LU name is	RALYP528

Figure 103. AnyNet/2 Sockets over SNA Initialization on System RALYPS2B

AnyNet/2 Sockets over SNA can be stopped by pressing Ctrl-C in the OS/2 window session where the snackets.exe program is running - the window shown in Figure 103.

By default, AnyNet/2 Sockets over SNA will display error messages in the snackets.exe window.

)S2 C:	<pre>\>netstat -s</pre>				
SOCK	TYPE	FOREIGN	LOCAL	FOREIGN	STATE
		PORT	PORT	HOST	
==== =	======	=========	========	=========	=========
57	DGRAM	0	mptn397	0.0.0.0	UDP
56	DGRAM	0	1031	0.0.0.0	UDP
55	STREAM	1042	1041	9.24.104.189	ESTABLISHED
54	STREAM	1041	1042	9.24.104.189	ESTABLISHED
52	STREAM	1040	1039	9.24.104.189	ESTABLISHED
51	STREAM	1039	1040	9.24.104.189	ESTABLISHED
49	STREAM	0	mptn397	0.0.0.0	LISTEN
7	STREAM	0	ftp21	0.0.0.0	LISTEN

We can use the NETSTAT -s command to verify that AnyNet/2 Sockets over SNA has initialized.

Figure 104. TCP/IP for OS/2 NETSTAT -s Command Output

From the NETSTAT -s display, we can see that Sockets over SNA is enabled because sockets are bound to the well-known port for Sockets over SNA (port 397). The four stream sockets 55,54,52 and 51 are used for internal Sockets over SNA connections.

To verify that AnyNet/2 Sockets over SNA has built the route correctly, we can use the NETSTAT -r command.

C:\>netstat -	r			£1		:
destination	router	retcht	use	TTAGS	snmp metric	Intrt
9.67.60.24	9.67.60.24	0	0	U	-1	sna0
9.67.60.20	9.67.60.24	0	0	U	-1	sna0
default	9.24.104.1	1	66	U	-1	lan0
9.24.104.0	9.24.104.189	4	404	U	-1	lan0
9.0.0.0	9.67.60.24	0	0	U	-1	sna0

Figure 105. TCP/IP for OS/2 NETSTAT -r Command Output

From the NETSTAT -r display, we can see both the native and non-native route entries. The first two entries are the result of the AnyNet/2 local and remote node definitions; both point to the local Sockets over SNA interface. The third entry is a result of a TCP/IP default route entry. The fourth entry is the result of adding a native TCP/IP interface.

- Note -

The NETSTAT -r route information above is how the system will decide whether to use native TCP/IP or Sockets over SNA for a connection. For the system to use Sockets over SNA, the route selected must either have a router definition specifying the address of the local Sockets over SNA interface or the address of an AnyNet Sockets over SNA Gateway. When choosing a route to use, the system will select the most specific entry. You should *not* have duplicate route entries. FTP can also be initiated from the OS/2 system as shown in the following panel.

```
OS2 C:\>ftp 9.67.60.20
IBM TCP/IP for OS/2 - FTP Client ver 09:44:28 on Mar 04 1994
Connected to 9.67.60.20.
220-QTCP at 9.67.60.20.
220 Connection will close if idle more than 5 minutes.
Name (9.67.60.20): anyuser
331 Enter password.
Password: .....
230 ANYUSER logged on.
ftp>
```

Figure 106. TCP/IP for OS/2 FTP Command Output

The active Communications Manager/2 LU 6.2 sessions can be displayed as follows:

- 1. Open the Communication Manager/2 icon
- 2. Select Subsystem Management
- 3. Select SNA Subsystem
- 4. Select Display active configuration
- 5. Select General SNA
- 6. Select LU 6.2 sessions

3

-----deleted-----

3>Session ID	X'68F417A710520D2C'
Conversation ID	X' A7270BCE'
LU alias	ralyps2b
Partner LU alias	@1000002
Mode name	SNACKETS
Send maximum RU size	1920
Receive maximum RU size	1920
Send pacing window	1
Receive pacing window	7
Link name	LINKOO01
Outbound destination address (DAF)	X'02'
Outbound origin address (OAF)	X'02'
OAF-DAF assignor indicator (ODAI)	B'0'
Session type	LU-LU session
Connection type	Peer
Procedure correlator ID (PCID)	X' C0773C225E0C886E'
PCID generator CP name	USIBMRA.RALYPS2B
Conversation group ID	X'14520D2C'
LU name	USIBMRA.RALYPS2B
Partner LU name	USIBMRA.RALYAS4A
Pacing type	Adaptive
Primary LU indicator	Local LU

FMD PIUs sent by primary LU	5
FMD PIUs sent by secondary LU	7
Non-FMD PIUs sent by primary LU	1
Non-FMD PIUs sent by secondary LU	1
Bytes sent by primary LU	349
Bytes sent by secondary LU	372
PLU to SLU compression level	None
PLU to SLU compression percent	0
SLU to PLU compression level	None
SLU to PLU compression percent	0

The active Communications Manager/2 Transaction Programs can be displayed as follows:

- 1. Open the Communication Manager/2 icon.
- 2. Select Subsystem Management.
- 3. Select SNA Subsystem.
- 4. Select Display active configuration.
- 5. Select General SNA.
- 6. Select Transaction programs.

Bytes sent by target

* * Active Transaction Programs Active transaction programs 1 X'28F0F0F1' 1>Transaction program name Transaction program ID X'08181FA7CF510D2C' User ID Transaction program initiated Locally LU alias ralyps2b Logical unit of work name USIBMRA.RALYPS2B Logical unit of work instance X' DDDDDDDDDDE7' Logical unit of work sequence X'0001' Number of conversations 1 1.1>Conversation ID X' A7270BCE' Conversation state Send only Session ID X'68F417A7DA510D2C' Synchronization level None Conversation type Basic Conversation group ID X'2 COD51DE' Conversation source Partner LU Conversation style Two-way simultaneous Bytes sent by source 139

193

X'28F0F0F1' is the transaction program name for Sockets over SNA.

JS2 C:	<pre>>netstat -s</pre>				
SOCK	TYPE	FOREIGN	LOCAL	FOREIGN	STATE
		PORT	PORT	HOST	
==== =		========			======
68	STREAM	ftp21	1044	9.67.60.20	CLOSED
57	DGRAM	0	mptn397	0.0.0.0	UDP
56	DGRAM	0	1031	0.0.0.0	UDP
55	STREAM	1042	1041	9.24.104.189	ESTABLISHED
54	STREAM	1041	1042	9.24.104.189	ESTABLISHED
52	STREAM	1040	1039	9.24.104.189	ESTABLISHED
51	STREAM	1039	1040	9.24.104.189	ESTABLISHED
49	STREAM	0	mptn397	0.0.0.0	LISTEN
7	STREAM	0	ftp21	0.0.0.0	LISTEN

If we use the NETSTAT -s command again, we can see the active session from an IP address perspective.

Figure 107. TCP/IP for OS/2 NETSTAT -s Command Output

The active Sockets over SNA connection is using local port 1044.

AnyNet/400 APPC over TCP/IP

This chapter presents the process of defining and verifying AnyNet/400 APPC over TCP/IP at the International Technical Support Organization in Raleigh.

Along with the AnyNet/400 environments, the AnyNet/2 and AnyNet/MVS implementations are used in some of the scenarios.

The information is presented in the following sections:

- 1. Introduction to OS/400 APPC over TCP/IP
- 2. Using AnyNet/400 APPC over TCP/IP
- 3. Configuring AnyNet/400 APPC over TCP/IP
- 4. APPC over TCP/IP Scenarios
 - APPC over TCP/IP Scenario 1: AS/400 to AS/400 Same SNA Network
 - APPC over TCP/IP Scenario 2: AS/400 to AS/400 Different SNA Networks
 - APPC over TCP/IP Scenario 3: AS/400 to PS/2 Same SNA Network
 - APPC over TCP/IP Scenario 4: AS/400 to various AS/400 Bridge
 - APPC over TCP/IP Scenario 5: AS/400 to MVS Same SNA Network
- 5. Verifying the Scenarios

For further information on AnyNet/400 APPC over TCP/IP refer to AS/400 Communications Configuration, SC41-3401.

Introduction to OS/400 APPC over TCP/IP

Until recently the AS/400 has been largely an SNA-based system. Because of this, the majority of the applications (IBM-supplied and non IBM-supplied) are APPC (Advanced Program-to-Program Communications) based. Providing the network is SNA-based, these applications can communicate with each other in a very reliable manner. However, more and more networks are becoming router-based. While many routers in the market place today can handle APPC traffic, in many situations companies are reluctant to turn on the router function that accomplishes this. Many companies would also like to see only TCP/IP across their networks. This was a problem in the past but with the announcement of the AnyNet family of products, companies can use APPC (ICF) or CPI-C applications across TCP/IP networks. AnyNet allows a company to choose the application programs that best meet the needs of their business without having to worry about the transport protocol they are using over their network. 5250 Display Station Passthrough, Client Access/400, etc. can, using AnyNet/400 APPC over TCP/IP, run over a TCP/IP network.

AnyNet/400 is one member of the AnyNet family of products. AnyNet/400 is included with the base OS/400 Version 3 Release 1 or higher. Support is provided to allow APPC applications to run over TCP/IP and sockets applications to run over SNA. In addition, Network Extensions (5733-SA1) provides AnyNet/400 support to allow APPC applications to run over IPX and sockets applications to run over IPX. Support is also provided to allow Client Access/400 to run over TCP/IP. In this chapter we look at APPC applications over TCP/IP.

AnyNet/400 APPC over TCP/IP can be used by those customers who:

- · Want to run existing APPC applications across a TCP/IP network
- Want to simplify their network by reducing the number of protocols being used

Specifically, APPC over TCP/IP support in AnyNet/400, allows APPC programs to communicate between systems over a TCP/IP network. APPC over TCP/IP support can also be used to communicate with systems in an SNA network. This, however, requires an AnyNet gateway between the TCP/IP and SNA networks. The AnyNet gateway is covered in "AnyNet Gateways" on page 141.

AnyNet/400 APPC over TCP/IP makes it possible to use existing APPC (ICF) or CPI-C applications over a TCP/IP network. For example, 5250 Display Station Passthrough, SNADS (SNA Distribution Services) and Client Access/400 can all run, unchanged, over a TCP/IP network.

Using AnyNet/400 APPC over TCP/IP

The AnyNet/400 APPC over TCP/IP code is part of the base OS/400 V3R1 code. There are no special installation requirements.

Once AnyNet/400 APPC over TCP/IP has been configured, you will be able to run APPC (ICF) or CPI-C applications across a TCP/IP network. At the time that this book was written, the following APPC applications were supported under AnyNet/400:

- CICS/400
- DB2/400
- 5250 Display Station Pasthrough
- DRDA
- SNADS
- Client Access/400
- · ICF or CPI-C user-written APPC applications

The running of these applications is transparent to the user regardless of what transport protocol is being used. The user may, however, notice a performance degradation when using an APPC application via AnyNet/400 as opposed to running the same application natively under SNA. Applications running on their native protocols may run faster than those running on a non-native protocol. The flexibility of the AnyNet/400 product should, however, outweigh any performance degradation. It is important to note that if your system implements AnyNet/400 (the Network Attribute ALWANYNET is set to *YES) any sockets applications running natively over TCP/IP will run slower. All of these points need to be considered when deciding whether to use the AnyNet/400 support. If you are not using AnyNet, ALWANYNET should be set to *NO.

Note

To use AnyNet/400 APPC over TCP/IP, it is not necessary to have the TCP/IP Connectivity Utilities (5763-TC1) installed on your system.

Configuring AnyNet/400 APPC over TCP/IP

In order to run APPC over TCP/IP on your AS/400, the following OS/400 configuration steps are required:

- 1. Establish a TCP/IP configuration between the systems.
- 2. Change the Network Attribute ALWANYNET to *YES.
- 3. Create an APPC controller with LINKTYPE(*ANYNW).
- 4. Add an entry to the APPN remote location list.
- 5. Map the APPC LU name to an internet address.

The user ID, under which the APPC over TCP/IP configuration is created, must have sufficient authority to access the relevant commands. Some of the commands require the user ID to have the IOSYSCFG authority. The examples shown here were created using a profile with QSECOFR authority.

1. Establish a TCP/IP configuration between the systems

A prerequisite for APPC over TCP/IP is a TCP/IP configuration between the systems. In this step we show the basic steps to establishing a TCP/IP configuration between two systems. If your system already has a TCP/IP configuration to the remote system with which you want to communicate via APPC over TCP/IP, then you can skip this step and proceed to step 2 on page 94 in this section.



Figure 108. Two Systems Connected Using TCP/IP

In the following panels we create the TCP/IP configuration for RALYAS4A in Figure 108. The configuration steps for RALYAS4B would be the same using the different adapter (LAN) address, internet address and host name.

The following panels show the configuration screens for a token-ring configuration. If you require help in establishing a TCP/IP configuration over another type of interface, refer to the manual *AS/400 TCP/IP Configuration and Reference*, SC41-3420.

The AS/400 line description defines the physical interface to the network. If an appropriate line description does not already exist (they can be shared), you need to create one. Here we use the CRTLINTRN command to create a token-ring line description.

Create Line Desc	c (Token-Ring)	(CRTLINTRN)
Type choices, press Enter.		
Line description > Resource name > Online at IPL	L41TR LIN041 *YES *NOWAIT 40 4M 1994 400010020001 *SYSGEN *SYSGEN	Name Name, *NWID, *NWSD *YES, *NO *NOWAIT, 15-180 (1 second) 1-256 4M, 16M, *NWI 265-16393, 265, 521, 1033 40000000000-7FFFFFFFFFFF 05600000-056FFFF, *SYSGEN 02-FE, *SYSGEN *MAXFRAME, 265-16393 *CALC, *NONSNA, *SNA, *HPR
Text 'description' >	'4M Token Ring	g line description for LINO41'
F3=Exit F4=Prompt F5=Refresh F13=How to use this display	F10=Additiona F24=More keys	Bottom parameters F12=Cance

Figure 109. Create Token-Ring Line Description - System RALYAS4A

For a TCP/IP configuration, there is no need to create controller and device descriptions, they are automatically created when TCP/IP first uses the token-ring line.

TCP/IP Interface

The TCP/IP interface defines this AS/400 on the TCP/IP network. Enter the CFGTCP command to access the Configure TCP/IP panel, and take option 1 to work with TCP/IP interfaces.

CFGTCP	Configure TCP/IP	Suctor							
Select one of the following:		system:	KALTA34A						
 Work with TCP/IP interfaces Work with TCP/IP routes Change TCP/IP attributes Work with TCP/IP port restrictions Work with TCP/IP remote system information 									
10. Work with TCP/IP host table entries 11. Merge TCP/IP host table 12. Change local domain and host names 13. Change remote name server									
20. Configure TCP/IP applications 21. Configure related tables									
Selection or command ===> <u>1</u>									
F3=Exit F4=Prompt F9=Retr	eve F12=Cancel								

Figure 110. TCP/IP Configuration Menu

Гуре 1=	options, press E Add 2=Change	nter. 4=Remove 5=Disp	lay 9=Start	10=En	d	
Opt	Internet Address	Subnet Mask	Line Description	Line Type		
	9.24.104.56 127.0.0.1	255.255.255.0 255.0.0.0	L41TR *LOOPBACK	*TRLAN *NONE		
F3=E F11=	xit F5=Refresh Display interface	F6=Print list status	F10=Work with F12=Cancel	h IP ove F17=Top	r SNA inter F18=Bott	Botton faces om

Figure 111. TCP/IP Interface Definition - System RALYAS4A

If a TCP/IP interface does not already exist, add an entry using the internet address allocated to this system and the mask of the subnet in which the system resides.

Besides allowing you to add, change and remove TCP/IP interfaces, this screen also allows you to start and end these interfaces.

TCP/IP Route

If the route to the remote host is via a gateway or the remote host resides in a different network or subnetwork to the local host, it will be necessary to use option 2 from the Configure TCP/IP screen to configure a route. This is not the case in this simple scenario.

TCP/IP Host Table

The local host table on the AS/400 contains a list of the internet addresses and associated host names for this network. To access the AS/400 host table enter the CFGTCP command and take option 10 (Work with TCP/IP Host Table Entries).

```
Work with TCP/IP Host Table Entries
                                                             System:
                                                                       RALYAS4A
Type options, press Enter.
  1=Add
         2=Change
                     4=Remove
                                5=Display
                                            7=Rename
     Internet
                      Host
Opt Address
                      Name
     9.24.104.56
                      RALYAS4A
                      RALYAS4A.ITSO.RAL.IBM.COM
     9.24.104.57
                      RALYAS4B
                      RALYAS4B.ITSO.RAL.IBM.COM
         F5=Refresh
                       F6=Print list
                                       F12=Cancel
                                                    F17=Position to
F3=Exit
```

Figure 112. TCP/IP Host Table Entries - System RALYAS4A

Unless you are planning to use a name server, add an entry for the local system and any remote system(s) to which TCP/IP is to be used. In the above example, both the short and long names have been entered.

2. Change the Network Attribute ALWANYNET to *YES

Now we start the AnyNet specific configuration steps. First we must change the ALWANYNET network attribute to *YES. Changing this attribute will allow Sockets over SNA, APPC over TCP/IP, Sockets over IPX, and APPC over IPX to run on your system. The default for this value, when V3R1 is initially installed, is *NO. Use the DSPNETA command see what your system is set to. If it is set to *NO, use the command:

CHGNETA ALWANYNET(*YES)

After changing this attribute, you can verify the change by entering the DSPNETA command. The resulting displays are shown in the following figure.

Display Notwork Attributes		
Display Network Attributes	Svstem:	RALYAS4A
Current system name	RALYAS4A	
Pending system name		
Local network ID	USIBMRA	
Local control point name	RALYAS4A	
Default local location	RALYAS4A	
Default mode		
APPN node type	^NETNUDE *NONE	
Intermediate data compression	*NONE	
Maximum number of intermediate sessions	200	
Route addition resistance	128	
Server network ID/control point name	*LCLNETID *ANY	
		More
~ <u></u>		
Display Network Attributes	a .	
Alout status	System:	KALYAS4A
Alert logging status	ON ★Δ11	
Alert primary focal point	*YFS	
Alert default focal point	*N0	
Alert backup focal point		
Network ID	*NONE	
Alert focal point to request	RAK	
Network ID	USIBMRA	
Alert controller description	*NONE	
Alert hold count \ldots \ldots \ldots \ldots \ldots	0	
	AS4UUNE I	
library	27201	
Output queue	OPRINT	
Library	QGPL	
Job action	*FILE	
		More
~		
Display Network Attributes	Svstem:	RALYAS4A
Maximum hop count	16	
DDM request access	*OBJAUT	
Client request access	*OBJAUT	
Default ISDN network type		
Default ISDN connection list	QDCCNNLANY	
Allow ANYNET support	*YES	
Network Server Domain	RALYAS4A	
		Bottom
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 113. Display of Network Attributes with ALWANYNET(*YES)

Changing the ALWANYNET network attribute to *YES will result in the APPC over TCP/IP job (QAPPCTCP) being started in the QSYSWRK subsystem.

3. Create an APPC controller with LINKTYPE(*ANYNW)

The AS/400 controller description defines the remote system. A new LINKTYPE has been added to the APPC controller description for AnyNet. With AnyNet, the APPC controller is no longer directly attached to a line description. Use the CRTCTLAPPC (Create APPC Controller Description) command to create an APPC controller with LINKTYPE(*ANYNW).

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > ANYNWAS4B
                                                Name
Link type . . . . . . . . . . > *ANYNW
                                                *ANYNW, *FAX, *FR, *IDLC...
Online at IPL . . .
                                  *YES
                                                *YES, *NO
                     . . . . .
                                  *NETATR
                                                Name, *NETATR, *NONE, *ANY
Remote network identifier . . .
                                                Name, *ANY
Remote control point . . . . . > AS4BANYT
User-defined 1 . . . . . . . .
                                  *I TND
                                                0-255, *LIND
                                                0-255, *LIND
User-defined 2 . . . . . . . .
                                  *LIND
User-defined 3 . . . . . . . .
                                                0-255, *LIND
                                  *LIND
Text 'description' . . . . . . > 'RALYAS4B via AnyNet/400'
                                                                      Bottom
F3=Exit F4=Prompt F5=Refresh
                                  F10=Additional parameters F12=Cancel
F13=How to use this display
                                  F24=More keys
```

Figure 114. Create Controller Description with LINKTYPE(*ANYNW)

The Remote network identifier should match the local network identifier on the remote system. *NETATR indicates that the value in the network attributes should be used - that the local system and remote system have the same network ID. The Remote control point name, however, is not used external to the system. The remote control point name entered should match the value entered in the APPN remote location list (see below).

APPC Device Description and Mode Description

The APPC device description will be automatically created when the above controller is activated.

APPC over TCP/IP uses mode descriptions in the same way as APPC over SNA does.

Note: It is not possible to map an APPC mode to an IP type of service.

4. Add an entry to the APPN remote location list

To communicate using APPC over TCP/IP, the system requires an APPN remote location list entry for each remote system to which APPC over TCP/IP will be used. APPC over TCP/IP communications needs the information in the APPN remote location list to determine which controller description to use when it activates the session. Furthermore, the entry allows the AS/400 system to automatically configure the APPC device description.

To update the APPN remote location list, use the following command:

CHGCFGL *APPNRMT

		Cha	nge Config	uration L [.]	ist	11/10/94	RALYAS44
Configura Configura Text	tion list tion list	: Q type: * :	APPNRMT APPNRMT			11/10/94	10.47.20
Type chan	ges, press	s Enter.					
		APP	N Remote L	ocations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
RALYAS4B	*NETATR	*NETATR	AS4BANYT	*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Disp	lav session	informati	on F12=0	Cancel F1	7=Top F1	8=Bottom
						· · · · · · -	

Figure 115. APPN Remote Location List Panel

AS/400 APPN requires that all remote location names be unique. Thus, it can not have the same remote location name/remote network ID in both its SNA network and its TCP/IP or IPX network.

The Remote Location name should match the local location (LU) name at the remote system. The Local Location name should match the remote location (LU) name at the remote system. The Remote Network ID and Control Point Net ID should match the remote network identifier in the APPC controller with a LINKTYPE(*ANYNW). *NETATR indicates that the value in the network attributes should be used. The Remote Control Point name should match the remote control name in the APPC controller with a LINKTYPE(*ANYNW).

Any entry added to the APPN remote location list will result in an entry in the local APPN topology database. However, the APPC over TCP/IP entries will not be propagated to other systems in the APPN network; the entry is as an end node, only information on attached network nodes is propagated. No topology updates will flow as a result of adding the APPC over TCP/IP entries. In addition to being used locally, the APPC over TCP/IP entries will allow this system to respond to APPN search requests received for these LU names. It is this function that allows the AS/400 to act as a bridge (see APPC over TCP/IP scenario 4).

5. Map the APPC LU name to an internet address

The TCP/IP host table provides the mapping between the host name and internet address. Here it is providing the mapping between the SNA remote location name/remote network ID and the remote internet address.

Enter the CFGTCP command to access the Configure TCP/IP panel, and take option 10 to work with the TCP/IP host table.

	Work with TCP/I	P Host Table Entr	ies System:	
Type options 1=Add 2=0	, press Enter. Change 4=Remove 5=Di	splay 7=Rename	System:	KALTA34A
Interne	t Host			
Opt Address	Name			
9.24.10	1.56RALYAS4ARALYAS4A.ITSO.	RAL.IBM.COM		
_ 9.24.10	1.57 RALYAS4B RALYAS4B.ITSO. RALYAS4B.USIBM	RAL.IBM.COM RA.SNA.IBM.COM		
F3=Exit F5	=Refresh F6=Print list	F12=Cancel F	17=Position to	

Figure 116. TCP/IP Host Table Entries

For APPC over TCP/IP, the host name entries are made up as follows:

- RALYAS4B Remote SNA location (LU) name
- USIBMRA Remote SNA network ID
- SNA.IBM.COM SNA Domain Name Suffix

Add an entry for each remote system to which APPC over TCP/IP will be used. The remote SNA location names and SNA network IDs should be as specified in the APPN remote location list.

— Note -

A PTF is now available to allow the AS/400 to use an SNA domain name suffix of other than SNA.IBM.COM. The PTF is shipped in two parts: MF08352 and SF21042. The PTF was not used during our residency.

When communicating between systems using APPC over TCP/IP, both systems must use the same SNA Domain Name Suffix.

This host table will be used by native TCP/IP and APPC over TCP/IP. The entries *without* the extension SNA.IBM.COM are for native TCP/IP.

- Note -

The AS/400 TCP/IP Host Table will allow a maximum of four host names to be entered against a single host internet address. This may become a restriction when using AnyNet/400 APPC over TCP/IP. One possible alternative is to use a name server rather than the AS/400 host table.

With all of the configuration steps completed, you are now ready to use the APPC over TCP/IP support of AnyNet/400. The next section shows specific APPC over TCP/IP configuration scenarios.

APPC over TCP/IP Scenarios

This section presents the scenarios we used to verify the different APPC over TCP/IP implementations. Each scenario contains a diagram showing the actual environment, AS/400 and MVS or PS/2 configuration displays and a matching parameters list.

The following scenarios will be covered in this section:

- APPC over TCP/IP Scenario 1: AS/400 to AS/400 Same SNA Network
- · APPC over TCP/IP Scenario 2: AS/400 to AS/400 Different SNA Networks
- APPC over TCP/IP Scenario 3: AS/400 to PS/2 Same SNA Network
- · APPC over TCP/IP Scenario 4: AS/400 to various AS/400 Bridge
- APPC over TCP/IP Scenario 5: AS/400 to MVS Same SNA Network

APPC over TCP/IP Scenario 1: AS/400 to AS/400 - Same SNA Network

This configuration is the simplest and likely to be the most common. It is also an example of a configuration that should be set up prior to moving on to a more complex configuration.

Shown in the following figure are the two systems used in this scenario and their respective TCP/IP internet addresses. A TCP/IP configuration is already in place between the systems using the internet addresses shown.



Figure 117. Systems and Addresses Used for APPC over TCP/IP Scenario 1

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RALYAS4B systems. They illustrate the configuration steps required for this APPC over TCP/IP scenario.

First we must check that Allow ANYNET Support is set to *YES in the network attributes of each system. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Before we can configure the APPC controller descriptions and add the APPN remote location list entries, we need to display the network attributes on each system to determine the network ID and default local location name configured at each system.

	System:	RALYAS4A
Current system name	RALYAS4A	
ocal network ID	USTRMRA	
Local control point name	RALYAS4A	
Default local location	RALYAS4A	
Default mode		
Data compression	*NONE	
intermediate data compression	*NONE	
Maximum number of intermediate sessions :	200	
Server network ID/control point name	*LCLNETID *ANY	
		More

Figure 118. Scenario 1: Network Attributes - RALYAS4A

							Syst	em:	RALYAS4
Current system name			•		•	:	RALYAS4B		
Pending system name .			•	•	•	:			
Local network ID			•	•		:	USIBMRA		
Local control point name			•			:	RALYAS4B		
Default local location .			•			:	RALYAS4B		
Default mode			•			:	BLANK		
APPN node type			•			:	*NETNODE		
Data compression			•			:	*NONE		
Intermediate data compress	sion		•			:	*NONE		
Maximum number of interme	diate	sessi	ons			:	200		
Route addition resistance						•	128		
Server network ID/control	point	: name				:	*LCLNETID	*ANY	
									More

Figure 119. Scenario 1: Network Attributes - RALYAS4B

From Figure 118 and Figure 119 we can see that the network IDs (Local network ID) on both systems are the same (USIBMRA) hence in the APPC controller descriptions and APPN Remote Location lists we can specify *NETATR for Remote Network ID and Control Point Net ID on both systems.

Next, we create a controller description on RALYAS4A with LINKTYPE *ANYNW.

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > ANYNWAS4B
                                                    Name
                                                    *ANYNW, *FAX, *FR, *IDLC...
Link type . . . . . . . . . > *ANYNW
Online at IPL . . . . . . . .
                                    *YES
                                                    *YES, *NO
Remote network identifier . . . *NETATR
                                                    Name, *NETATR, *NONE, *ANY
Remote control point . . . . > AS4BANYT
                                                    Name, *ANY
                                                   0-255, *LIND
0-255, *LIND
0-255, *LIND
User-defined 1 . . . . . . . .
                                    *LIND
User-defined 2 . . . . . . . .
                                     *LIND
User-defined 3 . . . . . . . *LIND 0-255, *LIND
Text 'description' . . . . . > 'To RALYAS4B via AnyNet/400'
                                                                            Bottom
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters
                                                                   F12=Cancel
F13=How to use this display
                                     F24=More keys
```

Figure 120. Scenario 1: Controller Description - RALYAS4A

In the following panel we create a controller description on RALYAS4B with LINKTYPE *ANYNW.

Create Ct1 D Type choices, press Enter. Controller description > Link type	esc (APPC) (CR ANYNWAS4A *ANYNW *YES *NETATR AS4AANYT *LIND *LIND *LIND 'To RALYAS4A	Name *ANYNW, *FAX, *FR, *IDLC *YES, *NO Name, *NETATR, *NONE, *ANY Name, *ANY 0-255, *LIND 0-255, *LIND 0-255, *LIND via AnyNet/400'
F3=Exit F4=Prompt F5=Refresh	F10=Additiona	Bottom
F13=How to use this display	F24=More keys	1 parameters F12=Cancel

Figure 121. Scenario 1: Controller Description - RALYAS4B

Configura Configura Text	tion list tion list	: Q type: * :	APPNRMT APPNRMT			11/10/94	11:46:23
Type chan	ges, press	s Enter.					
		APP	N Remote L	ocations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	9	Secure
Location	ID	Location	Point	Net ID	Password		Loc
RALYAS4B	*NETATR	*NETATR	AS4BANYT	*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
E2-Evit	F11=Disp]	lay session	informati	on F12=0	Cancel F1	7=Top F1	8=Bottom

Next, we add the APPC over TCP/IP entry to the APPN remote location list at RALYAS4A.

Figure 122. Scenario 1: APPN Remote Location List - RALYAS4A

Next, we add the APPC over TCP/IP entry to the APPN remote location list at RALYAS4B.

		Cha	nge Config	uration L	ist	11/10/04	RALYAS4B
Configura Configura Text	tion list tion list	: Q type: * :	APPNRMT APPNRMT			11/10/94	11:23:23
Type chan	ges, press	Enter.					
		APP	N Remote L	ocations-			
Remote	Network	Local	Control	Point	Location	(Sacura
location		Location	Point	Net ID	Password		
	*NFTATR	*NFTATR	Δςάδανντ	*NFTATR	Tussworu		*NO
	*NFTATR	*NFTATR	AJ-AANTI	*NFTATR			*NO
	*NFTATR	*NFTATR		*NFTATR			*N0
	*NFTATR	*NFTATR		*NFTATR			*N0
	*NFTATR	*NFTATR		*NFTATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Displ	ay session	informati	on F12=0	Cancel F1	7=Top F2	18=Bottom



 $\overline{}$

The host table at RALYAS4A in the following figure has had the APPC over TCP/IP entry added.

		Work with TCP/IP	Host Table Er	ntries System:	RALVASAA
Туре 1=	options, press Add 2=Change	ne			
0pt	Internet Address	Host Name			
- -	9.24.104.56	RALYAS4A RALYAS4A.ITSO.R/	AL.IBM.COM		
-	9.24.104.57	RALYAS4B RALYAS4B.ITSO.R/ RALYAS4B.USIBMR/	AL.IBM.COM A.SNA.IBM.COM		
F3=E	xit F5=Refresh	F6=Print list	F12=Cancel	F17=Position to	

Figure 124. Scenario 1: TCP/IP Host Table Entries - RALYAS4A

 $\overline{}$

The RALYAS4B host table in the following figure has also had the APPC over TCP/IP entry added.

Type options, press 1=Add 2=Change	Work with TCP/IP Host Table Entries System Enter. 4=Remove 5=Display 7=Rename	n: RALYAS4B
Internet Opt Address 9.24.104.57 9.24.104.56	Host Name RALYAS4B RALYAS4B.ITSO.RAL.IBM.COM RALYAS4A RALYAS4A.ITSO.RAL.IBM.COM RALYAS4A.USIBMRA.SNA.IBM.COM	
F3=Exit F5=Refres	h F6=Printlist F12=Cancel F17=Positiont	:0

Figure 125. Scenario 1: TCP/IP Host Table Entries - RALYAS4B

Shown next are the matching parameters between RALYAS4A and RALYAS4B.



Figure 126. APPC over TCP/IP Scenario 1: Matching Parameters Table

APPC over TCP/IP Scenario 2: AS/400 to AS/400 - Different SNA Networks

In this scenario, two AS/400s communicate with each other via APPC over TCP/IP but from different SNA networks.

Shown in the following figure are the two systems used in this scenario and their respective IP addresses. A TCP/IP configuration is already in place between the systems using the internet addresses shown.



Figure 127. Systems and Addresses Used for APPC over TCP/IP Scenario 2

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RCHASM02 systems. They illustrate the configuration steps required for this APPC over TCP/IP scenario.

First we must check that Allow ANYNET Support is set to *YES in the network attributes of each system. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Before we can configure the APPC controller descriptions and add the APPN remote location list entries, we need to display the network attributes on each system to determine the network ID and default local location name configured at each system.

	Disp	lay Ne	etwor	k A	١tt	ri	bu	tes		
									System:	RALYAS4A
Current system name			•••	•	•	•	•	:	RALYAS4A	
Pending system name .			•••	•	•	•	•	:		
Local network ID			•••			•	•	:	USIBMRA	
Local control point name			• •			•	•	:	RALYAS4A	
Default local location .			• •			•	•	:	RALYAS4A	
Default mode			•••		•			:	BLANK	
APPN node type			•••		•			:	*NETNODE	
Data compression								:	*NONE	
Intermediate data compres	ssion							:	*NONE	
Maximum number of interme	ediate	sessi	ons					:	200	
Route addition resistance	e							:	128	
Server network ID/contro	l poin	t name	e	•		•	•	:	*LCLNETID *AM	IY
										More

Figure 128. Scenario 2: Network Attributes - RALYAS4A

												Syst	em:	RCHASMO
Current system name	• •		•					•			:	RCHASM02		
Pending system nam	е.		•								:			
Local network ID			•					•			:	ITSCNET		
Local control point	name		•								:	RCHASM02		
Default local locati	on .		•								:	RCHASM02		
Default mode			•								:	BLANK		
APPN node type			•								:	*NETNODE		
Data compression			•								:	*NONE		
Intermediate data co	mpres	sion									:	*NONE		
Maximum number of in	terme	diate	e s	ess	ion	s					:	200		
Route addition resis	tance		•								:	128		
Server network ID/co	ntrol	poir	nt	nam	ne .	•	•	•	•	•	:	*LCLNETID	*ANY	
														More

Figure 129. Scenario 2: Network Attributes - RCHASM02

Next, we create a controller description on RALYAS4A with LINKTYPE *ANYNW.

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > ANYNWRAS2
                                                    Name
                                                    *ANYNW, *FAX, *FR, *IDLC...
Link type . . . . . . . . . > *ANYNW
Online at IPL .... *YES
                                                    *YES, *NO
Remote network identifier \ldots > ITSCNET
                                                    Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > RCHASMO2
                                                    Name, *ANY
                                                   0-255, *LIND
0-255, *LIND
0-255, *LIND
User-defined 1 . . . . . . . .
                                     *LIND
User-defined 2 . . . . . . . .
                                     *LIND
User-defined 3 . . . . . . . . *LIND 0-255, *LIND
Text 'description' . . . . . . > 'To Rochester2 via AnyNet/400'
                                                                            Bottom
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters
                                                                   F12=Cancel
F13=How to use this display
                                     F24=More keys
```

Figure 130. Scenario 2: Controller Description - RALYAS4A

In the following panel we create a controller description on RCHASM02 with LINKTYPE *ANYNW.

Create Ctl D Type choices, press Enter. Controller description > Link type > Online at IPL	esc (APPC) (CR ANYNWAS4A *ANYNW *YES USIBMRA RALYAS4A *LIND *LIND 'To Raleigh-A	Name *ANYNW, *FAX, *FR, *YES, *NO Name, *NETATR, *NON Name, *ANY O-255, *LIND O-255, *LIND O-255, *LIND via AnyNet/400'	*IDLC E, *ANY
F3=Exit F4=Prompt F5=Refresh	F10=Additiona	l parameters F12=C	Bottom
F13=How to use this display	F24=More keys		ancel

Figure 131. Scenario 2: Controller Description - RCHASM02

Configuratio Text Type changes	n list typ • • • • • • • press En	e: *A .:	PPNRMT				
Text Type changes		. :					
Type changes	, press En						
Type changes	, press En						
	· .	ter.					
		APPN	Remote L	ocations			
Rei	note		Remote	Control			
Remote Ne	twork Lo	cal	Control	Point	Location	S	ecure
Location ID	Lo	cation	Point	Net ID	Password		Loc
RCHASM02 IT	SCNET *N	ETATR	RCHASM02	ITSCNET			*NO
*N	ETATR *N	ETATR		*NETATR			*N0
*N	ETATR *N	ETATR		*NETATR			*N0
*N	ETATR *N	ETATR		*NETATR			*N0
*N	ETATR *N	ETATR		*NETATR			*NO
*N	ETATR *N	ETATR		*NETATR			*N0
*N	ETATR *N	ETATR		*NETATR			*N0
*N	ETATR *N	ETATR		*NETATR			*N0
							More
F3=Exit F1	1=Displav	session	informati	on F12=Ca	ancel F17	7=Top F1	8=Bottom
	5						

Now we add the APPC over TCP/IP entry to the APPN remote location list at RALYAS4A.

Figure 132. Scenario 2: APPN Remote Locations List - RALYAS4A

Next, we add the APPC over TCP/IP entry to the APPN remote location list at RCHASM02.

Configuration list : QAPPNRMT Configuration list type : *APPNRMT Text : Type changes, press Enter. APPN Remote Locations Remote Network Local Control Point Location Secure Location ID Location Point Net ID Password Loc RALYAS4A USIBMRA *NETATR RALYAS4A USIBMRA *NO *NETATR *NETATR ALYAS4A USIBMRA *NO *NETATR *NETATR *NETATR *NETATR *NO *NETATR *NETATR *NETATR *NETATR *NO *NETATR *NETATR *NETATR *NO *NETATR *NETATR *NETATR *NO *NETATR *NETATR *NETATR *NO *NO			Cha	nge Config	uration L [.]	ist	11/10/04	RCHASMO2
Type changes, press Enter. APPN Remote Locations Remote Remote Control Remote Network Local Control Point Location Secure Location ID Location Point Net ID Password Loc RALYAS4A USIBMRA *NETATR RALYAS4A USIBMRA *NO	Configura Configura Text	tion list tion list	: Q type: *	APPNRMT APPNRMT			11/10/94	11:02:07
Remote Remote Control Remote Network Local Control Location ID Location Point Location Location ID Location Point Net ID Password Loc RALYAS4A USIBMRA *NETATR RALYAS4A USIBMRA *NO	Type chan	iges, press	Enter.					
Remote Network Local Control Point Location Secure Location ID Location Point Net ID Password Loc RALYAS4A USIBMRA *NETATR RALYAS4A USIBMRA *NO			APP	N Remote L	ocations-			
*NETATR *NETATR *NO *NETATR *NTATR *NO	Remote Location RALYAS4A 	Network ID USIBMRA *NETATR *NETATR *NETATR *NETATR *NETATR *NETATR	Local Location *NETATR *NETATR *NETATR *NETATR *NETATR *NETATR *NETATR	Control Point RALYAS4A	Control Point Net ID USIBMRA *NETATR *NETATR *NETATR *NETATR *NETATR	Location Password 	S	ecure Loc *NO *NO *NO *NO *NO *NO *NO *NO
F3=Exit F11=Display session information F12=Cancel F17=Top F18=Bott	F3=Exit	F11=Displ	ay session	informati	on F12=(Cancel F1	7=Top F1	More 8=Bottom

Figure 133. Scenario 2: APPN Remote Locations List - RCHASM02

 $\overline{}$

The host table at RALYAS4A in the following figure has had the APPC over TCP/IP entry added.

Type 1=	e options, press E Add 2=Change	Work with TCP/IP Inter. 4=Remove 5=Disp	Host Table Er blay 7=Renam	ntries System: ne	RALYAS4A
Opt _ _ _	Internet Address 9.24.104.56 9.5.69.250	Host Name RALYAS4A RALYAS4A.ITSO.R/ RCHASM02 RCHASM02.RCHLAND RCHASM02.ITSCNET	AL.IBM.COM D.IBM.COM F.SNA.IBM.COM		
F3=E	xit F5=Refresh	F6=Print list	F12=Cancel	F17=Position to	

Figure 134. Scenario 2: TCP/IP Host Table Entries - RALYAS4A

The RCHASM02 host table in the following figure has also had the APPC over TCP/IP entry added.

Type o	options, press E	Work with TCP/IP Host Table Entries System: nter. 4=Remove 5=Display 7=Rename	RCHASM02
0pt #	Internet Address 9.5.69.250 9.24.104.56	Host Name RCHASMO2 RCHASMO2.RCHLAND.IBM.COM RALYAS4A RALYAS4A.ITSO.RAL.IBM.COM RALYAS4A.USIBMRA.SNA.IBM.COM	
F3=Exi	it F5=Refresh	F6=Print list F12=Cancel F17=Position to	

Figure 135. Scenario 2: TCP/IP Host Table Entries - RCHASM02

Shown next are the matching parameters between RALYAS4A and RCHASM02.



Figure 136. APPC over TCP/IP Scenario 2: Matching Parameters Table

APPC over TCP/IP Scenario 3: AS/400 to PS/2 - Same SNA Network

Shown in the following figure are the two systems used in this scenario and their respective IP addresses. A TCP/IP configuration is already in place between the systems using the internet addresses shown.



Figure 137. Systems and Addresses Used for APPC over TCP/IP Scenario 3

The following series of panels show the AS/400 and PS/2 configuration screens taken from the RALYAS4A and WTR32226 systems. They illustrate the configuration steps required for this APPC over TCP/IP scenario.

Please note that only the key AnyNet/2 configuration displays are shown in this section. For further AnyNet/2 configuration help, refer to *AnyNet: SNA over TCP/IP, Installation and Interoperability* GG24-4395.

– PS/2 Software Installed ·

The following software was installed on WTR32226:

- OS/2 Version 2.1
- CM/2 Version 1.11 with AnyNet/2 support installed (additional functions)
- TCP/IP Version 2.0 for OS/2 Base kit plus CSD UN64092
- AnyNet/2 Version 2.0, SNA over TCP/IP

The software was installed in the above order.

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Before we can configure the APPC controller description and add the APPN remote location list entry, we need to display the network attributes on RALYAS4A and the .ndf file on WTR32226 to determine the network ID and default local location (LU) name configured at each system.

	- 1										Syst	em:	RALYAS4A
Current system name		•	•		•	•	•	•	•	:	RALYAS4A		
Pending system name .		• •	•	•	•	•	•	•	•	:			
Local network ID		• •	•	•	•	•	•	•	•	:	USIBMRA		
Local control point name		• •	•	•	•	•	•	•	•	:	RALYAS4A		
Default local location .		• •	•	•	•	•	•	•	•	:	RALYAS4A		
Default mode		• •	•	•	•	•	•	•	•	:	BLANK		
APPN node type			•		•	•				:	*NETNODE		
Data compression			•		•	•				:	*NONE		
Intermediate data compre	ssion		•		•	•				:	*NONE		
Maximum number of interm	ediate	ses	ssid	ons		•				:	200		
Route addition resistanc	e		•			•				:	128		
Server network ID/contro	1 poin	t na	ame			•				:	*LCLNETID	*ANY	
	•												
													More

Figure 138. Scenario 3: Network Attributes - RALYAS4A

DEFINE_LOCAL_CP FQ_CP_NAME(USIBMRA.WTR32226) CP_ALIAS(WTR32226) NAU_ADDRESS(INDEPENDENT_LU) NODE_TYPE(EN) NODE_ID(X'05D32226') NW_FP_SUPPORT(NONE) HOST_FP_SUPPORT(YES) HOST_FP_LINK_NAME(HOST\$1) MAX_COMP_LEVEL(NONE) MAX_COMP_TOKENS(0);

DEFINE_LOGICAL_LINK LINK_NAME(LINK0001) FQ_ADJACENT_CP_NAME(USIBMRA.RALYAS4A) ADJACENT_NODE_TYPE(LEARN) DLC_NAME(IBMTRNET) ADAPTER_NUMBER(0) DESTINATION_ADDRESS(X'40001002000104') ETHERNET_FORMAT(NO) CP_CP_SESSION_SUPPORT(NO) SOLICIT_SSCP_SESSION(NO) ACTIVATE_AT_STARTUP(YES) USE_PUNAME_AS_CPNAME(NO) LIMITED_RESOURCE(USE_ADAPTER_DEFINITION) LINK_STATION_ROLE(USE_ADAPTER_DEFINITION) MAX_ACTIVATION_ATTEMPTS(USE_ADAPTER_DEFINITION) EFFECTIVE_CAPACITY(USE_ADAPTER_DEFINITION) COST_PER_CONNECT_TIME(USE_ADAPTER_DEFINITION) COST_PER_BYTE(USE_ADAPTER_DEFINITION) SECURITY(USE_ADAPTER_DEFINITION) PROPAGATION_DELAY(USE_ADAPTER_DEFINITION) USER_DEFINED_1(USE_ADAPTER_DEFINITION) USER_DEFINED_2(USE_ADAPTER_DEFINITION) USER_DEFINED_3(USE_ADAPTER_DEFINITION);

DEFINE_PARTNER_LU FQ_PARTNER_LU_NAME(USIBMRA.RALYAS4A) PARTNER_LU_ALIAS(RALYAS4A) PARTNER_LU_UNINTERPRETED_NAME(RALYAS4A) MAX_MC_LL_SEND_SIZE(32767) CONV_SECURITY_VERIFICATION(NO) PARALLEL_SESSION_SUPPORT(YES);

DEFINE_PARTNER_LU_LOCATION FQ_PARTNER_LU_NAME(USIBMRA.RALYAS4A) WILDCARD_ENTRY(NO) FQ_OWNING_CP_NAME(USIBMRA.RALYAS4A) LOCAL NODE NN SERVER(NO);

- DEFINE_MODE MODE_NAME(QPCSUPP) COS_NAME(#CONNECT) DEFAULT_RU_SIZE(NO) MAX_RU_SIZE_UPPER_BOUND(1024) RECEIVE_PACING_WINDOW(7) MAX_NEGOTIABLE_SESSION_LIMIT(32767) PLU_MODE_SESSION_LIMIT(64) MIN_CONWINNERS_SOURCE(32) COMPRESSION_NEED(PROHIBITED) PLU_SLU_COMPRESSION(NONE) SLU_PLU_COMPRESSION(NONE);
- DEFINE_DEFAULTS IMPLICIT_INBOUND_PLU_SUPPORT(YES) DEFAULT_MODE_NAME(BLANK) MAX_MC_LL_SEND_SIZE(32767) DIRECTORY_FOR_INBOUND_ATTACHES(*) DEFAULT_TP_OPERATION(NONQUEUED_AM_STARTED) DEFAULT_TP_PROGRAM_TYPE(BACKGROUND) DEFAULT_TP_CONV_SECURITY_RQD(NO) MAX_HELD_ALERTS(10);

START_ATTACH_MANAGER;

From the PS/2 .ndf file and AS/400 network attributes above, we can see that the network IDs on both systems are the same (USIBMRA); hence we specified *NETATR for Remote Network ID and Control Point Net ID in the APPC controller description and APPN remote location list entry.

Next, we create a controller description on RALYAS4A with LINKTYPE *ANYNW.

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > ANYNWPS2A
                                                   Name
                                                   *ANYNW, *FAX, *FR, *IDLC...
Link type . . . . . . . . . > *ANYNW
Online at IPL .... *YES
                                                   *YES, *NO
Remote network identifier . . . *NETATR
                                                   Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > WTR32226
                                                   Name, *ANY
                                                   0-255, *LIND
0-255, *LIND
0-255, *LIND
User-defined 1 . . . . . . . .
                                    *LIND
User-defined 2 . . . . . . . .
                                    *LIND
User-defined 3 . . . . . . *LIND 0-255, *LIND
Text 'description' . . . . . > 'To PC Workstation via AnyNet/400'
                                                                            Bottom
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters
                                                                  F12=Cancel
F13=How to use this display
                                     F24=More keys
```

Figure 139. Scenario 3: Controller Description - RALYAS4A

Next, we add the APPC over TCP/IP entry to the APPN remote location list at RALYAS4A.

		Cha	nge Config	uration L	ist	11/10/94	RALYAS4A 10:47:23
Configura Configura Text	tion list tion list	: Q type: * :	APPNRMT APPNRMT			11, 10, 5	1011/120
Type chan	ges, press	s Enter.					
		APP	N Remote L	ocations-			
Domoto	Remote		Remote	Lontrol Doint	Location	c	0.01100
Remote	Network	Local	Deint		Location	2	lecure
LOCALION			POINL	Net ID	Password		LOC
WTR32226	^NETATR	^NETATR	WIR32226	^NETATR			^NU
	*NEIAIR	*NETATR		*NEIAIR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
		*NFT∆TR		*NFTATR			*N0
							110
	INCIAIR	NETATIK					More

Figure 140. Scenario 3: APPN Remote Locations List - RALYAS4A
The host table at RALYAS4A in the following figure has had the APPC over TCP/IP entry added.

Work with TCP/IP Host Table Entries System: RALYAS4A Type options, press Enter. 1=Add 2=Change 4=Remove 5=Display 7=Rename Internet Host Opt Address Name 9.24.104.56 RALYAS4A RALYAS4A.ITSO.RAL.IBM.COM 9.24.104.186 AS4PS2A AS4PS2A.ITS0.RAL.IBM WTR32226.USIBMRA.SNA.IBM.COM F3=Exit F5=Refresh F6=Print list F12=Cancel F17=Position to

Figure 141. Scenario 3: TCP/IP Host Table Entries - RALYAS4A

Note that in this scenario the PS/2's SNA name (USIBMRA.WTR32226) is different from its TCP/IP host name (AS4PS2A).

WTR32226 Configuration

To configure AnyNet/2 SNA over TCP/IP, we define the following:

- SNA Domain Name Suffix
- Routing Preference

The SNA Domain Name Suffix is used when SNA over TCP/IP creates an IP domain name from an SNA LU name, network ID and this suffix. The IP domain name for SNA over TCP/IP has the format luname.netid.snasuffix and is defined as follows:

- luname is the SNA LU name.
- · netid is the SNA network ID (NETID).
- snasuffix is the SNA domain name suffix.

To define the SNA Domain Name Suffix, we use the AnyNet/2 SNA over TCP/IP configuration tool. To access the AnyNet/2 SNA over TCP/IP configuration tool, select the **Configure AnyNet/2 SNA over TCP/IP** icon from the AnyNet/2 folder. The folder icon should be displayed on the OS/2 desktop, if the AnyNet/2 code has been installed correctly.

👪 AnyNet/2 SNA over TCP/IP -	- Icon View	: C
Configure AnyNet/2 SNA over TCP/IP	LutPM	Install AnyNet/2 Products

Figure 142. AnyNet/2 SNA over TCP/IP Folder

AnyNet/2 Configuration		
Configure SNA over TCP/IP	Interface Parameters	SNA/ <u>I</u> P
The next screens are for sys	tem administrators only.	
SNA Domain Name Suffix:	SNA.IBM.COM	
Is this a critical workstation?	<u> </u>	
	(
▶		
Help <u>D</u> efau	Ilts Save Page 1 of 3	
Enter the suffix for this domain.	•••	
Econo Entranceo		

Figure 143. Scenario 3: SNA Domain Name Suffix - System WTR32226

When initiating a session, AnyNet/2 SNA over TCP/IP uses a preference table to determine whether native SNA or SNA over TCP/IP (non-native) will be used for that session. If no routing preference table is configured, the default is to first try to establish the session over native SNA. If this session setup fails, SNA over TCP/IP will be used.

To customize the routing preference table, we can use the LULIST AnyNet/2 command. When entered, the command prompts with the following information:

```
usage: lulist \{a|r||p|f|c|d|u|h\} argument(s).
    Arguments by function:.
    a netid.luname flag ( \ensuremath{\mathsf{ADD}}\xspace LUNAME
                                           ).
    r netid.luname
                          ( REMOVE LUNAME ).
                          ( LOOKUP LUNAME ).
    1 netid.luname
                          ( PRINT TABLE ).
    р
                          ( FLUSH TABLE
    f
                                           ).
    c netid.luname flag ( CHANGE LUNAME ).
    d
                          ( PRINT DEFAULT ).
    d flag
                          ( SET DEFAULT
                                           ).
    u
                          ( UPDATE TABLE ).
                          ( HELP
    h
                                           ).
flag: O=Native, 1=Non-Native, 2=Native Only, 3=Non-Native Only.
```

Figure 144. AnyNet/2 LULIST Command Prompts

The options available for the table default and table entries are as follows:

Native: SNA will be tried first. If the session request fails, SNA over TCP/IP will be used.

Non-native: SNA over TCP/IP will be tried first. If the session fails, SNA will be used.

Native only: Only SNA will be used.

Non-native only: Only SNA over TCP/IP will be used.

For the connection to RALYAS4A to use *only* the SNA over TCP/IP connection, we would enter the following command:

OS2 C:->lulist a usibmra.ralyas4a 3 Luname usibmra.ralyas4a added to table.

To verify the above change, we could use the following command:

OS2 C:->lulist l usibmra.ralyas4a usibmra.ralyas4a NON-NATIVE_ONLY As for AnyNet/400, AnyNet/2 SNA over TCP/IP uses the native TCP/IP host table to map SNA LU names to internet addresses. The OS/2 TCP/IP host table is changed either via the TCP/IP Configuration icon (page 3 of the Services configuration section), or by editing the HOSTS file (\tcpip\etc\hosts).

Telnet Passwo	rd		Routin
NewsReader/2 Serve	r Einer		Autost
HOSTS (Resolve host names when	RH	OSTS	Services
nameserver is unavailable)	(Hosts authorized	d to use RSH server)	SMMD
9.24.104.56	KINO ELUTEILES.		
	126161.6		
lindo Defaulte	Holn	Page 3 of 3	

Figure 145. OS/2 TCP/IP Host Table Menu

Update the table with the required mapping, as shown in Figure 146.

≚ HOSIKS Entrop	Edit
IP Address	9.24.104.56
Hostname	ralyas4a.usibmra.sna.ibm.com
Aliases	ralyas4a 💦
Comment	AS400A at Raleigh
Edit	Cancel Help

Figure 146. Scenario 3: OS/2 TCP/IP Host Table Entry - WTR32226

The Aliases field in an OS/2 TCP/IP host table entry can contain multiple host names. This would have allowed us to enter the long TCP/IP host name for RALYAS4A in addition to the short one shown.

Shown next are the matching parameters between RALYAS4A and WTR32226.



Figure 147. APPC over TCP/IP Scenario 3: Matching Parameters Table

APPC over TCP/IP Scenario 4: AS/400 Bridge

AnyNet/400 does not provide an AnyNet gateway function. However, it is able to provide a connection between a TCP/IP network and an SNA network in a limited manner. Those limitations are as follows:

Unlike an AnyNet SNA over TCP/IP Gateway, with the AS/400 Bridge, sessions can *only* be established from a system in the SNA network to an AnyNet system in the TCP/IP network. Sessions *cannot* be established from an AnyNet system to an SNA system.

Unlike an AnyNet SNA over TCP/IP Gateway, two AS/400s running AnyNet/400 *cannot* be used together to provide connections between SNA systems across a TCP/IP network.

In this scenario we use the AS/400 bridge function on RALYAS4A to establish an APPC connection from the native SNA (no-AnyNet) system RALYAS4B to the AnyNet/400 system RCHASM02. An SNA/APPN configuration is already in place between RALYAS4A and RALYAS4B using the network ID and CP names shown. A TCP/IP configuration is already in place between RALYAS4A and RCHASM02 using the internet addresses shown.



Figure 148. Systems and Addresses Used for APPC over TCP/IP Scenario 4

The configuration of RALYAS4A and RCHASM02 for this scenario is identical to that for "APPC over TCP/IP Scenario 2: AS/400 to AS/400 - Different SNA Networks" on page 105. There are no special configuration requirements for the AS/400 to act as an APPC over TCP/IP bridge. The APPN connection between RALYAS4B and RALYAS4A will allow sessions to be established from RALYAS4B using the APPC over TCP/IP APPN remote location list entry for RCHASM02 at RALYAS4A.

- Remember –

Sessions can only be established from a system in the SNA network to an AnyNet APPC over TCP/IP system in the TCP/IP network. Sessions *cannot* be established from an AnyNet system to an SNA system.

Shown next are the matching parameters between the three systems.



Figure 149. APPC over TCP/IP Scenario 4: Matching Parameters Table

APPC over TCP/IP Scenario 5: AS/400 to MVS - Same SNA Network

Shown in the following figure are the two systems used in this scenario and their respective IP addresses. A TCP/IP configuration is already in place between the systems using the internet addresses shown.



Figure 150. Systems and Addresses Used for APPC over TCP/IP Scenario 5

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A system. Also shown is a subset of the AnyNet/MVS configuration information from RAI. They illustrate the configuration steps required for this APPC over TCP/IP Gateway scenario.

Please note that only the key AnyNet/MVS configuration displays are shown in this section. For further AnyNet/MVS configuration help, refer to *AnyNet: SNA* over *TCP/IP*, *Installation and Interoperability* GG24-4395.

— Host Software Installed -

The following software was installed on RAI:

- IBM MVS/ESA System Product (SP) Version 3 Release 1.3
- IBM MVS/ESA System Modification Program/Extended (SMPE) Release 5
- IBM TCP/IP Version 2 Release 2.1 for MVS
- IBM C for System/370 Version 2 at PUT level 9107
- VTAM Version 4 Release 2 base
- VTAM Version 4 Release 2 AnyNet host feature

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Before we can configure the APPC controller description and add the APPN remote location list entry, we need to display the network attributes on RALYAS4A and the VTAM startup options from RAI to determine the network IDs and location (LU) names to be used.

	System:	RALYAS4A
Current system name	RALYAS4A	
Pending system name		
_ocal network ID	USIBMRA	
_ocal control point name	RALYAS4A	
Default local location	RALYAS4A	
Default mode	BLANK	
APPN node type	*NETNODE	
Data compression	*NONE	
Intermediate data compression	*NONE	
Maximum number of intermediate sessions:	200	
Route addition resistance	128	
Server network ID/control point name :	*LCLNETID *ANY	
		More

Figure 151. Scenario 5: AS/400 Network Attributes

The VTAM startup options from RAI are not shown here. The relevant items from the startup options are: NETID=USIBMRA and SSCPNAME=RAI.

Next, we create a controller description on RALYAS4A with LINKTYPE *ANYNW.

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > ANYNWMVSI
                                                Name
Link type
          . . . . . . . . . . . . > *ANYNW
                                                *ANYNW, *FAX, *FR, *IDLC...
                                  *YES
                                                *YES, *NO
Online at IPL . . .
                      . . . . .
                                  *NETATR
                                                Name, *NETATR, *NONE, *ANY
Remote network identifier . . .
                                                Name, *ANY
Remote control point . . . . > RAIANYNT
User-defined 1 . . . . . . . . .
                                                0-255, *LIND
                                   *LIND
User-defined 2 . . . . . . . . .
                                  *LIND
                                                0-255, *LIND
User-defined 3 . . . . . . . .
                                  *LIND
                                                0-255, *LIND
Text 'description' . . . . . . > 'To AnyNet/MVS'
                                                                       Bottom
F3=Exit F4=Prompt
                     F5=Refresh
                                  F10=Additional parameters
                                                              F12=Cancel
F13=How to use this display
                                  F24=More keys
```



		Cito	inge conrig		50	03/08/95	14:06:54
Configura	tion list	: Q	APPNRMT				
Configura	tion list	type : *	APPNRMT				
Text	• • • •	:					
ype chan	ges, press	s Enter.					
		4.0.0					
	Domoto	APP	N REMOTE L	Control			
Omoto	Notwork		Control	Point	Location	c	ocuro
ocation		Location	Point	Not ID	Deseword	5	
	*NFTATR	*NFTATR	ΡΔΤΔΝΥΝΤ	*NFTATR	Tassword		*NO
	*NFTATR	*NFTATR	10(1)(1)(1)	*NFTATR			*N0
	*NFTATR	*NFTATR		*NFTATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
3=Fvit	F11=Disn]	lav session	informati	on F12=(ancel F1	7=Ton F1	8=Rottom

In the following panel we add the APPC over TCP/IP entry to the APPN remote location list at RALYAS4A.

Figure 153. Scenario 5: AS/400 APPN Remote Locations

The host table at RALYAS4A, shown following, has had the APPC over TCP/IP entry added.

_

		Work with TCP/IP	Host Table Er	ntries System:	RALYAS4A
Туре 1=	options, press E Add 2=Change	nter. 4=Remove 5=Dis	play 7=Renam	ne	
Opt	Internet Address	Host Name			
_	9.24.104.56	RALYAS4A RALYAS4A.ITSO.R	AL.IBM.COM		
-	9.24.104.74	RAI RAI.ITSO.RAL.IB RAI.USIBMRA.SNA	M.COM .IBM.COM		
F3=E	xit F5=Refresh	F6=Print list	F12=Cancel	F17=Position to	

Figure 154. Scenario 5: AS/400 TCP/IP Host Table

 $\overline{}$

AnyNet/MVS Configuration



Figure 155. Scenario 5: AnyNet/MVS Configuration

The IP network is represented to VTAM as a TCP/IP major node, using a VBUILD TYPE=TCP as shown in Figure 156.

EDIT	RISC	.VTAMLS	T(RAIB	SNIP) -	01.03	Columns 00001 0	0072
*****	*******	******	******	*******	Top of	Data ***********************************	****
==MSG>	-Warning-	- The l	JNDO co	mmand is	not ava	ilable until you change	
==MSG>	Ū	your	edit p	rofile u	sing the	command RECOVERY ON.	
000001	*******	******	*****	******	*******	*******************************	**
000002	*						*
000003	*	VTA	M 42	ANYNET	-	SNA OVER TCP/IP	*
000004	*						*
000005	*			SA 18	DEFINIT	IONS	*
000006	*						*
000007	*******	******	******	******	******	*******************************	**
800000	RAIBSNIP	VBUILD) TYPE	=TCP,			Х
000009			CONTIM	ER=30,		WAIT FOR MPTN TO COME UP	Х
000010			DGTIME	R=30,		INTERVAL BETWEEN RETRIES	Х
000011			DNSUFX	=IBM.COM	,	DOMAIN NAME SUFFIX	Х
000012			EXTIME	R=3,		BETW. SEND SNA EXPEDITED DAT	A X
000013			IATIME	R=120,		TIME BEFORE MPTN KEEPALIVE	Х
000014			PORT=3	97,		WELLKNOWN PORT FOR ANYNET	Х
000015			TCB=10	,		NUMBER MVS SUBTASKS	Х
000016			TCPIPJ	0B=T18AT	СР	TCP/IP JOBNAME	
000017	RAIGSNIP	GROUP	ISTATU	S=ACTIVE		GROUPNAME	
000018	RAILSNIP	LINE	ISTATU	S=ACTIVE		LINENAME	
000019	RAIPSNIP	PU	ISTATU	S=ACTIVE		PUNAME	
*****	*******	******	******	******	Bottom o	f Data **********************************	*****

Figure 156. Scenario 5: IP Network Representation to VTAM

When using APPC over TCP/IP, VTAM sees any remote LUs as independent LUs, which are defined as CDRSCs.

EDIT RISC.VTAMLST(RAIRSNIP) - 01.07 Columns 00001	00072
****** *******************************	******
==MSG> -Warning- The UNDO command is not available until you change	
==MSG> your edit profile using the command RECOVERY ON.	
000001 ********************************	****
000002 * UPDATE LOG	*
000003 *	*
000004 * 03/07/95 MCLI MODIFY COMMENTS	*
000003 *	*
000003 *	*
000008 *	*
000009 * VTAM 42 ANYNET SNA OVER TCP/IP	*
000010 *	*
000011 * SA 18 DEFINITIONS	*
000012 *	*
000013 * NAME CDRSC ALSLIST=NAME OF THE PU STATEMENT DEFINED	*
000014 * WITHIN THE VBUILD TYPE=TCP	*
000015 *	*
000016 * - THE NAME LABEL OF THE CDRSC DEFINITION STATEMENT MUST BE	*
000017 * THE REMOTE ILU NAME.	*
000018 *	*
000019 * - WE MUST CODE ALSREQ=YES TO USE THE PREDEFINED LIST.	*
000020 *	*
000021 * - WE USE SOME CDRSC WITH THE NETID NOT CODED IN ORDER TO	*
000022 * THE CDRMNAME AS AN ADJSSCP.	*
000023 *	*
000024 *********************************	******
000025 VBUILD TYPE=CDRSC	
000026 *	
000027 NETWORK NETID=USIBMRA	
000028 *	
000034 RALYAS4A CDRSC ALSLIST=RAIPSNIP,ALSREQ=YES AS400	
****** *******************************	******

Figure 157. Scenario 5: LU Representation to VTAM

 \bigcap

The TCP/IP Host Table used by AnyNet/MVS SNA over TCP/IP is the normal host table.

EDIT TCPIP.ITSC.HOSTS.LOCAL Columns 00001 00072 ==MSG> -Warning- The UNDO command is not available until you change ==MSG> your edit profile using the command RECOVERY ON. 000001 : -----000002; Update log 000003 ; 01/31/95 mcli Change 9.67.38.3 to 9.67.38.20 000004; 000005 ; -----000006; WATSON IP ADDRESSES 000007 ; NOTES: 000008 ; 1. To request additions, changes, or deletions from this file please 000009 ; use the WATIP REQUEST online form which can be found on the 000010; CMSSYS 19f disk (also known as the U disk). Follow further 000011; instructions within WATIP REQUEST. 000012 ; 2. This file should NOT contain any blank lines. 000013 ; -----000014 ; 000015 ; Ring 9.2.1.0 - Netmask 255.255.255.128 - Hawthorne I 16Mb 000016 ; Begin 9.2.1.0 000017 HOST : 14.0.0.0 : YKTVMV , CIAMPA, GARY , GTC, ME , TEST :::: 000018 H0ST:9.67.38.36:WTR05221.USIBMRA.IBM.COM, ISNIPJL1.USIBMRA.IBM.COM :::: 000019 HOST:9.67.38.36:ISNIPJL2.USIBMRA.IBM.COM, ISNIPJL3.USIBMRA.IBM.COM :::: 000020 HOST:9.67.38.36:ISNIPJL4.USIBMRA.IBM.COM :::: 000021 HOST:9.67.38.37:WTR05115.USIBMRA.IBM.COM,ISNIPML1.USIBMRA.IBM.COM ::::: 000022 HOST:9.67.38.37:ISNIPML2.USIBMRA.IBM.COM, ISNIPML3.USIBMRA.IBM.COM :::: 000023 HOST:9.67.38.37:ISNIPML4.USIBMRA.IBM.COM :::: 000024 HOST : 9.67.38.35 : WTR05222.USIBMSC.IBM.COM :::: 000025 HOST : 9.67.38.20 : RAIAC.USIBMRA.IBM.COM :::: 000026 HOST : 9.67.38.11 : RABAT.USIBMRA.IBM.COM :::: 000027 HOST : 9.67.38.20 : RAPAC.USIBMRA.IBM.COM :::: 000028 HOST : 9.67.38.11 : RA3AC.USIBMRA.IBM.COM :::: 000029 HOST : 9.67.38.11 : RABAC.USIBMRA.IBM.COM :::: 000030 HOST : 9.24.104.56: RALYAS4A.USIBMRA.IBM.COM :::: 000032; *****

Figure 158. Scenario 5: VTAM TCP/IP Host Table

The last entry in the table is the SNA over TCP/IP entry added for RALYAS4A.

No matching parameter table was created for this scenario.

Verifying the Scenarios

In order to prove that the APPC over TCP/IP connection is working, we can follow a step-by-step verification process. In a failing environment, this step-by-step process should help identify the failing area. Verification is shown for the following:

- AnyNet/400 APPC over TCP/IP
- AnyNet/2 SNA over TCP/IP
- AnyNet/MVS SNA over TCP/IP

AnyNet/400 APPC over TCP/IP Verification

The verification of APPC over TCP/IP should be carried out in the following stages:

- AS/400 TCP/IP Verification
- AS/400 APPC over TCP/IP Verification

- Note

The verifications in this section were carried out from RALYAS4A and RCHASM02 in APPC over TCP/IP scenario 2.

AS/400 TCP/IP Verification

AnyNet/400 APPC over TCP/IP requires a TCP/IP configuration between the systems. This TCP/IP configuration is established as if it were to be used by native TCP/IP applications; there are no special TCP/IP configuration requirements to allow APPC over TCP/IP to use the TCP/IP configuration. Before we verify the APPC over TCP/IP configuration, we should verify the native TCP/IP configuration. This can be done in such a way that it also verifies part of the APPC over TCP/IP configuration. For example, the following will verify the TCP/IP connection between RALYAS4A and RCHASM02 via the APPC over TCP/IP host table entry:

```
ping rchasm02.itscnet.sna.ibm.com
Verifying connection to host system RCHASM02 at address 9.5.69.250.
Connection verification 1 took .522 seconds. 1 successful connection
verifications.
Connection verification 2 took .299 seconds. 2 successful connection
verifications.
Connection verification 3 took .231 seconds. 3 successful connection
verifications.
Connection verification 4 took .234 seconds. 4 successful connection
verifications.
Connection verification 5 took .288 seconds. 5 successful connection
verifications.
Round-trip (in milliseconds) min/avg/max = 231/314/522
Connection verification statistics: 5 of 5 successful (100 %).
```

Figure 159. AS/400 PING Command Job Log Information

Once we are satisfied that the TCP/IP configuration is working fine, we can move on to verify the APPC over TCP/IP configuration.

AS/400 APPC over TCP/IP Verification

Having verified the native TCP/IP configuration to the remote system, we can now verify the APPC over TCP/IP configuration.

First we should check that the APPC over TCP/IP job is running. The command WRKACTJOB SBS(QSYSWRK) will display the active jobs in the QSYSWRK subsystem. The APPC over TCP/IP job QAPPCTCP should be active as shown in the following figure.

						03/08/95	17:24:02
CPU %	6: .0 I	Elapsed tim	ne: 00:	00:00	Active j	obs: 63	
уре	options, press	s Enter.					
2=0	Change 3=Hold	d 4=End	5=Work	with	6=Release	7=Display mes	sage
8=V	Nork with spoo	led files	13=Disc	onnect	•••		
)pt	Subsystem/Job	User	Туре	CPU %	Function	Status	
	QSYSWRK	QSYS	SBS	.0		DEQW	
<u>5</u>	QAPPCTCP	QSYS	BCH	.0	PGM-QZPAIJ	OB TIMW	
	QECS	QSVSM	BCH	.0	PGM-QNSECS	JB DEQW	
_	QMSF	QMSF	BCH	.0		DEQW	
_	QNSCRMON	QSVSM	BCH	.0	PGM-QNSCRM	ON DEQW	
_	QTCPIP	QTCP	BCH	.0		DEQW	
_	QTFTP00619	QTCP	BCH	.0		DEQW	
_	QTFTP00734	QTCP	BCH	.0		DEQW	
_	QTFTP02472	QTCP	BCH	.0		TIMW	
							More
Paran	neters or comma	and					
===>							
-3=E>	cit F5=Re ⁻	fresh F10)=Restart	statis	tics F11=	Display elapse	d data

Figure 160. Work with Active Jobs Panel

If we look at the job log associated with QAPPCTCP, we see the following:

	Display Job Log	Gustan	
Job : QAPPCTCP	User : QSYS	System: Number :	011338
<pre>>> CALL QSYS/QZPAIJOB APPC over TCP/IP j</pre>	ob started.		
Press Enter to continu	e.		Bottom
F3=Exit F5=Refresh F16=Job menu	F10=Display detailed messages F24=More keys	s F12=Cancel	

Figure 161. Display Job Log (QAPPCTCP) Panel

Note -

The APPC over TCP/IP job (QAPPCTCP) is initially started when the Allow AnyNet support (ALWANYNET) network attribute is changed to *YES. If the job fails for any reason, it is necessary to stop TCP/IP (ENDTCP), and start TCP/IP (STRTCP) again to re-start the job.

Before we can use the AS/400 APPC over TCP/IP configuration, we must Vary on the APPC controller description we created for the APPC over TCP/IP connection. The Work with Configuration Status command can be used to show the status of the controller. For example, the following command resulted in the display shown in Figure 162.

WRKCFGSTS *CTL ANYNWRAS2

Wor Position to Type options, press Enter. 1=Vary on 2=Vary off 9=Display mode status Opt Description Stat	rk with Co 5=Work wi • tus	onfigurat Startin ith job	ion Status ng characters 8=Work with d	03/08/95 lescription	RALYAS4A 16:30:11
Position to Type options, press Enter. 1=Vary on 2=Vary off 9=Display mode status Opt Description Stat	5=Work wi • tus	Startiı ith job	ng characters 8=Work with d	lescription	
Type options, press Enter. 1=Vary on 2=Vary off 9=Display mode status Opt Description Stat	5=Work wi • tus	ith job	8=Work with d	lescription	
Opt Description Stat	tus				
ANYNWRAS2 VAR1	IED OFF			Job	
					Bottom
Parameters or command ===>					
F3=Exit F4=Prompt F12=(Cancel F	23=More	options F24=	More keys	

Figure 162. Work with Configuration Status for Controller at RALYAS4A

To make the configuration available, use option 1 (Vary on). The configuration should then go to a VARIED ON status.

When the first controller with link type *ANYNW is varied on, two TCP/IP connections will be started; one is a TCP connection that goes to LISTEN state to allow the system to accept incoming APPC over TCP/IP sessions; while the other is a UDP connection to handle out-of-band data for all APPC over TCP/IP activity. NETSTAT option 3 can be used to display all TCP/IP sessions (native TCP/IP and APPC over TCP/IP). Figure 163 shows NETSTAT option 3 prior to any APPC over TCP/IP sessions being established.

Wor	k with TCP/IP Conr	nection Status	System: RALYAS4A
Type options, press Enter			
4=End 5=Display detai	ls		
Remote Rem	ote Local		
Opt Address Por	t Port	Idle Time Stat	e
* *	ftp-con >	026:45:25 List	en
* *	telnet	025:04:38 List	en
* *	APPCove >	000:09:55 List	en
* *	APPCove >	000:09:55 *UDP	
* *	lpd	026:44:24 List	en
			Bottom
F5=Refresh F11=Display	oyte counts F13=	Sort by column	
F14=Display port numbers	F22=Display enti	ire field F24=M	lore keys

Figure 163. NETSTAT Option 3 - TCP/IP Connection Status (1 of 4)

If the APPC over TCP/IP connections (APPCove) fail for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the jobs.

If the remote system is another AS/400, then STRPASTHR can be used to verify the configuration. For example:

STRPASTHR RMTLOCNAME(RCHASMO2) RMTNETID(ITSCNET)

An AS/400 command that can be used to verify an APPC configuration to *any* remote APPC system is STRMOD. For example:

STRMOD RMTLOCNAME(RCHASMO2) RMTNETID(ITSCNET) Command STRMOD completed successfully for mode BLANK device RCHASMO2. The STRMOD command completed successfully for all modes.

If the remote system was an AS/400 and the Allow AnyNet support Network attribute (ALWANYNET) was set to *NO, then STRMOD would fail in the following manner:

STRMOD RMTLOCNAME(RCHASMO2) RMTNETID(ITSCNET) Session maximum not changed. Command STRMOD failed. The STRMOD command failed for one or more modes.

The QSYSOPR message queue message provided the following additional information:

BIND sense code X'80140000' received for mode BLANK device RCHASM02.

With a session active, $\mathsf{WRKCFGSTS}$ shows the active session in the normal way.

		Work with Configurat	ion Status	03/08/05	RALYAS4A
Position to	D	Starti	ng character	S (02/06/95	10:40:03
Type option 1=Vary or 9=Display	ns, press En n 2=Vary o y mode statu	ter. ff 5=Work with job s	8=Work with	description	
Opt Descr ANYNWF RCH/ BF	iption RAS2 ASM02 LANK	Status ACTIVE ACTIVE ACTIVE/SOURCE	WTR32226E	Job ISTIARI	011387
Parameters	or command				Bottom
===> F3=Exit I	F4=Prompt	F12=Cancel F23=More	options F2	4=More keys	

Figure 164. Work with Configuration Status for Controller at RALYAS4A

The device description RCHASM02 was autocreated.

The NETSTAT option 3 display in Figure 165 shows the associated TCP/IP sessions.

```
Work with TCP/IP Connection Status
                                                          System:
                                                                    RALYAS4A
Local internet address . . . . . . . . . . . *ALL
Type options, press Enter.
 4=End 5=Display details
     Remote
                     Remote
                                Local
Opt Address
                     Port
                                Port
                                          Idle Time State
                     *
                                ftp-con > 027:06:16 Listen
                     *
     *
                                telnet
                                          025:25:30 Listen
     *
                     *
                                APPCove > 000:30:47 Listen
                     *
                                APPCove > 000:30:46 *UDP
                     *
                                          027:05:16 Listen
                                1pd
    9.5.69.250
                     APPCove > 1036
                                          000:01:19 Established
     9.5.69.250
                     APPCove > 1037
                                          000:01:09 Established
                                                                      Bottom
F5=Refresh
            F11=Display byte counts
                                     F13=Sort by column
F14=Display port numbers
                         F22=Display entire field F24=More keys
```

Figure 165. NETSTAT Option 3 - TCP/IP Connection Status (2 of 4)

The two sessions represent the two APPC sessions in place; one is for the SNA service manager (SNASVCMG) and the other is for the user session.

		Work wi	th TCP/	'IP Connecti	on Status		
	1 internet add	mass			*^	System:	RALYAS4A
LUCC	li internet aud	iress	• • •		"ALL		
Туре	e options, pres	s Enter.					
4=	End 5=Displa	y details					
	Pomoto	Pomoto					
Ont	Address	Port	Port	Idle Time	State		
ope	*	*	21	027:06:16	Listen		
	*	*	23	025:25:30	Listen		
	*	*	397	000:30:47	Listen		
	*	*	397	000:30:46	*UDP		
	*	*	515	027:05:16	Listen		
	9.5.69.250	397	1036	000:01:19	Established		
	9.5.69.250	397	1037	000:01:09	Established		
							Bottom
F5=F	Refresh F11=D	isplay byte	counts	F13=Sort	by column		
F14=	Display port n	ames F15=	Subset	by local ad	dress F24=	More keys	
F5=F F14=	Display port n	ames F15=	Subset	by local ad	dress F24=	More keys	

Figure 166 shows an alternate view of the previous figure after having pressed F14 to display the port numbers.

Figure 166. NETSTAT Option 3 - TCP/IP Connection Status (3 of 4)

Port 397 is the well-known port for SNA over TCP/IP.

NETSTAT option 3 at the remote system shows the same sessions from the other end of the connection, as can be seen in Figure 167.

	Work with	TCP/IP Conr	nection Stat	CUS	
Local internet addr	ess		• • • * ALL	-	REITASPICE
Type options, press 4=End 5=Display	Enter. details				
Remote	Remote	Local			
Opt Address	Port	Port	Idle Time	State	
*	*	ftp-con >	000:53:30	Listen	
*	*	telnet	000:54:53	Listen	
*	*	APPCove >	000:14:31	Listen	
*	*	APPCove >	000:05:20	*UDP	
9.24.104.56	1036	APPCove >	000:14:33	Established	
9.24.104.56	1037	APPCove >	000:00:00	Established	
	.				Bottom
F5=Refresh F11=Di	splay byte c	ounts F13=	Sort by col	umn	
F14=Display port nu	mbers F22=	Display enti	re field	F24=More keys	

Figure 167. NETSTAT Option 3 - TCP/IP Connection Status (4 of 4)

The ability to establish APPC over TCP/IP sessions can be verified in many ways. Above we showed the use of STRMOD which results in a CNOS (Change Number of Sessions) LU6.2 command flowing to the remote system.

Another means of verifying the configuration is to use APING; this test tool is available for all IBM platforms and many non-IBM platforms. It functions, in an APPC environment, in a very similar way to PING in a TCP/IP environment. See Appendix B, "APING" on page 349 for details of AS/400 APING. Figure 168 shows the output from the command:

CALL APING RALYAS4A

llocat	e duration:		0 ms	
Connect	ed to a partne	r running on: OS/4	400	
rogram	startup and (confirm duration:	8000 ms	
	Duration (msec)	Data Sent (bytes)	Data Rate (KB/s)	Data Rate (Mb/s)
	1000 0	200 200	0.2	0.002
Totals:	1000	400	0.4	0.003
Ouratio Press E	n statistics: NTER to end te	Min = 0 Ave = erminal session.	500 Max = 100	0

Figure 168. APING Sample Output between AS/400s

The APING example above was carried out from RALYAS4B in APPC over TCP/IP scenario 1.

AnyNet/2 SNA over TCP/IP Verification

- Note

The verifications in this section were carried out from WTR32226 in APPC over TCP/IP scenario 3.

To start AnyNet/2 SNA over TCP/IP, we should do the following:

- 1. Start OS/2 TCP/IP.
- 2. Start Communication Manager/2.

The SNA over TCP/IP code is loaded into memory and linked for use when Communication Manager/2 is started following the AnyNet/2 installation. To check whether Communication Manager/2 is running, we can use the CMQUERY command which displays the following panel:

orkstation Type : 9 efault configuration : N ctive configuration : N	Single User WTRMODEL WTRMODEL
Service	Status
CM Kernel	ACTIVE
SNA Services	ACTIVE
SRPI	*** Stopped ***
X.25	*** Stopped ***
SNA Phone Connect	*** Stopped ***
ACDI	*** Stopped ***
3270 Emulator	ACTIVE
5250 Emulator	ACTIVE

Figure 169. Communications Manager/2 CMQUERY Command Output

From this output, you can see that the kernel and SNA services are active.

Each time Communication Manager/2 is started, it determines whether it is enabled to route SNA frames over the IP network. If the SNA over TCP/IP files are not in place, Communication Manager/2 assumes that SNA over TCP/IP is not available and routes all SNA frames over the SNA network.

To verify that AnyNet/2 SNA over TCP/IP has initialized, we can use the NETSTAT -s command to display the following:

SOCK	ТҮРЕ	FOREIGN	LOCAL	FOREIGN HOST	STAT
=		========	========	========	
32	STREAM	mptn397	1033	9.24.104.56	ESTABLISHED
31	DGRAM	. 0	1025	0.0.0.0	UDP
30	STREAM	mptn397	1032	9.24.104.56	ESTABLISHED
28	DGRAM	0	mptn397	0.0.0.0	UDP
27	DGRAM	0	. 0	0.0.0.0	UDP
26	STREAM	1031	1030	9.24.104.186	ESTABLISHED
25	STREAM	1030	1031	9.24.104.186	ESTABLISHED
23	STREAM	1029	1028	9.24.104.186	ESTABLISHED
22	STREAM	1028	1029	9.24.104.186	ESTABLISHED
20	STREAM	0	mptn397	0.0.0.0	LISTEN
			·		

Figure 170. OS/2 TCP/IP NETSTAT -s Command Output

From the NETSTAT -s display, we can see that SNA over TCP/IP is enabled because sockets are bound to the well-known port for SNA over TCP/IP (port 397). The four stream sockets 26,25,23 and 22 are used for internal SNA over TCP/IP connections. An SNA over TCP/IP session was active when this information was captured; it is using local ports 1033 and 1032.

The active Communications Manager/2 LU 6.2 sessions can be displayed as follows:

- 1. Open the Communication Manager/2 icon.
- 2. Select Subsystem Management.
- 3. Select SNA Subsystem.
- 4. Select Display active configuration.
- 5. Select General SNA.
- 6. Select LU 6.2 sessions.

-----deleted-----

4

<pre>2>Session ID Conversation ID LU alias Partner LU alias Mode name Send maximum RU size Receive maximum RU size Send pacing window Receive pacing window Link name Outbound destination address (DAF) Outbound origin address (OAF) OAE-DAE assignor indicator (ODAI)</pre>	X'1044C793ACC82DB8' X'0000000' WTR32226 RALYAS4A SNASVCMG 512 512 1 1 overTCP X'01' X'02' B'1'
Session type	LU-LU session
Procedure correlator ID (PCID) PCID generator CP name Conversation group ID	X' F1FB3DDD790197F4' USIBMRA.WTR32226 X' B0C82DB8'
LU name Partner LU name Pacing type Primary LU indicator	USIBMRA.WIR32226 USIBMRA.RALYAS4A Adaptive
FMD PIUs sent by primary LU FMD PIUs sent by secondary LU	2
Non-FMD FIUS sent by primary LU Non-FMD PIUs sent by secondary LU Bytes sent by primary LU	1 305
Bytes sent by secondary LU PLU to SLU compression level PLU to SLU compression percent SLU to PLU compression level SLU to PLU compression percent	170 None O None O
· · · · · · · · · · · · · · · · · · ·	-

-----deleted------

Non-native connections show a link name of overTCP.

If the APING application is also installed on the AnyNet/2 system, it can be used to verify the session as shown in Figure 171.

APING for Destination Allocate duration: Connected to a partne	n: USIBMRA.RA er running on	LYAS4A RALYAS4A 3390 ms : OS/400		
Program startup and (Confirm durat	ion: 3437 ms		
Duration	Data Sent	Data Rate	Data Rate	
(msec)	(bytes)	(KB/s)	(Mb/s)	
125	200	1.6	0.013	
62	200	3.2	0.025	
Totals: 187	400	2.1	0.017	
Duration statistics:	Min = 62	Ave = 93 Max =	125	

Figure 171. APING Sample Output from PS/2 to AS/400

AnyNet/MVS SNA over TCP/IP Verification

- Note -

The verifications in this section were carried out from RAI in APPC over TCP/IP scenario 5.

We can use the TCP/IP PING application to verify the MVS - AS/400 TCP/IP configuration prior to trying APPC over TCP/IP.

```
Menu List Mode Functions Utilities Help
_____
                             ISPF Command Shell
Enter TSO or Workstation commands below:
===> ping 9.24.104.56
Place cursor on choice and press enter to Retrieve command
=> ping 9.24.104.56
=> ping ralyas4a.usibmra.ibm.com
=> ping 9.67.38.37
=> call 'mcli.sall.aping.loadlib(aping)' 'usibmra.ralyas4a'
=> call 'mcli.sall.aping.loadlib(aping)' 'usibmra.wtr05115'
=> /$sn,a=raot1b08
=>
=>
=>
EZA0458I Ping V3R1: Pinging host 9.24.104.56. Use ATTN to interrupt.
EZA0463I PING: Ping #1 response took 0.024 seconds. Successes so far 1.
***
```



Having verified the TCP/IP configuration and with APING installed on both the MVS system and the AS/400, we can use this to verify the APPC over TCP/IP configuration.

Menu List Mode Functions Utilities Help _____ ISPF Command Shell Enter TSO or Workstation commands below: ==> call 'mcli.sal1.aping.loadlib(aping)' 'usibmra.ralyas4a' Place cursor on choice and press enter to Retrieve command => ping 9.24.104.56 => ping ralyas4a.usibmra.ibm.com => ping 9.67.38.37 => call 'mcli.sall.aping.loadlib(aping)' 'usibmra.ralyas4a' => call 'mcli.sall.aping.loadlib(aping)' 'usibmra.wtr05115' => /\$sn,a=raot1b08 => => => APING version 2.44 APPC echo test with timings. by Peter J. Schwaller (pjs@ralvm6.vnet.ibm.com) *** Allocate duration: 17000 ms Connected to a partner running on: OS/400 Program startup and Confirm duration: 5000 ms Data Rate Data Rate Duration Data Sent (bytes) (KB/s) (Mb/s) (msec) _____ ----------0.002 1000 200 0.2 200 0 Totals: 1000 400 0.4 0.003 Duration statistics: Min = 0 Ave = 500 Max = 1000 ***

Figure 173. APING Sample Output from MVS to AS/400

If we use NetView to display the status of the AnyNet PU with the APING session active, we see the following:

```
* RAIAN D NET,E,ID=RAIPSNIP

RAIAN IST097I DISPLAY ACCEPTED

' RAIAN

IST075I NAME = RAIPSNIP , TYPE = PU_T2.1

IST486I STATUS= ACTIV--L--, DESIRED STATE= ACTIV

IST1043I CP NAME = ***NA***, CP NETID = USIBMRA , DYNAMIC LU = YES

IST081I LINE NAME = RAILSNIP, LINE GROUP = RAIGSNIP, MAJNOD = RAIBSNIP

IST654I I/O TRACE = OFF, BUFFER TRACE = OFF

IST355I LOGICAL UNITS:

IST080I RALYAS4A ACT/S WTR05115 ACT/S

IST314I END
```

Figure 174. NetView AnyNet PU Status

If we use NetView to display the VTAM status of RALYAS4A with the APING session still active, we see the following:

```
* RAIAN
          D NET, E, ID=RALYAS4A
        ISTO97I DISPLAY ACCEPTED
  RAIAN
' RAIAN
ISTO75I NAME = USIBMRA.RALYAS4A , TYPE = CDRSC
IST486I STATUS= ACT/S , DESIRED STATE= ACTIV
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED ,SLU ENABLED ,SESSION LIMIT NONE
IST231I CDRSC
              MAJOR NODE = RAIRSNIP
IST1044I ALSLIST = RAIPSNIP
ISTO82I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1711 ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = RAIPSNIP
IST634I NAME
                STATUS
                              SID
                                            SEND RECV VR TP NETID
                           F86FE164CDFD7933 0006 0008
IST635I RAIAZ ACTIV-P
                                                           USIBMRA
IST635I RAIAZ ACTIV-P F86FE164CDFD7925 0001 0001
                                                           USIBMRA
IST314I END
```

Figure 175. NetView AnyNet LU Status

AnyNet Gateways

This chapter presents the process of defining and verifying AnyNet/400 Sockets over SNA and APPC over TCP/IP when used in conjunction with AnyNet Gateways. The chapter also includes a 5494 scenario.

Along with the AnyNet/400 environments, the AnyNet/2 and AnyNet/MVS implementations will also be used in some of the scenarios.

The information is presented in the following sections:

- 1. Introduction to using AnyNet/400 in conjunction with an AnyNet Gateway
- 2. Sockets over SNA Gateway Scenario
- 3. APPC over TCP/IP Gateway Scenario
- 4. 5494 over TCP/IP Gateway Scenario

Each scenario includes a section on verification.

Introduction to using AnyNet/400 in Conjunction with an AnyNet Gateway

AnyNet/400 Sockets over SNA, APPC over TCP/IP, APPC over IPX and Sockets over IPX are MPTN access node implementations. The MPTN architecture also defines a transport gateway.

As discussed in "MPTN Gateway" on page 18, an MPTN transport gateway connects two dissimilar networks to provide an end-to-end service over their concatenation. An MPTN gateway can be used in the following ways:

- 1. To provide a connection between an AnyNet system and a native system.
- 2. To provide a connection between native systems via a non-native network.

In this section we primarily discuss option 1 (connections between AnyNet systems and native systems). Although not covered in detail in this redbook (there is no AnyNet/400 content), option 2 can be used by AS/400 applications.

Specifically, in this section we will look at scenarios where AnyNet/400 is used in conjunction with either an AnyNet Sockets over SNA gateway or an AnyNet SNA over TCP/IP gateway. These AnyNet gateways implement the MPTN transport gateway function.

In the scenarios that follow we have only a single system using the gateway. This does not have to be the case. For example, if we look at the 5494 over TCP/IP Gateway scenario, there could be other native SNA systems (for example, non-AnyNet Client Access/400 PCs) using the gateway to access either the AS/400 shown or another AnyNet/400 APPC over TCP/IP system. There could also be other native SNA systems accessing other AnyNet APPC over TCP/IP (or SNA over TCP/IP) systems via this same gateway.

As discussed above, AnyNet gateways can also be used to provide connections between native systems across a non-native network. Figure 176 on page 142 and Figure 177 on page 142 show how multiple gateways can be used by AS/400 applications to provide connections between native systems via a non-native network.



Figure 176. Multiple Sockets over SNA Gateways

In the environment in Figure 176, socket applications running on native TCP/IP systems in one network can communicate with sockets applications running on native TCP/IP systems in the other network, across an SNA network.



Figure 177. Multiple SNA over TCP/IP Gateways

In the environment in Figure 177, SNA applications running on native SNA systems in one network can communicate with SNA applications running on native SNA systems in the other network, across a TCP/IP network.

Sockets over SNA Gateway Scenario

This section presents the process of defining and verifying AnyNet/400 Sockets over SNA, via an AnyNet Sockets over SNA gateway, at the International Technical Support Organization in Raleigh.

– Note –

The AS/400 applications supported under AnyNet/400 in this environment are as when using AnyNet/400 Sockets over SNA in an non-gateway environment (as shown in "Using AnyNet/400 Sockets over SNA" on page 24).

In this scenario, we will use one-to-one mapping to map the IP addresses to SNA LU names.

Shown in the following figure are the systems used in this scenario and their respective IP over SNA addresses. An SNA/APPC configuration is already in place between RALYAS4A and RALSOCGW using the network ID and CP names shown. A TCP/IP configuration is already in place between RALSOCGW and RALYPS2B using the internet addresses shown.



Figure 178. Systems Used for Sockets over SNA Gateway Scenario

The following series of panels show the AS/400 and PS/2 configuration panels taken from the RALYAS4A, RALSOCGW and RALYPS2B systems. They illustrate the configuration steps required for this Sockets over SNA scenario.

Please note that only the key AnyNet/2 configuration displays are shown in this section. For further AnyNet/2 configuration help, refer to *AnyNet/2: Sockets over SNA and NetBIOS over SNA, Installation and Interoperability* GG24-4396.

- PS/2 Software Installed

The following software was installed on RALSOCGW:

- OS/2 Version 2.1
- CM/2 Version 1.11 with AnyNet/2 support installed (additional functions)
- TCP/IP Version 2.0 for OS/2 Base kit plus CSD UN64092
- AnyNet/2 Sockets over SNA Gateway Version 1.1 plus the fixes for APARs IC08105 and IC07866.

The software was installed in the above order.

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Next, we configure a Sockets over SNA interface on RALYAS4A.

		Wo	rk	with	IP over	SNA In	terfaces	Svs	tom.	ραι γαςάδ
Type opt 1=Add	tions 2=	, press Enter Change 4=Re	mov	e 9	9=Start	10=End	ł	593		INC ING TA
Opt	Inte Addr	rnet ess		Subne Mask	et		Interface Status			
_	9.67	.60.20		255.2	255.255.0		Active			
										Bottom
F3=Exit F12=Cano	cel	F5=Refresh F17=Top	F6 F1	=Prin 8=Bo	nt list ttom	F10=W0	ork with TCI	P/IP	interfa	ces

Figure 179. Sockets over SNA Gateway Scenario: Work with IP over SNA Interfaces

The subnet mask of 255.255.255.0 indicates that the first three bytes of the internet address (9.67.60) is the network ID.

Type o 1=Ac	option: Id 4	s, press Enten =Remove	Work with IP ove ^.	r SNA Routes	System:	RALYAS4A
Opt	Rou [.] Des	te tination	Subnet Mask	Next Hop		
-	9.24.104.0		255.255.255.0	9.67.60.25		
						Bottom
F3=Exi F12=Ca	t ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCF	P/IP routes	

Because system RALYAS4A will be communicating with a system via an AnyNet Sockets over SNA gateway, a route needs to be configured.

Figure 180. Sockets over SNA Gateway Scenario: Work with IP over SNA Routes

	W	ork with IP ov	ver SNA Locations	System:	RALYAS4A
Type o 1=Ac	options, press Ente dd 2=Change 4=R	r. emove		Ĵ	
Opt	Remote Destination	Subnet Mask	Remote Network ID	Location Template	
- - -	9.67.60.20 9.67.60.25	*HOST *HOST	USIBMRA USIBMRA	RALYAS4A RALSOCGW	
					Bottom
F3=Exi (C) CC	it F5=Refresh F DPYRIGHT IBM CORP.	6=Print list 1980, 1994.	F12=Cancel F17=	=Top F18=Bot	tom

Next, we configure the IP over SNA locations on RALYAS4A.

Figure 181. Sockets over SNA Gateway Scenario: Work with IP over SNA Locations

By default, AnyNet/2 will use mode SNACKETS for Sockets over SNA. We therefore map the IP Type of Service we want to use (*NORMAL) to the SNA Mode SNACKETS.

	Work with IP over SNA Type of Ser	vice	
Type o 2=Cl	options, press Enter. hange	System:	RALYAS4A
Opt 	Type of Service SNA Mode *MINDELAY *NETATR *MAXTHRPUT *NETATR *MAXRLB *NETATR *MINCOST *NETATR *NORMAL SNACKETS		Bottom
F3=Ex F12=Ca (C) C0	it F5=Refresh F6=Print list F10=Work with ancel OPYRIGHT IBM CORP. 1980, 1994.	Mode Descriptions	

Figure 182. AS/400 Work with IP over SNA Type of Service

Mode SNACKETS with the parameters shown in Figure 44 on page 42 should be added to RALYAS4A.

RALYPS2B Configuration

For RALYPS2B to be able to communicate with systems in the 9.67.60 network, a route must be added to the OS/2 TCP/IP configuration as shown in the following figure.

⊻ TCP/IP Configuratio	onfigure Routing	Information	Motrio	a Network
CDefault/Net/Subnet/Host)	(<ip address="">) 9 . 67 . 60</ip>	((IP Address)) 9 24 104 17 9 24 104 1	(<# of Hops to Destination>)	Autostart SLIP Services SNMP
Insert Before	Insert After	Edit (Help	Delete	

Figure 183. Sockets over SNA Gateway Scenario: OS/2 TCP/IP Route Configuration Panel

RALSOCGW Configuration

The Communications Manager/2 setup is *not* shown here. An end node-tonetwork node server configuration was created via the APPC APIs through Token-ring CM/2 menu option to RALYAS4A. The AS/400 APPC controller and device descriptions were auto-created when this CM/2 configuration was started.

Select the **Configure AnyNet/2 Gateway** icon to access the configuration screens on RALSOCGW. The folder icon should be displayed on the OS/2 desktop, if the AnyNet/2 Sockets over SNA Gateway has been installed correctly.

🔊 AnyNet/2 Gateway - Io	on View	
Start AnyNet/2 Sockets Gateway	Configure AnyNet/2 Gateway	

Figure 184. AnyNet/2 Sockets over SNA Gateway Folder

The first AnyNet/2 Sockets over SNA Gateway screen defines the local system (local node).

🗶 🛛 AnyNet	/2 Configuration			
	See / Sha			
	Start Sockets over SNA Gateway automatically			
	IP Address for SNA:	9.67.60.25		
	Address Mask: 255.255.255.255			
	LU Template:	RALSOCGW		
	SNA Network Name:	USIBMRA		
Ga Enter th Local	ateway Connection Limit Pass Help I Paddress of your local nod node <u>R</u> emote nodes	word: Save Page 1 of 5 le. Save Start options		

Figure 185. Sockets over SNA Gateway Scenario: Local Node Definition for RALSOCGW

The second AnyNet/2 Sockets over SNA configuration screen defines the remote systems (remote nodes).

AnyNet/2 Configuration						
Co	Configure Sockets over SNA Gateway–Remote Nodes					
	Address 1 of 1					
	IP Network ID:	9.67.60.20				
	Address Mask:	255.255.255.255				
	LU Template:	RALYAS4A				
	SNA Network Name:	USIBMRA				
	New					
Help Page 2 of 5						
Enter the	e IP network ID for this node.					
Local	node <u>Remote nodes</u>	<u>Start options</u>				

Figure 186. Scenario 3: Sockets over SNA Remote Node Definition for RALSOCGW

Note: With one-to-one mapping, a remote node definition is required for *every* Sockets over SNA system accessed via the gateway. If instead we had used algorithmic mapping, one remote node definition could be used to give access to many Sockets over SNA systems.

The final AnyNet/2 Sockets over SNA Gateway configuration screen allows the SNA mode used for Sockets over SNA to be changed. Configuration screens 3 and 4 are not shown here.

AnyNet/2 Configuration	
Configure Sockets over SNAModes	50 <u>0</u> /58A
Default mode for all ports: SNACKETS	
Set default modes for individual ports:	
Mew	
Edit	
Help Defaults Save Page 5 of 5	
Enter the default mode name for all Sockets over SHA traffic.	197
Local node Remote nodes Start options Define modes	

Figure 187. Sockets over SNA Gateway Scenario: Modes Definition for RALSOCGW

The AnyNet/2 Sockets over SNA Gateway configurator produces a command file (sxstart.cmd) based on the information in the AnyNet/2 Sockets over SNA Gateway configuration screens. This command file will be used when AnyNet/2 Sockets over SNA Gateway is started. System RALSOCGW has the following sxstart.cmd file:

@REM Sockets over SNA startup file

@REM First, start the Snackets program.

start snackets logfile 100000 sessions 30

@REM Next, tell Sockets over SNA how to map IP addresses to LU names. @REM Wait for Sockets over SNA to get set up before continuing. sxmap -w add 9.67.60.25 255.255.255.255 USIBMRA RALSOCGW

sxmap add 9.67.60.20 255.255.255.255 USIBMRA RALYAS4A

@REM Use IFCONFIG to define the local address ifconfig sna0 9.67.60.25 route add 9.67.60.25 9.67.60.25 0 route add 9.67.60.20 9.67.60.25 0

Shown next are the matching parameters between all the systems.

SYSTEM RALYPS2B ******		SYSTEM RALSOCGW ******** CM/2 APPC APIS DEFINITION			SYSTEM RALYAS4A ******** LINE DESCRIPTION		
TCP/IP CONFI	GURATION		TCP/IP CONFIGURATI	ON			
INTERFACE PA	RAMETERS		INTERFACE PARAMETE	RS			
IP ADDRESS SUBNET MASK	9.24.104.189 255.255.255.0		IP ADDRESS SUBNET MASK	9.24.104.178 255.255.255.0			
ROUTING INFO	RMATION		ROUTING INFORMATIO	N			
ROUTE TYPE	NET 9.67.60		ROUTE TYPE	DEFAULT			
ROUTER	9.24.104.178	↓	ROUTER	9.24.104.1			
			SOCKETS OVER SNA G	ATEWAY			
			LOCAL NODE DEFINIT	ION		IP OVER SNA	INTERFACES
			IP ADDR ADDRESS MASK LU TEMPLATE	9.67.60.25 ← 255.255.255.255 RALSOCGW ←		INTNETADR SUBNETMASK	9.67.60.20 4 255.255.255.0
			SNA NETWORK NAME	USIBMRA <		IP OVER SNA	ROUTES
			REMOTE NODE DEFINI IP NETWORK ID	TION 9.67.60.20 ← 255 255 255 255		RTEDEST SUBNET MASK NEXTHOP	9.24.104.0 255.255.255.0 9.67.60.25
			LU TEMPLATE SNA NETWORK NAME	RALYAS4A		IP OVER SNA	LOCATIONS
			SOCKETS OVER SNA M DEFAULT MODE FOR	IDDES		RMTDEST SUBNETMASK RMTNETID LOCTPL	9.67.60.20 *HOST USIBMRA RALYAS4A
			ALL PORTS: SNACKE	TS ←		RMTDEST SUBNETMASK RMTNETID LOCTPL	9.67.60.25 *HOST USIBMRA RALSOCGW
						IP OVER SNA	TYPE OF SERVICE
						TYPE OR SEVI SNA MODE: S	CE NORMAL NACKETS

Figure 188. Sockets over SNA Gateway Scenario: Matching Parameters Table
Verifying the Sockets over SNA Gateway Scenario

In order to prove that the Sockets over SNA connection is working, we can follow a step-by-step verification process. In a failing environment, this step-by-step process should help locate the failing area. Verification is shown for the following:

- AnyNet/400 via Sockets over SNA Gateway
- AnyNet/2 Sockets over SNA Gateway

AnyNet/400 via Sockets over SNA Gateway Verification

The verification of Sockets over SNA via an AnyNet Sockets over SNA Gateway should be carried out in the following stages:

- Verify the SNA configuration between the AnyNet/400 system and the gateway.
- Verify the TCP/IP configuration between the native TCP/IP system and the gateway.
- Verify the Sockets over SNA configuration between the AnyNet/400 system and gateway.
- Verify the end-to-end Sockets over SNA configuration from either end.

Verify the SNA configuration between the AnyNet/400 system and the gateway.

AnyNet/400 Sockets over SNA requires an SNA configuration between the systems. This SNA configuration is established as if it were to be used by native APPC applications; there are no special SNA configuration requirements to allow Sockets over SNA to use the SNA configuration. Before we verify the Sockets over SNA configuration to the gateway, we should verify the native SNA configuration. This can be done in many ways. In this example where the gateway system is an OS/2 system, verification will take place when the link is activated. The reason being that a CP (Control Point) session is established between the systems. Assuming the connection is via a LAN, this CP session activation will result in the target AS/400 controller and device descriptions being autocreated.

The following figure shows the autocreated AS/400 LAN configuration.

Positi	ion to	Work with	Configurat Starti	ion Stat	us 12/15/94 cters	RALYAS4A 12:45:48
Type o 1=Va 9=Di	options, press E ary on 2=Vary isplay mode stat	nter. off 5=Work us	with job	8=Work	with description	
Opt [l 	Description _41TR RALSOCGW RALSOCGW	Status ACTIVE ACTIVE ACTIVE			Job	
Parame	eters or command					Botto
===> F3=Exi	it F4=Prompt	F12=Cancel	F23=More	options	F24=More keys	

Figure 189. Verifying an SNA Configuration between Systems RALSOCGW and RALYAS4A

This SNA configuration can be further verified by issuing the STRMOD command as shown in the following:

```
STRMOD RMTLOCNAME(RALSOCGW) MODE(SNACKETS)
Command STRMOD completed successfully for mode SNACKETS device RALSOCGW.
The STRMOD command completed successfully for all modes.
```

Once we are satisfied that the SNA configuration is working fine, we can move on to verify the TCP/IP configuration involved.

Verify the TCP/IP configuration between the native TCP/IP system and the gateway.

The TCP/IP configuration between the native TCP/IP system and the gateway can be verified by use of the PING TCP/IP application.

OS2 C:\>ping 9.24.104.178 PING 9.24.104.178: 56 data bytes 64 bytes from 9.24.104.178: icmp_seq=0. time=46. ms 64 bytes from 9.24.104.178: icmp_seq=1. time=0. ms 64 bytes from 9.24.104.178: icmp_seq=2. time=0. ms 64 bytes from 9.24.104.178: icmp_seq=3. time=0. ms 64 bytes from 9.24.104.178: icmp_seq=4. time=0. ms ----9.24.104.178 PING Statistics----5 packets transmitted, 5 packets received, 0% packet loss round-trip (ms) min/avg/max = 0/9/46

Figure 190. OS/2 PING Command Output

Verify the Sockets over SNA configuration between the AnyNet/400 System and gateway.

Before we try to establish a Sockets over SNA connection through the gateway, it is wise to try to establish a connection to the gateway.

Before we can use an AS/400 TCP/IP application with Sockets over SNA, we must start the server for that application on the AS/400. To start the FTP application server (the application we use in this verification), enter the command:

```
STRTCPSVR SERVER(*FTP)
```

Alternatively we can start TCP/IP on the AS/400. To do this, enter the command STRTCP. In the examples that follow we have used the STRTCP command. By default, STRTCP will start the FTP server.

Besides being able to display native TCP/IP network status, NETSTAT can also be used to display Sockets over SNA interfaces, routes and connection status. Figure 191 shows the status of the Sockets over SNA interface (9.67.60.20). From this NETSTAT option 1 (Work with TCP/IP Interface Status) display we can verify that the local IP over SNA interface is active and hence available for use. If not available (Inactive), we can use option 9 to make it available. No native TCP/IP interface is configured on this system.

		Work with TCP/IP	Interface St	atus S	ystem:	RALYAS4A
Type	options, press E	nter.			-	
5= 12	Display details =Work with config	8=Display associ uration status	ated routes	9=Start	10=End	
	Internet	Network	Line	Interface		
0pt	Address	Address	Description	Status		
- F	9.67.60.20	9.67.60.0	*IPS	Active		
	127.0.0.1	127.0.0.0	*LOOPBACK	Active		
						Bottom
F3=F	xit F4=Prompt	F5=Refresh F11	=Disnlav line	informati	on F12	=Cancel
F13=	Sort by column	F24=More keys	bispidy inc	ini of mat i	011 112	Guncer

Figure 191. NETSTAT Work with TCP/IP Interface Status

NETSTAT option 2 (Display TCP/IP route information) gives route information for all routes (native TCP/IP and Sockets over SNA). The panel also shows whether or not the route is available.

		Display TCP/IP	Route Informat	ion	
Type 5=	options, press E Display details	nter.		System	KALTAJ4A
Opt _ _ _	Route Destination 9.67.60.0 9.24.104.0 127.0.0.0	Subnet Mask 255.255.255.0 255.255.255.0 255.0.0.0	Next Hop *DIRECT 9.67.60.25 *DIRECT	Route Available *YES *YES *YES	
F3=E F13=	xit F5=Refresh Sort by column	F6=Print list F17=Top	F11=Display r F18=Bottom	oute type F12	Bottom 2=Cancel

Figure 192. NETSTAT Display TCP/IP Route Information

The NETSTAT option 2 example in Figure 192 is from a system with only a Sockets over SNA configuration. The first entry was automatically added when the Sockets over SNA Interface was added (a Sockets over SNA interface with an internet address of 9.67.60.20 and a subnet mask of 255.255.255.0). This entry will give access to systems on the same network as the local system. The second entry is the result of adding a Sockets over SNA route with a route destination of 9.24.104.0, subnet mask of 255.255.255.0 and next hop of 9.67.60.25. The third entry is the loopback entry. We can use this display to verify that a route is available to the remote system with which we want to communicate using Sockets over SNA. Note that the next hop for 9.67.60.0 is direct, go use the local interface, in this case IP over SNA. Whereas the next hop for 9.24.104.0 is the address of the AnyNet Sockets over SNA gateway.

Having verified that the local IP over SNA interface is active and that a route is available, we can now try to establish a Sockets over SNA session to the gateway system. Under native TCP/IP we would normally use the PING application to initially test a configuration. However, under OS/400 Sockets over SNA, PING Server only is supported. This, therefore, does not make a good test tool to use in this environment. Since the FTP (File Transfer Protocol) application is universally supported by TCP/IP systems, we have used this application here to verify the Sockets over SNA configurations.

– PING client –

An OS/400 V3R1 PTF is now available that makes it possible to use the OS/400 PING client with AnyNet. The PTF number is SF25273.

We must first make sure that Sockets over SNA and any application we want to use are started on the remote system. In the example that follows we FTP to an OS/2 system. We therefore need to start AnyNet/2 Sockets over SNA and the FTP application server on the OS/2 system. To start AnyNet/2 Sockets over SNA we use the SXSTART command. See "AnyNet/2 Sockets over SNA Gateway Verification" on page 159. In Figure 193 we have used the following command to access the OS/2 system RALSOCGW via Sockets over SNA:

ftp '9.67.60.25'

```
File Transfer Protocol
Previous FTP subcommands and messages:
 Connecting to remote host name 9.67.60.25 using port 21.
 220 as4ps2 IBM TCP/IP for OS/2 - FTP Server ver 12:58:07 on Mar 16 19
  ready.
 215 OS/2 operating system
> anyuser
  331 Password required for anyuser.
 230 User anyuser logged in.
Enter an FTP subcommand.
===>
F3=Exit
           F6=Print
                          F9=Retrieve
F17=Top
                        F21=CL command line
          F18=Bottom
```

Figure 193. FTP via Sockets over SNA to an OS/2 System

```
— Note —
```

We could, of course, have added 9.67.60.25 to the local TCP/IP host table (or to the name server being used) which would have allowed us to use a host name rather than the internet address with the FTP command.

Having established a Sockets over SNA connection, if we now look at the AS/400 configurations status via the WRKCFGSTS command.

	Work with Configura	tion Status	11/30/04	RALYAS4A
Position to	Start	ing charact	ers	10:55:11
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work with job us	8=Work wi	th description	
Opt Description L41TR RALSOCGW RALSOCGW	Status ACTIVE ACTIVE ACTIVE		Job	
SNACKETS	ACTIVE/SOURCE	DSP01	ANYUSER	010193
SNACKETS	ACTIVE/TARGET	DSP01	ANYUSER	010193
Parameters or command				Bottom
===>				
F3=Exit F4=Prompt	F12=Cancel F23=More	options	F24=More keys	

Figure 194. WRKCFGSTS of Active Sockets over SNA Session

Note that unlike Sockets over SNA to another access node, in this case two SNA sessions are established (one source and one target). The reason for this is the fact that an AnyNet gateway uses twin-opposed half-duplex SNA sessions for Sockets over SNA.

NETSTAT option 3 can be used to display the session from a TCP/IP perspective as shown in Figure 195.

		Work with	TCP/IP Conr	nection Stat	tus	
Loca	l internet addre	ss		.: *ALI	- System:	KALTA34A
Type 4=	e options, press End 5=Display	Enter. details				
	Remote	Remote	Local			
0pt	Address	Port	Port	Idle Time	State	
•	*	*	ftp-con >	000:11:17	Listen	
	*	*	telnet	000:27:03	Listen	
	*	*	lpd	000:26:53	Listen	
	9.67.60.25	ftp-con >	1032	000:02:39	Established	
F5=R	efresh F11=Dis	olav byte co	ounts F13=	-Sort by col	umn	
F14=	Display port num	pers F22=D)isplay enti	re field	F24=More keys	

Figure 195. NETSTAT Work with TCP/IP Connection Status

 $\overline{}$

Verify the end-to-end Sockets over SNA configuration from either end.

Having verified the configuration to the gateway from either end, we can now try to establish a connection through the gateway. Again, we have used FTP to verify the configuration. Having verified that FTP is running at the remote system (RALYPS2B), we FTP from RALYAS4A to RALYPS2B.

ftp '9.24.104.189'

File Transfer Protocol
<pre>Previous FTP subcommands and messages: Connecting to remote host name 9.24.104.189 using port 21. 220 as4ps2 IBM TCP/IP for OS/2 - FTP Server ver 12:48:07 on Dec 15 1994 ready. 215 OS/2 operating system > anyuser 331 Password required for anyuser. 230 User anyuser logged in.</pre>
Enter an FTP subcommand. ===>
F3=Exit F6=Print F9=Retrieve F17=Top F18=Bottom F21=CL command line

Figure 196. FTP Command to RALYPS2B from RALYAS4A

NETSTAT option 1 (Work with TCP/IP interface status) and option 2 (Display TCP/IP route information) panels remain unchanged from those shown in Figure 191 on page 153 and Figure 192 on page 154. NETSTAT option 3 (Work with TCP/IP connection status) now shows the connection to RALYPS2B.

		Work with	TCP/IP Conn	ection Stat	us System:	RALYAS4A
Loca	l internet addre	ss		.: *ALL	-	
Type 4=	e options, press End 5=Display	Enter. details				
	Remote	Remote	Local			
0pt	Address	Port	Port	Idle Time	State	
	*	*	ftp-con >	000:11:17	Listen	
	*	*	telnet	000:27:03	Listen	
	*	*	1pd	000:26:53	Listen	
	9.24.104.189	ftp-con >	1054	000:01:42	Established	
F5=R F14=	efresh F11=Dis Display port num	play byte co bers F22=D	ounts F13= Display enti	Sort by col re field	umn F24=More keys	

Figure 197. NETSTAT Work with TCP/IP Connection Status

With the FTP connection established, WRKCFGSTS will be as shown in Figure 194 on page 156. If we now initiate a file transfer to RALYPS2B, a second pair of SNA sessions will be established as can be seen in Figure 198.

	Work with Configura	tion Status	5	RALYAS4A
Position to	Start	ing charact	11/30/94 ters	11:04:13
Type options, press 1=Vary on 2=Vary 9=Display mode sta	Enter. off 5=Work with job tus	8=Work wi	ith description	
Opt Description L41TR RALSOCGW RALSOCGW	Status ACTIVE ACTIVE ACTIVE		Job	
SNACKETS	ACTIVE/SOURCE	DSP01	ANYUSER	010193
	ACTIVE/TARGET	DSP01 DSP01	ANYUSER	010193
SNACKETS	ACTIVE/SOURCE	DSP01	ANYUSER	010193
Parameters or commar	d			Botton
===> F3=Exit F4=Prompt	F12=Cancel F23=More	options	F24=More keys	

Figure 198. WRKCFGSTS of Active Sockets over SNA Session

— Configuration advice -

In Figure 198 we can see that four SNA sessions have been established. Two of these are for the FTP control session and two for the data connection. Two sessions are established for each because an AnyNet Sockets over SNA gateway uses twin-opposed half-duplex conversations. You should be aware of this point when deciding the session limits associated with modes that will be used for Sockets over SNA.

AnyNet/2 Sockets over SNA Gateway Verification

To check whether Communication Manager/2 is running, we can use the CMQUERY command.

Workstation Type Default configuration Active configuration	: Single User : RALSOCGW : RALSOCGW
Service	Status
CM Kernel	ACTIVE
SNA Services	ACTIVE
SRPI	*** Stopped ***
X.25	*** Stopped ***
SNA Phone Connect	*** Stopped ***
ACDI	*** Stopped ***
3270 Emulator	*** Stopped ***
5250 Emulator	*** Stopped ***

Figure 199. Communications Manager/2 CMQUERY command

To start AnyNet/2 Sockets over SNA Gateway, we should do the following:

- 1. Start Communication Manager/2.
- 2. Start AnyNet/2 Sockets over SNA Gateway.

AnyNet/2 Sockets over SNA can be started by either opening the **Start AnyNet/2 Sockets Gateway** icon or by entering the SXSTART command.

🔊 AnyNet/2 Gateway - Io	on View	
Start AnyNet/2 Sockets Gateway	Configure AnyNet/2 Gateway	

Figure 200. AnyNet/2 Sockets over SNA Gateway Folder

If you plan to use an OS/2 TCP/IP application (for example, FTP), then it is also necessary to start that application on the OS/2 system.

When AnyNet/2 Sockets over SNA Gateway is started, the sxstart command file will run. The following is an example of the output of the sxstart.cmd file:

```
OS2 C:\>sxstart
OS2 C:\>start snackets logfile 100000 sessions 30
OS2 C:\>sxmap -w add 9.67.60.25 255.255.255 USIBMRA RALSOCGW
OS2 C:\>sxmap add 9.67.60.20 255.255.255 USIBMRA RALYAS4A
OS2 C:\>ifconfig sna0 9.67.60.25
OS2 C:\>route add 9.67.60.25 9.67.60.25 0
add host 9.67.60.25: router 9.67.60.25 0
add host 9.67.60.20: router 9.67.60.25
```

Figure 201. AnyNet/2 sxstart Command Output

Once initialized, AnyNet/2 Sockets over SNA Gateway will run in an OS/2 window session named snackets.exe:

snackets.exe		
AnyNet/2 Soc	ckets over SNA Gateway Version 1.10	
Copyright:	Licensed Materials - Property of IBM	
	5622-260 (C) Copyright IBM Corp. 1993, 1994 All rights reserved.	
SOS0009: AnyNet SOS0026: IP add -	t/2 Sockets over SNA Gateway initialization c dress 9.67.60.25 assigned to sna0; LU name is	omplete RALSOCGV

Figure 202. AnyNet/2 Sockets over SNA Gateway Initialization on RALSOCGW

AnyNet/2 Sockets over SNA Gateway can be stopped by pressing Ctrl-C in the OS/2 window session where the snackets.exe program is running - the window shown in Figure 202.

By default, AnyNet/2 Sockets over SNA Gateway will display error messages in the snackets.exe window.

In Figure 183 on page 146 we added a route to RALYPS2B, the OS/2 command NETSTAT -r can be used to verify that the route was added correctly as shown in the following figure.

C:\>netStat -	- r.					
destination	router	refcnt	use ⁻	flags	snmp metric	intrf
default	9.24.104.1	0	12	U	-1	1an0
9.24.104.0	9.24.104.189	4	152	U	-1	1an0
9.67.60.0	9.24.104.178	0	19	U	-1	1an0

Figure 203. OS/2 TCP/IP NETSTAT -r Command Output

At the gateway system (RALSOCGW) NETSTAT -r will show the native TCP/IP and Sockets over SNA route entries added at that system as shown next.

C:\>netstat -	r					
destination	router	refcnt	use	flags	snmp metric	intrf
9.67.60.25	9.67.60.25	0	0	U	-1	sna0
9.67.60.20	9.67.60.25	0	0	U	-1	sna0
default	9.24.104.1	0	0	U	-1	1an0
9.24.104.0	9.24.104.178	0	0	U	-1	1an0
9.0.0.0	9.67.60.25	0	0	U	-1	sna0
127.0.0.0	127.0.0.2	0	0	U	-1	gw0

Figure 204. OS/2 TCP/IP NETSTAT -r Command Output

In the following example we FTP from RALYPS2B to RALYAS4A.

```
OS2 C:->ftp 9.67.60.20
IBM TCP/IP for OS/2 - FTP Client ver 09:44:28 on Mar 04 1994
Connected to 9.67.60.20.
220-QTCP at 9.67.60.20.
220 Connection will close if idle more than 5 minutes.
Name (9.67.60.20): anyuser
331 Enter password.
Password: .....
230 ANYUSER logged on.
ftp>
```

Figure 205. OS/2 TCP/IP FTP Command

The active Communications Manager/2 LU 6.2 sessions on RALSOCGW can be displayed as follows:

- 1. Open the Communication Manager/2 icon.
- 2. Select Subsystem Management.
- 3. Select SNA Subsystem.
- 4. Select Display active configuration.
- 5. Select LU 6.2 sessions.

* Session Information *	
Numbon of cossions	Л
Number of sessions	4
deleted	
2-Section ID	V/50F717AED7F06F2C/
Conversation ID	X 32L/1/A3D/L90L3C X' Δ51F15QC'
	ralsocow
Partner III alias	0100000
Mode name	SNACKETS
Send maximum RU size	1920
Receive maximum RU size	1920
Send pacing window	1
Receive pacing window	7
Link name	LINK0001
Outbound destination address (DAF)	X'02'
Outbound origin address (OAF)	x'02'
OAF-DAF assignor indicator (ODAI)	B'0'
Session type	LU-LU session
Connection type	Peer
Procedure correlator ID (PCID)	X' F0D312A294ED9659'
PCID generator CP name	USIBMRA.RALSOCGW
Conversation group ID	X' DBE96E3C'
LU name	USIBMRA.RALSOCGW
Partner LU name	USIBMRA.RALYAS4A
Pacing type	Adaptive
Primary LU indicator	Local LU
FMD PIUs sent by primary LU	8
FMD PIUs sent by secondary LU	2
Non-FMD PIUs sent by primary LU	1
Non-FMD PIUs sent by secondary LU	1
Bytes sent by primary LU	516
Bytes sent by secondary LU	134
PLU to SLU compression level	None
PLU to SLU compression percent	0
SLU to PLU compression level	None
SLU to PLU compression percent	0
4>Session ID	X'0A242FA5FRF96F30'
Conversation ID	X' A517DF7F'
	ralsocow
Partner III alias	0100000
Mode name	SNACKETS
Send maximum RU size	1920

Receive maximum RU size	1920
Send pacing window	1
Receive pacing window	7
Link name	LINK0001
Outbound destination address (DAF)	X'02'
Outbound origin address (OAF)	X'02'
OAF-DAF assignor indicator (ODAI)	B'1'
Session type	LU-LU session
Connection type	Peer
Procedure correlator ID (PCID)	X' F64B0D2BCC94B2A6'
PCID generator CP name	USIBMRA.RALYAS4A
Conversation group ID	X'EEE96E3C'
LU name	USIBMRA.RALSOCGW
Partner LU name	USIBMRA.RALYAS4A
Pacing type	Adaptive
Primary LU indicator	Partner LU
FMD PIUs sent by primary LU	5
FMD PIUs sent by secondary LU	2
Non-FMD PIUs sent by primary LU	1
Non-FMD PIUs sent by secondary LU	1
Bytes sent by primary LU	440
Bytes sent by secondary LU	161
PLU to SLU compression level	None
PLU to SLU compression percent	0
SLU to PLU compression level	None
SLU to PLU compression percent	0

Note that two sessions are being used unlike the non-gateway AnyNet/2 Sockets over SNA example where a single session was used. The reason for this is the fact that an AnyNet gateway uses twin-opposed half-duplex SNA sessions for Sockets over SNA.

The active Communications Manager/2 Transaction Programs on RALSOCGW can be displayed as follows:

- 1. Open the Communication Manager/2 icon.
- 2. Select Subsystem Management.
- 3. Select SNA Subsystem.
- 4. Select Display active configuration.
- 5. Select Transaction programs.

* Active Transaction Programs *	
Active transaction programs	2
1>Transaction program name Transaction program ID User ID	X′28F0F0F1′ X′04002FA5E5E96E3C′
Transaction program initiated LU alias Logical unit of work name Logical unit of work instance Logical unit of work sequence Number of conversations	Locally ralsocgw USIBMRA.RALSOCGW X'DDDDDDDDDDE09' X'0001' 1

<pre>1.1>Conversation ID Conversation state Session ID Synchronization level Conversation type Conversation group ID Conversation source Conversation style Bytes sent by source Bytes sent by target</pre>	X'A51F159C' Send X'52E717A5D7E96E3C' None Basic X'3C6EE9DB' Partner LU Two-way alternate 139 O
2>Transaction program name Transaction program ID User ID Transaction program initiated LU alias Logical unit of work name Logical unit of work instance Logical unit of work sequence Number of conversations	X'28F0F0F1' X'060C2FA5F0E96E3C' Remotely ralsocgw USIBMRA.RALYAS4A X'DDDDDDDDDE0C' X'0001' 1
2.1>Conversation ID Conversation state Session ID Synchronization level Conversation type Conversation group ID Conversation source Conversation style Bytes sent by source Bytes sent by target	X'A517DE7E' Receive X'OA242FA5EBE96E3C' None Basic X'3C6EE9EE' Local LU Two-way alternate 207 O

X'28F0F0F1' is the transaction program name for Sockets over SNA.

With the FTP session established from RALYPS2B to RALYAS4A, NETSTAT -s on RALYPS2B shows the following:

0S2 C:	<pre>\>netstat -s</pre>				
SOCK	ТҮРЕ	FOREIGN PORT	LOCAL PORT	FOREIGN HOST	STATE
==== =	=========		=========	=========	=========
24 6	STREAM STREAM	ftp21 0	1029 ftp21	9.67.60.20 0.0.0.0	ESTABLISHED LISTEN

Figure 206. OS/2 TCP/IP NETSTAT -s Command Output - RALYPS2B

With the FTP session still established, NETSTAT -s on RALSOCGW shows the following:

	Anatatat a				
SOCK	TYPE	FOREIGN PORT	LOCAL PORT	FOREIGN HOST	STATE
==== =					
18	STREAM	1234	1025	127.2.0.21	ESTABLISHED
5	STREAM	0	ftp21	0.0.0.0	LISTEN

Figure 207. OS/2 TCP/IP NETSTAT -s Command Output - RALSOCGW

The GWSTAT utility can be used at RALSOCGW to display information about Sockets over SNA Gateway activity.

```
OS2 C:\>gwstat
Current # of gateway entries: 1
Maximum # of gateway entries: 2
Total # of gateway entries:
                              3
Current # of gateway threads: 1
Maximum # of gateway threads: 2
Total # of gateway threads:
                              3
Maximum gateway chain length: 2
UDP bytes sent native to MPTN: 0
UDP bytes sent MPTN to native: 0
TCP bytes sent native to MPTN: 312
TCP bytes sent MPTN to native: 364
Gateway entry limit:
                              3
Connections refused:
                              0
Datagrams dropped:
                              0
```

Figure 208. AnyNet/2 GWSTAT Command Output - RALSOCGW (1 of 2)

The GWSTAT -c command can be used to display gateway connections as shown in the following figure.

0S2 C:\	>gwstat	- C		
ID	Proto	Native endpoint	MPTN endpoint	Flags
020015	ТСР	9.24.104.189/ 1028	9.67.60.20/ 21	008c

Figure 209. AnyNet/2 GWSTAT Command Output - RALSOCGW 2 of 2

APPC over TCP/IP Gateway Scenario

This section presents the process of defining and verifying AnyNet/400 APPC over TCP/IP, via an AnyNet SNA over TCP/IP gateway, at the International Technical Support Organization in Raleigh.

```
– Note –
```

The AS/400 applications supported under AnyNet/400 in this environment are the same as when using AnyNet/400 APPC over TCP/IP in a non-gateway environment (as shown in "Using AnyNet/400 APPC over TCP/IP" on page 90).

Shown in the following figure are the systems used and their respective IP addresses for this scenario. An SNA/APPC configuration is already in place between RALYAS4B and RAK using the network ID and CP names shown. A TCP/IP configuration is already in place between RALYAS4A and RAI using the internet addresses shown.



Figure 210. Systems Used for APPC over TCP/IP Gateway Scenario

— Note -

An APPN configuration exists between RAI and RAK. Originally there was also an APPN configuration between RALYAS4B and RAK. However, this scenario would not work with this APPN configuration in place. It appears that AS/400 V3R1 APPN will not work from a host LEN connection (AnyNet/MVS, looks, to VTAM like a LEN connection) to a host APPN connection. This problem has been reported and APAR MA10052 has been opened. The circumvention we used was to define the RALYAS4B - RAK connection as LEN in the host controller description on RALYAS4B. The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RALYAS4B systems. Also shown is a subset of the AnyNet/MVS configuration information from RAI. They illustrate the configuration steps required for this APPC over TCP/IP Gateway scenario.

Please note that only the key AnyNet/MVS configuration displays are shown in this section. For further AnyNet/MVS configuration help, refer to *AnyNet: SNA over TCP/IP, Installation and Interoperability* GG24-4395.

— Host Software Installed —

The following software was installed on RAI:

- IBM MVS/ESA System Product (SP) Version 3 Release 1.3
- IBM MVS/ESA System Modification Program/Extended (SMPE) Release 5
- IBM TCP/IP Version 2 Release 2.1 for MVS
- IBM C for System/370 Version 2 at PUT level 9107
- VTAM Version 4 Release 2 base
- VTAM Version 4 Release 2 AnyNet host feature

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Before we can configure the APPC controller description and add the APPN remote location list entry, we need to display the network attributes on RALYAS4A and RALYAS4B, and the VTAM startup options from RAI to determine the network IDs and location (LU) names to be used.

			-											System:		RALYAS4A
Current system name	•	•	•	•	•	•	•	•	•	•	•	•	:	RALYAS4A		
Pending system name .	•	•	•	•	•	•	•	•	•	•	•	•	:			
Local network ID	•	•	•	•		•	•	•	•		•	•	:	USIBMRA		
Local control point name		•	•	•	•		•	•	•	•	•	•	:	RALYAS4A		
Default local location .				•	•	•	•	•	•				:	RALYAS4A		
Default mode			•	•		•	•	•					:	BLANK		
APPN node type													:	*NETNODE		
Data compression													:	*NONE		
Intermediate data compre	ssi	on											:	*NONE		
Maximum number of interm	edi	at	е	se	ss	io	ns						:	200		
Route addition resistanc	e												:	128		
Server network ID/contro	1 p	oi	nt	n	am	e	•	•	•	•	•	•	:	*LCLNETID *A	۱Y	
																More.

Figure 211. APPC over TCP/IP Gateway Scenario: AS/400 Network Attributes - RALYAS4A

														Syst	em:	RALYAS4
Current system name	•	•	•	•	•	•	•	•	•	•	•	•	:	RALYAS4B		
Pending system name .		•	•	•	•	•	•	•	•	•	•	•	:			
Local network ID						•							:	USIBMRA		
Local control point name													:	RALYAS4B		
Default local location .													:	RALYAS4B		
Default mode													:	BLANK		
APPN node type													:	*NETNODE		
Data compression													:	*NONE		
Intermediate data compre	ss	ioı	n										:	*NONE		
Maximum number of interm	ed	ia	te	S	ess	sic	ons	5					:	200		
Route addition resistanc	е												:	128		
Server network ID/contro	1	po [.]	int	t I	nan	ıe							:	*LCLNETID	*ANY	
																More

Figure 212. APPC over TCP/IP Gateway Scenario: AS/400 Network Attributes - RALYAS4B

The VTAM startup options from RAI are not shown here. The relevant items from the startup options are: NETID=USIBMRA and SSCPNAME=RAI.

Next, we create a controller description on RALYAS4A with LINKTYPE *ANYNW.

Create Ctl Des Type choices, press Enter.	sc (APPC) (CRT	CTLAPPC)
Controller description > A Link type > * Online at IPL * Remote network identifier * Remote control point > F User-defined 1 * User-defined 2 * User-defined 3 *	ANYNWMVSI *ANYNW *YES *NETATR RAIANYNT *LIND *LIND *LIND *LIND 'To AnyNet Gat	Name *ANYNW, *FAX, *FR, *IDLC *YES, *NO Name, *NETATR, *NONE, *ANY Name, *ANY 0-255, *LIND 0-255, *LIND 0-255, *LIND eway'
F3=Exit F4=Prompt F5=Refresh F F13=How to use this display F	F10=Additional F24=More keys	Bottom parameters F12=Cancel

Figure 213. APPC over TCP/IP Gateway Scenario: AS/400 APPC Controller Description

In the following panel we add the APPC over TCP/IP entries to the APPN remote location list at RALYAS4A.

		Cha	nge Config	juration L [.]	ist	03/07/95	RALYAS4A 14:06:54
Configura	tion list	: Q	APPNRMT				
Configura	tion list	type : *	APPNRMT				
Text		:					
Type chan	ges, press	s Enter.					
		APP	N Remote L	ocations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
RAI	*NETATR	*NETATR	RAIANYNT	*NETATR			*N0
RALYAS4B	*NETATR	*NETATR	RAIANYNT	*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Disp]	lay session	informati	on F12=0	Cancel F1	7=Top F1	.8=Bottom

Figure 214. APPC over TCP/IP Gateway Scenario: AS/400 APPN Remote Locations - RALYAS4A

While the first entry is not required for the correct operation of this scenario, it will allow us to test to the gateway prior to trying to establish a connection through the gateway.

			Work with TC	P/IP Host	: Table En	tries System:	RAI YAS4A
Туре 1=	opti Add	ons, press E 2=Change	nter. 4=Remove 5=	-Displav	7=Renam	le	
Opt	Inte Addr	ernet	Host Name				
_ _	9.24	1.104.56	RALYAS4A RALYAS4A.ITS	SO.RAL.IB	SM.COM		
-	9.24.104.74		RAI RAI.ITSO.RAU RAI.USIBMRA RALYAS4B.USI	.IBM.COM SNA.IBM. BMRA.SNA	1 COM .IBM.COM		
F3=E	xit	F5=Refresh	F6=Print l [.]	ist F12	eCancel?	F17=Position to	

The host table at RALYAS4A, shown following, has had the APPC over TCP/IP entries added.

Figure 215. APPC over TCP/IP Gateway Scenario: AS/400 TCP/IP Host Table

– Note –

 \sim

The AS/400 TCP/IP Host Table will allow a maximum of four host names to be entered against a single host internet address. This may become a restriction when using AnyNet/400 APPC over TCP/IP with an AnyNet SNA over TCP/IP gateway. Although, in fact, only the last host table entry shown is actually required for the correct operation of this scenario. One possible alternative is to use a name server rather than the AS/400 host table when the requirement is to communicate with more than four hosts via an AnyNet SNA over TCP/IP gateway.

RALYAS4B Configuration

ſ____

Only a subset of the configuration for RALYAS4B is shown.

Create Ctl Desc (SNA Host	:) (CRTCTLHOST)
Type choices, press Enter.	
Controller description > RAOPO8 Link type > *SDLC Online at IPL *YES Switched connection *NO Switched network backup *NO APPN-capable *YES Attached nonswitched line > RAOLOO22 Maximum frame size *LINKTYPE Remote network identifier *LINKTYPE Remote control point > RAK SSCP identifier *LIND Station address > 01 APPN CP session support > *NO APPN node type > *LENNODE APPN transmission group number 1	Name *IDLC, *FR, *LAN, *SDLC, *X25 *YES, *NO *NO, *YES *NO, *YES *YES, *NO Name 265-16393, 256, 265, 512 Name, *NETATR, *NONE, *ANY Name, *ANY 0500000000000-05FFFFFFFF 05600000-056FFFFF, *LIND 01-FE *YES, *NO *ENDNODE, *LENNODE 1-20, *CALC
:F3=Exit F4=Prompt F5=Refresh F12=Cancel :F24=More keys	F13=How to use this display

Figure 216. APPC over TCP/IP Gateway Scenario: AS/400 Host Controller Description - RALYAS4B

C	12 12	~				03/07/95	15:03:0
Configura	tion list	· · · · Q					
Configura	LION IISL	type: ~	APPINRMI				
iext		:					
Type chan	aps nross	Entor					
Type chan	yes, press	S LIILEI.					
		APP	N Remote	locations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
RALYAS4A	*NETATR	*NETATR	RAK	*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Displ	lay session	informat	ion F12=(Cancel F1	7=Top F1	8=Bottom

Figure 217. APPC over TCP/IP Gateway Scenario: AS/400 APPN Remote Locations - RALYAS4B

AnyNet/MVS Configuration

The AnyNet/MVS configuration for this scenario is identical to that for APPC over TCP/IP scenario 5. There are no special configuration requirements for AnyNet/MVS SNA over TCP/IP to act as a gateway.



Figure 218. APPC over TCP/IP Gateway Scenario: AnyNet/MVS Gateway Configuration

The IP network is represented to VTAM as a TCP/IP major node using a VBUILD TYPE=TCP as shown in Figure 219.

EDIT RISC.VTA	<pre>AMLST(RAIBSNIP) -</pre>	01.03	Columns 00001 000	72
***** *********	*****	* Top of D	ata ***********************************	***
==MSG> -Warning- Th	ne UNDO command i	s not avai	lable until you change	
==MSG> yo	our edit profile	using the	command RECOVERY ON.	
000001 **********	******	********	************************************	
000002 *			*	
000003 *	VTAM 42 ANYNET	-	SNA OVER TCP/IP *	
000004 *			*	
000005 *	SA 18	DEFINITI	ONS *	
000006 *			*	
000007 **********	**************	********	***************************************	
000008 RAIBSNIP VBU	JILD TYPE=TCP,			Х
000009	CONTIMER=30,		WAIT FOR MPTN TO COME UP	Х
000010	DGTIMER=30,		INTERVAL BETWEEN RETRIES	X
000011	DNSUFX=IBM.CO	Μ,	DOMAIN NAME SUFFIX	X
000012	EXTIMER=3,		BETW. SEND SNA EXPEDITED DATA	X
000013	IATIMER=120,		IIME BEFORE MPIN KEEPALIVE	X
000014	PORI=39/,		WELLKNOWN PORT FOR ANYNET	X
000015	ICB=10,	TOD	NUMBER MVS SUBIASKS	X
000016	ICPIPJOB=II8A		TCP/IP JUBNAME	
000017 RAIGSNIP GRO	JUP ISTATUS=ACTIV	E F	GROUPNAME	
000018 RAILSNIP LIN	LE ISTATUS=ACTIV	E F		
UUUUI9 KAIPSNIP PU	1214102=4C11A	L Dottom - f		***
		BOLLOW OL	Udld ""	

Figure 219. APPC over TCP/IP Gateway Scenario: IP Network Representation to VTAM

When using APPC over TCP/IP, VTAM sees any remote LUs as independent LUs, which are defined as CDRSCs.

EDIT RISC.VTAMLST(RAIRSNIP) - 01.07 Columns 00001 00072 ==MSG> -Warning- The UNDO command is not available until you change ==MSG> your edit profile using the command RECOVERY ON. 000002 * UPDATE LOG * 000003 * * 000004 * 03/07/95 MCLI MODIFY COMMENTS 000003 * 000003 * 000008 * -----000009 * VTAM 42 ANYNET SNA OVER TCP/IP 000010 * 000011 * SA 18 DEFINITIONS 000012 * 000013 * NAME CDRSC ALSLIST=.....NAME OF THE PU STATEMENT DEFINED 000014 * WITHIN THE VBUILD TYPE=TCP 000015 * 000016 * - THE NAME LABEL OF THE CDRSC DEFINITION STATEMENT MUST BE 000017 * THE REMOTE ILU NAME. 000018 * 000019 * - WE MUST CODE ALSREQ=YES TO USE THE PREDEFINED LIST. 000020 * - WE USE SOME CDRSC WITH THE NETID NOT CODED IN ORDER TO 000021 * 000022 * THE CDRMNAME AS AN ADJSSCP. 000023 * 000025 VBUILD TYPE=CDRSC 000026 * 000027 NETWORK NETID=USIBMRA 000028 * 000034 RALYAS4A CDRSC ALSLIST=RAIPSNIP,ALSREQ=YES AS400

Figure 220. APPC over TCP/IP Gateway Scenario: LU Representation to VTAM

The TCP/IP Host Table used by AnyNet/MVS SNA over TCP/IP is the normal host table.

Columns 00001 00072 EDIT TCPIP.ITSC.HOSTS.LOCAL ==MSG> -Warning- The UNDO command is not available until you change ==MSG> your edit profile using the command RECOVERY ON. 000001 ; -----000002; Update log 000003 ; 01/31/95 mcli Change 9.67.38.3 to 9.67.38.20 000004; 000005 ; -----000006; WATSON IP ADDRESSES 000007 ; NOTES: 000008 ; 1. To request additions, changes, or deletions from this file please 000009 ; use the WATIP REQUEST online form which can be found on the 000010 ; CMSSYS 19f disk (also known as the U disk). Follow further 000011 ; instructions within WATIP REQUEST. 000012 ; 2. This file should NOT contain any blank lines. 000013 ; -----000014 ; 000015 ; Ring 9.2.1.0 - Netmask 255.255.255.128 - Hawthorne I 16Mb 000016 ; Begin 9.2.1.0 000017 HOST : 14.0.0.0 : YKTVMV , CIAMPA, GARY , GTC, ME , TEST :::: 000018 HOST:9.67.38.36:WTR05221.USIBMRA.IBM.COM, ISNIPJL1.USIBMRA.IBM.COM ::::: 000019 HOST:9.67.38.36:ISNIPJL2.USIBMRA.IBM.COM, ISNIPJL3.USIBMRA.IBM.COM :::: 000020 HOST:9.67.38.36:ISNIPJL4.USIBMRA.IBM.COM :::: 000021 HOST:9.67.38.37:WTR05115.USIBMRA.IBM.COM, ISNIPML1.USIBMRA.IBM.COM :::: 000022 HOST:9.67.38.37:ISNIPML2.USIBMRA.IBM.COM, ISNIPML3.USIBMRA.IBM.COM ::::: 000023 HOST:9.67.38.37:ISNIPML4.USIBMRA.IBM.COM :::: 000024 HOST : 9.67.38.35 : WTR05222.USIBMSC.IBM.COM :::: 000025 HOST : 9.67.38.20 : RAIAC.USIBMRA.IBM.COM :::: 000026 HOST : 9.67.38.11 : RABAT.USIBMRA.IBM.COM :::: 000027 HOST : 9.67.38.20 : RAPAC.USIBMRA.IBM.COM :::: 000028 HOST : 9.67.38.11 : RA3AC.USIBMRA.IBM.COM :::: 000029 HOST : 9.67.38.11 : RABAC.USIBMRA.IBM.COM :::: 000030 HOST : 9.24.104.56: RALYAS4A.USIBMRA.IBM.COM :::: 000032;

Figure 221. APPC over TCP/IP Gateway Scenario: VTAM TCP/IP Host Table

The last entry in the table is the SNA over TCP/IP entry added for RALYAS4A.

No matching parameter table was created for this scenario.

Verifying the APPC over TCP/IP Gateway Scenario

In order to prove that the APPC over TCP/IP connection is working we can follow a step-by-step verification process. In a failing environment, this step-by-step process should help locate the failing area. Verification is shown for the following:

- AnyNet/400 via APPC over TCP/IP Gateway
- AnyNet/MVS SNA over TCP/IP Gateway

AnyNet/400 via APPC over TCP/IP Gateway Verification

The verification of APPC over TCP/IP via an AnyNet SNA over TCP/IP Gateway should be carried out in the following stages:

- Verify the TCP/IP configuration between the AnyNet/400 system and the gateway.
- Verify the APPC over TCP/IP configuration between the AnyNet/400 system and the gateway.
- Verify the SNA configuration between the native SNA system and the gateway.
- Verify the end-to-end APPC over TCP/IP Gateway configuration from either end.

Verify the TCP/IP configuration between the AnyNet/400 system and the gateway.

AnyNet/400 APPC over TCP/IP requires a TCP/IP configuration between the systems. This TCP/IP configuration is established as if it were to be used by native TCP/IP applications; there are no special TCP/IP configuration requirements to allow APPC over TCP/IP to use the TCP/IP configuration. Before we verify the APPC over TCP/IP configuration, we should verify the native TCP/IP configuration. This can be done in such a way that it also verifies part of the APPC over TCP/IP configuration. For example, the following will verify the TCP/IP configuration between RALYAS4A and RAI via the APPC over TCP/IP host table entry:

```
ping rai.usimbra.sna.ibm.com
Verifying connection to host system RAI.USIBMRA.SNA.IBM.COM at address
9.24.104.74.
Connection verification 1 took .171 seconds. 1 successful connection
verifications.
Connection verification 2 took .161 seconds. 2 successful connection
verifications.
Connection verification 3 took .042 seconds. 3 successful connection
verifications.
Connection verification 4 took .062 seconds. 4 successful connection
verifications.
Connection verification 5 took .038 seconds. 5 successful connection
verifications.
Round-trip (in milliseconds) min/avg/max = 38/94/171
Connection verification statistics: 5 of 5 successful (100 %).
```

```
Figure 222. AS/400 PING Command Job Log Information
```

Once we are satisfied that the TCP/IP configuration is working fine, we can move on to verify the APPC over TCP/IP configuration.

Verify the APPC over TCP/IP configuration between the AnyNet/400 system and the gateway.

Having verified the native TCP/IP configuration to the gateway, we can now verify the APPC over TCP/IP configuration to the gateway.

First we should check that the APPC over TCP/IP job is running. The command WRKACTJOB SBS(QSYSWRK) will display the active jobs in the QSYSWRK subsystem. The APPC over TCP/IP job QAPPCTCP should be active as shown in the following figure.

		h	lork with	Active	e Jobs	03/09/95	RALYAS4
CPU १	k: .0 I	Elapsed tim	ne: 00:	00:00	Active j	obs: 63	10.04.02
Гуре	options, press	Enter.					
2=(Change 3=Hold	d 4=End	5=Work	with	6=Release	7=Display mes	sage
8=V	Nork with spoo	led files	13=Disc	onnect	•••		
)pt	Subsystem/Job	User	Туре	CPU %	Function	Status	
	QSYSWRK	QSYS	SBS	.0		DEQW	
5	QAPPCTCP	QSYS	BCH	.0	PGM-QZPAIJ	OB TIMW	
	QECS	QSVSM	BCH	.0	PGM-QNSECS	JB DEQW	
	QMSF	QMSF	BCH	.0		DEQW	
_	QNSCRMON	QSVSM	BCH	.0	PGM-QNSCRM	ION DEQW	
_	QTCPIP	QTCP	BCH	.0		DEQW	
_	QTFTP00619	QTCP	BCH	.0		DEQW	
	QTFTP00734	QTCP	BCH	.0		DEQW	
	QTFTP02472	QTCP	BCH	.0		TIMW	
							More
Paran ===>	neters or comma	and					
-3=E>	kit F5=Ret	fresh F10)=Restart	statis	tics F11=	Display elapse	d data
-12=(Cancel F23=Mo	ore options	F24=M	ore kev	'S		

Figure 223. Work with Active Jobs Panel

If we look at the job log associated with QAPPCTCP, we see the following:

	Display Job Log	Sustan	
Job : QAPPCTCP	User : QSYS	System: Number :	011338
<pre>>> CALL QSYS/QZPAIJOB APPC over TCP/IP j</pre>	ob started.		
Press Enter to continu	e.		Bottom
F3=Exit F5=Refresh F16=Job menu	F10=Display detailed messages F24=More keys	F12=Cancel	

Figure 224. Display Job Log (QAPPCTCP) Panel

Note -

The APPC over TCP/IP job (QAPPCTCP) is initially started when the Allow AnyNet support (ALWANYNET) network attribute is changed to *YES. If the job fails for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the job.

Before we can use the AS/400 APPC over TCP/IP configuration, we must Vary on the APPC controller description we created for the APPC over TCP/IP connection. The Work with Configuration Status command can be used to show the status of the controller. For example, the following command resulted in the display shown in Figure 225.

WRKCFGSTS *CTL ANYNWMVSI

	Work with C	onfiguration Status O	RALYAS4A 3/07/95 14:47:01
Position to	••	Starting characters	-, -,
Type options, press 1=Vary on 2=Var 9=Display mode s	s Enter. ry off 5=Work w catus	ith job 8=Work with desc	ription
Opt Description ANYNWMVSI	Status VARIED OFF	Job	
Parameters or comma	and		Bottom

Figure 225. Work with Configuration Status for Controller ANYNWMVSI (1 of 2)

To make the configuration available, use option 1 (Vary on). The configuration should then go to a VARIED ON status.

When the first controller with link type *ANYNW is varied on, two TCP/IP connections will be started; one is a TCP connection that goes to LISTEN state to allow the system to accept incoming APPC over TCP/IP sessions; while the other is a UDP connection to handle out-of-band data for all APPC over TCP/IP activity. NETSTAT option 3 can be used to display all TCP/IP sessions (native TCP/IP and APPC over TCP/IP). Figure 226 shows NETSTAT option 3 prior to any APPC over TCP/IP sessions being established.

	Work wit	h TCP/IP Conr	nection Status	Svstom.	ραι νας λα
Local internet a	ddress		.: *ALL	System.	NAL IAJAA
Type options, pro 4=End 5=Disp	ess Enter. lay details				
Remote Opt Address *	Remote Port *	Local Port ftp-con >	Idle Time Sta	te	
* *	* *	telnet APPCove >	025:04:38 Lis 000:09:55 Lis	ten ten	
*	*	lpd	000:09:55 A0D	ten	
F5=Refresh F11	=Displav bvte	counts F13=	Sort bv column		Bottom
F14=Display port	numbers F22	=Display enti	re field F24=I	More keys	

Figure 226. NETSTAT Option 3 - TCP/IP Connection Status (1 of 2)

If the APPC over TCP/IP connections (APPCove) fail for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the jobs.

We can use the STRMOD AS/400 command to verify the APPC over TCP/IP configuration to the gateway.

strmod rai Command STRMOD completed successfully for mode BLANK device RAI. The STRMOD command completed successfully for all modes.

Work with Configuration Status RALYAS4A 03/07/95 15:14:20 Position to Starting characters Type options, press Enter. 1=Vary on 2=Vary off 5=Work with job 8=Work with description 9=Display mode status ... Opt Description Status -----Job-----ANYNWMVSI ACTIVE RAI ACTIVE Bottom Parameters or command ===> F4=Prompt F12=Cancel F23=More options F3=Exit F24=More keys

With a session active, WRKCFGSTS shows the autocreated device description for RAI.

Figure 227. Work with Configuration Status for Controller ANYNWMVSI (2 of 2)

The NETSTAT option 3 display in Figure 228 shows the associated TCP/IP session.

```
Work with TCP/IP Connection Status
                                                          System:
                                                                    RALYAS4A
Local internet address . . . . . . . . . . . *ALL
Type options, press Enter.
 4=End 5=Display details
     Remote
                     Remote
                               Local
0pt
    Address
                     Port
                                Port
                                          Idle Time State
                     *
     *
                                ftp-con > 006:02:37 Listen
 _
    *
                     *
                                          006:02:41 Listen
                                telnet
 _
    *
                     *
                               APPCove > 000:31:50 Listen
 _
    *
                     *
                               APPCove > 000:30:55 *UDP
 _
                     *
    *
                                1pd
                                          006:02:24 Listen
 _
    9.24.104.74
                     APPCove > 1042
                                          000:00:43 Established
                                                                      Bottom
F5=Refresh F11=Display byte counts F13=Sort by column
F14=Display port numbers F22=Display entire field F24=More keys
```

Figure 228. NETSTAT Option 3 - TCP/IP Connection Status (2 of 2)

Verify the SNA configuration between the native SNA system and the gateway.

We can use the STRMOD AS/400 command to verify this SNA configuration also.

strmod rak

Command STRMOD completed successfully for mode BLANK device RAK. The STRMOD command completed successfully for all modes.

With a session active, WRKCFGSTS shows the autocreated device description for RAK.

```
Work with Configuration Status
                                                                 RALYAS4B
                                                        03/07/95 15:42:43
Position to . . . .
                                   Starting characters
Type options, press Enter.
 1=Vary on 2=Vary off 5=Work with job 8=Work with description
  9=Display mode status ...
Opt Description
                     Status
                                          -----Job-----
                   ACTIVE
    RAOP08
                   ACTIVE
      RAK
                                                                   Bottom
Parameters or command
===>
F3=Exit
         F4=Prompt
                    F12=Cancel
                                F23=More options
                                                  F24=More keys
```

Figure 229. Work with Configuration Status for Controller RAOP08 (1 of 2)

Verify the end-to-end APPC over TCP/IP Gateway configuration from either end.

We can use the STRPASTHR command (Start 5250 Pass-Through) to verify the end-to-end configuration (first from RALYAS4B).

STRPASTHR RALYAS4A

With the passthrough session active, WRKCFGSTS of the host controller at RALYAS4B shows the autocreated device description for RALYAS4A.

	Work with Conf	iguration Status	RALYAS4B
Position to	· · ·	Starting characters	;
Type options, pre 1=Vary on 2=V 9=Display mode	ss Enter. ary off 5=Work with status	job 8=Work with	description
Opt Description RAOPO8 RALYAS4A	Status ACTIVE ACTIVE		-Job
BLANK RAK	ACTIVE/SOURCE ACTIVE	WTR05200D MI	CK 000222
			Bottom
Parameters or com ===>	nand		Bottom
F3=Exit F4=Prom	pt F12=Cancel F23	=More options F24	l=More keys

Figure 230. Work with Configuration Status for Controller RAOP08 (2 of 2)

With the passthrough session still active, WRKCFGSTS of the APPC controller at RALYAS4A shows the autocreated device description for RALYAS4B.

	Work with Configura	tion Status	03/07/05	RALYAS4A
Position to	Start	ing character	s	10.00.00
Type options, press Ed 1=Vary on 2=Vary 9=Display mode state	nter. off 5=Work with job us	8=Work with	description	
Opt Description ANYNWMVSI RAI RALYAS4B	Status ACTIVE ACTIVE ACTIVE		Job	
BLANK	ACTIVE/TARGET	RALYAS4B	QUSER	015622
Parameters or command				Bottom
===>				
F3=Exit F4=Prompt	F12=Cancel F23=More	options F2	4=More keys	

Figure 231. Work with Configuration Status for Controller ANYNWMVSI (1 of 2)

The NETSTAT option 3 display in Figure 232 shows the associated TCP/IP sessions; one is for the SNA service manager (SNASVCMG) and the other is for the user session.

Гуре 4=	options, press End 5=Display	Enter. details				
Dpt - - - - -	Remote Address * * * 9.24.104.74 9.24.104.74	Remote Port * * * * APPCove > 1049	Local Port ftp-con > telnet APPCove > APPCove > lpd 1043 APPCove >	Idle Time 006:02:37 006:02:41 000:31:50 000:30:55 006:02:24 000:21:40 000:21:29	State Listen Listen *UDP Listen Established Established	
						D. LL.

Figure 232. NETSTAT Option 3 - TCP/IP Connection Status (1 of 2)

```
— Note –
```

If we had first tried to establish the connection from RALYAS4A, the connection attempt would have failed; the reason being that dynamic LU definition is being used at the host in this instance. Only when RALYAS4B connects to the host will the LU name be known to it.

If we now use the STRPASTHR command (Start 5250 Pass-Through) from RALYAS4A as follows:

STRPASTHR RALYAS4B

With this passthrough session active, WRKCFGSTS of the APPC controller at RALYAS4A shows the following status:

	Work with Configura	tion Status	03/07/95	RALYAS4A
Position to	Start	ing characters	03/07/33	10.10.20
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work with job us	8=Work with	description	
Opt Description ANYNWMVSI RAI RAIYAS4B	Status ACTIVE ACTIVE ACTIVE		-Job	
BLANK	ACTIVE/SOURCE	WTR05200C	MICK	015602
Parameters or command				Bottom
===> F3=Exit F4=Prompt	F12=Cancel F23=More	options F24	-=More keys	

Figure 233. Work with Configuration Status for Controller ANYNWMVSI (2 of 2)

The NETSTAT option 3 display in Figure 234 shows the associated TCP/IP sessions; one is for the SNA service manager (SNASVCMG) and the other is for the user session.

	Work with	TCP/IP Conr	nection Stat	tus Sveteme	
Local internet add	ress		.: *ALI	- System:	KALTA34A
Type options, pres 4=End 5=Displa	s Enter. y details				
Remote Opt Address - * - * - * - * - * - * - * - * - * - 9.24.104.74 - 9.24.104.74	Remote Port * * * APPCove > APPCove >	Local Port ftp-con > telnet APPCove > APPCove > lpd 1044 1045	Idle Time 007:00:11 000:09:41 000:39:40 000:01:30 006:59:58 000:11:54 000:10:15	State Listen Listen *UDP Listen Established Established	
F5=Refresh F11=D F14=Display port n	isplay byte co umbers F22=1	ounts F13= Display enti	=Sort by co] ire field	umn F24=More keys	Bottom

Figure 234. NETSTAT Option 3 - TCP/IP Connection Status (2 of 2)

AnyNet/MVS SNA over TCP/IP Gateway Verification

If we use NetView to display the status of the AnyNet PU with the RALYAS4A to RALYAS4B passthrough session active, we see the following:

```
* RAIAN D NET,E,ID=RAIPSNIP
RAIAN IST097I DISPLAY ACCEPTED
' RAIAN
IST075I NAME = RAIPSNIP , TYPE = PU_T2.1
IST486I STATUS= ACTIV--L--, DESIRED STATE= ACTIV
IST1043I CP NAME = ***NA***, CP NETID = USIBMRA , DYNAMIC LU = YES
IST081I LINE NAME = RAILSNIP, LINE GROUP = RAIGSNIP, MAJNOD = RAIBSNIP
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST355I LOGICAL UNITS:
IST080I RALYAS4A ACT/S WTR05115 ACT/S
IST314I END
```

Figure 235. NetView AnyNet PU status

If we use NetView to display the VTAM status of RALYAS4A with the RALYAS4A to RALYAS4B passthrough session still active, we see the following:

```
* RAIAN
        D NET,E,ID=RALYAS4A
        IST097I DISPLAY ACCEPTED
 RAIAN
' RAIAN
IST075I NAME = USIBMRA.RALYAS4A , TYPE = CDRSC
IST486I STATUS= ACT/S , DESIRED STATE= ACTIV
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED ,SLU ENABLED ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = RAIRSNIP
                                 - NETSRVR = ***NA***
IST1184I CPNAME = USIBMRA.RAI
IST1044I ALSLIST = RAIPSNIP
ISTO82I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1711 ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = RAIPSNIP
IST634I NAME
                STATUS SID
                                          SEND RECV VR TP NETID
IST635I RALYAS4B ACTIV-S
                          F64B0D2BCC7DF3FF
                                           0 0 USIBMRA
IST635I RALYAS4B ACTIV-S
                                                    0 0 USIBMRA
                        F64B0D2BCC7DF3FE
IST924I -----
ISTO75I NAME = USIBMRA.RALYAS4A , TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC NN
IST1184I CPNAME = USIBMRA.RALYAS4A - NETSRVR = ***NA***
IST314I END
```

Figure 236. NetView AnyNet LU status

5494 over TCP/IP Using SNA over TCP/IP Gateway Scenario

Systems do not have to support AnyNet for them to be able to use AnyNet. In this scenario a 5494 remote workstation controller is communicating with an AS/400 via a TCP/IP network. It does this by using the services of an AnyNet SNA over TCP/IP Gateway.

The following figure shows the systems used and their respective IP addresses for this scenario. A TCP/IP configuration is already in place between RALYAS4A and RALSNAGW using the internet addresses shown.



Figure 237. Systems Used for 5494 over TCP/IP Gateway Scenario

The following series of panels show the configuration screens taken from the RALYAS4A and RALSNAGW systems and the 5494 configuration panels. They illustrate the configuration steps required for this APPC over TCP/IP Gateway scenario.

Please note that only the key AnyNet/2 configuration displays are shown in this section.

— PS/2 Software Installed

The following software was installed on RALSNAGW:

- OS/2 Version 2.1
- CM/2 Version 1.11 with AnyNet/2 support installed (additional functions) plus the fix for APAR JR08244
- TCP/IP Version 2.0 for OS/2 Base kit plus CSD UN64092
- AnyNet/2 SNA over TCP/IP Gateway Version 1.0

The software was installed in the above order.

RALYAS4A Configuration

First we must check that Allow ANYNET Support is set to *YES in the network attributes of RALYAS4A. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Before we can configure the APPC controller description and add the APPN remote location list entry, and configure the 5494, we need to display the network attributes on RALYAS4A.

						System:	RALYAS4
Current system name		• •	•		:	RALYAS4A	
Pending system name			•		:		
_ocal network ID		• •	•		:	USIBMRA	
_ocal control point name					:	RALYAS4A	
Default local location			•		:	RALYAS4A	
Default mode					:	BLANK	
APPN node type					:	*NETNODE	
Data compression					:	*NONE	
Intermediate data compression					:	*NONE	
Maximum number of intermediate	session	s.			:	200	
Route addition resistance					:	128	
Server network ID/control point	name .	• •	•	•••	:	*LCLNETID *AN	Y
							More

Figure 238. 5494 over TCP/IP Gateway Scenario: AS/400 Network Attributes

Next, we create an APPC controller description on RALYAS4A with LINKTYPE *ANYNW.

Create Ctl De Type choices, press Enter. Controller description > Link type > Online at IPL > Remote network identifier Remote control point > User-defined 1	ANYNWPSGW Name *ANYNW *ANYNW, *FAX, *FR, *IDLC *YES *YES, *NO *NETATR Name, *NETATR, *NONE, *ANY RALSNAGW Name, *ANY *LIND 0-255, *LIND *LIND 0-255, *LIND *LIND 0-255, *LIND *LIND 0-255, *LIND *LIND 0-255, *LIND
F3=Exit F4=Prompt F5=Refresh F13=How to use this display	Bottom F10=Additional parameters F12=Cancel F24=More keys

Figure 239. 5494 over TCP/IP Gateway Scenario: AS/400 APPC Controller Description
In the following panel we create a remote workstation controller description on RALYAS4A.

Create Ctl Desc (Remote	WS) (CRTCTLRWS)
Type choices, press Enter.	
Controller description > RAL5494 Controller type > 5494 Controller model > 2 Link type > *NONE Online at IPL > *RAL5494 Local location > RAL5494 Local location *NETATR Remote network identifier *NETATR Autocreate device *NETATR Switched disconnect > 'AnyNet Context'	Name 3174, 3274, 5251, 5294 0, 1, 0001, 2, 0002, 12, 0012 *IDLC, *LAN, *NONE, *SDLC *YES, *NO Name Name, *NETATR Name, *NETATR, *NONE *ALL, *NONE *YES, *NO onnected 5494'
F3=Exit F4=Prompt F5=Refresh F12=Cance F24=More keys	More 1 F13=How to use this display

Figure 240. 5494 over TCP/IP Gateway Scenario: AS/400 RWS Controller Description

Note: With OS/400 V3R1 and 5494 Microcode Release 3.0, the remaining 5494 definitions (device descriptions, etc.) will be autocreated.

-

Now RAL	we YAS4	add 4A.	the	APPC	over	TCP/IP	entries	to ti	he A	APPN	remote	location	list at
с <u> </u>													
							• •						

		Cha	nge Config	juration L	ist	02/06/05	RALYAS4A
Configura Configura Text	tion list tion list 	: Q type: *	APPNRMT APPNRMT			03/00/95	10:47:25
Type chan	ges, press	s Enter.					
		APP	N Remote L	ocations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
RALSNAGW	*NETATR	*NETATR	RALSNAGW	*NETATR			*N0
RAL5494	*NETATR	*NETATR	RALSNAGW	*NETATR			*NO
_	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Displ	lay session	informati	on F12=0	Cancel F1	7=Top F1	8=Bottom

Figure 241. 5494 over TCP/IP Gateway Scenario: AS/400 APPN Remote Locations List

While the first entry is not required for the correct operation of this scenario, it will allow us to test to the gateway prior to trying to establish a connection through the gateway.

The host table at RALYAS4A, shown following, has had the APPC over TCP/IP entries added.

 Туре 1=	e options, press H Add 2=Change	Work with TCP/IP Inter. 4=Remove 5=Disp	Host Table En blay 7=Renam	tries System: me	RALYAS4A
Opt _ _ _	Internet Address 9.24.104.56 9.24.104.189	Host Name RALYAS4A RALYAS4A.ITSO.R/ RALSNAGW RALSNAGW.ITSO.R/ RALSNAGW.USIBMR/ RALS494.USIBMRA	AL.IBM.COM AL.IBM.COM A.SNA.IBM.COM SNA.IBM.COM		
F3=E	xit F5=Refresh	F6=Print list	F12=Cancel	F17=Position to	

Figure 242. 5494 over TCP/IP Gateway Scenario: AS/400 TCP/IP Host Table

• Note

The AS/400 TCP/IP Host Table will allow a maximum of four host names to be entered against a single host internet address. As can be seen from the example in Figure 242 on page 188, where we have already used all four entries for 9.24.104.189, this may become a restriction when using AnyNet/400 APPC over TCP/IP with an AnyNet SNA over TCP/IP gateway. Although, in fact, only the last entry is actually required for the correct operation of this scenario. One possible alternative is to use a name server rather than the AS/400 host table when the requirement is to communicate with more than four hosts via an AnyNet SNA over TCP/IP gateway.

RALSNAGW Configuration

A suitable Communications Manager/2 configuration environment for this scenario can be created from the single screen shown next.

∠ APPC APIs throu	igh Token-ring						
<u>N</u> etwork ID	USIBMRA						
<u>L</u> ocal node name	RALSNAGW						
Local node type-	a network node server						
En <u>d</u> node – no i	∭En <u>d</u> node – no network node server						
Network node							
Network node ser	ver address (hex)						
<u>0</u> K <u>A</u> dvanced	d Cancel Help						

Figure 243. 5494 over TCP/IP Gateway Scenario: Communications Manager/2 Configuration Panel

To configure AnyNet/2 SNA over TCP/IP Gateway, we define the following:

- · SNA Domain Name Suffix
- Routing Preference

The SNA Domain Name Suffix is used when SNA over TCP/IP creates an IP domain name from an SNA LU name, network ID and this suffix. The IP domain name for SNA over TCP/IP has the format luname.netid.snasuffix and is defined as follows:

- luname is the SNA LU name.
- netid is the SNA network ID (NETID).
- · snasuffix is the SNA domain name suffix.

To define the SNA Domain Name Suffix, we use the AnyNet/2 SNA over TCP/IP Gateway configuration tool. To access the AnyNet/2 SNA over TCP/IP Gateway configuration tool, select the **AnyNet Configuration Tool** icon from the AnyNet/2 folder. The folder icon should be displayed on the OS/2 desktop, if the AnyNet/2 code has been installed correctly.

AnyNet A	PPC over TCP/IP Gateway	- Icon View
AnyNet Books		

Figure 244. AnyNet/2 SNA over TCP/IP Gateway Folder

The copy of AnyNet/2 SNA over TCP/IP Gateway being used was an early copy, hence the incorrect wording on the folder.

AnyNet Configuration – Installed configuration products							
<u> </u>							
SNA over TCP/IP Gatewa	SNA/IP GW						
Gateway Connection Limit Password							
SNA Domain Name Suffix	SNA.IBM.CO	ЭМ					
Connection Retry Duration		300					
Connection Wait Time Limit		30					
Critical Workstation?	🕷 Yes	💓 No					
Remote Node Inactivity Poll Interval		90					
TCP/IP Start Time Limit		15					
Unacknowledged Datagram Retry Interval		30					
Unsent Datagram Retry Interval		3					
Well-known Port		397					
		Page 1 of 1					
This value can contain only letters(A-Z) and d	igits(0-9).						
							

Figure 245. 5494 over TCP/IP Gateway Scenario: AnyNet/2 SNA over TCP/IP Gateway Configuration Panel

When initiating a session, AnyNet/2 SNA over TCP/IP Gateway uses a preference table to determine whether native SNA or SNA over TCP/IP (non-native) will be used for that session. If no routing preference table is configured, the default is to first try to establish the session over native SNA. If this session setup fails, SNA over TCP/IP will be used.

To customize the routing preference table, we can use the LULIST AnyNet/2 command. When entered, the command prompts with the following information:

```
OS2 C:\>lulist
usage: lulist \{a|r||p|f|c|d|u|h\} argument(s).
   Arguments by function:.
    a netid.luname flag ( ADD LUNAME
                                         ).
   r netid.luname
                        ( REMOVE LUNAME ).
   1 netid.luname
                        ( LOOKUP LUNAME ).
                        ( PRINT TABLE ).
    p
                        ( FLUSH TABLE
    f
                                         ).
   c netid.luname flag ( CHANGE LUNAME ).
                        ( PRINT DEFAULT ).
   d
   d flag
                        ( SET DEFAULT
                                         ).
   u
                        ( UPDATE TABLE
                                         ).
   h
                        ( HELP
flag: O=Native, 1=Non-Native, 2=Native Only, 3=Non-Native Only.
```

Figure 246. AnyNet/2 LULIST Command Prompts

The options available for the table default and table entries are as follows:

Native: SNA will be tried first. If the session request fails, SNA over TCP/IP will be used.

Non-native: SNA over TCP/IP will be tried first. If the session fails, SNA will be used.

Native only: Only SNA will be used.

Non-native only: Only SNA over TCP/IP will be used.

For the connection to RALYAS4A to *only* use the SNA over TCP/IP connection, we would enter the following command:

OS2 C:\>lulist a usibmra.ralyas4a 3 Luname usibmra.ralyas4a added to table.

To verify the above change we could use the following command:

OS2 C:\>lulist l usibmra.ralyas4a usibmra.ralyas4a NON-NATIVE_ONLY As for AnyNet/400, AnyNet/2 SNA over TCP/IP Gateway uses the native TCP/IP host table to map SNA LU names to internet addresses. The OS/2 TCP/IP host table is changed either via the TCP/IP Configuration tool (page 3 of the Services section) or by editing the HOSTS file (\tcpip\etc\hosts).

Telnet Password	1	Routin
NewsReader/2 Server		Autos
HOSTS	RHOSTS	
(Resolve host names when nameserver is unavailable)	(Hosts authorized to use RSH server)	Services
9.24.104.56	(NO ENTRIES)	
		<i>"</i>
	lininininininininininininininininininin	
Add East 10	winter	
IL-J- D-E-JA	Holp Dago 2 of 2	

Figure 247. 5494 over TCP/IP Gateway Scenario: OS/2 TCP/IP Host Table Menu

Update the table with the required mapping, as shown in Figure 248.

¥	Edit
IP Address	9.24.104.56
Hostname	ralyas4a.usibmra.sna.ibm.com
Aliases	ralyas4a 💦
Comment	AS400A at Raleigh
Edit	Cancel Help

Figure 248. 5494 over TCP/IP Gateway Scenario: OS/2 TCP/IP Host Table Entry

The Aliases field in an OS/2 TCP/IP host table entry can contain multiple host names. This would have allowed us to enter the long TCP/IP host name for RALYAS4A in addition to the short one shown.

5494 Configuration

— 5494 Software Installed -

5494 Microcode Release 3.0 was installed.

-							-
	0	1	2	3	4	5	6
0/	00	00	00	00	00	00	00
1/	00	00	00	00	00	00	00
2/	00	00	00	00	00	00	00
3/	00	00	00	00	00	00	00
4/	00	00	00	00	00	00	00
5/	00	00	00	00	00	00	00
6/	00	00	00	00	00	00	00
7/	00	00	00	00	00	00	00
5494 LICENSED INTERNAL CODE (C) COPYRIGHT IBM CORP. 1988, 1994. ALL RIGHTS RESERVED. US GOVERNMENT USERS RESTRICTED RIGHTS - USE, DUPLICATION OR DISCLOSURE RESTRICTED BY GSA ADP SCHEDULE CONTRACT WITH IBM CORP.							
AA-> 4 1-> 00 F-> 04 G	-> 01 H-	> 30 I-> (030 J-> 08	3			P->

Figure 249. 5494 over TCP/IP Gateway Scenario: 5494 Configuration Screen 1

The 5494 configuration screen 1 parameters are defined as follows:

- AA Communications mode (4=Token-ring)
- 1 Keyboard translation
- F Local token-ring services access point (SAP)
- G Token-ring response timer (T1)
- H Token-ring inactivity timer (Ti)
- I Token-ring receiver acknowledgement timer (T2)
- J Token-ring retry count (N2)





The 5494 configuration screen 2 parameters are defined as follows:

- 11 Default network ID
- 12 5494 LU name
- 13 5494 CP name
- 14 Default mode name
- 15 5494 token-ring address
- 16 Logical connection retry parameters
- 17 5494 serial number
- 18 5494 system Password
- 19 5494 ID number
- H1:1 AS/400 LU name
- H1:2 AS/400 network ID
- H1:3 5494 network ID
- H1:4 AS/400 mode name
- H1:5 SNA over TCP/IP Gateway token-ring address
- H1:7 SNA over TCP/IP Gateway token-ring SAP
- H1:8 SNA over TCP/IP Gateway token-ring maximum out
- H1:9 SNA over TCP/IP Gateway token-ring maximum in

Shown next are the matching parameters between all the systems.



Figure 251. 5494 over TCP/IP Gateway Scenario: Matching Parameters Table

Verifying the 5494 over TCP/IP Using SNA over TCP/IP Gateway Scenario

In order to prove that the 5494 connection is working we can follow a step-bystep verification process. In a failing environment, this step-by-step process should help locate the failing area. Verification is shown for the following:

- 5494 over TCP/IP using SNA over TCP/IP Gateway
- AnyNet/2 SNA over TCP/IP Gateway

5494 over TCP/IP Using SNA over TCP/IP Gateway Verification

The verification of 5494 over TCP/IP via an AnyNet SNA over TCP/IP gateway should be carried out in the following stages:

- Verify the TCP/IP configuration between the AnyNet/400 system and the gateway.
- Verify the APPC over TCP/IP configuration between the AnyNet/400 system and the gateway.
- Verify the SNA configuration between the 5494 and the gateway.
- · Verify the end-to-end 5494 over TCP/IP Gateway configuration.

Verify the TCP/IP configuration between the AnyNet/400 system and the gateway.

AnyNet/400 APPC over TCP/IP requires a TCP/IP configuration between the systems. This TCP/IP configuration is established as if it were to be used by native TCP/IP applications; there are no special TCP/IP configuration requirements to allow APPC over TCP/IP to use the TCP/IP configuration. Before we verify the APPC over TCP/IP configuration, we should verify the native TCP/IP configuration. This can be done in such a way that it also verifies part of the APPC over TCP/IP configuration. For example, the following will verify the TCP/IP configuration between RALYAS4A and RALSNAGW via the APPC over TCP/IP host table entry:

```
ping ralsnagw.usibmra.sna.ibm.com
Verifying connection to host system RALSNAGW at address 9.24.104.189.
Connection verification 1 took .212 seconds. 1 successful connection
verifications.
Connection verification 2 took .016 seconds. 2 successful connection
verifications.
Connection verification 3 took .016 seconds. 3 successful connection
verifications.
Connection verification 4 took .018 seconds. 4 successful connection
verifications.
Connection verification 5 took .016 seconds. 5 successful connection
verifications.
Connection verification 5 took .016 seconds. 5 successful connection
verifications.
Round-trip (in milliseconds) min/avg/max = 16/55/212
Connection verification statistics: 5 of 5 successful (100 %).
```

Figure 252. AS/400 PING Command Job Log Information

Once we are satisfied that the TCP/IP configuration is working fine, we can move on to verify the APPC over TCP/IP configuration.

Verify the APPC over TCP/IP configuration between the AnyNet/400 system and the gateway.

Having verified the native TCP/IP configuration to the gateway, we can now verify the APPC over TCP/IP configuration to the gateway.

First we should check that the APPC over TCP/IP job is running. The command WRKACTJOB SBS(QSYSWRK) will display the active jobs in the QSYSWRK subsystem. The APPC over TCP/IP job QAPPCTCP should be active as shown in the following figure.

CPU %: Type op 2=Cha 8=Wor	.0 E otions, press	lapsed tim Enter.	ne: 00:	00:00	Active j	obs: 63	
Type op 2=Cha 8=Wor	otions, press	Enter.					
2=Cha 8=Wor	hloH=£ ann						
8=Wor	inge 5 noru	4=End	5=Work	with	6=Release	7=Display mes	sage
0 1101	rk with spool	ed files	13=Disc	onnect	•••		
)pt Su	ubsystem/Job	User	Туре	CPU %	Function	Status	
QS	SYSWRK	QSYS	SBS	.0		DEQW	
5	QAPPCTCP	QSYS	BCH	.0	PGM-QZPAIJ	OB TIMW	
	QECS	QSVSM	BCH	.0	PGM-QNSECS	JB DEQW	
	QMSF	QMSF	BCH	.0		DEQW	
	QNSCRMON	QSVSM	BCH	.0	PGM-QNSCRM	ION DEQW	
	QTCPIP	QTCP	BCH	.0		DEQW	
	QTFTP00619	QTCP	BCH	.0		DEQW	
	QTFTP00734	QTCP	BCH	.0		DEQW	
	QTFTP02472	QTCP	BCH	.0		TIMW	
							More
Paramet	ers or comma	nd					
			Deeteut		±: - 11		
-3=EX11	, FS=KET	resn FIU	=kestart	stat1s	SLICS FII=	uispiay elapse	eu data



If we look at the job log associated with QAPPCTCP, we see the following:

	Display Job Log	Sustan	
Job : QAPPCTCP	User : QSYS	Number :	011338
<pre>>> CALL QSYS/QZPAIJOB APPC over TCP/IP j</pre>	ob started.		
Press Enter to continu	le.		Bottom
F3=Exit F5=Refresh F16=Job menu	F10=Display detailed messages F24=More keys	F12=Cancel	

Figure 254. Display Job Log (QAPPCTCP) Panel

Note -

The APPC over TCP/IP job (QAPPCTCP) is initially started when the Allow AnyNet support (ALWANYNET) network attribute is changed to *YES. If the job fails for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the job.

Before we can use the AS/400 APPC over TCP/IP configuration, we must Vary on the APPC controller description we created for the APPC over TCP/IP connection. The Work with Configuration Status command can be used to show the status of the controller. For example, the following command resulted in the display shown in Figure 255.

WRKCFGSTS *CTL ANYNWPSGW

	Work with Configu	ration Status	03/06/95	RALYAS4A 15:07:53
Position to	Sta	arting characters	,,	
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work with jo us	b 8=Work with de	scription	
Opt Description ANYNWPSGW	Status VARIED OFF	J	ob	
Parameters or command				Bottom

Figure 255. Work with Configuration Status for Controller ANYNWPSGW (1 of 3)

To make the configuration available, use option 1 (Vary on). The configuration should then go to a VARIED ON status.

When the first controller with link type *ANYNW is varied on, two TCP/IP connections will be started; one is a TCP connection that goes to LISTEN state to allow the system to accept incoming APPC over TCP/IP sessions; while the other is a UDP connection to handle out-of-band data for all APPC over TCP/IP activity. NETSTAT option 3 can be used to display all TCP/IP sessions (native TCP/IP and APPC over TCP/IP). Figure 256 shows NETSTAT option 3 prior to any APPC over TCP/IP sessions being established.

	Work with	n TCP/IP Conr	ection Statu	IS System:	RAI YAS4A
Local internet ac	dress		.: *ALL	55500	IN EINS IN
Type options, pre 4=End 5=Displ	ess Enter. lay details				
Remote	Remote	Local			
Opt Address	Port	Port	Idle Time	State	
*	*	ftp-con >	026:45:25	Listen	
*	*	telnet	025:04:38	Listen	
*	*	APPCove >	000:09:55	Listen	
*	*	APPCove >	000:09:55	*UDP	
*	*	lpd	026:44:24	Listen	
					Bottom
F5=Refresh F11= F14=Display port	=Display byte o numbers F22=	counts F13= Display enti	Sort by colure field F	mn 24=More keys	

Figure 256. NETSTAT Option 3 - TCP/IP Connection Status (1 of 3)

If the APPC over TCP/IP connections (APPCove) fail for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the jobs.

We can use the STRMOD AS/400 command shown following to verify the APPC over TCP/IP connection to the gateway:

strmod ralsnagw

Command STRMOD completed successfully for mode BLANK device RALSNAGW. The STRMOD command completed successfully for all modes.

Work with Configuration Status RALYAS4A 03/06/95 15:55:48 Position to Starting characters Type options, press Enter. 1=Vary on 2=Vary off 5=Work with job 8=Work with description 9=Display mode status ... Opt Description Status -----Job-----ANYNWPSGW ACTIVE RALSNAGW ACTIVE Bottom Parameters or command ===> F4=Prompt F12=Cancel F23=More options F3=Exit F24=More keys

With a session active, WRKCFGSTS shows the autocreated device description for RALSNAGW.

Figure 257. Work with Configuration Status for Controller ANYNWPSGW (2 of 3)

The NETSTAT option 3 display in Figure 258 shows the associated TCP/IP session.

```
Work with TCP/IP Connection Status
                                                         System:
                                                                   RALYAS4A
Local internet address . . . . . . . . . . . *ALL
Type options, press Enter.
  4=End 5=Display details
                     Remote
     Remote
                               Local
0pt
   Address
                     Port
                               Port
                                         Idle Time State
                     *
                                ftp-con > 001:35:46 Listen
 _
     *
                     *
                               telnet
                                          001:35:53 Listen
 _
     *
                     *
                               APPCove > 001:36:19 Listen
 _
    *
                     *
                               APPCove > 000:01:50 *UDP
 _
                     *
                                          001:35:12 Listen
    *
                               1pd
 _
    9.24.104.189
                     APPCove > 1025
                                          000:07:25 Established
                                                                     Bottom
F5=Refresh
            F11=Display byte counts F13=Sort by column
F14=Display port numbers F22=Display entire field F24=More keys
```

Figure 258. NETSTAT Option 3 - TCP/IP Connection Status (2 of 3)

Verify the SNA configuration between the 5494 and the gateway.

When the 5494 is powered on, it will call-out to the Gateway PS/2. The CM/2 CMLINKS command can be used to verify this connection.

```
OS2 C:\>cmlinks
     Link
                 DLC
                                 Partner
     Name
              Name #
                            FQName
                                       Type Sess
                                                       State
                    - ----
*
   @ANYGW
            $ANYNET 0 $ANYNET.$GWCP
                                        LEN O
                                                  Active
   @AAAAAAB IBMTRNET 0 USIBMRA.RAL5494
                                        LEN 3
                                                  Active
```

Figure 259. Communications Manager/2 CMLINKS Command Output

The first entry is a system added AnyNet entry. The second entry was dynamically added when the 5494 contacted the PS/2.

Verify the end-to-end 5494 over TCP/IP Gateway configuration.

We have now verified the configuration to the gateway from either end.

We should now vary on the AS/400 Workstation controller for the 5494. With this controller in a Vary On Pending state, we can verify the end-to-end connection by powering on the 5494. With an active 5494 connection, WRKCFGSTS now shows the following:

	Work with Configura	tion Status	03/06/95	RALYAS4A
Position to \ldots	• Start	ing charact	ers	10.49.33
Type options, press F 1=Vary on 2=Vary 9=Display mode stat	Enter. off 5=Work with job cus	8=Work wi	th description	
Opt Description ANYNWPSGW RALSNAGW RAL5494	Status ACTIVE ACTIVE ACTIVE		Job	
QRMTWSC	ACTIVE/TARGET ACTIVE/SOURCE	RAL5494 RAL5494	QUSER QUSER	015594 015594
Parameters or command	i			Bottom
F3=Exit F4=Prompt	F12=Cancel F23=More	options	F24=More keys	

Figure 260. Work with Configuration Status for Controller ANYNWPSGW (3 of 3)

уре 4=	End 5=Display	details				
	Remote	Remote	Local			
)pt	Address	Port	Port	Idle Time	State	
_	*	*	ftp-con >	002:28:34	Listen	
_	*	*	telnet	002:28:41	Listen	
_	*	*	APPCove >	000:10:05	Listen	
_	*	*	APPCove >	000:00:22	*UDP	
_	*	*	1pd	002:27:59	Listen	
_	9.24.104.189	APPCove >	1033	000:09:39	Established	
_	9.24.104.189	1061	APPCove >	000:09:55	Established	

The NETSTAT option 3 display in Figure 261 shows the associated TCP/IP sessions.

Figure 261. NETSTAT Option 3 - TCP/IP Connection Status (3 of 3)

Figure 262 shows the status of the remote workstation controller description for RAL5494.

	Work with Configura	tion Status 03/07/95	RALYAS4A 09:30:49
Position to	Start	ing characters	09.00.19
Type options, press H 1=Vary on 2=Vary 9=Display mode stat	Enter. off 5=Work with job cus	8=Work with description	
Opt Description RAL5494 RAL5DSP15	Status ACTIVE SIGNON DISPLAY	Job	
Parameters or command	1		Botton
F3=Exit F4=Prompt	F12=Cancel F23=More	options F24=More keys	

Figure 262. Work with Configuration Status for Controller RAL5494

 $\overline{}$

AnyNet/2 SNA over TCP/IP Gateway Verification

The following information shows the same active 5494 session as the AS/400 panels in the previous section.

To check whether Communication Manager/2 is running, we can use the CMQUERY command:

```
OS2 C:\>cmquery
            Communications Manager Query Services
   Workstation Type
                    : Single User
   Default configuration : RALSNAGW
   Active configuration : RALSNAGW
    Service
                              Status
   _____
     CM Kernel
                              ACTIVE
                     ACTIVE
ACTIVE
*** Stopped ***
     SNA Services
     SRPI
     X.25
     SNA Phone Connect
     ACDI
     3270 Emulator
     5250 Emulator
   _____
   Monday, 03/06/95 17:17:45 End of Program - CMQuery
```

Figure 263. Communications Manager/2 CMQUERY Command Output

From this output, you can see that the kernel and SNA services are active.

Each time Communication Manager/2 is started, it determines whether it is enabled to route SNA frames over the IP network. If the SNA over TCP/IP files are not in place, Communication Manager/2 assumes that SNA over TCP/IP is not available and routes all SNA frames over the SNA network.

To verify that AnyNet/2 SNA over TCP/IP has initialized, we can use NETSTAT -s command as in the following panel:

JSZ C:	<pre>>netstat -s</pre>				
SOCK	TYPE	FOREIGN	LOCAL	FOREIGN	STATE
		PORT	PORT	HOST	
==== =		=========	=========	=========	=========
81	STREAM	1033	mptn397	9.24.104.56	ESTABLISHED
80	STREAM	mptn397	1061	9.24.104.56	ESTABLISHED
79	DGRAM	0	1041	0.0.0.0	UDP
57	DGRAM	0	mptn397	0.0.0.0	UDP
56	DGRAM	0	1033	0.0.0.0	UDP
55	STREAM	1051	1050	9.24.104.189	ESTABLISHED
54	STREAM	1050	1051	9.24.104.189	ESTABLISHED
52	STREAM	1049	1048	9.24.104.189	ESTABLISHED
51	STREAM	1048	1049	9.24.104.189	ESTABLISHED
49	STREAM	0	mptn397	0.0.0.0	LISTEN
6	STREAM	0	ftp21	0.0.0.0	LISTEN

Figure 264. OS/2 TCP/IP NETSTAT -s Command Output

From the netstat -s display, we can see that the SNA over TCP/IP Gateway is enabled because sockets are bound to the well-known port for SNA over TCP/IP (port 397). The four stream sockets 55,54,52 and 51 are used for internal SNA over TCP/IP connections. An SNA over TCP/IP session was active when this information was captured; it is using the first two ports shown.

The active Communications Manager/2 APPN sessions can be displayed as follows:

- 1. Open the Communication Manager/2 icon.
- 2. Select Subsystem Management.
- 3. Select SNA Subsystem.
- 4. Select Display active configuration.
- 5. Select APPN.

 \sim

6. Select Intermediate Sessions.

Number of intermediate sessions

2

USIBMRA.RAL5494
\$ANYNET.\$GWCP
@AAAAAE
@ANYGW
X' F0AB0F127FD45AA4'
USIBMRA.RAL5494
USIBMRA.RAL5494
USIBMRA.RALYAS4A
12
16
4
4

Bytes sent by primary LU	634
Bytes sent by secondary LU	1254
2 Drimany cide adjacent CD name	
Secondary side adjacent CP name	USIBMRA.RAL5494
Primary side link name	@ANYGW
Secondary side link name	@AAAAAE
Procedure correlator ID (PCID)	X' F64B0D2BCC7DF3ED'
PCID generator CP name	USIBMRA.RALYAS4A
Primary LU name	USIBMRA.RALYAS4A
Secondary LU name	USIBMRA.RAL5494
FMD PIUs sent by primary LU	12
FMD PIUs sent by secondary LU	9
Non-FMD PIUs sent by primary LU	1
Non-FMD PIUs sent by secondary LU	1
Bytes sent by primary LU	1503
Bytes sent by secondary LU	367

The Communications Manager/2 APPN topology can be displayed as follows:

- 1. Open the **Communication Manager/2** icon.
- 2. Select Subsystem Management.
- 3. Select SNA Subsystem.
- 4. Select Display active configuration.
- 5. Select APPN.
- 6. Select Toplogy.

**************************************	1
1>Network node CP name Route additional resistance Congested? Quiescing? ISR depleted? Number of TGs	USIBMRA.RALSNAGW 128 No No 2
<pre>1.1>TG partner CP name</pre>	USIBMRA.RAL5494
Transmission group number	O
TG partner node type	Real
Quiescing?	No
Topology	Local
Effective capacity	3.99 megabits per second
Cost per connect time	O
Cost per byte	0
Propagation delay	384.00 microseconds (local area network)
User defined parameter 1	128
User defined parameter 2	128
User defined parameter 3	128
Security	Nonsecure
1.2>TG partner CP name	\$ANYNET.\$GWCNET
Transmission group number	1

TG partner node type Quiescing? Topology Effective capacity Cost per connect time Cost per byte Propagation delay User defined parameter 1 User defined parameter 2 User defined parameter 3 Security Virtual (connection network) No Network 2.76 megabits per second 254 254 9.22 milliseconds (telephone) 128 128 128 Nonsecure

AnyNet/400 APPC over IPX

This chapter presents the process of configuring AnyNet/400 APPC over IPX at the International Technical Support Organization in Raleigh.

The information is presented in the following sections:

- 1. Introduction to AnyNet/400 APPC over IPX
- 2. Using AnyNet/400 APPC over IPX
- 3. Configuring AnyNet/400 APPC over IPX
- 4. Verifying the Scenario

For further information on AnyNet/400 APPC over IPX refer to AS/400 International Packet Exchange Support, SC41-3400.

Introduction to APPC over IPX

Until recently the AS/400 has been largely an SNA-based system. Because of this, the majority of the applications (IBM-supplied and non IBM-supplied) are APPC (Advanced Program-to-Program Communications) based. Providing the network is SNA-based, these applications can communicate with each other in a very reliable manner. However, more and more networks are becoming router-based. While many routers in the market place today can handle APPC traffic, in many situations companies are reluctant to turn on the router function that accomplishes this. Many companies would also like to see only IPX across their networks. This was a problem in the past but with the announcement of the AnyNet family of products, companies can use APPC (ICF) or CPI-C applications across IPX networks. AnyNet allows a company to choose the application programs that best meet the needs of their business without having to worry about the transport protocol they are using over their network. 5250 Display Station Passthrough, etc. can, using AnyNet/400 APPC over IPX, run over an IPX network.

AnyNet/400 is one member of the AnyNet family of products. AnyNet/400 is included with the base OS/400 Version 3 Release 1 or higher. Network Extensions (5733-SA1) provides OS/400 Version 3 Release 1 with IPX support. Network Extensions also provides AnyNet/400 support to allow APPC applications to run over IPX and sockets applications to run over IPX. In this chapter we look at APPC applications over IPX.

AnyNet/400 APPC over IPX can be used by those customers who want the following:

- To run existing APPC applications across an IPX network
- To simplify their network by reducing the number of protocols being used

Specifically, APPC over IPX support in AnyNet/400, allows APPC programs to communicate between systems over an IPX network.

AnyNet/400 APPC over IPX makes it possible to use existing APPC (ICF) or CPI-C applications over an IPX network. For example, 5250 Display Station Passthrough, and SNADS (SNA Distribution Services) can all run, unchanged, over an IPX network.

Using AnyNet/400 APPC over IPX

The AnyNet/400 APPC over IPX code requires the following:

- 5733-SA1, Network Extensions
- PTF Cumulative C5304310 or later
- Informational PTF II08907 for the Network Extensions feature. This contains pre and post installation instructions and lists other prerequisite PTF requirements.

Once AnyNet/400 APPC over IPX has been configured, you will be able to run APPC (ICF) or CPI-C applications across an IPX network. At the time that this book was written, the following APPC applications were supported under AnyNet/400:

- CICS/400
- DB2/400
- 5250 Display Station Passthrough
- DRDA
- SNADS
- · ICF or CPI-C user-written APPC applications

The running of these applications is transparent to the user regardless of what transport protocol is being used. The user may, however, notice a performance degradation when using an APPC application via AnyNet/400 as opposed to running the same application natively under SNA. Applications running on their native protocols may run faster than those running on a non-native protocol. The flexibility of the AnyNet/400 product should, however, outweigh any performance degradation. It is important to note that if your system implements AnyNet/400 (the Network Attribute ALWANYNET is set to *YES) any Sockets applications running natively over IP will run slower. All of these points need to be considered when deciding whether to use the AnyNet/400 support. If not using AnyNet, ALWANYNET should be set to *NO.

Configuring AnyNet/400 APPC over IPX

In order to run APPC over IPX on your AS/400, the following OS/400 configuration steps are required:

- 1. Establish an IPX configuration between the systems.
- 2. Change the Network Attribute ALWANYNET to *YES.

- 3. Create an APPC controller with LINKTYPE(*ANYNW).
- 4. Add an entry to the APPN remote location list.
- 5. Add an SNA over IPX Location.

Network Extensions Installation -

Please note that we do not cover the installation of NetWork Extensions (5733-SA1) in this book. Please refer to *AS/400 International Packet Exchange Support*, SC41-3400 for information on this.

The user ID, under which the APPC over IPX configuration is created, must have sufficient authority to access the relevant commands. Some of the commands require the user ID to have the IOSYSCFG authority. The examples shown here were created using a profile with QSECOFR authority.

1. Establish an IPX configuration between the systems

A prerequisite for APPC over IPX is an IPX configuration between the systems. In this step we show the basic steps to establishing an IPX configuration between two systems. If your system already has an IPX configuration to the remote system with which you want to communicate via APPC over IPX, then you can skip this step and proceed to step 2 on page 216 in this section.



Figure 265. Two Systems Connected Using IPX

In the following panels we create the IPX configuration for RALYAS4A in Figure 265. The configuration steps for RALYAS4B will be the same except where noted throughout this chapter. Also, panels for RALYAS4B will be shown when relevant.

Line Description

The AS/400 line description defines the physical interface to the network. If an appropriate line description does not already exist (they can be shared), you need to create one. Here we use the CRTLINX25 command to create an X.25 line description. The parameters that will be different on RALYAS4B will be the Resource name and the Local network address.

Create Line	Desc (X.25) (0	CRTLINX25)
Type choices, press Enter.		
Line description > Resource name > Logical channel entries:	• X25LINE • LIN072	Name Name, *NWID
Logical channel identifier > Logical channel type > PVC controller	• 001 • *PVC	OO1-FFF, *PROMPT *PVC, *SVCIN, *SVCBOTH Name
+ for more values Local network address > Connection initiation >	• 312 • *LOCAL	*LOCAL, *REMOTE, *WAIT
Physical interface	*X21BISV24 *NONSWTPP *NOWAIT	*X21BISV24, *X21BISV35 *NONSWTPP, *SWTPP *NOWAIT, 15-180 (1 second)
Line speed	9600 *SYSGEN *NO	*CALC, 600, 1200, 2400 05600000-056FFFFF, *SYSGEN *YES. *NO
_		More
Create Line	Desc (X.25) ((CRTLINX25)
Type choices, press Enter.		
Maximum frame size	1024	1024, 2048, 4096
Receive value	128 *TRANSMIT	64, 128, 256, 512, 1024 *TRANSMIT, 64, 128, 256
Transmit value	*DFTPKTSIZE *TRANSMIT 8	*DFTPKTSIZE, 64, 128,256 *DFTPKTSIZE, *TRANSMIT,64 8, 128
Default window size: Transmit value Receive value	2 *TRANSMIT	1-15 1-15, *TRANSMIT
Insert net address in packets . Text 'description'	*YES Back-to-back	*YES, *NO X.25 to RALYAS4B
F3=Exit F4=Prompt F5=Refresh	F10=Additiona	Bottom al parameters F12=Cancel



Note: In our test environment we did not use an actual X.25 network. We used a back-to-back X.25 connection with X.25 DCE support *YES specified in the X.25 line description of one system.

For an IPX configuration, there is no need to create controller and device descriptions, they are automatically created when IPX first uses the X.25 line.

The IPX configuration can be created with commands or by choosing options from the CFGIPX menu as shown in Figure 267 on page 211. Enter G0 CFGIPX to access this menu.

CFGIPX	Configure IPX	Suctor.		
Select one of the following:	595000	KALIAJ4A		
Configure IPX 1. Configure IPX circuits 2. Work with IPX descripti 3. Work with IPX status	ons			
Configure AnyNet/400 over IPX 10. Work with IP over IPX interfaces 11. Work with IP over IPX routes 12. Work with IP over IPX addresses 20. Work with SNA over IPX locations				
Selection or command ===> <u>2</u>				
F3=Exit F4=Prompt F9=Retrie	ve F12=Cancel			

Figure 267. Configure IPX Menu

IPX Description

An IPX description defines the characteristics of the local IPX node. Multiple IPX descriptions can be configured but only one can be active at a time. Use the command CRTIPXD or choose option 2 from the menu shown in Figure 267. The panel presented is shown in Figure 268 on page 212.

Create IPX Description (CRTIPXD) Type choices, press Enter. IPX description > IPXDSRVCFG Name 0000001-FFFFFFE, *RANDOM IPX internal network number . . > A0000001 IPX routing protocol *RIP *NLSP, *RIP IPX router name *NONE IPX maximum datagram size . . . 576 576-65535 Text 'description' > 'IPX Description for IPX Lab' Additional Parameters IPX packet forwarding *YES *YES, *NO IPX hop count 64 8-127 SPX maximum sessions 1000 100-9999 SPX watchdog abort timeout . . . 30000-3000000 30000 556-300000 SPX watchdog verify timeout . . 3000 More... F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display F24=More keys Create IPX Description (CRTIPXD) Type choices, press Enter. SPX are you there timeout . . . 6000 556-600000 SPX default retry count . . . 10 1-255 LAN hello 20 1-600 WAN hello 20 1-600 Designated router interval . . . 10 1-100 Holding time multiplier 3 2-20 Log protocol errors *NO, *YES *NO Name, *LIBCRTAUT, *CHANGE *LIBCRTAUT Authority Bottom F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display F24=More keys

Figure 268. Create IPX Description - RALYAS4A

Create IPX Description (CRTIPXD) Type choices, press Enter. IPX description > IPXDCTLCFG Name 0000001-FFFFFFE, *RANDOM IPX internal network number . . > B0000001 IPX routing protocol *RIP *NLSP, *RIP IPX router name *NONF IPX maximum datagram size . . . 576 576-65535 Text 'description' > 'IPX Description for IPX Lab' Additional Parameters IPX packet forwarding *YFS *YES, *NO IPX hop count 64 8-127 SPX maximum sessions 1000 100-9999 SPX watchdog abort timeout . . . 30000 30000-3000000 SPX watchdog verify timeout . . 3000 556-300000 More... F4=Prompt F12=Cancel F13=How to use this display F3=Fxit F5=Refresh F24=More keys

Figure 269. Create IPX Description - RALYAS4B

The IPX internal network number represents the internal IPX network on this AS/400. It controls all of the services under the IPX protocol stack. The IPX internal network number must be unique within the whole network. We chose A0000001 for RALYAS4A and B0000001 for RALYAS4B. There is no default for this parameter.

The IPX routing protocol parameter controls whether this IPX description supports RIP routing and SAP packet processing (RIP/SAP) only, or NLSP with RIP/SAP compatibility. If your network supports NLSP or has NLSP-enabled routers, then you should specify *NLSP. Specifying *NLSP also gives you RIP/SAP compatibility. This means that the AS/400 NLSP router can interoperate on a network that uses RIP and SAP packets. If your network only supports RIP routing and SAP packet processing, and does not contain any NLSP-enabled routers, you would specify *RIP.

IPX Circuit

An IPX circuit is a logical representation of a path for IPX communications. For a local area network (LAN), it defines the path or point of attachment from the IPX protocol layer to the IPX network. For a wide area network (WAN), it defines the path from the IPX protocol layer to a remote IPX node or system. Circuits are not physical objects. There must be at least one circuit defined for every line description with which you want to use IPX processing. To create a circuit, enter the command ADDIPXCCT or choose option 1 from the CFGIPX menu followed by option 1 (Work with IPX circuits) from the Configure IPX Circuits menu. The panels shown in Figure 270 on page 214 will be presented.

Add IPX Circuit (ADDIPXCCT) Type choices, press Enter. Circuit name > X25SRVCFG Line description > X25LINE Name 0000001-FFFFFFD IPX network number > 00000001 X.25 PVC logical channel id . . > 001 001-FFF X.25 SVC network address X.25 SVC call type *DEMAND *DEMAND, *PERM X.25 SVC reverse charge *NONE *NONE, *REQUEST, *ACCEPT... X.25 SVC idle circuit timeout . 60 1-600 X.25 default packet size: Transmit packet size *LIND *LIND, 64, 128, 256, 512... Receive packet size *LIND *LIND, *TRANSMIT, 64, 128... X.25 default window size: Transmit window size *LIND 1-15, *LIND Receive window size *LIND 1-15, *LIND, *TRANSMIT *YES, *NO Enable for NLSP *YES 1-63, *CALC Cost override for NLSP *CALC More... F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel F13=How to use this display F24=More keys Add IPX Circuit (ADDIPXCCT) Type choices, press Enter. Enable for IW2 *YES *YES, *NO Additional Parameters Default maximum datagram size . *LIND 576-16388, *LIND Throughput *CALC 300-4294967295, *CALC Delay time 1-5000000, *CALC *CALC *YES Automatic start *YES, *NO *ON, *OFF, *AUTO RIP state *0FF RIP update interval 30-300000 60 RIP age multiplier 4 1-10 SAP state *0FF *ON, *OFF, *AUTO SAP update interval 30-300000 60 SAP age multiplier 4 1-10 Bottom F5=Refresh F12=Cancel F13=How to use this display F3=Exit F4=Prompt F24=More keys

Figure 270. Create IPX Circuit - RALYAS4A

Add IPX Circuit (ADDIPXCCT)						
Type choices, press Enter.	Type choices, press Enter.					
Circuit name	X25CTLCFG X25LINE 00000001 001 *DEMAND *NONE 60	Name 00000001-FFFFFFD 001-FFF *DEMAND, *PERM *NONE, *REQUEST, *ACCEPT 1-600				
Transmit packet size Receive packet size X.25 default window size: Transmit window size Receive window size Enable for NLSP	*LIND *LIND *LIND *LIND *YES	*LIND, 64, 128, 256, 512 *LIND, *TRANSMIT, 64, 128 1-15, *LIND 1-15, *LIND, *TRANSMIT *YES, *NO				
Cost override for NLSP	*CALC	1-63, *CALC More				
F3=Exit F4=Prompt F5=Refresh F13=How to use this display	F10=Additiona F24=More keys	l parameters F12=Cancel				
Add IPX Circuit (ADDIPXCCT)						
Type choices, press Enter.						
Enable for IW2	*YES	*YES, *NO				
Additio	nal Parameters					
Default maximum datagram size . Throughput	*LIND *CALC *CALC *YES *OFF 60 4 *OFF 60 4	576-16388, *LIND 300-4294967295, *CALC 1-5000000, *CALC *YES, *N0 *ON, *OFF, *AUTO 30-300000 1-10 *ON, *OFF, *AUTO 30-300000 1-10				
F3=Exit F4=Prompt F5=Refresh F24=More keys	F12=Cancel	Bottom F13=How to use this display				

Figure 271. Create IPX Circuit - RALYAS4B

The circuit name uniquely identifies the circuit.

For an X.25 PVC connection (as in this example), the IPX Network number must be the same on both systems.

Specifying *OFF for RIP and SAP state will disable RIP and SAP on this circuit. The connection to the remote system will only be established for data.

Parameters are the same on both systems except for the circuit name.

IPX Circuit Route

An IPX circuit route is required because we have specified *OFF for RIP and SAP in the IPX circuits. A circuit route defines a static route to a circuit in

the IPX configuration. A static route is associated with a certain circuit. It shows how to reach a remote node or network through that circuit. It also defines attributes needed for routing to that remote IPX node or network.

To create a circuit route, enter the command ADDCCTRTE, or take option 1 from the CFGIPX menu, followed by option 2 (Work with IPX circuit routes) from the Configure IPX Circuits menu to get the following panel.

Add Circuit Route (ADDCCTRTE) Type choices, press Enter. Circuit name > X25SRVCFG Remote IPX network number . . . > B0000001 0000001-FFFFFFE 1-127 Number of hops 1 1-32767 Number of ticks $\ldots \ldots > 30$ Bottom F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display F24=More keys

Figure 272. Create IPX Circuit Route - RALYAS4A

Add Circuit Route (ADDCCTRTE)				
Type choices, press Enter.				
Circuit name > X25CTL Remote IPX network number > A00000 Number of hops 1 Number of ticks > 30	CFG 01 00000001-FFFFFFE 1-127 1-32767			
F3=Exit F4=Prompt F5=Refresh F12=Ca F24=More keys	ncel F13=How to use this display			

Figure 273. Create IPX Circuit Route - RALYAS4B

The Circuit name specifies the IPX circuit to be used for this static route.

The Remote IPX network number specifies the remote IPX network number of the system that this route connects to.

Number of hops is equal to the number of routers that are crossed in order to reach the network or system specified in the RMTNETNBR parameter.

Number of ticks specifies the number of ticks needed to reach the remote network. A tick equals 1/18th of a second.

2. Change the Network Attribute ALWANYNET to *YES

Now we start the AnyNet specific configuration steps. First we must change the ALWANYNET network attribute to *YES. Changing this attribute will allow support on your system for APPC over IPX, Sockets over SNA, APPC over IP and Sockets over IPX. The default for this value, when V3R1 is initially installed, is *NO. Use the DSPNETA command see what your system is set to. If it is set to *NO, use the command:

CHGNETA ALWANYNET(*YES)

After changing this attribute, you can verify the change by entering the DSPNETA command. The resulting displays are shown in the following figure.

Display Notwork Attributos	
Syst	Jem: KALYAS4A
Pending system name	
Local network ID	
Local control point name	
Default local location	
Default mode	
APPN node type *NETNODE	
Data compression *NONE	
Intermediate data compression *NONE	
Maximum number of intermediate sessions : 200	
Route addition resistance	1.0.007
Server network ID/control point name : *LCLNETID	*ANY
	More
	nor e
	=
Display Network Attributes	
Syst	tem: RALYAS4A
Alert status	
Alert Togging Status	
Alert primary local point	
Alert backup focal point	
Network ID * *NONF	
Alert focal point to request	
Network ID	
Alert controller description *NONE	
Alert hold count	
Alert filter	
Library	
Message queue	
Library	
Output queue	
Library QGPL	
Job action	
	More
Display Network Attributes	
Syst	cem: RALYAS4A
Maximum hop count	
DDM request access	
Client request access *OBJAUT	
Default ISDN network type	
Allow Anthel Support	
	Bottom
Press Enter to continue.	
F3=Fxit F12=Cancel	

Figure 274. Display of Network Attributes with ALWANYNET(*YES)

Changing the ALWANYNET network attribute to *YES will result in the APPC over IPX job (QAPPCIPX) being started in the QSYSWRK subsystem.

3. Create an APPC controller with LINKTYPE(*ANYNW)

The AS/400 controller description defines the remote system. A new LINKTYPE has been added to the APPC controller description for AnyNet. With AnyNet, the APPC controller is no longer directly attached to a line description. Use the CRTCTLAPPC (Create APPC Controller Description) command to create an APPC controller with LINKTYPE(*ANYNW).

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > CTLAPPCIPX
                                               Name
Link type . . . . . . . . . > *ANYNW
                                               *ANYNW, *FAX, *FR, *IDLC...
Online at IPL . . . . . . . . .
                                 *YES
                                               *YES, *NO
                                 *NETATR
Remote network identifier . . .
                                               Name, *NETATR, *NONE, *ANY
                                               Name, *ANY
Remote control point . . . . . > IPXCPB
User-defined 1 . . . . . . . .
                                 *LIND
                                               0-255, *LIND
User-defined 2 . . . . . . . .
                                               0-255, *LIND
                                 *LIND
User-defined 3 . . . . . . . .
                                              0-255, *LIND
                                *LIND
Text 'description' . . . . . > APPC CTLD for SNA over IPX
                                                                     Bottom
F3=Exit F4=Prompt F5=Refresh
                                F10=Additional parameters F12=Cancel
F13=How to use this display
                                 F24=More keys
```

Figure 275. Create Controller Description with LINKTYPE(*ANYNW) - RALYAS4A

Create Ctl Desc (APPC) (CRTCTLAPPC) Type choices, press Enter.
Controller descriptionCTLAPPCIPXNameLink type> *ANYNW*ANYNW, *FAX, *FR, *IDLCOnline at IPL> YES*YES, *NORemote network identifier*NETATRName, *NETATR, *NONE, *ANYRemote control point> IPXCPAName, *ANYUser-defined 1*LIND0-255, *LINDUser-defined 2*LIND0-255, *LINDUser-defined 3> APPC CTLD for SNA over IPX
Bottom F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel F13=How to use this display F24=More keys

Figure 276. Create Controller Description with LINKTYPE(*ANYNW) - RALYAS4B

The Remote network identifier should match the local network identifier on the remote system. *NETATR indicates that the value in the network attributes should be used, that the local system and remote system have the same network ID. The Remote control point name, however, is not used external to the system. The remote control point name entered should match the value entered in the APPN remote location list.

APPC Device Description and Mode Description

The APPC device description will be automatically created when the above controller is activated.

Note: It is not possible to map an APPC mode to an IP type of service.

4. Add an entry to the APPN remote location list

To communicate using APPC over IPX, the system requires an APPN remote location list entry for each remote system to which APPC over IPX will connect. APPC over IPX communications needs the information in the APPN remote location list to determine which controller description to use when it activates the session. Furthermore, the entry allows the AS/400 system to automatically configure the APPC device description.

To update the APPN remote location list, use the following command:

CHGCFGL *APPNRMT

				•		03/08/95	16:31:11
Configura	tion list	: Q	APPNRMT				
Configura	tion list	type : *	APPNRMT				
lext	• • • • •	:					
- .							
lype chan	ges, press	s Enter.					
			N Domoto	lacationa			
	Domoto	APP	N Remote	Locations-			
Domoto	Notwork		Control	Doint	Location	c	0.01170
Remote	Network	LOCAI	Control		Location	3	ecure
Location		Location	POINT	Net ID	Password		LOC
RALYAS4B	^NETATR	RALYAS4A	INXCOR	^NETATR			^NU
	*NETATR	*NETATR		*NETATR			*N0
	*NEIAIR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Fxit	F11=Disp]	av session	informat	ion F12=0	Cancel F1	7=Top F1	8=Bottom

Figure 277. APPN Remote Location List Panel - RALYAS4A

		Cha	nge Confi	guration L [.]	ist	03/08/95	RALYAS4A 16:31:14
Configura	tion list	: 0	APPNRMT			00,00,00	10.01.11
Configura	tion list	type: *	APPNRMT				
Text		:					
Type chan	iges, press	s Enter.					
		APP	N Remote	Locations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
RALYAS4A	*NETATR	RALYAS4B	IPXCPA	*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*NO
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Disp	lay session	informat	ion F12=0	Cancel F1	.7=Top F1	.8=Bottom

Figure 278. APPN Remote Location List Panel - RALYAS4B

AS/400 APPN requires that all remote location names be unique. Thus, it cannot have the same remote location name and remote network ID in both its SNA network and its TCP/IP or IPX network.

- The Remote Location name should match the local location (LU) name at the remote system.
- The Local Location name should match the remote location (LU) name at the remote system.
- The Remote Network ID and Control Point Net ID should match the remote network identifier in the APPC controller with a LINKTYPE(*ANYNW). *NETATR indicates that the value in the network attributes should be used.
- The Remote Control Point name should match the remote control name in the APPC controller with a LINKTYPE(*ANYNW).

Any entry added to the APPN remote location list results in an entry in the local APPN topology database. However, the APPC over IPX entry will not be propagated to other systems in the APPN network; the entry is as an end node, only information on attached network nodes is propagated. No topology updates will flow as a result of adding the APPC over IPX entry. In addition to being used locally, the APPC over IPX entries will allow this system to respond to APPN search requests received for these LU names.

5. Add an SNA over IPX Location

The add SNA over IPX location command is used to add a location name mapping entry. SNA over IPX location name mappings define the IPX addresses that are associated with each remote SNA location (LU Name and Network ID). They create a mapping from a remote SNA location to an IPX address. Enter the command ADDSNILOC or take option 20 from the CFGIPX menu.

Add SNA over IPX Location (ADDSNILOC) Type choices, press Enter. Remote location > RALYAS4B Name Remote network identifier . . . > *NETATR Name, *NETATR Remote IPX network number . . . > B0000001 0000001-FFFFFFD Remote IPX node address . . . > *AS400 00000000001-FFFFFFFFFF... Bottom F4=Prompt F12=Cancel F3=Exit F5=Refresh F13=How to use this display F24=More keys



Add SNA over IP)	PX Location (ADDSNILOC)
Type choices, press Enter.	
Remote location > RA	RALYAS4A Name
Remote network identifier > *M	*NETATR Name, *NETATR
Remote IPX network number > AG	A0000001 0000001-FFFFFFD
Remote IPX node address > *A	*AS400 00000000001-FFFFFFFFFFF
F3=Exit F4=Prompt F5=Refresh F1	Bottom
F24=More keys	F12=Cancel F13=How to use this display

Figure 280. Add an SNA over IPX Location - RALYAS4B

The remote location name specifies the remote location to be associated with a specific remote IPX network number and remote IPX node address.

The remote network ID specifies the SNA remote network identifier to be associated with a specific remote IPX network number and remote IPX address. The remote location name and the remote network ID must match the APPC over IPX entry in the APPN remote configuration list.

The remote IPX network number specifies the remote IPX network to be associated with this SNA remote location.

The remote IPX node address specifies the remote IPX node to be associated with this SNA remote location. If the remote destination is an AS/400 this value must be *AS400.

APPC over IPX Addresses CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage SNA over IPX locations:

- ADDSNILOC Add SNA over IPX location
- CHGSNILOC Change SNA over IPX location
- RMVSNILOC Remove SNA over IPX location
Verifying the Scenario

In order to prove that the APPC over IPX connection is working, we can follow a step-by-step verification process. In a failing environment, this step-by-step process should help identify the failing area. Verification is shown in the following steps:

- AS/400 IPX Verification
- AS/400 APPC over IPX Verification

AS/400 IPX Verification

AnyNet/400 APPC over IPX requires an IPX configuration between the systems. This IPX configuration is established as if it were to be used by native IPX applications. There are no special IPX configuration requirements to allow APPC over IPX to use the native IPX configuration. Before we verify the APPC over IPX configuration, we will first verify the IPX native configuration.

The IPXPING command (also known as the VFYIPXCNN command) tests the Internetwork Packet Exchange (IPX) connection from a local system to a remote IPX system specified by the remote network number and remote node address parameters.

The verifications in this section was carried out between the RALYAS4A and RALYAS4B as shown in Figure 265 on page 209.

The command used is:

IPXPING RMTNETNBR(B0000001) RMTNDEADR(*AS400)

This command produces Figure 281 in the job log.

```
IPXPING RMTNETNBR(B0000001) RMTNDEADR(*AS400)
Verifying connection to remote system at network number B0000001, node
  address 00000000001.
Connection verification 1 took .281 seconds. 1 successful connection
  verifications.
Connection verification 2 took .280 seconds. 2 successful connection
  verifications.
Connection verification 3 took .283 seconds. 3 successful connection
  verifications.
Connection verification 4 took .280 seconds. 4 successful connection
  verifications.
Connection verification 5 took .279 seconds. 5 successful connection
  verifications.
Round-trip (in milliseconds) min/avg/max = 279/280/283
Connection verification statistics: 5 of 5 successful (100 %).
```

Figure 281. AS/400 IPXPING Command Job Log Information

Once we are satisfied that the IPX configuration is working fine, we can move on to verify the APPC over IPX configuration.

AS/400 APPC over IPX Verification

Having verified the native IPX configuration to the remote system, we can now verify the APPC over IPX configuration.

First we should check that the APPC over IPX job is running. The command WRKACTJOB SBS(QSYSWRK) will display the active jobs in the QSYSWRK subsystem. The APPC over IPX job QAPPCIPX should be active as shown in the following figure.

		h	lork with	Active	Jobs	03/08/95	RALYAS4/ 17:24:02
CPU %	i: .0 E	lapsed tim	ne: 00:	00:00	Active j	obs: 63	
Type 2=0 8=W	options, press Change 3=Holo Nork with spool	s Enter. 1 4=End ed files	5=Work 13=Disc	with onnect	6=Release	7=Display mes	sage
)pt	Subsystem/Job	User	Туре	CPU %	Function	Status	
	QSYSWRK	QSYS	SBS	.0		DEQW	
<u>5</u>	QAPPCIPX	QSYS	BCH	.0		TIMW	
	QCQEPMON	QSVMSS	BCH	.0	PGM-QCQEPM	ION MSGW	
_	QCQRCVDS	QSVMSS	BCH	.0	PGM-QCQAPE	RM MSGW	
_	QECS	QSVSM	BCH	.0	PGM-QNSECS	JB DEQW	
_	QIPX	QSYS	BCH	.0		DEQW	
	QMSF	QMSF	BCH	.0		DEQW	
	QNSCRMON	QSVSM	BCH	.0	PGM-QNSCRM	ION DEQW	
_	QVARRCV	QSVMSS	BCH	.0	PGM-QVARRC	V DEQW	
							More
aran	neters or comma	and					
==>							
3=Ex	cit F5=Ref	Fresh F10	=Restart	statis	tics F11=	Display elapse	d data
12=0	Cancel F23=Mc	ore options	F24=M	ore key	S		

Figure 282. Work with Active Jobs Panel

If we look at the job log associated with QAPPCIPX, we see the following:

	Display Job Log		
Job : QAPPCIP	User : QSYS	System: Number :	RALYAS4A 011338
Job 034770/QSYS/QAI QSYSWRK in QSYS. Job 034770/QSYS/QAI SNA over IPX job Q/	PCIPX started on 12/13/95 at Job entered system on 12/13/ PCIPX submitted. PPCIPX successfully started.	12:36:31 in subsysto 95 at 12:36:30.	em
Press Enter to cont	nue.		Bottom
F3=Exit F5=Refres F16=Job menu	F10=Display detailed mess F24=More keys	ages F12=Cancel	

Figure 283. Display Job Log (QAPPCIPX) Panel

Note

The APPC over IPX job (QAPPCIPX) is initially started when the Allow AnyNet support (ALWANYNET) network attribute is changed to *YES. If the job fails for any reason, it is necessary to stop IPX (ENDIPX), and start IPX (STRIPX) again to re-start the job.

Before we can use the AS/400 APPC over IPX configuration, we must Vary on the APPC controller description we created for the APPC over IPX connection. The Work with Configuration Status command can be used to show the status of the controller. For example, the following command resulted in the display shown in Figure 284.

WRKCFGSTS *CTL CTLAPPCIPX

	Work with	Configurat	ion Status	03/08/95	RALYAS4A 16:30:11
Position to	•	Starti	ng characters	5	
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work us	with job	8=Work with	description	
Opt Description CTLAPPCIPX	Status VARIED OFF			Job	
Parameters or command					Bottom
F3=Exit F4=Prompt	F12=Cancel	F23=More	options F24	l=More keys	

Figure 284. Work with Configuration Status for Controller at RALYAS4A

To make the configuration available, use option 1 (Vary on). The configuration should then go to a VARIED ON status.

If the remote system is another AS/400, then STRPASTHR can be used to verify the configuration. For example:

STRPASTHR RMTLOCNAME(RALYAS4B) RMTNETID(USIBMRA)

An AS/400 command that can be used to verify an APPC configuration to *any* remote APPC system is STRMOD. For example:

STRMOD RMTLOCNAME(RALYAS4B) RMTNETID(USIBMRA) Command STRMOD completed successfully for mode BLANK device RALYAS4B. The STRMOD command completed successfully for all modes.

If the remote system was an AS/400 and the Allow AnyNet support Network attribute (ALWANYNET) was set to *NO, then STRMOD would fail in the following manner: STRMOD RMTLOCNAME(RALYAS4B) RMTNETID(USIBMRA) Session maximum not changed. Command STRMOD failed. The STRMOD command failed for one or more modes.

The QSYSOPR message queue message provided the following additional information:

BIND sense code X'80140000' received for mode BLANK device RALYAS4B.

With a session active, WRKCFGSTS shows the active session in the normal way.

	Work with Configura	tion Status	RALYAS4A
Position to	Start	ing characters	0/00/95 10:40:05
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	Enter. off 5=Work with job cus	8=Work with descr	ription
Opt Description CTLAPPCIPX RALYAS4B	Status ACTIVE ACTIVE	Job-	
BLANK	ACTIVE/SOURCE	WTR05207F USERE	8 011387
Parameters or command	1		Bottom
==>	[10 0-m-s] [20 Mana	Entire FOA Marrie	
rs-Exit F4=Prompt	FIZ-CANCEL FZ3=MORE	options F24=MOre	е кеуз

Figure 285. Work with Configuration Status for Controller at RALYAS4A

The device description RALYAS4B was autocreated.

The ability to establish APPC over IPX sessions can be verified in many ways. Above we show the use of STRMOD, which results in a CNOS (Change Number of Sessions) LU6.2 command flowing to the remote system.

Another means of verifying the configuration is to use APING; this test tool is available for all IBM platforms and many non-IBM platforms. It functions, in an APPC environment, in a very similar way to PING in an IPX environment. See Appendix B, "APING" on page 349 for details of AS/400 APING. Figure 286 on page 227 shows the output from the command:

CALL APING RALYAS4A

onnecte	ed to a nartner	running on · OS	/400	
rogram	startup and Cc	onfirm duration:	8000 ms	
	Duration (msec)	Data Sent (bytes)	Data Rate (KB/s)	Data Rate (Mb/s)
	1000	200 200	0.2	0.002
otals:	1000	400	0.4	0.003
uratior	n statistics:	Min = 0 Ave =	= 500 Max = 1000	0

Figure 286. APING Sample Output between AS/400s

The APING example above was carried out from RALYAS4B in APPC over IPX scenario 1.

Following are the matching parameters between the systems.

RALYAS4A

RALYASB



Figure 287. APPC over IPX Matching Parameters Table

AnyNet/400 Sockets over IPX

This chapter presents the process of defining and verifying AnyNet/400 Sockets over IPX at the International Technical Support Organization in Raleigh.

The information is presented in the following sections:

- 1. Introduction to OS/400 Sockets over IPX
- 2. Using AnyNet/400 Sockets over IPX
- 3. Configuring AnyNet/400 Sockets over IPX
- 4. Sockets over IPX Scenarios
 - · Sockets over IPX Scenario 1: AS/400 to AS/400 Same Subnetwork
 - Sockets over IPX Scenario 2: AS/400 to AS/400 Different Subnetworks
- 5. Verifying the Scenarios

For further information on AnyNet/400 IP over IPX refer to *AS/400 Internetwork Packet Exchange Support*, SC41-3400.

Introduction to OS/400 Sockets over IPX

In today's computing world, the consumer is able to choose from a vast number of application programs to help run and maintain their businesses. However, these applications are normally developed to run on a specific transport protocol. For example, the File Transfer Protocol (FTP) application was written to be used with the TCP/IP protocol. A company running IPX on their network would need to use an application developed for IPX protocols. A problem arises if this company finds that the FTP application is better suited to their file transfer needs than any IPX application. This was a problem in the past, but with the announcement of the AnyNet family of products, they can use the FTP application across their IPX network. AnyNet allows a company to choose the application programs that best meet the needs of their business without having to worry about the transport protocol they are using over their network.

AnyNet/400 is one member of the AnyNet family of products. AnyNet/400 is included with the base OS/400 Version 3 Release 1 Modification 0 or higher. Network Extensions (5733-SA1) provides OS/400 Version 3 Release 1 with IPX support. Network Extensions also provides AnyNet/400 support to allow sockets applications to run over IPX and APPC applications to run over IPX. In this chapter we look at sockets applications over IPX.

AnyNet/400 Sockets over IPX can be used by those customers who want to do the following:

- To run existing socket applications written to the AF_INET family over an existing IPX network
- · To simplify their network by reducing the number of protocols being used

Specifically, Sockets over IPX support in AnyNet/400 allows sockets application programs to communicate between systems over an IPX network.

AnyNet/400 Sockets over IPX makes it possible to add BSD (Berkeley Software Distribution) sockets applications to existing IPX networks. This allows OS/400

users to use most sockets applications (for example, FTP, SMTP and SNMP) across an IPX network.

Using AnyNet/400 Sockets over IPX

The AnyNet/400 Sockets over IPX code requires the following:

- Network Extensions feature 5733-SA1.
- PTF Cumulative C5304310 (or later).
- Informational PTF II08907 for the Network Extensions feature. This contains pre and post installation instructions and lists other prerequisite PTF requirements.

Once AnyNet/400 Sockets over IPX has been configured, you will be able to run sockets applications over your existing IPX network. At the time that this book was written, the following sockets applications were supported under AnyNet/400:

- File Transfer Protocol (FTP)
- Remote Printing (LPD and LPR)
- Simple Network Management Protocol (SNMP)
- Simple Mail Transfer Protocol (SMTP)
- AS/400 DCE Base Services/400
- PING Server
- Any customer application written to AF_INET using sock_stream or sock_dgram (see below)

The following were not supported:

- TELNET Still written in PASCAL interface
- PING client Written to sock_raw

So, TELNET and PING client are not supported by AnyNet/400.

— PING client –

An OS/400 V3R1 PTF is now available which makes it possible to use the OS/400 PING client with AnyNet. The PTF number is SF25273.

AF_INET sockets applications using either the sock_stream or sock_dgram socket types will work but not those that use the sock_raw interface. The characteristics of a socket are determined by the following:

- · Socket type
- · Address family
- Protocol

The AS/400 sockets API will support the following three type of sockets:

- Sock_stream
- Sock_dgram
- Sock_raw

The AS/400 will also support the following two address families:

- AF_INET
- AF_UNIX

When we say AF_INET over IPX, we mean any AF_INET sockets application that uses sock_stream or sock_dgram will be supported by AnyNet/400. Note that sock_raw is *not* supported at this time.

The running of these applications is transparent to the user regardless of what transport protocol is being used. The user may, however, notice a performance degradation when using a sockets application via AnyNet/400 as opposed to running the same application natively under TCP/IP. Applications running on their native protocols may run faster than those running on a non-native protocol. The flexibility of the AnyNet/400 product should, however, outweigh any performance degradation.

It is important to note that if your system implements AnyNet/400 (the Network Attribute ALWANYNET is set to *YES), any sockets applications running natively over TCP/IP will run slower.

All of these points need to be considered when deciding whether to use the AnyNet/400 support. If not using AnyNet, ALWANYNET should be set to *NO.

```
- Note -
```

To use AnyNet/400 Sockets over IPX it is not necessary to have the TCP/IP Connectivity Utilities (5763-TC1) installed on your system. However, it is necessary to have this licensed program installed before we can use the FTP, LPD/LPR and SMTP TCP/IP applications. To see if this licensed program is installed on your system, enter the command G0 LICPGM and take option 10.

Configuring AnyNet/400 Sockets over IPX

In order to run Sockets over IPX on your AS/400, the following OS/400 configuration steps are required:

- 1. Establish an IPX configuration between the systems.
- 2. Change the Network Attribute ALWANYNET to *YES.
- 3. Assign an IP address to your system for Sockets over IPX.
- 4. Define routes (if necessary) to the system(s) to which you will communicate.
- 5. Establish IP to IPX address mapping.

- Note -

Configuring AnyNet/400 Sockets over IPX can be a simple three-step process. In many situations steps 2, 3 and 5 only will be required.

Network Extensions Installation –

Please note that we do not cover the installation of NetWork Extensions (5733-SA1) in this book. Please refer to *AS/400 International Packet Exchange Support*, SC41-3400 for information on this.

The user ID, under which the Sockets over IPX configuration is created, must have sufficient authority to access the relevant commands. Some of the com-

mands require the user ID to have the IOSYSCFG authority. The examples shown here were created using a profile with QSECOFR authority.

1. Establish an IPX configuration between the systems

A prerequisite for Sockets over IPX is an IPX configuration between the systems. In this step we show the basic steps to establishing an IPX configuration between two systems.



Figure 288. Two Systems Connected Using IPX

In the following panels we create the IPX configuration for RALYAS4A in Figure 288. The configuration steps for RALYAS4B will be the same except where noted throughout this chapter. Also, panels for RALYAS4B will be shown when relevant.

Line Description

The AS/400 line description defines the physical interface to the network. If an appropriate line description does not already exist (they can be shared), you need to create one. Here we use the CRTLINX25 command to create an X.25 line description. The parameters that will be different on RALYAS4B will be the Resource Name and the Local network address.

Create Line Desc (X.25) (CRTLINX25) Type choices, press Enter. Line description > X25LINE Name Name, *NWID Resource name > LIN072 Logical channel entries: Logical channel identifier . . > 001 001-FFF, *PROMPT Logical channel type > *PVC *PVC, *SVCIN, *SVCBOTH... PVC controller Name + for more values Local network address > 312 Connection initiation > *LOCAL *LOCAL, *REMOTE, *WAIT... *YES Online at IPL *YES, *NO *X21BISV24 *X21BISV24, *X21BISV35... Physical interface Connection type *NONSWTPP *NONSWTPP, *SWTPP Vary on wait *NOWAIT *NOWAIT, 15-180 (1 second) Line speed 9600 *CALC, 600, 1200, 2400... Exchange identifier *SYSGEN 05600000-056FFFFF, *SYSGEN Extended network addressing . . *NO *YES, *NO More... Create Line Desc (X.25) (CRTLINX25) Type choices, press Enter. Maximum frame size 1024 1024, 2048, 4096 Default packet size: Transmit value 64, 128, 256, 512, 1024... 128 Receive value *TRANSMIT *TRANSMIT, 64, 128, 256... Maximum packet size: Transmit value *DFTPKTSIZE *DFTPKTSIZE, 64, 128,256... Receive value *TRANSMIT *DFTPKTSIZE, *TRANSMIT,64... 8, 128 8 Default window size: Transmit value 2 1-15 1-15, *TRANSMIT Receive value *TRANSMIT *YES *YES, *NO Insert net address in packets . Text 'description' Back-to-back X.25 to RALYAS4B Bottom F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel

Figure 289. Configure X.25 Line

Note: In our test environment we did not use an actual X.25 network. We used a back-to-back X.25 connection with the X.25 DCE support (X25DCE) *YES specified in the X.25 line description on one of our systems.

For an IPX configuration, there is no need to create controller and device descriptions, they are automatically created when IPX first uses the X.25 line.

The IPX configuration can be created with commands or by choosing options from the CFGIPX Menu as shown in Figure 290 on page 234. Enter G0 CFGIPX to access this menu.

CFGIPX	Configure IPX	Sustom	
Select one of the follow	ing:	System.	KAL I A 34A
Configure IPX 1. Configure IPX ci 2. Work with IPX de 3. Work with IPX st	rcuits scriptions atus		
Configure AnyNet/400 o 10. Work with IP ove 11. Work with IP ove 12. Work with IP ove	ver IPX r IPX interfaces r IPX routes r IPX addresses		
20. Work with SNA ove	er IPX locations		
Selection or command ===> <u>2</u>			
F3=Exit F4=Prompt F9	=Retrieve F12=Cancel		

Figure 290. Configure IPX Menu

IPX Description

An IPX description defines the characteristics of the local IPX node. Multiple IPX descriptions can be configured but only one can be active at a time. Use the command CRTIPXD or choose option 2 from the CFGIPX menu shown in Figure 290. The panel presented is shown in Figure 291 on page 235.

Create IPX	Description (C	RTIPXD)
Type choices, press Enter.		
IPX description > IPX internal network number > IPX routing protocol IPX router name	IPXDSRVCFG A0000001 *RIP *NONE	Name 00000001-FFFFFFE, *RANDOM *NLSP, *RIP
IPX maximum datagram size Text 'description' >	576 ′IPX Descript	576-65535 ion for IPX Lab'
Additio	nal Parameters	
IPX packet forwarding IPX hop count SPX maximum sessions SPX watchdog abort timeout SPX watchdog verify timeout	*YES 64 1000 30000 3000	*YES, *NO 8-127 100-9999 30000-3000000 556-300000
F3=Exit F4=Prompt F5=Refresh F24=More keys	F12=Cancel	F13=How to use this display
Create IPX	Description (C	RTIPXD)
Type choices, press Enter.		
SPX are you there timeout SPX default retry count LAN hello WAN hello Designated router interval Holding time multiplier Log protocol errors Authority	6000 10 20 20 10 3 *N0 *LIBCRTAUT	556-600000 1-255 1-600 1-600 1-100 2-20 *NO, *YES Name, *LIBCRTAUT, *CHANGE
F3=Exit F4=Prompt F5=Refresh F24=More keys	F12=Cancel	Bottom F13=How to use this display

Figure 291. Create IPX Description - RALYAS4A

Create IPX Description (CRTIPXD) Type choices, press Enter. IPX description > IPXDCTLCFG Name 0000001-FFFFFFE, *RANDOM IPX internal network number . . > B0000001 *RIP IPX routing protocol *NLSP, *RIP IPX router name *NONF IPX maximum datagram size . . . 576 576-65535 Text 'description' > 'IPX Description for IPX Lab' Additional Parameters IPX packet forwarding *YFS *YES, *NO IPX hop count 64 8-127 1000 100-9999 SPX maximum sessions SPX watchdog abort timeout . . . 30000 30000-3000000 SPX watchdog verify timeout . . 3000 556-300000 More... F4=Prompt F5=Refresh F12=Cancel F13=How to use this display F3=Fxit F24=More keys



The IPX internal network number represents the internal IPX network on this AS/400. It controls all of the services under the IPX protocol stack. The IPX internal network number must be unique within the whole network. We chose A0000001 for RALYAS4A and B0000001 for RALYAS4B. There is no default for this parameter.

The IPX routing protocol parameter controls whether this IPX description supports RIP routing and SAP packet processing (RIP/SAP) only, or NLSP with RIP/SAP compatibility. If your network supports NLSP or has NLSP-enabled routers, then you should specify *NLSP. Specifying *NLSP also gives you RIP/SAP compatibility. This means that the AS/400 NLSP router can interoperate on a network that uses RIP and SAP packets. If your network only supports RIP routing and SAP packet processing, and does not contain any NLSP-enabled routers, you would specify *RIP.

IPX Circuit

An IPX circuit is a logical representation of a path for IPX communications. For a local area network (LAN), it defines the path or point of attachment from the IPX protocol layer to the IPX network. For a wide area network (WAN), it defines the path from the IPX protocol layer to a remote IPX node or system. Circuits are not physical objects. There must be at least one circuit defined for every line description with which you want to use IPX processing. Type ADDIPXCCT or choose option 1 from the CFGIPX menu. followed by option 1 (Work with IPX circuits) from the Configure IPX Circuits menu. The panels shown in Figure 293 on page 237 will be presented.

Type choices, press Enter.				
Circuit name > Line description > IPX network number > X.25 PVC logical channel id > X.25 SVC network address	X25SRVCFG X25LINE 00000001 001	Name 00000001-FFFFFFD 001-FFF		
X.25 SVC call type X.25 SVC reverse charge X.25 SVC idle circuit timeout . X.25 default packet size:	*DEMAND *NONE 60	*DEMAND, *PERM *NONE, *REQUEST, *ACCEPT 1-600		
Transmit packet size Receive packet size X.25 default window size:	*LIND *LIND	*LIND, 64, 128, 256, 512 *LIND, *TRANSMIT, 64, 128		
Iransmit window size Receive window size Enable for NLSP Cost override for NLSP	*LIND *LIND *YES *CALC	1-15, *LIND 1-15, *LIND, *TRANSMIT *YES, *NO 1-63, *CALC		
F3=Exit F4=Prompt F5=Refresh F13=How to use this display —	F10=Additiona F24=More keys	More al parameters F12=Cancel		
Add IPX	Circuit (ADDIP	PXCCT)		
Type choices, press Enter.				
Enable for IW2	*YES	*YES, *NO		
Additio	nal Parameters	5		
Default maximum datagram size . Throughput	*LIND *CALC *CALC *YES *OFF 60 4 *OFF 60 4	576-16388, *LIND 300-4294967295, *CALC 1-500000, *CALC *YES, *N0 *ON, *OFF, *AUTO 30-300000 1-10 *ON, *OFF, *AUTO 30-300000 1-10 Bottom		
F3=Exit F4=Prompt F5=Refresh F24=More keys	F12=Cancel	F13=How to use this display		

Figure 293. Create IPX Circuit - RALYAS4A

Add IPX Circuit (ADDIPXCCT) Type choices, press Enter. Circuit name > X25CTLCFG Line description > X25LINE Name 0000001-FFFFFFD IPX network number > 00000001 X.25 PVC logical channel id . . > 001 001-FFF X.25 SVC network address X.25 SVC call type *DEMAND *DEMAND, *PERM X.25 SVC reverse charge *NONE *NONE, *REQUEST, *ACCEPT... X.25 SVC idle circuit timeout . 60 1-600 X.25 default packet size: *LIND *LIND, 64, 128, 256, 512... Transmit packet size Receive packet size *LIND *LIND, *TRANSMIT, 64, 128... X.25 default window size: Transmit window size *LIND 1-15, *LIND *LIND 1-15, *LIND, *TRANSMIT Receive window size *YES, *NO Enable for NLSP *YES Cost override for NLSP *CALC 1-63, *CALC More... F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel F3=Fxit F13=How to use this display F24=More keys Add IPX Circuit (ADDIPXCCT) Type choices, press Enter. Enable for IW2 *YES *YES, *NO Additional Parameters Default maximum datagram size . *LIND 576-16388, *LIND Throughput 300-4294967295, *CALC *CALC Delay time *CALC 1-5000000, *CALC *YES, *NO Automatic start *YES *ON, *OFF, *AUTO RIP state *0FF RIP update interval 30-300000 60 RIP age multiplier 1 - 104 SAP state *0FF *ON, *OFF, *AUTO SAP update interval 30-300000 60 SAP age multiplier 4 1-10 Bottom F12=Cancel F13=How to use this display F3=Exit F4=Prompt F5=Refresh F24=More keys

Figure 294. Create IPX Circuit - RALYAS4B

The circuit name uniquely identifies the circuit.

For an X.25 PVC connection (as in this example), the IPX Network number must be the same on both systems.

Specifying *OFF for RIP and SAP state will disable RIP and SAP on this circuit. The connection to the remote system will only be established for data.

Parameters are the same on both systems except for the circuit name.

IPX Circuit Route

An IPX circuit route is required because we have specified *OFF for RIP and SAP in the IPX circuits. A circuit route defines a static route to a circuit in

the IPX configuration. A static route is associated with a certain circuit. It shows how to reach a remote node or network through that circuit. It also defines attributes needed for routing to that remote IPX node or network. To create a circuit route, Enter the command ADDCCTRTE, or take option 1 from the CFGIPX menu, followed by option 2 (Work with IPX circuit routes) from the Configure IPX Circuits menu to get the following panel.

Add Circuit Route (ADDCCTRTE)							
Type choices, press Enter.							
Circuit name > X25SRVCFG Remote IPX network number > B0000001 Number of hops 1 1-127 Number of ticks > 30 1-32767							
F3=Exit F4=Prompt F5=Refresh F24=More keys	F12=Cancel	Bottom F13=How to use this display					

Figure 295. Create IPX Circuit Route - RALYAS4A

Add Circuit Route (ADDCCTRTE)							
Type choices, press Enter.							
Circuit name > X25 Remote IPX network number > A00 Number of hops 1 Number of ticks > 30	CTLCFG 00001 0000001-FFFFFFE 1-127 1-32767						
F3=Exit F4=Prompt F5=Refresh F12 F24=More keys	=Cancel F13=How to use this disp						

Figure 296. Create IPX Circuit Route - RALYAS4B

The Circuit name specifies the IPX circuit to be used for this static route.

The Remote IPX network number specifies the remote IPX network number of the system that this route connects to.

Number of hops is equal to the number of routers that are crossed in order to reach the network or system specified in the RMTNETNBR parameter.

Number of ticks specifies the number of ticks needed to reach the remote network. A tick equals 1/18th of a second.

2. Change the Network Attribute ALWANYNET to *YES

Now we start the AnyNet specific configuration steps. First we must change the ALWANYNET network attribute to *YES. Changing this attribute will allow Sockets over SNA, APPC over TCP/IP, Sockets over IPX, and APPC over IPX to run on your system. The default value, when V3R1 is initially installed, is *NO. Use the DSPNETA command to see what your system is set to. If it is set to *NO, use the following command:

CHGNETA ALWANYNET(*YES)

 $\overline{}$

After changing this attribute, you can verify the change by entering the DSPNETA command. The resulting displays are shown next.

_

 Display Network Attributes	_	
Current system name	System: RALYAS4A	RALYAS4A
Pending system name		
Local network ID	USIBMRA	
Local control point name	RALYAS4A	
Default local location	RALYAS4A	
ADDN mode type		
Data compression	*NONE	
Intermediate data compression	*NONE	
Maximum number of intermediate sessions :	200	
Route addition resistance	128	
Server network ID/control point name :	*LCLNETID *ANY	
		More
Display Network Attributes		
	System:	RALYAS4A
Alert Status	*0N *ALL	
Alert primary focal point	*YFS	
Alert default focal point	*N0	
Alert backup focal point		
Network ID	*NONE	
Alert focal point to request	RAK	
Network ID	USIBMRA	
Alert controller description	*NUNE	
Alert filter	0 AS/100NET	
	OAL SNDA	
Message queue	QSYSOPR	
Library	QSYS	
Output queue	QPRINT	
Library	QGPL	
Job action	*FILE	Massa
		More
Display Network Attributes	<u> </u>	
Maximum hop count	System:	KALYAS4A
	10 *ΩΒ.1ΔΗΤ	
Client request access	*OBJAUT	
Default ISDN network type		
Default ISDN connection list	QDCCNNLANY	
Allow ANYNET support	*YES	
Network Server Domain	KALYAS4A	
		Bottom
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 297. AS/400 Network Attributes - System RALYAS4A

3. Assign an IP address to your local system for Sockets over IPX

We have to define a logical internet address on the system for use with Sockets over IPX. We do this by entering G0 CFGIPX and taking option 10.

CFGIPX	Configure IPX	Sustan	
Select one of the following:		system:	KALTAS4A
Configure IPX 1. Configure IPX circuits 2. Work with IPX descript 3. Work with IPX status	ions		
Configure AnyNet/400 over IP 10. Work with IP over IPX 11. Work with IP over IPX 12. Work with IP over IPX 20. Work with SNA over IPX	K interfaces routes addresses locations		
Selection or command ===> <u>10</u>			
F3=Exit F4=Prompt F9=Retrie	eve F12=Cancel		

Figure 298. Configure Sockets over IPX - System RALYAS4A

	WO	JIK WILH IP OVER	IFA INCEFIACES	System:	RALYAS4
Type option 1=Add 2	s, press Enter =Change 4=Re	r. emove 9=Start	10=End		
Int Opt Adc <u>1 9.6</u> (No inter	ernet Iress 17.60.20 faces)	Subnet Mask	Interface Status		
F3=Exit F12=Cancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TC	P/IP inter	Bottor faces

Figure 299. AS/400 Work with IP over IPX Interfaces (1 of 2)

Add an entry by entering 1 in the option field and typing in an IP address for Sockets over IPX. Your system administrator should help you determine what IP address to give to the system for use with Sockets over IPX.

- Note -

Your IP over IPX addresses must use a separate network (or subnetwork) to any other networks (or subnetworks) that you use. For example, if you already have a native TCP/IP network, Sockets over IPX must be allocated a separate network (or subnetwork) to this.

After entering the IP address, you will be prompted for a Subnet mask.

```
Add IP over IPX Interface (ADDIPIIFC)

Type choices, press Enter.

Internet address . . . . . . . > <u>'9.67.60.20'</u>

Subnet mask . . . . . . . . . . <u>255.255.255.0</u>

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display

F24=More keys
```

Figure 300. AS/400 Add IP over IPX Interface

Here again, your system administrator should be able to help you determine what subnet mask to use for your Sockets over IPX network.

In our case, we have chosen to use 9.67.60 for our Sockets over IPX network (subnet mask 255.255.255.0). Our system has a native TCP/IP connection to network 9.24.104 (subnet mask 255.255.255.0). The native TCP/IP address can be seen using the CFGTCP command and taking option 1. Shown in the following figure is the AS/400's IP over IPX interface. After creating this interface, it is automatically started and shows a status of ACTIVE.

	V	lork with IP over 1	IPX Interfaces	System:	RALYAS4A
Type opt 1=Add	tions, press Ente 2=Change 4=F	er. Remove 9=Start	10=End	-	
Opt	Internet Address	Subnet Mask	Interface Status		
-	9.67.60.20	255.255.255.0	Active		
F3=Exit F12=Canc	F5=Refresh cel F17=Top	F6=Print list F18=Bottom	F10=Work with TCP/	IP inter	Bottom faces

Figure 301. AS/400 Work with IP over IPX Interfaces (2 of 2)

Along with adding a new interface, the panel above allows you to either change, remove, start or end an existing interface.

This interface defines a logical interface and not a physical interface. It is not associated with any line description or network interface. This is illustrated in Figure 302 on page 243. The second entry represents our system's IP over IPX interface. Unlike the native TCP/IP interface (9.24.104.56), there is no line description associated with the Sockets over IPX interface (9.67.60.20). The value of *IPI indicates that this interface is used by Sockets over IPX.

NETSTAT Interface Information

The NETSTAT command gives network status information for all network types (native TCP/IP and Sockets over IPX). NETSTAT option 1 (Work with TCP/IP Interface Status) gives interface information for all interfaces (native TCP/IP and Sockets over IPX). The panel also shows whether or not the interface is active.

		Work with TCP/I	[P Interface Sta	atus	System:	RAI YAS4A
Type 5= 12	options, press E Display details =Work with config	nter. 8=Display assoc juration status	ciated routes	9=Start	10=End	
0pt 	Internet Address 9.24.104.56 9.67.60.20 127.0.0.1	Network Address 9.24.104.0 9.67.60.0 127.0.0.0	Line Description TRN2619 *IPI *LOOPBACK	Interfac Status Active Active Active	e	
F3=E F13=	xit F4=Prompt Sort by column	F5=Refresh F1 F24=More keys	l1=Display line	informat	ion F12	Bottom =Cancel

Figure 302. Work with TCP/IP Interface Status - System RALYAS4A

From this display you can start or end any of the interfaces listed. This screen is a quick way of viewing the status of both your TCP/IP interfaces and your IP over IPX interfaces.

IP over IPX Interface CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage IP over IPX interfaces:

- · ADDIPIIFC Add IP over IPX interface
- CHGIPIIFC Change IP over IPX interface
- · RMVIPIIFC Remove IP over IPX interface
- · STRIPIIFC Start IP over IPX interface
- ENDIPIIFC End IP over IPX interface

4. Define routes (if necessary) to the systems to which you will communicate

It may be necessary to define a route to the remote system for IP over IPX.

As with native TCP/IP, a route definition is required when the remote system is in a different network (or subnetwork) to the local system.

The system automatically builds a route that gives access to systems that are in the same network as the local system.

A route is assigned by entering the GO CFGIPX command and taking option 11.

Type opt 1=Add	ions, press Ente 4=Remove	Work with IP ov	er IPX Routes	System:	RALYAS4A
0pt <u>1</u>	Route Destination xxx.xxx.xxx.xxx	Subnet Mask	Next Hop		
(No Ro	utes)				
F3=Exit F12=Canc	F5=Refresh el F17=Top	F6=Print list F18=Bottom	F10=Work with TC	P/IP routes	Bottom

Figure 303. AS/400 Work with IP over IPX Routes

The Route Destination can be the address of a network, subnetwork or a specific host. For example, a Route Destination for all hosts in the 112.2.3 subnetwork would be identified by entering 112.2.3.0 for the Route destination with a Subnet Mask of 255.255.255.0. A Subnet Mask value of *HOST indicates that the internet address value specified in the Route Destination field is a host address; the Subnet Mask value is calculated to be 255.255.255.255. If the Internet address value specified for the Route Destination field is the address of a network or subnetwork, you must specify a value other than *HOST for the Subnet Mask field.

- Note

Where the dominant network is Sockets over IPX or where there is Sockets over IPX on a system with no native TCP/IP interface, it is possible to use the default route entry (*DFTROUTE) for Sockets over IPX.

Remote System in a Different Network to Local System

In Figure 304, the remote system is in a different Sockets over IPX network (subnetwork) to the local system, it is therefore necessary to define a route to that system.



Figure 304. Two Systems Connected Via IPX - Using Different IP over IPX Subnets

The following displays show the route entries that should be entered on both systems. These routes will enable each system to access the other, via Sockets over IPX. Route entry for local system:

Type o 1=Ac	options	s, press Enten =Remove	Work with IP ove ^.	er IPX Routes	System:	LOCALSYS
Opt _ _	Rou Des 9.62	te tination 7.65.0	Subnet Mask 255.255.255.0	Next Hop 9.67.64.2	24	
F3=Exi F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with 1	CP/IP routes	Bottom

Figure 305. IP over IPX Route Entry for Local System

The above entry allows the local system to communicate with any host in the 9.67.65 network. We could have used a Route Destination of 9.67.65.25 with a Subnet Mask of *HOST, but this would only allow this system to communicate with the single remote system.

Route entry for remote system:

Type c 1=Ac	options Id 4:	s, press Enter =Remove	Work with IP over r.	• IPX Routes	System:	REMOTSYS
0pt _ _	Rout Dest	te tination 7.64.0	Subnet Mask 255.255.255.0	Next Hop 9.67.65.25		
F3=Exi F12=Ca	t	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TC	P/IP routes	Bottom

Figure 306. IP over IPX Route Entry for Remote System

The above entry allows the remote system to communicate with any host in the 9.67.64 network. We could have used a Route Destination of 9.67.64.24 with a Subnet Mask of *HOST, but this would only allow this system to communicate with the single remote system.

Note that in both cases the Next Hop is the local IP over IPX interface internet address.

IP over IPX Route CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage IP over SNA routes:

- ADDIPIRTE Add IP over IPX route
- RMVIPIRTE Remove IP over IPX route

5. Establish IP address to IPX address mapping

We now map the logical IP over IPX addresses to IPX addresses. To do this, take option 12 from the CFGIPX menu, to work with IP over IPX addresses.

Type 1=A	options, press Ent dd 2=Change 4=	Work with IP ov er. Remove	ver IPX Addresses	System: RALYAS4A
0pt <u>1</u>	Remote Destination <u>9.67.60.21</u>	Subnet Mask <u>*HOST</u>	Remote IP) Network	K Remote IPX Node Address
F3=Ex (C) C	it F5=Refresh OPYRIGHT IBM CORP.	F6=Print list 1980, 1994.	F12=Cancel F17=Tc	op F18=Bottom

Figure 307. AS/400 Work with IP over IPX Addresses (1 of 2)

The Work with IP over IPX Addresses display is used to add IP to IPX address mapping. It can also be used to change or remove the mappings and display the existing IP to IPX address mappings.

The Remote destination specifies the logical IP address of the remote host or network. In combination with the subnet mask, the remote destination will be identified as a system or network.

The subnet mask is used to indicate whether the Remote Destination is a system or a network. If the remote destination is a system, *HOST is specified. If the remote destination is a network, the subnet mask associated with that network should be specified.

Add an entry by entering 1 in the option field and typing in the logical IP address of the remote destination and a subnet mask entry. Your system administrator should help you determine what IP address and subnet mask to give to the system to use with Sockets over IPX.

After entering the IP address and subnet mask you will be presented with the following display.

Add IP over IPX Add	ress (ADDIPIADR)
Type choices, press Enter.	
Remote destination > <u>'9.67.6</u> Subnet mask > <u>*HOST</u> Remote IPX network number *CALC Remote IPX node address *CALC	50.21' 00000001-FFFFFFD, *CALC 00000000001-FFFFFFFFFFFF
F3=Exit F4=Prompt F5=Refresh F12=Ca F24=More keys	Bottom ncel F13=How to use this display

Figure 308. Adding an IP over IPX Address

The remote IPX network number specifies the remote IPX network number associated with this IP network or IP address. When the remote system is an AS/400, the internal IPX network number configured in that system's IPX description would be entered for this parameter.

The Remote IPX node address specifies the remote IPX node number associated with this IP network, subnetwork or IP host. When configuring an IP over IPX address mapping entry and the remote destination is an AS/400, the remote node address value must be equal to *CALC. If the remote destination is actually a network with one or more AS/400s on that network, any valid remote node address value may be entered.

— Mapping Algorithm

The *CALC parameter is used to indicate that the mapping is algorithmic. When *CALC is used for remote IPX network number or remote IPX node address mapping, the IPX source node address is equal to 4000. This is concatenated with the remote destination IP address which is converted into the character representation of its hexadecimal form.

For example, if the IP address 9.5.1.69 is configured, then the IPX node would be calculated to be 400009050145.

This mapping algorithm is widely used in current Novell Networks.

In our case, the remote system is an AS/400 with an internal IPX network number of B0000001 so we entered the following:

	Add IP over 1	[PX Address (/	ADDIPIADR)	
Type choices, press E	nter.			
Remote destination . Subnet mask Remote IPX network nu Remote IPX node addres		<u>'9.67.60.21'</u> <u>*HOST</u> <u>B0000001</u> *CALC	00000001-F FFF 0000000000 01-F	FFD, *CALC FFFFFFFFFFE
F3=Exit F4=Prompt F24=More keys	F5=Refresh	F12=Cancel	F13=How to use t	Bottom his display

Figure 309. Adding an IP over IPX Address

Pressing the Enter key results in the following panel:

Type op 1=Add	tions, press E 2=Change	Work with IP ov nter. 4=Remove	ver IPX Addres	ses	System:	RALYAS4A
Opt _	Remote Destination	Subnet Mask	Ren Ne	note IPX etwork	Remote Node A	IPX ddress
_	9.07.00.21	1021	БС	000001	CALC	
F3=Exit	F5=Refresh	F6=Print list	F12=Cancel	F17=Top	F18=Bot	Bottom tom

Figure 310. Work with IP over IPX Addresses (2 of 2)

IP over IPX Addresses CL Commands

For those users that prefer to use CL commands, the following is a list of the CL commands that can be used to manage IP over IPX addresses:

- · ADDIPIADR Add IP over IPX addresses
- CHGIPIADR Change IP over IPX addresses
- RMVIPIADR Remove IP over IPX addresses

With all of the configuration steps completed, you are now ready to use the Sockets over IPX support of AnyNet/400. The next section shows specific Sockets over IPX configuration scenarios.

Sockets over IPX Scenarios

This section presents the scenarios we used to verify the different Sockets over IPX implementations. Each scenario contains a diagram showing the actual environment, AS/400 configuration displays and a matching parameters list.

The following scenarios will be covered in this section:

- · Sockets over IPX Scenario 1: AS/400 to AS/400 Same Subnetwork
- · Sockets over IPX Scenario 2: AS/400 to AS/400 Different Subnetworks

Sockets over IPX Scenario 1: AS/400 to AS/400 - Same Subnetwork

This configuration is the simplest and likely to be the most common. It is also an example of a configuration that should be set up prior to moving on to a more complex configuration.

Shown in the following figure are the two systems used in this scenario and their respective IP over IPX internet addresses. An IPX configuration is already in place between the systems using the IPX addresses shown.



Figure 311. Addresses Used for Sockets over IPX Scenario 1

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RALYAS4B systems. They illustrate the configuration steps required for this Sockets over IPX scenario.

First we must check that Allow ANYNET Support is set to *YES in the network attributes of each system. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

Next, we configure an IP over IPX interface on RALYAS4A.

Type c	ntions	nress Enter			System:	RALYAS4
1=Ac	dd 2=	Change 4=Re	emove 9=Start	10=End		
Opt	Inte Addr	ernet ress	Subnet Mask	Interface Status		
_	9.67	7.60.20	255.255.255.0	Active		
						Bottor
F3=Exi F12=Ca	it ancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCF	P/IP inter	faces

Figure 312. Scenario 1: Work with IP over IPX Interfaces - System RALYAS4A

The subnet mask of 255.255.255.0 indicates that the first three bytes of the internet address (9.67.60) is the network ID.

In the following panel we configure an IP over IPX interface on RALYAS4B.

	Wa	ork with IP over 1	IPX Interfaces Sv	stem: RALYAS4B
Type options 1=Add 2=	s, press Enter =Change 4=Re	emove 9=Start	10=End	
Inte Opt Addu	ernet ress	Subnet Mask	Interface Status	
<u> </u>	7.60.21	255.255.255.0	Active	
				Bottom
F3=Exit F12=Cancel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCP/IP	interfaces

Figure 313. Scenario 1: Work with IP over IPX Interfaces - System RALYAS4B

No routes are required in this scenario; both systems are in the same Sockets over IPX network (9.67.60).

Type c 1=Ac	W options, press Ente dd 2=Change 4=R	ork with IP ov r. emove	ver IPX Addresses	System: RALYAS4A
Opt	Remote Destination	Subnet Mask	Remote IPX Network	Remote IPX Node Address
-	9.67.60.21	*HOST	B0000001	*CALC
				Bottom
F3=Exi (C) CC	it F5=Refresh F DPYRIGHT IBM CORP.	6=Print list 1980, 1994.	F12=Cancel F17=To	p F18=Bottom

In the following panels we have configured the IP over IPX addresses for both systems.

Figure 314. Scenario 1: Work with IP over IPX Addresses - System RALYAS4A

	0000001 *CALC
_ 9.67.60.20 *HOST A0000001 *CAI	0000001 *CALC

Figure 315. Scenario 1: Work with IP over IPX Addresses - System RALYAS4B

Shown next are the matching parameters between systems RALYAS4A and RALYAS4B.

RALYAS4A

RALYAS4B



Figure 316. Sockets over IPX Scenario 1: Matching Parameters Table

Sockets over IPX Scenario 2: AS/400 to AS/400 - Different Subnetworks

In this scenario, two AS/400s communicate with each other via Sockets over IPX but from different IP networks (subnetworks).

Shown in the following figure are the two systems used in this scenario and their respective IP over IPX internet addresses. An IPX configuration is already in place between the systems using the IPX addresses shown.



Figure 317. Systems and Addresses Used for Sockets over IPX Scenario 2

The following series of panels show the AS/400 configuration screens taken from the RALYAS4A and RALYAS4B systems. They illustrate the configuration steps required for this Sockets over IPX scenario.

First we must check that Allow ANYNET Support is set to *YES in the network attributes of each system. Use DSPNETA to determine this, and if necessary, use CHGNETA ALWANYNET(*YES) to change.

		Wo	rk wit	h IP over	IPX In	terfaces	Sys	tem:	RALYAS4A
Type opt 1=Add	tions 2=	, press Enter Change 4=Re	move	9=Start	10=En	d	- 0 -		
Opt	Inte Addr	rnet ess	Subi Mas	net k		Interfac Status	e		
_	9.67	.60.20	255	.255.255.0		Active			
									Bottom
F3=Exit F12=Cano	cel	F5=Refresh F17=Top	F6=Pr F18=B	int list ottom	F10=W	ork with	TCP/IP	inter	faces

Next, we configure an IP over IPX interface on RALYAS4A.

Figure 318. Scenario 2: Work with IP over IPX Interfaces - System RALYAS4A

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.60) of the internet address is the network ID.

Next, we configure an IP over IPX interface on RALYAS4B.

Work with IP over IPX Interfaces System: RALYAS4B							
Type o 1=Ad	ptions ld 2=	, press Enter Change 4=Re	move 9=Start	10=End			
Opt	Inte Addr	ernet ress	Subnet Mask	Interface Status			
	9.67	.61.20	255.255.255.0	Active			
						Bottom	
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with TCP	/IP interfa	aces	

Figure 319. Scenario 2: Work with IP over IPX Interfaces - System RALYAS4B

The subnet mask of 255.255.255.0 indicates that the first three bytes (9.67.61) of the internet address is the network ID.

In this scenario RALYAS4A and RALYAS4B are in different Sockets over IPX networks (subnetworks). We must therefore define a route on each system.

Work with IP over IPX Routes System: RALYAS4A Type options, press Enter. 1=Add 4=Remove								
Opt	Rout Dest	te tination	Subnet Mask		Next Hop			
_	9.67	7.61.0	255.255.255.0)	9.67.60.20			
							Bottom	
F3=Exit F12=Car	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=W	ork with TCF	P/IP routes		

First we configure an IP over IPX route on RALYAS4A.

Figure 320. Scenario 2: Work with IP over IPX Routes - RALYAS4A

In the following panel we configure an IP over IPX route on RALYAS4B.

Type o 1=Ad	ptions d 4=	s, press Enter Remove	Work with IP ove	r IPX Routes	System:	RALYAS4B
Opt	Rout Dest	e cination	Subnet Mask	Next Hop		
	9.67	7.60.0	255.255.255.0	9.67.61.2	0	
						Bottom
F3=Exi F12=Ca	t ncel	F5=Refresh F17=Top	F6=Print list F18=Bottom	F10=Work with T	CP/IP routes	

Figure 321. Scenario 2: Work with IP over IPX Routes - RALYAS4B

The route examples shown allow each system to communicate with any system in the remote Sockets over IPX network. Instead of the examples shown, we could have entered specific entries that *only* allowed communications between the two systems shown. These specific entries would have the following values:

RALYAS4	4		
	Route	Subnet	Next
	Destination	Mask	Нор
	9.67.61.20	*HOST	9.67.60.20
RALYAS4	3		
	Route	Subnet	Next
	Destination	Mask	Нор
	9.67.60.20	*HOST	9.67.61.20

Type opt 1=Add	tions, press Er 2=Change 4	Work with IP ow Her. H=Remove	ver IPX Addresses	System: RALYAS4A
Opt	Remote Destination	Subnet Mask	Remote IPX Network	Remote IPX Node address
_	9.67.61.20	*HOST	B0000001	*CALC
				Bottom
F3=Exit	F5=Refresh	F6=Print list	F12=Cancel F17=Top	F18=Bottom

Lastly we configure the IP over IPX Addresses on each system.

Figure 322. Scenario 2: Work with IP over IPX Addresses - System RALYAS4A

Type opt 1=Add	tions, press Er 2=Change 4	Work with IP ov hter. ⊨Remove	ver IPX Addresses	System: RALYAS4B
Opt	Remote Destination	Subnet Mask	Remote IPX Network	Remote IPX Node address
_	9.67.60.20	*HOST	A0000001	*CALC
				510 0 11
F3=Exit	F5=Refresh	F6=Print list	F12=Cancel F17=To	p F18=Bottom

Figure 323. Scenario 2: Work with IP over IPX Addresses - System RALYAS4B

Shown next are the matching parameters between systems RALYAS4A and RALYAS4B.

RALYAS4A

RALYAS4B



Figure 324. Sockets over IPX Scenario 2: Matching Parameters Table
Verifying the Scenarios

In order to prove that the Sockets over IPX connection is working we can follow a step-by-step verification process. In a failing environment, this step-by-step process should help identify the failing area.

AnyNet/400 Sockets over IPX Verification

The verification of Sockets over IPX should be carried out in the following stages:

- AS/400 IPX Verification
- AS/400 Sockets over IPX Verification

- Note -

The verifications shown in this section were carried out from RALYAS4A in Sockets over IPX scenario 1.

AS/400 IPX Verification

AnyNet/400 Sockets over IPX requires an IPX configuration between the systems. This IPX configuration is established as if it were to be used by native IPX applications. There are no special IPX configuration requirements to allow Sockets over IPX to use the IPX configuration. Before we verify the Sockets over IPX configuration, we should verify the native IPX configuration. In our example we will use the IPXPING command on to verify the configuration. The results of the IPXPING can be displayed by entering the DSPJ0BL0G command and using F10 to display the detailed messages. The following shows IPXPING has been run on RALYAS4A to verify that RALYAS4B can be reached.

```
IPXPING RMTNETNBR(B0000001) RMTNDEADR(*AS400)
Verifying connection to remote system at network number B0000001, node
  address 00000000001.
Connection verification 1 took .280 seconds. 1 successful connection
  verifications.
Connection verification 2 took .279 seconds. 2 successful connection
  verifications.
Connection verification 3 took .279 seconds. 3 successful connection
  verifications.
Connection verification 4 took .279 seconds. 4 successful connection
  verifications.
Connection verification 5 took .280 seconds. 5 successful connection
  verifications.
Round-trip (in milliseconds) min/avg/max = 279/279/280
Connection verification statistics: 5 of 5 successful (100 %).
```

Figure 325. AS/400 IPXPING Job Log Information

AS/400 Sockets over IPX Verification

Having verified the native IPX configuration to the remote system, we can now verify the Sockets over IPX configuration.

Before we can use an AS/400 TCP/IP application with Sockets over IPX, we must start the server for that application on the AS/400. To start the FTP application server (the application we use in this verification), enter the command:

STRTCPSVR SERVER(*FTP)

Alternatively we can start TCP/IP on the AS/400. To do this, enter the command STRTCP. In the examples that follow we have used the STRTCP command. By default, STRTCP will start the FTP server.

The NETSTAT (Network Status) command can be used to display the status of Sockets over IPX interfaces, routes and connections in addition to native TCP/IP network status. We can use NETSTAT option 1 (Work with TCP/IP Interface Status) to verify that the Sockets over IPX interface is active.

Type 5= 12	options, press E Display details =Work with config	Work with TCP/IP Inter. 8=Display associ uration status	' Interface St	atus 9=Start	System: 10=End	RALYAS4A
Opt	Internet Address 9.24.104.56 9.67.60.20 127.0.0.1	Network Address 9.24.104.0 9.67.60.0 127.0.0.0	Line Description TRN2619 *IPI *LOOPBACK	Interfac Status Active Active Active	e	
F3=E F13=	xit F4=Prompt Sort by column	F5=Refresh F11 F24=More keys	=Display line	informat	ion F12	Bottom =Cancel

Figure 326. NETSTAT Work with TCP/IP Interface Status

Figure 326 shows the status of both the native TCP/IP interface (9.24.104.56) and the Sockets over IPX interface (9.67.60.20). From this display we can verify that the local IP over IPX interface is active and hence available for use. If not available (Inactive), we can use option 9 to make it available.

NETSTAT option 2 (Display TCP/IP route information) gives route information for all routes (native TCP/IP and Sockets over IPX). The display also shows whether or not the route is available.

Type 5=	e options, press E Display details	Display TCP/IP nter.	Route Informatio	on Syste	m: RALYAS4A
Opt _ _ _ _	Route Destination 9.67.60.0 9.24.104.0 9.67.61.0 127.0.0.0 *DFTROUTE	Subnet Mask 255.255.255.0 255.255.255.0 255.255.255.0 255.0.0.0 *NONE	Next Hop *DIRECT *DIRECT 9.67.60.20 *DIRECT 9.24.104.1	Route Available *YES *YES *YES *YES *YES	
F3=E F13=	xit F5=Refresh Sort by column	F6=Print list F17=Top	F11=Display ro F18=Bottom	ute type – F	Bottom 12=Cancel

Figure 327. NETSTAT Display TCP/IP Route Information

The NETSTAT option 2 example in Figure 327 is from a system with both a native TCP/IP configuration and a Sockets over IPX configuration. The first two entries were automatically added when the native TCP/IP and Sockets over IPX interfaces were added (a native TCP/IP interface with an internet address of 9.24.104.56 and a subnet mask of 255.255.255.0, a Sockets over IPX interface with an internet address of 9.67.60.20 and a subnet mask of 255.255.255.0). These entries give access to systems in the same network as the local system. Note that the next hop for these entries is *DIRECT, go use the local interface. The third entry is the result of adding a Sockets over IPX route with a route destination of 9.67.61.0, subnet mask of 255.255.255.0 and next hop of 9.67.60.20. Note that the next hop for this entry is the address of the local IP over IPX interface. The fourth entry is the loopback entry. The last entry is the default route on the system; in this example, the default route is for native TCP/IP with a next hop of 9.24.104.1. We can use this display to verify that a route is available to the remote system with which we want to communicate using Sockets over SNA. The example in Figure 327 is from Sockets over IPX scenario 2.

- Note -

The NETSTAT option 2 route information above is how the system will decide whether to use native TCP/IP or Sockets over IPX for a connection. For the system to use Sockets over IPX, the route selected must have a next hop that specifies either *DIRECT where this maps to *IPI (as in the 9.67.60.0 route destination in Figure 327, NETSTAT option 1 can be used to verify that this route destination maps to a network address against which *IPI is specified) or the address of the local IP over IPX interface (as in the 9.67.61.0 route destination in Figure 327). When choosing a route to use, the system will select the most specific entry. You should *not* have duplicate route entries.

Having verified that the local IP over IPX interface is active and that a route is available to the remote system, we can now try to establish a Sockets over IPX session to that system. Under native TCP/IP we would normally use the PING application to initially test a configuration. However, under OS/400 Sockets over IPX, PING Server only is supported. This, therefore, does not make a good test tool to use in this environment. Since the FTP (File Transfer Protocol) application is universally supported by TCP/IP systems, we have used this application here to verify the Sockets over IPX configurations.

— PING client –

An OS/400 V3R1 PTF is now available that makes it possible to use the OS/400 PING client with AnyNet. The PTF number is SF25273.

We must first make sure that Sockets over IPX and any application we want to use are started on the remote system. In the example that follows, we will FTP from RALYAS4A to RALYAS4B. We therefore need to start Sockets over IPX and the FTP application server on the RALYAS4B system.

In Figure 328, we have used the following command to access the RALYAS4B system via Sockets over IPX:

ftp '9.67.60.21'

File Transfer Protocol
Previous FTP subcommands and messages: Connecting to host name RALYIPB at address 9.67.60.21 using port 21. 220-QTCP at 9.67.60.21. 220 Connection will close if idle more than 5 minutes. 215 OS/400 is the remote operating system. The TCP/IP version is "V3R
<pre>> anyuser 331 Enter password. 230 ANYUSER logged on. 250 Now using naming format "0". 257 "QGPL" is current library.</pre>
Enter an FTP subcommand. ===>
F3=Exit F6=Print F9=Retrieve F17=Top F18=Bottom F21=CL command line

Figure 328. FTP via Sockets over IPX to Another AS/400 System

— Note ·

We could, of course, have added 9.67.60.21 to the local TCP/IP host table (or to the name server being used) which would have allowed us to use a host name rather than the internet address with the FTP command.

Having established a Sockets over IPX connection, if we now use NETSTAT option 3 (Work with TCP/IP Connection Status), it will show this active session from an IP address perspective, as shown in Figure 329.

		Work with	TCP/IP Conn	ection Stat	us System•	β ΔΙ ΥΔ54Δ
Loca	l internet addres	ss		.: *ALL		INE INSTR
Type 4=	e options, press l End 5=Display o	Enter. details				
	Remote	Remote	Local			
0pt	Address	Port	Port	Idle Time	State	
	*	*	ftp-con >	000:04:36	Listen	
	*	*	telnet	000:05:14	Listen	
	*	*	1pd	000:04:41	Listen	
	9.67.60.21	ftp-con >	1025	000:00:01	Established	
						Bottom
F5=R F14=	efresh F11=Disp Display port numl	olay byte co pers F22=D	ounts F13= Display enti	Sort by col re field	umn F24=More keys	

Figure 329. NETSTAT Work with TCP/IP Connection Status (1 of 2)

If instead the AS/400 was the target of the Sockets over IPX FTP connection, NETSTAT option 3 would show the following:

		Work with	TCP/IP Conn	ection Stat	cus System:	RALYAS4A
Loca	I internet addres	ss		••• *ALL	-	
Type 4=	e options, press H End 5=Display o	Enter. details				
	Remote	Remote	Local			
Opt	Address	Port	Port	Idle Time	State	
	*	*	ftp-con >	000:04:36	Listen	
	*	*	telnet	000:05:14	Listen	
	*	*	lpd	000:04:41	Listen	
	9.67.60.21	1034	ftp-con >	000:04:24	Established	
						Bottom
⊦5=R F14=	etresh F11=Disp Display port numb	olay byte co bers F22=E	ounts F13= Display enti	Sort by col re field	umn F24=More keys	



Client Access/400 for Windows 3.1 over TCP/IP

This chapter presents the installing and configuration of V3R1M1 Client Access/400 for Windows 3.1 over TCP/IP on a Personal Computer at the International Technical Support Organization in Raleigh.

Because a TCP/IP protocol stack is required to be installed and configured prior to the installation of Client Access/400 for Windows 3.1, the installation of a subset of IBM TCP/IP for DOS (provided with Client Access/400 for Windows 3.1) is also covered.

The information is presented in the following sections:

- 1. Introduction to V3R1M1 Client Access/400 for Windows 3.1 over TCP/IP
- 2. Using Client Access/400 for Windows 3.1 over TCP/IP
- 3. Configuring AnyNet/400 APPC over TCP/IP on the AS/400
- 4. Installing and Configuring TCP/IP for DOS
- 5. Using PING to verify the TCP/IP configuration
- 6. Interim AS/400 APPC over TCP/IP verification
- 7. Installing and Configuring Client Access/400 for Windows 3.1
- 8. Ending Client Access/400 for Windows 3.1 over TCP/IP and exiting windows
- 9. Help with problem determination

For further information on AnyNet/400 APPC over TCP/IP, refer to *AS/400 Communications Configuration*, SC41-3401. For further information on Client Access/400 for Windows 3.1 TCP/IP setup, refer to *Client Access/400 for Windows 3.1 TCP/IP Setup*, SC41-3580.

There are also several informational PTFs available listing current information on known problems (supported TCP/IP protocol stacks, etc.). Informational PTF II08677 is an index to all other Client Access/400 for Windows 3.1 informational PTFs.

Introduction to Client Access/400 for Windows 3.1 over TCP/IP

Client Access/400 for Windows 3.1 is an APPC program that operated only in SNA networks until the availability of OS/400 V3R1 and V3R1M1 Client Access/400 for Windows 3.1. Now Client Access/400 for Windows 3.1 includes the IBM AnyNet programs which use the Multiprotocol Transport Networking Architecture (MPTN). This communications technology defines a transparent layer between Client Access/400 for Windows 3.1 on the PC and the network protocol. This allows Client Access/400 for Windows 3.1 to fully function in a TCP/IP network. Some of the other Client Access/400 for Windows 3.1 functional enhancements provided by V3R1M1 include:

- Graphical User Interface to AS/400: This is in the form of System Object Access, Graphical Access for OS/400 and Graphical Operations.
- Multiple Terminal and Print Emulators: RUMBA/400 or Personal Communications/5250.

- Database Access facility: A graphical interface that allows a user to easily select and retrieve AS/400 database records.
- Virtual Print: You can print PC documents on an AS/400 printer or PC printer defined as an AS/400 printer.
- Shared Folders: Network drives can be assigned to any part of the IFS namespace therefore allowing you to view the entire file structure on the AS/400.
- Application Programming Interfaces (APIs).

The benefits of Client Access/400 for Windows 3.1 operating in either a TCP/IP or SNA network are as follows:

- Customers no longer need to make PC connectivity decisions based on the underlying network protocol.
- Broadens access to applications.
- Investment in existing and future applications is protected through application independence.

Using Client Access/400 for Windows 3.1 over TCP/IP

V3R1M1 Client Access/400 for Windows 3.1 allows all the Client Access/400 for Windows 3.1 functions to be used in a TCP/IP environment.

PC software requirements are as follows:

- · DOS version 5.0 or later
- Microsoft Windows version 3.1 or Microsoft Windows for Workgroups version 3.11
- A supported TCP/IP protocol stack. A subset of TCP/IP for DOS is provided with Client Access/400 for Windows 3.1

The following TCP/IP protocol stacks are supported by Client Access/400 for Windows 3.1:

- IBM TCP/IP for DOS, Version 2.1.1 with CSD UB10718
- Walker Richer Quinn (WRQ) TCP Connection for Windows, Version 4.02
- FTP PC/TCP OnNet 1.1 for DOS/Windows (Windows VxD Kernel)
- Novell LAN WorkPlace for DOS, Version 5
- Microsoft TCP/IP-32 3.11a for Windows for Workgroups, Version 3.11 (VxD)
- NetManage Chameleon TCP/IP for Windows, Version 4.5.1

V3R1M1 Client Access/400 for Windows 3.1 over TCP/IP requires OS/400 Version 3.0 Release 1.0 and the following program options to be installed on the AS/400:

- 5763 SS1 Host Servers V3R1M0
- 5763 XA1 Client Access/400 Family Base V3R1M1
- 5763 XC1 Client Access/400 for Windows 3.1 V3R1M1
- 5763 XC1 Client Access/400 Windows 3.1 (SBCS or DBCS) V3R1M1

The following may be optionally installed:

 5763 XC1 Client Access/400 - Windows 3.1 RUMBA (SBCS or DBCS) V3R1M1

- 5763 XC1 Client Access/400 Windows 3.1 PC5250 (SBCS or DBCS) V3R1M1
- 5763 XC1 Client Access/400 GraphicsOps for Windows V3R1M1
- 5763 XC1 Client Access/400 Ultimedia Facilities V3R1M1

You should also ensure that the latest Cumulative PTF package is installed. We used V3R1M1 Client Access/400 for Windows 3.1 with Cumulative PTF package C5304310.

Configuring AnyNet/400 APPC over TCP/IP

In order to run APPC over TCP/IP on your AS/400, the following OS/400 configuration steps are required:

- 1. Establish a TCP/IP configuration.
- 2. Change the Network Attribute ALWANYNET to *YES.
- 3. Add an entry to the APPN remote location list.
- 4. Create an APPC controller with LINKTYPE(*ANYNW).
- 5. Map the APPC LU name to an internet address.

The user ID, under which the APPC over TCP/IP configuration is created, must have sufficient authority to access the relevant commands. Some of the commands require the user ID to have the IOSYSCFG authority. The examples shown here were created using a profile with QSECOFR authority.

1. Establish a TCP/IP configuration

A prerequisite for APPC over TCP/IP is a TCP/IP configuration between the systems. In this step we show the basic steps to establishing a TCP/IP configuration. If your system already has a TCP/IP configuration to the remote system with which you want to communicate via APPC over TCP/IP then you can skip this step and proceed to step 2 on page 270 in this section.



Figure 331. An AS/400 and PC Connected Using Client Access/400 for Windows 3.1 over TCP/IP

In the following panels we create the TCP/IP configuration for RALYAS4A.

The following panels show the configuration screens for a token-ring configuration. If you require help in establishing a TCP/IP configuration over another type of interface, refer to the manual *AS/400 TCP/IP Configuration and Reference* SC41-3420.

Line Description

The AS/400 line description defines the physical interface to the network. If an appropriate line description does not already exist (they can be shared), you need to create one. Here we use the CRTLINTRN command to create a token-ring line description.

Create Line Desc ((Token-Ring)	(CRTLINTRN)
Type choices, press Enter.		
Line description > TF Resource name > LI Online at IPL > LI Vary on wait	RN2619 IN041 YES NOWAIT 0 M 994 00010020001 SYSGEN	Name Name, *NWID, *NWSD *YES, *NO *NOWAIT, 15-180 (1 second) 1-256 4M, 16M, *NWI 265-16393, 265, 521, 1033 400000000000-7FFFFFFFFFFF 05600000-056FFFFF, *SYSGEN
SSAP list: Source service access point . *S SSAP maximum frame SSAP type	SYSGEN	02-FE, *SYSGEN *MAXFRAME, 265-16393 *CALC, *NONSNA, *SNA, *HPR
lext 'description' > '4	4M loken Ring	g line description for LINO41'
F3=Exit F4=Prompt F5=Refresh F1 F13=How to use this display F2	10=Additional 24=More keys	Bottom parameters F12=Cancel

Figure 332. Create Token-Ring Line Description - System RALYAS4A

For a TCP/IP configuration, there is no need to create controller and device descriptions, they are automatically created when TCP/IP first uses the token-ring line.

TCP/IP Interface

The TCP/IP interface defines this AS/400 on the TCP/IP network. Enter the CFGTCP command to access the Configure TCP/IP panel, and take option 1 to work with TCP/IP interfaces.

CFGTCP	Configure TCP/IP	Sustan	
Select o	one of the following:	system:	KALTAJ4A
1. 2. 3. 4. 5.	Work with TCP/IP interfaces Work with TCP/IP routes Change TCP/IP attributes Work with TCP/IP port restrictions Work with TCP/IP remote system information		
10. 11. 12. 13.	Work with TCP/IP host table entries Merge TCP/IP host table Change local domain and host names Change remote name server		
20. 21.	Configure TCP/IP applications Configure related tables		
Selectic ===> <u>1</u>	on or command		
F3=Exit	F4=Prompt F9=Retrieve F12=Cancel		

Figure 333. TCP/IP Configuration Menu

Type 1=	options, press E Add 2=Change	nter. 4=Remove 5=Disp	lay 9=Start	10=En	System: d	RALYAS4A
0pt	Internet Address	Subnet Mask	Line Description	Line Type		
 	9.24.104.56 127.0.0.1	255.255.255.0 255.0.0.0	TRN2619 *LOOPBACK	*TRLAN *NONE		
F3=E F11=	xit F5=Refresh Display interface	F6=Print list status	F10=Work wit F12=Cancel	h IP ove F17=Top	r SNA inte F18=Boti	Bottom rfaces tom

Figure 334. TCP/IP Interface Definition - System RALYAS4A

If a TCP/IP interface does not already exist, add an entry using the internet address allocated to this system and the mask of the subnet in which the system resides.

Besides allowing you to add, change and remove TCP/IP interfaces, this screen also allows you to start and end these interfaces.

TCP/IP Route

If the route to the remote host is via a gateway or the remote host resides in a different network or subnetwork to the local host, it will be necessary to use option 2 from the Configure TCP/IP screen to configure a route. This is not the case in this simple scenario.

TCP/IP Host table

The local host table on the AS/400 contains a list of the internet addresses and associated host names for this network. To access the AS/400 host table enter the CFGTCP command and take option 10 (Work with TCP/IP Host Table Entries).

			Work with TCP/II	9 Host Table	Entries System:	
Type	e opt	ions, press E	inter.	anlay 7-Don	System:	KALTA34A
1-	Auu	z-change	4-Relilove 5-DT	spidy /-Ren	dille	
	Inte	ernet	Host			
0pt	Addı	ress	Name			
-	9.24	4.104.56	RALYAS4A			
-			RALYAS4A.ITSO.	RAL.IBM.COM		
-	9.24	4.104.178	WINTCPIP			
			WINTCPIP.1130.1	AL.IDM.COM		
F 2_F		FF-Defineeh	F6-Dwint list	E12-Canaal	E17-Desition to	
F3=E	XIT	ro=ketresn	FO=Print list	FIZ=Cancel	FI/=PUSITION TO	

Figure 335. TCP/IP Host Table Entries - System RALYAS4A

Unless you are planning to use a name server, add an entry for the local system and any remote system(s) to which TCP/IP is to be used. In the above example, both the short and long names have been entered.

2. Change the Network Attribute ALWANYNET to *YES

Now we start the AnyNet specific configuration steps. First we must change the ALWANYNET network attribute to *YES. Changing this attribute will allow both APPC over TCP/IP and Sockets over SNA support to run on your system. This attribute also enables APPC over IPX and Sockets over IPX on your system. The default for this value, when V3R1 is initially installed, is *NO. Use the DSPNETA command see what your system is set to. If it is set to *NO, use the command:

CHGNETA ALWANYNET (*YES)

After changing this attribute, you can verify the change by entering the DSPNETA command. The resulting displays are shown in the following figure.

Display Network Attributes	Svctom.	RΔΙ ΥΔS4Δ
Current system name	RALYAS4A	
Pending system name		
Local network ID	USIBMRA	
Local control point name	RALYAS4A	
Default local location	RALYAS4A	
Default mode	BLANK	
APPN node type	*NETNODE	
Data compression	*NONE	
Intermediate data compression	^NUNE	
Maximum number of intermediate sessions :	200	
Server network ID/control point name		
		More
Display Network Attributes	Suctor	Δ Ι ΛΨζην
Alert status	*0N	INAL I AJ4A
Alert logging status	*AI I	
Alert primary focal point	*YES	
Alert default focal point	*N0	
Alert backup focal point		
Network ID	*NONE	
Alert focal point to request	RAK	
Network ID	USIBMRA	
Alert controller description	*NONE	
Alert hold count	0	
Alert filter	AS400NET	
Library	QALSNDA	
	US I SUPR	
loh action	*FILF	
	1122	More
- <u> </u>		
Display Network Attributes		
	System:	RALYAS4A
Maximum hop count	16	
DDM request access	*OBJAUT	
Client request access	*UBJAUT	
Default ISDN network type		
	UDUUNNLANY	
Allow ANTNEL Support		
	NAL I AJ4A	
		Bottom
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 336. Display of Network Attributes with ALWANYNET(*YES)

Changing the ALWANYNET network attribute to *YES will result in the APPC over TCP/IP job (QAPPCTCP) being started in the QSYSWRK subsystem.

3. Create an APPC controller with LINKTYPE(*ANYNW)

The AS/400 controller description defines the remote system. A new LINKTYPE has been added to the APPC controller description for AnyNet. With AnyNet, the APPC controller is no longer directly attached to a line description. Use the CRTCTLAPPC (Create APPC Controller Description) command to create an APPC controller with LINKTYPE(*ANYNW).

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > APPCOVRTCP
                                                Name
                                                *ANYNW, *FAX, *FR, *IDLC...
Link type . . . . . . . . . . > *ANYNW
Online at IPL .
                                  *YES
                                                *YES, *NO
                     . . . . .
               . .
                                  *NETATR
                                                Name, *NETATR, *NONE, *ANY
Remote network identifier . . .
                                               Name, *ANY
Remote control point . . . . . > TCPIP
User-defined 1 . . . . . . . .
                                  *LIND
                                               0-255, *LIND
                                               0-255, *LIND
User-defined 2 . . . . . . . .
                                  *LIND
User-defined 3 . . . . . . . .
                                               0-255, *LIND
                                 *LIND
Text 'description' . . . . . . > 'Client Access AnyNet Controller'
                                                                      Bottom
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display
                                  F24=More keys
```

Figure 337. Create Controller Description with LINKTYPE(*ANYNW)

The Remote network identifier should match the local network identifier on the remote system, *NETATR indicates that the value in the network attributes should be used - that the local system and remote system have the same network ID. The remote control point name, however, is not used external to the system. The remote control point name entered should match the value entered in the APPN remote location list (see below).

APPC Device Description and Mode Description

The APPC device description is automatically created when the PC initially connects with the AS/400.

APPC over TCP/IP uses mode descriptions in the same way that APPC over SNA does.

Note: It is not possible to map an APPC mode to an IP type of service.

Additional Technical Information for APPC Controller

The following technical information describes the differences between an AnyNet connection and a normal SNA connection:

- The name of the *ANYNW controller and the remote control point name have no relationship to the name of the PC coming in.
- Each *ANYNW controller can handle up to 254 PCs at a time, and since the PCs may have different control point names and LU names, again, there is no relationship.
- The remote control point name in the *ANYNW controller is only used internally to the AS/400 system, as you see later when we add an entry to the configuration list.

- When the BIND comes in for a PC through AnyNet, the code on the AS/400 system looks at the NETID.LUNAME part of the domain name of the PC. If there is a device already created with the NETID.LUNAME on any *ANYNW controller, and it is varied on, this device is used. If no match for the NETID.LUNAME is found on the *ANYNW controllers, the controller with the least number of devices attached is used to attach the newly created device.
- An *ANYNW controller must be varied on for APPC over TCP/IP to function.
- The device description that is created for your PC on the AS/400 system remains in status Active even if you disconnect your PC from the AS/400 system.

— Note –

In most cases, you only need to create one *ANYNW controller since you can have up to 254 PCs coming through that controller. If you have several *ANYNW controllers, there is no way to predict under which controller the device corresponding to your PC will appear, unless you manually create the device description associated with that PC.

4. Add an entry to the APPN Remote Location List

For most Client Access/400 for Windows 3.1 users this step is *not* required and can be skipped. However, the CPI-C interface provided with V3R1M1 Client Access/400 for Windows 3.1 supports incoming Allocates. The AS/400 system will require a APPN remote location list entry for each PC using Client Access/400 for Windows 3.1 and this function. This is because APPC over TCP/IP communications needs the information in the APPN remote location list to determine which controller description to use when it activates the session.

To update the APPN remote location list, use the following command:

CHGCFGL *APPNRMT

The resulting display is as in Figure 338 on page 274.

		Cha	nge Confi	guration L [.]	ist	11/10/94	RCHASO40 10:47:23
Configura	tion list	: Q	APPNRMT				
Configura	tion list	type : *	APPNRMT				
Text		:					
T							
Type chan	ges, press	s Enter.					
		٥٥٨	N Domoto	locations			
	Remote	APP	Remote	Control			
Remote	Network	Local	Control	Point	location	¢	Secure
location	ID	Location	Point	Net ID	Password		
WINTCPIP	USIBMRA	RALYAS4A	TCPIP	*NETATR			*N0
	*NETATR	*NETATR	-	*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Disp	lay session	informat	ion F12=0	Cancel F1	7=Top F1	8=Bottom

Figure 338. APPN Remote Location List Panel

AS/400 APPN requires that all remote location names be unique. For this reason, it cannot have the same remote location name and remote network ID in both its SNA network and its TCP/IP network.

- The Remote Location name should match the local location (LU) name at the remote system. This will be the PC location name on the Common Options menu shown in Figure 356 on page 290.
- The Local Location name should match the remote location (LU) name at the remote system. This will be the System name on the TCP/IP Configuration menu shown in Figure 357 on page 291.
- The Remote Network ID and Control Point Net ID should match the remote network identifier in the APPC controller with a LINKTYPE(*ANYNW). *NETATR indicates that the value in the network attributes should be used.
- The Remote Control Point name should match the remote control name in the APPC controller with a LINKTYPE(*ANYNW).

Any entry added to the APPN remote location list results in an entry in the local APPN topology database. However, the APPC over TCP/IP entries are not propagated to other systems in the APPN network; the entry is used as an end node, only information on attached network nodes is propagated. No topology updates flow as a result of adding the APPC over TCP/IP entries. In addition to being used locally, the APPC over TCP/IP entries allows this system to respond to APPN search requests received for these LU names. It is this function that allows the AS/400 system to act as a bridge.

Additional Technical Information for the APPN Remote Location List

 A configuration list entry is only necessary if your application does an allocate out of the AS/400 system. We recommend that you include the necessary entries in this list in order to have your AnyNet configuration complete and ready for possible future use should an application wish to call out to a PC.

• You need to be able to attach an APPC controller to a PC LU name. If your PCs have similar LU names, you can use generic entries in the configuration list as shown in Figure 339.

		Cild	inge contri		136	11/10/94	11:12:24
Configura Configura Text	tion list	: Q type: * :	APPNRMT APPNRMT				
Type char	iges, press	s Enter.					
		APP	N Remote	Locations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
WINTCP*	USIBMRA	RALYAS4A	TCPIP	USIBMRA			*N0
		*NETATR		*NETATR			*N0
	"NETATK						
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR *NETATR *NETATR	*NETATR *NETATR		*NETATR *NETATR			*N0 *N0
	*NETATR *NETATR *NETATR *NETATR	*NETATR *NETATR *NETATR		*NETATR *NETATR *NETATR			*NO *NO *NO
	*NETATR *NETATR *NETATR *NETATR *NETATR	*NETATR *NETATR *NETATR *NETATR		*NETATR *NETATR *NETATR *NETATR			*NO *NO *NO *NO

Figure 339. APPN Remote Location List Panel with a Generic Name Entry

 It is possible that an incoming conversation (such as Client Access) produces a device description on one *ANYNW controller, while an outgoing conversation to the same PC (such as data queues) produces a device on another controller as specified in the configuration list. This means that there may be two device descriptions for the same PC!

– Hint -

To keep the administration as simple as possible, try to create only the necessary number of APPC controllers of type *ANYNW. Remember, each controller can support up to 254 PCs.

5. Map the APPC LU name to an internet address

The TCP/IP host table provides the mapping between host name and internet address. Here it is providing the mapping between the SNA remote location name/remote network ID and the remote internet address.

Enter the CFGTCP command to access the Configure TCP/IP panel, and take option 10 to work with the TCP/IP host table.

			Work with	TCP/IP	Host	Table En	tries	vstem·	ραι γαςάδ
Type options, press I 1=Add 2=Change			nter. 4=Remove	5=Disp	lay	7=Renam	e	ystem.	INE INSTA
0pt	Inte Addr	ernet ress	Host Name						
_	9.24	1.104.56	RALYAS4A RALYAS4A. RALYAS4A	ITSO.RA	L.IBM	.COM			
-	9.24.104.178		WINTCPIP WINTCPIP. WINTCPIP.	ITSO.RA USIBMRA	L.IBM	.COM IBM.COM			
F3=E>	kit	F5=Refresh	F6=Print	list	F12=	Cance1	F17=Posit	ion to	

Figure 340. TCP/IP Host Table Entries

For APPC over TCP/IP, the host name entries are made up as follows:

- WINTCPIP Remote SNA location (LU) name
- USIBMRA Remote SNA network ID
- SNA.IBM.COM SNA Domain Name Suffix

Add an entry for each remote system to which APPC over TCP/IP will be used. The remote SNA location names and SNA network IDs should be as specified in the APPN remote location list.

— Note -

A PTF is now available to allow the AS/400 to use an SNA domain name suffix of other than SNA.IBM.COM. The PTF is shipped in two parts: MF08352 and SF21042. Both PTFs are on Cumulative C5157310 or later.

When communicating between systems using APPC over TCP/IP, both systems must use the same SNA Domain Name Suffix.

This host table will be used by native TCP/IP and APPC over TCP/IP. The entries *without* the extension SNA.IBM.COM are for native TCP/IP.

- Note -

The AS/400 TCP/IP Host Table will allow a maximum of four host names to be entered against a single host internet address. This may become a restriction when using AnyNet/400 APPC over TCP/IP. One possible alternative is to use a name server rather than the AS/400 host table.

With all of the configuration steps completed, you are now ready to use the APPC over TCP/IP support of AnyNet/400. The next section shows how to set up the PC side of the configuration.

Installing and Configuring TCP/IP for DOS

This section presents the installation of the TCP/IP for DOS subset provided with Client Access/400 for Windows 3.1. The following steps need to be performed:

- 1. Install TCP/IP for DOS on the PC.
- 2. Configure TCP/IP for DOS.
- 3. Install TCP/IP for DOS fix.
- 4. Update the TCP/IP for DOS host file on the PC.
- 5. Update the CONFIG.SYS and AUTOEXEC.BAT files.

Please note that we have only shown the key TCP/IP for DOS configuration displays in this section. For further help, refer to *Client Access/400 for Windows 3.1 TCP/IP Setup*, SC41-3580.

— PC Software Installed -

The following software was installed on WINTCPIP:

- IBM DOS 7.0
- Microsoft Windows 3.1
- The TCP/IP for DOS subset provided with V3R1M1 Client Access/400 for Windows 3.1. We used diskettes provided with Client Access/400 for Windows 3.1 by specifying Feature 8540. You can also create these diskettes from the QIWSTOOL folder if PTFs SF23551,SF23552, SF23553, and SF24028 are applied to your system.
- The fix for TCP/IP for DOS APAR HB60120.

The software was installed in the above order.

- 1. Install TCP/IP for DOS on the PC.
 - a. Insert the TCP/IP for DOS Installation diskette in Drive A.
 - b. Type a:/install at the DOS prompt and press Enter.
 - c. When the Installation Complete message is displayed, reboot the PC to make the changes to the AUTOEXEC.BAT and the CONFIG.SYS effective.
- 2. Configure TCP/IP for DOS.
 - a. Type custom at the DOS prompt and press Enter.
 - b. Select the CONFIGURE pull-down menu.
 - c. Select the **Physical Connection Type** from the pull-down menu. In our case this is the NDIS interface. For our PC, the following entries were made:

Gubnet mask 🗾	572555245570 1116741 Toker		10000° 00° 100000 X
und adapter 👥			50000 00-00000 ×
P ields. Arrows select [check	to move wit] options.	hin a group.	
1	fields. Arrows o select [check	fields. Arrows to move wit to select [check] options.	fields. Arrows to move within a group. to select [check] options.

Figure 341. Configuration of the NDIS Interface

Select **OK**. You will need to insert the TCP/IP driver diskette (D1 or D2) when requested.

d. Next, Name Resolution will need to be selected. We did not use a Domain name server in our configuration. Because of this, we will need to update the TCP/IP for DOS hosts table in a later step. On our PC we entered the following entries:

	ie (this com Company and the second	nputer s	i namej			
Domain r	iame Intelectionelection					
Doma:	n name serve	er addre	eses			
2						
4 4						
		888 				
	1	íAB to m	iove bet	ween fi	elds.	
		8 .		88 .		

Figure 342. Name Resolution Configuration

Note: The values entered in Figure 341 and Figure 342 match the host table entry shown in Figure 335 on page 270.

e. Next we selected **Autostart** and enabled TCP/IP. This allows TCP/IP to start automatically when the PC is started.

Select the 5	ervices you w	ant started a	itomatically	•
TCP/IP Network Mana	gement	SNMPD	inable VI	
TAB to move	between fiel	ds. SPACEBAA	to select [c	heck] options.

Figure 343. Selecting Autostart of TCP/IP for DOS

f. Next take the option to **Exit and Save**. You will be requested to increase the FILES entry in the config.sys. This needs to be a high number. We recommend 255.



Figure 344. Increasing the Files= Statement

You may also be may need additional statements added to your SYSTEM.INI file. You should allow custom to add these statements.



Figure 345. Adding UniqueDOSPSP=True setting to SYSTEM.INI



Figure 346. Adding InDOSPolling=True to SYSTEM.INI

— Note -

We did not need to configure Routing Information in our configuration because we are on the same IP network as the AS/400. If the AS/400 is not on the same IP network then Routing Information will need to be configured.

3. Apply TCP/IP for DOS fix.

On our PC we had DOS 7.0 installed. When using TCP/IP for DOS with DOS 7.0, an updated DOSTCP.SYS file is required.

We obtained the update by calling 1-800-992-4777 and requesting the TCP/IP for DOS fix for APAR HB60120.

If you have Internet access, as an alternative you can do the following:

- a. Go to The IBM Personal Computers home page located at http://www.pc.ibm.com/.
- b. Select Files.
- c. Select TCP/IP Support Files in the Networking File Areas category.
- d. Download the DOSTCP.ZIP file.
- e. Use PKUNZIP.exe to decompress the file and copy the DOSTCP.SYS file to the TCPDOS\BIN directory.

The PC should now be restarted.

4. Update the TCP/IP for DOS hosts file.

The entries to the hosts file on the PC are only needed if you do not have a name server, or if your name server cannot hold the long name required for AnyNet communications. In our configuration a name server was not used.

The hosts file is located in the \TCPIP\ETC directory on the PC. The following three entries need to be added:

- a. The AnyNet name for the AS/400
- b. The TCP/IP name for the AS/400
- c. The TCP/IP name for the PC

On our PC, the DOS 7.0 editor was used to update the hosts file as shown in Figure 347. The values entered match those entered in Figure 340 on page 276.

# # hosts					
# # This file contains # This file is used	the hostnam to resolve a	es and their a hostname into	ddress for h an Internet	osts in the n address	etwork
₩ # The format of this	file is				
# Internet Address	Hostnar	ne [Aliases]	4 Comme	nts	
A litems are seperate A of a comment.	d by any numl	per of blanks.	A # indicat	es the begini	ng
.⊣ ≒ Internet Address	Hostname	Alias	# Comments		
# 192.1.1.1	mentor_n1	mether	# Address o	f mentor in N	etworki
# 129.5.5.3	mentor_n2	m802 3 wise	# Address o	f mentor in N	etwork2
# 9.5.2.201	mentor n3	#tok	# Address o	f mentor in N	etwork3
# 9.5.2.205	babbage		# Address o	f mentor in N	etwork3
8.24.104.56	RALYAS4A.US	SIBMRA.SNA.IBM	.COM # AS/4	CO ANYNET Nam	e
9.24.104.56	RALYASAA		# AS/4	OO TCPIP Name	
9.24.104.178	WINTCPIP		# This	PC's Name	
C:\TCPDOS\ETC\HOSTS		Line	12 Col	1 Insert	E 3.12
F1=Help 2=Save 3=0	uit 4=File	6=Dra	w 7=Name 8	≃Edit 9≃Undo	10=Next

Figure 347. The Updated HOSTS File

5. Update the CONFIG.SYS and AUTOEXEC.BAT.

a. Add the following to the CONFIG.SYS file:

SHELL=C:\DOS\COMMAND.COM C:\DOS /P /e:512

If the CONFIG.SYS already has the SHELL statement, make sure that the /e: variable is 512 or greater.

b. Make sure that all PATH statements in the AUTOEXEC.BAT file are 80 or less characters long. Long PATH statements may cause problems when using Client Access/400 for Windows 3.1 over AnyNet.

— Тір

Using %PATH% to append an extra PATH to the existing PATH will shorten the PATH statement.

Using PING to Verify the TCP/IP Configuration

You should be able to verify the TCP/IP configuration done so far by using the PING command to check the network connections. This should be done from both the PC and the AS/400. The following commands were issued for our configuration:

 To test the TCP/IP for DOS connections from the PC, you should be able to PING the three names added to the hosts file as shown in Figure 347 on page 281. On our PC we entered the following PING commands:

PING RALYAS4A.USIBMRA.SNA.IBM.COM

PING RALYAS4A

PING WINTCPIP

— Тір -

PING is a never-ending command in TCP/IP for DOS. To stop the PING command you must press the Ctrl + Break or Ctrl + C keys.

2. On the AS/400 the following PING commands should run successfully:

PING RALYAS4A PING WINTCPIP.USIBMRA.SNA.IBM.COM PING WINTCPIP

Note: NETSTAT is also available with TCP/IP for DOS if additional verification is required. Refer to *Client Access/400 for Windows 3.1 TCP/IP Setup*, SC41-3580 for information on NETSTAT.

Interim AS/400 APPC over TCP/IP Verification

In the following section we install Client Access/400 for Windows 3.1 over TCP/IP. During the installation, the PC connects to the AS/400 and downloads further Client Access/400 for Windows 3.1 files to the PC. Because of this, it is a good idea to verify as much of the AS/400 APPC over TCP/IP configuration as is possible at this point.

First, we should check that the APPC over TCP/IP job is running. The command WRKACTJOB SBS(QSYSWRK) displays the active jobs in the QSYSWRK subsystem. The APPC over TCP/IP job QAPPCTCP should be active as shown in the following figure.

		h	lork with	Active	Jobs	03/08/95	RALYAS4/ 17:24:02
CPU	%: .0 E	lapsed tim	ne: 00:	00:00	Active j	obs: 63	
Гуре	options, press	Enter.					
2=	Change 3=Hold	4=End	5=Work	with	6=Release	7=Display mes	sage
8=	Work with spool	ed files	13=Disc	onnect	•••		
Dpt	Subsystem/Job	User	Туре	CPU %	Function	Status	
	QSYSWRK	QSYS	SBS	.0		DEQW	
5	QAPPCTCP	QSYS	BCH	.0	PGM-QZPAIJ	OB TIMW	
	QECS	QSVSM	BCH	.0	PGM-QNSECS	JB DEQW	
	QMSF	QMSF	BCH	.0		DEQW	
	QNSCRMON	QSVSM	BCH	.0	PGM-QNSCRM	ION DEQW	
	QTCPIP	QTCP	BCH	.0		DEQW	
	QTFTP00619	QTCP	BCH	.0		DEQW	
	QTFTP00734	QTCP	BCH	.0		DEQW	
	QTFTP02472	QTCP	BCH	.0		TIMW	
							More
Paraı ===>	meters or comma	nd					
F3=E	xit F5=Ref	resh F10)=Restart	statis	tics F11=	Display elapse	d data
F12=	Cancel F23=Mo	re ontions	F24=M	ore kev	's		

Figure 348. Work with Active Jobs Panel

If we look at the job log associated with QAPPCTCP, we see the following:

	Display Job Log	Cure term	
Job : QAPPCTCP	User : QSYS	System: Number :	011338
<pre>>> CALL QSYS/QZPAIJOB APPC over TCP/IP j</pre>	ob started.		
Press Enter to continu	e.		Bottom
F3=Exit F5=Refresh F16=Job menu	F10=Display detailed messages F24=More keys	F12=Cancel	

Figure 349. Display Job Log (QAPPCTCP) Panel

- Note -

The APPC over TCP/IP job (QAPPCTCP) is initially started when the Allow AnyNet support (ALWANYNET) network attribute is changed to *YES. If the job fails for any reason, it is necessary to stop TCP/IP (ENDTCP), and start TCP/IP (STRTCP) again to re-start the job.

Before we can use the AS/400 APPC over TCP/IP configuration, we must Vary on the APPC controller description we created for the APPC over TCP/IP connection. The Work with Configuration Status command can be used to show the

status of the controller. For example, the following command resulted in the display shown in Figure 350 on page 284:

WRKCFGSTS *CTL APPCOVRTCP

			Work with	Configurat	tion Stat	US 03/08/05	RALYAS4
Posi	tion to	••••	•	Start	ing chara	cters	10.30.1
Type 1= 9=	options Vary on Display	5, press E 2=Vary mode stat	nter. off 5=Work us	with job	8=Work	with description	
0pt 	Descrip APPCOVF	otion RTCP	Status VARIED OFF			Job	
Para ===>	meters c	or command					Bottor
F3=E	xit F4	l=Prompt	F12=Cancel	F23=More	options	F24=More keys	

Figure 350. Work with Configuration Status for Controller at RALYAS4A

To make the configuration available, use option 1 (Vary on). The configuration should then go to a VARIED ON status.

When the first controller with link type *ANYNW is varied on, two TCP/IP connections will be started; one is a TCP connection that goes to LISTEN state to allow the system to accept incoming APPC over TCP/IP sessions; while the other is a UDP connection to handle out-of-band data for all APPC over TCP/IP activity. NETSTAT option 3 can be used to display all TCP/IP sessions (native TCP/IP and APPC over TCP/IP). Figure 351 shows NETSTAT option 3 prior to any APPC over TCP/IP sessions being established.

	Work with	n TCP/IP Conr	ection Statu	lS Svstem.	ραι γαςλα
Local internet a	ddress		.: *ALL	5y5 tem.	INE INSTR
Type options, pr 4=End 5=Disp	ess Enter. lay details				
Opt Address * * * * *	Remote Port * * * *	Local Port ftp-con > telnet APPCove > APPCove > lpd	Idle Time 026:45:25 025:04:38 000:09:55 000:09:55 026:44:24	State Listen Listen Listen *UDP Listen	
F5=Refresh F11 F14=Display port	=Display byte o numbers F22=	counts F13= =Display enti	Sort by colu re field 1	umn 524=More keys	Bottom

Figure 351. NETSTAT Option 3 - TCP/IP Connection Status

If the APPC over TCP/IP connections (APPCove) fail for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the jobs.

You should now be ready to install V3R1M1 Client Access/400 for Windows 3.1 on the PC.

Installing and Configuring Client Access/400 for Windows 3.1 on the PC

This section describes how to install and configure Client Access/400 for Windows 3.1 over TCP/IP on the PC.

- 1. Insert the Client Access/400 for Windows 3.1 Disk 1 in drive A.
- 2. Start Windows.
- 3. In Program Manager select Run from the FILE pull-down menu.
- 4. Type a:\install in the Run Command Box and press Enter.
- On the Install-directories panel, select the type of connections you plan to use. We chose the Select all button in our installation as shown in Figure 352 on page 286.

	Install - c	lirectories	
Select the component At least one compon Synchronous (SDLC) Asynchronous (Async Twinaxial TCP/IP with AnyNet X.25	ts that you want to i ent must be selecte)	install: d to proceed. Descriptions. Select all Deselect all	
Bytes needed: Enter the directories w These directories will	6,716,200 here you want to in: be created if they d	stall the components o not already exist.	
Target directory:	C:\CAWIN		
	Disk space .	Cancel	Help

Figure 352. Selecting the Location of the CAWIN Directory

1	Tip
	Clicking the Select all button at this point will allow you to change the connection type at a later date without running the install program again.

- 6. Type in the Target Directory and click on the Install button.
- 7. Insert diskettes as requested.

8. Click on the **OK** button when the Initial installation complete message is displayed.



Figure 353. Initial Installation Complete Message

9. Click on the \mathbf{OK} button when the message to restart Window displayed.



Figure 354. Restart Windows

10. Click on the **Continue** button when the Welcome to Setup window is displayed.

				Program Manager	
File	<u>O</u> ptions	<u>W</u> indow	<u>H</u> elp	r rogram manager	
			Cli	ent Access/400 Setup	
				Welcome to Setup	
		Ţ	l he Setup	o program will guide you through	
		t	he config	uration and the option selection	
			for using	g your system with the AS/400.	
				Continue	
	Bonne				

Figure 355. Welcome to Setup Window

11. In the Common Options panel we entered the parameters as shown in Figure 356.

	Common Options	
Connection type	TCP/IP with AnyNet	ŀ
PC location name	WINTCPIP	
PC network ID	USIBMRA	
Common AS/400 user ID		
	Advanced options]
ÛK	Eancel	Heb

Figure 356. Entering the COMMON OPTIONS

The PC location name should match the remote location name specified in Figure 338 on page 274.

The PC network ID should match the remote network identifier specified in Figure 337 on page 272.

- 12. Click on **OK** to continue.
- 13. Click on the Add button.

14. The TCP/IP Configuration panel appears. For our PC we entered the parameters shown in Figure 357.

System name	RALYAS4A
- SNA Domain Suffix	SNA.IBM.COM
Connection user ID	
Use common AS/400 user ID	
🔿 Use system specific user ID	
Optional System network ID	
System ands riame Start system connections automatically	
Advanced options	
OK Cancel	<u>H</u> elp

Figure 357. Entering the TCP/IP Configuration Options

The System name should match the local location name specified in Figure 338 on page 274.

The SNA Domain Suffix should match the SNA Domain Name Suffix specified in Figure 340 on page 276.

15. Click on **OK** to continue.

16. When the message to restart your PC is displayed, remove any diskettes in the diskette drive and click on the **Yes** button.

				Program Manager		•
<u>F</u> ile	<u>O</u> ptions	<u>W</u> indow	<u>H</u> elp			
	000000000000000000000000000000000000000					
			Clie	ent Access/400 Setup		
	9142 -	Configurati tor	on file cha	anges require restarting	g your personal	
	computer. Select YES to restart now or NO to continue without restarting					
					Ū	
		Yes		No	Help	
ä						

Figure 358. Windows Needs to Be Restarted After Configuration of CA/400

17. Press Ctrl-Alt-Del to reboot the PC when the reboot message is displayed. If you want to change the window group name for Client Access/400 for Windows 3.1, type in the new name and click on the **OK** button. Otherwise just click on the **OK** button to accept the default name.

	2			Program Manager	•
<u>[</u>	Eile	<u>O</u> ptions	<u>W</u> indow	<u>H</u> elp	
				Client Access/400 Setup	
			Choos	e OK to accept the default program	
			gro	up name or type a different name.	
			Client A	ccess/400 for Windows	
				<u>and</u>	
	I		200000000000000000000000000000000000000		
	<i>.</i>	8			

Figure 359. The Program Group Name Window

18. At the AS/400 Connection-Basic panel enter a valid Client Access User ID and Password.

	Client Access/40	0 Setup	_	
2	The Setup program is connecti	ng your managing system		
Seti	up Configuration A57400	Folders Help		
	AS/	400 Connection - Basic		
	<u>File Options H</u> elp			
	Connection information Common user ID			
	Password			
	System	RALYAS4		
	UK	Cancel	Help	
	<u></u>			
*				

Figure 360. The AS/400 Connection-Basic Panel
19. At this point Client Access/400 for Windows 3.1 will connect to the AS/400 and the Client Access/400 Setup list box will be displayed.

<u> </u>	elect options to install.
For informati	on about each option choose help.
Client Access Sta	tup
Error Log	-
Administration	
Data Queues DDE	Server
Application Progra OfficeVision MAP	m Interfaces (APIs) Drivers
Space required	
Option:	129 KB
Total selected:	0 KB
Total selected:	0 KB

Figure 361. Client Access/400 Setup List Box

20. Select the features you want to install and click on **OK**. At this point you have a successful connection to the AS/400.

Show next are the matching parameters between WINTCPIP and RALYAS4A.



Figure 362. Client Access/400 for Windows 3.1 over TCP/IP: Matching Parameters Table

Ending Client Access/400 for Windows 3.1 over TCP/IP and Exiting Windows

One of the requirements of using Client Access/400 for Windows 3.1 over TCP/IP is that before you exit Windows, you must end communications.

— IMPORTANT -

Any time that you exit Windows, or a Windows program wants to restart Windows for you, Client Access/400 for Windows 3.1 over TCP/IP communications must be ended. If it is not ended, Windows will abort the exit.

To end Client Access/400 for Windows 3.1 over TCP/IP and exit Windows, do the following:

- 1. Double-click on the **AS/400 Connections** icon in the Client Access group window.
- 2. Select Options from the menu bar and choose End Communications.
- 3. Confirm with a Yes to End Communications.
- 4. Exit from Windows.

If a Windows program has displayed a Restart Windows Dialog box, do the following:

- 1. Before answering the dialog, go to the Client Access group and double-click on the **AS/400 connections** icon.
- 2. Select Options from the menu bar and choose End Communications.
- 3. Confirm with Yes to End Communications.
- 4. Go back to the dialog Box and choose Yes to restart windows.

Note: The Client Access Update program will require these steps if files need to be updated.

Help with Problem Determination

This section covers some of the common problems encountered when installing Client Access/400 for Windows 3.1 over TCP/IP.

Message 9125 Connection Failed, return code = 0x32

The following problems could be causing this message:

 The host name used on the AS/400 or the host name referred to in the PC's hosts file does not match the local location name (LCLLOCNAME) value in the network attributes (DSPNETA).

In this case the PC returns the 9125 message and the a ANY0005E message is logged in the MSGLOG.NSD file in the \CAWIN directory.

- The host table entry on the AS/400 is incorrect.
- Only one, or neither of the AnyNet TCP/IP jobs are running. Normally, two jobs should be running at all times (see Figure 351 on page 285).

If either job is *not* running on the AS/400, enter the ENDTCP command followed by the STRTCP command. This will restart both jobs. Remember, ending TCP/IP affects all TCP/IP users on the AS/400.

- Previous AS/400 connections have not ended. To fix this problem, enter NETSTAT on the AS/400 and choose option 3. Find the IP address of your PC and end any jobs running for it. This is usually caused when a PC is restarted without properly ending the Client Access/400 for Windows 3.1 over TCP/IP connections. The AnyNet jobs require a 6 minute wait period before ending. This means you have to either wait 6 minutes before reconnecting, or end the jobs for the PC.
- The DOS environment space is not big enough. The CONFIG.SYS file needs to have a SHELL statement with a /e: variable of 512 or greater. Also, the SHELL statement should have the correct path for the COMMAND.COM program.
- The PATH statement is more than 80 characters long. Long path statements may cause problems when using Client Access/400 for Windows 3.1 over TCP/IP. Use the %PATH% append to shorten the PATH.

Message 5239 Adapter Handler not Installed

This means that something is wrong with the TCP/IP stack. The following are possible causes:

- TCP/IP is not installed on the PC. Client Access ships with a version of TCP/IP for DOS. It needs to be installed and started before starting Client Access/400 for Windows 3.1.
- TCP/IP is not running on the PC. TCP/IP is started by the TCPSTART command. Check that it starts successfully.
- TCP/IP is not configured correctly on the PC. The following are common mistakes:
 - The hosts file wasn't updated correctly.
 - The Domain Name is incorrect.
 - The Route is incorrect (it may not be needed).
 - The Name Server IP address is incorrect, or could not be reached.

Error: The route you are attempting to add already exists

If you are using IBM DOS 7.0, you must obtain an updated DOSTCP.SYS file. The DOSTCP.SYS file that is on the TCP/IP for DOS install diskettes provided with Client Access/400 for Windows 3.1 V3R1M1 will not work with DOS 7.0 and will cause the above message to display. See step 3 on page 280 for information on obtaining this fix.

Client Access/400 Optimized for OS/2 over TCP/IP

This chapter presents the process of configuring Client Access/400 Optimized for OS/2 over TCP/IP at the International Technical Support Organization in Raleigh.

The information is presented in the following sections:

- 1. Introduction to Client Access/400 Optimized for OS/2 over TCP/IP
- 2. Using Client Access/400 Optimized for OS/2 over TCP/IP
- 3. Configuring AnyNet/400 on the AS/400
- 4. Configuring Client Access/400 Optimized for OS/2 over TCP/IP Part 1
- 5. Interim APPC over TCP/IP verification
- 6. Configuring Client Access/400 Optimized for OS/2 over TCP/IP Part 2
- 7. Installation Hints and Tips

For further information on Client Access/400 Optimized for OS/2 over TCP/IP refer to the README.CA4 file which is contained on the first install diskette. If you have another install media, the document is in the QPWXGOS2 directory. This file contains information supplementary to the online Help and other publications. It includes newly added function, hints, tips, restrictions and corrections.

For further information on Client Access/400 Optimized for OS/2 TCP/IP setup, refer to: *Client Access/400 Optimized for OS/2 Getting Started*, SC41-3510 and Redbook: *Inside Client Access/400 Optimized for OS/2*, SG24-2587.

Introduction to Client Access/400 Optimized for OS/2 over TCP/IP

Client Access/400 Optimized for OS/2 is an APPC program that operated only in SNA networks until the arrival of OS/400 V3R1. Now Client Access/400 Optimized for OS/2 includes the IBM AnyNet programs that use the Multiprotocol Transport Networking architecture (MPTN). This communications technology defines a transparent layer between Client Access/400 Optimized for OS/2 on the PC and the network protocol. This allows Client Access/400 Optimized for OS/2 to fully function in a TCP/IP network. Some of the other Client Access/400 Optimized for OS/2 functional enhancements provided by V3R1 include the following:

- Client Management: The integration of AnyNet/2 into Client Access/400 Optimized for OS/2 provides Simple Network Management Protocol (SNMP) support for managing client workstations (host resources MIB). SNMP allows for installed product information and problem reports from the client workstation to be sent to the AS/400 directly for analysis.
- Graphical User Interface to AS/400: This is in the form of Graphical Access for OS/400 and Graphical Operations.
- Multiple Terminal and Print Emulators: RUMBA/400 or Personal Communications/5250.
- Data Access facility: A graphical interface which allows a user to easily select and retrieve AS/400 database records.
- Network Print: This replaces the Virtual Print function provided by PC Support/400. You can print PC documents on an AS/400 printer or a PC printer defined as an AS/400 printer.

- Network Drive: This replaces Shared Folders as provided by PC Support/400. Client Access/400 Optimized for OS/2 network drives can be assigned to any part of the IFS namespace therefore allowing you to view the entire file structure on the AS/400.
- Application Programming Interfaces (APIs).

The benefits of Client Access/400 Optimized for OS/2 operating in either a TCP/IP or SNA network are as follows:

- Customers no longer need to make PC connectivity decisions based on the underlying network protocol.
- · Broadens access to applications.
- Investment in existing and future applications is protected through application independence.

Using Client Access/400 Optimized for OS/2 over TCP/IP

Client Access/400 Optimized for OS/2 is the first 32-bit client of the Client Access/400 Family. Developed using object-oriented programming principles, Client Access/400 Optimized for OS/2 provides automated installation, enhanced service functions, and improved configuration.

PC Software Requirements

Client Access/400 Optimized for OS/2 requires one of the following:

- OS/2 2.11 or higher
- OS/2 Version 2.11 for Windows
- OS/2 Warp Version 3.0
- OS/2 Warp Connect

Note: We used Client Access/400 Optimized for OS/2 V3R1M1 with OS/2 Warp Version 3.0 and the communications components provided by Client Access/400 Optimized for OS/2.

Client Access/400 Optimized for OS/2 contains a subset of AnyNet/2 and Communications Manager/2 1.11. No other communications software is required. These programs allow the APPC protocol to run over an SNA connection or a TCP/IP connection. The complete list of protocols supported are the following:

- APPC
- CPI-C
- Sockets

- Note -

The Client Access/400 OS/2 Client (16-bit) also includes a subset of IBM Communications Manager/2 1.11 but does not include AnyNet/2, therefore, it can only be used in SNA networks.

AS/400 Software Requirements

V3R1M1 Client Access/400 Optimized for OS/2 over TCP/IP requires OS/400 Version 3.0 Release 1.0 and the following program options to be installed on the AS/400:

- 5763 SS1 Host Servers
- 5763 XA1 Client Access/400 Base V3.1.0 or later
- 5763 XG1 Client Access/400 Optimized for OS/2

The following may be optionally installed:

- 5763 XG1 Client Access/400 RUMBA Optimized for OS/2 V3.1.0 or later
- 5763 XG1 Client Access/400 PC5250 Optimized for OS/2 V3.1.0 or later
- 5763 XG1 Client Access/400 GraphicOps for OS/2 V3.1.0 or later

Also ensure that the latest Cumulative PTF Package is installed. We used the Client Access/400 Optimized for OS/2 Refresh Version 3.1.1 with Cumulative C5304310. The refresh code for Client Access/400 Optimized for OS/2 became available in 3rd Quarter 1995 and offers enhancements for ODBC Level 2, NLV support, AFP Workbench, subset native SDLC and asynchronous connectivity, and Ultimedia system facilities.

Installing in an existing environment

If you plan on installing Client Access/400 Optimized for OS/2 in an existing setup, please refer to the README.CA4 file on the first install diskette or in the QPWXGOS2 directory. The scenarios covered are the following:

- Installing over an original OS/2 Client
- Installing using Communications Manager/2 1.11
- · Installing over NetWare
- Installing with Warp Connect

Configuring AnyNet/400 APPC over TCP/IP

In order to run APPC over TCP/IP on your AS/400, the following OS/400 configuration steps are required:

- 1. Establish a TCP/IP configuration.
- 2. Change the Network Attribute ALWANYNET to *YES.
- 3. Create an APPC controller with LINKTYPE(*ANYNW).
- 4. Add an entry to the APPN remote location list.
- 5. Map the APPC LU name to an internet address.

The user ID, under which the APPC over TCP/IP configuration is created, must have sufficient authority to access the relevant commands. Some of the commands require the user ID to have the IOSYSCFG authority. The examples shown here were created using a profile with QSECOFR authority.

1. Establish a TCP/IP configuration

A prerequisite for APPC over TCP/IP is a TCP/IP configuration between the AS/400 and the PC. In this step we will show the how to configure the TCP/IP connection. If your system already has a TCP/IP configuration to the remote system with which you want to communicate via APPC over TCP/IP,



then you can skip this step and proceed to step 2 on page 305 in this section.

Figure 363. An AS/400 and PC Connected Using Client Access/400 Optimized for OS/2 over TCP/IP

In the following panels we create the TCP/IP configuration for RALYAS4A in Figure 363. The configuration steps for OS2TCPIP (the Client Access/400 Optimized for OS/2 PC) are discussed in "Configuring Client Access/400 Optimized for OS/2 over TCP/IP" on page 312.

The following panels show the configuration screens for a token-ring configuration. If you require help in establishing a TCP/IP configuration over another type of interface, refer to the manual *AS/400 TCP/IP Configuration and Reference* SC41-3420.

The AS/400 line description defines the physical interface to the network. If an appropriate line description does not already exist (they can be shared), you need to create one. Here we use the CRTLINTRN command to create a token-ring line description.

Create Line Desc (Token-Ring) (CRTLINTRN) Type choices, press Enter. Line description > TRN2619 Name Name, *NWID, *NWSD Resource name > LINO41 Online at IPL *YES *YES, *NO Vary on wait *NOWAIT *NOWAIT, 15-180 (1 second) Maximum controllers 40 1-256 Line speed 4M 4M, 16M, *NWI Maximum frame size 265-16393, 265, 521, 1033... 1994 Local adapter address > 400010020001 40000000000-7FFFFFFFFFF... Exchange identifier *SYSGEN 05600000-056FFFF, *SYSGEN SSAP list: Source service access point . *SYSGEN 02-FE, *SYSGEN SSAP maximum frame *MAXFRAME, 265-16393 SSAP type *CALC, *NONSNA, *SNA, *HPR + for more values Text 'description' > '4M Token Ring line description for LIN041' Bottom F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel F13=How to use this display F24=More keys

Figure 364. Create Token-Ring Line Description - System RALYAS4A

For a TCP/IP configuration, there is no need to create controller and device descriptions, they are automatically created when TCP/IP first uses the token-ring line.

TCP/IP Interface

The TCP/IP interface defines this AS/400 on the TCP/IP network. Enter the CFGTCP command to access the Configure TCP/IP panel, and take option 1 to work with TCP/IP interfaces.

CFGTCP	Configure TCP/IP				
Select one of the following:	one of the following:				
1. Work with TCP/IP inte 2. Work with TCP/IP rout 3. Change TCP/IP attribu 4. Work with TCP/IP port 5. Work with TCP/IP remo	rfaces es tes restrictions te system information				
10. Work with TCP/IP host 11. Merge TCP/IP host tab 12. Change local domain a 13. Change remote name se	table entries le nd host names rver				
20. Configure TCP/IP appl 21. Configure related tab	ications les				
Selection or command ===> <u>1</u>					
F3=Exit F4=Prompt F9=Retr	ieve F12=Cancel				

Figure 365. TCP/IP Configuration Menu

Ŧ		Work with TCP	/IP Interface	S	System:	RALYAS4A
1ype 1=	Add 2=Change	4=Remove 5=Disp	olay 9=Start	10=En	d	
0pt	Internet Address	Subnet Mask	Line Description	Line Type		
 	9.24.104.56 127.0.0.1	255.255.255.0 255.0.0.0	TRN2619 *LOOPBACK	*TRLAN *NONE		
F3=E F11=	xit F5=Refresh Display interface	F6=Print list status	F10=Work wit F12=Cancel	h IP ove F17=Top	r SNA inte F18=Bot	Bottom erfaces ttom

Figure 366. TCP/IP Interface Definition - System RALYAS4A

If a TCP/IP interface does not already exist, add an entry using the internet address allocated to this system and the mask of the subnet in which the system resides.

Besides allowing you to add, change and remove TCP/IP interfaces, this screen also allows you to start and end these interfaces.

TCP/IP Route

If the route to the remote host is via a gateway or the remote host resides in a different network or subnetwork to the local host, it will be necessary to use option 2 from the Configure TCP/IP screen to configure a route. This is not the case in this simple scenario.

TCP/IP Host table

The local host table on the AS/400 contains a list of the internet addresses and associated host names for this network. To access the AS/400 host table enter the CFGTCP command and take option 10 (Work with TCP/IP Host Table Entries).

		Work with TCP/IP	Host Table E	ntries System:	RALYAS4A
Гуре	options, press	Enter.	1	·	
1=A	Add 2=Change	4=Remove 5=Disp	olay /=Renar	ne	
	Internet	Host			
)pt	Address	Name			
-	9,24,104,56	- RALYAS4A			
-		RALYAS4A.ITSO.RA	AL.IBM.COM		
_	9.24.104.189	OS2TCPIP			
		US21CP1P.1150.RA	AL.IBM.COM		
-3=E>	xit F5=Refres	n F6=Print list	F12=Cancel	F17=Position to	

Figure 367. TCP/IP Host Table Entries - System RALYAS4A

Unless you are planning to use a name server, add an entry for the local system and any remote system(s) to which TCP/IP is to be used. In the above example, both the short and long names have been entered.

2. Change the Network Attribute ALWANYNET to *YES

Now we start the AnyNet specific configuration steps. First we must change the ALWANYNET network attribute to *YES. Changing this attribute will allow support on your system for APPC over TCP/IP, Sockets over SNA, APPC over IPX and Sockets over IPX. The default for this value, when V3R1 is initially installed, is *NO. Use the DSPNETA command to see what your system is set to. If it is set to *NO, use the command:

CHGNETA ALWANYNET(*YES)

After changing this attribute, you can verify the change by entering the DSPNETA command. The resulting displays are shown in the following figure.

Display Network Attributes System: RALYAS4A Pending system name Image: System name Local network ID Image: System name Local control point name Image: System name Default local location RALYAS4A Default mode Image: System name APPN node type Image: System name Intermediate data compression Image: System name Maximum number of intermediate sessions 200 Route addition resistance Image: System name Maximum number of intermediate sessions 200 Route addition resistance 128 Server network ID/control point name "NONE Alert status *ALYAS4A Alert togging status *ALYAS4A Alert togging status *ALYAS4A Network ID System: Network ID More Alert focal point The system Network ID More Alert focal point More Librar			
Current system name RALYAS4A Pending system name USIBMRA Local network ID USIBMRA Local control point name RALYAS4A Default local location RALYAS4A Default mode BLANK APPN node type *NONE Intermediate data compression *NONE Maximum number of intermediate sessions :200 Route addition resistance :128 Server network ID/control point name *LCLNETID Network Attributes System: RALYAS4A Alert status Alert togging status *NONE Alert default focal point *NONE Alert tocal point *NONE Alert torcal point *NONE Alert tocal point *NONE Alert tocal point USIBMRA Alert tocal point USIBMRA Alert controller description *NONE Alert toid count 0 Alert tord count 0 Alert torga point USIBMRA Alert optint for equest System: Network ID System: Alert tocal	Display Network Attributes	System:	RALYAS4A
Pending system name	Current system name	RALYAS4A	
Local control point name	Pending system name		
Local control point name RALYASAA Default mode	Local network ID	USIBMRA	
Default local location	Local control point name	RALYAS4A	
Default Mode **NETNODE APPN node type **NETNODE Data compression **NONE Intermediate data compression **NONE Maximum number of intermediate sessions 200 Route addition resistance 128 Server network ID/control point name **LCLNETID *ANY More Maximum number of intermediate sessions *200 Route addition resistance **None Alert status **ON Alert status *ON Alert primary focal point **YES Alert default focal point **NONE Alert focal point to request **NON Alert focal point to request **NONE Alert fold count *NONE Alert hold count *NONE Alert fold count *O Alert fold count *O Alert fold count *O Mexing queue QP	Default local location		
All througe opperation *NONE Intermediate data compression *NONE Maximum number of intermediate sessions 200 Route addition resistance 128 Server network ID/control point name 128 Server network ID/control point name *LCLNETID *ANY More Display Network Attributes System: RALYAS4A Alert status *AL Alert primary focal point *AL Alert default focal point *YES Alert docal point to request *NONE Alert focal point to request *NONE Alert fold count *NONE Alert hold count *ON Alert hold count O Alert borary QALSNDA Message queue O Library O Job action *System: RALYAS4A Maximum hop count *O Maximum hop count *O <td></td> <td></td> <td></td>			
Intermediate data compression *NONE Maximum number of intermediate sessions 200 Route addition resistance 128 Server network ID/control point name *LCLNETID *ANY More Display Network Attributes System: RALYAS4A Alert status *ON Alert orgging status *ALL Alert primary focal point *YES Alert default focal point *NO Alert stackup focal point *NO Alert controller description *NONE Alert fold count 0 Alert filter USIBMRA Alert controller description *NONE Alert fold count 0 Alert filter QSYSOPR Library QSYS Output queue QPRINT Library QSYS Output queue *OBJAUT Client request access *OBJAUT Client request access *OBJAUT DDM request access *OBJAUT DDM request access *OBJAUT Default ISDN network type <t< td=""><td>Data compression</td><td>*NONF</td><td></td></t<>	Data compression	*NONF	
Maximum number of intermediate sessions 200 Route addition resistance 200 Route addition resistance 128 Server network ID/control point name **LCLNETID *ANY More Display Network Attributes System: RALYAS4A Alert default focal point *NON Alert default focal point *NONE Alert hold count Oper controller description USIBMRA Library <tr< td=""><td>Intermediate data compression</td><td>*NONE</td><td></td></tr<>	Intermediate data compression	*NONE	
Route addition resistance 128 Server network ID/control point name *LCLNETID More More Display Network Attributes System: RALYAS4A Alert status *ON Alert logging status *ALL Alert primary focal point *YES Alert default focal point *NO Alert backup focal point *NO Alert docal point to request *NO Alert controller description *NONE Alert filter O Library QALSNDA Message queue QSYSOPR Library QGPL Job action *GBJAUT Client request access *OBJAUT Default ISDN network type ODCCNNLANY Allow ANYNET support *YES Network Server Domain *YES Network Server Domain *YES	Maximum number of intermediate sessions :	200	
Server network ID/control point name *LCLNETID *ANY More Display Network Attributes System: RALYAS4A Alert status *ON Alert primary focal point *ALL Alert primary focal point *ALL Alert primary focal point *ALL Alert primary focal point *NO Alert default focal point *NO Alert backup focal point *NO Alert controller description *NONE Alert filter AS400NET Library QALSNDA Message queue QSYSO Output queue QSYS Output queue QSYS Output queue QSYS Output queue QSYS Output queue *FILE More *OBJAUT Client reguest access *OBJAUT Client reguest access *OBJAUT Client reguest access *OBJAUT Default ISDN connection list QDCCNNLANY Allow ANYNET support *YES Network Server Domain *YES Network Server	Route addition resistance	128	
More Display Network Attributes System: RALYAS4A Alert status *ON Alert logging status *ALL Alert primary focal point *XLL Alert default focal point *NO Alert default focal point *NO Alert default focal point *NO Alert focal point to request *NONE Alert controller description USIBMRA Alert controller description Waximum Association Alert filter QALSNDA Message queue QSYSOPR Library QGPL Job action *FILE More *GBJAUT Client request access *OBJAUT Client request access *OBJAUT Client request access *OBJAUT Default ISDN network type QCCNNLANY Allow ANYNET support *YES Network Server Domain *RALYAS4A	Server network ID/control point name :	*LCLNETID *ANY	
Display Network Attributes System: RALYAS4A Alert status *ON *ALL Alert primary focal point *ALL Alert primary focal point *NO Alert backup focal point *NO Alert backup focal point *NONE Alert default focal point *NONE Alert book point *NONE Alert focal point to request *NONE Alert controller description *NONE Alert filter Alext NONE Alert filter QALSNDA Message queue QSYSOPR Library QSYS Output queue QFL Job action *FILE More *OBJAUT Client request access *OBJAUT Default ISDN network type *OBJAUT Default ISDN network type @CCNNLANY Allow ANYNET support *YES Network Server Domain RALYAS4A			
Display Network Attributes System: RALYAS4A Alert status * NON * Alert logging status * ALL Alert primary focal point * ALL * ALL Alert primary focal point * NO Alert default focal point * NO Alert backup focal point * NO Alert tocal point to request * NONE Alert controller description * NONE Alert controller description * NONE Alert filter QALSNDA Message queue QSYSOPR Library QSYS Output queue QPRINT Library QGPL Job action * OBJAUT Client request access * OBJAUT Client request access * OBJAUT Default ISDN network type : Default ISDN network type : Default ISDN network type : Perfault ISDN network type : Network Server Domain : Alert filter : Alert filter : Alert filter : Display Network Attributes Syste	_		More
Alert status *ON Alert logging status *ALL Alert primary focal point *NO Alert default focal point	Display Network Attributes	C	
Alert logging status ************************************	Alort status	System:	KALYAS4A
Alert primary focal point	Alert logging status	*ΔII	
Alert default focal point	Alert primary focal point	*YES	
Alert backup focal point ************************************	Alert default focal point	*N0	
Network ID **NONE Alert focal point to request RAK Network ID RAK Network ID USIBMRA Alert controller description USIBMRA Alert controller description *NONE Alert filter 0 Alert filter AS400NET Library QALSNDA Message queue QSYSOPR Library QSYS Output queue QSYS Output queue QGPL Job action GPL Job action *FILE Maximum hop count *I6 DDM request access *OBJAUT Client request access *OBJAUT Default ISDN network type U Default ISDN connection list QDCCNNLANY Allow ANYNET support *YES Network Server Domain *RALYAS4A	Alert backup focal point		
Alert focal point to request RAK Network ID SIBMRA Alert controller description USIBMRA Alert hold count Alert hold count Alert hold count QALSNDE Library QALSNDA Message queue QSYSOPR Library QSYS Output queue QSYS Output queue QGPL Job action YFILE More More Display Network Attributes System: RALYAS4A Maximum hop count Maximum hop count 16 DDM request access *OBJAUT Client request access *OBJAUT Default ISDN network type QDCCNNLANY Allow ANYNET support *YES Network Server Domain RALYAS4A	Network ID	*NONE	
Network ID	Alert focal point to request	RAK	
Alert controller description : *NONE Alert hold count : : 0 Alert filter : : 0 Alert filter : : : Library : : : Message queue : : : Library : : : Output queue : : : Job action : : : Display Network Attributes System: RALYAS4A Maximum hop count : : : Display Network Attributes System: RALYAS4A Maximum hop count : : : Display Network Attributes System: RALYAS4A Maximum hop count : : : Display Network Attributes System: RALYAS4A Maximum hop count : : : Display Network Attributes : : : Display Network Attributes : : : Display Network Attributes : :	Network ID	USIBMRA	
Alert hold count	Alert controller description	*NONE	
Alert filter	Alert hold count \ldots \ldots \ldots \ldots \ldots	0	
Library		AS4UUNET	
Message queue QSTS Output queue QSYS Output queue QPRINT Library QGPL Job action YFILE More *FILE More %Ostsork Display Network Attributes System: RALYAS4A Maximum hop count Maximum hop count 16 DDM request access *OBJAUT Client request access *OBJAUT Default ISDN network type QDCCNNLANY Allow ANYNET support YES Network Server Domain RALYAS4A			
Output queue QPRINT Library QGPL Job action QGPL Job action *FILE More *FILE More 16 DDM request access *OBJAUT Client request access *OBJAUT Default ISDN network type QDCCNNLANY Allow ANYNET support YES Network Server Domain RALYAS4A	library	2720	
Library		OPRINT	
Job action		OGPL	
More Display Network Attributes System: RALYAS4A Maximum hop count	Job action	*FILE	
Display Network Attributes System: RALYAS4A Maximum hop count			More
Display Network Attributes System: RALYAS4A Maximum hop count	~		
Maximum hop count System: System: RALYAS4A Maximum hop count 16 DDM request access *0BJAUT Client request access *0BJAUT Default ISDN network type *0BJAUT Default ISDN connection list QDCCNNLANY Allow ANYNET support *YES Network Server Domain RALYAS4A	Display Network Attributes		
Maximum hop count 16 DDM request access *0BJAUT Client request access *0BJAUT Default ISDN network type *0BJAUT Default ISDN connection list QDCCNNLANY Allow ANYNET support *YES Network Server Domain RALYAS4A Bottom Bottom	Display Network Attributes	System·	RAI YAS4A
DDM request access	Maximum hop count	16	
Client request access	DDM request access	*OBJAUT	
Default ISDN network type	Client request access	*OBJAUT	
Default ISDN connection list QDCCNNLANY Allow ANYNET support	Default ISDN network type		
Allow ANYNET support	Default ISDN connection list	QDCCNNLANY	
Network Server Domain RALYAS4A Bottom	Allow ANYNET support	*YES	
Bottom	Network Server Domain	RALYAS4A	
Duran Futan ta antiduna	Duran Fatan ta antinua		Bottom
rress Enter to continue.	rress enter to continue.		
F3=Exit F12=Cancel	F3=Exit F12=Cancel		

Figure 368. Display of Network Attributes with ALWANYNET(*YES)

Changing the ALWANYNET network attribute to *YES will result in the APPC over TCP/IP job (QAPPCTCP) being started in the QSYSWRK subsystem.

3. Create an APPC controller with LINKTYPE(*ANYNW)

The AS/400 controller description defines the remote system. A new LINKTYPE has been added to the APPC controller description for AnyNet. With AnyNet, the APPC controller is no longer directly attached to a line description. Use the CRTCTLAPPC (Create APPC Controller Description) command to create an APPC controller with LINKTYPE(*ANYNW).

```
Create Ctl Desc (APPC) (CRTCTLAPPC)
Type choices, press Enter.
Controller description . . . . > APPCOVRTCP
                                               Name
                                               *ANYNW, *FAX, *FR, *IDLC...
Link type . . . . . . . . . . > *ANYNW
Online at IPL ....
                                  *YES
                                               *YES, *NO
                     . . . . .
                                 *NETATR
Remote network identifier . . .
                                               Name, *NETATR, *NONE, *ANY
                                               Name, *ANY
Remote control point . . . . . > TCPIP
                                               0-255, *LIND
User-defined 1 . . . . . . . .
                                 *I TND
                                               0-255, *LIND
User-defined 2 . . . . . . . .
                                 *LIND
User-defined 3 . . . . . . . .
                                               0-255, *LIND
                                 *LIND
Text 'description' . . . . . . > 'Client Access AnyNet Controller'
                                                                     Bottom
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display
                                 F24=More keys
```

Figure 369. Create Controller Description with LINKTYPE(*ANYNW)

The Remote network identifier should match the local network identifier on the remote system. *NETATR indicates that the value in the network attributes should be used, that the local system and remote system have the same network ID. The Remote control point name, however, is not used external to the system. The remote control point name entered should match the value entered in the APPN remote location list.

APPC Device Description and Mode Description

The APPC device description is automatically created when the PC initially connects with the AS/400.

APPC over TCP/IP uses mode descriptions in the same way that APPC over SNA does.

Note: It is not possible to map an APPC mode to an IP type of service.

Additional Technical Information for APPC Controller

The following technical information describes the difference between a TCP/IP APPC Controller and an SNA APPC Controller:

- The name of the *ANYNW controller and the remote control point name have no relationship to the name of the PC coming in.
- Each *ANYNW controller can handle up to 254 PCs at a time, and since the PCs may have different control point names and LU names, again, there is no relationship.
- The remote control point name in the *ANYNW controller is only used internally to the AS/400 system, as you see later when we add an entry to the configuration list.

- When the BIND comes in for a PC through AnyNet, the code on the AS/400 system looks at the NETID.LUNAME part of the domain name of the PC. If there is a device already created with the NETID.LUNAME on any *ANYNW controller, and it is varied on, this device is used. If no match for the NETID.LUNAME is found on the *ANYNW controllers, the controller with the least number of devices attached is used to attach the newly created device. This balances the load on each of the *ANYNW controllers.
- An *ANYNW controller must be varied on for APPC over TCP/IP to function.
- The device description that is created for your PC on the AS/400 system remains in status Active even if you disconnect your PC from the AS/400 system.

- Note

In most cases, you only need to create one *ANYNW controller since you can have up to 254 PCs coming through that controller. If you have several *ANYNW controllers, there is no way to predict under which controller the device corresponding for your PC will appear, unless you manually create the device description associated with that PC.

4. Add an Entry to the APPN Remote Location List

For functions that are initiated from the AS/400 system, such as RUNRMTCMD and data queues, the AS/400 system requires an APPN remote location list entry for each remote system where APPC over TCP/IP is used. APPC over TCP/IP communications needs the information in the APPN remote location list to determine which controller description to use when it activates the session.

To update the APPN remote location list, use the following command:

CHGCFGL *APPNRMT

The resulting display is in Figure 370 on page 309.

		Cha	nge Config	guration L [.]	ist	11/10/94	RALYAS4A
Configura	tion list	: Q	APPNRMT			11, 10, 51	1011/120
Text	••••	· · · · :					
Type chan	iges, press	s Enter.					
		APP	N Remote I	Locations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	5	Secure
Location	ID	Location	Point	Net ID	Password		Loc
OS2TCPIP	USIBMRA	RALYAS4A	TCPIP	*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
							More
F3=Exit	F11=Disp]	lay session	informat	ion F12=(Cancel F1	7=Top F1	8=Bottom
	·					•	

Figure 370. APPN Remote Location List Panel

AS/400 APPN requires that all remote location names be unique. Thus, it cannot have the same remote location name and remote network ID in both its SNA network and its TCP/IP or IPX network.

- The Remote Location name should match the local location (LU) name at the remote system. Use the PC Location name as shown in Figure 385 on page 322.
- The Local Location name should match the remote location (LU) name at the remote system. Use the System Name shown in Figure 392 on page 327.
- The Remote Network ID and Control Point Net ID should match the remote network identifier in the APPC controller with a LINKTYPE(*ANYNW). *NETATR indicates that the value in the network attributes should be used.
- The Remote Control Point name should match the remote control name in the APPC controller with a LINKTYPE(*ANYNW).

Any entry added to the APPN remote location list results in an entry in the local APPN topology database. However, the APPC over TCP/IP entry is not propagated to other systems in the APPN network; the entry is used as an end node, only information on attached network nodes is propagated. No topology updates flow as a result of adding the APPC over TCP/IP entry. In addition to being used locally, the APPC over TCP/IP entry allows this system to respond to APPN search requests received for these LU names. It is this function that allows the AS/400 system to act as a bridge.

Additional Technical Information for the APPN Remote Location List

 A configuration list entry is only necessary if your application does an allocate out of the AS/400 system. We recommend that you include the necessary entries in this list in order to have your AnyNet configuration complete and ready for possible future use should an AS/400 application need to call out to a PC. • You need to be able to attach an APPC controller to a PC LU name. Therefore, if your PCs have similar LU names, you can use generic entries in the configuration list as shown in Figure 371 on page 310.

		Cha	nge Confi	guration L [.]	ist	12/04/95	RALYAS4A
Configura	ation list	: Q	APPNRMT			12/01/55	11.12.2
Configura	ation list	type : *	APPNRMT				
lext .		:					
Type char	anc proce	Entor					
Type chai	iyes, press	s Enter.					
		APP	N Remote	Locations-			
	Remote		Remote	Control			
Remote	Network	Local	Control	Point	Location	S	ecure
Location	ID	Location	Point	Net ID	Password		Loc
OS2TCP*	USIBMRA	RALYAS4A	TCPIP	USIBMRA		_	
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
	*NETATR	*NETATR		*NETATR			*N0
-3=Exit	F11=Displa	ay session	informati	on F12=Ca	ancel F17	=Top F18	=Bottom

Figure 371. APPN Remote Location List Panel with Generic Name

 It is possible that an incoming conversation (such as Client Access/400) produces a device description on one *ANYNW controller, while an outgoing conversation to the same PC (such as data queues) produces a device on another controller as specified in the configuration list. This means that there may be two device descriptions for the same PC!

- Hint

To keep the administration as simple as possible, try to create only the necessary number of APPC controllers of type *ANYNW. Remember, each controller can support up to 254 PCs.

5. Map the APPC LU name to an internet address

The TCP/IP host table provides the mapping between host name and internet address. Here it is providing the mapping between the SNA remote location name/remote network ID and the remote internet address.

Enter the CFGTCP command to access the Configure TCP/IP panel, and take option 10 to work with the TCP/IP host table.

			Work with TC	P/IP Host	Table En	tries System:	ραι γαςάα
Type 1=	e opti Add	ions, press E 2=Change	nter. 4=Remove 5	=Display	7=Renam	e	NAL ING TA
0pt	Inte Addi	ernet ress	Host Name				
_	9.24	1.104.56	RALYAS4A RALYAS4A.IT RALYAS4A.IIS	SO.RAL.IB	M.COM		
-	9.24	4.104.189	OS2TCPIP OS2TCPIP.IT OS2TCPIP.US	SO.RAL.IB	M.COM .IBM.COM		
F3=E	xit	F5=Refresh	F6=Print 1	ist F12	=Cancel	F17=Position to	

Figure 372. TCP/IP Host Table Entries

For APPC over TCP/IP, the host name entries are made up as follows:

- OS2TCPIP Remote SNA location (LU) name
- · USIBMRA Remote SNA network ID
- SNA.IBM.COM SNA Domain Name Suffix

Add an entry for each remote system to which APPC over TCP/IP will be used. The remote SNA location names and SNA network IDs should be as specified in the APPN remote location list.

— Note -

A PTF is now available to allow the AS/400 to use an SNA domain name suffix of other than SNA.IBM.COM. The PTF is shipped in two parts: MF08352 and SF21042. Both PTFs are on Cumulative C5157310 or later.

When communicating between systems using APPC over TCP/IP, both systems must use the same SNA Domain Name Suffix.

This host table will be used by native TCP/IP and APPC over TCP/IP. The entries *without* the extension SNA.IBM.COM are for native TCP/IP.

— Note –

The AS/400 TCP/IP Host Table will allow a maximum of four host names to be entered against a single host internet address. This may become a restriction when using AnyNet/400 APPC over TCP/IP. One possible alternative is to use a name server rather than the AS/400 host table.

With all of the configuration steps completed, you are now ready to use the APPC over TCP/IP support of AnyNet/400. The next section shows how to set up the PC side of the configuration.

Configuring Client Access/400 Optimized for OS/2 over TCP/IP

The installation and configuration of Client Access/400 Optimized for OS/2 will be carried out in the following phases:

- 1. Client Access/400 Optimized for OS/2 Installation TCP/IP Part 1
- 2. Interim APPC over TCP/IP verification
- 3. Client Access/400 Optimized for OS/2 Installation TCP/IP Part 2

Client Access/400 Optimized for OS/2 Installation - TCP/IP, Part 1

- Before you start the installation process on the PC, there are some adjustments that you need to make to CONFIG.SYS. We suggest you make the following adjustments now:
 - RESTARTOBJECTS

We recommend that you add a restart objects statement or change the existing restart objects statement in CONFIG.SYS to:

SET RESTARTOBJECTS=STARTUPFOLDERSONLY

Doing this tells OS/2 to start only the objects in the OS/2 Startup Folder when the Workplace Shell is started, thereby keeping applications that need Client Access/400 functions from starting before Client Access/400 is started.

The CONNECTIONS option of SET AUTOSTART

The CONNECTIONS option of AUTOSTART is not supported. Remove the CONNECTIONS statement from the following line:

SET AUTOSTART=PROGRAMS, TASKLIST, FOLDERS, CONNECTIONS, LAUNCHPAD

Having CONNECTIONS on the OS/2 SET AUTOSTART statement tells OS/2 to reconnect remote printer connections that were active when OS/2 shut down. Client Access/400 connections cannot be restarted at the time OS/2 connects these drives and printers.

After Client Access/400 Optimized for OS/2 installation, you can use Client Access/400s startup configuration folder to automatically start network drives and printers. You can automatically start Client Access/400 by dragging a shadow of the Start Client Access/400 icon to OS/2's startup folder.

Backing up CONFIG.SYS

In case you need to remove Client Access/400 Optimized for OS/2, make a backup copy of CONFIG.SYS before you start the installation process.

 The installation program, INSTALL.EXE, is located on the first installation diskette, or in the QPWXGOS2 directory on the drive you are going to install from. Enter the following command at an OS/2 prompt:

A:\INSTALL

for diskette installation, or if you are installing from other than diskettes: d:\path\QPWXGOS2\INSTALL

where d:\path represents the drive and path that contains the QPWXGXXX directories.

3. On the Client Access Part 1 panel, select Install.

- 4. If you have Communications Manager/2 and NTS/2 already installed on your PC, please refer to the README.CA4 document on the first install diskette before you continue with the installation of Client Access/400 Optimized for OS/2.
- 5. Select **Custom** for the type of installation followed by **OK** to continue.
- 6. On the panel shown in Figure 373, you can change the installation location Drive and Path and the installation temporary storage Drive. The default location is C:\CA0S2\ even if you are starting OS/2 from the D: drive. In this example, we install on the D: drive.

ů	Installatio	n Options – Custom Installation
ſ	-Installation	location
	Drive	
	Path	\CA0\$2\
	-Installation	temporary storage
	Drive	C (30 MB required)
[<u>0</u> K	<u>U</u> ndo Cancel Help

Figure 373. Installation Options - Custom Installation Panel

The Installation temporary drive storage is used by the installation program to store programs and files during the installation process. The temporary space needed is approximately 30 MB when all options are installed. The space is freed when the installation is completed.

Select OK.

 On the Communications Support Options panel shown in Figure 374 on page 314, choose TCP/IP for the Network type parameter, and then choose OK.

Communications Su	pport Options
Network type	iieiiii X
Connection type	LAN R
<u>O</u> K <u>U</u> ndo	Cancel Help

Figure 374. Communication Support Options - Panel

8. On the next panel (shown in Figure 375 on page 315), enter the LAN adapter information. Use the pull-down button to select the LAN adapter type installed in your PC.

— Attention –

If you are connected on token-ring, ensure that you select the appropriate adapter from the list instead of just taking the default IBM Token Ring Network Adapters entry. In our test case the default matched the type of card we used.

If you have an adapter installed that is not on the list, and already have LAN Adapter Protocol Support installed on the PC, choose **Other** from the list. A panel is displayed that tells you to configure the adapter using the LAPS configuration program at the end of installation part 1. For those adapters that are included on the list, Client Access/400 Optimized for OS/2 automatically installs and configures LAPS with the appropriate information. If you do not have LAPS already installed, and you are installing the V3R1M0 version of the client, you *must* first choose an adapter from the list, and then reconfigure LAPS to replace the adapter with the correct one following part 1 of the installation process.

LAN Adapter – Setup	
LAN adapter information]
Туре	
IBM Token Ring Network Adapters	
Address (optional)	
Address format	
🖉 Token ring	
2 Ethernet	
K Undo Cancel Help	

Figure 375. LAN Adapter - Setup Panel

Address (optional)

All LAN adapters cards have a burnt-in or encoded address that is used as the default when connecting to networks. The installation program uses this encoded address as the default unless you choose to override the address. To override the address in the LAN adapter card, enter a 12-digit hexadecimal number to use as the LAN address for the personal computer. Use the following ranges for the LAN adapter address:

• IBM token-ring network format:

Use range 40000000000 - 7FFFFFFFFFF.

• IEEE standard notation, Ethernet address format:

Use range 02000000000 - FFFFFFFFFFF.

The address you use must be unique on the local area network.

Address format

Defines the address format of the LAN destination address at the workstation. Select the address format from the radio buttons. The two address formats are token-ring or Ethernet. The default is token-ring.

- 9. Select OK to continue.
- 10. The Communications Components panel lists the components that are installed on your workstation during part 1 of the installation process:
 - NTS/2 (when LAN)
 - · Communications Manager
 - User Profile Management
 - AnyNet: Sockets over SNA
 - Systems Management
 - System Information Agent
 - Desktop Management Interface

It is possible to change the drive where some of the components are installed by selecting **Installation Path**.

Selecting **Check disk space** displays the required disk space for each of the components.

- To continue, select **OK** from the Communications Components panel, and the panel shown in Figure 376 is displayed. The required parameters are in Figure 372 on page 311.
 - Local TCP host name
 - Domain name
 - · SNA domain name suffix

— Important: SNA Domain Suffix –

The default value for the SNA Domain Suffix is SNA.IBM.COM. If you wish to change SNA Domain name suffix from the default, you need the following two PTFs - SF21042 and MF08352. They are on PTF cumulative C5157310 or later. This value must be the same as the value that is defined on the AS/400 system for the APPC applications that communicate with the AS/400 system.

TCP/IP and AnyNet - Setup
Local TCP/IP host
Host name
OS2TCPIP
Domain name
ITSO.RAL.IBM.COM
AnyNet: SNA over TCP/IP setup SNA domain name suffix SNA.IBM.COM
<u>O</u> K <u>U</u> ndo Cancel Help

Figure 376. TCP/IP and AnyNet - Setup Panel

- 12. Select **OK** to continue.
- 13. On the Selective Install panel shown in Figure 377 on page 317, you can choose the functions that are installed during part 2 of the installation program. If you want to change the installation drive for the PC5250 or RUMBA/400 component, select the corresponding **Installation path** button.

Selective Install	
_C Optional components to install—	
M PC5250	Installation path
🕷 RUMBA/400	Installation path
M Database access	
🕅 File transfer	
M Administration	
🕷 Printer drivers	Details
M Online publications	Details
05/2 communications	
options for DOS	
Client Access/400	
AFP WorkBench Viewer	
Uneck disk spa	ace
<u>O</u> K <u>U</u> ndo Car	ncel Help

Figure 377. Selective Install Panel

- 14. If you want to change which printer drivers or online publications you are going to install, select the appropriate **Details** button. On the Printer Drivers
 Details panel, select or deselect:
 - · OS/2 AFP printer driver
 - OS/2 SCS printer driver
 - · Windows AFP printer driver

Make your choices and then select OK.

On the Online Publications - Details panel, select or deselect:

- Command and message references
- Communication books

Make your choices and select OK.

- 15. The Check disk space button allows you to review the disk space required for each of the components that are to be installed.
- 16. To continue, select **OK** from the Selective Install panel.
- 17. Select Yes on the Begin Client Access/400 Installation? panel to continue, or select No to go back and make corrections. When you select Yes, you see the Client Access/400 Install in Progress panel shown in Figure 378 on page 318. This panel details the files that are being copied on your PC, and gives an indication of the time remaining to install each component.

Adding C:\CW	B\$TEMP\CWBDTSC	ICF	
3		_	
0	25 50	75	10

Figure 378. Client Access/400 Install in Process Panel

If you are installing from diskettes, you are prompted to insert diskettes when needed.

18. Select **Close** from the panel shown in Figure 379 to complete part 1 of the installation on the PC.

📓 Ins	tallation Part 1 Complete	
Ø	Part 1 of Client Access/400 installation is complete. To continue with part 2 of installation you must shutdown and restart your workstation. The AS/400 Workstation icon contains the icon for starting part 2.	
	▶	
Clo	se Help	

Figure 379. Installation Part 1 Complete - Panel

Note:	
If you are going to install Part 2 using an alternative source to diskette or the AS/400 system, such as CD-ROM or a LAN server, you must ensure that you have the line SET CAINSTALL_SOURCE=d:\path\ in CONFIG.SYS, where d:\path\ is the path containing the QPWXGxxx di tories.	;s ∙ec-

19. Shut down and restart the PC.

Interim AS/400 APPC over TCP/IP Verification

In the following section we install Client Access/400 Optimized for OS/2 over TCP/IP. During the installation, the PC connects to the AS/400 and downloads further Client Access/400 Optimized for OS/2 files to the PC. Because of this, it is a good idea to verify as much of the AS/400 APPC over TCP/IP configuration as is possible at this point.

First we should check that the APPC over TCP/IP job is running. The command WRKACTJOB SBS(QSYSWRK) will display the active jobs in the QSYSWRK subsystem. The APPC over TCP/IP job QAPPCTCP should be active as shown in the following figure.

						03/08/95	17:24:02
CPU %	s: .0 I	lapsed tim	ne: 00:	00:00	Active j	obs: 63	
Гуре	options, press	Enter.					
2=C	Change 3=Hold	l 4=End	5=Work	with	6=Release	7=Display mes	sage
8=W	lork with spoo	ed files	13=Disc	onnect	•••		
)pt	Subsystem/Job	User	Туре	CPU %	Function	Status	
	QSYSWRK	QSYS	SBS	.0		DEQW	
<u>5</u>	QAPPCTCP	QSYS	BCH	.0	PGM-QZPAIJ	OB TIMW	
	QECS	QSVSM	BCH	.0	PGM-QNSECS	JB DEQW	
	QMSF	QMSF	BCH	.0		DEQW	
	QNSCRMON	QSVSM	BCH	.0	PGM-QNSCRM	ON DEQW	
	QTCPIP	QTCP	BCH	.0		DEQW	
	QTFTP00619	QTCP	BCH	.0		DEQW	
	QTFTP00734	QTCP	BCH	.0		DEQW	
	QTFTP02472	QTCP	BCH	.0		TIMW	
							More
Param	neters or comma	and					
===>							
F3=Ex	it F5=Re	Fresh F10	=Restart	statis	tics F11=	Display elapse	d data

Figure 380. Work with Active Jobs Panel

If we look at the job log associated with QAPPCTCP, we see the following:

	Display Job Log	<u>Custom</u>	
Job : QAPPCTCP	User : QSYS	Number :	011338
<pre>>> CALL QSYS/QZPAIJOE APPC over TCP/IP j</pre>	3 job started.		
Press Enter to continu	ie.		Bottom
F3=Exit F5=Refresh F16=Job menu	F10=Display detailed messages F24=More keys	F12=Cancel	

Figure 381. Display Job Log (QAPPCTCP) Panel

Note

The APPC over TCP/IP job (QAPPCTCP) is initially started when the Allow AnyNet support (ALWANYNET) network attribute is changed to *YES. If the job fails for any reason, it is necessary to stop TCP/IP (ENDTCP), and start TCP/IP (STRTCP) again to re-start the job.

Before we can use the AS/400 APPC over TCP/IP configuration, we must Vary on the APPC controller description we created for the APPC over TCP/IP connection. The Work with Configuration Status command can be used to show the status of the controller. For example, the following command resulted in the display shown in Figure 382:

WRKCFGSTS *CTL APPCOVRTCP

	Work with Configurati	ion Status 03/08/95	RALYAS4A
Position to	Startir	ng characters	10.30.11
Type options, press E 1=Vary on 2=Vary 9=Display mode stat	nter. off 5=Work with job us	8=Work with description	
Opt Description APPCOVRTCP	Status VARIED OFF	Job	
Parameters or command			Bottom
F3=Exit F4=Prompt	F12=Cancel F23=More of	options F24=More keys	

Figure 382. Work with Configuration Status for Controller at RALYAS4A

To make the configuration available, use option 1 (Vary on). The configuration should then go to a VARIED ON status.

When the first controller with link type *ANYNW is varied on, two TCP/IP connections will be started; one is a TCP connection that goes to LISTEN state to allow the system to accept incoming APPC over TCP/IP sessions; while the other is a UDP connection to handle out-of-band data for all APPC over TCP/IP activity. NETSTAT option 3 can be used to display all TCP/IP sessions (native TCP/IP and APPC over TCP/IP). Figure 383 shows NETSTAT option 3 prior to any APPC over TCP/IP sessions being established.

Local internet address * *ALL Type options, press Enter. 4=End 5=Display details Remote Remote Local Opt Address Port Port Idle Time State * * ftp-con > 026:45:25 Listen * * telnet 025:04:38 Listen * * APPCove > 000:09:55 Listen * * APPCove > 000:09:55 *UDP * * 1pd 026:44:24 Listen		Work with	TCP/IP Conn	ection Statu	s System:	RALYAS4A
Type options, press Enter. 4=End 5=Display details Opt Address Port Port Idle Time State * * ftp-con > 026:45:25 Listen * * telnet 025:04:38 Listen * * APPCove > 000:09:55 Listen * * * APPCove > 000:09:55 *UDP * * 1pd 026:44:24 Listen	Local interne	t address		.: *ALL		
RemoteRemoteLocalOptAddressPortPortIdle TimeState**ftp-con >026:45:25Listen**telnet025:04:38Listen**APPCove >000:09:55Listen**APPCove >000:09:55*UDP**1pd026:44:24Listen	Type options, 4=End 5=D	press Enter. isplay details				
Opt Address Port Port Idle Time State * * ftp-con > 026:45:25 Listen * * telnet 025:04:38 Listen * * APPCove > 000:09:55 Listen * * APPCove > 000:09:55 *UDP * * lpd 026:44:24 Listen	Remote	Remote	Local			
* * ftp-con > 026:45:25 Listen * telnet 025:04:38 Listen * APPCove > 000:09:55 Listen * APPCove > 000:09:55 *UDP * * Ipd 026:44:24 Listen	Opt Address	Port	Port	Idle Time	State	
<pre>* * telnet 025:04:38 Listen * * APPCove > 000:09:55 Listen * * APPCove > 000:09:55 *UDP * * 1pd 026:44:24 Listen Bottom</pre>	*	*	ftp-con >	026:45:25	Listen	
* * APPCove > 000:09:55 Listen * * APPCove > 000:09:55 *UDP * * 1pd 026:44:24 Listen Bottom	*	*	telnet	025:04:38	Listen	
* * APPCove > 000:09:55 *UDP * * 1pd 026:44:24 Listen Bottom	*	*	APPCove >	000:09:55	Listen	
* * 1pd 026:44:24 Listen	*	*	APPCove >	000:09:55	*UDP	
Bottom	*	*	lpd	026:44:24	Listen	
Rottom						
F5=Refresh F11=Display byte counts F13=Sort by column	F5=Refresh	F11=Display byte co	ounts F13=	Sort by colu	mn	Bottom

Figure 383. NETSTAT Option 3 - TCP/IP Connection Status

If the APPC over TCP/IP connections (APPCove) fail for any reason, it is necessary to stop TCP/IP (ENDTCP) and start TCP/IP (STRTCP) again to re-start the jobs.

You should now be ready to install Client Access/400 Optimized for OS/2, part 2, on the PC.

Client Access/400 Optimized for OS/2 Installation - TCP/IP, Part 2

When you restart the PC following part 1 of the installation program, you see the



AS/400 Workstation icon on the OS/2 desktop.

– Note –

If you chose **Other** from the list in panel Figure 375 on page 315 and have not yet configured 802.2 for your adapter, you must do so at this point, by entering the LAPS command at an OS/2 command prompt.

- 1. Double-click on the AS/400 Workstation icon
- 2. Select the Client Access/400 Install part 2 icon to start part 2 of the installation.

Client Access/400 Installation – Part 2	
∟ Tasks for installation: Part 2———	
Communications setup	
Basic Advanced	
Set up	Not completed
AS/400 connection setup	
Set up	Not completed
│	
<u>Connect to AS/400</u> Cancel	Help

Figure 384. Client Access/400 Installation - Part 2 Panel

3. On the first panel shown in Figure 384, you can choose between basic or advanced communications setup.

The option for *basic* setup allows all but the most detailed parameters to be configured, and that is the method that we use here. If you need to change details such as retry defaults you will need to use the Advanced Options. This is not covered in this chapter.

4. Choose **Basic** and select **Set up...** from the Communication Setup box, and the panel shown in Figure 385 is displayed.

Communications Setup - Local No	de
_Local node (PC) Information——	
Network ID 🖡	USIBMRA
PC location name	0S2TCPIP
<u>D</u> efault	<u>C</u> ancel Help

Figure 385. Client Access/400 Communication Setup - Local Node

- 5. The required parameters are as follows:
 - The PC network ID should match the remote network identifier specified in Figure 369 on page 307.

- The PC location name should match the remote location name specified in Figure 370 on page 309.
- Choose **OK** to continue.
- 6. The next panel is the Communication Setup SNMP panel. If you want to enable the client management support, you must select Enable SNMP system and problem management, and supply the IP address of the AS/400 system as the system to notify. You can also fill in information for the system location (a building or office number, for example), and the system contact (the administrator or owner of the machine, for example).
- Select OK and the Communication Setup TCP/IP Network panel shown in Figure 386 is displayed.

Note: If you already have TCP/IP installed on your PC, this information is already completed for you.

Communications Setup - TCP/II	P Network
Network interface LAN logical adapter	0 🕻 (0 - 7)
🕷 Enable and save	
Adapter 0 information:	
IP address	9.24.104.189
Subnet mask	255.255.255.0
Broadcast address	255.255.255.0
<u>O</u> K <u>D</u> efault	<u>C</u> ancel Help

Figure 386. Communication Setup - TCP/IP Network Panel

Adapter number

Select the LAN logical adapter number. If you only have one LAN adapter in your PC, the adapter number is 0.

IP Address

Internet protocol address of your PC as entered in Figure 372 on page 311.

Subnet mask

This field specifies how much of the local address portion of the internet address (IP address) to reserve for a subnetwork address. In our example, the subnet mask is 255.255.255.0. Leaving this field blank means that you are not using a subnetwork.

If you are not sure what to use for your subnet mask, contact your network administrator.

Broadcast address

This field defaults to 255.255.255.0. If you want to receive simultaneous transmission of data packets, enter the broadcast address using the same format as in the IP address. Be sure that the broadcast address is correct. An incorrect broadcast address creates extra traffic on the network, which can cause network performance problems.

If you are not sure of the broadcast address ask your network administrator or leave the default.

8. Choose OK, and the TCP/IP Routers panel shown in Figure 387 is displayed. If the TCP/IP network where your PC is attached is connected to other networks through routers or gateways, you must configure the routing information in order to be able to communicate with TCP/IP hosts in the other networks. If your network is not connected to other TCP/IP networks, you can leave this parameter blank.

Dauta	Destination	Doutor	
type	IP address	IP address	
22.22	· · · · · · · · · · · · · · · · · · ·		
	Insert <u>b</u> efor	e Change	
	Insert after	-	

Figure 387. Communication Setup - TCP/IP Routers Panel

You can add the routing information by choosing one of the **Insert** buttons. If you are not sure of this parameter ask your network administrator.

Choose **OK** to continue.

 You are then prompted with the TCP/IP Name Servers panel shown in Figure 388 on page 325. By choosing Add, insert the IP address of the name servers in your network that resolve domain names to IP addresses. If you are not sure of this information ask your network administrator.

		Add	
		<u>C</u> hange	
	k	Delete	

Figure 388. Communication Setup - Name Servers

10. Choose **OK** to continue and the TCP/IP Hosts panel is displayed as shown in Figure 389. Figure 389 is an example of how the panel looks when information has been added.

	<u>A</u> dd	
	Change	
	The second	
 , III	Delete	

Figure 389. Communication Setup - Hosts Panel

Select Add, and the panel in Figure 390 on page 326 is presented.

Hosts – Add	
Host name	_
RALYAS4A.USIBMRA.SNA.IBM.COM	
Host IP address	
924.104.56]
Alias (optional)	R
RALYAS4A]
Comment (optional)	
]
	негр

Figure 390. Communication Setup - Add Host Panel

11. Enter the following information:

Host name

Enter the complete host name of the AS/400 system including the SNA domain suffix.

Host IP address

Enter the IP address of the AS/400 system.

Alias The alias allows you to enter a short form of the name for the AS/400 system. This can be the same as the normal AS/400 system name, for example.

The parameters are as shown in Figure 372 on page 311.

— Note: -

An alias name is required for some functions when running over TCP/IP (RUMBA/400 display and printer emulation, Database Access GUI and file transfer, for example).

- 12. Choose **Add** and the TCP/IP Hosts panel shown in Figure 389 on page 325 is re-displayed.
- Select OK to return to the Client Access/400 Installation Part 2 panel, shown in Figure 391 on page 327. Notice that this time the communication setup task is labeled as completed. Now you have to complete the AS/400 connection setup task.

Client Access/400 Installation – Part 2	
Tasks for installation: Part 2———	
Communications setup	
🔹 🗑 Basic 💮 Advanced	
Set up	Completed
AS/400 connection setup	
Set up	Not completed
│ └── ∧ ─────	
<u>Connect to AS/400</u> Cancel	Неір

Figure 391. Installation Part 2 - Panel

14. In the AS/400 connection setup box, select **Set up** and the AS/400 Connection Setup panel shown in Figure 392 is displayed.

AS/400 Connection	
AS/400 for connection——	
Network ID	USIBMRA
System	RALYAS4A
<u>O</u> K <u>D</u> efault	Cancel Help

Figure 392. AS/400 Communication Setup - Panel

- 15. Enter the AS/400 Network ID. The default is APPN. This parameter should match the remote network identifier defined in Figure 369 on page 307.
- Enter the system name of the AS/400 system that you want to connect to. This parameter should match the local location name defined in Figure 370 on page 309.
- 17. Choose OK to return to the Client Access/400 Installation Part 2 panel.

Both setup tasks on the communication setup panel are now marked as completed.

18. Select the **Connect to AS/400** ... button, and the panel shown in Figure 393 on page 328 is displayed.

Client Access/400 Installation Part 2 - Progress	•
Starting communications Connecting to AS/400 USIBMRA.RALYAS4A Installing Selective Install options Applying updates from USIBMRA.RALYAS4A Setting up the Client Access/400 environment	
► E	

Figure 393. Installation Part 2 Progress - Panel

 After communications has been started, a connection is made to the AS/400 system, and the AS/400 Logon panel is displayed. Enter the user ID and password, and select **OK**.

The panel shown in Figure 393 keeps you informed of the status of the installation.

20. The options that you chose to install during part 1 of the installation in step 13 on page 316 are now installed and the update function is run from the AS/400 system. If you chose to install RUMBA/400 or PC/5250 during part 1 of the installation, the panel shown in Figure 394 is displayed.

Emulation Session Setup	D
_C Emulation session icon location————————————————————————————————————	
Client Access/400 startup configuration	
🕼 Client Access/400 software products folder	
🕼 Desktop	
<u>O</u> K <u>D</u> efault Help	

Figure 394. Emulation Session Setup

21. Choose the location of the emulation session icon from the panel. If you choose **Client Access/400 startup configuration**, the emulation session icon is placed in the Client Access/400 startup configuration folder, which causes the emulator to start when Client Access/400 is started.

Select OK to continue.

22. After a successful installation, you see the Installation Part 2 Complete panel shown in Figure 395 on page 329.



Figure 395. Congratulations - Panel

Select OK.

- 23. Shut down the PC using OS/2 shut down.
- 24. When you restart the PC, the second pass of the update function is started automatically to copy files from a temporary directory on the PC into the correct component directories.
- 25. When the update has finished, you must shut down and restart the PC before you can use Client Access/400 Optimized for OS/2.

- To Continue -

This completes the initial installation of Client Access/400 Optimized for OS/2 on the PC.

Shown next are the matching parameters between the two systems.



Figure 396. TCP/IP Matching Parameters Table
Installation Hints and Tips

The following installation hints and tips might be useful when looking for problems related to the use of Client Access/400 Optimized for OS/2 in a TCP/IP environment.

README.CA4

Print the README.CA4 file before installing Client Access/400 Optimized for OS/2. It is located in the QPWXGOS2 directory. This file contains hints and tips, restrictions, and changes to the product which you may not find in other documentation.

Performance

You can make a change to the AS/400 TCP/IP interface and router configuration which should increase performance. Currently the AS/400 system defaults to a Maximum Transmission Unit (MTU) of 576 when a new route is added via ADDTCPRTE. This value ensures packets are not dropped over the route as all TCP/IP implementations have to support at least a 576-byte transmission unit. However, in many cases this value is unnecessarily small since there are no intermediate hops that only support a 576-byte packet. If this is the case, you should change the MTU from 576 to *IFC. The MTU now defaults to the line description frame size. This is approximately 2000 for token-ring and 1500 for Ethernet.

Ending Client Access/400 Optimized for OS/2

There is no Stop icon provided with Client Access/400 Optimized for OS/2. In order to stop it correctly take the following steps:

- 1. Manually end all open emulators, file transfer sessions, database access sessions, etc.
- 2. If any of the above were started in the Client Access Startup Configuration folder you can close them down by using the Disconnect option associated with this folder.
- As an alternative to the above, you can build a command file to shut down Client Access/400 Optimized for OS/2. You can decide if Communications Manager is to stop as part of this process. The command file will look like this:

REM Command file to shut down Client Access/400 Optimized for OS/2 REM Do a controlled shut down of net printers NET400 RELEASE * /F=CTRL REM Do a forced shut down of net drives NET400 RELEASE * /F RFM Remove the net drive background task NET400 SHUTDOWN REM Stop the router STOPRTR REM Stop service tasks CWBLOG SHUTDOWN Stops Communications manager. This statement is optional. RFM STOPCM

All of the above statements are documented in the online command reference in the Information folder except the NET400 SHUTDOWN.

Note: This command file will stop most processes but there may be some still left running.

Reinstalling PC5250

If you wish to reinstall PC5250, first make sure to remove it via the Client Access/400 Selective Install. If you do not do this and then try to reinstall again, you can get access violations to certain files.

You may need to reboot the system before PC5250 is fully removed. Check the subdirectory PCOMOS2 is gone or empty before you start any reinstall options.

When Things Go Wrong

Here is a list of useful OS/2 commands and logs that could help in problem determination:

- \IBMCOM\LANTRAN.LOG Gives information about the starting of communications.
- History Log and Problem log are both found behind the Service icon of Client Access/400 Optimized for OS/2.
- NETSTAT command with its various options gives useful information about the status TCP/IP.
- · SET command shows the environment variables that the PC is using.
- CAINSTL1.LOG gives information on the Client Access/400 Optimized for OS/2 installation.

Verifying the TCP/IP Configuration

If you have fully installed Client Access/400 Optimized for OS/2 and you are having problems connecting to the AS/400 you can manually verify the TCP/IP connection to ensure that TCP/IP is functioning correctly by using the PING command. This should be done from both the PC and the AS/400. The following commands were issued for our configuration:

 To test the TCP/IP connection from the PC you need to open an OS/2 window and start TCP/IP manually. Client Access/400 Optimized for OS/2 when fully installed will automatically start TCP/IP. Type TCPSTART. This command is found in the TCPIP\BIN directory. Type PING followed by the host name or address as seen in the host table entries in Figure 390 on page 326. On our PC we could have entered any of the following commands to verify the connection:

PING RALYAS4A PING RALYAS4A.USIBMRA.SNA.IBM.COM PING 9.24.104.56

Any of the above should prove a connection to the AS/400. If the connection fails there may be a problem with the TCP/IP configuration.

2. On the AS/400 the following PING commands should also run successfully:

PING OS2TCPIP.USIBMRA.SNA.IBM.COM PING OS2TCPIP PING '9.24.104.189'

The addresses used above were defined in Figure 367 on page 305.

Appendix A. Communications Traces

To aid problem determination, two communications traces have been formatted in this section and analyzed to a degree. One trace is for Sockets over SNA and the other for APPC over TCP/IP. Particular attention has been paid to the AnyNet (MPTN) parts of the traces.

Sockets over SNA Communications Trace

The communications trace below was taken from Sockets over SNA scenario 3. The trace shows the establishment of an FTP session from RALYAS4A to RALYPS2B: sign on, enter password then quit.

The communications trace has been formatted twice, once with Data representation 2 (EBCDIC) and once with Data representation 1 (ASCII). The two traces were then combined: the FTP records being taken from the ASCII trace, all other trace records from the EBCDIC trace. Other than Data representation =1 and Format SNA data only=N, the trace format parameters for the ASCII formatted trace were as for the EBCDIC formatted trace, as shown following.

	Trace Description	•••	•	:	FTP SOCSNA T	0 PS/2
		•••	:	:	1	1=Line, 2=Network Interface
					TON	3=Network server
	Object protocol	•••	·	:	IRN	
	Start date/lime	•••	·	:	03/14/95 10	:45:44
	End date/lime	•••	·	:	03/14/95 10	:4/:1/
	Bytes collected	•••	•	:	220546	1 100% 0 056% 2 0040%
	Butter size	•••	•	:	3	1=128K, 2=256K, 3=2048K 4=4096K, 5=6144K, 6=8192K
	Data direction	• •	•	:	3	1=Sent, 2=Received, 3=Both
	Stop on buffer full .		•	:	N	Y=Yes, N=No
	Number of bytes to trac	e				
	Beginning bytes		•	:	*CALC	Value, *CALC
	Ending bytes	•••	•	:	*CALC	Value, *CALC
	Controller name	• •	•	:	RALYPS2B	*ALL, name
	Data representation .		•	:	2	1=ASCII, 2=EBCDIC, 3=*CALC
	Format SNA data only .	•••	•	:	Y	Y=Yes, N=No
	Format RR, RNR commands	•	•	:	N	Y=Yes, N=No
	Format TCP/IP data only	•	·	:	N	Y=Yes, N=No
	Format UI data only .	•••	•	:	N	Y=Yes, N=No
	Format MAC or SMT data	only	1	:	N	Y=Yes, N=No
	Format Broadcast data	•••	•	:	Y	Y=Yes, N=No
Re	ecord Number Nu	mber	Ċ	of r	ecord in trac	e buffer (decimal)
S,	′R S=	Sent	;	R=I	Received M	=Modem Change
С	ontroller name Na	me c) f	con	troller assoc	iated with record
Da	ata Type EE	CDIC	C	data	, ASCII data	or Blank=Unknown
SI	NA DataNH	DR,	Τŀ	HDR,	TH, RH and R	U for record
NI	IDR Ne	twor	٠k	Laye	er Header	
Tŀ	1DR Ra	pid	T٢	rans	it Protocol T	ransport Header
Tŀ	1 Tr	ansn	1i s	ssion	n Header	
Rŀ	1 Re	ques	st/	Res	oonse Header	
Rl	J Re	ques	st/	Res	oonse Unit	
NI	IDR Parameter Descriptio	ns:				
	TPF	Trar HIC	ιsπ äΗ,	niss , NE	ion Priority FWORK)	Field (LOW, MEDIUM,
	ANR	Auto	oma	atic	Network Rout	ing Field
Tł	HDR Parameter Descriptio	ns:				
	TCID	Trar	ISP	ort	Connection I	dentifier
	SETUPI	Conr	iec	ction	n Setup Indic	ator
	SOMI	Star	٠t	of I	lessage Indic	ator
	EOMI	End	of	f Mes	ssage Indicat	or
	SRI	Stat	us	s Ree	quested Indic	ator
	RASAPI	Resp	or	nd As	SAP Indicator	
	RETRYI	Retr	·у	Ind	icator	
	LMI	Last	: N	lessa	age Indicator	
	CQFI	Conr	ied	ction	n Qualifier F	ield Indicator
	OSI	0pt i	or	nal :	Segments Indi	cator

TH Parameter Descriptions:
FID Format Identification
MPF Mapping Field (segment of Basic Informatio Unit (BIU) - ONLY, FIRST, MIDDLE, LAST)
OAF Origination Address Field
DAF Destination Address Field
SNF Sequence Number Field
DCF Data Count Field
LA Local Address
ODAI OAF-DAF Assignor Indicator
FEI Expedited Flow Indicator
LU Logical Unit
SSCP System Services Control Point
PU Physical Unit
SA Session Address
RH Parameter Descriptions:
REO Request
RSP
RH Category Descriptions:
NC Network Control
SC Session Control
DFC Data Flow Control
NC Network Control
FMD Function Management Data
FMH Function Management Header
RH Indicators:
FI Format Indicator
SDI Sense Data Included Indicator
BCI Begin Chain Indicator
ECI End Chain Indicator
DR1 Definite Response 1 Indicator
LCCI Length-Checked Compression Indicator
DR2 Definite Response 2 Indicator
ERI Exception Response Indicator
RTI Response Type Indicator
QRI Queued Response Indicator
EBI End Bracket Indicator
CDI Change Direction Indicator
PI Pacing Indicator
BBI Begin Bracket Indicator
CSI Code Selection Indicator
EDI Enciphered Data Indicator
PDI Padded Data Indicator
CEBI Conditional End Bracket Indicator
RIWI Request Larger Window Indicator

Trace records 464-502 show the APPN 'FIND' (GDS'12CA') from the AS/400 to the PS/2 for LU USIBMRA.RALYPS2B, the response from the PS/2 and the establishment (BIND and BIND response) of the SNA service manager (SNASVCMG) session between the two.

Trace records 507-519 show the CNOS (Change number of Sessions) exchange for mode SNACKETS and then the establishment (BIND and BIND response) of this session. The session over which the Sockets over SNA data will flow.

Trace records 534 and 537 show an attach and response. This attach and response is for the MTPN_Connect. The trace records have been broken down. An MPTN_Connect request is the first message sent over a transport provider connection in order to establish a non-native MPTN connection. An MPTN_Connect response acknowledges that request and indicates whether or not the connection was accepted.

Further information on the MPTN Formats can be found in: *Multiprotocol Transport Networking (MPTN) Architecture: Formats.*

Trace record 1178 shows the UNBIND for the SNACKETS session.

Record Number	S/R	Controller Name	Data Type	SNA Data: NHDR, THDR, TH, RH, RU
464	S	RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=02, SNF'=0003 RH : ('0B9181'X) REQ FMD, FI, BCI, ECI, DR1, ERI, PI, BBI, CEBI
		RU Command RU Data	:	FMH- 5=110502FF0003D00000422F0F0F3000000 *} 004312CA038080148200F3E4E2C9C2D4D9C14BD9C1D3E8D7E2F2C2143C00 *B.3USIBMRA.RALYPS2B* F6E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C1143D00F3E4E2C9C2D4D9C14BD9 *B.3USIBMRA.RALYPS2B* C1D3E8C1E2F4C1002112C50000010000008E2D5C1C3D2C5E3E200000C2C *ALYAS4AESNACKETS* 01087BC3D6D5C5C32002712C480000000001B60F64B0D2BCC86C0FD10 *6CNNECT6F{*
465	R	RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=01, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI
467	R	RU Data RALYPS2B	EBCDIC	000001 * * TH : FID=2, MPF=0n1y 0DAI=0, DAF'=01, 0AF'=02, SNF'=0004 RH : ('0R9181'X) RE0 FMD FI BCI FCI DR1 FRI PI BRI CFRI
		RU Command	:	FMH- 5=320502FF0003D000000422F0F0F3001910E4E2C9C2D4D9C1 *}
		RU Data	:	4b9010560712272C20000000000000000000000000000000
				000001000000082D5C1C12D2C5E3E200001B461480010F5BC1D5E805C5E3 *SNACKETS\$NAYNETS 4B5BC7E6C3D5C5E3800582F0F0F0164700000000971000000000FFE00 *SNACKETS\$NAYNETS 017100808080174615801510E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C10016 *USIBMRA.RALYAS4A* 470000000807500000000000000000014C00808080174615801510E4E2C9 *USIBMRA.RALYAS4A* C2D4D9C14BD9C1D3E8C1E2F4C100164700000000807500000000000000000000000000
470	S	RALYPS2B	EBCDIC	TH : FID=2, MPF=0n1y ODAI=0, DAF'=02, OAF'=01, SNF'=00000, EFI RH : ('830100'X) RSP FMD, PI
499	S	RO DALA RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=0000, EFI RH : ('6B8100'X) REQ SC, FI, BCI, ECI, DR1, PI
		RU Command RU Data	:	BIND 31001307B0B05133078786868707060200000000000009443400010E4E2 *GFFGMUS* C9C204D9C14B09C1D3E8C1E2F4C132000902E2D5C1E2E5C3D4C709030163 *1BMRA.RALYAS4ASNASVCMG* 4921A1C00050010E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C10A1300776349 *{.&.USIBMRA.RALYAS4A* 21A1C00050010E4E2C9C2D4D9C14BD9C1D3E8D7E2F2C26019F64B0D2BCC *{.&.USIBMRA.RALYAS4A* 86C0FD10E4E2C9C2D4D9C14BD9C1D3E8D7E2F2C26019F64B0D2BCC *{
500	R	RALYPS2B	EBCDIC .	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=01, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI 000001 * * *
502	R	RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=00000, EFI RH : ('EB8000'X) RSP SC, FI, DR1
		RU Data	:	3100 31001307B0B0503300808686800006020000000000014234000002B00 *&FF
507	S	RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=0001 RH : ('0B9120'X) REQ FMD, FI, BCI, ECI, DR1, ERI, PI, CDI
508	R	RU Data RALYPS2B	EBCDIC	TH : FID=2. MFE=0n1v 0DAT=1. DAF'=02. 0AF'=02. SNF'=0001
509	R	RU Data	:	RH : ('039101'X) REQ FMD, BCI, ECI, DR1, ERI, PI, CEBI 001912100A000000001E00022001C0008E2D5C1C3D2C5E3E2 *SNACKETS TH · FID=2 MPE=0n1x ODA1=1 DA1=1 DAF'=02 SNF'=0000 FEI *
505	i,	RU Data	:	RH : ('830100'X) RSP FMD, PI 000001 * *
512	S	RALYPS2B	EBCDIC	TH : FID=2, MPF=0n1y ODAI=1, DAF'=02, OAF'=02, SNF'=00000, EFI RH : ('830100'X) RSP FMD, PI
516	S	RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=03, OAF'=02, SNF'=0000, EFI RH : ('6B8100'X) REQ SC, FI, BCI, ECI, DR1, PI
		RU Command RU Data	:	BIND 31001307B0B051330787F7F7870706020000000000009443400010E4E2 *G77GMUS* C9C2D4D9C14B09C1D3E8C1E2F4C132000902E2D5C1C3D2C5E3E209030163 *IBMRA.RALYAS4ASNACKETS* 4923110000022104E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C10A1300776349 *USIBMRA.RALYAS4A* 2311000002010E4E2C9C2D4D9C14BD9C1D3E8D7E2F2C26019F64B0D2BCC *USIBMRA.RALYAS4A* 86C0FE10E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C12C0A01087BC3D6D5D5C5 *F{USIBMRA.RALYAS4A*CONNE* C3E32B190101174615801510E4E2C9C2D4D9C14BD9C1D3E8D7E2F2C200 *CTUSIBMRA.RALYPS2B.*
517	R	RU Data	FRCDIC	IH : FID=2, MPF=ONIY UDA1=0, DAF'=00, OAF'=01, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI 000001 * *
519	R	RALYPS2B	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=03, SNF'=0000, EFI RH : ('EB8000'X) RSP SC, FI, DR1
		RU Data	:	3100 31001307B0B050330080F7F780000602000000000014234000002B00 *&

Record Number	S/R	Controller Name	Data Type	SNA Data: NHDR, THDR, TH, RH, RU
521	S	RALYPS2B RU Command	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=0002 RH : ('4B9100'X) REQ DFC, FI, BCI, ECI, DR1, ERI, PI BIS
522	R	RU Data RALYPS2B RU Command	EBCDIC	*. * TH : FID=2, MPF=0n1y ODAI=1, DAF'=02, OAF'=02, SNF'=0002 RH : ('4BB100'X) REQ DFC, FI, BCI, ECI, DR1, DR2, ERI, PI BIS
523	R	RU Data RALYPS2B	EBCDIC	*. * TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI
526	S	RU Data RALYPS2B	EBCDIC	000001 * * TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI
530	S	RU Data RALYPS2B	EBCDIC	000003 ^ TH : FID=2, MPF=Only ODAI=1, DAF'=02, OAF'=02, SNF'=0000, EFI RH : ('6 B8000'X) REQ SC, FI, BCI, ECI, DR1 UNREND
531	P	RU Data		3201000000006019F64B0D2BCC86C0FD10E4E2C9C2D4D9C14BD9C1D3E8C1 *
551	ĸ	RU Command	· · · · · :	RH : ('EB8000'X) RSP SC, FI, DR1 UNBIND
534	S	RALYPS2B	EBCDIC	TH : FID=2, MPF=0nly ODAI=1, DAF'=03, OAF'=02, SNF'=0001
	. h	RU Command	:	RH : ('0A9100'X) REQ FMD, F1, BC1, DR1, ER1, P1 FMH- 5=0E0502FF0003D200000428F0F0F1 *K001 IIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
Atta TP (Ch Trans	action Progr	am) name (++++ 28F0F0F1=Sockets over SNA)+++++++
		RU Data	:	0037800A00354002010509433C1803001502010509433C14030405050000 * *
Reco	rd le	ngth (binary	()	
MPTN Requ	_Conn est (ect bit O in thi	s byte=0)-	
Comm	and 1	ength (binar	·y)	
MPTN Dest Dest	qual inati inati	ifier for de on address l on address i	est addr (C ength (inc n hex (9.6	I2=IP addr)++ :::::: :::::: :luding this byte)++ :::::: :::::: i7.60.24)+++++++++++:::::
Dest Dest	inati inati	on port leng on port in h	ith (includ Nex (decima	ling this byte)++:::: :::::: 1 21 - port FTP listens on)++++ ::::::
MPTN Sour Sour	qual ce ad ce ad	ifier for so dress length dress in hex	ource addr 1 (includir 2 (9.67.60.	(02=IP addr)++ :::::: g this byte)+++ :::::: 20)
Sour Sour	ce po ce po	rt length rt in hex		:::::: ++:::: +++++
535	R	RALYPS2B	EBCDIC	00000F00000000000000000000000000000001190A00080001141C *
537	R	RU Data RALYPS2B	: EBCDIC	NII (830100 X) NSI THE, FI 000007 * * TH FID=2, MPF=0nly ODAI=1, DAF'=02, OAF'=03, SNF'=0001 NII ((220100(X))) PS0 FND POL DD1 FD1 D1 OD1
		RU Data	:	KH : (029120 X) KEQ FMD, BCI, DRI, ERI, PI, CDI 0037808000354002010509433C1803001502010509433C14030405050000 *
Reco	rd le	ngth (binary	/)	:::: ++++
MPTN Resp (bit	_Conn onse 2=1	ect (bit O in th in this byte	is byte=1) would ind	++ ++ licate a negative response)
The of t	remai he co	nder of the ntents of th	response i Ne MPTN_Con	s an echo nect request.
539	S	RALYPS2B	EBCDIC	00000F00000000000000000000000000000000
		RU Data	:	kH : (*830100'X) RSP FMD, P1 00000E *

*******	*****	*******	********	*****	*****	******	*******	******	**********	******	********	*******	********	*****	*****	****
*	Trace	records	992 to 1	1151 f	ormatt *****	ted in ASCI	[- FTP *******	Data	*****	******	*******	*******	*******	*****	******	****
Record Number	S/R	Data Length	Record Timer	Da Ty	ta pe	Controller Name	Destir MAC Ac	nation Idress	Source MAC Address	Frame Format	: Command	Number I Sent	Number Received	Poll/ Final	DSAP	SSAF
 992	 R	 Q3	2757 1	 FR		 RΔI YPS2R	400010	020001	C00052005185		 т	31	28			
332	K	55	Routing	Infor	matior	1	:	: 02F0	00032003103	LLC	1	51	20	011	04	04
			Data .	:	2E000 502F4 20313	020300020093 195020666F72 323A35383A30	12000540 2204F532 037206F6	0323230 F322021 5E204D63	02061733470733 02046545020536 17220313620313	26320494 57276657 93934207	24D205443 220766572 265616479	* *P/IP * 12:58	* .T.220 FOR OS/2 - B:07 ON MA	AS4PS FTP S R 16 1	2C IBM ERVER 994 RE/	TC* VER* ADY*
994	S	12	2757.1	FB		RALYPS2B	400052	2005185	00010020001	110	т	28	32	0FF	04	04
551	5	12	Routing	Infor	matior	1	:	: 0270	000010020001	LLO	-	20	52	011	01	01
			Data .	:	2F000	03020000830	10000000)E				*/	.*			*
1009	S	18	2760.5	EB	CDIC	RALYPS2B	400052	2005185	C00010020001	LLC	Ι	29	32	OFF	04	04
			Routing	Infor	matior 25000		:	: 02/0				*	* сус	т		*
1010	R	12	2760.5	: FR		RALYPS2B	400010)0222395.)020001	C00052005185		T	32		0FF	04	04
1010			Routing	Infor	matior	1	:	: 02F0	00002000100	220	-	02		0	•••	•••
			Data .	:	2F000	02030000830	10000000)7				*/	.*			*
1012	R	39	2760.5	EB	CDIC	RALYPS2B	400010	020001	C00052005185	LLC	Ι	33	30	OFF	04	04
			Routing	Infor	matior	1	:	: 02F0		F706F706	174606567		+ 015	05/2		
			Data .	:	2EUUU 20737	J20300030090 707377656D01	J20001E0	032313	5204F532F32206	F/065/26	01/4090E0/	^ трур *	^215 FM	05/2	UPERAL	ING^ *
1059	S	26	2765.2	FB		RALYPS2B	400052	2005185	00010020001		T	30	34	0FF	04	04
1005	0	20	Routing	Infor	matior	1	:	: 0270	000010020001	220	-		0.	0	•••	•••
			Data .	:	2E000	030200030090	02000110	0055534	55220616E79757	365720D0	A	*	*USE	R ANYU	SER	*
1060	R	48	2765.3	EB	CDIC	RALYPS2B	400010	020001	C00052005185	LLC	Ι	34	31	OFF	04	04
			Routing	Infor	matior	1	:	: 02F0	1205061222222	F7064007	0000717000	• ↓	+ / 221	DACCH		01174
			Dala .	•••	72656	5420666F7220	J2000270)616F797	JUSSSSS. 75736572	205061/3/3//0 2760004	F/20420/	205/1/509	*RFD_F	^331 DR ANYLISER	PA22M	UKD KE	^۱UJ
1116	S	25	2770.6	EB	CDIC	RALYPS2B	400052	2005185	C00010020001	LLC	I	31	35	0FF	04	04
			Routing	Infor	matior	1	:	0270								
	_		Data .	:	2E000	030200040090	02000100	050415	35320616E79707	7640D0A	_	*	*PAS	S ANYP	WD	*
1117	R	41	2770.6	EB	CDIC	RALYPS2B	400010	020001	C00052005185	LLC	I	35	32	OFF	04	04
			Data	infor	2F000	1	:	: UZFU 10323331	12055736572206	16F70757	365722060	*	* 230	IISER	ΔΝΥΠΣΕΙ	R *
			Dutu .	•••	6F676	57656420696	E2E0D0A	002000	2000700072200	102/5/5/	505722000	*OGGED	IN	USER .	11110521	*
1150	S	18	2774.5	EB	CDIC	RALYPS2B	400052	2005185	C00010020001	LLC	Ι	32	36	OFF	04	04
			Routing	Infor	matior	1	:	: 0270				.4.		-		
1151	D	26	Data	:		DAL VDS2P	J2000090	020001	2540D0A	110	т	*	*QUI	0.000	04	<u>^</u>
1151	ĸ	20	Routing	Infor	matior	KALIF32D	400010	: 02F0	00052005185	LLC	1	50	33	UFF	04	04
			Data .	:	2E000	020300060090	02000110	032323	L20476F6F64627	9652E0D0	A	*	*221	GOODB	YE	*
******	*****	*******	********	*****	*****	********	*******	******	*********	*******	********	*******	*******	*****	*****	****
********	Back	to EBCDI	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	، باد باد باد باد باد با	له بله بله بله بله بله	و مله	له عله عله عله عله عله عله عله ع	و علو علو علو علو علو علو علو ع	ﻮﻟﻮ ﺧﻮ	له بله بله بله بله بله بله بله	له عله عله عله عله عله عله عله عله ع	، بله بله بله بله بله بله بله بله بله ب	مان	ىل ىل ىل ىل ىل	و بله بله بله بله بله بله	****
Record	~ ~ ~ ~ ~ ~	Control	ler Data		~ ~ ~ ~ ~ ~ /					~~~~~~			*****		~ ~ ~ ~ ~ ~ ~	~ ~ ~ ^
Number	S/R	Name	Туре	2	SNA D	Data: NHDR,	THDR, 1	ΓH, RH,	RU							
1152	R	RALYPS2	B EBCI	DIC	TH :	FID=2, MI	PF=0nly		ODAI=1, DAF'	=02, OAF	F'=03, SNF	' =0007				
		DII Data			KH :	(*009020*)	() REQ	FMD, DI	RI, ERI, CDI			*				*
1153	R	RALYPS2	B EBCI		TH :	FID=2. MI	PF=0nlv		ODAI=1. DAF'	=02. OAF		~=0008				
					RH :	('019001')	() REQ	FMD, E	CI, DR1, ERI,	CEBI	,					
					No Rl	J data										
1165	S	RALYPS2	B EBCI	DIC	TH :	FID=2, MI	PF=0nly		ODAI=1, DAF'	=03, OAF	F'=02, SNF	' =0006				
					KH :	('019001')	() REQ	FMD, E	JI, DRI, ERI,	CERI						
1175	S	RALYPS2	B FBCI	DIC	TH :	FID=2. MI	PF=0nlv		ODAI=1. DAF'	=03 0AF		· =0007				
11/0	0	10121102	2001		RH :	('4B9000')	() REQ	DFC, I	FI, BCI, ECI,	DR1, ERI		0007				
		RU Comm	and	:	BIS											
		RU Data		. :	70							*.				*
11/6	к	RALYPSZ	R FRCI	JIC	IH :	FID=2, MI	V PEO		UDAI=1, DAF':	=02, UAF	- =03, SNH D EDT	=0009				
		RU Comm	and	:	BIS	(400000	() KEQ	Drc,	I, DUI, EUI,	DRI, DRZ	., LKI					
		RU Data		. :	70							*.				*
1178	S	RALYPS2	B EBCI	DIC	TH :	FID=2, MI	PF=Only		ODAI=1, DAF':	=03, OAF	"=02, SNF	€′=0000, E	FI			
			d		RH :	('6B8000')	() REQ	SC, F	I, BCI, ECI, D	R1						
		RII Data	ari a . .	:	32010	10 10000000601	F64R0D	BULARU)FF10F4F2CQC2D	4D9C14PF	901035801	*	- 6 F ¹	115 T R		۲Δ*
		Duta		• •	E2F40	C1				.0001400		*S4A	• ••••••			*
1181	R	RALYPS2	B EBCI	DIC	TH :	FID=2, M	PF=0nly		ODAI=1, DAF'	=02, OAF	"=03, SNF	~=0000, E	FI			
		D U C			RH :	('EB8000')	() RSP	SC, I	I, DR1							
		RU Comm	and	:	UNBÍN 32	ND.						*				*
* * * *	* E	ND 0	F C O	• • •	TEF	R PRIN	тоит	r * *	* * *			•				

APPC over TCP/IP Communications Trace

The communications trace below was taken from APPC over TCP/IP scenario 1. The trace shows the establishment of a 5250 Pass-Through session from RALYAS4A to RALYAS4B: sign on, enter password then ENDPASTHR.

Note that the communications trace has been formatted in EBCDIC, Data representation =2.

COMMUNICATIONS TRACE Title: Trace Description :	DSPT APPCOVE DSPT APPCOVE	AS4B AS4B	03/15/95	11:12:02	Page:	1
Configuration object : Type	L41TR 1	1=Line, 2=Networ	k Interface			
Object protocol	TRN	3=Network server	`			
Start date/Time	03/15/95 11	:09:31				
End date/Time :	03/15/95 11	:11:06				
Bytes collected :	526071					
Buffer size	3	1=128K, 2=256K, 4=4096K, 5=6144k	3=2048K . 6=8192K			
Data direction	3	1=Sent, 2=Receiv	ed, 3=Both			
Stop on buffer full	N	Y=Yes, N=No				
Number of bytes to trace						
Beginning bytes :	*CALC	Value, *CALC				
Ending bytes:	*CALC	Value, *CALC				
Controller name :	*ALL	*ALL, name				
Data representation :	2	1=ASCII, 2=EBCDI	C, 3=*CALC			
Format SNA data only :	N	Y=Yes, N=No				
Format KK, KNK Commands :	N	Y=Yes, N=No				
ID address	1 0 2/ 10/ 56	*11 addres	c			
IP address	9.24.104.50	*All addres	s			
Format UI data only	N	Y=Yes, N=No	5			
Format MAC or SMT data only :	N	Y=Yes, N=No				
Format Broadcast data	Y	Y=Yes, N=No				
COMMUNICATIONS TRACE Title:	DSPT APPCOVE	AS4B	03/15/95	11:12:02	Page:	2
Record Number Number of	record in trac	e buffer (decimal)			
S/R S=Sent F	R=Received M	=Modem Change				
Data Length Amount of	data in record	(decimal)				
Record Status Status of	record					
Record limer lime stamp	Seconds, 100	millisecond reso	olution,			
Deta Type EPODIC det	Range 1s U to	0553.5 Seconds				
Controller name Name of co	.d, ASUII üdid Introller assoc	or Blank=Unknown iated with record	I			
Command Command/Re	snonse informa	tion				
Number sent Count of r	records sent					
Number received Count of r	records receive	d				
Poll/Final ON=Poll fo	or Commands, Fi	nal for Responses				
Destination MAC Address F	Physical addres	s of destination				
Source MAC Address F	Physical addres	s of source				
DSAP Destinatio	on Service Acce	ss Point				
SSAP Source Ser	VICE ACCESS PO	1nt 1) MAG (Madda				
Frame Format LLL (LOGIC	al Link Contro	I) or MAC (Media				
Commands/Responses:	((101)					
I Informatio	n adu					
	eduy ht Doody					
RE.1 Reject	it Ready					
III	Information					
UA Unnumbered	Acknowledgmen	t				
DISC Disconnect	/Request Disco	nnect				
TEST Test	·					
SIM Set Initia	lization Mode					
FRMR Frame Reje	ct					
DM Disconnect	ed Mode					
XID Exchange I	U	d Modo Evitoriala				
SADML Set ASYNCA ***** Command/Re	inonous Balance Isponse Not Val	u moue Extended id				

Trace records 390-392 show the ARP (TCP/IP Address Resolution Protocol) processing. Record 391 is the initial ARP REQUEST sent by RALYAS4A, record 392 is the ARP RESPONSE from RALYAS4B. Although shown in the trace as arriving first, record 390 is RALYAS4A receiving its own ARP REQUEST.

Trace records 393-395 show the TCP/IP connection establishment between RALYAS4A and RALYAS4B - the three-way handshake.

Trace records 397 and 411 show the MPTN_Connect and response. The trace records have been broken down. An MPTN_Connect request is the first message sent over a transport provider connection in order to establish a non-native MPTN connection. An MPTN_Connect response acknowledges that request and indicates whether or not the connection was accepted.

Trace record 420 shows the MPTN header. The trace record has also been broken down.

Further information on the MPTN Formats can be found in: *Multiprotocol Transport Networking (MPTN) Architecture: Formats.*

Note that the destination port when sending is 397, APPC/TCP.

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Received	Poll/ Final	DSAP	SSAP
390	 R	33	5117.4			FFFFFFFFFFF	C00010020001	LLC	UI			0FF	 AA	 AA
			Routing Inf	ormatio	n	: 0270								
			Frame Type	: ARP	Sr	c Addr: 9.24.1	04.56 Dest	t Addr:	9.24.104.	57	Operation:	REQUES	Т	
			ARP Header	: 0006	080006040001	40001002000109	18683800000000	00000918	36839					
391	S	33	511/.4			+++++++++++	C00010020001	LLC	01			0FF	AA	AA
			Routing Int	ormatio	n	: 02/0		+ Addma	0 24 104	c 7	Onomation	DEOUES	т	
			APP Header	· 0006	31	AUUP: 9.24.1	186838000000000	00000019	9.24.104.	57	operation:	REQUES	1	
392	R	33	5117 5	. 0000	000000040001	40001002000109	C00010020002	1100000	111			OFF	ΔΔ	ΔΔ
552	ĸ	55	Routing Inf	ormatio	n	: 02F0	000010020002	LLU	01			011	701	701
			Frame Type	: ARP	Sr	c Addr: 9.24.1	04.57 Dest	t Addr:	9.24.104.	56	Operation:	RESPON	ISE	
			ARP Header	: 0006	080006040002	40001002000209	18683900000000	00000918	36838		·			
393	S	49	5117.5			400010020002	C00010020001	LLC	UI			0FF	AA	AA
			Routing Inf	ormatio	n	: 0270								
			Frame Type	: IP	T0	S: NORMAL	Length:	44	Protocol:	ТСР	Dat	agram I	D: 31	F5
				Src	Addr: 9.24.1	04.56 Des	t Addr: 9.24.10	04.57	Fragme	nt Flag	s: MAY ,LA	ST		
			SNAP Header	: 0000	000800	40066626001060	2000106020							
			IP Header	: 4500	002031F50000	40000030091808	3809180839							
				• Src	Port: 1034	Inassigned	Dest Port · 30	97 APPC	/TCP					
				SEO	Number: 109	1843732 ('4114	3694'X) ACK NI	umber:	0	('0000	0000'X)			
				Code	Bits: SYN		Window:	8192	TCP Option	: MSS=	1949			
			TCP Header	: 040A	018D41143694	00000000600220	00165D000002040	079D						
394	R	49	5117.5			400010020001	C00010020002	LLC	UI			0FF	AA	AA
			Routing Inf	ormatio	n	: 02F0								
			Frame Type	: IP	TO	S: NORMAL	Length:	44	Protocol:	TCP	Dat	agram I	D: 02/	47
			CNAD Useday	Src	Addr: 9.24.1	04.5/ Des	t Addr: 9.24.10	04.56	Fragme	nt Flag	s: MAY ,LA	ST		
			SNAP Header	: 0000	000800	40060504001060	2000106020							
			IP Header	: 4500	1002C02A70000	40009584091868	3909180838							
				• Src	Port · 397	ΔΡΡΓ/ΤΓΡ	Dest Port · 103	34 Ilnas	signed					
				SEO	Number: 130	2184593 (′4D9D	C291'X) ACK Nu	umber: 1	1091843733	('4114)	3695'X)			
				Code	Bits: SYN A	СК	Window:	8192	TCP Option	: MSS=	1949			
			TCP Header	: 018D	040A4D9DC291	41143695601220	00061D000002040	079D						
395	S	45	5117.6			400010020002	C00010020001	LLC	UI			0FF	AA	AA
			Routing Inf	ormatio	n	: 0270								
			Frame Type	: IP	TO	S: NORMAL	Length:	40	Protocol:	TCP	Dat	agram I	D: 31	F6
				Src	Addr: 9.24.1	04.56 Des	t Addr: 9.24.10	04.57	Fragme	nt Flag	s: MAY ,LA	ST		
			SNAP Header	: 0000	000800	40066620001060	2000106020							
			IP Heauer IP Ontions	. 4500	002031700000	40000039091000	2003100023							
			TCP	• Src	Port: 1034	Inassigned	Dest Port · 30	97 APPC	/TCP					
				SEO	Number: 109	1843733 ('4114	3695'X) ACK Ni	umber:	1302184594	(′4D9D	C292'X)			
				Code	Bits: ACK		Window:	8192	TCP Option	: NONE	,			
			TCP Header	: 040A	018D41143695	4D9DC292501020	001FC30000		·					

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Received	Poll/ Final	DSA	AP SSAF
397	S	332	5117.9 Routing Ir		on	400010020002 : 0270	C00010020001	LLC	UI			0FF	 AA	A AA
			SNAP Header IP Header IP Options TCP	e : IP Src er: 000 : 450 s : NON . : Src SEQ	Addr: 9.24.1 0000800 0014731F80000 E Port: 1034, Number: 109	N: NURMAL 04.56 Des 40066518091868 Unassigned 1843733 ('4114	Lengtn: st Addr: 9.24.1 33809186839 Dest Port: 3 13695'X) ACK M	327 04.57 897,APPC/ lumber: 1	Protocol: Fragme /TCP 1302184594	nt Flags ('4D9DC	Dat : MAY ,LA :292' X)	agram 1 .ST	D: 3	31F8
			TCP Header	Cod r : 040	e Bits: ACK P A018D41143695 0011F800A011B	SH 4D9DC292501820 2A0B0111F4F2C0	Window: 000949E0000 002D4D9C14BD9C1	8192 1	CP Option	* NONE	1151	BMRA RA	ΙΥΔ	34R *
Reco	ord le	ength (bi	nary)		:::: :::: -++++ ::::							Dinitia	LING	, 10
MPTN Requ	l_Conr iest (ect (bit 0 ir	n this byte	=0)	:::: :::: ++									
Comm	and 1	ength (b	oinary)		:::: ++++A addr	·								
Dest Dest	inati inati	on addre	ess length ess in hex	(includi (USIBMRA	ng this byte) .RALYAS4B)	++		+++++++++	+++++					
MPTN	l qual	ifier fo	or source a	ddr (OB=	SNA addr)				 +++					
Sour Sour	rce ac	ldr len (ldr hex ((incl this (USIBMRA.RA)	011 byte)+ LYAS4A)-	1E4E2C9C2D4D9 + -++++++++	C14BD9C1D3E8C1	LE2F4C101097764 +++++++	90457140)00C90F00	*USI	BMRA.RALYA	.S4A	•••	.I*
401	R	45	5118.0 Pouting I	000 130 D4D 09C C00 051 2B1 050	205000007600 7B0B051330787 9014BD9C1D3E8 0002D1104E4E2 02D0010E4E2C9 0E4E2C9C2D4D9 9010117461580 1190A000A0020	00007620000502 86868707060200 C1E2F4C1320009 C9C2D4D9C14BD9C1 C14BD9C1D3E8C1 0110E4E2C9C2D4 010310831A0000 400010020001	0000000000000000 000000000000094 0002E2D5C1E2E5C3 0C1D3E8C1E2F4C26C LE2F4C12C0A0408 4D9C14BC1E2F4C22 00584 C00010020002	43000006 43000010 804C70903 0A130077 919F64B00 87BC3D6D5 87BC3D6D5 82C1D5E8E3 LLC	80003100 DE4E2C9C2 801649041 764904109 D2BCC86C1 D5C5C3E3 800180000 UI	* *MRA.F * . { * { * USI *	GFFG ALYAS4A .USIBMRA.F USIBMRA.RA BMRA.RALYA USIBM C	M .SNASVC ALYAS4A ILYAS4B- IS4A IRA.AS4B .D OFF	MG .6 #CON ANYT AA	USIB*
			SNAP Header IP Header IP Options TCP	e : IP Src er: 000 : 450 s : NON . : Src SEQ	on TO Addr: 9.24.1 0000800 0002802A80000 E Port: 397, Number: 130	: 02F0 IS: NORMAL 04.57 Des 40069587091868 APPC/TCP 2184594 ('4D9E	Length: st Addr: 9.24.1 33909186838 Dest Port: 10 DC292'X) ACK N	40 04.56 034,Unass Number: 1	Protocol: Fragme signed 1091844020	TCP nt Flags ('41143	Dat : MAY ,LA 7B4′X)	agram I ST	D: 0)2A8
411	R	281	TCP Header 5120.5	Cod r : 018	e Bits: ACK D040A4D9DC292	411437B450101E 400010020001	Window: EE11FC30000 C00010020002	7905 1 LLC	CP Option	: NONE		OFF	AA	A AA
			Routing In Frame Type SNAP Header IP Header IP Options TCP	e : IP Src er: 000 : 450 s : NON . : Src SEQ	on TO Addr: 9.24.1 0000800 0011402A90000 E Port: 397, Number: 130 6 Bits: ACK B	: 02F0 S: NORMAL 04.57 Des 4006949A091868 APPC/TCP 2184594 ('4D9E	Length: st Addr: 9.24.1 33909186838 Dest Port: 10 02292'X) ACK M Window:	276 .04.56 034,Unass lumber: 1	Protocol: Fragme signed 1091844020	TCP nt Flags ('41143	Dat : MAY ,LA 7B4′X)	agram I ST	D: 0)2A9
			TCP Heade Data	r : 018 . : 000	D040A4D9DC292	2411437B450181E 2A0B0111E4E2C9	EE1CBECOOOO 9C2D4D9C14BD9C1	D3E8C1E2	2F4C2010B	*	YUSI	BMRA.RA	LYAS	64B*
Reco MPTN Resp (bit	ord le	ength (bi nect (bit 0 i	nary)	e=1)	:::: -++++ ++	vocnonco)								
The is e	, ∠-ı forma echoed	itted MP1 I back ir	N_Connect n this MPTN	request _Connect	data above response.	response)								
				011 000 130 E2D 130 4BD C2C	1E4E2C9C2D4D9 2050000007600 7B0B051330007 5C1E2E5C3D4C7 07764936A3800 9C1D3E8C1E2F4 1D5E8E3001800	C14BD9C1D3E8C1 00007620000508 86868700060200 0203021105E4E2 00B900006019F6 C12B1901011746 000501190A0004	LE2F4C101097764 3000601010A0200 00000000000094 2C9C2D4D9C14BD9 54B0D2BCC86C105 515800110E4E2C9 A0020010310831A	90457140 890000EE 443000000 0C1D3E8C1 510E4E2C9 0C2D4D9C1 00000584	000C90F00 380003100 02B000902 LE2F4C20A 0C2D4D9C1 L4BC1E2F4	*USI * *SNASV *L *.RALY *BANYT	BMRA.RALYA FFG 'CMGUS 	.S4A IBMRA.R FA. USI	I ALYA .USI BMRA D	.I* ***** AS4B.* EBMRA* A.AS4* 0 *

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Receive	Poll/ ed Final	D	SAP	SSAF
414	s	45	5121.1 Routing In	formatio	n	400010020002	C00010020001	LLC	UI			0FF	,	AA	AA
			Frame Type	: IP Src	TO Addr: 9.24.1	S: NORMAL 04.56 Des	Length: t Addr: 9.24.1	: 40 L04.57	Protocol: Fragme	TCP nt Flags:	D MAY ,	atagram LAST	ID:	31F	9
			IP Header	r: 0000 : 4500 : NONE	000800 002831F90000	40066636091868	3809186839								
			TCP	: Src SEQ	Port: 1034, Number: 109	Unassigned 1844020 ('4114	Dest Port: 3 37B4'X) ACK N	897,APPC	/TCP 1302184830	('4D9DC3	87E′X)				
420	s	92	TCP Header 5121 9	: 040A	018D411437B4	4D9DC37E50181F 400010020002	Window: 141E9C0000 C00010020001	/956	ICP Option	: NONE		OFF		ΔΔ	ΔΔ
120	5	52	Routing In Frame Type	formatio : IP	n TO	: 0270 S: NORMAL	Length:	: 87	Protocol:	ТСР	D)atagram	ID:	31F	A
			SNAP Header	Src r: 0000	Addr: 9.24.1	04.56 Des	t Addr: 9.24.1	104.57	Fragme	nt Flags:	MAY ,	LAST			
			IP Options	: NONE		400000000000000000000000000000000000000	3009100039								
			TCP	: Src SEQ Code	Port: 1034, Number: 109 Bits: ACK P	Unassigned 1844020 ('4114: SH	Dest Port: 3 37B4'X) ACK N Window:	397,APPC, Number: 7956	/TCP 1302184830 ICP Ontion	('4 D9DC3 : NONE	87E′X)				
			TCP Header Data	: 040A : 0000	018D411437B4	4D9DC37E50181F 90200C0502FF00	1479ED0000 03D000000206F1	10019121	002000000	*		}	1		*
Reco	ord le	ength (bi	nary)	 ++++	:: :: :: ::++++ :: ::	:::: Normal S :::: request	NA data follow for mode BLANK	vs: the n	remainder (of this r	record i	s a CNOS			
MPTN	N Head	ler (x'00	'= no compe	nsation)	++ ::	····									
SNA	TH Se	equence n	umber		::++++ ::	::::									
SNA	КН				++		4040			*					+
421	R	45	5122.1 Routing In	formatio	n	400010020001 : 02F0	C00010020002	LLC	UI	^ • • • • • •	•••	OFF	ł	AA	AA
			Frame Type	: IP Src	TO Addr: 9.24.1	S: NORMAL 04.57 Des	Length: t Addr: 9.24.1	: 40 L04.56	Protocol: Fragme	TCP nt Flags:	D MAY ,	atagram LAST	ID:	02A	A
			SNAP Header IP Header IP Ontions	r: 0000 : 4500 • NONE	000800 002802AA0000	40069585091868	3909186838								
			TCP	: Src SEQ Code	Port: 397, Number: 130 Bits: ACK P	APPC/TCP 2184830 ('4D9D SH	Dest Port: 10 C37E'X) ACK N Window:)34,Unas Number: 7858	signed 1091844067 TCP Option	('411437 : NONE	'E3'X)				
425	R	80	TCP Header 5122.7	: 018D	040A4D9DC37E	411437E350181E 400010020001	B21ECF0000 C00010020002	LLC	UI			OFF		AA	AA
			Frame Type	: IP Src	TC Addr: 9.24.1		Length: t Addr: 9.24.1	: 75 104.56	Protocol: Fragme	TCP nt Flags:	D MAY)atagram LAST	ID:	02A	В
			SNAP Header	r: 0000 : 4500	000800 004802AB0000	40069561091868	3909186838								
			TCP	: NUNE : Src	Port: 397,	APPC/TCP	Dest Port: 10)34,Unas:	signed						
			TOD 11 1	SEQ Code	Number: 130 Bits: ACK P	2184830 ('4D9D SH	C37E'X) ACK N Window:	Number: 7858	1091844067 TCP Option	('411437 : NONE	'E3'X)				
			Data	: 018L : 0000 4040	0040A4D9DC37E 0002300000103 0404040	9001001912100A	B2585A0000 00000000000800	04000400	008404040	* *			•••	•••	*
426	S	45	5123.1 Routing In	formatio	n	400010020002	C00010020001	LLC	UI			OFF	1	AA	AA
			Frame Type	: IP Src	T0 Addr: 9.24.1	S: NORMAL 04.56 Des	Length: t Addr: 9.24.1	: 40 L04.57	Protocol: Fragme	TCP nt Flags:	D MAY ,	atagram LAST	ID:	31F	В
			SNAP Header IP Header	r: 0000 : 4500	000800 002831FB0000	40066634091868	3809186839								
			TCP	: Src SEQ	Port: 1034, Number: 109 Bits: ACK P	Unassigned 1844067 ('4114	Dest Port: 3 37E3'X) ACK N Window:	397,APPC, Number:	/TCP 1302184865 ICP Option	('4 D9DC3	8A1′X)				
427	S	49	TCP Header 5123.4	: 040A	018D411437E3	4D9DC3A150181E 400010020002	F11E6D0000 C00010020001	LLC	UI	· HONE		OFF	,	AA	AA
			Routing In Frame Type	formatio : IP	n TO	: 0270 S: NORMAL	Length:	44	Protocol:	TCP	D)atagram	ID:	31F	С
			SNAP Header	5rc r: 0000 • 4500	Adar: 9.24.1 0000800 00203150000	04.50 Des	L AGGY: 9.24.1	104.5/	Fragme	nt Flags:	MAY,	LASI			
			IP Options	: NONE	Dout 1025	llpaceigrad	Doct Dout 7	07 4000							
			168	: Src SEQ	Number: 1035,	3377745 ('412B	9ED1'X) ACK N	Number:		('000000	000'X)				
			TCP Header	Code : 040E	ві <mark>ть:</mark> SYN 8018D412B9ED1	00000000600220	Window: 00AE0700000204	8192 1079D	ICP Uption	: MSS= 19	149				

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Receive	Poll/ d Final	DS	AP :	SSAP
428	R	49	5123.4 Routing Inf	ormatic		400010020001 : 02F0	C00010020002	LLC	UI			0FF	A	A	AA
			Frame Type SNAP Header IP Header	: IP Src : 0000 : 4500	TO Addr: 9.24.1 0000800 0002C02AC0000	S: NORMAL 04.57 De: 4006957F091868	Length: st Addr: 9.24.1 83909186838	44 04.56	Protocol: Fragme	TCP nt Flags	D : MAY ,	atagram LAST	ID:	02A	C
			TCP	: NONE : Src SEQ Code	Port: 397, Number: 130 Bits: SYN A	APPC/TCP 3677193 ('4DB4 CK	Dest Port: 10 48909'X) ACK N Window:	35,Unas umber: 8192	signed 1093377746 FCP Option	('412B9 : MSS= 1	ED2′X) 949				
430	S	45	5123.5 Routing Inf	: 0180 Formatic	004084D848909	400010020002	C00010020001	LLC	UI			OFF	A	A	AA
			Frame Type SNAP Header IP Header IP Options	: IP Src : 0000 : 4500 : NONE	TO Addr: 9.24.1 0000800 0002831FD0000	S: NORMAL 04.56 De: 40066632091868	Length: st Addr: 9.24.1 83809186839	40 04.57	Protocol: Fragme	TCP nt Flags	D : MAY ,	atagram LAST	ID:	31FI	D
			TCP Hondon	: Src SEQ Code	Port: 1035, Number: 109 Bits: ACK	Unassigned 3377746 ('4121	Dest Port: 3 B9ED2'X) ACK N Window:	97,APPC, umber: 2 8192	71CP 1303677194 TCP Option	('4 DB489 NONE	90A'X)				
432	S	332	5123.5	: 040	0010041209E02	400010020002	C00010020001	LLC	UI			OFF	A	A	AA
			Frame Type	: IP Src	T0 Addr: 9.24.1		Length: st Addr: 9.24.1	327 04.57	Protocol: Fragme	TCP nt Flags	D: MAY,	atagram LAST	ID:	31F	E
			SNAP Header IP Header IP Options	•: 0000 : 4500	0000800 0014731FE0000 =	40066512091868	83809186839								
			TCP	: Src SEQ	Port: 1035, Number: 109	Unassigned 3377746 ('4121	Dest Port: 3 B9ED2'X) ACK N	97,APPC	/TCP 1303677194	('4 DB48	90A'X)				
			TCP Header Data	Code : 0406 : 0000 0111 0080 1307 D409 A200 0000 0610 2819 0501	2 B1ts: ACK P 3018D412B9ED2 0011F800A011B LE4E2C9C2D4D9 005000007600 7B0B051330383 9009D1104E12 009D1104E4E2 09D0010E4E2C9 DE4E2C9C2D4D9 01190A000020	SH 4DB4890A50182(2A0B0111E4E2C) C14BD9C1D3E8C: 0000762000500 C1E2F4C1320009 C9C2D4D9C14BD9 C2D4D9C14BD9C C14BD9C1D3E8C 011021B31A0000	W1ndow: 000E6020000 9C2D4D9C14BD9C1 1E2F4C101097764 8000601010A0200 0000000000094 902404040404040 9C1D3E8C1E2F4C260 1E2F4C12C0A0108 4D9C14BC1E2F4C2	8192 D3E8C1E2 904B004(BC000061 43000010 40400903 0A130073 19F64B01 7BC3D6D2 C1D5E8E3	1CP 0ption 2F4C2010B 000F00F00 380003100 0E4E2C9C2 30164904A 764904AA2 02BCC86C1 5D5C5C3E3 300180000	*USII * *MRA.RA *S *USII *USII *USII	U BMRA.RAL ALYAS4A. .USIBMRA USIBMRA. BMRA.RAL USI	SIBMRA.R YAS4A .RALYAS4 RALYAS4B YAS4A BMRA.AS4	ALYA M A 6. .#CO BANY	S4B .0 .US NNE	··* ··* IB* ·¢* ¢S* FA* CT* ·*
433	R	281	5123.6 Routing Inf	ormatic	on	400010020001 : 02F0	C00010020002	LLC	UI		•••••	OFF	A	A	AA
			Frame Type SNAP Header IP Header IP Options TCP	: IP Src : 0000 : 4500 : NONE : Src SEQ	TC Addr: 9.24.1 0000800 0011402AD0000 E Port: 397, Number: 130	S: NORMAL 04.57 De: 40069496091868 APPC/TCP 3677194 ('4DB4	Length: st Addr: 9.24.1 83909186838 Dest Port: 10 4890A'X) ACK N	276 04.56 35,Unas:	Protocol: Fragmen signed 1093378033	TCP nt Flags ('412B9	D : MAY , FF1'X)	atagram LAST	ID:	02AI	D
			TCP Header Data	: 0180 : 0000 0111 0080 1307 4040 1300 4BD9 C2C1	2 BILS: ACK P 20040B4DB4890A 200EC808A00E8 1E4E2C9C2D4D9 205000007600 780B051330003 20404040404040 20404040404040 207764936D4600 201D3E8C1E2F4 1D5E8E3001800	SH 412B9FF150181 2A0B0111E4E2C C14BD9C1D3E8C 0000762000050 8C8C830006020 0203021105E4E 004600006019Ff C12B190101174 000501190A000/	WINDOW: EE15C0E0000 9C2D4D9C14BD9C1 1E2F4C101097764 8000601010A0200 00000000000094 2C9C2D4D9C14BD9 64B0D2BCC86C106 615800110E4E2C9 A0020010310831A	7905 D3E8C1E2 904B004(890000E1 4300000(C1D3E8C) 10E4E2C9 C2D4D9C1 00000584	2F4C2010B 2000F00F00 380003100 22B000902 1E2F4C20A 9C2D4D9C1 14BC1E2F4	*SII *SII * * *L *.RALY, *BANYT	YU BMRA.RAL	SIBMRA.R YAS4A USIBMRA. .6FA US C	ALYA M RALY US IBMR	S4B .0 AS4I IBMI A.A D	••* ••* B•* RA* S4*
437	S	45	5124.2 Routing Inf Frame Type SNAP Header IP Header IP Options TCP	Formatic : IP Src : 0000 : 4500 : NONE : Src	on TO Addr: 9.24.1 0000800 0002831FF0000 E Port: 1035,	400010020002 : 0270 IS: NORMAL 04.56 Des 40066630091868 Unassigned	C00010020001 Length: st Addr: 9.24.1 83809186839 Dest Port: 3	40 40 04.57 97,APPC,	UI Protocol: Fragmen	TCP nt Flags	D : MAY ,	OFF atagram LAST	A ID:	A 31F	AA F
			TCP Header	SEQ Code : 040E	Number: 109 e Bits: ACK P 3018D412B9FF1	3378033 ('4128 SH 4DB489F650181	B9FF1'X) ACK N Window: F14EFB70000	umber: 1 7956	1303677430 TCP Option	('4 DB48 NONE	9F6′X)				

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Receiv	Poll ed Fina	/ I D	SAP	SSAP
441	S	293	5124.9			400010020002	C00010020001	LLC	UI			0FF		AA	AA
			Frame Type	IP Src	TO TO Addr: 9.24.1	S: NORMAL 04.56 De	Length st Addr: 9.24.2	: 288 104.57	Protocol: Fragme	TCP nt Flags	: MAY	Datagram ,LAST	ID:	320)0
			IP Header IP Options	: 4500 : NONE	012032000000	4006653709186	83809186839		(700						
			ICP	: Src SEQ Code	Number: 1035, Number: 109 Bits: ACK P	Unassigned 3378033 ('412 SH	Dest Port: 3 B9FF1'X) ACK Mindow:	397,APPC Number: 7956	71CP 1303677430 TCP Option	('4 DB489 : NONE	9F6′X)				
			TCP Header Data	: 040B : 0000 C2D4 BD12 02B9	018D412B9FF1 00F80000010B D9C14BD9C1D3 A0200003E005 0025009208C0	4DB489F650181 9020290502FF0 E8C1E2F4C1AAC 00400623E6E3D 0020000000000	F1474250000 803D000400430F(581A43EE9000100 9F0F5F2F0F0C34(000000DC3D8D7C	0F0F5001 0C512F50 0F3F1F8F 1C3E3D3F	910E4E2C9 0C112E200 DF0F0F0F2 DF0404000	*8. *BMRA. * *	RALYAS4	}. A.EAU.Z. WTR05200 CQ	.005 E. 2 31 PACT	l 5.A. 8000	ISI* .S.*)02* .*
				2FC4 F0F0 D9C1 4040	F6C00001E4E2 F0F240404040 D3E8C1E2F4C1 4040404040404040	C20202B900250 4040404005600 D4C9C3D240404 404040404040404	2B90025F3F2F7F4 6000007E300000 04040404040404040 040404040404040	44040404 000004BC 04040404 04040404	0F3F1F8F0 108000000 040404040 04040D9C1	*.D6{. *0002 *RALYA *	.USB S4AMICK	32 T.	74 ••••	31 .A	.80* ••* * RA*
				D3E8	C1E2F4C14040					*LYAS4	A				*
443	R	45	5125.0		_	400010020001	C00010020002	LLC	UI			OFF		AA	AA
			Frame Type	: IP	n TO Addr: 9 24 1	: 02F0 S: NORMAL 04 57 De	Length	: 40	Protocol:	TCP nt Flags	• MAY	Datagram	ID:	02 <i>A</i>	ŧΕ
			SNAP Header	·: 0000	000800	04.37 00	St Aut . 5.24.	104.30	i i ugine	ne riugs	• 1141	, LAU			
			IP Header	: 4500	002802AE0000	4006958109186	83909186838								
			IP Options	: NONE		1000 (700		00F 11							
			ICP	: Src SEQ Code	Number: 39/, Number: 130 Bits: ACK P	APPC/ICP 3677430 ('4DB SH	489F6'X) ACK Mindow:	035,Unas Number: 7657	signed 1093378281 TCP Option	('412BA	0E9′X)				
	_		TCP Header	: 018D	040B4DB489F6	412BA0E950181	DE9EFEA0000								
447	R	128	5126.6 Routing Inf	ormatio	n	400010020001 : 02F0	C00010020002	LLC	UI			OFF		AA	AA
			Frame Type	: IP Src	TC Addr: 9.24.1	S: NORMAL 04.57 De	Length st Addr: 9.24.2	: 123 104.56	Protocol: Fragme	TCP nt Flags	: MAY	Datagram ,LAST	ID:	02 <i>F</i>	١F
			SNAP Header IP Header	·: 0000 : 4500	000800 007B02AF0000	4006952D09186	83909186838								
			TCP	: NUNE : Src	Port: 397.	APPC/TCP	Dest Port: 10	035,Unas	signed						
				SEQ Code	Number: 130 Bits: ACK P	3677430 ('4DB SH	489F6'X) ACK Mindow:	Number: 7657	1093378281 TCP Option	('412BA : NONE	0E9′X)				
			TCP Header	: 018D	040B4DB489F6	412BA0E950181	DE91B570000		'						
			Data	: 0000 D9C1	005300000103 D3E8C1E2F4C2	A000004912A09 D8D7C1C4C5E5F	0000560060020C0 0F0F0F100000000000000000000000000000	0003D000 000000000	0C9F9F0F3 000000000	* *RALYA: *	S4BQPAD	EV0001	. { 	I9 	/03* ···* *
450	S	55	5126.7 Routing Inf	ormatio	n	400010020002	C00010020001	LLC	UI			OFF		AA	AA
			Frame Type	: IP Src	TC Addr: 9.24.1	S: NORMAL	Length: st Addr: 9.24.	: 50	Protocol: Fragme	TCP nt Flags	• MAY	Datagram	ID:	320)1
			SNAP Header IP Header	·: 0000 : 4500	000800 003232010000	4006662409186	83809186839					,			
			IP Options	: NONE											
			ТСР	: Src SEQ Code	Port: 1035, Number: 109 Bits: ACK P	Unassigned 3378281 ('412 SH	Dest Port: 3 BAOE9'X) ACK Mindow:	397,APPC Number: 7873	/TCP 1303677513 TCP Option	('4 DB48/ : NONE	A49′X)				
			TCP Header	: 040B	018D412BA0E9	4DB48A4950181	EC14DA80000								
451	R	45	Data 5126.8	: 0000	000A00800083	A000 400010020001	C00010020002	LLC	UI	*	C	0FF		AA	* AA
			Routing Inf Frame Type	ormatio : IP	n TO	: 02F0 S: NORMAL	Length	: 40	Protocol:	TCP		Datagram	ID:	02E	30
			SNAP Header	·: 0000	Addr: 9.24.1 000800	04.57 De	st Addr: 9.24.	104.56	Fragme	nt Flags	: MAY	,LASI			
			IP Header IP Options	: 4500 : NONE	002802800000	400695/109186	83303186838								
			ТСР	: Src SEQ	Port: 397, Number: 130	APPC/TCP 3677513 ('4DB	Dest Port: 10 48A49'X) ACK M	035,Unas Number:	signed 1093378291	('412BA	0F3′X)				
			TCP Header	: 018D	040B4DB48A49	412BA0F350181	DDFEF970000	/04/	ier oprion	. NUME					

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Received	Poll/ Final	DSAP	SSAP
452	R	579	5127.0 Routing Inf	ormatic	on	400010020001 : 02F0	C00010020002	LLC	UI			OFF	AA	AA
			Frame Type	: IP Src	T(Addr: 9.24.1	OS: NORMAL	Length: t Addr: 9.24.1	574 04.56	Protocol: Fragme	TCP nt Flags	Date: MAY	tagram I AST	D: 02	B1
			SNAP Header	·: 0000	0000800			01.00	i i aginei	ine i nago		101		
			IP Header	: 4500	023E02B10000	40069368091868	33909186838							
			IP Options	: NONI	Ponte 207		Doct Bont. 10	25 Unac	cianod					
			109	SEO	Number: 130	3677513 ('4DB4	18A49'X) ACK N	umber:	1093378291	('412BA	0F3′X)			
				Code	e Bits: ACK F	SH	Window:	7647	TCP Option	NONE	,			
			TCP Header	: 018	0040B4DB48A49	412BA0F350181	DF42BB0000							
			Data	: 0000	0021600000203	9020020C12A000	00041080030E18	0000000	0000000000	*	• • • • • • • • • •	• • • • • • • • •	• • • • •	•••*
				1622	24040404040404040	404040404040404040)E289879540D695	0201374	02011022F	*		SIGN ON		···· · *
				20E2	2A8A2A3859440	404B404B404B40	04B404B407A2011	024520D	9C1D3E8C1	*.SYST	EM	:	RA	LYA*
				E2F4	4C22011032F20	E2A482A2A8A2A3	8594404B404B40	4B404B4	07A201103	*S4B	SUBSYST	IEM	:	•••*
				4520	3404B407A2011	044520D8D7C1C4	C5E5F0F0F0F0F120	01A0404 1106102	0E4A28599	*	:OPAI	DEV0001.	AT . U	SER*
				4040)4B404B404B40	48404840484048	3404B404B404B40	4B404B4	04B404B20	*				*
				1100	5341D40202400	0A00000000000000000	00000000110734	1D40202	7000A1108	*			• • • •	•••*
				1020 4R40	JD/99968/998] JAR404R201108	94619799968385	084A49985404B40	4840484	04B404B40 1001020D4	*PRU	JRAM/ PRUCI	DURE .	•••	• ^ м*
				859	5A440404B404E	404B404B404B40)4B404B404B404B	404B404	B404B404B	*ENU	· · · · · · ·			*
				404	3201109341D40	0024000A00000	000000000000000000000000000000000000000	110A102	0C3A49999	*			C	URR*
				8595	5A34093898299	8199A8404B404E	3404B404B404B40	4B404B4	04B404B20	*ENT L	IBRARY .		 DASS	···*
				8440	0404B404B404E	404B404B404B404B40	000000000110710 04B404B404B404B	404B404	B20110734	*D .			. FR33	WUK *
				2702	2073E00111827	22404DC35D40C3	BD6D7E8D9C9C7C8	E340C9C	2D440C3D6	*	(C) (COPYRIGH	T IBM	C0*
453	~	45	5107 0	D9D7	4B40F1F9F8F0	6B40F1F9F9F44E	340404040200452	0000		*RP. 1	980, 1994	• • • • • •	••••••	*
457	5	45	512/.2 Routing Inf	ormatio	n	400010020002 · 0270	00010020001	LLC	UI			OFF	AA	AA
			Frame Type	: IP	т	S: NORMAL	Length:	40	Protocol:	ТСР	Da	tagram I	D: 32	:02
				Src	Addr: 9.24.1	.04.56 Des	st Addr: 9.24.1	04.57	Fragme	nt Flags	: MAY ,L/	AST		
			SNAP Header	·: 0000	000800	40066620001969	22000106020							
			IP Options	: NONI	<u>=</u>	40000020091808	3203100033							
			тср	: Src	Port: 1035,	Unassigned	Dest Port: 3	97,APPC	/TCP					
				SEQ	Number: 109	3378291 ('4128	BAOF3'X) ACK N	umber:	1303678047	('4DB48	C5F′X)			
			TCP Header	· 040	8 BITS: ACK F 8018D412BA0F3	'SH 4DB4805F501810	Window:	/339	ICP Uption	: NONE				
858	S	93	5141.2	. 010		400010020002	C00010020001	LLC	UI			OFF	AA	AA
			Routing Inf	ormatio	on	: 0270					_			
			Frame Type	: IP	T(OA 56 Des	Length:	88	Protocol:	TCP nt Flags	. млу I	tagram I ∧s⊤	D: 32	04
			SNAP Header	·: 0000	0000800	.04.30 Des	St Addi. 5.24.1	04.37	i i aginei	iit i lays	, PAT , LA	131		
			IP Header	: 4500	0005832040000	400665FB091868	33809186839							
			IP Options	: NONI	Dowt . 1025	Unaccianad	Doct Dont. 2	07 4000						
			109	SEO	Number: 1035,	13378291 (' 412E	BAOF3'X) ACK N	umber:	1303678047	('4DB48	C5F'X)			
				Code	e Bits: ACK F	SH	Window:	7339	TCP Option	NONE	,			
			TCP Header	: 040	3018D412BA0F3	4DB48C5F501810	CAB85B40000	2051000	007205111	+			1	1 +
			Dala	: 0000	5C1D5F8F4F2C5	D9110735C1D5F8	3D7F6C4	3811000	00/3BF111	*ANY	USFR AN'	 Y PWD	• • • • •	•1•*
860	R	45	5141.3			400010020001	C00010020002	LLC	UI			OFF	AA	AA
			Routing Inf	ormatio	on	: 02F0	Law white	40	Ductors	TCD	Dec		D. 02	202
			Frame Type	: IP Src	Addr: 9.24.1	.04.57 Des	t Addr: 9.24.1	40	Fragme	nt Flags	: MAY .L/	Lagram I AST	D: 02	B3
			SNAP Header	. 0000	00800				· · - j		, ,			
			IP Header	: 4500	0002802B30000	4006957C091868	33909186838							
			IP Uptions	· NUNI	- Port: 397	ΑΡΡΟ/ΤΟΡ	Dest Port: 10	35 llnas	signed					
				SEQ	Number: 130	3678047 ('4DB4	18C5F'X) ACK N	umber:	1093378339	(′412BA	123′X)			
				Code	e Bits: ACK F	PSH	Window:	7599	TCP Option	: NONE				
961	D	96	ICP Header	: 018	0040B4DB48C5F	412BA12350181L	DAFED810000	110	ШT			055	۸۸	۸۸
004	K	00	Routing Inf	ormatio	on	: 02F0	00010020002	LLC	01			011	77	~~
			Frame Type	: IP	тс	S: NORMAL	Length:	81	Protocol:	ТСР	Da	tagram I	D: 02	B4
				Src	Addr: 9.24.1	.04.57 Des	st Addr: 9.24.1	04.56	Fragme	nt Flags	: MAY ,L/	AST		
			IP Header	· 4500)000800)005102840000	40069552091868	3909186838							
			IP Options	: NONI										
			ТСР	: Src	Port: 397,	APPC/TCP	Dest Port: 10	35,Unas	signed	<i>.</i> .				
				SEQ	Number: 130	13678047 ('4DB4 ОSH	BC5F'X) ACK N	umber:	1093378339	('412BA	123′X)			
			TCP Header	: 018	040B4DB48C5F	412BA12350181	AFD6C80000	1.222	ier option	. NUNE				
			Data	: 0000	002900000303	9020001F12A000	000040080030E18	0000000	000000000	*				*
				0000	0000004F30005	D97000				*	3R			*

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Received	Poll/ d Final	DS	AP S	SSAP
872	S	132	5142.1 Routing Inf	formatio	n	400010020002	C00010020001	LLC	UI			0FF	Α	A	AA
			Frame Type SNAP Header	: IP Src -: 0000	TO Addr: 9.24.1 000800	S: NORMAL 04.56 Des	Length: t Addr: 9.24.1	127 04.57	Protocol: Fragmen	TCP nt Flags:	Da MAY ,I	atagram LAST	ID:	3205	j
			IP Header IP Options	: 4500 : NONE	007F32050000	400665D3091868	3809186839								
			тср	: Src SEQ Code	Port: 1035, Number: 109 Bits: ACK P	Unassigned 3378339 ('412B 'SH	Dest Port: 3 A123'X) ACK N Window:	97,APPC, umber: 1 7298	/TCP 1303678088 FCP Option	('4 DB480 : NONE	:88′ X)				
			ICP Header Data	: 040B : 0000 3AD9	018D412BA123 005700000303 708003000202	4DB48C8850181C 9020004D12A000 00000000000000000	82A63E0000 00040080030900 0000000000000000	0088000	000000000 1000000000	* *.R		•••••	н.	••••	··* ··*
873	R	65	5142.3	0000	0000000000000	0000010000000 400010020001	7F31D000513000 C00010020002	00000000 LLC	000 UI	*	•••••	•••"} OFF	A	 A	* AA
			Frame Type	: IP Src	n TO Addr: 9.24.1	: 02F0 S: NORMAL 04.57 Des	Length: t Addr: 9.24.1	60 04.56	Protocol: Fragmen	TCP nt Flags:	Da MAY ,I	atagram LAST	ID:	02B	ō
			SNAP Header IP Header IP Options	<pre>^: 0000 : 4500 : NONE</pre>	000800 003C02B50000	40069566091868	3909186838								
			TCP	: Src SEQ Code	Port: 397, Number: 130 Bits: ACK P	APPC/TCP 3678088 ('4DB4 'SH	Dest Port: 10 8C88′X) ACK N Window:	35,Unass umber: 1 7512	signed LO93378426 FCP Option	('412BA1 : NONE	.7A′X)				
878	s	45	TCP Header Data 5142 4	: 018D : 0000	040B4DB48C88 001400000403	412BA17A50181D 9020000A12A000 400010020002	5842570000 000400000C 00010020001		ШТ	*	•••••			Δ	* ^^
0/0	5	-5	Routing Inf Frame Type	formatio : IP	n TO	: 0270 S: NORMAL	Length:	40	Protocol:	ТСР	Da	atagram	ID:	3206	5
			SNAP Header IP Header	Src r: 0000 : 4500	Addr: 9.24.1 000800 002832060000	04.56 Des 40066629091868	t Addr: 9.24.1 3809186839	04.57	Fragmen	nt Flags:	MAY ,I	LAST			
			IP Options TCP	: NONE : Src SEQ Code	Port: 1035, Number: 109 Bits: ACK P	Unassigned 3378426 ('412B SH	Dest Port: 3 A17A'X) ACK N Window:	97,APPC, umber: 1 7278	/TCP 1303678108 FCP Option	('4 DB480 : NONE	:9C′X)				
879	R	60	TCP Header 5142.7	: 040B	018D412BA17A	4DB48C9C50181C 400010020001	6EEE2E0000 C00010020002	LLC	UI			0FF	A	A	AA
			Routing Inf Frame Type	formatio : IP Src	n TO Addr: 9.24.1	: 02F0 S: NORMAL 04.57 Des	Length: t Addr: 9.24.1	55 04.56	Protocol: Fragme	TCP	Da May J	atagram LAST	ID:	02B6	ō
			SNAP Header IP Header	·: 0000 : 4500	000800 003702B60000	4006956A091868	3909186838		agiiici			2.101			
			TCP	: NONE : Src SEQ	Port: 397, Number: 130	APPC/TCP 3678108 ('4DB4	Dest Port: 10 8C9C'X) ACK N	35,Unass umber: 1	signed 1093378426	('412BA1	.7A′X)				
			TCP Header Data	: 018D : 0000	040B4DB48C9C 000F0180004B	412BA17A50181D 8000C900010001	158A05A0000	/512	ICP Option	*	I				*
880	S	45	5142.8 Routing Inf	formatio	n	400010020002	C00010020001	LLC	UI			OFF	А	A	AA
			Frame Type SNAP Header	: IP Src r: 0000	اں Addr: 9.24.1 000800	04.56 Des	Length: t Addr: 9.24.1	40 04.57	Protocol: Fragmen	ICP nt Flags:	Da MAY ,I	atagram LAST	ID:	320	'
			IP Header IP Options	: 4500 : NONE	002832070000	40066628091868	3809186839	07 4000	(TOD						
			109	: Src SEQ Code	Number: 1035, Number: 109 Bits: ACK P	Unassigned 3378426 ('412B 'SH	A17A'X) ACK N Window:	umber: 1 7263	1303678123 CP Option	('4 DB480 : NONE	CAB′X)				
881	S	56	TCP Header 5142.9 Routing Inf	: 040B	018D412BA17A n	4DB48CAB50181C 400010020002 • 0270	5FEE2E0000 C00010020001	LLC	UI			OFF	A	A	AA
			Frame Type	: IP Src	T0 Addr: 9.24.1	04.56 Des	Length: t Addr: 9.24.1	51 04.57	Protocol: Fragmen	TCP nt Flags:	Da MAY ,I	atagram LAST	ID:	3208	3
			IP Header IP Options	: 0000 : 4500 : NONE	000800 003332080000	4006661C091868	3809186839								
			ТСР	: Src SEQ Code	Port: 1035, Number: 109 Bits: ACK P	Unassigned 3378426 ('412B SH	Dest Port: 3 A17A'X) ACK N Window:	97,APPC umber: 1 7263	/TCP 1303678123 FCP Option	('4 DB480 : NONE	CAB′X)				
			ICP Header Data	: 040B : 0000	018D412BA17A 000B018000CB	40848CAB50181C 8000C9	5FA2CC0000			*	I				*

Record Number	S/R	Data Length	Record D Timer T	ata ype	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Receiveo	Poll/ I Final	DSAP	SSAP
883	R	50	5142.9 Routing Info	 rmation		400010020001 : 02F0	C00010020002	LLC	UI			OFF	AA	AA
		Frame Type :	IP Src A	T0 ddr: 9.24.1	S: NORMAL 04.57 Des	Length: t Addr: 9.24.1	45 04.56	Protocol: Fragmer	TCP nt Flags	Da : MAY ,L	ıtagram I _AST	D: 02	B7	
			SNAP Header: IP Header :	00000 45000 NONE	00800 02D02B70000	40069573091868	3909186838							
			TCP :	Src P SEQ N	ort: 397, umber: 130 Bits: ACK P	АРРС/ТСР 3678123 ('4DB4 SH	Dest Port: 10 8CAB'X) ACK N	35,Unase umber:	signed 1093378437 ICP Option	('412BA	185′X)			
			TCP Header :	018D0	40B4DB48CAB	412BA18550181D	4DEA2B0000	7501	icr option.	*				*
884	S	65	5143.0 Routing Info	rmation	00505	400010020002	C00010020001	LLC	UI			OFF	AA	AA
			Frame Type :	IP Src A	T0 ddr: 9.24.1	S: NORMAL 04.56 Des	Length: t Addr: 9.24.1	60 04.57	Protocol: Fragmer	TCP nt Flags	Da : MAY ,L	≀tagram I _AST	D: 320	09
			SNAP Header: IP Header : IP Ontions :	00000 45000 NONE	00800 03C32090000	40066612091868	3809186839							
			TCP :	Src P SEQ N	ort: 1035, umber: 109	Unassigned 3378437 ('412B	Dest Port: 3 A185'X) ACK N	97,APPC, umber:	/TCP 1303678128	('4DB48	CBO′X)			
			TCP Header :	Code 040B0	Bits: ACK P 18D412BA185	SH 4DB48CB050181C 90200400060000	Window: 5A4A920000	/258	ICP Option:	* NONE				*
886	R	746	5143.0	00000	00100000446	400010020001	C00010020002	LLC	UI		• • • • • • • • • •	OFF	AA	AA
			Routing Info Frame Type :	rmation IP	 TO	: 02F0 S: NORMAL	Length:	741	Protocol:	ТСР	Da	atagram]	D: 02	B8
			SNAP Header:	Src A 00000	ddr: 9.24.1 00800	04.57 Des	t Addr: 9.24.1	04.56	Fragmer	nt Flags	: MAY ,L	_AST		
			IP Header :	45000	2E502B80000	400692BA091868	3909186838							
				Src P	ort: 397,	APPC/TCP	Dest Port: 10	35,Unas:	signed					
			TOD Has down	SEQ N Code	umber: 130 Bits: ACK P	36/8128 ('4DB4 SH	Window:	umber: 7481	10933/845/ TCP Option:	('412BA) NONE	199 [,] X)			
			Data :	01800	40B4DB48CB0 2BD00000503	412BA19950181D 902002B312A000	3927EC0000 00041080030E18	0000000	000000000	*				*
				00000	00004400411 02000000000	00001114061D50 000000000000000	00200099110101	20D4C1C9 0022C1E2	9D5000000 261F4F0F0	* *	· · · · · · · · · ·	&R	.MAIN	···* 400*
				40D48 F2F4C	1899540D485	95A42011023D20	E2A8A2A385947A	200020D9	9C1D3E8C1	* MAIN *S4r	MENU	.SYSTEM:	RA	LYA* 011*
				96A68	995877A2011	050620F14B00E4	A2859940A381A2	92A2201	1060620F2	*OWING	····›	USER TAS	KS	2*
				4B00D A2A8A	68686898385 2A3859440A3	40A381A292A220 81A292A2201108	11070620F34B00 0620F44B00C689	C785958 9385A261	599819340 340938982	*OFF *SYSTE	ICE TASKS M TASKS	53 	GENER/ LES,	AL * LIB*
				99819 87998	98985A26B40	81958440869693 20110A0620F64B	848599A2201109	0620F54I 898381A	BOOD79996 B899695A2	*RARIE *GRAMM	S, AND FO)LDERS	5	PRO* ONS*
				20110	B0620F74B00	C4858689958540	969940838881958	878540A3	3888540A2	*	7DEFINE	OR CHAN	IGE TH	E S*
				110D0	620F94B00C4	89A2979381A840	968293859440886 8140948595A420	110E052	DF1F04B00	*9	8 DISPLAY	A MENU.	1	0*
				C9958 110F0	696999481A3 520F1F14B00	89969540C1A2A2 C393898595A340	89A2A38195A340 C1838385A2A240	9697A389 A381A292	99695A220 2A2201111	*INFOR	MATION AS	SISTANT ACCESS	OPTIO TASKS	NS.* *
				0520F	9F04B00E289	87954096868620 84201114012075	11130120E28593	8583A38	996954096	*90.	.SIGN OFF	•••••SEL	ECTIO	N 0*
				C5A78	9A3200020C6	F47ED799969497	A3200020C6F97E	D985A39	98985A585	*EXIT.	F4=PRON	1PTF9=	RETRI	EVE*
				20002 9540C	0C6F1F27EC3 1A2A289A2A3	81958385932000 8195A320111701	20C6F1F37EC995 20C6F2F37EE285	86969994 A340899!	481A38996 589A38981	*F1 *N ASS	2=CANCEL. ISTANT	F13=IN	FORMA	TIO* TIA*
				93409 D6D9D	48595A42011 74840F1F9F8	1801224DC35D40	C3D6D7E8D9C9C7	C8E340C9	9C2D440C3	*L MENI *ORP	J(C) 1980 - 190	COPYRIG	HT IB	* ۲ N
				00000 13140	000000000000 70411001804	0000000000000000 520000	000000000000000000000000000000000000000	00000000	000220020	*	· · · · · · · · · · · · · · · · · · ·			···* *
889	S	45	5143.2 Routing Info	rmation		400010020002	C00010020001	LLC	UI			OFF	AA	AA
			Frame Type :	IP Snc A	T0	S: NORMAL	Length:	40	Protocol:	TCP	. мах и	itagram I	D: 320	AC
			SNAP Header:	00000	00800	04.J0 Des	9.24.1	04.37	i i aginei	it i lays	. "'^' ,'			
			IP Header : IP Options :	45000 NONE	U28320A0000	40066625091868	3809186839							
			TCP :	Src P	ort: 1035, umber: 100	Unassigned 3378457 ('4128	Dest Port: 3	97,APPC	/TCP 1303678829	('4 DR48	F6D' X)			
				Code	Bits: ACK P	SH	Window:	6557	TCP Option:	NONE				
			itr Header •	U40B0	100412BA199	40848660501819	9066060000							

Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Receiv	• Poll/ red Final	DSAF	P SSAP
1672	S	86	5150.6 Routing Inf Frame Type SNAP Header	ormatic : IP Src : 0000	on TO Addr: 9.24.1)000800	400010020002 : 0270 S: NORMAL 04.56 Des	C00010020001 Length: t Addr: 9.24.1	LLC 81 04.57	UI Protocol: Fragmen	TCP nt Flags		OFF Datagram ,LAST	AA ID: 32	AA 20B
			IP Header IP Options TCP TCP Header Data	: 4500 : NONE : Src SEQ Code : 040E : 0000	00051320B0000 Port: 1035, Number: 109 Bits: ACK P 3018D412BA199 0002900000503	400665FB091868 Unassigned 3378457 ('412E SH 4DB48F6D501819 9020001F12A000	33809186839 Dest Port: 3 3A199'X) ACK N Window: 99DC9500000 000040080030614	897,APPC lumber: 6557	/TCP 1303678829 TCP Option 01410F111	('4DB48 NONE	F6D'X)		1	1.*
1673	R	121	5150.7 Routing Inf	1407 ormatic	78595849781A2	A38899 400010020001 : 02F0	C00010020002	LLC	UI	*END	PASTHR	OFF	AA	ÅÅ
			Frame Type SNAP Header IP Header IP Options TCP	: IP Src : 0000 : 4500 : NONE : Src SEQ Code	TC Addr: 9.24.1 0000800 0007402BB0000 Port: 397, Number: 130 S Bits: ACK P	S: NORMAL 04.57 Des 40069528091868 APPC/TCP 3678829 ('4DB4 SH	Length: t Addr: 9.24.1 33909186838 Dest Port: 10 18F6D'X) ACK M Window:	116 .04.56 035,Unas lumber: 7440	Protocol: Fragmen signed 1093378498 TCP Option	TCP nt Flags ('412BA : NONE	: MAY 1C2′X)	Datagram ,LAST	ID: 02	2BB
			Data	: 018L : 0000 F4C2	0040840848F60 0004C00000603 209C1D3E8C1E2	9001004212A050 F4C14040D9C1D3	000003C0000000000000000000000000000000	00000D9C	1D3E8C1E2 4F0F1D8E4	*<. *4BRAL *SED	YAS4A	& RALYAS4A	RAL 00040	LYAS* D1QU*
1675	R	45	5150.8 Routing Inf Frame Type SNAP Header IP Header IP Options	ormatic : IP Src : 0000 : 4500 : NONE	on TO Addr: 9.24.1 0000800 0002802BA0000	400010020001 : 02F0 S: NORMAL 04.57 Des 40069575091868	C00010020002 Length: t Addr: 9.24.1 33909186838	LLC 40 04.56	UI Protocol: Fragmen	TCP nt Flags	 : MAY	OFF Datagram ,LAST	AA ID: 02	AA 2BA
			TCP	: Src SEQ Code	Port: 397, Number: 130 Bits: ACK P	APPC/TCP 3678829 ('4DB4 SH	Dest Port: 10 8F6D'X) ACK N Window:)35,Unas lumber: 7440	signed 1093378498 TCP Option	('412BA : NONE	1C2′X)			
1677	S	45	SNAP Header IP Header IP Options	ormatic : IP Src : 0000 : 4500 : NONE	on TO Addr: 9.24.1 0000800 00028320C0000	4120A1C250101 400010020002 : 0270 S: NORMAL 04.56 Des 40066623091868	C00010020001 Length: t Addr: 9.24.1	LLC 40 04.57	UI Protocol: Fragmen	TCP nt Flags	: MAY	OFF Datagram ,LAST	AA ID: 32	AA 20C
			TCP	: Src SEQ Code : 040E	Port: 1035, Number: 109 Bits: ACK P 3018D412BA1C2	Unassigned 3378498 ('412E 'SH '4DB48FB9501819	Dest Port: 3 A1C2'X) ACK N Window: 951EDE60000	897,APPC lumber: 6481	/TCP 1303678905 TCP Option	('4DB48 : NONE	FB9′X)			

***** END OF COMPUTER PRINTOUT *****

Appendix B. APING

APING is a small APPC program that sends data across a network and receives data back. APING is used to test connectivity between two systems in an SNA network in a similar way to PING in a TCP/IP network. APING must be running on both systems (client and server). Like PING, APING times how long the data transfer takes. The APING package is available on the following:

• CompuServe

There is an APPC Info Exchange forum on CompuServe (type GO APPC to access this forum). In the Sample Program Library section, there are several packages related to APING:

- APING.ZIP The OS/2 APING executables, C source code, and makefiles for many platforms
- APINGS.ZIP The C source portion of the APING.ZIP package
- PNGFAM.ZIP The executables from the APING.ZIP package
- APINGC.ZIP The CICS COBOL source for the APINGD server
- MKTTOOLS

MKTTOOLS is an IBM-internal bulletin board containing packages that can be distributed to customers. The packages related to APING are the following:

- APING PACKAGE: The OS/2 APING executables, C sourcecode, and makefiles for many platforms
- APINGCIC PACKAGE: The CICS COBOL source for the APINGD server
- OS2BBS

OS2BBS is a bulletin board accessible through the IBM Information Network. The APING package is available on the OS2BBS.

 APING.ZIP: The OS/2 APING executables, C source code, and makefiles for many platforms

The APING program consists of two sides: the client side and the server side. On the client side, the user starts up the APING program and specifies what actions should be taken. As a result, the APINGD program is started on the server side. The APING and APINGD programs then communicate using CPI-C and complete the transaction.

APING for OS/400

The C source for APING and APINGD is shipped with OS/400 V3R1. It is shipped as part of QUSRTOOL. The OS/400 APING we used during our residency was created from this source.

For further information on OS/400 APING, see *OS/400 APPC Programming*, SC41-3443.

Installing OS/400 APING

If the tool does not already exist, you must create it by creating a CL program that compiles and builds the objects you need.

- Note -

ILE C/400 (5763-CX2) must be installed on the system on which APING and APINGD are created.

To create the APING and APINGD tools do the following:

1. Unpackage QUSRTOOL.

To reduce the amount of time it takes to install the QUSRTOOL library and reduce the amount of storage used by the QUSRTOOL library, all source physical files, except QATTINFO, are now distributed as save files. Each source physical files is now contained within a save file of the same name.

Two programs that convert save files to source physical files (UNPACKAGE) and source physical files to save files (PACKAGE) have been provided. Before any tools can be compiled and run, you must unpackage the appropriate save files.

To unpackage the QUSRTOOL library, enter:

CALL QUSRTOOL/UNPACKAGE ('*ALL' 1)

2. To create the CL install program TLPCRT in library MYLIB, enter:

CRTCLPGM PGM(MYLIB/TLPCRT) SRCFILE(QUSRTOOL/QATTCL) SRCMBR(TLPCRT)

Where MYLIB is the library in which you want the CL program to exist.

3. To call the installation program, enter:

CALL PGM(MYLIB/TLPCRT) PARM(APING)

Where APING is the library in which you want the tools APING and APINGD to exist. If this library does not already exist it will be created.

- Add the library in which APING and APIND reside to the User Library List. To change the User Library List:
 - a. Enter the WRKSYSVAL command.
 - b. Page down until you find the QUSRLIBL system value, select 2 for change.
 - c. Add the library that you used when creating the tools (usually APING) to the list.

Deleting OS/400 APING

To delete the APING tool, create the CL delete program TLPDLT in library MYLIB:

CRTCLPGM PGM(MYLIB/TLPDLT) SRCFILE(QUSRTOOL/QATTCL)

Where MYLIB is the library in which you want the CL program to exist.

Once the delete program is created, you can do one of the following:

1. If you want to delete only the source members in QUSRTOOL, enter:

CALL MYLIB/TLPDLT (*YES *NONE)

2. If you want to delete only the library APING, enter:

CALL MYLIB/TLPDLT (*NO APING)

Where APING is the library in which you created the tools APING and APINGD.

3. If you want to delete both the source members in QUSRTOOL and the library APING, enter:

CALL MYLIB/TLPDLT (*YES APING)

Where APING is the library in which you created the tools APING and APINGD.

Using OS/400 APING

The simplest way to use APING is to specify only the partner destination name. For example, you can start APING with:

===> call aping destination

Running the APING program with the default parameters will result in a session allocation, which will be timed. Then APING will send 100 bytes to the partner, and receive the same number of bytes, which will also be timed. This will be done twice, since the first timing is likely to include process start up time on the partner side.

The following describes all of the APING parameters:

APING destination optional parameters

The destination is the only required parameter. You may specify any number of the additional parameters. If you specify any parameter more than once, only the last parameter value will be used.

destination

This identifies the partner system on which the APINGD server program runs.

It may be either a CPI-C symbolic destination name or a partner LU name.

If the destination is a CPI-C symbolic destination name, it must be 1 to 8 characters and must be configured in your platform's symbolic destination name table.

-m mode_name

Mode name (default: "#INTER").

-t tp_name

The TP name to start on the partner (default: "APINGD").

-s N

N is the size of the packet transmitted (default: 100 bytes).

This is the number of bytes sent in each Send call by each side. You may specify a value from 0 to 32767.

-i N

N is the number of iterations done (default: 2).

The number of iterations will be seen in the output as the number of sets of timing information. You may want to increase this number to

get a larger sample of timings. You may specify a value from 1 to 32767.

-c N

N is the number of consecutive packets sent by each side (default: 1).

This is the number of Send calls issued by each side before giving the partner permission to send. For each iteration, each side will make this number of Sends, each of the specified packet size. You may specify a value from 1 to 32767.

-u userid

This is the user ID that will be sent to the partner. The user ID can be 1-8 characters in length. You should use this parameter when the destination transaction program has been configured to require security. One indication that the destination transaction program requires security is a CPI-C return code of

XC_SECURITY_NOT_VALID.

Specifying this parameter implies the conversation will use CPI-C security=PROGRAM. A password must also be specified. If a user ID is specified without a password, APING will prompt the user for a password.

-p password

This is the password that will be sent to the partner. The password can be 1-8 characters in length.

-n

This parameter forces APING to use NO security on the conversation. (CPI-C security=NONE). This should be used when you receive a CPI-C return code of XC_SECURITY_NOT_VALID, but the destination transaction program is not configured to require security.

-1

Only send data from client to server (no echo). Note that the flag is a numeral one, not the letter L.

APING Output

The following illustrates the simplified line flows that result when APING is started with the following parameters:

APING destination -s 10000 -i 2 -c 4

LOCAL COMPUTER		PARTNER COMPUTER
Allocate	>	Accept Conversation
Confirm	>	Confirmed
Send(10000)	>	Receive
Receive	<	Send(10000)
Receive	<	- Send(10000)
Receive	<	- Send(10000)
Receive	<	- Send(10000)
Send(10000)	;	> Receive
Send(10000)	;	> Receive
Send(10000)	;	> Receive
Send(10000)	:	> Receive

Receive	<	Send(10000)
Receive	<	Send(10000)
Receive	<	Send(10000)
Receive	<	Send(10000)
Deallocate		

The output from the APING program is similar to the following:

Dyre	ter J. Schwall	er (pjs@ralvm6.vn	et.ibm.com)	
Allocat	e duration:		0 ms	
Program	startup and C	onfirm duration:	720 ms	
	Duration (msec)	Data Sent (bytes)	Data Rate (KB/s)	Data Rate (Mb/s)
	60	64000	1041.7	8.333
	30	64000	2083.3	16.667
	00	128000	1388.9	11.111

Figure 397. APING Sample Output

The Allocate duration is how long it takes for the Allocate call to return to the program. The next call in APING is a Confirm call, which is timed to determine the approximate program start up time of the partner transaction program.

The number of APING duration lines will be equal to the number of iterations requested (see the -i parameter above). In this case, the default of 2 was used.

The last output line provides a summary of the APING duration lines already displayed. The minimum, maximum and average APING duration is displayed in milliseconds. The overall data rate for all APINGs is calculated and displayed.

Note that on some platforms the timer resolution is one second, or 1000 milliseconds.

Examples of APING Use between AS/400s

 $\overline{}$

In the following example we use APING between RALYAS4A and RALYAS4B with neither a user ID or password specified:

CALL PGM(APING) PARM('RALYAS4B')

When a user ID (-u) is not specified, the user ID from QCMN subsystem will be used, for example QUSER from:

		Display Commun	ICATIONS EN	tries	Sustan.		
Subsystem description:		QCMN	Status:	ACTIVE	System.		
		Job		Defa	ault	Max	
Device	Mode	Description	Library	Usei	r	Active	
*ALL	QCASERVR	*USRPRF		*NOI	NE	*NOMAX	
*ALL	QPCSUPP	*USRPRF		*SYS	S	*NOMAX	
*APPC	*ANY	*USRPRF		QUSI	ER	*NOMAX	

Figure 398. QCMN Subsystem Communications Entries

In the following example we use APING between RALYAS4A and RALYAS4B with both a user ID and password specified:

CALL PGM(APING) PARM('RALYAS4B' '-uUSERID' '-pPASSWORD')

Note: User ID and password *must* be in upper case.

During the residency we used OS/400 APING in conjunction with OS/2 and MVS APING.

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