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Considerations for AS/400s acting as Remote Cluster Controllers

Introduction:

Purpose 1: IBM 5494 and 5500 Remote Control Replacement

This paper provides concise technical guidance for using an AS/400 for remote sites with a variety of workstation types instead of an IBM 5494 or 5500 Remote Control Unit. It discusses planning and installation considerations, differences in network support functions, configuration functions, and operational characteristics. It focuses only on IBM 5494 and 5500 functions and does not discuss other AS/400 applications or functions which might be used at a remote site.

Organizations may choose to use a small AS/400 instead of the IBM 5494 or 5500 remote controllers to support remote sites. This choice is more common since IBM withdrew the IBM 5494 and 5500 AS/400 remote controllers from marketing December, 1999. Service / support for the 5494 and 5500 was not withdrawn at this time, but rather than search out a used IBM 5494 or 5500, some organizations will instead choose to use a small AS/400 such as the AS/400e model 170 or model 150.

The term "replace" or "replacement" when used in this document refers to the usage of an AS/400 to provide equivalent functions for the withdrawn remote controllers. It does not advocate physical replacement of existing IBM 5494 or 5500 remote controllers.

Purpose 2: Migration to TCP/IP from SNA

If an organization's migration plan from an SNA network to a TCP/IP network includes using AS/400s as remote controllers, this document should be of value. It addresses both SNA and TCP connectivities and can address related migration considerations.

Scope:

This paper will serve as a guideline, and as a resource reference document, such that a system administrator can plan, install, configure, maintain, and control a remote network of AS/400's used as cluster controllers. It does not address application distribution across networks, nor does it detail specific installation unique parameters with regard to low-level protocol features

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Configure a Remote AS/400 - SNA Networks

Introduction:

Replacement of the 5494 with an AS/400 will change the method for providing workstation session support to remote users. This section of the white paper will refer to the "remote AS/400" as the AS/400 replacing the 5494. The "local AS/400" refers to the AS/400 that currently provides application support, network access, etc., for the workstations currently connected off the 5494.

With the remote AS/400 replacing the 5494, the remote AS/400 will be providing workstation session support for the remote workstations. The connection between the local and remote AS/400s for accessing applications on the local AS/400 will now be handled by Display Station Pass-Through support. The reference manual *Remote Work Station Support*, SC41-5402, provides information on configuring systems to use Pass-through.

The following sections identify configuration changes to be made to the local and remote AS/400 to support the remote workstation users in the same manner the 5494 does today. There are also some suggestions that will assist remote workstation users in the new Pass-through environment.

Network Attributes

Network Attributes help identify the remote AS/400 to the local AS/400, and to the rest of the network. The simplest change is to have the new remote AS/400 take over the "network identity" of the old 5494. Use the AS/400 command CHGNETA on the remote AS/400 to set the System name, Local control point name and Default local location name to the 5494 Logical Unit (LU) Name (Field 12 on the 5494 Configuring Network Information, Configuration Screen 2). Change the Local network ID to the 5494 Default Network Name (Field 11).

Line Descriptions

The line description will define the communication link between the local and remote AS/400s. It defines the physical interface between the local and remote AS/400 and the protocol used for communications. It may also include information about the line speed, whether the line is switched or non-switched, and the network address or telephone number of the system. This link will probably be the same link that was used to connect the 5494. If that is the case, then configuration screen 1 Field AA on the 5494 will denote the communication mode currently in use, and will help identify which of the following sections should be used. The remaining configuration fields on the 5494 will provide

information that will be needed for other parameters in the AS/400 Line and controller descriptions. Refer to the reference manual 5494 Remote Control Unit User's Guide GA27-3960, for a description of these fields and their values. The following examples identify the required parameters for each of the line types. The remaining parameters use the defaults. Refer to the reference manuals *Remote Workstation Support*, SC41-5402, and *Communications Configuration* SC41-5401 for information on specifying values other than the defaults for these parameters. The line description on the local AS/400 can also be used to determine any specific parameter values other than the defaults that may be needed.

Token Ring
>CRTLINTRN LIND(line connecting 5494 to the local AS/400) RSRCNAME(resource name of port)

Ethernet
>CRTLINETH LIND(line connecting 5494 to the local AS/400) RSRCNAME(resource name of port)

SDLC non-switched
>CRTLINSDLC LIND(line connecting 5494 to the local AS/400) RSRCNAME(resource name of port)

SDLC switched
>CRTLINSDLC LIND(line connecting 5494 to the local AS/400) RSRCNAME(resource name of port) CNN(*SWTPP) STNADR(01)

X.25
>CRTLINX25 LIND(line connecting 5494 to the local AS/400) RSRCNAME(resource name of port) LGLCHLE(determined by the channel services contracted from your network carrier) NETADR(provided by your network carrier) CNNINIT(*LOCAL)

Frame Relay (SNA)
>CRTLINFR LIND(line connecting 5494 to the local AS/400)

Controller Descriptions

The controller description will represent a logical connection to the local AS/400. It will include addressing information about the local system, such as its token ring adapter address or telephone numbers used for switched connections. The following examples identify the required parameters for each of the controller types. The remaining parameters use the defaults. Refer to the reference manuals *Remote Workstation Support*, SC41-5402, and *Communications Configuration* SC41-5401 for information on specifying values other than the defaults for these parameters.

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Token Ring
CRTCTLAPPC CTLD(DSPNETA local location name of local AS/400) LINKTYPE(*LAN)
SWTLINLST(line description configured in the above section) RMTNETID(DSPNETA
network name on local AS/400) RMTCPNAME(DSPNETA local control point name on
local AS/400) ADPTADR(lan adapter address of the token ring line description on the local
AS/400)

Ethernet
CRTCTLAPPC CTLD(DSPNETA local location name of local AS/400) LINKTYPE(*LAN)
SWTLINLST(line description configured in the above section) RMTNETID(DSPNETA
network name on local AS/400) RMTCPNAME(DSPNETA local control point name on
local AS/400) ADPTADR(lan adapter address of the token ring line description on the local
AS/400)

SDLC non-switched
CRTCTLAPPC CTLD(DSPNETA local location name of local AS/400) LINKTYPE(*SDLC)
LINE(line description configured in above section) RMTNETID(DSPNETA network name
on local AS/400) RMTCPNAME(DSPNETA local control point name on local AS/400)
STNADR(01-from where?)

SDLC switched
CRTCTLAPPC CTLD(DSPNETA local location name of local AS/400) LINKTYPE(*SDLC)
SWITCHED(*YES) SWTLINLST(line description configured in above section)
RMTNETID(DSPNETA network name on local AS/400) RMTCPNAME(DSPNETA local
control point name on local AS/400) CNNNBR(phone number of modem used to dial out)
STNADR(01-from where?)

X.25
CRTCTLAPPC CTLD(DSPNETA local location name of local AS/400) LINKTYPE(*X25)
LINE(line description configured in above section) RMTNETID(DSPNETA network name
on local AS/400) RMTCPNAME(DSPNETA local control point name on local AS/400)
NETLVL(1984) LGLCHLID(channel to be used for this connection)

Frame Relay
CRTCTLAPPC CTLD(DSPNETA local location name of local AS/400) LINKTYPE(*FR)
SWTLINLST(line description configured in above section) RMTNETID(DSPNETA network
name on local AS/400) RMTCPNAME(DSPNETA local control point name on local
AS/400)

Device Description

The device description describes the characteristics of the logical device
used to communicate with the local AS/400. It will include the location name for the local
AS/400, as well as the controller associated with the device. The following example will
create the proper APPC device description for any controller defined in the above section.
The example identifies the required parameters for the device. The remaining parameters
use the defaults. Refer to the reference manuals *Remote Workstation Support*, SC41-5402,
and *Communications Configuration* SC41-5401 for information on specifying values
other than the defaults for these parameters.

> CRTDEVAPPC DEVD(DSPNETA local location name of local AS/400)
> RMTLOCNAME(DSPNETA local location name of local AS/400) RMTNETID(DSPNETA
> network name on local AS/400) CTL(controller description configured in the above section)

Display Station Pass-through

Replacing the 5494 with the remote AS/400 may require introducing the concept of display station pass-through sessions to the remote users. However, there are features of the AS/400 that can be used to shield the user from these differences, and the following sections will identify some of these features.

Automatic Sign-on

AS/400 display station pass-through allows the user to request an automatic sign-on to the target system. The "target system" refers to the local AS/400 in this discussion. If the user has the correct security authorization and if the target system allows automatic sign-on, the user can bypass the sign-on display on the target system. In fact, with some changes on the local and remote AS/400s the user signing on at the remote workstation will not even know that a display station pass-through session has been established. To implement this type of automatic sign-on follow these steps:

1. Create a CL program on the remote AS/400 that will initiate an automatic sign-on to the local AS/400, and then sign-off

2. Create or change the user profiles on the remote AS/400 to indicate the CL program created in step 1 as the Initial program. This CL program will then be executed when the user signs onto the remote AS/400. Also set the parameter DSPSGNINF to *NO on the local system, so last sign-on information is not displayed for the pass-through session.

3. Create the APPC controller and device descriptions on the local and remote AS/400 so that the APPC device description has parameter SECURELOC set to *YES. This will allow the automatic sign-on to occur without requiring a password. In this way the command created in step 1 will work for all users.

4. On the local AS/400 be sure the system value QRMTSIGN is set to *SAMEPRF. Make sure each user has the same user-id and password on the local AS/400 and the remote AS/400.

For step 1 the CL program will contain these CL commands:

> STRPASTHR RMTLOCNAME(DSPNETA local location name of local AS/400)
> RMTNETID(DSPNETA network name on local AS/400)
> RMTUSER(*CURRENT) PASTHRSCN(*NO)
> SIGNOFF

The parameter RMTUSER(*CURRENT) tells pass-through to use the user-id currently in use on this session as the user-id to sign-on at the local AS/400. It will also use the same password to perform the automatic sign-on function. The parameter PASTHRSCN(*NO) tells the remote AS/400 to not put up the pass-through initialization in progress screen, further shielding the remote user from the underlying function being performed on their behalf to attain a sign-on at the local AS/400.

For step 3 the APPC controller and device on the local system must be APPN(*NO). This then allows the APPC device to be created with SECURELOC(*"YES). This indicates that the remote location defined by this APPC device is a secure location so the local system will accept its security validation and will not require a password for the pass-through session sign-on if the local AS/400 has system value QRMTSIGN set to *SAMEPRF. To define the controller for this function, add the parameter APPN(*NO) after the LINKTYPE parameter in the examples in the Controller Descriptions section. For the device, add the parameters APPN(*NO) SECURELOC(*YES) at the end of the example in the Device Description section.

The manual *Remote Workstation Support*, SC41-5402, contains detailed information on the implementation of pass-through sessions and automatic sign-on, and the different options available.

STRPASTHR Command On a User Menu
The AS/400 provides a wealth of functionality. The Automatic Sign-on example defined above keeps the remote workstation user from taking advantage of all the capabilities of the remote AS/400. More flexibility can be provided by utilizing the example CL program as an option off a user menu. The remote workstation user can then select a menu option that automatically signs on a session to the local AS/400. Modify the CL program to remove the "SIGNOFF" CL command, and when the user enters the ENDPASTHR command to end the pass-through session to the local AS/400, they will be back at the user menu on the remote AS/400 workstation session.

User-defined STRPASTHR command
Another option for providing some automation to the pass-through process is to create a site-unique version of the STRPASTHR command. Copy it to a work library that is ahead of QSYS in the library list for all users. Change the parameter defaults to the site-specific values, such at RMTUSER(*CURRENT), RMTLOCNAME, and RMTNETID.

User Sign-on Program
A sign-on validation program can be implemented to take care of correlating remote workstation user requests for pass-through sessions, available user ids and passwords on the local AS/400, etc. This program can then be defined in the QRTMSIGN system value on the local AS/400. Considerations for this program and a sample CL program are found in the manual *Remote Workstation Support*, SC41-5402.

Local AS/400 Configuration Changes

There will need to be some consideration for configuration changes on the local AS/400 to support the new pass-through sessions. The following sections identify changed to be considered. These system values are thoroughly discussed in the display station pass-through chapter in the manual *Remote Workstation Support*, SC41-5402.

QRMTSIGN System Value
*SAMEPRF value was described above in the Automatic Sign-on section as a way of using the same user-id and password for sign-on during the pass-through session. *VERIFY is a value that allows automatic sign-on with a different user-id value.

ADDWSE SBSD(user-defined subsystem name) WRKSTNTYPE(5291)
If the local AS/400 does not utilize the IBM-supplied subsystem descriptions, a workstation entry may need to be added to the user-defined subsystem description on the local AS/400 to allow the pass-through sessions to go active.

Central Site Pre-configuration Considerations

Enterprises planning to install AS/400s at multiple remote sites might consider configuring the systems at a central site before shipment to the remote site for installation. Configuration of all the remote AS/400s can then be done by a common team, using common naming conventions, processes, etc. Once the configurations are determined for a typical remote site a CL program could then be developed that creates the line, controller, and device descriptions needed. The same program could modify network attributes and system values.

Matching AS/400 parameters for a 5494 connected by token-ring

You must coordinate communications configuration parameters between AS/400 and the 5494 controller that is connected by token-ring. You can coordinate these values automatically or manually. Pick one of these ways:

   To **automatically** connect the AS/400 to a 5494 controller, you can use the automatic remote controller   (QAUTORMT)   system value.
   To **manually** connect the AS/400 to a 5494:

Use the following table to configure the AS/400 to a 5494 controller that is connected by token-ring.

The following table gives a description of the parameters . Following are the related fields and subfields from the 5494 configuration display, and the AS/400 configuration value and the matching 5494 value to enter in the display subfield.

AS/400 Prompt	AS/400 Parameter	5494 Field	Subfld	AS/400 Value	5494 Value	Notes
Local adapter address	ADPTADR	H1	5	-	-	Values specified in the AS/400 line description (CRTLINTRN command) and for the 5494 Remote Control Unit must match.
LAN remote adapter address	ADPTADR	15	-	-	-	Values specified for the AS/400 CRTCTLAPPC command and for the 5494 Remote Control Unit must match.
Destination service access point	DSAP	F	-	-	-	Values specified for the AS/400 CRTCTLAPPC command and for the 5494 Remote Control Unit must match.
Local location name	LCLLOCNAME	H1	1	-	-	Values specified for the AS/400 CRTCTLRWS command and for the 5494 Remote Control Unit must match. This will probably match LCLLOCNAME in the network attributes.
Remote control point name	RMTCPNAME	13	-	-	-	Values specified for the AS/400 CRTCTLAPPC command and for the 5494 Remote Control Unit must match.
Remote network identifier	RMTNETID	11	3	-	-	Values specified for the AS/400 CRTCTLAPPC and CRTCTLRWS commands and for the 5494 Remote Control Unit must match. This will probably match LCLNETID in the network attributes and H1:2.
Remote location name	RMTLOCNAME	12	-	-	-	Values specified for the AS/400 CRTCTLRWS command and for the 5494 Remote Control Unit must match.

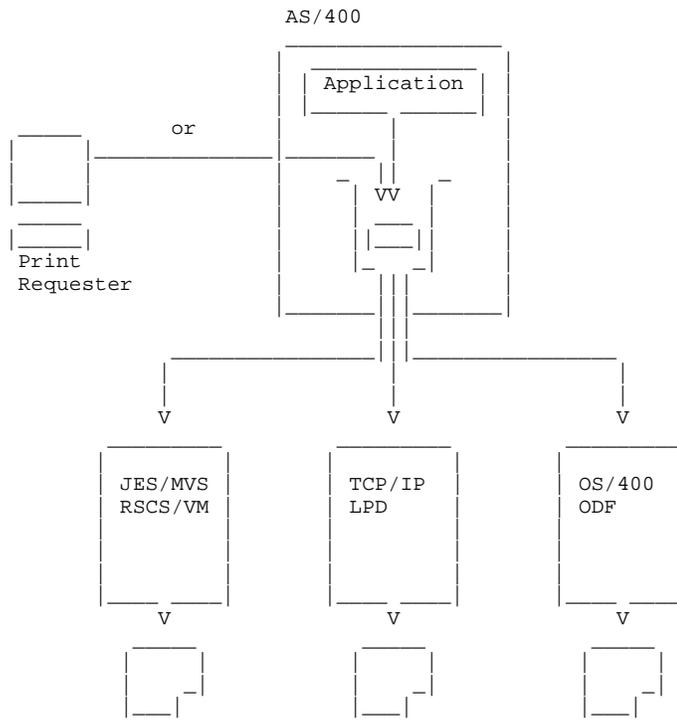| Link type | LINKTYPE | AA | - | *LAN | 4 | 5494 configuration values must match the values specified for the LINKTYPE parameter on the CRTCTLAPPC command. For APPC controllers that specify LINKTYPE(*SDLC), the value specified in the 5494 configuration must be compatible with the physical interface (INTERFACE parameter) specified on the CRTLINSDLC command. Select 4 for the network connections. |

Differences between AS/400 native printer support and 5x94 printer support

Printed output must be redirected through the AS/400 acting as a cluster controller, compared with the native device directed print support within the 5x94 products. See chapter 18 in the Redbook, "AS/400 in Multiprotocol Networks, SG24-4522-01", and also the Redbook, " IBM AS/400 Printing V, SG24-2160-00 " which can also be viewed on-line from http://www.redbooks.ibm.com/.

The last section of printer related material from that document is inserted here.

Print Output to Printers Controlled by Other Systems

The AS/400 as a print requester can forward print output to other systems using facilities like TCP/IP LPR, SNA/DS Object Distribution Facility (ODF) or Network Job Entry (NJE).

```
                          AS/400
                       _____
                      | _____  |
                      ||Application|
                      || _____  |
            or        ||       |  |
 _____   _____|        |  |
|      | |             _  ||  _ |  |
|_____| |            | | VV |  |
 _____  |            | |____||  |
|_____| |            | |___| |  |
Print    |            |_     _|  |
Requester|            |_____|
         |_____|
              |        ||  |_____
              |        ||  |                |
              V        V                    V
         _____   _____        _____
        |         | |         |      |         |
        | JES/MVS | | TCP/IP  |      | OS/400  |
        | RSCS/VM | | LPD     |      | ODF     |
        |         | |         |      |         |
        |         | |         |      |         |
        |_____| |_____|      |_____|
             V           V                V
          _____       _____            _____
         |    _|     |    _|          |    _|
         |___|       |___|            |___|
```

Print Output Transfer to Other Systems

Type of Printer		Connection to Printer		Printer Data Stream Support			
	AS/400 transfers	Link	Network	ASCII	SCS	IPDS	AFPDS
ASCII	as TCP/IP LPR	LAN/WAN	TCP/IP	yes	yes 1	–	yes 2
IPDS	using SNADS/ODF	LAN/WAN	SNA	–	yes	yes	yes
IPDS	using NJE VM/MVS Bridge	LAN/WAN	SNA	–	yes	yes 3	yes

Notes:

  1 This is the conversion from SCS to ASCII performed by the OS/400

Host Print Transform function.

2 Transformation from AFPDS to ASCII by the OS/400 host print transform function.

3 IPDS data cannot be sent if any special device requirements are present such as fonts, bar codes rotation, or graphics. You can send the data by copying the spooled file to a database file (CPYSPLF command) and then using the SNDNETF command to send it as a network file.

With OS/400 V3R1, the Remote System Printing function allows spooled files to be automatically sent to other systems.

The following parts of remote system printing are documented with configuration examples, supported data stream tables, and AFP resources considerations in either the AS/400 Printer Device Programming, SC41-5713, or the AS/400 Printing IV, GG24-4389, and are not discussed in this chapter.
· AS/400 to AS/400 Version 3 and later
· AS/400 to AS/400 Version 2
· AS/400 to S/390 system
· AS/400 to Print Services facility/2 (PSF/2)
· AS/400 to RS/6000 (with destination type *OTHER)

Configure a Remote AS/400 - TCP/IP Networks

Introduction

Replacement of the 5500 with an AS/400 will change the method for providing workstation session support to remote users. This section of the white paper will refer to the "remote AS/400" as the AS/400 replacing the 5500. The "local AS/400" refers to the AS/400 that currently provides application support, network access, etc, for the workstations currently connected off the 5500.

With the remote AS/400 replacing the 5500, the remote AS/400 will be providing workstation session support for the remote Twinax IP workstations. The connection between the local and remote AS/400s for accessing applications on the local AS/400 will now be handled by passing the TCP/IP packets from the remote Twinax IP workstations to the local AS/400.

The following sections identify configuration changes to be made to the local and remote AS/400s to support the remote workstation users in the same manner the 5500 does today.

TCP/IP SUBSYSTEM

The TCP/IP subsystem will need to be started and configured on both the local and remote AS/400s in order to allow 5500 functions to be implemented on the remote AS/400.

The STRTCP command on the AS/400 allows the AS/400s TCP/IP application servers and interfaces to be started. For details on these applications and working with the TCP/IP interfaces see the REDBOOK GG24-3442-02
IBM AS/400 TCP/IP Configuration and Operation

TCP/IP Interfaces

A TCP/IP interface line description will define the communication link between the local and remote AS/400s. This link will probably be the same link that would have been used used to connect the 5500 or 5494 . A communication link should already be established in place between the local and remote AS/400 for the 5494 function so all that should beis needed is to add an IP interface and routes to the existing communications links.

Adding of IP Interfaces on Communication Links

Local AS/400

A incoming IP port of the local AS/400 needs to be defined as a TCP/IP interface in order for the remote AS/400 to TCP/IP connect to it. This requires the specifying of an TCP/IP interface on the incoming communication controller.

Adding of an interface is accomplished by entering the following command on the local AS/400 command prompt.

ADDTCPIFC INTNETADR(IP address of controller) LIND(controller name)
SUBNETMASK(subnetmask of controller IP address)

Example: A Token Ring controller in the local AS/400 called LIN01TR with an IP address of
7.193.19.3 on subnet 255.255.224.0 will be the receiving port of IP packets from the
remote AS/400.
The command entered would be:

ADDTCPIFC INTNETADR('7.193.19.3') LIND(LIN03TR)
SUBNETMASK('255.255.224.0')

An interface should be built for each communication controller used on the local AS/400 to interface to the remote AS/400.

Remote AS/400

An outgoing IP port of the remote AS/400 needs to be defined as a TCP/IP interface in order for it to connect to the local AS/400. This requires the specifying of an TCP/IP interface on the outgoing communication controller.

ADDTCPIFC INTNETADR(IP address of controller) LIND(controller name)
SUBNETMASK(subnetmask of controller IP address)

Example: A Token Ring controller in the remote AS/400 called LIN03TR with an IP address of
7.193.19.1 on subnet 255.255.224.0.

The command entered would be:

ADDTCPIFC INTNETADR('7.193.19.1') LIND(LIN03TR)
SUBNETMASK('255.255.224.0')

An interface should be built for each communication controller used on the remote AS/400 to interface back to the local AS/400.
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Setting up of remote Twinax IP Controller

In order for remote twinax clients to have TCP/IP over Twinax support, a TCP/IP interface needs to be defined on the remote AS/400 twinax controller. In addition to allow proper routing of IP packets out of the remote AS/400 to the local host an additional parameter, Associated local interface (LCLIFC) needs to be defined. The IP address of this LCLIFC should be the default communication IP port that connects back to the local AS/400.

> Example: A Twinax Controller card in the remote AS/400 called QTDLCCTL01 with an IP address of 7.193.21.1 on subnet 255.255.255.0 interfacing out of the remote AS/400 on the Token Ring port IP address 7.193.19.1 .
>
> The command entered would be:
>
> ADDTCPIFC INTNETADR('7.193.21.1') LIND(QTDLCCTL01) SUBNETMASK('255.255.255.0') LCLIFC('7.163.19.1')
>
> ** In the case that a TDLC controller for the Twinax Controller has not already been created you will need to create one using :
>
> CRTLINTDLC LIND(name of SNA controller) WSC (physical controller)
>
> Example: Above Twinax controller card
>
> CRTLINTDLC LIND(QTDLCCTL01) WSC (CTL01)

Using NETSTAT command

The TCP/IP command NETSTAT is used to work with these interfaces after TCP/IP is started.

From the command prompt on the remote AS/400 type the command NETSTAT , then select Option 1 (Work with TCP/IP interface status). A list of TCP/IP interfaces should appear, including the Twinax TDLC interface and the external interface to the local AS/400. Insure the interfaces are started , and if not active, make active by entering a "9" on its option line.

Insure that IP datagram forwarding is set to *YES by typing the command CHGTCPA followed by the PF4 key (not Enter). If IP datagram forwarding is not set to *YES, change this option and press Enter to save.

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** Special Note on Token Ring Interface

To insure optimal transfer from the Token Ring (T/R) interface to the Twinax interface, the MTU size of the T/R interface should be changed to 4096. Follow these steps to check and change the MTU size.

NOTE: If the remote AS/400 is OS/400 V4R4 or greater, your Token Ring MTU size has been increased   by default and will not need to be changed.

    1. Type the command NETSTAT, then select Option 1 (Work with TCP/IP interface status). A list of TCP/IP interfaces should appear, including the T/R interface. If this interface is active, end it by placing a "10" on its option line.

    2. Enter a "12" on the T/R interface option line to work with configuration status. The T/R line, controller, and device description should appear. If they are active or varied on, vary them off by placing a "2" on the line description's option line.

    3. Enter a "8" on the T/R line description option line. When the next screen appears, enter a "2" on the option line to change the line description. A list of choices to change will appear. Find the choice marked "Maximum frame size", change its value to 4096, and press Enter.

    4. After the description has been changed, press PF12 once to return to the Work with Configuration Status screen. Vary the descriptions back on by placing a "1" on the line description option line.

    5. Press PF3 to return to Work with TCP/IP Interface Status screen and enter a "9" on the T/R interface option line to restart the interface.

Display Emulation on Remote Clients

    Twinax Network stations and Personal Computers that are installed with Twinax adapter cards like the IBM Express adapters are the means of establishing a physical TCP/IP link between the display devices and the remote AS/400. Documentation that is included with the display device or adapter card contains instructions as to how to establish this physical TCP/IP link between device and host.

    Display emulation on remote clients is achieved by taking advantage of the Telnet application that is part of the AS/400s TCP/IP subsystem. Telnet allows for virtual display devices to be created once a physical TCP/IP link between device and host is Explain established. Telnet and virtual device configuration Work in progress.

    In addition to CA/400, configured for TCP/IP on the client, there are many Telnet applications that can run on the remote client. Windows operating system itself contains a crude Telnet application that will provide basic display emulation. The documentation that comes with the Telnet application that is chosen should be consulted for particle steps to follow for setup and executing of application.

*NOTE The creating of virtual devices on the AS/400 requires that the system value QAUTOVRT is set to a number high enough to support the number of virtual devices that are intended to be supported by the AS/400.

   To display and change the number of devices supported enter on the command line
      WRKSYSVAL QAUTOVRT.
   Insure this number is not 0 and is set high enough to allow all expected devices to be
   configured.

Adding of IP Interface Route on remote AS/400

        In order to for twinax IP communication packets to pass through the remote AS/400 back to the local AS/400 or out to the external network a TCP/IP default route needs to be setup. This default route allows the remote AS/400 to know how to route packets intended to route back to the local AS/400 or the external network. To create a default route on the remote AS/400 the following command should be issued.

ADDTCPRTE RTEDEST(*DFTROUTE) SUBNETMASK(*NONE) NEXTHOP('X.XXX.XXX.XXX')

   Where X.XXX.XXX.XXX is the IP value of gateway the remote AS/400 is trying to route IP traffic to.

For example if the remote AS/400 was trying to route traffic back to the local AS/400 LAN or WAN gateway that was configured with IP address 7.193.19.3 the command would be

ADDTCPRTE RTEDEST(*DFTROUTE) SUBNETMASK(*NONE) NEXTHOP('7.193.19.3')

TCP/IP routes can be shown by selecting Option 2 (Display TCP/IP route information) under the NETSTAT (Work with TCP/IP Network Status) menu. After setting up a default route on the remote AS/400 this screen should show the route back to the local AS/400 as shown below for the above example.

Display TCP/IP Route Information

System: XXXXX

Type options, press Enter.
  5=Display details

Opt	Route Destination	Subnet Mask	Next Hop	Route Available
	127.0.0.0	255.0.0.0	*DIRECT	*YES
	224.0.0.0	240.0.0.0	*DIRECT	*YES
	*DFTROUTE	*NONE	7.193.19.3	*YES

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Telnet pass-through to multiple systems

You can start a Telnet session while you are currently in a Telnet session, or start a display station pass-through (DSPT) session while you are in a Telnet session. You can also start a Telnet session at the same time that you are in a display station pass-through session. This method for moving back and forth between systems, or passing through multiple systems, is referred to as cascaded Telnet.

The system where you first use pass-through (DSPT) or Telnet is called the home system. The home system may be either a Telnet client system or a DSPT source system. The last Telnet server system, or the last DSPT target system, is called the end system. The system that you pass-through to get from the home system to the end system is an intermediate system.

To start a cascaded Telnet session, type the STRTCPTELN (TELNET) command from an existing Telnet or DSPT session.

System request options for cascaded Telnet

Once you have started a cascaded Telnet session, press the System Request (Sys Req) key, then press Enter to display the System Request menu.

The following options are those associated with the cascaded Telnet system:

> Starting a system request at a client system: AS/400 System Request option 10 displays the System Request menu on the previous client system.

Transferring to the client system: AS/400 System Request option 11 transfers you to an
  alternate job on the previous client system.
Starting a system request at the home system: AS/400 System request option 13 takes you
  from an intermediate or end
system to the System Request menu of the home system.
Transferring to the home system: AS/400 System Request option 14 takes you from an
  intermediate or end system to
the alternate job on the home system.

If you are using a Telnet client session to connect to the original AS/400, the client PC is treated as the home system for all System Request options. For options 10 and 11, the client PC is the previous system. For options 13 and 14, the client PC is the home system.

Use System Request option 11 to move backward from each system until you reach the first AS/400 that is not the client box. From here you can use System Request option 1 to move forward, system to system. Although this does not provide you with a direct path from one system to the first AS/400, it will enable you to get there using the System Request options.

To bypass the System Request menu, press the System Request key and type the number 10 on the command line. This shortcut is applicable between AS/400 systems only.

ANYNET considerations-

Please refer to "AS/400 in Multiprotocol Networks, SG24-4522-01 ",
which can also be viewed on-line from
http://publib.boulder.ibm.com/cgi-bin/bookmgr/BOOKS/SG244522
Also, refer to "Guide to APPC over TCP/IP ", SV40-0215-00.

Also, see TCP and SNA integration. SG24-5291-00

Remote console operations

Please refer to "AS/400 Basic System Operation, Administration, and Problem Handling V4R4", SC41-5206-03

Diagnostic and network service support considerations

Please refer to " OS/400 Central Site Distribution V4R3 ", SC41-5308-01

Bibliography

5494 related:

- IBM 5494 Remote Control Unit Planning Guide, GA27-3936-05,
- IBM 5494 Remote Control Unit User's Guide, GA27-3852
- IBM 5494 Remote Control Unit User's Guide, GA27-3960-05
- IBM 5494 Remote Control Unit Functions Reference, SC30-3533-04
- IBM 5494 Remote Control Unit Maintenance Information, SY27-0327
- IBM 5494 Remote Control Unit Problem Determination Guide Quick Reference, GA27-3909
- IBM 5494 Remote Control Unit Attachment to Subarea Network RPQ 8Q0932, SC30-3566

5500 related:

- IBM 5500 Express IP Control Unit Planning, Installation, and Maintenance Guide, S05J-4934-00
- REDBOOK GG24-3442-02 IBM AS/400 TCP/IP Configuration and Operation
- REDBOOK AS/400 IBM Network Station: Techniques for Deployment in a WAN, SG24-5187-00

AS/400 related:

- OS/400 Communications Configuration, (V4R1) SC41-5401-00
  This document provides information for the application programmer or system programmer about configuration commands and defining lines, controllers, and devices.

- LAN and Frame Relay Support, SC41-5404, describes the AS/400 support for IBM Token-Ring, Ethernet, distributed data interface (DDI), and wireless local area networks and frame relay wide area networks. This manual includes information about bridged local area networks and the use of frame relay networks for connection to remote local area networks.

- Communications Management, SC41-5406, contains information on working with communications status, errors, performance, line speed, and storage requirements

- Remote Work Station Support, SC41-5402, contains information on using display station pass-through, SNA pass-through, network routing facility (NRF), SNA Primary LU2 Support (SPLS), distributed host command facility (DHCF), and 5250 and 3270 remote work station communications.

- TCP/IP Configuration and Reference, SC41-5420-03, provides information for configuring and using AS/400 TCP/IP support. The applications included are Network Status (NETSTAT), Packet Internet Groper (PING), TELNET, File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), line printer requester (LPR), and line printer daemon (LPD). The TCP and UDP Pascal application program interface (API) is also discussed.

- Local Device Configuration, SC41-5121, describes how to configure devices that are locally attached to the AS/400 system, including devices attached to twinaxial local work station controllers and tape controllers.

- CL Programming, SC41-5721, provides an overview of CL programming topics, including information about built-in functions and system-supplied programs that can be used by CL programs, program debugging, and how to create and use user-defined messages and commands.

- System Operation, SC41-4203-00, provides information about how to use the system unit control panel and console, send and receive messages, respond to error messages, start and stop the system, use control devices, work with program temporary fixes (PTFs), and process and manage jobs on the system.

- AS/400 in Multiprotocol Networks, SG24-4522-01 , which can also be viewed on-line from http://publib.boulder.ibm.com/cgi-bin/bookmgr/BOOKS/SG244522

- Guide to APPC over TCP/IP , SV40-0215-00.

- TCP and SNA integration. SG24-5291-00

- AS/400 Basic System Operation, Administration, and Problem Handling V4R4", SC41-5206-03

- OS/400 Central Site Distribution V4R3 , SC41-5308-01

URL's and Internet resources:

http://publib.boulder.ibm.com/pubs/html/as400/v4r4/ic2924/info/INFOCENT.HTM

http://www.redbooks.ibm.com/

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