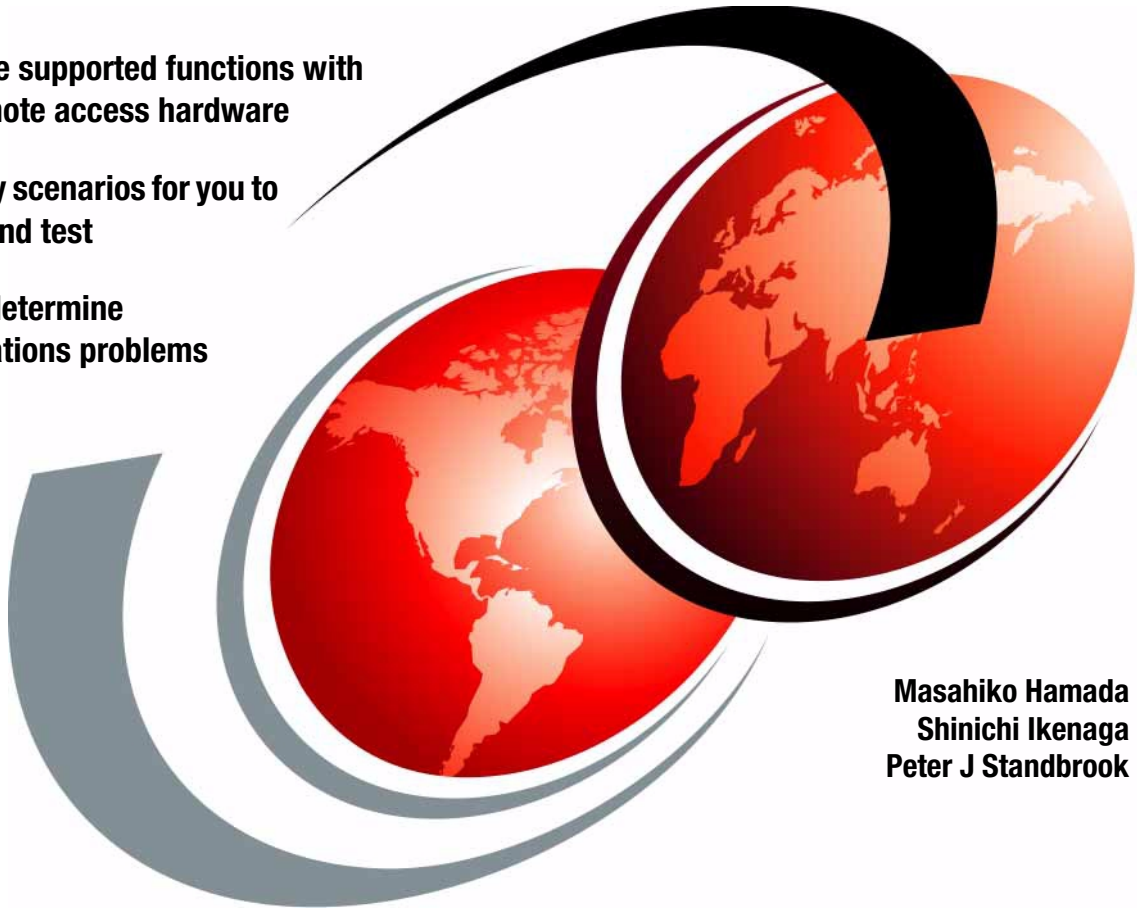
IBM

AS/400 Remote Access

Configuration Examples

- Explains the supported functions with AS/400 remote access hardware
- Offers many scenarios for you to configure and test
- Helps you determine communications problems



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AS/400 Remote Access Configuration Examples

August 2000

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix C, “Special notices” on page 257.

First Edition (August 2000)

This edition applies to Version 4 Release 4 and Version 4 Release 5 of OS/400 (5768SS1).

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Contents

Preface

The flexibility of the AS/400 system allows you to connect several systems to a network. AS/400 remote access hardware provides many ways to connect to the network without modems or terminal adapters.

This redbook describes AS/400 remote access configuration examples using the #2761/#4761 integrated analog modem and the #2750, #4750, #2751, and #4751 integrated ISDN adapter for AS/400 V4R4 and V4R5. The information in this redbook helps you install, tailor, and configure the new remote access hardware through simple to more complex scenario examples. Scenarios are included to show the use of remote access hardware for AS/400 system connection to the WAN environment.

The intended audience for this redbook includes the system or network administrator who plans, configures, and maintains AS/400 networks.

The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization Rochester Center.

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Chapter 1. Introduction to ISDN and integrated modem support

In August 1999, IBM announced three new AS/400 adapters: the Integrated Services Digital Network (ISDN) #2750 and #2751 and the Integrated Analog Modem #2761. These adapters have been available since December 1999. In May 2000, IBM announced three feature codes (#4750/#4751/#4761) for AS400e Model 270, SBx, and 8xx. Their use, and how their associated lines are configured, is the principle feature of this redbook together with a section on problem analysis and resolution. This introduction includes a detailed description of the adapters and modems, their positioning, and a summary chart indicating the maximum operational speed of the possible scenarios.

Note

The #2750, #2751, and #2761 for Models 6xx, Sxx, and 7xx are equivalent to the #4750, #4751, and #4761 for Models 270, 8xx, and SBx. In this redbook, we use the #2750, #2751, and #2761 for making the sample configurations. You can use the #4750, #4751, and #4761 instead of the cards that we use.

1.1 ISDN communications adapters (#2750/#4750 and #2751/#4751)

ISDN service on the AS/400 system supports a basic rate interface (BRI). The #2750/#4750 and #2751/#4751 ISDN adapters support full-duplex mode and are both a 4 port (8 channel) basic rate interface PCI. The #2750/#4750 is the U interface (2 wire) version IOA used primarily in North America. The #2751/#4751 is the S/T interface (4 wire) version IOA used primarily outside of North America.

ISDN adapters consolidate a wide variety of connectivity needs for remote devices attached to AS/400 servers as shown in Figure 1 on page 2.

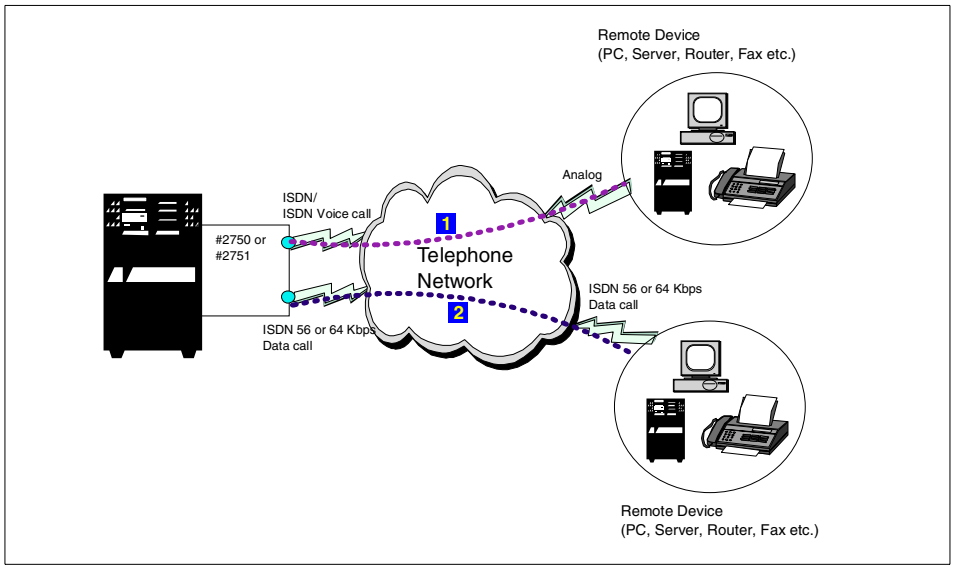


Figure 1. AS/400 ISDN connectivity

The diagram in Figure 1 shows:

1. Remote computers/devices connected by an analog modem to a phone system

   The remote device in Figure 1 connects to the telephone network through a modem. The #2750/#4750 or #2751/#4751 ISDN adapters give modem speeds up to 56 Kbps (V.90 and K56flex).

2. Remote computers/devices connected by an ISDN to a phone network

   The remote device in Figure 1 connects to the ISDN either directly or indirectly through a terminal adapter.

Based on the latest Digital Signal Protocol (DSP) technology, both adapters allow connections to data modems connected to the analog network with analog modems, as well as other ISDN devices. Each port comprises a 2B+D configuration.

#2750/#4750 and #2751/#4751 run the following protocols without requiring an external modem or terminal adapter:

- ISDN data link control (IDLC) over ISDN
- Point to Point Protocol (PPP) over ISDN
- Fax over ISDN

These IOAs do not support X.25 or X.31.

In V4R5, PPP dial-on demand is supported over ISDN. Dial-on demand enables starting and stopping communications dynamically with different end systems or devices. The #2750/#4750 and #2751/#4751 IOAs also support data over voice, where an ISDN voice connection, instead of a data connection, transports data. Use data over voice when data connections are not available or when it is cheaper than data over data.

Note

Data over voice ISDN is a means of reducing costs by changing the configuration of the ISDN hardware to make calls as voice instead of data. Every ISDN line is split into two B-channels (64 Kbps) and one D-channel (16 Kbps). Normally, ISDN calls used for Internet access are made as data calls, using either one or both of the B-channels, with the D-channel used for call signaling. Such calls give a throughput of either 64 Kbps. The voice call restricts the possible bandwidth for data transmission to 56 Kbps. However, data is still moving over digital ISDN, making it significantly quicker than any analog modem connection. If the small loss of bandwidth from 64 Kbps to 56 Kbps is acceptable, data over voice is for you.

Specify the use of data over voice in the connection list entry for switched connections. See Table 1 on page 8 for the valid combinations.

The prerequisites for either adapter are:

- Cards slots
  - PCI slot C03 in Model 170 (base system unit) or System Expansion Units, slot E03 in #7101, or slots E03, E08, and E09 in #7102. A #2824 IOP is required.
  - Storage/PCI Expansion Tower (#5065) on Models 620, 740, S20, S30, S40, SB1, and 730.
  - One PCI slot and PCI LAN/WAN Workstation IOA (#2824) on Models 600, 620, S10, S20, and 720.
  - Base PCI Integrated Expansion Unit (#9330) on Models 620, S20, or 720.
- OS/400 V4R4 with PTF MF23502 or Cumulative PTF package C0049440 or later is required (OS/400 V4R5).
- Both #2750/#4750 or #2751/#4751 require country certification or homologation.

- Only one PCI #2750/#4750 or #2751/#4751 Remote Access IOA can be attached to an input/output processor (IOP), such as the #2824 PCI LAN/WAN Workstation IOP.
- For data mode support, B-channel supports digital data at 64 Kbps. For modem support, B-channel supports V.90 and lower modulations.

Additional considerations include:

- X.75 is not supported. X.75 is an outdated “transport protocol”, which has been used in Germany to carry TCP/IP data over switched connections. The alternative accepted worldwide protocol is PPP, which is supported. It is understood that German Internet Service Providers are moving to PPP.
- V.110 is supported at 56 Kbps. V.110 is a form of “rate adaptation” used with some digital networks that support only 56 Kbps *digital* connections (1 bit of the 8 bits of a 64 Kbps connection is not available). This is useful only when connecting an ISDN device to another ISDN device (including ISDN terminal adapters) through such a network connection.
- V.120 is not supported. V.120 is another “rate adaptation” that allows older, slower devices to connect through an ISDN terminal adapter to another ISDN device supporting V.120. Using such a scheme, a device capable of only supporting a slower speed, such as 9.6 Kbps, could connect to another device.
- Bundling multiple B-channels is not currently supported.
- When the #2750/#4750/#2751/#4751 is functioning as a modem server (ISDN connected to remote analog modem), slower modem speeds are supported as part of the normal modem protocol negotiations. This eliminates the need for a terminal adapter.
- The two features are intended for expanded connection availability from clients using the AS/400 system as a server. They are not intended for ultra high-speed file transfer environments. The two features provide nearly identical functions. The only difference is the type of wiring to the customer’s installation.
- The #2750/#4750 attaches to a two-wire U interface. The connection from the phone company to the customer’s location is a two-wire connection. The endpoint at the customer’s location is called the *U interface*. A #2750/#4750 can be attached to this two wire interface. The #2750/#4750 is supported only in the United States and Singapore.
- The #2751/#4751 attaches to a four-wire interface. A device called a *Network Terminating Unit (NTU)* converts the two-wire interface mentioned above into four wires. Some countries, especially in Europe, only allow attachment to an S/T interface and require the use of a phone

company-provided NTU. The four-wire S/T interface also allows a feature called *passive bus*, which is not available on the two-wire U interface. Passive bus allows up to eight ISDN devices to be wired to the same line. Each ISDN BRI has two channels that are similar to two phone connections over one physical set of wires. One advantage of a four-wire interface with passive bus is that one may have both a voice conversation and a data session in progress on the BRI at the same time.

- These IOAs do not support X.25 or X.31. ISDN Adapter/IOA (Feature #2605) supports X.31 (X.25 over ISDN).

1.2 PCI Integrated Analog Modem

The #2761/#4761 simplifies the attachment of remote devices to the AS/400 servers. A combination of up to eight of the following remote devices can be connected simultaneously:

- Remote computers/devices connected to a normal analog telephone system with a modem, for example, a laptop PC with an integrated modem.
- Remotely attached fax machines. This adapter can replace the Integrated Fax Adapter (Feature #2664).

Figure 2 shows the flow of analog connectivity with the AS/400 system.

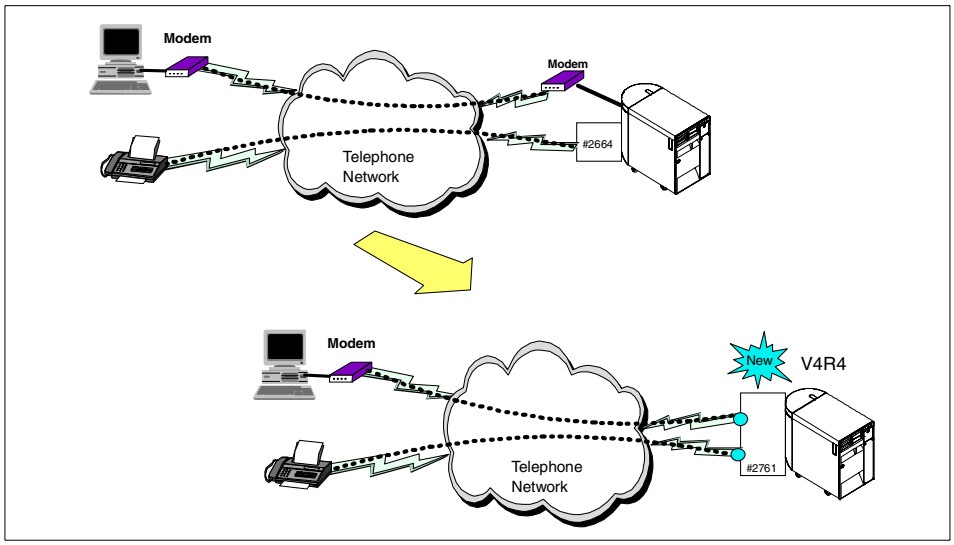


Figure 2. AS/400 analog connectivity

Based on the latest Digital Signal Processor technology, #2761/#4761 supports full duplex mode and allows the modem function to be integrated into an IOA and supports multiple analog ports (eight phone lines). #2761/#4761 runs the following protocols without requiring an external modem:

- SDLC
- SLIP/PPP
- FAX

An asynchronous line description is required for a fax modem and can only be used for the fax modem.

Prerequisites for the adapter are:

- Cards slots
  - PCI slot C03 in Model 170 (base system unit) or System Expansion Units, in slot E03 in #7101, or slots E03, E08, and E09 in #7102.
  - Storage/PCI Expansion Tower (#5065) on Models 620, 740, S20, S30, S40, SB1, and 730.
  - One PCI slot and PCI LAN/WAN Workstation IOA (#2824) on Models 600, 620, S10, S20, and 720.
  - Base PCI Integrated Expansion Unit (#9330) on Models 620, S20, or 720.
- OS/400 V4R4 with PTF MF23502 or cumulative PTF package C0049440 or later is required.
- The #2761/#4761 requires country certification or homologation.
- Only one PCI #2761/#4761 Remote Access IOA can be attached to an IOP, such as the #2824 PCI LAN/WAN Workstation IOP.

Note

To OS/400, the #2761/#4761 appears as a single IOA with up to eight individual line resources.

1.3 Positioning ISDN and analog modem support

When choosing between ISDN digital line (ISDN IOAs #2750/#4750 and #2751/#4751) and analog phone line support, you are usually better served with an ISDN digital line instead of the analog line for the following reasons:

- Line quality is better. There are fewer data transmission errors over ISDN.
- 56 Kbps V.90 modulation is only available when one side of the connection is digital. All 56 Kbps modem protocols work only when one side of the connection is digital. It is not possible to achieve 56 Kbps connections with any modems connected together over analog phone lines. This is described in the Chapter 4, “ISDN/Analog connections” on page 109.
- You can attach many PPP lines to a single network interface (NWI) and, therefore, have many lines active at the same time. With the integrated modem adapter (#2761/#4761), only one line can be active at the same time per resource.
- Because of the modem architecture limitation, it is not possible to exceed 33.6 Kbps with the #2761/#4761 connected to another modem device. It is possible to achieve 56 Kbps connections with the #2761/#4761 connected to a remote digitally connected device such as a #2750/#4750 or #2751/#4751.
- With a #2750/#4750 or #2751/#4751 (connected to a digital ISDN phone line), it is possible to make a 56 Kbps connection with a remote modem connected via an analog phone line. Dial time is faster using ISDN. Additionally, if the connection is ISDN-to-ISDN, modem training time is eliminated. This makes dial-on demand an attractive capability.

Other points to consider when choosing between ISDN and analog include:

- The SNA/SDLC protocol is only supported on the #2761/#4761.
- The SNA/IDLC is only supported on the #2750/#4750 and #2751/#4751.

Notes

- TCP/IP PPP is supported on all six cards.
- When operating under V4R4, the receiving AS/400 system has the capability to route incoming faxes automatically to end users based on the codes added by the sender to the “dial information”. This function is known as *Dual Tone Multi Frequency (DTMF)* and is currently offered by some FAX support vendors. For more detail, see “DTMF support” on page 57.
- Communication Controllers #2750/#4750, #2751/#4751, and #2761/#4761 require approval to attach telecommunication products to the Public Telecommunications Network.

1.4 #2750/#4750, #2751/#4751, and #2761/#4761 card summary chart

Table 1 provides some scenarios of the supported communication between the adapters and remote devices. Maximum supported speeds are included, which can be negotiated down to 300 bps.

Table 1. Function summary table

From	To	TCP/IP SLIP	TCP/IP PPP	SNA SDLC	SNA IDLC	Fax	Maximum speed
Remote ISDN	#2750 / #4750 / #2751/ #4751		X		X		64.0 Kbps
Remote Analog (Async) V.90	#2750 / #4750 / #2751 / #4751		X				56.0 Kbps* 53.3 Kbps
Remote Analog (Async) V.34	#2750 / #4750 / #2751 / #4751		X				33.6 Kbps
Remote Analog (Sync) V.34	#2750 / #4750 / #2751 / #4751		X				33.6 Kbps
FAX Group3	#2750 / #4750 / #2751 / #4751					X	14.4 Kbps
Remote Analog (Async) V.34	#2761 / #4761	X	X				33.6 Kbps
Remote Analog (Sync) V.34	#2761 / #4761		X	X			33.6 Kbps
FAX Group3	#2761 / #4761					X	14.4 Kbps

From	To	TCP/IP SLIP	TCP/IP PPP	SNA SDLC	SNA IDLC	Fax	Maximum speed

Notes:

* US Federal Communications Commission regulations stipulate a maximum of 53.3 Kbps, 56 Kbps supported.

- See notes on Modulation Standards for details and speed support combinations.

The modulation and correction standards that are met with the #2750/#4750, #2751/#4751, and #2761/#4761 support are listed here:

- Data modes
  - V.90 maximum actual speed is 53.3 Kbps due to U.S. government regulations. ISDN V.110 supports up to 56 Kbps (with fallback to V.34)
  - K56flex (with fallback to V.34)
  - V.34+ (33.6 Kbps with fallback to 31.2 Kbps and V.34)
  - V.34 (28.8 Kbps with fallback to 26.4/24.0/21.6/19.2/16.8 Kbps and V.32bis)
  - V.32bis (14.4 Kbps with fallback to 12.0/9.6/7.2/4.8 Kbps and V.22bis)
  - V.32 (9.6 Kbps with fallback to 4.8 Kbps and V.22bis)
  - V.24bis
  - V.23 (600/1200 Kbps)
  - V.22bis (2.4 Kbps with fallback to V.22)
  - V.22 (1.2 Kbps with fallback to 600 bps)
  - V.21: 300 bps
  - Bell 212a: 1200 bps
  - Bell 103: 300 bps
  - Error correction
    - V.42 (LAPM and MNP 204)
  - Data compression
    - V.42bis (including MNP 5)
    - MNP Class 2, 4, and 5
- Fax modes
  - V.17 (14.4 Kbps)
  - V.21 channel 2 (300 bps)

- V.27ter (4.8 Kbps)
- V.29 (9.6Kbps)
- Group 3

Note

K56flex and V.90 modems, as used by the Digi AccelePort RAS product, are capable of receiving downloads at up to 56 Kbps and sending at up to 33.6 Kbps. Based on your telephone company's power output, receiving speeds may be limited. Actual speeds may vary.

1.5 Redbook purpose and description

The purpose of this redbook is to describe the configuration options available using the #2750/#4750, #2751/#4751, and #2761/#4761 when connecting local and remote computers or devices. The configuration steps are detailed in the chapters that follow and include the problems encountered when configuring and testing:

- Chapter 2, “Analog connections” on page 15
- Chapter 3, “ISDN connections” on page 61
- Chapter 4, “ISDN/Analog connections” on page 109
- Chapter 5, “The 7852 modem and the #2761 SLIP connections” on page 159
- Chapter 6, “Problem analysis and resolution” on page 175
- Chapter 7, “Advanced topics” on page 197

Table 2 summarizes the scenarios that were successfully configured and tested.

Table 2. Scenarios

From/To	ISDN #2751/#4751	#2761/#4761	#7852	FAX
ISDN #2751	PPP D U,N IDLC (Chapter 3) FAX/400 (Chapter 4) PPP DoD U,N (Chapter 7)	PPP D U,N (Chapter 5)	NA	FAX/400 (Chapter 4)

From/To	ISDN #2751/#4751	#2761/#4761	#7852	FAX
#2761	PPP U,N (Chapter 4)	PPP D U,N PPP DoD U,N SDLC FAX/400 (Chapter 2) SLIP (Chapter 5)	PPP D U,N PPP DoD U,N SDLC (Chapter 5)	FAX/400 (Chapter 2)
7852-400 Modem	NA	PPP D U,N PPP DoD U,N SDLC (Chapter 5)		
Group 3 FAX	FAX/400 (Chapter 4)	FAX/400 (Chapter 2)		
PC	PPP D ISDN (Chapter 3) TA (Chapter 4)	PPP D V.90 (Chapter 4)		

Notes:
PPP Point to Point Protocol
ISDN Integrated Services Digital Network
IDLC ISDN Data Link Control
U Unnumbered (LAN interface ip address used)
N Numbered (Virtual interface used)
D Dial
DoD Dial-on demand
SLIP Serial Line Internet Protocol

The terms shown in Table 2 are explained here:

- **Dial-on-demand modes:**

  Dial-on demand is the establishment of a connection between two AS/400 systems when that connection is required (on demand). There are three possible dial-on-demand modes:

  - Dial-on demand
  - Dial-on demand (answer enabled dedicated peer)
  - Dial-on demand (remote peer enabled): New to OS/400 V4R5

- **Dial-on demand (dial only)**:

  On the originating system, a dial-on-demand (dial only) profile is initiated by starting an application calling to connect to the remote target, which

already has an Answer profile in a “Waiting for incoming call” status. The call can be initiated in one direction only, and the remote peer must be waiting in “Answer” mode to process the incoming call. No line resource on the originating system is committed until a call is placed.

- **Dial-on demand (answer enabled dedicated peer)**:

  Call origination is possible from either system with dial-on-demand (answer enabled dedicated peer) connection profiles by starting an application calling to connect to the remote peer. A line/modem resource is dedicated to an individual remote peer and committed when the profile is started.

- **Dial-on demand (remote peer enabled)**:

  Call origination is possible from either system with dial-on-demand (remote peer enabled) connection profiles by starting an application calling to connect to the remote peer. No line or modem resource is dedicated and there is no association of lines to users. The Dial profile is bound to an Answer profile, and no line resource is committed until a call is placed. For more information, refer to Chapter 7, “Advanced topics” on page 197.

- **IDLC**:

  ISDN Data Link Control (IDLC) is the official IBM name for the IBM implementation of the ITU-T recommendation for Layer 2 protocol and conforms to the ITU-T specification Q.922. This specification is for a Layer 2 protocol on the B-channel.

- **PPP**:

  Point to Point Protocol (PPP) is a method of connecting two hosts to each other over a dial line or leased line. A common example is a PPP connection that is established between a remote office and the home office, in order to transfer data using the TCP/IP protocol. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

- **SLIP**:

  Serial Line Internet Protocol (SLIP) is a TCP/IP protocol that allows connection between systems over a pair of modems using an analog telephone line. Use SLIP to connect personal computers to an AS/400 system from the telephone jack in a hotel, for example, or simply to connect two computers together directly using a null modem. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

- **Numbered nets**:

  Normally, all the interfaces connected to a network have an IP address. If the network is a point-to-point network, each end is given an IP address so that the PPP connection forms a separate network. This is described as a “numbered net”. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

- **Unnumbered nets**:

  When two hosts are network connected, normally both interfaces must have an IP address. If the network is point-to-point, each interface does not necessarily need an IP address defined. Instead, unnumbered nets can be used, which entails the use of existing adapter addresses, such as LAN adapter addresses, in the point-to-point configuration. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

Chapter 2. Analog connections

This chapter identifies connection scenarios using the #2761 Integrated Analog Modem. It details the configuration instructions for each of the five scenarios and lists the problems encountered during setup. The scenarios are as follows:

- Scenario 1: #2761 to and from the #2761 SDLC
- Scenario 2: #2761 to and from the #2761 TCP/IP PPP
- Scenario 3: #2761 to and from the #2761 dial-on-demand dedicated peer
- Scenario 4: PC with modem to the #2761 using TCP/IP PPP
- Scenario 5: #2761 to and from fax

Figure 3 shows a diagram of the analog connection test environment.

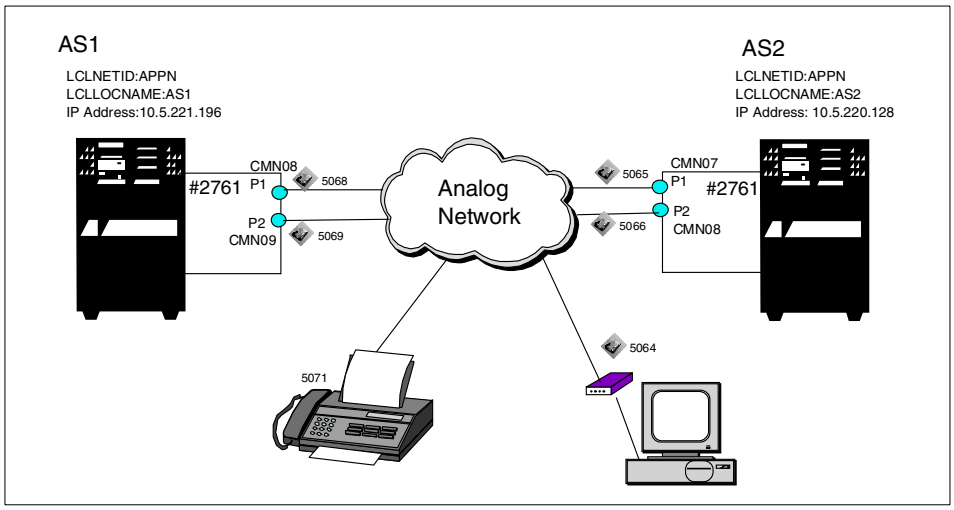


Figure 3. Overview of the analog connection test environment

The hardware and software used include:

- An AS/400 system with a #2761 Integrated Analog Modem adapter card and OS/400 V4R4
- Facsimile Support for AS/400 (FS/400), 5769-TBY V4R4 for connecting to fax. The PTFs needed for FS/400 V4R4 are:
  - SF58612
  - SF59414
  - SF59420
  - SF60848

- SF62303
- SF62503

- A PC with V.90 modem and Microsoft Windows NT Workstation 4.0

Note

In this chapter, the windows shown for the remote access configuration are from a V4R4 system. The information may be formatted differently in other releases. Use the examples here as a guide.

2.1 Scenario 1: #2761 to and from the #2761 SDLC

There are two cases considered in this scenario of SDLC configurations between AS/400 systems supporting SNA applications:

- Case 1: AS/400 Dial-on demand to AS/400 Answer
- Case 2: AS/400 Dial to AS/400 Answer

Figure 4 shows the testing environment used for this scenario.

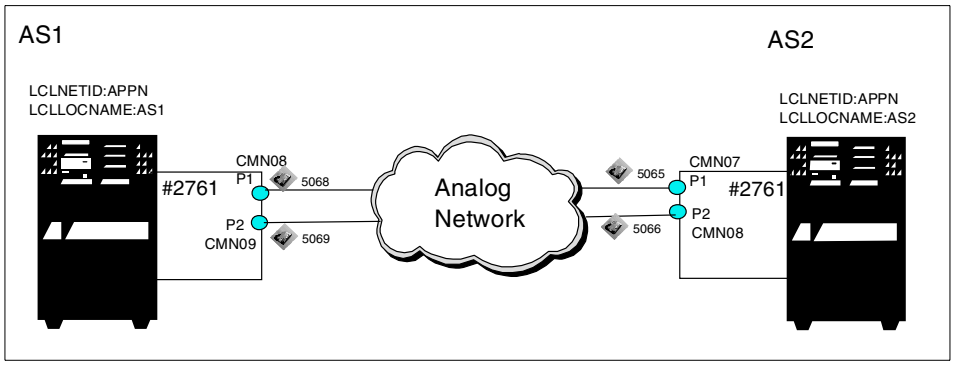


Figure 4. Scenario 1 network topology

Note

You cannot use the leased line in this scenario.

2.1.1 Scenario usage

The principle use of this scenario is for SNA applications at a speed of 33.6 Kbps over a dial-up connection. The eight ports can provide simultaneous access by up to eight connecting sites. These sites may be other AS/400 systems with the same modem card or AS/400 systems with 7852 modems attached.

2.1.2 Configuration steps

To implement this scenario, perform the following steps on both systems:

1. Note, verify, and change the AS/400 network attributes.
2. Verify the AS/400 hardware resources.
3. Create the SDLC lines.

2.1.2.1 Note, verify, and change the AS/400 network attributes

Before creating the configuration definitions, note the network attributes in both systems recording the Local network ID (LCLNETID) and Default local location name (LCLLOCNAME), which are required for the APPC controller (and device) creation. Verify that the Modem Country ID (MDMCNTRYID) is set to the local value. This is necessary to ensure that the country-specific default characteristics of the modem are defined, which is operational and, in some countries, a legal requirement.

On the AS/400 command line, type:

```
DSPNETA
```

Press Enter to display the Display Network Attributes screen (Figure 5).

```
                    Display Network Attributes
                                                        System:   AS1
Current system name  . . . . . . . . . . . . . . :   AS1
  Pending system name  . . . . . . . . . . . . . :
Local network ID . . . . . . . . . . . . . . . . :   APPN
Local control point name . . . . . . . . . . . . :   AS1
Default local location . . . . . . . . . . . . . :   AS1
Default mode . . . . . . . . . . . . . . . . . . :   BLANK
APPN node type . . . . . . . . . . . . . . . . . :   *ENDNODE
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
```

Figure 5. Network attributes

Press Page Down to display the screen shown in Figure 6 on page 18.

Note

The reverse-type numbers in the following figures correspond to the numbers listed in Table 3 on page 23 through Table 5 on page 24.

```
                        Display Network Attributes
                                                          System:   AS1
Maximum hop count  . . . . . . . . . . . . . . . . :   16
DDM request access . . . . . . . . . . . . . . . . :   *OBJAUT
Client request access  . . . . . . . . . . . . . . :   *OBJAUT
Default ISDN network type  . . . . . . . . . . . . :   *NISDN
Default ISDN connection list . . . . . . . . . . . :   QDCCNNLANY
Allow AnyNet support . . . . . . . . . . . . . . . :   *NO
Network server domain  . . . . . . . . . . . . . . :   S10240BM
Allow APPN virtual support . . . . . . . . . . . . :   *NO
Allow HPR transport tower support  . . . . . . . . :   *NO
Virtual controller autocreate APPC device limit  :   100
HPR path switch timers:
  Network priority . . . . . . . . . . . . . . . . :   1
  High priority  . . . . . . . . . . . . . . . . . :   2
  Medium priority  . . . . . . . . . . . . . . . . :   4
  Low priority . . . . . . . . . . . . . . . . . . :   8
Allow add to cluster . . . . . . . . . . . . . . . :   *NONE
Modem country ID . . . . . . . . . . . . . . . . . :   US      01
```

Figure 6. DSPNETA screen

To change this parameter, on the AS/400 command line, enter:

```
CHGNETA MDMCNTRYID(xx)
```

In this command, *xx* specifies the local country identifier.

2.1.2.2 Verifying the AS/400 hardware resources

Identify the line resource of the eight port integrated modem by using the command:

```
DSPHDWRSC *CMN
```

The display shown in Figure 7 appears.

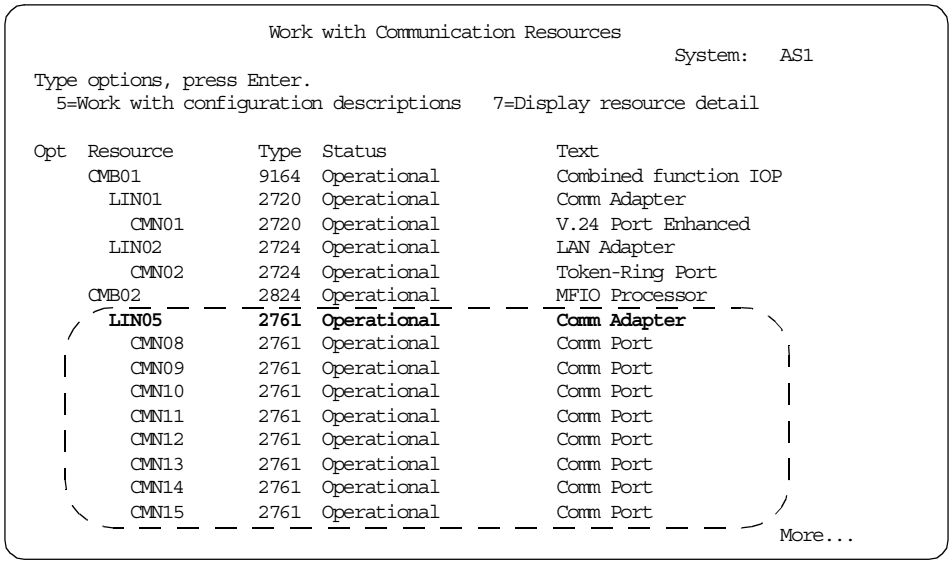


*Figure 7. WRKHDWRSC *CMN screen*

In this example, the eight port integrated modem adapter's hardware resource name is LIN05 and each port has the name in the range CMN08-15.

2.1.2.3 Creating the SDLC lines and controllers

The usual CL configuration commands are employed to implement an AS/400 system-to-AS/400 system connection using the #2761 Integrated Analog Modem. An SDLC line and APPC controller are created allowing the APPC device to autocreate.

1. Create a switched point-to-point SDLC line on each AS/400 system. Enter the `CRTLINSDLC` command on the AS/400 command line. The screen shown in Figure 8 on page 20 is displayed.

```
                    Create Line Desc (SDLC) (CRTLINSDLC)

Type choices, press Enter.

Line description . . . . . LIND          > C2S1N12
Resource names . . . . . RSRCNAME     > CMN08          02
                         + for more values
Online at IPL  . . . . . ONLINE        > *NO
Data link role . . . . . ROLE            *NEG
Physical interface . . . . . INTERFACE   > *INTMODEM     03
Connection type  . . . . . CNN           > *SWIPP        04
Vary on wait . . . . . VRYWAIT           *NOWAIT
Exchange identifier  . . . . . EXCHID    > 05600001
NRZI data encoding . . . . . NRZI        *YES
Line speed . . . . . LINESPEED   > 19200
Modem type supported . . . . . MODEM     *NORMAL
Switched connection type . . . . SWTCNN  *BOTH
Autoanswer . . . . . AUTOANS             *YES
Autodial . . . . . AUTODIAL      > *YES          05
```

Figure 8. CRTLINSDLC screen (Part 1 of 2)

```
                    Create Line Desc (SDLC) (CRTLINSDLC)

Type choices, press Enter.

Modem init command string  . . . MDMINZCMD      *NONE

Dial command type  . . . . . DIALCMD        *NONE          06
Calling number . . . . . CALLNBR         *NONE

Station address  . . . . . STNADR        01             07
Connect poll retry . . . . . CNNPOLLRTY  7
Maximum frame size . . . . . MAXFRAME    521
Duplex . . . . . DUPLEX          *HALF
Inactivity timer . . . . . INACTTMR      300
Poll response delay  . . . . . POLLRSPDLY  0
Nonproductive receive timer  . . NPRDRCVTMR  320
Idle timer . . . . . IDLTMR              30
Connect poll timer . . . . . CNNPOLLTMR  30
Poll cycle pause . . . . . POLLPAUSE     0
Frame retry  . . . . . FRAMERTY          7
                                                              More...
```

Figure 9. CRTLINSDLC screen (Part 2 of 2)

2. Create an APPC controller on each AS/400 system. Enter the command CRTCTLAPPC on the AS/400 command line. The screen shown in Figure 10 is displayed.

```
                    Create Ctl Desc (APPC) (CRTCTLAPPC)

Type choices, press Enter.

Controller description . . . . . CTLD          > C2S1C12
Link type  . . . . . . . . . . . LINKTYPE      > *SDLC
Online at IPL  . . . . . . . . . ONLINE        > *NO
Switched connection  . . . . . . SWITCHED      > *YES
Short hold mode  . . . . . . . . SHM             *NO
APPN-capable . . . . . . . . . . APPN          > *NO              08
Controller type  . . . . . . . . TYPE            *BLANK
Switched line list . . . . . . . SWTLINLST     > C2S1N12
                           + for more values
Maximum frame size . . . . . . . MAXFRAME        *LINKTYPE
Remote network identifier  . . . RMTNETID        *NETATR
Remote control point . . . . . . RMTCPNAME     > AS2
Exchange identifier  . . . . . . EXCHID        > 05600002
Initial connection . . . . . . . INLCNN          *DIAL
Dial initiation  . . . . . . . . DIALINIT        *LINKTYPE        09

                                                                More...
```

Figure 10. CRTCTLAPPC screen

3. Accept APPN *YES on the create controller screen, and APPC devices create automatically. If you select APPN *NO, an APPC device must be created on both systems using the CRTDEVAPPC command. Enter the CRTDEVAPPC command on the AS/400 command line. The screen shown in Figure 11 appears.

```
                  Create Device Desc (APPC) (CRTDEVAPPC)

Type choices, press Enter.

Device description . . . . . . . DEVD          > C2S1D12
Remote location  . . . . . . . . RMTLOCNAME    > AS2
Online at IPL  . . . . . . . . . ONLINE        > *NO
Local location . . . . . . . . . LCLLOCNAME      *NETATR
Remote network identifier  . . . RMTNETID        *NETATR
Attached controller  . . . . . . CTL           > C2S1C12
Mode . . . . . . . . . . . . . . MODE            *NETATR
                           + for more values
Message queue  . . . . . . . . . MSGQ            *CTLD
  Library  . . . . . . . . . . .
APPN-capable . . . . . . . . . . APPN          > *NO
Single session:                  SNGSSN
  Single session capable . . . .                 *NO
  Number of conversations  . . .
Location password  . . . . . . . LOCPWD          *NONE
Secure location  . . . . . . . . SECURELOC       *NO
                                                              More...
```

Figure 11. CRTAPPCDEV screen

2.1.2.4 Parameter relationship of SDLC in the configuration

Figure 12 shows the relationship between the command parameters for the SDLC configuration.

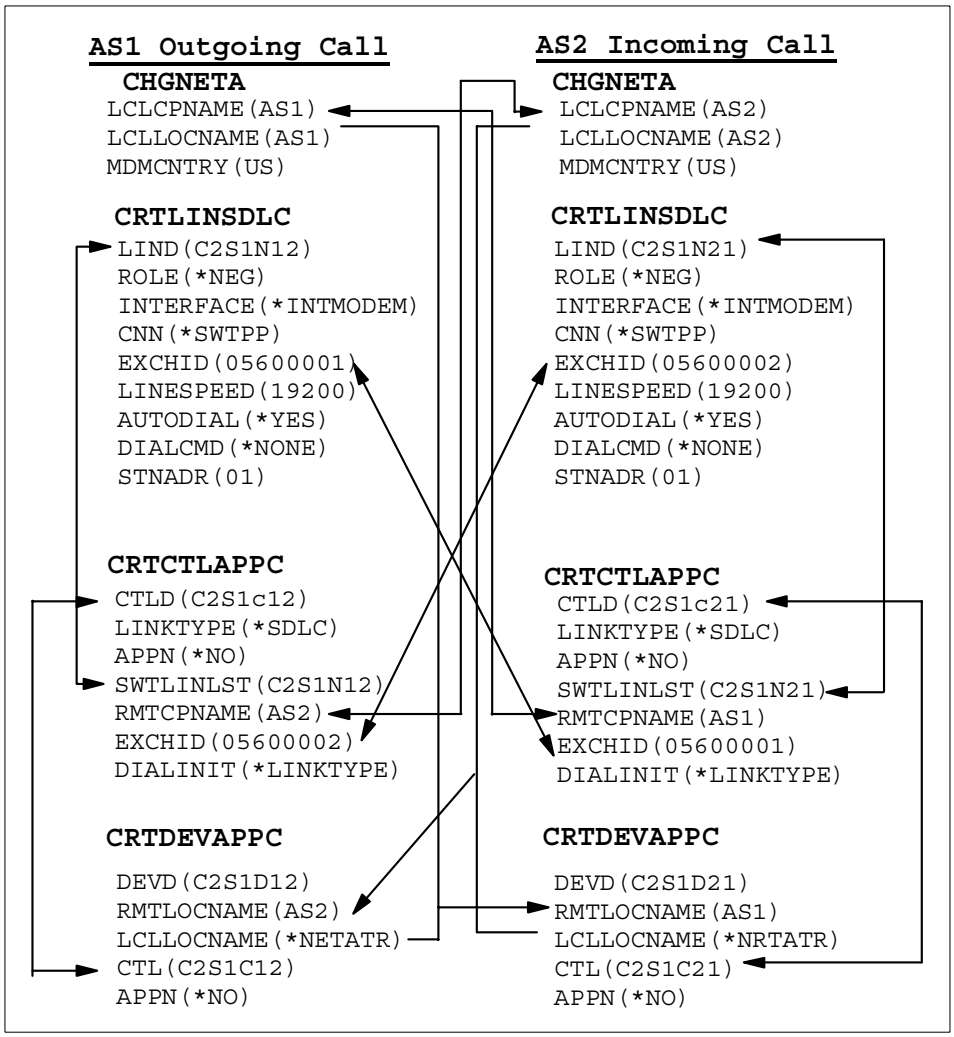


Figure 12. Parameter relationship of the SDLC configuration

2.1.2.5 Configuration cases summary

In Case 1, the DIALINIT controller description parameter is set to *LINKTYPE. To implement Case 2, change the INLCNN controller description parameter from *LINKTYPE to *IMMED. The connection is started as soon as the controller is varied on.

Table 3 through Table 5 on page 24 show the information required to create the SDLC configurations. Only the parameters necessary to create this scenario are identified. For more information, refer to *OS/400 Communications Configuration*, SC41-5401.

Note

The numbers in the following tables correspond to the reverse-type numbers in Figure 5 on page 17 through Figure 10 on page 21.

Table 3. Network Attribute parameter for modem local characteristics

Parameter and number		Description	Value in this scenario
MDMCNTRY	01	Specifies the country identifier associated with a modem.	US

Table 4. Modem-specific SDLC line description parameters

Parameter and number		Description	Value in this scenario
RSRCNAME	02	Specifies the resource name that identifies the hardware this description represents.	AS1 = CMN08 AS2 = CMN07
INTERFACE	03	Specifies the type of physical interface on the input/output adapter (IOA) port.	*INTMODEM
CNN	04	Specifies the type of line connection.	*SWTPP
AUTODIAL	05	Specifies automatic, not manual, dialing	*YES
DIALCMD	06	Specifies the type of dial command used to establish a switched connection with a remote system.	*NONE
STNADR	07	Specifies the station address that must match the station address in the APPC controller.	01

Table 5. Controller Case parameter

Parameter and number		Description	Value in this scenario
APPN	08	Specifies if Advanced Peer to Peer Networking is used.	*NO
DIALINIT	09	Specifies the method used to make the initial dial on a switched line between the system and the remote controller.	*LINKTYPE (Case 1) *IMMED (Case 2)

2.1.2.6 Operation and status

For Case 1, vary on the lines and controllers on each AS/400 system. Use the `STRPASTHR` command, from one system to the other, to confirm the configuration definitions.

For Case 2, change the DIALINIT controller parameter to *IMMED on one system, for example AS1. The connection is started as soon as the controller is varied on.

To confirm that the line, controller, and device are all in ACTIVE status, enter the following command on both systems:

```
WRKCFGSTS *LIN <linename>
```

2.2 Scenario 2: #2761 to and from the #2761 TCP/IP PPP

In this scenario, the AS/400 to AS/400 connections using PPP are configured for the following cases.

- Case 1: AS/400 Dial to AS/400 Answer numbered
- Case 2: AS/400 Dial to AS/400 Answer unnumbered
- Case 3: AS/400 Dial-on demand to AS/400 Answer numbered
- Case 4: AS/400 Dial-on demand to AS/400 Answer unnumbered

Figure 13 shows the testing environment used for this scenario.

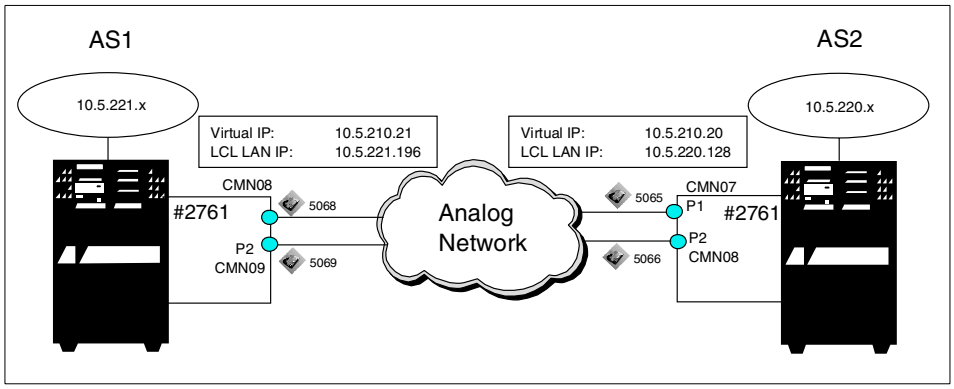


Figure 13. #2761 to and from the #2761 TCP/IP PPP

2.2.1 Scenario usage

The principle use for this scenario is for the operation of TCP/IP applications over an analog network operating at 33.6 Kbps. Up to eight connections are possible running simultaneously between the AS/400 systems.

2.2.2 Configuration steps

To implement this scenario, perform the following steps:

1. Configure a PPP profile as a switched Dial on AS1.
2. Configure a PPP profile as a switched Answer on AS2.

2.2.2.1 Configuring a PPP profile as a switched Dial on AS1

Configuration definitions for TCP/IP PPP are made using Client Access Express Operations Navigator. Follow these steps:

> **Note**
>
> The reverse-type numbers in the following figures correspond to the numbers listed in Table 6 on page 32 through Table 8 on page 33.

1. Create a new connection profile.

   Click **Operations Navigator->Network->Point to Point**. Click **Connection Profiles**. Right-click, and select **New Profile**.

2. Configure the General page (Figure 14 on page 26) of the PPP profile.

   Enter the name and description. Select **Switched line** for Line connection type and **Dial** for Mode type.

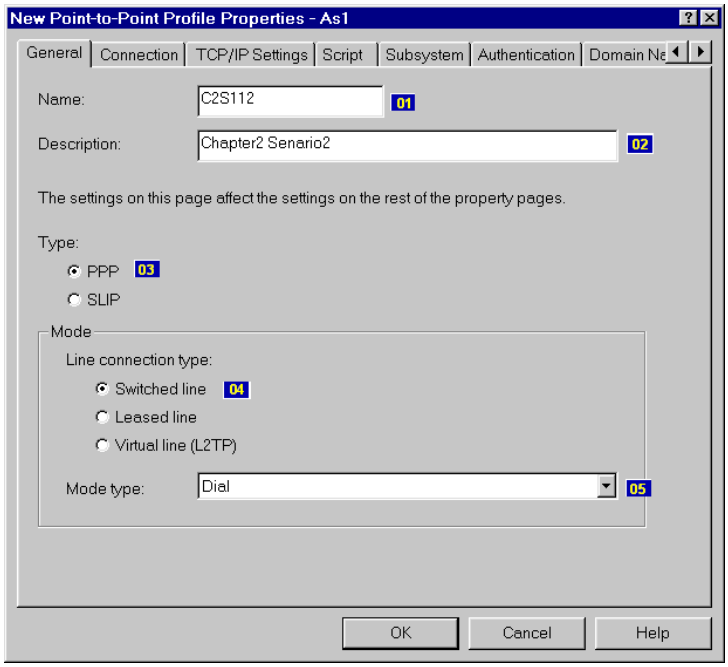


Figure 14. Creating a new Point-to-Point Protocol profile

3. Select and configure the **Connection** page (Figure 15) of the PPP profile.

   Click **Add**, and enter the remote phone number. Select **Analog line** for Type of line service. Enter the name, and click **New** to create a new line for the connection. You can add up to three remote phone numbers. If the line exits, select the line description from the Name list.

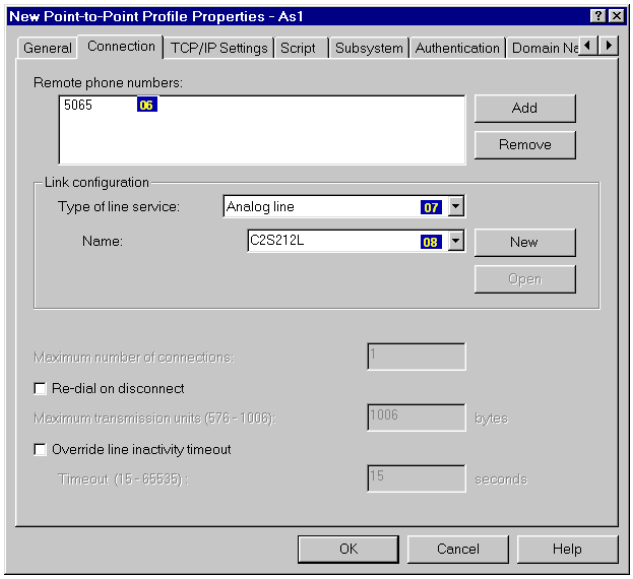


Figure 15. Creating a connection using the Connection tab

4. Create a new PPP line.

   Click **New**. Enter a description, and select **Resource name** (Figure 16).

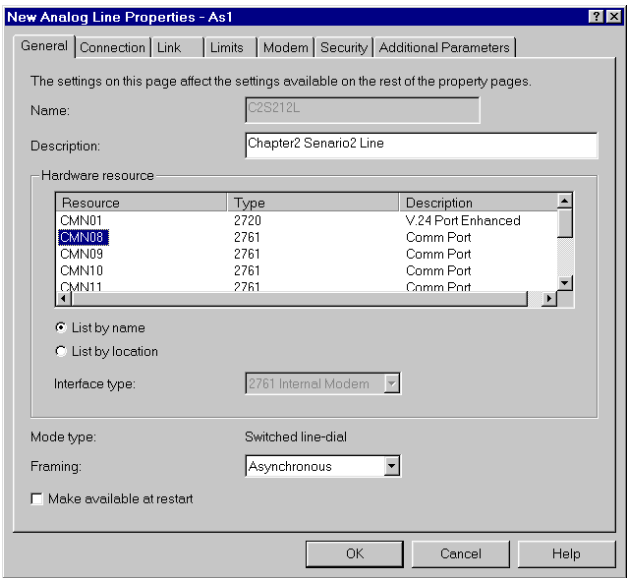


Figure 16. Displaying the line description to see the line name

5. Click the **Connection** tab (Figure 17).

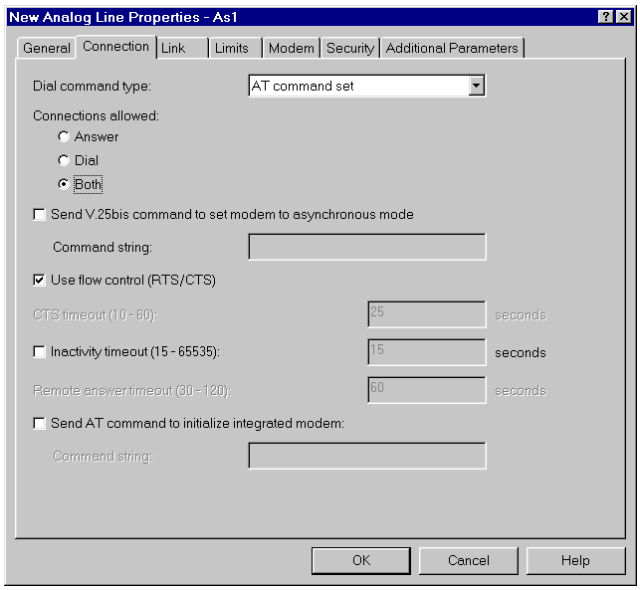


Figure 17. Setting Use flow control

Set Connections allowed to **Both**, and select **Use flow control**.

6. Click the **Link** tab (Figure 18).

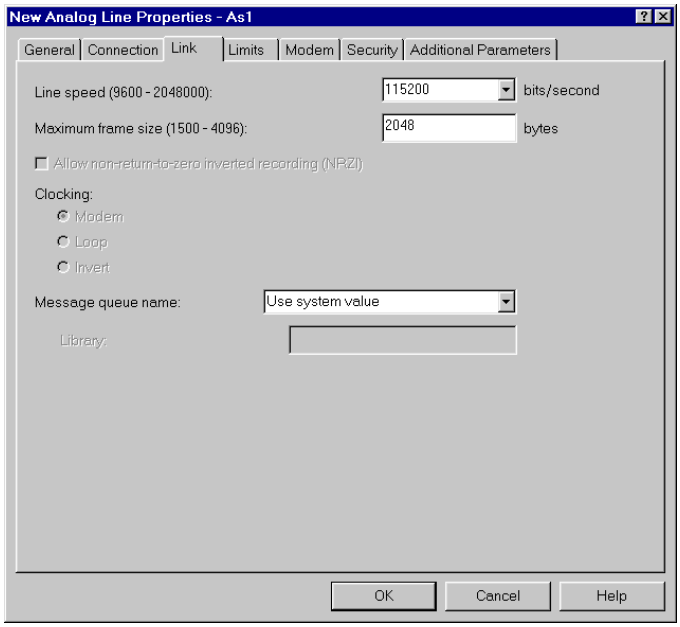


Figure 18. Setting the line speed and maximum frame size

Enter the line speed and maximum frame size (or leave the defaults).

7. Click the **Modem** tab (Figure 19 on page 30).

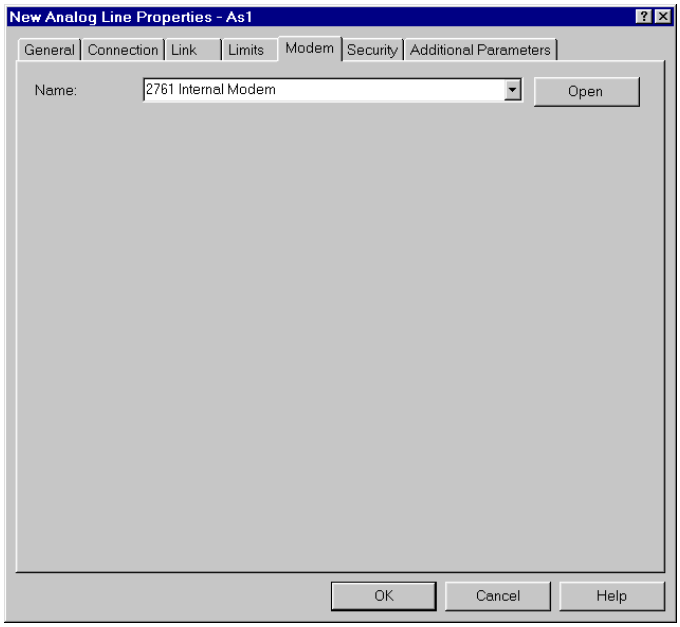


Figure 19. Selecting the 2761 Internal modem

Select **2761 Internal Modem**.

8. Click **OK**. The page shown in Figure 15 on page 27 appears again.

   Click **TCP/IP Settings**. The display shown in Figure 20 appears. Select or enter a local IP address.

   - For Cases 1 and 3, select the *VIRTUALIP address and set the AS2 *VIRTUALIP address in the Remote IP address field.
   - For Cases 2 and 4, select the local LAN address and the AS2 LAN address in the Remote IP address field.

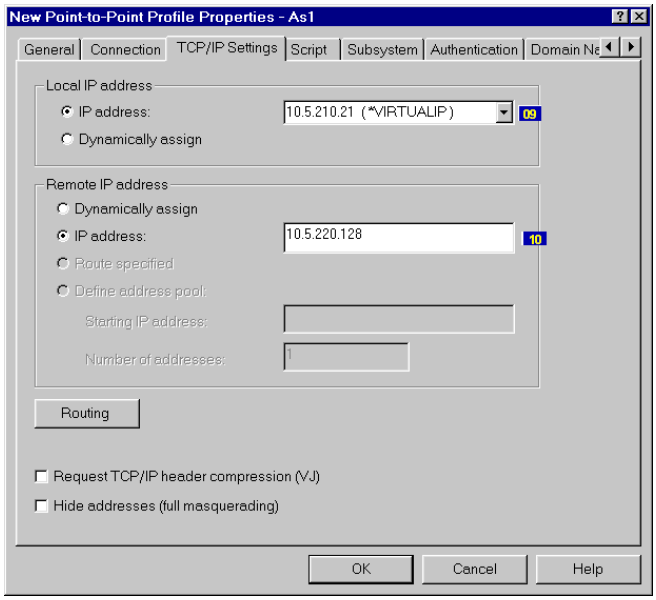


Figure 20. Setting the local and remote IP address

9. Click **OK** to create a new profile.

After creating a new profile with a new line created in step 4, a line, controller and device objects are created all bearing the same name as the newly created line. If a new line is not created, objects already created and identified by the name of the line selected at step 4 are used.

2.2.2.2 Configuring a PPP profile as a switched answer on AS2

Create a new profile by repeating steps 1 to 9. However, in this case, set the Mode type to **Answer** in step 2 on the General properties page.

2.2.2.3 Configuration summary of all cases in scenario 2

Table 6 on page 32 through Table 8 on page 33 show the information required to create the PPP profile. Only the parameters required to create the profiles in this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

Note

The numbers in the following tables correspond to the reverse-type numbers shown in Figure 14 on page 26 through Figure 20 on page 31.

Table 6. Information on the General page to create a PPP profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	C2S112
Description	02	Optional field - Type the description.	
Type	03	Required field - PPP or SLIP Specify PPP to create ISDN line on the Connection tab.	PPP
Mode			
Line connection type:	04	Required field - Select one from the following types: - Switched line: - Leased line: - Virtual line [L2TP]:	Switched Line
Mode type:	05	Required field - When Line connection type is Switched line, select one from the four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1 = Dial (Cases 1 and 2) AS1 = DoDdial (Cases 3 and 4) AS2 = Answer (Cases 1 through 4)

Table 7. Information on the Connection page to create a PPP profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values except Answer as the value of Mode type on the General tab. Specify the remote local phone number.	AS1 = 5065 (All cases) AS2 = 5068 (All cases)

Field name and number		Description	Value in this scenario
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	Analog Line
Name	08	Required field - Type new line name or select the existing line.	C2S212L (All cases used the same line)

Table 8. Information on the TCP/IP Settings page to create a PPP profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - Select IP address or Dynamically assign)			
IP address	09	Specify an existing IP address for the local system.	*VIRTUALIP (Cases 1 and 3) LAN address (Cases 2 and 4)
Remote IP address (Required field - Select IP address or Dynamically assign)			
IP address	10	Specify an existing IP address for the remote system	*VIRTUALIP (Cases 1 and 3) *LAN address (Cases 2 and 4)

2.2.2.4 Operation and status

This section shows how to activate the PPP profile and the resulting status:

1. Verify whether the profile in both systems is either in Inactive or Ended status.
2. Right-click the profile name in each system and select **Start** to activate the connection. The Answer profile shows “Waiting for incoming call” status on the Operations Navigator screen (Figure 21 on page 34), and the Dial profile shows an “Active connections” status in Cases 1 and 2.

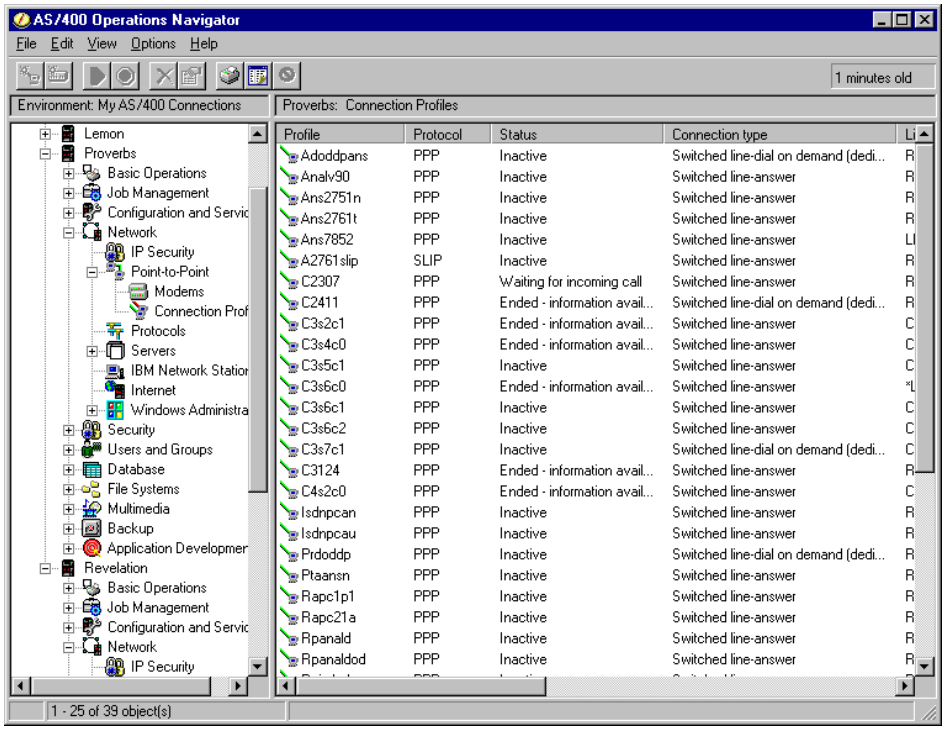


Figure 21. Answer profile status on AS2

3. In Cases 3 and 4, PING or Telnet from the Dial system to activate the connection.

2.3 Scenario 3: #2761 to and from the #2761 DoD dedicated peer

In this scenario, the AS/400 to AS/400 connection profiles using PPP are configured for the following cases:

- Case 1: AS/400 Dial to AS/400 DoD (answer enabled dedicated peer) numbered
- Case 2: AS/400 Dial to AS/400 DoD (answer enabled dedicated peer) unnumbered
- Case 3: AS/400 DoD to AS/400 DoD (answer enabled dedicated peer) numbered

- Case 4: AS/400 DoD to AS/400 DoD (answer enabled dedicated peer) unnumbered
- Case 5: AS/400 DoD (answer enabled dedicated peer) to AS/400 DoD (answer enabled dedicated peer) numbered

Figure 22 shows the testing environment used for this scenario.

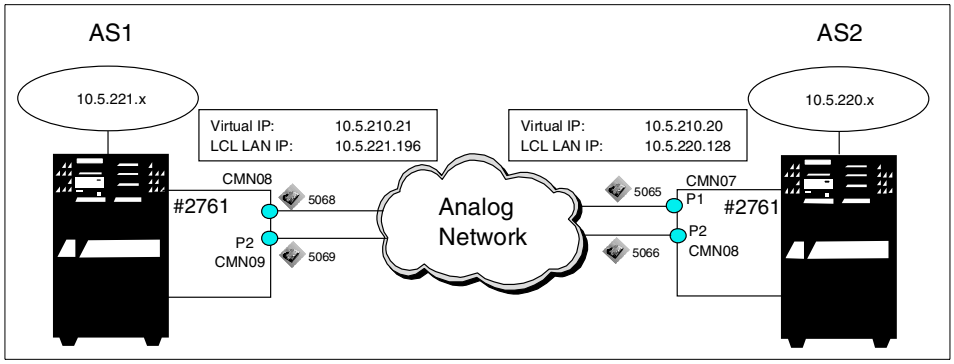


Figure 22. #2761 to and from #2761 dial-on-demand dedicated peer

2.3.1 Scenario usage

This scenario supports connections from specific remote users identified by their calling number. Only those users having a listed number can establish a connection to use the TCP/IP applications.

2.3.2 Configuration steps

To implement this scenario, complete the following steps:

1. Configure PPP profiles as a switched Dial, DoD, and DoD (answer enabled dedicated peer) on AS1.
2. Configure a PPP profile as a switched DoD (answer enabled dedicated peer) on AS2.

2.3.2.1 Configuring a PPP profile as a switched Dial on AS1

Configuration definitions for TCP/IP PPP are made using Client Access Express Operations Navigator. Follow these steps:

Note

The reverse-type numbers in the following figures correspond to the numbers listed in Table 9 on page 42 through Table 11 on page 43.

1. Create a new connection profile.

   Click **Operations Navigator->Network->Point to Point**. Click **Connection Profiles**. Right-click, and select **New Profile**.

2. Click and configure the **General** page of the PPP profile.

   Enter a name and description (Figure 23). Select **Switched line** for Line connection type and **Dial** for Mode type.

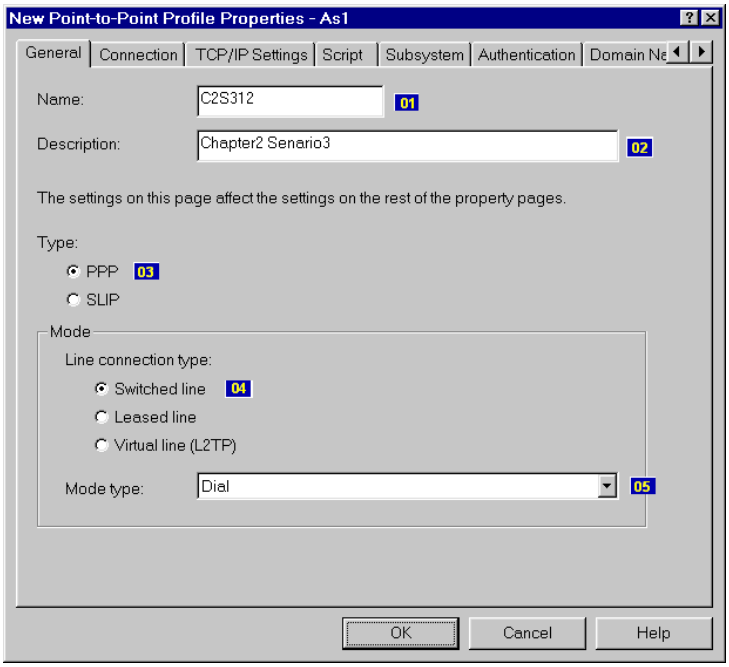


Figure 23. New Point-to-Point Profiles Properties General page

3. Select and configure the **Connection** page (Figure 24) of the PPP profile.

   Click **Add**, and enter a remote phone number. Select **Analog line** for Type of line service. Enter a name, and click **New** to create a new line for the connection. You can add up to three remote phone numbers. If the line exits, select the line description from the Name list.

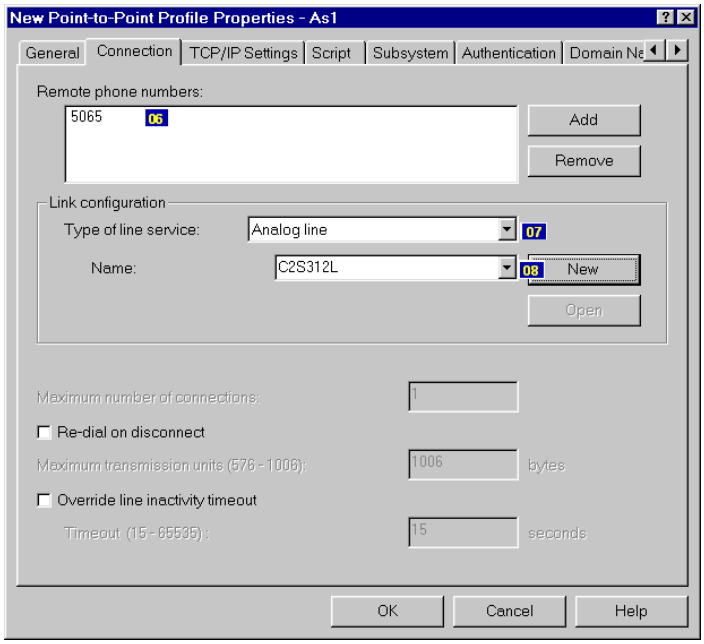


Figure 24. New Point-to-Point Connection page

4. Create a new PPP line.

   Click the **New** button on the Connection page. Enter a description, and select **Resource name** (Figure 25 on page 38).

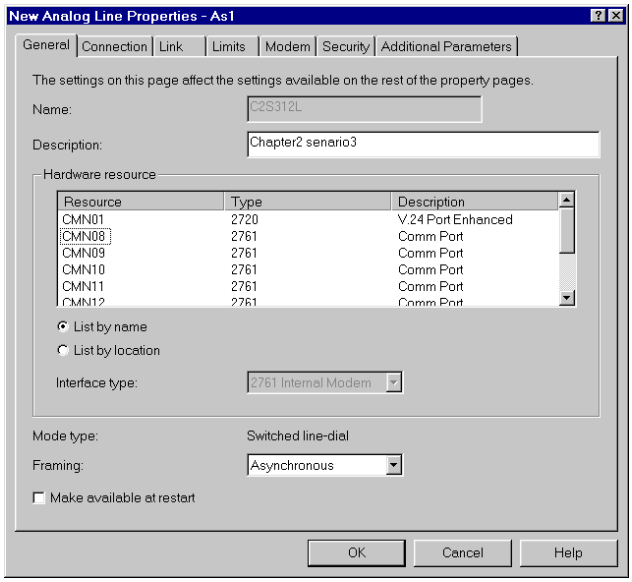


Figure 25. Properties: General display

5. Click the **Connection** tab (Figure 26).

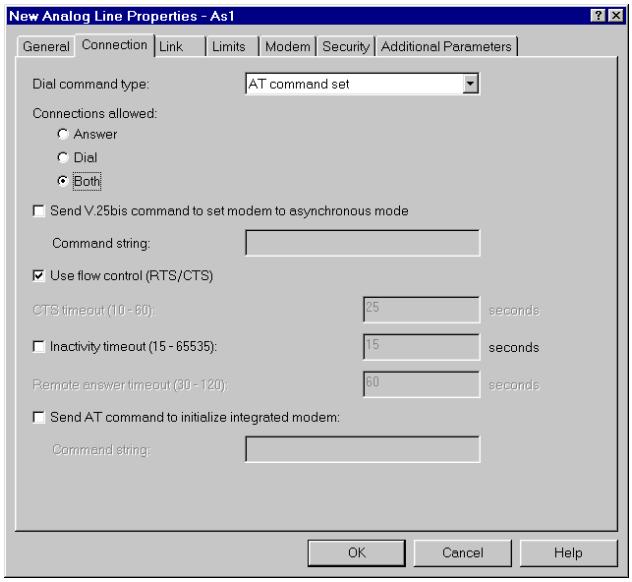


Figure 26. Properties: Connection display

6. Set Connection allowed to **Both**, and select **Use flow control**.

7. Click the **Link** tab (Figure 27).

   Enter the line speed and maximum frame size (or leave the default settings).

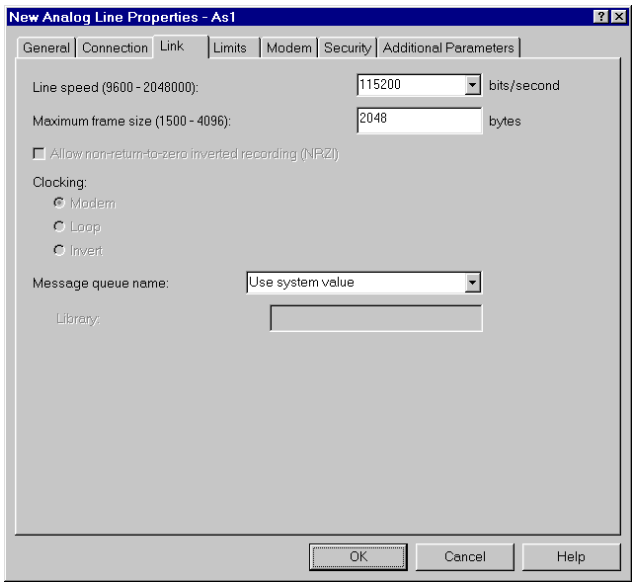


Figure 27. Properties: Link display

8. Click the **Modem** tab (Figure 28 on page 40).

   Select **2761 Internal Modem**.

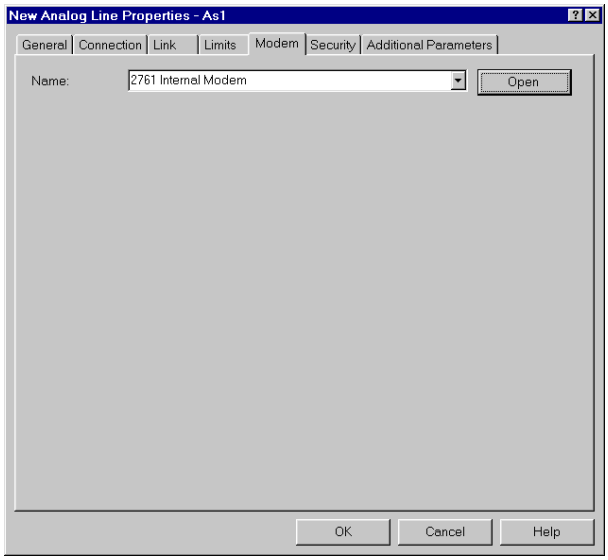


Figure 28. Properties: Modem display

9. Click **OK**.

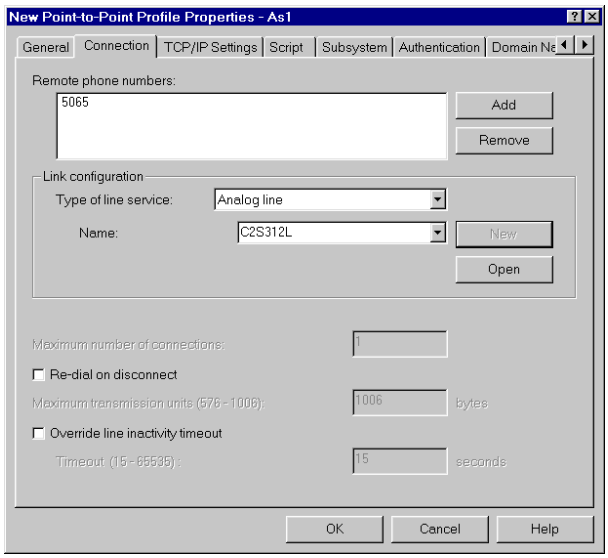


Figure 29. New Point-to-Point Properties Connection display

10. Click the **TCP/IP Settings** tab (Figure 30).

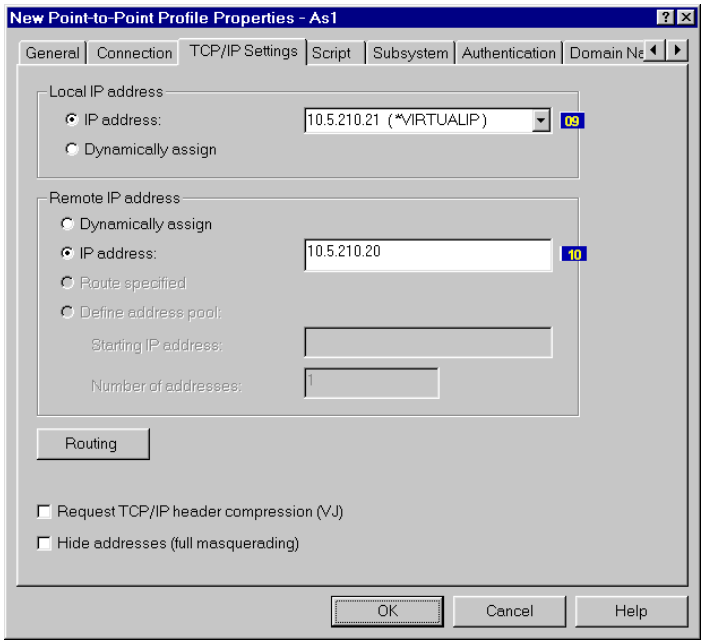


Figure 30. New Point-to-Point Properties TCP/IP Settings display

11.Select or enter a local IP address.

- For Cases 1, 3 and 5, select the *VIRTUALIP address, and set the AS2 *VIRTUALIP address in the Remote IP address field.
- For Cases 2 and 4, select the local LAN address, and set the AS2 LAN adapter address in the Remote IP address field.

12.Click **OK** to create a new profile.

2.3.2.2 Creating a DoD (answer enabled dedicated peer) profile on AS2

Create the new profile repeating steps 1 to 12. However, now you must set the Mode type to **Dial-on-demand (answer enabled dedicated peer)** on the General properties page.

2.3.2.3 Creating a DoD (dial only) profile on AS1

Create the new profile repeating actions 1 to 12. Here, set the Mode type to **Dial-on-demand (dial only)** in the General properties page.

2.3.2.4 Creating a DoD (answer enabled dedicated peer) profile on AS1

Create a new profile by repeating steps 1 to 12. Here, set the Mode type to **Dial-on-demand (answer enabled dedicated peer)** on the General properties page.

2.3.2.5 Configuration summary of all cases in scenario 3

Table 9 through Table 11 show the information required to create the PPP profiles in these scenarios. Only the parameters required to create the profiles are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

Note

The numbers in the following tables correspond to the reverse-type numbers shown in Figure 23 on page 36 through Figure 30 on page 41.

Table 9. Information on the General page to create a PPP profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	C2S312
Description	02	Optional field - Type the description.	
Type	03	Required field - PPP or SLIP You must specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			
Line connection type:	04	Required field - Select one from the following types: - Switched line: - Leased line: - Virtual line [L2TP]:	Switched Line

Field name and number		Description	Value in this scenario
Mode type:	05	Required field - When Line connection type is Switched line, select one from the four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1 = Dial (Cases 1 and 2) AS1 = DoDdial (Cases 3 and 4) AS1 = DoD (answer enabled dedicated peer) (Case 5) AS2 = DoD (answer enabled dedicated peer) (Cases 1 through 5)

Table 10. Information on the Connection page to create a PPP profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values except Answer as the value of Mode type on General tab. Specify the remote local phone number.	AS1 = 5065 (All cases) AS2 = 5068 (All cases)
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	Analog Line
Name	08	Required field - Type a new line name or select the existing line.	C2S312L (All cases used the same line)

Table 11. Information on TCP/IP Settings page to create a PPP profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - Select IP address or Dynamically assign)			
IP address	09	Specify an existing local IP address.	*VIRTUALIP (Cases 1 and 3) LAN address (Cases 2 and 4)
Remote IP address (Required field - Select IP address or Dynamically assign)			

Field name and number		Description	Value in this scenario
IP address	10	Specify an existing remote IP address.	*VIRTUALIP (Cases 1 and 3) LAN address (Cases 2 and 4)

2.3.2.6 Operation and status

To activate the profiles and view the resulting status, follow these steps:

1. Right-click on the profile name in each system, and select **Start**. The status after a few seconds reaches “Waiting for incoming call” in the AS2 system. In AS1, the status is “Active connections” for Cases 1 and 2. The status is “Waiting for dial. Switched.” for Cases 3 and 4 and “Waiting for incoming call” for Case 5.
2. PING or Telnet from the AS1 system to activate the connection.
3. PING or Telnet from the AS2 system to activate the connection for Case 5. “Dial-on-Demand (answer enabled dedicated peer)” in both systems allows a connection to be started from either system.

2.4 Scenario 4: PC with a modem to the #2761 using TCP/IP PPP

This section describes the PC with a modem connecting to the AS/400 system using TCP/IP PPP. The scenario includes these four cases:

- Case 1: PC Dial to AS/400 Answer numbered
- Case 2: PC Dial to AS/400 Answer unnumbered
- Case 3: PC Dial to AS/400 DoD (answer enabled dedicated peer) numbered
- Case 4: PC Dial to AS/400 DoD (answer enabled dedicated peer) unnumbered

Figure 31 shows the testing environment.

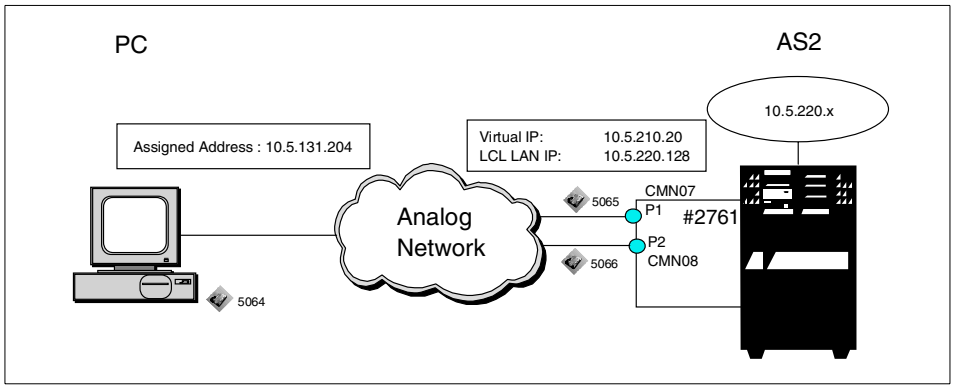


Figure 31. PC with V.90 modem to the #2761 using TCP/IP PPP

2.4.1 Configuration usage

The principle usage will be PC users connecting over a dialed link to up to eight ports to implement TCP/IP applications.

2.4.2 Configuration steps

Configuration definitions for TCP/IP are made using Client Access Express Operations Navigator.

To implement this scenario, perform the following steps:

1. Configure PPP profiles as switched Answer and DoD (answer enabled dedicated peer) on AS2.
2. Create a PC connection configuration to the AS/400 system.

2.4.2.1 Configuring a PPP profile as a switched Answer on AS2

Operations Navigator is the interface to configure PPP. Figure 32 on page 46 to Figure 38 on page 51 show the sample displays when creating the PPP connection profile as a switched Answer on AS2. Follow these steps:

1. Click **Operations Navigator->Network->Point to Point**. Right-click **Connection Profiles** for New Profile. The display shown in Figure 32 on page 46 appears.

   Enter a name and description. Set Mode as **Switched line** and Mode type to **Answer**.

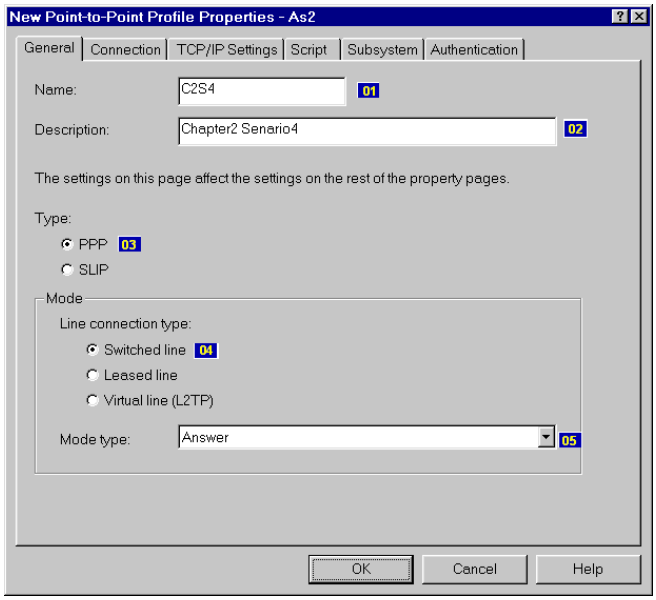


Figure 32. Creating a new point-to-point profile for scenario 4

2. Click the **Connection** tab (Figure 33).

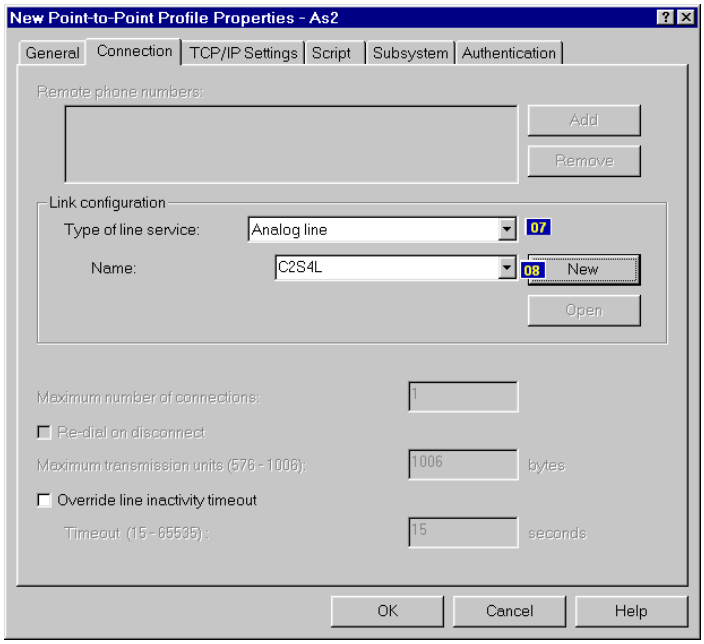


Figure 33. Selecting the line type and name

Click **Add** and complete the fields for Type of Line Service (analog line) and Name. If the line does not exist, click **New** to create one. Then, complete the New Analog Line Properties pages.

3. Click **Open**.

   Enter a description, and select a resource name (Figure 34 on page 48).

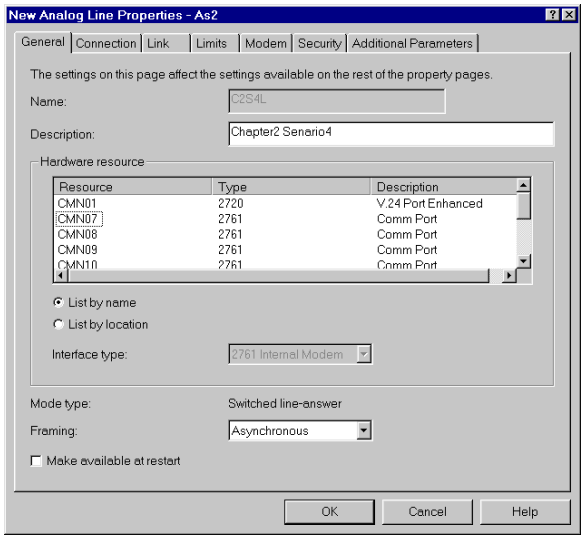


Figure 34. Selecting a resource name

4. Click the **Connection** tab (Figure 35).

   Set Connection allowed to **Both**, and click **Use flow control**.

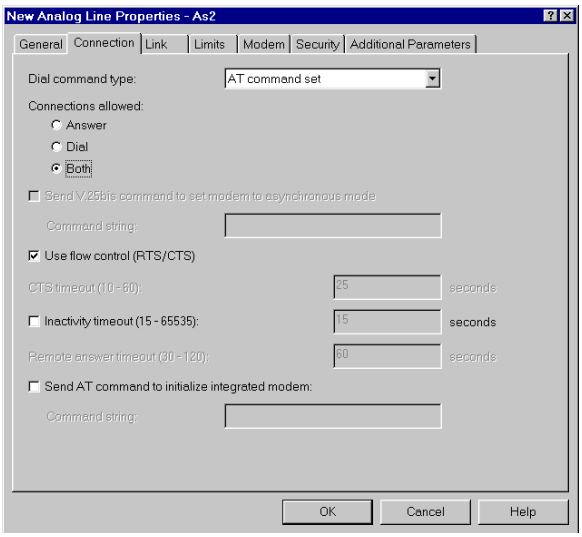


Figure 35. Setting the connection properties

5. Click the **Link** tab (Figure 36).

Complete the line speed and Maximum Frame Size fields (or leave the defaults).

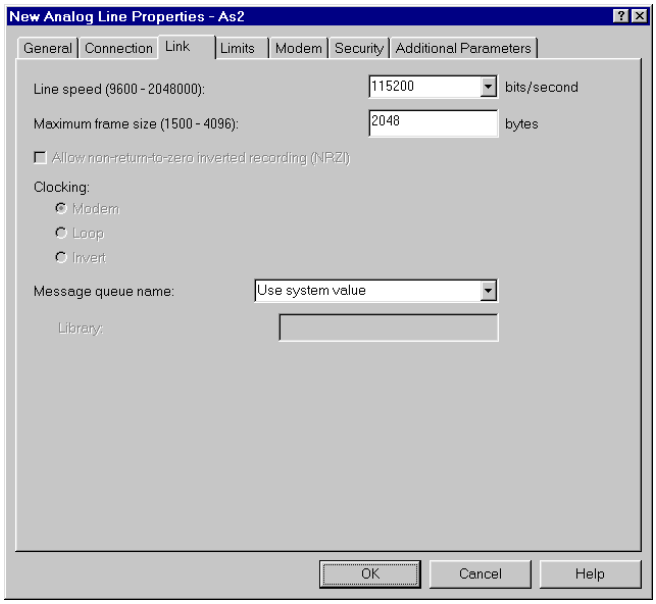


Figure 36. Setting the line speed and maximum frame size

6. Click the **Modem** tab (Figure 37 on page 50).

   Select **2761 Internal Modem**.

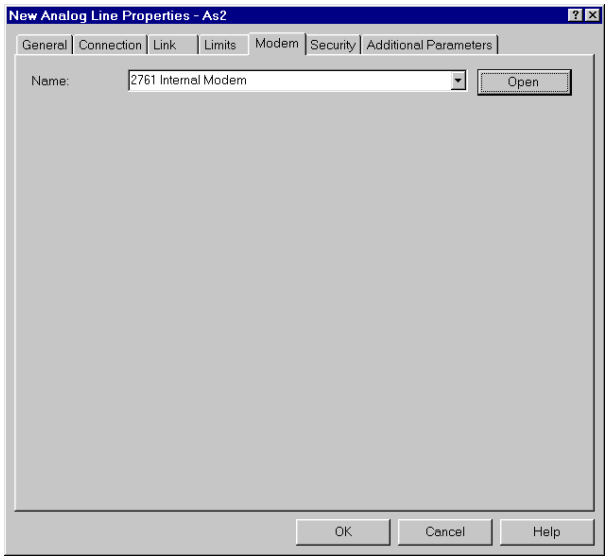


Figure 37. Selecting the Modem page

7. Click **OK**. The same page that is shown in Figure 33 on page 47 appears. Click the **TCP/IP Settings** tab (Figure 38).

   Enter a local IP address.

   - For Cases 1 and 3, select the *VIRTUALIP address.
   - For Cases 2 and 4, select the local LAN adapter IP address.

   Enter the IP address of the PC as the Remote IP address. Select **Allow IP Forwarding** under the Routing button.

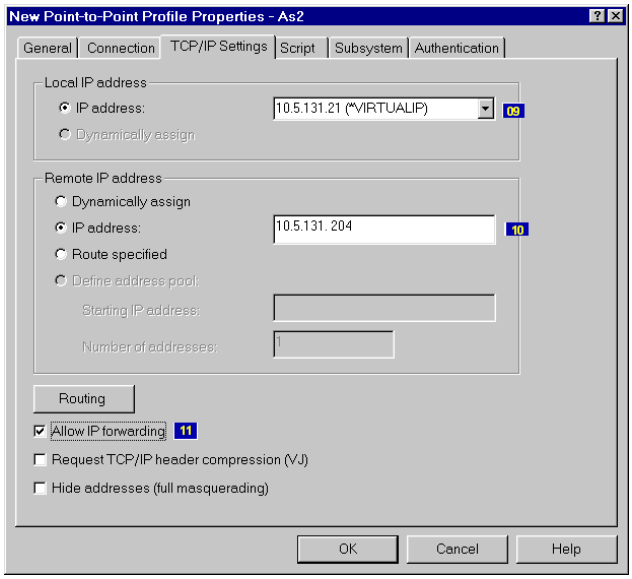


Figure 38. TCP/IP Settings

8. Right-click on the profile name, and select **Start**.

2.4.2.2 Creating a PC connection configuration to the AS/400

Refer to Chapter 4 in *More Cool Things Than Ever*, SG24-5190, to configure PPP Dial-Up Networking on PCs with Windows systems.

2.4.2.3 Configuration summary of all cases in Scenario 4

Table 12 on page 52 through Table 14 on page 53 show the information required to create the PPP profiles in this scenario. Only the required parameters are specified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

Note

The numbers in the following tables correspond to the reverse-type numbers shown in Figure 32 on page 46 through Figure 38.

Table 12. Information on the General page to create a PPP profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	C2S4
Description	02	Optional field - Type the description.	
Type	03	Required field - PPP or SLIP Specify PPP to create analog line on the Connection tab.	PPP
Mode -			
Line connection type:	04	Required field - Select one from the following types: - Switched line: - Leased line: - Virtual line [L2TP]:	Switched Line
Mode type:	05	Required field - When Line connection type is Switched line, select one from the four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS2 = Answer (Cases 1 and 2) AS2 = DoD (Answer enabled dedicated peer) (Cases 3 and 4)

Table 13. Information on the Connection page to create a PPP profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values, except Answer, as the value of Mode type on the General tab. Specify the remote local phone number.	AS2 = 5065 (All cases)
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	Analog Line
Name	08	Required field - Type new line name or select the existing line.	C2S4L (All cases used the same line)

Table 14. Information on the TCP/IP Settings page to create a PPP profile

Field name and number		Description	Value in this scenario
Local IP address (Required field -Select IP address or Dynamically assign)			
IP address	09	Specify an existing local IP address.	*VIRTUALIP (Cases 1 and 3) LAN address (Cases 2 and 4)
Remote IP address (Required field - Select IP address or Dynamically assign)			
IP address	10	Specify existing remote IP address	10.5.131.204
Routing	11	Select IP Forwarding	(select)

2.4.2.4 Operation and status

This section describes the activation of the PPP profile, its resulting status, and PC connection establishment:

1. Right-click on the profile name, and select **Start**. After a short period, the profile status shows “Waiting for incoming call”.
2. Establish a connection by clicking **Dialup Networking** and selecting **Dial**. Then, confirm the connection by clicking **OK.**

Note

The dial-on-demand (answer enabled dedicated peer) profiles in Cases 3 and 4 functioned effectively as “Answer” profiles only. Connection from the AS/400 system is not possible since the PC cannot be placed in Answer mode.

2.5 Scenario 5: #2761 to and from Fax

#2761 supports Group 3 fax over analog network. We used Facsimile Support for AS/400 (FS/400) as the fax application. This scenario, illustrated in Figure 39 on page 54, includes three cases:

- Case 1: AS/400 to Fax
- Case 2: Fax to AS/400
- Case 3: AS/400 to AS/400

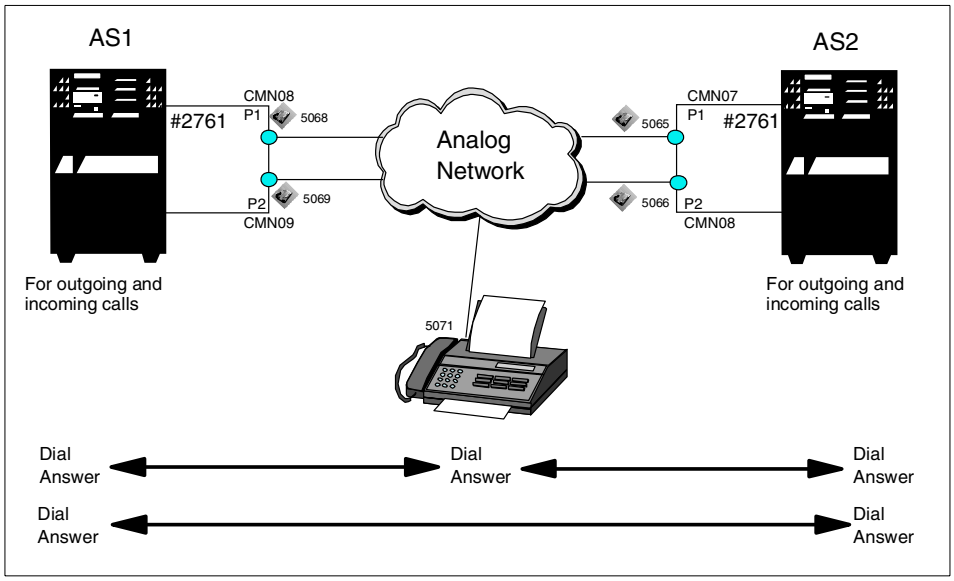


Figure 39. Scenario 5: #2761 to and/or from Fax

2.5.1 Scenario usage

The scenario describes using fax over an analog network. The fax application employed is Facsimile Support for AS/400. Connecting over the integrated #2761 IOA, it will support up to eight simultaneous connections.

2.5.2 Configuration steps

The following section gives a detailed description of how to configure a fax connection for an analog network on the AS/400 system.

To implement this scenario, perform the following steps (the same steps on both AS/400 systems):

1. Create the fax description.
2. Add the description of a fax card to the fax description.

Note

For the #2761, you will have eight resource names. You need to run the CRTFAXD command for each resource that you want be a fax controller. For example, if you want to use all eight for faxing, you must run eight CRTFAXD commands. On each CRTFAXD command, use a unique line description name.

Prior to V4R4, there was a limitation on the number of 7852-400 modems that could be started as fax controllers. We limited a customer to one 7852-400 modem as a fax controller.

In V4R4 (with a PTF), we lifted the restriction. In V4R4, you can start as many 7852-400 modems as you like. It will be that way from V4R4 onward.

There is no restriction in Facsimile Support/400 as to the number of fax controllers you can start. The STRFAXSPT command is limited to 20 controllers, but that command can be issued as many times as a user wants.

As far as the #2761 goes, we allow you to start all eight ports as fax controllers (if you have them configured). There is no restriction. If you had multiple #2761s, you could start all the ports as fax controllers. For example, if you had 2,761 cards and had configured all 16 ports as fax controllers, you could use the STRFAXSPT command to start all 16 ports.

Figure 40 on page 56 and Figure 41 on page 57 show configuration samples on AS1. As you read the following sections, note the numbers that appear in reverse bold type. These numbers correspond to those in the Configuration summary tables (Table 15 on page 59 and Figure 16 on page 59).

2.5.2.1 Creating the fax description

To create the fax description, enter the following command on each AS/400 system:

```
CRTFAXD
```

The display shown in Figure 40 on page 56 appears.

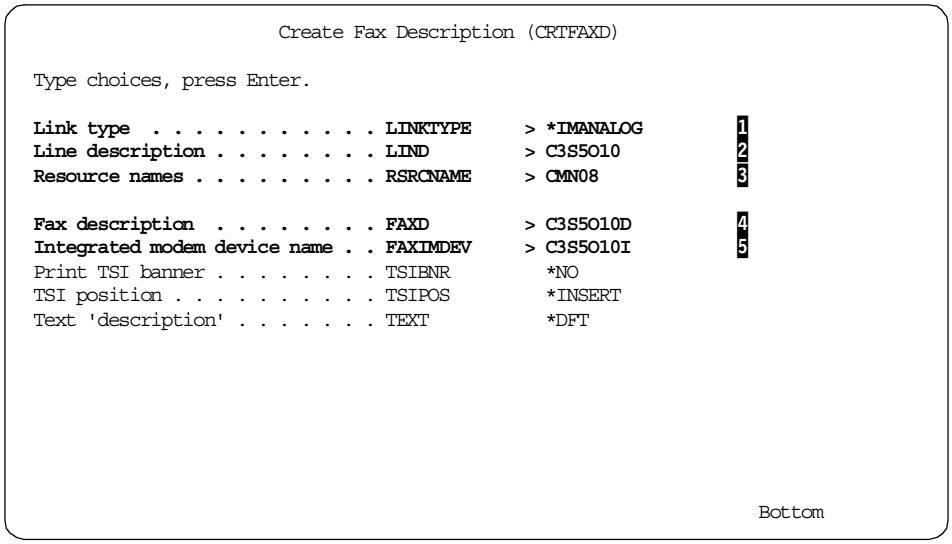


Figure 40. Creating the fax description

The line, controller, and device description are created as a result of this command.

The significant parameters of Fax using the #2761 in the fax description are (the values we used are shown in parentheses):

- **LINKTYPE**: Specifies *IMANALOG for using #2761 integrated modem (*IMANALOG).
- **LIND**: Specifies the name of the line description (C3S5O10).
- **RSRCNAME**: Specifies the resource name that you can find using WRKHDWRSC command (CMN08).
- **FAXD**: Specifies the fax description name. This name is used as a controller name (C3S5O10D).
- **FAXIMDEV**: Specifies the device name (C3S5O10I).

2.5.2.2 Adding the description of a fax card to the fax description

To add the description of a fax card to the fax description, enter the following command on each AS/400 system:

```
ADDFAXCRD
```

See the display in Figure 41.

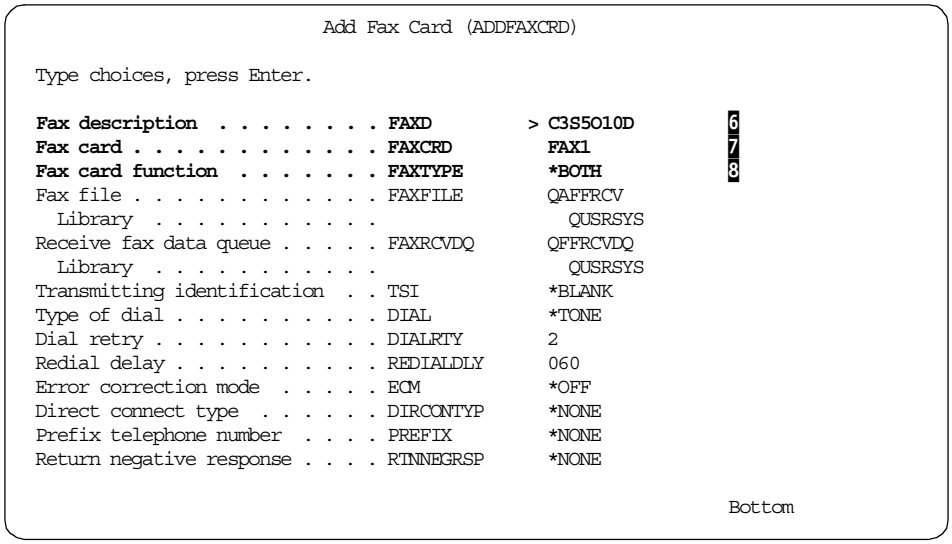


Figure 41. Adding the fax card to the fax description

The significant parameters of Fax using the #2761 in the ADDFAXCRD command are (the values we used are shown in parentheses):

- **FAXD**: Specifies the fax description name that is specified for the FAXD parameter of the CRTFAXD command (C3S5O10).
- **FAXCRD**: Specifies FAX1. For the Integrated Analog Modem (#2761), FAX1 is the only valid value (FAX1).
- **FAXTYPE**: Specifies *BOTH to support both outgoing and incoming functions (*BOTH).

Note

It is possible for one #2761 communication port to use both incoming and outgoing call functions. If you want to maximize the throughput of an outgoing fax, configure it as *SEND. When you configure as *BOTH, the receiving fax is given top priority. You have to wait about 30 seconds for the switch to the incoming fax.

DTMF support

Dual Tone Multi Frequency (DTMF) is supported as documented in the Fax Support manuals. Apply the DTMF PTF (SF62301), if you want to take advantage of the Dual Tone Multi-Frequency (DTMF) capability of the feature 2761 PCI Based Remote Access Analog Adapter for receive applications.

Follow the steps as listed here. If you do not want to use the DTMF capability, you do not need to complete these steps.

1. End Facsimile Support/400 using the following command:

   ```
   ENDFAXSPT FAXD(*ALL)
   ```

2. For each PCI Based Remote Access Analog Adapter port for which you want to use DTMF, enter the following command:

   ```
   RMVFAXCRD FAXD(FAXDxx) FAXCRD(*ALL)
   ```

   Here, *FAXDxx* is the name of the fax controller description for which you want to use the DTMF capability.

3. Use the CRTDTAARA command with the following parameters for each PCI Based Remote Access Analog Adapter for which you want to use the DTMF capability:

   ```
   CRTDTAARA DTAARA(QGPL/FAXDxxDT) TYPE(*CHAR) LEN(100) VALUE(' ')
   AUT(*USE)
   ```

   The name of the data area should be the name of your fax description with the “DT” at the end.

4. Use the ADDFAXCRD command for each PCI Based Remote Access Analog adapter. Use the ADDFAXCRD command to configure the card for your specific needs. To take advantage of the DTMF function, the card must be configured as *BOTH or *RECEIVE.

5. Use the STRFAXSPT command to restart Facsimile Support/400.

Refer to Chapter 13 in *Facsimile Support for AS/400 Programmer’s Guide and Reference*, SC41-0656, for information about the DTMF process.

Refer to Chapter 6 in *Facsimile Support for AS/400 Programmer's Guide and Reference*, SC41-0656, for more information about how the DTMF tones are stored and logged. In the same publication, refer to Chapter 9 for information about the Configure Fax Services (CFGFAXSRV) command. This command allows you to start inbound routing with the Facsimile Support for AS/400 product.

2.5.2.3 Configuration summary of all test cases in scenario 4

Table 15 and Table 16 show the suggested parameter settings required to create the fax configurations and parameter values set in this scenario. As you read the following sections, note the numbers. These numbers

correspond to those that appear in reverse bold type in Figure 40 on page 56 and Figure 41 on page 57.

Table 15. Fax description parameter to create a fax connection

Parameter		Description	Value in this scenario
LINKTYPE	01	Optional field - The type of line to which the fax controller or the Integrated Fax Adapter is attached.	*IMANALOG
LIND	02	Required field - Specify the PPP line name.	AS1 = C3S5O10 AS2 = C3S5O02
RSRCNAME	03	Required field - Specify the resource name.	AS1 = CMN08 AS2 = CMN07
FAXD	04	Optional field - The name of the fax description.	AS1 = C3S5O10D AS2 = C3S5O02D
FAXIMDEV	05	Optional field - The name of the device description for a fax controller which controls a fax line on either a remote access analog adapter or a remote access ISDN adapter.	AS1 = C3S5O10I AS2 = C3S5O02I

Table 16. Fax card parameter to create a fax connection

Parameter		Description	Value in this scenario
FAXD	06	Optional field - The name of the fax description to which the fax card or fax port description is added.	AS1 = C3S5O10D AS2 = C3S5O02D
FAXCRD	07	Optional field - The name of the fax card or port description that is added to the fax description. Specify FAX1 for a fax description of *IMANALOG.	FAX1
FAXTYPE	08	Optional field - The type of fax functions supported by this fax card or port.	*BOTH

2.5.2.4 Operation

Enter the following command to activate the environment and start the fax function:

```
STRFAXSPT FAXD(C3S5O10) EHNSRV(*NO)
```

Follow the steps in 6.1.5, “Fax connections” on page 180.

Chapter 3. ISDN connections

In this chapter, the connection scenarios using the #2751 ISDN Card are identified. Configuration instructions for each of the four scenarios are detailed and the problems encountered during the setup are enumerated. All scenarios are possible under OS/400 V4R4. The scenarios are as follows:

- Scenario 1: #2751 to and from the #2751 IDLC
- Scenario 2: #2751 to and from the #2751 PPP
- Scenario 3: PC with ISDN adapter to the #2751 TCP/IP PPP

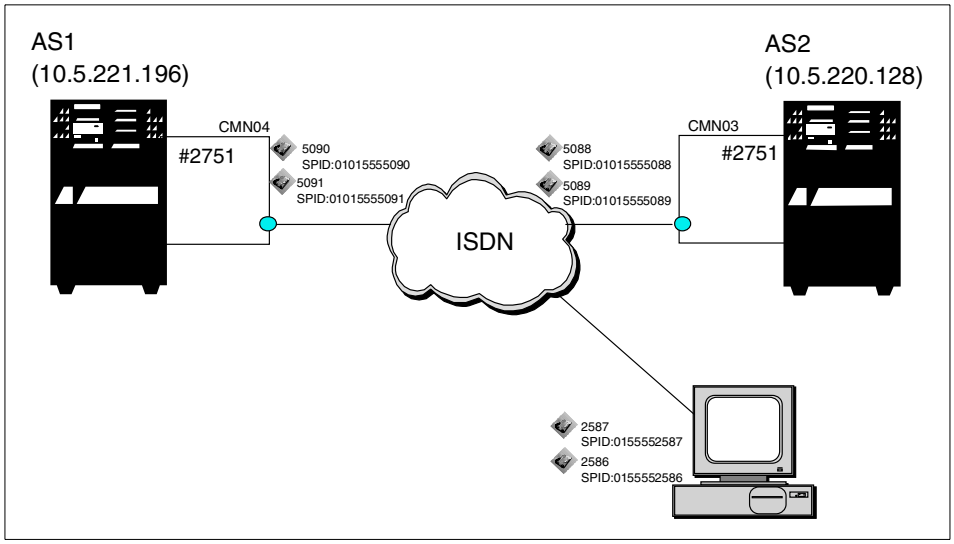


Figure 42. Overview of the ISDN connection test environment

The hardware and software used includes:

- AS/400 system with #2751 adapter card and OS/400 V4R4
- PC with ISDN adapter and Microsoft Window NT Workstation

Note

The same function as a dial-on demand (answer enabled dedicated peer) in 2.3, “Scenario 3: #2761 to and from the #2761 DoD dedicated peer” on page 34, is included in the dial-on-demand (remote peer enabled) function possible under OS/400 V4R5 and PTF(SF62239). The function is noted in 7.4, “PPP dial-on-demand remote peer enabled (V4R5)” on page 205.

In this chapter, the windows shown for the remote access configuration are from a V4R4 system. The information may be formatted differently in other releases. Use the examples here as a guide.

3.1 Scenario 1: #2751 to and from the #2751 IDLC

This section describes the situation connecting AS/400 to AS/400 using ISDN Data Link Control (IDLC) for SNA over ISDN. This scenario allows users on the network where AS1 is located to access resources on the network where AS2 is located. This scenario includes two cases:

- Case 1: AS/400 Dial-on demand to AS/400 Answer using IDLC

  In this case, dialing is delayed until a job is initiated, which requires a connection to the remote system.

- Case 2: AS/400 Dial to AS/400 Answer using IDLC

  In this case, the system automatically dials the remote system immediately upon varying on the controller description

Figure 43 shows the testing environment used for this scenario.

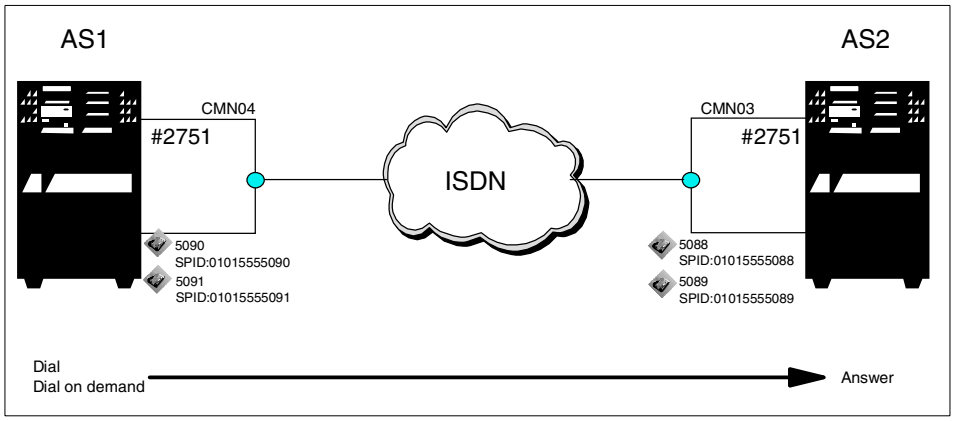


Figure 43. Scenario1: #2751 to and from the #2751 using IDLC

3.1.1 Scenario usage

This scenario supports the use of SNA applications over a digital connection at digital speeds. SNA uses an IDLC protocol to communicate over ISDN. IDLC provides a reliable link with the remote site.

3.1.2 Configuration steps

The following section gives a detailed description of how to configure the IDLC connection. As you read the following sections, note the numbers that appear in reverse-bold type. These numbers correspond to those in the Configuration summary tables (Table 17 on page 73 to Table 21 on page 75).

To implement this scenario, perform the following steps:

1. Verify and change the AS/400 Network attributes.
2. Create the Network interface.
3. Create the Connection list.
4. Add an entry to the Connection list.
5. Create the IDLC line description.
6. Create the APPC controller description.
7. Create an APPC device description, if you need one.

Figure 44 on page 64 to Figure 52 on page 71 show IDLC configuration screens on AS1.

Note

In the parameters listed in the following sections, the values that we used are shown in parentheses (), for example (*NETATR)

3.1.2.1 Verifying or changing the AS/400 network attributes

Before creating the configuration, verify the network attributes.

On the AS/400 command line, type:

```
DSPNETA
```

Press Enter to display the Display Network Attributes screen. Press Page Down to display the screen shown in Figure 44.

```
                        Display Network Attributes
                                                          System:  AS1
Maximum hop count  . . . . . . . . . . . . . . . :   16
DDM request access . . . . . . . . . . . . . . . :   *OBJAUT
Client request access  . . . . . . . . . . . . . :   *OBJAUT
Default ISDN network type  . . . . . . . . . . . : 1 *NISDN
Default ISDN connection list . . . . . . . . . . : 2 QDCCNNLANY
Allow AnyNet support . . . . . . . . . . . . . . :   *NO
Network server domain  . . . . . . . . . . . . . :   S1025YDM
Allow APPN virtual support . . . . . . . . . . . :   *NO
Allow HPR transport tower support  . . . . . . . :   *NO
Virtual controller autocreate APPC device limit  :   100


                                                                      Bottom
Press Enter to continue.
```

Figure 44. Verifying the network attributes

The ISDN significant parameters in the network attributes are:

- **DFTNETTYPE**: Specifies the system default value of the ISDN network type. If the default value is set to blank, you have to specify an appropriate value (*NISDN).
- **DFTCNNLST**: Specifies the system default value of the ISDN connection list. The default value is set to QDCCNNLANY supplied by IBM (QDCCNNLANY).

3.1.2.2 Creating the network interface

The network interface description defines the physical interface on the AS/400 system to ISDN. Each network interface has a resource name such as CMN04. Therefore, the IDLC line has no resource name assigned to it.

To create a network interface, enter the following command on each AS/400 system:

```
CRTNWIISDN
```

The screens shown in Figure 45 and Figure 46 on page 66 appear.

```
                Create Network Interface ISDN (CRTNWIISDN)

Type choices, press Enter.

Network interface description  . NWID         > C3S1O12
Resource name  . . . . . . . . . RSRCNAME 3   > CMN04
Online at IPL  . . . . . . . . . ONLINE       > *NO
Vary on wait . . . . . . . . . . VRYWAIT        *NOWAIT
Network type . . . . . . . . . . NETTYPE  4      *NETATR
Rate . . . . . . . . . . . . . . RATE           *BASIC
Channel entries:                 CHLENTRY 5
  Channel number . . . . . . .                  *SWITALL
  Channel connection . . . . . .
  Line description . . . . . . .
                         + for more values
Protocol entries:                PCLENTRY  6
  Protocol . . . . . . . . . . .              > *IDLCMAX
  Preload Licensed Internal Code
  Maximum switched channels  . .
                         + for more values
                                                          More...
```

Figure 45. Creating the network interface ISDN (Part 1 of 2)

```
                Create Network Interface ISDN (CRTNWIISDN)

Type choices, press Enter.

Auto SPID detection  . . . . . AUTOSPID       *NO
Service profile identifiers:     SPID   7
  SPID number  . . . . . .                   > 1
  SPID value . . . . . .                     > 01015555090

  SPID number  . . . . . .                   > 2
  SPID value . . . . . .         8           > 01015555091
Local number . . . . . . . . . LCLNBR        > 5090

                                             > 5091

                                                                  Bottom
```

Figure 46. Creating the network interface ISDN (Part 2 of 2)

The ISDN significant parameters in the network attributes include:

- **RSRCNAME**: Specifies the resource name, which you can find by using the WRKHDWRSC command (*CMN04).
- **NETTYPE**: Specifies the type of Integrated Services Digital Network (ISDN) to which the system is attached (*NETATR).
- **CHLENTRY**: Specifies *SWTLL. This value is used for all switched B channels (*SWTALL).
- **PCLENTRY**: Specifies *IDLCMAX to specify your protocol (*IDLCMAX).
- **SPID**: SPID, which you get from your service provider (1 01015555090 2 01015555091).
- **LCLNBR**: Specifies the local number, which you get from your service provider (5090 5091).

3.1.2.3 Creating the connection list

The connection list provides the local and remote phone numbers to be accepted for incoming calls.

To create a connection list, enter the following command on each AS/400 system:

```
CRTCNNL
```

The screen shown in Figure 47 appears.

```
                    Create Connection List (CRTCNNL)

Type choices, press Enter.

Connection list  . . . . . . . . CNNL         > C3S1012
Network type . . . . . . . . . . NETTYPE        *NETATR
Text 'description' . . . . . . . TEXT           *BLANK


                          Additional Parameters

Characters to remove . . . . . . RMVCHR         ' '
                                                '('
                                                ')'
                                                '/'
                                                '-'
                                                '+'
                           + for more values    '.'
Authority  . . . . . . . . . . . AUT            *LIBCRTAUT

                                                                  Bottom
```

Figure 47. Creating the connection list

3.1.2.4 Adding the connection list entry

To add a connection list, enter the following command on each AS/400 system:

```
ADDCNNLE
```

The screens shown in Figure 48 and Figure 49 on page 68 appear.

```
                    Add Connection List Entry (ADDCNNLE)

Type choices, press Enter.

Connection list  . . . . . . . . CNNL          > C3S1012
Entry  . . . . . . . . . . . . . ENTRY         > C3S1012
Remote number  . . . . . . . . . RMTNBR        > 5088   9

Information transfer type  . . . INFTRFTYPE      *UNRESTRICTED
Text 'description' . . . . . . . TEXT            *BLANK


                           Additional Parameters

Remote number type . . . . . . . RMTNBRTYPE      *UNKNOWN
Remote numbering plan  . . . . . RMTNBRPLAN      *UNKNOWN
Remote subaddress  . . . . . . . RMTSUBADR       *ANY

Remote subaddress type . . . . . RMTSUBTYPE      *USER

                                                                    More...
```

Figure 48. Adding the entry to the connection list (Part 1 of 2)

```
                    Add Connection List Entry (ADDCNNLE)

Type choices, press Enter.

Local number . . . . . . . . . . LCLNBR        > 5090     10

Local number type  . . . . . . . LCLNBRTYPE      *UNKNOWN
Local numbering plan . . . . . . LCLNBRPLAN      *UNKNOWN
Local number presentation  . . . LCLNBRPSN       *NONE
Local subaddress . . . . . . . . LCLSUBADR       *ANY

Local subaddress type  . . . . . LCLSUBTYPE      *USER









                                                                    Bottom
```

Figure 49. Adding the entry to the connection list (Part 2 of 2)

The ISDN significant parameters in the network attributes include:

- **RMTNBR**: Specifies the local number assigned to the remote system. The incoming call dialed from the specified phone number is accepted (5088).

- **LCLNBR**: Specifies the local number assigned to the local system. The incoming call directed at the specified phone number is accepted (5090).

3.1.2.5 Creating the IDLC line description

To create the IDLC line, enter the following command on each AS/400 system:

```
CRTLINIDLC
```

The screen shown in Figure 50 appears.

```
                    Create Line Desc (IDLC) (CRTLINIDLC)

Type choices, press Enter.

Line description . . . . . LIND          > C3S1O12
Online at IPL  . . . . . . ONLINE          *YES
Vary on wait . . . . . . . VRYWAIT         *NOWAIT
NWI connection type  . . . . . CNN       11  *SWT
Switched NWI list:             SWINWILST  12
  NWI description  . . . . . .             > C3S1O12
  NWI channel type . . . . . .               *B
  NWI channel number . . . . .               *CALC
                          + for more values
Switched connection type . . . . SWTCNN   13  > *DIAL
Exchange identifier  . . . . . EXCHID        *SYSGEN
Error threshold level  . . . . THRESHOLD     *OFF
Maximum frame size . . . . . . MAXFRAME      2048
Switched NWI selection . . . . . SWINWISLCT  *FIRST
Text 'description' . . . . . . TEXT          *BLANK

                                                                More...
```

Figure 50. Creating the IDLC line description

The ISDN significant parameters in the network attributes include:

- **CNN**: Specifies *SWT or *NONSWT (*SWT).
- **SWTNWILST**: Specifies the network interface description that is used for this line description (C3S1O12).
- **SWTCNN**: Specifies whether this line is used for incoming calls, outgoing calls, or both (*DIAL).
- **CNNLSTIN**: This parameter is valid when the SWTCNN parameter is set to either *ANS or *BOTH. Specify the name of connection for incoming calls. The default value is *NETATR. We specified *NETATR on AS2 (*NETATR).

3.1.2.6 Creating the APPC controller description

To create the APPC controller, enter the following command on each AS/400 system:

```
CRTCTLAPPC
```

The screen shown in Figure 51 appears.

```
                    Create Ctl Desc (APPC) (CRTCTLAPPC)

Type choices, press Enter.

Controller description . . . . . CTLD          > C3S1O12
Link type  . . . . . . . . . . . LINKTYPE 15   > *IDLC
Online at IPL  . . . . . . . . . ONLINE        > *NO
Switched connection  . . . . . . SWITCHED 16   > *YES
APPN-capable . . . . . . . . . . APPN          > *NO
Controller type  . . . . . . . . TYPE            *BLANK
Switched line list . . . . . . . SWTLINLST 17 > C3S1O12
                         + for more values
Maximum frame size . . . . . . . MAXFRAME        *LINKTYPE
Remote network identifier  . . . RMTNETID        *NETATR
Remote control point . . . . . . RMTCPNAME     > PROVERBS
Exchange identifier  . . . . . . EXCHID
Initial connection . . . . . . . INLCNN 18       *DIAL
Dial initiation  . . . . . . . . DIALINIT 19     *LINKTYPE
Outgoing connection list . . . . CNNLSTOUT 20 > C3S1O12
Connection list entry  . . . . . CNNLSTOUTE 21> C3S1O12
                                                              More...
```

Figure 51. Creating the APPC controller attached to the IDLC line

The ISDN significant parameters in the network attributes include:

- **LINKTYPE**: Specifies *IDLC because the line description that is used for this controller is for IDLC (*IDLC).
- **SWITCHED**: Specifies *YES because the line description that is used for this controller is a switched line (*YES).
- **SWTLINLST**: Specifies the line description name that is used for this controller (C3S4O12).
- **INLCNN**: Specifies which method is used to establish a connection with this controller: *DIAL or *ANS (*DIAL).
- **DIALINIT**: Specifies whether the system automatically dials the remote system or controller immediately upon varying on this controller description or if dialing is delayed until a job is initiated that requires connection to the remote system or controller. Dial initiation is valid only when *DIAL is specified for the initial connection (INLCNN) parameter (*LINKTYPE).

- **CNNLSTOUT**: Specifies the name of the connection list object that contains the ISDN-assigned numbers for a dial-out operation to the ISDN (C3S1O12).
- **CNNLSTOUTE**: Specifies the entry name from the connection list that is used to make a call to the Public Switched Data Network (C3S1O12).

3.1.2.7 Creating the APPC device description

To create the APPC device, enter the following command on each AS/400 system:

```
CRTDEVAPPC
```

The screen shown in Figure 52 appears.

```
                    Create Device Desc (APPC) (CRTDEVAPPC)

Type choices, press Enter.

Device description . . . . . . . DEVD         > C3S1O12
Remote location  . . . . . . . . RMTLOCNAME   > AS2
Online at IPL  . . . . . . . . . ONLINE       > *NO
Local location . . . . . . . . . LCLLOCNAME   > AS1
Remote network identifier  . . . RMTNETID       *NETATR
Attached controller  . . . . . . CTL          > C3S1O12
Mode . . . . . . . . . . . . . . MODE           *NETATR
                         + for more values
Message queue  . . . . . . . . . MSGQ           *CTLD
  Library  . . . . . . . . . . .
APPN-capable . . . . . . . . . . APPN         > *NO
Single session:                  SNGSSN
  Single session capable . . . .                *NO
  Number of conversations  . . .


                                                                    Bottom
```

Figure 52. Creating the APPC device attached to the APPC controller

There are no ISDN significant parameters in the creation of the APPC device.

3.1.2.8 Parameter relationship in the IDLC configuration

Figure 53 on page 72 shows the relationship between the command parameters for IDLC configuration.

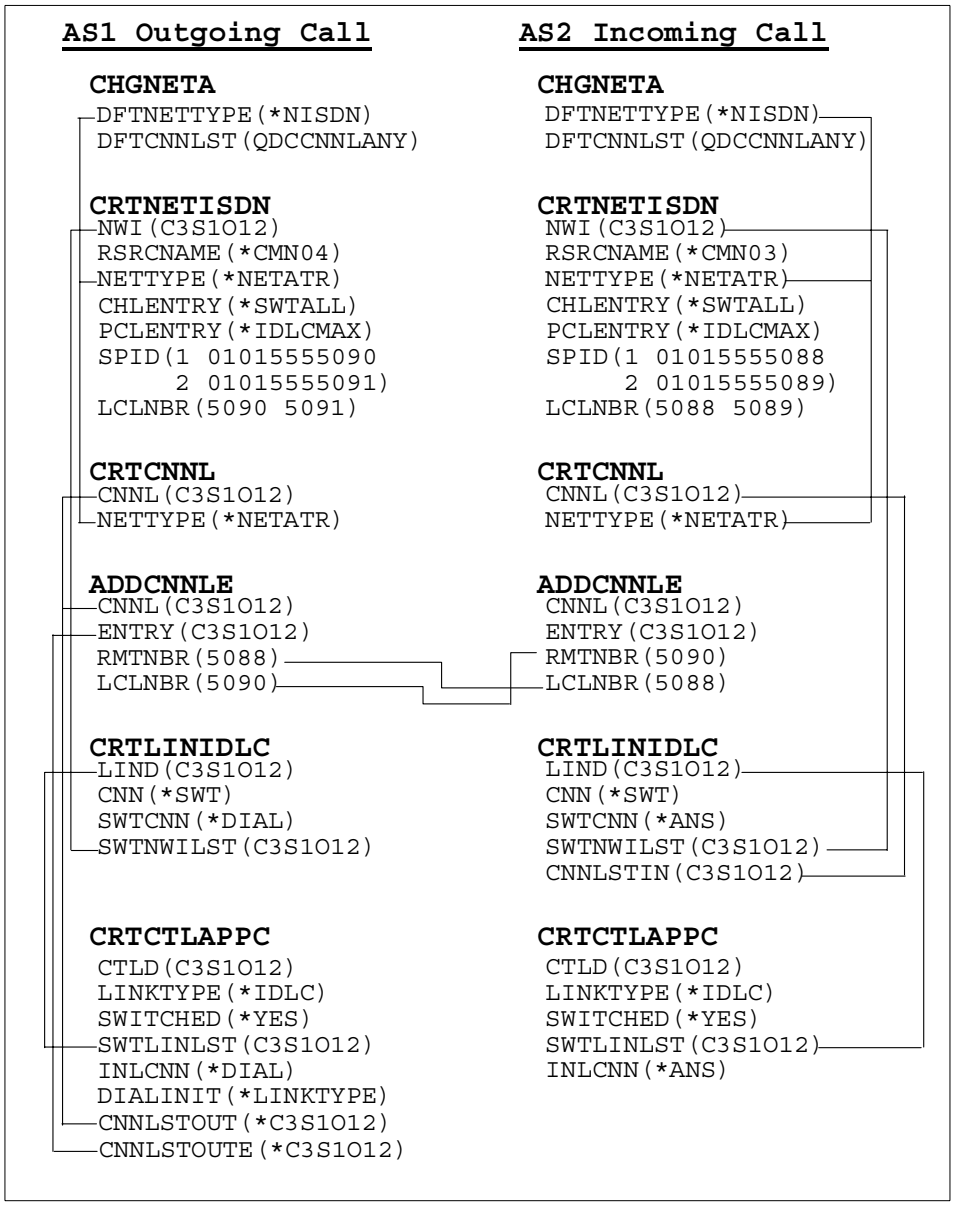


Figure 53. Parameter relationship for the IDLC configuration

3.1.2.9 Configuration summary

The configuration of Case 2 is similar to the configuration of Case 1. Change the value of the INLCNN parameter of controller description on AS1 site from *LINKTYPE to *IMMED.

Table 17 through Table 21 on page 75 show the information required to create the IDLC configurations. The parameters listed as Optional or Required to create this scenario are identified. For more information, refer to *OS/400 Communications Configuration,* SC41-5401.

As you read the following sections, note that the numbers correspond to those numbers in reverse-bold type in Figure 44 on page 64 to Figure 52 on page 71.

Table 17. Network Attributes parameter to create an IDLC connection

Parameter and number		Description	Value in this scenario
DFTNETTYPE	01	Optional field - The system default value of the ISDN network type.	*NISDN
DFTCNNLLST	02	Optional field - The system default connection list name.	QDCCNNLANY

Table 18. Network Interface parameter to create an IDLC connection

Parameter and number		Description	Value in this scenario
RSRCNAME	03	Required field - The resource name that identifies the hardware.	AS1 = CMN04 AS2 = CMN03
NETTYPE	04	Optional field - The type of network to which this system is attached.	*NETATR
CHLENTRY	05	Optional field - Specify a channel entry corresponding to a B channel or D channel associated with the network interface. If you specify *SWTALL, one D channel and two B channels are created.	*SWTALL

Parameter and number		Description	Value in this scenario
PCLENTRY	06	Optional field - Specify a list of protocols used and protocol-specific information. If you specify *IDLCMAX, the associated microcode is preloaded and the channels are activated.	*IDLCMAX
SPID	07	Required field - The service profile identifier (SPID) used to identify the AS/400 system to the network provider. The SPID is provided by the network provider at subscription time.	AS1 = 01015555090 /01015555091 AS2 = 01015555088 /01015555089
LCLNBR	08	Optional field - The number by which this system is known to the ISDN.	AS1 = 5090 /5091 AS2 = 5088 /5089

Table 19. Connection List and Entry parameter to create an IDLC connection

Parameter and number		Description	Value in this scenario
RMTNBR	09	Required field - The number of the remote system in the ISDN.	AS1 = 5088 AS2 = 5090
LCLNBR	10	Optional field - Information about the number called for an incoming call. If you enter a specific number, only calls directed at this local number are accepted.	AS1 = 5090 AS2 = 5088

Table 20. Line Description parameter to create an IDLC connection

Parameter and number		Description	Value in this scenario
CNN	11	Required field - Switched or non-switched.	*SWT
SWTNWILST	12	Optional field - A list of network interface descriptions to which this line can be attached.	C3S1O12

Parameter and number		Description	Value in this scenario
SWTCNN	13	Optional field - Shows whether the switched line is used for incoming calls, outgoing calls, or both.	AS1 = *DIAL AS2 = *ANS
CNNLSTIN	14	Optional field - The name of the connection list used to identify incoming calls.	AS2 = C3S1O12

Table 21. Controller Description parameter to create an IDLC connection

Parameter and number		Description	Value in this scenario
LINKTYPE	15	Required field - Specify the type of line to which this controller is attached.	*IDLC
SWITCHED	16	Required field - Specify whether this controller is attached to a switched line.	*YES
SWTLINLST	17	Required field - A list of Network Interface Descriptions to which this line can be attached.	C3S1O12
INLCNN	18	Optional field - *DIAL or *ANS	AS1 = *DIAL AS2 = *ANS
DIALINIT	19	Optional field - Displayed when INNLCNN is *DIAL. For switched connections, shows whether the system automatically dials the remote system or controller immediately upon varying on this controller description.	AS1 = *LINKTYPE (Case 1), AS1 = *IMMED (Case 2)
CNNLSTOUT	20	Optional field - The name of the connection list object that contains the ISDN-assigned numbers for a dial-out operation to the ISDN.	C3S1O12
CNNLSTOUTE	21	Optional field - The entry name from the connection list that is used to make a call to the Public Switched Data Network.	C3S1O12

3.1.2.10 Operation and status

This section shows how to activate the configuration objects and the status for normal operation.

To activate the environment, perform the following steps (the same operation in both AS/400 systems):

1. Vary on the network interface.
2. Vary on the IDLC line description.
3. Vary on the APPC controller description.
4. Vary on the APPC device description.

To check the status of the network interface, enter the following command:

```
WRKCFGSTS CFGTYPE(*NWI) CFGD(C3S1O12)
```

NWI must be varied on. See Figure 54.

```
                        Work with Configuration Status              AS1
                                                          04/13/00  17:02:44
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    13=Work with APPN status...

Opt  Description       Status               -------------Job--------------
     C3S1O12          VARIED ON




                                                                      Bottom
Parameters or command
===>
```

Figure 54. NWI status after varying on

To check the status of the line description, enter the following command:

```
WRKCFGSTS CFGTYPE(*LIN) CFGD(C3S1O12)
```

The line status must be CONNECT PENDING in Case 1. See Figure 55.

```
                        Work with Configuration Status              AS1
                                                          04/13/00  17:06:25
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    13=Work with APPN status...

Opt  Description      Status               -------------Job--------------
     C3S1012          CONNECT PENDING

                                                                      Bottom
Parameters or command
===>
```

Figure 55. Line status after varying on

To check the status of the controller and device description, enter the following command.

```
WRKCFGSTS CFGTYPE(*CTL) CFGD(C3S1012)
```

The controller and device must have a status of VARY ON PENDING in Case 1 (Figure 56 on page 78).

```
                        Work with Configuration Status              AS1
                                                          04/13/00  17:09:27
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    13=Work with APPN status...

Opt  Description       Status               -------------Job--------------
     C3S1012          VARY ON PENDING
       C3S1012        VARY ON PENDING









                                                                      Bottom
Parameters or command
===>
```

Figure 56. Controller and device status after varying on

Then, start the APPC application. In this case, we used a 5250 pass through:

```
STRPASTHR RMTLOCNAME(AS2)
```

After the connection is established, the status is changed as shown in Figure 57.

To confirm the status of the configuration objects, enter the following command:

```
WRKCFGSTS CFGTYPE(*NWI) CFGD(C3S1012)
```

The status appears as shown in Figure 57.

```
                        Work with Configuration Status
                                                                System:   AS1
Position to  . . . . .                 Starting characters
Opt  Description       Status                    -------------Job--------------
     C3S1012           ACTIVE
       C3S1012         ACTIVE
         C3S1012       ACTIVE
           C3S1012     ACTIVE
             BLANK     ACTIVE/TARGET             *PASSTHR
                                                                          Bottom
===>
```

Figure 57. Status of all objects on AS1

The operation to activate the environment of Case 2 is the same as Case 1. However, AS1 dials automatically to make a connection when you vary on the controller description. The status of all objects is shown in Figure 58.

```
                        Work with Configuration Status                  AS1
                                                              04/13/00  17:18:36
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    13=Work with APPN status...

Opt  Description       Status                    -------------Job--------------
     C3S1012           ACTIVE
       C3S1012         ACTIVE
         C3S1012       ACTIVE
           C3S1012     ACTIVE




                                                                          Bottom
Parameters or command
===>
```

Figure 58. The status of all objects for Case 2

3.2 Scenario 2: #2751 to and from the #2751 PPP

This section describes the AS/400 to AS/400 system connections using PPP. It allows AS1 users to access resources on AS2. This scenario includes four cases:

- Case 1: AS/400 Dial to AS/400 Answer numbered
- Case 2: AS/400 Dial to AS/400 Answer unnumbered
- Case 3: AS/400 Dial-on demand to AS/400 Answer numbered
- Case 4: AS/400 Dial-on demand to AS/400 Answer unnumbered

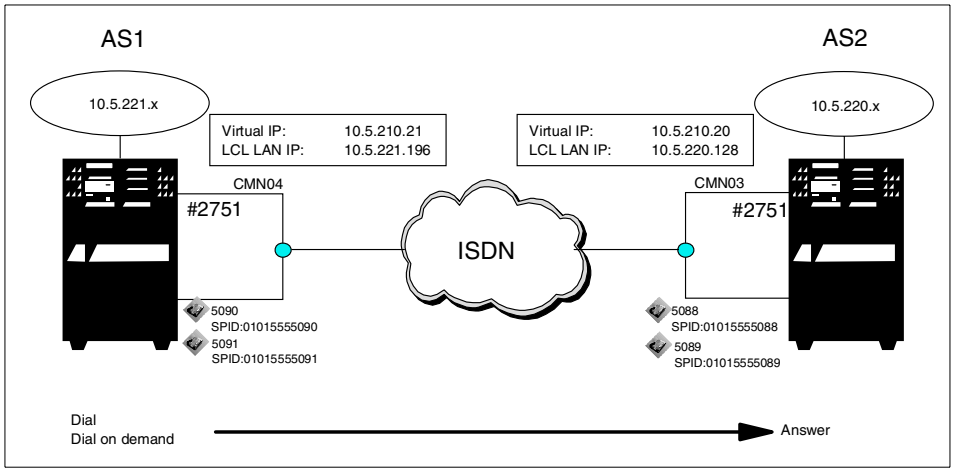


Figure 59. Scenario 2: #2751 to and from the #2751 PPP

3.2.1 Scenario usage

This scenario is used for a PPP connection over ISDN. With ISDN, you can take advantage of fewer communication transmission errors, faster speeds, and faster connect times. PPP allows interoperability among the remote access software of different manufacturers and the same physical communication to be used by multiple network protocols.

3.2.2 Configuration steps

The following section describes how to configure the PPP connection. As you read the following sections, note that the numbers that appear in reverse bold type correspond to those numbers in the configuration summary tables (Table 22 on page 91 to Table 24 on page 93).

To implement this scenario, perform the following steps:

1. Configure the PPP profile as a switched dial on AS1.
2. Configure the PPP profile as a switched answer on AS2.

3.2.2.1 Configuring a PPP profile as a switched dial on AS1

The Operations Navigator is the interface to configure PPP. Figure 60 through Figure 70 on page 89 show the sample displays when creating the PPP connection profile as a switched dial (Case 1) on AS1. Follow these steps:

1. Create a new connection profile.

   Click the **Connection Profiles**. Right-click, and select **New Profile** (Figure 60).

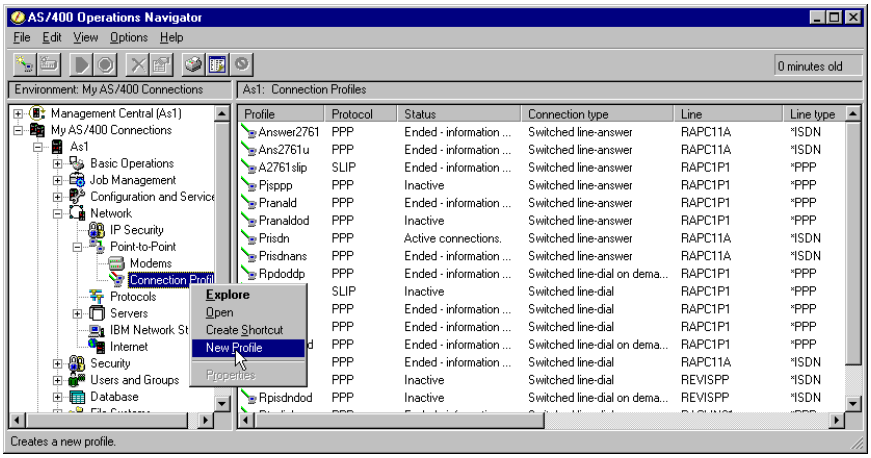


Figure 60. Creating a new profile

2. Configure the General page (Figure 61 on page 82) of the PPP profile.

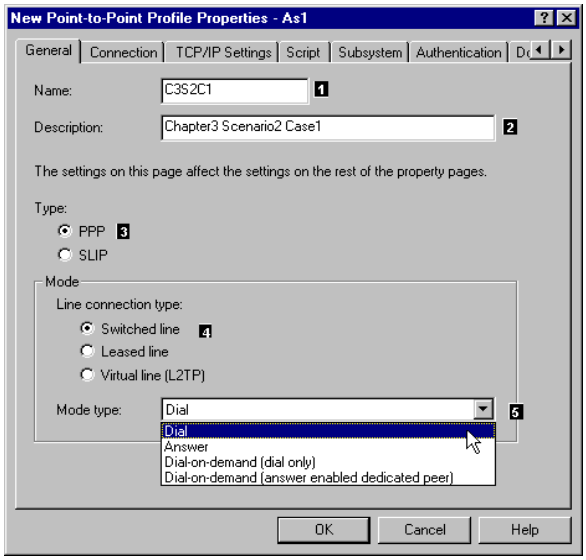


Figure 61. General page of the PPP profile as a switched dial

Enter a name and description. Select **Switched line** for Line connection type and **Dial** for Mode type. Only PPP for Type is allowed for an ISDN connection.

3. Select and configure the **Connection** page (Figure 62) of the PPP profile.

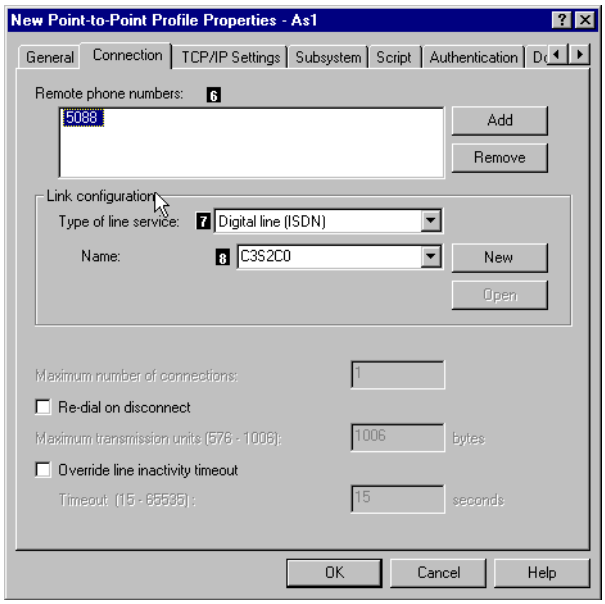


Figure 62. Connection page of the PPP profile as a switched dial

Click **Add**, and enter a remote phone number. Select **Digital line (ISDN)** for Type of line service. Enter a name, and click **New** to create a new line for the connection. You can add up to three remote phone numbers. If the line exits, select the line description from the Name list.

4. Create a new PPP line over the ISDN (Figure 63 on page 84).

   Enter a description.

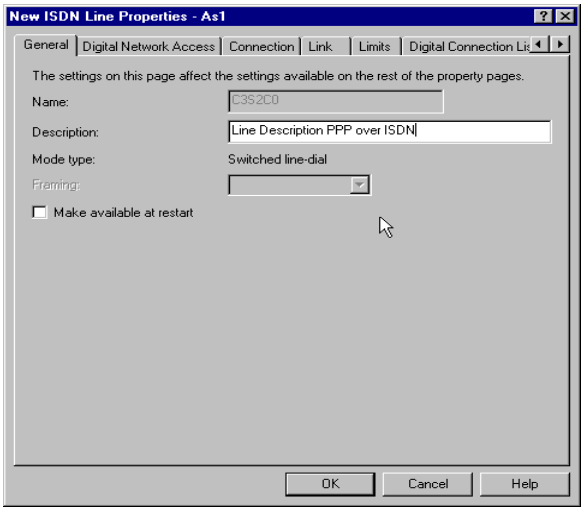


Figure 63. General page to create a new PPP line profile as a switched dial

5. Add the network interface to the PPP line.

   Click **Add** to specify the network interface description used by this line (Figure 64).

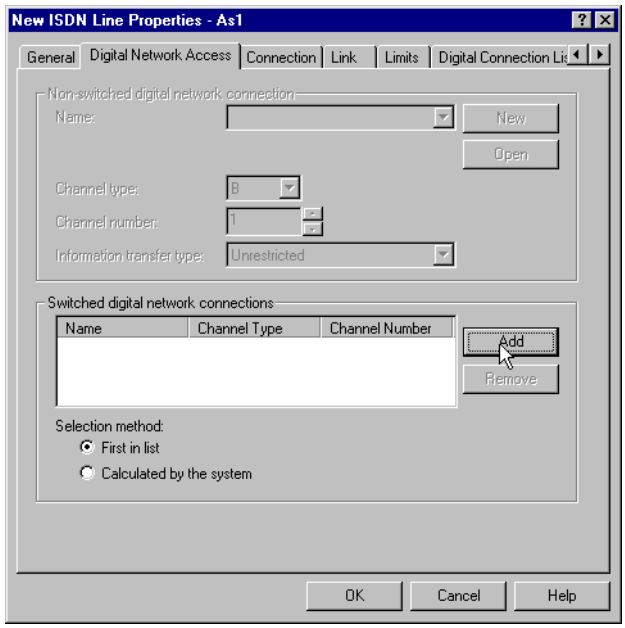


Figure 64. Digital Network Access page to create a new PPP line profile

6. Select the network interface (Figure 65) to which the PPP line can be attached.

   Select a network interface description, and click **OK**. If the network interface description does not exist, enter the name. Then, click **New** to create one, and complete the New ISDN Network Connection Properties pages.

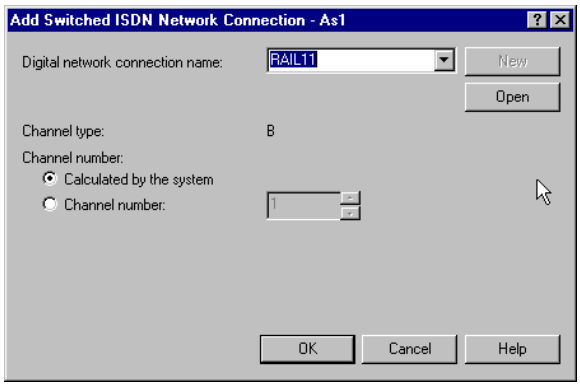


Figure 65. Adding a switched ISDN network connection to create a new line

7. Configure the Connection page for a new PPP line.

   Select **Both** for Connection allowed (Figure 66 on page 86).

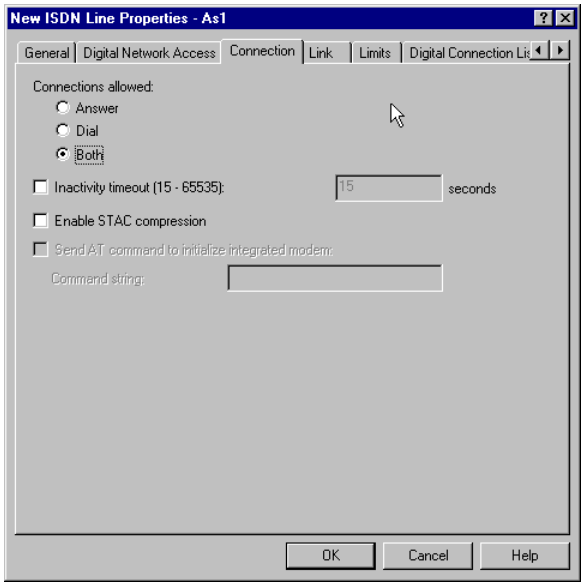


Figure 66. Connection page to create a new line of PPP profile as a switched dial

8. Select and configure the **Link** page (Figure 67) for a new PPP line.

   Select **64000** for Line speed, and type `2048` for Maximum frame size.

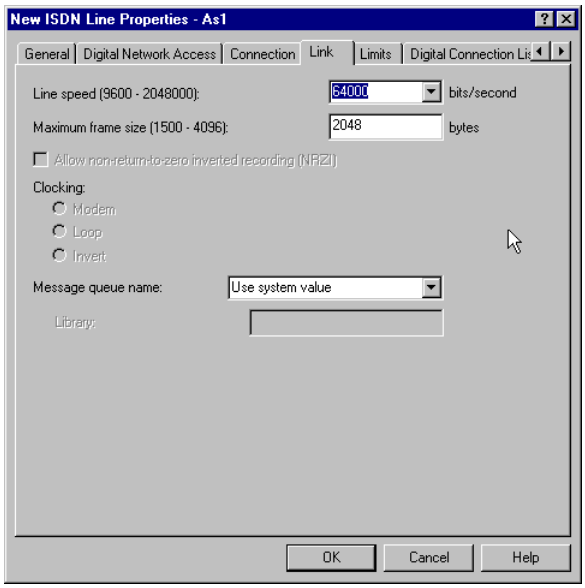


Figure 67. Link page to create a new PPP line profile

Note

The maximum frame size on the 2751 and 2750 input/output adapters (IOA) is 2064 bytes. Exceeding this value causes an IOP activation failure with a message that warns of a MAXFRAME configuration problem.

9. Select and configure **Digital Connection List** page (Figure 68) for a new PPP line.

   Select the **Unrestricted** box for “Information transfer type accepted for incoming calls”, and select **Unrestricted** for “Information transfer type for outgoing calls”. Specify **Unrestricted** for type of both incoming and outgoing calls if the remote site is connected to ISDN. Click **OK** to create a new line description. While a new line description is created, the connection list is created that has two entries, ANYIN and ANYOUT, of which the value of INFTFRTYPE parameter is *UNRESTRICTED.

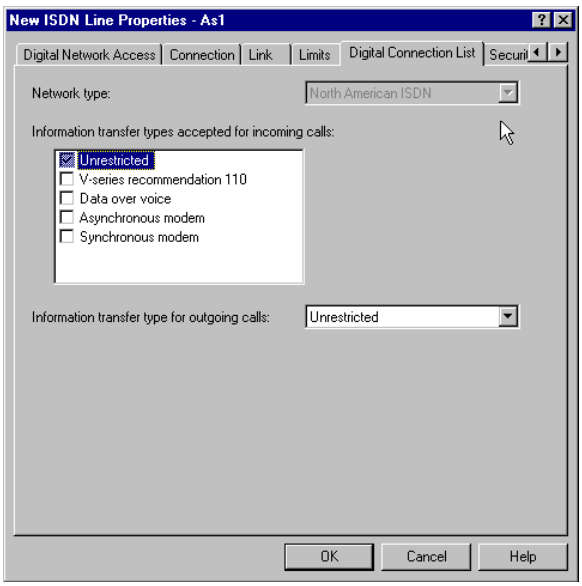


Figure 68. Digital Connection List page to create a new PPP line profile

10. Select and configure the **TCP/IP Settings** page (Figure 69 on page 88) of the PPP profile.

    a. Configure TCP/IP Settings page of the PPP profile for a numbered network.

Select a *VIRTUALIP address made for a numbered network on AS1 for a local IP address, and enter a *VIRTUALIP address made for numbered net on AS2 for a remote IP address. Click **OK** to create a profile (Case 1 and 3).

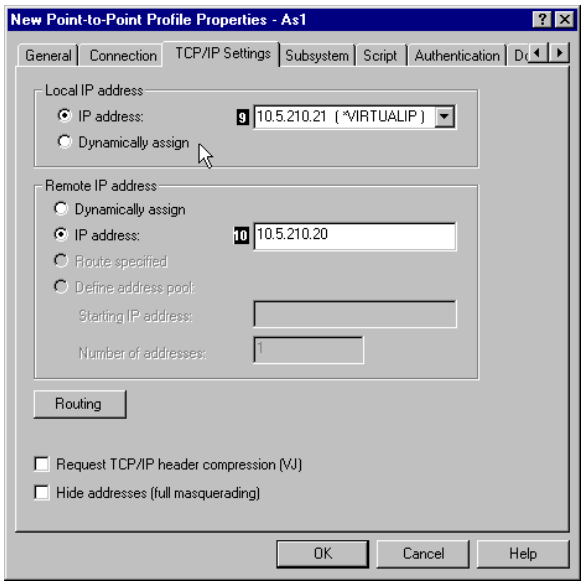


Figure 69. TCP/IP Settings page of PPP profile as a switched dial numbered

b. Configure the TCP/IP Settings page of the PPP profile for an unnumbered network.

   To configure an unnumbered network, select a real IP address on AS1 for a local IP address, and enter a real address on AS2 for a remote IP address. Click **OK** to create a profile (Cases 2 and 4).

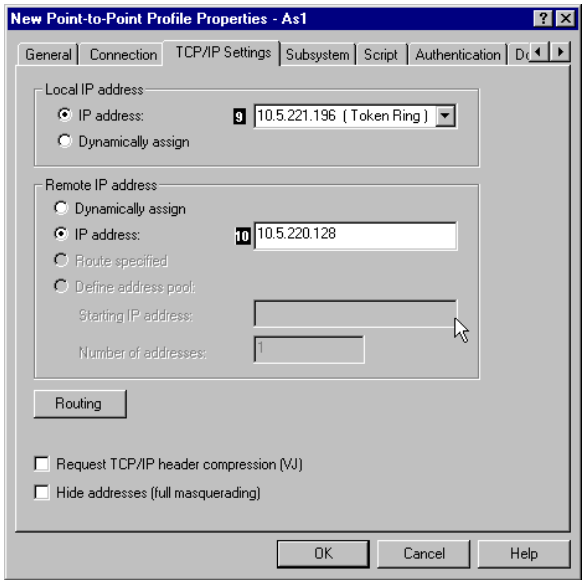


Figure 70. TCP/IP Settings page of the PPP profile as a switched dial unnumbered

After creating a new profile, the following configuration objects are created on the AS/400 system:

- Network interface created in step 6. In this case, the network interface already exists.
- Connection list and two entries, if a new line was created in steps 3 to 9.
- PPP line description, if a new line was created in steps 3 to 9.

3.2.2.2 Configuring the PPP profile as a switched answer on AS2

The PPP connection profile as switched answer on AS2 is configured similar to the profile on AS1. The different panels for Case 1 are shown in these steps:

1. Configure the General page (Figure 71 on page 90) of the PPP answer profile.

   Enter a name and description. Select **Switched line** for Line connection type and **Answer** for Mode type.

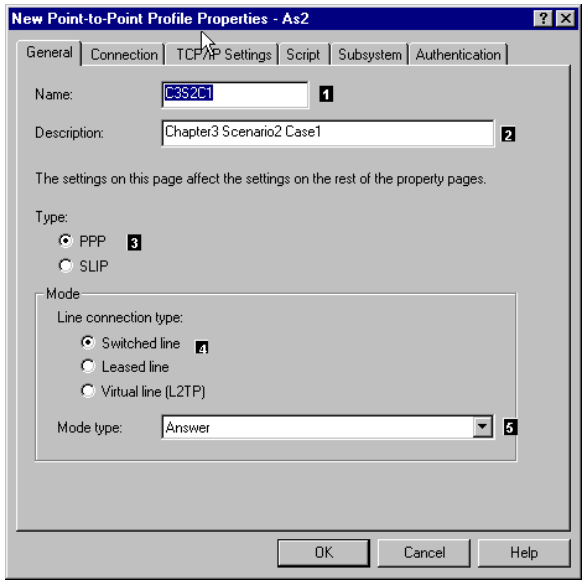


Figure 71. General page of the PPP connection profile as a switched answer

2. Select and configure the **TCP/IP Settings** of the PPP answer profile (Figure 72).

   Select a *VIRTUALIP address made for a numbered network on AS2 for a local IP address, and enter a *VIRTUALIP address made for a numbered network on AS1 for a remote IP address. Click **OK** to create a profile.

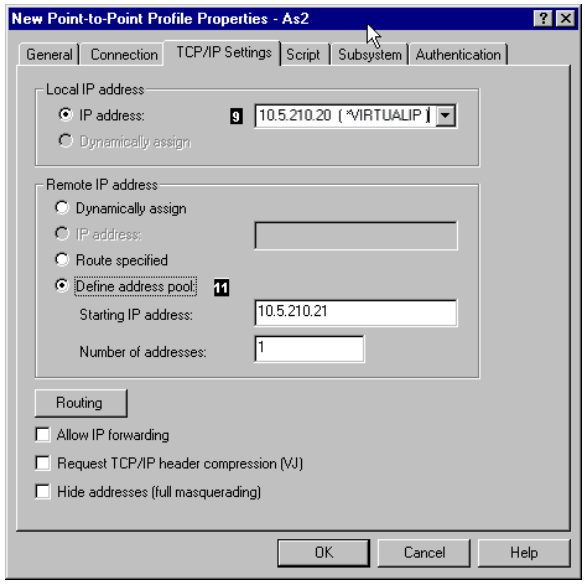


Figure 72. TCP/IP Setting page of the PPP profile as a switched answer numbered

3.2.2.3 Configuration summary

Table 22 to Table 24 on page 93 show the information required to create the PPP profile. Only the parameters necessary to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

As you read the following sections, note that the numbers correspond to those numbers that appear in reverse bold type in Figure 61 on page 82 to Figure 72.

Table 22. Information on the General page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	C3S2Cn - We used the following naming rule: - C3 = Chapter 3 - S2 = Scenario 2 - C1 through C4 = Case number
Description	02	Optional field - Type the description.	

Field name and number		Description	Value in this scenario
Type	03	Required field - PPP or SLIP You must specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			
Line connection type:	04	Required field - Select one from the following types: - Switched line: - Leased line: - Virtual line [L2TP]:	Switched Line
Mode type:	05	Required field - When the Line connection type is Switched line, select one from the four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1 = Dial (Cases 1 and 2) AS1 = DoDdial (Cases 3 and 4) AS2 = Answer (Cases 1 through 4)

Table 23. Information on the Connection page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values, except Answer, as the value of Mode type on the General tab. Specify the remote local phone number.	AS1 = 5088 (All cases)
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	Digital line [ISDN]
Name	08	Required field - Type the new line name or select an existing line.	C3S2C0 (All cases used the same line)

Table 24. Information on the TCP/IP settings page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	09	Specify that you want to use an existing IP address for your local address.	AS1 = 10.5.210.21 for numbered/10.5.221.196 for unnumbered AS2 = 10.5.210.20 for numbered/10.5.220.128 for unnumbered
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	10	Specifies that you want to enter an existing IP address for the address on the remote end of the connection.	AS1 = 10.5.210.20 for numbered/10.5.220.128 for unnumbered
Define address pool	11	Specifies a pool of remote IP addresses to be used for multiple connection profile types. Specify a starting IP address and the number of addresses.	AS2 = 10.5.210.21 for numbered/10.5.221.196 for unnumbered (Cases 1 through 4)

3.2.2.4 Operation and status

This section shows how to activate PPP profile and a normal status at the time. Follow these steps:

1. Start the answer profile on AS2.

   Before starting the PPP profile, confirm whether the status of profile is Inactive or Ended. Click on the profile. Right-click, and select **Start** (Figure 73 on page 94).

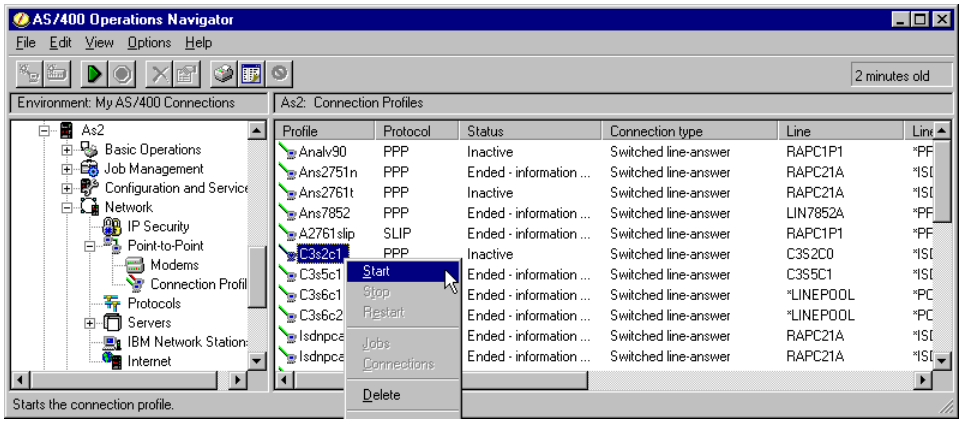


Figure 73. Starting the operation on AS2

2. Check the status after starting the profile on AS2 (Figure 74).

   Press F5 to confirm the status of the PPP profile. The status must be *Active connections*. In this case, the status of the line description is connect pending.

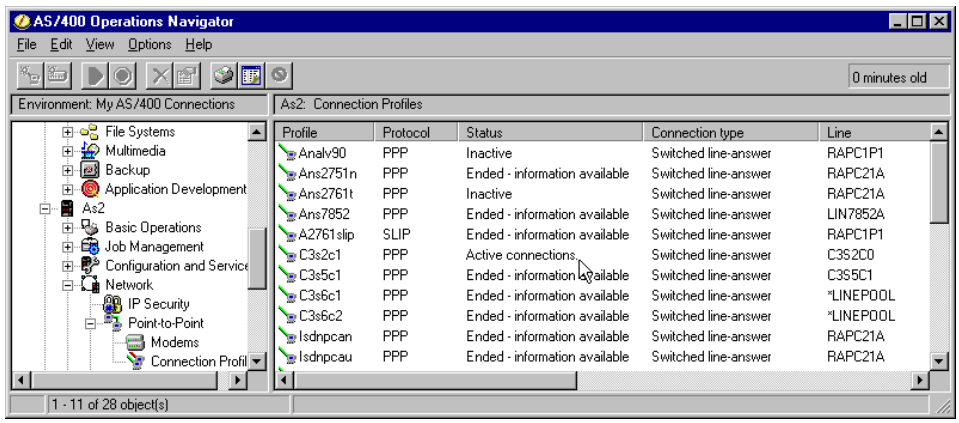


Figure 74. Status after starting the profile on AS2

3. Start the dial profile on AS1.

   Before starting the PPP profile, confirm whether the status of profile is Inactive or Ended. Click on the profile. Right-click, and select **Start** (Figure 75).

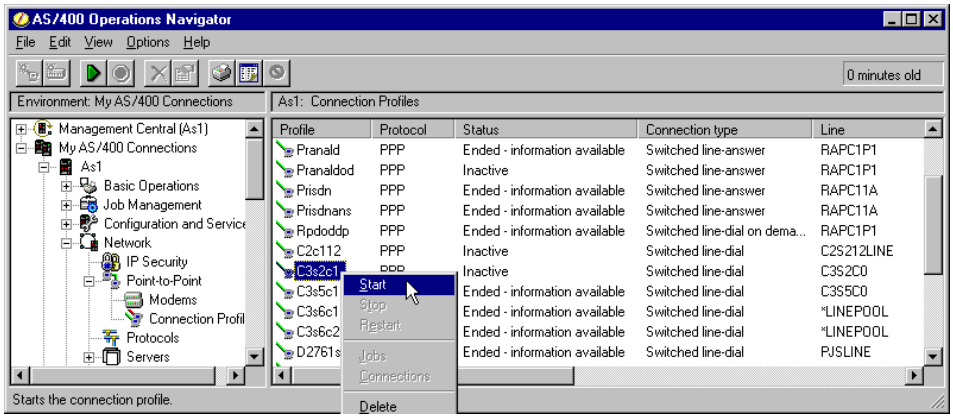


Figure 75. Starting the operation on AS1

4. Check the status after starting the profile on AS1 (Figure 76).

   Press F5 to confirm the status of the PPP profile. The status must be Active connections. Since the mode type of the profile is a dial, AS1 dials to AS2 immediately after starting the profile.

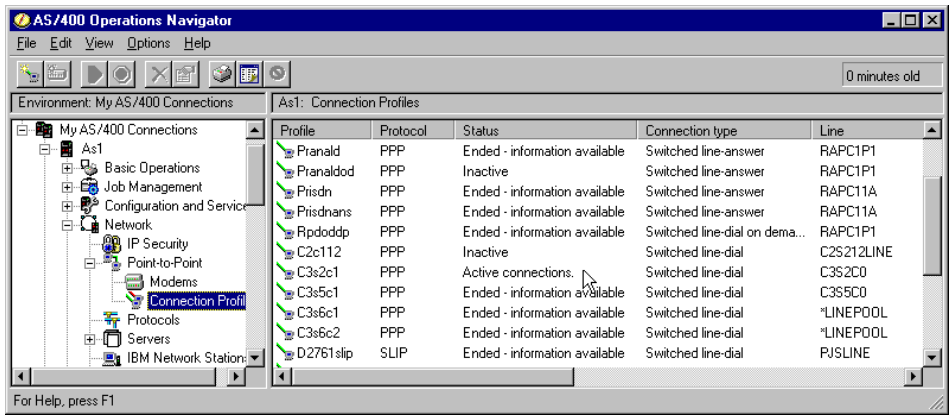


Figure 76. Status after starting the profile on AS1

5. View the job log of the profile on AS2.

   Click the profile. Right-click, and select **Jobs** (Figure 77 on page 96).

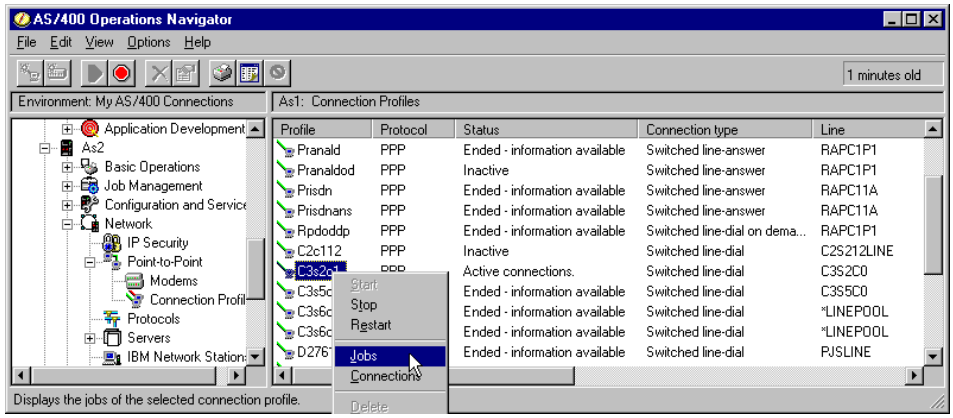


Figure 77. Viewing the job log of the profile on AS2 (Part 1 of 2)

Click the job that you want to see. Right-click, and select **Job Log** (Figure 78). If the job has already ended, select **Print Output**. The jobs are not lined up by a time sequence.

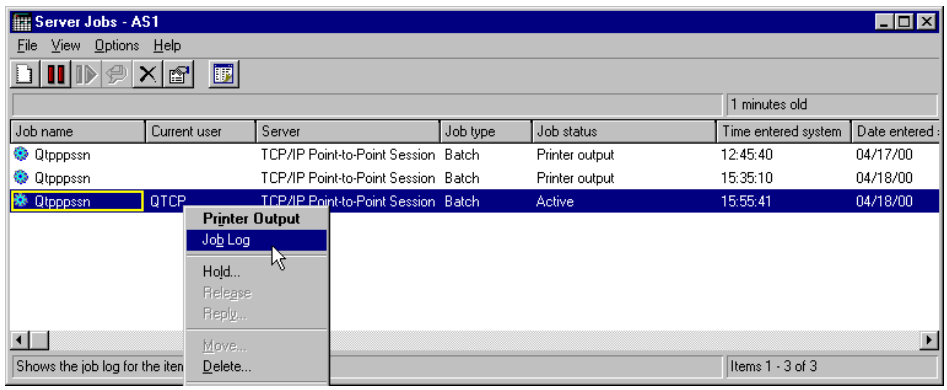


Figure 78. Viewing the job log of the profile on AS2 (Part 2 of 2)

6. View the job log of the profile on AS2 (Figure 79).

   In this case, it takes five seconds from dial to the completion of the IP address setting. You need to consider the time to make a connection for designing a TCP or UDP application when using a dial-on-demand profile.

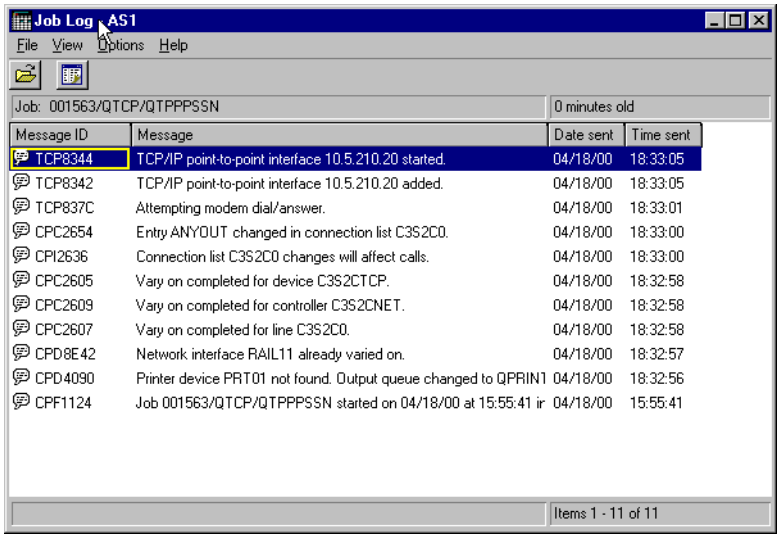


Figure 79. Job log of the profile on AS2

7. Stop the profile on AS1.

   Click on the profile. Right-click, and select **Stop** (Figure 80).

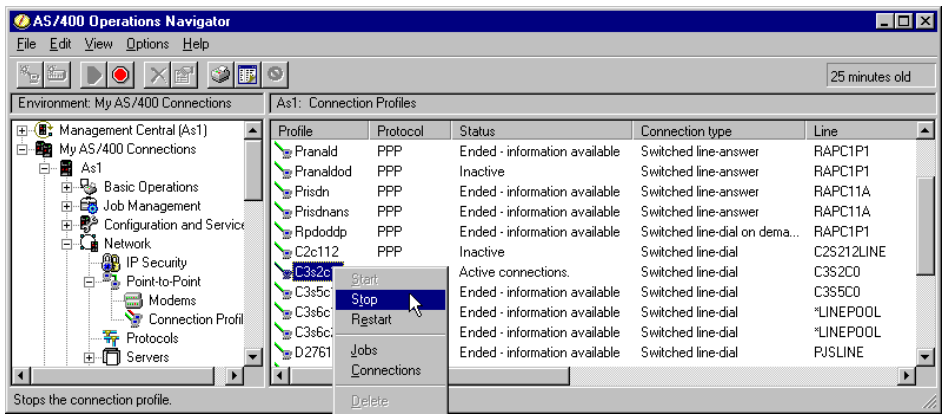


Figure 80. Stopping the profile on AS1

8. Check the status after stopping the profile on AS1 (Figure 81 on page 98).

   After stopping the PPP profile, the status changes from *Session job ending* to *Ended*. To see the latest status, press F5.

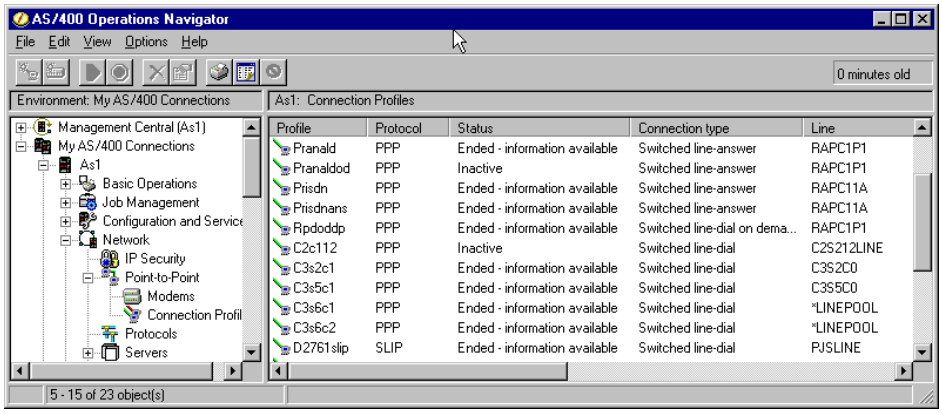


Figure 81. Status after stopping the profile on AS1

9. Check the status on the AS/400 screen after starting both profiles.

   Type the following command on AS1 to confirm the status of the PPP configuration objects:

   ```
   WRKCFGSTS CFGTYPE(*NWI) CFGD(RAIL11)
   ```

   The screen shown in Figure 82 appears.

```
                          Work with Configuration Status              AS1
                                                        04/18/00 18:48:41
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    13=Work with APPN status...

Opt  Description       Status               -------------Job--------------
     RAIL11           ACTIVE
       C3S2C0         ACTIVE
         C3S2CNET     ACTIVE
           C3S2CTCP   ACTIVE               QTPPPSSN    QTCP        001563




                                                                      Bottom
Parameters or command
===>
```

Figure 82. Status of the PPP configuration after starting the profile on AS1

   Type the following command to confirm the PPP job and profile on AS1:

   ```
   WRKTCPPTP
   ```

The screen shown in Figure 83 appears.

```
                    Work with Point-to-Point TCP/IP

Type option, press Enter.
  1=Add     2=Change   3=Copy   4=Remove          5=Display details   6=Print
  9=Start   10=End     12=Work with line status   14=Work with job

                                                    Line      Line    Job
Opt  Name        Mode   Type   Status          Description  Type    Name
                 *DIAL
     C3S2C1      *DIAL  *PPP   JOBSACTIVE      C3S2C0       *ISDN   QTPPPCTL
     C3S5C1      *DIAL  *PPP   OUTQ            C3S5C0       *ISDN   QTPPPCTL
     C3S6C1      *DIAL  *PPP   OUTQ                         *POOL   QTPPDIAL88
     C3S6C2      *DIAL  *PPP   OUTQ                         *POOL   QTPPDIAL89

                                                                    Bottom
```

Figure 83. Confirming the PPP profile on AS1

3.3 Scenario 3: PC with an ISDN adapter to the #2751 PPP

This section describes the situation where a PC user at a remote site wants to connect to an AS/400 system (Figure 84 on page 100). This scenario includes two cases:

- Case 1: PC Dial to AS/400 Answer numbered
- Case 2: PC Dial to AS/400 Answer unnumbered

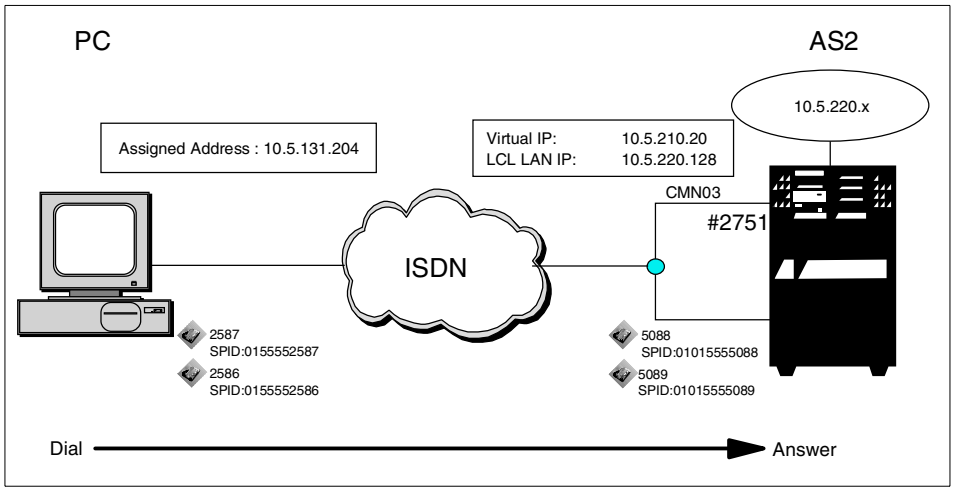


Figure 84. Scenario 3: PC with an ISDN adapter to the #2751 PPP

3.3.1 Scenario usage

This scenario allows remote PC users with an ISDN card to access AS/400 resources by using PPP. PC users can take advantage of faster communication speeds of 64 Kbps and less connection time.

3.3.2 Configuration steps

The following section describes how to configure the connection between an AS/400 system and a PC:

1. Configure the PPP profile on the AS/400 system.
2. Set up the dial-up network on the PC.

3.3.2.1 Configuring the PPP profile on the AS/400 system

The procedure and parameters required to create a PPP answer profile on the AS/400 system is similar to that described in 3.2.2.2, “Configuring the PPP profile as a switched answer on AS2” on page 89. The difference is to specify the starting IP address and the number of addresses in the Define address pool of the TCP/IP Settings page on the AS/400 system. The first system to connect is assigned the IP address that is specified in the Starting IP address field. If that address is already in use, the next available IP address within the Number of addresses field will be assigned (Figure 85).

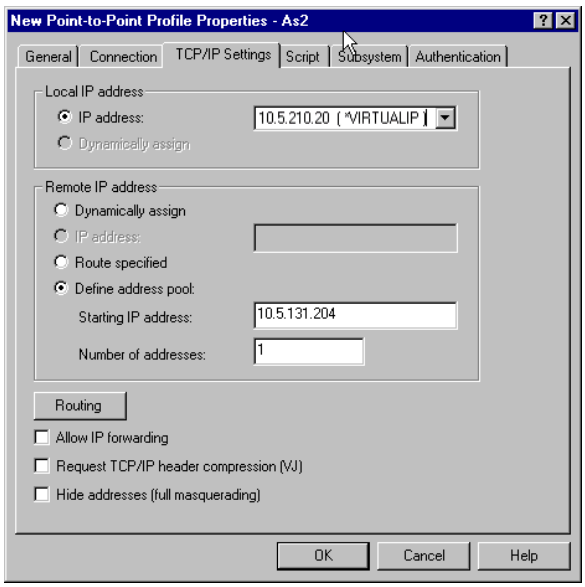


Figure 85. TCP/IP Settings page of the PPP answer profile for a PC on AS2

Configuration summary

Table 25 through Table 27 on page 102 show the information required to create the PPP answer profile on AS2. The parameters flagged as Optional and Required to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190, and *OS/400 TCP/IP Configuration and Reference V4R4*, SC41-5420.

Table 25. Information on the General page to create a PPP over the ISDN profile

Field name		Description	Value in this scenario
Name		Required field - The name of a connection profile.	C3S3Cn - We used the following naming rules: - C3 = Chapter 3 - S3 = Scenario 3 - C1 through C2 = Case number
Description		Optional field - Type the description.	
Type		Required field - PPP or SLIP You must specify PPP to create ISDN line on the Connection tab.	PPP
Mode -			

Field name		Description	Value in this scenario
Line connection type:		Required field - Select one from the following types: - Switched line = - Leased line = - Virtual line [L2TP] =	Switched Line
Mode type:		Required field - When Line connection type is Switched line, select one of these four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS2 = Answer (Cases 1 through 2)

Table 26. Information on the Connection page to create a PPP over an ISDN profile

Field name		Description	Value in this scenario
Link configuration			
Type of line service		Required field - Select the type of line service for a point-to-point link.	Digital line [ISDN]
Name		Required field - Type a new line name or select the existing line.	C3S2C0 (All cases used the same line)

Table 27. Information on the TCP/IP Settings page to create a PPP over an ISDN profile

Field name		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address		Specify that you want to use an existing IP address for your local address.	AS2 = 10.5.210.20 for numbered/10.5.220.128 for unnumbered
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address		Specifies that you want to enter an existing IP address for the address on the remote end of the connection.	

Field name		Description	Value in this scenario
Define address pool		Specifies a pool of remote IP addresses to be used for multiple connection profile types. Specify a starting IP address and the number of addresses.	10.5.131.204 (Cases 1 and 2) The number of connection = 1

3.3.2.2 Setting up Dial-Up Networking on the PC

Figure 86 through Figure 88 on page 104 show the values of Phonebook properties of Dial-Up Networking on a PC in this scenario.

1. Edit the Basic page of Phonebook (Figure 86).

   Specify the phone number of the remote system for Phone number, and select the ISDN adapter for Dial using.

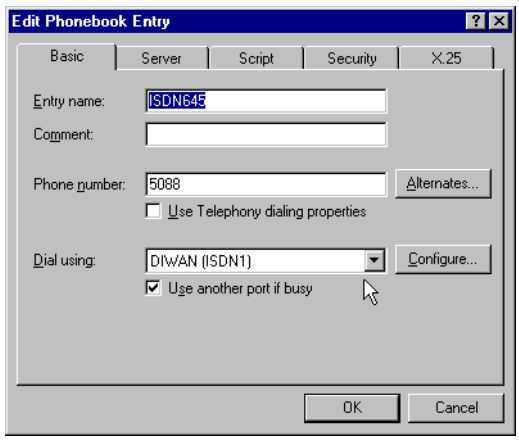


Figure 86. Basic page of Phonebook

2. Edit the Server page of Phonebook (Figure 87 on page 104).

   Select **PPP: Windows NT, Windows 95 Plus, Internet** for Dial-up server type, and select the **TCP/IP** checkbox for Network protocols.

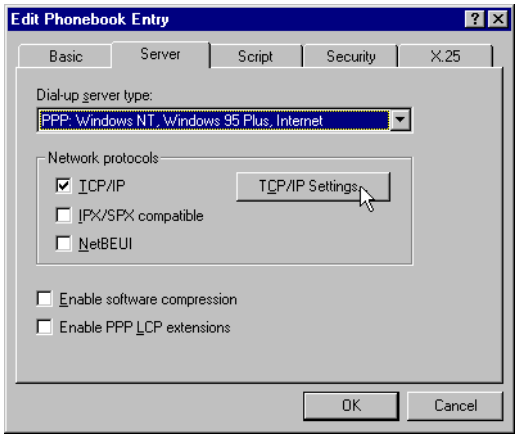


Figure 87. Server page of Phonebook

3. Edit the PPP TCP/IP Settings properties of Phonebook (Figure 88).

   Select **Server assigned IP address** to obtain an IP address from AS2.

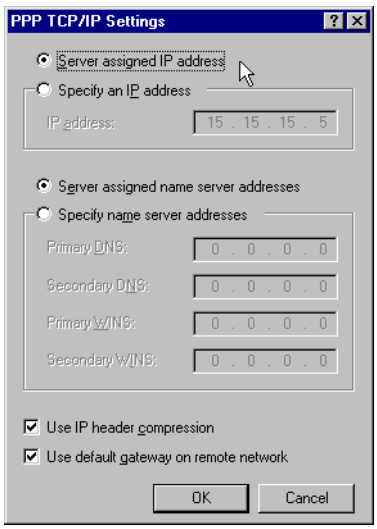


Figure 88. TCP/IP Settings properties of Phonebook

For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190, to configure PPP Dial-Up Networking on Windows systems.

3.3.2.3 Operation and status

This section shows how to start the dial-up network and a normal status on a PC. Before starting Dial-Up Networking on the PC, start the answer profile on AS2.

1. Start Dial-Up Networking on the PC.

   Click the **Start->Programs->Accessories->Dial-Up Networking**. See Figure 89.

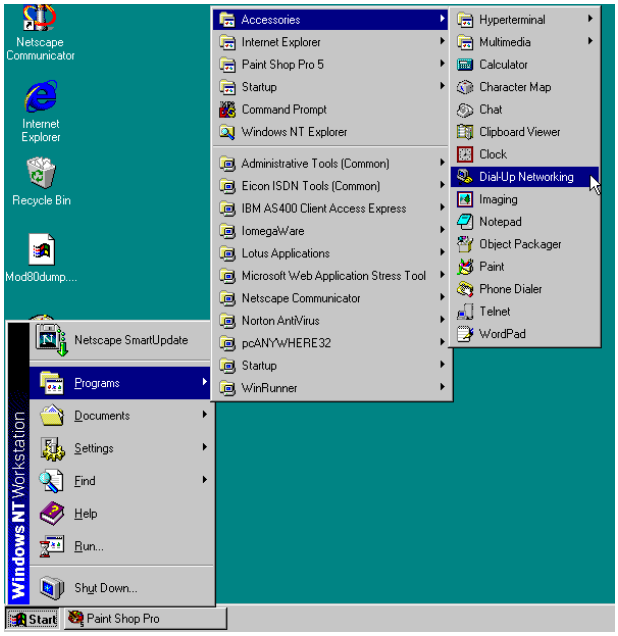


Figure 89. Starting Dial-Up Networking on a PC

2. Start dialing using the Phonebook.

   Select the Phonebook, and click **Dial** (Figure 90 on page 106).

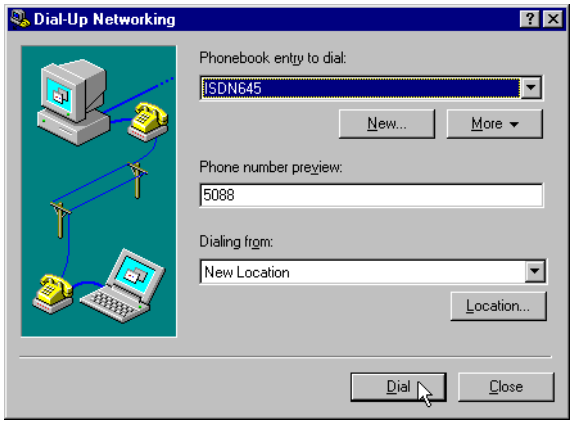


Figure 90. Starting dial-up using Phonebook

3. The status appears during dial-up on the PC (Figure 91).

Figure 91. Status while dialing on the PC

After dialing starts, the dialog indicating the status of dial operation is shown on the screen. The status changes from Dialing, to Verifying user name and password, to Registering your computer on network, and to Authenticated. Then, the connection is established.

4. After the connection is established, the Dial-Up Networking Monitor - Status page appears.

   Figure 92 and Figure 93 show panels of the Dial-Up Networking Monitor after the PPP connection is established. The line speed is 64 Kbps, and the assigned IP address is 10.5.131.204.

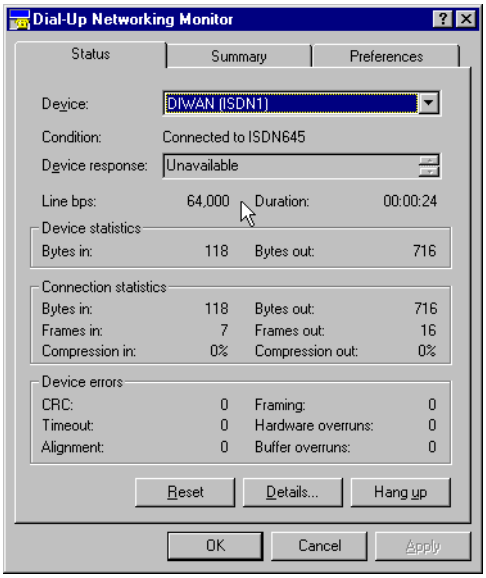


Figure 92. Status of the Dial-Up Networking Monitor after making a connection (Part 1 of 2)

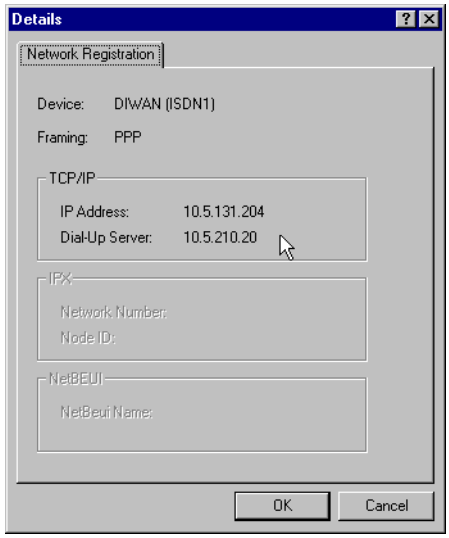


Figure 93. Status of the Dial-Up Networking Monitor after making a connection (Part 2 of 2)

Note: It only takes a few seconds to make a connection in this scenario. PC users can use AS/400 resources soon after starting the call.

Chapter 4. ISDN/Analog connections

This chapter describes mixed mode connection scenarios using the #2761 Integrated Analog Modem and #2751 Integrated ISDN Adapter, together with the V.90 modem PC connecting to a #2751 using TCP/IP PPP. Another scenario describes an asynchronous line connection to a #7820 terminal adapter to a remote #2751 ISDN adapter using TCP/IP PPP. You'll find configuration instructions for all scenarios and a discussion of the problems encountered during setup. The scenarios are:

- Scenario 1: #2751 to and from the #2761 TCP/IP PPP
- Scenario 2: PC with modem to the #2751 TCP/IP PPP
- Scenario 3: Asynchronous line with terminal adapter (TA) to the #2751 TCP/IP PPP
- Scenario 4: #2751 to Fax

Note

In this chapter, the windows shown for remote access configuration are from a V4R4 system. The information may be formatted differently in other releases. Use the examples here as a guide.

4.1 Scenario 1: #2761 to and from the #2751 TCP/IP PPP

In this scenario, the following cases are configured for AS/400 to AS/400 system connections using PPP:

- Case 1: AS/400 Dial to AS/400 Answer numbered
- Case 2: AS/400 Dial to As/400 Answer unnumbered

Figure 94 on page 110 shows the testing environment for this scenario.

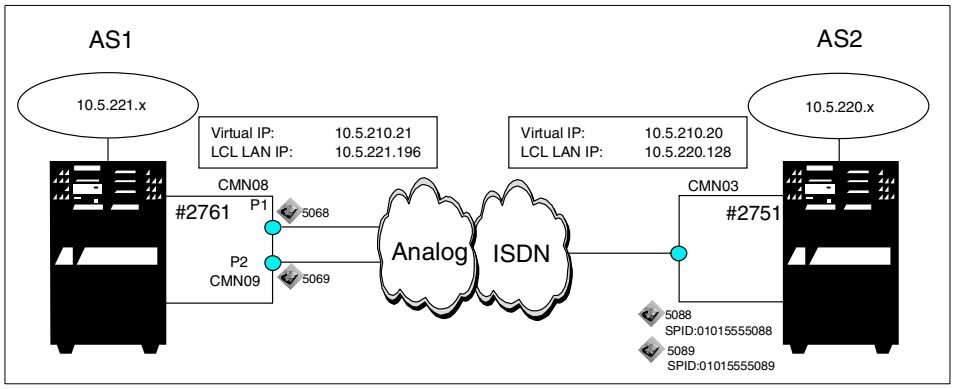


Figure 94. #2751 to and from the #2761 TCP/IP PPP

4.1.1 Scenario usage

The principle use of this scenario is for executing TCP/IP applications in a mixed protocol environment, between an AS/400 system, with an ISDN adapter, to another system with an analog adapter installed.

4.1.2 Configuration steps

The following section explains how to configure the PPP connection. The following steps are performed:

1. Configure a PPP profile as a switched Dial on AS1.
2. Configure a PPP profile as a switched Answer on AS2.

The configuration definitions for TCP/IP PPP are made using Client Access Express Operations Navigator.

Note

The numbers in reverse bold type in Figure 95 through Figure 109 on page 122 correspond to the numbers in Table 28 on page 122 through Table 36 on page 139.

4.1.2.1 Configuring a PPP profile as a switched Dial on AS1

For this configuration, complete the following steps:

1. Click **Operations Navigator->Network->Point to Point**. Right-click **Connection Profiles for New Profile**.

Enter a name and description. Set Mode line connection type to **Switched line** and Mode type to **Dial** (Figure 95).

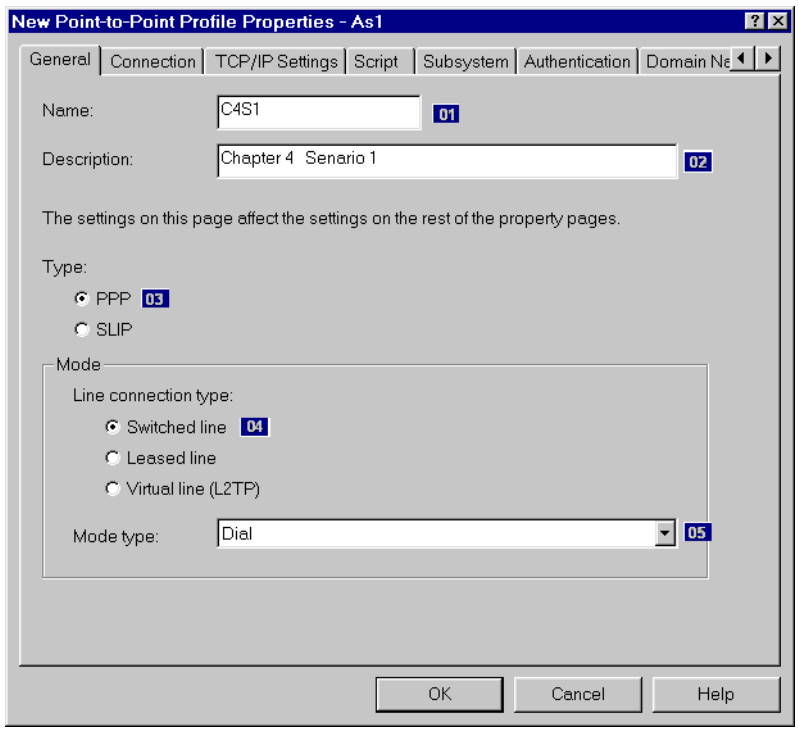


Figure 95. Creating a PPP profile for AS1 (dial mode)

2. Click the **Connection** tab (Figure 96 on page 112).

   Click **Add**, and enter the Remote phone number.

   a. Select **Analog line** for Link configuration Type of Line Service. Enter a name, and click **New** to create a new line for the connection. You can add up to three remote phone numbers.

   b. If the line exits, select the line description from Name list. Click **Open** to create a line, and complete the New Analog Line Properties pages.

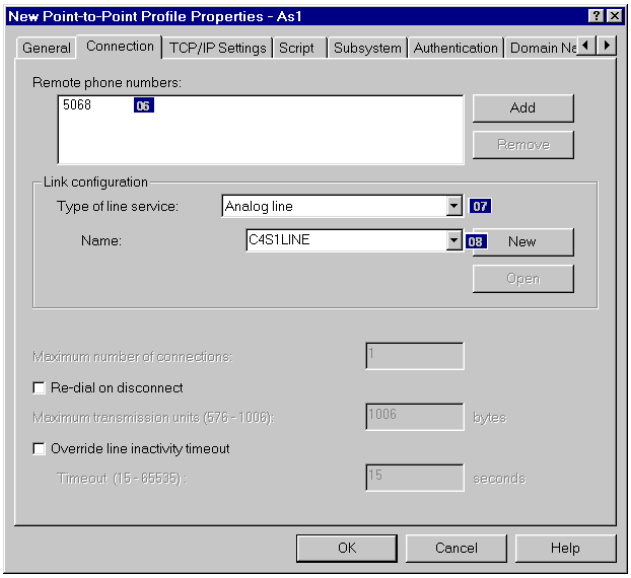


Figure 96. Creating a new line for AS1 on the Connection tab

3. Click **New**. The New Analog Line Properties page appears (Figure 97). Enter a description, and select a resource name.

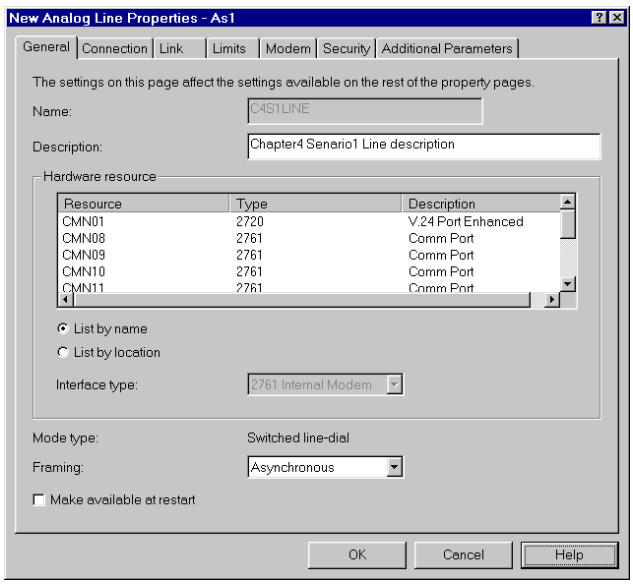


Figure 97. Selecting the resource name for the line description

4. Click the **Connection** tab (Figure 98).

   Set Connection to **Both**, and click **Use flow control** (Figure 98).

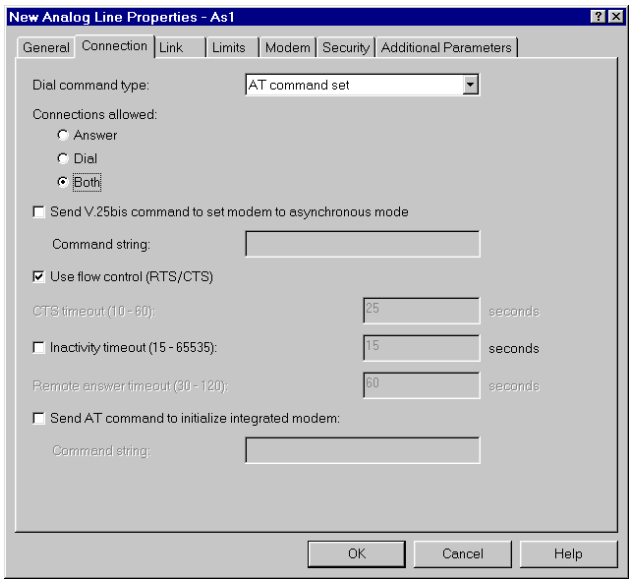


Figure 98. Setting the connection parameters for a new PPP line

5. Click the **Link** tab.

   Enter a line speed and maximum frame size (or leave the defaults). See Figure 99 on page 114.

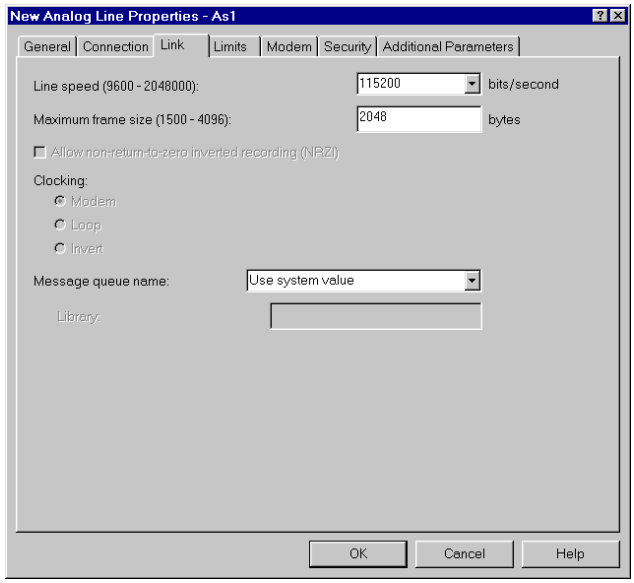


Figure 99. Setting the Link parameters for a new PPP line

6. Click the **Modem** tab.

   Select **2761 Internal Modem** (Figure 100).

   Click **OK**. Then, the Connection display shown in Figure 96 on page 112 appears again.

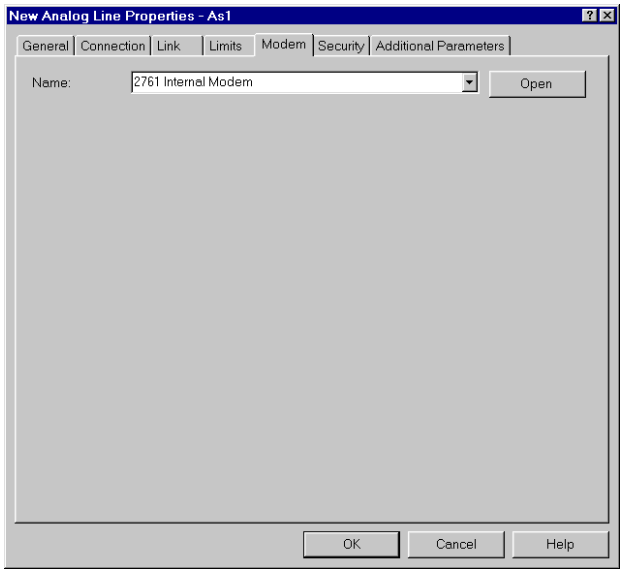


Figure 100. Selecting the Modem profile for a new PPP line

7. Click the **TCP/IP Settings** tab (Figure 101 on page 116).

   Select or enter a local IP address:

   - For Case 1, select the local *VIRTUALIP address, and set the AS2 *VIRTUALIP address in the Remote IP address field.
   - For Case 2, select the local LAN address, and set the AS2 LAN address in the Remote IP address field.

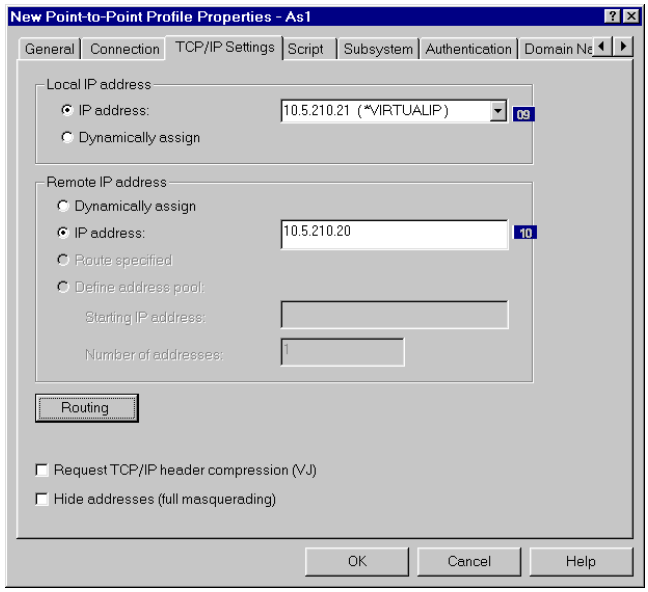


Figure 101. Assigning the local and remote IP address

8. Click **OK** to create the profile.

4.1.2.2 Creating a PPP profile as a switched Answer on AS2

Create a New Answer profile on the target AS/400 system by performing the following steps:

1. Click **Operations Navigator->Network->Point to Point**. Right-click **Connection Profiles for New Profile**.

   On the General page (Figure 102), enter a name (of the profile) and description. Set Type as **PPP**, Mode as **Switched line**, and Mode type as **Answer**.

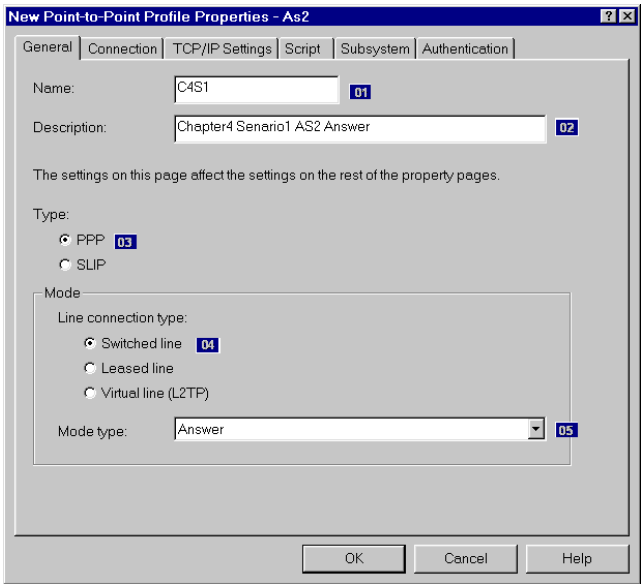


Figure 102. Creating a PPP profile for AS2 (Answer mode)

2. Click the **Connection** tab (Figure 103 on page 118).

   Select **Digital line (ISDN)** for Type of line service, and select the line name from the list or create a new line. In this section, use the created line. If you want to know how to create the new line, see 3.2, “Scenario 2: #2751 to and from the #2751 PPP” on page 80.

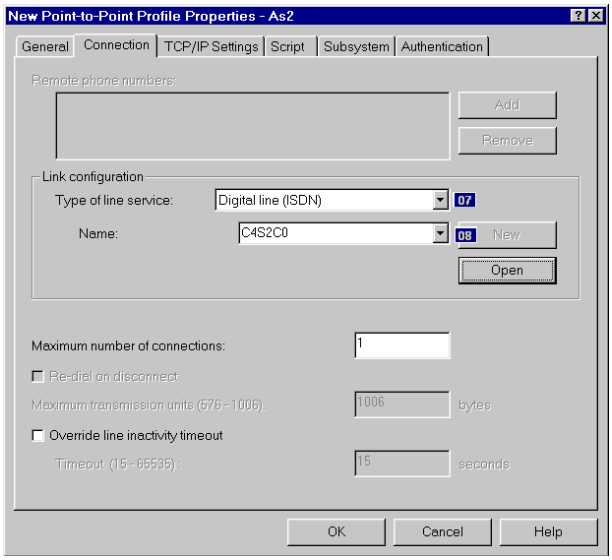


Figure 103. Selecting the line name on the Connection tab

3. Click **Open**. A properties display appears for the selected line (Figure 104).

   Enter a description.

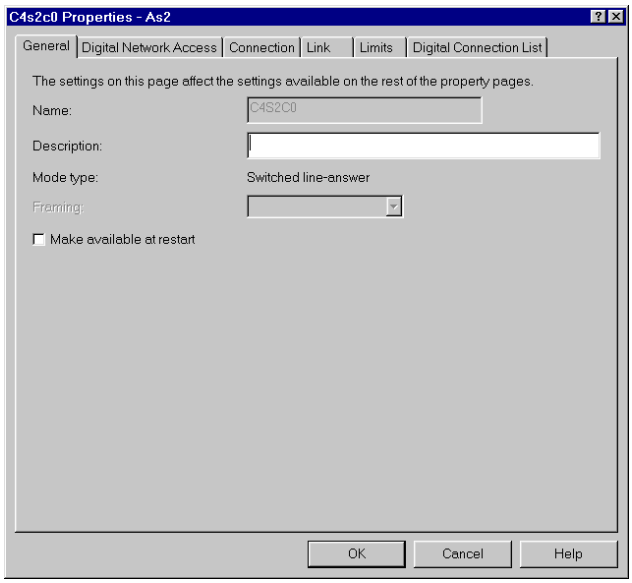


Figure 104. General tab of the selected line

4. Click the **Digital Network Access** tab (Figure 105).

   Select a switched digital network connection by clicking on an entry, or click **Add** to create a new interface or change an existing interface description.

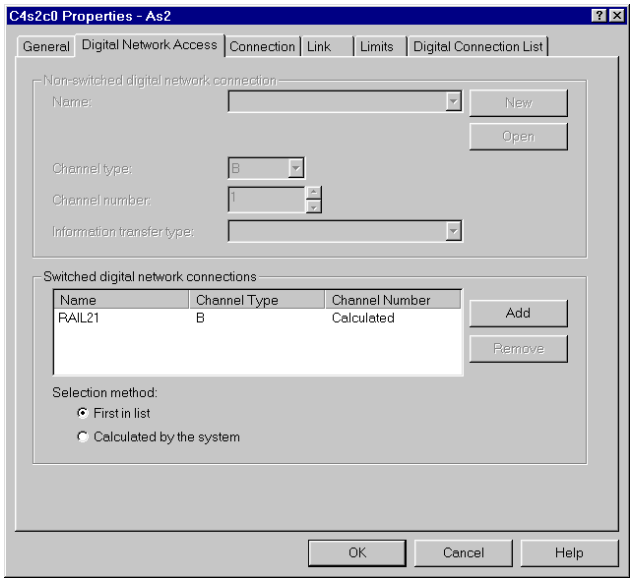


Figure 105. Verifying the resources for the line

5. Click the **Connection** tab (Figure 106 on page 120).

   For Connections allowed, select **Answer**.

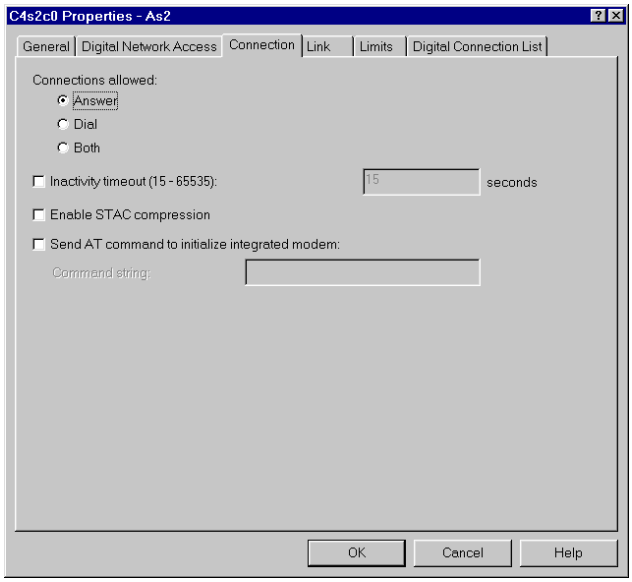


Figure 106. Verifying the Connection properties of the line

6. Click the **Link** tab (Figure 107).

   Enter a line speed of `64000` and a frame size of `2048`.

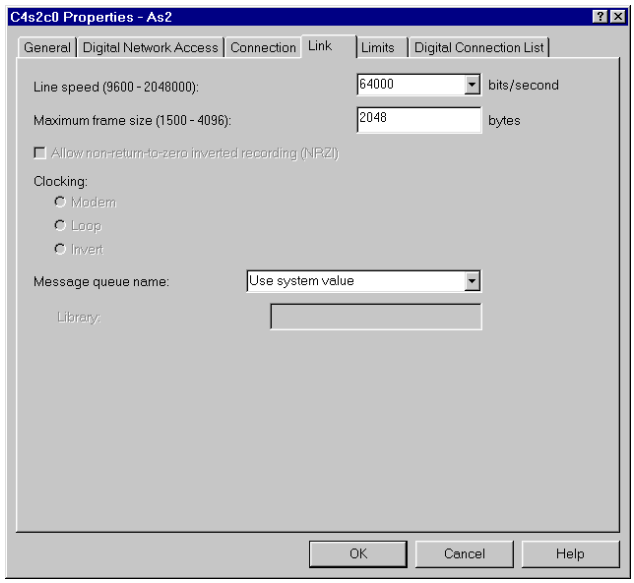


Figure 107. Verifying the line speed and frame size

7. Click the **Digital Connection List** tab (Figure 108).

   For Information transfer types accepted for incoming calls, select **Asynchronous modem**.

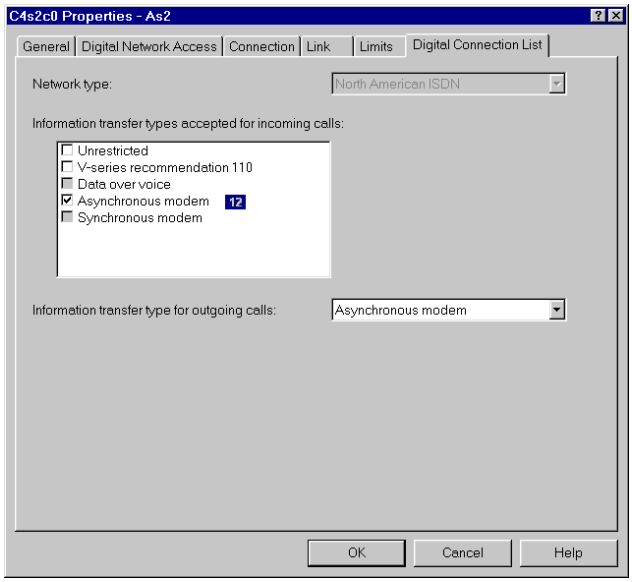


Figure 108. Verifying the transfer type

8. Click **OK**. Then, the New Point-to-Point Properties Connection page shown in Figure 103 on page 118 is displayed.
9. Click the **TCP/IP Settings** tab (Figure 109 on page 122).

   Select a local IP address, and set a remote IP address.

   - For Case 1, select the *VIRTUALIP address for the local IP address. In the Remote IP address box, select **Define address pool**, and specify the AS1 *VIRTUALIP address in the starting IP address field. Also specify `1` for Number of addresses.
   - For Case 2, select the local LAN address for the local IP address. In the Remote IP address box, select **Define address pool**, and specify the AS1 LAN address in the Remote IP address field. Select **Routing** and **Allow IP forwarding**.

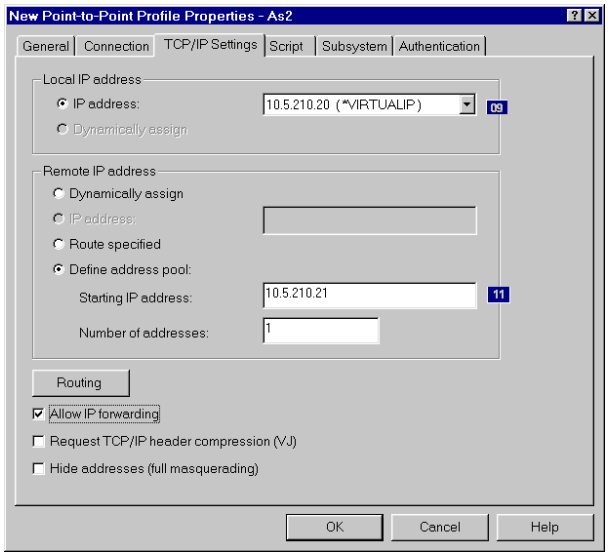


Figure 109. Specifying the local and remote IP address

10.Click **OK** to create the new PPP profile.

4.1.2.3 Configuration summary of scenario 1 cases

Table 28 through Table 31 on page 126 show the information required to create the PPP profile. The parameters flagged as Optional or Required to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

Note that the numbers in the following tables correspond to those numbers in reverse-bold type in Figure 95 on page 111 to Figure 109.

Table 28. Information on the General page to create PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	C4S1
Description	02	Optional field - Type the description.	
Type	03	Required field - PPP or SLIP You must specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			

Field name and number		Description	Value in this scenario
Line connection type	04	Required field - Select one from the following types: - Switched line: - Leased line: - Virtual line [L2TP]:	Switched Line
Mode type	05	Required field - When Line connection type is Switched line, select one of these four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1= Dial (Cases 1 and 2) AS2 = Answer (Cases 1 and 2)

Table 29. Information on the Connection page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values, except Answer, as the value of the Mode type on the General tab. Specify the remote local phone number.	AS2 = 5068 (for AS1 PPP profile)
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	AS1 = Analog line AS2 = Digital line [ISDN]
Name	08	Required field - Type a new line name or select the existing line.	AS1 = C4S1LINE AS2 = C4S2C0

Table 30. Information on the TCP/IP Settings page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	09	Specify that you want to use an existing IP address for your local address.	AS1 = 10.5.210.21 (Case 1) AS1 = 10.5.220.128 (Case 2) AS2 = 10.5.210.20 (Case 1) AS2 = 10.5.220.128 (Case 2)
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	10	Specifies that you want to enter an existing IP address for the address on the remote end of the connection.	AS1 = 10.5.210.20 (Case 1) AS1 = 10.5.220.128 (Case 2)
Define address pool	11	Specifies a pool of remote IP addresses to be used for multiple connection profile types. Specify a starting IP address and the number of addresses.	AS2 = 10.5.210.21 (Case 1) AS2 = 10.5.221.196 (Case 2)

Table 36. Required information for the Digital Connection List tab

Field name and number		Description	Value in this scenario
Information transfer types accepted for incoming calls	12	As field name	AS2 = Asynchronous

4.1.2.4 Operation and status

This section shows how to activate the PPP profiles and their resulting status. Follow these steps:

1. Verify whether the profile status in both systems is Inactive or Ended.
2. Right-click on the profile name, and select **Start** to activate the connection. The Answer profile shows a “Waiting for incoming call” status

on the Operations Navigator screen. The Dial profile shows an “Active connections” status.

3. PING or Telnet to test the connection.

4.2 Scenario 2: PC with modem to the #2751 TCP/IP PPP

This section describes a situation where a PC user at a remote site wants to connect to the AS/400 system. See Figure 110.

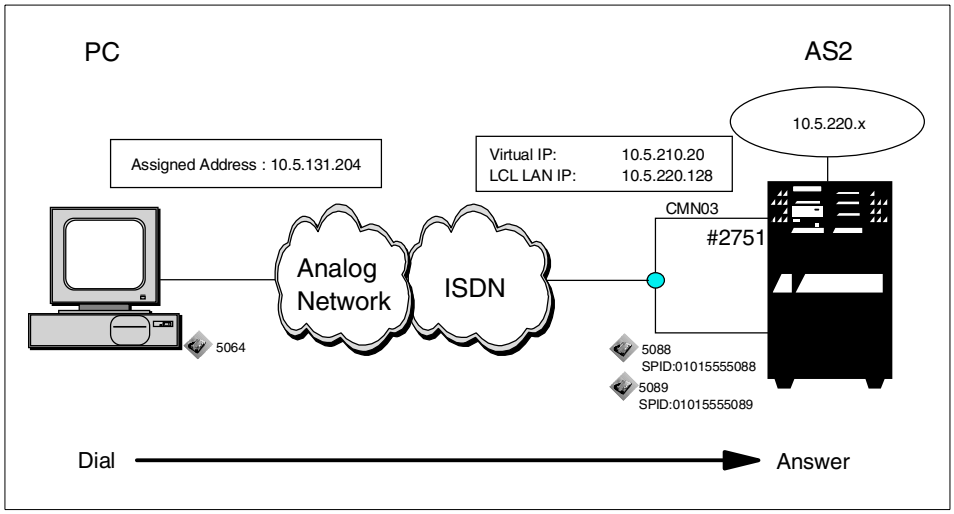


Figure 110. Scenario 2: PC with V.90 modem to the #2751 using PPP

4.2.1 Scenario usage

This scenario allows remote PC users connected to an analog network to access AS/400 resources by using PPP. When PC users use the V.90 modem, the #2751 provides PC users quicker operations at 48 Kbps than the 33.6 Kbps of the #2761.

4.2.2 Configuration steps

The following sections describe how to configure the connection between an AS/400 system and a PC:

1. Configure the PPP profile on the AS/400 system.
2. Set up the dial-up network on the PC.

4.2.2.1 Configuring the PPP profile on the AS/400 system

The procedure and parameters needed to create a PPP answer profile on an AS/400 system are almost the same as those used in 3.3.2.1, “Configuring the PPP profile on the AS/400 system” on page 100. The difference is to change the value of the Information transfer type for both incoming and outgoing calls to Asynchronous modem. This is an essential requirement for a PPP over an analog or digital connection (Figure 111).

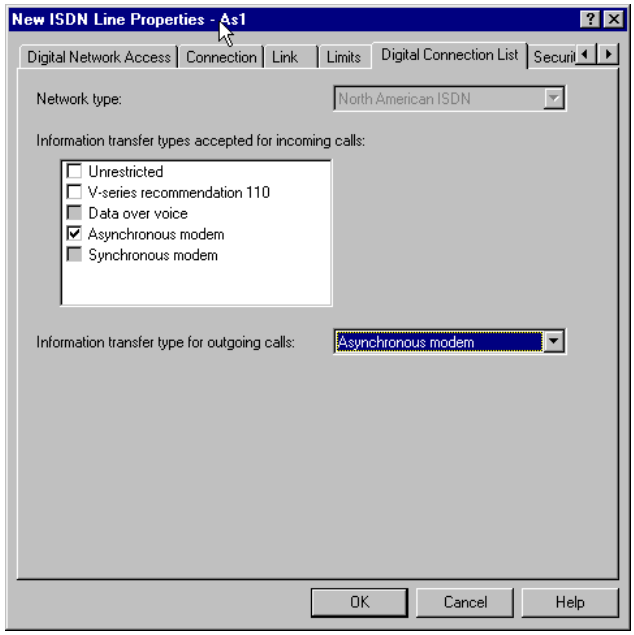


Figure 111. Digital Connection List for line of PPP answer profile for a PC on AS2

Configuration summary

Table 31 through Table 33 show the information required to create the PPP answer profile on AS2. The parameters flagged as Optional or Required to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190, and *OS/400 TCP/IP Configuration and Reference V4R4*, SC41-5420.

Table 31. Information on the General page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Name		Required field - The name of a connection profile.	C4S2
Description		Optional field - Type the description.	

Field name and number		Description	Value in this scenario
Type		Required field - PPP or SLIP You must specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			
Line connection type:		Required field - Select one of the following types: - Switched line = - Leased line = - Virtual line [L2TP] =	Switched Line
Mode type:		Required field - When Line connection type is Switched line, select one of these four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS2 = Answer

Table 32. Information on the Connection page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Link configuration			
Type of line service		Required field - Select the type of line service for a point-to-point link.	Digital line [ISDN]
Name		Required field - Type a new line name or select the existing line.	C4S2C0

Table 33. Information on the TCP/IP Settings page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address		Specify that you want to use an existing IP address for your local address.	AS2 = 10.5.210.20 or 10.5.220.128

Field name and number		Description	Value in this scenario
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address		Specifies that you want to enter an existing IP address for the address on the remote end of the connection.	
Define address pool		Specifies a pool of remote IP addresses to be used for multiple connection profile types. Specify a starting IP address and the number of addresses.	10.5.131.204 The number of connection = 1

4.2.2.2 Setting up Dial-Up Networking on a PC

The procedure and parameter needed to set up the Phonebook of Dial-Up Networking on a PC are almost same as those used in 3.3.2.2, “Setting up Dial-Up Networking on the PC” on page 103. The difference is that, here, you need to select the V.90 modem for Dial using in the Basic page of the Phonebook (Figure 112).

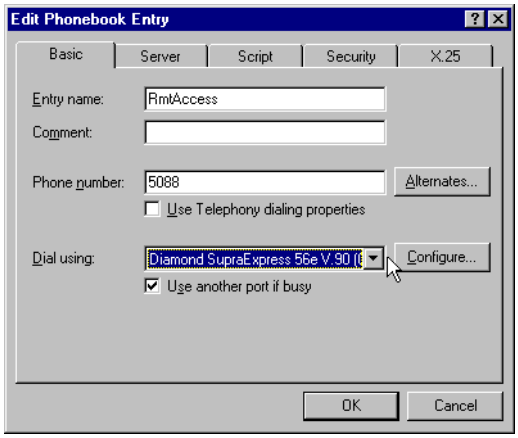


Figure 112. Editing the Basic page of Phonebook

Refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190, for configuring the PPP Dial-Up Networking on Windows systems.

4.2.2.3 Operation and status

The operation in this scenario is the same as the operation in 3.3.2.3, “Operation and status” on page 105. Figure 113 shows the Dial-Up

Networking Monitor panel after the PPP connection is established. The line speed is 48 Kbps.

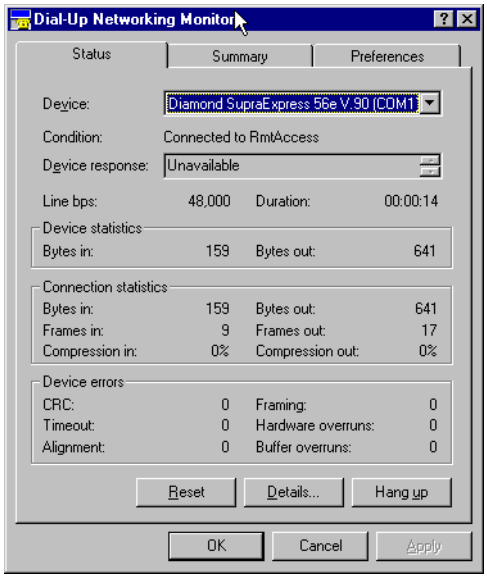


Figure 113. Status of the Dial-Up Networking Monitor after making a connection

Note

Communication speed in this scenario is 48 Kbps faster than the scenario using the #2761 where the maximum speed possible is 33.6 Kbps. PC users with a V.90 modem can use part of the high communication speed on the ISDN without additional cost.

4.3 Asynchronous line with a terminal adapter to the #2751 TCP/IP PPP

In this scenario, the PPP connection profiles are configured for the following cases:

- Case 1: AS/400 Dial to AS/400 Answer numbered
- Case 2: AS/400 Dial to AS/400 Answer unnumbered

Figure 114 on page 130 shows the test environment for this scenario.

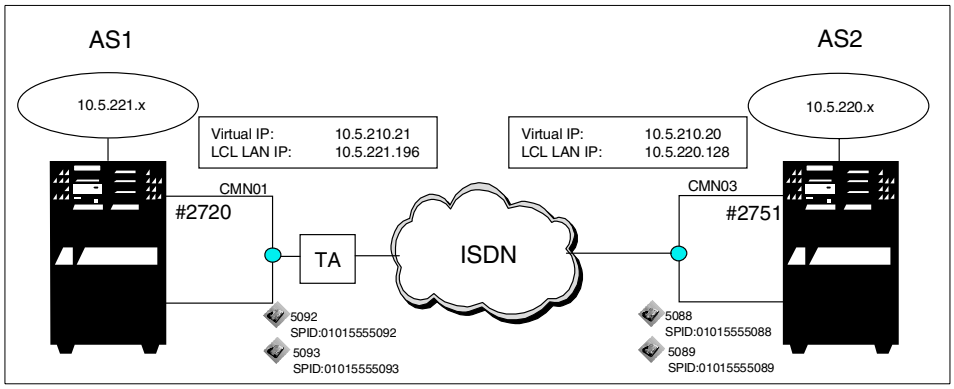


Figure 114. Asynchronous line with a terminal adapter to the #2751 TCP/IP PPP

4.3.1 Scenario usage

This scenario allows connections using PPP through a US Robotics Courier I modem terminal adapter (TA) to a remote system over ISDN. This makes the TCP/IP applications available between the systems.

4.3.2 Configuration steps

To implement this scenario, the following steps are required:

1. Configure a PPP profile as a switched Dial on the source system, AS1.
2. Configure a PPP profile as a switched Answer on the target system, AS2.

The configuration definitions for TCP/IP PPP are made using Client Access Express Operations Navigator.

Note

The numbers in reverse bold type in Figure 115 through Figure 124 on page 138 correspond to the numbers in Table 35 on page 138 through Table 40 on page 154.

4.3.2.1 Configuring a Dial-on profile on AS1

On the source AS/400 system, create a Dial/Both Profile:

1. Click **Operations Navigator->Network->Point to Point**. Right-click **Connection Profiles for New Profile**.

   The New Point-to-Point Properties display appears as shown in Figure 115.

Enter a name and description. For Mode line connection type, select **Switched line**, and for Mode type, select **Dial**.

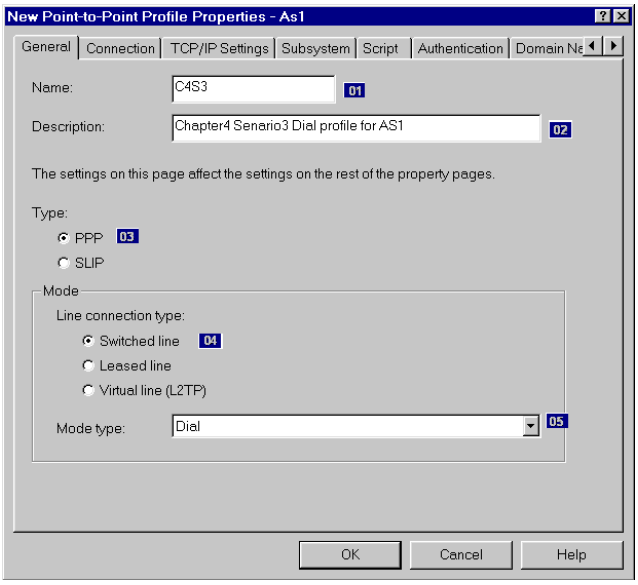


Figure 115. Creating a PPP profile for AS1

2. Click the **Connection** tab (Figure 116 on page 132).

   Click **Add**, and enter the remote phone number.

   a. Select **Analog line** for Link configuration Type of Line Service. Enter a name, and click **New** to create a new line for the connection. You can add up to three remote phone numbers.

   b. If the line exits, select the line description from Name list. Click **Open** to create one. Then, complete the New Analog Line Properties pages.

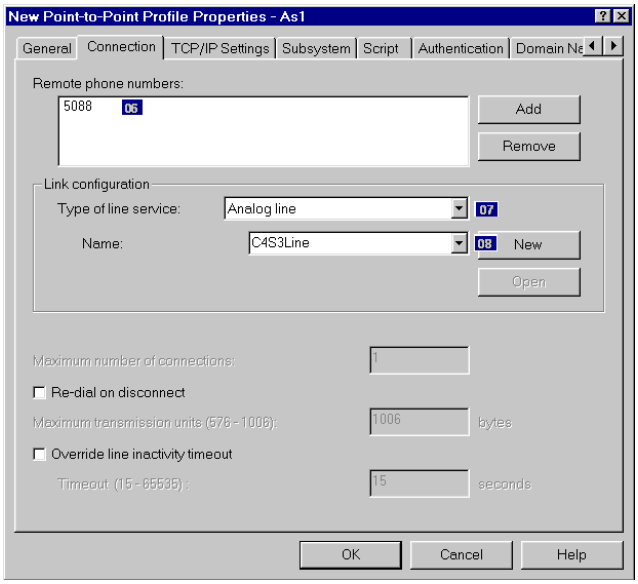


Figure 116. Creating a new line for the C4S3 PPP profile

3. Click **New** to create a new link. Complete the New Analog Line Properties pages (Figure 117).

   Enter a description, and select a resource name of **2720** type.

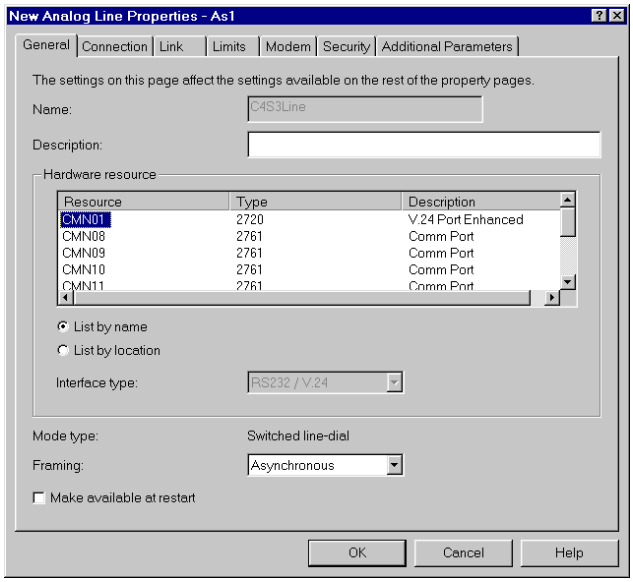


Figure 117. Selecting a resource name for line C4S3

4. Click the **Connection** tab (Figure 118).

   Set Connections allowed to **Both**, and click **Use flow control**.

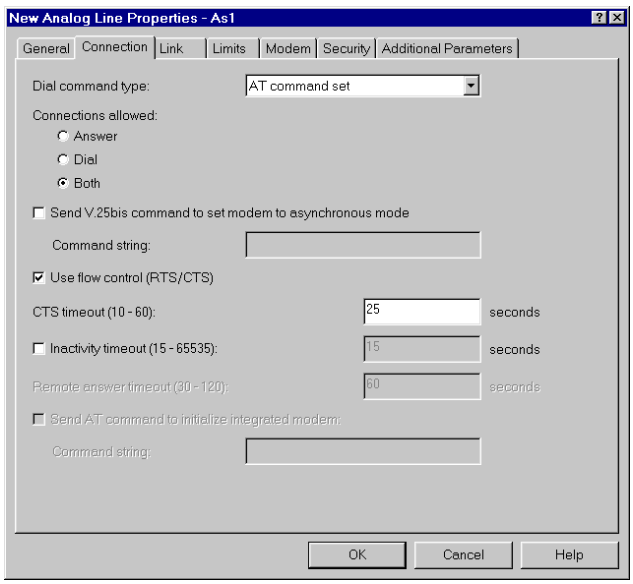


Figure 118. Setting the Connection parameters for line C4S3S

5. Click the **Link** tab (Figure 119).

   Enter a line speed and maximum frame size (or leave the defaults).

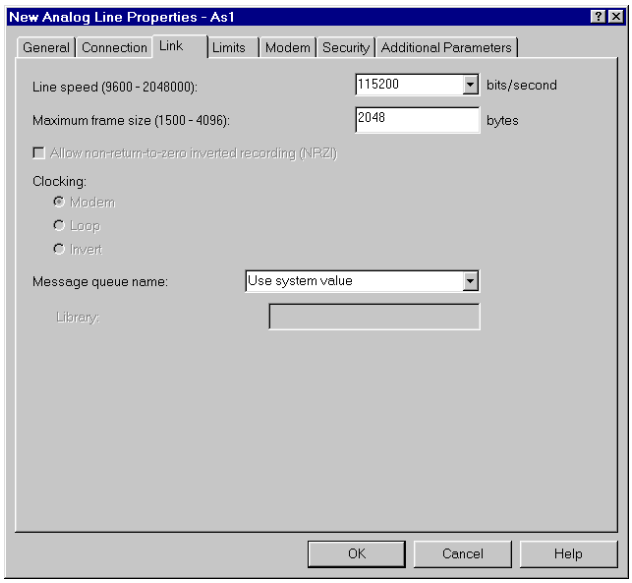


Figure 119. Setting Link properties for line C4S3

6. Click the **Modem** tab (Figure 120).

   Select **3Com/US Robotics Courier I ISDN/V.Everything, V.35 230.4Kbps** for Modem name.

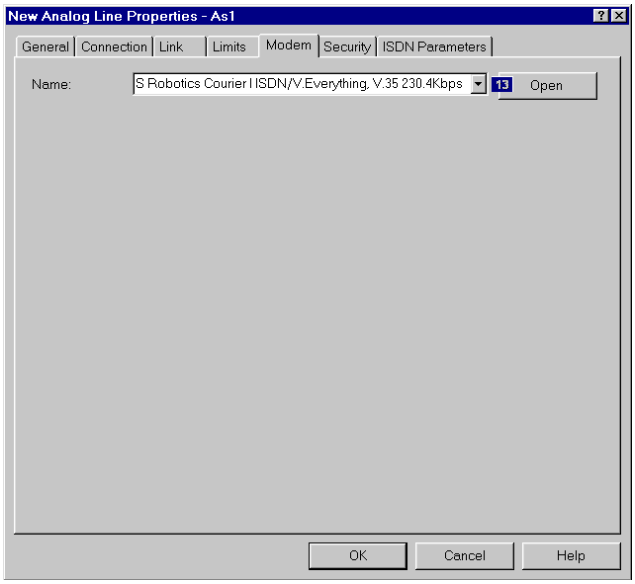


Figure 120. Setting the Modem parameter for line C4S3

7. Click the **ISDN Parameters** tab (Figure 121) to add AT commands for TA.

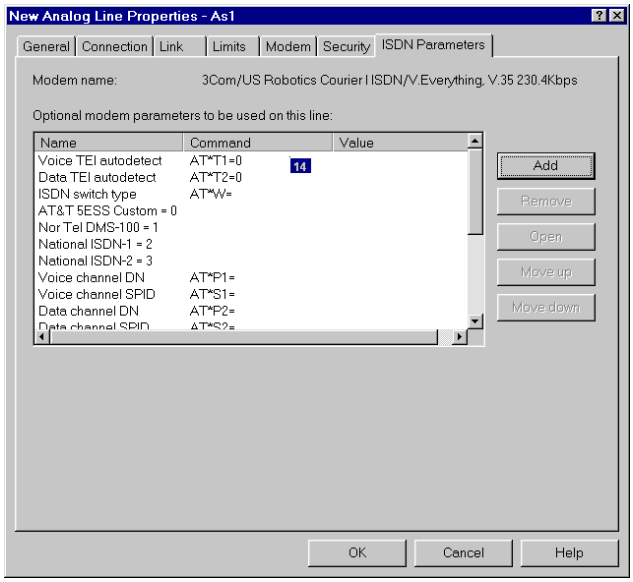


Figure 121. Setting AT commands for TA

Click the **Add** button. Enter the information from Table 34 on the display shown in Figure 122.

Table 34. AT command for 3Com/US Robotics Courier I ISDN/V.Everything

Name	Command	In this case
ISDN switch type	AT*W=2	
Voice channel DN	AT*P1='your first phone number'	AT*P1=5088
Voice channel SPID	AT*S1='your first SPID'	AT*S1=01015555088
Data channel DN	AT*P2='your second phone number'	AT*P2=5089
Data channel SPID	AT*S2='your second SPID'	AT*S2=010155555089
Reset modem	ATZ!	
Modem/FAX voice channel	AT*V1=0	
Speaker Control Option	AT*M=1	

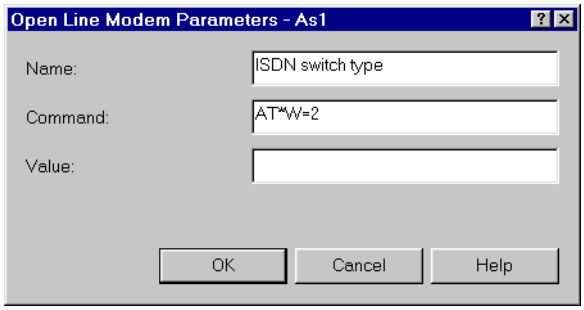


Figure 122. Modem parameter screen

8. Click **OK**. Then, the Point-to-Point Profile Properties display shown in Figure 116 on page 132 appears again.
9. Click the **TCP/IP Settings** tab (Figure 123).

   Select or enter a local IP address:

   - For Case 1, select the local *VIRTUALIP address, and set the AS2 *VIRTUALIP address in the Remote IP address field.
   - For Case 2, select the local LAN address, and set the AS2 LAN address in the Remote IP address field.

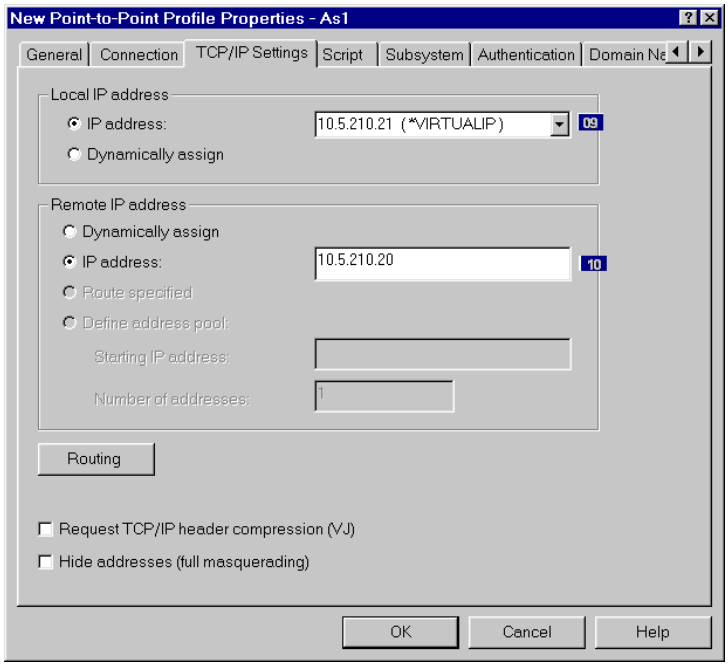


Figure 123. Setting the TCP/IP Settings page for the C4S3 PPP profile

10.Click **OK** to create.

4.3.2.2 Creating an Answer profile on AS2

Create a new answer profile on the target AS/400 system AS2. Perform the same configuration steps as explained in 4.1.2, “Configuration steps” on page 110. However, in this case, select **Unrestricted** for Information transfer types accepted for incoming calls on step 7 (see Figure 124 on page 138).

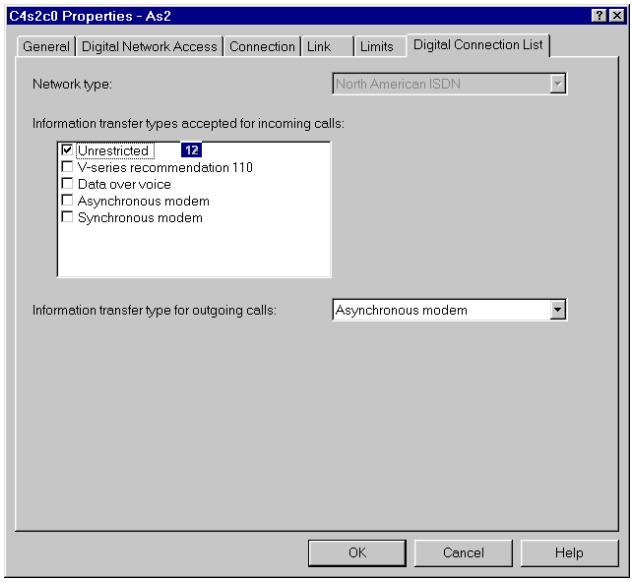


Figure 124. Digital Connection List for the C4S2C0 PPP profile

4.3.2.3 Configuration summary of Scenario 3

Table 35 through Table 38 on page 140 shows the information required to create the PPP profile. The parameters flagged as Optional or Required to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190.

Note that the numbers in the following tables correspond to those numbers in reverse-bold type in Figure 115 on page 131 to Figure 124.

Table 35. Information on the General page to create a PPP profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	C4S3
Description	02	Optional field - Type the description.	
Type	03	Required field - PPP or SLIP You must specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			

Field name and number		Description	Value in this scenario
Line connection type	04	Required field - Select one from the following types: - Switched line: - Leased line: - Virtual line [L2TP]:	Switched Line
Mode type	05	Required field - When the Line connection type is Switched line, select one of these four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1 = Dial (Cases 1 and 2) AS2 = Answer (Cases 1 and 2)

Table 36. Information on the Connection page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values except Answer as the value of Mode type on the General tab. Specify the remote local phone number.	AS2 = 5088 (for AS1 PPP profile)
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	AS1 = Analog line AS2 = Digital line [ISDN]
Name	08	Required field - Type new line name or select the existing line.	AS1 = C4S3LINE AS2 = C4S2C0

Table 37. Information on the TCP/IP Settings page to create a PPP over the ISDN profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	09	Specify that you want to use an existing IP address for your local address.	AS1 = 10.5.210.21 (Case 1) AS1 = 10.5.220.128 (Case 2) AS2 = 10.5.210.20 (Case 1) AS2 = 10.5.220.128 (Case 2)
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	10	Specifies that you want to enter an existing IP address for the address on the remote end of the connection.	AS1 = 10.5.210.20 (Case 1) AS1 = 10.5.220.128 (Case 2)
Define address pool	11	Specifies a pool of remote IP addresses to be used for multiple connection profile types. Specify a starting IP address and the number of addresses.	AS2 = 10.5.210.21 (Case 1) AS2 = 10.5.221.196 (Case 2)

Table 38. Required information for the Digital Connection List tab

Field name and number		Description	Value in this scenario
Information transfer types accepted for incoming calls	12	As field name	AS2 = Unrestricted

Table 39. Modem properties and ISDN commands

Field name and number		Description	Value in this scenario
Modem	13	Modem name	AS1 = US Robotics I ISDN Courier I

Field name and number		Description	Value in this scenario
ISDN parameters	14	ISDN parameters	AS1:AT*W=2, AT*M=1, ATS1=first spid, AT*P1=first phone num. AT*V1=0 AT*S2=second spid AT*P2=2nd phone num. ATZ!

4.3.2.4 Operation and status

This section shows how to activate the PPP profiles and their resulting status:

1. Verify whether the profile status in both systems is Inactive or Ended.
2. Right-click the profile name, and select **Start** to activate the connection. The Answer profile shows a “Waiting for incoming call” status on the Operations Navigator screen. The Dial profile shows an “Active connections” status.
3. PING or Telnet from the Dial, AS1, system to test the connection.

4.4 Scenario 4: Fax to and from the #2751

The #2751 supports Group 3 fax over ISDN. We used Facsimile Support for AS/400 (FS/400) as a fax application. This scenario includes three cases:

- Case 1: AS/400 to Fax
- Case 2: Fax to AS/400
- Case 3: AS/400 to AS/400

The PTFs needed for FS/400 are:

- SF58612
- SF59414
- SF59420
- SF60848
- SF62303
- SF62503

The setup for this scenario is shown in Figure 125 on page 142.

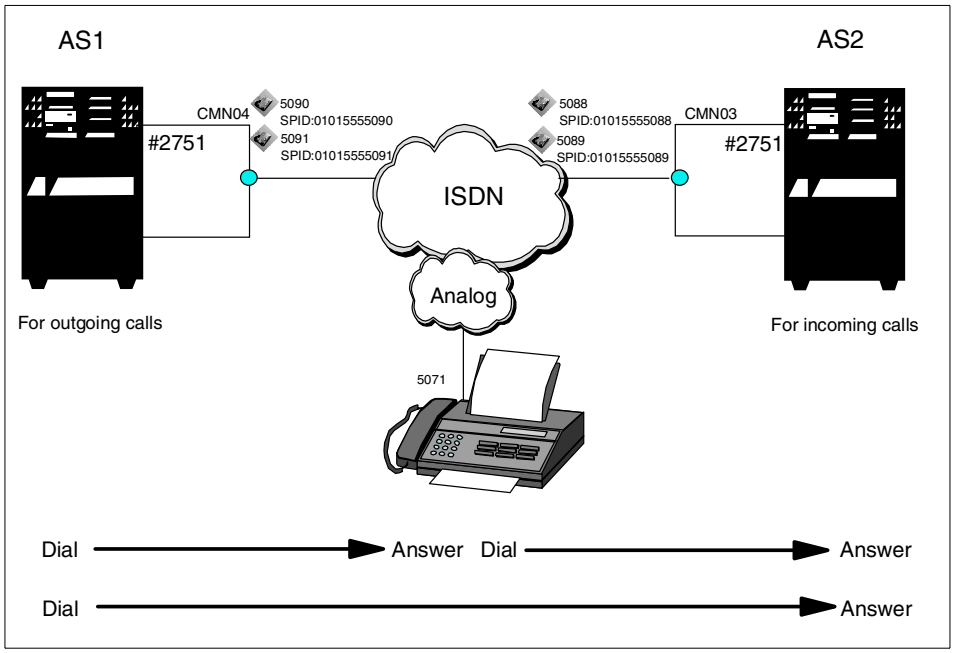


Figure 125. Scenario 4: Fax to and from the #2751

4.4.1 Scenario usage

This scenario is used for Fax over ISDN taking advantage of up to eight simultaneous connections. One distinct advantage of this scenario is inbound routing. When you use the #2761, you can use the DTMF for inbound routing as explained in “DTMF support” on page 57. You can use DTMF with the #2750 and #2751 as well. In addition, you have the following two types of ISDN functions for inbound routing:

- Route base on calling number

  Specify the remote number in the RMTNBR field of each connection list entry using the ADDCNNLE command.

- Use a multiple subscribe number

  Configure multiple fax lines for the BRI port that have connection lists with a connection list entry with unique called numbers.

4.4.2 Configuration steps

The following sections describe how to configure a fax connection over an ISDN on an AS/400 system.

Note

The numbers in reverse-bold type in Figure 126 on page 144 through Figure 134 on page 151 correspond to the numbers in Table 40 on page 154 through Table 44 on page 157.

To implement this scenario, perform the following steps (use the same steps on both outgoing from, and incoming calls to, the AS/400 system):

1. Create the network interface for ISDN.
2. Create the connection list.
3. Add an entry to the Connection list.

   You can also use Operations Navigator for these steps (steps 1 through 3). You create an NWI for the PPP via Operations Navigator.
4. Create the PPP line description.
5. Create the fax description.
6. Add the description of a fax card to the fax description for each port.

Note

For the #2751 and #2750, you will have four resource names. You need to run the Create Fax Description (CRTFAXD) command for each resource that you want to be a fax controller. For example, if you want to use all four names for faxing, you must run the CRTFAXD commands eight times. For each CRTFAXD command, use a unique line description name.

To configure Fax over ISDN using FS/400, you need to create the network interface, the connection list and entry, and the line description. The CRTFAXD command does not create those objects differently from the fax over analog scenario.

Figure 127 on page 144 to Figure 134 on page 151 show configuration samples on AS1 (for outgoing calls).

4.4.2.1 Creating the network interface for ISDN

To create a network interface, enter the following command on each AS/400 system:

```
CRTNWIISDN
```

The screens shown in Figure 126 and Figure 127 appear.

```
                Create Network Interface ISDN (CRTNWIISDN)

Type choices, press Enter.

Network interface description  . NWID         > C3S4O10
Resource name  . . . . . . . . . RSRCNAME 1   > CMN04
Online at IPL  . . . . . . . . . ONLINE       > *NO
Vary on wait . . . . . . . . . . VRYWAIT        *NOWAIT
Network type . . . . . . . . . . NETTYPE  2     *NETATR
Rate . . . . . . . . . . . . . . RATE           *BASIC
Channel entries:                 CHLENTRY 3
  Channel number . . . . . . .                  *SWTALL
  Channel connection . . . . . .
  Line description . . . . . . .
                       + for more values
Protocol entries:                PCLENTRY 4
  Protocol . . . . . . . . . . .                *PPPMAX
  Preload Licensed Internal Code
  Maximum switched channels  . .
                       + for more values
                                                          More...
```

Figure 126. Creating the network interface ISDN for the Fax configuration (Part 1 of 2)

```
                Create Network Interface ISDN (CRTNWIISDN)

Type choices, press Enter.

Auto SPID detection  . . . . . . AUTOSPID       *NO
Service profile identifiers:     SPID     5
  SPID number  . . . . . . . . .                > 1
  SPID value . . . . . . . . . .                > 01015555090

  SPID number  . . . . . . . . .                > 2
  SPID value . . . . . . . . . .                > 01015555091
Local number . . . . . . . . . . LCLNBR   6     > 5090

                                                > 5091




                                                          Bottom
```

Figure 127. Creating the network interface ISDN for the Fax configuration (Part 2 of 2)

The significant parameters of fax over ISDN significant parameters in the network interface are:

Note

The values that we used for the parameters throughout this section are shown in parentheses.

- **RSRCNAME**: Specifies the resource name which you can find out by using WRKHDWRSC command (CMN04).
- **NETTYPE**: Specifies the type of Integrated Services Digital Network (ISDN) to which the system is attached (*NETATR).
- **CHLENTRY**: Specifies *SWTALL. This value is used for all switched B channels (*SWTALL).
- **PCLENTRY**: Specifies *PPPMAX. This is a default value (*PPPMAX).
- **SPID**: Specifies the SPID that you get from your service provider (1 01015555090 2 01015555091).
- **LCLNBR**: Specifies the local number that you get from your service provider (5090 5091).

4.4.2.2 Creating the connection list

To create a connection list, enter the following command on each AS/400 system:

```
CRTCNNL
```

The display shown in Figure 128 on page 146 appears.

```
                    Create Connection List (CRTCNNL)

Type choices, press Enter.

Connection list  . . . . . . . . . CNNL         > C3S4010
Network type . . . . . . . . . . . NETTYPE        *NETATR
Text 'description' . . . . . . . . TEXT           *BLANK


                          Additional Parameters

Characters to remove . . . . . . . RMVCHR         ' '
                                                  '('
                                                  ')'
                                                  '/'
                                                  '-'
                                                  '+'
                           + for more values      '.'
Authority  . . . . . . . . . . . . AUT            *LIBCRTAUT

                                                                  Bottom
```

Figure 128. Creating the connection list for the Fax configuration

4.4.2.3 Adding an entry to the connection list

To add a connection list, enter the following command on each AS/400 system:

```
ADDCNNLE
```

The screens shown in Figure 129 and Figure 130 appear.

```
                    Add Connection List Entry (ADDCNNLE)

Type choices, press Enter.

Connection list  . . . . . . . . CNNL          > C3S4O10
Entry  . . . . . . . . . . . . . ENTRY         > C3S4O10
Remote number  . . . . . . . . . RMTNBR 7      > *ANY

Information transfer type  . . . INFTRFTYPE 8  > *FAXMODEM
Modem init command string  . . . MDMINZCMD  9  > *LIND

Text 'description' . . . . . . . TEXT            *BLANK


                                                                  Bottom
```

Figure 129. Adding the entry to the connection list for the Fax configuration (Part 1 of 2)

```
                    Add Connection List Entry (ADDCNNLE)

Type choices, press Enter.

Local number . . . . . . . . . . LCLNBR 10      *ANY

Local number type  . . . . . . . LCLNBRTYPE     *NETTYPE
Local numbering plan . . . . . . LCLNBRPLAN     *NETTYPE
Local number presentation  . . . LCLNBRPSN      *NONE
Local subaddress . . . . . . . . LCLSUBADR      *ANY

Local subaddress type  . . . . . LCLSUBTYPE     *NETTYPE


                                                                  Bottom
```

Figure 130. Adding the entry to the connection list for the Fax configuration (Part 2 of 2)

The significant parameters of Fax over ISDN in the connection list are:

- **RMTNBR**: If you specify a number, only calls from the specified number are accepted. An outgoing call is made by using the number (*ANY).

- **INFTRFTYEP**: Specify *FAXMODEM to allow fax data to be transferred over the ISDN (*FAXMODEM).
- **MDMINZCMD**: Specify *LIND because the modem command string is provided by the line description. The AS/400 system will modify the PPP line description with the correct modem initial strings for the #2751 or the #2750 (*LIND). If you do not select *LIND, the Fax session will default to normal mode and no error correction.
- **LCLNBR**: If you specify a number, only local calls to the specified local number are accepted by the system. *ANY is a legal value (*ANY).

4.4.2.4 Creating the PPP line description

After you configure a network interface description, create a connection list, and add entries, create a PPP line description to use with fax.

To create the PPP line, enter the following command on each AS/400 system:

```
CRTLINPPP
```

The screens shown in Figure 131 and Figure 132 appear.

```
                    Create Line Desc (PPP) (CRTLINPPP)

Type choices, press Enter.

Line description . . . . . . . . LIND          > C3S4O10
Resource name  . . . . . . . . . RSRCNAME 11  > *NWID
Connection type  . . . . . . . . CNN 12         *SWTPP
Switched NWI list:               SWINWILST 13
  NWI description  . . . . . .                > C3S4O10
  NWI channel type . . . . . .                  *B
  NWI channel number . . . . . .                *CALC
                       + for more values
Online at IPL  . . . . . . . . . ONLINE         *NO
Vary on wait . . . . . . . . . . VRYWAIT        *NOWAIT
Line speed . . . . . . . . . . . LINESPEED 14 > 64000
Maximum frame size . . . . . . . MAXFRAME       2048
Switched connection type . . . . SWTCNN 15      *BOTH
Switched NWI selection . . . . . SWINWISLCT     *FIRST
Outgoing connection list . . . . CNNLSTOUT 16 > C3S4O10
Connection list entry  . . . . . CNNLSTOUTE 17> C3S4O10
                                                                More...
```

Figure 131. Creating the line description for the Fax configuration (Part 1 of 2)

```
                    Create Line Desc (PPP) (CRTLINPPP)

Type choices, press Enter.

Incoming connection list . . . . CNNLSTIN 13  > *NETATR
Network controller . . . . . . . NETCTL
Inactivity timer . . . . . . . . INACTTMR       *NOMAX
Text 'description' . . . . . . . TEXT           *BLANK


                          Additional Parameters

Async control character map  . . ACCM           00000000
LCP authentication values:       LCPAUT
  Remote peer challenge timer  .                *NONE
  Max authentication attempts  .                5




                                                                More...
```

Figure 132. Creating the line description for the Fax configuration (Part 2 of 2)

The significant parameters of Fax over ISDN in the line description are:

- **RSRCNAME**: Specifies *NWID. The resource name specified on the network interface, the value of the SWTNWILST parameter, is used (*NWID).
- **CNN**: Specifies the type of line (*SWTPP).
- **SWTNWILST**: Specifies the network interface description, which is used for this line description (C3S4O10). In the NWI channel number field, specify *CALC for allowing to select the channel by the AS/400 system.
- **LINESPEED**: Specifies a line speed (64000).
- **SWTCNN**: Specifies whether the line is used for outgoing calls, incoming calls, or both. AS1 must be either *DIAL or *BOTH, and AS2 must be either *ANS or *BOTH (*BOTH).
- **CNNLSTOUT**: Specifies the connection list name for outgoing calls on AS1 (C3S4O10).
- **CNNLSTOUTE**: Specifies the entry name from the connection list, which is specified for the CNNLSTOUT parameter on AS1 (C3S4O10).
- **CNNLSTIN**: Specifies the connection list name for incoming calls on AS2. Do not specify on AS1 (*NETATR).

4.4.2.5 Creating the fax description

To create the fax description, enter the following command on each AS/400 system:

```
CRTFAXD
```

The display shown in Figure 133 appears.

```
                    Create Fax Description (CRTFAXD)

Type choices, press Enter.

Link type  . . . . . . . . . . . LINKTYPE 19  > *IMISDN
Line description . . . . . . . . LIND 20      > C3S4O10
Fax description  . . . . . . . . FAXD 21      > C3S4O10D
Integrated modem device name . . FAXIMDEV 22  > C3S4O10I
Print TSI banner . . . . . . . . TSIBNR         *NO
TSI position . . . . . . . . . . TSIPOS         *INSERT
Text 'description' . . . . . . . TEXT           *DFT

                                                                  Bottom
```

Figure 133. Creating the fax description

The controller and device description are created as a result of this command.

The significant parameters of Fax over ISDN in the fax description are:

- **LINKTYPE**: Specifies *IMISDN for Fax over ISDN (*IMISDN).
- **LIND**: Specifies the line description name (created in 4.4.2.5, “Creating the fax description” on page 150; C3S4O10).
- **FAXD**: Specifies the fax description name. This name is used as a controller name (C3S4O10D).
- **FAXIMDEV**: Specifies the device name (C3S4O10D).

Note

Apply the DTMF PTF (SF62301), if you want to take advantage of the Dual Tone Multi-Frequency (DTMF) capability of the feature #2750 or #2751 PCI ISDN IOAs for receive applications. For details, refer to “DTMF support” on page 57.

4.4.2.6 Adding the description of a fax card to the fax description

To add the description of a fax card to the fax description, enter the following command on each AS/400 system:

```
ADDFAXCRD
```

The screen shown in Figure 134 appears.

```
                        Add Fax Card (ADDFAXCRD)

Type choices, press Enter.

Fax description  . . . . . FAXD 23       > C3S4O10D
Fax card . . . . . . . . . . . . FAXCRD 24    FAX1
Fax card function  . . . . . FAXTYPE 25  > *SEND
Fax file . . . . . FAXFILE       QAFFRCV
  Library  . . . . . .             QUSRSYS
Receive fax data queue . . . . . FAXRCVDQ      QFFRCVDQ
  Library  . . . . . .             QUSRSYS
Transmitting identification  . . TSI           *BLANK
Type of dial . . . . . DIAL          *TONE
Dial retry . . . . . DIALRTY      > 1
Redial delay . . . . . REDIALDLY    > 005
Error correction mode  . . . . . ECM           *OFF
Direct connect type  . . . . . DIRCONTYP      *NONE
Prefix telephone number  . . . . PREFIX        *NONE
Return negative response . . . . RTNNEGRSP     *NONE

                                                                    Bottom
```

Figure 134. Adding the fax card to the fax description

The significant parameters of Fax over ISDN in the ADDFAXCRD command are:

- **FAXD**: Specifies the fax description name that is specified for the FAXD parameter of CRTFAXD command (C3S4O10D).
- **FAXCRD**: Specifies FAX1. The other value is not permitted when the value of LINKTYPE of the fax description is *IMISDN (FAX1).

- **FAXTYPE**: Specifies *SEND for outgoing calls and *RECEIVE for incoming calls. *BOTH is not a valid value for Fax over ISDN. In this scenario, AS1 must be *SEND and AS2 must be *RECEIVE (*SEND).

Note

For simultaneous sending and receiving, create another line description and fax description. Then, add a fax card to the fax description.

4.4.2.7 Parameter relationship for the Fax configuration

Figure 135 shows the relationship among the command parameters for the Fax configuration.

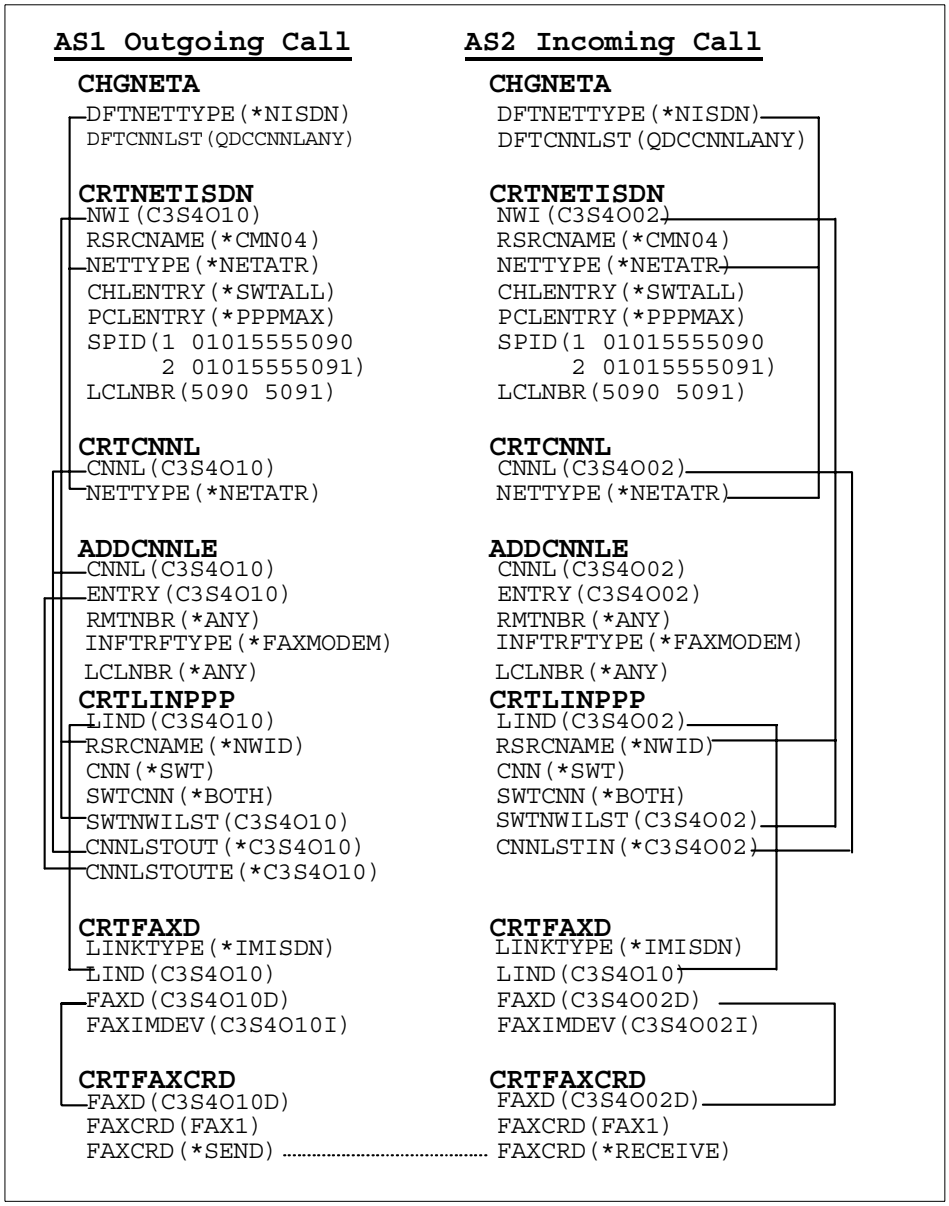


Figure 135. Parameter relationship for the Fax configuration

4.4.2.8 Configuration summary

Table 40 through Table 44 on page 157 show the information required to create the fax configurations. Only the parameters necessary to create this

scenario are identified. For more information, search on ISDN at the AS/400 Information Center Web at:
`http://publib.boulder.ibm.com/pubs/html/as400/infocenter.htm`

You can also find more information in *Facsimile Support for AS/400 Installation Guide,* SC41-0654, and *Facsimile Support for AS/400 Programmer's Guide and Reference*, SC41-0656.

As you read the following tables, note that the numbers correspond to the numbers that appear in reverse-bold type in Figure 126 on page 144 to Figure 134 on page 151.

Table 40. Network Interface parameter to create the Fax over ISDN connection

Parameter		Description	Value in this scenario
RSRCNAME	01	Required field - The resource name that identifies the hardware.	AS1 = CMN04 AS2 = CMN03
NETTYPE	02	Optional field - The type of network to which this system is attached.	*NETATR
CHLENTRY	03	Optional field - Specify a channel entry corresponding to a B channel or D channel associated with the network interface. If you specify *SWTALL, one D channel and two B channels are created.	*SWTALL
PCLENTRY	04	Optional field - Specify a list of protocols used and protocol-specific information.	*PPPMAX
SPID	05	Required field - The service profile identifier (SPID) used to identify the AS/400 system to the network provider. The SPID is provided by the network provider at subscription time.	AS1= 01015555090 /01015555091 AS2= 01015555088 /01015555089
LCLNBR	06	Optional field - The number by which this system is known to the ISDN.	AS1 = 5090 /5091 AS2 = 5088 /5089

Table 41. Connection list and Entry parameters to create the Fax over ISDN connection

Parameter		Description	Value in this scenario
RMTNBR	07	Required field - The number of the remote system in the ISDN.	*ANY
INFTRFTYPE	08	Optional field - The information transfer type determines the layer 1 protocol (physical layer) and B-channel data encoding format (how data is to be interpreted and transformed, if required). You must specify *FAXMODEM to send and receive Fax data.	*FAXMODEM
MDMINZCMD	09	Optional field - The modem initialization command string that is sent to set the modem. This value is valid only when the INFTRFTYPE parameter value *FAXMODEM, *ASYNCMODEM, or *SYNCMODEM is specified.	*LIND
LCLNBR	10	Optional field - Information about the number called for an incoming call. If you enter a specific number, only calls directed at this local number will be accepted.	*ANY

Table 42. Line Description parameter to create the Fax over ISDN connection

Parameter		Description	Value in this scenario
RSRCNAME	11	Required field - The resource name that identifies the hardware that the description represents. Specify *NWID when the attached network interface description.	*NWID
CNN	12	Optional field - The type of line connection used.	*SWTPP
SWTNWILST	13	Optional field - A list of Network Interface Descriptions to which this line can be attached.	AS1 = C3S4O10 AS2 = C3S4O02
LINESPEED	14	Optional field - The speed of the line in bits-per-second.	64000
SWTCNN	15	Optional field - Shows whether the switched line is used for incoming calls, outgoing calls, or both.	*BOTH
CNNLSTOUT	16	Required field - The name of a connection list object that contains the ISDN/T1 assigned numbers for a dial-out operation to the ISDN/T1. This parameter is valid only when RSRCNAME(*NWID) and CNN(*SWTPP) are used.	AS1 = C3S4O10
CNNLSTOUTE	17	Required field - The entry name from the connection list used to make a call to the ISDN/T1. The connection list must be specified on the CNNLSTOUT parameter. This parameter is valid only when RSRCNAME(*NWID) and CNN(*SWTPP) are used.	AS1 = C3S4O10
CNNLSTIN	18	Optional field - The name of the connection list used to identify incoming calls.	AS2 = C3S4O02

Table 43. Fax description parameter to create the Fax over ISDN connection

Parameter		Description	Value in this scenario
LINKTYPE	19	Optional field - The type of line to which the fax controller or the Integrated Fax Adapter is attached.	*IMISDN
LIND	20	Required field - Specify the PPP line name.	AS1 = C3S4O10 AS2 = C3S4O02
FAXD	21	Optional field - The name of the fax description.	AS1 = C3S4O10D AS2 = C3S4O02D
FAXIMDEV	22	Optional field - The name of the device description for a fax controller, which controls a fax line on either a remote access analog adapter or a remote access ISDN adapter.	AS1 = C3S4O10I AS2 = C3S4O02I

Table 44. Fax Card parameter to create the Fax over ISDN connection

Parameter		Description	Value in this scenario
FAXD	23	Optional field - The name of the fax description to which the fax card or fax port description is added.	AS1 = C3S4O10D AS2 = C3S4O02D
FAXCRD	24	Optional field - The name of the fax card/port description that is added to the fax description. Specify FAX1 for a fax description of *IMISDN.	FAX1
FAXTYPE	25	Optional field - The type of fax functions supported by this fax card/port. For a fax description of *IMISDN, *BOTH is not valid for the fax card function.	AS1 = *SEND AS2 = *RECEIVE

4.4.2.9 Operation and status

To activate the environment, follow these steps (same operation on both AS/400 systems):

1. Vary on the network interface:
   a. Enter the following command to activate the network interface:

      ```
      VRYCFG CFGOBJ(C3S4O10) CFGTYPE(*NWI) STATUS(*ON)
      ```

   b. Enter the following command to confirm the network interface status:

      ```
      VRYCFG CFGOBJ(C3S4O10) CFGTYPE(*NWI) STATUS(*ON)
      ```

   NWI must be varied on as shown in Figure 136.

```
                        Work with Configuration Status              AS1
                                                          04/14/00 15:20:37
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    13=Work with APPN status...

Opt  Description      Status               -------------Job--------------
     C3S4O10          VARIED ON









                                                                     Bottom
Parameters or command
===>
```

Figure 136. Network interface status

2. Start the Fax function

   Enter the following command to start the Fax function:

   ```
   STRFAXSPT FAXD(C3S4O10D) ENHSRV(*NO)
   ```

Go to 6.1.5, “Fax connections” on page 180, to complete this process.

Chapter 5. The 7852 modem and the #2761 SLIP connections

This chapter explains the scenarios comprising the #2761 connections to and from the 7852-400 Options modem using SDLC and TCP/IP PPP. It also includes a scenario between the #2761 modems using SLIP. We explain the setup and usage of each scenario, as well as any problems that were encountered. The scenarios are:

- Scenario 1: #2761 to and from the 7852 modem SDLC
- Scenario 2: #2761 to and from the 7852 modem TCP/IP PPP
- Scenario 3: #2761 to and from the 7852 modem Dial-on demand
- Scenario 4: #2761 to and from the 7852 modem DoD dedicated peer
- Scenario 5: #2761 to and from the #2761 SLIP

Note

In this chapter, the windows shown for the remote access configuration are from a V4R4 system. The information may be formatted differently in other releases. Use the examples here as a guide.

5.1 Scenario 1: #2761 to and from the 7852 modem SDLC

There are two cases considered in this scenario of SDLC configurations between AS/400 systems supporting SNA applications:

- Case 1: AS/400 dial-on demand to AS/400 Answer
- Case 2: AS/400 Dial to AS/400 Answer

Figure 137 shows the test environment.

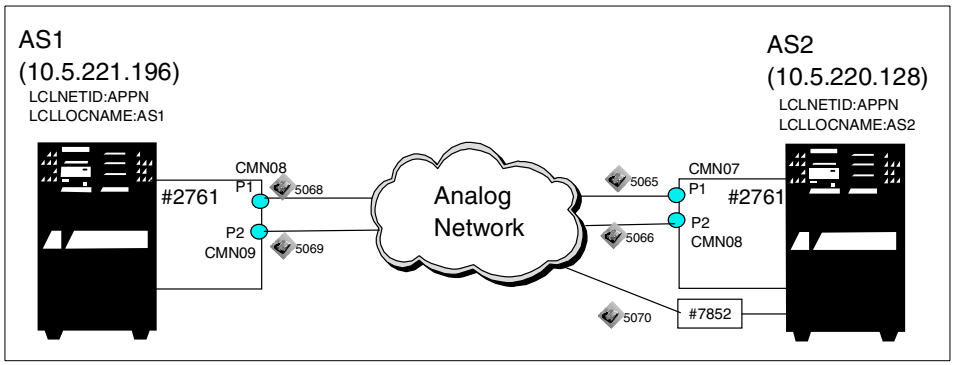


Figure 137. Scenario 1 network topology

The 7852 modem switches are set to UUDDUUUDDUDUUUUU, where D indicates Down, and U indicates Up.

Switch 12 is set to Up for synchronous operation.

5.1.1 Scenario usage

The most likely usage is connecting an AS/400 system with an integrated modem to one or more systems with existing 7852 modems to implement SNA applications. It allows users to connect without changing their existing 7852 modems.

Both APPC and APPN configurations were tested including multi-PASSTHRU and multi-TELNET steps to other systems.

5.1.2 Configuration steps

Perform the same configuration steps as explained in 2.1.2, “Configuration steps” on page 17, with the following differences for the 7852 modem end, AS2, line description.

- **RSRCNAME(CMNxx)**: DSPHDWRSC *CMN V.24 (port enhanced)
- **INTERFACE(*RS232V24)**: Physical interface
- **CNN(*SWTPP)**: Switched line
- **DIALCMD(*V25bis)**

There are no modem significant parameters in the creation of the APPC controller (and device).

5.1.2.1 Configuration cases summary

In Case 1, the DIALINIT controller description parameter is set to *LINKTYPE.

To implement Case 2, change the INLCNN controller description parameter from *LINKTYPE to *IMMED. The connection is started as soon as the controller is varied on.

Table 45 through Table 47 show the information that is required to create an SDLC configuration. Only the parameters that are necessary to create this scenario are identified.

Table 45. Network Attribute parameter for modem local characteristics

Parameter and number		Description	Value in this scenario
MDMCNTRY	01	Modem country ID	US

Table 46. Modem-specific SDLC line description parameters

Parameter and number		Description	Value in this scenario
RSRCNAME	02	Resource name	AS1 = CMN08 AS2 = CMN01
INTERFACE	03	Physical interface	AS1 = *INTMODEM AS2 = *RS232V24
CNN	04	Connection type	*SWTPP
DIALCMD	05	Dial command type	AS1 = *NONE AS2 = *V25bis

Table 47. Controller Case parameter

Parameter and number		Description	Value in this scenario
DIALINIT	06	Dial initiation	*LINKTYPE (Case 1) *IMMED (Case 2)

5.1.2.2 Operation and status

For Case 1, vary on the lines and controllers on each AS/400 system. Use STRPASTHR from one system to the other to confirm the configuration definitions.

For Case 2, change the DIALINIT controller parameter to *IMMED on one system, for example AS1. The connection is started as soon as the controller is varied on.

For each case, complete these steps:

1. Type `WRKCFGSTS *LIN` *`linename`* on both systems to confirm that the line, controller, and device are all in ACTIVE status.
2. After varying on the lines and controllers on each AS/400 system, type `STRPASTHR` to confirm the configuration definitions.

5.2 Scenario 2: #2761 to and from the 7852 modem TCP/IP PPP

In this scenario, the AS/400 to AS/400 connections using PPP are configured for the following cases:

- Case 1: AS/400 Dial to AS/400 Answer numbered
- Case 2: AS/400 Dial to AS/400 Answer unnumbered

Figure 138 shows the test environment.

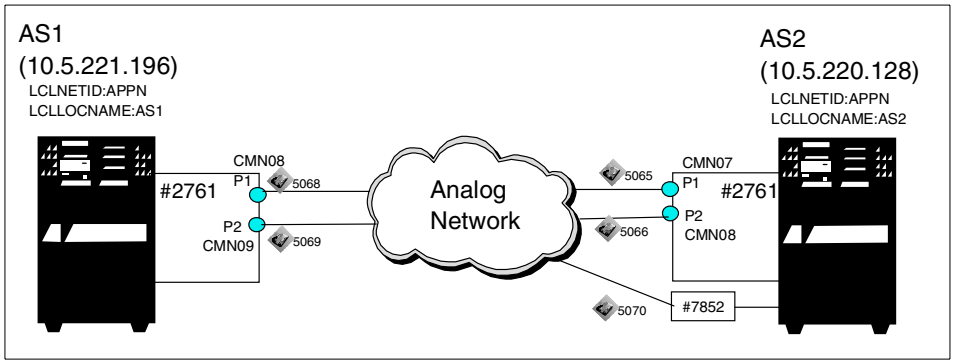


Figure 138. Scenario 2 network topology

7852 modem switches are set to UUDDUUUUDDUDDUUUU, where D indicates Down, and U indicates Up.

Switch 12 is set to Down for asynchronous operation.

5.2.1 Scenario usage

This scenario allows users to connect with an existing 7852 modem and to implement TCP/IP applications.

5.2.2 Configuration steps

Before starting the profile definitions, check the system value, QRETSVRSEC. It has a default of zero meaning security data required by the server for user authentication on the target is *not* retained on the host.

To implement this scenario, perform the following steps:

1. Configure a PPP profile as a switched Dial on AS1.
2. Configure a PPP profile as a switched Answer on AS2.

5.2.2.1 Configuring a PPP profile as a switched Dial on AS1

Perform the same configuration steps that are explained in 2.2.2, “Configuration steps” on page 25, to create a mode-type dial.

5.2.2.2 Configuring a PPP profile as a switched Answer on AS2

Perform the same configuration steps that are explained in 2.2.2, “Configuration steps” on page 25, to create a mode-type Answer profile. But, in this case, be sure to select the 7852-400 modem.

Note

A profile created initially with the line property connection set to Answer can only be changed to Dial or Both if a different link configuration line name is specified. Operations Navigator message CPDB181, Connection list required, is displayed when attempting the change.

5.2.2.3 Configuration summary of Scenario 2 cases

Table 48 to Table 50 on page 164 show the information required to create the PPP profiles. All the parameters shown are required.

Table 48. Required information for the General tab

Field name and number		Description	Value in this scenario
Name	01	Connection profile name	AS1 = RPANALD AS2 = ANS7852
Type	02	Connection type	PPP
Line configuration type	03	Mode - Line configuration type	Switched line
Mode type	04	Mode - Mode type	AS1 = Dial (Cases 1 and 2) AS2 = Answer (Cases 1 and 2)

Table 49. Required information for the Connection tab

Field name and number		Description	Value in this scenario
Type of line service	05	Link configuration-type of line service	Single line

Field name and number		Description	Value in this scenario
Name	06	Line name	AS1 = PJSLINE AS2 = LIN7852A
Remote phone	07	Remote phone number	AS2 = 5070

Table 50. Required information for the TCP/IP tab

Field name and number		Description	Value in this scenario
IP address	08	Local IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)
IP address	09	Remote IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)

5.2.2.4 Operation and status

To activate the profiles and view the resulting status, follow these steps:

1. Verify whether the profile on each system is in Inactive or Ended status.
2. Right-click the profile name in each system, and select **Start** to activate the connection. The Answer profile shows a “Waiting for incoming call” status. The Dial system shows “Active connections” in both cases.
3. PING or Telnet from the Dial system to check the connection.

5.3 Scenario 3: #2761 to and from the 7852 modem dial-on demand

In this scenario, the AS/400 to AS/400 system connections using PPP are configured for the following cases:

- Case 1: AS/400 dial-on demand to AS/400 Answer numbered
- Case 2: AS/400 dial-on demand to AS/400 Answer unnumbered

Figure 139 shows the test environment.

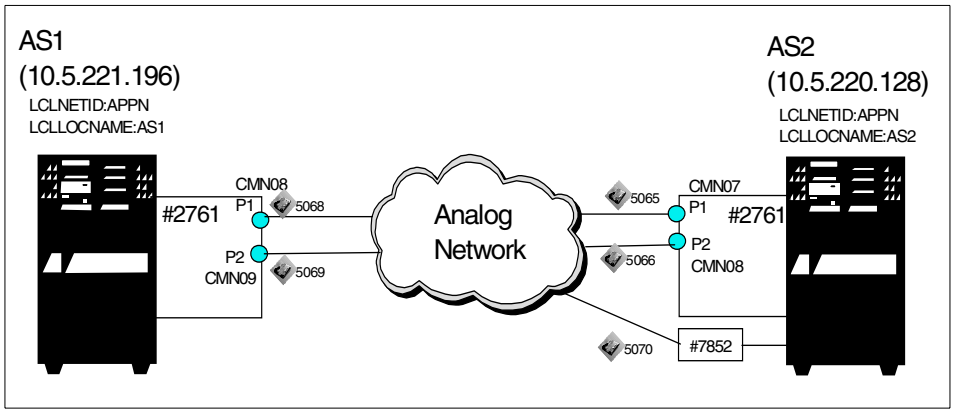


Figure 139. Scenario 3 network topology

7852 modem switches are set to UUDDUUUUDDUDDUUUU, where D indicates Down, and U indicates Up.

Switch 12 is set to Down for Asynchronous operation.

5.3.1 Scenario usage

This scenario allows users to connect with an existing 7852 modem and implement TCP/IP applications with link dropping when the session ends.

5.3.2 Configuration steps

Before starting the profile definitions, check the system value, QRETSVRSEC. It has a default of zero meaning that security data required by the server for user authentication on the target is *not* retained on the host.

To implement this scenario, perform the following steps:

1. Configure a PPP profile as a switched Dial on AS1.
2. Configure a PPP profile as a switched Answer on AS2.

5.3.2.1 Creating a profile as a switched dial-on demand on AS1

Perform the same configuration steps that are explained in 2.2.2, “Configuration steps” on page 25, to create a mode-type dial-on demand (dial only) profile on AS1.

5.3.2.2 Creating a profile as a switched Answer on AS2

Perform the same configuration steps that are explained in 2.2.2, “Configuration steps” on page 25, to create an Answer profile. This time, be sure to select the 7852-400 modem resource.

Note

A profile created initially, with Line property connection set to Answer, can only be changed to Dial or Both if a different Link configuration line name is specified. Operations Navigator message CPDB181, “Connection list required”, is displayed when attempting the change.

5.3.2.3 Configuration summary of Scenario 3 cases

Table 51 to Table 53 show the information required to create the profiles. All the parameters shown are required.

Table 51. Required information for the General tab

Field name and number		Description	Value in this scenario
Name	01	Connection profile name	AS1 = C2309 AS2 = ANS7852
Type	02	Connection type	PPP
Line configuration type	03	Mode- Line configuration type	Switched line
Mode type	04	Mode- Mode type	AS1 = DoD (Cases 1 and 2) AS2 = Answer (Cases 1 and 2)

Table 52. Required information for the Connection tab

Field name and number		Description	Value in this scenario
Type of line service	05	Link configuration-type of line service	Single line
Name	06	Line name	AS1 = PJSLINE AS2 = LIN7852A
Remote phone	07	Remote phone number	AS2 = 5070

Table 53. Required information for the TCP/IP tab

Field name and number		Description	Value in this scenario
IP address	08	Local IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)
IP address	09	Remote IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)

5.3.2.4 Operation and status

To activate the profiles and view the resulting status, follow these steps:

1. Verify whether the profile on each system is in Inactive or Ended status.
2. Right-click on the profile name in each system, and select **Start** to activate the connection. The Answer profile shows a “Waiting for incoming call” status. The DoD profile shows a “Waiting for dial. Switched.” status.
3. PING or Telnet from the Dial system to activate the connection.

5.4 Scenario 4: #2761 to and from the 7852 modem DoD dedicated peer

In this scenario, the AS/400 to AS/400 connections using PPP are configured for the following cases:

- Case 1: AS/400 DoD (answer enabled dedicated peer) to AS/400 DoD (answer enabled dedicated peer) numbered
- Case 2: AS/400 DoD (answer enabled dedicated peer) to AS/400 DoD (answer enabled dedicated peer) unnumbered

Figure 140 on page 168 shows the test environment.

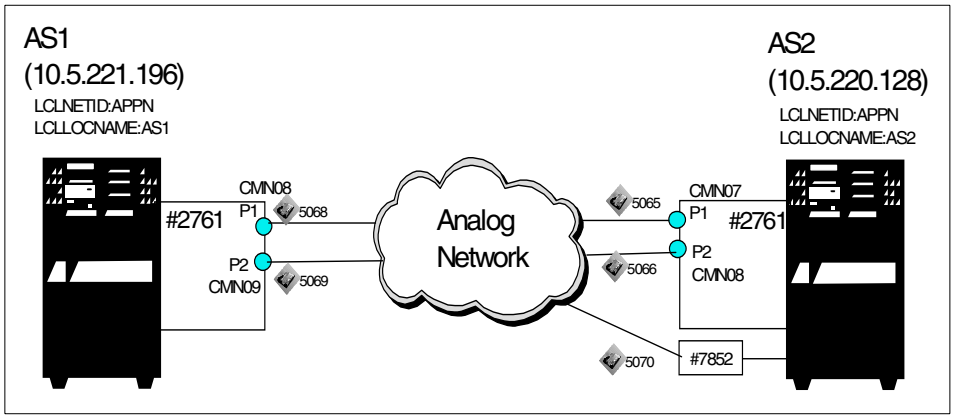


Figure 140. Scenario 4 network topology

7852 modem switches are set to UUDDUUUUDDUDDUUUU, where D indicates Down, and U indicates Up.

Switch 12 is set to Down for Asynchronous operation.

5.4.1 Scenario usage

This scenario allows users to connect with an existing 7852 modem and implement TCP/IP applications establishing a connection from either system as, and when, required.

5.4.2 Configuration steps

Before starting the profile definitions, check the system value, QRETSVRSEC. It has a default of zero, meaning security data required by the server for user authentication on the target is *not* retained on the host.

To implement this scenario, perform the following steps:

1. Configure a PPP profile as a switched DoD (Answer...) on AS1
2. Configure a PPP profile as a switched DoD (Answer...) on AS2

5.4.2.1 Creating a switched dial-on demand (Answer) on AS1

Perform the same configuration steps that are explained in 2.3.2, “Configuration steps” on page 35, to create a mode-type dial-on-demand (answer enabled dedicated peer) profile on AS1.

5.4.2.2 Creating a switched dial-on demand (Answer) on AS2

Perform the same configuration steps that are explained in 2.3.2, “Configuration steps” on page 35, to create a mode-type dial-on-demand (answer enabled dedicated peer) profile on AS2. In this case, select the 7852-400 modem resource.

Note

A profile created initially with Line property connection set to Answer can only be changed to Dial or Both if a different Link configuration line name is specified. Operations Navigator message CPDB181, “Connection list required”, is displayed when attempting the change.

5.4.2.3 Configuration summary of Scenario 4 cases

Table 54 to Table 56 on page 170 show the information required to create the profiles. Only the required information is identified.

Table 54. Required information for the General tab

Field name and number		Description	Value in this scenario
Name		Connection profile name	AS1 = Rpdoddp AS2 = A7852dodp
Type		Connection type	PPP
Line configuration type		Mode - Line configuration type	Switched line
Mode type		Mode - Mode type	AS1 = DoD (Answer) (Cases 1 and 2) AS2 = DoD (Answer) (Cases 1 and 2)

Table 55. Required information for the Connection tab

Field name and number		Description	Value in this scenario
Type of line service		Link configuration-type of line service	Single line
Name		Line name	AS1 = PJSLINE AS2 = LIN7852A

Field name and number		Description	Value in this scenario
Remote phone		Remote phone number	AS1 = 5068 AS2 = 5070

Table 56. Required information for the TCP/IP tab

Field name and number		Description	Value in this scenario
IP address		Local IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)
IP address		Remote IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)

5.4.2.4 Operation and status

To activate the profiles and view the resulting status, complete these steps:

1. Verify whether the profile on each system is in Inactive or Ended status.
2. Right-click the profile name in each system, and select **Start** to activate the connection. The Answer profile shows a “Waiting for incoming call” status. The DoD profile shows a “Waiting for dial. Switched.” status.
3. PING or Telnet from the Dial system to activate the connection.

5.5 Scenario 5: #2761 to and from the #2761 TCP/IP SLIP

In this scenario, the AS/400 to AS/400 connections using SLIP are configured for the following cases:

- Case 1: AS/400 Dial to AS/400 Answer numbered
- Case 2: AS/400 Dial to AS/400 Answer unnumbered

Figure 141 shows the test environment.

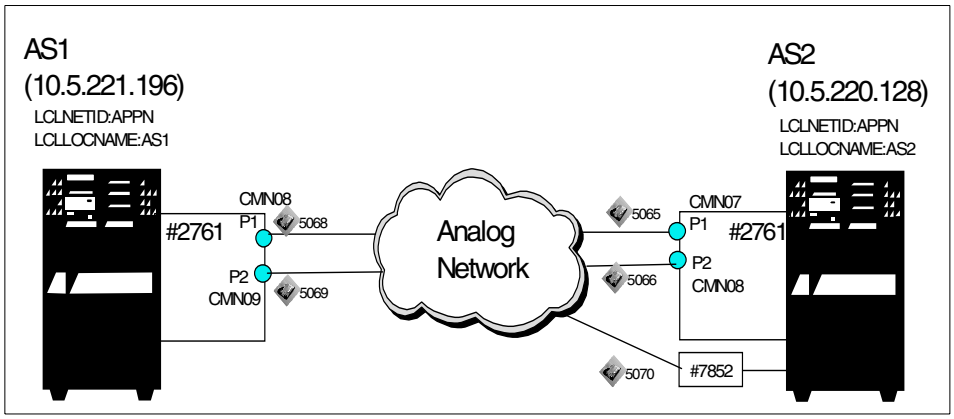


Figure 141. Scenario 5 network topology

5.5.1 Scenario usage

This scenario allows users connect to implement TCP/IP applications between the local and remote AS/400 systems.

5.5.2 Configuration steps

Before you start the profile definitions, check the system value QRETSVRSEC. It has a default of zero, meaning security data required by the server for user authentication on the target is *not* retained on the host.

To implement this scenario, perform the following steps:

1. Configure a PPP profile as a switched Dial on AS1.
2. Configure a PPP profile as a switched Answer on AS2.

5.5.2.1 Configuring a SLIP profile as a switched Dial on AS1

Perform the same configuration steps that are explained in 2.2.2, “Configuration steps” on page 25, to create a mode-type dial.

5.5.2.2 Configuring a SLIP profile as a switched Answer on AS2

Perform the same configuration steps that are explained in 2.2.2, “Configuration steps” on page 25, to create a mode-type Answer profile. In this case, select the 7852-400 modem.

Note

A profile created initially with Line property connection set Answer can only be changed to Dial or Both if a different Link configuration line name is specified. Operations Navigator message CPDB181, “Connection list required”, is displayed when attempting the change.

5.5.2.3 Configuration summary of Scenario 2 cases

Table 57 to Table 59 show the information required to create the SLIP profiles. All the parameters shown are required.

Table 57. Required information for the General tab

Field name and number		Description	Value in this scenario
Name		Connection profile name	AS1 = A2761 AS2 = D2761slip
Type		Connection type	SLIP
Line configuration type		Mode- Line configuration type	Switched line
Mode type		Mode- Mode type	AS2 = Dial (Cases 1 and 2) AS1 = Answer (Cases 1 and 2)

Table 58. Required information for the Connection tab

Field name and number		Description	Value in this scenario
Type of line service		Link configuration-type of line service	Single line
Name		Line name	AS1 = PJSLINE AS2 = LIN7852A
Remote phone		Remote phone number	AS1 = 5068

Table 59. Required information for the TCP/IP tab

Field name and number		Description	Value in this scenario
IP address		Local IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)
IP address		Remote IP address	*VIRTUALIP (Cases 1 and 2) LAN address (Cases 1 and 2)

5.5.2.4 Operation and status

To activate the profiles and view the resulting status, follow these steps:

1. Verify whether the profile on each system is in Inactive or Ended status.
2. Right-click on the profile name in each system and select **Start** to activate the connection. The Answer profile shows a “Waiting for incoming call” status. The Dial system shows an “Active connections” status in both cases.
3. PING or Telnet from the Dial system to check the connection.

Chapter 6. Problem analysis and resolution

This chapter identifies possible connection failures between two locations and offers suggestions for cause identification and resolution. First, it shows the status of objects and display lines when connections are established and working. Next, it identifies the steps to follow when connections cannot be started or fail after starting successfully. Then, it identifies the actions to complete and references for problem resolution when the cause is unrelated to setup or configuration. Finally, this chapter describes performance issues.

6.1 Evidence of working scenarios

Successfully started connections are identified in this section in the following groups:

- SDLC connections
- IDLC connections
- PPP connections
- SLIP connections
- FAX connections

6.1.1 SDLC connections

This section looks at commands and object configuration status indicating a successful SDLC connection.

Before you enter the Start PassThru (STRPASTHR) command to establish the connection to the remote system, the line at each end must be in CONNECT PENDING status, and the APPC controller (and Device) must be in VARY ON PENDING status.

After you enter the STRPASTHR command and a short delay, the screen displayed in Figure 142 on page 176 appears that shows the status of the line, controller, and device on both systems for a successful connection.

```
                        Work with Configuration Status              AS1
                                                          05/02/00  13:35:55
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    13=Work with APPN status...

Opt  Description       Status               -------------Job--------------
     C2S1N12          ACTIVE
       C2S1C12        ACTIVE
         C2S1D12      ACTIVE
           *UNKNOWN   ACTIVE               QPADEV0001  REDBOOK     003054




                                                                      Bottom
Parameters or command
```

Figure 142. After starting the applications

6.1.2 IDLC connections

In this section, the commands and screens are identified to verify whether a successful IDLC connection has been made. Section 3.1.2.10, “Operation and status” on page 76, identifies the commands that were entered and the resulting screens that allow the user to confirm whether a successful IDLC connection has been established.

6.1.3 PPP connections

This section looks at two types of PPP connections. First, it examines successful PPP connections over an analog. Then, it looks at a successful PPP connection over an ISDN.

6.1.3.1 PPP connections over an analog

Complete the following steps:

1. Click the Operations Navigator PPP **Connection Profile** on the target or remote system (Figure 143).

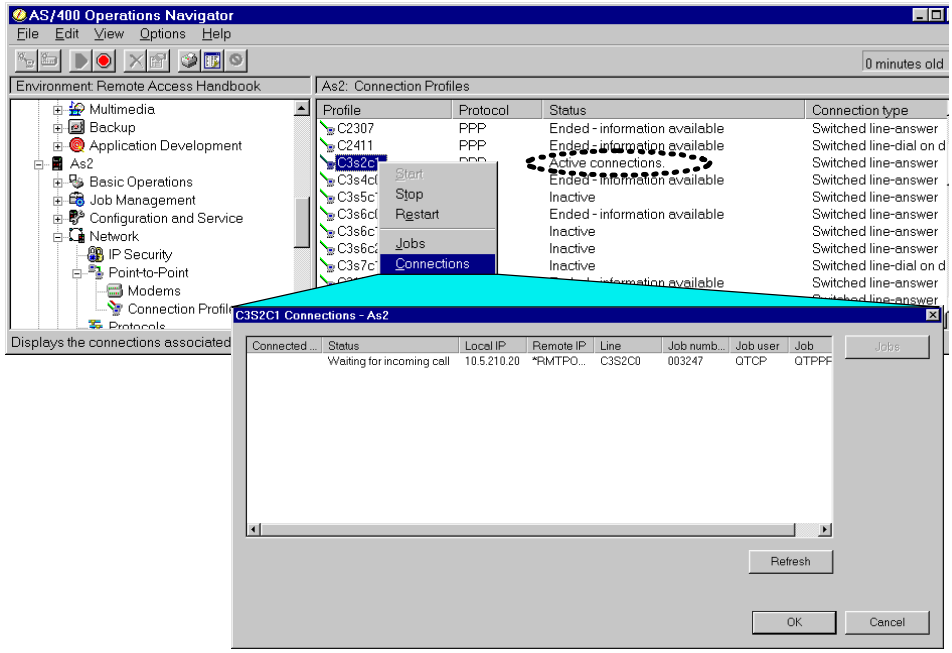


Figure 143. Waiting for incoming status of the target system

2. Click the Operations Navigator PPP **Connection Profile** on the source system.

   Right-click **Start** on the profile name as shown in Figure 144 on page 178. To see the Connection status, right-click **Connection** on the profile name (same as step 1). Click the **Refresh** button to update the status. The status messages, “Session job Starting”, “Calling remote system”, and “IPCP configuring” appear in order each time you click the Refresh button. Finally, the “Active” status is displayed as shown in Figure 145 on page 178.

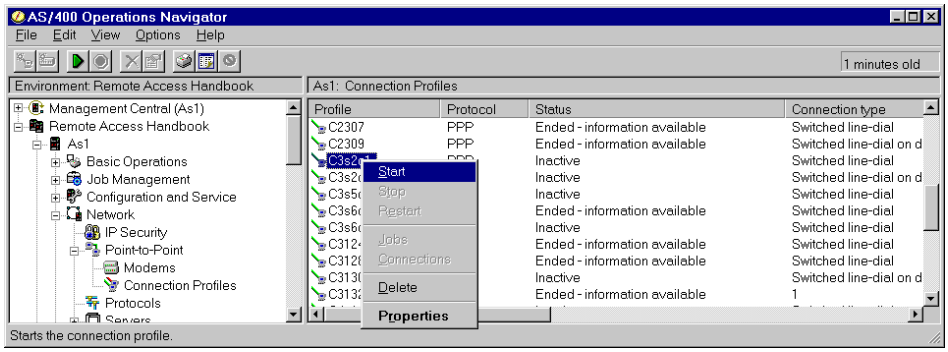


Figure 144. Starting the PPP profile of the source system

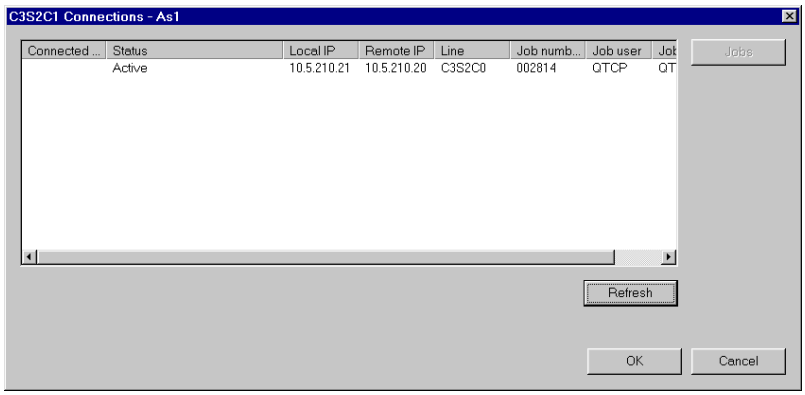


Figure 145. Active status of the source system

3. Enter `WRKCFGSTS *LIN` *`line name`* on the command line. This command allows you to see all configuration objects in ACTIVE status with a QTPPDIALnn job started on the source system (Figure 146) and a QTPPANSnnnn job started on the target system.

```
                        Work with Configuration Status                AS1
                                                              05/02/00  15:44:20
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    13=Work with APPN status...

Opt  Description       Status              -------------Job--------------
     C3S2C0           ACTIVE
       C3S2CNET       ACTIVE
         C3S2CTCP     ACTIVE              QTPPPDIAL01  QTCP        003064




                                                                      Bottom
Parameters or command
```

Figure 146. PPP jobs on the 5250 screen

4. Enter the WRKTCPPTP command on the command line to see the status of all profiles. This command confirms the active status of the selected PPP profile (Figure 147).

```
                      Work with Point-to-Point TCP/IP

Type option, press Enter.
  1=Add     2=Change   3=Copy   4=Remove          5=Display details   6=Print
  9=Start   10=End     12=Work with line status   14=Work with job

                                                    Line      Line    Job
Opt  Name        Mode   Type   Status          Description  Type    Name
                 *DIAL
     C3S2C1      *DIAL  *PPP   ACTIVE          C2S2C0       *PPP    QTPPDIAL01
     C3S2C3      *DIAL  *PPP   INACTIVE        C3S2C0       *ISDN   QTPPPCTL
     C3S5C1      *DIAL  *PPP   INACTIVE        C3S5C0       *ISDN
     C3S6C1      *DIAL  *PPP   OUTQ                         *POOL   QTPPDIAL63
     C3S6C2      *DIAL  *PPP   INACTIVE        *LINEPOOL    *POOL
     C3124       *DIAL  *PPP   OUTQ            RAPC12A      *ISDN   QTPPPCTL
     C3128       *DIAL  *PPP   OUTQ            RAPC12A      *ISDN   QTPPPCTL
     C3130       *DIAL  *PPP   INACTIVE        RAPC12A      *ISDN   QTPPPCTL
     C3132       *DIAL  *PPP   OUTQ            RAPC12A      *ISDN   QTPPPCTL


                                                                      Bottom
```

Figure 147. WRKTCPPTP screen showing a profile with ACTIVE status

6.1.3.2 PPP connections over ISDN

Section 3.1, “Scenario 1: #2751 to and from the #2751 IDLC” on page 62, outlines the commands that you need to enter. It also shows the resulting screens that allow you to confirm whether a successful ISDN connection has been established.

6.1.4 SLIP connections

The commands entered and screens displayed indicating successful SLIP connections are almost the same as those for a PPP over an analog. The differences are in the names of the jobs started on the WRKCFGSTS *LIN *<line name>* screen and the profile detail displayed on the WRKTCPPTP screen.

- Entering WRKCFGSTS *LIN *<line name>* on the command line shows all configuration objects in ACTIVE status with a QTPPDIALnn job started on the source system and a QTPPANSnnnn job started on the target.
- Entering WRKTCPPTP on the command line shows the status of all profiles and confirms the ACTIVE status of the selected *SLIP profile.

6.1.5 Fax connections

This section presents the required commands and screens that are displayed to confirm that the Fax system is active and operational. Note that the operational screens for Fax over an analog and Fax over an ISDN are the same.

1. Start the Fax function by entering the following command:

   ```
   STRFAXSPT FAXD(C3S4O10D) ENHSRV(*NO)
   ```

2. Confirm the status after starting the Fax function.

   a. Enter the following command to confirm the status of configuration objects:

      ```
      WRKCFGSTS CFGTYPE(*LIN) CFGD(C3S4O10)
      ```

      The screen shown in Figure 148 appears.

```
                          Work with Configuration Status              AS1
                                                              04/14/00 15:26:40
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    13=Work with APPN status...

Opt  Description       Status               -------------Job--------------
     C3S4O10          CONNECT PENDING
       C3S4O10D       ACTIVE
         C3S4O10I     VARIED ON

                                                                      Bottom
Parameters or command
===>
```

Figure 148. The other objects status on AS1

b. Enter the following command to confirm the status of fax related jobs:

```
WRKACTJOB SBS(QFAXSBS)
```

The screen shown in Figure 149 appears.

```
                              Work with Active Jobs                   AS1
                                                              04/14/00 15:32:34
CPU %:     .5     Elapsed time:   01:26:42     Active jobs:   124

Type options, press Enter.
  2=Change   3=Hold   4=End   5=Work with   6=Release   7=Display message
  8=Work with spooled files   13=Disconnect ...

Opt  Subsystem/Job  User        Type  CPU %  Function        Status
     QFAXSBS        QSYS        SBS      .0                 DEQW
       C3S4O10DIC   ITSCID60    BCH      .0  PGM-QFFFAXCTL1   DEQW
       C3S4O10DIP   ITSCID60    BCH      .0  PGM-QFFSNDCTL1   DEQW
       C3S4O10DIS   ITSCID60    BCH      .0  PGM-QFFASC       DEQW
       FAXMSTCTL    ITSCID60    BCH      .0  PGM-QFFMSTCTL1   DEQW
       FAXTRNLOG    ITSCID60    BCH      .0  PGM-QFFTRLOG1    DEQW



                                                                      Bottom
Parameters or command
===>
```

Figure 149. The status of Fax-related jobs on AS1

3. Send the AS/400 spooled file to the fax machine. Enter the following command:

   ```
   SNDFAX TO((5071)) FILE(QSYSPRT) SPLNBR(*LAST) MSGQ(QUSRSYS/QFAXOPR)
   ```

   Specify the MSGQ parameter to receive the confirmation message.

4. Confirm the status of the configuration objects and the confirmation message.

   a. Enter the following command to confirm the status of configuration objects:

      ```
      WRKCFGSTS CFGTYPE(*LIN) CFGD(C3S4O10)
      ```

      See Figure 150.

```
                          Work with Configuration Status              AS1
                                                        04/14/00  15:48:43
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    13=Work with APPN status...

Opt  Description      Status               -------------Job--------------
     C3S4O10          ACTIVE
       C3S4O10        ACTIVE
         C3S4O10D     ACTIVE
           C3S4O10I   ACTIVE               C3S4O10DIS  ITSCID60    001370




                                                                      Bottom
Parameters or command
===>
F3=Exit   F4=Prompt   F12=Cancel   F23=More options   F24=More keys
```

Figure 150. Status of the configuration objects when sending a fax on AS1

   b. Enter the following command to see the confirmation message:

      ```
      DSPMSG MSGQ(QFAXOPR)
      ```

      See Figure 151.

```
                              Display Messages
                                                              System:   AS1
Queue . . . . . :   QFAXOPR                 Program . . . . :   *DSPMSG
  Library . . . :     QUSRSYS                 Library . . . :
Severity  . . . :   95                      Delivery  . . . :   *HOLD

Type reply (if required), press Enter.
  Fax control job 001363/ITSCID60/C3S4O10DIC ended normally.
  Transaction log job 001364/ITSCID60/FAXTRNLOG ended normally.
  Facsimile Support for AS/400 ended normally.
  Facsimile Support for AS/400 being started.
  Fax controller C3S4O10D is starting.
  Facsimile Support for AS/400 started.
  Fax control job 001369/ITSCID60/C3S4O10DIC started.
  Send fax job 001371/ITSCID60/C3S4O10DIP started.
  Transaction log job 001372/ITSCID60/FAXTRNLOG started.
  Member FTLOG01 is being used to log the fax transactions.
  Fax transmission to telephone number 5071 completed successfully.
  Fax transmissions to all telephone numbers specified in a SNDFAX request
    have completed successfully.
                                                                      Bottom
F3=Exit             F11=Remove a message                F12=Cancel
F13=Remove all      F16=Remove all except unanswered    F24=More keys
```

Figure 151. Confirmation message

5. Check the status on AS2 (Incoming calls). The operation to activate the fax environment is the same as for AS1. The differences in status are shown in Figure 152 and Figure 153 on page 184.

```
Work with Configuration Status
                                                              System:   AS2
Position to  . . . . .               Starting characters
Opt  Description      Status                 -------------Job--------------
     C3S4O02          CONNECT PENDING
       C3S4O02D       ACTIVE
         C3S4O02I     ACTIVE                 C3S4O02DIS  ITSCID60    001841









                                                                      Bottom
===>
```

Figure 152. The status of the configuration objects after starting

```
                                Work with Active Jobs                   AS2
                                                                04/14/00 16:21:35
CPU %:     .3     Elapsed time:   00:17:31     Active jobs:   119

Type options, press Enter.
  2=Change   3=Hold   4=End   5=Work with   6=Release   7=Display message
  8=Work with spooled files   13=Disconnect ...

Opt  Subsystem/Job  User        Type  CPU %  Function        Status
     QFAXSBS        QSYS        SBS      .0                 DEQW
       C3S4O02DIC   ITSCID60    BCH      .0  PGM-QFFFAXCTL1  DEQW
       C3S4O02DIS   ITSCID60    BCH      .0  PGM-QFFASC      SELW
       FAXMSTCTL    ITSCID60    BCH      .0  PGM-QFFMSTCTL1  DEQW
       FAXTRNLOG    ITSCID60    BCH      .0  PGM-QFFTRLOG1   DEQW




                                                                Bottom
Parameters or command
===>
```

Figure 153. The status of Fax-related jobs on AS2

a. Enter the following command on AS1 to send the AS/400 spooled file to AS2:

   ```
   SNDFAX TO((5088)) FILE(QSYSPRT) SPLNBR(*LAST) MSGQ(QUSRSYS/QFAXOPR)
   ```

   Specify the phone number of AS2.

b. Enter the following command on AS2 to confirm that the fax was received from AS1:

   ```
   WRKFAX
   ```

   See Figure 154.

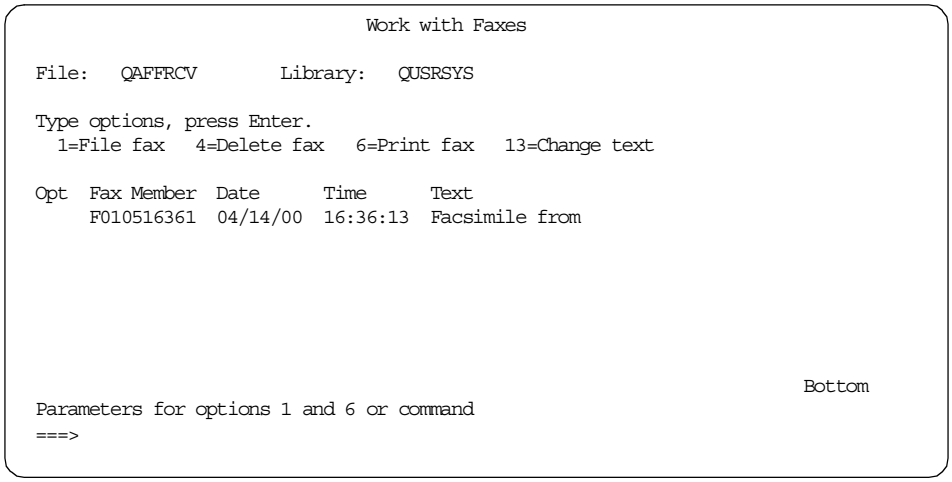


Figure 154. WRKFAX display

The received fax is shown as a member of the QAFFRCV file.

You can also see the communication trace for fax data using the following command:

```
STRCMNTRC CFGOBJ(C3s5O10) CFGTYPE(*LIN)
```

On the communication trace, you can see the modem status and modem command as shown in Figure 155 on page 186 and Figure 156 on page 187.

```
COMMUNICATIONS TRACE       Title: Fax Trace                      05/10/00  13:58:40                          Page:       3
Record       Data    Record    Record
Number  S/R  Length  Status    Timer
------  ---  ------  --------  ---------------
     1   M       20  DD000002  13:56:04.79050
         Modem Status Event:
                   Mode                  =       Idle
                   Initial Transmit Rate =          0 bps
                   Initial Receive Rate  =          0 bps
                   Current Transmit Rate =          0 bps
                   Current Receive Rate  =          0 bps
         Data . . . . . :  0000000100000000 0000000000000000  00000000                          *.....................
     2   M       16  DD000001  13:56:04.79060
         Serial Status Event:
              Input Flow Control State:
                   Xon/Xoff              Ignored
                   RTS                   Ignored
                   DTR                   Ignored
              Output Flow Control State:
                   Xon/Xoff              Ignored
                   CTS                   Ignored
                   DSR                   Ignored
              Modem Signal State:
                   RTS                   Active
                   CTS                   Active
                   DTR                   Active
                   DSR                   Active
                   RI                    Inactive
                   DCD                   Inactive
         Data . . . . . :  0000000000000000 0202020201010000                                    *.................
     3   S       14  00000000  13:56:12.45439
         Data . . . . . :  41542B46434C4153 533D322E300D                                        *AT+FCLASS=2.0.
     4   R        6  00000000  13:56:13.05168
         Data . . . . . :  0D0A4F4B0D0A                                                         *..OK..
     5   S       30  00000000  13:56:13.05173
         Data . . . . . :  41542B464C4F3D32 3B2B46424F3D313B  2B4645413D313B2B 4643523D310D       *AT+FLO=2;+FBO=1;+FEA=1;+FCR=1.
     6   R        6  00000000  13:56:13.74834
         Data . . . . . :  0D0A4F4B0D0A                                                         *..OK..
     7   S       24  00000000  13:56:13.74839
         Data . . . . . :  41542B464E523D31 2C312C312C313B2B  4643513D322C300D                   *AT+FNR=1,1,1,1;+FCQ=2,0.
     8   R        6  00000000  13:56:14.44505
         Data . . . . . :  0D0A4F4B0D0A                                                         *..OK..
     9   S       12  00000000  13:56:14.44510
         Data . . . . . :  41542B4652513D39 352C350D                                            *AT+FRQ=95,5.
```

Figure 155. Fax communication trace (Part 1 of 2)

```
COMMUNICATIONS TRACE       Title:Fax Trace                          05/10/00  13:58:40                          Page:       7
Record       Data    Record    Record
Number  S/R  Length  Status    Timer
------  ---  ------  --------  ---------------
    45   S       24  00000000  13:57:40.13957
         Data . . . . . :  41542B46495533D31 2C352C302C322C31  2C302C302C30200D                  *AT+FIS=1,5,0,2,1,0,0,0 .
    46   R        6  00000000  13:57:40.83651
         Data . . . . . :  0D0A4F4B0D0A                                                          *..OK..
    47   S        7  00000000  13:57:40.83656
         Data . . . . . :  41542B4644540D                                                        *AT+FDT.
    48   R      108  00000000  13:57:43.72421
         Data . . . . . :  0D0A2B4648543A20 4646203033203433  20323020323020323 3020323020323020  *..+FHT: FF 03 43 20 20 20 20 20
                           3230323023203230 2032302032302032  3020323020323020 3230203230203230  *20 20 20 20 20 20 20 20 20 20 20 2
                           2032302032302032 302032300D0A0D0A  2B4648543A204646 2031332038332030  * 20 20 20 20....+FHT: FF 13 83
                           3020433620413820 30300D0A                                            *0 C6 A8 00..
    49   R       42  00000000  13:57:46.91050
         Data . . . . . :  0D0A2B4648523A20 4646203133203834  0D0A0D0A2B464353 3A312C332C302C32  *..+FHR: FF 13 84....+FCS:1,3,0,
                           2C312C302C302C34 0D0A                                                *,1,0,0,4..
    50   M       16  DD000001  13:57:47.11044
         Serial Status Event:
              Input Flow Control State:
                   Xon/Xoff              Ignored
                   RTS                   Ignored
                   DTR                   Ignored
              Output Flow Control State:
                   Xon/Xoff              Ignored
                   CTS                   Ignored
                   DSR                   Ignored
              Modem Signal State:
                   RTS                   Active
                   CTS                   Inactive
                   DTR                   Active
                   DSR                   Active
                   RI                    Inactive
                   DCD                   Active
         Data . . . . . :  0000000000000000 0201020201020000                                    *.................
    51   R       11  00000000  13:57:47.11050
         Data . . . . . :  0D0A434F4E4E4543 540D0A                                               *..CONNECT..
    52   S     4096  00000000  13:57:47.11079
         Data . . . . . :  1062106510661O6C 001A6CD400500140  05001A6CD4005001 4005001A6CD40050  *.B.E.F.L..L*.P.@...L*.P.@...L*.
                           014005001A6CD400 50014005001A6CD4  0050014005001A6C D40050014005001A  *.@...L*.P.@...L*.P.@...L*.P.@..
                           6CD400500140050O 1A6CD40050014005  001A6CD400500140 05001A6CD4005001  *L*.P.@...L*.P.@...L*.P.@...L*.P
                           4005001A6CD40050 014005001A6CD400  5001400500lA6CD4 0050014005001A6C  *@...L*.P.@...L*.P.@...L*.P.@...
                           D40050014005001A 6CD4005001400500  1A6CD40050014005 001A6CD400500140  **.P.@...L*.P.@...L*.P.@...L*.P.
                           05001A6CD4005001 4005001A6CD40050  014005001A6CD400 50014005001A6CD4  *...L*.P.@...L*.P.@...L*.P.@...L
                           0050014005001A6C D40050014005001A  6CD4005001400500 1A6CD40050014005  *.P.@...L*.P.@...L*.P.@...L*.P.@
                           001A6CD400500140 05001A6CD4005001  4005001A6CD40050 014005001A6CD400  *..L*.P.@...L*.P.@...L*.P.@...L*
                           50014005001A6CD4 0045B0B5C00459A2  D1C644C172466321 82E575B0F91B05E0  *P.@...L*.E***.Y***D*RFC|**U**..
```

Figure 156. Fax communication trace (Part 2 of 2)

6.2 Connection failures

This section shows you the steps to help you identify connection failure causes and resolve them by using the available facilities. The steps are outlined here:

1. After the Operations Navigator messages appear (which are in TCPnnnn form), enter the following command:

   ```
   DSPMSGD RANGE(TCPnnnn) MSGF(QSYS/QTCPMSG)
   ```

2. Enter the following command:

   ```
   DSPMSG QSYSOPR
   ```

3. To review the relevant QEZJOBLOG, run the following command:

   ```
   WRKOUTQ
   ```

4. From the WRKTCPPTP screen, start the required profile. Press F1 on the displayed message, and press F10 to display the job log messages.

5. From the Connection Profiles display in Operations Navigator, right-click the profile name, and click **Jobs**. Then, right-click **Printer Output**, right-click on any parameter, and click **Open** to display the modem dialog.
6. From the Connection Profiles display, right-click on the profile name, and click **Jobs**. Then, right-click on the user name, and click the job log to display each entry on one line. This format is easier to read than displaying the spooled output file. You can display the details by clicking the required line and right-clicking **Details**.

6.2.1 Configuration errors

Most connection failures can be attributed to configuration errors that can be found (and corrected) by using one or more of the previously described facilities, plus a review of the profile configuration. The following list shows a set of configuration errors that were resolved by using the facilities and changing the profile definitions. Review the following items in order:

1. Verify that the line resource is not in use by another configuration, as indicated by messages CPD27D0 and TCP8317 Reason Code 04.
2. Verify whether the remote answer profile is in “Waiting for incoming call” status.
3. Verify that the remote phone number is correct and contains all the required digits, including the “dial-out” digit.
4. Make sure the line name is correct. If a profile has been created initially as a “Connections Allowed” Answer and subsequently changed to Dial or Both or vice versa, the Operations Navigator message CPDB181 “Connection list required” is displayed. The problem is resolved by defining a different line.
5. Verify that the remote IP address is correct. Unless they are dynamically assigned, local and remote Dial profile IP addresses must match the remote and local IP addresses, respectively, in the Answer profile. Message TCP8208 asks you to review previous messages, which can be viewed by typing the `WRKTCPPTP` command and then pressing F1 and F10.
6. Be sure that the correct modem was selected from the list and is being used.
7. When connecting digital to analog, ensure that the digital connection list “Information transfer type accepted for incoming calls” is set to the correct remote modem type, most likely asynchronous or synchronous.
8. When connecting to a 7852 modem, ensure that switch 12 is set correctly: Up for synchronous or Down for asynchronous mode. A line defined as Asynchronous, which is connected to a synchronous modem, or vice

versa, can appear as an “internal system failure” when the line is varied on.

6.2.2 PPP common error

This section describes common PPP errors that are found when setting up point-to-point connections.

6.2.2.1 Modem hardware configuration

The typical problem with the modem hardware is incorrect configuration of dip-switches and other hardware settings. Make sure that the modem is configured for the correct framing type, either Async or Sync. Refer to the modem manual for instructions.

6.2.2.2 Modem AT commands

If the modem you are trying to use is not in the predefined list of modems supplied with OS/400, you have to create a new modem. This can be done by basing the new modem on an existing modem, for example the generic Hayes.

If you suspect problems with the Hayes AT commands for the PPP jobs in the QSYSWRK subsystem, you should examine either the job log of the PPP job or the spooled files that the job generates.

Figure 157 through Figure 160 on page 191 show a debugging example.

```
                        Work with Configuration Status              AS1
                                                          05/10/00  15:07:30
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    13=Work with APPN status...

Opt  Description      Status               -------------Job--------------
     C2S212LINE       ACTIVE
       C2S21NET       ACTIVE
5        C2S21TCP     ACTIVE               QTPPDIAL12  QTCP        003438
```

Figure 157. Working with the PPP job

```
                              Work with Job
                                                                System:   AS1
Job:   QTPPDIAL12     User:   QTCP           Number:   003438

Select one of the following:

     1. Display job status attributes
     2. Display job definition attributes
     3. Display job run attributes, if active
     4. Work with spooled files

    10. Display job log, if active or on job queue
    11. Display call stack, if active
    12. Work with locks, if active
    13. Display library list, if active
    14. Display open files, if active
    15. Display file overrides, if active
    16. Display commitment control status, if active
                                                                        More...
Selection or command
===> 4

F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel
```

Figure 158. Viewing the spooled files or job logs

```
                        Work with Job Spooled Files

Job:   QTPPDIAL12     User:   QTCP           Number:   003438

Type options, press Enter.
  1=Send   2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Messages
  8=Attributes        9=Work with printing status

                Device or                       Total   Current
Opt  File       Queue       User Data   Status  Pages     Page   Copies
 5   C2S212     QPRINT      QTPPDIAL12   HLD        1                1
     QPJOBLOG   QEZJOBLOG   QTPPDIAL12   RDY        3                1
```

Figure 159. Displaying the spooled file

Figure 160 shows a connection with no errors. The spooled file is useful in debugging wrong AT commands.

```
                                        Display Spooled File
File  . . . . . :   C2S212                                                  Page/Line   1/6
Control . . . . .                                                          Columns     1 - 130
Find  . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3
15:07:19.268 === Modem for PPP line C2S212LINE : 2761 Internal Modem.
15:07:19.269 === Attempting modem reset.
15:07:19.277 ==> ATZS0=0
15:07:19.365 === Reading modem response.
15:07:19.869 <== ATZS0=0
15:07:19.869 === Reading modem response.
15:07:21.519 <== OK
15:07:21.547 === Attempting modem initialization.
15:07:21.547 ==> ATE0Q0V1S7=70W1X4&K3&S1\N3
15:07:21.580 === Reading modem response.
15:07:22.225 <== ATE0Q0V1S7=70W1X4&K3&S1\N3
15:07:22.225 ... OK
15:07:22.239 === Attempting modem dial/answer.
15:07:22.239 ==> ATDT5065
15:07:27.361 === Reading modem response.
15:07:50.909 <== CARRIER 31200
15:07:52.958 === Reading modem response.
15:07:53.471 <== PROTOCOL: LAPM
15:07:53.471 ... CONNECT 115200
                                                                                                        More...
```

Figure 160. The spooled file from the PPP job

A brief description of the symbols shown in the spooled file is shown here:

- ======== Regular information text
- <======= Outbound text (to the modem) follows
- =======> Inbound text (from the modem) follows

If, for some reason, you cannot find the spooled files from the PPP jobs, use the Work with Spooled Files (`WRKSPLF QTCP`) command to help you locate them. Look for job names starting with User Data QTPPANSnnn or QTPPDIALnn.

Normally, the spooled file is only generated in cases where an error occurs. To force the generation of the spooled file, start the PPP connection from the green-screen interface with the Start Point-to-Point TCP/IP (STRTCPPTP) command.

6.2.2.3 Problems with PPP users and passwords

Make sure that the user IDs and password are entered using the same case. For example, make sure that, for system A, the user is USER (all in uppercase) and the user is spelled the same way on system B, USER (not mixed or lowercase).

Furthermore, make sure that the authentication protocol used by the peers is the same. Do not use PAP at one peer, while the other peer is configured as CHAP.

6.2.2.4 Problems with PPP lines when starting the configuration profile

Remember to vary off other lines using the same hardware resource.

6.2.2.5 Problems with the PPP protocol

Investigating the lower levels of the PPP protocol may be necessary in some situations, where the peers are unable to communicate with each other due to some configuration error. If the PPP log or the job log of the PPP job does not show any indication of the problem, you can investigate the problem using the communications trace function.

Use the Start Communications Trace (STRCMNTRC) command to start a communications trace. Section A.2, “Sample line trace of PPP over ISDN” on page 244, shows an example.

6.3 Analog and digital network problems

This section describes how to identify remote connection or network problems and resolve them by describing the available facilities. This section discusses three parts: analog, digital, and performance, which is only a problem when experience does not relate to guided expectation.

6.3.1 Analog network problems

When application users lose their sessions to a remote location, the configuration object status, as shown in Figure 142 on page 176, may indicate:

- CONNECT PENDING for the Line
- VARY ON PENDING for the Controller and Device

The following list identifies analog network problems and how to resolve them:

- If the line status is other than CONNECT PENDING, you need to vary off the line and then vary on the line to bring it to CONNECT PENDING status.
- If the line status is CONNECT PENDING, the problem is caused by an action at the remote end, or the phone line between the locations has failed. In this case, contact the remote operator and identify the status of the remote objects. If the status of the remote configuration objects is the same as shown in Figure 142 on page 176, start the application to recover the connection.

- If the line status remains other than CONNECT PENDING at either or both ends after attempts to vary on, a local modem or cable failure is indicated. Use the `DSPMSG QSYSOPR` command to see the line failure messages and follow the recovery procedures. Start a Service Tool check for permanent communications errors on the line, and use the given System Reference Codes (SRC) to identify the cause of the problem.
- Line reconnection by re-starting applications provides an alternative route to the remote system if the original problem was caused by a phone line failure.
- Use the Service Tool to identify the hardware element in the link that is “most likely” the cause of the problem.
- Check the QSYSOPR message queue for related messages and follow recovery actions.

6.3.2 ISDN network problems

The following facilities are used to identify and resolve ISDN networking problems:

- Start a Service Tool (STRSST) to check for any communications hardware element failures. There can be System Reference Codes for the line protocol that identify the failing item in the “most likely” to “least likely” order.
- DSPMSG QSYSOPR to display failure messages and recovery actions. Messages with an asterisk have additional problem analysis information. Press F14 to display this information. “Cause codes” may be included in the message.
- Cause codes indicate why network events occur and appear in messages sent to the QSYSOPR message queue. The cause code is one field in the cause information element (IE) that the local system may send or receive.
- The IE fields include Source of generated code, Coding standard used, Cause code, and Diagnostic codes specific to the network or terminal equipment.
- ISDN communication traces. To gather communications trace data, the following commands are used:
  - Start Communications Trace (STRCMNTRC) specifying the Network interface to collect D-Channel data and the Line description to collect B-Channel data.
  - End Communications Trace (ENDCMNTRC)
  - Print Communications Trace (PRTCMNTRC)

- Check Communications Trace (CHKCMNTRC)
- Delete Communications Trace (DLTCMNTRC)

> **Note**
>
> An ISDN communication trace remains active for one call. Once the call is terminated, the communications trace is stopped.

- The system service tools, STRSST, includes the trace commands previously mentioned.
- The data on the D-Channel uses the Link Access Procedure D channel format and can help determine call-in and call-out problems. LAPD is a duplex, asynchronous, symmetric procedure used to communicate control instructions, such as setting up and ending a connection to the control, D-Channel, of ISDN.

  Refer to Appendix B, “ISDN cause codes” on page 253, for ISDN cause codes.

6.4 Performance issues

ISDN performance can be improved by increasing throughput after a connection is established, increasing the channel throughput, and increasing the call acceptance rate.

6.4.1 Throughput after connecting

To improve performance, the line and controller can be configured to use a larger initial parameter value when attempting to make a connection and a smaller final value once the connection is established. Define a larger value in the line description and an optional smaller value in the attached controller.

IDLC controller description parameters receive their initial connection values from the attached line description. A parameter value defined in the controller description is used after the connection is established. If no value is defined in the controller, the line description value continues to be used. The following controller parameters use *LIND as the default:

- IDLC window size (IDLCWDWSIZ)
- IDLC frame retry (IDLCFRMRTY)
- IDLC response timer (IDLCRSPTMR)
- IDLC connect retry (IDLCCNNRTY)
- Maximum frame size (MAXFRAME)

6.4.2 Channel throughput

Channel throughput is maximized by choosing the correct frame size, window size, and request or response time limit, which is the maximum time between a request and response.

6.4.2.1 Frame size

The MAXFRAME parameter in the line and controller descriptions specifies the frame size for PPP and IDLC. A higher number of larger-sized frames can be sent without waiting and may provide better performance. Large frame sizes, however, do not perform well in electrically noisy environments because of the longer transmission times. The maximum frame size for 2750 and 2751 is 2064.

6.4.2.2 IDLC window size

The IDLC window size refers to the maximum number of IDLC frames that can be sent before an acknowledgment is required. The IDLCWDWSIZ parameter in the line and controller descriptions specifies the window size. The maximum is 31. Generally, a larger window size and a greater number of frames that can be sent without waiting can provide better performance if the frame size is small or if the transmission delay is long. Larger window sizes decrease the waiting time for an acknowledgment. As with larger frame sizes, a large window size does not perform well with error-prone lines or networks or in electrically noisy environments.

6.4.3 Call acceptance performance

If call-acceptance times exceed those required by the network, changing the connection list entries can reduce the time that the system processes incoming calls.

Connection lists can be enhanced in a number of ways to increase call acceptance by using line numbers once only. This avoids duplicate connection list entries and limits the use of *ANY for remote numbers and line descriptions.

- Use line numbers once.

  For PPP, FAX, and IDLC, a line number should appear once in all connection lists and not be duplicated.

- Avoid duplicate connection list entries.

  The connection list used for answering should not contain duplicate entries. Having a unique entry for each remote system reduces the search time and avoids having several connection lists searched for the same call. Avoid duplicate entries in the same or different connection lists.

- Limit the use of *ANY for remote numbers.

  Using *ANY for the parameter remote number, RMTNBR, in the connection list increases the chances of accepting the call. *ANY can decreases system performance because more processing is required as a result of time spent answering “wrong number” calls. To process calls targeted only for the interface, the exact local number or local sub-address can be configured in the NWI.

- Consider the number of line descriptions.

  For IDLC and PPP, system performance decreases as the number of line descriptions associated with the connection lists increases because the system is checking more line descriptions.

Chapter 7. Advanced topics

This chapter describes the advanced PPP functions on the AS/400 system. It introduces, explains, and shows you how to set up of each of the following functions:

- Challenge Handshake Authentication Protocol (CHAP)
- Multiple connection profile
- Data over voice
- Dial-on demand (remote peer enabled)

Note

In this chapter, the windows shown for remote access configuration are from a V4R5 system. The information may be formatted differently in other releases. Use the examples here as a guide.

7.1 CHAP

The PPP protocol defines two types of authentication protocol: Password Authentication Protocol (PAP) and CHAP. The PAP protocol simply transmits a user and password to the remote site for confirmation. CHAP provides a more secure authentication protocol by encrypting the user name and password before transmission. For more information, refer to RFC 1334, *PPP Authentication Protocols*.

Use the Authentication page of the PPP profile to specify the authentication protocol choice. Figure 161 on page 198 through Figure 165 on page 199 show the steps to specify authentication on an AS/400 system.

1. If authentication is required by the remote site, select **Enable local system identification**, and select **CHAP only** or **PAP only**. Then, enter a user name and password according to information provided by the remote site.
2. If the remote system is to be authenticated, select **Require remote system identification**, and select **CHAP only** or **PAP only**. Then, enter a validation list name, and click **New** to create the validation list (Figure 161 on page 198).

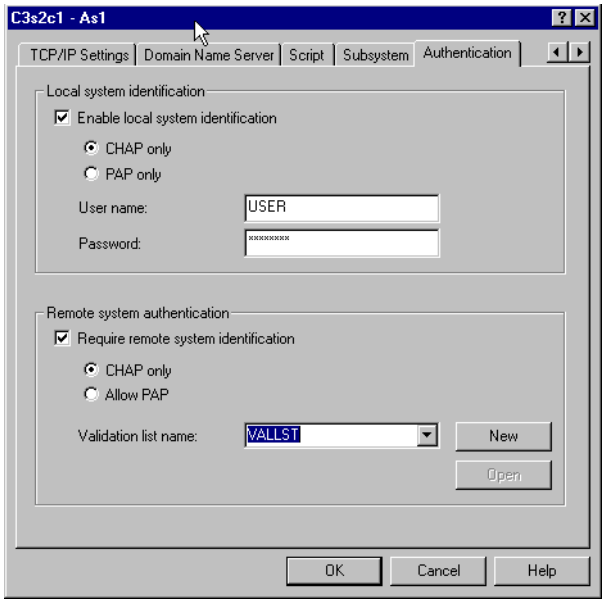


Figure 161. Authentication page of the PPP profile on the AS/400 system

3. Click **Add** to add a new user to the validation list (Figure 162).

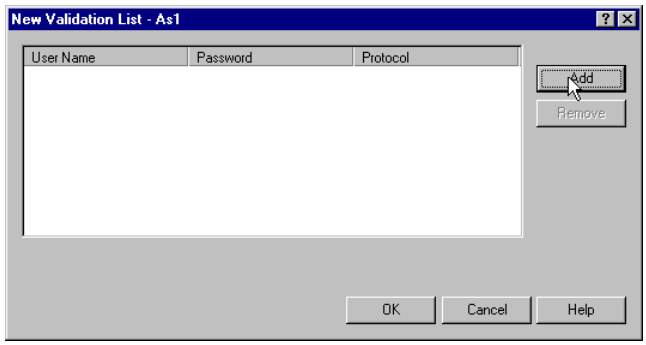


Figure 162. Validation list

4. Select either **CHAP only** or **PAP only**. Then, enter a user name and password, and click **OK** (Figure 163).

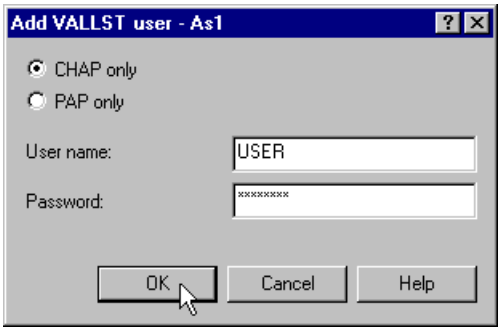


Figure 163. Adding the password to the validation list

5. Enter a password for password confirmation (Figure 164).

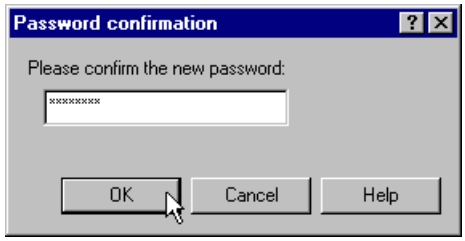


Figure 164. Confirming the password

Click **OK** after all users are registered (Figure 165).

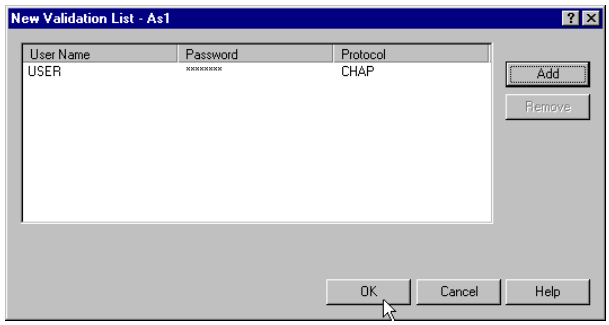
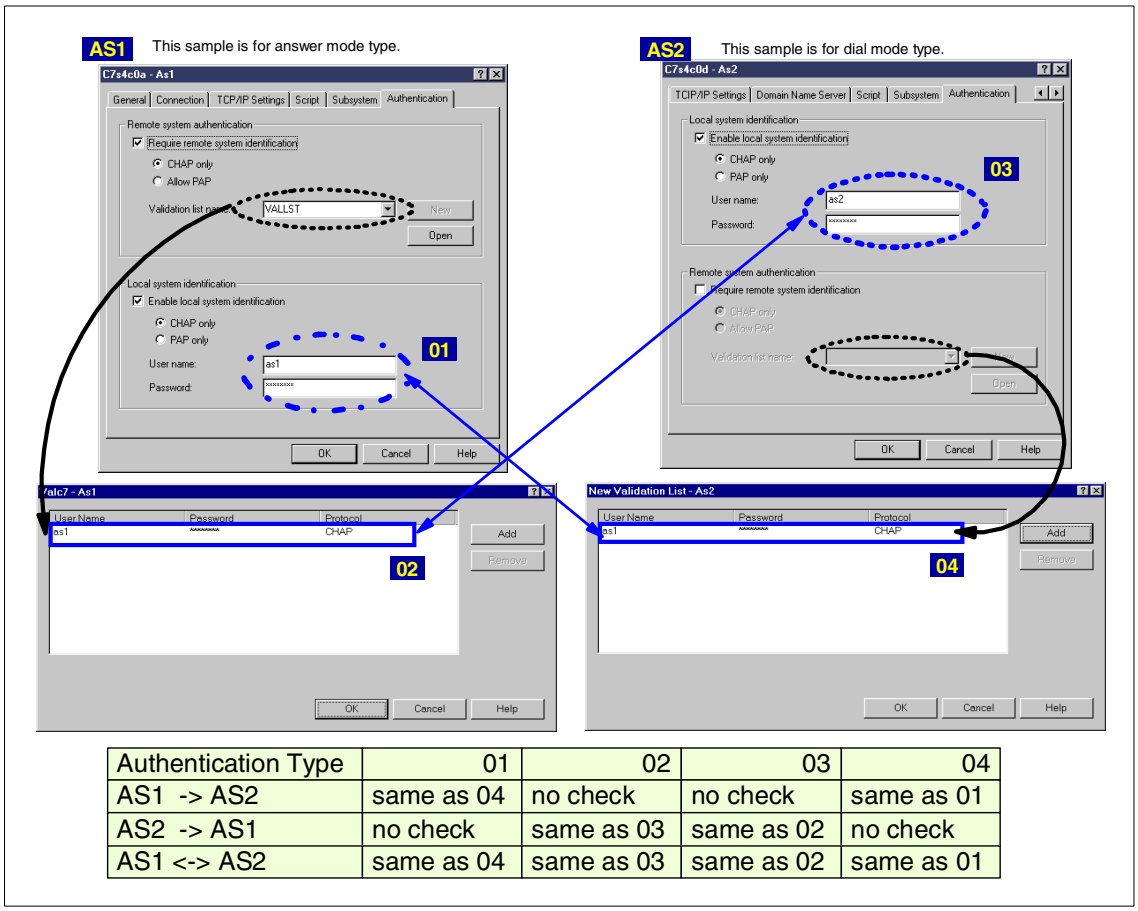


Figure 165. Completing the entry of password for validation list

Note

The QRETSVRSEC system value must be set to 1 to save the password for the validation. *ALLOBJ and *SECADM special authority are required to change the QRETSVRSEC system value.

As shown in Figure 166, when AS1 is dialing and AS2 is answering, select **Enable local system identification** on AS1. Also, select **Require remote system identification** on AS2. The validation list on AS2 will include the user and password that was specified in the Local system identification on AS1. For other cases, refer to the table in Figure 166.



Authentication Type	01	02	03	04
AS1 -> AS2	same as 04	no check	no check	same as 01
AS2 -> AS1	no check	same as 03	same as 02	no check
AS1 <-> AS2	same as 04	same as 03	same as 02	same as 01

Figure 166. Relationship between local and remote authentication

7.2 Multiple connection profile

A multiple connection profile allows many incoming calls to be handled by one profile so that one profile is not restricted to one PPP line. This feature is implemented by configuring a line pool and a remote IP address pool.

To create a PPP multiple connection profile, follow these steps:

1. Configure a multiple connection line pool.

   Many lines can be added to a line pool. A separate connection job is started for each line defined in the line pool. All of the connection jobs wait for incoming calls on their respective lines. Create one connection profile and start the profile. All connection jobs that are required will start.

   Select **Analog line pool (Multiple connection)** for Type of line service, enter a line pool name for Name, and click **New** (Figure 167). The line pool created by this profile can be shared with the other profiles. However, only one profile can use the same line pool name at any one time.

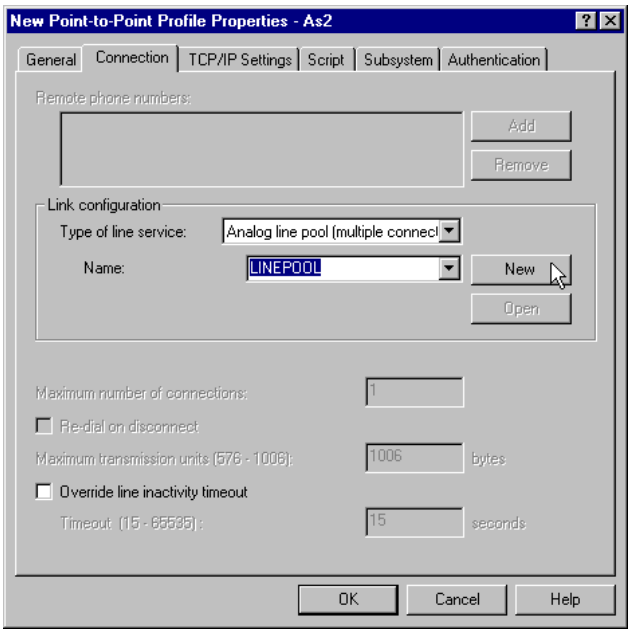


Figure 167. Configuring a multiple connection line pool

   Select a line from the Available lines list, and then click **Add**. The selected lines now appear in the Selected line for pool list. Click **OK** to complete the line pool definition.

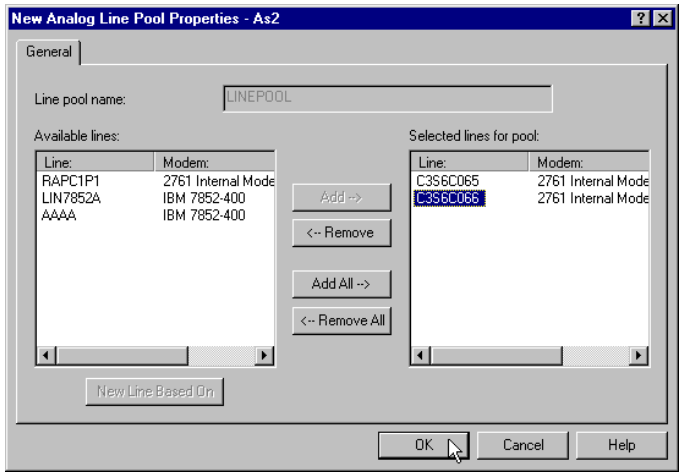


Figure 168. Adding lines to the line pool

2. Configure remote IP address pools.

   Remote IP address pools can be used for any answering a PPP profile that is used for multiple incoming calls. This feature assigns a unique remote IP address to each of the incoming systems.

   Select **Define address pool** in the Remote IP address box (Figure 168), and enter a Starting IP address and Number of address. In this case, “2” is specified for Number of addresses because two lines are available. Remote IP addresses are sequentially given out to each connection, beginning with the starting IP address up to the number defined in the pool.

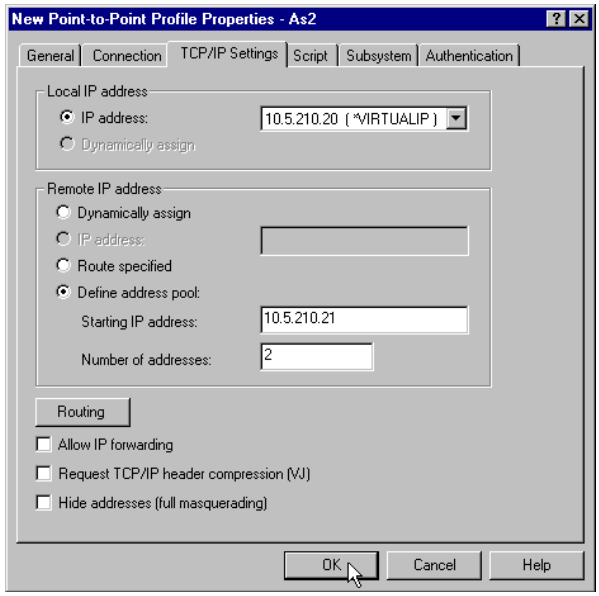


Figure 169. Configuring remote address pools

After starting this profile, two PPP jobs are started as shown in Figure 170.

```
                          Work with Configuration Status
                                                                 System:   AS2
Position to  . . . . .                  Starting characters
Opt  Description       Status                    ------------Job-------------
     C3S6C065          ACTIVE
       C3S6CNET        ACTIVE
         C3S6CTCP      ACTIVE              QTPPPSSN    QTCP        002130
     C3S6C066          ACTIVE
       C3S6CNET00      ACTIVE
         C3S6CTCP00    ACTIVE              QTPPPSSN    QTCP        002153




                                                                      Bottom
===>
```

Figure 170. Status on AS2 after starting the profile

All lines in the specified line pool (refer to Figure 168) are used. Therefore, the other profiles that use the same line pool cannot start.

7.3 Data over voice

The #2750 and #2751 IOAs support data over voice, where an ISDN voice connection, instead of a data connection, transports data. Use data over voice when:

- Data connections are not available.
- It is cheaper than a data-over-data connection.

When transmitting data over voice, there is some performance loss (56 Kbps versus 64 Kbps).

Confirm with the network service provider that data over voice is available locally.

Use the Digital Connection List page for a line description of the PPP profile to use data over voice. Select **Data over voice** for Information transfer type both for incoming and outgoing calls as shown in Figure 171. This will allow you to use data over voice on the AS/400 system.

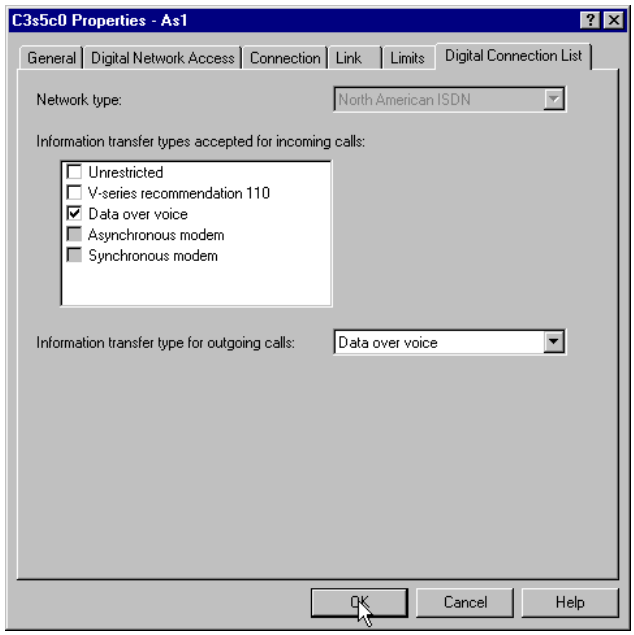


Figure 171. Specifying data over voice on the Digital Connection List tab

After a new profile for data over voice is created, the connection list is created, which has two entries, DOVIN and DOVOUT, of which INFTFRTYPE parameter is *DOV.

7.4 PPP dial-on-demand remote peer enabled (V4R5)

OS/400 V4R5 supports a new mode: Switched line - Dial-on-demand (Remote peer enabled). In this mode, the same function for ISDN as dial-on demand (Answer enabled dedicate peer) for analog lines can be created and can include a WAN topology described as hub-and-spoke. Hub-and-spoke is described in 7.4.2, “PPP dial-on-demand hub and spoke” on page 223. Essentially, it defines a configuration where one system is a hub connected to up to eight other systems as spokes. This section describes configuration examples of PPP dial-on-demand remote peer enabled.

7.4.1 ISDN answer enabled dial-on demand (not dedicated)

The dial-on-demand (answer enabled dedicated peer) profile for ISDN cannot be created because the precise ISDN resource for Dial or Answer cannot be dedicated. For ISDN, use dial-on-demand (remote peer enabled) profiles to control dialing out and normal answer profiles to control dialing in. When configuring the DoD (remote peer enabled) profile, an answer profile used to handle incoming calls can be specified. Start *both* profiles. It is then possible to receive calls from the remote peer or call the remote peer.

This section describes the AS/400 to AS/400 connections using PPP dial-on-demand remote peer enabled. There are six cases in this scenario:

- Case 1: AS/400 Dial to AS/400 DoD (remote peer enabled) numbered
- Case 2: AS/400 Dial to AS/400 DoD (remote peer enabled) unnumbered
- Case 3: AS/400 DoD (dial only) to AS/400 DoD (remote peer enabled) numbered
- Case 4: AS/400 DoD (dial only) to AS/400 DoD (remote peer enabled) unnumbered
- Case 5: AS/400 DoD (remote peer enabled) to AS/400 DoD (remote peer enabled) numbered
- Case 6: AS/400 DoD (remote peer enabled) to AS/400 DoD (remote peer enabled) unnumbered
- Case 7: PC dial to AS/400 DoD (remote peer enabled) numbered
- Case 8: PC dial to AS/400 DoD (remote peer enabled) unnumbered

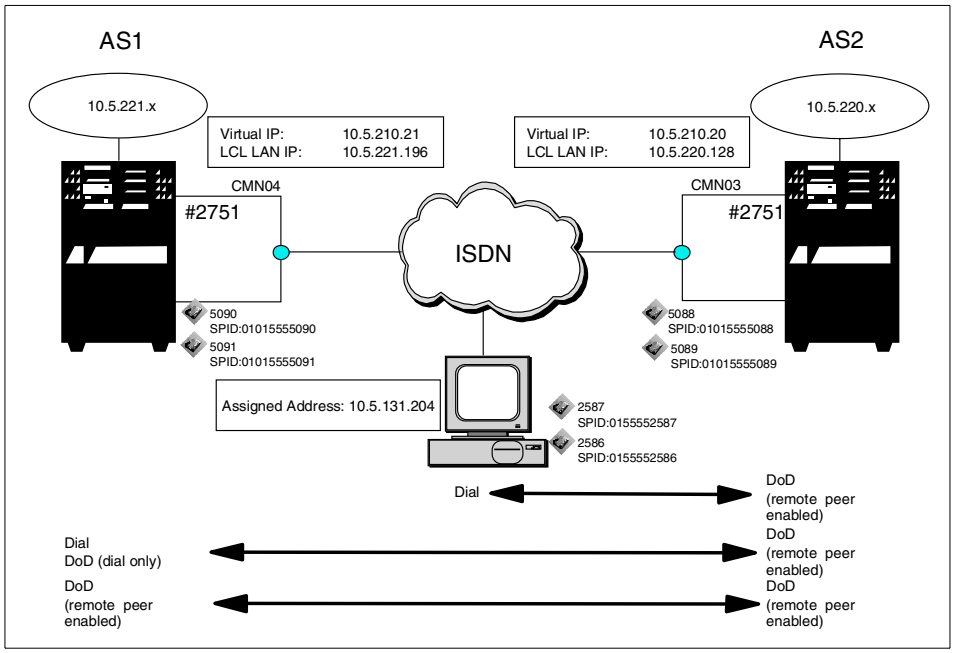


Figure 172. Scenario 4: #2751 to and from the #2751 PPP DoD remote peer enabled

7.4.1.1 Scenario usage

The dial-on-demand remote peer enabled profile allows users on either system, establish connections with the other. For example, either end can initiate a call. Lines and modems are not dedicated, lines are not associated to users, and line resources are not committed until a call is placed.

7.4.1.2 Configuration steps

The following section describes how to configure the PPP connection (Cases 5 and 7).

1. Configure the profile for a DoD remote peer enabled on AS2:
   a. Create the PPP profile as Answer on AS2.
   b. Create the PPP profile as DoD remote peer enabled on AS2.
2. Configure the profile for a DoD remote peer enabled on AS1:
   a. Create the PPP profile as Answer on AS1.
   b. Create the PPP profile as DoD remote peer enabled on AS1.
3. Set up Dial-Up Networking on the PC.

Note

The numbers in reverse-bold type in the following figures correspond to the numbers in Table 60 on page 219 through Table 64 on page 222.

Prerequisite

This function is possible under OS/400 V4R5 with PTF (SF62239). Also use Operations Navigator V4R5 with SP1 (SF62213).

Specify the remote authentication for using DoD (remote peer enabled).

Configuring the profile for DoD remote peer enabled on AS2

Create two profiles: an answer profile to handle incoming calls and a DoD (remote peer enabled) profile to handle outgoing calls.

The Operations Navigator panels are changed under V4R5. Figure 173 through Figure 184 show panel images for Cases 5 and 7 on AS2. Create an Answer profile before creating a DoD (remote peer enabled) profile.

1. Create the PPP profile as Answer on AS2.
   a. Configure the General page of the Answer profile (Cases 5 and 7).

      Enter a name and description. Select **Switched line** for Line connection type and **Answer** for Mode type. Only **PPP** for Type is allowed for an ISDN connection (Figure 173 on page 208).

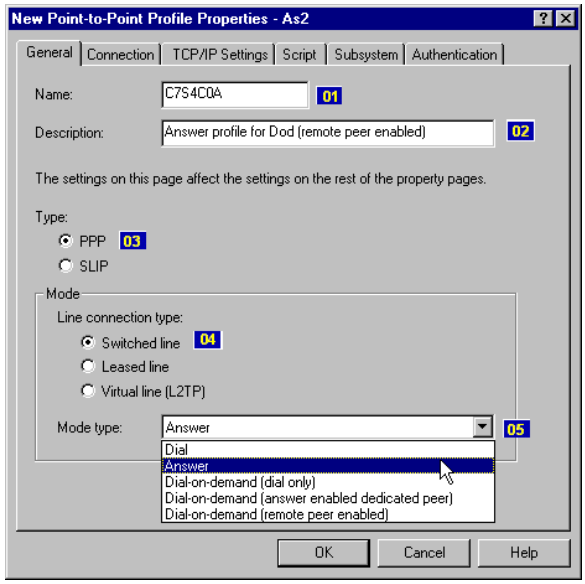


Figure 173. Configuring the General page of the Answer profile

b. Configure the Connection page of the Answer profile.

   Select **Integrated ISDN** line for Type of line service, and select the line from Name list. If the line does not exist, enter a name, and click **New** to create a new line for the connection. To make a new line, refer to 3.2.2.1, “Configuring a PPP profile as a switched dial on AS1” on page 81. In this case, specify 2 for Maximum number of connections because there are two B-channels available (Figure 174).

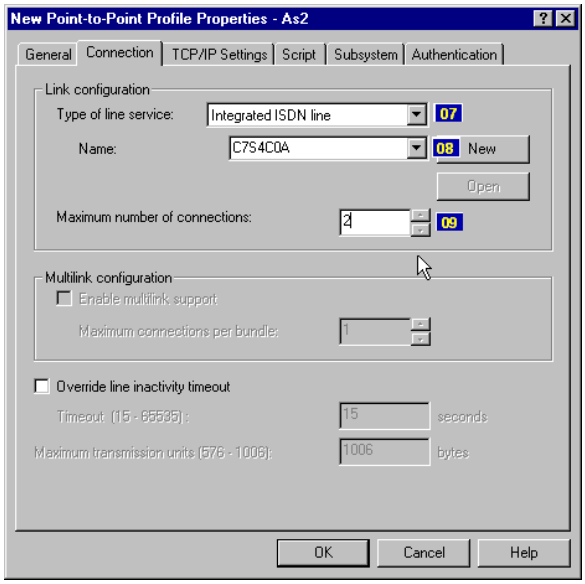


Figure 174. Configuring the Connection page of the Answer profile

c. Configure the TCP/IP Settings page of the Answer profile.

   Select a *VIRTUALIP address made for a numbered network on AS2 for Local IP address. Select **Route specified**, and then click **Routing** to specify the remote IP address (Figure 175 on page 210).

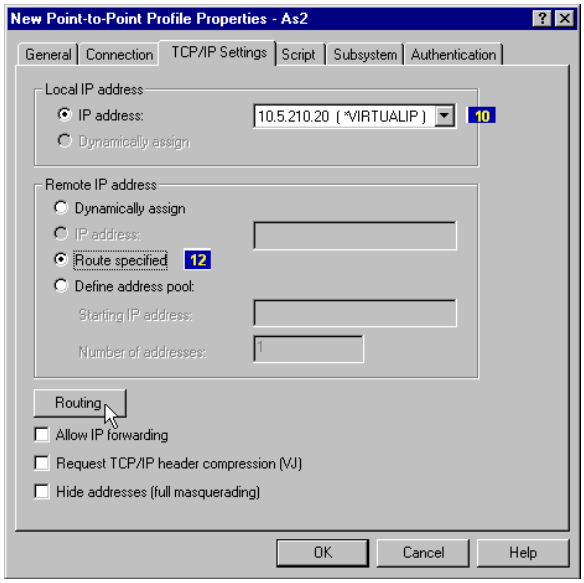


Figure 175. Configuring the TCP/IP Settings page of the Answer profile

d. Configure the Routing properties of the Answer profile (Figure 176).

   To add a route, click **Add**.

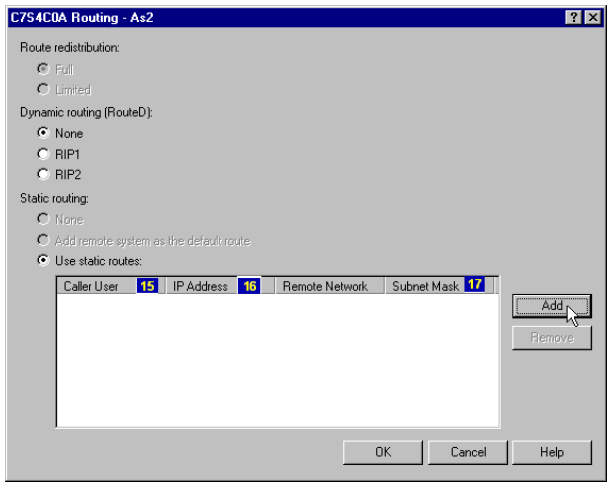


Figure 176. Configuring the Routing properties of the Answer profile (Part 1 of 3)

Enter the user name of the remote site for Caller user name. The user name must be defined in the validation list. Enter an IP address and Subnet mask used by the user (Figure 177).

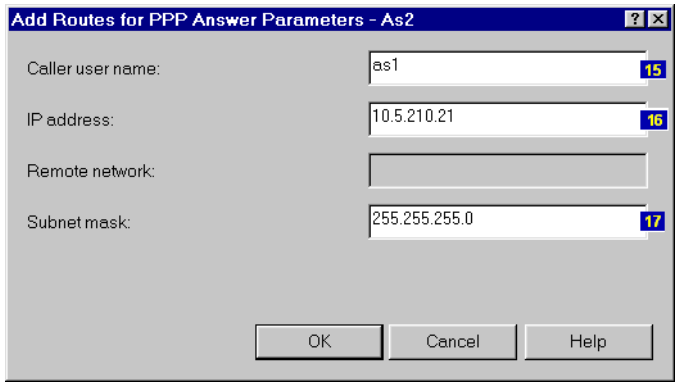


Figure 177. Configuring the Routing properties of the Answer profile (Part 2 of 3)

Two users are defined, an AS1 user and a PC user in this case (Figure 178).

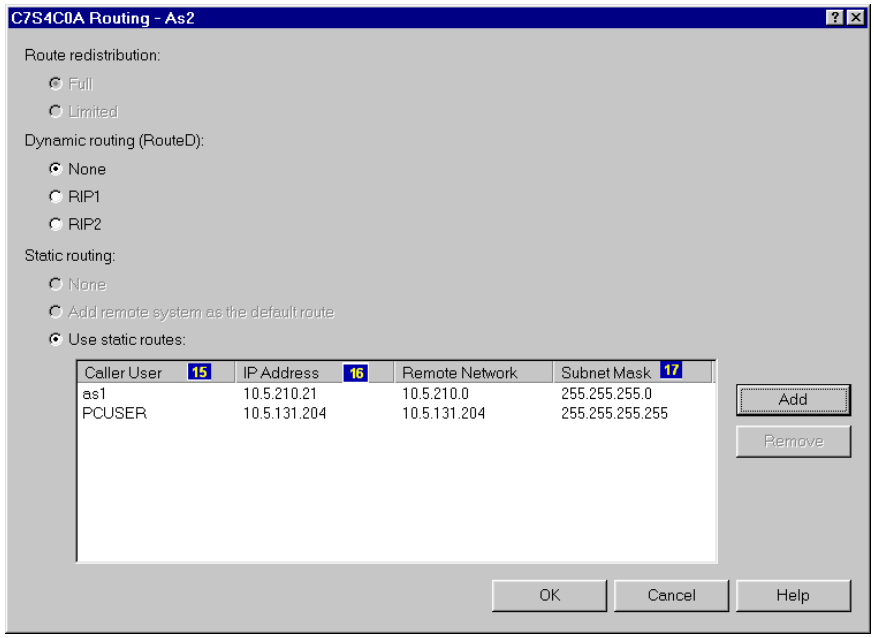


Figure 178. Configuring the Routing properties of the Answer profile (Part 3 of 3)

e. Configure the Authentication page of the Answer profile.

To require the remote system to be authenticated, select **Require remote system identification**, and select **CHAP only**. Select the validation list, or enter a new validation list name and click **New**. For more information

about CHAP, refer to 7.1, “CHAP” on page 197. Click **OK** to make a DoD remote peer enabled profile, after registering the users to the validation list (Figure 179).

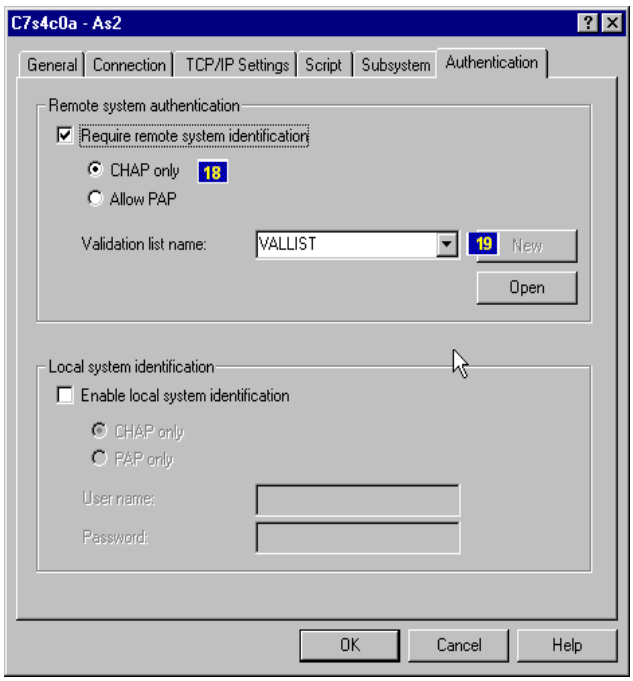


Figure 179. Configuring the Authentication page of the Answer profile

The selected validation list has two users for an AS1 and a PC. The remote site must use the user name and password defined in this panel when dialing to make a connection with AS2 (Figure 180).

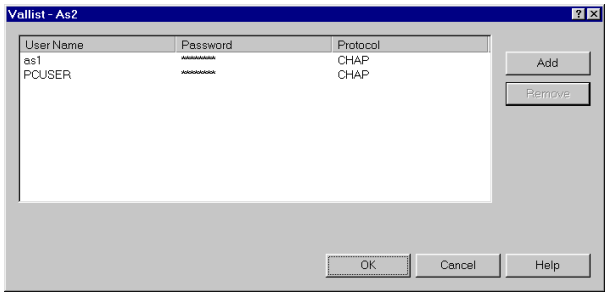


Figure 180. Adding the user name and password to the validation list

2. Create the PPP profile as a DoD remote peer enabled on AS2.

a. Configure the General page of the DoD remote peer-enabled profile.

   Enter a name and description. Select **Switched line** for Line connection type and **Dial-on-demand (remote peer enabled)** for Mode type. Only **PPP** for Type is allowed for ISDN connection (Figure 181).

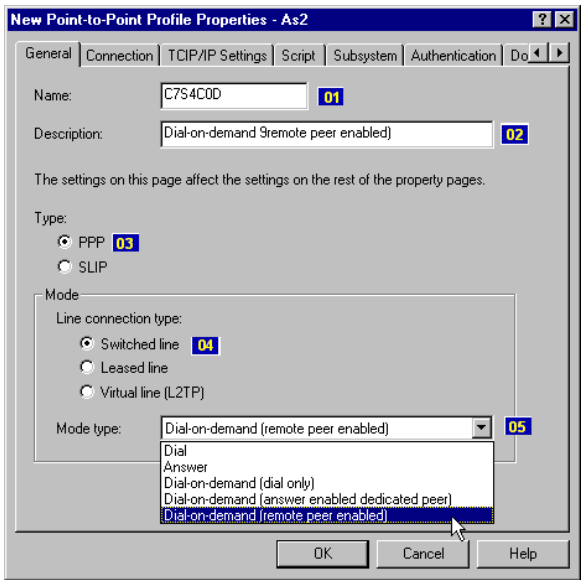


Figure 181. Configuring the General page of the C7S4C0D remote peer profile

b. Configure the Connection page of the DoD remote peer-enabled profile.

   Select **Integrated ISDN** line for Type of line service, and select the line from the Name list. If the line does not exist, enter a name, and click **New** to create a new line for the connection. To make a new line, refer to 3.2.2.1, “Configuring a PPP profile as a switched dial on AS1” on page 81. Do not use the same line used by the Answer profile. Click **Add**, and enter remote phone numbers. In this case, the remote phone number is 5090, which is the phone number of AS1 (Figure 182 on page 214).

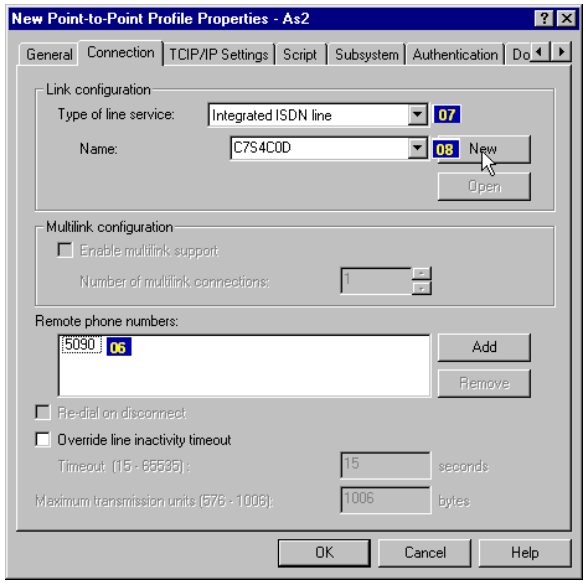


Figure 182. Configuring the Connection page of the C7S4C0D profile

c. Configure the TCP/IP Settings page of the DoD remote peer-enabled profile.

   Select **C7S5C0A**, which was created the same way as described in Chapter 1, “Create the PPP profile as Answer on AS2.” on page 207, for Peer answer connection profile. Select **as1** for Remote peer user name. “as1”, whose user name is as1 is a target system for AS1. Local IP address and Remote IP address are set from the Answer profile automatically (Figure 183).

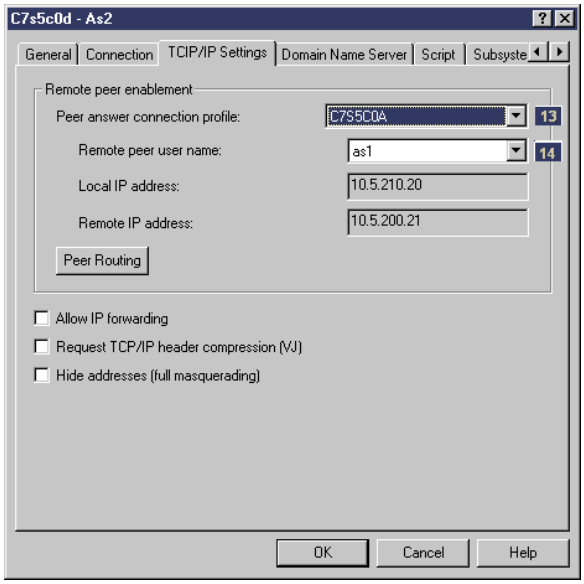


Figure 183. Configuring the TCP/IP Settings page of the C7S4C0D profile

d. Configure the Authentication page of the DoD remote peer-enabled profile.

The connection of the DoD remote peer enabled requires the use of authentication. Therefore, select **Enable local system identification**, and select **CHAP only**. Enter a user name and password according to the information provided by the remote site, AS1. To make a DoD remote peer-enabled profile, click **OK** (Figure 184 on page 216).

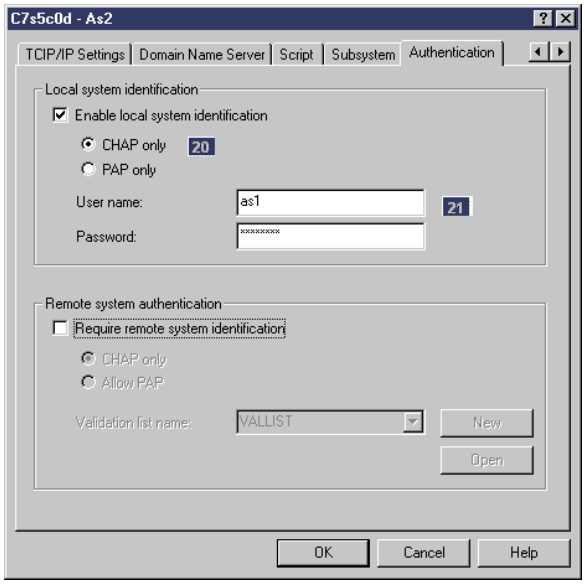


Figure 184. Configuring the Authentication page of the C7S4C0D profile

Configuring the profile for DoD remote peer-enabled on AS1

The PPP connection profile on AS1 is almost the same as the profile on AS2. The different panels are shown in the following process (Case 5):

1. Create the PPP profile as Answer on AS1.

   Figure 185 and Figure 186 show the different panels on AS1 from AS2.

   Select a *VIRTUALIP address made for a numbered network on AS1 for Local IP address (Figure 185).

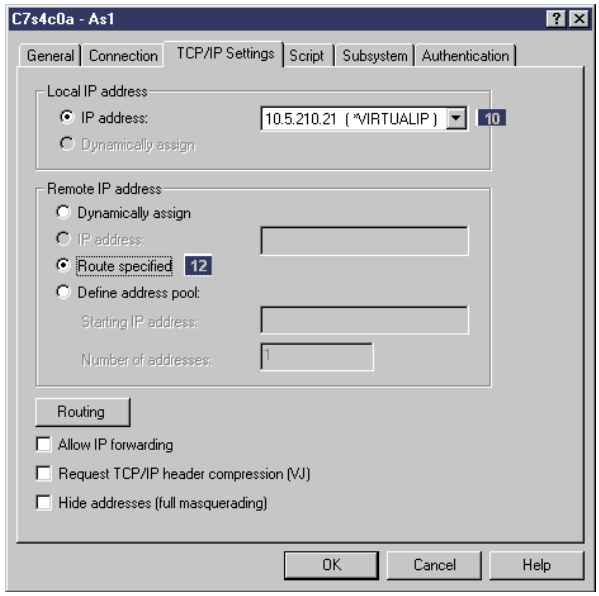


Figure 185. Configuring the TCP/IP Settings page of the Answer profile on AS1

Click **Routing**. Add the user name of the remote site, an IP address, and subnet mask used by the user. Two users are defined, an AS2 user and a PC user in this case (Figure 186).

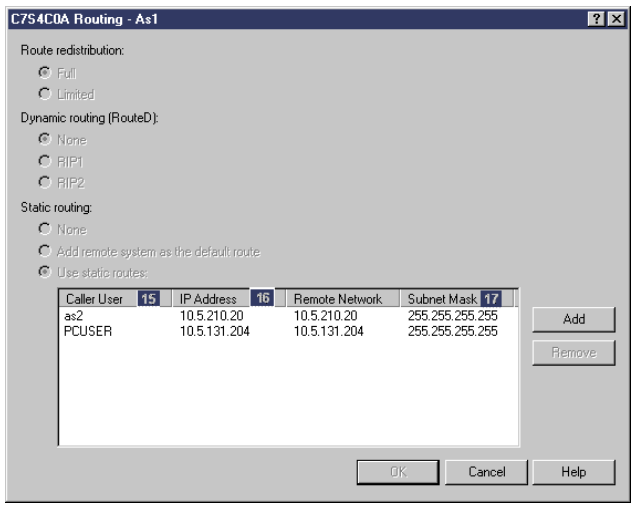


Figure 186. Configuring the Routing properties of the Answer profile

2. Create the PPP profile as DoD remote peer-enabled on AS1.

Figure 187 and Figure 188 show the different panels on AS1 from AS2.

Select **Integrated ISDN line** for Type of line service, and select the line from Name list. If the line does not exist, enter a name, and click **New** to create a new line for the connection (Figure 187). To make a new line, refer to 3.2.2.1, “Configuring a PPP profile as a switched dial on AS1” on page 81. Do not use the same line used by the Answer profile. Click **Add** and enter remote phone numbers. In this case, the remote phone number is 5088, which is the phone number of AS2.

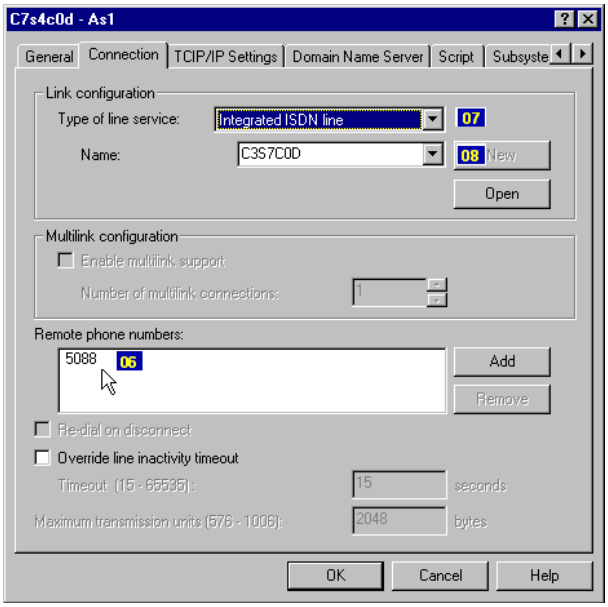


Figure 187. Setting the Connection page of the C7S4C0D remote peer profile on AS1

Select **C7S4C0A**, which was created as explained in step 1 on page 207, for Peer answer connection profile. Select **as2** for Remote peer user name. “as2”, whose user name is as2, is a target system for AS1. Local IP address and Remote IP address are set from the Answer profile automatically (Figure 188).

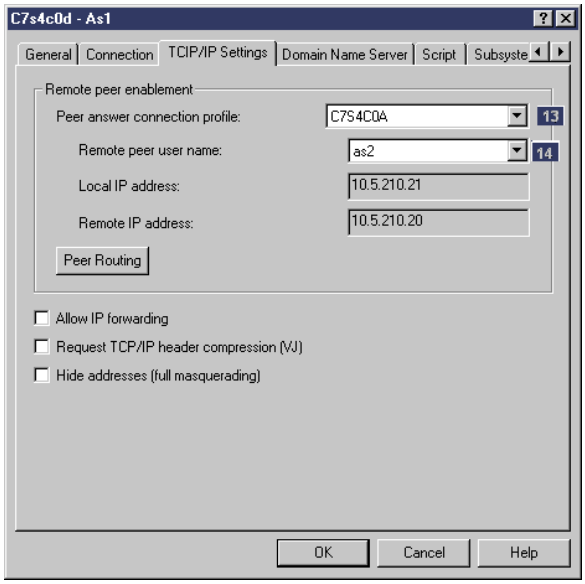


Figure 188. Configuring the TCP/IP Settings page of the C7S4C0D profile on AS1

Setting up Dial-Up Networking on the PC

The procedure and parameter needed to set up the Phonebook of Dial-Up Networking on a PC are similar to those used in 3.3.2.2, “Setting up Dial-Up Networking on the PC” on page 103. In this case, the difference is to change the phone number to 5089 on the Basic page of the Phonebook.

Configuration summary

Table 60 to Table 64 on page 222 show the information required to create the PPP profile. Only the parameters necessary to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190, and *OS/400 TCP/IP Configuration and Reference V4R4*, SC41-5420.

The numbers listed in the following tables correspond to those in reverse-bold type in Figure 173 on page 208 to Figure 188.

Table 60. Information on the General page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	
Description	02	Optional field - Type the description.	

Field name and number		Description	Value in this scenario
Type	03	Required field - PPP or SLIP Specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			
Line connection type:	04	Required field - Select one from the following types: - Switched line = - Leased line = - Virtual line [L2TP] =	Switched Line
Mode type:	05	Required field - When Line connection type is Switched line, select one of these four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1 = Answer and DoD remote peer AS2 = Answer and DoD remote peer AS3 = DoD dial only

Table 61. Information on the Connection page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values except Answer as the value of Mode type on the General tab. Specify the remote local phone number.	AS1 = 5088, AS2 = 5090 (All cases)
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	Digital line [ISDN]
Name	08	Required field - Type a new line name or select the existing line.	C7S4C0A (For Answer) C7S4C0D (For Dial, DoD dial, DoD remote peer)
Maximum number of connections	09	Optional field - Specifies the maximum number of connections for ISDN that are allowed for the answer.	2 (For Answer)

Table 62. Information on TCP/IP Settings page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	10	Specify an existing IP address for the local address.	AS1 = 10.5.210.21 for numbered/10.5.221.196 for unnumbered AS2 = 10.5.210.20 for numbered/10.5.220.128 for unnumbered
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	11	Specify the address for the remote system.	AS1 = 10.5.210.20 for numbered/10.5.220.128 for unnumbered (Cases 1 through 4)
Route specified	12	Specifies whether you want the remote IP address to be specified using the Routing button.	AS1 = Checked (Cases 5 and 6) AS2 = Checked (All cases)
Remote Peer enabled			
Peer answer connection profiles	13	Specify the Answer profile for this connection.	AS1 = Answer profile name (Cases 5 and 6) AS2 = Answer profile name (All cases)
Remote peer user name	14	Specifies the user name for authentication.	AS1 = as1 (Cases 5 and 6) AS2 = as2 (All cases)

Table 63. Information on the Routing Properties page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Static routing: Check the Use static routes (For Answer)			
Caller User	15	Specifies the user name of the caller.	AS1 = as2, PCUSER AS2 = as1, PCUSER
IP Address	16	Specifies an IP address of the caller.	AS1 = 10.5.210.20 (as2) AS1 = 10.5.131.204 (PCUSER) AS2 = 10.5.210.21 (as1) AS2 = 10.5.131.204 (PCUSER)
Subnet Mask	17	Specifies the subnet mask of the remote system.	255.255.255.255

Table 64. Information on the Authentications page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Remote system authentication (Option field - Check the box for the Answer profile)			
CHAP only	18	We recommend that you use CHAP, instead of PAP, whenever possible. CHAP uses user and password encryption. PAP transmits in clear text form.	Checked
Validation list name	19	Select the name of the validation list that contains the remote users that are allowed to connect to the AS/400.	VALLIST with user: as1 & as2 & PCUSER
Local system identification (Option field - Check the box for the dial, DoD dial, and DoD remote peer profiles)			
CHAP only	20	We recommend that you use CHAP, instead of PAP, whenever possible, because the user and password are transmitted encrypted. PAP transmits in clear text form.	Checked

Field name and number		Description	Value in this scenario
User name and Password	21	Specifies the user name and password for the user. The user and password must be accepted by the remote system.	User name: as1 or as2 and Password:

7.4.2 PPP dial-on-demand hub and spoke

Hub-and-spoke (or star) topologies are generally the easiest and least expensive to configure. In this topology, each site is linked to a central location. Remote users can tap server resources at the central site and, when necessary, hop through to other remote sites. Before V4R5, when dial-on-demand mode was used, the central AS/400 system could not be configured using hub-and-spoke topologies. Now, you can configure the central site AS/400 system with fully meshed topologies to communicate with each site. For example, a central system using a hub-and-spoke configuration six-site network would require less than five modems or ports (it communicates with all site systems at the same time; five modems or ports are required). A fully meshed central system six-site network would require five modems or ports (one from the hub site to each of the five other sites) as shown in Figure 189 on page 224.

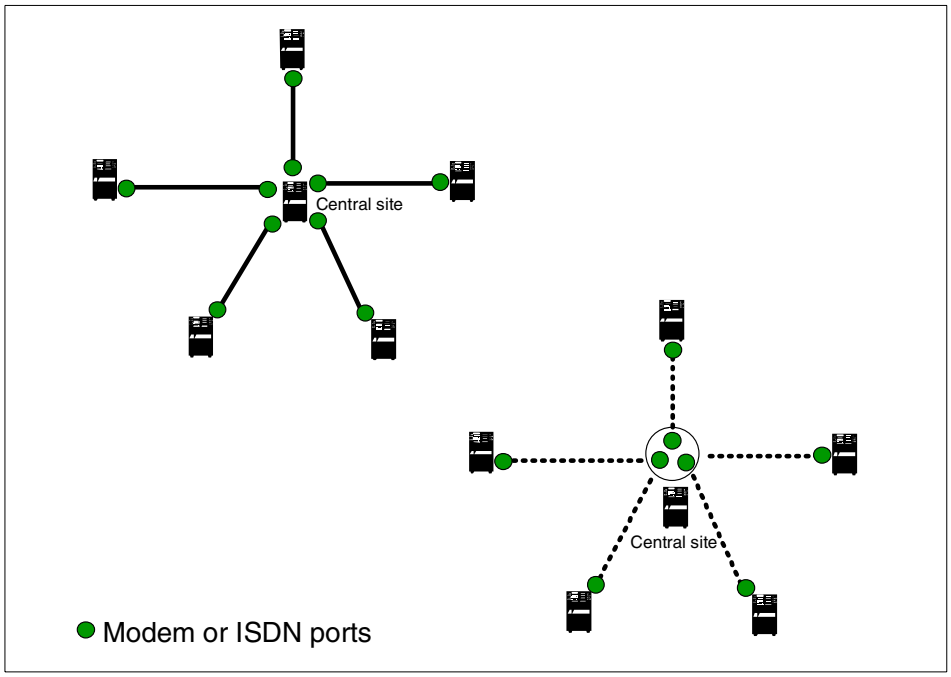


Figure 189. Fully meshed and hub-and-spoke topologies

This section describes the three AS/400 system connections using PPP dial-on-demand remote peer enabled as shown in Figure 190. This scenario is comprised of two V4R5 AS/400 systems and one V4R4 AS/400 system. AS3 is a V4R4 system.

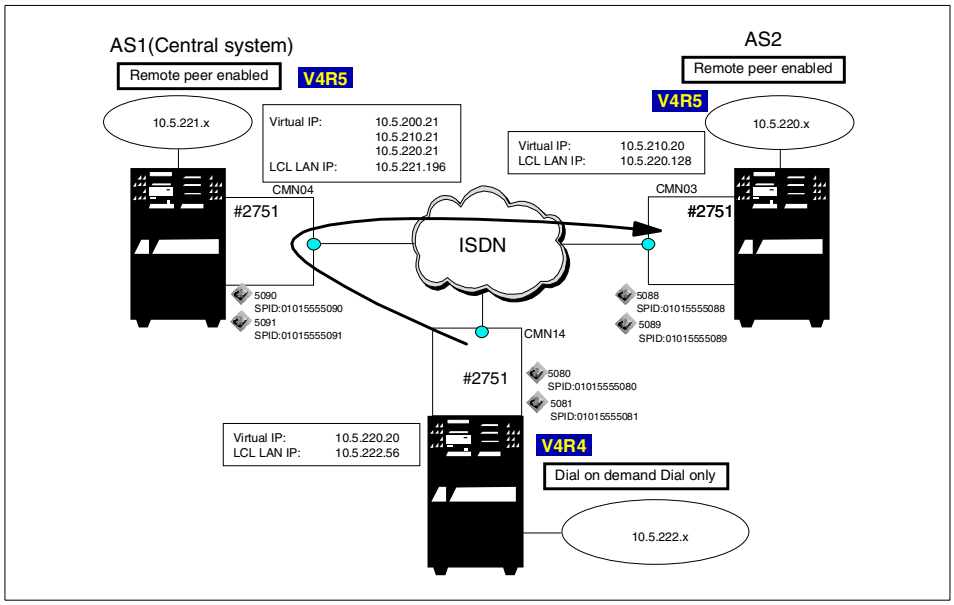


Figure 190. Hub-and-spoke scenario environment

7.4.2.1 Scenario usage

The case in which all systems are specified to use dial-on-demand remote peer enabled is most useful. If a connection between AS/400 systems is not made, AS1, AS2, and AS3 can dial to connect to the other side. The dialer and answer are not fixed.

If you use an analog network, you can configure the central AS/400 system to use dial-on-demand remote peer enabled. You can configure endpoint AS/400 systems to use dial-on-demand answer enabled dedicated peer.

7.4.2.2 Configuration steps

The following section describes how to configure the PPP connection:

1. Configure the profile for DoD remote peer enabled on AS1 (central system):
   a. Create the PPP profile as Answer on AS1.
   b. Create the PPP profile as DoD remote peer enabled on AS1.
2. Configure the profile for DoD remote peer enabled on AS2:
   a. Create the PPP profile as Answer on AS2.
   b. Create the PPP profile as DoD remote peer enabled on AS2.

3. Configure the profile for DoD dial only on AS3.

   Create the PPP profile as DoD daily only on AS3.

> **Note**
>
> The numbers in reverse-bold type in the following figures correspond to the numbers in Table 65 on page 235 through Table 69 on page 237.

Prerequisite

For the central system, use OS/400 V4R5 with PTF (SF62239). Also use Operations Navigator V4R5 with SP1 (SF62213).

For endpoint systems, use OS/400 V4R4 or V4R5. When you use DoD remote peer enabled for endpoint systems, use S/400 V4R5 with PTF (SF62239) and Operations Navigator V4R5 with SP1.

Both systems need to specify remote authentication for using DoD (Remote peer enabled).

Configuring the profile for DoD remote peer enabled on AS1

The PPP connection profile on AS1 for the central system is similar to the one described in “Configuring the profile for DoD remote peer-enabled on AS1” on page 216. The different panels are shown in the following series of steps.

1. Create the PPP profile as Answer on AS1.

   Select a *VIRTUALIP address made for a numbered network on AS1 for Local IP address. Select **Allow IP forwarding** to route to another network (Figure 191).

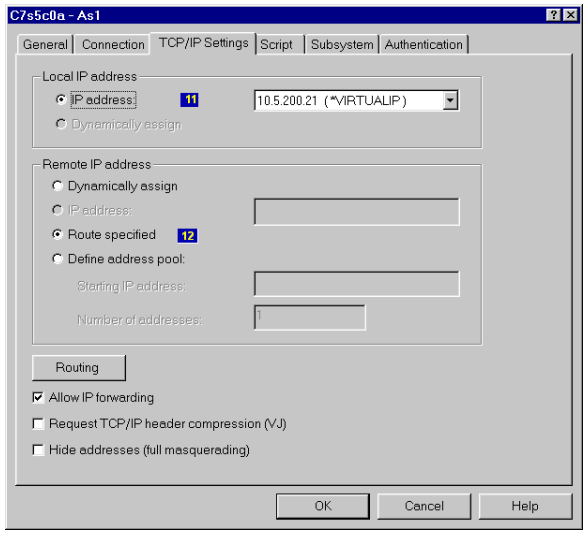


Figure 191. Configuring the TCP/IP Settings page of the Answer profile on AS1

Add the user name for each remote site, an IP address, and subnet mask used by the user. Two users are defined: an as2 user and an as3 user in this case (Figure 192).

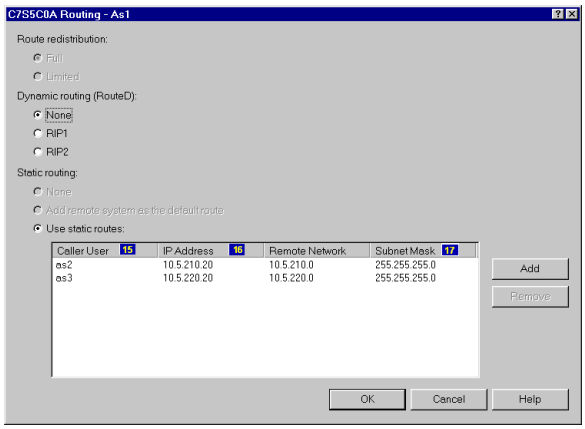


Figure 192. Configuring the Routing properties of the Answer profile

2. Create the PPP profile as DoD remote peer enabled on AS1.

   Select **Integrated ISDN line** for Type of line service, and select the line from Name list. If the line does not exist, enter a name, and click **New** to create a new line for the connection (Figure 193 on page 228). To make a new line, refer to 3.2.2.1, “Configuring a PPP profile as a switched dial on

AS1” on page 81. Do not use the same line used by the Answer profile. Click **Add**, and enter remote phone numbers. In this case, the remote phone number is 5088, which is the phone number of AS2.

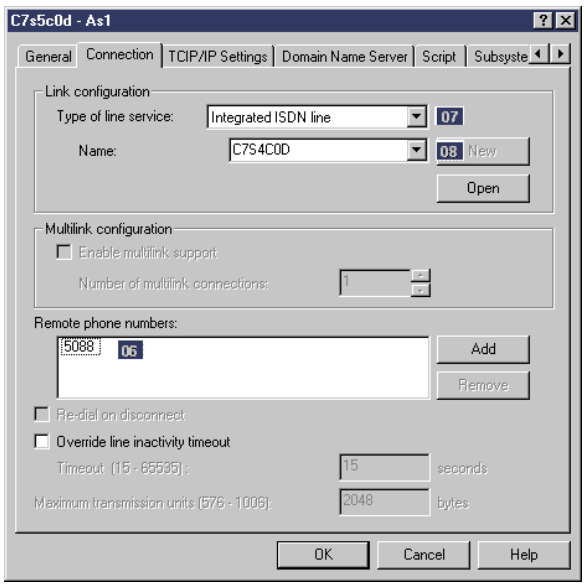


Figure 193. Setting the Connection page of the remote peer profile on AS1

Select the Answer profile name made in step 1 on page 226, for Peer answer connection profile. Specify `as2` or `as3` for Remote peer user name. “as2”, whose user name is as2, is a target system for AS2. “as3”, whose user name is as3, is a target system for AS3. Local IP address and Remote IP address are set from the Answer profile automatically (Figure 194).

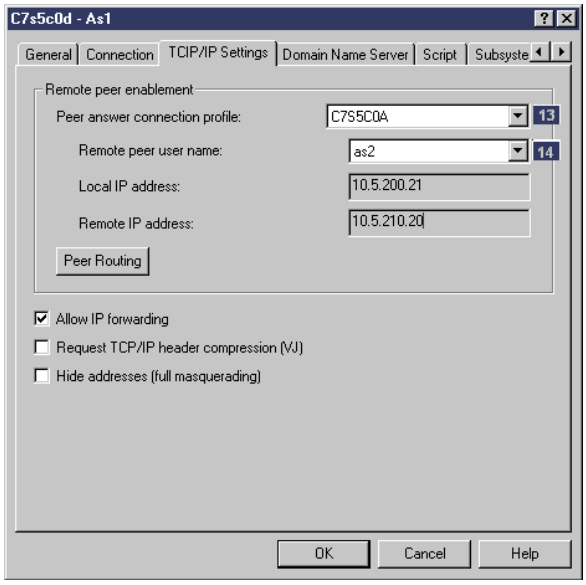


Figure 194. Setting the TCP/IP Settings page of the remote peer profile on AS1

Configuring the profile for DoD remote peer enabled on AS2

The PPP connection profile on AS2 for OS/400 V4R5 endpoint system is similar to the profile in “Configuring the profile for DoD remote peer enabled on AS2” on page 207. Complete the following process:

1. Create the PPP profile as Answer on AS2.

   Figure 195 and Figure 196 on page 230 show the different panels on AS1 from AS2.

   Select a *VIRTUALIP address made for a numbered network on AS1 for Local IP address. If you want access to the AS2 network (10.5.210.0/255.255.255.0) from the remote site user, select **Allow IP forwarding** (Figure 195 on page 230).

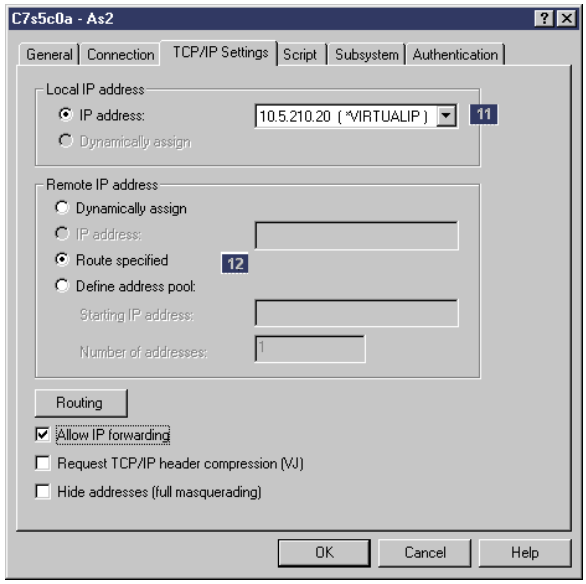


Figure 195. Setting the TCP/IP Settings page of the Answer profile on AS1

Add the user name of the remote site, an IP address, and subnet mask used by the user, which is an as1 user in this case. Also specify the routing for 10.5.220.0/255.255.255.0 network for as1. When you specify the settings shown in Figure 196, you can see the TCP/IP routing information after starting the profiles.

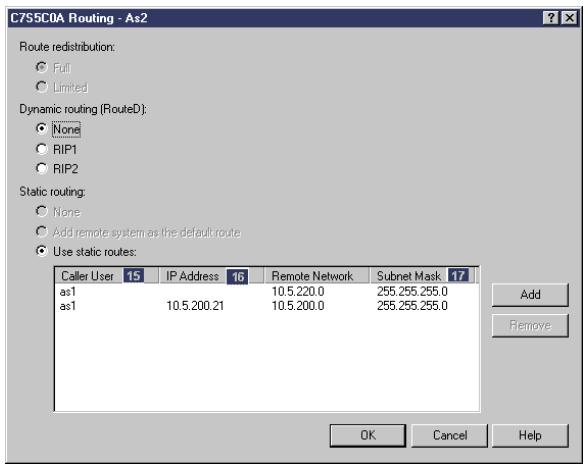


Figure 196. Setting the Routing properties of the Answer profile

```
                    Display TCP/IP Route Information
                                                          System:   AS2
Type options, press Enter.
  5=Display details

     Route            Subnet           Next             Route
Opt  Destination      Mask             Hop              Available
     10.5.220.0       255.255.252.0    *DIRECT          *YES
     10.5.210.20      *HOST            *DIRECT          *YES
     10.5.200.0       255.255.255.0    *DIRECT          *DOD
     10.5.220.0       255.255.255.0    10.5.200.21      *DOD
     127.0.0.0        255.0.0.0        *DIRECT          *YES
     224.0.0.0        240.0.0.0        *DIRECT          *YES
     224.0.0.0        240.0.0.0        *DIRECT          *DOD
     224.0.0.0        240.0.0.0        *DIRECT          *YES
     *DFTROUTE        *NONE            10.5.220.1       *YES
```

Figure 197. Display TCP/IP Route Information after starting the profile

2. Create the PPP profile as DoD remote peer enabled on AS2.

   Select the Answer profile name **C3S7C0A**, which was created in step 1 for Peer answer connection profile. Select **as1** for Remote peer user name. “as1”, whose user name is as1, is a target system for AS1. Local IP address and Remote IP address are set from the Answer profile automatically (Figure 198).

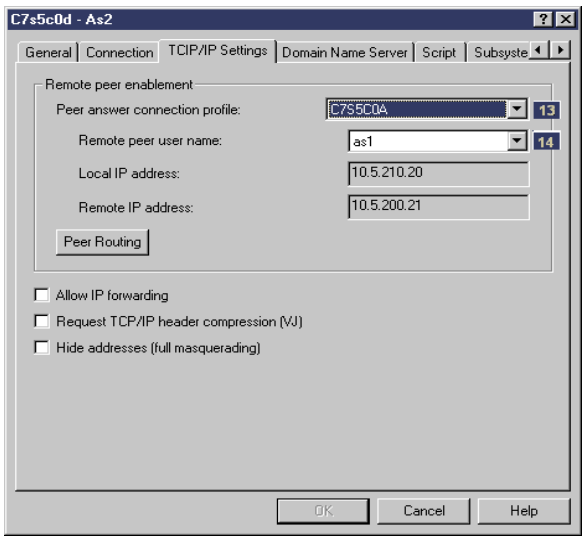


Figure 198. Setting the TCP/IP Settings page of the remote peer profile on AS1

Configuring the profile for DoD dial only on AS3

The PPP connection profile on AS3 for V4R4 endpoint system is similar to the profile for Case 3 or 4 in 3.3.2.1, “Configuring the PPP profile on the AS/400 system” on page 100. Follow this process:

1. Create the PPP profile as Answer on AS3.

   Configure the General page of the PPP DoD (dial only) profile.

   Enter a name and description. Select **Switched line** for Line connection type and **Dial-on-demand (dial only)** for Mode type (Figure 199).

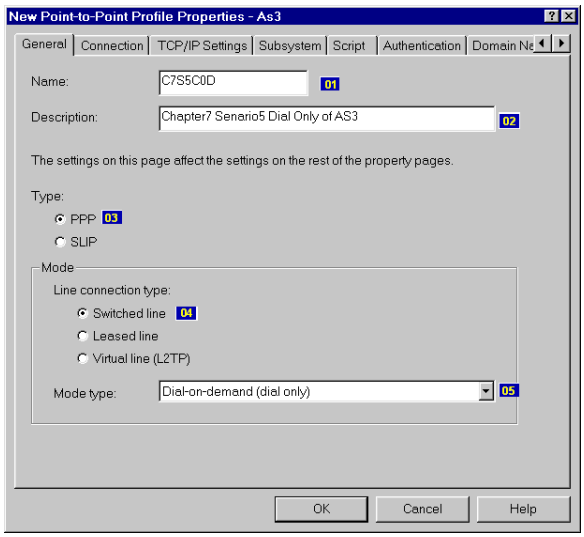


Figure 199. General page of the PPP connection profile as a switched answer

2. Set the TCP/IP setting on AS3.

   Select a *VIRTUALIP address made for a numbered network on AS1 for Local IP address. If you want to access the local network of AS3 (10.5.220.0/255.255.255.0) from a remote site user, select **Allow IP forwarding** (Figure 200).

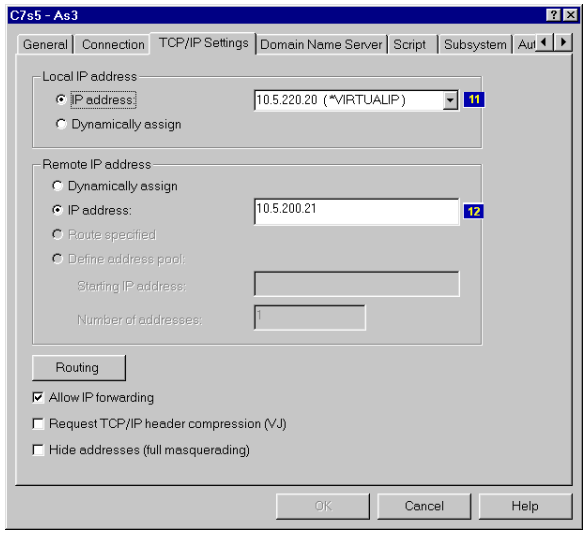


Figure 200. Configuring the TCP/IP Settings page of the Answer profile on AS1

Add the user name of the remote site, an IP address, and subnet mask used by the user, which is an as1 user in this case. Also, specify the routing for 10.5.210.0/255.255.255.0 network for as1 (Figure 201).

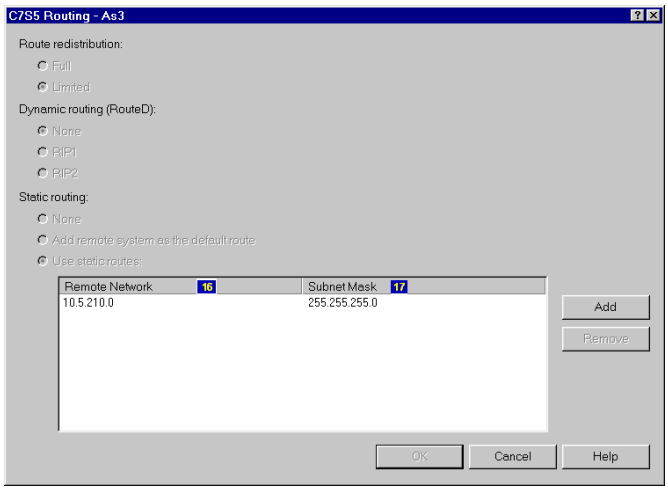


Figure 201. Configuring the Routing properties of the Answer profile

3. Set authentication on AS3.

   To require the remote system to be authenticated, select **Require remote system identification**, and click **CHAP only**. Select the validation list or

enter a new validation list name, and click **New** (Figure 202). For more information about CHAP, refer to 7.1, “CHAP” on page 197. Click **OK** to make a DoD remote peer enabled profile, after registering the users to the validation list.

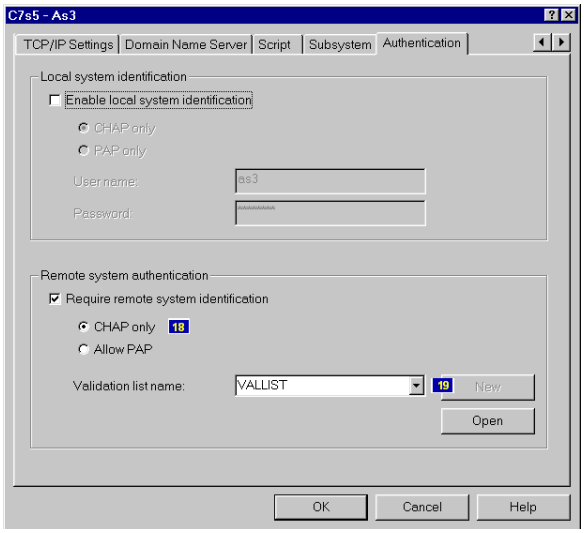


Figure 202. Configuring the Authentication page of the Answer profile

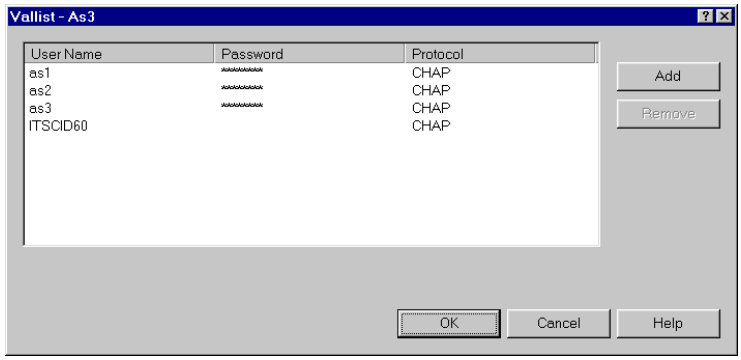


Figure 203. Adding the user name and password to the validation list

The selected validation list has two users for an AS1 and an AS2. The remote site must use the user name and password defined in this panel when dialing to make a connection with AS3.

Configuration summary

Table 65 through Table 69 on page 237 show the information required to create the PPP profile. Only the parameters necessary to create this scenario are identified. For more information, refer to *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190, and *OS/400 TCP/IP Configuration and Reference V4R4*, SC41-5420.

The numbers listed in the following tables correspond to the numbers in reverse-bold type in Figure 191 on page 227 to Figure 203 on page 234.

Table 65. Information on the General page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Name	01	Required field - The name of a connection profile.	
Description	02	Optional field - Type the description.	
Type	03	Required field - PPP or SLIP Specify PPP to create an ISDN line on the Connection tab.	PPP
Mode -			
Line connection type:	04	Required field - Select one from the following types: - Switched line = - Leased line = - Virtual line [L2TP] =	Switched Line
Mode type:	05	Required field - When Line connection type is Switched line, select one of these four options: - Dial - Answer - Dial-on-demand [dial only] - Dial-on-demand [answer enabled dedicated peer]	AS1 = Dial (Cases 1 and 2) AS1 = DoD dial (Cases 3 and 4) AS1 = Answer & DoD remote peer (Cases 5 and 6) AS2 = Answer & DoD remote peer (All cases)

Table 66. Information on the Connection page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Remote phone number	06	Required field - Valid only when selecting the values, except Answer, as the value of Mode type on the General tab. Specify the remote local phone number.	AS1 = 5088 AS2 = 5090 AS3 = 5091
Link configuration			
Type of line service	07	Required field - Select the type of line service for a point-to-point link.	Digital line [ISDN]
Name	08	Required field - Type a new line name or select the existing line.	C7S4C0A (For Answer) C7S4C0D (For Dial, DoD dial, and DoD remote peer)
Maximum number of connections	09	Optional field - Specifies the maximum number of connections for ISDN that are allowed for the answer.	2 (For Answer)

Table 67. Information on TCP/IP Settings page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Local IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	10	Specify an existing IP address for the local address.	AS1 = 10.5.200.21 AS2 = 10.5.210.20 AS3 = 10.5.220.20
Remote IP address (Required field - You must check for IP address or Dynamically assign)			
IP address	11	Specify the address for the remote system.	AS3 =10.5.200.21
Route specified	12	Specifies whether you want the remote IP address to be specified using the Routing button.	AS1 = Checked AS2 = Checked
Remote Peer enabled			

Field name and number		Description	Value in this scenario
Peer answer connection profiles	13	Specify the Answer profile fir this connection.	AS1 = Answer profile name AS2 = Answer profile name
Remote peer user name	14	Specifies the user name for authentication.	AS1 = as1 or as2 AS2 = as1

Table 68. Information on Routing properties to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Static routing: Check the Use static routes (For Answer)			
Caller User	15	Specifies the user name of the caller.	AS1 = as2 and as3 AS2 = as1 AS3 = (none)
IP Address	16	Specifies an IP address of the caller.	AS1 = 10.5.210.20 (as2) AS1 = 10.5.1220.20 (as3) AS2 = 10.5.210.21 (as1) AS2 = 10.5.220.0 (as1) AS3 = 10.5.210.0
Subnet Mask	17	Specifies the subnet mask of the remote system.	255.255.255.0

Table 69. Information on the Authentications page to create a PPP over an ISDN profile

Field name and number		Description	Value in this scenario
Remote system authentication (Option field - Check the box for the Answer profile)			
CHAP only	18	We recommend that you use CHAP, instead of PAP, whenever possible. CHAP uses user and password encryption. PAP transmits in clear text form.	Checked

Field name and number		Description	Value in this scenario
Validation list name	19	Select the name of the validation list that contains the remote users that are allowed to connect to the AS/400 system.	VALLIST with user: as1, as2, and as3
Local system identification (Option field - Check the box for the dial, DoD dial, and DoD remote peer profiles)			
CHAP only	20	We recommend that you use CHAP, instead of PAP, whenever possible, because the user and password are transmitted encrypted. PAP transmits in clear text form.	Checked
User name & Password	21	Specifies the user name and password for the user. The user and password must be accepted by the remote system.	User name: as1, as2, and as3 Password:

Appendix A. ISDN trace data

This appendix shows the normal data flow in both the B- and D-channels of the AS/400 #2751 ISDN adapter card. Data flow traces are provided to further illustrate the ISDN data flow.

A.1 Sample network interface trace of PPP over ISDN (D-channel)

The data flow in the D-channel varies depending on the network to which the AS/400 system is connected. This section includes the major distinctions between the ITU-T standard and the ISDN implementation of different networks supported by the AS/400 system.

The data flow can be divided into two categories:

- Layer 2 data flow
- Layer 3 data flow

Layer 2 is in charge of establishing and ending the link between the AS/400 system and the network. D-channel Layer 2 is up once the Set Asynchronous Balance Mode Extension (SABME) and Unnumbered Acknowledgment (UA) frames are exchanged as shown in Figure 204. It is in charge of data link error handling procedures and multiplexing or de multiplexing the data for the different Service Access Points (SAP) in Layer 3 of the D-channel.

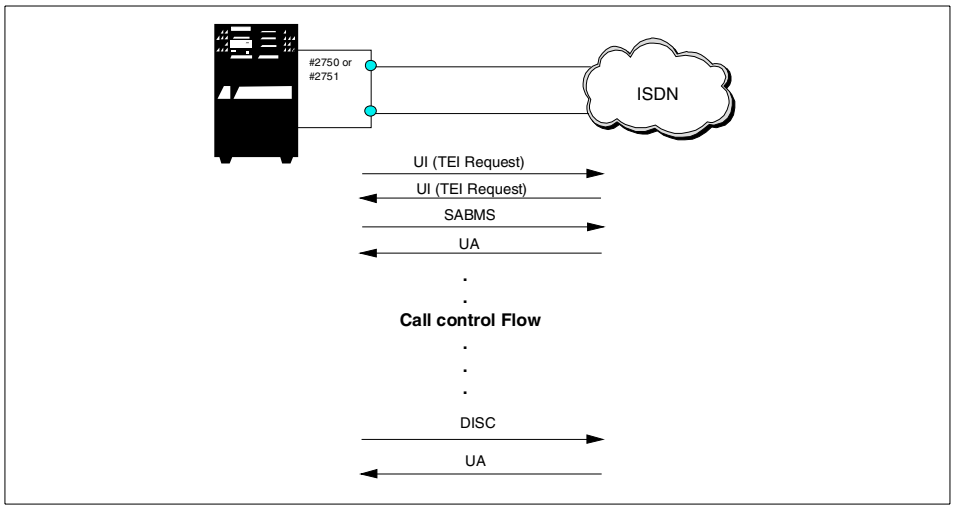


Figure 204. D-channel Layer 2 data flow

The main purpose of Layer 3 in the D-channel is to provide *call control services* to the user. The call control is the key service that provides the establishment and release of circuit-switched connections.

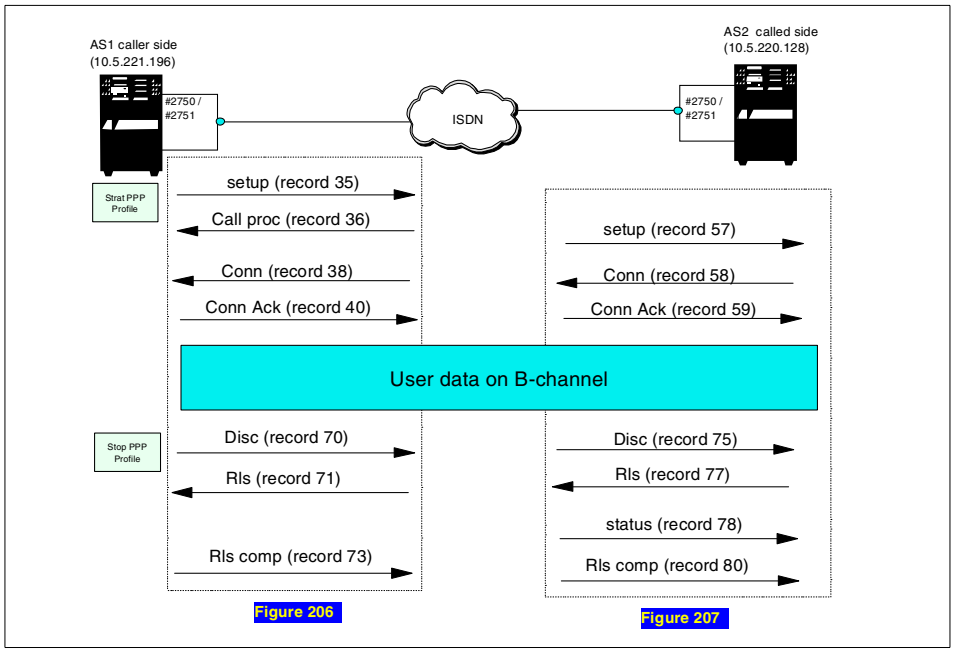


Figure 205. D-channel Layer 3 data flow

In Figure 205, the flow of call control message, indicated by Figure 206 and Figure 207, is shown. You see the details of the call control messages in Figure 206 on page 242 and Figure 207 on page 243.

- **35 in Figure 206**: When you start the PPP profiles, it sends a SETUP messages across the user network interface. The SETUP message contains the call reference and call information elements (for example, calling and called number, and facility request). The calling system can receive either a Setup Acknowledgement (SETUP ACK), a Call Processing (CALL PROC), or an ALERT message from the network.
- **57 in Figure 207**: At the called side (AS2), the network sends a SETUP message to the called AS/400 system. Also, AS2 sends a CALL PROC message (not shown in Figure 207) to signal the network that it received all the information that it needed from the SETUP message.
- **36 in Figure 206**: The calling system received the CALL PROC message.

- **58 in Figure 207**: When the called system accepts the call, it sends a Connect (CONN) message.
- **59 in Figure 207**: The network answers with a Connect Acknowledgement (CONN ACK) message.
- **38 in Figure 206**: Also, the calling system receives a Connect (CONN) message. The AS1 answers with a Connect Acknowledgement (CONN ACK) message to the network.
- **40 in Figure 206**: The AS1 answers with a Connect Acknowledgement (CONN ACK) message to the network.

  At this point, the link in the B-channel, which was chosen during the establishment of the call, can be activated as explained in A.2, “Sample line trace of PPP over ISDN” on page 244.
- **70 in Figure 206**: After the link in the B-channel is disconnected, either one of the systems start the call disconnection process by sending a Disconnect (DISC) message.
- **75 in Figure 207**: DISC message is received by the other side (AS2).
- **77 in Figure 207**: The AS2 responds with a Release (RLS) message to indicate that the disconnect process has been initiated.
- **71 in Figure 206**: AS1 receives a Release (RLS) message from the network.
- **73 in Figure 206**: Upon receiving the RLS message, AS1, which originated the DISC message, sends a Release Complete (RLS COMP) to indicate that the call reference and B-channel have been disconnected.
- **78 in Figure 207**: AS2 receives a Release Complete (RLS COMP) message to indicate that the call reference and B-channel have been disconnected.

Figure 206 on page 242 and Figure 207 on page 243 show the communications trace of PPP over ISDN when the following operations are done using Case 1 in 3.2, “Scenario 2: #2751 to and from the #2751 PPP” on page 80.

```
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3
 Record       Q.931       Call   C/R  Line        ---------------------------------- Information Elements --------- -------------
 Number  S/R  Message     Ref    Flg  Name        Byte Data      Description                                            Record Timer
 ------  ---  ----------  -----  ---  ----------  ---  --------  ------------------------------------------------------ -------------
     35   S   SETUP           2  OFF  C3S2C0        1  00000100  Bearer capability                                      07:25:56.1934
                                                   2  00000010    IE length  . . . . . . . . . : 2 Octets
                                                   3  1-------    Extension Bit  . . . . . . . : Not Continued
                                                      -00-----    Coding Standard  . . . . . . : Standardized coding
                                                      ---01000    Info Transfer Capability . . : Unrestricted Digital Info
                                                   4  1-------    Extension Bit  . . . . . . . : Not Continued
                                                      -00-----    Transfer mode  . . . . . . . : Circuit mode
                                                      ---10000    Info Transfer Rate . . . . . : 64 kbit/s
                                                   1  01110000  Called party number
                                                   2  00000101    IE length  . . . . . . . . . : 5 Octets
                                                   3  1-------    Extension Bit  . . . . . . . : Not Continued
                                                      -000----    Type of number . . . . . . . : unknown
                                                      ----0000    Numbering Plan ID  . . . . . : Unknown
                                                   4  ........    Number digits  . . . . . . . : '5089'
     36   R   CALL PROC       2  ON   C3S2C0        1  00011000  Channel identification                                 07:25:56.2929
                                                   2  00000001    IE length  . . . . . . . . . : 1 Octet
                                                   3  1-------    Extension Bit  . . . . . . . : Not Continued
                                                      -0------    Interface ID . . . . . . . . : Implicitly Identified
                                                      --0-----    Interface Type . . . . . . . : Basic Interface
                                                      ---0----    Spare
                                                      ----1---    Preferred/Exclusive  . . . . : Exclusive
                                                      -----0--    D-Channel Indicator  . . . . : Not D-Channel
                                                      ------01    Info Channel Selection . . . : B1 channel
     38   R   CONN            2  ON   C3S2C0                    No Information Element                                 07:25:56.7907
     40   S   CONN ACK        2  OFF  C3S2C0                    No Information Element                                 07:25:56.9896
     70   S   DISC            2  OFF  C3S2C0        1  00001000  Cause                                                  07:27:10.1064
                                                   2  00000010    IE length  . . . . . . . . . : 2 Octets
                                                   3  1-------    Extension Bit  . . . . . . . : Not Continued
                                                      -00-----    Coding Standard  . . . . . . : Standardized coding
                                                      ---0----    Spare
                                                      ----0000    Location . . . . . . . . . . : User
                                                   4  1-------    Extension Bit  . . . . . . . : Not Continued
                                                      -0010000    Cause value  . . . . . . . . : 16 Normal call clearing
     71   R   RLS             2  ON   C3S2C0                    No Information Element                                 07:27:10.2059
     73   S   RLS COMP        2  OFF  C3S2C0                    No Information Element                                 07:27:10.4047
* * * * *  E N D  O F  C O M P U T E R  P R I N T O U T  * * * * *
```

Figure 206. NWI communications trace on AS1

```
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3
 Record       Q.931       Call   C/R  Line        ---------------------------------- Information Elements --------- -------------
 Number  S/R  Message     Ref    Flg  Name        Byte Data      Description                                            Record Timer
 ------  ---  ----------  -----  ---  ----------  ---  --------  ------------------------------------------------------ -------------
     57   R   SETUP          57  OFF  C3S2C0       1  00000100  Bearer capability                                      15:55:39.7309
                                                  2  00000010    IE length  . . . . . . . . . . : 2 Octets
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -00-----    Coding Standard  . . . . . . : Standardized coding
                                                     ---01000    Info Transfer Capability . . : Unrestricted Digital Info
                                                  4  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -00-----    Transfer mode  . . . . . . . . : Circuit mode
                                                     ---10000    Info Transfer Rate . . . . . : 64 kbit/s
                                                  1  00011000  Channel identification
                                                  2  00000001    IE length  . . . . . . . . . . : 1 Octet
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -0------    Interface ID . . . . . . . . . : Implicitly Identified
                                                     --0-----    Interface Type . . . . . . . . : Basic Interface
                                                     ---0----    Spare
                                                     ----1---    Preferred/Exclusive  . . . . : Exclusive
                                                     -----0--    D-Channel Indicator  . . . . : Not D-Channel


                                                     ------01    Info Channel Selection . . . : B1 channel
                                                  1  01101100  Calling party number
                                                  2  00000110    IE length  . . . . . . . . . . : 6 Octets
                                                  3  0-------    Extension Bit  . . . . . . . . : Continued
                                                     -000----    Type of number . . . . . . . . : unknown
                                                     ----0000    Numbering Plan ID  . . . . . : Unknown
                                                  4  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -00-----    Presentation Indicator . . . . : Presentation allowed
                                                     ---000--    Spare
                                                     ------00    Screening Indicator  . . . . : User-provided not screened
                                                  5  ........    Number digits  . . . . . . . . : '5090'
                                                  1  01110000  Called party number
                                                  2  00000101    IE length  . . . . . . . . . . : 5 Octets
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -000----    Type of number . . . . . . . . : unknown
                                                     ----0000    Numbering Plan ID  . . . . . : Unknown
                                                  4  ........    Number digits  . . . . . . . . : '5089'
     58   S   CONN           57  ON   C3S2C0       1  00011000  Channel identification                                 15:55:39.8303
                                                  2  00000001    IE length  . . . . . . . . . . : 1 Octet
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -0------    Interface ID . . . . . . . . . : Implicitly Identified
                                                     --0-----    Interface Type . . . . . . . . : Basic Interface
                                                     ---0----    Spare
                                                     ----1---    Preferred/Exclusive  . . . . : Exclusive
                                                     -----0--    D-Channel Indicator  . . . . : Not D-Channel
                                                     ------01    Info Channel Selection . . . : B1 channel
     59   R   CONN ACK       57  OFF  C3S2C0                    No Information Element                                 15:55:39.9301
     75   R   DISC           57  OFF  C3S2C0       1  00001000  Cause                                                  15:56:17.3973
                                                  2  00000010    IE length  . . . . . . . . . . : 2 Octets
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -00-----    Coding Standard  . . . . . . : Standardized coding
                                                     ---0----    Spare
                                                     ----0001    Location . . . . . . . . . . : private network/local user
                                                  4  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -0010000    Cause value  . . . . . . . . . : 16 Normal call clearing
     77   S   RLS            57  ON   C3S2C0       1  00001000  Cause                                                  15:56:17.5966
                                                  2  00000010    IE length  . . . . . . . . . . : 2 Octets
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -00-----    Coding Standard  . . . . . . : Standardized coding
                                                     ---0----    Spare
                                                     ----0001    Location . . . . . . . . . . : private network/local user
                                                  4  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -0010000    Cause value  . . . . . . . . . : 16 Normal call clearing
     78   R   STATUS         57  OFF              1  00001000  Cause                                                  15:56:17.6962
                                                  2  00000011    IE length  . . . . . . . . . . : 3 Octets
                                                  3  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -00-----    Coding Standard  . . . . . . : Standardized coding
                                                     ---0----    Spare
                                                     ----0001    Location . . . . . . . . . . : private network/local user
                                                  4  1-------    Extension Bit  . . . . . . . . : Not Continued
                                                     -1100100    Cause value  . . . . . . . . . : 100 Invalid IE contents
                                                  5  00001000    Diagnostics
                                                  1  00010100  Call state
                                                  2  00000001    IE length  . . . . . . . . . . : 1 Octet
                                                  3  00------    Coding Standard  . . . . . . : Standardized coding
                                                     --001100    Call state value . . . . . . : U12/N12-disconnect indication
     80   R   RLS COMP       57  OFF  C3S2C0                    No Information Element                                 15:56:17.8954
* * * * *  E N D  O F  C O M P U T E R  P R I N T O U T  * * * * *
```

Figure 207. NWI communications trace on AS2

As indicated here, the network interface trace shows the flow of call control messages in the D-channel between the AS/400 system and the network.

A.2 Sample line trace of PPP over ISDN

Figure 208 and Figure 209 show the communications trace of PPP over ISDN on AS1 when the following operations are done using Case 1 from 3.2, “Scenario 2: #2751 to and from the #2751 PPP” on page 80:

1. Start the profile on AS2.
2. Start the profile on AS1.
3. Run `PING RMTSYS('10.5.210.20') PKTLEN(128)` on AS1.
4. Stop the profile on AS1.
5. Stop the profile on AS2.

```
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3
  Record       Data    Record      Record           DLC Frame  Address  Control
  Number  S/R  Length  Status      Timer            Format     Field    Field    Protocol ID
  ------  ---  ------  ----------  ---------------  ---------  -------  -------  ------------
       1   S       18    00000000    7:25:57.03267    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 01 (Configure Request)       ID: 76           Length:    14
          Option . . . . :  Type: 01 (MRU)                     Length:   4      MRU:  2048
          Option . . . . :  Type: 05 (Magic Number)            Length:   6      Magic Number: 05652722
          Data . . . . . :  FF03C0210176000E 0104080005060565  2722                          *..{..............
       2   R       18    00000000    7:25:57.12176    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 01 (Configure Request)       ID: 96           Length:    14
          Option . . . . :  Type: 01 (MRU)                     Length:   4      MRU:  2048
          Option . . . . :  Type: 05 (Magic Number)            Length:   6      Magic Number: 3A728165
          Data . . . . . :  FF03C0210196000E 0104080005063A72  8165                          *..{..o.........a.
       3   S       18    00000000    7:25:57.18177    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 02 (Configure Ack)           ID: 96           Length:    14
          Option . . . . :  Type: 01 (MRU)                     Length:   4      MRU:  2048
          Option . . . . :  Type: 05 (Magic Number)            Length:   6      Magic Number: 3A728165
          Data . . . . . :  FF03C0210296000E 0104080005063A72  8165                          *..{..o.........a.
       4   S       18    00000000    7:26:00.07665    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 01 (Configure Request)       ID: 76           Length:    14
          Option . . . . :  Type: 01 (MRU)                     Length:   4      MRU:  2048
          Option . . . . :  Type: 05 (Magic Number)            Length:   6      Magic Number: 05652722
          Data . . . . . :  FF03C0210176000E 0104080005060565  2722                          *..{..............
       5   R       18    00000000    7:26:00.16579    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 02 (Configure Ack)           ID: 76           Length:    14
          Option . . . . :  Type: 01 (MRU)                     Length:   4      MRU:  2048
          Option . . . . :  Type: 05 (Magic Number)            Length:   6      Magic Number: 05652722
          Data . . . . . :  FF03C0210276000E 0104080005060565  2722                          *..{..............
       6   R       12    00000000    7:26:00.17594    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 0B (Discard Request)         ID: 97           Length:     8
                            Magic Number: 3A728165
          Data . . . . . :  FF03C0210B970008 3A728165                                     *..{..p....a.
       7   R       14    00000000    7:26:00.20562    PPP        FF       UI    8021 (IPCP)
          IPCP . . . . . :  Code: 01 (Configure Request)       ID: B3           Length:    10
          Option . . . . :  Type: 03 (IP Address)              Length:   6      IP Address: 10.5.210.20
          Data . . . . . :  FF03802101B3000A 03060A05D214                                 *...........K.
       8   S       12    00000000    7:26:00.27565    PPP        FF       UI    C021 (LCP)
          LCP  . . . . . :  Code: 0B (Discard Request)         ID: 77           Length:     8
                            Magic Number: 05652722
          Data . . . . . :  FF03C0210B770008 05652722                                     *..{.........
       9   S       14    00000000    7:26:00.29554    PPP        FF       UI    8021 (IPCP)
          IPCP . . . . . :  Code: 01 (Configure Request)       ID: F2           Length:    10
          Option . . . . :  Type: 03 (IP Address)              Length:   6      IP Address: 10.5.210.21
          Data . . . . . :  FF03802101F2000A 03060A05D215                                 *.....2......K.
      10   S       14    00000000    7:26:00.31548    PPP        FF       UI    8021 (IPCP)
          IPCP . . . . . :  Code: 02 (Configure Ack)           ID: B3           Length:    10
          Option . . . . :  Type: 03 (IP Address)              Length:   6      IP Address: 10.5.210.20
          Data . . . . . :  FF03802102B3000A 03060A05D214                                 *...........K.
      11   R       14    00000000    7:26:00.40461    PPP        FF       UI    8021 (IPCP)
          IPCP . . . . . :  Code: 02 (Configure Ack)           ID: F2           Length:    10
          Option . . . . :  Type: 03 (IP Address)              Length:   6      IP Address: 10.5.210.21
          Data . . . . . :  FF03802102F2000A 03060A05D215                                 *.....2......K.
```

Figure 208. PPP over ISDN communications trace on AS1 (Part 1 of 2)

```
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3
 Record       Data    Record      Record           DLC Frame  Address  Control
 Number  S/R  Length  Status      Timer            Format     Field    Field    Protocol ID
 ------  ---  ------  ----------  ---------------  ---------  -------  -------  ------------
     12   S      160    00000000    7:26:58.66941    PPP          FF       UI     0021 (IP)
          IP (version 4) :  Precedence: 0  TOS: Default              Length:   156  Datagram ID: 139C  Fragment Flags: May  ,Last
                            Protocol: ICMP                           Src Addr: 10.5.210.21             Dest Addr: 10.5.210.20
          IP Options . . :  None
          ICMP . . . . . :  Type: Echo Request                       Code: No Code
          Data . . . . . :  FF0300214500009C 139C00004001AE91  0A05D2150A05D214 0800E2C7001B6C01   *..........  ..j..K...K...SG..%
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
     13   R      160    00000000    7:26:58.83809    PPP          FF       UI     0021 (IP)
          IP (version 4) :  Precedence: 0  TOS: Default              Length:   156  Datagram ID: 3D47  Fragment Flags: May  ,Last
                            Protocol: ICMP                           Src Addr: 10.5.210.20             Dest Addr: 10.5.210.21
          IP Options . . :  None
          ICMP . . . . . :  Type: Echo Reply                         Code: No Code

          Data . . . . . :  FF0300214500009C 3D470000400184E6  0A05D2140A05D215 0000EAC7001B6C01   *..........  .dW..K...K....G..%
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
                            808BF2EE47170000 808BF2EE47170000  808BF2EE47170000 808BF2EE47170000   *..2.......2.......2.......2....
     14   S        8    00000000    7:27:08.18938    PPP          FF       UI     C021 (LCP)
          LCP  . . . . . :  Code: 05 (Terminate Request)       ID: 78           Length:     4
          Data . . . . . :  FF03C02105780004                                                      *..{.....
     15   R        8    00000000    7:27:08.26869    PPP          FF       UI     C021 (LCP)
          LCP  . . . . . :  Code: 06 (Terminate Ack)           ID: 78           Length:     4
          Data . . . . . :  FF03C02106780004                                                      *..{.....
* * * * *   E N D   O F   C O M P U T E R   P R I N T O U T   * * * * *
```

Figure 209. PPP over ISDN communications trace on AS1 (Part 2 of 2)

PPP over ISDN on the AS/400 system uses an HDLC frame. Every packet, therefore, has an HDLC frame (x'FF03') at the start of data. PPP over ISDN is made up of an HDLC frame and PPP data. The front two bytes of PPP data show protocol. The other data format is varied by each protocol. For more information, refer to the RFCs listed in Table 70.

Table 70. Protocol versus RFC

Protocol	RFC
PPP	1661
PPP-HDLC	1662
IP	791
ICMP	792

The normal process is outlined here:

1. Initialize and establish a PPP link between AS/400 system by using configuration packets of Link Control Protocol (LCP). Show record number 1 through 6 and 8.
2. Configure a connection so that the PPP link can deal with IP datagram by using IP control protocol (IPCP) as Network Control Protocol (NCP) in this

case. To set details, IP address setting is done (show record number 7 and 9 through 11). The first and second steps are done by starting both the Answer profile on AS2 and the Dial profile on AS1.

3. When the second step is completed, any application using an IP datagram is available. We used the ping command in this case (show record number 12 and 13).
4. Terminate a link between the AS/400 systems by using configuration packets of LCP (show record number 14 and 15). This step is denied by stopping the dial profile on AS1.

A detailed explanation of each record follows:

- Record number 1

  This is an LCP packet by which AS1 requests AS2 to configure MRU and a magic number. AS1 sent this packet to AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'01': Configuration request
  - x'76': Identifier
  - x'000E': Packet length except HDLC frame and LCP (14 bytes)
  - x'01': Type of LCP configuration request ('01' MRU size)
  - x'04': Length (4 bytes)
  - x'0800': MRU size (2048 bytes)
  - x'05': Type of LCP configuration request ('05' Magic number)
  - x'06': Length of (6 bytes)
  - x'05652722': Magic number of AS1

- Record number 2

  This is an LCP packet by which AS2 requests AS1 to configure MRU and a magic number. AS1 received this packet from AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'01': Configuration request
  - x'96': Identifier
  - x'000E': Packet length except HDLC frame and LCP (14 bytes)
  - x'01': Type of LCP configuration request ('01' MRU size)
  - x'04': Length (4 bytes)
  - x'0800': MRU size (2048 bytes)
  - x'05': Type of LCP configuration request ('05' Magic number)
  - x'06': Length of (6 bytes)
  - x'3A728165': Magic number of AS2

- Record number 3

  This is an LCP packet by which AS1 informs AS2 to acknowledge the request from AS2 to configure MRU and a magic number. AS1 sent this packet to AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'02': Configuration ACK
  - x'96': Identifier
  - x'000E': Packet length except HDLC frame and LCP (14 bytes)
  - x'01': Type of LCP configuration request ('01' MRU size)
  - x'04': Length (4 bytes)
  - x'0800': MRU size (2048 bytes)
  - x'05': Type of LCP configuration request ('05' Magic number)
  - x'06': Length of (6 bytes)
  - x'3A728165': Magic number of AS2

- Record number 4

  This is the same as record 1. This is an LCP packet by which AS1 requests AS2 to configure MRU and a magic number. AS1 sent this packet to AS2.

- Record number 5

  This is an LCP packet by which AS2 informs AS1 to acknowledge the request from AS1 to configure MRU and magic number. AS1 received this packet from AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'02': Configuration ACK
  - x'76': Identifier
  - x'000E': Packet length except HDLC frame and LCP (14 bytes)
  - x'01': Type of LCP configuration request ('01' MRU size)
  - x'04': Length (4 bytes)
  - x'0800': MRU size (2048 bytes)
  - x'05': Type of LCP configuration request ('05' Magic number)
  - x'06': Length of (6 bytes)
  - x'05652722': Magic number of AS1

- Record number 6

  This is an LCP packet by which AS2 requests AS1 to discard a magic number. AS1 received this packet from AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP

- x'0B': Discard request
- x'97': Identifier
- x'0008': Packet length except HDLC frame and LCP (8 bytes)
- x'3A728165': Magic number of AS2

- Record number 7

  This is an IPCP packet by which AS2 requests AS1 to use 10.5.210.20 as the local IP address on AS2. AS1 received this packet from AS2.

  - x'FF03': HDLC frame
  - x'8021': IPCP
  - x'01': Configure request
  - x'B3': Identifier
  - x'000A': Packet length except HDLC frame and LCP (10 bytes)
  - x'03': Type of IPCP request ('03' IP address request)
  - x'06': Length (6 bytes)
  - x'0A05D214': IP address (IP address 10.5.210.20)

- Record number 8

  This is an LCP packet by which AS1 requests AS2 to discard a magic number. AS1 sent this packet to AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'0B': Discard request
  - x'97': Identifier
  - x'0008': Packet length except HDLC frame and LCP (8 bytes)
  - x'05652722': Magic number of AS1

- Record number 9

  This is an IPCP packet by which AS1 request AS2 to use 10.5.210.21 as the local IP address on AS1. AS1 sent this packet to AS2.

  - x'FF03': HDLC frame
  - x'8021': IPCP
  - x'01': Configure request
  - x'F2': Identifier
  - x'000A': Packet length except HDLC frame and LCP (10 bytes)
  - x'03': Type of IPCP request ('03' IP address request)
  - x'06': Length (6 bytes)
  - x'0A05D215': IP address (IP address 10.5.210.21)

- Record number 10

  This is an IPCP packet by which AS1 informs AS2 to acknowledge the request from AS2 to use 10.5.210.20 as the IP address on AS2. AS1 sent this packet to AS2.

- x'FF03': HDLC frame
- x'8021': IPCP
- x'02': Configure ACK
- x'B3': Identifier
- x'000A': Packet length except HDLC frame and LCP (10 bytes)
- x'03': Type of IPCP request ('03' IP address request)
- x'06': Length (6 bytes)
- x'0A05D214': IP address (IP address 10.5.210.20)

- Record number 11

  This is an IPCP packet by which AS2 informs AS1 to acknowledge the request from AS1 to use 10.5.210.21 as the IP address on AS1. AS1 received this packet from AS2.

  - x'FF03': HDLC frame
  - x'8021': IPCP
  - x'02': Configure ACK
  - x'F2': Identifier
  - x'000A': Packet length except HDLC frame and LCP (10 bytes)
  - x'03': Type of IPCP request ('03' IP address request)
  - x'06': Length (6 bytes)
  - x'0A05D215': IP address (IP address 10.5.210.21)

- Record number 12

  This is an IP packet. AS1 confirmed the connection with AS2 by using the ping command.

  - x'FF03': HDLC frame
  - x'0021': IP
  - x'4': IP version 4
  - x'5': IP header length (4 byte x 5 = 20 bytes)
  - x'00': Service type (Normal)
  - x'009C': IP packet length (156 bytes)
  - x'139C': Identifier
  - x'0': Flag
  - x'000': Fragment offset
  - x'40': Time of live
  - x'01': Protocol
  - x'AE91': Header checksum
  - x'0A05D215': Source IP address
  - x'0A05D214': Destination IP address
  - x'08': Type of ICMP ('08' Echo request)
  - x'00': x'00' only
  - x'E2C7': Checksum
  - x'001B': Identifier

- x'6C01': Sequence number
- x'808F~0000: Data

- Record number 13

  This is an IP packet. AS1 received the response from AS2.

  - x'FF03': HDLC frame
  - x'0021': IP
  - x'4': IP version 4
  - x'5': IP header length (4 bytes x 5 = 20 bytes)
  - x'00': Service type (Normal)
  - x'009C': IP packet length (156 bytes)
  - x'3D47': Identifier
  - x'0': Flag
  - x'000': Fragment offset
  - x'40': Time of live
  - x'01': Protocol
  - x'84E6': Header checksum
  - x'0A05D214': Source IP address
  - x'0A05D215': Destination IP address
  - x'00': Type of ICMP ('00' Echo reply)
  - x'00': x'00' only
  - x'EAC7': Checksum
  - x'001B': Identifier
  - x'6C01': Sequence number
  - x'808F~0000: Data

- Record number 14

  This is an LCP packet by which AS1 requests AS2 to terminate the PPP connection with AS2. AS1 sent this packet to AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'05': Terminate request
  - x'78': Identifier
  - x'0004': Packet length except HDLC frame and LCP (4 bytes)

- Record number 15

  This is an LCP packet by which AS2 informs AS2 to acknowledge the request from AS1 to terminate the PPP connection with AS2. AS1 received this packet from AS2.

  - x'FF03': HDLC frame
  - x'C021': LCP
  - x'06': Terminate ACK

- x'78': Identifier
- x'0004': Packet length except HDLC frame and LCP (4 bytes)

Appendix B. ISDN cause codes

This appendix contains descriptions of ITU-T standard cause codes. In general, a cause code indicates current ISDN activity or reports an ISDN-specific error. Network-specific cause codes are not translated to the ITU-T value that the AS/400 system uses. However, the system checks the cause codes for normal and acceptable calling conditions. All other values are logged into the system error log (QSYSOPR or the configured message queue).

Table 71. ISDN cause codes

Cause code (decimal)	Description
1	Unallocated (unassigned number)
2	No route to specified transit network
3	No route to destination
6	Channel unacceptable
7	Call awarded and being delivered in an established channel
16	Normal call clearing
17	User busy
18	No user responding
19	No answer from user (user alerted)
21	Call rejected
22	Number changed
26	Non-selected user clearing
27	Destination out of order
28	Incorrect number format
29	Facility rejected
30	Response to Status Enquiry
31	Normal, unspecified
34	No circuit/channel available
38	Network out of order

Cause code (decimal)	Description
41	Temporary failure
42	Switching equipment congestion
43	Access information discarded
44	Requested circuit or channel not available
47	Resources unavailable, unspecified
49	Quality of service unavailable
50	Requested facility not subscribed
57	Bearer capability not authorized
58	Bearer capability not presently available
63	Service or option not available, unspecified
65	Bearer capability not implemented
66	Channel type not implemented
69	Requested facility not implemented
70	Only restricted digital information bearer capability is available
79	Service or option not implemented, unspecified
81	Call reference value not valid
82	Identified channel does not exist
83	A suspended call exists, but this call identity does not
84	Call identity in use
85	No call suspended
86	Call having the requested call identity has been cleared
88	Incompatible destination
91	Transit network selection not valid
95	Message not valid, unspecified
96	Mandatory information element is missing
97	Message type nonexistent or not implemented

Cause code (decimal)	Description
98	Message not compatible with call state or message type nonexistent or not implemented
99	Information element nonexistent or not implemented
100	Information element contents not valid
101	Message not compatible with call state
102	Recovery on timer expiry
111	Protocol error, unspecified
127	Interworking, unspecified

Appendix C. Special notices

This publication is intended to help administrators who manage the AS/400 network. The information in this publication is not intended as the specification of any programming interfaces that are provided by OS/400 Version 4 Release 4 or Version 4 Release 5. See Appendix D, “Related publications” on page 261, for more information about what publications are considered to be product documentation.

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Appendix D. Related publications

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

D.1 IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 263.

- *V4 TCP/IP for AS/400: More Cool Things Than Ever*, SG24-5190

D.2 IBM Redbooks collections

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at **ibm.com**/redbooks for information about all the CD-ROMs offered, updates and formats.

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D.3 Other resources

These publications are also relevant as further information sources:

- *Facsimile Support for AS/400 INstallation Guide,* SC41-0654
- *Facsimile Support for AS/400 Programmer’s Guide and Reference*, SC41-0656
- *OS/400 Communications Configuration*, SC41-5401
- *OS/400 TCP/IP Configuration and Reference V4R4*, SC41-5420
- RFC 1334, *PPP Authentication Protocols*

  A complete list of RFCs can be accessed online at:
  `http://www.rfc-editor.org/rfc.html`

D.4 Referenced Web sites

These Web sites are also relevant as further information sources:

- Visit the AS/400 Information Center online at:
  `http://publib.boulder.ibm.com/pubs/html/as400/infocenter.htm`
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Abbreviations and acronyms

APPC	Advanced Program to Program Communication
APPN	Advanced Peer to Peer Network
BRI	Basic Rate Interface
CHAP	Challenge Handshake Authentication Protocol
DoD	Dial on demand
DSP	Digital Signal Protocol
DTMF	Dual Tone Multi Frequency
HDLC	High-level Data Link Control
IBM	International Business Machines Corporation
IDLC	ISDN Data Link Control
IOA	Input/output adapter
IOP	Input/output processor
IPCP	IP Control Protocol
ISDN	Integrated Services Digital Network
ITSO	International Technical Support Organization
ITU-T	International Telecommunication Union, Telecommunication Standardization Sector
LAN	Local area network
LAPM	Link Access Procedure for Modem
LCP	Link Control Protocol
MNP	Microcom Networking Protocol
MRU	Maximum Receive Unit
NCP	Network Control Protocol
NTU	Network Terminating Unit
PAP	Password Authentication Protocol
POTS	Plain Old Telephone Service
PPP	Point-to-Point Protocol
PTF	Program temporary fix
SAP	Service Access Point
SDLC	SNA Data Link Control
SLIP	Serial Line Internet Protocol
SNA	System Network Architecture
SPID	Service Profile IDentifier
WAN	Wide area network

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