December 2001

SDLC and X.25 support for Windows[7] SNA Server, Host Integration Server and Novell[7] NetWare[7] for SAA

Installation and Operations Manual

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1. Introduction

This document describes the use of the Sangoma ISA S503, S508 or PCI S514 cards to support:

▾▾   SDLC and X.25/QLLC host connections under the **Microsoft SNA Server and Host Integration Server.**

▾▾   SDLC host connections under **Novell NetWare** and **NetWare for SAA 1.x and up.**

This allows the connection of Microsoft or NT NetWare servers to IBM mainframes or AS/400 systems, which use IBM SNA protocols.

The conventional support for these server platforms is supplemented by significant improvements and added features. Among these are the following:

?? Line speeds up to 4Mbps.

?? Up to 4 RS232 or V.35/X.21 ports per card.

?? Optional internal data clock generation (command line settable from 1200 bps to 1Mbps).

?? Ability to connect back-to-back to host with simple null modem cable.

?? Improved statistics and diagnostics information, including English language driver log file and LinkView™.

?? Decreased server utilization through increased on-board protocol handling.

It is assumed that the relevant Novell and Microsoft documentation is available for reference. These include:

?? Microsoft SNA Server Installation Guide and Planning guide for the Microsoft SNA Server installation

?? Novell NetWare for SAA Administration guide for the NWSAA installation

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2.   Hardware

?? The S503 is an ISA card with a single port, capable of running at 128kbps (SDLC) or 64kbps (X.25). The port is jumper configurable as RS232 or V.35/X.21.

?? The S508 is an ISA card with two ports.
The main port is capable of running at 1Mbps, RS232 or V.35/X.21, software selectable.
The secondary port is RS232 only, and capable of running at 128kbps.

?? The S514 is a PCI card with either two or 4 ports.
The main port is capable of running at 1.5Mbps, RS232 or V.35/X.21, software selectable.
The secondary port is RS232 only, and capable of running at 256kbps.
The S541 is optionally available in a dual CPU version supporting at total of two 1.5Mbps and two 256kbps ports.

Jumper Settings

S5141 or S5142 adapters

The S514, being PCI based, has no jumpers for the setting of PC resources. The only user settable jumpers under normal circumstances are jumpers J2, J3, J7 and J8. The other jumpers are described for completeness, but *should not be changed without consulting your Sangoma dealer*.

| Jumper	Remarks
J2, J3, J7, J8	To run the ports using RS232 with internal clocking set Jumpers J2, J3, J7 and J8 to positions 1 - 2. For all other configurations, *including V.35 with internal clocking*, leave the jumpers in the factory position of 3 - 4.
J4, J5,	Do not change these unless you are using the S514 for embedded clock multipoint RS485 applications. Removing these jumpers removes the terminating resistors, which will introduce noise on a normal point-to-point line.
J11	Used only for initial eprom programming. Do not change
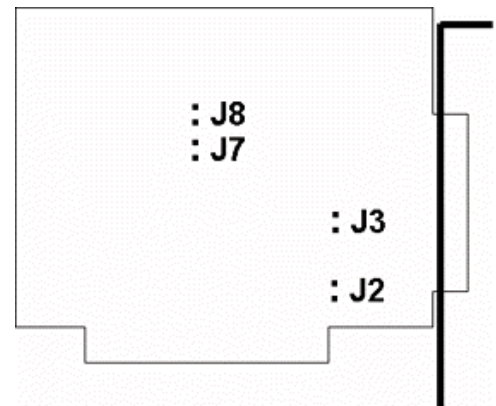
The S514/FT1 card has *no user settable jumpers* at all.

508 ADAPTER

I/O Base address:

JP1-1	JP1-2	JP1-3	
CLOSED	CLOSED	CLOSED	250-253 (Hex)
OPEN	CLOSED	CLOSED	270-273 (Hex)
CLOSED	OPEN	CLOSED	280-283 (Hex)
OPEN	OPEN	CLOSED	300-303 (Hex)
CLOSED	CLOSED	OPEN	350-353 (Hex)
OPEN	CLOSED	OPEN	360-363 (Hex)
CLOSED	OPEN	OPEN	380-383 (Hex)
OPEN	OPEN	OPEN	390-393 (Hex
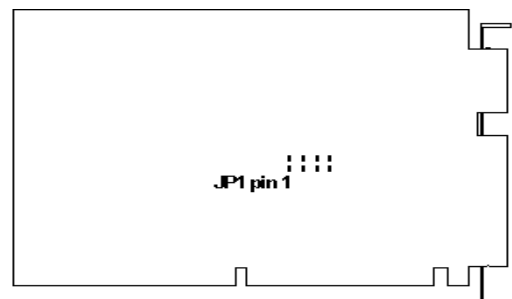
503 ADAPTER

I/O Base address:

JP3-1,2	JP3-3,4	JP3-5,6	I/O Address
CLOSED	CLOSED	CLOSED	254-257 (Hex)
OPEN	CLOSED	CLOSED	304-307 (Hex)
CLOSED	OPEN	CLOSED	354-357 (Hex)
OPEN	OPEN	CLOSED	364-367 (Hex)
CLOSED	CLOSED	OPEN	250-253 (Hex)
OPEN	CLOSED	OPEN	300-303 (Hex)
CLOSED	OPEN	OPEN	350-353 (Hex)
OPEN	OPEN	OPEN	360-363 (Hex) ⁻
Electrical interface:			
JP3 9-10	OPEN	V.35/RS530/X.21 interface	
P3 9-10	CLOSED	RS232 interface	
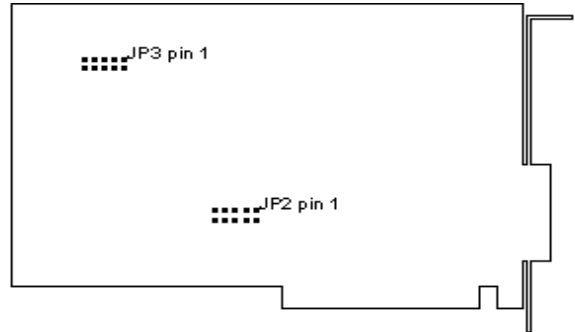
IRQ Selection:

JP2	Selection	JP2	Selection	JP2	Selection	JP2	Selection	JP2	Selection
1,2	IRQ 2	3,4	IRQ 3	5,6	IRQ 4	7,8	IRQ 5	9,10	IRQ 7 ⁻

⁻ Factory default.

Do not **change** other jumper settings without consulting your Authorised Sangoma Dealer

Internal Line Clocking

For back-to-back connections, the cards can provide their own Transmit and Receive clock signals, which, with the appropriate cable, can also provide the clock for third party devices.

Cable Pinouts

DB25 Pinouts for S503/S508

RS232	
Pin #	**Function**
2	TxD
3	RxD
7	GND
4	RTS
5	CTS
20	DTR
6	DSR
8	DCD
15	TxC
17	RxC
24	BxC

V.35/X.21/EIA530	
Pin #	**Function**
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
10	TxA
9	TxB
12	RxA
11	RxB
19	Tx Clock A
20	DTR (V10
13	DTRA (V11
14	DTRB (V11
21	Tx Clock B
22	RI
23	Rx Clock A
25	Rx Clock B
18	Aux. Clock A
16	Aux. Clock B

DB37 Pinouts for S514 PCI cards
PR=Primary port, SEC= Secondary port

PIN	PR:RS232	SEC:RS232	PR:V.35/X.21	SEC:V.35/X.21
1	RTS		RTS	
2	CTS		CTS	
3	GND	GND	GND	GND
4	DCD		DCD	
5	DTR		DTR (V.10)	
6	TXD			
7	RXD			
8	TXC			
9	RXC			
10		RTS		RTS
11		CTS		CTS
12		DCD		DCD
13		DTR		DTR (V.10)
14		TXD		
15		RXD		
16		TXC		
17		RXC		
18			TXB	
19			TXA	
20			RXA	
21			RXB	
22			TX Clock A	
23			TX Clock B	
24			RX Clock A	
25			RX Clock B	
26			DTR A (V.11)	
27			DTR B (V.11)	
28				TXA
29				TXB
30				RXA
31				RXB
32				TX Clock A
33				TX Clock B
34				RX Clock A
35				RX Clock B
36				DTR A (V.11)
37				DTR B (V.11)

3. Microsoft SNA Server: Installation and operation of the S508 and S514 cards

Introduction

This software suite supports the Microsoft SNA Server 4+ under Windows NT Server 4+ and Windows 2000, using the PCI S514 card and the ISA S508 card. If you are using the S503 ISA card, see the following chapter for installation instructions.

Driver Installation

1. For Windows NT, the driver will install during software installation.
2. For Windows 2000:
   1. Insert Sangoma card into your computer.
   2. Boot your machine.
   3. For S514 PCI cards:
      a) The S514 PCI card will automatically detected by Plug and Play Manager. You will see the **Found new Hardware** message and the **Found New Hardware** Wizard will open. Click on **Next**.
      b) Select the second option **Display a list of the known drivers for this device so that I can choose a specific driver** and click on **Next**.
      c) Select **Network Adapters** from the **Hardware type** list and click on **Next**.
      d) Insert the Sangoma CD and click on **Have Disk**. Navigate to **.. /Windows/SNA_Server-HIS2000/S514-S508/Win2000**, select **SangSync.inf** file and click on **OK.**

         Please NOTE: The CD contains drivers for many applications of the Sangoma Hardware, not just for SNA support. **Thus you _cannot_ simply let Windows search for a suitable driver on the CD**, there are several such drivers and you will install the wrong one.

      e) Select the network adapter you want to install from the **Network Adapters** list (one of the following **Sangoma SDLC/X.25 PCI Adapter with 2 CPU**, **Sangoma SDLC/X.25 PCI Adapter with 1 CPU** or Sangoma **SDLC/X.25 ISA Adapter**) and click **Next**. Click on **Next** if you are ready to install the driver.
      f) Click on **Next** in the next window.
      g) The driver will install and be loaded by Windows 2000.
   4. For S508 ISA cards:
      The ISA card is not Plug and Play card and you will need to add the new device by hand.
      a) Open the **Control Panel** window.
      b) Click twice to **Add/Remove hardware**.
      c) The **Add/Remove Hardware Wizard** will open. To continue, click on **Next**.
      d) Select **Add device**, click on **Next** again.
      e) The Windows 2000 will start to search for new Plug and Play devices. Select **Add a new device** and click on **Next**.
      f) Select the second option **No, I want to select the hardware from a list**

and click on **Next.**

g) Repeat all steps from step 3 for S514 PCI card.

Software Installation

1. Install the SNA Server**.**
2. Once the S508/S514 card has been installed, boot Windows NT Server/Windows 2000, and follow the steps below.
3. Run **SangLink_wnt.msi** for Windows NT from the directory **/Windows/SNA_Server-HIS2000/S514-S508/WinNT** or **SangLink_w2k.msi** for Windows 2000 from the directory **/Windows/SNA_Server-HIS2000/S514-S508/Win200**. If you using the Windows NT and Microsoft Installer Service is not installed on your computer, do the next steps:
   a) Download **instmsiw.exe, SangLink.exe and SangLink.ini** from our ftp area **ftp.sangoma.com/SNA Server/WindInst.**
   b) Run SangLink.exe. This application will install Microsoft Installer Service on your computer.
4. You can choose the directory where you want install the **Sangoma LinkView** diagnostic program (default directory is **C:\Program Files\Sangoma LinkView**). The Setup program will copy the Link service files into the SNA server root directory, automatically update the Registry and install the **LinkView** diagnostic tool to directory that you choose.

Link Service Installation

1. Open the **SNA Server Manager.**
2. Open **Insert Link Service** dialog box.

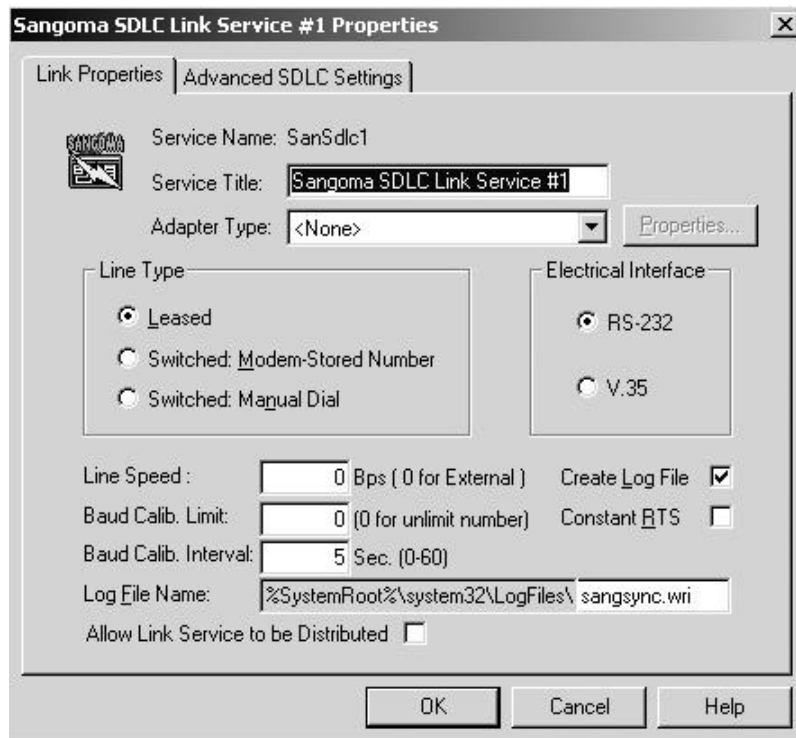3. Select **Sangoma SDLC/X.25 Link Service** according to your needs, and click on the **Add** button:
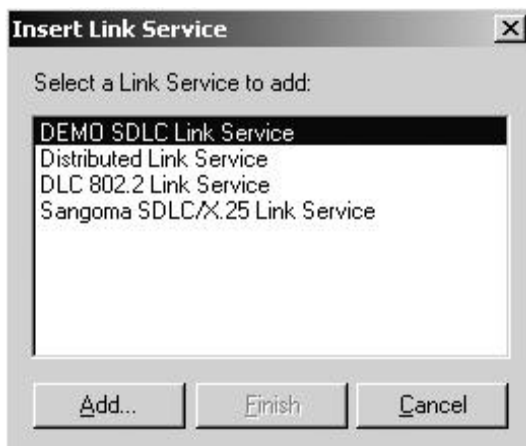
4. The following dialog box will appear. Select the protocol type for the new Link Service:
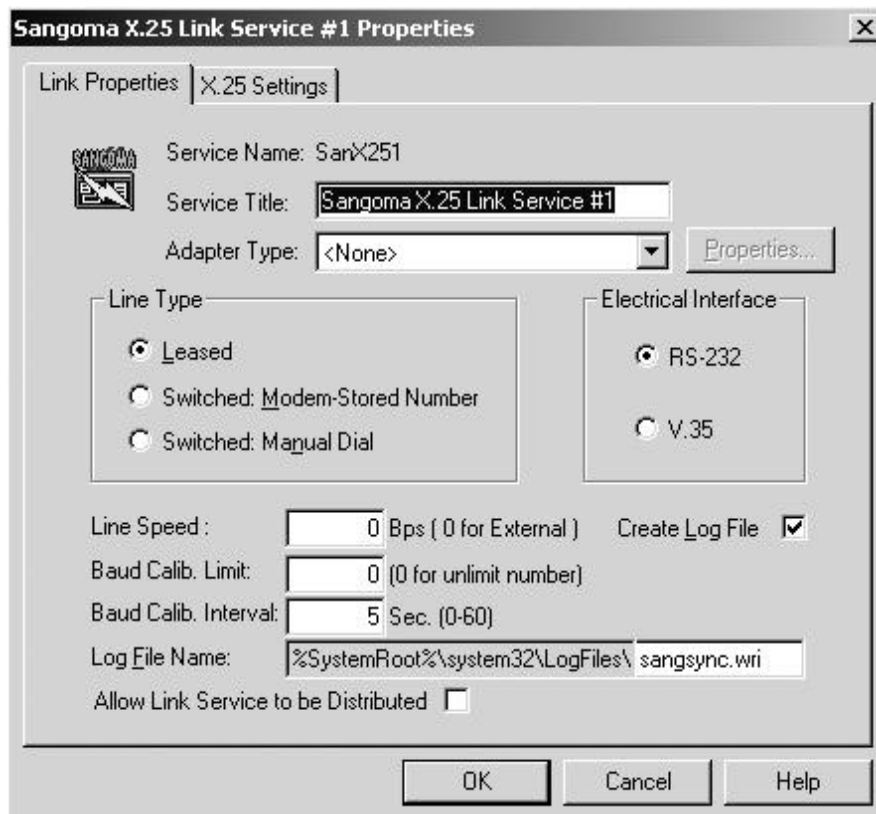
Insert Sangoma SDLC/X.25 Link Service

Please, choose protocol type for New Link Service:

<Choose protocol>

OK   Cancel
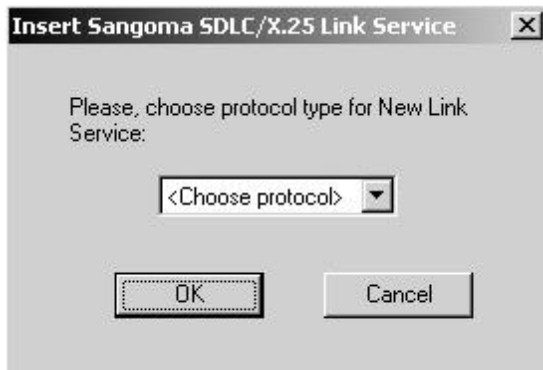
5. The following boxes will appear according selected protocol type.

For SDLC Link Service:

Sangoma SDLC Link Service #1 Properties

Link Properties | Advanced SDLC Settings

Service Name: SanSdlc1

Service Title: Sangoma SDLC Link Service #1

Adapter Type: <None>   Properties...

Line Type
  ○ Leased
  ○ Switched: Modem-Stored Number
  ○ Switched: Manual Dial

Electrical Interface
  ○ RS-232
  ○ V.35

Line Speed :   0 Bps (0 for External)   Create Log File ☑
Baud Calib. Limit: 0 (0 for unlimit number)   Constant RTS ☐
Baud Calib. Interval: 5 Sec. (0-60)
Log File Name: %SystemRoot%\system32\LogFiles\ sangsync.wri
Allow Link Service to be Distributed ☐

OK   Cancel   Help

For the X.25 Link Service:

6. Select the Adapter type from the **Adapter Type** list. Click on **Properties** to configure the current Link services. To enable a log file for the current Link Service, select **Create Log File** (selected by default). If the **Create Log File** option is selected, you will be able to change log file name for the current Link Service. The log file contains entries in English for significant events and errors that occur in the driver, as well as link status or line state changes.
7. The **Baud Calib.** Options relate to measurement of the line baud rate required for proper operation of RTS switching. The default settings rarely need changing.
8. To Configure Advanced SDLC Settings, choose **Advanced SDLC Settings**:
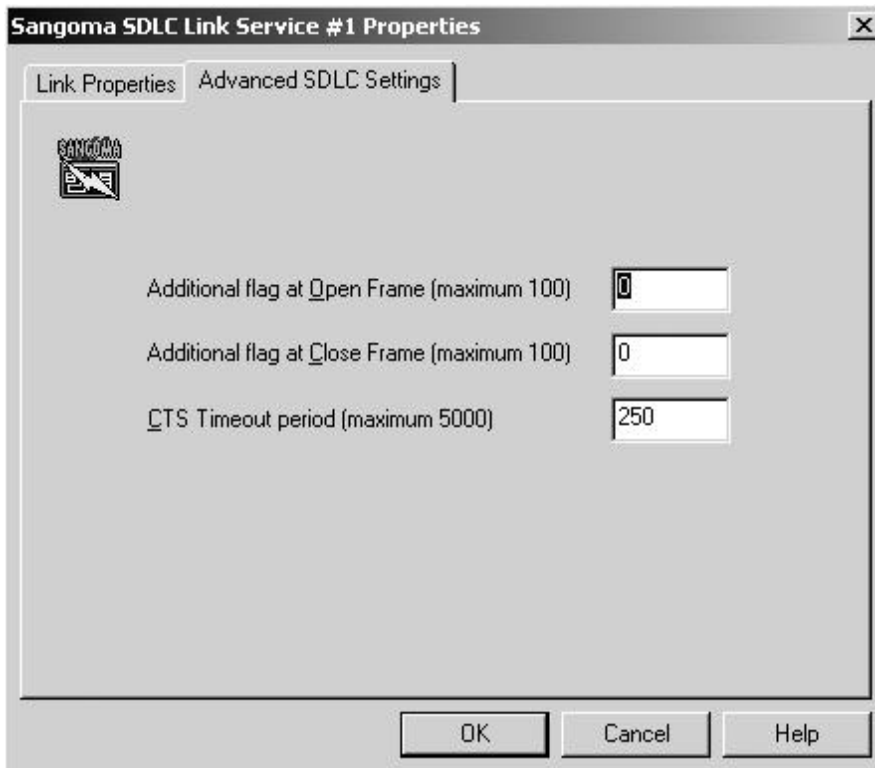
9. The **Advanced SDLC settings** rarely need to be changed.

10. To configure the X.25 Link Service, choose **X.25 Settings**:
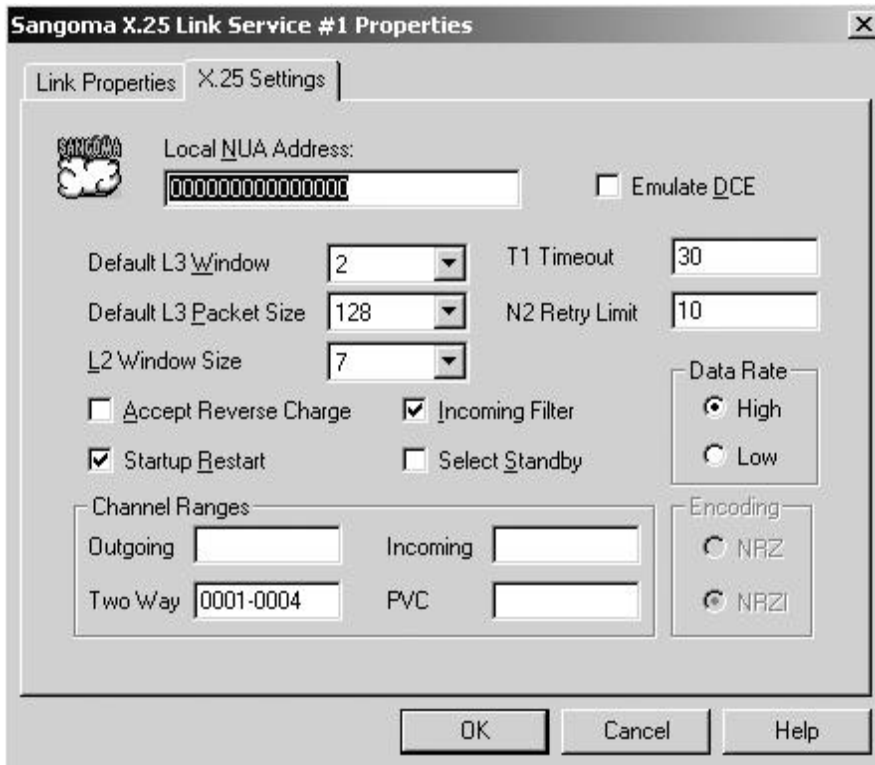
11. The S508 has one Primary 1.5Mbps port and one Secondary 128Kbps port (RS232 only). The S514 has at Primary 1.5Mbps port and one Secondary 512Kbps port. The card is provided standard with one cable for the Primary port. A Y-cable upgrade kit is available to support both Primary and Secondary ports. The S5142 has dual CPUs and therefore another set of Primary and Secondary ports, to handle a total of 4 individual SNA lines per board.

12. To configure adapter type for the current Link Service, click on **`Properties`**. The following dialog box will appear depending on the Adapter Type (depends on adapter type):

a) S508 ISA Card (for Windows NT).

This dialog appears if you clicked on **`Property`** for the **`Sangoma S508 ISA`** card under Windows NT:


To configure S508 ISA Adapter, select the resources that you want to use and click on **`Run Tests`** button to check these resources. If the selected resources are available and are not conflicting with other devices, you will receive the message:
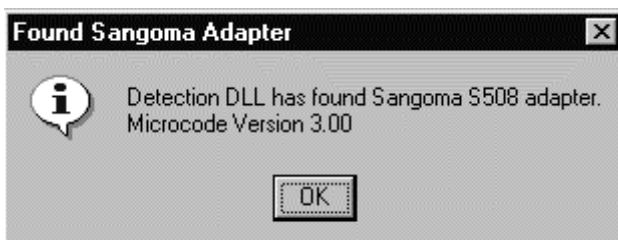
Otherwise, if selected resource area not available or conflict with other devices, you will receive

an error message. For example:
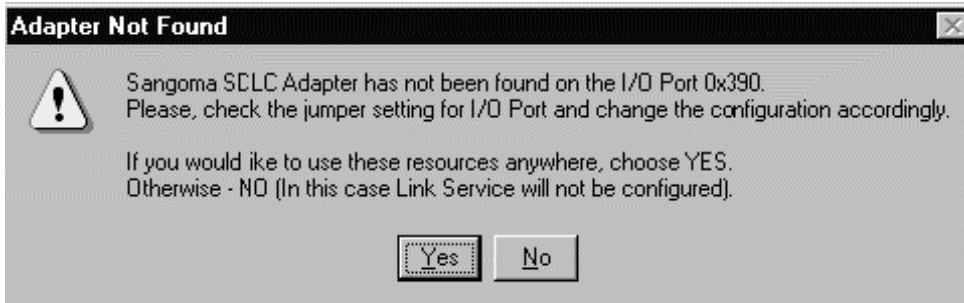
You can use **Available Resources** dialog to find available resources for your current hardware configuration. To choose a resource, double click on the resource value. It will appear on the corresponding List Box in the **S508 Card Configuration** Property Page.

All resources are set in software on the S508, except for the I/O port. The default value of 0x360 almost never has to be changed, however.

NOTE: The **Run Tests** button will *always fail* if the driver is *already loaded*. This is because the card is conflicting with itself. You can only use the **Run Tests** button if the driver for the card is disabled, or before the card is loaded.

b) **S508 ISA Card (for Windows 2000)**

This dialog appears if you clicked on **Property** for **Sangoma S508 ISA** card under Windows 2000:
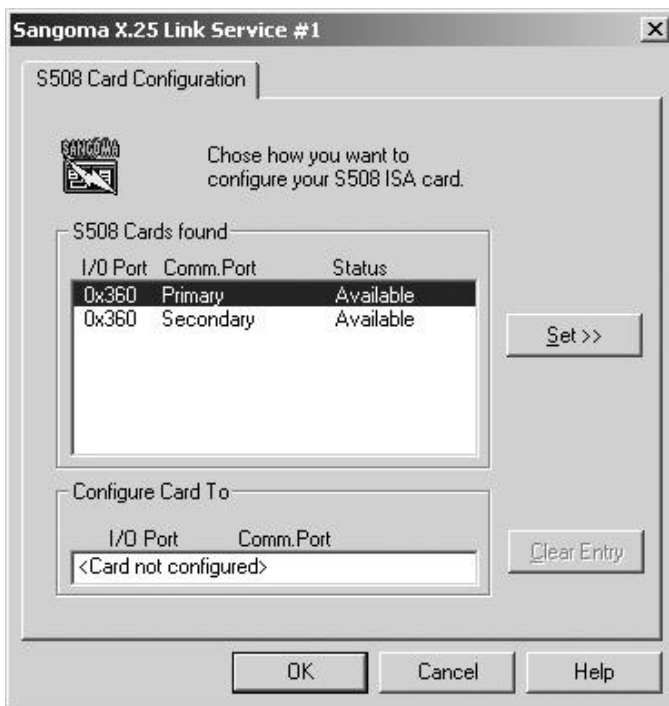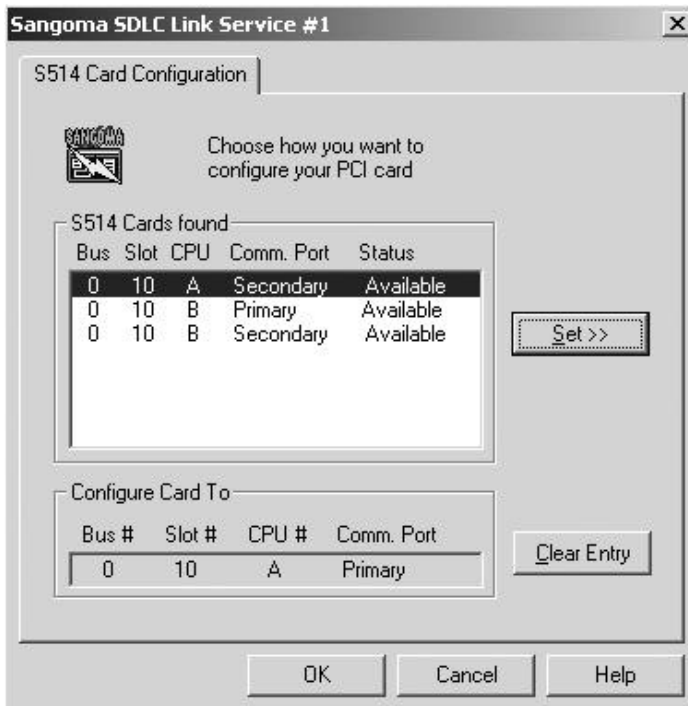
Select available configuration from the **S508 Cards found** list box and click on **Set**. An **Available Configuration** is a configuration that is not used by any Link Service. If configuration is used by a Link Service you will find the name of this Link Service in **Status**. For example:
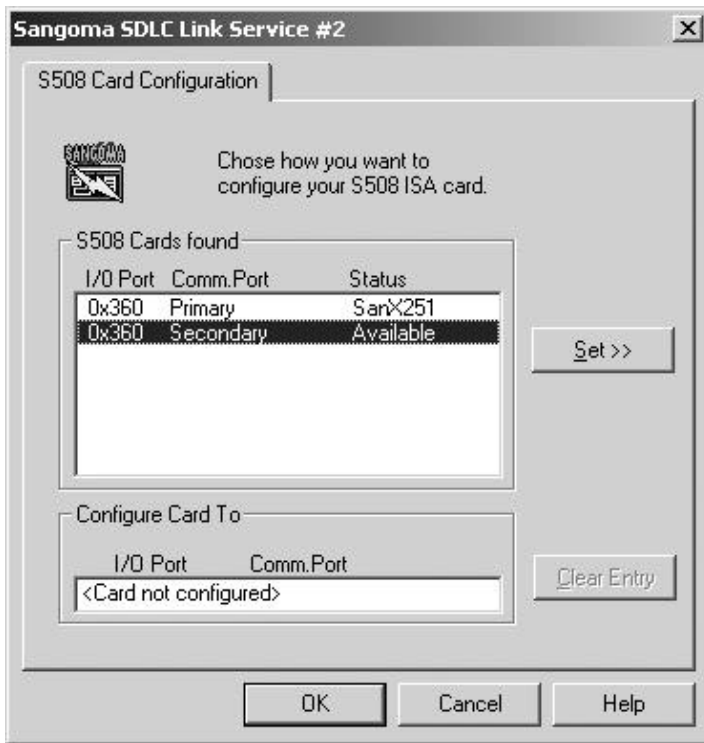
To change the current configuration click on **Clear Entry** and choose another available configuration from the list box.

c) **S514 PCI Card.**
This dialog appears if you clicked on **Property** for **Sangoma S514 PCI** card:

To configure theS514 PCI Card, select available configuration from the list box **S514 Cards found** and click on **Set**. An **Available configuration** is a configuration that not used by any Link Service. To change the current configuration click on **Clear Entry** and choose another available configuration from the list box.

Installation of multiple Link Services

The SANGSYNC driver for SNA server 4.0 supports an unlimited number of cards. The following rules apply:

1. The link service index number corresponds to the driver's card number. The link service names are: **SanSdlc1, SanSdlc2, SanSdlc3, SanSdlc4**. Subtract 1 from the link service number to obtain the card number.

2. For the driver to start successfully, it must be able to reserve the resources used by all configured cards. When the SNA service is started, the driver is started, and the reserved resources are recorded. They may be viewed by running **Windows NT Diagnostics**. If the SNA service cannot start, it may be that **SANGSYNC** could not start due to a resource conflict.

Link Service Configuration

1. Reconfiguring the Link Service using SNA Server Manager may change the parameters that were set during installation. Open the **Link Services** folder, select the link service you wish to configure, click the right mouse button and select **Properties** from the pop-up menu.
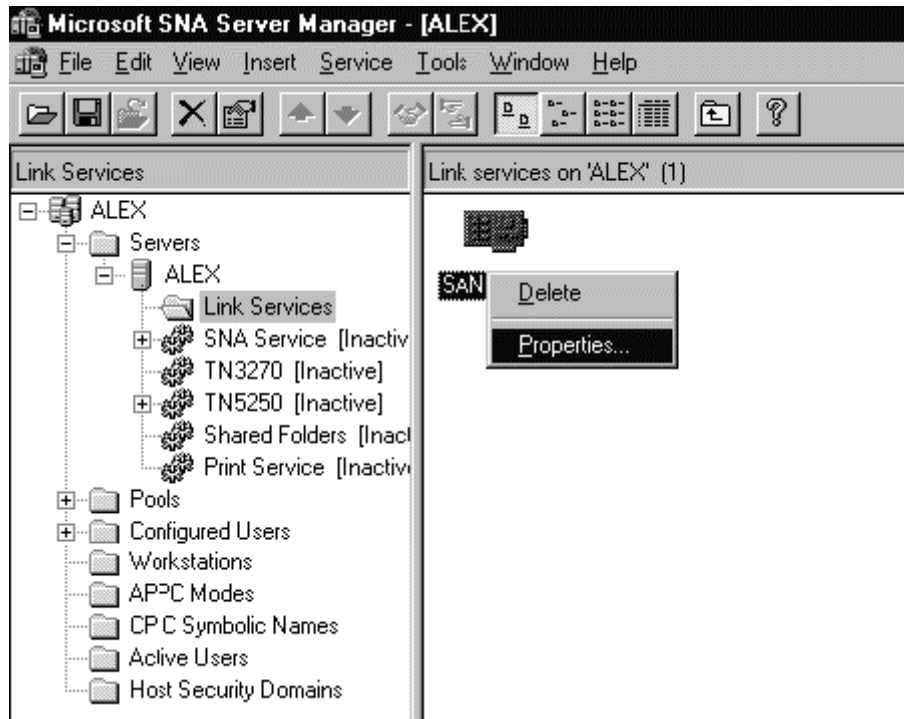
2. Change the Link Service properties according to your needs, and click **OK**. Note that you will have to restart the SNA Service in order to apply the changes made.

Removal of Link Service

1. To remove the Link Service open **SNA Server manager**, then the **Link Services** folder, select the link service you wish to delete, click the right mouse button and select **Delete** from the pop-up menu.

Uninstalling the Driver

1. To uninstall Sangoma Link Service software, go to **Control Panel | Add/Remove Program**, find the **Sangoma Link Service** and click on **Add/Remove**… to uninstall driver.
2. All Sangoma Link Services will be automatically removed.

Troubleshooting

Sangoma driver logs

When the link service starts the Sangoma driver, log file entries are created in the file sangsync.wri in the directory ../winnt/system32/logFiles. The log file details the crucial steps in loading the driver and initializing, testing and loading the card. After loading, any unusual line event also creates an entry. On shutdown a summary of traffic is added to the file. The result is an easily read log that allows for detailed debugging of hardware and line problems.

An example of a log file is shown below:

```
12.27.2001 15:33:15 ****************************************************************
12.27.2001 15:33:15 ***** Loading Sangoma SyncLink Device Driver (V.2.4.0.1) *****
12.27.2001 15:33:15 ****************************************************************
12.27.2001 15:33:15 SYNC: Starting resource allocation for driver
12.27.2001 15:33:15 SYNC(0): Starting to configure this device...
12.27.2001 15:33:15 SYNC(0): Creating device object...
12.27.2001 15:33:15 SYNC(0): Starting Device Setup...
12.27.2001 15:33:15 SYNC(0): Current device running SDLC protocol (SanSdlc1)
12.27.2001 15:33:15 SYNC(0): Current configuration: Bus=0, Slot=9, Cpu=0, CommPort=0
12.27.2001 15:33:15 SYNC(0): Link Service configured to External Clocking
12.27.2001 15:33:15 SYNC(0): Configure electrical interface for RS-232.
12.27.2001 15:33:15 SYNC(0): Device object created. Setting up symbolic link...
12.27.2001 15:33:15 SYNC(0): Symbolic link created. Reserving resources...
12.27.2001 15:33:15 SYNC(0): Finding a device previously configured with the same resources...
12.27.2001 15:33:15 SYNC(0): Starting to allocate resources and configure hardware ...
12.27.2001 15:33:15 SYNC(0): Starting S514 adapter initialization...
12.27.2001 15:33:15 SYNC(0): Found a PCI device at Bus 0, SlotNumber 9.
12.27.2001 15:33:15 SYNC(0): Resources allocated successfully.
12.27.2001 15:33:15 SYNC(0): Starting Map Memory for S514...
12.27.2001 15:33:15 SYNC(0): Control Register Byte = 0xF75D9000 Size = 0x00000010
12.27.2001 15:33:15 SYNC(0): Physical memory = 0xFAB16000 Size = 0x00040000
12.27.2001 15:33:15 SYNC(0): S514 Register = 0xF75D8000 Size = 0x00000100
12.27.2001 15:33:15 SYNC(0): Memory mapped OK!
12.27.2001 15:33:15 SYNC(0): Initialization successfull.
12.27.2001 15:33:15 SYNC(0): Configure communication for Primary port..
12.27.2001 15:33:15 SYNC(0): Starting to load code...
12.27.2001 15:33:15 SYNC(0): Shut down SDLA...
12.27.2001 15:33:16 SYNC(0): Initialize SDLA hardware...
12.27.2001 15:33:16 SYNC(0): Zeroing card memory...
12.27.2001 15:33:16 SYNC(0): Downloading code ...
12.27.2001 15:33:16 SYNC(0): Starting to download code (length is 38868)...
12.27.2001 15:33:16 SYNC(0): Start adapter's CPU...
12.27.2001 15:33:16 SYNC(0): Firmware code downloaded!!
12.27.2001 15:33:16 SYNC(0): Received I from the board!!
12.27.2001 15:33:16 SYNC(0): Read CHDLC code version ...
12.27.2001 15:33:16 SYNC(0): Set CHDLC configuration...
12.27.2001 15:33:16 SYNC(0): Create Baud Calibration Thread...
12.27.2001 15:33:16 SYNC(0): Baud Calibration Thread started!
12.27.2001 15:33:16 SYNC(0): Call to register a device driver's ISR (IRQ 5)...
12.27.2001 15:33:16 SYNC(0): IRQ 5 allocated for current device.
12.27.2001 15:33:16 SYNC(0): Device setup is complete
12.27.2001 15:33:16 SYNC: Log Thread is started!
12.27.2001 15:33:16 SYNC: Success on DriverEntry
12.27.2001 15:33:17 SYNC(0): SNA Server Manager called IRP_MJ_CREATE.
12.27.2001 15:33:17 SYNC(0): rcode = 0x00000000... DONE
12.27.2001 15:33:17 SYNC(0): Set Modem status (0x01)...
12.27.2001 15:33:17 SYNC(0): Starting initialization...
12.27.2001 15:33:18 SYNC(0): Current Link Service configured to 06/FF Poll Addresses
12.27.2001 15:33:18 SYNC(0): Set Interrupt mode (0x00)...
12.27.2001 15:33:18 SYNC(0): Disable communications...
12.27.2001 15:33:18 SYNC(0): <ERROR> Disable communication command returns error code (0x21)
12.27.2001 15:33:18 SYNC(0): Set CHDLC configuration...
12.27.2001 15:33:18 SYNC(0): Initializing Rx/Tx buffers...
12.27.2001 15:33:18 SYNC(0): Read CHDLC configuration...
12.27.2001 15:33:18 SYNC(0): Set Interrupt mode (0x08)...
12.27.2001 15:33:18 SYNC(0): Set advanced SDLC configuration (0:0:250)...
12.27.2001 15:33:18 SYNC(0): Initialization has been successfully completed!
12.27.2001 15:33:18 SYNC(0): Set Modem status (0x01)...
12.27.2001 15:33:19 SYNC(0): Modem changed status: DSR - High DCD - High.
12.27.2001 15:33:23 SYNC(0): Start Baud Calibration...
12.27.2001 15:33:23 SYNC(0): Read Baud calibration result...
12.27.2001 15:33:23 SYNC(0): Baud rate calibration failed (no transmit clock)!
12.27.2001 15:33:27 SYNC(0): Modem changed status: DSR - High DCD - Low.
12.27.2001 15:33:28 SYNC(0): Start Baud Calibration...
12.27.2001 15:33:28 SYNC(0): Read Baud calibration result...
12.27.2001 15:33:28 SYNC(0): Read CHDLC configuration...
12.27.2001 15:33:28 SYNC(0): The baud rate after calibration is 4800.
12.27.2001 15:33:28 SYNC(0): Starting initialization...
12.27.2001 15:33:28 SYNC(0): Current Link Service configured to 06/FF Poll Addresses
```

```
12.27.2001 15:33:28 SYNC(0): Set Interrupt mode (0x00)...
12.27.2001 15:33:28 SYNC(0): Disable communications...
12.27.2001 15:33:28 SYNC(0): <ERROR> Disable communication command returns error code (0x21)
12.27.2001 15:33:28 SYNC(0): Set CHDLC configuration...
12.27.2001 15:33:28 SYNC(0): Initializing Rx/Tx buffers...
12.27.2001 15:33:28 SYNC(0): Read CHDLC configuration...
12.27.2001 15:33:29 SYNC(0): Set Interrupt mode (0x03)...
12.27.2001 15:33:29 SYNC(0): Set advanced SDLC configuration (0:0:250)...
12.27.2001 15:33:29 SYNC(0): Enable communications...
12.27.2001 15:33:29 SYNC(0): Initialization has been successfully completed!
12.27.2001 15:33:39 SYNC(0): Modem changed status: DSR - High DCD - High.
12.27.2001 15:33:49 SYNC(0): Received frame is SNRM
12.27.2001 15:33:50 SYNC(0): Transmitted frame is UA
12.27.2001 15:33:53 SYNC(0): rcode = 0x00000000... DONE
```

The log file can also be inspected using the LinkView facility, see below.


LinkView Diagnostic Utility

LinkView is a powerful debugging tool that provides real time debugging information of your connection. LinkView allows you to see the configuration for current link service, all available statistics from the board, driver statistics, line and command traces, memory dump and to view the log file created by the driver.

For help with LinkView, open the LinkView Help from
Start | Program | Sangoma LinkView.
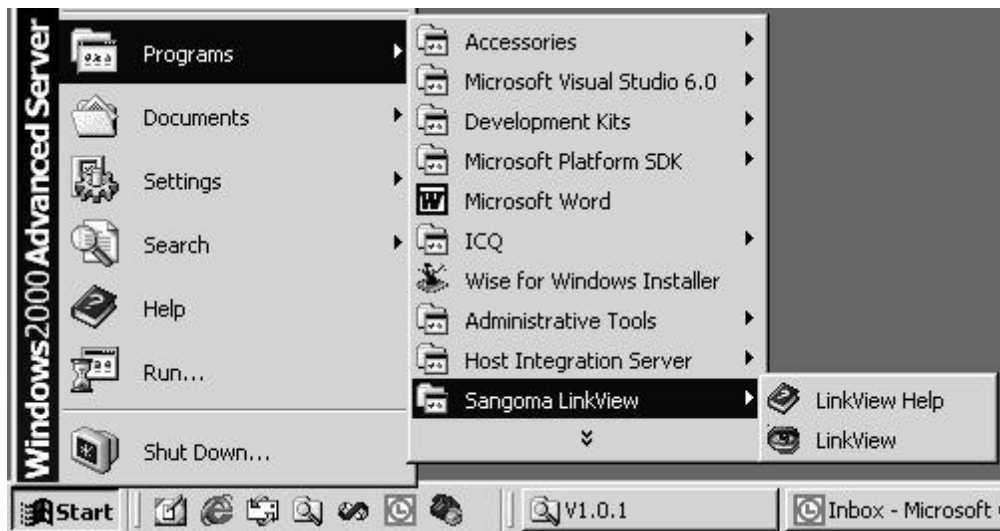
LinkView includes traces of SNA manager commands to the driver as well as traffic, both of which can be logged to disk.

A typical LinkView screen is shown below.
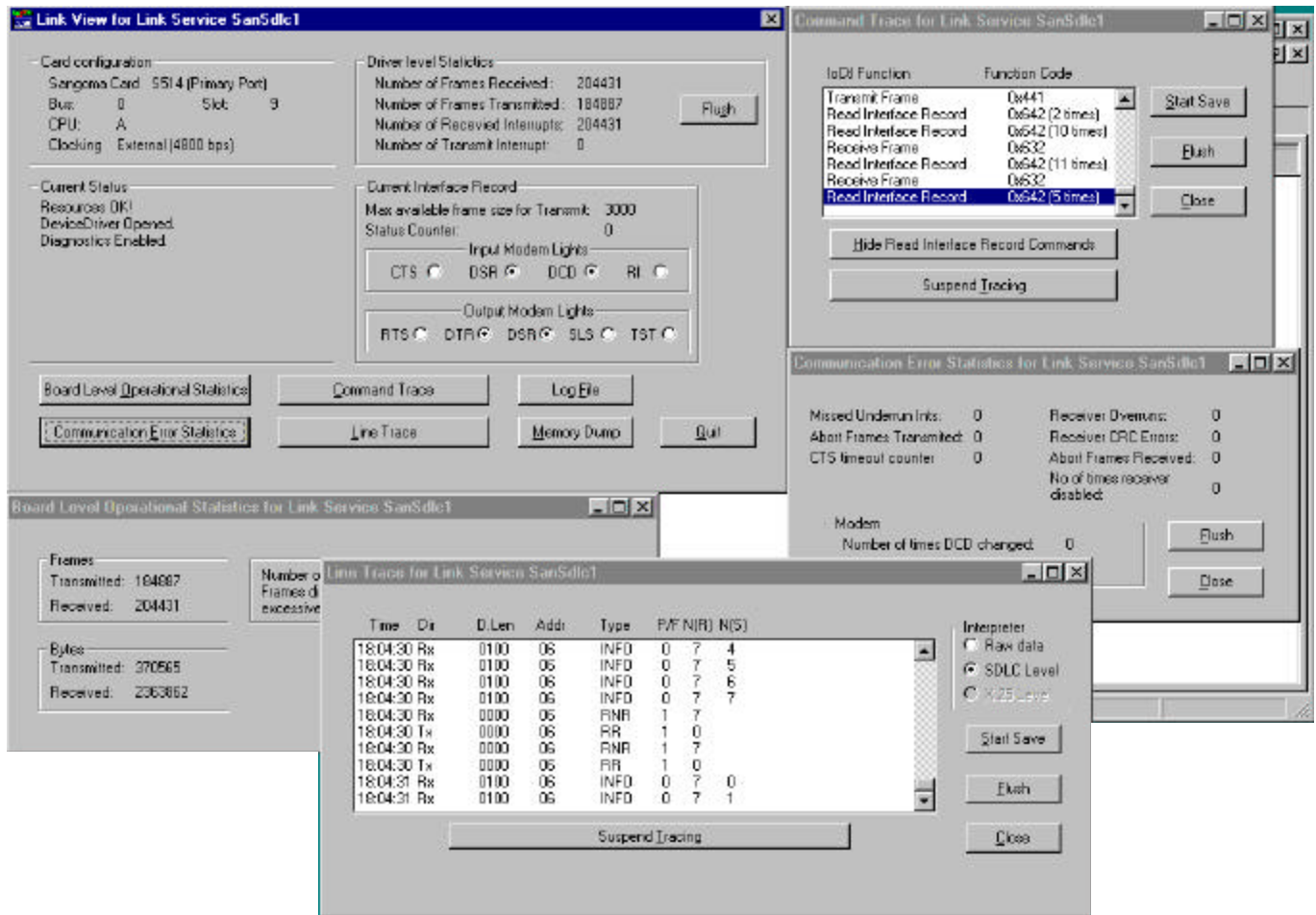
LinkView is useful for solving line and protocol related problems once the card and driver are working normally, as shown in the log.

Drivers for Microsoft SNA Server 3.x using the S503 card

Please note that versions 3.x and below of the SNA Server are only supported on the ISA *S503* card.
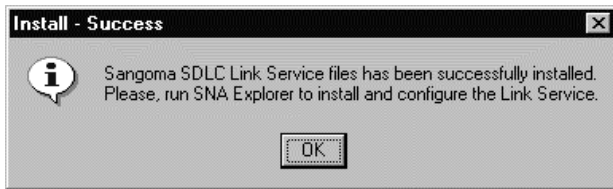
Link Services Installation

Once the S503 card has been installed, boot Windows NT Server, and follow the steps below. It is assumed that the **SNA Server** is already installed.

Run `INSTALL.EXE` from the installation floppy or directory if you are installing the Link Service from the hard drive. If installing from the floppy, change the path from `A:\` to `A:\SNA_Server`
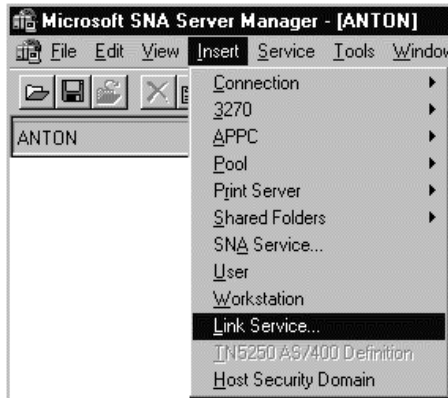
You will also be asked what directory to install the Sangoma Diagnostic program in.

Click on **Install Software** button to copy Link Service files into the SNA Server root directory and update registry entries and copy the diagnostic program onto the hard drive. Click on **OK** when prompted :

```
Install - Success                          [x]

  (i)   Sangoma SDLC Link Service files has been successfully installed.
        Please, run SNA Explorer to install and configure the Link Service.

                      [ OK ]
```

Open the **SNA Server Manager**

Open **Insert Link Service** dialog box.

```
Microsoft SNA Server Manager - [ANTON]
 File  Edit  View  Insert  Service  Tools  Window
 [  ] [  ] [  ] [X] [  Connection        ►
                     3270               ►
 ANTON               APPC               ►
                     Pool               ►
                     Print Server       ►
                     Shared Folders     ►
                     SNA Service...
                     User
                     Workstation
                     Link Service...
                     TN5250 AS/400 Definition
                     Host Security Domain
```
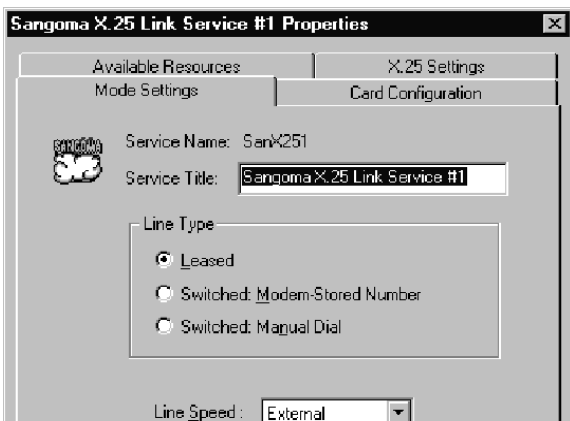
Select **Sangoma SDLC Link Service** or **Sangoma X.25 Link Service** according to your needs, and click on **Add** button. The following dialog boxes will appear, depending on the Link Service type.

For the SDLC Link Service :
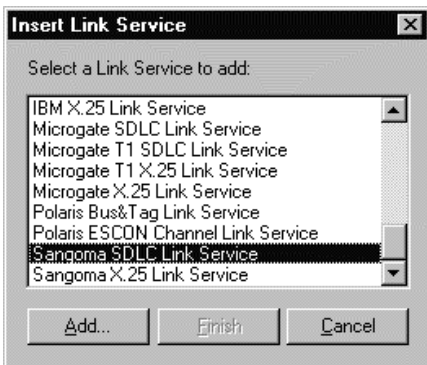
For the X.25 Link Service :

Click on **Finish** button in the **Insert Link Service** dialog box to finish the installation.

Installation of multiple Link Services

The SANGSYNC driver supports up to 4 cards. Therefore up to 4 Link Services may be installed for either SDLC or X.25. The following rules apply :

The link service index number corresponds to the driver's card number. The link service names are: SanSdlc1, SanSdlc2, SanSdlc3, SanSdlc4; and SanX251, SanX252, SanX253, SanX254. Subtract 1 from the link service number to obtain the card number.

For the driver to start successfully, it must be able to reserve the resources used by all configured cards. When the SNA service is started, the driver is started, and the reserved resources are recorded. They may be viewed by running **Windows NT Diagnostics**. If the SNA service cannot start, it may be that **SANGSYNC** could not start due to a resource conflict. Use **SangDiag\SangDiag.exe** from this distribution in order to determine the problem. Refer to **SangDiag\readme.txt** for more information.

The installation DLLs for SDLC and X.25 are primarily designed such that only one link service type will be used for all cards. However, it is possible to use SDLC on one card and X.25 on another by following these rules:

> Since the card number used depends on the link service index number, and both link service types start with the number 1 when installed, they will share the same card.

> Since they cannot actually use the same card at the same time, one of these link services will be redundant, but still necessary to install. For example, to run SDLC on card 0 and X.25 on card 1, perform the following:

> Run SNA Server Manager.
> Install the SDLC link service #1 and set up the hardware configuration for this card 0.

Note that the INSTALL.EXE program should be used only once, i.e. when you install Sangoma Link Service for the first time.

> Install the X.25 link service #1 - the hardware configuration should match that previously configured for SDLC.

> Install the X.25 link service #2 and set up the hardware configuration for the second card (number 1).

When setting up the connections in **SNA Server Manager**, the first QLLC connection corresponding to the first X.25 link service should not be used, unless on occasion the first card may be used for this purpose, but then you must ensure that the SDLC connection will not be used also.

Link Service Configuration

The parameters that were set during installation may be changed by configuring the **Link Service** using **SNA Server Manager**. Open the "**Link Services**" folder, select the link service you wish to configure, click the right mouse button and select "**Properties**" from the pop-up menu.

Set up the card resources in the **Card Configuration** tab.
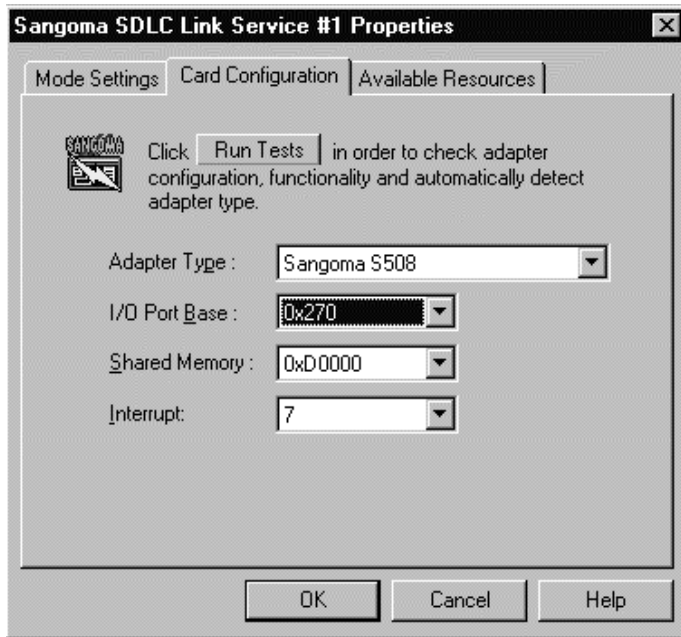
The I/O port and Interrupt must match the jumper settings on the card itself. Note that the default I/O port address of Hex 360 is almost always good. The shared memory address is set in software, so you can change it dynamically. Once you have set the resources, click the "**Test**" button to ensure that the resources chosen for the card do work in the system as configured. If there is any conflict, the test will fail.

Note that if the card is already loaded, then the test will *always find a conflict*, i.e. the card conflicts with a loaded device, namely itself. Thus you can only use the **Test** button if the driver is not loaded. If the Test is successful you will see the following window:

Use the Mode Setting tab to set up the line configuration.
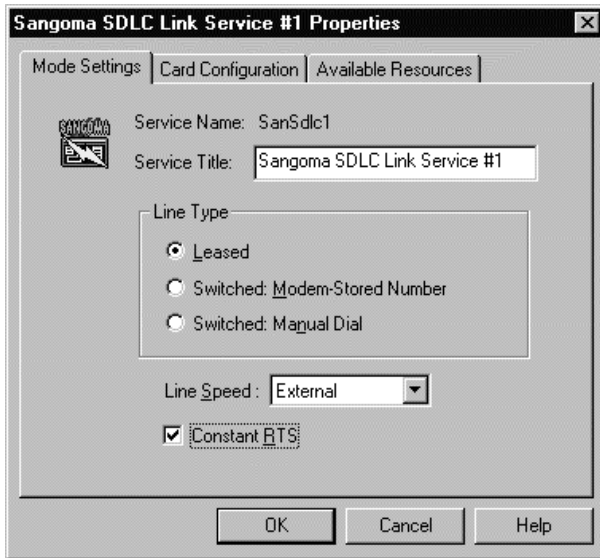
The **Line Speed** may be set to a finite value if this is a back-to-back set-up with the Sangoma card providing the clock.

Point-to-Point lines often use **Constant RTS** while Multipoint lines usually have switched RTS.

Note that you will have to restart the SNA Server in order to apply the changes made.

Removal of Link

To remove the Link Service open **SNA Server manager**, then the **"Link Services"** folder, select the link service you wish to delete, click the right mouse button and select '**Delete**" from the pop-up menu.

Note that the Link Service files will not be removed from the SNA Server root directory, therefore the Link Service may be reinstalled anytime by repeating the installation process.

Troubleshooting

SangDiag.exe: Link Services Diagnostic Utility

SangDiag.exe will have been installed on your system, and may be started from the Start menu.

From the Start Menu, command line, or Explorer run SangDiag. The screen is shown below:

The window information includes:

-        Counts of transmitted and received frames and events.
-        Counts of communication errors, indispensable for debugging line problems.
-        status of modem control lines, both outgoing and incoming.
-        Information on board configuration, resource conflicts and driver status.
-        A real time line trace of the frame data. A trace of the driver calls made by the NT SNA Server.

For additional notes on using **SangDiag.exe** please refer to **SangDiag\readme.txt** file.

4. The STSDLC driver for NetWare for SAA

Please note that currently, this is only supported on the *S503* card.

Installation

Installation of the **STSDLC** package requires the following:

- ▼▼ A **Novell NetWare 3.X or 4.X** or above server supporting Novell **NetWare for SAA version 2.X.** and above.
- ▼▼ A workstation logged on to the server with supervisor or equivalent rights.
- ▼▼ The Sangoma Technologies S508/S503 card (Synchronous Data Link Adapter) properly configured and installed.
- ▼▼ The Sangoma Technologies Installation diskette.

Software

Software installation is accomplished by placing the supplied diskette into a drive accessible by a workstation and copying the required WAN driver file into the server system directory. NetWare 3.x users will find the WAN driver in the **/nw/server.3x** directory while users of NetWare 4.x and above must use the driver from the **/nw/server.4x** directory. The **/nw** directory also includes a **README** file containing update information and/or corrections to this manual. The file may be viewed with any standard text editor.

The STSDLC MLID and 503 card are designed to replace the standard Novell NetWare for SAA SDLC WAN drivers and hardware. **Note that the STSDLC driver does not support X.25 (QLLC), only true SDLC**. Except when noted in this manual, **STSDLC.LAN** operation specifics can be determined by referring to the NetWare for SAA Administration Guide sections for the **R2SDLC.LAN**. Only the differences are outlined in this chapter.

Loading the STSDLC.LAN Driver

The **STSDLC.LAN** driver must be loaded and configured before NetWare for SAA can establish communications with an SDLC host. This is accomplished from the system console by loading the **STSDLC.LAN** module with the following command line arguments:

port: Defines the start of the card I/O address setting. This value **must** correspond to that selected when setting the hardware jumpers on the card. (Please refer to table 2-3.) Possible values in hex are 360, 350, 300 and 250. The default is 360.

mem: Defines the start address of the Card-PC shared memory window. This window occupies 8K of contiguous address space in the upper PC memory area. The selected value must point to memory not in use by any other hardware or shadow RAM. Possible values in hex are:

A0000,	A2000,	A4000,	A6000,	A8000,	AA000,	AC000,	AE000,
C0000,	C2000,	C4000,	C6000	C8000,	CA000,	CC000,	CE000,
D0000,	D2000,	D4000,	D6000	D8000,	DA000,	DC000,	DE000,
E0000,	E2000,	E4000,	E6000	E8000,	EA000,	EC000,	EE000

The default is D0000.

`int:`   Defines the card interrupt vector number (IRQ). This value **must** correspond to that selected when setting the hardware jumpers on the card. (please refer to table 2-4.) Possible values are 2, 3, 5 and 7. The default is 7.

`name:`   Specifies the adapter name for use by NetWare for SAA. This name should match the name specified in the NetWare for SAA profile.

`speed:`   (Optional) Specifies the value of the data clock speed when using the card internal data clock generator. Possible values for the card generated line speed (in bits/s) are: 0 (external, or modem provided clock), 1200, 2400, 4800, 9600, 19200, 38400, 45000, 56000, 74000, 112000.

For example, to load the STSDLC driver for an S503 at I/O addresses 250 to 253, memory window E2000 to E3FFF, IRQ line 2, internally generated clock speed 56 kbps and adapter name *"sangoma"*, switch to the system console screen and type:

        load stsdlc port=250 mem=E2000 int=2 speed=56000 name=sangoma <ENTER>

After successfully loading, the STSDLC driver will display a message indicating the adapter I/O address and calibrated operating speed. For example:

        STSDLC LOAD: Adapter SDLA@250 initialized at 8.0 MHZ.

If problems occurred during loading, a message will be displayed indicating the nature of the error. For a description of the error messages, please refer to the section "*Troubleshooting: Error Messages During STSDLC Loading*" in this manual.

2.1   Interpreting the STSDLC Statistics

The STSDLC statistics package provide an excellent diagnostic and connection optimization tool. The statistics can be viewed by performing the following:

1)   Invoke the **`MONITOR`** module from the NetWare server system console or from a workstation running RCONSOLE.

2)   Select the **`LAN/WAN Information`** option.

3)   Select the appropriate STSDLC LAN driver.

☎   As with most STSDLC operations, this is a standard NetWare procedure outlined in the NetWare/NetWare for SAA manuals.

A list of all of the STSDLC statistics variables and some interpretation guidelines is given in the table.

STSDLC Statistics Variables

Variable	Interpretation
Total Packets Sent	- number of frames received by the STSDLC driver from NetWare for SAA and successfully relayed to the card
Total Packets Received	- number of frames received by the STSDLC driver from the card and successfully buffered for NetWare for SAA
No ECB Available Count	- number of times that the STSDLC driver unsuccessfully attempted to receive buffer space for received data - this value should be as low as possible (preferably zero) - if this value is too high, increase the values of: minimum packet receive buffers in STARTUP.NCF, maximum packet receive buffers in AUTOEXEC.NCF
Send Packet Too Big Count	- number of frames received by the STSDLC driver from NetWare for SAA with a packet length in excess of 4096 bytes - **this value should always be zero**, otherwise please contact your SANGOMA representative
Received Packet Overflow Count	- number of receiver overrun errors at the STSDLC driver level - **this value should always be zero**, otherwise please contact your SANGOMA representative
Received Packet Too Big Count	- number of frames received by the STSDLC driver from the card with a frame length in excess of 4106 bytes - **this value should always be zero**, otherwise check your host SDLC configuration
Received Packet Too Small Count	- number of frames received by the STSDLC driver from the card with a zero length data field - **this value should always be zero**, otherwise check your host SDLC configuration
Send Packet Miscellaneous Errors	- number of miscellaneous errors occurring when relaying frames from NetWare for SAA to the card - **this value should always be zero**, otherwise please contact your SANGOMA representative
Send Packet Retry Count	- number of times re-transmissions were necessary to relay a frame from the STSDLC driver to the card due to buffering restrictions - if this value is non-zero it indicates that your SDLC host is not able to

Variable	Interpretation
	keep up with the traffic from this station; consider re-configuring your SDLC host or using a higher line speed
Checksum Errors	- number of CRC errors on frames received by the card from the SDLC host - this value should be as low as possible (less than 2 % of Total Packets Received), otherwise check your cables, modem, communications line and connections and consider using a lower line speed
Link State (0=INACTIVE,1=ACTIVE)	- indicates the connection status between the STSDLC driver and NetWare for SAA - if this value is zero after loading a NetWare for SAA profile check to ensure that the profile is configured correctly and that the adapter name is the same as that used when loading the STSDLC driver
Tx Frames (Hardware)	- number of frames transmitted by the card to the /SDLC host - this value should be the same as the Total Packets Sent statistic listed above
Tx Bytes	- number of bytes transmitted by the card to the SDLC host
Rx Frames (Hardware)	- number of frames received by the card from the SDLC host - this value should be the same as the Total Packets Received statistic listed above
Rx Bytes	- number of bytes received by the card from the SDLC host
Tx Abort Frames	- number of abort frames transmitted by the card to the SDLC host - this value should be less than 1 % of Tx Frames (Hardware), otherwise consider lowering line speed or upgrading to a higher speed card
Rx Abort Frames	- number of abort frames received by the card. - this value should be less than 1 % of Rx Frames (Hardware), otherwise consider lowering your line speed or upgrading your SDLC host
Tx Underruns	- number of transmit underruns on the card - this value should be as low as possible (preferably zero), otherwise consider lowering line speed or upgrading to a higher speed card
Rx Discards	- number of frames received from the SDLC host that were discarded by the card - this value should be as low as possible (preferably zero), otherwise consider lowering your line speed.
DSR/DCD Failures	- number of times the card to SDLC host connection was broken due an unexpected drop in the DSR/DCD modem lines - if this variable has a non-zero value check your cables,

Variable	Interpretation
	communications line, modem and connections
CTS Failures	- for switched CTS/RTS: total number of times a timeout occurred while waiting for the CTS modem line to go high - for constant RTS: total number of times the card to SDLC host connection was broken due an unexpected drop in the CTS modem line - if this variable has a non-zero value check your cables, communications line, modem and connections
DSR/DCD Status Changes	- number of status changes of the DSR/DCD modem lines since card loading
CTS Status Changes	- number of status changes of the CTS modem lines since card loading - this value should rotate (from 0 to 255) when using switched CTS/RTS
Tx Interrupt Count	- number of PC interrupts notifying the STSDLC driver of a ready-to-send condition
Rx Interrupt Count	- number of PC interrupts notifying the STSDLC driver of a data-received condition
Command Interrupt Count	- number of PC interrupts notifying the STSDLC driver that a miscellaneous command has been completed - this value should increase when the statistics data is on-screen
Unknown Interrupt Count	- number of PC interrupts of an unknown origin - a value between zero and five is normal (due to transient conditions during startup) - a value greater than five indicates that there may be a conflict for the selected STSDLC interrupt vector
ECBs Queued for Tx	- number of ECBs containing data received by the STSDLC driver from NetWare for SAA that are awaiting onward transmission to the SDLC host - if this value is non-zero it indicates that your SDLC host is not able to keep up with the traffic from this station; consider re-configuring your SDLC host or using a higher line speed
Bad ECB Resource Count	- number of ECBs received by the STSDLC driver from NetWare for SAA that were actually intended for some other driver - if this value is non-zero check your NetWare for SAA configuration or call your SANGOMA representative

Troubleshooting

This section provides a detailed description of all STSDLC error messages and includes some general problem solving tips.

Error Messages During STSDLC Loading

`Maximum number of SDLAs currently installed.`
- You are attempting to install a fifth card in the same server; support is provided for a maximum of four adapters only.

`Error in command line options.`
- One or more of the specified command line arguments is invalid. (Please refer to the section STSDLC Operation: Loading the STSDLC.LAN Driver.)

`No SDLA found at specified I/O Port.`
- Ensure that the card has been correctly jumpered for the I/O address specified on the command line.
- Ensure that no I/O address conflict is occurring; check that no other hardware installed on the PC uses the same range of I/O addresses.

`Unable to write to specified shared memory area.`
- Ensure that no memory conflict is occurring; check that no other hardware installed on the PC uses the same memory area.
- Ensure that the selected memory area has not been enabled for Shadow Ram in the System BIOS.

`Error obtaining specified interrupt vector.`
- Ensure that the card has been correctly jumpered for the IRQ specified on the command line.
- Ensure that no IRQ conflict is occurring; check that no other hardware installed on the PC uses the same IRQ setting.

`Error reserving specified hardware options.`
- Ensure that no hardware collisions exist; check that the settings for the I/O address, memory and IRQ parameters do not conflict with settings already in use by other hardware.

`The SDLA failed the speed calibration test.`
- Ensure that no memory conflict is occurring; check that no other hardware installed on the PC uses the same memory area.
- Ensure that the selected memory area has not been enabled for Shadow Ram in the System BIOS.

`The SDLA is issuing unexpected return codes.`
- This error can occur when there is a high instance of modem failures on the line.
- Check the modem cable and cable connections.

`Error reading SDLA firmware.`
Invalid Protocol Module.
- These errors indicate that the STSDLC.LAN binary has been corrupted.

-       Re-install the STSDLC software.

Error registering SDLA with Link Support Layer.
-       Ensure that NetWare for SAA is installed and configured correctly.

Error allocating memory for SDLA workspace.
Error allocating firmware buffer.
Error adding SDLA Workspace to list.
Unable to get required Resource Tags.
-       Your NetWare for SAA server does not have enough memory to support the STSDLC driver or adapter workspace.
-       Unload any unnecessary modules from the server.
-       Upgrade your server memory.

Error Messages During STSDLC Operation

Unexpected loss of DSR/DCD signal.
-       The card detected a drop in the DSR/DCD modem lines while in the connected state.
-       Check your cables, modem, communications line and connections.

Unexpected loss of CTS signal.
-       The card detected an unscheduled drop in the CTS modem line while in the connected state.
-       Check your cables, modem, communications line and connections. If you have NWSAA configured for Switched RTS/CTS and the modem/DSU is strapped for constant CTS, you will get this error.

Time-out waiting for CTS signal.
        (Applies to switched RTS operation only.)
-       A timeout occurred waiting for the CTS modem line to go high.
-       Check your cables, modem, communications line and connections.
-       Check your SDLC host configuration.

The transmit ECB queue is full.
-       NetWare for SAA is sending data at a rate faster than the SDLC host is able to receive it.
-       Check your SDLC host/network operation.

Bad packet received from LSL.
-       A packet sent to the STSDLC driver by NetWare for SAA was actually intended for another driver.
-       This is a NetWare bug that has been corrected in later versions of NetWare for SAA.
-       Contact your Novell representative.

Firmware level adapter failure.
-       This error can occur when there is a high instance of modem failures on the line.
-       Check your cables, modem, communications line and connections.

Out of ECBs for error reporting.
-       The STSDLC driver is unable to report errors due to a shortage of available ECBs.

- UNREPORTED ERRORS MAY BE OCCURRING.
- Take steps to reduce the number of errors occurring before you. received this message.

Checking if NWSAA sees the card

Under **Monitor, STSDLC Statistics**, examine the **Command interrupt Count**. If all the NWSAA bindings are correct, and the card is working properly, this count should go up about every second. If the count is zero or not increasing, there is a problem with the card itself or the NWSAA bindings.

If problems persist

If you encounter errors that are not listed in this section, consult your NetWare and NetWare for SAA manuals.

If you are unable to resolve any of the errors listed above or any other errors related to STSDLC operation please call your SANGOMA Technologies Inc. representative at (905) 474-1990.

6. Debugging a dead line: SNOOPER for the S503 and S508

Please note that SNOOPER is a DOS program and therefore *cannot support the S514 card*. Use LinkView instead.

Introduction

Installing communications equipment can be frustrating and time consuming particularly when the connection is new. There are many parameters which must be set exactly correctly before you can even get to **?** first base**?** where host communications are established. The DOS program `SNOOPER.EXE` has been included to help wring out problems in host set ups, communication lines, modems or DSUs, cables and cards.

`SNOOPER` explores the Server, finding out whether the card is configured such that all conflicts are avoided. It then passively snoops the communications line, finds the correct line encoding and provides displays of useful SDLC line information. `SNOOPER` is designed to automatically decode SDLC and Frame Relay links, but information is provided that verifies X.25 links as well.

2.1   Running SNOOPER.EXE

If you are having trouble connecting to the host, boot up under MS-DOS. *Preferably, do not load any memory manager in CONFIG.SYS.* `SNOOPER` will run in a DOS box under Windows.

In the \SNOOPER directory on the Sangoma distribution disk enter the following:

        `SNOOPER`

Interpreting SNOOPER Data

`SNOOPER` first detects the adapter type and finds its base port address. It then searches the PC**?**s high memory area looking for a free 8k window in which to load itself.

```
ADAPTER CONFIGURATION SUMMARY
   Adapter type                : S503      (loaded OK)
   I/O port base address       : 0x360
   8K window memory address    : 0xC8
   Adapter operating frequency: 7159090 Hz
   IRQ used by adapter         : 7
   Adapter memory size (K)     : 64
   Press any key to continue with SNOOPER...
```

A screen similar to the one above will display.

Having snooped the server for free memory space and I/O ports, `SNOOPER` will. load the board and test the IRQs. If there is a free set of resources available, the program will load the card and pause so you can note down the hardware configurations that work.

It will then proceed to snoop the communication line. It will load in the first available shared memory block, using the I/O port and IRQ it has found.

The second screen then comes up.

At the top, the menu selections allow you to :

`Configure`:
>   Sets up the electrical connection (V.35 or RS232 and sets board clocking options. You can set to have the board provide the clocking (Internal) or the clocking can be External. If you are connecting to a DSU, chose External. If you are connected with a back-to-back cable, one end of the link will be set as External and the other as Internal. You can set the line speed for an Internal clock.

`Protocol`:
>   Either set for **SDLC Monitor**, **Monitor Line only** (use for, SYNCHRONOUS PPP or X.25) or **Frame Relay emulate CPE**.

`Trace`:
>   Sets tracing and disk tracing options.

`Reset` and **`Quit`**:
>   In SDLC monitor mode, `SNOOPER` looks for SDLC traffic alternately in NRZ and NRZi mode. As soon as it finds traffic it displays the SDLC Addresses on the line that have been used by other devices or are available for use by a new system (yours).

Below is a display for a Frame Relay trace. The SDLC trace looks similar.

```
SNOOPER  Ver 2.00 (c)SANGOMA TECH, 1996 || CURRENT STATUS: EMULATING FR CPE
                                MAIN
Configuration   Protocol    Trace    Reset    Quit

     RAW TRACE DATA (HEXADECIMAL)
TX: 00 01 03 08 00 75 95 01 01 00 03 02 00 00
TX: 00 01 03 08 00 75 95 01 01 00 03 02 00 00
```

If this is an X.25 connection, you can use the **Monitor Only** option to look for SABM frames from the switch.

If the connection to the DSU or modem is working correctly, DCD and, perhaps, CTS should be up.

The errors reported on the right hand side should remain zero.

The program terminates when you **Quit**.

When configuring Interrupt, I/O Base and Memory Base for the connection, use the data from this screen and you will not have any trouble.

SNOOPER may also be run with defined card settings. The full list of command line arguments are as follows:

```
-p[I/O PORT BASE ADDRESS]  (default: unknown)
-m[SHARED MEMORY ADDRESS]  (default: unknown)
-t[ADAPTER TYPE]    (default: unknown, 0=S502A, 1=S502E, 2=S503,
                     3=S508)
-i[IRQ TO BE TESTED}(default: unknown)
```

For example:

```
SNOOPER -mCA -t2
```

Check to see if a S503 adapter is in the PC and if memory area 0xCA00 is available for use.

The first character of the shared memory window segment and offset specifies the 64K PC memory segment to be used. Valid values are A, C, D or E. The second character defines the 8K window within the selected 64K memory segment. Valid values are as follows:

Value	PC memory window
0	0000H to 1FFFH
2	2000H to 3FFFH
4	4000H to 5FFFH
6	6000H to 7FFFH
8	8000H to 9FFFH
A	A000H to BFFFH
C	C000H to DFFFH
E	E000H to FFFFH