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User Manual Rev. 2.0

8 Port BRI-S/T ISDN Simulator

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P/N: BRI-8ST

Contents

Chapter 1:   Important Information

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Important Safeguards

Read and understand the following instructions before using the system:

Close supervision is necessary when the system is used by or near children. Do not leave unattended while in use.

Always disconnect the system from power before cleaning and servicing and when not in use.

Do not spray liquids directly onto the system when cleaning. Always apply the liquid first to a static free cloth.

Do not place this product onto unstable desk, cart or table. The product may fall causing serious damage to the product.

Do not immerse the system in any liquid or place any liquids on it.

Do not disassemble this system (except as instructed in the manufacturers instructions). To reduce the risk of shock and to maintain the warranty on the system, a qualified technician must perform service or repair work.

Connect this appliance to a grounded outlet.

Connect the system only to surge protected power outlets.

Keep ventilation openings free of any obstructions.

Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

1. When the power supply adapter or plug is damaged or frayed.

2. If liquid has been spilled into the product.

3. If the product has been exposed to rain or water.

8. If the product has been dropped or the enclosure has been damaged.

9. If the product exhibits a distinct change in performance.

SAVE THESE INSTRUCTIONS

Regulatory Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense.

Chapter 2: Introduction

ISDN Simulator is an eight port ISDN Switch which was designed to ease testing, demonstration and development of ISDN Basic Rate CPE (TE) equipment. It simulates eight ISDN BRI lines reducing installation and monthly charges from Telephone Company and provides full featured BRI lines for Voice, Data and Video communications. ISDN simulator is equipped with "S/T" (4 wire) interfaces, allowing to connect eight devices with "S/T" interface type.

Unpacking

Carefully unpack the items in the shipping box and verify that you have received the following:

1. ISDN Simulator unit
2. Wall mount power adapter
3. ISDN Manager Configuration Diskette
4. DB9F-DB9M 6-ft RS-232 cable for connection to a PC.

Fast Start for Advanced Users

1. Plug the power adapter into a power outlet, and connect the output power cable to the power jack on your simulator.

2. Connect your devices to ISDN simulator with a straight CAT5 cable.

3. Connect the COM port on your PC to RS-232 port on simulator.

4. Use "ISDN Manager" application or AT commands to configure simulator.

About your ISDN Simulator

Virtual Console's "BRI-8ST" ISDN simulator is an ISDN switch with eight BRI "S/T" interfaces, whichprovides call switching services for Basic Rate Interface (BRI) terminal equipment. All our ISDN simulators conform to the ISDN architecture and to individually programmable switch types (Table 1). Our products are extensively used with ISDN routers, modems, ISDN telephones, faxes and commercial H.320 videoconferencing products.

Table 1: Switch Types Emulated

Switch Type	SPID required
National ISDN-1	Yes
NET3	No
AT&T 5ESS	Optional
Nortel DMS-100	Yes

**Figure 1: ISDN Functional Architecture**
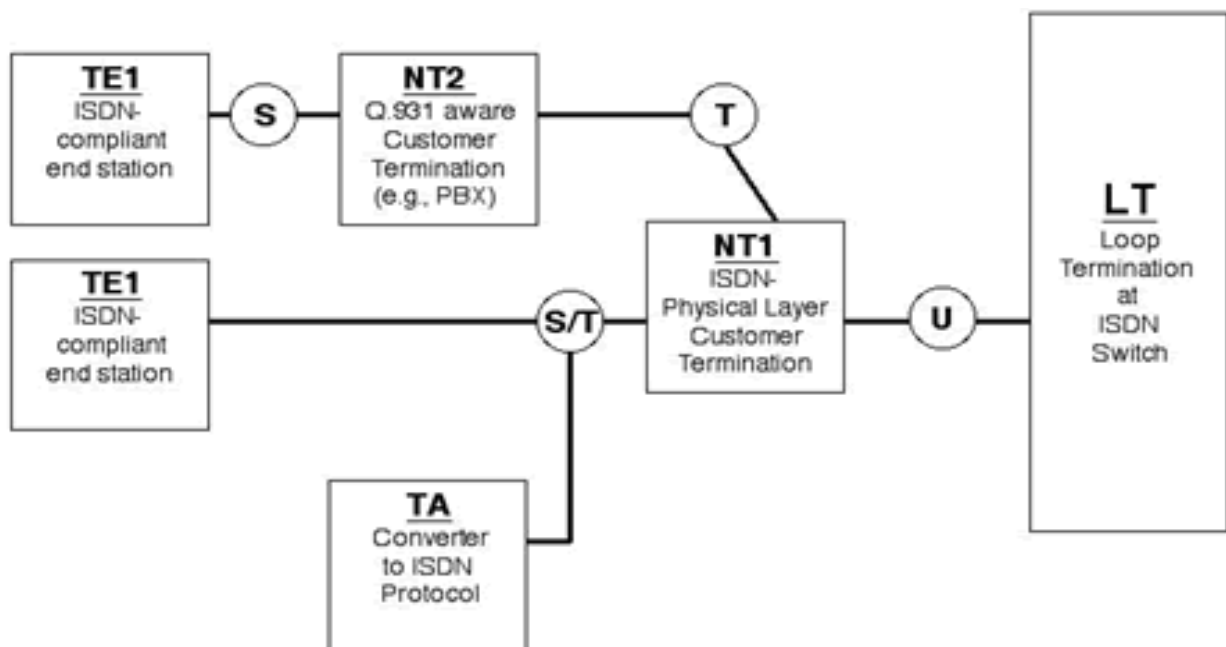
The ISDN simulator appears to the customer-side Functional Groupings as the Loop Termination (LT) at the telephone central office. These Functional Groupings, examples of which are shown in, include ISDN-compliant Terminal Equipment (TE1), Network Terminations (NT1 and NT2) and Terminal Adapters (TA).

To an NT1 or NT2, the simulator provides the "S/T" interfaces.

Over these physical interfaces flow the protocols described in Figure 2.

While Q.931, the ISDN primary "dialing" protocol, usually is used to set up dynamic ISDN calls, ISDN simulator also supports semi-permanent "nailed up" B channels that act like private leased lines. Refer to ISDN Manager chapter for configuring "Leased Line" mode.

Figure 2: ISDN Protocol Stack
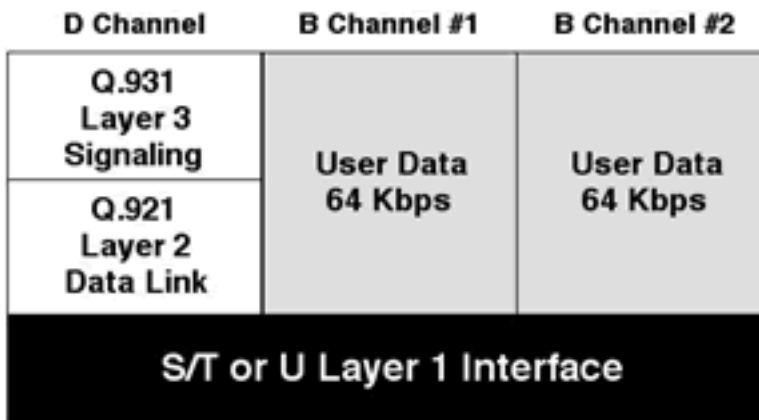
Selecting a ISDN Switch type

To use ISDN simulator you must set the switch type. Use drop down menu in ISDN Manager application to select appropriate BRI switch type. Selected BRI switch type must match the one configured on ISDN device. Once that is done, you will always need to set the phone numbers (i.e., DN) and, if the configured switch type requires it, the SPID numbers.
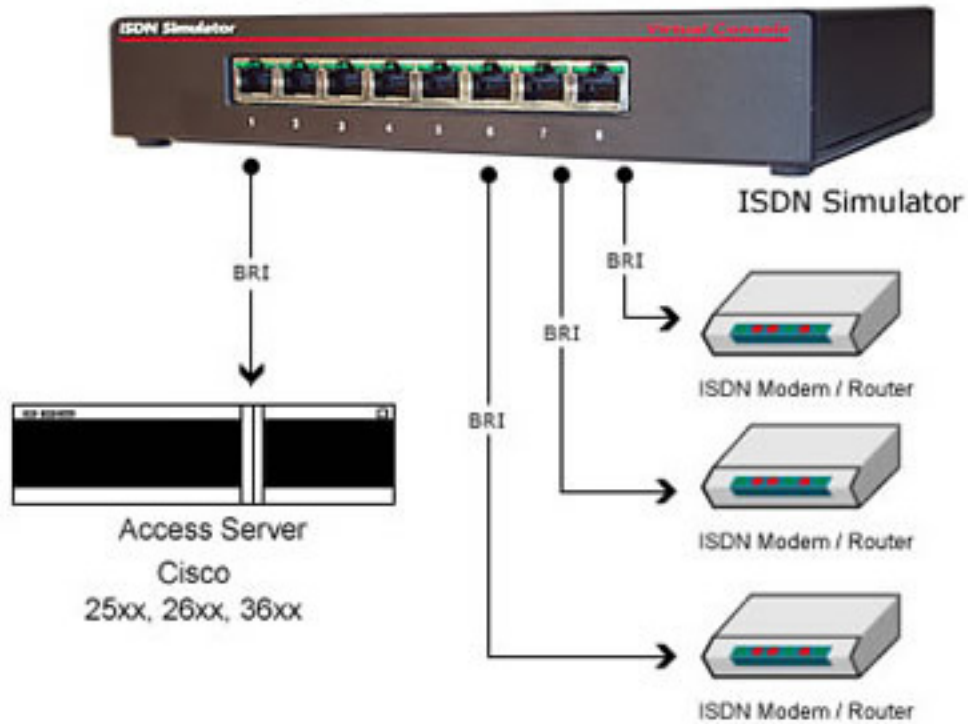
"Caller ID", or, in formal ISDN terminology, "calling number identification presentation", is always enabled and a part of standard call setup procedure defined in Q.931 standard.
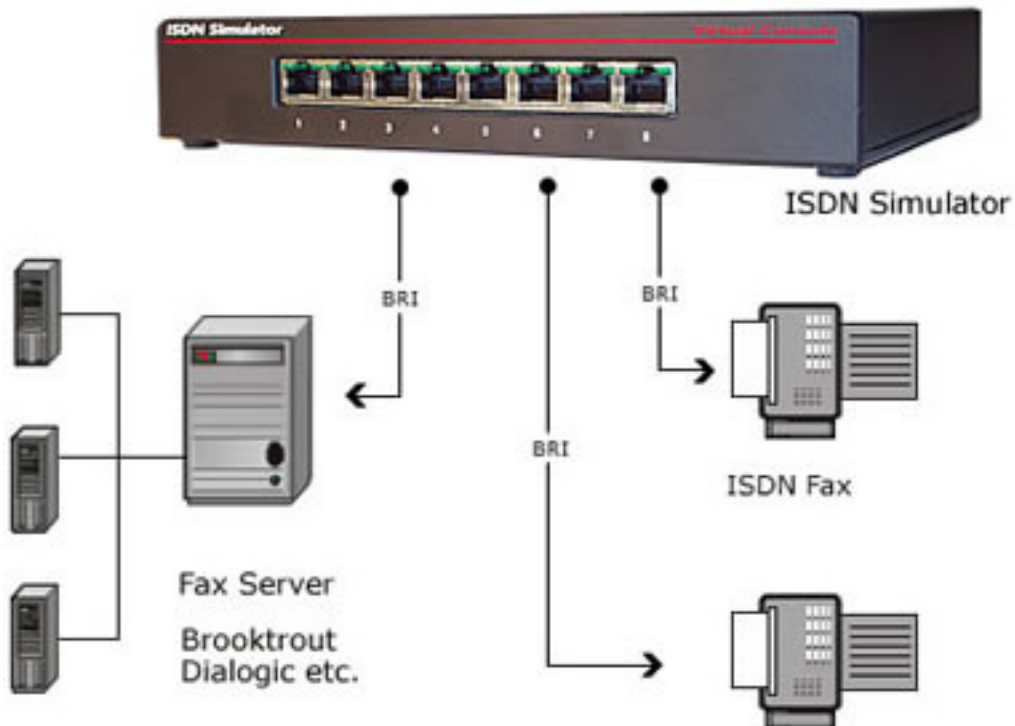
Chapter 3: Product Description

The Virtual Consoles ISDN simulator provides a "Telco in a box" for a variety of device testing scenarios including ISDN routers, modems, ISDN telephones, faxes and H.320 video conferencing stations Commercial H.320 videoconferencing equipment will set up from one to four physical BRI Interfaces delivering up to 512kbps bandwidth for each site.

Figure 3: Functional Applications of the Virtual Console Simulator

1. RAS Server Deployment

ISDN Simulator

BRI

BRI

BRI

BRI

BRI

ISDN Modem / Router

ISDN Modem / Router

Access Server
Cisco
25xx, 26xx, 36xx

ISDN Modem / Router

2. Fax Server Development

ISDN Simulator

BRI

BRI

BRI

ISDN Fax

Fax Server

Brooktrout
Dialogic etc.

3. H.320 Video-Conferencing
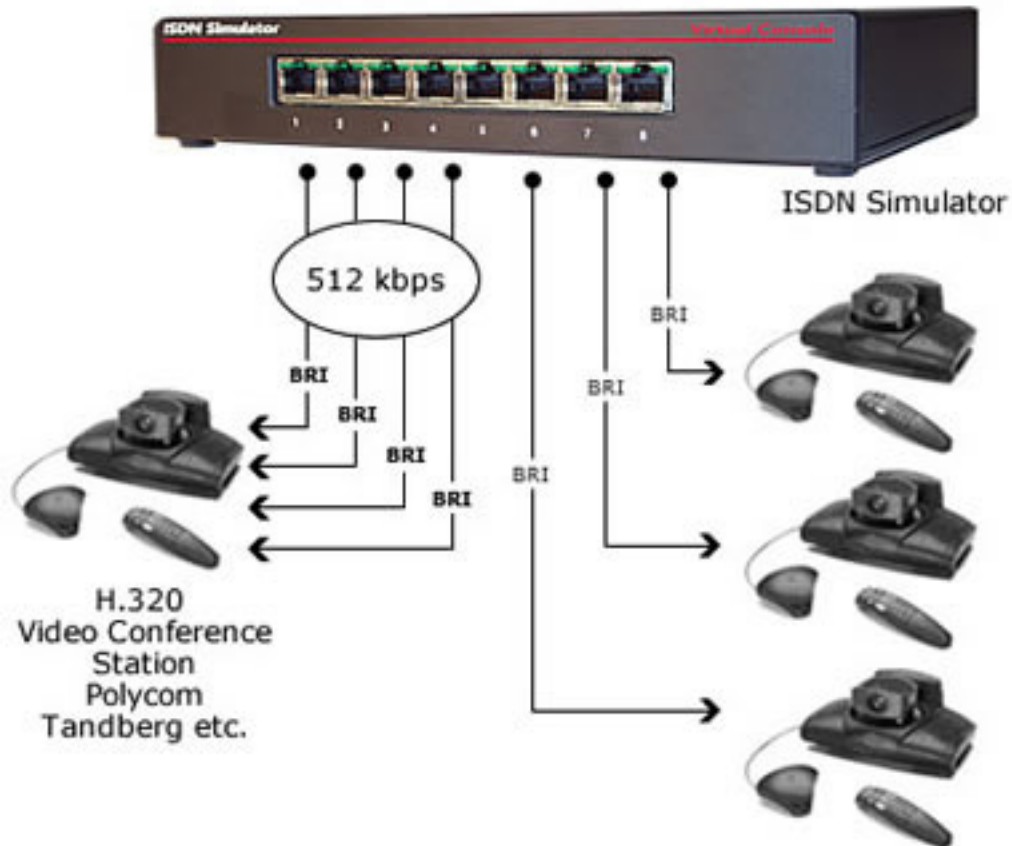
The device has the most common connectors and indicators on its front panel. In a rack installation with routers, you would typically want the front panel on the same side as the router interface connectors. Less frequently used connectors and switches are on the back. Do note that the "Reset" button function can be invoked remotely through the ISDN Manager interface.

Ports / Interfaces

The simulator has eight separate BRI "S/T" interfaces

Power

ISDN Console simulator is powered from a 9-12 DC or AC, 500 mA supply that plugs into a standard household outlet. International power supplies are available if you need to use the device in a country that does not use 120 VAC 60 Hz.

Note: Power supply may be slightly warm when operating.

The simulator does not provide inline power to connected ISDN devices. They will need independent power sources.

Cabling

Straight-through RS-232 cable with DB9 M/F connectors is supplied with each ISDN Simulator for the ISDN Manager or console management. To connect ISDN devices to the simulator, also use a straight-through CAT3 or CAT5 cable with RJ45 connectors.

Controls

A hardware **"Reset"** button is on the back panel of the ISDN Simulator. You can also Reboot ISDN Simulator remotely using ISDN Manager application or AT command (ATZ) sent via console port.

The button on simulator is labeled as "Reset"; the button in ISDN Manager is labeled as **"Reboot"**.

LEDs

Each of the eight RJ45 ports has two integrated Green LEDs (LEFT and RIGHT). The left LED on port 1 is always "ON" to indicate presence of power, even when no device is connected. On all other ports, the right LED turns solid GREEN when a device is connected at the physical layer. The left LED on all other ports, dark until layer 2 initializes, turns green when layer 2 is up.

As layer 3 activity begins, the left and right LEDs will begin to blink. If the switch type requires SPIDs and a SPID is invalid for a B channel, the associated channel LED -- left for B-channel 1, right for B-channel 2 -- will blink slowly.

If either SPIDs are not required, or the correct SPID is used, once the B-channel 1 is up, the left LED will begin blinking rapidly. In like manner, when the B-channel 2 comes up, the right LED will begin to blink rapidly.

Chapter 4: Controlling and Configuring your ISDN Simulator

Your simulator is controlled by ISDN Manager application or AT commands. Connect to this COM port on your PC to RS-232 port on simulator with the supplied 6-foot straight-through DB9 cable. We recommend that you use the ISDN Manager application, which provides a graphic interface with several convenient click buttons. In test racks, you may find it more convenient to control simulator with AT commands.

## Configuring the ISDN Simulator with ISDN Manager

Virtual Console's "ISDN Manager" application is the principal means of configuring and controlling ISDN simulators. It is a Windows application supported for Windows 2000 and Windows XP. The ISDN Manager version for this product also supports 8-port BRI S/T, as well as PRI, simulators.

Figure 4: ISDN Manager Screens
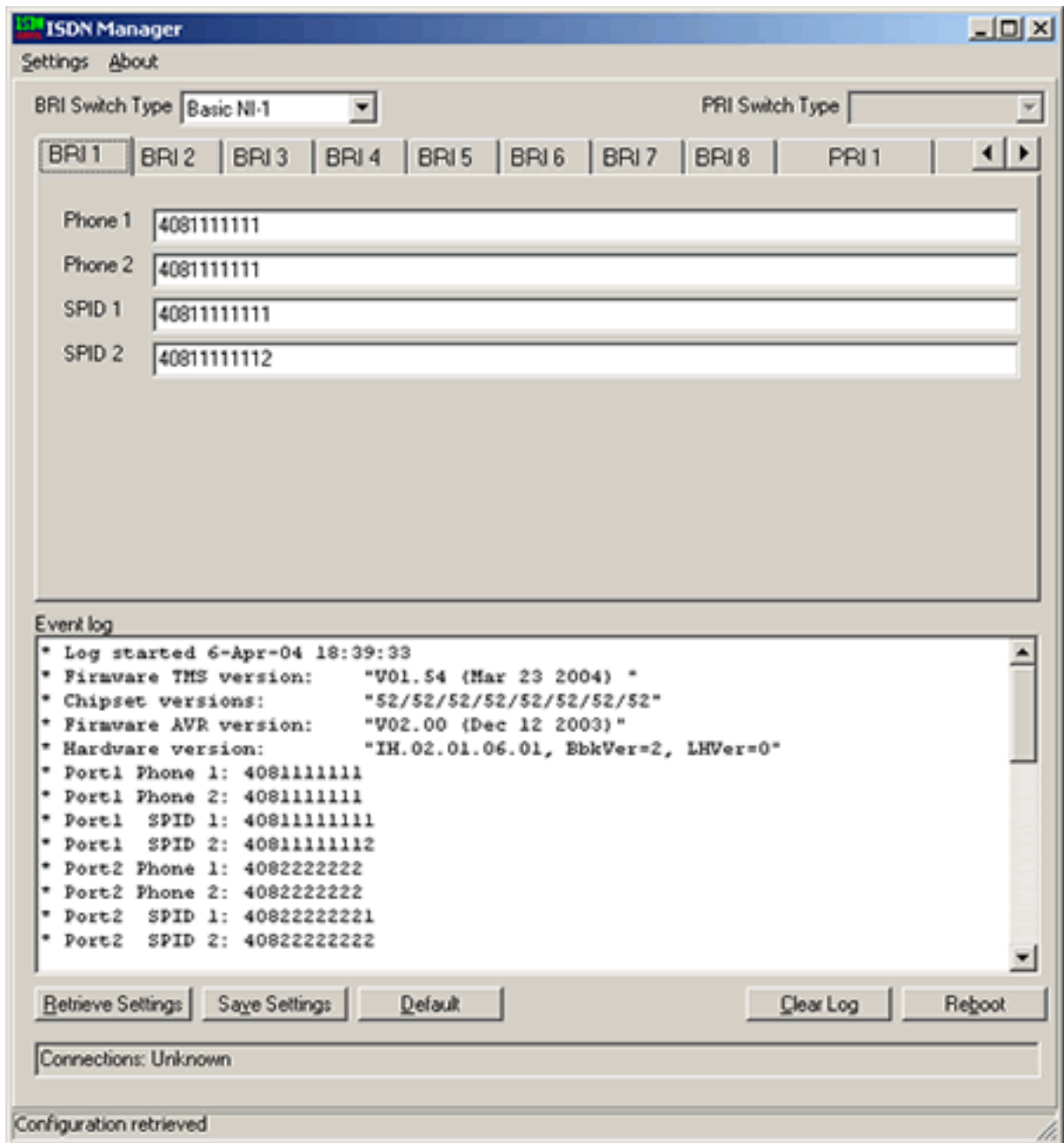
When you bring up ISDN Manager, you can set the appropriate COM port for it to communicate with the simulator with the settings' tab (Figure 5).   The "gather low-level diagnostics" is used only when working with the factory.

**Figure 5: Setting the COM port for ISDN Manager**
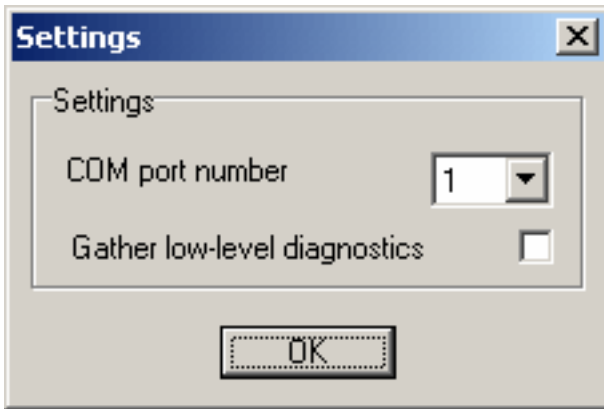
Your PC COM port must be configured with the settings in Table 2

Table 2: COM port settings for ISDN Manager

Parameter	Value
Baud rate	115200 bps
Data bits	8
Parity	None
Stop bits	1
Flow Control	Hardware

Once you are in communications with the ISDN simulator, you can click the "About" tab to check firmware and software versions (Figure 6).   See "Upgrading Firmware" for the upgrade procedure, which will give you a new version of the TMS code. The AVR and Hardware fields in the figure are for factory use.

Figure 6: Version information from ISDN Manager "About" tab
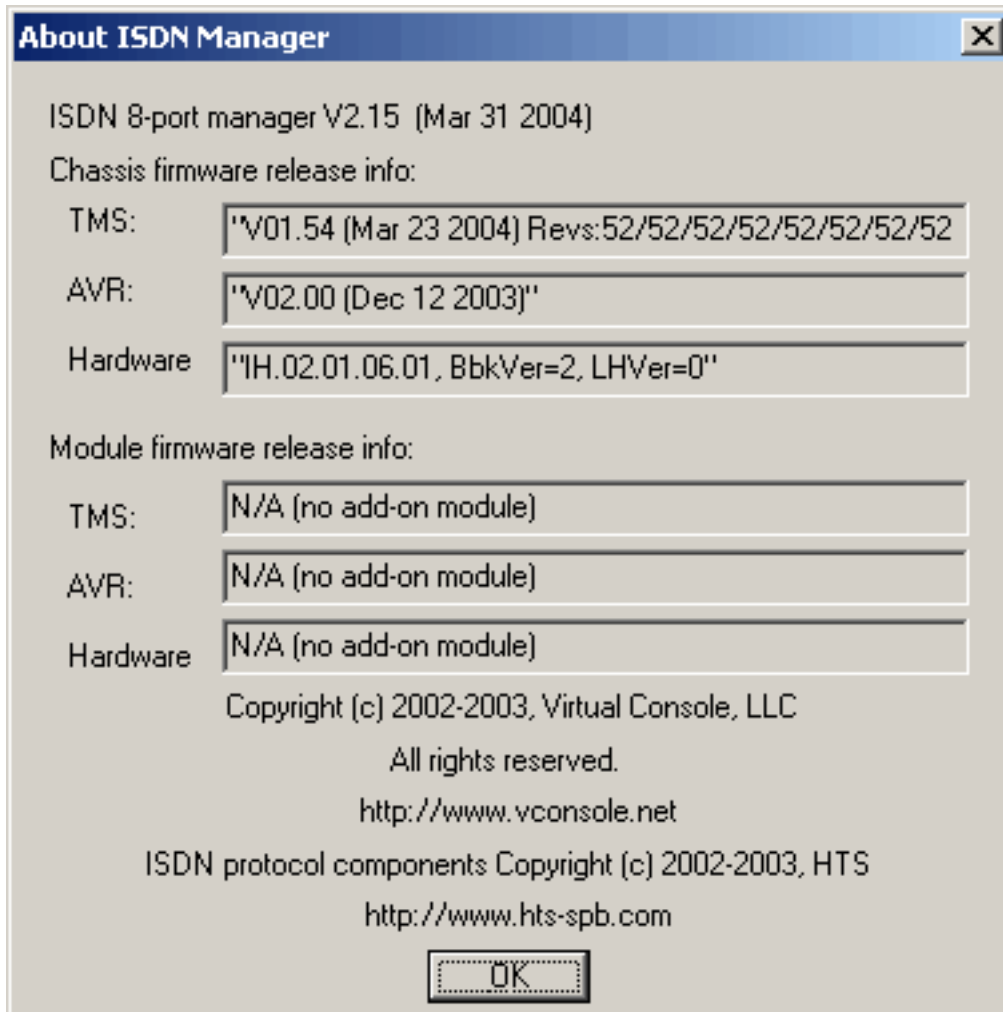
On the main screen, you set the "switch-type" (see Table 1).

To set individual port characteristics, click on the appropriate "Port" tab. The screen will then show the current phone number and, when applicable, SPID number (see Table 6) for each B channel on the port. You can then set the values as required.

If you need to configure a B channel in "nailed up", "semi-permanent", or "dedicated line" mode, check the appropriate box at the top of the ISDN Manager screen.

Configuring ISDN Simulator via Terminal Server

Many test environments control all devices from a single point, using a terminal server to connect to all devices at a remote site. You can control the ISDN simulator in this manner. You must set the asynchronous interface on the terminal server to the values in Table 3, and use the commands in Table 5.

Table 3: Interface Settings for Reverse Telnet

Parameter	Value
Baud rate	115200 bps
Data bits	8
Parity	None
Stop bits	1
Flow Control	Hardware

From a terminal server, since you cannot press display buttons, modem-style AT commands must be issued for all functions.

Since these commands apply to B-channels, you need to understand which B channel numbers apply to which physical S/T interface (Table 4).

Table 4: Configuring the ISDN Simulator via Terminal Interface

BRI physical interface	First B-channel number	Second B-channel number
Port 1	0	8
Port 2	1	9
Port 3	2	10
Port 4	3	11
Port 5	4	12
Port 6	5	13
Port 7	6	14
Port 8	7	15

Once you understand the logical numbering, you can complete the commands (Table 5). The "x" parameter in this table refers to the BRI channel number in Table 4.

Table 5: Configuring the Simulator via Terminal Interface, where "x" is the B-channel number

Function	Additional Parameters	Command
Get Phone number on B-channel "x"	"x" is the B-channel number from 0 to 15	ATNx?
Get SPID number on B-channel "x"		ATPx?
Set Phone number on B-channel "x"		ATNx ="value"
Set SPID number on B-channel "x"		ATPx ="value"
Get/Set switch type (in concert with SPID settings):	0 = either NI-1 or Net3 - NI-1: SPID set - NET3: no SPIDs ("") 64 = 5ESS (SPIDs optional) 512 = DMS-100	ATO
Save Configuration		AT&W
Reboot		ATZ

It is recommended to reboot (ATZ) after any configuration changes.

SPID assignments

Some ISDN switches, or provider implementations of switches, require Service Provider Identifiers (SPID). You need to know the type required for your reference configuration.

You can use any SPID numbering scheme that matches your requirement. We support three types of SPID numbering (Table 6). Whenever you change the SPID, reboot the simulator and preferably the TE device.

Table 6: SPID Formats

SPID format	Switch type	Comment
All SPIDs are "0" Matches any SPID on the TE side	Supported by NI-1, DMS-100, 5ESS	Troubleshooting use
All SPID are empty	Supported by NET3 only	Standard
Any sequence of 40 digits.	Supported by NI-1, DMS-100, 5ESS	Standard

Upgrading Firmware

Virtual Consoles will periodically publish firmware and software upgrades.

Visit www.vconsole.com for latest versions. When you download new firmware, check if there is a newer version of ISDN Manager and upgrade that as well.

Table 8: Firmware Upgrade

File	Function & comments
XLOAD.EXE	Firmware loader
XXXXX.XMD	Firmware, where XXXXXX is a platform specific designation.
DEV.CFG	Device default configuration file

To load new firmware with the XLOAD program, connect a COM port of a PC to the console port of the simulator. The XLOAD program must have exclusive use of the COM port; no other application may use it while the upgrade program is running.

> **Example:**
> **XLOAD.EXE P2US.XMD /Com:1 /Cfg:DEV.CFG**

at the Windows DOS command prompt. In this example, the Virtual Console device is connected to COM1 port and loads the default settings from the DEV.CFG file.

Troubleshooting

Be systematic in your troubleshooting, from the environmental and then bottom-up from layer 1 upwards.

Table 8: Symptoms and Recommended Actions

Left LED on Port 1 does not light	Check power cabling, and the power supply. Verify the outlet has power.
Port's Right LED does not light up after a device is connected.	1. Check port 1, left LED. If it is OFF, check power cabling, and the power supply 2. Check that the ISDN device is powered up 3. Check device cabling. Verify interface type. 3. Try another port 4. Contact technical support
Port's Left LEDs do not light up after a device is connected.	1. Check that the ISDN device is powered up 2. Try another port (other than port 1) 3. Contact technical support
Left/Right LEDs are solid Green, and do not start blinking after the placing a call	1. Verify phone numbers dialed 2. Verify switch type and SPID settings 3. Verify ISDN device configuration 4. Try another port 5. Contact technical support

Chapter 5: AT command configuration examples

Assigning Phone Numbers

Port 1:   (42211001, 42211001)
Port 2:   (42211002, 42211002)
Port 3:   (42211003, 42211003)
Port 4:   (42211004, 42211004)
Port 5:   (42211005, 42211005)
Port 6:   (42211006, 42211006)
Port 7:   (42211007, 42211007)

AT Configuration script:

```
atn0="42211001"
atn1="42211002"
atn2="42211003"
atn3="42211004"
atn4="42211005"
atn5="42211006"
atn6="42211007"
atn7="42211008"
atn8="42211001"
atn9="42211002"
atn10="42211003"
atn11="42211004"
atn12="42211005"
atn13="42211006"
atn14="42211007"
atn15="42211008"
at&w
atz
```

Configuring NET3 switch type without SPID numbers

```
atp0=""
atp1=""
atp2=""
atp3=""
atp4=""
atp5=""
atp6=""
atp7=""
atp8=""
atp9=""
atp10=""
atp11=""
atp12=""
atp13=""
atp14=""
atp15=""
ato=0
at&w
atz
```

Configuring NI-1 switch type that matches any SPID numbers

```
atp0="0"
atp1="0"
atp2="0"
atp3="0"
atp4="0"
atp5="0"
atp6="0"
atp7="0"
atp8="0"
atp9="0"
atp10="0"
atp11="0"
atp12="0"
atp13="0"
atp14="0"
atp15="0"
ato=0
at&w
atz
```

Configuring 5ESS switch type with SPID numbers

```
atp0="02422110010101"
atp1="02422110020101"
atp2="02422110030101"
atp3="02422110040101"
atp4="02422110050101"
atp5="02422110060101"
atp6="02422110070101"
atp7="02422110080101"
atp8="02422110010102"
atp9="02422110020102"
atp10="02422110030102"
atp11="02422110040102"
atp12="02422110050102"
atp13="02422110060102"
atp14="02422110070102"
atp15="02422110080102"
ato=64
at&w
atz
```

Configuring 5ESS switch type without SPID numbers

```
atp0=""
atp1=""
atp2=""
atp3=""
atp4=""
atp5=""
atp6=""
atp7=""
atp8=""
atp9=""
atp10=""
atp11=""
atp12=""
atp13=""
atp14=""
atp15=""
ato=64
at&w
atz
```

Configuring DMS-100 switch type (same as 5ESS with SPIDS, except ATO=512)

```
atp0="02422110010101"
atp1="02422110020101"
atp2="02422110030101"
atp3="02422110040101"
atp4="02422110050101"
atp5="02422110060101"
atp6="02422110070101"
atp7="02422110080101"
atp8="02422110010102"
atp9="02422110020102"
atp10="02422110030102"
atp11="02422110040102"
atp12="02422110050102"
atp13="02422110060102"
atp14="02422110070102"
atp15="02422110080102"
ato=512
at&w
atz
```

Chapter 6: Specifications

Power Adapter:	**Input: 110/220 VAC Output: 9 VDC, 600mA. 2.5mm jack**
S/T Interface:	**RJ-45, 8-pin modular jack**
S/T Interface protocol:	**2B1Q (2 Binary 1 Quaternary)**
Maximum cable drop:	**1600 meters**
RS-232 Interface:	**DB-9 Female**
Storage Temperature:	**-40 to +55C**
Operating Temperature:	**0 to 50 C**
Humidity Max:	**75%**
Dimensions:	**8.75"L X 6.5"W X 1.6"H**
Weight:	**1 lb (500g)**