



**128K PCI ISDN MODEM**

**User Manual – Linux 2.4 Kernel**

Revision 1.0

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**WARNING : This product may only be connected to the Telecommunications Network under the following conditions :**

(i) The card can only be installed in a Computer that has a case (cover) fitted that can only be removed with the use of a tool or key. The card should not be installed in a Computer with a "Flip Top" case.

(ii) Do not connect the card to the Telecommunications Network until the Computer case is fitted and screwed or locked in place.

(iii) In the event that the Computer case is to be removed, the card must be disconnected from the Telecommunications Network before the case is removed, and must not be re-connected until the case is replaced and screwed or locked in place.

## Chapter 1 - Introduction

### **Features**

- PCI PLUG and PLAY. No jumpers or switches.
- Supports Telstra OnRamp2 , OnRamp Business Highway and OnRamp Home Highway
- Supports PPP (64 kbit/s) and Multi-link PPP (128kbit/s)
- Supports 64/128K and 56/112k DOV (data-over-voice)
- Two cards allow connections at up to 256kbps
- Linux Kernel 2.4.20 includes DOV drivers
- For 2.4 kernels prior to 2.4.20 a separate driver is provided

### **Packing List**

You should find the following items in your NETjet 128K ISDN modem kit:

- NETjet PCI ISDN card
- NETjet Distribution CD, including documentation files
- An RJ-45 ISDN cable

Please contact your dealer if any items are damaged or missing.

### **Trademarks**

NETjet is a registered trademark of Traverse Technologies Australia Pty Ltd. All other trademarks and copyrights are the property of their respective holders.

### **Introduction**

This manual provides step-by-step instructions for installing and setting up the NETjet ISDN adapter to complete a call across an ISDN network. You can use the NETjet ISDN adapter to connect your Linux machine to a remote computer network. The remote network can be the Internet, or it can be a Remote Access Server in your office network. This manual also describes how to set up a Linux machine to work as a Remote Access Server.

## **Chapter 2 - How to order an ISDN line**

At present, Telstra are the only carrier within Australia that supply Basic Rate ISDN lines.

Telstra Sales can be contacted on 132000 anywhere in Australia.

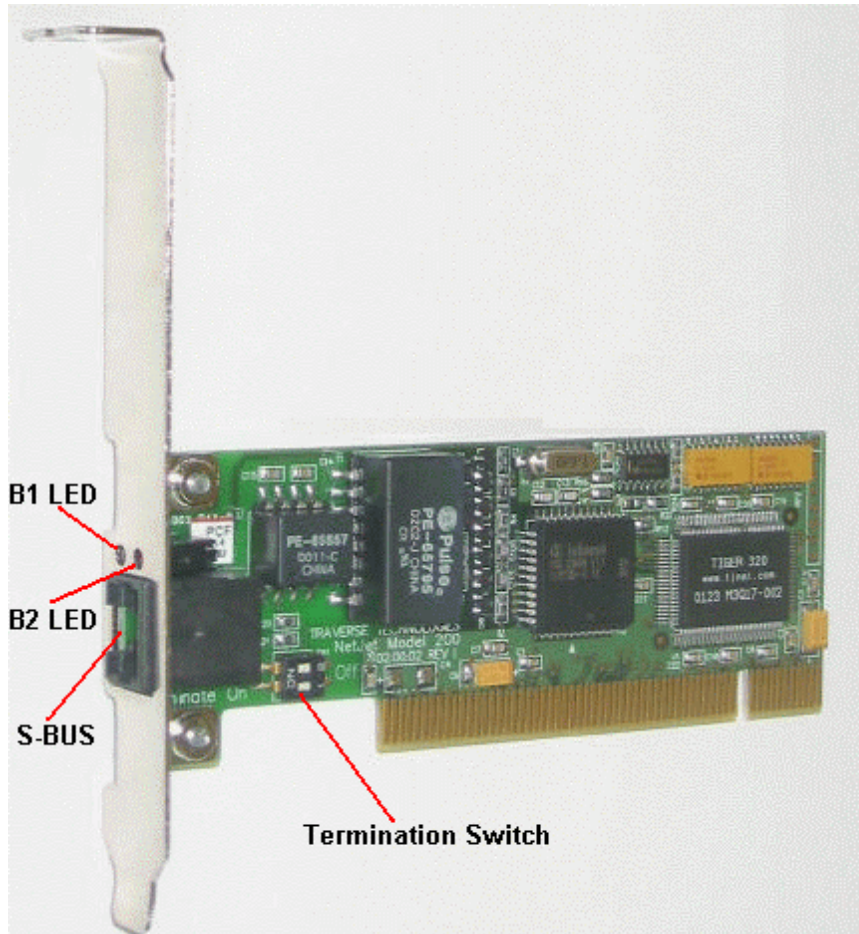
Information on their ISDN services is also available on the internet at:

web <http://www.telstra.com.au/onramp/>  
email [ISDN@Telstra.com.au](mailto:ISDN@Telstra.com.au)

The NET*jet* PCI ISDN card is compatible with the Telstra OnRamp2 ISDN, OnRamp Business Highway and OnRamp Home Highway services.

## Chapter 3 - Hardware installation

### 3.1 Connections, switches and LEDs



#### **B1 LED**

This indicates B channel 1 activity – **ON = Connected**

#### **B2 LED**

This indicates B channel 2 activity – **ON = Connected**

#### **S-BUS Port**

Connect this port to the S-BUS port on the Telstra NT-1

#### **Termination Switch**

This configures the termination of the ISDN S-BUS, see section 3.3

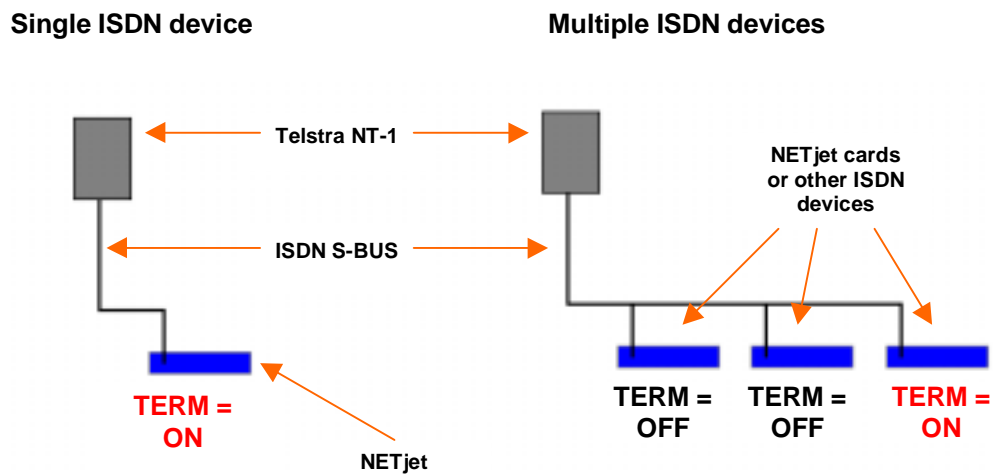
### **3.2 Installation**

- (i) Power OFF your computer system.
- (ii) Remove screws and case.
- (iii) Locate a free PCI slot.
- (iv) Unscrew/remove slot rear panel.
- (v) Place the *NETjet* PCI ISDN adapter over the PCI slot. Press the ISDN card down firmly with both hands into the slot. Check to be sure that the ISDN card is seated properly in the PCI slot.
- (vi) Screw/secure rear panel of *NETjet* ISDN adapter.
- (vii) Refit case and screws.
- (viii) Plug one end of the cable that came with your *NETjet* PCI ISDN adapter into the jack on the adapter and plug the other end into Telstra's NT1 RJ45 socket labelled **S-BUS**.

### 3.3 ISDN Termination Switch

An ISDN S-BUS termination switch is provided on the NETjet PCI card. The factory setting for this switch is ON which is the normal setting for almost all installations. However where there is more than one device on the S-BUS, the last device should have its termination set to ON, and all other devices should be set to OFF.

The diagram below illustrates typical ISDN S-BUS termination configurations:



## Chapter 4 - ISDN4Linux Driver Installation

If your kernel is earlier than 2.4.20 it is recommended to upgrade the ISDN4Linux drivers to pick up the following fixes and features

- DOV support
- LED support
- ML-PPP kernel panic bug fix

The current driver is

**isdn-2.4-170402.tgz**

which includes the above fixes and features.

### **4.1 Install Driver Source**

The current driver can be found on the NETjet distribution CD in the **/linux** directory. Alternatively you can download the latest 2.4 Linux driver from [www.traverse.com.au](http://www.traverse.com.au)

#### **CD Installation**

- (i) Place the CD into your drive
- (ii) Mount the CD

**mount /dev/cdrom /mnt/cdrom**

- (iii) Copy the source tarball across to your hard drive

**cp /mnt/cdrom/linux/isdn-2.4-170402.tgz /usr/src**

- (iv) Change into the /usr/src directory

**cd /usr/src**

- (v) Extract the source

**tar -xvzf isdn-2.4-170402.tgz**

- (vi) Install the source into /usr/src/linux

**cd /usr/src/isdn  
./std2kern**

You should now see all source files being installed

## 4.2 Driver Configuration

Next configure the kernel options for isdn4linux

(i) Run menuconfig

```
cd /usr/src/linux
```

```
make menuconfig
```

(ii) Select **ISDN subsystem** from the main menu

```
----- Main Menu -----
Arrow keys navigate the menu.  <Enter> selects submenus --->.
Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
<M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help.
Legend: [*] built-in [ ] excluded <M> module < > module capable

^(-)-----
  General setup --->
  Memory Technology Devices (MTD) --->
  Parallel port support --->
  Plug and Play configuration --->
  Block devices --->
  Multi-device support (RAID and LVM) --->
  Networking options --->
  Telephony Support --->
  ATA/IDE/MFM/RLL support --->
  SCSI support --->
  Fusion MPT device support --->
  I2O device support --->
  Network device support --->
  Amateur Radio support --->
  IrDA (infrared) support --->
  ISDN subsystem --->
  Old CD-ROM drivers (not SCSI, not IDE) --->
  Input core support --->
v(+)------

  <Select>  < Exit >  < Help >
```

(iii) Configure the **ISDN subsystem** as shown

```
----- ISDN subsystem -----
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help.
Legend: [*] built-in [ ] excluded <M> module < > module capable

  <M> ISDN support
    [*] Support synchronous PPP
    [*]   Use VJ-compression with synchronous PPP
    [*]   Support generic MP (RFC 1717)
    < >   Support BSD compression
    [ ] Support audio via ISDN
    [ ] X.25 PLP on top of ISDN
  ISDN feature submodules --->
  --- low-level hardware drivers
  Passive ISDN cards --->
  Active ISDN cards --->

  <Select>  < Exit >  < Help >
```

(iv) Configure the **PASSIVE subsystem** as shown

```
----- Passive ISDN cards -----
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help.
Legend: [*] built-in [ ] excluded <M> module < > module capable

  <M> HiSax SiemensChipSet driver support
  --- D-channel protocol features
  [*] HiSax Support for EURO/DSS1
  [ ] Support for german chargeinfo
  [ ] Disable sending complete
  [ ] Disable sending low layer compatibility
  [ ] Disable keypad protocol option
  [ ] HiSax Support for german ITR6
  [ ] HiSax Support for US NI1
  --- HiSax supported cards
  [ ] Teles 16.0/8.0
  [ ] Teles 16.3 or PNP or PCMCIA
  [ ] Teles PCI
  [ ] Teles SOBox
  [ ] Sedlbauer cards
  [ ] USR Sportster internal TA
  [ ] MIC card
  [*] NETjet card
  [ ] NETspider U card
  [ ] Niccy PnP/PCI card
  [ ] Siemens I-Surf card
v(+)
```

**<Select>**    < Exit >    < Help >

(v) Configure the **ACTIVE subsystem** as shown

```
----- Active ISDN cards -----
Arrow keys navigate the menu.  <Enter> selects submenus --->.
Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
<M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help.
Legend: [*] built-in [ ] excluded <M> module < > module capable

< > ICN 2B and 4B support
< > PCBIT-D support
< > Spellcaster support
< > IBM Active 2000 support
[ ] Eicon active card support
< > CAPI2.0 support
< > Hypercope HYSDN cards (Champ, Ergo, Metro) support (module only

<Select>  < Exit >  < Help >
```

(vii) Now save and exit

```
Do you wish to save your new kernel configuration?

< Yes >  < No >
```

### ***4.3 Compiling the Kernel***

- (i) Compile the kernel

**make dep clean bzlilo**

This will take between 15 minutes and a few hours depending on the speed of your machine and the other kernel options.

- (ii) Compile the modules

**make modules**

This will take between 5 minutes and a few hours depending on the speed of your machine and the your kernel module options.

- (iii) Install the modules

**make modules\_install**

## **4.4 Lilo**

It is recommended that you configure lilo so that you can still boot with your previous kernel if the new build does not work for some reason.

- (i) Check /boot directory for symbolic links

```
cd /boot  
ls -al
```

- (ii) If you find that the following file names are symbolic links eg.

```
System.map -> System.map-2.4.7-10
```

```
vmlinuz -> vmlinuz-2.4.7-10
```

Remove the links

```
rm System.map  
rm vmlinuz
```

- (iii) Copy the new kernel files

```
cp /System.map /boot  
cp /vmlinuz /boot
```

- (iv) Now edit your /etc/lilo.conf file so that you can boot from either kernel image as shown below...

```
prompt  
timeout=50  
default=linux  
boot=/dev/hda  
map=/boot/map  
install=/boot/boot.b  
message=/boot/message  
initrd=/boot/initrd-2.4.7-10.img  
linear
```

```
image=/boot/vmlinuz  
  label=linux  
  read-only  
  root=/dev/hda5
```

```
image=/boot/vmlinuz-2.4.7-10  
  label=orig  
  read-only  
  root=/dev/hda5
```

- (v) Now run lilo to install the kernel images

**lilo**

You should now see something like...

```
Added linux *  
Added orig
```

Now when you system boots you can choose from either kernel at the boot prompt, with the new kernel "linux" being the default kernel.

- (vi) Now reboot your system

```
shutdown -r now
```

## Chapter 5 - ISDN4Linux Utilities Installation

Most modern Linux distributions include the ISDN Utilities so you may be able to skip this step. If your distribution does not include the utilities then these must be installed.

**IMPORTANT : If you need to use 56/112K DOV then you must perform a source installation (see section 5.3) This DOES NOT APPLY to 64/128k DOV.**

### 5.1 Check Utilities installation

(i) At the command prompt enter

```
isdnctrl --version
```

If the utilities are installed you will see

```
isdnctrl version 3.1pre1
```

This version can be used for 64/128k data and 64/128k DOV  
You can now skip straight to Section 6.

**IMPORTANT : If you need to use 56/112K DOV then you must perform a source installation (see section 5.3)**

### 5.2 RPM Utilities installation

If your Linux distribution supports RPMs you can perform an RPM Install.  
The current Utilities RPM can be found on the NETjet distribution CD in the `/linux` directory.  
Alternatively you can download the latest Utilities RPM from [www.traverse.com.au](http://www.traverse.com.au)

This RPM can be used for 64/128k data and 64/128k DOV

**IMPORTANT : If you need to use 56/112K DOV then you must perform a source installation (see section 5.3)**

#### CD Installation

- (i) Place the CD into your drive
- (ii) Mount the CD

```
mount /dev/cdrom /mnt/cdrom
```

- (iii) Install the RPM

```
rpm -i /mnt/cdrom/linux/isdn4k-utils-3.1-46.rpm
```

If the RPM installs correctly you can now skip straight to Section 6.

### 5.3 Source Utilities installation

**IMPORTANT :** A source installation is only necessary if you need to use 56/112K DOV or if your Linux distribution does not include these utilities. See section 5.1 and 5.2 for the other install methods.

The current source utilities version is

**isdn4k-utils-3.1b7.56.tgz**

The current utilities can be found on the NETjet distribution CD in the **/linux** directory. Alternatively you can download the latest utilities from [www.traverse.com.au](http://www.traverse.com.au)

#### CD Installation

- (viii) Place the CD into your drive
- (ix) Mount the CD

**mount /dev/cdrom /mnt/cdrom**

- (x) Copy the source tarball across to your hard drive

**cp /mnt/cdrom/linux/ isdn4k-utils-3.1b7.56.tgz /usr/src**

- (xi) Change into the /usr/src directory

**cd /usr/src**

- (xii) Extract the source

**tar -xvzf isdn4k-utils-3.1b7.56.tgz**

- (xiii) Configure the utilities

**cd isdn4k-utils**  
**make config**

- (xiv) Compile the utilities

**make**

- (xv) Install the utilities

**make install**

Select **General configuration** from the main menu

```
----- Main Menu -----  
Arrow keys navigate the menu. <Enter> selects submenus --->.  
Highlighted letters are hotkeys. Pressing <Y> enables, <N> disables  
features. Press <Esc><Esc> to exit, <?> for Help. Legend: [*]  
enabled [ ] disabled  
  
Code maturity level options --->  
General configuration --->  
Runtime configuration tools --->  
Card configuration tools --->  
Tools for monitoring activity --->  
Applications --->  
Documentation --->  
---  
Load an Alternate Configuration File  
Save Configuration to an Alternate File  
  
<Select> < Exit > < Help >
```

Configure the **General options** as shown

```
----- General configuration -----
Arrow keys navigate the menu.  <Enter> selects submenus --->.
Highlighted letters are hotkeys.  Pressing <Y> enables, <N> disables
features.  Press <Esc><Esc> to exit, <?> for Help.  Legend: [*]
enabled [ ] disabled

--- Build options
[*] Build programs which need X11 installed
"/usr/src/linux" Kernel source directory
--- Destination directories
"/usr/bin" Directory to install binaries
"/sbin" Directory to install admin binaries
"/usr/man" Directory to install man pages
--- Runtime defaults
"/var/run" Write .pid files here
"/var/lock" Write lock files here
"LCK.." Prefix for the lock file
"/etc/isdn" General configuration directory
"isdn.conf" Global configuration file
"callerid.conf" Global phone number file
"~/.isdn" User configuration file
--- Configuration library options
"63" Your country code
"" Your area code

v(+)
```

**<Select>**    < Exit >    < Help >

**IMPORTANT :**

- **DO NOT select "Build programs which need X11 installed"**
- **Set the country code to 63**

Configure the **Runtime options** as shown

```
----- Runtime configuration tools -----  
Arrow keys navigate the menu. <Enter> selects submenus --->.  
Highlighted letters are hotkeys. Pressing <Y> enables, <N> disables  
features. Press <Esc><Esc> to exit, <?> for Help. Legend: [*]  
enabled [ ] disabled  
  
[*] isdnctrl  
[ ] Enable configfile-option (uses dbm lib)  
[*] Enable timru-controls  
[ ] iprofd  
[ ] divertctrl  
  
[<Select>] < Exit > < Help >
```

Configure the **Card options** as shown

```
----- Card configuration tools -----  
Arrow keys navigate the menu.  <Enter> selects submenus --->.  
Highlighted letters are hotkeys.  Pressing <Y> enables, <N> disables  
features.  Press <Esc><Esc> to exit, <?> for Help.  Legend: [*]  
enabled [ ] disabled  
  
[ ] telesctrl  
[*] hisaxctrl  
[ ] icnctrl  
[ ] pcbitctl  
[ ] avmcapictrl  
[ ] actctrl  
[ ] eiconctrl  
  
<Select>  < Exit >  < Help >
```

Configure the **Monitor options** as shown

```
----- Tools for monitoring activity -----  
Arrow keys navigate the menu. <Enter> selects submenus --->.  
Highlighted letters are hotkeys. Pressing <Y> enables, <N> disables  
features. Press <Esc><Esc> to exit, <?> for Help. Legend: [*]  
enabled [ ] disabled  
  
[ ] imon  
[*] imontty  
[ ] isdnlog  
---  
[ ] ippstats  
< > xisdnload  
< > xmonisdn  
Options for xmonisdn --->  
  
<Select> < Exit > < Help >
```

Configure the **Applications options** as shown

```
----- Applications -----  
Arrow keys navigate the menu. <Enter> selects submenus --->.  
Highlighted letters are hotkeys. Pressing <Y> enables, <N> disables  
features. Press <Esc><Esc> to exit, <?> for Help. Legend: [*]  
enabled [ ] disabled  
  
[ ] vbox  
[*] ippd  
Options for ippd --->  
  
<Select> < Exit > < Help >
```

Configure the **ippd options** as shown

```
Options for ippd
Arrow keys navigate the menu.  <Enter> selects submenus --->.
Highlighted letters are hotkeys.  Pressing <Y> enables, <N> disables
features.  Press <Esc><Esc> to exit, <?> for Help.  Legend: [*]
enabled [ ] disabled

[*] Support for MS chap secrets
[ ] Support for RADIUS protocol
[ ] Support for RADIUS wtpp logging
"" radiusclient config file path

<Select>  < Exit >  < Help >
```

Configure the **Documentation options** as shown

```
----- Documentation -----  
Arrow keys navigate the menu. <Enter> selects submenus --->.  
Highlighted letters are hotkeys. Pressing <Y> enables, <N> disables  
features. Press <Esc><Esc> to exit, <?> for Help. Legend: [*]  
enabled [ ] disabled  
  
[*] Install generic pages  
[*] Generate FAQ  
"/usr/doc/faq/... Directory to install FAQ  
  
<Select> < Exit > < Help >
```

Now exit and save your configuration

```
Do you wish to save your new configuration?  
  
< Yes > < No >
```

(xvi) Compile the utilities

**make**

(xvii) Install the utilities

**make install**

## Chapter 6 - Scripts and configuration.

### 6.1 Create an ioptions file

You MUST have a file called 'ioptions' in the /etc/ppp directory. If one does not already exist, then create it with to following command:

```
touch /etc/ppp/ioptions
```

### 6.2 Set up the password files

Passwords for ppp dialup connections are stored in the following files

```
/etc/ppp/chap-secrets
```

```
/etc/ppp/pap-secrets
```

If you are unsure which protocol your ISP requires, set up both files the same. Shown below is an example of a secrets file...

```
# client      server secret
fred          *      flintstone
```

This example shows the following user account:

Username: fred            Password: flintstone

**Note that the server entry should always be a wildcard "\*".**

### 6.3 Basic script (dialisdn)

You will need a start/stop script for your ISDN connection. This basic script called "dialisdn" is a simple one that can be used for desktop and testing applications. It also includes instructions for setting up DOV. This script is on the distribution CD ...

```
/linux/scripts/dialisdn
```

Alternatively you can download the latest script from [www.traverse.com.au](http://www.traverse.com.au)

### **6.3 Permanent link script (imond)**

A far more sophisticated set of scripts script including recovery strategies should your link go down. These scripts allow you to set up a permanent connection (leased line) to another ISDN site using PPP. The Perl script is designed to keep your ISDN line up at all times. If a dropout occurs the script will re-connect the call. You can even define your own re-dial policy to avoid huge phone bills that exceed your cap in case of a fault (i.e.radius / authentication failure). These scripts are also available on the distribution CD ...

**/linux/scripts/lcall2**  
**and**  
**/linux/scripts/imond**

Alternatively you can download these latest scripts from [www.traverse.com.au](http://www.traverse.com.au)

You should use these scripts if you need a permanent ISDN link, although **dialisdn is recommended for initial testing.**

These scripts allow you to set up a permanent connection (leased line) to another ISDN site (such as Telstra Internet) using PPP. The Perl script is designed to keep your ISDN line up at all times. If a dropout occurs the script will re-connect the call. You can even define your own re-dial policy to avoid huge phone bills that exceed your cap in case of a fault (i.e.radius / authentication failure).

### **6.4 Script Install and Configuration**

Firstly copy the desired scripts to the **/etc/ppp** directory and set the file attributes...

**chmod 755 /etc/ppp/dialisdn**  
or  
**chmod 755 /etc/ppp/lcall2**  
**chmod 755 /etc/ppp/imond**

For all scripts, you must initialise the following variables:

**CHANNELS** - connection speed

CHANNELS="1" for 64K  
CHANNELS="2" for 128K

**USER** - your login username

This is your login name and the associated password must be in your secrets files

**HDLC** - layer 2 HDLC protocol

HDLC="hdlc" for 64K/128K DOV or DATA calls

HDLC="hdlc\_56k" for 56K/112K DOV calls only

**LOCAL\_NUMBER**

This is your ISDN telephone number. For outgoing calls you can set this to '0'.

**REMOTE\_NUMBER** – the number to call (i.e. your ISP) which can include an std code in front.

eg. "V9290000" for a DOV call  
or "9290000" for a DATA call

**MY\_IP\_ADDRESS** - your local ip address [0.0.0.0] \*\*

**DEST\_IP\_ADDRESS** - your destination ip address [0.0.0.0]

**\*\*Note** : if the server (or ISP) dynamically assigns IP addresses each time you log in, then you can leave these two fields as 0.0.0.0

## 6.5 RAS Scripts

These scripts allow you to configure a Linux box as a RAS (Remote Access Server). These scripts are also available on the distribution CD ...

**/linux/scripts/ras**  
**and**  
**/linux/scripts/rascheck**

Alternatively you can download these latest scripts from [www.traverse.com.au](http://www.traverse.com.au)

The main script (ras), sets up for remote access and requires the following parameters to be configured...

**SPEED** - connection speed, the allowed values are "64" or "128"

**CARDS** – the number of ISDN cards, the allowed values are "1" or "2"

**LOCAL\_NUMBER0** – this configures the incoming call number and accepted call types for ISDN card 0...

- add a "V" at the start of the number to accept only DOV calls to that number  
eg. "V94867775"
- add a "B" at the start of the number to accept both DATA and DOV calls to that number  
eg. "B94867775"
- if the first character is numeric or a wildcard then only DATA calls will be accepted  
eg. "94867775" or "\*\*"
- you can also use wildcards for DOV or both DOV and DATA  
eg. "V\*" or "B\*"

**LOCAL\_NUMBER1** – this configures the incoming call number and accepted call types for ISDN card 1. See the description for **LOCAL\_NUMBER0** above.

**IP\_ADDRESS** – this configures IP Addresses for Dial-in user accounts.  
Shown below is the relevant section for configuring RAS IP Address Assignment in the ras file...

```
:  
:  
# 1st dial in  
MY_IP_ADDRESS="192.168.0.200"  
DEST_IP_ADDRESS="192.168.0.201"  
  
# 2nd dial in  
MY_IP_ADDRESS1="192.168.0.202"  
DEST_IP_ADDRESS1="192.168.0.203"  
  
# 3rd dial in  
MY_IP_ADDRESS2="192.168.0.204"  
DEST_IP_ADDRESS2="192.168.0.205"  
  
# 4th dial in  
MY_IP_ADDRESS3="192.168.0.206"  
DEST_IP_ADDRESS3="192.168.0.207"  
:  
:
```

This example has shows 4 RAS interfaces (ipp0 .. ipp3) with the following IP addresses...

<b>Interface</b>	<b>Server Address</b>	<b>Client Address</b>
ipp0	192.168.0.200	192.168.0.201
ipp1	192.168.0.202	192.168.0.203
ipp2	192.168.0.204	192.168.0.205
ipp3	192.168.0.206	192.168.0.207

**DNS** - this configures DNS Addresses for Dial-in user accounts. Shown below is the relevant section for configuring RAS DNS Addresses in the ras file...

```
:  
:  
PRI_DNS="139.130.4.4"  
SEC_DNS="139.130.4.5"  
:  
:
```

This example has shows a Primary and Secondary DNS as follows..

<b>DNS</b>	<b>Address</b>
Primary	139.130.4.4
Secondary	139.130.4.5

## **RASCHECK**

In addition to the ras script you can also use rascheck to reset ipppd (ISDN PPP Daemon) when the last caller hangs up. Copy this script to **/etc/ppp/rascheck** then...

**chmod 755 /etc/ppp/rascheck**

and add the following line to **/etc/ppp/ip-down.local...**

**/etc/ppp/rascheck**

## Chapter 7 - Activating your ISDN link

### 7.1 Loading modules

The modules required (isdn.o and hisax.o) are normally loaded by the dial (or answer script). For debugging purposes you can also load these modules manually from the command line...

```
modprobe hisax type=20 protocol=2 id="HiSax"
```

If the module loads without error messages, you should see the following in response to the **lsmod** command...

**lsmod**

Module	Size	Used by
hisax	149616	0 (unused)
isdn	107600	0 [hisax]
slhc	4816	0 [isdn]

You should also see the following at the end of the **/var/log/messages** file...

```
May 7 18:57:10 Linux72 kernel:  
    ISDN subsystem Rev:1.114.6.18/1.94.6.10/1.140.6.11D/1.85.6.10/none/1.5.6.4 loaded  
May 7 18:57:11 Linux72 kernel: HiSax: Linux Driver for passive ISDN cards  
May 7 18:57:11 Linux72 kernel: HiSax: Version 3.5 (module)  
May 7 18:57:11 Linux72 kernel: HiSax: Layer1 Revision 2.41.6.5  
May 7 18:57:11 Linux72 kernel: HiSax: Layer2 Revision 2.25.6.4  
May 7 18:57:11 Linux72 kernel: HiSax: TeiMgr Revision 2.17.6.3  
May 7 18:57:11 Linux72 kernel: HiSax: Layer3 Revision 2.17.6.5  
May 7 18:57:11 Linux72 kernel: HiSax: LinkLayer Revision 2.51.6.7  
May 7 18:57:11 Linux72 kernel: HiSax: Approval certification failed because of  
May 7 18:57:11 Linux72 kernel: HiSax: unauthorized source code changes  
May 7 18:57:11 Linux72 kernel: HiSax: Card 1 Protocol EDSS1 Id=HiSax (0)  
May 7 18:57:11 Linux72 kernel: HiSax: Traverse Tech. NETjet-S driver Rev. 2.7.6.7  
May 7 18:57:11 Linux72 kernel: PCI: Found IRQ 12 for device 00:0a:0  
May 7 18:57:11 Linux72 kernel: NETjet-S: PCI card configured at 0xb800 IRQ 12  
May 7 18:57:11 Linux72 kernel: NETjet-S: ISAC version (0): 2086/2186 V1.1  
May 7 18:57:11 Linux72 kernel: NETjet-S: IRQ 12 count 0  
May 7 18:57:11 Linux72 kernel: NETjet-S: IRQ 12 count 4  
May 7 18:57:11 Linux72 kernel: HiSax: DSS1 Rev. 2.30.6.2  
May 7 18:57:11 Linux72 kernel: HiSax: 2 channels added  
May 7 18:57:11 Linux72 kernel: HiSax: MAX_WAITING_CALLS added
```

If the driver fails to load, use the **cat /proc/pci** command to check to see if your ISDN card has been detected by the bios. In amongst the other PCI devices on you machine you should see...

**Bus 0, device 10, function 0:**

**Ethernet controller: Tiger Jet Network Inc. Model 300 128k (rev 0).**

**IRQ 12.**

**Master Capable. Latency=32. Min Gnt=1.Max Lat=128.**

**I/O at 0xb800 [0xb8ff].**

**Non-prefetchable 32 bit memory at 0xe5000000 [0xe5000fff].**

**Note : the addresses, bus number and device number will vary from machine to machine.**

If the ISDN card is not listed, then you should check to see that the card is seated correctly in it's PCI slot. You can also try another slot. Also check the edge connector on the card for signs of dirt, pizza finger prints or contamination. The edge connector can be cleaned by using an abrasive pencil eraser, then wipe it with a clean cloth dipped in Metholated Spirits.

If the card is listed and the module did not load check the following...

- (i) The ISDN subsystem options as shown in section 4.2 (iii)?
- (ii) Did you run the make modules step as shown in section 4.3 (ii)?
- (iii) Did you run the make modules\_install step as shown in section 4.3 (iii)?
- (iv) Did you install the correct kernel and did you boot from it as shown in section 4.4?

Once you have checked all of these, and still not found the cause of the problem **install and run the diagnostic software** on the distribution CD in the **/diagnostic** directory.

## 7.2 Running the dialisdn script

Once you have loaded the modules correctly now try the **dialisdn** script. In another window (ALT-F2) run a tail on the **/var/log/messages** file so you can see what is going on...

**ALT-F2**

```
tail -f /var/log/messages
```

**ALT-F1**

```
cd /etc/ppp  
./dialisdn start
```

**ALT-F2**

You should see something like this...

```
Linux72 kernel: isdn: Verbose-Level is 7  
Linux72 ipppd[9721]: Found 2 devices: ,  
Linux72 ipppd[9721]: ipppd i2.2.12 (isdn4linux version of pppd by MH) started  
Linux72 ipppd[9721]: init_unit: 0  
Linux72 ipppd[9721]: Connect[0]: /dev/ippp0, fd: 7  
Linux72 ipppd[9721]: init_unit: 1  
Linux72 ipppd[9721]: Connect[1]: /dev/ippp1, fd: 8  
Linux72 kernel: ippp0: dialing 1 vxxxxxxx...  
Linux72 kernel: Call type is DOV (Data over Voice)  
Linux72 kernel: isdn_net: ippp0 connected  
Linux72 ipppd[1372]: Local number: 0, Remote number: 8358662, Type: outgoing  
Linux72 ipppd[1372]: PHASE_WAIT -> PHASE_ESTABLISHED, ifunit: 0,  
linkunit: 0, fd: 7  
Linux72 ipppd[1372]: ChapReceiveChallenge: Rcvd id 1.  
Linux72 ipppd[1372]: ChapReceiveChallenge: received name field:  
'none'  
Linux72 ipppd[1372]: ChapReceiveSuccess: Rcvd id 1.  
Linux72 ipppd[1372]: Remote message: Welcome to gateway.  
Linux72 ipppd[1372]: MPPP negotiation, He: Yes We: Yes  
Linux72 ipppd[1372]: ioctl(SIOCGIFADDR): Cannot assign requested  
address  
Linux72 ipppd[1372]: CCP enabled! Trying CCP.  
Linux72 ipppd[1372]: CCP: got ccp-unit 0 for link 0 (Compression  
Control Protocol)  
Linux72 ipppd[1372]: ccp_resetci!  
Linux72 ipppd[1372]: local IP address 192.168.1.201  
Linux72 ipppd[1372]: remote IP address 192.168.1.200
```

### 7.3 Error conditions

As an aid to trouble shooting some typical error conditions in `/var/log/messages` are shown below...

#### (i) Incorrect call type

Most ISPs have different phone numbers for DATA and DOV calls so it is important that you check your call type. For DOV calls you should see...

**Linux72 kernel: Call type is DOV (Data over Voice)**

For DATA calls...

**Linux72 kernel: Call type is DATA**

#### (ii) ISDN Line not connected

**Linux72 kernel: isdn: HiSax,ch0 cause: E001B**

**Linux72 kernel: isdn\_net: local hangup ipp0**

**Linux72 kernel: ipp0: Chargesum is 0**

Check that your ISDN card is connected to the SBUS port on the Telstra NT-1. **DO NOT connect to the phone ports on the NT-1.**

Once you have checked this, and still not found the cause of the problem **install and run the diagnostic software** on the distribution CD in the `/diagnostic` directory.

#### (iii) No Answer or Busy

Shown below is an example of where the ISP doesn't answer or is Busy.

```
May 9 10:34:19 Linux72 modprobe: modprobe: Can't locate module ipp0
May 9 10:34:21 Linux72 kernel: isdn: Verbose-Level is 7
May 9 10:34:22 Linux72 ippd[1551]: Found 2 devices: ,
May 9 10:34:22 Linux72 ippd[1551]: ippd i2.2.12 (isdn4linux version of pppd by MH)
started
May 9 10:34:22 Linux72 ippd[1551]: init_unit: 0
May 9 10:34:22 Linux72 ippd[1551]: Connect[0]: /dev/ipp0, fd: 7
May 9 10:34:22 Linux72 ippd[1551]: init_unit: 1
May 9 10:34:22 Linux72 ippd[1551]: Connect[1]: /dev/ipp1, fd: 8
May 9 10:34:24 Linux72 kernel: ipp0: dialing 1 8358662...
May 9 10:34:24 Linux72 kernel: Call type is DATA
May 9 10:34:33 Linux72 kernel: isdn_net: local hangup ipp0
May 9 10:34:33 Linux72 kernel: ipp0: Chargesum is 0
```

**(iv) Incorrect username or password.**

Shown below is an example of where the Username or Password is incorrect.

```
May 9 11:09:14 Linux72 modprobe: modprobe: Can't locate module ippp0
May 9 11:09:16 Linux72 kernel: isdn: Verbose-Level is 7
May 9 11:09:17 Linux72 ipppd[2388]: Found 2 devices: ,
May 9 11:09:17 Linux72 ipppd[2388]: ipppd i2.2.12 (isdn4linux version of pppd by MH)
started
May 9 11:09:17 Linux72 ipppd[2388]: init_unit: 0
May 9 11:09:17 Linux72 ipppd[2388]: Connect[0]: /dev/ippp0, fd: 7
May 9 11:09:17 Linux72 ipppd[2388]: init_unit: 1
May 9 11:09:17 Linux72 ipppd[2388]: Connect[1]: /dev/ippp1, fd: 8
May 9 11:09:19 Linux72 kernel: ippp0: dialing 1 8358662...
May 9 11:09:19 Linux72 kernel: Call type is DATA
May 9 11:09:20 Linux72 kernel: isdn_net: ippp0 connected
May 9 11:09:20 Linux72 ipppd[2388]: Local number: 0, Remote number: 8358662, Type:
outgoing
May 9 11:09:20 Linux72 ipppd[2388]: PHASE_WAIT -> PHASE_ESTABLISHED, ifunit: 0,
linkunit: 0, fd: 7
May 9 11:09:20 Linux72 ipppd[2388]: ChapReceiveChallenge: Rcvd id 1.
May 9 11:09:20 Linux72 ipppd[2388]: ChapReceiveChallenge: received name field:
'none'
May 9 11:09:20 Linux72 ipppd[2388]: ChapReceiveFailure: Rcvd id 1.
May 9 11:09:20 Linux72 ipppd[2388]: Remote message: I don't like you. Go 'way.
May 9 11:09:20 Linux72 ipppd[2388]: CHAP authentication failed
```

## Appendix A - Frequently Asked Questions (FAQ)

### A1. Why does my dialup script fails with an error "ipp0: Invalid argument"

The output of my dialup script shows the following error message when dialling:

```
+ isdnctrl dial ipp0  
ipp0: Invalid argument
```

This could be caused by one of the following...

- There is a typo in your dial script
- There are control characters in your dial script - was a DOS or Windows machine involved in getting the script onto the linux box?
- You have a driver / utility mis-match. Try the utilities on our site. Also check that you don't have 2 copies of the utilities loaded on your machine.

### A2. Why do I get repeated "no compressor set" error messages or my system locks up on connection.

If your system locks up on connection, it could be that you are connected to a Tigris access server. Try adding the parameter -ccp to the ippd options in your script file. This can also cause problems such as repeated error messages such as "no compressor set".

### A3. Why can't I get 128K (multilink) to work?

If your ISDN line works normally at 64K but you cannot get 128K multilink to work, generally there are 3 possibilities...

#### (i) Router setup at the far end

Nine times out of ten this is the problem. Check with your provider then....

- a. Try another account elsewhere, or
- b. Get someone else to try your account - feel free to contact us at Traverse as we can make a test call for you in a matter of minutes, and supply you with a log file. Usually the hard part here is convincing your provider that the problem is at their end - this is where a log file is invaluable.

#### (ii) Script problems

Try the dialisdn script on the distribution CD or traverse website, it works!

#### (iii) Multilink support in isdn4kutils

If you have done a source installation of the utilities make sure the Multilink support is set to ON.

#### **Important Note:**

It is virually impossible for a faulty NETjet card to be the cause of this problem. Both ISDN B channels use the same hardware and travel on the same bus. So if one channel is OK, then the other will be. There has not been a single instance of a card fault causing a Multilink problem.

#### **A4. Why do I get compile/link errors with the utilities?**

Compile and or link errors can occur with the isdn4linux utilities if you select unsupported options. Build only the essential utilities, then you will minimise the chances of fouling up your installation - you can always go back and install the non-essential utilities later. The essential utilities are:

**ippdd**  
**isdnctrl**  
**hisaxctrl**

and it is also a good idea to include the 'imontty' utility.

#### **A5. How can I tell how many channels are active?**

Use the imontty command.

#### **A6. Are there any log files I can check?**

Yes, see **/var/log/messages**. Examples of correct operation are shown in Section 7.

#### **A7. What can I do if I get an immediate 'local hangup' message ?**

If your card refuses to dial out and you get the message 'local hangup ipp0' in your **/var/log/messages** file (typically within a few seconds of the dial attempt), there can be a number of causes:

- (i) RJ45 cable not connected or faulty – have you connected to the SBUS port on the NT-1?
- (ii) ISDN line not working or not yet activated by Telstra
- (iii) faulty NETjet card

For (i), (ii) and (iii) **install and run the diagnostic software** on the distribution CD in the **/diagnostic**. This software will dial the exchange and loop back to the second channel on your card - this will prove whether or not any of the above faults exist.

If Telstra has configured the line incorrectly, you can get a message 'No layer 2' in the output from the diagnostic - this probably means that the exchange has your ISDN line configured as 'point-to-point' instead of 'point-to-multipoint' in which case it will never work. Contact the Telstra ISDN fault desk on 1800 101 004

- (iv) you have a Microlink ISDN line but have not configured it correctly

Check that you have selected the option 'Disable sending complete' when configuring ISDN in your 'make menuconfig'. If you have a Telstra OnRamp line then it does not matter how you set this option

- (v) you have mismatched versions of the ISDN Utilities

Check that the utilities were installed OK, and that there are not pre-existing versions picked up in your 'path' statement (see section 5.1)

#### **A8. Why can I connect OK but not transfer information?**

Check that your routing table is valid (use the 'route' command). This is a very common source of problems. If you are not familiar with routing tables, get some help.

#### **A9. How can I keep my link up all the time ?**

Use the imond script. See section 6.3

#### **A10. Why do I lose packets?**

Some older routers require an MTU value of less than 1500. Try a value of 1460 in the ipppd section of the dialup script.

#### **A11. What can cause loss of link followed by isdn\_tx\_tmeout messages?**

Frequent drop outs can be caused by a number of things but one possibility is an interrupt conflict with a device or driver that is unable to share. Although the Hisax driver and share IRQs, not all other drivers can. You can check the interrupt assignments with the **cat /proc/pci** command.

#### **A12. How can I quickly find out if I am within 25KM of my ISP?**

ISDN in Australia is charged at either local or long distance rates depending on whether you are within 25KM of your destination number, say your ISP. This is very important to the size of your bill, especially if you wish to use DOV. How Telstra calculates this is a bit of a mystery, but you can find out quickly enough by using Telstra's Call Cost Calculator function found on the following web page :

<http://www.telstra.com.au/locallongdistance/>

or by calling Telstra's Pricing Inquiry Line on 12552

#### **A13. What do the Exxxx errors (cause codes) mean?**

See Appendix B

#### **A14. What does the message 'Kernel check for LZS failed' mean ?**

This message appears in the /var/log/messages file and warns that your build of the Kernel does not support LZS compression. To suppress this message simply insert the '-lzs' option into the ipppd parameters of your script file.

#### **A15. What does the message "no CHAP/PAP secret entry for this user!" mean?**

This means that the user specified in your script file does not have a correct entry in your secrets file(s). Check these files...

/etc/ppp/chap-secrets  
/etc/ppp/pap-secrets

Generally it is recommended to keep these files the same so that both authentication methods can be used.

**A16. Why does my ISDN link occasionally drop out?**

Telstra does not guarantee that an ISDN call can be "held" for ever. This is due to bearer switching and other transient conditions within the Telstra network. However it is possible to detect these drop outs and restore the connection almost instantly. See section 6.3

***Note that between one and four dropouts per month is considered normal.***

**A17. Why don't I always get full throughput on my ISDN link?**

If you don't always get a full 64K (about 7.4K bytes/sec) or 128K (14.8K bytes/sec) throughput, this may be unrelated to your ISDN link, and more probably caused by bottlenecks in the Internet. You can best check throughput by doing a large download from an Australian site such as the Bureau of Meteorology ([www.bom.gov.au](http://www.bom.gov.au)).

**A18. Where can I find more information?**

An excellent resource is the isdn4linux FAQ. An up to date English version can be found at...

<http://www.mhessler.de/i4lfaq.html>

Failing that if you can't find a solution to your problem on the FAQ you can email us at...

[linux@traverse.com.au](mailto:linux@traverse.com.au)

## Appendix B - ISDN Cause codes

If your ISDN connection fails normally, a 'CAUSE CODE' will be logged in the /var/log/messages log file. This code takes the form Exxxx, where the last 4 hex digits describe the location code and the cause code. The following extract is derived from the linux "man isdn\_cause" command.

ETSI Cause Values for the ISDN D-channel protocol

Cause messages are 2-byte information elements, describing the state transitions of an ISDN line. Each cause message describes its origination (location) in one byte, while the cause code is described in the other byte. Internally, when EDSS1 (the HiSax ETSI DSS1 protocol) is used, the first byte contains the location while the second byte contains the cause code. In the Linux ISDN subsystem, the cause messages visible to the user are unified to avoid confusion. All user visible cause messages are displayed as hexadecimal strings. When using EDSS1, these strings are preceded by the character 'E'.

The following location codes are defined:

- 00 Message generated by user (usually the hisax driver)
- 01 Message generated by private network serving the local user
- 02 Message generated by public network serving the local user (usually the Telstra exchange)
- 03 Message generated by transit network
- 04 Message generated by public network serving the remote user (usually your ISP)
- 05 Message generated by private network serving the remote user (also your ISP)
- 07 Message generated by international network
- 0A Message generated by network beyond inter-working point

The following cause codes are defined:

- 01 Unallocated (unassigned) number
- 02 No route to specified transit network
- 03 No route to destination
- 06 Channel unacceptable
- 07 Call awarded and being delivered in an established channel
- 10 Normal call clearing
- 11 User busy
- 12 No user responding
- 13 No answer from user (user alerted)
- 15 Call rejected
- 16 Number changed
- 1A Non-selected user clearing
- 1B Destination out of order
- 1C Invalid number format
- 1D Facility rejected
- 1E Response to status enquiry
- 1F Normal, unspecified
- 22 No circuit or channel available
- 26 Network out of order
- 29 Temporary failure
- 2A Switching equipment congestion
- 2B Access information discarded
- 2C Requested circuit or channel not available
- 2F Resources unavailable, unspecified

- 2F Resources unavailable, unspecified
- 2F Resources unavailable, unspecified
- 31 Quality of service unavailable
- 32 Requested facility not subscribed
- 39 Bearer capability not authorised
- 3A Bearer capability not presently available
- 3F Service or option not available, unspecified
- 41 Bearer capability not implemented
- 42 Channel type not implemented
- 45 Requested facility not implemented
- 46 Only restricted digital information bearer
- 4F Service or option not implemented, unspecified
- 51 Invalid call reference value
- 52 Identified channel does not exist
- 53 A suspended call exists, but this call identity does not
- 54 Call identity in use
- 55 No call suspended
- 56 Call having the requested call identity
- 58 Incompatible destination
- 5B Invalid transit network selection
- 5F Invalid message, unspecified
- 60 Mandatory information element is missing
- 61 Message type non-existent or not implemented
- 62 Message not compatible with call state or message or message type non existent or not implemented
- 63 Information element non-existent or not implemented
- 64 Invalid information element content
- 65 Message not compatible
- 66 Recovery on timer expiry
- 6F Protocol error, unspecified
- 7F Inter working, unspecified

**Notes:**

Cause code **E0231** which means "Quality of service unavailable", and is a "Message generated by the public network serving the local user". Ask yourself this question - have I paid my Telstra bill lately?

Cause code **E0261** which means "mandatory information element missing" This can occur with an old Telstra Microlink ISDN line Rebuild your ISDN subsystem with the "disable sending complete" option set (works for both Microlink and OnRamp).

## Appendix C – Support and Warranty

### ***C.1 Technical Support***

If you encounter problems with your NETjet PCI ISDN Modem, and you cannot locate the problem, firstly ***install and run the diagnostic software*** on the distribution CD in the **diagnostic** directory. Secondly contact the dealer where you purchased your modem. If your dealer is unable to help you then contact:

Traverse Technologies Australia Pty Ltd.  
652 Smith St  
Clifton Hill  
Vic 3068  
Internet: <http://www.traverse.com.au>  
[support@traverse.com.au](mailto:support@traverse.com.au)

### ***C.2 Returning a Product***

If Technical Support determines that you need to return the product for warranty repair service, you will be issued a Return Authorisation (RA) number.

Return Authorisation Guidelines:

1. No product will be accepted for return for warranty service unless accompanied by a valid RA number. No RA number will be issued without a valid serial number. Write the RA number clearly on the outside of the package as follows: "RA#Annnn".
2. Keep a record of the RA number and the name of the service representative who issued you the RA number for future reference.
3. Return a copy of the original sales invoice for proof of purchase and verification of warranty.
4. If it is determined that your warranty has expired or that the problem is not covered by the warranty, a method of payment will have to be authorised before an RA number is issued.
5. Write your name, return address and RA number on a small strip of paper and tape it to the NETjet PCI ISDN Modem before packing it
6. Write a note describing the problem giving as much detail as possible.
7. Place the modem in the original packaging, then in padded shipping bag. Use protective material, such as bubble wrap or foam to further protect the modem.
8. The RA number that is issued to you is valid for only thirty days after the date of issue.
9. We will not accept packages that are not prepaid for shipping charges. We will not accept COD shipments for shipping costs.

10. The shipping address:  
Traverse Technologies Australia Pty Ltd  
Technical Support  
652 Smith St  
Clifton Hill  
Vic 3068, Australia

If you drop off a product at the above address, it will be processed and returned as a normal RA. Please do not expect to be given a replacement right away, while you wait.

### ***C.3 Warranty Terms you should know***

Warranty Repair: Traverse Technologies Australia Pty Ltd will repair or replace (at our option) free of charge, within the warranty period. We require you to furnish a receipt, or similar bill of sale to determine the date of purchase. If you do not supply an adequate proof of purchase with the product, you will be charged an out-of-warranty repair fee, determined by the value of labor plus materials.

Shipping: For products under warranty, you must pay one way shipping and we will cover the shipping charges when we return the product to you. We cover the return charges within Australia. We do not provide express, or next day shipment of products. You will be required to pay for any next day shipping, or special handling you require. We will ship back to you by the most economical way, eg. Express Post. Replacement goods will not be shipped until the returned unit is received.

### ***C.4 Limited Warranty***

Our company warrants this product against defects in materials and workmanship for a period of one (1) year from the date of purchase. During the warranty period, products determined by us to be defective in form or function will be repaired, or at our option, replaced at no charge. This warranty does not apply if the product has been damaged by accident, abuse, misuse, missing serial number, or force majeure (such as a lightning strike), or as a result of service or modification other than by Traverse Technologies Australia Pty. Ltd.

This warranty applies only to the original purchaser of the NETjet PCI ISDN Modem, and is non-transferable. The warranty does not cover any parts not installed by Traverse Technologies Australia Pty. Ltd. This warranty is limited to parts and labor only and does not include any incidental that may occur during the course of service including (but not limited to) shipping, delivery, etc. Any incidental charges that may occur are the responsibility of the user.

Traverse Technologies Australia Pty. Ltd. is not responsible for any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, this product. This includes damage to property and, to the extent permitted by law, damages for personal injury. This warranty is in lieu of all other warranties including implied warranties of merchant ability and fitness for a particular purpose.

This warranty applies only to this product, and is governed by the laws of Australia.

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