HiSax is a Linux hardware-level driver for passive ISDN cards with Siemens chipset (ISAC_S 2085/2086/2186, HSCX SAB 82525). It is based on the Teles driver from Jan den Ouden.
It is meant to be used with isdn4linux, an ISDN link-level module for Linux written by Fritz Elfert.

Supported cards

Teles 8.0/16.0/16.3 and compatible ones
Teles 16.3c
Teles S0/PCMCIA
Teles PCI
Teles S0Box
Creatix S0Box
Creatix PnP S0
Compaq ISDN S0 ISA card
AVM A1 (Fritz, Teledat 150)
AVM Fritz PCMCIA
AVM Fritz PnP
AVM Fritz PCI
ELSA Microlink PCC-16, PCF, PCF-Pro, PCC-8
ELSA Quickstep 1000
ELSA Quickstep 1000PCI
ELSA Quickstep 3000 (same settings as QS1000)
ELSA Quickstep 3000PCI
ELSA PCMCIA
ITK ix1-micro Rev.2
Eicon Diva 2.0 ISA and PCI (S0 and U interface, no PRO version)
Eicon Diva 2.01 ISA and PCI
Eicon Diva 2.02 PCI
Eicon Diva Piccola
ASUSCOM NETWORK INC. ISDNLink 128K PC adapter (order code I-IN100-ST-D)
Dynalink IS64PH (OEM version of ASUSCOM NETWORK INC. ISDNLink 128K adapter)
PCBIT-DP (OEM version of ASUSCOM NETWORK INC. ISDNLink)
HFC-2BS0 based cards (TeleInt SA1)
Sedlbauer Speed Card (Speed Win, Teledat 100, PCI, Fax+)
Sedlbauer Speed Star/Speed Star2 (PCMCIA)
Sedlbauer ISDN-Controller PC/104
USR Sportster internal TA (compatible Stollmann tina-pp V3)
USR internal TA PCI

ith Kommunikationstechnik GmbH MIC 16 ISA card
Traverse Technologie NETjet PCI S0 card and NETspider U card
Ovislink ISDN sc100-p card (NETjet driver)
Dr. Neuhaus Niccy PnP/PCI
Siemens I-Surf 1.0
Siemens I-Surf 2.0 (with IPAC, try type 12 asuscom)
ACER P10
HST Saphir
Berkom Telekom A4T
Scitel Quadro
Gazel ISDN cards
HFC-PCI based cards
Winbond W6692 based cards
HFC-S+, HFC-SP/PCMCIA cards
formula-n enternow
Gerdes Power ISDN

Note: PCF, PCF-Pro: up to now, only the ISDN part is supported
      PCC-8: not tested yet
      Eicon.Diehl Diva U interface not tested

If you know other passive cards with the Siemens chipset, please let me know.
You can combine any card, if there is no conflict between the resources
(io, mem, irq).

Configuring the driver

The HiSax driver can either be built directly into the kernel or as a module.
It can be configured using the command line feature while loading the kernel
with LILO or LOADLIN or, if built as a module, using insmod/modprobe with
parameters.
There is also some config needed before you compile the kernel and/or
modules. It is included in the normal "make [menu]config" target at the
kernel. Don't forget it, especially to select the right D-channel protocol.

Please note: In older versions of the HiSax driver, all PnP cards
needed to be configured with isapnp and worked only with the HiSax
driver used as a module.

In the current version, HiSax will automatically use the in-kernel
ISAPnP support, provided you selected it during kernel configuration
(CONFIG_ISAPNP), if you don't give the io=, irq= command line parameters.

The affected card types are: 4,7,12,14,19,27-30

a) when built as a module

```
insmod/modprobe  hisax.o \
  io=iobase irq=IRQ mem=membase type=card_type \
  protocol=D_channel_protocol id=idstring
```

or, if several cards are installed:

```
insmod/modprobe hisax.o \
  io=iobase1,iobase2,... irq=IRQ1,IRQ2,... mem=membase1,membase2,... \
  type=card_type1,card_type2,... \
  protocol=D_channel_protocol1,D_channel_protocol2,... \
  id=idstring1%idstring2 ...
```

where "iobaseN" represents the I/O base address of the Nth card, "membaseN" the memory base address of the Nth card, etc.

The reason for the delimiter "%" being used in the idstrings is that "," won't work with the current modules package.

The parameters may be specified in any order. For example, the "io" parameter may precede the "irq" parameter, or vice versa. If several cards are installed, the ordering within the comma separated parameter lists must of course be consistent.

Only parameters applicable to the card type need to be specified. For example, the Teles 16.3 card is not memory-mapped, so the "mem" parameter may be omitted for this card. Sometimes it may be necessary to specify a dummy parameter, however. This is the case when there is a card of a different type later in the list that needs a parameter which the preceding card does not. For instance, if a Teles 16.0 card is listed after a Teles 16.3 card, a dummy memory base parameter of 0 must be specified for the 16.3. Instead of a dummy value, the parameter can also be skipped by simply omitting the value. For example: mem=,0xd0000. See example 6 below.

The parameter for the D-Channel protocol may be omitted if you selected the correct one during kernel config. Valid values are "1" for German 1TR6, "2" for EDSS1 (Euro ISDN), "3" for leased lines (no D-Channel) and "4" for US NI1.
With US NI1 you have to include your SPID into the MSN setting in the form <MSN>:<SPID> for example (your phonenumber is 1234 your SPID 5678):

```
AT&E1234:5678                       on ttyI interfaces
isdnctrl eaz ippp0 1234:5678        on network devices
```

The Creatix/Teles PnP cards use io1= and io2= instead of io= for specifying the I/O addresses of the ISAC and HSCX chips, respectively.

Card types:

Type		Required parameters (in addition to type and protocol)
1	Teles 16.0	irq, mem, io
2	Teles 8.0	irq, mem
3	Teles 16.3 (non PnP)	irq, io
4	Creatix/Teles PnP	irq, io0 (ISAC), io1 (HSCX)
5	AVM A1 (Fritz)	irq, io
6	ELSA PCC/PCF cards	io or nothing for autodetect (the iobase is required only if you have more than one ELSA card in your PC)
7	ELSA Quickstep 1000	irq, io (from isapnp setup)
8	Teles 16.3 PCMCIA	irq, io
9	ITK ix1-micro Rev.2	irq, io
10	ELSA PCMCIA	irq, io (set with card manager)

11	Eicon.Diehl Diva ISA PnP	irq, io
11	Eicon.Diehl Diva PCI	no parameter
12	ASUS COM ISDNLink	irq, io (from isapnp setup)
13	HFC-2BS0 based cards	irq, io
14	Teles 16.3c PnP	irq, io
15	Sedlbauer Speed Card	irq, io
15	Sedlbauer PC/104	irq, io
15	Sedlbauer Speed PCI	no parameter
16	USR Sportster internal	irq, io
17	MIC card	irq, io
18	ELSA Quickstep 1000PCI	no parameter
19	Compaq ISDN S0 ISA card	irq, io0, io1, io (from isapnp setup io=IO2)
20	NETjet PCI card	no parameter
21	Teles PCI	no parameter
22	Sedlbauer Speed Star (PCMCIA)	irq, io (set with card manager)
24	Dr. Neuhaus Niccy PnP	irq, io0, io1 (from isapnp setup)
24	Dr. Neuhaus Niccy PCI	no parameter
25	Teles S0Box	irq, io (of the used lpt port)
26	AVM A1 PCMCIA (Fritz!)	irq, io (set with card manager)
27	AVM PnP (Fritz!PnP)	irq, io (from isapnp setup)
27	AVM PCI (Fritz!PCI)	no parameter
28	Sedlbauer Speed Fax+	irq, io (from isapnp setup)
29	Siemens I-Surf 1.0	irq, io, memory (from isapnp setup)
30	ACER P10	irq, io (from isapnp setup)
31	HST Saphir	irq, io
32	Telekom A4T	none
33	Scitel Quadro	subcontroller (4*S0, subctrl 1...4)
34	Gazel ISDN cards (ISA)	irq,io
34	Gazel ISDN cards (PCI)	none
35	HFC 2BDS0 PCI	none
36	W6692 based PCI cards	none
37	HFC 2BDS0 S+, SP	irq,io
38	NETspider U PCI card	none
39	HFC 2BDS0 SP/PCMCIA	irq,io (set with cardmgr)
40	hotplug interface	
41	Formula-n enter:now PCI	none

At the moment IRQ sharing is only possible with PCI cards. Please make sure that your IRQ is free and enabled for ISA use.

Examples for module loading

1. Teles 16.3, Euro ISDN, I/O base 280 hex, IRQ 10
   modprobe hisax type=3 protocol=2 io=0x280 irq=10

2. Teles 16.0, 1TR6 ISDN, I/O base d80 hex, IRQ 5, Memory d0000 hex
   modprobe hisax protocol=1 type=1 io=0xd80 mem=0xd0000 irq=5

3. Fritzcard, Euro ISDN, I/O base 340 hex, IRQ 10 and ELSA PCF, Euro ISDN
   modprobe hisax type=5,6 protocol=2,2 io=0x340 irq=10 id=Fritz%Elsa

4. Any ELSA PCC/PCF card, Euro ISDN
   modprobe hisax type=6 protocol=2

5. Teles 16.3 PnP, Euro ISDN, with isapnp configured

```
   isapnp config:  (INT 0 (IRQ 10 (MODE +E)))
                   (IO 0 (BASE 0x0580))
                   (IO 1 (BASE 0x0180))
   modprobe hisax type=4 protocol=2 irq=10 io0=0x580 io1=0x180
```

In the current version of HiSax, you can instead simply use

```
modprobe hisax type=4 protocol=2
```

if you configured your kernel for ISAPnP. Don't run isapnp in this case!

6. Teles 16.3, Euro ISDN, I/O base 280 hex, IRQ 12 and
   Teles 16.0, 1TR6, IRQ 5, Memory d0000 hex
   ```
   modprobe hisax type=3,1 protocol=2,1 io=0x280 mem=0,0xd0000
   ```

   Please note the dummy 0 memory address for the Teles 16.3, used as a placeholder as described above, in the last example.

7. Teles PCMCIA, Euro ISDN, I/O base 180 hex, IRQ 15 (default values)
   ```
   modprobe hisax type=8 protocol=2 io=0x180 irq=15
   ```

b) using LILO/LOADLIN, with the driver compiled directly into the kernel
---

```
hisax=typ1,dp1,pa_1,pb_1,pc_1[,typ2,dp2,pa_2 ... \
      typn,dpn,pa_n,pb_n,pc_n][,idstring1[,idstring2,...,idstringn]]
```

where

typ1 = type of 1st card (default depends on kernel settings)
dp1 = D-Channel protocol of 1st card. 1=1TR6, 2=EDSS1, 3=leased
pa_1 = 1st parameter (depending on the type of the card)
pb_1 = 2nd parameter (" " " " " " ")
pc_1 = 3rd parameter (" " " " " " ")

typ2,dp2,pa_2,pb_2,pc_2 = Parameters of the second card (defaults: none)
typn,dpn,pa_n,pb_n,pc_n = Parameters of the n'th card (up to 16 cards are supported)

idstring = Driver ID for accessing the particular card with utility programs and for identification when using a line monitor (default: "HiSax")

Note: the ID string must start with an alphabetical character!

Card types:

type			
1	Teles 16.0	pa=irq	pb=membase pc=iobase
2	Teles 8.0	pa=irq	pb=membase
3	Teles 16.3	pa=irq	pb=iobase
4	Creatix/Teles PNP	ONLY WORKS AS A MODULE !	
5	AVM A1 (Fritz)	pa=irq	pb=iobase
6	ELSA PCC/PCF cards	pa=iobase or nothing for autodetect	
7	ELSA Quickstep 1000	ONLY WORKS AS A MODULE !	

8	Teles S0 PCMCIA	pa=irq pb=iobase
9	ITK ix1-micro Rev.2	pa=irq pb=iobase
10	ELSA PCMCIA	pa=irq, pb=io (set with card manager)
11	Eicon.Diehl Diva ISAPnP	ONLY WORKS AS A MODULE !
11	Eicon.Diehl Diva PCI	no parameter
12	ASUS COM ISDNLink	ONLY WORKS AS A MODULE !
13	HFC-2BS0 based cards	pa=irq pb=io
14	Teles 16.3c PnP	ONLY WORKS AS A MODULE !
15	Sedlbauer Speed Card	pa=irq pb=io (Speed Win only as module !)
15	Sedlbauer PC/104	pa=irq pb=io
15	Sedlbauer Speed PCI	no parameter
16	USR Sportster internal	pa=irq pb=io
17	MIC card	pa=irq pb=io
18	ELSA Quickstep 1000PCI	no parameter
19	Compaq ISDN S0 ISA card	ONLY WORKS AS A MODULE !
20	NETjet PCI card	no parameter
21	Teles PCI	no parameter
22	Sedlbauer Speed Star (PCMCIA)	pa=irq, pb=io (set with card manager)
24	Dr. Neuhaus Niccy PnP	ONLY WORKS AS A MODULE !
24	Dr. Neuhaus Niccy PCI	no parameter
25	Teles S0Box	pa=irq, pb=io (of the used lpt port)
26	AVM A1 PCMCIA (Fritz!)	pa=irq, pb=io (set with card manager)
27	AVM PnP (Fritz!PnP)	ONLY WORKS AS A MODULE !
27	AVM PCI (Fritz!PCI)	no parameter
28	Sedlbauer Speed Fax+	ONLY WORKS AS A MODULE !
29	Siemens I-Surf 1.0	ONLY WORKS AS A MODULE !
30	ACER P10	ONLY WORKS AS A MODULE !
31	HST Saphir	pa=irq, pb=io
32	Telekom A4T	no parameter
33	Scitel Quadro	subcontroller (4*S0, subctrl 1...4)
34	Gazel ISDN cards (ISA)	pa=irq, pb=io
34	Gazel ISDN cards (PCI)	no parameter
35	HFC 2BDS0 PCI	no parameter
36	W6692 based PCI cards	none
37	HFC 2BDS0 S+,SP/PCMCIA	ONLY WORKS AS A MODULE !
38	NETspider U PCI card	none
39	HFC 2BDS0 SP/PCMCIA	ONLY WORKS AS A MODULE !
40	hotplug interface	ONLY WORKS AS A MODULE !
41	Formula-n enter:now PCI	none

Running the driver

When you insmod isdn.o and hisax.o (or with the in-kernel version, during boot time), a few lines should appear in your syslog. Look for something like:

```
Apr 13 21:01:59 kke01 kernel: HiSax: Driver for Siemens chip set ISDN cards
Apr 13 21:01:59 kke01 kernel: HiSax: Version 2.9
Apr 13 21:01:59 kke01 kernel: HiSax: Revisions 1.14/1.9/1.10/1.25/1.8
Apr 13 21:01:59 kke01 kernel: HiSax: Total 1 card defined
Apr 13 21:01:59 kke01 kernel: HiSax: Card 1 Protocol EDSS1 Id=HiSax1 (0)
Apr 13 21:01:59 kke01 kernel: HiSax: Elsa driver Rev. 1.13
...
Apr 13 21:01:59 kke01 kernel: Elsa: PCF-Pro found at 0x360 Rev.:C IRQ 10
Apr 13 21:01:59 kke01 kernel: Elsa: timer OK; resetting card
Apr 13 21:01:59 kke01 kernel: Elsa: HSCX version A: V2.1  B: V2.1
```

Apr 13 21:01:59 kke01 kernel: Elsa: ISAC 2086/2186 V1.1
...
Apr 13 21:01:59 kke01 kernel: HiSax: DSS1 Rev. 1.14
Apr 13 21:01:59 kke01 kernel: HiSax: 2 channels added

This means that the card is ready for use.
Cabling problems or line-downs are not detected, and only some ELSA cards can detect the S0 power.

Remember that, according to the new strategy for accessing low-level drivers from within isdn4linux, you should also define a driver ID while doing insmod: Simply append hisax_id=<SomeString> to the insmod command line. This string MUST NOT start with a digit or a small 'x'!

At this point you can run a 'cat /dev/isdnctrl0' and view debugging messages.

At the moment, debugging messages are enabled with the hisaxctrl tool:

    hisaxctrl <DriverId> DebugCmd <debugging_flags>

<DriverId> default is HiSax, if you didn't specify one.

DebugCmd is 1 for generic debugging
            11 for layer 1 development debugging
            13 for layer 3 development debugging

where <debugging_flags> is the integer sum of the following debugging options you wish enabled:

With DebugCmd set to 1:

   0x0001 Link-level <--> hardware-level communication
   0x0002 Top state machine
   0x0004 D-Channel Frames for isdnlog
   0x0008 D-Channel Q.921
   0x0010 B-Channel X.75
   0x0020 D-Channel l2
   0x0040 B-Channel l2
   0x0080 D-Channel link state debugging
   0x0100 B-Channel link state debugging
   0x0200 TEI debug
   0x0400 LOCK debug in callc.c
   0x0800 More paranoid debug in callc.c (not for normal use)
   0x1000 D-Channel l1 state debugging
   0x2000 B-Channel l1 state debugging

With DebugCmd set to 11:

   0x0001 Warnings (default: on)
   0x0002 IRQ status
   0x0004 ISAC
   0x0008 ISAC FIFO
   0x0010 HSCX
   0x0020 HSCX FIFO (attention: full B-Channel output!)
   0x0040 D-Channel LAPD frame types
   0x0080 IPAC debug

```
   0x0100  HFC receive debug
   0x0200  ISAC monitor debug
   0x0400  D-Channel frames for isdnlog (set with 1 0x4 too)
   0x0800  D-Channel message verbose

With DebugCmd set to 13:

         1  Warnings (default: on)
         2  l3 protocol descriptor errors
         4  l3 state machine
         8  charge info debugging (1TR6)

For example, 'hisaxctrl HiSax 1 0x3ff' enables full generic debugging.

Because of some obscure problems with some switch equipment, the delay
between the CONNECT message and sending the first data on the B-channel is now
configurable with

hisaxctrl <DriverId> 2 <delay>
<delay> in ms Value between 50 and 800 ms is recommended.

Downloading Firmware
--------------------
At the moment, the Sedlbauer speed fax+ is the only card, which
needs to download firmware.
The firmware is downloaded with the hisaxctrl tool:

    hisaxctrl <DriverId> 9 <firmware_filename>

<DriverId> default is HiSax, if you didn't specify one,

where <firmware_filename> is the filename of the firmware file.

For example, 'hisaxctrl HiSax 9 ISAR.BIN' downloads the firmware for
ISAR based cards (like the Sedlbauer speed fax+).

Warning
-------
HiSax is a work in progress and may crash your machine.
For certification look at HiSax.cert file.

Limitations
-----------
At this time, HiSax only works on Euro ISDN lines and German 1TR6 lines.
For leased lines see appendix.

Bugs
----
If you find any, please let me know.


Thanks
------
Special thanks to:

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```

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My girl friend and partner in life Ute for her patience with me.

Enjoy,

Karsten Keil
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Appendix: Teles PCMCIA driver

See
http://www.stud.uni-wuppertal.de/~ea0141/pcmcia.html
for instructions.

Appendix: Linux and ISDN-leased lines

Original from Juergen Quade, new version KKe.

Attention NEW VERSION, the old leased line syntax won't work !!!

You can use HiSax to connect your Linux-Box via an ISDN leased line
to e.g. the Internet:

1. Build a kernel which includes the HiSax driver either as a module

or as part of the kernel.

```
cd /usr/src/linux
make menuconfig
<ISDN subsystem - ISDN support -- HiSax>
make clean; make zImage; make modules; make modules_install
```

2. Install the new kernel

```
cp /usr/src/linux/arch/i386/boot/zImage /etc/kernel/linux.isdn
vi /etc/lilo.conf
<add new kernel in the bootable image section>
lilo
```

3. in case the hisax driver is a "fixed" part of the kernel, configure the driver with lilo:

```
vi /etc/lilo.conf
<add HiSax driver parameter in the global section (see below)>
lilo
```

Your lilo.conf _might_ look like the following:

```
    # LILO configuration-file
    # global section
 # teles 16.0 on IRQ=5, MEM=0xd8000, PORT=0xd80
    append="hisax=1,3,5,0xd8000,0xd80,HiSax"
 # teles 16.3 (non pnp) on IRQ=15, PORT=0xd80
    # append="hisax=3,3,5,0xd8000,0xd80,HiSax"
    boot=/dev/sda
    compact        # faster, but won't work on all systems.
    linear
    read-only
    prompt
    timeout=100
    vga = normal    # force sane state
    # Linux bootable partition config begins
    image = /etc/kernel/linux.isdn
    root = /dev/sda1
    label = linux.isdn
    #
    image = /etc/kernel/linux-2.0.30
    root = /dev/sda1
    label = linux.secure
```

In the line starting with "append" you have to adapt the parameters according to your card (see above in this file)

3. boot the new linux.isdn kernel
4. start the ISDN subsystem:
   a) load - if necessary - the modules (depends, whether you compiled the ISDN driver as module or not)
      According to the type of card you have to specify the necessary driver parameter (irq, io, mem, type, protocol).
      For the leased line the protocol is "3". See the table above for the parameters, which you have to specify depending on your card.
   b) configure i4l

```
/sbin/isdnctrl addif isdn0
# EAZ  1 -- B1 channel   2 --B2 channel
/sbin/isdnctrl eaz isdn0 1
/sbin/isdnctrl secure isdn0 on
/sbin/isdnctrl huptimeout isdn0 0
```

```
      /sbin/isdnctrl l2_prot isdn0 hdlc
      # Attention you must not set an outgoing number !!! This won't work !!!
      # The incoming number is LEASED0 for the first card, LEASED1 for the
      # second and so on.
      /sbin/isdnctrl addphone isdn0 in LEASED0
      # Here is no need to bind the channel.
   c) in case the remote partner is a CISCO:
      /sbin/isdnctrl encap isdn0 cisco-h
   d) configure the interface
      /sbin/ifconfig isdn0 ${LOCAL_IP} pointopoint ${REMOTE_IP}
   e) set the routes
      /sbin/route add -host ${REMOTE_IP} isdn0
      /sbin/route add default gw ${REMOTE_IP}
   f) switch the card into leased mode for each used B-channel
      /sbin/hisaxctrl HiSax 5 1

Remarks:
a) Use state of the art isdn4k-utils

Here an example script:
#!/bin/sh
# Start/Stop ISDN leased line connection

I4L_AS_MODULE=yes
I4L_REMOTE_IS_CISCO=no
I4L_MODULE_PARAMS="type=16 io=0x268 irq=7 "
I4L_DEBUG=no
I4L_LEASED_128K=yes
LOCAL_IP=192.168.1.1
REMOTE_IP=192.168.2.1

case "$1" in
    start)
        echo "Starting ISDN ..."
        if [ ${I4L_AS_MODULE} = "yes" ]; then
                echo "loading modules..."
                /sbin/modprobe hisax ${I4L_MODULE_PARAMS}
        fi
        # configure interface
        /sbin/isdnctrl addif isdn0
        /sbin/isdnctrl secure isdn0 on
        if [ ${I4L_DEBUG} = "yes" ]; then
                /sbin/isdnctrl verbose 7
                /sbin/hisaxctrl HiSax 1 0xffff
                /sbin/hisaxctrl HiSax 11 0xff
                cat  /dev/isdnctrl >/tmp/lea.log &
        fi
        if [ ${I4L_REMOTE_IS_CISCO} = "yes" ]; then
                /sbin/isdnctrl encap isdn0 cisco-h
        fi
        /sbin/isdnctrl huptimeout isdn0 0
        # B-CHANNEL 1
        /sbin/isdnctrl eaz isdn0 1
        /sbin/isdnctrl l2_prot isdn0 hdlc
        # 1. card
        /sbin/isdnctrl addphone isdn0 in LEASED0
```

```
        if [ ${I4L_LEASED_128K} = "yes" ]; then
                /sbin/isdnctrl addslave isdn0 isdn0s
                /sbin/isdnctrl secure isdn0s on
                /sbin/isdnctrl huptimeout isdn0s 0
                # B-CHANNEL 2
                /sbin/isdnctrl eaz isdn0s 2
                /sbin/isdnctrl l2_prot isdn0s hdlc
                # 1. card
                /sbin/isdnctrl addphone isdn0s in LEASED0
                if [ ${I4L_REMOTE_IS_CISCO} = "yes" ]; then
                        /sbin/isdnctrl encap isdn0s cisco-h
                fi
        fi
        /sbin/isdnctrl dialmode isdn0 manual
        # configure tcp/ip
        /sbin/ifconfig isdn0 ${LOCAL_IP} pointopoint ${REMOTE_IP}
        /sbin/route add -host ${REMOTE_IP} isdn0
        /sbin/route add default gw ${REMOTE_IP}
        # switch to leased mode
        # B-CHANNEL 1
        /sbin/hisaxctrl HiSax 5 1
        if [ ${I4L_LEASED_128K} = "yes" ]; then
                # B-CHANNEL 2
                sleep 10; /* Wait for master */
                /sbin/hisaxctrl HiSax 5 2
        fi
        ;;
    stop)
        /sbin/ifconfig isdn0 down
        /sbin/isdnctrl delif isdn0
        if [ ${I4L_DEBUG} = "yes" ]; then
                killall cat
        fi
        if [ ${I4L_AS_MODULE} = "yes" ]; then
                /sbin/rmmod hisax
                /sbin/rmmod isdn
                /sbin/rmmod ppp
                /sbin/rmmod slhc
        fi
        ;;
    *)
        echo "Usage: $0 {start|stop}"
        exit 1
esac
exit 0
```