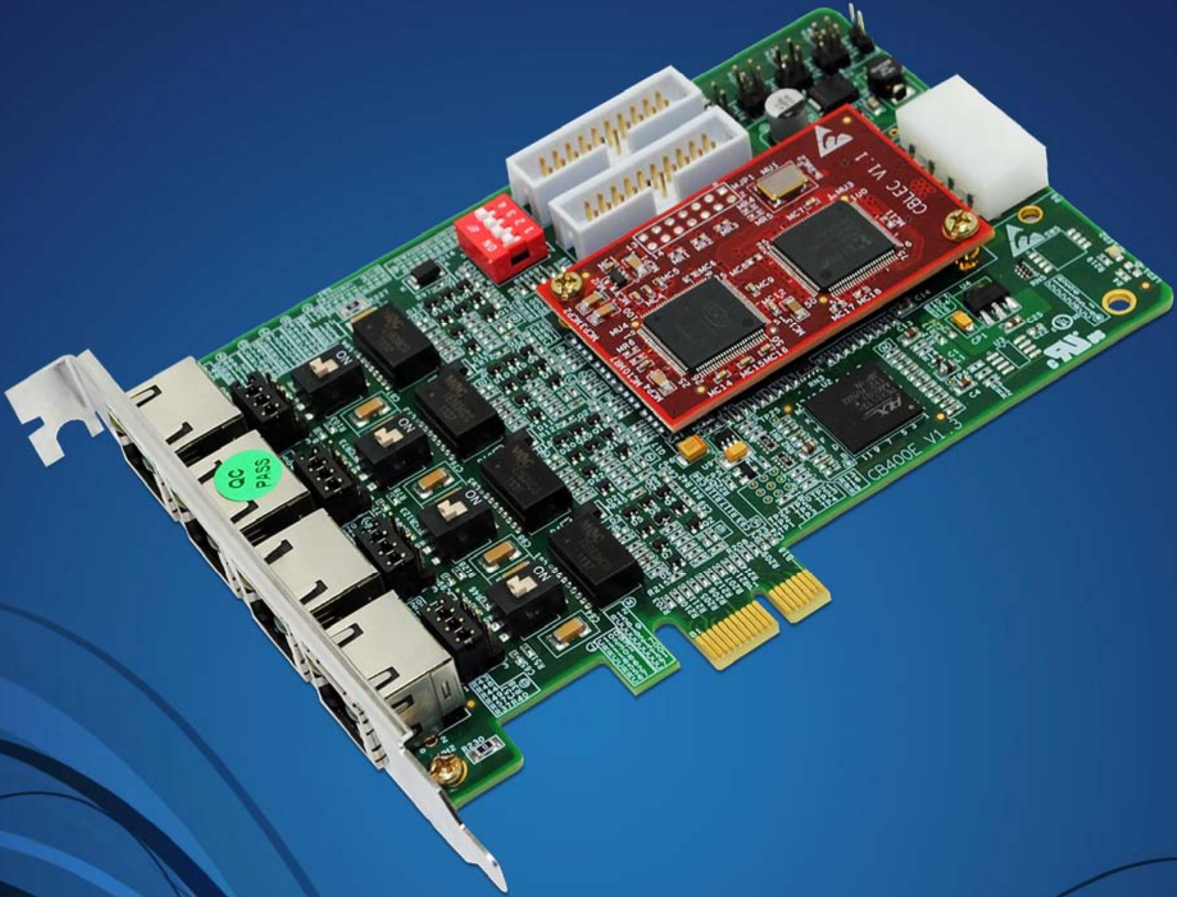


BRI Telephony Card

User Manual

Table of Contents

Overview

Allo.com digital cards are telephony PCI & PCI-e cards used for open source Asterisk based systems. Allo.com CB400P & CB400E are four ports ISDN Basic Rate Interface line termination PCI & PCI-e cards respectively. CB200P & CB200E are two ports ISDN Basic Rate Interface line termination PCI &PCI-e cards respectively.

Features

- Capable of serving as Terminal Equipment (TE) or as Network Termination (NT) device on each independent port
- Supports the ETSI standard using CPE-PTP (Point-to-Point), CPE-PTMP (Point-to-Multipoint), NET-PTP (Point-to-Point), and NETPTMP (Point-to-Multipoint)
- DTMF detection on all B-channels
- Suitable for 3.3 volts and 5.0 volts 32 bit PCI 2.2 slots & PCI-e 1.0 slots
- Onboard multi NT power feeding circuit
- Optional Hardware echo cancellation module

Applications

- ISDN BRI IP PBX
- Voice over IP BRI termination gateways
- ISDN Least Cost Routers
- Traditional Calls/VoIP Calls Conference
- IVR system
- ISDN Test Equipment

Hardware requirement

Least recommended hardware configuration

- 1.6-GHz Pentium IV
- 512 MB RAM
- 3.3V or 5V 32bit PCI slot (2.2) / PCI-e 1x slots (1.0a)

Card dimensions

CB400P & CB200P: 95 mm (height) ×140.61mm (Length)
CB400E & CB200E: 98.4 mm (height) × 140 mm (Length)

Hardware Setting

Port & Jumper Identification

CB400P & CB400E cards have four RJ45 ports. CB200P & CB200E cards have two RJ45 ports. Each port can be configured as either TE or NT operation. The ports are numbered in sequence from one to four. The bottom port is Port 1 and the top port is Port 4. See Figure 1 & 2 for appropriate identification of these ports. TE/NT configuration on the board for each port, should match with software configuration.

The following explains the jumpers, connectors and switches:

For CB400P and CB400E

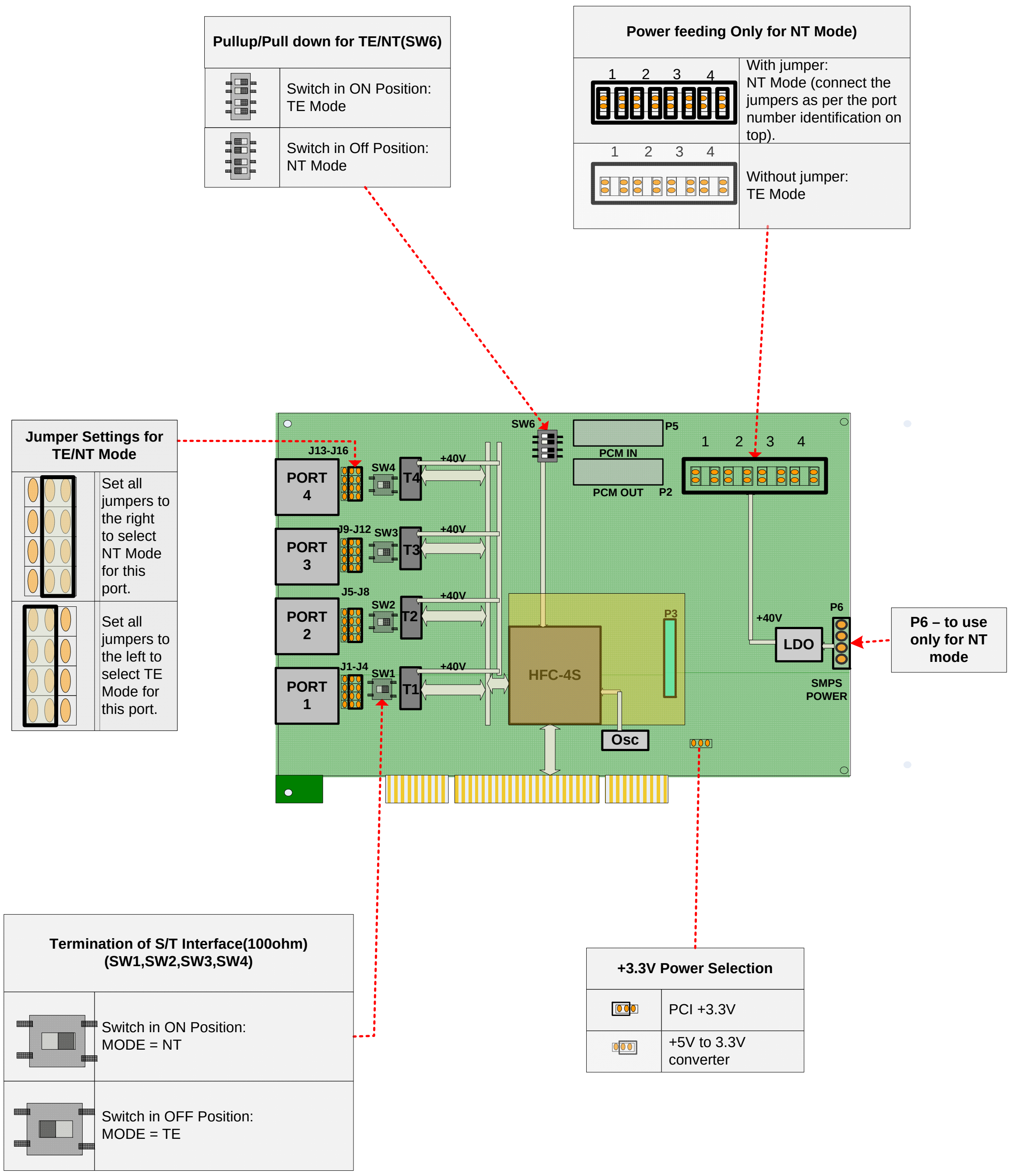
J1 - J16	Group of 4 Jumpers for TE/NT Mode setting
SW6	Pull up / Pull down switch for TE/NT Mode setting.
SW1 – SW4	DIP Switches for Termination in NT Mode
P6	SMPS power connector ((Used in NT mode)
P7-P10	Power feeding jumpers
P3,P4	Hardware echo cancellation connectors

For CB200P and CB200E

J1 - J8	Group of 4 Jumpers for TE/NT Mode setting
SW6	Pull up / Pull down switch for TE/NT Mode setting.
SW1 – SW2	DIP Switches for Termination in NT Mode
P6	SMPS power connector (Used in NT mode)
P7-P8	Power feeding jumpers
P3,P4	Hardware echo cancellation connectors

***NOTE**: Please focus on the switch number & connection number of switch SW6 shown in the below diagram.*

ALLO_4 Port BRI card Jumper Setting:



Pullup/Pull down for TE/NT(SW6)	
	Switch in ON Position: TE Mode
	Switch in Off Position: NT Mode

Power feeding Only for NT Mode)	
1 2 3 4	With jumper: NT Mode (connect the jumpers as per the port number identification on top).
1 2 3 4	Without jumper: TE Mode

Jumper Settings for TE/NT Mode	
	Set all jumpers to the right to select NT Mode for this port.
	Set all jumpers to the left to select TE Mode for this port.

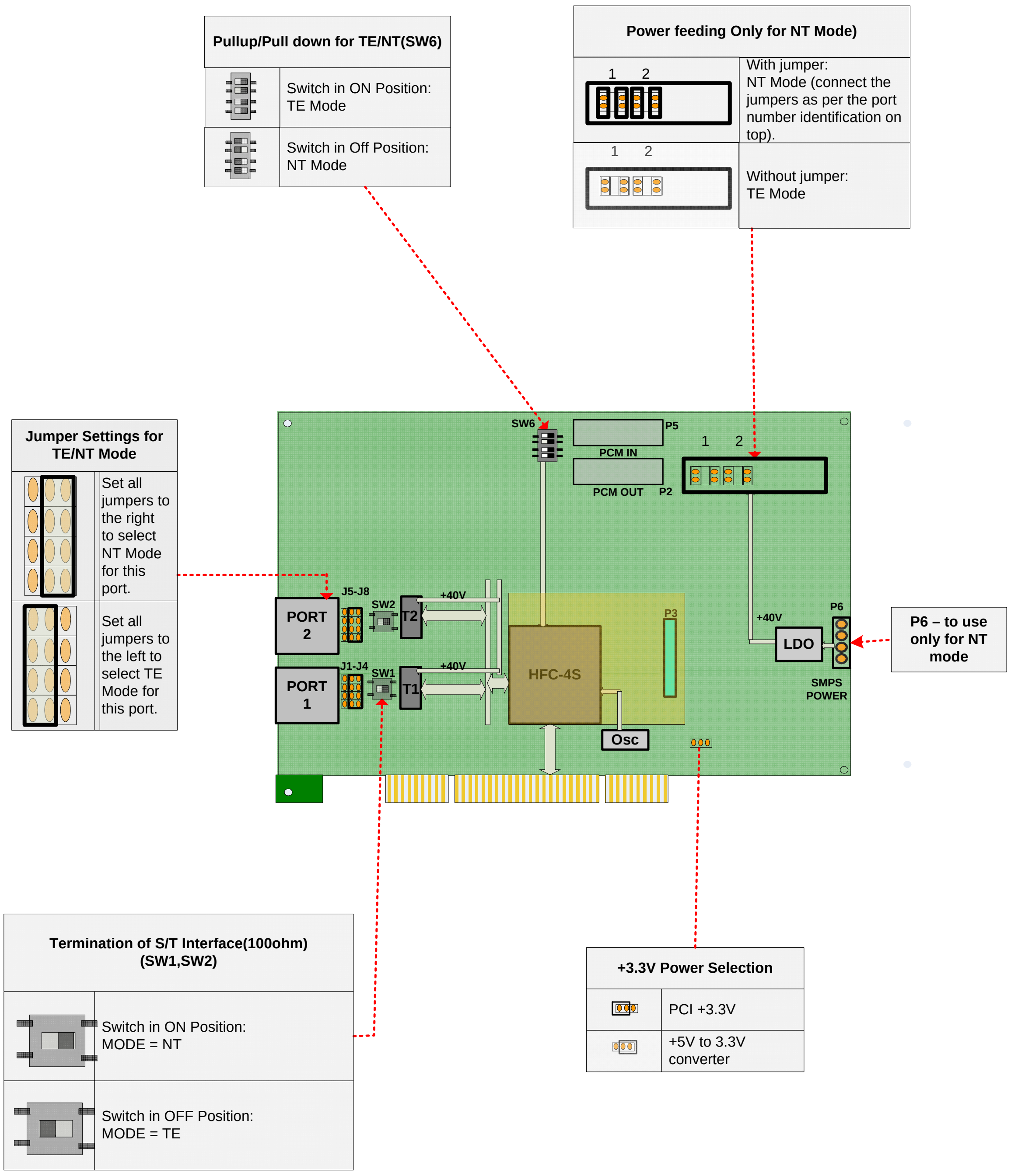
P6 – to use only for NT mode

Termination of S/T Interface(100ohm) (SW1,SW2,SW3,SW4)	
	Switch in ON Position: MODE = NT
	Switch in OFF Position: MODE = TE

+3.3V Power Selection	
	PCI +3.3V
	+5V to 3.3V converter

Figure 1: Jumper & switch position for CB400P/E cards

BRI_PCI_2 Port Jumper Setting:



Pullup/Pull down for TE/NT(SW6)

	Switch in ON Position: TE Mode
	Switch in Off Position: NT Mode

Power feeding Only for NT Mode)

1 2	With jumper: NT Mode (connect the jumpers as per the port number identification on top).
1 2	Without jumper: TE Mode

Jumper Settings for TE/NT Mode

	Set all jumpers to the right to select NT Mode for this port.
	Set all jumpers to the left to select TE Mode for this port.

P6 – to use only for NT mode

Termination of S/T Interface(100ohm) (SW1,SW2)

	Switch in ON Position: MODE = NT
	Switch in OFF Position: MODE = TE

+3.3V Power Selection

	PCI +3.3V
	+5V to 3.3V converter

Figure 2: Jumper & switch position for CB200P/E cards

NT or TE Mode Selection

NT and TE mode is determined by TE/NT Mode setting jumpers & switches, power feeding jumpers and termination switch. Each of the four/two ports can be set for TE or NT mode independently.

Note: The default Jumper setting is in TE mode

TE mode: Place the group of 4 TE/NT Mode setting jumpers on position 1-2 of the connectors, termination switches towards OFF position, TE/NT Mode setting switch SW6 towards ON position and remove the power feeding jumpers.

NT mode: Place the group of 4 TE/NT Mode setting jumpers on position 2-3 of the connectors, termination switches towards ON position, TE/NT Mode setting switch SW6 towards OFF position

Terminating the NT Mode Line

In NT mode, an additional 100 ohm termination can be provided for each port with the termination DIP switches. See Figure 1 & 2, for a detailed illustration of this setting. This switch must not be turned OFF in TE mode. The default setting is OFF.

Onboard Power for NT Mode

ISDN phones can be externally powered or powered from the BRI line. While using phones, sourcing power from BRI lines, following settings are necessary.

SMPS power should be connected on P6. Power feeding jumpers should be connected for each port. See Figure 1 & 2 for a detailed illustration of this setting. These jumpers must be removed in TE mode. The default setting is jumpers are open.

Software Installation

Allo.com Digital cards hardware are only supported under Linux. It requires drivers and libraries which are not integrated with the Linux kernel.

Recommendation
Linux distributions: CentOS 5.4/5.5 and Ubuntu 10.04/11.10
Asterisk Version: Asterisk 1.4/1.6/1.8
Allo Dahdi Driver: Dahdi 2.4.x/2.5/2.6.x/2.7.X

For an introduction to Asterisk, including additional information on its configuration, setups, and features, please refer to: http://www.asterisk.org

To install your CB400P/CB400E/CB200P/CB200E card, you will need:

- Full Linux kernel 2.6.15 (or later) source code.
- Development libraries and headers for ncurses
- Development libraries and headers for zlib and openssl

- Development libraries and headers for newt
- GCC and standard software build tools

It is recommended that you use the most recent version of the Asterisk, DAHDI, and libpri software with the patches provided for the best results. Asterisk 1.4 releases later than 1.4.21, and all releases of Asterisk 1.6, will automatically use DAHDI. If you wish to use the old versions of asterisk 1.4 or 1.2, you will need to follow the installation procedure with mISDN and mISDNuser.

Using Dahdi

Installation Test Environment considered:

OS	:	CentOS 5.5
Kernel version	:	2.6.18-274.7.1.el5
Asterisk version	:	Asterisk-1.8.4.2
Allo Dahdi version	:	dahdi-linux-complete-2.5.0.1+2.5.0.1 from
Libpri version	:	libpri-1.4
Hardware	:	CB400P/CB400E/ CB200P/CB200E

1. After inserting the card into your PCI slot, boot your machine to linux and execute the following command to list the devices detected by the PCI bus:

   ```
   # lspci -vn
   ```

   Confirm the output lists a device with Allo.com's PCI vendor ID which is "b51a". The output will be similar to the following:

   ```
   00:09.0 ISDN controller: Cologne Chip Designs GmbH ISDN network
   Controller [HFC-4S] (rev 01)
      Subsystem: Cologne Chip Designs GmbH Unknown device b51a
   ```

   Note: The output of lspci may or may not state "Allo.com". If it does not, this does not indicate a problem and the device ID may change due to chip upgrade.
   The Allo.com card identifier should be listed. If a card identifier is not listed, then your machine is not PCI 2.2 (or higher), and the card will not work.

2. To install Libpri, DAHDI and Asterisk in CentOS, we have to install the following prerequisite packages:
   bison bison-devel zlib zlib-devel openssl openssl-devel gnutls-devel flex gcc gcc-c++
   Execute the following command to install the above mentioned packages:

   ```
   # yum install bison bison-devel zlib zlib-devel openssl openssl-devel
   gnutls-devel flex gcc gcc-c++ libxml2
   ```

3. Download the libpri software, which are available at
   http://downloads.asterisk.org/pub/telephony/libpri/libpri-1.4-current.tar.gz

   ```
   # wget http://downloads.asterisk.org/pub/telephony/libpri/libpri-1.4-
   current.tar.gz
   ```

4. Expand the downloaded libpri under /usr/src/ directory, compile its contents, and install the drivers.

```
# tar -zxvf libpri-1.4-current.tar.gz
# cd libpri-1.4
# make
# make install
```

5. Download the ALLO DAHDI drivers, which are available at http://www.allo.com/isdn-bri-card.html under "DRIVERS & MANUAL "Section.

```
# wget http://www.allo.com/firmware/bri-card/allo-dahdi-drivers/dahdi-
linux-complete-2.5.0.1+2.5.0.1.tar.gz
```

6. Untar the downloaded file, compile and install using the following commands

```
# cd /usr/src
# tar -zxvf dahdi-linux-complete-2.5.0.1+2.5.0.1.tar.gz
# cd dahdi-linux-complete-2.5.0.1+2.5.0.1
# make
# make install
# make config
```

Note: Executing 'make config' will install an init script and symlinks which will allow you to start and stop DAHDI as a service.

7. Asterisk installation
For using Asterisk for your application, follow the steps below.
Download the Asterisk 1.8 latest release version.

```
# wget http://downloads.digium.com/pub/telephony/asterisk/asterisk-1.8-
current.tar.gz
# tar –xzvf asterisk-1.8-current.tar.gz
# cd asterisk-1.8/
# ./configure --with-pri=../libpri-1.4 --with-dahdi=../dahdi-linux-
complete-2.5.0.1+2.5.0.1
# make menuselect
# make
# make install
```

If this is the first Asterisk installation on this system, you should install the sample configuration files. To do this, run:

```
# make samples
```

Note: Running this command will overwrite any older Asterisk configuration files that you have in the /etc/asterisk directory.

Using mISDN

Installation Test Environment considered:

OS	:	CentOS 5.5
Kernel version	:	2.6.18-274.7.1.el5
Asterisk version	:	Asterisk 1.4.18
mISDN version	:	mISDN v1_1_9.1
Hardware	:	CB400P/CB400E/ CB200P/CB200E

1. After inserting the card into your PCI slot, boot your machine to linux and execute the following command to list the devices detected by the PCI bus

   ```
   # lspci -vn
   ```

   Confirm the output lists a device with Allo.com's PCI vendor ID which is "b51a". The output will be similar to the following:

   ```
   00:09.0 ISDN controller: Cologne Chip Designs GmbH ISDN network
   Controller [HFC-4S] (rev 01)
   Subsystem: Cologne Chip Designs GmbH Unknown device b51a
   ```

   Note: The output of lspci may or may not state "Unknown device". If it does not, this does not indicate a problem.
   The Allo.com card identifier should be listed. If a card identifier is not listed, then your machine is not PCI 2.2 (or higher), and the card will not work.

2. To install asterisk and mISDN in centos OS, we have to install the following prerequisite packages
   bison bison-devel zlib zlib-devel openssl openssl-devel gnutls-devel flex gcc gcc-c++
   Execute the following command to install the above mentioned packages:

   ```
   # yum install bison bison-devel zlib zlib-devel openssl openssl-devel
   gnutls-devel flex gcc gcc-c++
   ```

3. Download the mISDN and mISDNuser driver, which are available at:
   http://www.allo.com/isdn-bri-card.html

   ```
   #wget http://www.allo.com/firmware/bri-card/mISDN.tgz
   #wget http://www.allo.com/firmware/bri-card/mISDNuser-1_1_9.tar.gz
   ```

4. Expand the downloaded file, compile its contents, and install the drivers and tools.

   ```
   # tar -xvzf mISDN.tar.gz
   # cd mISDN-1_1_9.1/
   # make
   # make install
   ```

```
# tar -xvzf mISDNuser.tar.gz
# cd mISDNuser-1_1_9.1/
# make
# make install
```

5. Asterisk Installation

   For using Asterisk for your application, follow the steps below.

   - Download the Asterisk version 1.4.18

```
#wget
http://downloads.asterisk.org/pub/telephony/asterisk/releases/asterisk-
1.4.18.tar.gz
```

   - Expand the downloaded file, compile and install.

```
# tar -zxvf asterisk-X.X-current.tar.gz
# cd asterisk-X.X.X/
# ./configure
# make menuselect
# make
# make install
```

   If this is the first Asterisk installation on this system, you should install the sample configuration files. To do this, run:

```
# make samples
```

   Note: Running this command will overwrite any older Asterisk configuration files that you have in the /etc/asterisk directory.

Software Configuration

This session will provide steps for configuring the card and verifying its setup.

Using Dahdi

After compiling & installing DAHDI and Asterisk, please add the line "**allo4xxp**" at the end of the file in /etc/dahdi/modules and start load the driver by running:

- Load the Dahdi drivers

```
# /etc/init.d/dahdi start

Loading DAHDI hardware modules:
  wct4xxp:                                                [  OK  ]
  wcte12xp:                                               [  OK  ]
  wct1xxp:                                                [  OK  ]
  wcte11xp:                                               [  OK  ]
  wctdm24xxp:                                             [  OK  ]
  wcfxo:                                                  [  OK  ]
  wctdm:                                                  [  OK  ]
  wcb4xxp:                                                [  OK  ]
  wctc4xxp:                                                    [  OK  ]
  xpp_usb:                                                     [  OK  ]
  allo4xxp:                                                    [ OK ]

Running dahdi_cfg:                                             [  OK  ]
```

- Generate config files

```
# dahdi_genconf
```

This will generate /etc/dahdi/system.conf and etc/asterisk/dahdi-channels.conf files automatically. Checking whether the generated files information agrees with your hardware setup, if not, you should modify to your specific requirements. Do not forget to confirm dahdi-channels.conf is included in chan_dahdi.conf, if not included, run command:

```
# echo "#include dahdi-channels.conf" >> /etc/asterisk/chan_dahdi.conf
```

- Reload parameters in driver

```
# dahdi_cfg -vvvvv
```

The command is used for reading and loading parameters in the configuration file system.conf and writing to the hardware. A part of the output is showed below.

```
# dahdi_cfg  -vvvvv

DAHDI Tools Version - 2.5.0.1

DAHDI Version: 2.5.0.1

Echo Canceller(s): HWEC

Configuration
======================

SPAN 1: CCS/ AMI Build-out: 0 db (CSU)/0-133 feet (DSX-1)
SPAN 2: CCS/ AMI Build-out: 0 db (CSU)/0-133 feet (DSX-1)
SPAN 3: CCS/ AMI Build-out: 0 db (CSU)/0-133 feet (DSX-1)
SPAN 4: CCS/ AMI Build-out: 0 db (CSU)/0-133 feet (DSX-1)

Channel map:

Channel 01: Clear channel (Default) (Echo Canceler: none) (Slaves: 01)
Channel 02: Clear channel (Default) (Echo Canceler: none) (Slaves: 02)
Channel 03: Hardware assisted D-channel (Default) (Echo Canceler: none)
(Slaves: 03)
Channel 04: Clear channel (Default) (Echo Canceler: none) (Slaves: 04)
Channel 05: Clear channel (Default) (Echo Canceler: none) (Slaves: 05)
Channel 06: Hardware assisted D-channel (Default) (Echo Canceler: none)
(Slaves: 06)
Channel 07: Clear channel (Default) (Echo Canceler: none) (Slaves: 07)
Channel 08: Clear channel (Default) (Echo Canceler: none) (Slaves: 08)
Channel 09: Hardware assisted D-channel (Default) (Echo Canceler: none)
(Slaves: 09)
Channel 10: Clear channel (Default) (Echo Canceler: none) (Slaves: 10)
Channel 11: Clear channel (Default) (Echo Canceler: none) (Slaves: 11)
Channel 12: Hardware assisted D-channel (Default) (Echo Canceler: none)
(Slaves: 12)

12 channels to configure.

Setting echocan for channel 1 to none
Setting echocan for channel 2 to none
Setting echocan for channel 3 to none
Setting echocan for channel 4 to none
Setting echocan for channel 5 to none
Setting echocan for channel 6 to none
Setting echocan for channel 7 to none
Setting echocan for channel 8 to none
Setting echocan for channel 9 to none
Setting echocan for channel 10 to none
Setting echocan for channel 11 to none
Setting echocan for channel 12 to none
```

The following is a typical system.conf setup for BRI:

```
# Span 1: B4/0/1 "B4XXP (PCI) Card 0 Span 1" (MASTER) AMI/CCS
span=1,1,0,ccs,ami
# termtype: te
bchan=1-2
hardhdlc=3

# Span 2: B4/0/2 "B4XXP (PCI) Card 0 Span 2" AMI/CCS
span=2,2,0,ccs,ami
# termtype: te
bchan=4-5
hardhdlc=6

# Span 3: B4/0/3 "B4XXP (PCI) Card 0 Span 3" AMI/CCS RED
span=3,3,0,ccs,ami
# termtype: te
bchan=7-8
hardhdlc=9

# Span 4: B4/0/4 "B4XXP (PCI) Card 0 Span 4" AMI/CCS RED
span=4,4,0,ccs,ami
# termtype: te
bchan=10-11
hardhdlc=12

# Global data
loadzone        = us
defaultzone     = us
```

Using mISDN

- Modify the /etc/modprobe.d/blacklist file to add some blacklist. Add the following lines in the end of file.

```
blacklist hisax
blacklist hisax_fcpcipnp
blacklist hisax_isac
blacklist crc_ccitt
blacklist isdn
blacklist slhc
blacklist capi
blacklist capifs
blacklist kernelcapi
blacklist kernel_capi
blacklist avmfritz
blacklist hfc4s8s_l1
```

- Execute the following command to confirm the card is detected using the mISDN tool.

```
# mISDN scan
1 mISDN compatible device(s) found:
>> BN4S0
```

- Execute the following command to generate the configure file /etc/mISDN.conf. And edit the file appropriately (it is self documented).

```
# mISDN config
Writing /etc/mISDN.conf for 1 mISDN compatible device(s):
>> BN4S0
/etc/mISDN.conf already present, saving a backup: /etc/mISDN.conf.bak
```

- Execute the following command to start the required mISDN drivers.

```
# mISDN start
-- Loading mISDN modules --
>> /sbin/modprobe --ignore-install capi
>> /sbin/modprobe --ignore-install mISDN_core debug=0
>> /sbin/modprobe --ignore-install mISDN_l1 debug=0
>> /sbin/modprobe --ignore-install mISDN_l2 debug=0
>> /sbin/modprobe --ignore-install l3udss1 debug=0
>> /sbin/modprobe --ignore-install mISDN_capi
>> /sbin/modprobe --ignore-install hfcmulti type=0x4
protocol=0x2,0x2,0x2,0x2 layermask=0xf,0xf,0xf,0xf poll=128 debug=0
timer=0
>> /sbin/modprobe --ignore-install mISDN_dsp debug=0 options=0
```

- Execute the following command to check the port configurations.

```
# misdnportinfo
Port 1: TE-mode BRI S/T interface line (for phone lines)
-> Protocol: DSS1 (Euro ISDN)
-> Layer 4 protocol 0x04000001 is detected, but not allowed for TE lib.
-> childcnt: 2
* Port NOT useable for PBX (maybe there is already a PBX running?)
--------
Port 2: TE-mode BRI S/T interface line (for phone lines)
-> Protocol: DSS1 (Euro ISDN)
-> Layer 4 protocol 0x04000001 is detected, but not allowed for TE lib.
-> childcnt: 2
* Port NOT useable for PBX (maybe there is already a PBX running?)
--------
Port 3: TE-mode BRI S/T interface line (for phone lines)
-> Protocol: DSS1 (Euro ISDN)
-> Layer 4 protocol 0x04000001 is detected, but not allowed for TE lib.
-> childcnt: 2
* Port NOT useable for PBX (maybe there is already a PBX running?)
```

```
--------
Port 4: TE-mode BRI S/T interface line (for phone lines)
-> Protocol: DSS1 (Euro ISDN)
-> Layer 4 protocol 0x04000001 is detected, but not allowed for TE lib.
-> childcnt: 2
* Port NOT useable for PBX (maybe there is already a PBX running?)
--------
mISDN_close: fid(3) isize(131072) inbuf(0x8410060) irp(0x8410060)
iend(0x8410060)
```

Enabling Echo Cancellation

All Allo.com BRI cards is enhanced with optional echo cancellation module (LEC). Model names with postfix “D” are with LEC module. It improves voice quality in environments where software echo cancellation is not sufficient. The LEC provides 64ms of echo cancellation simultaneously on all eight/four B-channels. Echo cancellation is enabled by setting echocancel=64 in chan_dahdi.conf and vpmsupport=1 in /etc/modprobe.d/dahdi.conf for wcb4xxp. Echo cancellation is disabled by setting echocancel=0 in chan_dahdi.conf and vpmsupport=0 in /etc/modprobe.d/dahdi.conf for wcb4xxp. (mISDN driver will not support echo cancellation).

Test Configuration

Using Dahdi

Verify the Dahdi & Asterisk is properly configured with these commands.

- Load DAHDI drivers into the kernel using the modprobe utility. The appropriate driver for the CB400P/CB400E/CB200P/CB200E cards is `cem4xxp`. Execute the following commands:

```
# modprobe cem4xxp
# dahdi_cfg -vv
# dmesg

dahdi: Telephony Interface Registered on major 196
dahdi: Version: 2.5.0.1
wcb4xxp 0000:00:0c.0: probe called for b4xx...
PCI: Enabling device 0000:00:0c.0 (0100 -> 0103)
ACPI: PCI Interrupt 0000:00:0c.0[A] -> GSI 17 (level, low) -> IRQ 201
*cem4xxp* 0000:00:0c.0: Identified CEM QuadBri (controller rev 1) at
0001e800, IRQ 201
Inside zarlink_ec_init
Chip Type: zl50234/zl50235
zarlink_LEC_chip: Select chip ZL38065/ZL50232 with 32 channels
zarlink_LEC_chip: Inserting EchoCanceler module. 32 channels
cem4xxp 0000:00:0c.0: GPIO e0 Port 1: TE mode
**cem4xxp** 0000:00:0c.0: GPIO e0 Port 2: NT mode
**cem4xxp** 0000:00:0c.0: GPIO e0 Port 3: NT mode
cem4xxp 0000:00:0c.0: GPIO e0 Port 4: NT mode
cem4xxp 0000:00:0c.0: Did not do the highestorder stuff
```

- Run dahdi_tool from the command line and see if the span turns green for each span you have connected.

```
# dahdi_tool
```

- Start Asterisk, and then connect to the Asterisk CLI

```
# asterisk -vvvvvgc
```

Please run the following command:

```
*CLI> dahdi show status

Description                              Alarms  IRQ    bpviol CRC
Fra Codi Options  LBO

B4XXP (PCI) Card 0 Span 1                OK      0      0      0
CCS AMI          0 db (CSU)/0-133 feet (DSX-1)
B4XXP (PCI) Card 0 Span 2                OK      0      0      0
CCS AMI          0 db (CSU)/0-133 feet (DSX-1)
B4XXP (PCI) Card 0 Span 3                RED     0      0      0
CCS AMI          0 db (CSU)/0-133 feet (DSX-1)
B4XXP (PCI) Card 0 Span 4                RED     0      0      0
CCS AMI          0 db (CSU)/0-133 feet (DSX-1)


*CLI> dahdi show channels

   Chan  Extension      Context         Language   MOH Interpret
Blocked    State

 pseudo                        default           default
In Service
      1                           from-pstn        default
In Service
      2                           from-pstn        default
In Service
      4                           from-pstn        default
In Service
      5                           from-pstn        default
In Service
      7                           from-pstn        default
In Service
      8                           from-pstn        default
In Service
     10                          from-pstn        default
In Service
     11                          from-pstn        default
In Service
```

If DAHDI channels are found, it means they have been loaded into Asterisk. You are going to edit dial plan by your requirements.

Users must make sure that the context "from-pstn" and "from-internal" are in extensions.conf, here a simple example is given:

```
[from-pstn]
exten => _X.,1,Dial(dahdi/1)
exten => _X.,n,Hangup()

[from-intern]
exten => 100,1,Dial(dahdi/4/${EXTEN})
exten => 100,n,Hangup()
```

The dial plan achieves that, when an extension telephone dials 100, Asterisk will transfer through channel 4 to the destination. While a call comes from PSTN line, Asterisk answers firstly, and then gets through to the extension set which connects channel 1.

After saving your dial plan, please run "asterisk –r", then execute "reload" in the CLI. Next you are able to make calls.

Using mISDN

In the following procedures, loop back test performed to confirm the correct installation of the card. For this a straight-through cable is used.

- Configure the port 1 as NT mode and port 4 as TE mode by modifying the /etc/mISDN.conf file.

```
<?xml version="1.0"?>
<!--
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- - - -
Card Type: BN2S0, BN4S0, BN8S0
Card Attributes: ulaw=(yes|no), dtmf=(yes|no), pcm_slave=(yes|no),
ignore_pcm_frameclock=(yes|no), rxclock=(yes|no),
crystalclock=(yes|no), watchdog=(yes|no)
Port Attributes: mode=(te|nt), link=(ptp|ptmp), master-clock=(yes|no),
capi=(yes|no)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - -
Card Type: BN2E1
Card Attributes: ulaw=(yes|no), dtmf=(yes|no), pcm_slave=(yes|no),
ignore_pcm_frameclock=(yes|no), rxclock=(yes|no),
crystalclock=(yes|no), watchdog=(yes|no)
Port Attributes: mode=(te|nt), link=(ptp|ptmp), optical=(yes|no),
los=(yes|no),
ais=(yes|no), slip=(yes|no), nocrc4=(yes|no), capi=(yes|no)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - -
Card Type: hfcmulti, avmfritz, w6692pci
Port Attributes: mode=(te|nt), link=(ptp|ptmp), capi=(yes|no)
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- - - -
Module: hfcmulti
Options: poll=<number>, pcm=<number>, debug=<number>, timer=(yes|no)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - -
Module: hfcsusb
Options: debug=<number> poll=<number>
```

```
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- - - -
Module: xhfc
Options: debug=<number>
Port Attributes: mode=(te|nt), link=(ptp|ptmp), line=(s0|up)
capi=(yes|no) lineloop_b1=(yes|no) lineloop_b2=(yes|no),
lineloop_d=(yes|no)
polx=(yes|no)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - -
Module: mISDN_dsp
Options: debug=<number>, options=<number>, poll=<number>,
dtmfthreshold=<number>
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - -
-->
<mISDNconf>
<module poll="128" debug="0" timer="no">hfcmulti</module>
<module debug="0" options="0">mISDN_dsp</module>
<devnode user="root" group="root" mode="644">mISDN</devnode>
<card type="BN4S0">
<port mode="te" link="ptmp">1</port>
<port mode="te" link="ptmp">2</port>
<port mode="te" link="ptmp">3</port>
<port mode="nt" link="ptmp">4</port>
</card>
</mISDNconf>
```

Restart the mISDN drivers by executing the command

```
# mISDN restart
```

- Plug the straight-through cable into the port 1 and port 4.
- Modify the Asterisk config files appropriately.

```
#vi /etc/asterisk/misdn.conf
[outcall]
ports=1
context=from-isdn

[isdn]
ports=2,3,4
context=to-isdn
; adding the postfix 'ptp' to a port number is obsolete now, chan_misdn
; parses /etc/misdn-init.conf and sets the ptp mode to the corresponding
; configs. For backwards compatibility you can still set ptp here.
```

Edit dial-plan in extensions.conf file

```
#vi /etc/asterisk/extensions.conf
[from-isdn]
exten => _X., 1, Dial(SIP/555)
[to-isdn]
exten => _X., 1, Dial(mISDN/g:isdn/${EXTEN})
```

The dial plan is linked with misdn.conf. The example shows the port 1 is used for inbound calls and port 2, 3 & 4 are used for outbound calls.
After asterisk reload, check the status of misdn module through the CLI.

```
*CLI> misdn show stacks
BEGIN STACK_LIST:
* Port 1 Type TE Prot. PMP L2Link DOWN L1Link:UP Blocked:0 Debug:0
* Port 2 Type NT Prot. PMP L2Link DOWN L1Link:DOWN Blocked:0 Debug:0
* Port 3 Type NT Prot. PMP L2Link DOWN L1Link:DOWN Blocked:0 Debug:0
* Port 4 Type NT Prot. PMP L2Link DOWN L1Link:UP Blocked:0 Debug:0
```

- The below screens show the asterisk debug capture of outbound call & inbound call.

Inbound call

```
*CLI> -- Executing [08067120954@from-isdn:1] Dial("mISDN/1-u0",
"mISDN/4/08067120954") in new stack
-- Called 4/08067120954
-- mISDN/tmp2-u1 is proceeding passing it to mISDN/1-u0
-- mISDN/tmp2-u1 is ringing
== Spawn extension (isdn-in, 08067120954, 1) exited non-zero on
'mISDN/1-u0'
```

Outbound call

```
*CLI> -- Executing [7259691221@to-isdn:1] Dial("mISDN/7-u0",
"mISDN/1/7259691221") in new stack
-- Called 1/7259691221
-- mISDN/1-u2 is proceeding passing it to mISDN/7-u0
-- mISDN/1-u2 is ringing
-- mISDN/1-u2 is making progress passing it to mISDN/7-u0
== Spawn extension (isdn-out, 7259691221, 1) exited non-zero on
'mISDN/7-u0'
P[ 0] received 1k Unhandled Bchannel Messages: prim f2481 len 0 from
addr 55010480, dinfo 0 on this port.
```

Reference

http://allo.com
http://www.misdn.org/index.php/Main_Page
http://www.asterisk.org
http://www.voip-info.org