



**OpenVox Communication Co.Ltd**



**D110P/D110E on DAHDI User Manual**

Version: 2.2





**OpenVox Communication Co.Ltd**

***OpenVox-Best Cost Effective Asterisk Cards***

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## General Safety Instructions



### CAUTION

1. The computers that have D110P/D110E card installed must comply with the country's specific safety regulations.
2. Only service personnel should go to install D110P/D110E card.
3. Before installing D110P/D110E card, please unplug the power cord and remove the cover from your PC.
4. For avoiding personal injuries and damages to your machine and D110P/D110E card, make sure bracket of the card is secured to the PC's chassis ground by fastening the card with a screw.
5. Electrical Surges, ESD are very destructive to the equipment. To avoid it, make sure there is a low impedance discharge path from your computer to chassis ground.
6. To reduce the risk of damage or injury, please follow all steps or procedures as instructed.

## Test Environments

CentOS-5.5

Kernel version: 2.6.18-194. el5

DAHDI: dahdi-linux-complete-current

Asterisk: asterisk-1.8.5.0

Libpri: libpri-1.4.11.5

Hardware: OpenVox D110P/D110E

## Chapter 1 Overview

### 1.1 What is Asterisk

The Definition of Asterisk is described as follows:

Asterisk is a complete PBX in software. It runs on Linux, BSD, Windows (emulated) and provides all of the features you would expect from a PBX and more. Asterisk does voice over IP in four protocols, and can interoperate with almost all standard-based telephony equipment using relatively cost-effective hardware. Asterisk provides Voicemail services with Directory, Call Conferencing, Interactive Voice Response, Call Queuing. It supports for three-way calling, caller ID services, ADSI, IAX, SIP, H323 (as both client and gateway), MGCP (call manager only) and SCCP/Skinny (voip-info.org).

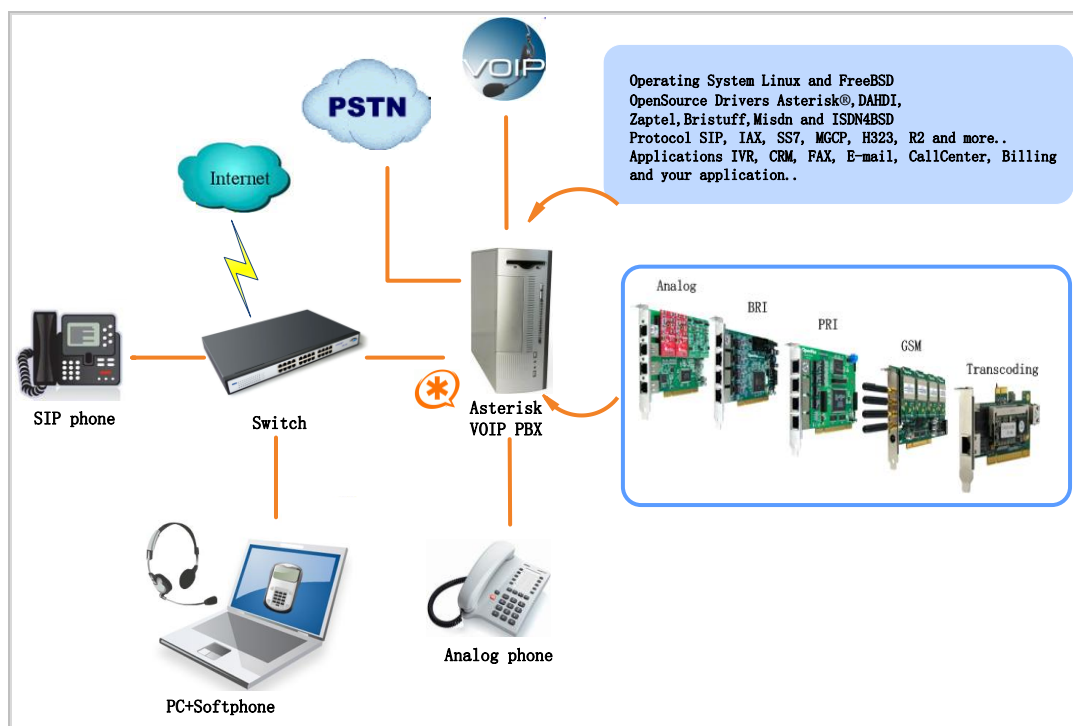


Figure 1 Topology

## 1.2 What is D110P/D110E

The D110P/D110E supports E1, T1 and J1 environments. It is selectable on a per-card or per-port basis. This feature enables signaling translation between E1 and T1 equipments and allows inexpensive T1 channel banks to connect with E1 circuits.

D110P/D110E supports industry standard telephony and data protocols, including Primary Rate ISDN (both N. American and Standard Euro) protocol families for voice, PPP, Cisco, HDLC, and Frame Relay data modes. Both line-side and trunk-side interfaces are supported.

D110P/D110E works well with Asterisk®, Elastix®, FreeSWITCH™, PBX in a Flash, trixbox®, Yate™ and IPPBX/IVR projects as well as other Open Source and proprietary PBX, Switch, IVR, and VoIP gateway applications.

### Target Applications

- Voice-over Internet Protocol (VoIP) Services
- Complex IVR Trees
- "Meet-Me" Bridge Conferencing
- VoIP Gateways (support SIP, H.323, and IAX)
- Legacy PBX/IVR Services
- Voice/Data Router (replace expensive routers)
- PRI/Switch Compatibility - Network or CPE



## Chapter 2 Hardware Setup

There are some points that should be paid attention to when setting up D110P/D110E.

### 2.1 Span type setup

The jumper P5 on the middle of right side controls the function of each span at E1 or T1 mode. Setting P5 to close means SPAN1 will work at E1 mode. Setting P5 to open means SPAN1 will be T1.

### 2.2 Slot compatibility

D110P is compatible with 32-bit 5.0V PCI slot, 64-bit 3.3V PCI slot or 64-bit 5.0V PCI slot, but D110E is compatible with PCI-E  $\times 1$ ,  $\times 2$ ,  $\times 4$ ,  $\times 8$ , or  $\times 16$  slot. You should confirm your slot type and insert D110P into a PCI slot or put D110E into a PCI-E slot as previously described.

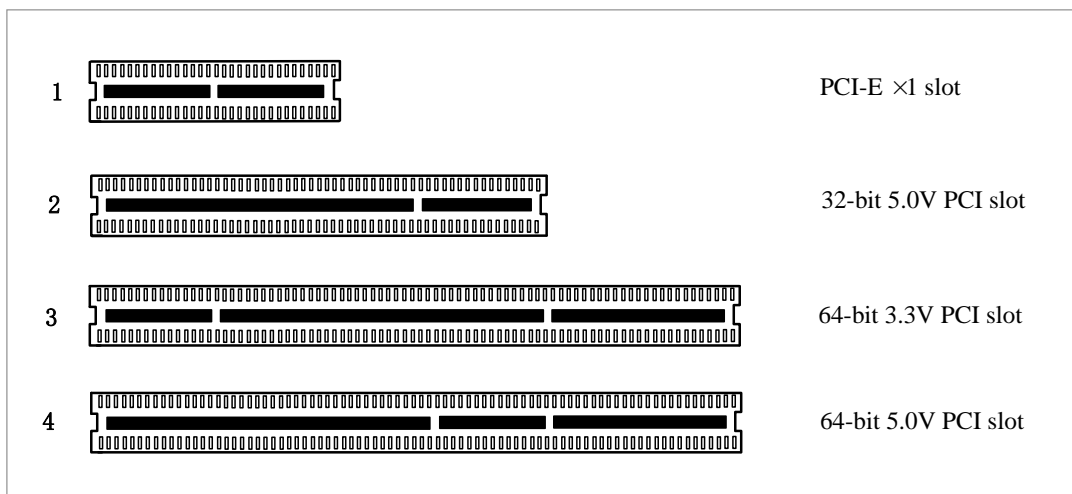


Figure 2 PCI-E and PCI slot

## 2.3 Timing cable

If you have just one card in the system, all channels on that card have already run under the same clock source, so timing cable is unnecessary.

But if there are more than one card, using timing cable has some advantages. Before using the clock line, each card works on its own clock, therefore precision of the clock is limited; each card will send/receive voice data at different speeds. In voice usage, this small issue can be omitted, but in data communication such as Fax/Modem, it will cause big problems. Data loss will cause communication broken or fax broken. Timing cable will force all cards to work at the same clock source, send data at the same speed, as a result no data will lost.

If you found J914 (input) and J915 (output) interfaces on the card, it means the card supports clock line, for details, please refer to [HERE](#).

## Chapter 3 Software Installation and Configuration

D110P/D110E supports DAHDI software driver on Linux. To make full use of D110P/D110E, you should download, compile, install and configure Libpri, DAHDI and Asterisk.

### 3.1 Download

DAHDI software packages are available on OpenVox official website or Digium. Some patches should be added while the driver source is from Digium, therefore, it is recommended that downloading the DAHDI driver package from OpenVox official website.

Gain DAHDI source package from OpenVox:

[http://downloads.openvox.cn/pub/drivers/dahdi-linux-complete/openvox\\_dahdi-linux-complete-current.tar.gz](http://downloads.openvox.cn/pub/drivers/dahdi-linux-complete/openvox_dahdi-linux-complete-current.tar.gz)

Get Asterisk software package from digium official website:

<http://downloads.asterisk.org/pub/telephony/asterisk/releases/asterisk-1.8.5.0.tar.gz>

Get Libpri software package from digium official website:

<http://downloads.asterisk.org/pub/telephony/libpri/releases/libpri-1.4.11.5.tar.gz>

Execute the following commands under the directory of /usr/src/ in

generally, the former three below are used for downloading these three packages and the later three are for unzipping them.

```
# wget http://downloads.openvox.cn/pub/drivers/da  
hdi-linux-complete/openvox_dahdi-linux-complete-c  
urrent.tar.gz
```

```
# wget http://downloads.asterisk.org/pub/telephon  
y/asterisk/releases/asterisk-1.8.5.0.tar.gz
```

```
# wget http://downloads.asterisk.org/pub/telephon  
y/libpri/releases/libpri-1.4.11.5.tar.gz
```

```
# tar -xvzf openvox_dahdi-linux-complete-current.  
tar.gz
```

```
# tar -xvzf asterisk-1.8.5.0.tar.gz
```

```
# tar -xzvf libpri-1.4.11.5tar.gz
```

## 3.2 Installation

### 1. Hardware detection

```
# lspci -vvvv
```

Check the outcome and confirm your system has recognized

D110P/D110E. If it has been recognized, "communication controller" will be displayed in the output information like that:

```
01:02.0 Network controller: Tiger Jet Network Inc. Tiger3XX Modem/ISDN interface
  Subsystem: Unknown device 79de:0001
  Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr-
Stepping- SERR- FastB2B-
  Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=medium >TAbort- <TAbort-
<MAbort- >SERR- <PERR-
  Latency: 64 (250ns min, 32000ns max)
  Interrupt: pin A routed to IRQ 225
  Region 0: I/O ports at c800 [size=256]
  Region 1: Memory at dcdff000 (32-bit, non-prefetchable) [size=4K]
  Capabilities: [40] Power Management version 2
    Flags: PMEClk- DSI+ D1- D2+ AuxCurrent=55mA PME (D0+,D1-
,D2+,D3hot+,D3cold+)
    Status: D0 PME-Enable- DSel=0 DScale=0 PME-
```

**Figure 3 Hardware detection**

If D110P/D110E is not recognized by the system, you have to power off and take out the card, then try to insert it into other PCI or PCI-E slot.

## 2. Software installation

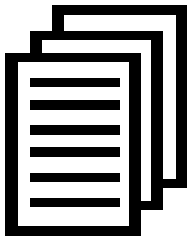
Some dependencies are crucial. If any of them is absent, the software installation process would not go through successfully. Let's run "yum install XX" (XX stands for the dependency's name) to check the availability of dependencies.

```
# yum install bison
```

```
# yum install bison-devel
```

```
# yum install ncurses
```

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



If there is no kernel-devel source in the system, users should run the following command to install the kernel-devel to peer current kernel:

```
# yum install kernel-devel-`uname -r`
```

While if there is no matched kernel-devel found, you should download matched RPM package to install it, or execute the following command to update to the latest and stable kernel version:

```
# yum install kernel kernel-devel
```

After installed, please reboot your machine to apply the new kernel and install the dependencies. If the dependency has been installed, system indicates that nothing to do which means you could go to next one

directly. Otherwise, the system will keep on installing it.

Among Libpri, DAHDI and Asterisk, let's install libpri firstly. Please execute those commands under the directory of /usr/src/ in generally:

```
# cd libpri-XX
```

```
# make
```

```
# make install
```

Change to the directory of dahdi-linux-complete-XX (XX represents DAHDI version), then perform commands one by one to install DAHDI.

```
# cd /usr/src/dahdi-linux-complete-XX
```

```
# make
```

```
# make install
```

```
# make config
```



**Caution:** If there is something wrong after "make", please refer to [HERE](#). In the url link, the moderator introduces you a method how to patch. After patching, save your changes and exit. Then run "make" again, if successfully done, it is time for you to install Asterisk.

Please operate those commands to install Asterisk.

```
# cd asterisk-XX
# ./configure
# make
# make install
# make samples
```



"make samples" will generate the standard sample configuration file in the directory `/etc/asterisk`. As a freshman, you should perform "make samples", that is to say, it is unnecessary to perform "make samples" every time. Because once performed, it will cover the old sample configuration files you have installed.

## 3.3 Configuration

### 1. Driver loading

After compiling and installing DAHDI and Asterisk, please load the driver by running:

```
# modprobe dahdi
# modprobe wctel1xp
```



```
# dahdi_genconf
```

If there is any error, please trace the cause. Until all errors are clear up, you could execute "dahdi\_genconf" again, and then go to the next step. By running "dahdi\_genconf", it will generate /etc/dahdi/system.conf and etc/asterisk/dahdi-channels.conf 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, run command:

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

A part of system.conf which is one of the basic channel configuration files is displayed.

```
# Span 1: WCT1/0 "Digium Wildcard TE110P T1/E1 Card 0" (MASTER)
span=1,1,0,ccs,hdb3,crc4
# termtype: te
bchan=1-15,17-31
dchan=16
echocanceller=mg2,1-15,17-31

# Global data

loadzone          = us
defaultzone       = us
```

Figure 4 A part of system.conf

## 2. Country mode modification

In order to match your country pattern, you need to change parameters `loadzone` and `defaultzone` to your country. For example, your system is in CHINA, you would like them change to:

```
loadzone = cn
```

```
defaultzone = cn
```



Some zonedata is available in the file

.. `/dahdi-XX/tools/zonedata.c`, you can refer to it to match

your country mode. Meanwhile, you also need to modify

another parameter which is in file

`/etc/asterisk/indications.conf`.

```
country=cn
```

A part of file `/etc/asterisk/dahdi-channels.conf` is showed as below.

(Modification, if it is not agree with the hardware setup)

```
; Span 1: WCT1/0 "Digium Wildcard TE110P  
T1/E1 Card 0" (MASTER)  
group=0,11  
context=from-pstn  
switchtype = euroisdn  
signalling = pri_cpe  
channel => 1-15,17-31  
context = default  
group = 63
```

**Figure 5 A part of dahdi-channels.conf**

After modifying the country mode, please execute the following command:

```
# dahdi_cfg -vvvvvv
```

The command is used for reading and loading parameters in the configuration file system.conf and writing to the hardware. A part of outputs are showed in the following figure.

```
[root@localhost ~]# dahdi_cfg -v
DAHDI Tools Version - 2.4.0

DAHDI Version: 2.4.0
Echo Canceller(s): MG2
Configuration
=====

SPAN 1: CCS/HDB3 Build-out: 0 db (CSU)/0-133 feet (DSX-1)

31 channels to configure.

Setting echocan for channel 1 to mg2
Setting echocan for channel 2 to mg2
Setting echocan for channel 3 to mg2
Setting echocan for channel 4 to mg2
Setting echocan for channel 5 to mg2
Setting echocan for channel 6 to mg2
Setting echocan for channel 7 to mg2
Setting echocan for channel 8 to mg2
Setting echocan for channel 9 to mg2
Setting echocan for channel 10 to mg2
.....
.....
Setting echocan for channel 27 to mg2
Setting echocan for channel 28 to mg2
Setting echocan for channel 29 to mg2
Setting echocan for channel 30 to mg2
Setting echocan for channel 31 to mg2
```

Figure 6 Channel map

### 3. Asterisk initiation

```
# asterisk -vvvvvvvgc
```

If Asterisk is already activate, run "asterisk -r" instead. In the CLI, please run the following command:

```
localhost*CLI> dahdi show channels
```

1	from-pstn	Default	In Service
2	from-pstn	default	In Service
3	from-pstn	default	In Service
4	from-pstn	default	In Service
5	from-pstn	default	In Service
6	from-pstn	default	In Service
7	from-pstn	default	In Service
8	from-pstn	default	In Service
9	from-pstn	default	In Service
10	from-pstn	default	In Service
11	from-pstn	default	In Service
12	from-pstn	default	In Service
13	from-pstn	default	In Service
14	from-pstn	default	In Service
15	from-pstn	default	In Service
17	from-pstn	default	In Service
18	from-pstn	default	In Service
19	from-pstn	default	In Service
20	from-pstn	default	In Service
21	from-pstn	default	In Service
22	from-pstn	default	In Service
23	from-pstn	default	In Service
24	from-pstn	default	In Service
25	from-pstn	default	In Service
26	from-pstn	default	In Service
27	from-pstn	default	In Service
28	from-pstn	default	In Service
29	from-pstn	default	In Service
30	from-pstn	default	In Service
31	from-pstn	default	In Service

Figure 7 channels show

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

requirements.

#### 4. Dialplan edit

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

```
# vim /etc/asterisk/extensions.conf

[from-pstn]
Exten => s,1,Answer()
exten => s,n,Playback(cc_welcome)
exten => s,n,Hangup()

[from-internal]
exten => _X.,1,Dial(dahdi/g0/${EXTEN})
exten => _X.,n,Hangup
```

Figure 8 dial plan

#### Additional function

Users should run command "cat /proc/interrupts" to check

D110P/D110E has independent interrupt. If it shares interrupt with other device, it may cause some problems or even cannot work normally.



## Chapter 4 Reference

[www.openvox.cn](http://www.openvox.cn)

[www.digium.com](http://www.digium.com)

[www.asterisk.org](http://www.asterisk.org)

[www.voip-info.org](http://www.voip-info.org)

[www.asteriskguru.com](http://www.asteriskguru.com)

### **Tips**

Any questions during installation, please consult in our forum or look up for answers from the following websites:

[Forum](#)

[wiki](#)

## Appendix A Specifications

### • Weight and size

Weight: 54g

Size: 122.2×63.5×16mm<sup>3</sup> (D110P)

119.7×68.8×16mm<sup>3</sup> (D110E)

### • Interfaces

RJ48 connector

PCI Bus: 3.3V or 5V bus slot, PCI 2.2 or above (D110P)

PCI-E ×1, ×2, ×4, ×8, ×16 slot (D110E)

### • Environments

Storage temperature: -65 ~ 125 °C

Operation temperature: 0 ~ 50 °C

Humidity: 10 ~ 90% NON-CONDENSING

### • Power consumption

Voltage: 3.3V

Power Dissipation Max:1.2W

### • Hardware and software requirements

RAM 128 + MB

Linux kernel 2.4.X or 2.6.X

CPU 800+ MHZ

