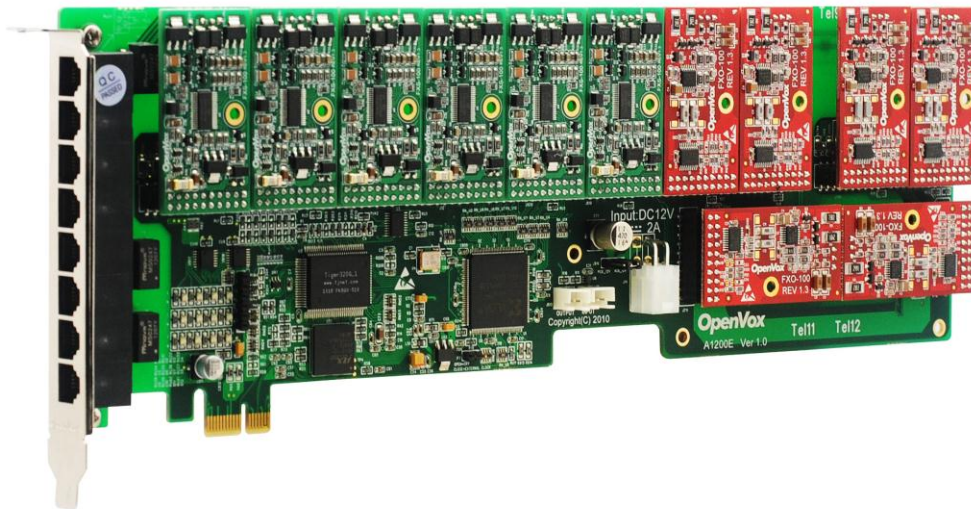




OpenVox Communication Co.Ltd



A1200E 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 A1200E card installed must comply with the country's specific safety regulations.
2. Only service personnel should go to install A1200E card.
3. Before installing A1200E card, please unplug the power cord and remove the cover from your PC.
4. For avoiding personal injuries and damages to your machine and A1200E 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-5.6

Kernel version: 2.6.18-238.12.1.el5

DAHDI: dahdi-linux-complete-current

Asterisk: 1.8.0

Hardware: OpenVox A1200E



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).

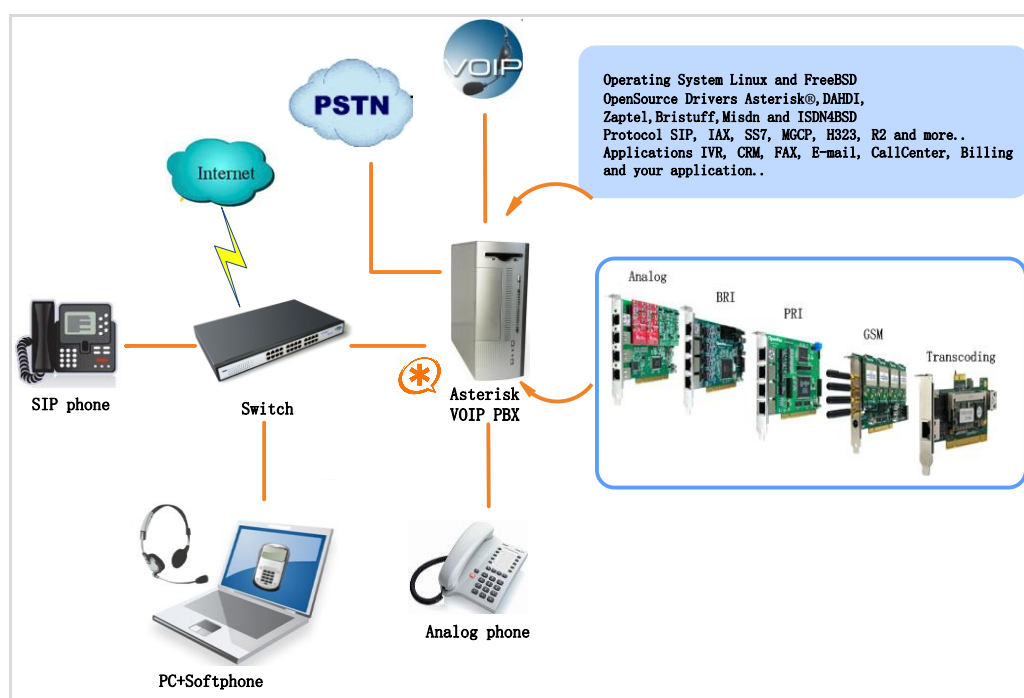


Figure 1 Topology

1.2 What is A1200E

A1200E is the industrial first 12 port analog card with 12 interchangeable FXS/FXO modules design. It can eliminate the requirement for separate channel banks or access gateways.

The A1200E contains 12 module banks. Each bank supports one analog interface. The module banks may be filled with up to 12 FXO or FXS modules enabling the creation of any combination of ports. Scaling of an analog card solution is accomplished by simply adding additional cards.

A1200E works 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.

Key benefits

- Modular Design: Up to 12 FXS, FXO or mixed FXS/FXO ports per card. Each port can be set as FXO or FXS via plugging different modules in it
- LEDs display the board's status
- Low CPU Payload : Below 25% with 5 A1200E cards(60 ports in total) after driver installed, on a Celereon D 2.53GHz
- Extending the system by adding more modules
- Easy to use: the modules are Pin to Pin compatible with Digium's X100M and S100M. Users are also able to apply Digium's

X100M/S100M modules on this card, or setup our FXO-100/

FXS-100 modules on TDM400P

- Excellent choice of upgrade Digium's TDM400P based Asterisk system to A1200E, achieving 96 ports density or more in one PC, and protecting users' investment by directly utilizing their investment on modules of TDM400P
- RoHS compliant
- Certificates: CE, FCC, A-Tick
- trixbox™ Officially Certified
- Elastix® Officially Certified

Features

- Supports PCI 2.2 or above, 3.3 V and 5 V PCI slots
- Power consuming: less than 37W (with full 12 port FXS modules), less than 7W (with full 12 port FXO modules)
- Industry standard full size length PCI card
- Open source driver working with zaptel, DADHI and so on.

Chapter 2 Hardware Setup

There are some points that should be paid attention to when setting up A1200E.

2.1 Power supply

The board should be powered when any FXS module is installed, please connect the power source with A1200E board by a specific connector.

2.2 Slot compatibility

A1200E is compatible with 32-bit 5.0V PCI slot, 64-bit 3.3V PCI slot or 64-bit 5.0V PCI slot except PCI-E slot; you should confirm your slot type and insert A1200E into any type of PCI slot as previously described.

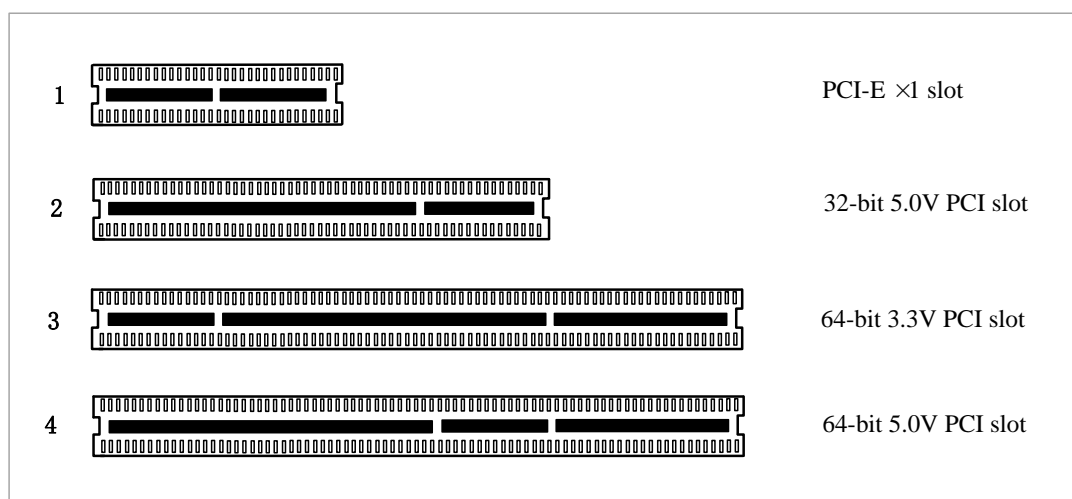


Figure 2 PCI-E and PCI slots

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](#).

2.4 FXO and FXS modules

FXO (Foreign eXchange Office) is the office end of the line, and FXS (Foreign eXchange Station) is the station end, there is so much difference between them, they can be identified by color, the former ones are red and the latter ones are green. FXO modules use FXS signaling while FXS modules use FXO signaling. FXO modules correspond to FXO interfaces which receive power (battery) and ring signals, and FXS

modules correspond to FXS ports which provides power (battery) and generates ring signals.

2.5 Span

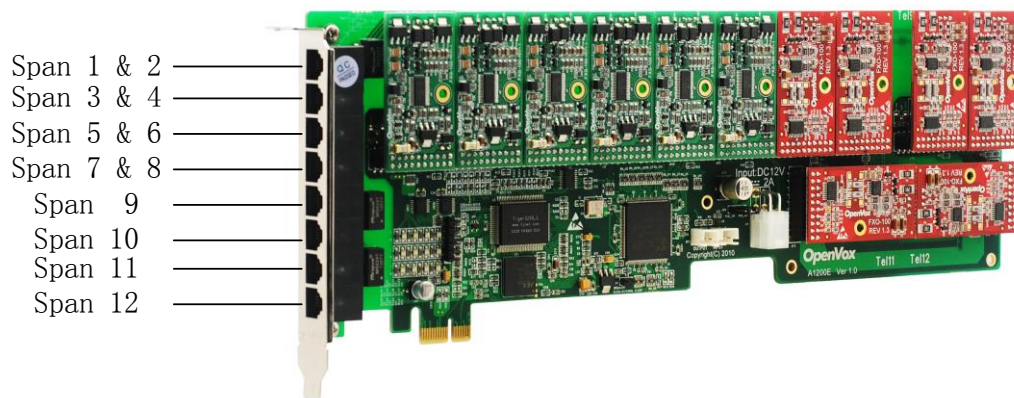


Figure 3 Span

2.6 Hardware setup procedure

- Power off your PC, remember unplug the AC power cable
- Insert A1200E into a 3.3V or 5.0V PCI slot vertically
- Put timing cable appropriately if necessary
- Please plug PSTN lines into FXO ports and extension telephone lines into FXS ports
- Fix the board by a screw
- Power on PC
- After power on, three rows in total 12 LEDs of the board left will be light which reflect channels' status, one LED corresponds to a

module.



Caution: If any FXS module is setup, you should make power on. During the above processes, an ESD wrist strap is needed. Once power is on, you must not attempt to

install or take down the board. If all modules are installed, the modules from 1 to 4 access the uppermost port and the rest modules are grouped by the same manner, in another word, every four modules correspond to a port in hardware then a port is divided into four channels by a splitter.

You have to insert the PSTN lines into FXO ports and extension telephone lines into FXS ports. After hard ware setup appropriately, it is time to install software.

Chapter 3 Software Installation and Configuration

A1200E supports DAHDI software driver on Linux. To make full use of A1200E, you should download, compile, install and configure 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

Get Asterisk software package from digium official website:

<http://downloads.asterisk.org/pub/telephony/asterisk/releases/asterisk-1.8.0.tar.gz>

Execute the following commands under the directory of /usr/src/ in general, the former two below are used for downloading these two packages and the later two are for unzipping them.

```
# wget http://downloads.openvox.cn/pub/drivers/dahdi-linux-complete/openvox_dahdi-linux-complete-current.tar.gz
# wget http://downloads.asterisk.org/pub/telephony/asterisk/releases/asterisk-1.8.0.tar.gz
# tar -xvzf openvox_dahdi-linux-complete-current.tar.gz
# tar -xvzf asterisk-1.8.0.tar.gz
```

3.2 Installation

1. Hardware detection

```
# lspci -vvvv
```

Check the outcome and confirm your system has recognized A1200E. If it has been recognized, communication controller will be displayed in the output information like that:

```
01:02.0 Communication controller: Tiger Jet Network Inc. Tiger3XX
Modem/ISDN interface
    Subsystem: Device 9500:0003
    Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop-
ParErr- Stepping- SERR- FastB2B- DisINTx-
    Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=medium
>TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
    Latency: 64 (250ns min, 32000ns max)
    Interrupt: pin A routed to IRQ 5
    Region 0: I/O ports at c800 [size=256]
    Region 1: Memory at dedff000 (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 NoSoftRst- PME-Enable- DSel=0 DScale=0
PME-
    Kernel modules: opvxa1200, hisax
```

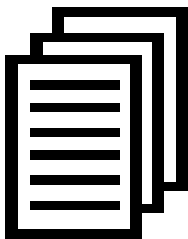
Figure 4 Hardware detection

If A1200E is not recognized by the system, you have to power off and take out the card, then try to insert it into other PCI 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.

After install the dependencies, please change to the directory dahdi-linux-complete-XX (XX represents DAHDI version), then perform the following commands one by one to install DAHDI.

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

```
# make
```

```
# make install
```

```
# make config
```

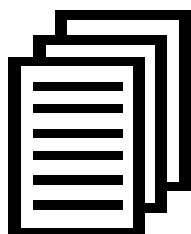


Caution: If there is something wrong after "make", please refer to [HERE](#). In the url link, the moderator introduces you a method how to patch. After patching,

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-1.8.0
# ./configure
# make
# make install
# make samples
```



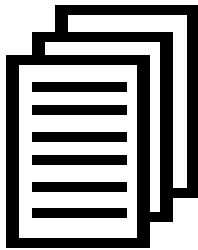
"make samples" will install the standard sample configuration file in the directory /etc/asterisk. As a freshman, you should perform make samples, that is to say, it is unnecessary to perform make samples every time. Because once performed, it will cover the old sample configuration files you have installed.

3.3 Configuration

1. Driver loading

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

```
# modprobe dahdi
# modprobe opvxa1200 opermode=CHINA
# dahdi_genconf
```



After running "modprobe dahdi" or "modprobe opvxa1200 opermode=CHINA", there is not any information displayed if loaded normally and successfully.

Opvxa1200 is the driver module name of A1200E. "opermode" applies to FXO port and is invalid for FXS port, and you are allowed to take place of "CHINA" to other mode name which is available in the file:

```
../dahdi-linux-XX/linux/drivers/dahdi/fxo_modules.h
```

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
```

FXO ports use FXS signaling, while FXS ports adopt FXO signaling. A part of system.conf which is one of the basic channel configuration files is displayed.

```
# Span 1: OPVXA1200/12 "OpenVox A1200P/A800P Board 13" (MASTER)
fxsks=1
fxsks=2
fxsks=3
fxsks=4
fxsks=5
fxsks=6
fxoks=7
fxoks=8
fxoks=9
fxoks=10
fxoks=11
fxoks=12

# Global data

loadzone      = us
defaultzone   = us
```

Figure 5 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: OPVXA1200/12 "OpenVox A1200P/A800P Board 13" (MASTER)
;;; line="1 OPVXA1200/12/0"
signalling=fxo_ks
callerid=asreceived
group=0
context=from-pstn
channel => 1
callerid=
group=
context=default

;;; line="2 OPVXA1200/12/1"
signalling=fxo_ks
callerid=Asreceived
mailbox=4008
group=0
context=from-pstn
channel => 2
callerid=
group=
Context=default
.....
.....
.....

;;; line="7 OPVXA1200/12/6"
signalling=fxs_ks
callerid="Channel 7" <4007>
mailbox=4007
group=5
context=from-internal
channel => 7
Callerid=
mailbox=
group=
context=default

;;; line="8 OPVXA1200/12/7"
signalling=fxs_ks
callerid="Channel 8" <4008>
mailbox=4008
group=5
context=from-internal
channel => 8
Callerid=
mailbox=
group=
context=default
.....
.....
.....
```

Figure 6 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.

```
Channel 01: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 01)
Channel 02: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 02)
Channel 03: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 03)
Channel 04: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 04)
Channel 05: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 05)
Channel 06: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 06)
Channel 07: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 07)
Channel 08: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 08)
Channel 09: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 09)
Channel 10: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 10)
Channel 11: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 11)
Channel 12: FXS Kewlstart (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
```

Figure 7 Channel map

3. Asterisk initiation

```
# asterisk -vvvvvvgc
```

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

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

Chan Pseudo	Extension	Context	Language	MOH Interpret
	1	from-pstn		default
	2	from-pstn		default
	3	from-pstn		default
	4	from-pstn		default
	5	from-pstn		default
	6	from-pstn		default
	7	from-internal		default
	8	from-internal		default
	9	from-internal		default
	10	from-internal		default
	11	from-internal		default
	12	from-internal		default

Figure 8 channels show

If dahdi channels are found, it means they have been loaded into Asterisk.

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,Dial(dahdi/1,,r)
exten => s,n,Hangup()

[from-internal]
exten => 200,1,Dial(dahdi/7/outgoing_number)
exten => 200,2,Hangup()
```

Figure 9 dial plan



You should write the destination number instead of the `outgoing_number` in the above dial plan. The above dial plan achieves that when an extension telephone dials 200, Asterisk will transfer through channel 7 to the destination.

While a call comes from PSTN line, Asterisk answers firstly, and then gets through the extension set which connects to channel 1.

After saving your dialplan, please run "`asterisk -r`", then execute "`reload`" in the CLI. Next you are able to make calls.

Chapter 4 Reference

www.openvox.cn

www.digium.com

www.asterisk.org

www.voip-info.org

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: 161g (5.68oz)

Size: 31.2×11.1×1.8cm (12.56×4.4×0.71 inch)

• Interfaces

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

Power Supply Connect: 12V 4-pin connector (When any FXS modules are installed)

Local Loop Access: Industry standard RJ-45 ports connect to four 4-pin or 6-pin RJ-11 port by a specific splitter

• Environment

Temperature: 0 ~ 50 °C (Operation)

- 40 ~ 125 °C (Storage)

Humidity: 10 ~ 90% NON-CONDENSING

• Power consumption

Voltage: 3.3V, 5V

Power consuming: less than 37W (with full 12 port FXS modules), less than 7W (with full 12 port FXO modules)

- **Hardware and software requirements**

RAM 128 + MB

Linux kernel 2.4.X or 2.6.X

CPU 800+ MHZ

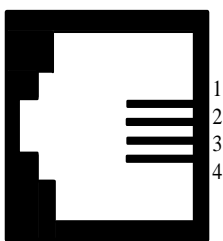
Suggestion

Suggest using at least 300 Watt power supply for your PC, and increased by 30W/twelve FXO ports.

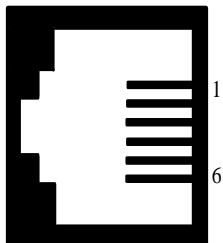
Appendix B PIN Assignments

A FXO or FXS port corresponds to four RJ11 port by a splitter. Either 4-pin or 6-pin RJ11 port is compatible with A1200E, let's illustrate pin assignments of RJ11 port by the following tables.

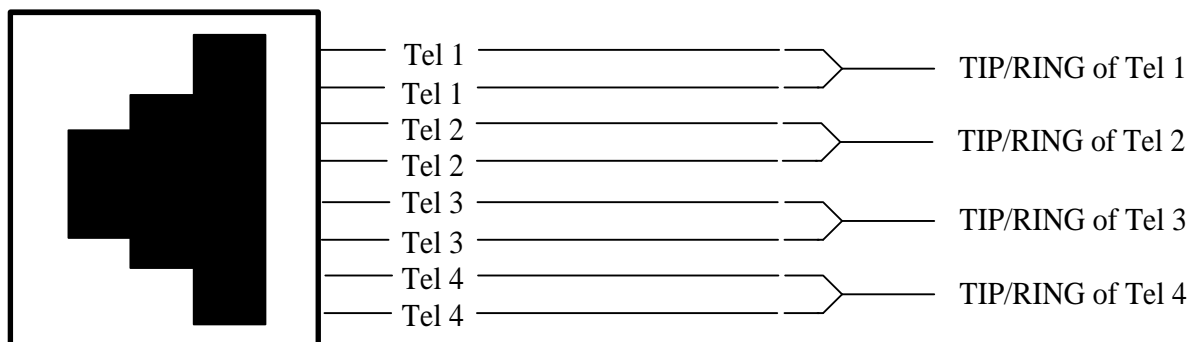
4-pin RJ11 port

4-pin RJ11 port	PIN	Description
	1	Not used
	2	Tip
	3	Ring
	4	Not used

6-pin RJ11 port

6-pin RJ11 port	PIN	Description
	1	Not used
	2	Not used
	3	Tip
	4	Ring
	5	Not used
	6	Not used

RJ-45 interface



Splitter

