OpenVox Communication Co.Ltd
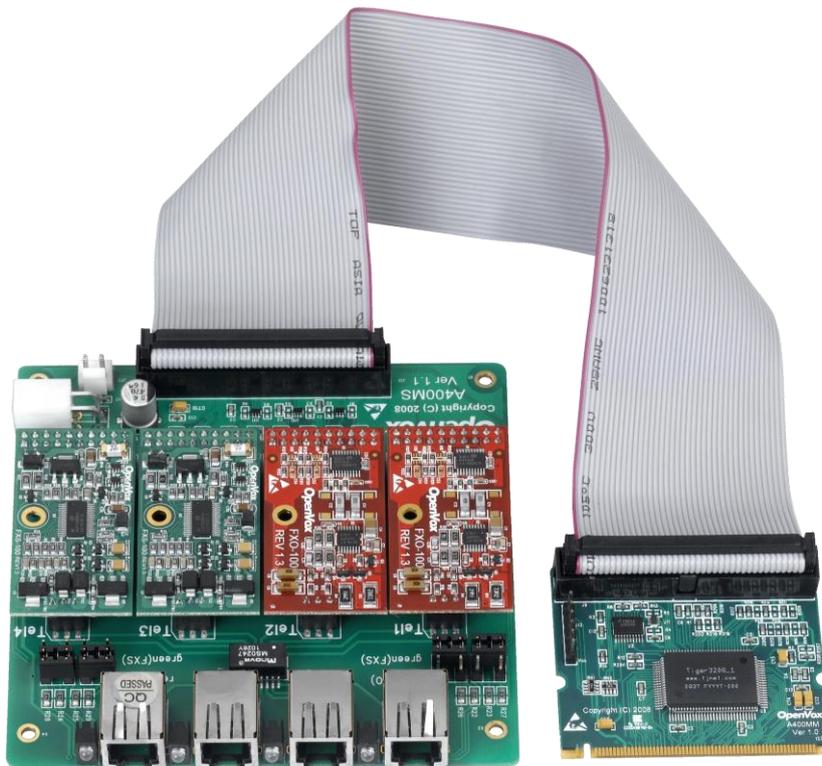

A400M on DAHDI User Manual

Version: 2.2

OpenVox Communication Co.Ltd

OpenVox-Best Cost Effective Asterisk Cards

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Contents

General Safety Instructions

CAUTION

1. The computers that have A400M card installed must comply with the country's specific safety regulations.

2. Only service personnel should go to install A400M card.

3. Before installing A400M card, please unplug the power cord and remove the cover from your PC.

4. For avoiding personal injuries and damages to your machine and A400M 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 A400M

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 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 A400M

OpenVox A400M delivers great voice quality in the telephony systems. With interchangeable FXS/FXO modules, it can eliminate the requirements for separate channel banks or access gateways.

The A400M consists of two parts: the A400MM and the A400MS. The A400MM connects Mini PCI slot while the A400MS installs FXS/FXO modules. The A400MS contains 4 module banks. Each bank supports one analog interface. The module banks may be filled with up to 4 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.

A400M works well with Asterisk®, Askozia®, 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

➢ Channel Bank Replacement / Alternative

➢ Small Office Home Office (SOHO) applications

➢ Small and Medium Business (SMB) applications

➢ Gateway termination to analog telephones/lines

Features

➢ Support Mini PCI type Ⅲ

➢ Designed for low-power systems

➢ Support AskoziaPBX system

➢ Support VIA, PC Engines motherboard and AMD geode based

motherboard

➢ Support trixbox, Elastix and other based Asterisk distributions

➢ Support GPL Software driver used with zapte and DAHDI

Chapter 2 Hardware Setup

There are some points that should be paid attention to when setting up A400M.

2.1 Power supply

The board should be powered when any FXS module installed; please connect the power source with A400M board by a 4-pin power source connector. If all modules are red, it can be powered by MIMI PCI slot, external voltage is unnecessary.

2.2 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 problem. 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 the details, please refer to **HERE**.

2.3 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. A FXO module corresponds to four FXO interfaces which receive power (battery) and ring signals, and a FXS module corresponds to four FXS ports which provides power (battery) and generates ring signals.

2.4 Hardware setup procedure

➢ Power off your PC, remember unplug the AC power cable

➢ Assemble A400MM and A400MS correctly with a IDE flat cable

➢ Set the jumpers which control modules

➢ Insert A400MM into a Mini PCI slot of a server

➢ Put timing cable correctly if necessary, for more details, please refer to **HERE**

➢ Please plug PSTN lines into FXO ports and extension telephone lines into FXS ports before you have detected your PSTN line works well.
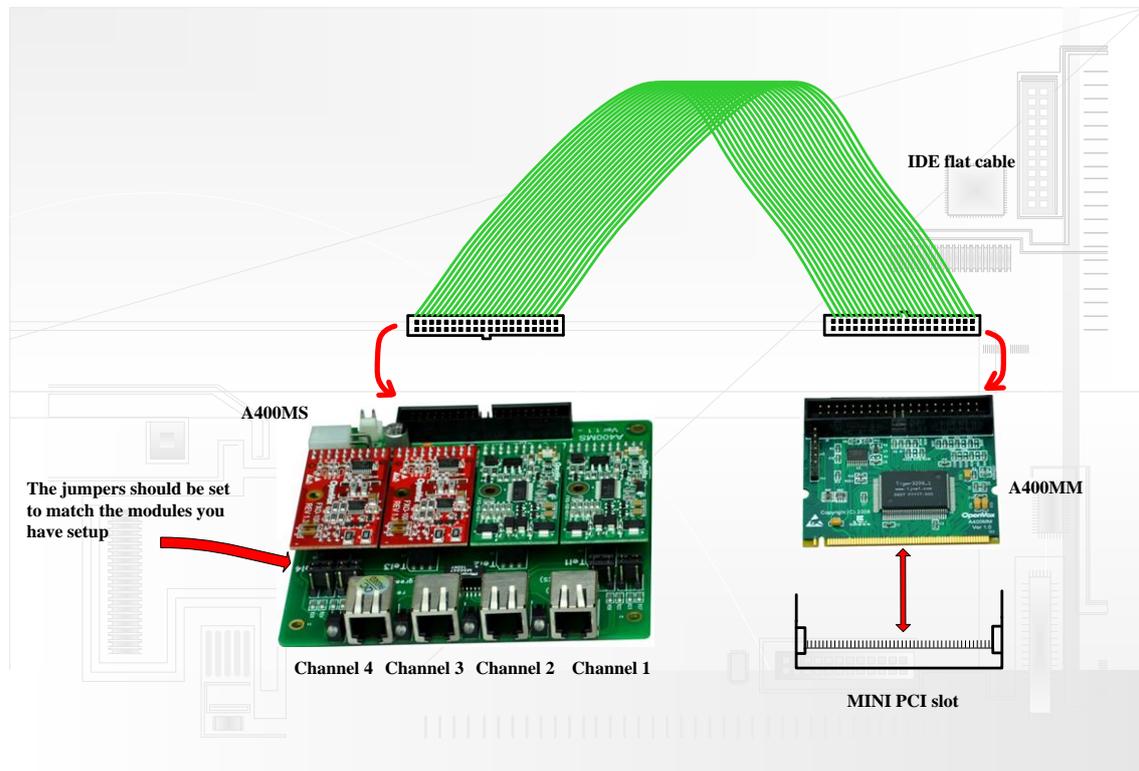
➢ Fix the board by a screw

➢ Power on PC

Figure 2 Hardware setup

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. Do not forget to connect PSTN lines into analog phones directly to make sure the lines and phones are available before insert the PSTN lines into FXO ports. After hard ware setup, it is time to install software.

Chapter 3 Software Installation and Configuration

A400M supports DAHDI software driver on Linux. To make full use of A400M, 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 made 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 in the directory /usr/src/ in generally, 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/da
hdi-linux-complete/openvox_dahdi-linux-complete-c
urrent.tar.gz
# wget http://downloads.asterisk.org/pub/telephon
y/asterisk/releases/asterisk-1.8.0.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 A400M. If it has been recognized, **"Network controller"** will be displayed in the output information like that:

```
01:02.0 Network controller: Tiger Jet Network Inc. Tiger3XX Modem/
ISDN interface
        Subsystem: Device b100:0001
        Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop-
ParErr- Step   ping- 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 225
        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+,D3ho     t+,D3cold+)
                Status: D0 NoSoftRst- PME-Enable- DSel=0 DScale=0
PME-
        Kernel driver in use: wctdm
        Kernel modules: wctdm, hisax
```

Figure 3 Hardware detection

If A400M is not recognized by the system, you have to power off and take out the card, then try to insert it into other Mini 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

commands one by one to install DAHDI.

```
# cd /usr/src/dahdi-linux-complete-XX
# make
# make install
# make config
```
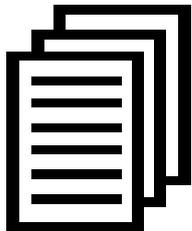
Caution: If there is something wrong after **"make"**, please refer to **HERE**. In the url link, the moderator introduces you a method how to patch. After patching, save your changes and exit. Then run **"make"** again, if successfully, you are going to install Asterisk.

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.
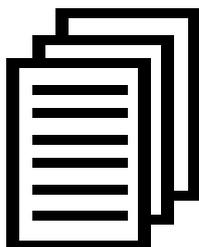
3.3 Configuration

1. Driver loading

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

```
# modprobe dahdi

# modprobe wctdm opermode=CHINA

# dahdi_genconf
```

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

"wctdm" is the driver module name of A400M. **"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: WCTDM/4 "Wildcard TDM400P REV E/F Board 5" (MASTER)
fxoks=1
fxoks=2
fxsks=3
fxsks=4

# 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: WCTDM/4 "Wildcard TDM400P REV E/F Board 5"
(MASTER)
;;; line="1 WCTDM/4/0 FXOKS"
signalling=fxo_ks
callerid="Channel 1" <4001>
mailbox=4001
group=5
context=from-internal
channel => 1
callerid=
mailbox=
group=
context=default

;;; line="2 WCTDM/4/1 FXOKS"
signalling=fxo_ks
callerid="Channel 2" <4002>
mailbox=4002
group=5
context=from-internal
channel => 2
callerid=
mailbox=
group=
context=default

;;; line="3 WCTDM/4/2 FXSKS"
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 3
callerid=
group=
context=default

;;; line="4 WCTDM/4/3 FXSKS"
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 4
callerid=
group=
context=default
```

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.

```
Channel map:

Channel 01: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 01)
Channel 02: FXO Kewlstart (Default) (Echo Canceler: none) (Slaves: 02)
Channel 03: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 03)
Channel 04: FXS Kewlstart (Default) (Echo Canceler: none) (Slaves: 04)

4 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
```

Figure 6 Channel map

3. Asterisk initiation

asterisk -vvvvvgc

If Asterisk is already activate, run **"asterisk –r"** instead. In the CLI,

please run the following command:

localhost*CLI> dahdi show channels

```
Chan Extension  Context         Language    MOH Interpret
Pseudo          default                      default
        1       from-internal                default
        2       from-internal                default
        3       from-pstn                    default
        4       from-pstn                    default
```

Figure 7 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/3/outgoing_number)
exten => 200,2,Hangup()
```

Figure 8 dial plan

You should write the destination number instead of the

outgoing_number in the above dial plan. The dialplan

achieves that when an extension telephone dials 200,

Asterisk will transfer through channel 3 to the external

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 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: 14g (A400MM)   (0.49oz)

                 64g (A400MS)   (2.26oz)

Size: 44.6×59.6×1mm^3 (A400MM)

                 113×113×1.3mm^3 (A400MS)

• Interfaces

Up to 4 ports through a combination of FXS and FXO modules

4 RJ-11 interfaces on a single PCI bracket

Mini PCI type III

• Environment

Temperature: 0 ~50°C (Operation)   - 40 ~125°C (Storage)

Humidity: 10 ~90% NON-CONDENSING

• Power consumption

Power: 1.8W Minimum, 11.6W Maximum

• Hardware and software requirements
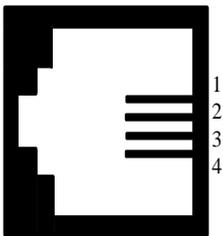
RAM 128 + MB   CPU 800+ MHZ
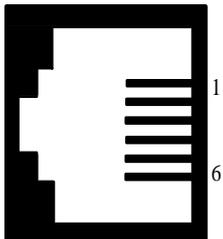
Linux kernel 2.4.X or 2.6.X

Appendix B PIN Assignments

Either 4-pin or 6-pin RJ11 port is compatible with A400M; 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