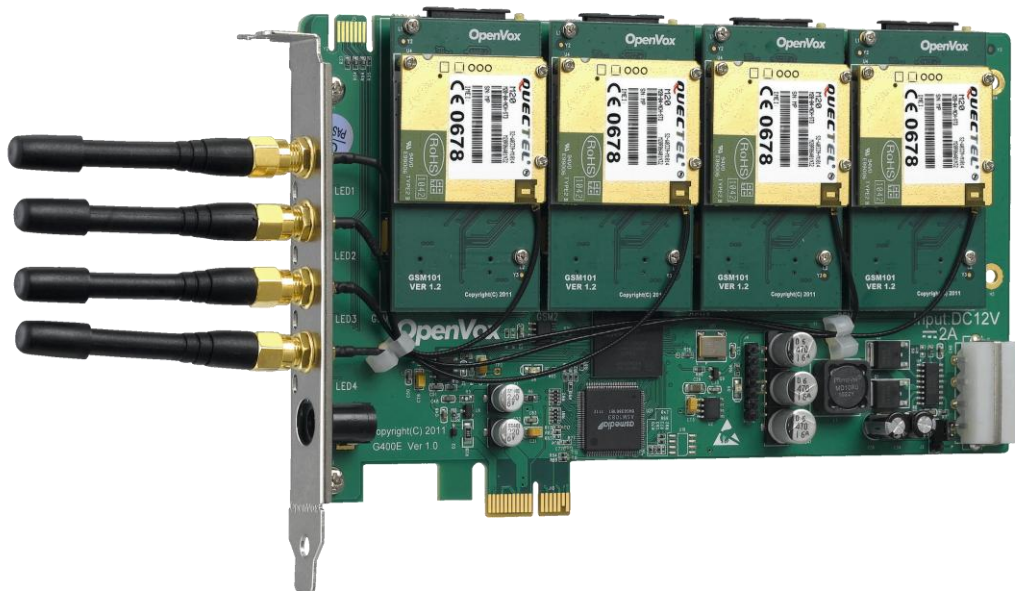




OpenVox Communication Co.Ltd



OpenVox G400E 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 G400E card installed must comply with the country's specific safety regulations.
2. Only service personnel should install G400E card.
3. Before you install G400E card, please unplug the power cord from the computer and remove the cover from your PC.
4. For avoiding personal injuries and damage to your computer and G400E card, make sure bracket of the card is secured to the PC's chassis ground by fastening the card with screws.
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

chan_extra-1.1.2

GSM SIM cards

OpenVox G400E

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 standards-based telephony equipment using relatively inexpensive 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).

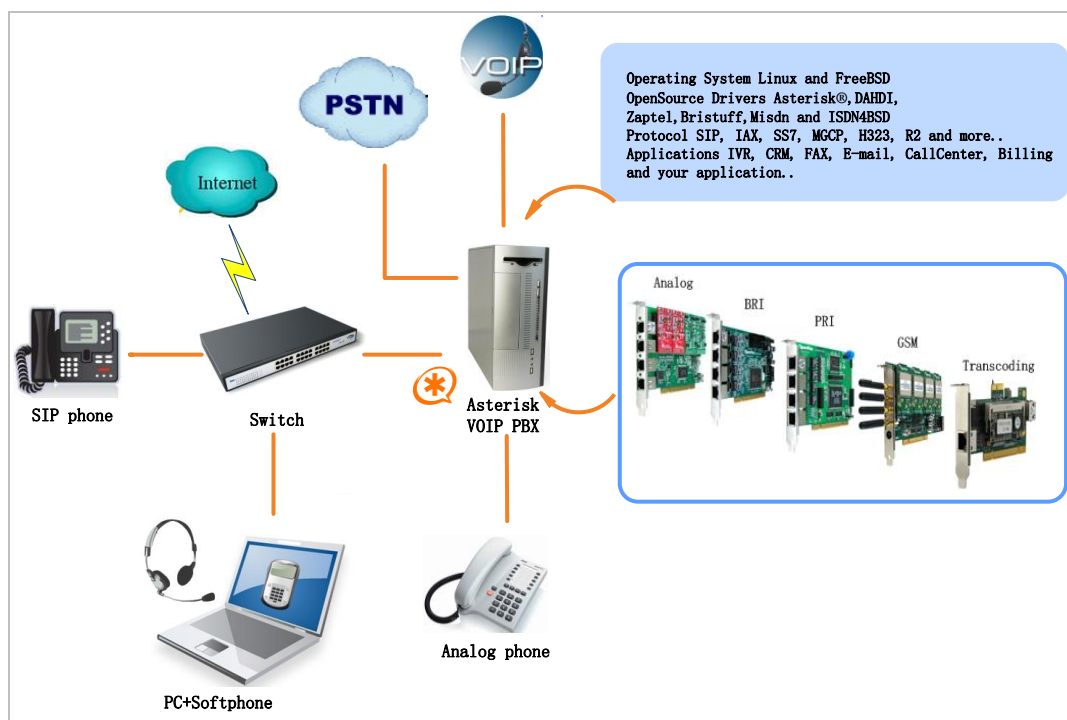


Figure 1 Topology

1.2 What is G400E

G400E is a 4-channel (slots) PCI-E GSM card and works in the GSM network. One GSM module supports one SIM card. The 3rd generation module based on chan_extra driver for OpenVox GSM cards support 3G(WCDMA). With the new module, users easily get the best stability in voice and SMS function

G400E allows users to choose the amount of modules and SIM cards according to their specific requirements. G400E can be implemented in Asterisk PBX and GSM network. Through this implementation, users will realize to make an asterisk PBX with flexibility and mobility perfectly.

Target applications

- GSM connectivity for PBX
- Mobile PBX
- GSM VOIP Gateway
- SMS Gateway
- GSM Callback service

Sample application

As the following figure conveys, SIP phone and soft phone are able to communicate with mobile phones via G400E which acts as a GSM

connection for PBX.

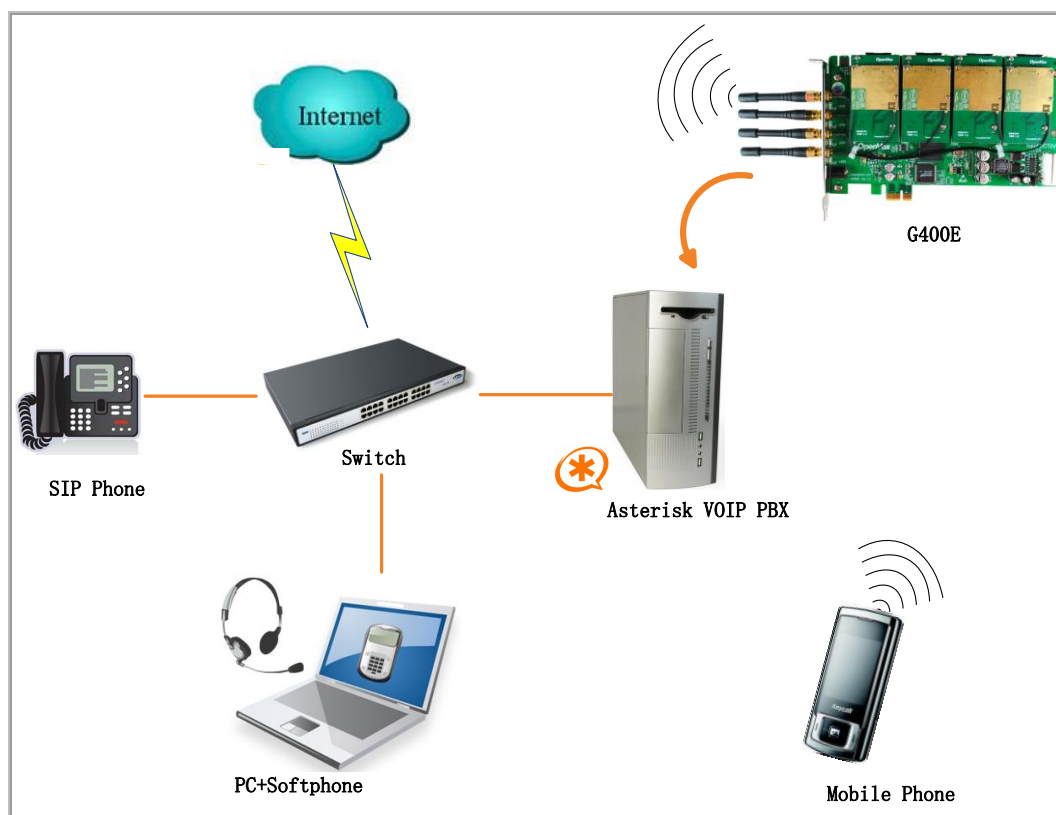


Figure 2 Sample application

Key benefits

- IMEI and PIN modification
- SMS batch receiving/sending, AT command availability
- Support USSD
- Scalable: Extending the system by adding more modules
- Easy to use: It bases on chan_extra open source solution
- Configurable: Setting GSM network requirements through configuration files

- High quality with low price
- Low power consumption
- Application: Use Asterisk[®] to build your IP-PBX/Voicemail system
- RoHS compliant
- Certificates: CE, FCC

Features

- Owns an electrical circuit switch to ensure the GSM modules are power-off when the system reboots
- Be compatible with Industry Standard: PCI-E ×1, ×2, ×4, ×8, ×16
- Quad-Band GSM/GPRS 850/ 900/1800/1900 MHz
- Supports LEDs indicating network status
- DIGITAL audio quality(echo cancel)
- 1 SIM card per GSM channel
- Supports external antenna
- GSM data connections
- DTMF detection

Chapter 2 Hardware Setup

There are some points should be paid attention to setup G400E.

2.1 Power supply

Please take particular attention to power supply connection. There are two alternatives allow users to select a power supply.

1. Using 12V external DC, you should adjust the jumper J3 to 1;
2. Using Molex connector by setting the jumper J3 to 2 as figure 3.

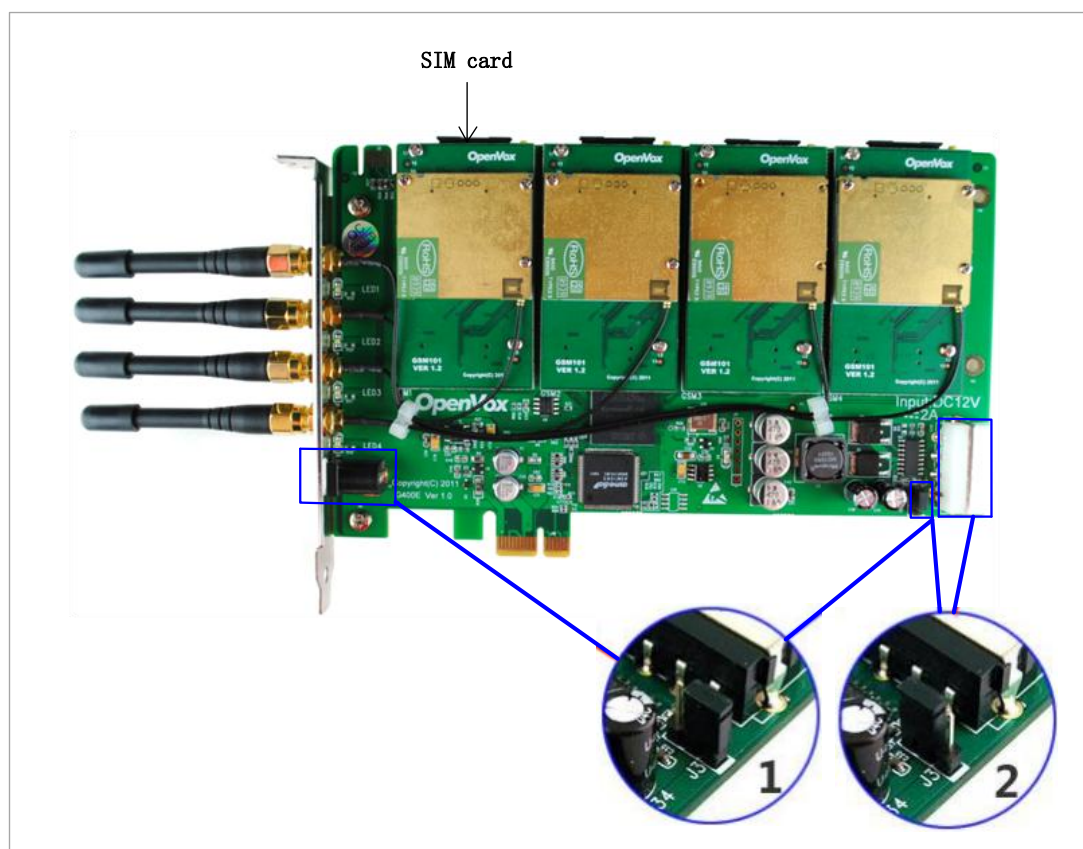


Figure 3 Power supply method

2.2 Slot compatibility

G400E is compatible with PCI-E $\times 1$ slot (slot 1) and $\times 2$, $\times 4$, $\times 8$, $\times 16$, while it is not fit for PCI slot (slot2, slot3, slot 4). You should confirm your slot type, and then insert G400E into a PCI-E slot. PCI and PCI-E slot are showed as following:



Figure 4 slots

2.3 Indication LEDs

There are 4 LEDs on the board. Each one indicates the working status of each SIM card. The details explanations are as followings:

- LED off: SIM card does not work
- 64ms On/800ms: SIM card does not find the network(64ms On/800ms means the LED is light on 64ms then go out 800ms)
- 64ms On/3000ms:SIM card finds the network
- 64ms On/300ms: GPRS communication

In addition, there are two LEDs located at the bottom of the board which are D8 and D9, under normal circumstances, they are lit when powered and D9 flashes more quickly than D8.

2.4 GSM modules and SIM cards

G400E supports 2G and 3G module, detail information about 3G modules please go to [here](#). One GSM module supports one SIM card and one antenna, please plug a SIM card into the back of a GSM module and activate it. For more details, please refer to figure 3.

2.5 Introduction of main chipset

Designed for global market, M20 is quad-band GSM/GPRS engine that works on frequencies, GSM/GPRS 850/900/1800/1900 MHz.

With a tiny configuration of 35mm × 32.5mm × 2.95 mm, M20 can fit almost all the space requirement in your application, such as smart phone, PDA phone, Car Phone, Wireless PSTN, and other mobile devices.

The M20 provides RF antenna interface. Customer's antenna should be located in the customer's main board and connect to module's antenna pad through micro strip line or other type RF traces whose impedance must be controlled in 50Ω.

The M20 is integrated with the TCP/IP protocol, Extended TCP/IP AT commands are developed for customers to use the TCP/IP protocol easily,

which is useful for those data transfer applications.

2.6 Hardware setup procedure

- Power off your PC, remember unplug the AC power cable
- Place SIM cards for GSM modules
- Insert G400E into a PCI-E slot
- Select a power supply way as previously stated
- Fix the board by a screw
- Power on your PC

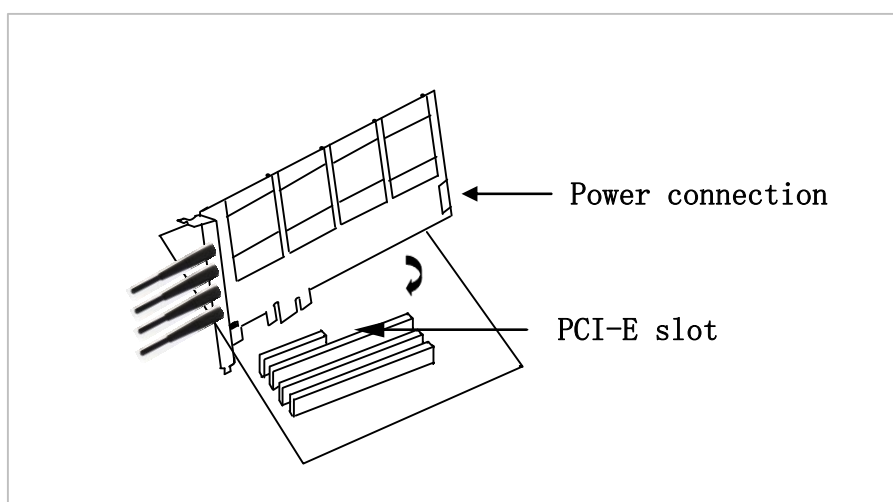


Figure 5 Hardware setup



Caution: 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. After hardware setup, it is time to install software.

Chapter 3 Software Installation and Configuration

3.1 Hardware detection

Detect hardware by executing command:

```
# lspci -vvvv
```

Check the outcome and confirm your system has recognized G400E. If it has been recognized, the output information will be showed like that:

```
01:04.0 Class ff00: Unknown device 1b74:0100 (rev 01)
  Subsystem: Unknown device 1b74:0104
  Control: I/O+ Mem+ BusMaster- SpecCycle- MemWINV- VGASnoop-
  ParErr- Stepping- SERR- FastB2B-
  Status: Cap- 66MHz- UDF- FastB2B- ParErr- DEVSEL=slow >TAbort-
  <TAbort- <MAbort- >SERR- <PERR-
  Interrupt: pin A routed to IRQ 66
  Region 0: Memory at dedf0000 (32-bit, non-prefetchable)
  [size=64K]
```

Figure 6 Hardware detection

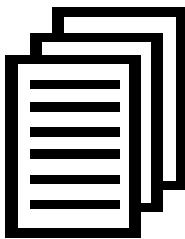
If G400E is not recognized by the system, you have to power off and take out of the card, then try to insert it into another PCI-E slot.

3.2 Dependencies 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 some 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.

3.3 chan_extra, DAHDI and Asterisk installation

Go to OpenVox official website to download chan_extra, the url link is:

<http://www.chan-extra.org/download/releases/>

Download chan_extra to the directory /usr/src/ in generally, and then unzip it.

```
# wget http://www.chan-extra.org/download/release  
s/chan_extra-1.XX.tar.gz  
  
# tar -xvzf chan_extra-1.XX.tar.gz
```

Change to the directory **chan_extra-1.XX** (XX stands for chan_extra version), then perform the specific command to install it.

```
# cd /usr/src/chan_extra-1.XX  
  
# ./install.sh
```

After running the above commands, the script will check whether the dependencies have been installed, if not, you should type "y" to accept to install all the necessary dependencies until the system detects all of them are "OK", then press "enter" key to operate the next step.

```
#####
#           OpenVox Extra Installation Script           #
#                   v1.1.2                             #
#           OpenVox Communication Co.,Ltd              #
#           Copyright (c) 2009-2011 OpenVox. All Rights Reserved. #
#####

Checking for C development tools ...                [ OK ]
Checking for C++ development tools ...              [ OK ]
Checking for Make utility ...                       [ OK ]
Checking for ncurses library ...                   [ OK ]
Checking for ncurses-devel library ...             [ OK ]
Checking for Perl development tools ...            [ OK ]
Checking for Patch ...                             [ OK ]
Checking for bison...                              [ OK ]
Checking for bison-devel...                        [ OK ]
Checking for openssl...                            [ OK ]
Checking for openssl-devel...                     [ OK ]
Checking for gnutls-devel...                      [ OK ]
Checking for zlib...                               [ OK ]
Checking for zlib-devel...                        [ OK ]
Checking for kernel development packages...       [ OK ]
Checking for libxml2-devel...                     [ OK ]

Press [Enter] to continue...
```

Figure 7 Depedencies detection

G400E software installation is indicated by some wizard options, you should select the right option by your specific case. Now let's introduce how to install the driver by source code.

```
#####
#           OpenVox Extra Installation Script           #
#                   v1.1.2                             #
#           OpenVox Communication Co.,Ltd              #
#           Copyright (c) 2009-2011 OpenVox. All Rights Reserved. #
#####

1) Source code install
2) Trixbox-dahdi install
3) Elastix-dahdi install
q) quit

Please enter your selection (1..3 or q) ->
```

Figure 8 Installation ways selection

It is time to select the installation way after dependencies detection.

->1) Source code install

(CentOS in addition to Elastix and trixbox, please choose "Source code install" option by typing "1". After a few seconds or minutes, you will come to next option that the way you want to install DAHDI)

```
Looking for dahdi-linux-complete directory in /usr/src ...

1 : /usr/src/dahdi-linux-complete-2.3.0.1+2.3.0
-----
n   : Download and install dahdi-linux-complete-2.3.0.1+2.3.0.tar.gz
    [Default installation]
m   : Enter dahdi-linux-complete dir path manually
d   : Download the latest version of dahdi-linux-complete
q   : Skip the step
     (ctrl-c to Exit)
Please select working dahdi-linux-complete directory [1-1, n, m, d, q]:
```

Figure 9 DAHDI installation ways selection

-->1: /usr/src/dahdi-linux-complete-XXX

(This option means the available DAHDI version which allows you to type the corresponding number to install. Here the default version dahdi-linux-complete-2.3.0.1+2.3.0 which are included in the installation package. If there are any other versions, the system will automatically look for and show the outcome.)

-->n: dahdi-linux-complete-2.3.0.1+2.3.0.tar.gz
[default]

(If you want the system to download and install the default version dahdi-linux-complete-2.3.0.1+2.3.0 automatically, you should type "n")

-->m: Enter dahdi_linux_complete dir path manually

(This option allows you to type the full path of DAHDI source if you have installed DAHDI. Also you can type the specific DAHDI version, the script will download the version you want of DAHDI to /usr/src/, then you will see a new option as following if you type dahdi-linux-complete-XXX(please type the version number instead of XXX))

-->d: Download the latest dahdi_linux_complete

(This option will download and install the latest dahdi_linux_complete version originally. While the latest version of dahdi_linux_complete is not support now, so it is recommended not to choose this option)

-->q: skip the step

(Skipping DAHDI installation directly)



After selecting the way you want to install DAHDI, the system will install it automatically until other options appear to install Asterisk.

Asterisk installation is similar with DAHDI:

```
Looking for Asterisk directory in /usr/src ...

1 : /usr/src/asterisk-1.6.2.11
-----
n   : Download and install asterisk-1.6.2.11.tar.gz [Default
installation]
m   : Enter Asterisk dir path manually
d1.6 : Download the latest version of Asterisk 1.6.2
q    : Skip the step
      (ctl-c to Exit)
Please select working Asterisk directory [1-1, n, m, d, q]:
```

Figure 10 asterisk installation means selection

-->1: /usr/src/asterisk-XXXX

(This option means the available Asterisk version which allows you to type the corresponding number to install. Besides the default version, there may be other versions your system has installed.)

-->n: asterisk-1.6.2.11.tar.gz [Default]

(The system will download and install asterisk-1.6.2.11 which is included in the installation package automatically if selecting this option)

-->m: Enter Asterisk directory path manually

(Choosing this option allows you to type the full path of Asterisk source if you have installed Asterisk. Also you can type the full version name of Asterisk, the script will download the version of asterisk to /usr/src/.)

-->d1.6: Download the Latest Asterisk 1.6.2

(This option will download and install the latest version of asterisk-1.6.2, but the version of Asterisk has been updated to 1.8, so it is not recommended you to choose this option)

-->q: skip the step

(Skipping Asterisk installation directly)

More information about the chan-extra installation, you can see the log file: chan-extra-XXXX/log/



Caution: If there is something wrong when compile DAHDI, please refer to [HERE](#). With this link, the moderator introduces you a method how to patch. After patching and recompiling, if successfully done, you are going to install Asterisk.

3.4 Driver loading and Asterisk initiation

Until now, you have set all necessary files, please load the driver and

Asterisk in the following way:

```
# service dahdi start  
  
# depmod -a  
  
# dahdi_genconf  
  
# dahdi_cfg -vvvv  
  
# dmesg
```

The following figure shows dmesg outputs information

```
ACPI: PCI Interrupt 0000:02:02.0[A] -> GSI 22 (level,  
low) -> IRQ 225  
Found an OpenVox G400E: Version 1.0  
opvxcg4xx: slot 0 is Installed  
opvxcg4xx: slot 1 is Installed  
opvxcg4xx: slot 2 is Installed  
opvxcg4xx: slot 3 is Installed  
opvxcg4xx: Powering up all spans...
```

Figure 11 dmesg outputs information

Start Asterisk by executing command:

```
# asterisk -vvvvvvvvvvc
```


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

```
localhost*CLI> gsm show spans
```

```
GSM span1: Provisioned, Up, Active  
GSM span2: Provisioned, Up, Active  
GSM span3: Provisioned, Up, Active  
GSM span4: Provisioned, Up, Active
```

Figure 12 channels' status

If the SIM cards have setup and Asterisk loaded successfully, GSM spans will show up and active.

3.5 Dialplan edit

Add dial plan in the file extension.conf. Users must make sure that the context "from-gsm" and "from-internal" are in extensions.conf, here a simple example is given:

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

```
[from-gsm]
exten => s, 1, Answer()
exten => s, n, Dial(SIP/500)

[from-internal]
exten => 100,1,Dial(extra/1/10000)
exten => 100,2,Hangup

exten => 200,1,Dial(extra/3/10000)
exten => 200,2,Hangup

exten => 300,1,Dial(extra/5/10000)
exten => 300,2,Hangup

exten => 400,1,Dial(extra/7/10000)
exten => 400,2,Hangup
```

Figure 13 dial plan show

The above dial plan realizes that calls from GSM network, Asterisk will connect it to SIP phone 500 which has registered previously. Once dial 100, Asterisk will connect to 10000 through the first channel and similar functions with the last three calls. After edition, please run "asterisk -r" again, and then execute "reload" in the CLI. All above complete successfully, you are able to make calls.

Chapter 4 References

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: 210g (6.72oz)

Size: 17.9 × 11.1 × 1.8 cm (7.05 × 4.37 × 0.71 inch)

• Interfaces

PCIe: Be compatible with PCI-E ×1, ×2, ×4, ×8, ×16

Power Supply Connect: 12V 4-pin connector

• Environment

Temperature: 0 ~ 50 °C (Operation)

- 40 ~ 125 °C (Storage)

Humidity: 10 ~ 90% NON-CONDENSING

• Power consumption

Maximum power consumption: 30W (four channels)

• Hardware and software requirements

RAM 128 + MB

CPU +1000 MHZ

Linux kernel 2.4.X or 2.6.X

Appendix B 2G and 3G Modules

2G Module: M20



Support Frequency Band:

- GSM850MHz
- GSM900MHz
- DCS1800MHz
- PCS1900MHz

3G Modules

1. WCD100:SIM5215A

It is a 2G/3G module, and its 2G function is used in worldwide while 3G function is commonly used in America.



Support Frequency Band:

- GSM850MHz
- EGSM900MHz
- DCS1800MHz
- PCS1900MHz
- WCDMA850MHz
- WCDMA1900MHz

2. WCD100:SIM5215E

It is a 2G/3G module, and its 2G function is used in worldwide while 3G function is commonly used in Europe.

**Support Frequency Band:**

- GSM850MHz
- EGSM900MHz
- DCS1800MHz
- PCS1900MHz
- WCDMA900MHz
- WCDMA2100MHz

Appendix C GSM frequency band reference

	1900MHz	1800 MHz	900 MHz	850 MHz
America	Antigua, Argentina Bahamas Barbados Belize Bermuda British Virgin Islands Bolivia Canada Chile Colombia Dominican Republic El Salvador Honduras Guatemala Jamaica Mexico Nicaragua Paraguay Peru Puerto Rico Trinidad and Tobago United States Uruguay U.S. Virgin Islands	Barbados Brazil Dominican Republic Costa Rica Grenada Jamaica Paraguay Trinidad Tobago Uruguay	Antigua Barbados Brazil British Virgin Islands Cuba Dominican Republic El Salvador Falkland Islands French Guiana Grenada Guatemala Jamaica St. Pierre and Miquelon Islands Suriname Venezuela	Anguilla Antigua Argentina Bolivia Brazil Canada Colombia Dominican Republic Ecuador El Salvador Grenada Guatemala Haiti Honduras Montserrat Nicaragua Panama Paraguay Peru Trinidad Tobago United States Uruguay Turks Caicos Islands Venezuela
Europe		Austria Belgium Bulgaria Cyprus Czech Republic Denmark Estonia Finland France	Austria Belgium Bulgaria Cyprus Czech Republic Denmark Estonia Finland France	

		Germany Greece Hungary Ireland Italy Liechtenstein Lithuania Luxembourg Malta Netherlands Poland Portugal Romania Slovakia Slovenia Spain Sweden Turkey Ukraine United Kingdom	Germany Greece Hungary Ireland Italy Liechtenstein Lithuania Luxembourg Malta Netherlands Poland Portugal Romania Slovakia Slovenia Spain Sweden Turkey Ukraine United Kingdom	
Middle East		Israel Algeria Libya Saudi Arabia Sudan Iran	Israel Algeria Libya Saudi Arabia Sudan Lebanon Iran	
Asia		Japan Korea China	Japan Korea China	

