

X100P SE Setup Guide - UK Caller ID (CID)

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Technical Support: This guide is freely available to anyone in the Open Source Community to help solve configuration and installation issues. However, email based technical support is only available to customers that have purchased Open Source telephony equipment directly from Novavox.

Updates: Due to the number of alternative Open Source IP PBX software packages available and new versions being regularly released, it is difficult to keep Open Source documentation fully up to date. If you find any out of date or inaccurate information within this document then please let us know by emailing us at feedback@novavox.co.uk and we will update the document as soon as possible.

Disclaimer: This document has been compiled based on experience resolving real world customer configuration issues as well as information available within the Open Source community. References to source material have not been included as it would make the document less easy to read. Also, keeping the references up to date would be very time consuming. However, if you discover information contained within this document for which you believe you are the original source and you would like to receive acknowledgement, then please let us know and we will add the appropriate reference.

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Novavox supplies a range of alternative Open Source telephony products including:

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- OpenVox 4 port modular analogue PCI Express cards
- OpenVox 1-4 port ISDN BRI PCI cards
- OpenVox 1-2 port ISDN PRI/E1/T1/J1 PCI cards
- OctWare SoftEcho carrier grade echo cancellation software licences

For full details of our alternative products please visit our websites product section:

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Contact Details

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1 Introduction

This document describes how to configure an Open Source IP PBX with an X100P Special Edition (SE) FXO PCI card installed to support Caller ID received from a UK BT PSTN line. The configuration requires implementing a patch for Asterisk®/Zaptel that was originally written for the UK but has also been known to work in other countries. The guide provides detailed step-by-step installation instructions specifically for Trixbox® 2.6.07. However, with a few modifications the same steps can be used for other Trixbox® versions as well as any Asterisk®/Zaptel based IP PBX system including AsteriskNOW®, Elastix® and PBX in a Flash.

The X100P SE shown below is a single port analogue computer telephony PCI card developed by X100P.com specifically for leading open source IP PBX software such as Digium® Asterisk® and Trixbox®.



The X100P SE provides a single, full featured FXO (Foreign Exchange Office) interface for connecting an Open Source IP PBX to the PSTN's (Public Switched Telephone Network's) CO (Central Office). The X100P SE works out of the box using the official Zaptel driver and is perfect for home and SOHO (Small Office Home Office) environments.

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2 Background

Caller Identity (CID) or Calling Number Identification is a telephony feature available on Packet Switched Telephony lines (PSTN) lines, which sends a caller's number to the called party's telephony equipment. In the US and a number of other countries CID is sent during the ringing signal. However, in the UK on BT lines CID is sent before the first ring and works as follows:

1. Polarity reversal to wake up the display
2. 300ms delay which may include other signalling
3. CITT V23 modem tones data burst to provide CID

The Silicon labs DAA chip (Si3012/Si3035) used by Digium® in their original X100P card and in the majority of low cost clone cards doesn't support polarity reversal detection. This means that when the Zaptel driver for the X100P card (wcfxo) was being developed there wasn't a requirement for polarity reversal detection and therefore code to support this feature was never included. When Digium® brought out their TDM400P card (equivalent to the OpenVox A400P) a different DAA chip was used that did support polarity reversal. Therefore, the Zaptel driver for the A400P/TDM400P (wctdm) was developed to support the polarity reversal detection feature.

The DAA chip used in the X100P SE card is a Si3014/Si3034, which does support polarity reversal detection. However, because the X100P card Zaptel driver does not include any polarity reversal detection code, the X100P SE polarity detection feature cannot be used. An alternative is to use a patch that uses a history buffer to store the CID value written by Tony Hoyle. By the time the first ring arrives, the buffer has a history of what was received immediately before so the CID information can be extracted.

3 Pre-Installation Guidelines

3.1 UK PSTN Service Providers

BT is the incumbent PSTN service provider in the UK, but there are a number of alternative providers including cable companies. Cable companies in the UK like Telewest and NTL (now Virgin Media) use different voice switches in different areas due to having built out their network through acquisitions. This means that in some areas CID is provided using the BT method (e.g. areas with Marconi switches) but in other areas the CID method is the same as the one used in the US (e.g. areas with Nortel Switches). If your PSTN provider is a UK cable company then it is advisable to try out the US CID options in Asterisk and if possible to find out what the CID method used is before installing the history buffer patch.

3.2 IP PBX Software Versions

Detailed instructions are provided for installing the history buffer patch on Trixbox 2.6.07, which is based on the following software packages:

- Asterisk 1.4.19.1
- Asterisk Addons 1.4.6
- Zaptel 1.4.10.1
- Kernel 2.6.18-53.1.4.el5

If you wish to install the patch using a different Trixbox version or another IP PBX software package, then you will need to ensure you check what software packages are currently running and modify the instructions to download/install the correct software versions.

3.3 History Patch Versions

We have modified the original patches to work using the Asterisk/Zaptel versions used in Trixbox 2.6.07. For example, the original Zaptel patch had to be modified as the `zaptel-base.c` and `zaptel.h` files are now in the kernel directory (since Zaptel version 1.4.9.2). The patches for Asterisk versions 1.2 and 1.4.2 can be found here:

<http://www.lusyn.com/resources/asterisk/index.htm>.

If the patches do not work with your particular Asterisk/Zaptel version you will need to look at the corresponding source code files to determine why the patch is failing. If you need assistance creating a patch for a specific Zaptel/Asterisk version then please email us at support@novavox.co.uk.

3.4 Configuration File Backups

Unless you run the "make sample" command after installing Asterisk your configuration files like `/etc/asterisk/zapata.conf` and `/etc/asterisk/extensions.conf` should not be modified. However, it is recommended to backup current configuration files just in case something goes wrong, particularly if the IP PBX is a working system.

3.5 Software Package Dependencies

If your IP PBX has additional software packages installed that are dependant Asterisk/Zaptel, then there is a possibility that they may not work properly after recompiling the Asterisk/Zaptel software and they may need to be reinstalled. Also, if you have installed any other patches or modified any of the original source code (e.g. to support vendor specific hardware drivers) then you will need to repeat/incorporate the same changes into the installation steps provided in this document.

4 Setup Instructions

The setup instructions provided are based on using yum for package updates/installation and wget to download source code tarballs. However, if preferred alternative methods can be used such as using apt or manually downloading rpm's to update/install packages and using svn to download source code.

Note: When copying text from PDF documents some characters such as hyphens are not copied to the clipboard. It is therefore advisable to input the commands below manually rather than copy and paste them to avoid errors.

4.1 Update Packages

It is recommended that you ensure that all installed software packages are up to date using:

```
#yum update -y
```

Warning: If you have patched any installed packages then these will need to be patched and recompiled again after using yum. As an alternative, you can just update the Asterisk/Zaptel packages as these will need to be patched and recompiled anyway.

4.2 Install kernel Source Tree

First of all check to see if you need to install a kernel source tree by running:

```
#ls -l /lib/modules/`uname -r`/build/.config || echo "Install kernel"
```

If the output shows "Install kernel" then check what kernel type you need as shown below, otherwise proceed to step 4.3.

Check if you are using a smp kernel or not:

```
#uname -r | grep -q smp && echo "Install SMP kernel."
```

If the output shows "Install SMP kernel.", then run:

```
#yum install kernel-smp-devel kernel -y
```

Otherwise run:

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

4.3 Install C/C++ Compiler Packages

Install C/C++ Compilers to Compile Source Code if you don't have them installed on your system:

```
#yum install gcc -y  
#yum install gcc-c++ -y
```

4.4 Shutdown and Restart the IP PBX

Reboot and check that everything is still working correctly after installing/updating relevant packages:

```
#shutdown -r now
```

4.5 Download Asterisk/Zaptel Source Code

Change to user source code directory and download/unzip the required software packages:

```
#cd /usr/src
```

Download/Unzip Asterisk:

```
#wget http://ftp.digium.com/pub/asterisk/releases/asterisk-1.4.19.1.tar.gz
#tar -xzvf asterisk-1.4.19.1.tar.gz
#ln -s asterisk-1.4.19.1 asterisk
```

Download/Unzip Asterisk Addons:

```
#wget http://ftp.digium.com/pub/asterisk/releases/asterisk-addons-1.4.6.tar.gz
#tar -xzvf asterisk-addons-1.4.6.tar.gz
#ln -s asterisk-addons-1.4.6 asterisk-addons
```

Download/Unzip Zaptel

```
#wget http://ftp.digium.com/pub/zaptel/releases/zaptel-1.4.10.1.tar.gz
#tar -xzvf zaptel-1.4.10.1.tar.gz
#ln -s zaptel-1.4.10.1 zaptel
```

4.6 Apply Patches

Download and Apply Asterisk Patch:

```
#cd /usr/src/asterisk
#wget http://www.novavox.co.uk/dev/patch/x100pse/x100p-se-asterisk-usehist-1-4-19.diff
#patch -p0 <x100p-se-asterisk-usehist-1-4-19.diff
```

Download and Apply Zaptel Patch:

```
#cd /usr/src/zaptel
#wget http://www.novavox.co.uk/dev/patch/x100pse/x100p-se-zaptel-usehist-1-4-10.diff
#patch -p0 <x100p-se-zaptel-usehist-1-4-10.diff
```

Recommendation: At this point you may wish to consider applying the Zaptel patch for enabling global line standards support, including support for complex impedance. Full instructions for the patch can be found here:

 [Novavox X100P SE Global Line Standards Setup Guide](#)

To apply the Global Line standards patch carry out step 4.6 from the Global Line Standards Setup Guide now, and then carry out step 4.10 to change the Zaptel operating mode before rebooting (i.e. before step 4.10 in this guide).

4.7 Stop Asterisk and Zaptel

First of all stop Asterisk:

```
#ampportal stop / CLI>stop now
```

Then stop Zaptel:

```
#service zaptel stop
```

4.8 Remove Existing Zaptel/Asterisk modules

Remove Zaptel Modules Directory

The commands below are correct for removing the Zaptel module directories in Trixbox 2.6.07 (the Zaptel modules may be in one or possibly both directories).

```
#rm -r /lib/modules/`uname -r`/extra/zaptel  
#rm -r /lib/modules/`uname -r`/misc
```

If you are using a different Trixbox version or an alternative IP PBX package then you will need to find where the Zaptel modules are currently installed. To find the Zaptel modules directory find the directory that the wcfxo.ko module is stored.

Remove Asterisk Modules directory

The command below are correct for removing the Asterisk module directories in Trixbox 2.6.07.

```
#rm -r /usr/lib/asterisk/modules
```

If you are using a different Trixbox version or an alternative IP PBX package then you will need to find where the Asterisk modules are currently installed. To find the Asterisk modules directory look for the chan_zap.so module.

Note: As an alternative to deleting the Asterisk/Zaptel module directories you could make a copy of the directories and then delete the old ones to provide a contingency plan if anything goes wrong.

4.9 Compile Source Code

Compile the Zaptel Source Code:

```
#cd /usr/src/zaptel  
#make clean  
#make
```

You should receive the following message:

```
****  
**** The configure script was just executed, so 'make' needs to be  
**** restarted.  
****  
make: *** [config.status] Error 1
```

Continue by running:

```
#make
```

```
#make install
#make config
```

The following should be included in the output:

```
...
I think that the zaptel hardware you have on your system is:
pci:0000:04:06.0      wcfxo-      1057:5608 Wildcard X100P
```

Compile the Asterisk Source Code:

```
#cd /usr/src/asterisk
#make clean
#./configure
#make
#make install
```

Note: Do not run 'make samples' as suggested otherwise your existing configuration files will be overwritten.

Compile the Asterisk Addons Source Code:

```
#cd /usr/src/asterisk-addons
#make clean
#./configure
#make
#make install
```

Note: Do not run 'make samples' as suggested otherwise your existing configuration files will be overwritten.

4.10 Shutdown and Restart the IP PBX

Note: If you are applying the Global Line standards patch then follow step 4.10 in the Global Line Standards Setup Guide before rebooting.

```
#shutdown -r now
```

4.11 Edit etc/asterisk/zapata.conf File

Edit /etc/asterisk/zapata.conf and add the following lines for Caller ID:

```
usecallerid=yes
cidsignalling=v23
cidstart=usehist
```

Note: Check that the settings in all your configuration files are still all correct. For example, if you run genzaptelconf or setup-pstn then one of your files may contain "cidstart=history", which is incorrect. In addition to the zapata.conf file, the configuration files to check include:

```
/etc/asterisk/zaptel.conf
/etc/asterisk/zapata-auto.conf
/etc/asterisk/zapata-channels.conf
```

To verify the configuration settings are correct refer to our X100P SE installation guide:

 [Novavox X100P SE PCI card Installation guide](#)

Configuration Complete

Your IP PBX is now fully configured to support CID on BT lines in the UK using your X100P SE card.

5 Further Assistance

If after following the instruction in this guide you have been unable to configure your X100P SE card to support Caller ID on UK BT lines, then please check if there are any solutions to the issues you are experiencing available from the Open Source community. Links to the online forums and wikis for assistance installing Asterisk/Trixbox are provided below:

Asterisk Wiki - <http://www.voip-info.org/wiki-Asterisk>

Asterisk Forum - <http://forums.digium.com>

Trixbox Forum - <http://www.trixbox.org/forum>

Trixbox Wiki - <http://help.trixbox.com>

For product installation/troubleshooting guides please visit our website support section:

www.novavox.co.uk/support

Novavox customers only: If after using the Open Source community resources available and following the guidance provided on our website you are unable to resolve an installation issue then please contact us at support@novavox.co.uk.

6 Quick Reference

Useful Commands

Command	Description
#amportal start	Start Asterisk
#amportal stop	Stop Asterisk
#asterisk -r	Connect to the Asterisk CLI
#lsmod	Lists information about all loaded modules
#modprobe	Adds a loadable module to the kernel, e.g. zaptel or wcfxo
#yum update	Update installed packages
#yum install	Install new packages
#service stop	Stop a service
#uname -r	Display kernel version
#ztcfg -vv	Reloads the zaptel.conf configuration, "-vv" option provides information on configured zap channels
#ztool	The Zaptel Tool (ztool) command shows the current status of any Zaptel supported interface cards
*CLI>exit	Exit from Asterisk CLI
*CLI>reload	Reload Asterisk
*CLI>zap show channels	Shows Zap channels recognised by Asterisk
*CLI>zap show status	Shows Zaptel devices recognised by Asterisk

Configuration File Descriptions

File	Description
/etc/zaptel.conf	Used by the Zaptel driver to define the relevant parameters for zaptel supported hardware devices
/etc/asterisk/zapata.conf	Used by Asterisk to store information about Zaptel devices and the features supported
/etc/asterisk/zapata-auto.conf	Automatically generated by genzaptelconf, contains Zaptel hardware configuration information used by Asterisk
/etc/asterisk/zapata-channels.conf	Automatically generated by genzaptelconf / setup-pstn, contains Zaptel hardware configuration information used by Asterisk
/etc/asterisk/indications.conf	Contains information about the sounds that a phone system in a particular country makes for various indications
/etc/sysconfig/zaptel	Zaptel service script used to load Zaptel modules

Appendix A - X100P SE PCI Card Information

Product Overview

The X100P Special Edition (SE) is a single port analogue computer telephony PCI card developed by X100P.com specifically for leading open source IP PBX software such as Digium Asterisk® and Trixbox®. The X100P SE provides a single, full featured FXO interface for connecting an Open Source IP PBX to the PSTN (Public Switched Telephone Network). The X100P SE works out of the box using the official Zaptel driver and is perfect for home and SOHO (Small Office Home Office) environments.

Product Comparison

The X100P SE is the best of breed X100P card available. The table below provides a comparison between the X100P SE and some of the X100 cards available from alternative suppliers.

	Authentic X100P SE	Motorola Wildcard	ATCOM AX-100P	Voxzone X100P	Additional Information
Global Line Standards Support					Supports complex impedance for UK/Europe, Australia and New Zealand
Built in Pass-Thru Port for Analogue Telephone					Built in telephony service backup in case of power or IP PBX system failure
3.3v and 5v PCI Bus Support					3.3v required for low power embedded appliances and some newer PCs
100% Surface Mounted Electrical Components					Most of the ATCOM components are surface mounted but not all
Low Profile PCI Bracket and RJ-45 Modem Cable					Low profile PCI bracket required for 2U high rack servers

Product Highlights

Global Line Standards and Caller ID Support

- The X100P SE uses Silicon Labs Si3014/Si3034 DAA chip which supports global line standards including Complex Impedance for UK/Europe, Australia and New Zealand
- Supports Caller ID including countries such as the UK using a Zaptel/Asterisk patch
- Full instructions provided for configuring Global line standards and UK Caller ID support for Trixbox® 2.6.07, instructions can be modified to work with any Asterisk based IP PBX system such as AsteriskNOW®, Elastix®, or PBX in a Flash

Built-in Pass-Thru Port for Connecting an Analogue Telephone

- Enables use of the phone line while not occupied by Asterisk
- Provides a telephony service backup capability in case of power or IP PBX system failure
- Intelligent Call Handling: Introducing a pickup delay allows users to pick up when in-house

Industrial Grade Surface Mounted Electronic Components

- Minimal Signal Interference: Due to significant reductions in component size and lead length
- Increased Reliability: Better mechanical performance under shake and vibration conditions
- Reduced Heat Transference: Reduces chance of damaging the circuit board
- Shipment Safe: Not a single protruding component (except for the RJ-11 phone line socket)



Authentic X100P Special Edition



Inferior, cheaper product

Multiple QC Tests Performed Under Official Asterisk Releases

- Every card Quality Tested/Assured at the X100P.com factory
- Voice Quality, Inbound and Outbound
- Voice Level, Inbound and Outbound
- Dual-tone multi-frequency (DTMF) Dialling, Outbound
- DTMF Detection, Inbound



```

[QC Test]
exten => s,1,wait,1
exten => s,2,answer
exten => s,3,digittimeout,5
exten => s,4,noop(-----)
exten => s,5,noop( )
exten => s,6,noop(CallerID: "${CALLERID}")
exten => s,7,noop( )
exten => s,8,noop(-----)
exten => s,9,wait,2
exten => s,10,record(testsound:rulaw,,4)
exten => s,11,playtones(record)
exten => s,12,wait,1
exten => s,13,background(testsound)
exten => s,14,waittexten(2)
exten => s,15,goto(10)
    
```

Excerpts from the Asterisk Dial plan used in the X100P.com QC Department

User Changeable Standard and Low Profile PCI Bracket Support

- Low Profile Bracket: Perfect for embedded appliance and Small Footprint server/PC Implementations
- Standard and Low Profile PCI Bracket Included with Every Purchase



Authentic X100P Special Edition
Low Profile Bracket Installed



Authentic X100P Special Edition
Standard Profile Bracket Installed

Enhanced PCI Bus Connectivity and Stability

- High Quality Printed Circuit Board (PCB) with Golden Pins
- Enables Stable PCI Connection
- No More Fatal 'PCI Master Abort'



Un-Retouched Photo Showing:
Authentic X100P Special Edition (Top)
Inferior, cheaper product (Bottom)

Technical Summary

- Half length PCI card compatible with nearly all commercially available PC motherboards
- Fully PCI 2.2 compliant: Auto-sense compatibility for both 5v and 3.3v PCI busses
- Full hardware and software compatibility: Compatible with most well known brands of open source computer telephony equipment
- Global telephony system support: Configurable line interface to meet international telephone line interface requirements
- Surface mounted industrial grade components: Minimal signal interference and increased reliability
- Solid tantalum capacitors: High volumetric efficiency/reliability, low Equivalent Series Resistance (ESR) and temperature stability over the range -55°C to +85°C
- Enhanced PCI Bus Connectivity and Stability
- Latest Revision of the Original DAA chipsets with numerous Bug Fixes
- Support for Digital Gain Control (Transmit and Receive)
- User Changeable Standard and Low Profile PCI Bracket Support
- Built-in Pass-Thru port: Enables use of the phone line while not occupied by Asterisk
- Dimensions excluding PCI bracket (H x L x W): 47mm x 120mm x 16mm / 1.8" x 4.7" x 0.6"
- Certificates: CE, FCC

Appendix B - Acronyms

Acronym	Description
BT	British Telecom
CO	Central Office
DAA	Direct Access Arrangement
CID	Caller Identity
DTMF	Dual-Tone Multi-Frequency
FXO	Foreign Exchange Office
FXS	Foreign Exchange Station/Subscriber
IP	Internet Protocol
IP PBX	IP Private Branch Exchange
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
PSTN	Public Switched Telephony Network
SOHO	Small Office Home Office
SMP	Symmetric Multi-Processing
UK	United Kingdom