A Positron Telecommunication Systems Inc
White Paper

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Positron's V-114 – T.30 Fax pass through over FXS

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Introduction

The V-Series PCI card by Positron Telecom is a leap forward in the telecommunications card market. It is the first of its kind to offer the functionality of Asterisk PBX on a card with integrated telephony ports, hardware based echo cancellation and Ethernet interface.

By integrating Linux, Asterisk, Echo Canceller, Ethernet (for PCI and LAN), Telephone ports (FXS) and Gateway functionality (FXO) we have created the first standalone solution that can be installed in any PC and by interfacing Ethernet to the PCI bus we have also made it an ANY Operating System solution – no special drivers required.

Asterisk® is a renowned open source telephony engine and tool kit. Asterisk allows the developers and integrators to create advanced communication solutions and thus offering flexibility unheard of in the world of proprietary communications.

The whitepaper outlines the configuration steps required on the V-114 PCI to have a successful T.30 fax pass through.

Network Design

The Network design (Figure 1.1.)

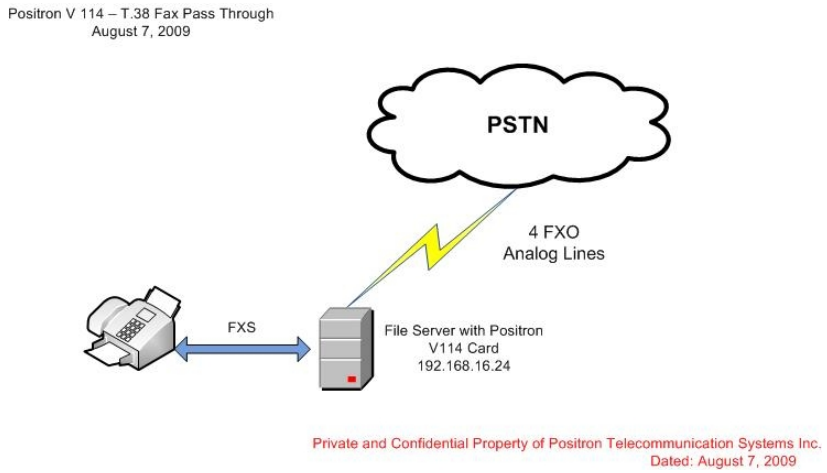

Figure 1.1: Network Design of the Test Bed

The test bed for the above network design consists of the following hardware.

1. V-114 PCI used as a PBX and installed in a File Server
2. T.30 Supported Fax Machine

Implementation

The following is an overview of the steps that will be required to complete the implementation:

1. Configuration of the FXO Ports on the V-114 PCI for PSTN connectivity and fax detection.
2. Configuration of the FXS port on the V-114 PCI for the Fax Machine.
3. Dialplan configuration on the V-114 PCI.

Benefits

1. Users can keep their existing fax machine / processes
2. Users can have failure safe device incase their IP based system fails
3. Configuration is simple and quick
4. No extra drivers or files required to implement this feature

1.1 - Configuration of FXO Ports on the V-114 PCI for PSTN connectivity and fax detection.

The V-114 PCI has 4 FXO ports and 1 FXS port. Hence it can connect to 4 Analog lines from the PSTN and an FXS device on the FXS port. The FXS device can be an analog phone or a Fax Machine. In the current network design, we have a fax machine on the FXS port.

It is required to program the country in order to get the appropriate dial tone, busy tone and other country specific tones. This is done in zaptel.conf file as mentioned in table 1.1.

Table 1.1 - Zaptel configuration on V-114

Changes	**Descriptions**
zaptel.conf	File Name on V-114
loadzone=us	This means your FXO ports will be loaded with US indication tones.
defaultzone=us	This means the default zone is "US".
fxsks=1,2,3,4	This line indicates to V-114 that the ports 1,2,3,4 are FXO.
fxoks=5	This line indicates to V-114 that the port 5 is an FXS.

The next step is to configure the "context" for the incoming calls on the FXO and enable fax detection to detect the fax calls. This is done in zapata.conf as shown below in table 1.2.

Table 1.2 - Zapata configuration on V-114 for FXO

Changes	**Description**
zapata.conf	File Name on V-114
faxdetect=incoming	Fax detect is set to incoming, this is required to detect fax calls on the incoming calls from the PSTN.
context=from-Bell	Context name is "from-Bell"
signalling=fxs_ks	The signaling is set to "fxsks" so that ports are configured to work as FXO with the application. This works in conjunction with the zaptel.conf file.
group=1	Group is used to bundle the FXO ports as a group. We can have multiple groups. The group number is set to 1.
relaxdtmf=yes	Relaxdtmf is set to yes, if we have any dtmf (Dual-tone multi-frequency) issues with the analog lines.
channel=>1,2,3,4	Channels that belong to the group=1 are specified here. For simplicity we are assigning all the FXO ports to group 1.
	Please note that we did not configure FXS port – 5 in the zapata.conf file. However, it is recommended to be configured in the zaptel.conf file, even though it is not used.

Reboot In order for the changes to be implemented, the system must be rebooted. The following command will reboot the system.

> reboot

2.1 - Configuration of the FXS port on the V-114 PCI for the Fax Machine

The FXS port is configured in zapata.conf. We are required to configure the context for the FXS Port used by the Fax machine to dial any Outgoing calls as described in table 2.1.

Table 2.1 - Zapata configuration on V-114 for FXS

Changes	Description
zapata.conf	File Name on V-114
context=from-FaxMachine	Context name is "from-FaxMachine"
signalling=fxo_ks	The signaling is set to "fxoks" so that ports are configured to work as FXS with the application. This works in conjunction with the zaptel.conf file.
relaxdtmf=yes	Relaxdtmf is set to yes, if we have any dtmf (Dual-tone multi-frequency) issues with the analog lines.
channel=>5	Channel that is assigned to FXS. In this case it is 5.

Reboot In order for the changes to be implemented, the system must be rebooted. The following command will reboot the system.

> reboot

3.1 – Dialplan configuration on the V-114 PCI Card

The V-114 PCI has to be configured to send/receive the fax calls from the PSTN to the Fax machine.

The context that is defined to receive the incoming calls from the PSTN in the "zapata.conf" file is "from-Bell".

The calls that V-114 receives in the context "from-Bell" are sent to the "fax" extension if a fax is detected on the call. The fax is then emailed to the admin user. This context is configured in the extensions.conf file as shown in table 3.1

Table 3.1 - dialplan configuration on V-114 for Incoming Fax Calls

Changes	Description
extensions.conf	File Name on V-114
[from-Bell]	Context name is "from-Bell"
exten => s,1,Answer()	Answers the call
exten => s,2,Playback(demo-congrats)	Plays back the audio file "demo-congrats" to the end user
exten => s,3,Hangup()	Hangs up the call
exten => fax,1,Dial(Zap/5,20)	If the call is being detected as fax, the call is sent to the Fax Machine that is on the FXS port number "5".
exten =>fax,2,Hangup()	Hangs up the call after the fax is completely received.

The following command needs to be executed in order to load the changes

> *asterisk –rx "dialplan reload"*

The context that is defined to send faxes out from the FXS port in the "zapata.conf" file is "from-FaxMachine".
The calls that are dialed out from the Fax Machine will use the context "from-FaxMachine" in the extensions.conf file and thus are terminated to the PSTN. The context is defined as shown in table 3.2

Table 3.2 - dialplan configuration on V-114 for Outgoing Fax Calls

Changes	Description
extensions.conf	File Name on V-114
[from-FaxMachine]	Context name is "from-FaxMachine"
exten=>_NXXXXXXXXX,1,Dial(Zap/g1/${EXTEN},20)	The first rule implies the user is dialing a 10 digit number. (N implies digits between 2 to 9, while X implies digits between 0 to 9)
exten=>_1NXXXXXXXXX,1,Dial(Zap/g1/${EXTEN},20)	The second rule implies the user is dialing a Long distance call.

Testing

Faxes are sent and received on the fax machine successfully.

Summary

The V-114 card is programmed successfully so that the FXS port connected to the fax machine is able to send/receive fax calls from the PSTN using the on board FXO ports and thus working as a T.30 fax pass through.

This test bed also infers the below statements.

"All other products of Positron Telecom which are based on asterisk Application and has an FXS port can perform a T.30 Fax pass through."

References

[1] PositronTelecom.com, "Positron V-114 Product Description", http://www.positrontelecom.com/en/prod_details.php?id=prod1229540276&c=125&s=131, accessed, July 2009.