



FAILOVER BOX

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About Voicetronix

Voicetronix manufactures and markets a range of computer telephony PCI cards that enable you to build PBX phone systems with commodity PC hardware. Open source telephony software such as OpenPBX and Asterisk are supported, as well as toolkits for building custom solutions.

Introduction

Whether your PBX server uses traditional analogue handsets, next generation IP phones or both, the ability to provide a controlled method for trunk lines failing over to specified analogue handsets/stations offers redundancy in the event of a:

1. Power failure,
2. Server breakdown or
3. Application failure.

Knowing that you can still make and take calls in the above mentioned circumstances offers you piece of mind that your communication system won't leave you completely stranded.

Failover with the OpenPCI-8LS PCI card

Voicetronix offers a failover switch box (**Failover Box**), which provides such redundancy and is intended to be used with its **OpenPCI-8LS** hardware in PBX applications.

Figure 1 depicts the Voicetronix **Failover Box**. It offers two RJ-45 sockets for interfacing to the OpenPCI-8LS card and eight RJ-11 sockets that interface to four trunk lines and four station/handsets.



Figure 1: Voicetronix Failover Box

The **Failover Box**, while providing failover capability, also acts as a cable breakout/splitter box, splitting the FXO and FXS ports on these RJ-45 sockets into individual RJ-11 sockets. This makes it easier to connect to trunk lines and telephone handsets that are usually available in RJ-11 sockets.

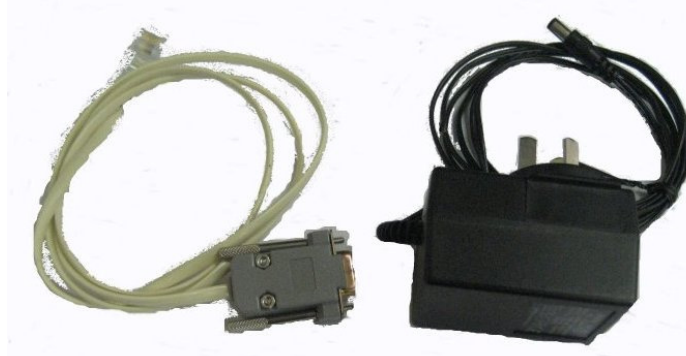


Figure 2: Serial cable and power pack for Failover Box

It is powered by a 9V AC 500mA power plug pack and communicates to your PBX server via a serial interface.

Failover with other vendors' telephony hardware

You don't have to be using Voicetronix hardware to benefit from the failover capabilities of the **Failover Box**. It may be used with other telephony cards such as Digium's TDM800P or Sangoma's A200 series when used in combination with our **Splitter Boxes**.

The **Splitter Box**, shown in Figure 3, converts a single RJ-45 socket to four RJ-11 sockets. A pair of these can be used to split the two RJ-45 connectors on the **Failover Box** to eight RJ-11 sockets for connecting to telephony hardware with only RJ-11 connectors.



Figure 3: Voicetronix Splitter Box

Other Features

- Can operate standalone or be connected to the server via the serial interface. In stand alone mode (no serial connection) only a power failure can trigger the failover mechanism. The serial connection facilitates communications to the server enabling you to query or reprogram the **Failover Box**. More importantly it can trigger failover in cases where there is a PC/server breakdown or application software failure. **Note:** A USB to serial converter cable is required if the PC has no COM port. Voicetronix doesn't supply this cable.
- Line status LEDs provide visual indicators on the line status of each trunk-station pair.
- Can be modified to meet customer requirements via the programmable PIC processor in the **Failover Box** and a set of serial commands using a serial port terminal emulator on the PC.

Specifications

Physical Connections

Top Face of Failover Box

Trunk Side (labeled FXO)

- Single RJ-45 socket connects to the FXO ports on the OpenPCI-8LS card. Alternatively, if using another vendors' telephony card then it will connect to the RJ-45 socket on the **Splitter Box** destined to the card's FXO ports.

Station Side (labeled FXS)

- The four RJ-11 sockets connect to trunk lines.
- Single RJ45 socket connects to the FXS ports on the OpenPCI-8LS card. Alternatively, if using another vendors' telephony card then it will connect to the RJ-45 socket on the **Splitter Box** destined to the card's FXS ports.
- The four RJ-11 sockets connect to handsets or fax machines.

Bottom Edge of Failover Box

- Power Socket 2.1mm 9V AC 500mA
- Serial Interface RS-232D on a RJ-45 wired according to EIA/TIA 561 DCE.

Serial Interface Parameters

Speed

4800 B.P.S. (Not Adjustable)

Mode

8 Data bits, No Parity, 1 Stop Bit.

Connection

RJ-45 (EIA/TIA 561)

Pin out

| <i>PIN #</i> | <i>SIGNAL</i> | <i>PIN #</i> | <i>SIGNAL</i> |
|--------------|---------------|--------------|---------------|
| 1 | No Connect | 5 | RD |
| 2 | No Connect | 6 | TD |
| 3 | DTR | 7 | No Connect |
| 4 | SGND | 8 | No Connect |

Programmable Interface

ANSI ASCII (Plain Text Format) serial commands

Serial Communications with the Failover Box

The **Failover Box** can be queried or reprogrammed via its serial interface. All serial commands are in ANSI ASCII (Plain Text Format). Any Serial Terminal Emulator can be used to access the port.

Serial Interface Command Set

| | |
|-------|------------------------------|
| A | Attention |
| ? | Report ID string “What am I” |
| H | Heart Beat |
| L | Load Parameters from EEPROM |
| S | Save Parameters to EEPROM |
| R | Read Parameter Number |
| W | Write Parameter Number |
| 'ESC' | 0x27 Escape current input |
| 'CR' | Commit Command |
| D | Display Verbose Status |
| F | Factory Defaults |

Command Format and Description

| <i>Command Name</i> | <i>Format</i> | <i>Description</i> | <i>Responses</i> |
|-----------------------------|---------------|-------------------------------------------------------------|------------------|
| Identify | ?<CR> | Product ID | (See Example 1) |
| Attention | A<CR> | Are you there? | OK<CR> |
| Display Status | D<CR> | | (See Example 2) |
| Factory Defaults | F<CR> | | OK<CR> |
| Heart Beat | H<CR> | | |
| Read Parameter | Rn<CR> | | |
| Write Parameter | Wn=x<CR> | | |
| Load Parameters from EEPROM | L<CR> | | OK<CR> |
| Save Parameters to EEPROM | S<CR> | | OK<CR> |
| | <ESC> | Terminates current input and returns to Command Idle State. | |
| | <CR> | Carriage Return (0x0D) | |

Command Error Responses

In cases where an invalid syntax is entered the error response is

Syntax?

In circumstances where numeric values are entered outside their range, the error response is

Range?

Examples using Serial Commands

Example 1. What is the product identification? This includes firmware revision and serial number.

```
?<CR>
```

```
Voicetronix  
Quad Failover Switch Box, v1.0  
SN: 01234567
```

Example 2. What is the state of the trunk and handset pairs?

```
D<CR>
```

```
Line 0 to HANDSET is IN-USE.  
Line 1 to CTCARD is IDLE.  
Line 2 to CTCARD is LOW Volts.  
Line 3 to CTCARD is RINGING.
```

Reading and writing to Failover Box parameters via serial interface

The Write Parameter command allows the alteration of the default behavior of the **Failover Box**. All values are decimal integers with a maximum range of '0' to '255'.

The **Failover Box** parameter information including description and defaults values are provided below.

| <i>PRAM #</i> | <i>R/W</i> | <i>Description</i> | <i>Default</i> |
|---------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| 48 | R/W | Trunk 0 Hook Threshold (Units x 0.7 = Volts) | 20 |
| 49 | R/W | Trunk 1 Hook Threshold (Units x 0.7 = Volts) | 20 |
| 50 | R/W | Trunk 2 Hook Threshold (Units x 0.7 = Volts) | 20 |
| 51 | R/W | Trunk 3 Hook Threshold (Units x 0.7 = Volts) | 20 |
| 52 | R/W | Low Voltage Threshold Level (Affects all Trunks) (Units x 0.7 = Volts) | 3 |
| 53 | R/W | SL Window Size (Affects all Trunks) (Unit = Internal Sample Rate Sample) | 2 |
| 54 | R/W | SL Window Stable Counter (Affects all Trunks) (Unit = Internal Sample Rate Sample) | 8 |
| 55 | R/W | Maximum Heart Beat interval (0.1 to 25.4 seconds) (Unit = 0.1 second) | 200 |
| 56 | R/W | Time before Heart Beat is signaled as healthy. (Unit = 0.1 second) | 50 |
| 57 | R/W | Bit field Bit 0 = [Heart Beat Detection enabled] 0 = DISABLED (+0) , 1 = ENABLED (+1) Bit 7 = [Heart Beat Detect][READ ONLY] 0 = ABSENT (+0) , 1 = PRESENT (+128) (Sum the (+n) values to get value to apply in decimal) | 0 |
| 58 | R/W | DIFV_STAB (Noise margin on input signal before ring detection / signal transitioning.) (Units x 0.7 = Volts, Note this is not ring volts as the level is attenuated by a low pass filter) | 35 |
| 59 | | Reserved | |
| 60 | | Reserved | |
| 61 | | Reserved | |

Examples using Serial Commands to modify Failover Box parameters

Example 3. Enable Keep Alive Heart Beat?

```
W57=128<CR>
```


OK

Example 4.

Change Keep Alive Heart Beat to 5 second maximum interval

W55=50<CR>

OK

Typical Application Configurations

Standard N-Station failover Configuration

In normal operating conditions the **Failover Box** acts as a breakout box allowing handsets/fax machines to be connected to the PBX server. In cases of power failure or PBX server malfunction, the **Failover box** by-passes the PBX server and connects the analogue handsets to the trunk lines directly, allowing users to make or to take calls.

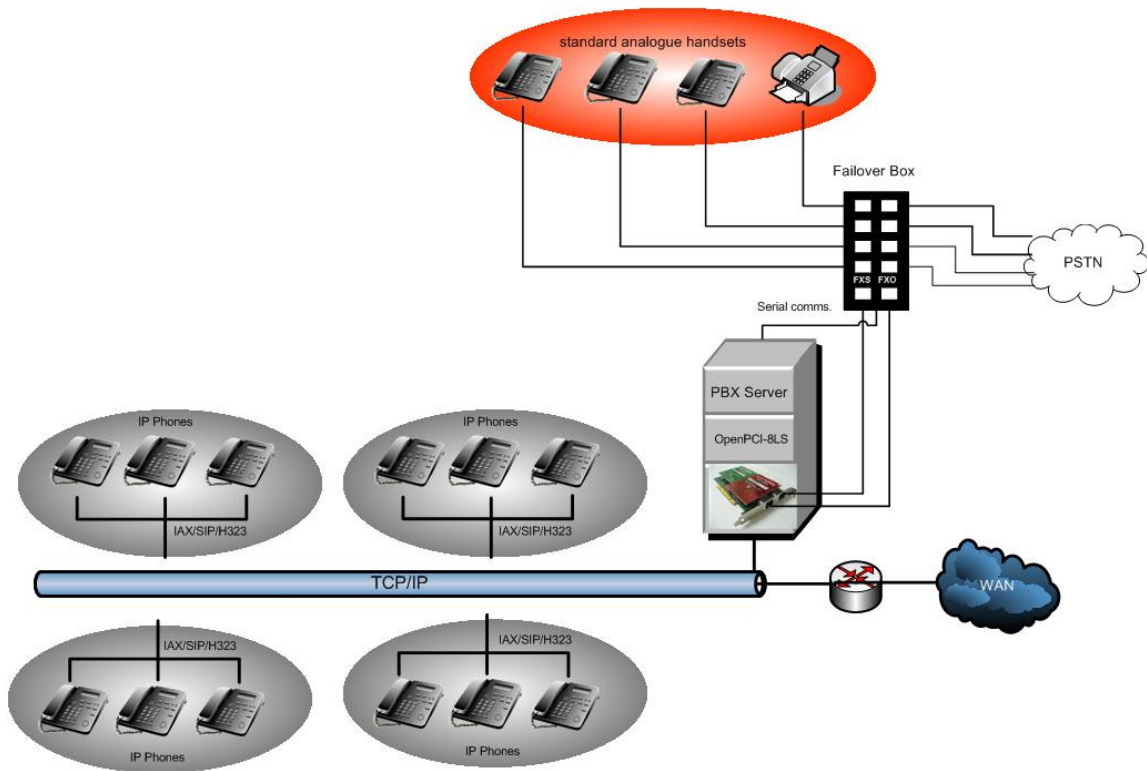


Figure 4: PBX solution with N-station failover option.

Failover Box configuration with other vendors' telephony hardware

The Voicetronix **Failover Box** can be used with other vendors' telephony cards. Other low density telephony cards have RJ-11 sockets to connect to trunk and station lines. Using a combination of our **Splitter boxes** and the **Failover box** as illustrated in the figure below, users of other telephony cards can ensure against power failure or server malfunction.

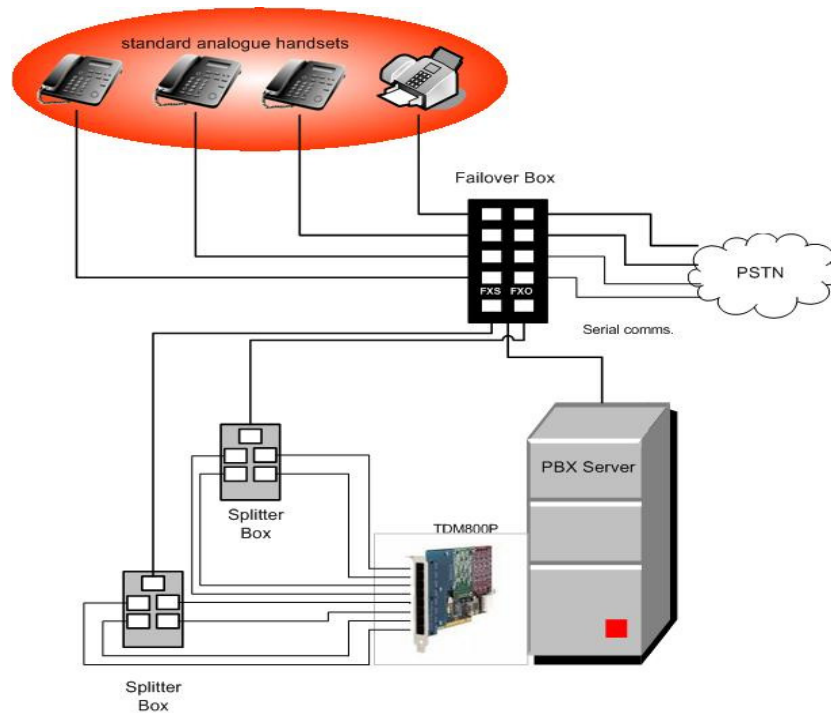


Figure 5: N-station Failover using telephony cards with only RJ-11 sockets.