



QUAD T1/E1 foneBRIDGE INSTALL GUIDE

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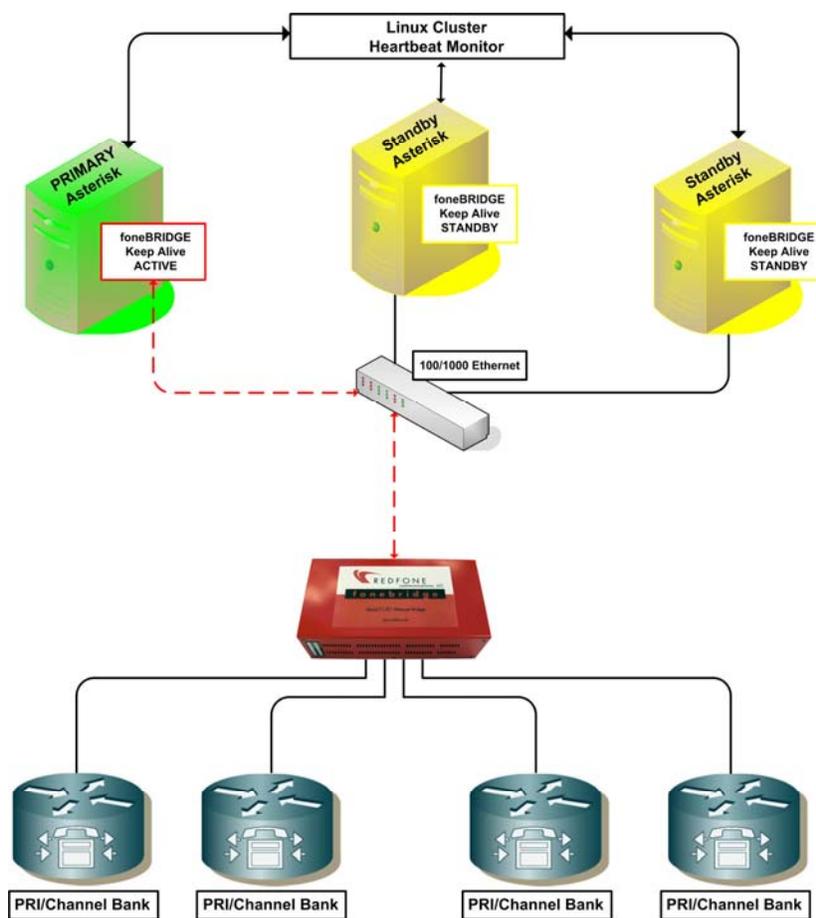
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Introduction

1.1 Overview

The **REDFONE foneBRIDGE** is a fully Asterisk™ PBX compatible appliance that provides 4 T1 or E1 interfaces which can be linked to channel banks, PRI lines or T1/E1 PBX systems.

At its core, the foneBRIDGE converts T1/E1 TDM signaling into the TDM over Ethernet (TDMoE) format. Power is supplied through Power over Ethernet (PoE 802.3AF) and the interface between the Asterisk Server(s) and the foneBRIDGE is provided with traditional Ethernet/RJ45 cabling. To the Asterisk server foneBRIDGE appears as a standard Quad T1 or E1 card though not physically installed in the server. When combined with Open Source High Availability software such as *Heartbeat* www.linux-ha.org the foneBRIDGE can play an integral role in providing always-on, high available, fault tolerant Asterisk clusters. **See diagram below**



Installation

2.1 Hardware Installation

- The foneBRIDGE can be mounted to a wallboard with optional flange mount brackets or placed upright desktop style.
- PoE power is supplied via the second Ethernet port. **See image below**



- The same PoE cable is connected into a 10/100/1000 switch or directly to the Asterisk server's 10/100/1000 Ethernet card.
- Span 1 or Port 1 begins on the far right side and proceeds left, 2, 3, 4.
- Cabling used for the T1/E1 interfaces is standard T1 crossover cables with RJ45 connections.

2.2 Asterisk Server Configuration

1. Current zaptel source is required to enable the full capability of the foneBRIDGE. Or zaptel CVS head as of 8/2005
2. Download and install zaptel following the directions for your particular kernel version

If installing on a linux-2.6 kernel you may need to patch the zaptel library before building.
Download patch at;

http://www.red-fone.com/download/fonebridge/zaptel_patch.diff

Patch instructions can be found at;

http://www.red-fone.com/download/fonebridge/patch_instructions.txt

3. Download and install foneBRIDGE configuration utility (fonulator)
 - Download: <http://www.red-fone.com/download/fonebridge/fonulator-0.1.1b.tgz>
 - Change to directory to where *fonulator-0.1.1b.tgz* was copied
 - *tar -xzyf fonulator-0.1.1b.tgz*
 - Copy fonulator to /usr/local/bin or /usr/local/sbin to allow it to be executed from any directory in the command line.
 - Verify it is set as executable; ex. *#chmod a+x fonulator*
4. Add fonulator utility to load automatically upon system boot following guidelines for your Linux distribution. Alternatively, for testing or manual operation fonulator can be executed by doing the following; *#fonulator &*
5. Copy sample configuration file to /etc/redfone.conf . The redone.conf configuration is used to configure the individual spans on the box that connect to PRI, Channel Banks, other PBXs, etc. This file allows you to set timing, line-encoding and framing on each individual T1 or E1 span.

The following sample is for a scenario where PRI lines are connected to Spans 1 & 2

```
-----  
span=1,1,0,esf,b8zs  
bchan=1-23  
dchan=24  
span=2,2,0,esf,b8zs  
bchan=25-47  
dchan=48  
span=3,0,0,esf,b8zs  
span=4,0,0,esf,b8zs  
card=eth0  
source=00:11:5B:66:48:6F  
destination=00:0C:42:03:34:7C
```

- The **span** value uses the exact format from the familiar *zaptel.conf* configuration file.
- **Note:** The *redfone.conf* does not allow for spaces, comments, semi-colons or any special characters.
- The **source** value should be the Asterisk box's MAC address.
- The **destination** value should be the MAC address of the foneBRIDGE Ethernet interface as indicated on MAC address label on right-hand side of unit. The 1st MAC address belongs to the 1st Ethernet (PoE Interface) of the fonebridge.
- The remaining values are consistent with the *zaptel.conf* guidelines

6. Configure *zaptel.conf*. Example below is for 2 PRI lines on Spans 1-2 and Channel Banks on Spans 3-4. All standard *zaptel.conf* rules and syntaxes apply.

```
-----
#
# Zaptel Configuration File
#
dynamic=eth,eth0/00:0C:42:03:34:7C/0,24,4
dynamic=eth,eth0/00:0C:42:03:34:7C/1,24,3
dynamic=eth,eth0/00:0C:42:03:34:7C/2,24,2
dynamic=eth,eth0/00:0C:42:03:34:7C/3,24,1
bchan=1-23
dchan=24
bchan=25-47
dchan=48
fxoks=49-72
fxsks=73-96
# Global data
loadzone= us
defaultzone= us
-----
```

The dynamic lines tell Zaptel to use the eth Ethernet driver on interface eth0. It will expect TDMoE data to come from 00:0C:42:03:34:7C (MAC address of the foneBRIDGE) and contain 24 channels of data in the case of a T1. The numbers after the MAC address correspond to the span numbers, 0 being first.

The last digits (4,3,2,1) sets the master span, the lowest number being the 'Master' and the higher numbers as failover spans should there be an interruption on the primary Master. Because of the way the foneBRIDGE operates, the most advantageous timing sets the 4th span as the 'master span'. This ensures that your Asterisk server waits until it has the slave spans before replying to the foneBRIDGE. This keeps timing in sync between your T1/E1 equipment and the Asterisk server.

Please note that at this time the foneBRIDGE supports either T1 or E1 but not combined T1/E1 on the same unit.

2.3 Operation

After starting up, the foneBRIDGE is still inactive. The foneBRIDGE will boot up and initializes its spans however it remains inoperative until it receives configuration data. Upon receipt of configuration data via the *fonulator utility* foneBRIDGE will configure its T1/E1 cards as per configuration rules in the *redfone.conf* file and begin sending TDMoE data to the requested destination. The foneBRIDGE also uses an internal heartbeat mechanism to send packets back to the

device that configured it. If the foneBRIDGE receives a configuration packet identical to its current configuration the packet will be ignored silently. If the configuration packet specifies different parameters, the foneBRIDGE will then reconfigure itself as requested. If the configuration packet came from a different source then heartbeats will be redirected to that source.

2.4 Validating Configurations

The default *ztool* included with the zaptel code can be used to confirm the proper installation and operation of the foneBRIDGE.

```
                Zapata Telephony Interfaces

Alarms          Span
OK              Dynamic 'eth' span at 'eth1/00:0C:42:03'
YEL            Dynamic 'eth' span at 'eth1/00:0C:42:03'
YEL            Dynamic 'eth' span at 'eth1/00:0C:42:03'
OK             Dynamic 'eth' span at 'eth1/00:0C:42:03'

Select          Quit
```

Additionally, once Asterisk is loaded channels can be checked by executing the following command from the Asterisk CLI: ***CLI> zap show channels**

The remaining Asterisk configurations including the `/etc/asterisk/zapata.conf` follow standard rules and syntax. No special procedures are required.

2.5 Configuration Samples

The following are sample redfone.conf & zaptel.conf files that can be referenced for different deployment scenarios;

4 x E1 PRI sample redfone.conf

```
-----  
span=1,1,0,ccs,hdb3  
bchan=1-15  
dchan=16  
bchan=17-31  
span=2,2,0,ccs,hdb3  
bchan=32-46  
dchan=47  
bchan=48-62  
span=3,3,0,ccs,hdb3  
bchan=63-67,69-73  
dchan=68  
span=4,4,0,ccs,hdb3  
bchan=74-108,110-124  
dchan=109  
card=eth0  
source=XX:XX:XX:XX:XX:XX  
destination=00:0C:42:03:XX:XX  
-----
```

Sample 4 x E1 PRI zaptel.conf that would compliment the above redfone.conf file

```
dynamic=eth,eth1/00:0C:42:03:XX:XX/0,31,4  
dynamic=eth,eth1/00:0C:42:03:XX:XX/1,31,3  
dynamic=eth,eth1/00:0C:42:03:XX:XX/2,31,2  
dynamic=eth,eth1/00:0C:42:03:XX:XX/3,31,1  
#  
bchan=1-15,17-31  
dchan=16  
bchan=32-46,48-62  
dchan=47  
bchan=63-77,79-93  
dchan=78
```

```
bchan=94-108,110-124
dchan=109
# Global data
loadzone= us
defaultzone= us
```

2 x E1 PRI sample redfone.conf

```
-----
span=1,1,0,ccs,hdb3
bchan=1-15
dchan=16
bchan=17-31
span=2,2,0,ccs,hdb3
bchan=32-46
dchan=47
bchan=48-62
span=3,3,0,ccs,hdb3
span=4,4,0,ccs,hdb3
card=eth0
source=XX:XX:XX:XX:XX:XX
destination=00:0C:42:03:XX:XX
-----
```

Sample 2 x E1 PRI zaptel.conf that would compliment the above redfone.conf file

```
dynamic=eth,eth1/00:0C:42:03:XX:XX/0,31,2
dynamic=eth,eth1/00:0C:42:03:XX:XX/1,31,1
#
bchan=1-15,17-31
dchan=16
bchan=32-46,48-62
dchan=47
# Global data
loadzone= us
defaultzone= us
```

