
ViciBox

Release 11.0

James Pearson

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ViciBox is the official installation image for the ViciDial® Call Center Suite.

Official support is available through the ViciDial Group.

Free community-based support is available on the ViciDial Forums.

ViciBox is based upon the OpenSuSE Leap distribution. The official OpenSuSE Documentation is also available online.

INTRODUCTION

1.1 Foreward

This documentation is for the IT guy or sysadmin tasked with installing and maintaining ViciBox with back-end aspects that integrate with ViciDial. It does not go over ViciDial administration such as creating users, loading leads, configuring campaigns, etc. The goal is to get ViciBox to the point where those things are all that's left.

For ViciDial administration we recommend downloading the official manuals. There is an Agent and Manager manual which cover all aspects of their respective web interfaces. They are available in either a free low-resolution black and white version or a high-resolution color paid-for version. The manuals are available at Eflo.net.

Lastly, while this documentation aims to be complete it will never cover everything. That is why the ViciBox manual was recreated as a GitHub project. This will allow anyone to submit changes and additions to the manual for review. Who knows, the next one who benefits from what you submit might just be future you the next time you run into a problem. Ask me how I know.

1.1.1 Recommended Skills

This documentation is designed to help those who are new or inexperienced with ViciBox and not necessarily Linux itself. If you have never installed Linux before it might be a good idea to find someone more experienced to help you. The good news is basic Linux experience will likely be enough to follow along with these instructions.

For network experience you will need a decent understanding of what a LAN/WAN is and how a basic NAT firewall works. If you have never done a port forward before then it might be a good idea to find someone more experienced to help you. ViciDial is very sensitive to its networking environment so it's important that it be properly implemented.

You will be required to interact with the command line interface in order to install and setup ViciBox. While this can be done directly from the server itself it's highly recommended to connect via SSH. You can use a stand-alone SSH client like [Putty](#) or the built-in ssh command if your operating system supports it.

1.1.2 Reading Guide

In order to remove as much ambiguity as possible a certain syntax or style was implemented. It is there to help readers understand what the intent of that instruction is. The following table shows how this style is implemented, what the intent is, along with a working example.

Table 1: Style and Syntax Example

As Written	Intention	Example
some Prompt	Look for the Prompt to come up on the CLI or console	at command prompt #
type this	Type everything in the block on the keyboard	type <code>yast lan</code> and
press KEY	Press the corresponding key, do not type out K E Y	press the ENTER key
press TAB	You may need to press the tab key multiple times	press TAB to move
press KEY1-KEY2	Press KEY1 and KEY2 at the same time	press ALT-0 for OK

1.2 Hardware

The recommendations and suggestions in this section are based on a relatively conservative outbound dialing ratio. This is assumed to be an outbound dial ratio of 5:1 for 25 agents. Actual capacity may vary depending upon dialing levels, lead quality, areas being called, time of day, etc. These recommendations should be viewed more as a starting point for your own installs.

1.2.1 Dimensioning

Server Scaling and Dimensioning is one of the hardest parts of ViciDial. The specifications provided are more of a guideline than a hard rule. ViciBox and ViciDial itself will run on anything you can install it to. If you're just doing sandbox testing or dev work then literally anything will work.

Express Box

Use the *Recommended* hardware specification at a minimum for an Express install. This is good for around 10-15 agents. If this server needs to be split and turned into a cluster then it should remain as the Web server.

Use the *Dedicated Database for 150-Agents* hardware specification for a more future-proof Express install. The hardware would likely be fine up to about 20 agents before resource contention becomes an issue. The good thing about starting with this hardware is that different roles can be split off of it while allowing it to continue being the dedicated database.

Telephony Server

Use the *Minimum* hardware specification if there is no call recording.

Use the *Recommended* hardware specification if there is call recording.

Both the above hardware specifications will allow for 25-agents and 125-trunks of capacity per server when using predictive dialing. For an inbound-only call center or one with minimal to no predictive dialing the above hardware specifications will allow for 50-agents and 250-trunks of capacity per server.

The biggest limitation is Asterisk, the telephony engine used in ViciDial. This is due to locking issue with Asterisk's internal channels. A channel is any connection between the Asterisk core process and any endpoint or module. For example, a logged in agent is using two channels. One channel for their phone connection and one channel for the meetme conference. Every call placed or received through a SIP Carrier also creates its own channel. Starting a call recording uses a channel as well. At any one time a single agent can be using up to 6 channels in Asterisk. The more channels you have and the more activity you have on them is what drives the locking issue. This is especially prevalent with automated predictive dialing methods where a large number of channels are simultaneously created and generating a lot of activity with the Asterisk core. It's why 5 is the recommended calls per second for most telephony servers. Asterisk also does not scale linearly with CPU performance. For example, a quad-core CPU might start having issues around 25-agents but an octal-core CPU might only get you up to 30-agents.

The second consideration with a telephony server centers around call recordings. The process of recording a call is initially done to a temporary RAM drive before being compressed to MP3 and written to the actual drive. Both of these processes require significantly more RAM and drive space. More memory might be needed if the calls are long (more than 30 minutes on average) or there are a high number of inbound calls. Drive size is mostly dictated by how many recordings you generate per day and the size of the recordings. If the recordings are not being offloaded to an archive server or NAS then it might be better to install a 2TB or larger drive. This is essentially required if it's a single-server ViciBox Express installation.

Web Server

The *Minimum* hardware specification is fine for 75 or so agents with SSL. Memory will likely need to be increased more than anything else.

The *Recommended* hardware specification is good for 150 or so agents with SSL. Once you start going above 150 agents I would just add RAM or CPU as you need it until you hit the TCP port limit. Drive storage needed for a web server is very minimal so the 500G drive listed in this spec is probably more than needed.

The ultimate limiting factor in a Web server is the number of available TCP ports. Apache, the web engine used in ViciBox, is configured to use all available TCP ports between 1024 and 65535. Once all of these ports are in use the web server essentially becomes unreachable for any new requests. Determining when you will hit this limit is difficult. It is dependant upon multiple factors such as how many agents you have, the features enabled in the agent interface, how much API use (or abuse) you are doing, and how long it takes for the database to respond with results. When this limit is finally hit there is no fix other than to have multiple web servers.

Apache itself mostly scales through available RAM followed by CPU performance. SSL in particular tends to be quite resource intensive and can easily cut the servers capacity in half. Fortunately memory and CPU is relatively cheap.

Database Server

The *Recommended* hardware specification is good up to about 75 agents as a dedicated database.

The *Dedicated Database for 150-Agents* hardware specification is good up to about 150 agents.

The *Dedicated Database for 300-Agents* hardware specification is good up to about 300 agents.

The limiting factor of the database is the memory table type in MariaDB. The memory table is a single-threaded table that runs exclusively in RAM. They are used for temporary tracking info and statistics within ViciDial. What happens is eventually this single thread cannot read the data from RAM, parse it, and return results fast enough. This results in queries being locked and delayed waiting to run against the table. Eventually this delay becomes great enough that it prevents ViciDial from operating correctly. Faster raw CPU speed helps but once you hit 5 or so Ghz there's no where left to go. In that situation the recommendation is to split the cluster into two smaller clusters. The good news is this isn't really an issue until you get to around 450 to 500 agents.

Memory is probably the best performance to value option with a database up to 64G. Everything after 64G or RAM is less effective due to the heavy write nature of ViciDial. In other words if 90% of the database load is all within the same 500-megs of data on the drive then there's only so much you can do with cache and buffers. Eventually the database just gets stuck waiting to read/write data from/to the drive.

For the drives it's recommended to use either a prosumer or enterprise grade drive. The Samsung Pro or Western Digital Black line of SSD drives are good examples of prosumer grade drives. An example of an enterprise grade drives would be the Intel Optane or Samsung PM lines. The primary drive metric you are looking for is mixed or random IO writes. ViciDial is very write intensive for a database application and random writes are what it does the most. The performance of even a basic SATA SSD is good enough for most smaller clusters. The second consideration with SSDs is their write endurance. This is why the prosumer grade or higher drives are recommended as their write endurance is much better. This is thanks to the use of MLC or TLC cells in the SSD as opposed to cheaper QLC cells.

Archive Server

The Archive server is an optional roll for ViciDial. Essentially all an archive server does is provide upload via FTP while allowing retrieval via HTTP. This is very likely a service that a common NAS or another server on the network can provide. The Archive server can even run in a VM.

Beyond providing the above services, all an archive server really needs is lots of reliable bulk storage. Hard Drives are a good fit for an archive server. It's recommended to use Enterprise-Class SATA Hard Drives for an archive server.

1.2.2 Specifications

CPU requirements are pretty lax for ViciDial. Anything newer than an AMD Zen1 (Ryzen 1000/Epyc 7001) or Intel Sandy Bridge (i3-2300/E3-1200) will work. The database will get the most benefit from multiple and faster CPU cores than anything else.

ECC memory is not required but highly recommended. You can potentially do without ECC memory on the telephony servers since they should be rebooted daily in most cases.

SATA SSD is the recommended minimum for all drives used. Given how inexpensive SSDs are in the 500GB to 1TB size range there really is no reason to be using spinning drives. The only use case for spinning drives in ViciDial would be in an archive server or NAS where you need tens to hundreds of terabytes of bulk storage.

RAID1 is also highly recommended for all servers. This can be accomplished through either a hardware RAID card or through two drives and the use of a software RAID. ViciBox has installation images available for both.

Minimum

- Quad (4) Core CPU 2.0+Ghz
- 8-GB RAM
- 160-GB storage

Recommended

- Quad (4) Core CPU 2.0+Ghz
- 16-GB RAM
- 500-GB storage

Dedicated Database for 150-Agents

- Octal (8) Core CPU 2.0+Ghz
- 32-GB RAM
- 500-GB storage

Dedicated Database for 300-Agents

- Sedecim (16) Core CPU 3.0+Ghz
- 64-GB RAM
- 500-GB NVMe storage

1.2.3 Example Installs

All the following examples are using the *Recommended* hardware specification unless noted otherwise. Predictive Dialing is also assumed to be in use with a 5:1 dialing ratio. If the call center is inbound only or uses very minimal to no predictive dialing then you can also double the agent and trunk capacity shown.

15-Agent / 75-Trunk ViciBox Express

- All-In-One install, best for small call centers
- 75 trunk capacity
- Recommend using a 2TB drive if you want call recordings

75-Agent / 375-Trunk ViciDial Cluster

- Three telephony servers
- One web server
- One database
- Optionally an archive server or NAS to offload the recordings to

150-Agent / 750-Trunk ViciDial Cluster

- Six telephony servers
- One web server
- One database server using the *Dedicated Database for 150-Agents* hardware specification
- Optionally a second database server doing replication for reporting and backup

300-Agent / 1500-Trunk ViciDial Cluster

- Twelve telephony servers
- Two web servers to split agents onto
- One database server using the *Dedicated Database for 300-Agents* hardware specification
- Optionally a load balancer to distribute agent connections
- Optionally a second database server doing replication for reporting

1.3 Network

The network quality needed for VoIP is very different then what is needed for things like streaming or general productivity. It's most similar to the network quality needed for FPS gaming. In order of importance you will want to monitor the Packet Loss, Jitter, and Latency between you and various endpoints like your SIP Carrier. Rarely is bandwidth solely the issue and any sort of internet 'Speed Test' will generally not help.

All checks should be done from the servers themselves or from a host on the same physical network as the servers. Unfortunately the quality of the internet varies with every hop which can be problematic with work from home agents and SIP carriers. It's not that uncommon to end up with an Agent or Carrier in New York who can connect to your server in Tampa just fine while another agent or carrier in Los Angeles might be having issues. The internet is a fickle beast kept running with zip ties and extension cords while a chunk of pallet is used to keep the door shut and a trash bag for weather-proofing. Those from the telco world will get that joke. The rest of you will just have to learn it the hard way.

[PingPlotter](#) is recommended to check for network issues. For Linux and Mac users you can also use the MyTraceRoute aka 'mtr' console application. Any examples or screenshots given in the following sections will be from PingPlotter.

And it pains me to write this, but WiFi should never ever be used for anything. All network connections should be wired. This is usually only a problem for work from home agents. My suggestion is to just buy them a very long cable.

1.3.1 Packet Loss

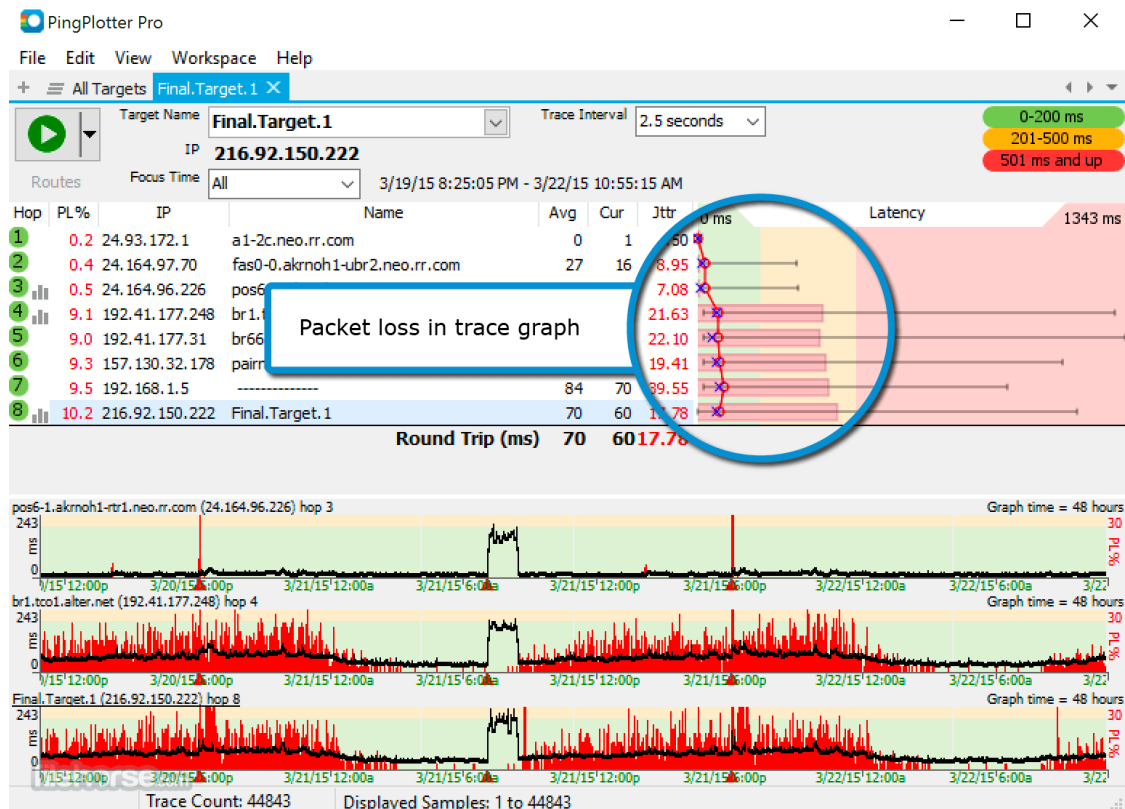
VoIP, especially SIP, is very sensitive to packet loss. Typically any packet loss above 2-3% will start to result in significant audio quality issues. This will usually start as choppy audio or what sounds like clipping/stuttering. While less common it might also manifest as chirping noises. The general rule is the greater the number of hops the more likely and worse the packet loss will be. This loosely tracks with geographical distance. For instance, going from New York to the Phillipines will greatly increase your chances of packet loss as opposed to going from New York to Los Angeles.

Generally there is very little you can do about packet loss as it mostly seems to happen in the middle of the internet. Very rarely is the issue within your network or even your ISP's network. If your ISP is a large regional cable modem provider then you are basically stuck waiting it out. If you are in an enterprise network space like a Data Center or Colocation Facility then they might be able to help. It will depend upon how close the bad hop is to their network and if they have any alternate routing paths available. The good news is that packet loss is bad for everybody so things will generally correct themselves pretty quickly.

When Packet Loss occurs it will show up on the graph as a red shaded loss with every hop after it having a similar amount of loss. That means that the packet loss occurring at that hop is translating into packet loss at all the hops after it. If a hop is red showing packet loss, but all the hops after it don't have a similar amount of packet loss, then it's just that hop ignoring pings. Ignoring pings on routers is common as pings are viewed as a nuisance resource hog.

Example

This screenshot shows packet loss occurring at hop 4. You can tell because all hops after hop 4 have similar levels of packet loss. Real packet loss is always inherited to all the hops after it.



1.3.2 Jitter

Jitter is the difference between ping times to an endpoint over time. For example, if host A pings host B and gets 20ms, then pings them again 5 seconds later and gets a 30ms ping, the jitter is 10ms between host A and B. If you then repeat this every 5 seconds and average the results over 5 or so minutes you will get a good measurement of the networks jitter. All networks have a base level of jitter. The problem is when this jitter starts to exceed 100ms on average. This is where audio start to be affected.

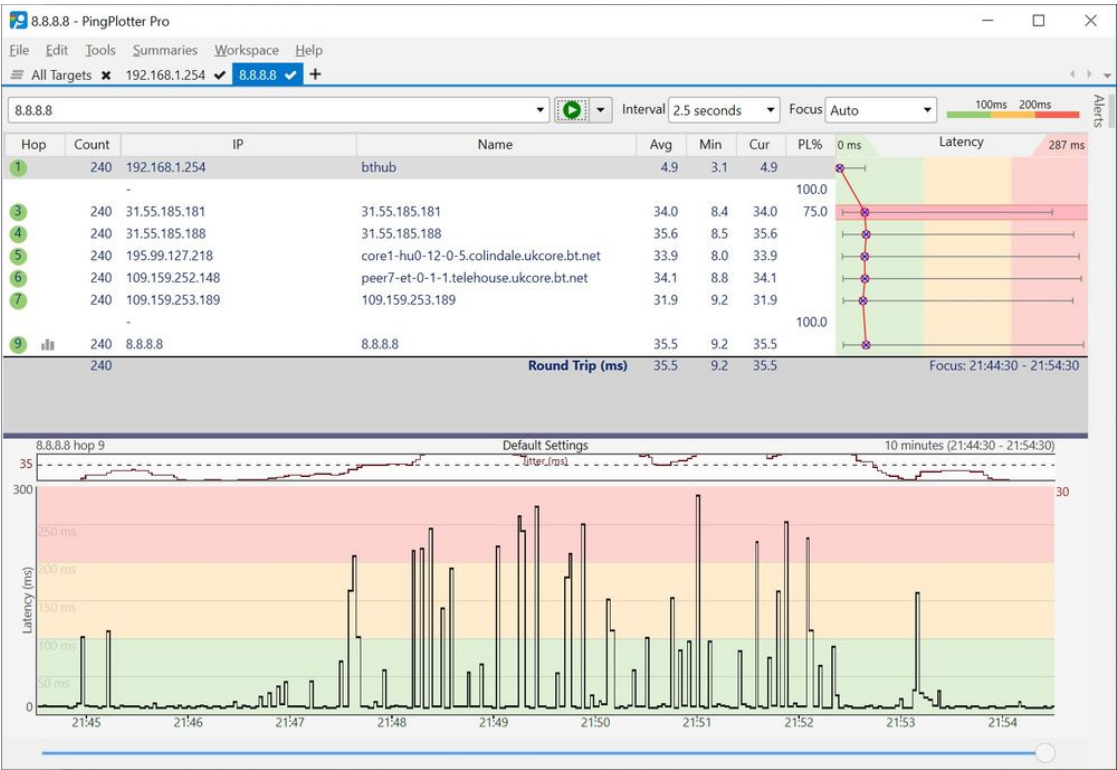
Jitter mostly manifests in the audio as distortion. Common descriptions of the audio would be that it sounded 'muddy', 'underwater', or 'warped'. Sometimes it will also manifest as chirps or slurring. This is less common and can often be confused with packet loss.

High jitter spikes are usually attributed to network connections nearing their capacity. This causes buffering on the network interfaces which results in network delays. In our experience jitter is either happening in the middle of the network like with packet loss, or it's happening at the local router. If Jitter is happening in the middle of the internet then there is not much you can do but hurry up and wait. Things will usually clear out with time but it's not uncommon to have jitter be an issue for minutes to hours at a time.

If the jitter is happening at the network's local router then it's usually the result of a bandwidth restriction. High-bandwidth sites like YouTube and Netflix or large file downloads like Windows Updates or automated backups can saturate the connection with the ISP. The solution is to either is to get more bandwidth and/or restrict what people should be accessing on the internet. If you have a more advanced router you can do things like bandwidth restrictions and block websites. Sometimes the issue is that the router is just overloaded. This is most common on the cheap routers. If you are running a mid-range router like an Asus RT-AC86U or better then the router is likely not an issue.

Example

The screenshot shows bad jitter in the bottom graph. You can see the black lines go from around 35ms (the average ping time) to as high as 290ms every 5 seconds or so. This is excessively high jitter and this connection will have a bad audio. Also of note on this example is that hop 3 looks like it is experiencing packet loss but it's not. You can see that the next few hops after hop 3 do not show similar levels of packet loss. This means that hop 3 is just ignoring ping which is normal.



1.3.3 Latency

Latency is the measure of how long it takes data to go from Host A to Host B. Latency under 100ms is considered good. It really only becomes a problem when you start getting up to 250ms of latency. At this point the delay in the audio becomes apparent to the caller and agent. It's possible for agents to learn to work with the delay but it's not desirable. In situations where you have US callers with agents in the Phillipines there's nothing you can do but work with it. It is quite impressive how well some agents can be working around the delay.

Latency mostly tracks with geographical distance since the speed of light is only so fast. So the latency from New York to the phillipines will always be much higher then the latency from New York to Los Angeles. If you are using a large regional ISP like a cable modem provider then there is really nothing you can do. Latency is not much of an issue for what most of the internet is used for. If you are in an enterprise network space like a Data Center or Colocation Facility then theres a chance they might be able to help. It will depend upon if they have any alternate routes with better network conditions.

INSTALLATION

ViciBox is installed in two phases. The first phase installs the base ViciBox operating system onto the server. The second phase involves setting up ViciDial itself. There is an interim phase, referred to as Phase 1.5, where some ancillary processes happen.

2.1 Media

ViciBox supports installation from a USB flash drive as well as a CD/DVD drive. This is accomplished through a hybrid ISO file that can be used for either media type. A simple ISO to USB writer like ImageUSB or Rufus can be used to create the installation thumb drive. There are two different installation medias currently available for ViciBox.

2.1.1 Standard ISO

Standard Installation Image

The 'standard' version is for installation into a system with a single drive. If you have a hardware RAID card then this is the image to use. When in doubt this is likely the easiest option to install.

2.1.2 MultiDevice ISO

MD RAID1 Installation Image

The 'MD' or MultiDevice media installs in a software RAID-1. This allows two drives to be used together for failure redundancy. For best results the two drives should be a matched pair. If one drive is slightly smaller it should be installed as the first drive in the system. The smaller drive also needs to be the selected target drive during the Phase 1 installation.

2.1.3 Create USB install media

This guide will walk you through creating a USB flash install media. The USB flash drive needs to be at least the size of the downloaded ISO. Any data that exists on the USB flash drive will be lost if you follow the below instructions.

Windows

There are many different programs available to write an ISO image to a USB flash drive. Rufus was used in this example since it's well known. Other options that have worked well is imageUSB from OS Forensics. If you run into problems with either of these you may need to run them as Administrator.

1. Download the appropriate install image: *Standard ISO* or *MultiDevice ISO*
2. Download [Rufus](#)
3. Run the downloaded Rufus executable from the previous step, I.E. 'rufus-4.0.exe'
4. Under 'Device' make sure it lists the correct USB flash drive to use
5. Boot selection should say "Disk or ISO image"
6. Click the Select button and select the downloaded ISO from step 1
7. Leaving all the rest of the settings at their defaults, click the 'Start' button at the bottom
8. In the pop-up window, click the 'OK' button to start writing the image to the USB flash drive
9. Sometimes there is a warning pop-up about searching for grub. If that happens, just click "OK" to continue
10. In the warning pop-up explaining that the flash drive is about to be erased, click the 'OK' button
11. When it's done, just click the 'close' button and remove your USB flash drive. It's now ready to install ViciBox.

Mac

Whoever wants to write these instructions please submit them

Linux

They're only reading this part to complain about how I didn't use the right utility with the right flags in some superior form of shell. I win.

1. Install Linux
2. ???
3. Profit, err, successfully written install media

2.2 Phase 1

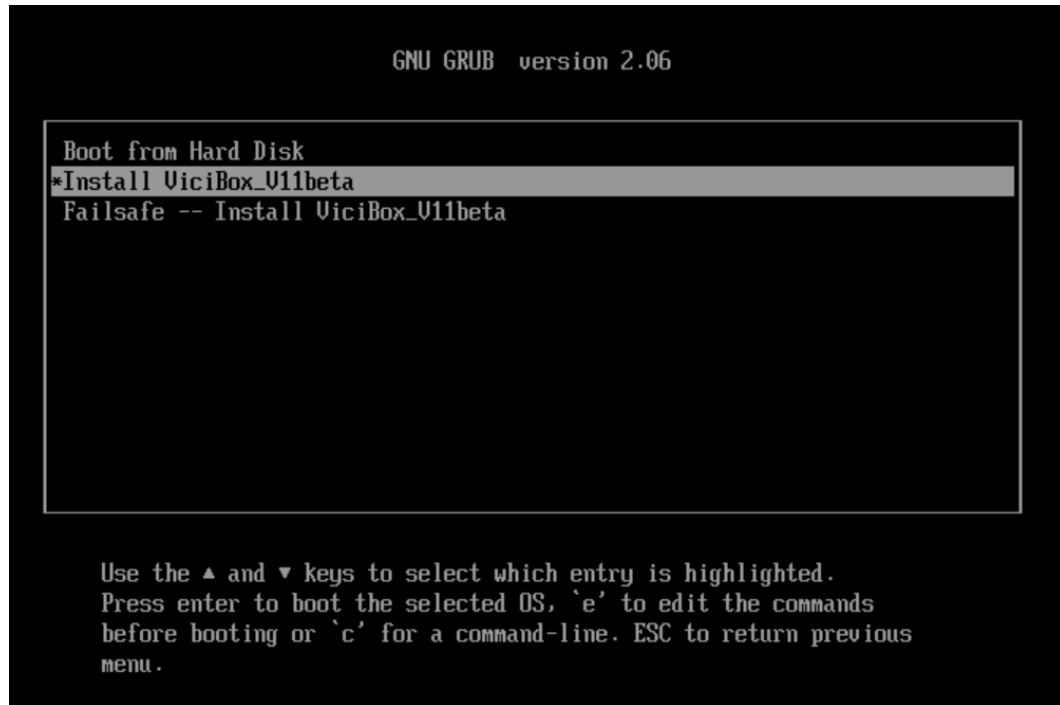
The installation of ViciBox is pretty straight forward. There have been some issues reported when installing over previous installations of Linux. The best way to insure a smooth installation is to wipe the drives before hand.

2.2.1 Install ViciBox

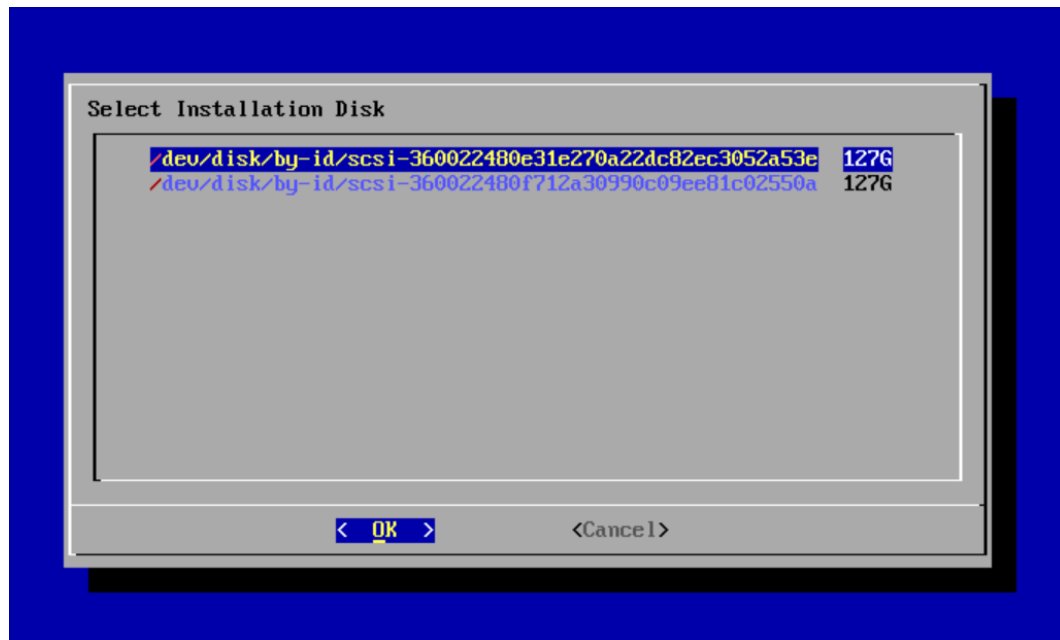
1. Boot from the install *Media*.
 2. By default the install media will boot from the servers local drive. Select **Install ViciBox** and press ENTER to start the ViciBox install.
 3. If there are multiple disks present in the system you will need to select the boot disk. Typically the first disk in the list is the first boot disk. Using the up and down arrow keys select the installation disk and press ENTER
 4. A confirmation dialog box will open to confirm the destruction of all data on the installation disk. If you proceed past this point there will be permanent data loss on the installation disk. Press ENTER to select **YES** and start the installation process.
 5. You will see a couple of progress indicators as the installer copies ViciBox to the installation disk. After that the system will boot from the installation disk and continue installing. After a short wait a **login:** prompt will be displayed along with the current network configuration. At this point the rest of the instruction can be carried out through either the console or SSH.
 6. At the **login:** prompt type root and press ENTER
 7. The first root login to the system will start a configuration wizard. Press ENTER to continue.
 8. Using the up and down arrow keys, select the system's localisation and press ENTER.
 9. Using the up and down arrow keys, select the system's keyboard layout and press ENTER.
 10. Using the up and down arrow keys, read through the license until satisfied. Press ENTER to continue.
 11. Using the TAB key, select **Yes** and press Enter to accept the license.
 12. Using the up and down arrow keys, select the system's local timezone and press ENTER.
 13. Type in the new root password you want to use and press ENTER. To keep the old root password type in vicidial.
 14. Type in the new root password again from the above step to confirm it and press ENTER.
 15. At this point the system will apply the settings before finally giving a **vicibox11:~ #** command prompt.
- Congrats, ViciBox has been installed.

Screenshots

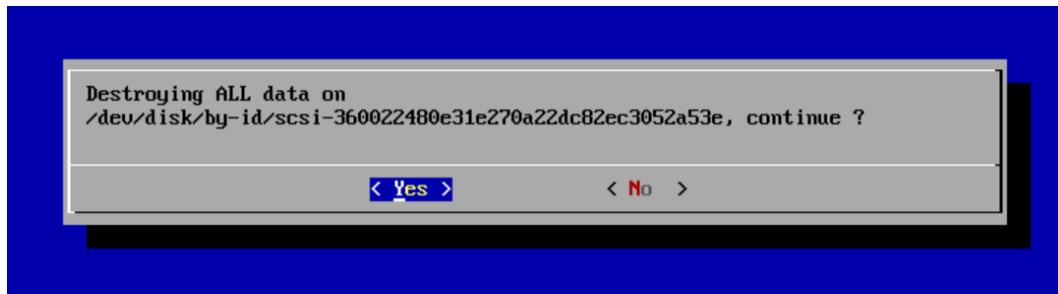
Select Install ViciBox



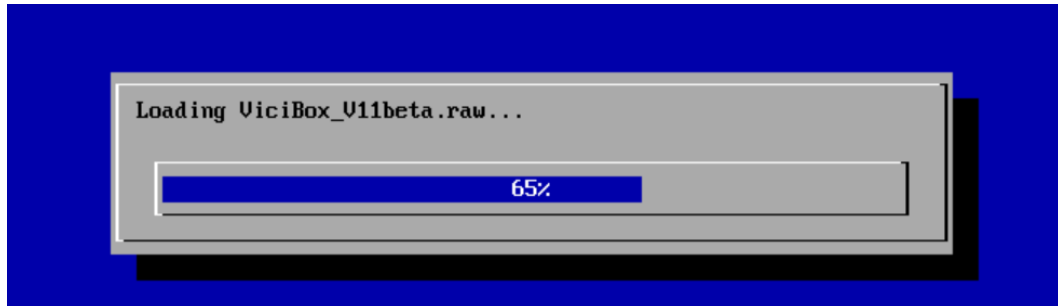
Select Installation Disk



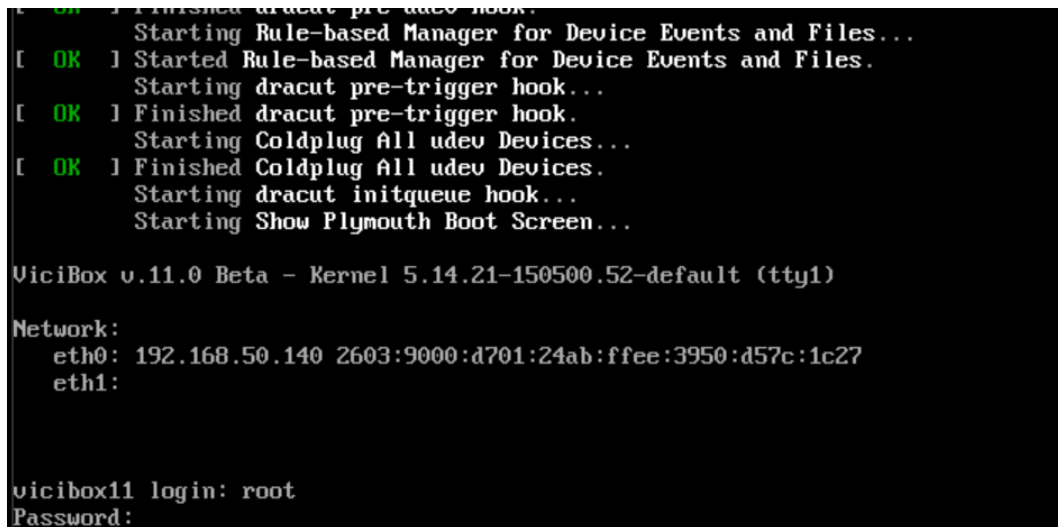
Confirm data destruction



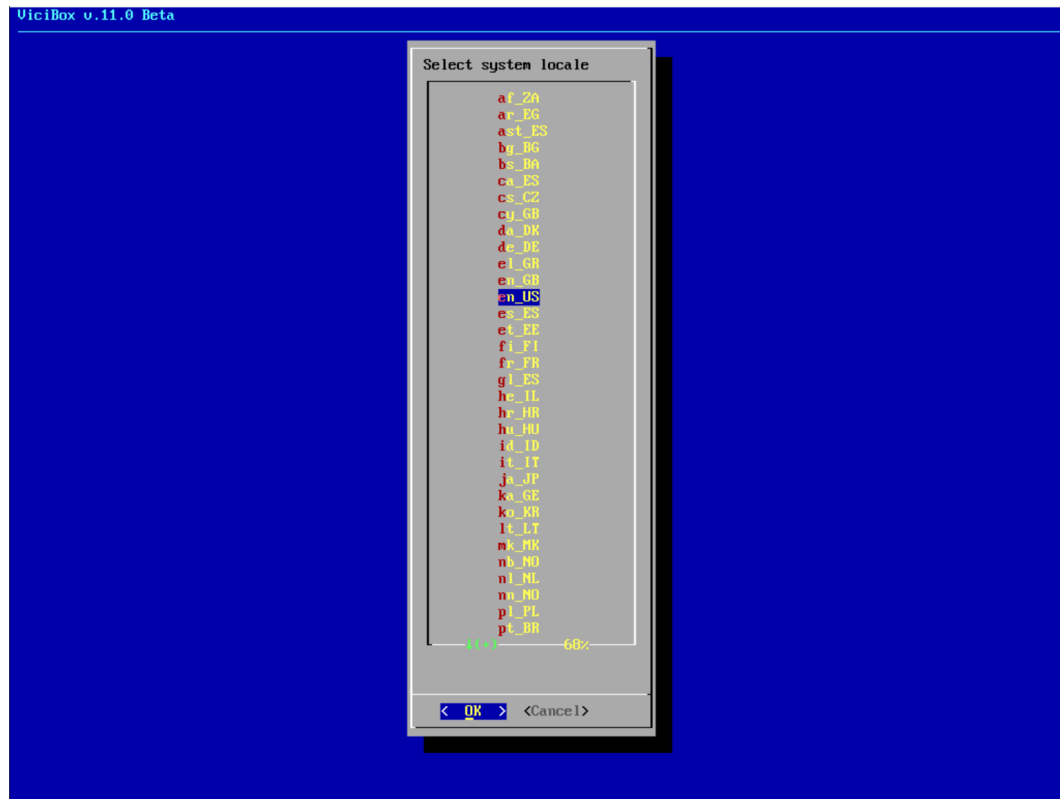
Installing to disk



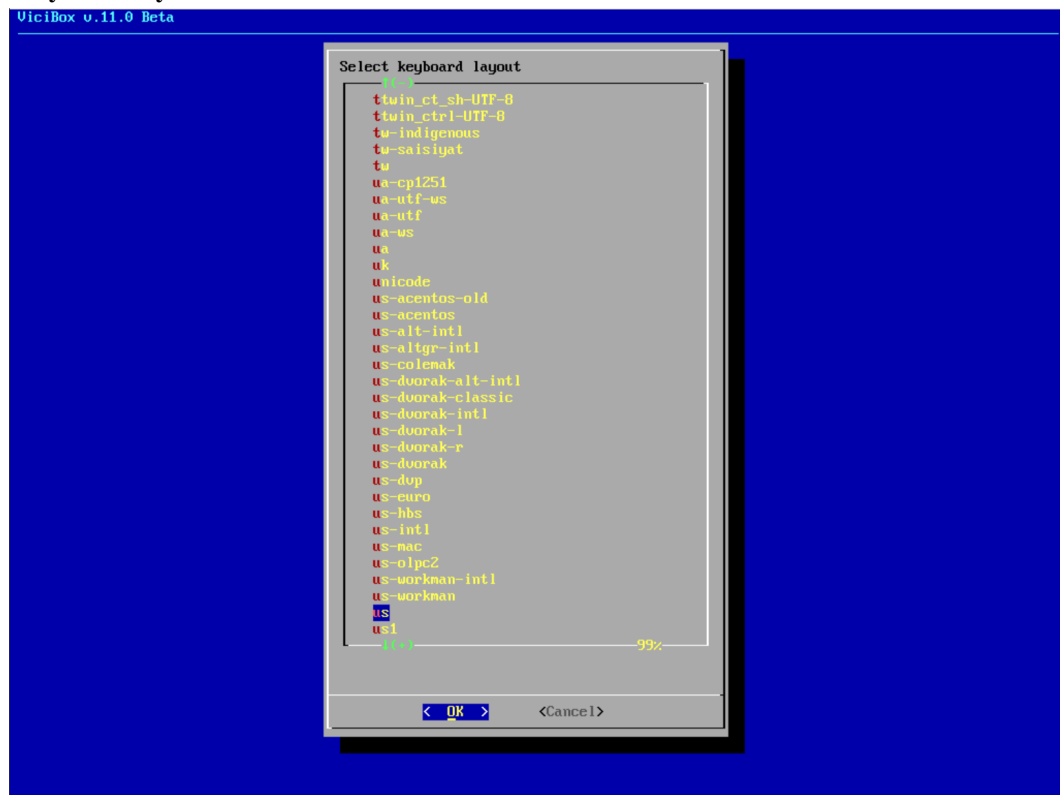
Login as root



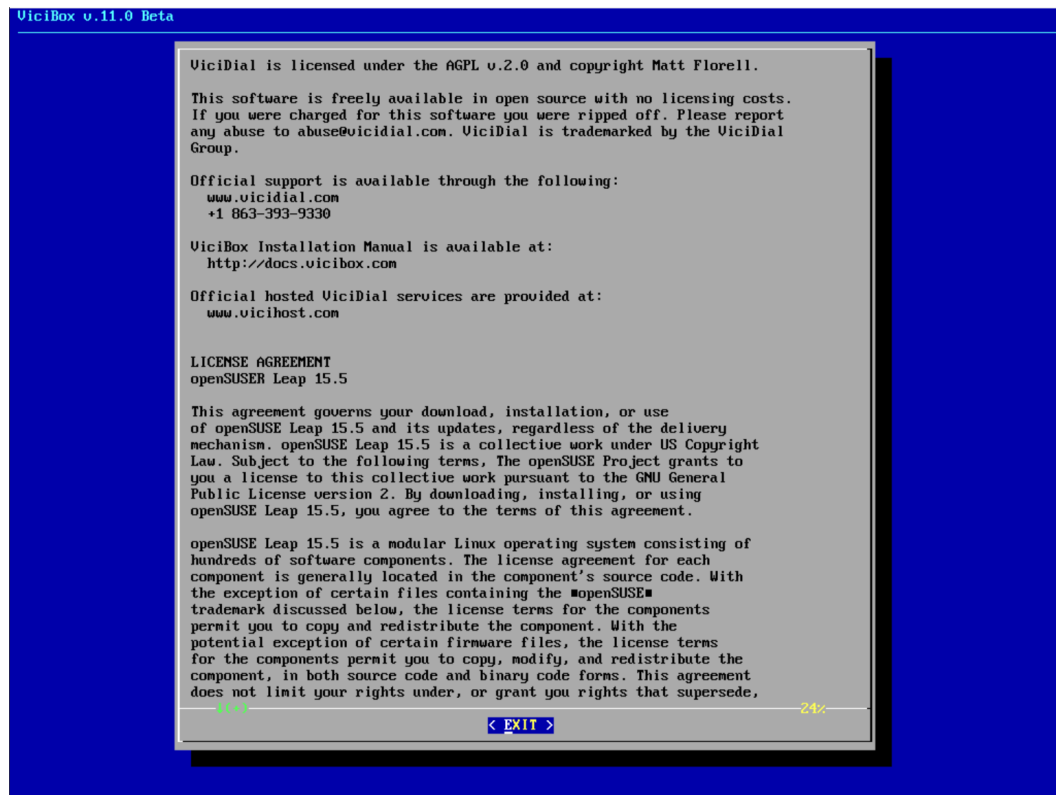
Select system locale



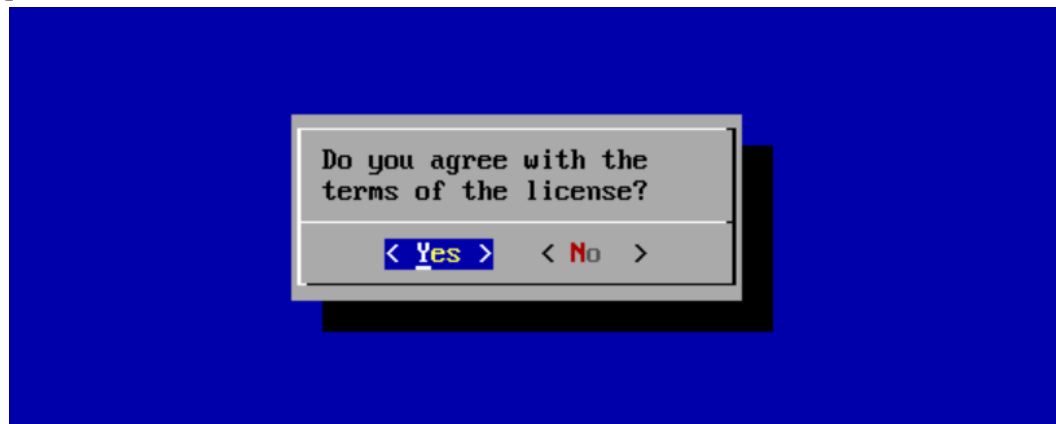
Select keyboard layout



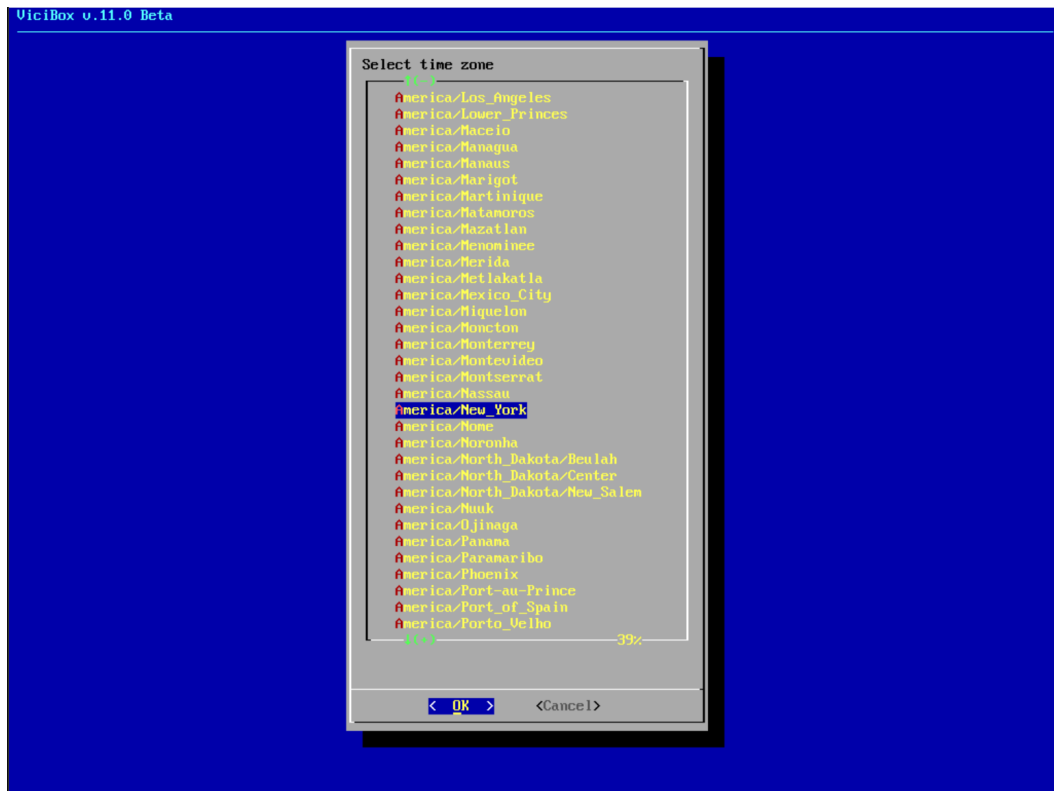
Read through license



Accept the license



Select timezone



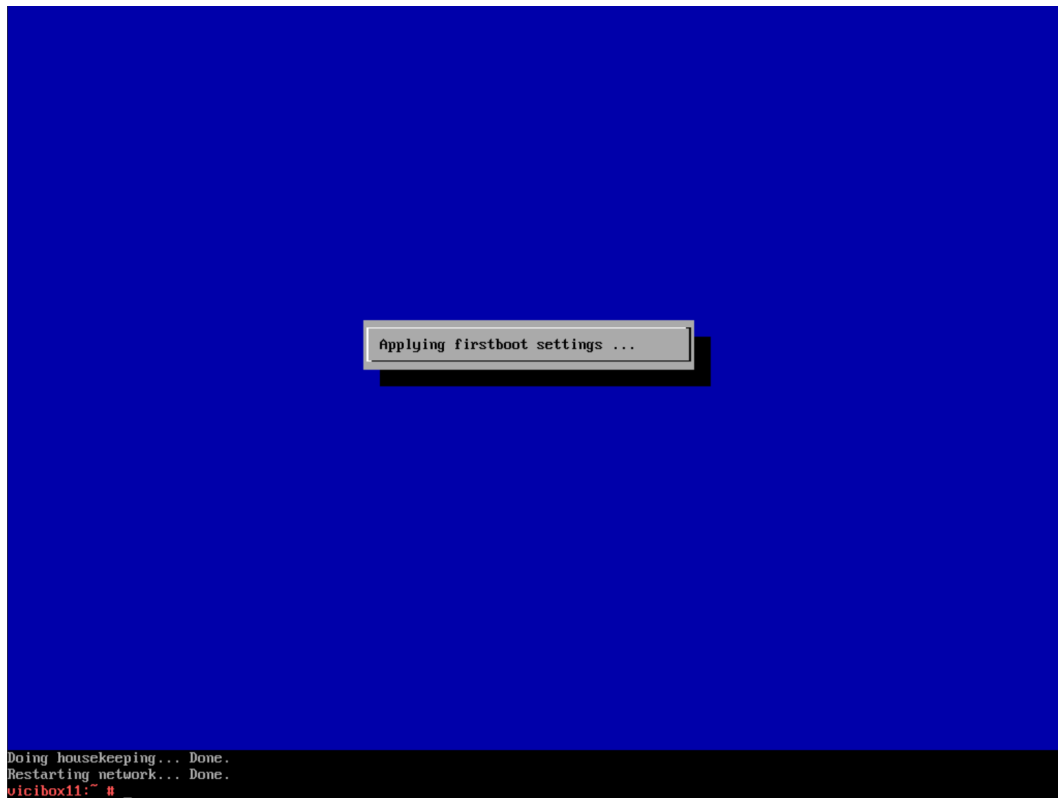
Type in new root password



Confirm the new root password



Command prompt, installation complete.



2.3 Phase 1.5

Before ViciDial is installed and setup on the servers it is necessary to configure the network. Since this is a convenient stopping point it is also a good time to do other things like install updates. It's recommended to do both of these where possible

2.3.1 Configure Static IP

While not necessary it is highly recommend to use a static IP. Once ViciDial is installed it's configuration will be tied to the current LAN and WAN IP. If those IPs change then ViciDial's configuration must also change to match. While not usually a problem with a LAN, a static IP is very important for the WAN. This static WAN IP is what will allow ViciDial to work reliably behind firewalls and with SIP carriers.

This might not be a problem if the ISP doesn't rotate the IPs that often. My residential cable modem ISP seems to rotate the IP every 30 days. Still, the cost to get a static IP is usually worth what a few hours of unexpected downtime in the middle of the day will be.

The IP address, net mask, and default gateway will be unique to your network and is beyond the scope of this document. While the DNS servers listed in the below example can be used safely it might be better to use the local router or ISP for DNS instead.

If there is a LAN and WAN network connected to the server then the WAN's default gateway should be used. There should only ever be one default gateway on the server no matter how many networks it is connected to.

If this server is to be used in a ViciDial cluster then each server must have a unique hostname. The recommended convention is 'DBX', 'webX', and 'dialerX'. For example, a basic three server cluster would use the hostnames 'DB1', 'web1', and 'dialer1'. An additioner Telephony server would be 'dialer2', etc. Please limit the hostname to 16 characters or less.

Table 1: Example Network Settings

Setting	Value
Host Name	vicidocs
IP Address	192.168.50.4
Subnet Mask	255.255.255.0 (/24)
Default Gate- way	192.168.50.1
Name Server 1	208.67.222.222
Name Server 2	208.67.220.220

Note: While the server supports IPv6 ViciDial itself has not been extensively tested with it. Therefore the documentation will assume IPv4 only for all networking.

yast lan

1. If not already, login as the `root` user to get to the `#` command prompt.
2. Type `yast lan` to start the network configuration.
3. Press the `TAB` key until the network interface is highlighted.
4. If there are multiple network interfaces, use the up and down arrow key to highlight the correct network interface
5. Press `ALT-I` to edit the highlighted network interface.
6. Press `ALT-T` to select **Statically Assigned IP Address**
7. Press `TAB` or `ALT-I` to move to the **IP Address** field.
8. Type in the static IP address for this network interface, I.E. `192.168.50.4`.
9. Press `TAB` or `ALT-S` to move to the **Subnet Mask** field.
10. Type in the subnet mask for this network interface, I.E. `255.255.255.0`. CIDR formats are also supported and can be typed in directly, I.E. `/24`.
11. Press `ALT-N` to continue back to the network Overview.
12. If you have multiple networks repeat steps 3 through 11 for any additional network interfaces needed
13. Press `ALT-S` to change to the Hostname/DNS configuration.
14. Press `ALT-T` or `TAB` to move to the **Static Hostname** field.
15. Type in the server name for this server, I.E. `vicibox-docs`
16. Press `ALT-1` or `TAB` to move to the **Name Server 1** field.
17. Type in the primary DNS server IP, I.E. `208.67.222.222`.
18. Press `ALT-2` or `TAB` to move to the the **Name Server 2** field.
19. Type in the secondary DNS server IP, I.E. `208.67.220.220`.
20. If you have a tertiary DNS server you can add it in the **Name Server 3** field.
21. Press `ALT-R` to change to the Routing configuration.
22. You will likely receive a notification about adapting the network configuration for the new hostname. Press `ALT-Y` to make sure **Yes** is selected and then press `ENTER`.
23. Press `ALT-D` to add a gateway to the server. The **Default Route** option should be checked.
24. Press `ALT-G` or `TAB` to move to the **Gateway** field
25. Type in the default gateway to use for this server, I.E. `192.168.50.1`
26. Press `ALT-O` or `TAB` to select the **OK** button. You should see the newly added gateway listed as default
27. Press `ALT-O` or `TAB` to select the **OK** button to accept the network configuration and make changes. If you are connected via SSH you might be disconnected during this process and will need to connect to the new static IP in the next step.
28. Before continuing it is necessary to log out and back in as root for the hostname change to take full effect. In the below screenshots the command prompt goes from `vicibox11:~ #` to `testBox1:~ #`.
29. At this point the network should be connected. Verify by pinging some hosts, I.E. `ping -4 google.com`.

30. Press CTRL-C to cancel the ping.

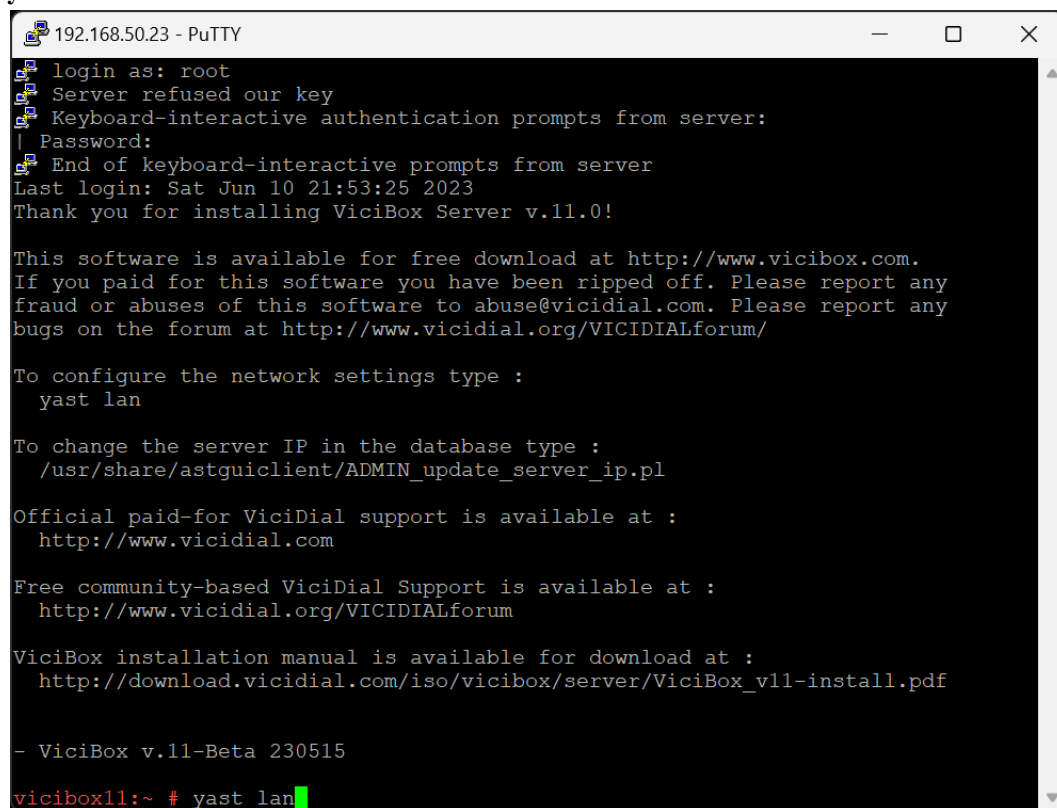
If only certain aspects of the network need to be modified, for instance changing the hostname or DNS servers, then only the instructions related to that setting need to be ran.

For Example, to change the hostname

1. If not already, login as the **root** user to get to the **#** command prompt.
2. Type **yast lan** to start the network configuration.
3. Press ALT-S to change to the Hostname/DNS configuration.
4. Press ALT-T or TAB to move to the **Static Hostname** field.
5. Type in the server name for this server, I.E. **vicibox-docs**.
6. You will likely receive a notification about adapting the network configuration for the new hostname. Press ALT-Y to make sure **Yes** is selected and then press ENTER.
7. Press ALT-O or TAB to select the **OK** button to accept the network configuration and make changes.
8. Before continuing with the rest of the setup it is necessary to log out and back in as root for the hostname change to take effect on the command line. In the below screenshots the command prompt goes from **vicibox11:~ #** to **testBox1:~ #**

Screenshots

Run yast lan



```
192.168.50.23 - PuTTY
login as: root
Server refused our key
Keyboard-interactive authentication prompts from server:
| Password:
| End of keyboard-interactive prompts from server
Last login: Sat Jun 10 21:53:25 2023
Thank you for installing ViciBox Server v.11.0!

This software is available for free download at http://www.vicibox.com.
If you paid for this software you have been ripped off. Please report any
fraud or abuses of this software to abuse@vicidial.com. Please report any
bugs on the forum at http://www.vicidial.org/VICIDIALforum/

To configure the network settings type :
yast lan

To change the server IP in the database type :
/usr/share/astguiclient/ADMIN_update_server_ip.pl

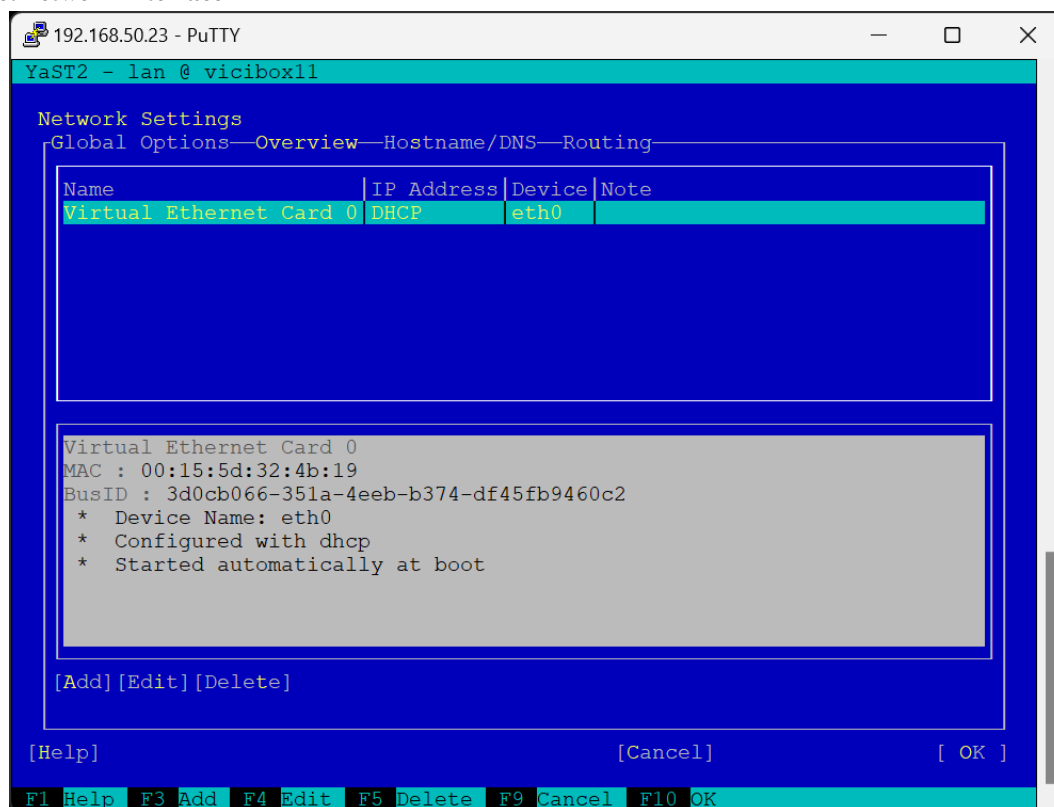
Official paid-for ViciDial support is available at :
http://www.vicidial.com

Free community-based ViciDial Support is available at :
http://www.vicidial.org/VICIDIALforum

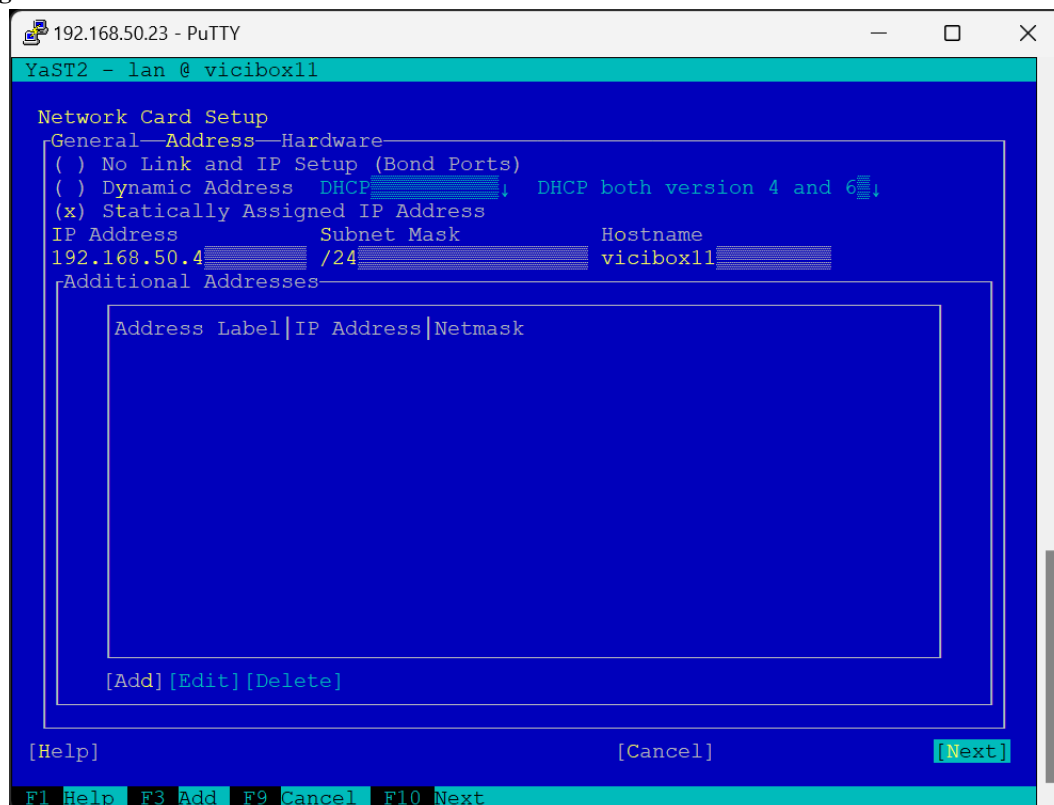
ViciBox installation manual is available for download at :
http://download.vicidial.com/iso/vicibox/server/ViciBox\_v11-install.pdf

- ViciBox v.11-Beta 230515
vicibox11:~ # yast lan
```

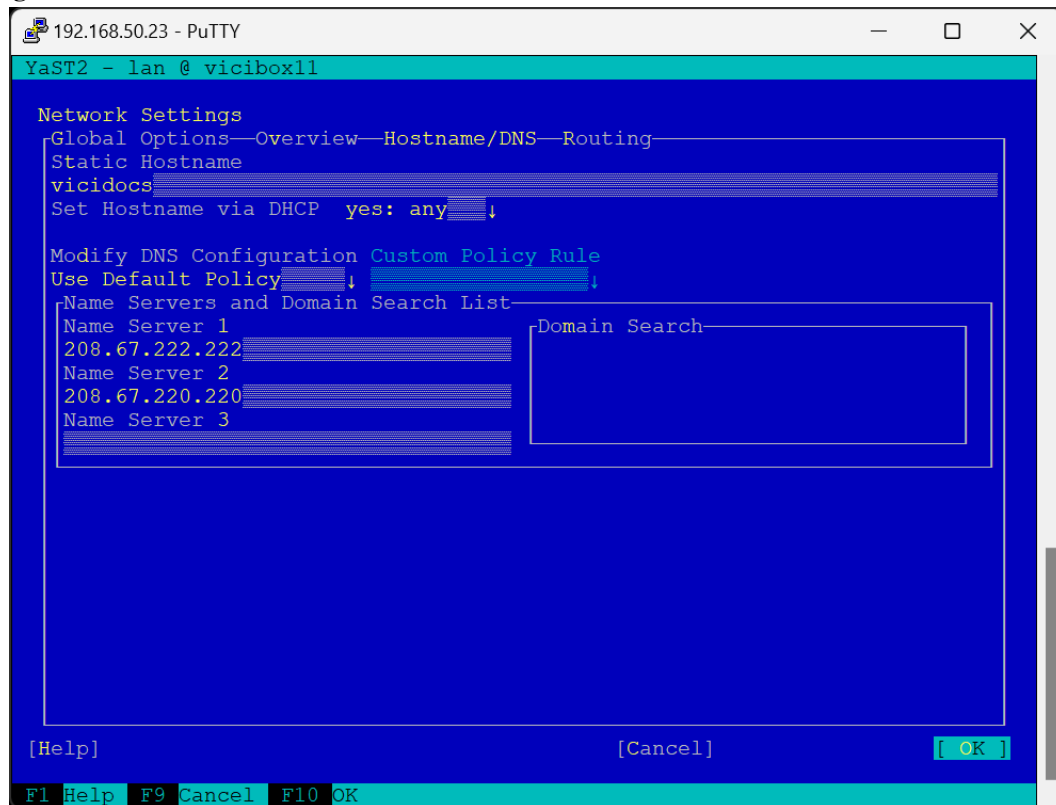
Select network interface



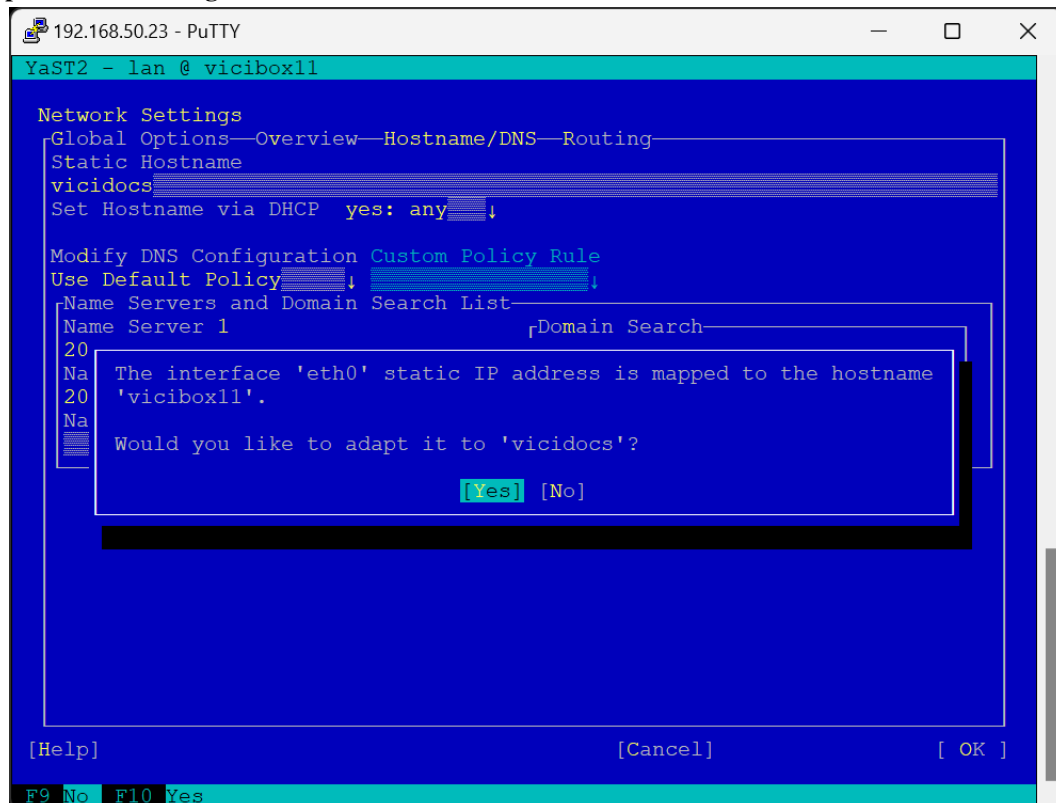
Assign static IP



Configure DNS



Accept hostname change



Add a Default Route

192.168.50.23 - PuTTY

YaST2 - lan @ vicidocs

Network Settings

Global Options—Overview—Hostname/DNS—Routing

[] Enable IPv4 Forwarding

[] Enable IPv6 Forwarding

Routing Table

Destination	Gateway	Device	Options
[x] Default Route			

Destination Gateway Device Options

Gateway 192.168.50.1

Device

Options

[OK] [Cancel] [Help]

[Add] [Edit] [Delete]

[Help] [Cancel] [OK]

F1 Help F9 Cancel F10 OK

Single Default Route

192.168.50.23 - PuTTY

YaST2 - lan @ vicidocs

Network Settings

Global Options—Overview—Hostname/DNS—Routing

[] Enable IPv4 Forwarding

[] Enable IPv6 Forwarding

Routing Table

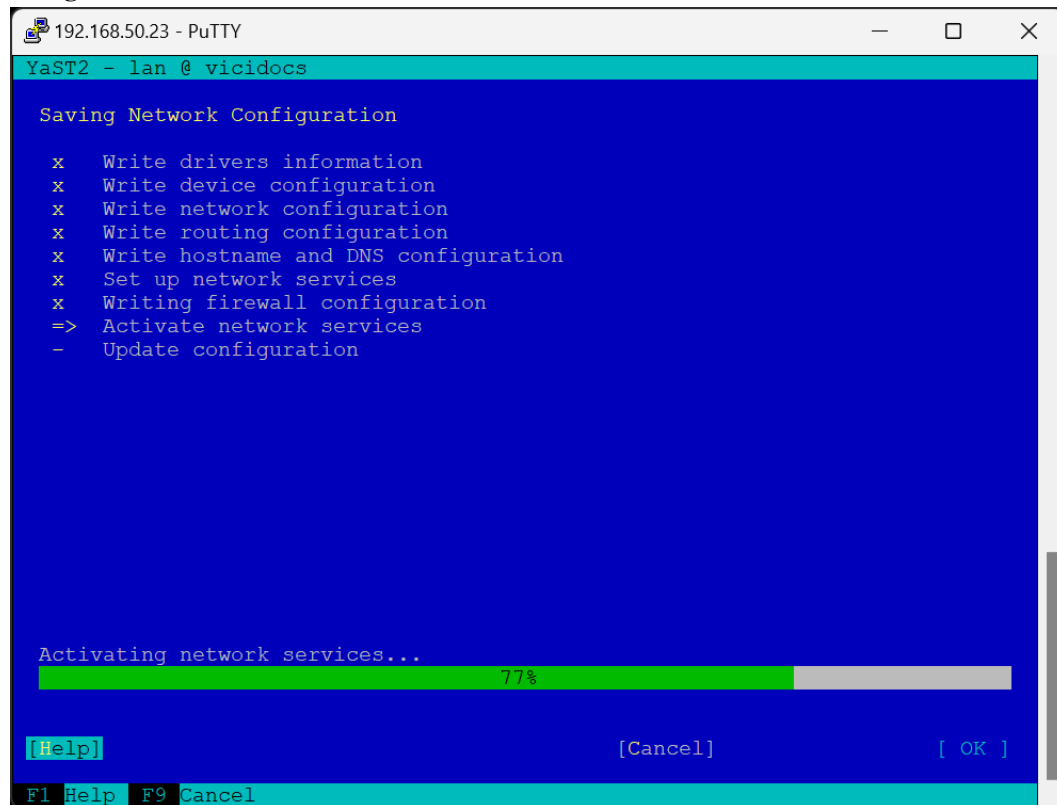
Destination	Gateway	Device	Options
default	192.168.50.1	-	

[Add] [Edit] [Delete]

[Help] [Cancel] [OK]

F1 Help F3 Add F4 Edit F5 Delete F9 Cancel F10 OK

Save changes



Verify connectivity and hostname change


```

192.168.50.4 - PuTTY
yast lan

To change the server IP in the database type :
/usr/share/astguiclient/ADMIN_update_server_ip.pl

Official paid-for ViciDial support is available at :
http://www.vicidial.com

Free community-based ViciDial Support is available at :
http://www.vicidial.org/VICIDIALforum

ViciBox installation manual is available for download at :
http://download.vicidial.com/iso/vicibox/server/ViciBox_v11-install.pdf

- ViciBox v.11-Beta 230515

vicidocs:~ # ping -4 google.com
PING (172.217.2.206) 56(84) bytes of data.
64 bytes from mia09s02-in-fl4.1e100.net (172.217.2.206): icmp_seq=1 ttl=117 time
=18.8 ms
64 bytes from mia09s02-in-fl4.1e100.net (172.217.2.206): icmp_seq=2 ttl=117 time
=16.8 ms
64 bytes from mia09s02-in-fl4.1e100.net (172.217.2.206): icmp_seq=3 ttl=117 time
=16.4 ms
64 bytes from mia09s02-in-fl4.1e100.net (172.217.2.206): icmp_seq=4 ttl=117 time
=29.4 ms
^C
--- ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 16.420/20.357/29.409/5.307 ms
vicidocs:~ #

```

2.3.2 Install Updates

While not required, it is *highly* recommended to install updates. This will update the ViciBox installer used in phase 2 as well as any new bug fixes or security updates. Internet connectivity is required to install updates. The initial update may take a while depending upon how many updates are available and how fast the internet connection is.

zypper up

1. If not already, login as the **root** user to get to the **#** command prompt.
2. Type **zypper up** and press **ENTER** to start the update process.
3. A list of updates and a summary of them will be shown. Type **Y** and press **ENTER** to start downloading and installing updates.
4. Occasionally an update will ask if you want to view it's update notice. Press **ENTER** to continue if this happens.
5. While not strictly necessary, it's advised to reboot the server at this time. Type **reboot** and press **ENTER** to reboot the server.

Note: It's not unusual for there to be up to 300 megs worth of updates. Depending upon the connection speed it could take a few minutes to download and install. If there are multiple servers this is a good time

to move to the next one.

Screenshots

Run zypper up and install updates

```

--- ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 16.420/20.357/29.409/5.307 ms
vicidocs:~ #
vicidocs:~ #
vicidocs:~ # zypper up
Retrieving repository 'openSUSE-Leap-15.5-PERL' metadata .....[done]
Building repository 'openSUSE-Leap-15.5-PERL' cache .....[done]
Retrieving repository 'openSUSE-Leap-15.5-ViciDial-Ast16' metadata .....[done]
Building repository 'openSUSE-Leap-15.5-ViciDial-Ast16' cache .....[done]
Retrieving repository 'openSUSE-Leap-15.5-ViciDial-ViciBox' metadata .....[done]
Building repository 'openSUSE-Leap-15.5-ViciDial-ViciBox' cache .....[done]
Retrieving repository 'openSUSE-SLE-15.5-Backports' metadata .....[done]
Building repository 'openSUSE-SLE-15.5-Backports' cache .....[done]
Retrieving repository 'openSUSE-SLE-15.5-SLE' metadata .....[done]
Building repository 'openSUSE-SLE-15.5-SLE' cache .....[done]
Retrieving repository 'Update repository of openSUSE Backports' metadata .[done]
Building repository 'Update repository of openSUSE Backports' cache .....[done]
Retrieving repository 'Update repository with updates from SUSE Linux Ente[done]
Building repository 'Update repository with updates from SUSE Linux Enterp[done]
Loading repository data...
Reading installed packages...

The following 13 packages are going to be upgraded:
  asterisk asterisk-dahdi asterisk-moh-base asterisk-sounds-base dracut
  dracut-mkinitrd-deprecated libasteriskpj2 libasteriskssl1 libwebp7 mariadb
  mariadb-client mariadb-errormessages vicibox-install

13 packages to upgrade.
Overall download size: 49.3 MiB. Already cached: 0 B. After the operation,
additional 274.5 KiB will be used.
Continue? [y/n/v/...? shows all options] (y): y

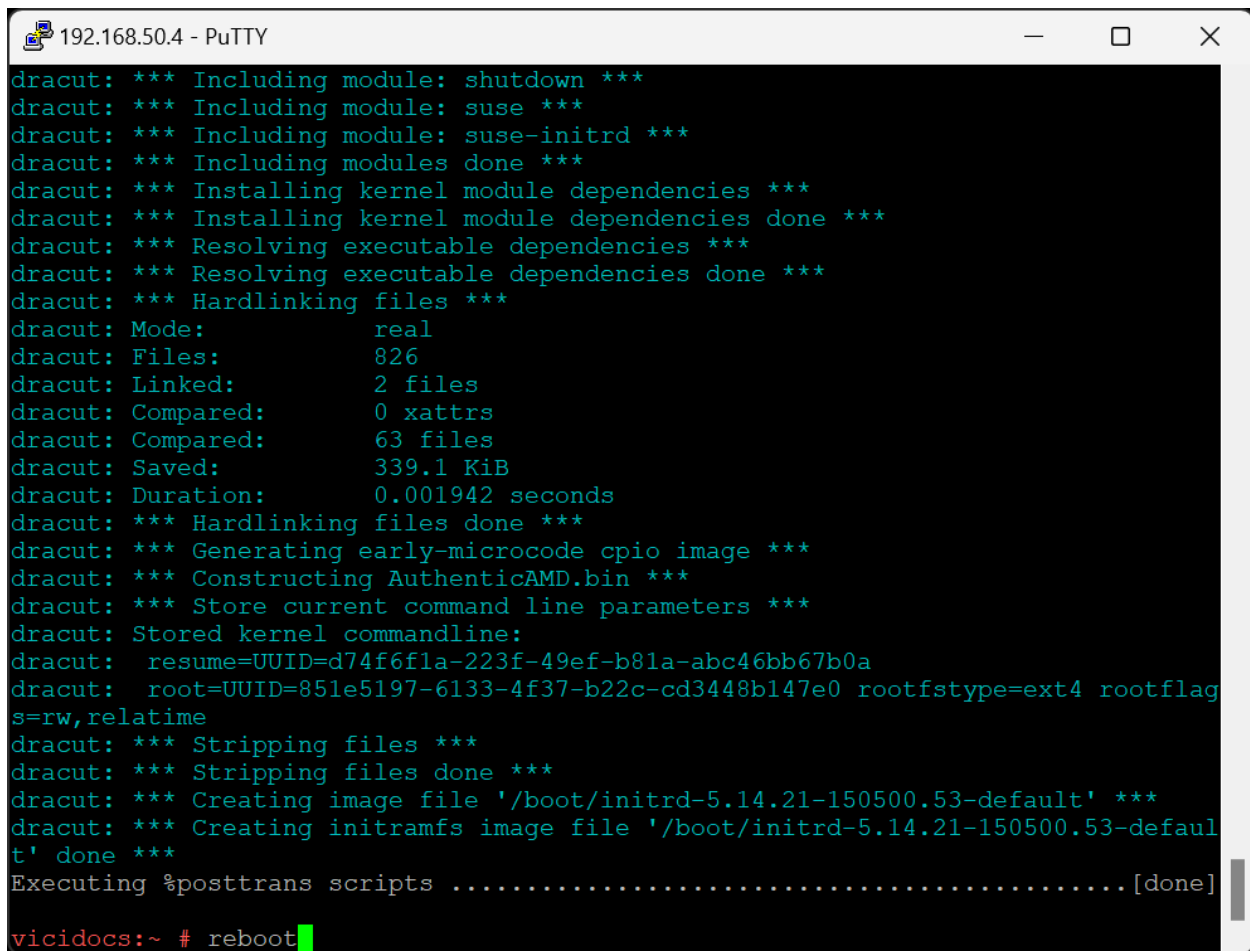
```

Reboot

2.3.3 MD RAID Setup

These instructions only apply if the *MultiDevice ISO* installation media was used. If the two drives are not the exact same size then the smaller drive must be the drive selected during installation. There is no way to add a second drive to a RAID array if it's not at least the same size or bigger than the first drive.

Warning: MD RAID setup can be temperamental. If there are any problems during the installation it's recommended to wipe all drives and start over. That can be done by running `wipefs -fa /dev/sda` and `wipefs -fa /dev/sdb` prior to reinstalling.



A screenshot of a PuTTY terminal window titled "192.168.50.4 - PuTTY". The window displays the output of the dracut boot process. The logs show various steps including including modules (shutdown, suse, suse-initrd), installing kernel module dependencies, resolving executable dependencies, hardlinking files, generating early-microcode cpio image, constructing AuthenticAMD.bin, storing current command line parameters, stripping files, and creating image files for the boot partition. The process concludes with "Executing %posttrans scripts" and "[done]". The prompt "vicidocs:~ # reboot" is visible at the bottom of the terminal.

```

dracut: *** Including module: shutdown ***
dracut: *** Including module: suse ***
dracut: *** Including module: suse-initrd ***
dracut: *** Including modules done ***
dracut: *** Installing kernel module dependencies ***
dracut: *** Installing kernel module dependencies done ***
dracut: *** Resolving executable dependencies ***
dracut: *** Resolving executable dependencies done ***
dracut: *** Hardlinking files ***
dracut: Mode:          real
dracut: Files:         826
dracut: Linked:        2 files
dracut: Compared:      0 xattrs
dracut: Compared:      63 files
dracut: Saved:         339.1 KiB
dracut: Duration:      0.001942 seconds
dracut: *** Hardlinking files done ***
dracut: *** Generating early-microcode cpio image ***
dracut: *** Constructing AuthenticAMD.bin ***
dracut: *** Store current command line parameters ***
dracut: Stored kernel commandline:
dracut:  resume=UUID=d74f6f1a-223f-49ef-b81a-abc46bb67b0a
dracut:  root=UUID=851e5197-6133-4f37-b22c-cd3448b147e0 rootfstype=ext4 rootflag
s=rw,relatime
dracut: *** Stripping files ***
dracut: *** Stripping files done ***
dracut: *** Creating image file '/boot/initrd-5.14.21-150500.53-default' ***
dracut: *** Creating initramfs image file '/boot/initrd-5.14.21-150500.53-default' done ***
Executing %posttrans scripts .....[done]
vicidocs:~ # reboot

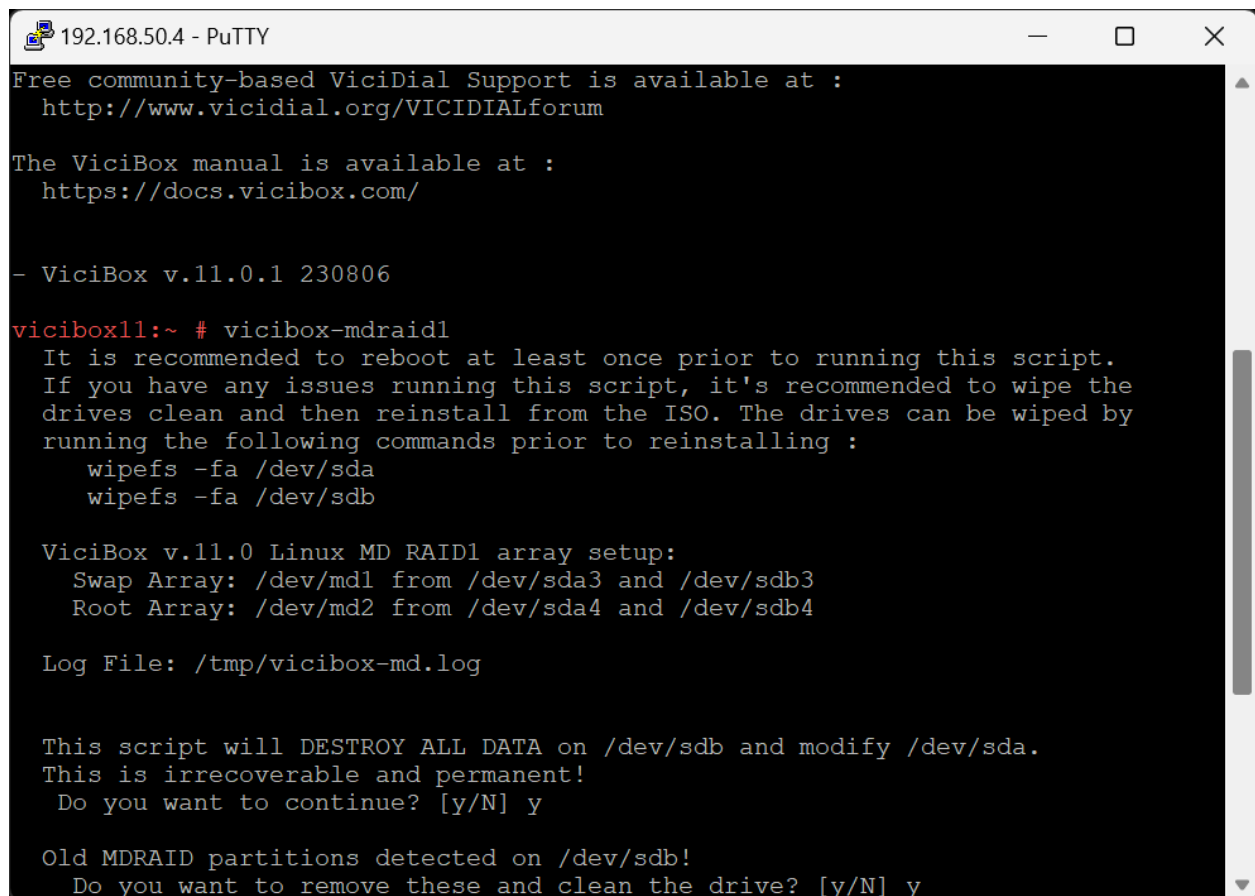
```

vicibox-mdraid1

1. If not already, login as the root user to get to the # command prompt.
2. Type `vicibox-mdraid1` and press ENTER to start the setup process.
3. A summary of what will be done is shown. Type Y and press ENTER start setting up the RAID array.
4. If any old RAID arrays are found the script will prompt if you want to remove them. Type Y and press ENTER to remove the old arrays.
5. When done, it's recommended to return to the command prompt instead of watching the arrays rebuild. Type N and press ENTER to exit to the # command prompt
6. To check the status of the MD RAID arrays, type `cat /proc/mdstat` and press ENTER. md1 is the swap array and md2 is the root array.
7. While not strictly necessary, it's advised to reboot the server at this time. Type `reboot` and press ENTER to reboot the server.

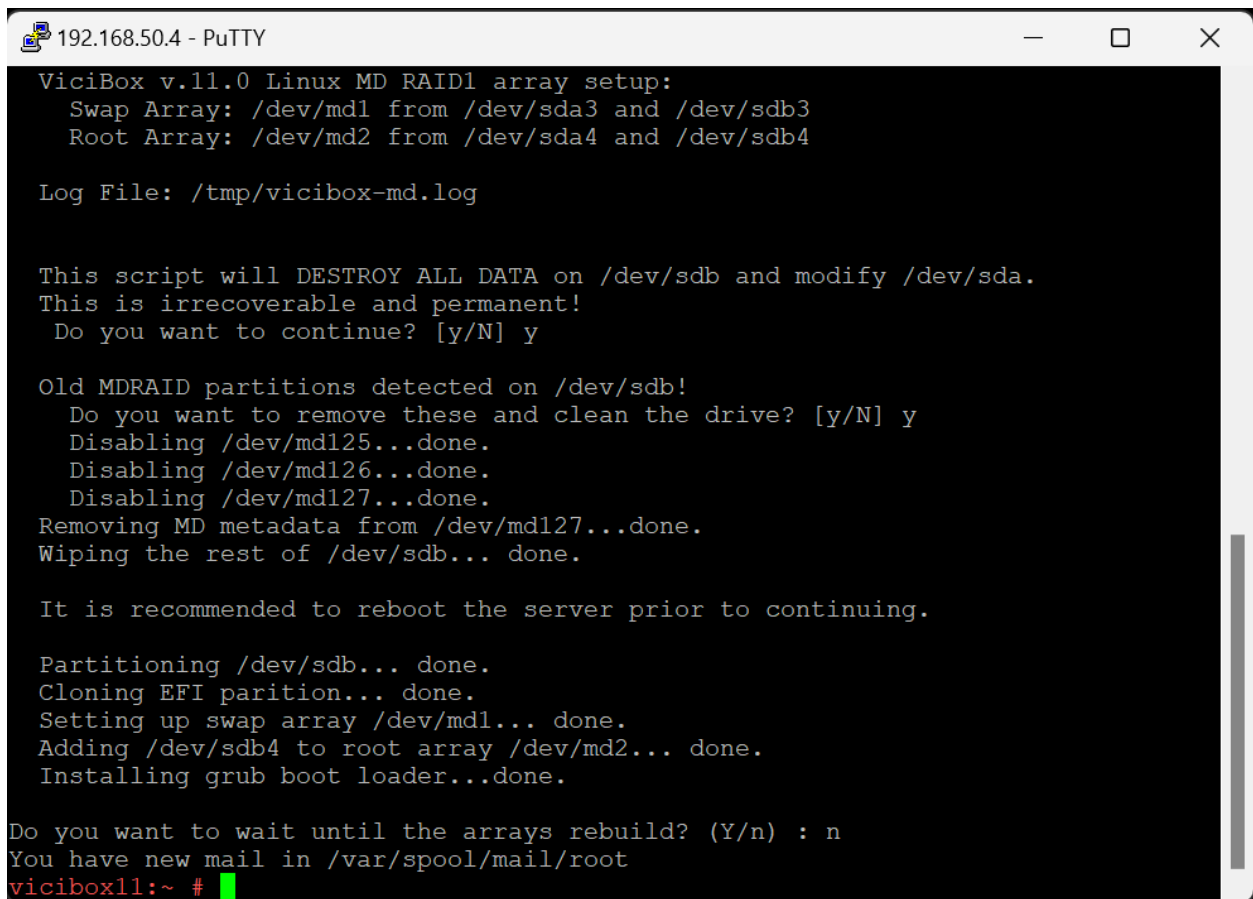
Screenshots

Run vicibox-mdraid1

A screenshot of a PuTTY terminal window titled "192.168.50.4 - PuTTY". The terminal displays the output of the `vicibox-mdraid1` script. It starts with a message about ViciDial support, followed by the ViciBox manual URL. The script version is `ViciBox v.11.0.1 230806`. The user enters `vicibox-mdraid1` at the `vicibox11:~ #` prompt. The script provides instructions on rebooting and wiping drives, showing the commands `wipefs -fa /dev/sda` and `wipefs -fa /dev/sdb`. It then displays the RAID setup: `ViciBox v.11.0 Linux MD RAID1 array setup:`, `Swap Array: /dev/md1 from /dev/sda3 and /dev/sdb3`, and `Root Array: /dev/md2 from /dev/sda4 and /dev/sdb4`. The log file is `/tmp/vicibox-md.log`. A warning message states: `This script will DESTROY ALL DATA on /dev/sdb and modify /dev/sda. This is irrecoverable and permanent!`. It asks `Do you want to continue? [y/N]` and the user responds with `y`. Finally, it detects old MDRAID partitions on `/dev/sdb` and asks `Do you want to remove these and clean the drive? [y/N]`, with the user again responding `y`.

If old RAID detected, clear it out

Verify RAID array is setup



```
ViciBox v.11.0 Linux MD RAID1 array setup:
  Swap Array: /dev/md1 from /dev/sda3 and /dev/sdb3
  Root Array: /dev/md2 from /dev/sda4 and /dev/sdb4

Log File: /tmp/vicibox-md.log

This script will DESTROY ALL DATA on /dev/sdb and modify /dev/sda.
This is irrecoverable and permanent!
Do you want to continue? [y/N] y

Old MDRAID partitions detected on /dev/sdb!
Do you want to remove these and clean the drive? [y/N] y
Disabling /dev/md125...done.
Disabling /dev/md126...done.
Disabling /dev/md127...done.
Removing MD metadata from /dev/md127...done.
Wiping the rest of /dev/sdb... done.

It is recommended to reboot the server prior to continuing.

Partitioning /dev/sdb... done.
Cloning EFI partition... done.
Setting up swap array /dev/md1... done.
Adding /dev/sdb4 to root array /dev/md2... done.
Installing grub boot loader...done.

Do you want to wait until the arrays rebuild? (Y/n) : n
You have new mail in /var/spool/mail/root
vicibox11:~ #
```

```
192.168.50.4 - PuTTY

Partitioning /dev/sdb... done.
Cloning EFI partition... done.
Setting up swap array /dev/md1... done.
Adding /dev/sdb4 to root array /dev/md2... done.
Installing grub boot loader...done.

Do you want to wait until the arrays rebuild? (Y/n) : n
vicibox11:~ # cat /proc/mdstat
Personalities : [raid1]
md1 : active raid1 sdb3[1] sda3[0]
      4189184 blocks super 1.2 [2/2] [UU]
      [=====>.....]  resync = 57.3% (2401024/4189184) finish=0.1min speed=218274K/sec

md2 : active raid1 sdb4[2] sda4[0]
      128948207 blocks super 1.2 [2/1] [U_]
      resync=DELAYED

unused devices: <none>
vicibox11:~ # df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        4.0M  4.0K  4.0M   1% /dev
tmpfs           2.0G  4.0K  2.0G   1% /dev/shm
tmpfs           783M   17M  766M   3% /run
tmpfs           4.0M    0  4.0M   0% /sys/fs/cgroup
/dev/md2        121G   3.0G  112G   3% /
tmpfs           392M    0  392M   0% /run/user/0
/dev/sda2       20M  328K   20M   2% /boot/efi
vicibox11:~ #
```

WipeFS

```

192.168.50.4 - PuTTY
/usr/share/astguiclient/ADMIN_update_server_ip.pl

Official paid-for ViciDial support is available at :
http://www.vicidial.com

Free community-based ViciDial Support is available at :
http://www.vicidial.org/VICIDIALforum

The ViciBox manual is available at :
https://docs.vicibox.com/

- ViciBox v.11 230623

vicibox11:~ # ls /dev/sd*
/dev/sda  /dev/sda2  /dev/sda4  /dev/sdb  /dev/sdb2  /dev/sdb4
/dev/sda1 /dev/sda3  /dev/sda5  /dev/sdb1 /dev/sdb3  /dev/sdb5
vicibox11:~ # wipefs -fa /dev/sda
/dev/sda: 8 bytes were erased at offset 0x00000200 (gpt): 45 46 49 20 50 41 52 54
/dev/sda: 8 bytes were erased at offset 0x1fbffffe00 (gpt): 45 46 49 20 50 41 52 54
/dev/sda: 2 bytes were erased at offset 0x000001fe (PMBR): 55 aa
vicibox11:~ # wipefs -fa /dev/sdb
/dev/sdb: 8 bytes were erased at offset 0x00000200 (gpt): 45 46 49 20 50 41 52 54
/dev/sdb: 8 bytes were erased at offset 0x1fbffffe00 (gpt): 45 46 49 20 50 41 52 54
/dev/sdb: 2 bytes were erased at offset 0x000001fe (PMBR): 55 aa
vicibox11:~ #

```

2.4 Phase 2

ViciDial is installed through the `vicibox-install` command. This command will ask a series of questions in order to determine how to install. A ViciDial cluster will use this command when setting up new servers.

An alternative to this is the mostly automated *Express Box* install. This actually runs the same program but with pre-defined settings. It is an all-in-one approach to ViciDial that can later be turned into a cluster if need be.

ViciDial is broken down into three main server roles with an optional fourth role.

- Database server with MariaDB
- Web server with Apache
- Telephony server with Asterisk

- Archive server with VSFTPd (Optional)

Once installed ViciDial and the server's configuration will be tied to the current LAN and WAN IP. If the network environment changes then those changes will need to be made in ViciDial and the server to match. This usually happens when migrating to a new ISP or moving to a different location.

Dimensioning, specifications, and clustering examples can be found in the *Hardware* section.

Attention: It highly recommended to *Install Updates* before continuing.

2.4.1 Express Box

With `vicibox-express` all three ViciDial roles will be installed onto a single server. This is best suited for contact centers with less than 20 agents or as a proof of concept. It is the recommend starting point for first time users of ViciBox as it's the easiest option.

Different roles can later be split off and moved to different servers. After all, an express box is just all three roles running on a single server. These roles can be moved to different servers on the network as needs changes.

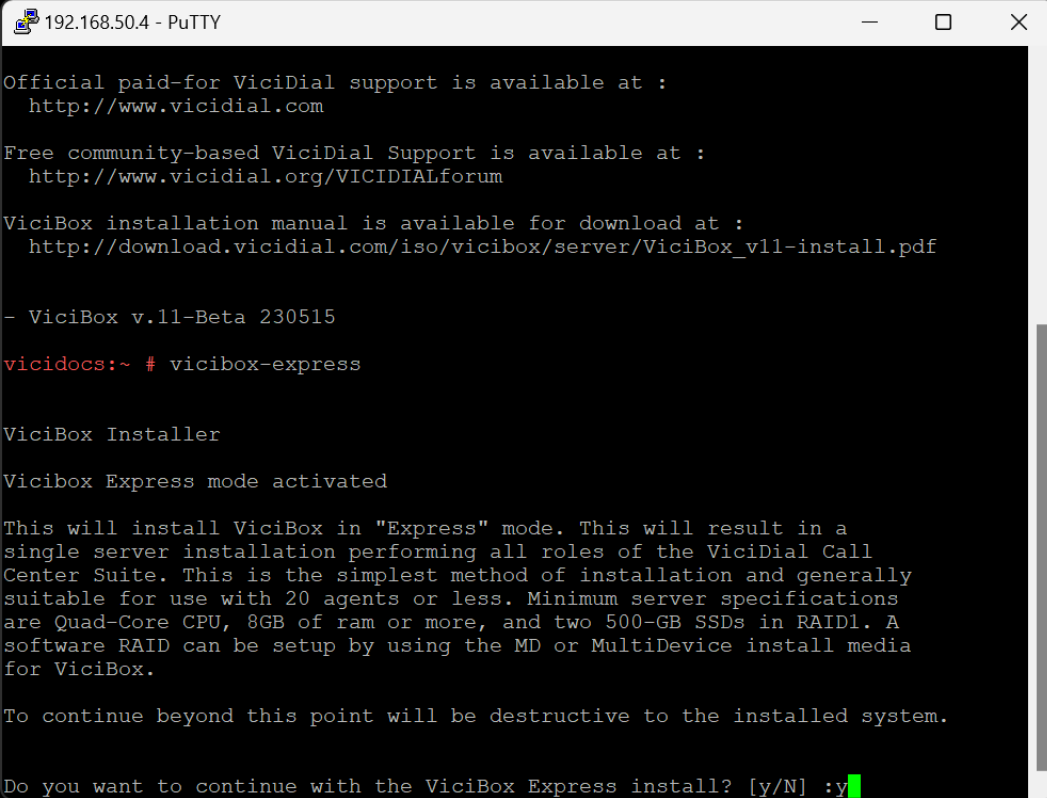
`vicibox-express`

1. If not already, login as the `root` user to get to the `#` command prompt.
2. Type `vicibox-express` and press ENTER.
3. Type `Y` and press ENTER to start the installation.
4. Once you are back at the `#` command prompt, the installation is complete. Type `reboot` and press ENTER.
5. Once the reboot is complete, log back in as `root` to get to the `#` command prompt.
6. Type `screen -ls` and press ENTER. While it might take upwards of 5 minutes, eventually there should be **11 Sockets in /run/screens/S-root** shown before returning to the `#` command prompt
7. Type `asterisk -r` and press ENTER to connect to the Asterisk console. There should be different processes like **sendcron** logging on and off.
8. Type `quit` and press ENTER to exit back to the `#` command prompt.
9. In a web browser, type in the servers IP address, I.E. `192.168.50.4`, and press ENTER
10. Click on **Administration** and login. The default **Username** is `6666` with **Password** `1234`. Upon login you should see the ViciDial Initial Setup screen.

ViciDial is now successfully installed and running. It's recommended to continue with the initial ViciDial setup and then give the **6666** user all Admin permissions.

Screenshots

Run vicibox-express and install



```
192.168.50.4 - PuTTY

Official paid-for ViciDial support is available at :
  http://www.vicidial.com

Free community-based ViciDial Support is available at :
  http://www.vicidial.org/VICIDIALforum

ViciBox installation manual is available for download at :
  http://download.vicidial.com/iso/vicibox/server/ViciBox_v11-install.pdf

- ViciBox v.11-Beta 230515

vicidocs:~ # vicibox-express

ViciBox Installer

Vicibox Express mode activated

This will install ViciBox in "Express" mode. This will result in a
single server installation performing all roles of the ViciDial Call
Center Suite. This is the simplest method of installation and generally
suitable for use with 20 agents or less. Minimum server specifications
are Quad-Core CPU, 8GB of ram or more, and two 500-GB SSDs in RAID1. A
software RAID can be setup by using the MD or MultiDevice install media
for ViciBox.

To continue beyond this point will be destructive to the installed system.

Do you want to continue with the ViciBox Express install? [y/N] :y
```

Reboot when done

```

192.168.50.4 - PuTTY
Updated to revision 3735.
Skipped '>> /var/log/vicibox.log 2>> /var/log/vicibox.log'
Summary of updates:
  Updated '/usr/src/astguiclient/trunk' to r3735.
Summary of conflicts:
  Skipped paths: 1
Doing general DataBase requirements...
Doing Master-specific MySQL setup...
Configuring Web Server...
Created symlink /etc/systemd/system/httpd.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/apache.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /usr/lib/systemd/system/apache2.service.
Configuring Telephony Server...
Loading GMT and Phone Codes...

Seeding the audio store, this may take a while...

PLEASE use secure passwords inside vicidial. It prevents hackers
and other undesirables from compromising your system and costing
you thousands in toll fraud and long distance. A secure password
Contains at least one capital letter and one number. A good example
of a secure password would be aZa2kvAltVQFNL.

Don't feed the black market, secure your systems properly!

System should be installed. Please type 'reboot' to cleanly load everything.
You have new mail in /var/spool/mail/root
vicidocs:~ # reboot

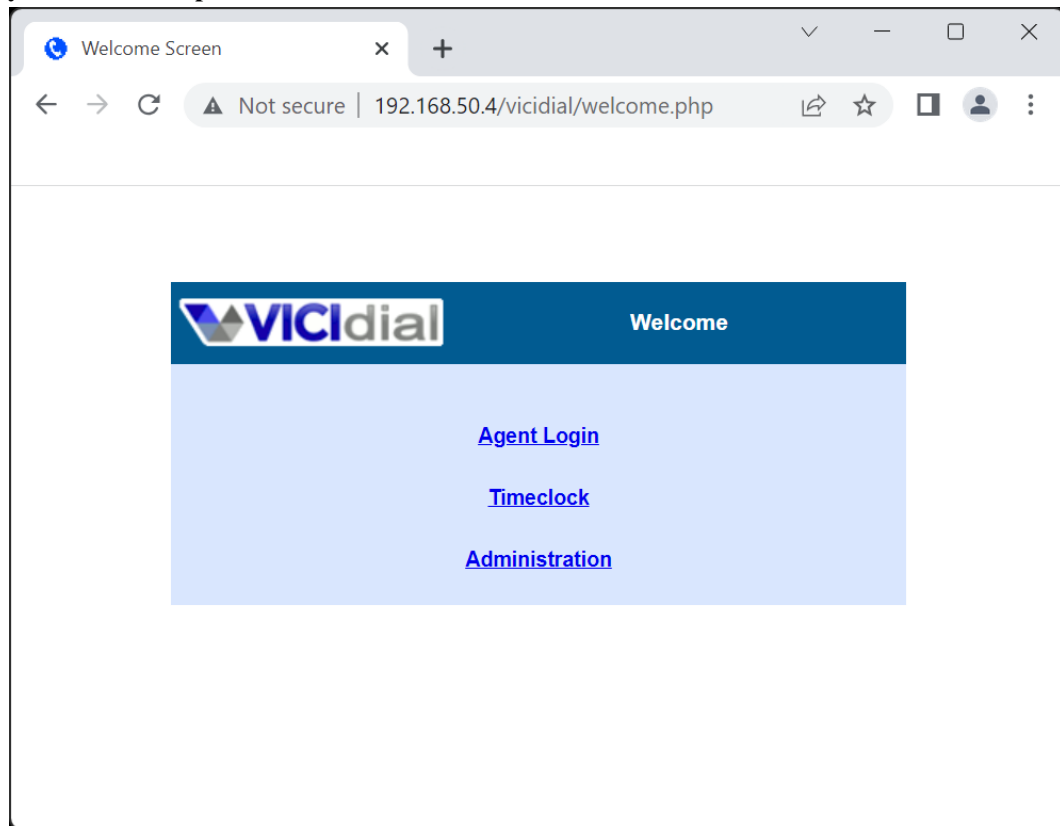
```

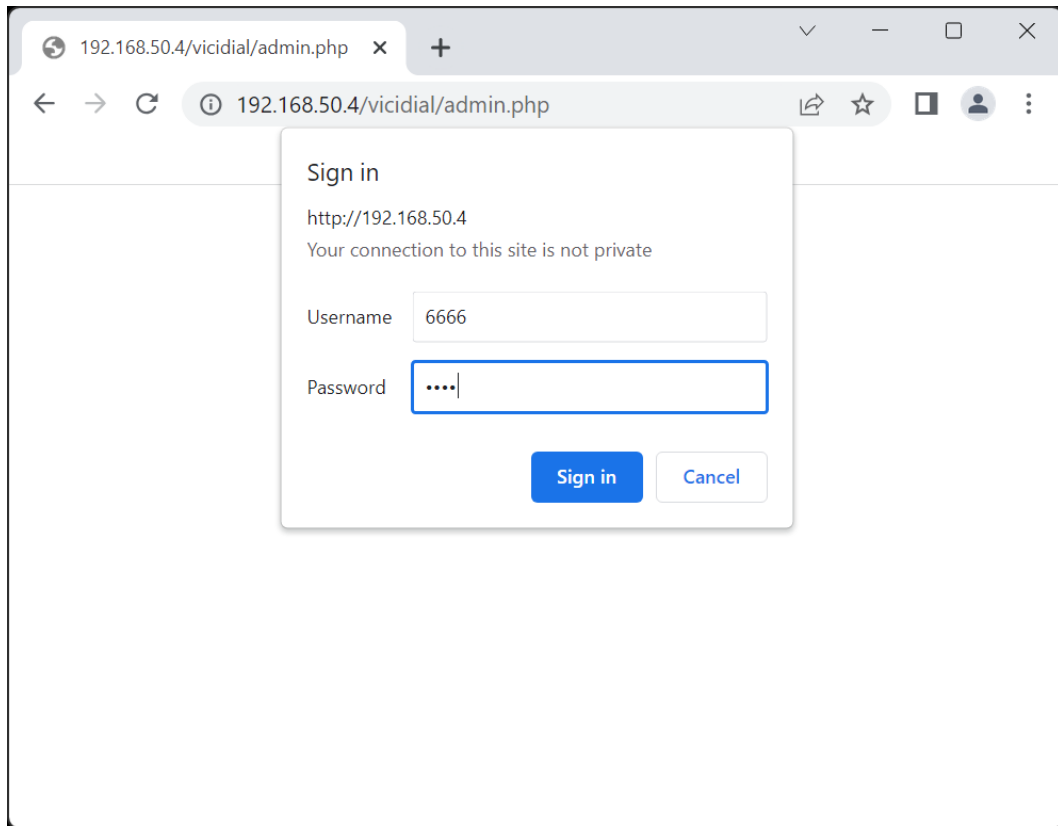
Verify ViciDial is running

```

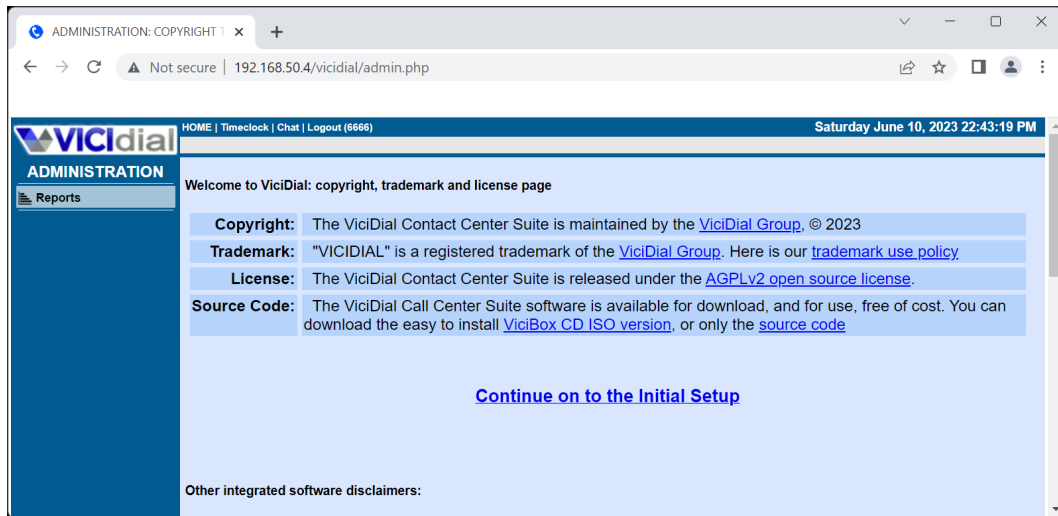
192.168.50.4 - PuTTY
vicidocs:~ # screen -ls
There are screens on:
  2917.ASTemail      (Detached)
  2914.ASTVDadFILL   (Detached)
  2911.ASTfastlog    (Detached)
  2908.ASTVDadapt    (Detached)
  2900.ASTVDremote   (Detached)
  2897.ASTVDauto     (Detached)
  2894.ASTlisten     (Detached)
  2891.ASTsend       (Detached)
  2888.ASTupdate     (Detached)
  2365.asterisk      (Detached)
  2359.astshell120230610223643 (Detached)
11 Sockets in /run/screens/S-root.
vicidocs:~ # asterisk -r
Asterisk 16.30.0-vici, Copyright (C) 1999 - 2021, Sangoma Technologies Corporation and others.
Created by Mark Spencer <markster@digium.com>
Asterisk comes with ABSOLUTELY NO WARRANTY; type 'core show warranty' for details.
This is free software, with components licensed under the GNU General Public License version 2 and other licenses; you are welcome to redistribute it under certain conditions. Type 'core show license' for details.
=====
Connected to Asterisk 16.30.0-vici currently running on vicidocs (pid = 2371)
[Jun 10 22:38:01] == Manager 'sendcron' logged on from 127.0.0.1
[Jun 10 22:38:01] == Manager 'sendcron' logged off from 127.0.0.1
[Jun 10 22:38:01] == Manager 'sendcron' logged on from 127.0.0.1
[Jun 10 22:38:01] == Manager 'sendcron' logged off from 127.0.0.1
vicidocs*CLI> quit
Asterisk cleanly ending (0).
Executing last minute cleanups
vicidocs:~ #

```

Verify web server is up**Login to ViciDial**



Continue on to the Initial Setup



2.4.2 Cluster

ViciDial Setup Order

- Database server
- Web server
- Telephony server

All clusters start with the primary Database server since everything starts there. Afterwards the web server is installed to provide services needed by the Telephony server. Lastly the Telephony server is installed and will setup portions of ViciDial needed by other servers. Any additional servers can be setup after these three are working together as a cluster.

The hostname for each server in a cluster is used as that server's name in the ViciDial database. Because of this each server must have a unique hostname. The recommended naming convention is to use 'DBX', 'webX', and 'dialX' as the prefix for the hostname, I.E. 'DB1', 'web1', 'dial1', etc. This designates the servers role as well as which one it is if there are multiple of that type in the cluster. How to change the hostname can be found in the [Configure Static IP](#) section.

Tip: While it might sound good to use greek gods, disney characters, or transformers for the hostname of your servers, don't. Being told that Optimus Prime went down but Megatron is handling it now is just confusing. And yes, that is based on a true story of an 11-server cluster. Optimus Prime was the primary database, Megatron was the replicated backup. Bumblebee was the web server and Starscream was their primary telephony server. No numbers either, so the second telephony server was Skywarp I think. Don't be that guy.

Planning

With `vicibox-install` the different roles of ViciDial can be ran on multiple servers. These servers can then connect with each other across the network to scale. By doing this a ViciDial Cluster can scale up to 500 agents.

The examples in this section will be for the three initial servers needed to make a ViciDial Cluster. This is the starting point upon which any size cluster can be built. To add more servers just repeat the install as needed.

If there are only two servers available for a cluster it is advised to have the Database and Web server role running on the more powerful of the two servers. To accomplish this the Web server role would also be selected during the setup of the Database. Fun fact, if you were to select all 3 roles on the same server you would end up with an [Express Box](#).

A ViciDial cluster can only have one primary Database server. The primary Database server is what all Web and Telephony servers will connect to. More information on the Database server role is available in the [Hardware](#) section.

Table 2: Cluster Information

Server	IP Address
DB1	192.168.50.4
web1	192.168.50.6
dial1	192.168.60.10

Database

1. If not already, login as the `root` user to get to the `#` command prompt.
2. Type `vicibox-install` and press `ENTER` to start the ViciBox installer.
3. Type `Y` and press `ENTER` at the **ViciBox install** prompt.
4. Type `Y` and press `ENTER` at the **expert installation** prompt.
5. The installer will attempt to find a LAN IP address to use for the cluster. If the IP shown is correct type `Y` and press `ENTER`. If not type `N` and press `ENTER` and follow the prompts.
6. Type `Y` and press `ENTER` at the **the Database** prompt.
7. Type `N` and press `ENTER` at the **Slave Database** prompt.
8. Type `Y` and press `ENTER` at the **DB settings** prompt. If you want to use different database settings type `N` and press `ENTER` to follow those prompts.
9. Type `N` and press `ENTER` at the **Web server** prompt.
10. Type `N` and press `ENTER` at the **Telephony server** prompt.
11. Type `N` and press `ENTER` at the **Archive server** prompt.
12. Type `N` and press `ENTER` at the **built-in firewall** prompt.
13. A summary will be listed of all selected options. Type in `Y` and press `ENTER` to accept and install.
14. Type `reboot` and press `ENTER` to reboot and cleanly load vicidial.
15. Login as the `root` user to get to the `#` command prompt.
16. Type `screen -ls` and press `ENTER` to show running screen sessions. There should be three listed like in the screenshot

This will create an entry under *Admin* → *Servers* called **DB1**. Do not delete this entry as it's needed for ViciDial to function properly.

Screenshots

Install Database

```

192.168.50.4 - PuTTY
DB1:~ # vicibox-install

ViciBox Installer

The installer will ask questions based upon the role that this server is
to provide for the ViciBox Call Center Suite. You should have the database
and optionally archive servers setup prior to installing any other servers.
The installer will not run without there being a configured database! If this
server is to be the database then it must be installed before the archive server
Verify that all servers are connected to the same network and have connectivity
to each other before continuing. This installer will be destructive to the the
server if it is run.

Do you want to continue with the ViciBox install? [y/N] : y

Do you want to enable expert installation? [y/N] : y

The Internal IP address found was 192.168.50.4.
Do you want to use this IP address for ViciDial? [Y/n]: y

Will this server be used as the Database? [y/N] : y
---> Will this be a Slave Database? [y/N] : n
Do you want to use the default ViciDial DB settings? [Y/n] : y

Will this server be used as a Web server? [y/N] : n

Will this server be used as a Telephony server? [y/N] : n

Will this server be used as an Archive server? [y/N] : n

Do you want to enable the built-in firewall? [y/N] : n

--- ViciBox Install Summary ---

Expert   : Yes
Legacy   : No
Database : Yes
Web      : No
Telephony: No
Archive  : No
Firewall : Disabled

--- Configuration Information ---
- Database -
SVN Rev  : 3735
IP Addr  : 192.168.50.4
Name     : asterisk
User     : cron
Password : 1234
Cust User: custom
Cust Pass: custom1234
Port     : 3306

Please verify the above information before continuing!
Do you want to continue the installation? [y/N] : y

```

Verify screen sessions

```

192.168.50.4 - PuTTY
bugs on the forum at http://www.vicidial.org/VICIDIALforum/

To configure the network settings type :
yast lan

To change the server IP in the database type :
/usr/share/astguiclient/ADMIN_update_server_ip.pl

Official paid-for ViciDial support is available at :
http://www.vicidial.com

Free community-based ViciDial Support is available at :
http://www.vicidial.org/VICIDIALforum

ViciBox installation manual is available for download at :
http://download.vicidial.com/iso/vicibox/server/ViciBox_v11-install.pdf

- ViciBox v.11-Beta 230515

DB1:~ # screen -ls
No Sockets found in /run/screens/S-root.

DB1:~ # screen -ls
There are screens on:
  2757.ASTemail      (Detached)
  2753.ASTVDadFILL   (Detached)
  2751.ASTVDadapt    (Detached)
3 Sockets in /run/screens/S-root.
DB1:~ #

```

Web

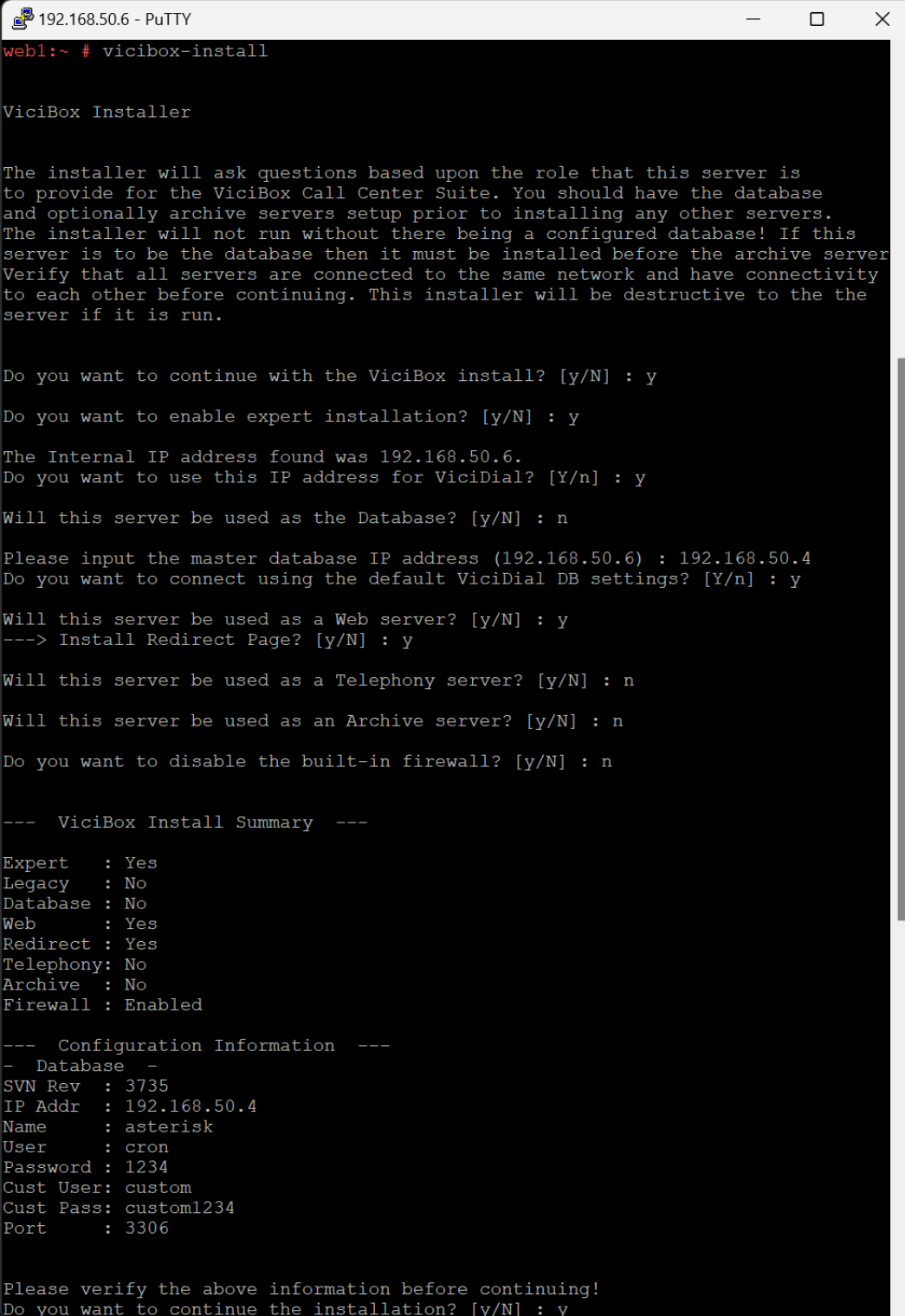
1. If not already, login as the root user to get to the # command prompt.
2. Type vicibox-install and press ENTER to start the ViciBox installer.
3. Type Y and press ENTER at the **ViciBox install** prompt.
4. Type Y and press ENTER at the **expert installation** prompt.
5. The installer will attempt to find a LAN IP address to use for the cluster. If the IP shown is correct type Y and press ENTER. If not type N and press ENTER and follow the prompts.
6. Type N and press ENTER at the **the Database** prompt.
7. Type in the Database IP address and press ENTER, I.E. 192.168.50.4. If the installer is unable to connect to the Database server it will error out. Correct any issues and run the installer again.
8. Type Y and press ENTER at the **Web server** prompt.
9. Type Y and press ENTER at the **Redirect Page** prompt.
10. Type N and press ENTER at the **Telephony server** prompt.
11. Type N and press ENTER at the **Archive server** prompt.
12. Type N and press ENTER at the **built-in firewall** prompt.
13. A summary will be listed of all selected options. Type in Y and press ENTER to accept and install.
14. Type reboot and press ENTER to reboot and cleanly load vicidial.
15. Once the server has rebooted, verify you can reach the web interface by going to the server's IP address in a browser, I.E. 192.168.50.6, and press ENTER

16. Click on **Administration** and login with **Username** 6666 and **Password** 1234 to continue with the ViciDial Initial Setup.

It is recommended to give the **6666** user all Admin permissions before continuing. If there are multiple web servers in the cluster these instructions can be repeated on any additional servers.

Screenshots

Install Web



```
192.168.50.6 - PuTTY
web1:~ # vicibox-install

ViciBox Installer

The installer will ask questions based upon the role that this server is
to provide for the ViciBox Call Center Suite. You should have the database
and optionally archive servers setup prior to installing any other servers.
The installer will not run without there being a configured database! If this
server is to be the database then it must be installed before the archive server
Verify that all servers are connected to the same network and have connectivity
to each other before continuing. This installer will be destructive to the the
server if it is run.

Do you want to continue with the ViciBox install? [y/N] : y

Do you want to enable expert installation? [y/N] : y

The Internal IP address found was 192.168.50.6.
Do you want to use this IP address for ViciDial? [Y/n]: y

Will this server be used as the Database? [y/N] : n

Please input the master database IP address (192.168.50.6) : 192.168.50.4
Do you want to connect using the default ViciDial DB settings? [Y/n] : y

Will this server be used as a Web server? [y/N] : y
---> Install Redirect Page? [y/N] : y

Will this server be used as a Telephony server? [y/N] : n

Will this server be used as an Archive server? [y/N] : n

Do you want to disable the built-in firewall? [y/N] : n

--- ViciBox Install Summary ---

Expert      : Yes
Legacy      : No
Database    : No
Web         : Yes
Redirect     : Yes
Telephony   : No
Archive     : No
Firewall    : Enabled

--- Configuration Information ---
- Database -
SVN Rev    : 3735
IP Addr    : 192.168.50.4
Name       : asterisk
User       : cron
Password   : 1234
Cust User  : custom
Cust Pass  : custom1234
Port       : 3306

Please verify the above information before continuing!
Do you want to continue the installation? [y/N] : y
```

Reboot

```

PuTTY (inactive)
U /usr/src/astguiclient/trunk/extras/upgrade_2.14.sql
U /usr/src/astguiclient/trunk/www/vicidial/admin.php
U /usr/src/astguiclient/trunk/www/vicidial/help_documentation.txt
U /usr/src/astguiclient/trunk/UPGRADE
Updated to revision 3735.
Skipped '>> /var/log/vicibox.log 2>> /var/log/vicibox.log'
Summary of updates:
  Updated '/usr/src/astguiclient/trunk' to r3735.
Summary of conflicts:
  Skipped paths: 1
Configuring Web Server...
Created symlink /etc/systemd/system/httpd.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/apache.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /usr/lib/systemd/system/apache2.service.
/tmp/rootcron: No such file or directory

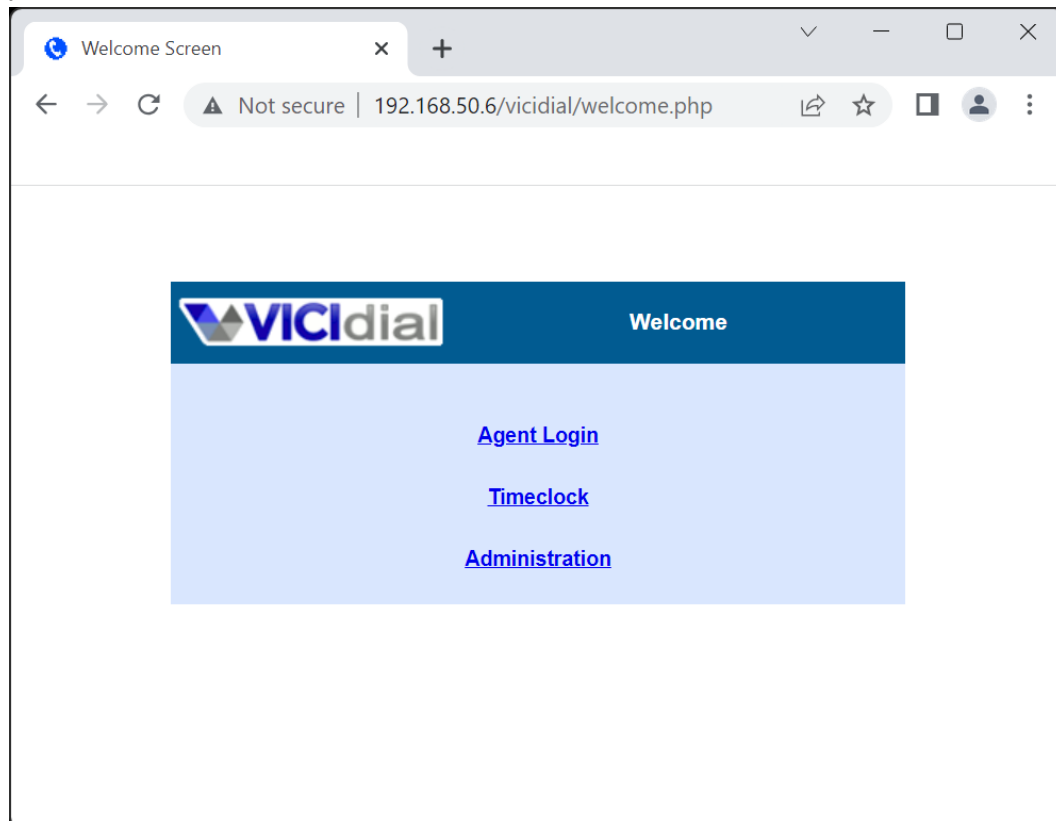
PLEASE use secure passwords inside vicidial. It prevents hackers
and other undesirables from compromising your system and costing
you thousands in toll fraud and long distance. A secure password
Contains at least one capital letter and one number. A good example
of a secure password would be TPfVSH6p4ZWwwJW.

Don't feed the black market, secure your systems properly!

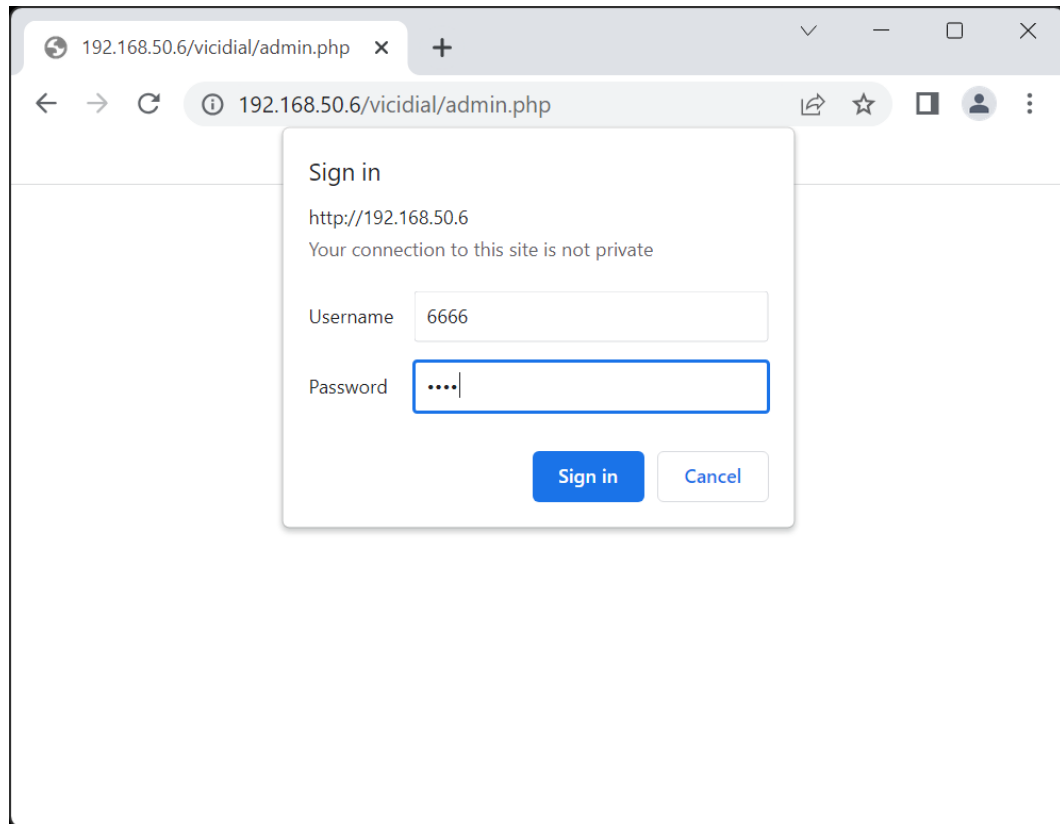
System should be installed. Please type 'reboot' to cleanly load everything.
web1:~ # reboot

```

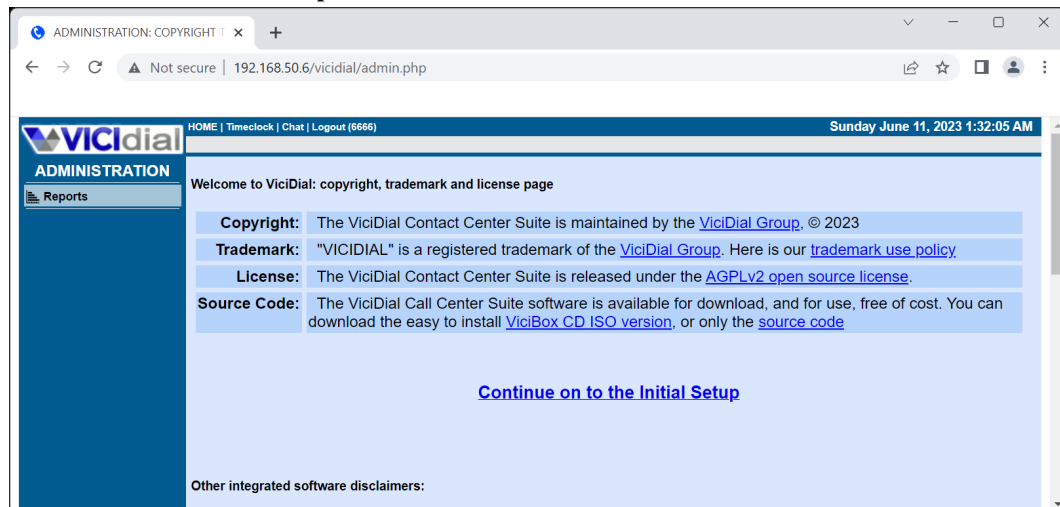
Verify web interface



Login with default user



Continue to ViciDial Initial Setup



Telephony

1. If not already, login as the **root** user to get to the **#** command prompt.
2. Type **vicibox-install** and press **ENTER** to start the ViciBox installer.
3. Type **Y** and press **ENTER** at the **ViciBox install** prompt.
4. Type **Y** and press **ENTER** at the **expert installation** prompt.
5. The installer will attempt to find a LAN IP address to use for the cluster. If the IP shown is correct type **Y** and press **ENTER**. If not type **N** and press **ENTER** and follow the prompts.
6. Type **N** and press **ENTER** at the **the Database** prompt.
7. Type in the Database IP address and press **ENTER**, I.E. **192.168.50.4**. If the installer is unable to connect to the Database server it will error out. Correct any issues and run the installer again.
8. Type **N** and press **ENTER** at the **Web server** prompt.
9. Type **Y** and press **ENTER** at the **Telephony server** prompt.
10. Do stuff here?
11. Type **N** and press **ENTER** at the **Archive server** prompt.
12. Type **N** and press **ENTER** at the **built-in firewall** prompt.
13. A summary will be listed of all selected options. Type in **Y** and press **ENTER** to accept and install.
14. Type **reboot** and press **ENTER** to reboot and cleanly load ViciDial.
15. Once the reboot is complete, log back in as **root** to get to the **#** command prompt.
16. Type **screen -ls** and press **ENTER**. While it might take upwards of 5 minutes, eventually there should be **8 Sockets in /run/screens/S-root**
17. Type **asterisk -r** and press **ENTER** to connect to the Asterisk console. There should be different processes like **sendcron** logging on and off.
18. Type **quit** and press **ENTER** to exit back to the **#** command prompt.

The Telephony server is now installed. If there are multiple telephony servers in the cluster these instructions can be repeated on any additional servers.

Screenshots

Install Telephony server



```
192.168.50.10 - PuTTY
diall:~ # vicibox-install

ViciBox Installer

The installer will ask questions based upon the role that this server is
to provide for the ViciBox Call Center Suite. You should have the database
and optionally archive servers setup prior to installing any other servers.
The installer will not run without there being a configured database! If this
server is to be the database then it must be installed before the archive server
Verify that all servers are connected to the same network and have connectivity
to each other before continuing. This installer will be destructive to the the
server if it is run.

Do you want to continue with the ViciBox install? [y/N] : y

Do you want to enable expert installation? [y/N] : y

The Internal IP address found was 192.168.50.10.
Do you want to use this IP address for ViciDial? [Y/n]: y

Will this server be used as the Database? [y/N] : n

Please input the master database IP address (192.168.50.10) : 192.168.50.4
Do you want to connect using the default ViciDial DB settings? [Y/n] : y

Will this server be used as a Web server? [y/N] : n

Will this server be used as a Telephony server? [y/N] : y
No Archive server found in provisioning table

Will this server be used as an Archive server? [y/N] : n

Do you want to disable the built-in firewall? [y/N] : n

--- ViciBox Install Summary ---
Expert      : Yes
Legacy      : No
Database    : No
Web         : No
Telephony   : Yes
Archive     : No
Firewall    : Enabled

--- Configuration Information ---
- Database -
SVN Rev    : 3735
IP Addr    : 192.168.50.4
Name       : asterisk
User       : cron
Password   : 1234
Cust User  : custom
Cust Pass  : custom1234
Port       : 3306

Please verify the above information before continuing!
Do you want to continue the installation? [y/N] : y
```

Reboot and verify Asterisk running

```

192.168.50.10 - PuTTY
diall:~ # screen -ls
There are screens on:
    2213.asterisk      (Detached)
    2207.astshell120230611025200      (Detached)
2 Sockets in /run/screens/S-root.
diall:~ # screen -ls
There are screens on:
    4650.ASTfastlog (Detached)
    4648.ASTVDremote      (Detached)
    4646.ASTVDauto  (Detached)
    4644.ASTlisten  (Detached)
    4642.ASTsend    (Detached)
    4640.ASTupdate  (Detached)
    2213.asterisk      (Detached)
    2207.astshell120230611025200      (Detached)
8 Sockets in /run/screens/S-root.
diall:~ # asterisk -r
Asterisk 16.30.0-vici, Copyright (C) 1999 - 2021, Sangoma Technologies Corporation and others.
Created by Mark Spencer <markster@digium.com>
Asterisk comes with ABSOLUTELY NO WARRANTY; type 'core show warranty' for details.
This is free software, with components licensed under the GNU General Public License version 2 and other licenses; you are welcome to redistribute it under certain conditions. Type 'core show license' for details.
=====
Connected to Asterisk 16.30.0-vici currently running on diall (pid = 2271)
[Jun 11 02:54:02] == Manager 'sendcron' logged on from 127.0.0.1
[Jun 11 02:54:02] == Manager 'sendcron' logged on from 127.0.0.1
[Jun 11 02:54:02] == Manager 'sendcron' logged off from 127.0.0.1
[Jun 11 02:54:02] == Manager 'sendcron' logged off from 127.0.0.1
diall*CLI> quit
Asterisk cleanly ending (0).
Executing last minute cleanups
diall:~ # █

```


NETWORKING

By default ViciBox will attempt to use DHCP on the first network interface. Any IP obtained will be shown on the server's display.

Table 1: Network Definitions

Term	Definition
WAN	Wire Area Network, the Internet
LAN	Local Area Network, private network
ISP	Internet Service Provider
NAT	Network Address Translation, the firewall

3.1 Deployments

Vicidial, or more specifically Asterisk, does not support a Multi-Homed ISP deployment. If true multi-network redundancy is needed then a BGP router connected to a couple ISPs with some IP space is the solution. Most colocation providers have this network redundancy built in. Asterisk can be setup to work in a sort of warm-failover with a second ISP but it can only ever use 1 ISP at a time.

3.1.1 LAN with NAT/firewall

By far the most common deployment, a single IP from the ISP is used by a firewall to do Network Address Translation (NAT) for an internal LAN. The ViciDial servers will all be configured with only a LAN IP while using the Firewall IP as the default gateway. This network is fine for smaller call centers with limited inbound. While larger ViciDial installs can be ran behind a firewall just fine, care must be taken to make sure all the port forwards are setup correctly.

Common Drawbacks

- Only one server can receive inbound SIP calls
- Only one server can provide web connections for remote agents
- Each telephony server needs a unique 5000 port UDP range
- If the Firewall has a bad day, everything has a bad day

- At best can only have 12 ViciDial telephony servers behind a NAT
- SIP is often problematic for a lot of NAT routers

3.1.2 LAN and WAN

In this deployment the ViciDial Web and Telephony server will be directly connected to both the LAN for agents as well as the WAN/ISP. This eliminates any potential issues with routers not handling SIP properly. The only limit to scaling is how many static IPs can be obtained.

Common Drawbacks

- Multiple static IP's may be expensive or hard to get from your ISP
- Requires two separate switches or one that can do VLANs
- Firewall must be managed on the server itself
- Might not be allowed under corporate network security policy

3.1.3 WAN Only

Mostly used by remote or work from home contact centers, this deployment is commonly done in a data center or colocation provider. Here the servers are only connected to the Internet. This deployment is the most complicated with a cluster as firewall rules need to be created to allow the cluster to communicate. If the IP address' are not contiguous then each server will need individual firewall rules to every other server. It's also way more likely any network changes or issue can easily result in the server being unreachable. This is a more advanced network deployment then any of the others and is not recommended if you are not experienced with Linux and networking.

Common Drawbacks

- Multiple static IP's may be expensive or hard to get from your ISP
- Using a Data Center or Colocation Provider can be quite costly
- Firewall configuration in a cluster can get burdensome if the static IPs aren't contiguous
- Requires a bit of networking and Linux experience to handle

3.2 Firewall

The ViciBox Firewall is an integration with firewalld in the underlying OS. It offers multiple modes of operation with some modes integrated directly within ViciDial as well.

ViciBox Firewall modes

- VoIP Black List (default)
- ViciDial White List
- ViciDial Black List
- Dynamic Portal integration
- Geo Blocking

If the ViciDial servers are already behind a network firewall then it's recommended to disable the built-in firewalld through `yast firewall`.

Since there is no way to accommodate all networks environments the default firewall configuration allows all connections needed for ViciDial. These would be the SIP telephony port, the HTTP and HTTPS web ports, the RTP audio ports, and the SSH port. With the exception of the RTP audio ports, It is recommended to limit accessibility to these ports where possible.

The RTP audio ports should remain accessible from all networks, including the public Internet. While the SIP Signalling on UDP Port 5060 will only come from a few Carrier IPs, the RTP audio port can and often does come from IP's outside of the carrier's normal footprint. This is done to minimize any delay between the audio endpoints aka the agent and the caller.

Attention: There is a known issue between the default VoIP Black List mode of operation and firewalld. The problem is that the size (50K+ entries) of the list can cause firewalld to enter a race condition. This most commonly happens after making network changes in `yast lan`. The recommended action is to stop firewalld through `service firewalld stop`, make any needed network changes, then `reboot` to cleanly load the list back in. If the VoIP Black List is not needed then just disable it. While this is not ideal it is better than nothing at all.

3.2.1 Zones

The concept of zones in firewalld, the underlying firewall in ViciBox, is applied globally to all connections. This means that any network traffic received on any network interface can be moved to a specific zone if it matches a rule. The default zone assigned to the network interface is only used when no other matching rule was found.

For example, even though `eth0` on the server has IP `192.168.50.4/24` and is in the **Trusted** zone by default, it's possible to have IP `192.168.50.40` be sent to the **External** zone if it's included on the [White List](#). Haphazardly adding IP address' to things not understanding this concept is the biggest cause of 'The whitelist/portal isn't working', 'I can't access the server anymore', and other timeless classics.

Public

The public zone is the 'Default' zone for all interfaces. This zone restricts access to everything on the server except what's needed for ViciDial. Any service that needs to be available to the general public goes in this zone.

Trusted

This zone is where the LAN network interface will need to be placed. Everything in this zone is allowed to connect to anything on the server. There is no need to add to remove services from this zone as it allows everything by default. It is functionally equivalent to turning the firewall completely off.

External

This zone is for allowed or authenticated access. The *White List* and *Dynamic Portal* will assign IP address' to this zone. Any services you want remote or work-from-home agents to have access to will need to be listed in this zone. By default all needed services for ViciDial are already added.

3.2.2 VoIP Black List

This mode of operation downloads the *VoIP Black List* and loads it into the firewall. This is a community submitted list that contains over 55K IP entries of known SIP abusers.

The Default

This mode of operation is the ViciBox default for new server installations. It is enabled through the the root's crontab.

Listing 1: Default crontab entry

```
### ViciBox integrated firewall, by default just load the VoIP Black list and ↵  
↵ reload it every 4 hours  
### You can lock everyone out of your server if you set this wrong, so ↵  
↵ understand what you are doing!!!  
@reboot /usr/bin/VB-firewall --voipbl --noblack --quiet  
0 */6 * * * /usr/bin/VB-firewall --voipbl --noblack --quiet
```

To disable the VoIP Black List just comment out the last two lines above in the crontab.

Listing 2: Commented crontab entry

```
### ViciBox integrated firewall, by default just load the VoIP Black list and
↳ reload it every 4 hours
### You can lock everyone out of your server if you set this wrong, so
↳ understand what you are doing!!!
#@reboot /usr/bin/VB-firewall --voipbl --noblack --quiet
#0 */6 * * * /usr/bin/VB-firewall --voipbl --noblack --quiet
```

3.2.3 Black List

The Black List blocks specific IP address' from accessing the server. This is controlled through an IP List inside ViciDial called **ViciBlack**. This allows for easy administration as the firewall can be controlled from the Admin interface.

Setup

The Black List needs to be setup in the crontab first.

Listing 3: Black List only crontab

```
### ViciBox integrated firewall, using blacklist only, check once every minute
@reboot /usr/bin/VB-firewall --black --quiet
* * * * * /usr/bin/VB-firewall --black --quiet
```

Listing 4: Black List with VoIP BL

```
### ViciBox integrated firewall, using blacklist and VoIPBL, check VoIPBL
↳ every 6 hours and blacklist every minute
@reboot /usr/bin/VB-firewall --black --voipbl --quiet
0 */6 * * * /usr/bin/VB-firewall --voipbl --quiet
* * * * * /usr/bin/VB-firewall --black --dynamic --quiet
```

The IP List feature must be enabled under *Admin* → *Settings*.

Control

The White List can be controlled through the ViciWhite IP list. This can be found by going to *Admin* → *IP Lists*. The format is simple with one IP or CIDR network per line. Any changes made may take up to 2-minutes to apply.

Listing 5: Sample White List entries

```
157.240.14.35
142.250.217.206
64.233.160.0/19
66.102.0.0/20
```

3.2.4 White List

The white list allows certain IP address' through the build-in firewall. This is controlled through an IP List inside ViciDial called **ViciWhite**. This allows for easy administration as the firewall can be controlled from the Admin interface.

Setup

The White List is only compatible with the Dynamic Portal. Below are the changes you would make to the ViciBox crontab entry. The recommendation is to just delete the old entries and copy-paste these in. The crontab entries shown are for White List Only and White List with Dynamic Portal.

Listing 6: White List only crontab

```
### ViciBox integrated firewall, using whitelist only, and check once every_
↪minute
@reboot /usr/bin/VB-firewall --white --quiet
* * * * * /usr/bin/VB-firewall --white --quiet
```

Listing 7: White List with Dynamic Portal crontab

```
### ViciBox integrated firewall, using whitelist and dynamic portal, and check_
↪once every minute
@reboot /usr/bin/VB-firewall --white --dynamic --quiet
* * * * * /usr/bin/VB-firewall --white --dynamic --quiet
```

The IP List feature must be enabled under *Admin* → *Settings*.

All services under the **Public** zone should be removed except **dhcpv6-client** and **rtp**.

Any IP address on the White List will be handled through the **External** zone in `yast firewall`. By default all the services needed for ViciDial are already listed in this zone.

Control

The White List can be controlled through the ViciWhite IP list. This can be found by going to *Admin* → *IP Lists*. The format is simple with one IP or CIDR network per line. Any changes made may take up to 2-minutes to apply.

Listing 8: Sample White List entries

```
157.240.14.35
142.250.217.206
64.233.160.0/19
66.102.0.0/20
```

3.2.5 Dynamic Portal

The dynamic portal allows for remote or work-from-home agents to authenticate with their ViciDial logins on a separate web portal. This portal is standalone outside the framework of ViciDial and restricts how fast authentication attempts can be made. It allows agents to dynamically add their IP to the firewall for ViciDial.

Setup

The dynamic portal is only compatible with the White List and is often ran in conjunction with it.

Listing 9: Dynamic Portal only crontab

```
### ViciBox integrated firewall, using whitelist only, and check once every
↳minute
@reboot /usr/bin/VB-firewall --dynamic --quiet
* * * * * /usr/bin/VB-firewall --white --quiet
```

Listing 10: White List with Dynamic Portal crontab

```
### ViciBox integrated firewall, using whitelist only, and check once every
↳minute
@reboot /usr/bin/VB-firewall --white --dynamic --quiet
* * * * * /usr/bin/VB-firewall --white --dynamic --quiet
```

All services under the **Public** zone should be removed except **dhcpv6-client** and **rtp**.

Any IP address from the Dynamic Portal will be handled through the **External** zone in `yast firewall`. By default all the services needed for ViciDial are already listed in this zone.

Enable Portal

The dynamic portal needs to be exposed to the Public zone. While the portal works with standard HTTP it's recommended to only use HTTPS. This will require a properly setup DNS and SSL certificate. If the SSL certificate is handled outside of `vicibox-ssl` then `/etc/apache2/vhosts.d/dynportal-ssl.conf` needs to be updated to point to the correct SSL certs.

Listing 11: Enable SSL Dynamic Portal

```
firewall-cmd --permanent --zone=public --add-port=446/tcp
firewall-cmd --reload
```

The portal should now be reachable by going to <https://your.server.com:446/valid8.php>

Obscurity

Since security by obscurity can be a good thing, it's also possible to change the dynamic portal to run on another port besides 446. To do that two files will need to be modified as well as the above firewall rule. References to port '446' will need to be changed to your own random port of choice.

Table 2: Dynamic Portal Config Files

File	Modification to make
/etc/apache2/vhost.d/dynamicportal.conf	First, change 446 to preferred port
/etc/apache2/listen.conf	Change all references of 446 to preferred port

Apache and firewalld will need to be restarted after making those changes. That can also be accomplished through a quick reboot.

Listing 12: Restart apache and firewalld

```
service apache2 restart
firewall-cmd --permanent --zone=public --add-port=<preferred-port>/tcp
firewall-cmd --reload
```

3.2.6 How-To's

How to do weird networking things, to be filled out later.

3.3 SSL

ViciBox supports SSL out of the box with a self-signed certificate. While functional, it is not recommended to use this certificate at all. It's merely a place-holder for a real SSL certificate.

For clusters it's recommended to use a wildcard SSL certificate. These are available from several Certificate Authorities including the free providers. Commercial SSL providers tend to be less problematic and require yearly renewals. The free SSL providers generally require that the certificate be renewed every 30 to 90 days through an automated process. It's this automated process in conjunction with firewalls that tends to be an issue.

Attention: Before SSL can be setup the server needs a Fully Qualified Domain Name aka 'FQDN'. For example, if 'your.domain.com' is the FQDN for the server then the ViciDial web interface should be accessible at '<http://your.domain.com>' in a web browser. Until this is correctly working no SSL certificate ever will.

3.3.1 Common Files

To help SSL certificates work across a cluster without requiring multiple webRTC templates there is a common file location that Apache and Asterisk is configured to use. By default the self-signed certificate is located there. To install your own certificates a symlink should be created from the actual SSL certificate to the common one.

Table 3: Common SSL files

File	Location	Purpose
/etc/apache2/ssl.crt	Public Certificate	
/etc/apache2/ssl.key	Private Key	
/etc/apache2/ssl.crt	Opus Audio Certificate Authority Chain	

Note: If vicibox-ssl is used then no common configuration is needed. The common config is handled as part of it.

Setup

The SSL certificates can be symlinked to the common vicibox certificates to help simplify setup.

Listing 13: Configure common SSL

```
cd /etc/apache2/ssl.crt
mv vicibox.crt vicibox.crt.old
ln -s /file/path/to/ssl.crt vicibox.crt
cd /etc/apache2/ssl.key
mv vicibox.key vicibox.key.old
ln -s /file/path/to/ssl.key vicibox.key
service apache2 restart
asterisk -rx "core restart now"
```

Verify that SSL is working by going to <https://your.domain.com> in a web browser. If there are no SSL warnings then it's installed correctly.

3.3.2 ViciBox SSL

To help secure the web interface on the internet ViciBox comes with `vicibox-ssl`. This script sets up free SSL certificates through the [Let's Encrypt](#) certificate authority and the [acme.sh](#) client. There is also an included `acme-renew.sh` script designed to help renew SSL certs when the local firewall is running. This is all handled automatically during the setup.

Table 4: Example SSL settings

Setting		Value
Fully ified main (FQDN)	Qual- Do- Name	vici- docs.vicibox.com
EMail Address	Alert	vici- docs@vicibox.com

vicibox-ssl

1. If not already, login as the `root` user to get to the `#` command prompt.
2. Type `vicibox-ssl` and press `ENTER` to start the setup process.
3. Type in the EMail address to use for the SSL certificate, I.E. `vicidocs@vicibox.com`
4. Type in the FQDN to use for the SSL certificate, I.E. `vicidocs.vicibox.com`
5. After reviewing the typed in information, press `Y` and then `ENTER` to start the automated setup process. If the SSL setup fails for whatever reason an error message will be displayed.
6. After an SSL certificate is generated, press `Y` and press `ENTER` to enable the new certificate in Apache and Asterisk
7. Press `Y` and `ENTER` to setup the needed crontab entry for cert renewal
8. Once back at the `#` command prompt, verify that Asterisk has loaded the SSL certs by running `asterisk -rx "http show status"`. It should say **HTTPS Server Enabled**.
9. The last test is to go to <https://your.domain.com> and verify that the browser is secure.

Screenshots

Run vicibox-ssl

Setup new SSL cert

Verify Asterisk loaded new cert

Verify https in web browser

```

192.168.50.4 - PuTTY

- ViciBox v.11-Beta 230515

vicidocs:~ # vicibox-ssl

ViciBox free SSL set-up script

Please make sure you have a Fully Qualified Domain Name pointed at this server
.
For example, if the FQDN of this server was 'vicibox.vicidial.com' and was
properly directed at this server you should be able to log into vicidial at
http://vicibox.vicidial.com

What is your EMail address : vicidocs@vicibox.com
What is your Fully Qualified Domain Name (FQDN) : vicidocs.vicibox.com

E-Mail : vicidocs@vicibox.com
FQDN : vicidocs.vicibox.com

Do you want to generate an SSL certificate now? (N/y) : y

```

```

192.168.50.4 - PuTTY

com/vicidocs.vicibox.com.cer
[Thu Jun 22 01:31:41 EDT 2023] Your cert key is in: /root/.acme.sh/vicidocs.vici
box.com/vicidocs.vicibox.com.key
[Thu Jun 22 01:31:41 EDT 2023] The intermediate CA cert is in: /root/.acme.sh/vi
cidocs.vicibox.com/ca.cer
[Thu Jun 22 01:31:41 EDT 2023] And the full chain certs is there: /root/.acme.sh
/vicidocs.vicibox.com/fullchain.cer

acme.sh successfully authenticated and generated an SSL certificate.

Do you want to enable the new SSL certificate in Apache/Asterisk? (N/y) : y

Enabling SSL certificate in Asterisk... done.
Reloading Asterisk http module... Module 'http' reloaded successfully.
done.
Enabling SSL certificate in Apache... done.
Reloading apache configuration... done.
Making changes to ViciDial... done.

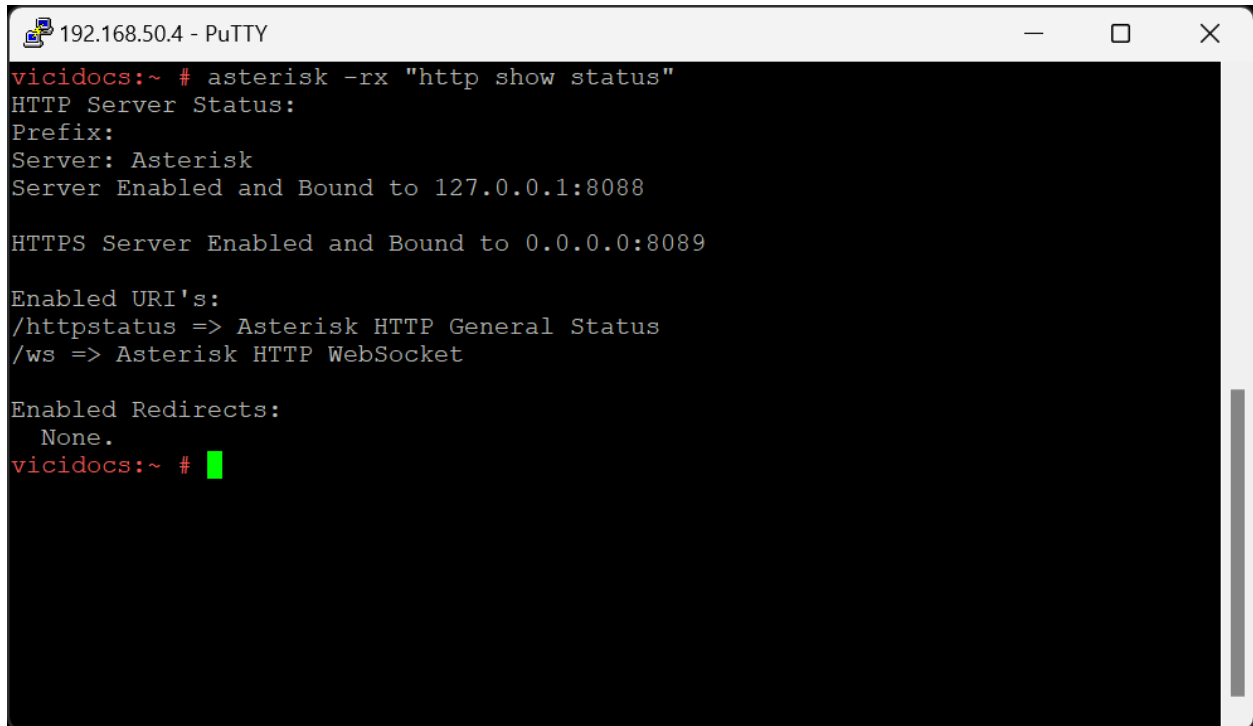
The SSL certificate is installed. The SSL certificate is valid for up to 90
days. After that time it will need to be re-generated by running :
/root/.acme.sh/acme.sh --renew-all

It is recommended to have the cert generation done weekly via a crontab
entry like this:

### Renew certificate every sunday at midnight
0 0 * * 0 /usr/share/vicibox-ssl/acme-renew.sh

Do you want to add this to the crontab now? (N/y) : y

```



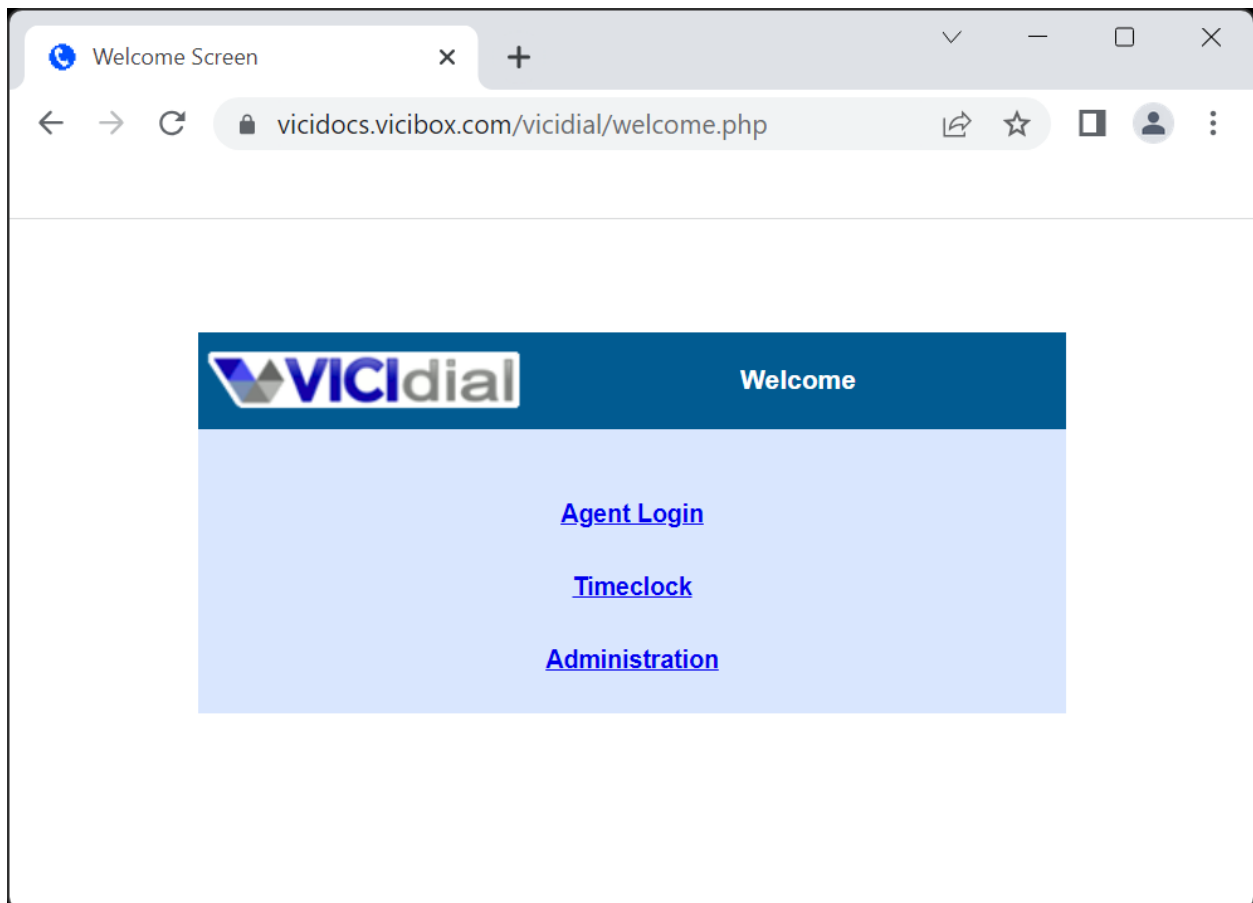
A screenshot of a PuTTY terminal window titled "192.168.50.4 - PuTTY". The terminal shows the output of the command `asterisk -rx "http show status"` executed in a shell where the prompt is `vicidocs:~ #`. The output displays the status of the Asterisk HTTP and HTTPS servers, including their prefixes, enabled status, and bound IP addresses and ports. It also lists enabled URI's and redirects.

```
vicidocs:~ # asterisk -rx "http show status"
HTTP Server Status:
Prefix:
Server: Asterisk
Server Enabled and Bound to 127.0.0.1:8088

HTTPS Server Enabled and Bound to 0.0.0.0:8089

Enabled URI's:
/httpstatus => Asterisk HTTP General Status
/ws => Asterisk HTTP WebSocket

Enabled Redirects:
None.
vicidocs:~ #
```



MAINTENANCE

Common maintenance items on ViciBox

4.1 Change Timezone

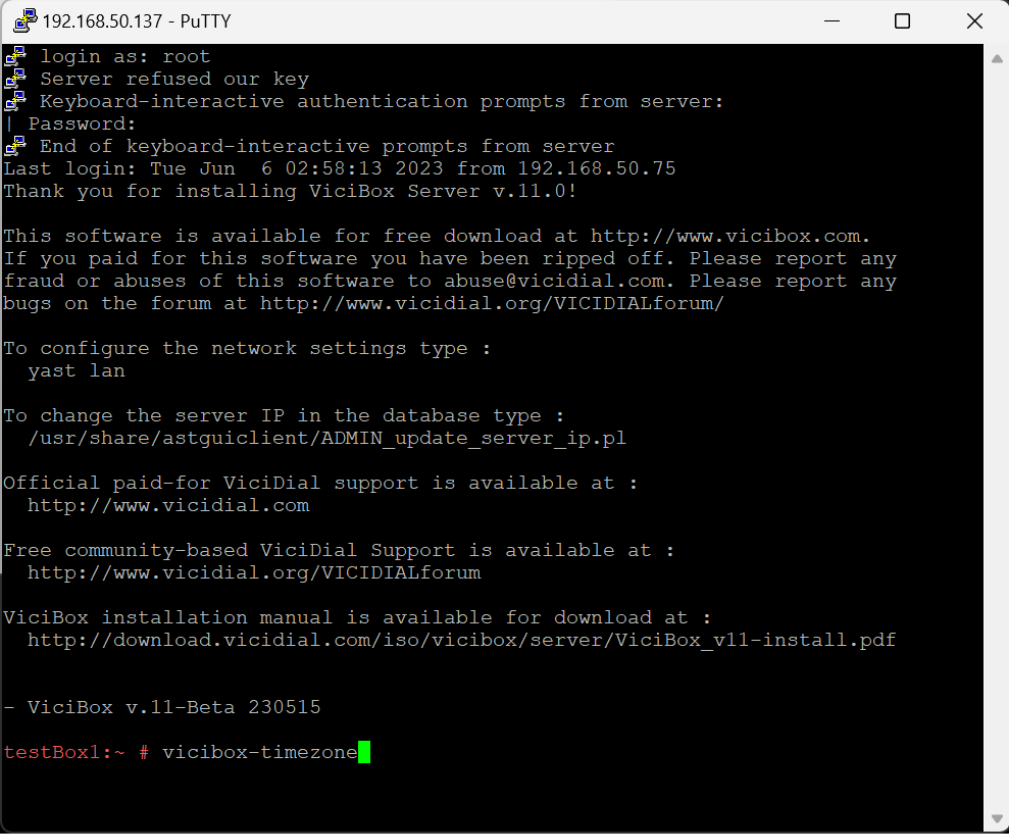
The timezone of the server should match the timezone for it's physical location. These instructions will modify the timezone settings of the underlying operating system. If these instructions are followed after ViciDial has been installed then you will still need to modify the GMT Offset of the server in the admin interface. This can be found under the Admin -> Servers section of ViciDial.

4.1.1 vicibox-timezone

1. If not already, login as the root user to get to the # command prompt.
2. Type `vicibox-timezone` and press ENTER to start the timezone configuration.
3. Using the Up and Down arrow keys, select the appropriate region for the server.
4. Press the TAB key to move to the **Time Zone** selection window.
5. Using the Up and Down arrow keys, select the appropriate time zone for the server.
6. Press ALT-O or TAB to select the **OK** button and apply changes.
7. The selected time zone should be shown on the output. Type `reboot` at the # command prompt to reboot the server.

Screenshots

Run vicibox-timezone



```
192.168.50.137 - PuTTY
login as: root
Server refused our key
Keyboard-interactive authentication prompts from server:
| Password:
| End of keyboard-interactive prompts from server
Last login: Tue Jun  6 02:58:13 2023 from 192.168.50.75
Thank you for installing ViciBox Server v.11.0!

This software is available for free download at http://www.vicibox.com.
If you paid for this software you have been ripped off. Please report any
fraud or abuses of this software to abuse@vicidial.com. Please report any
bugs on the forum at http://www.vicidial.org/VICIDIALforum/

To configure the network settings type :
  yast lan

To change the server IP in the database type :
  /usr/share/astguiclient/ADMIN_update_server_ip.pl

Official paid-for ViciDial support is available at :
  http://www.vicidial.com

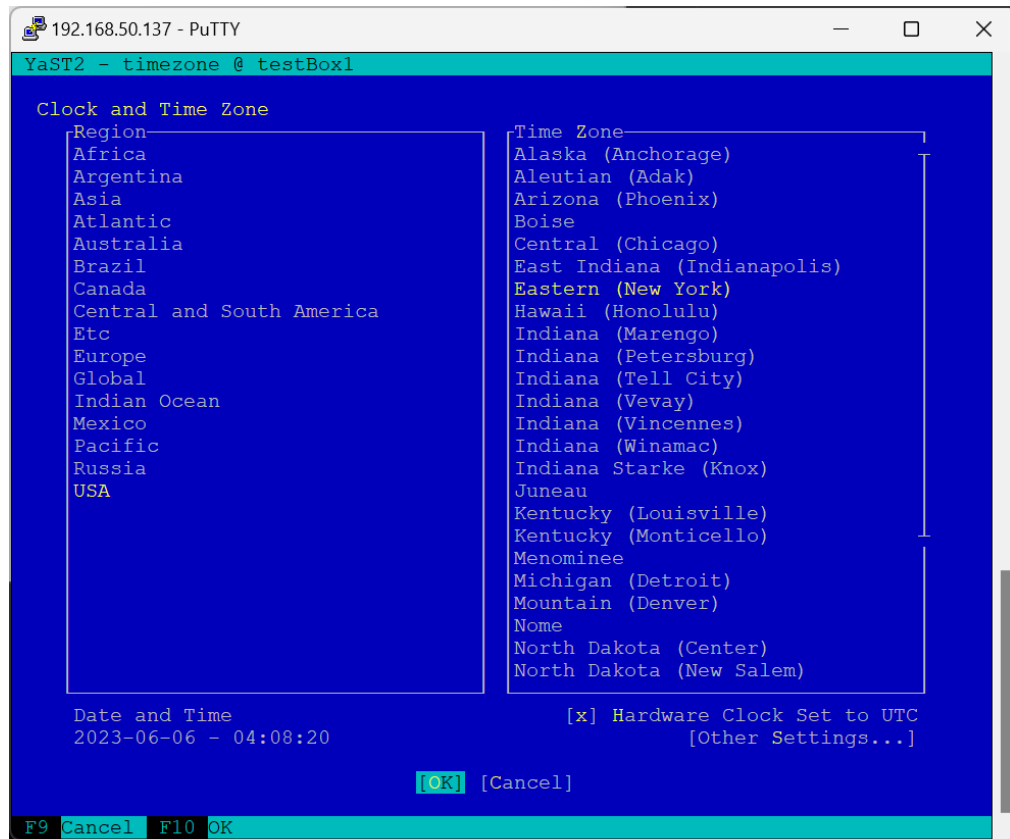
Free community-based ViciDial Support is available at :
  http://www.vicidial.org/VICIDIALforum

ViciBox installation manual is available for download at :
  http://download.vicidial.com/iso/vicibox/server/ViciBox\_v11-install.pdf

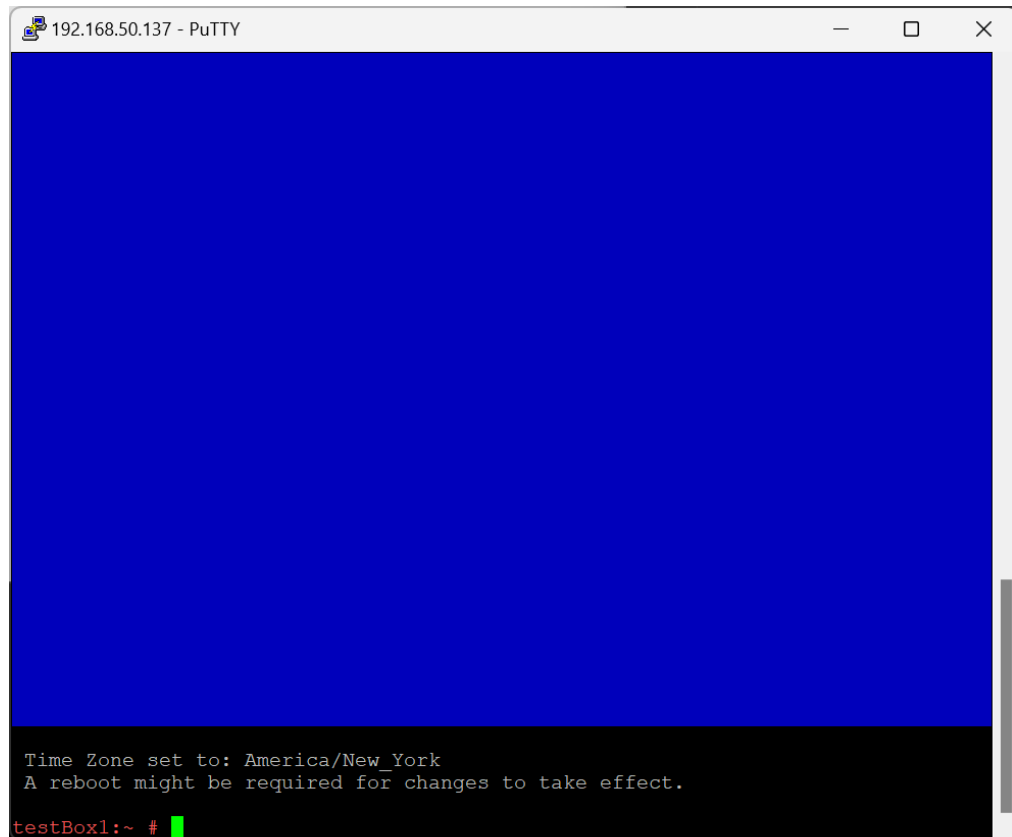
- ViciBox v.11-Beta 230515

testBox1:~ # vicibox-timezone
```

Select Region and time zone



Verify output



4.2 Change root password

Please try to pick a root password you will remember. Recovering a lost or forgotten root password is not overly trivial. Lastly, if there is no root access to the server then ViciDial and ViciBox cannot be maintained. You have been warned!

The root user is everything in Linux. It's highly recommended to change the root users password to something secure. While everyone will have their own preferences for passwords, here are some rough guidelines to help create a more secure password: * At least 14 characters in length * Contains at least one upper case (ABC) * Contains at least one lower case (abc) * Contains at least one number (123) * Contains at least one special character (@%!) * Does NOT contain 'vicial', 'vici', 'password', or 'pass'

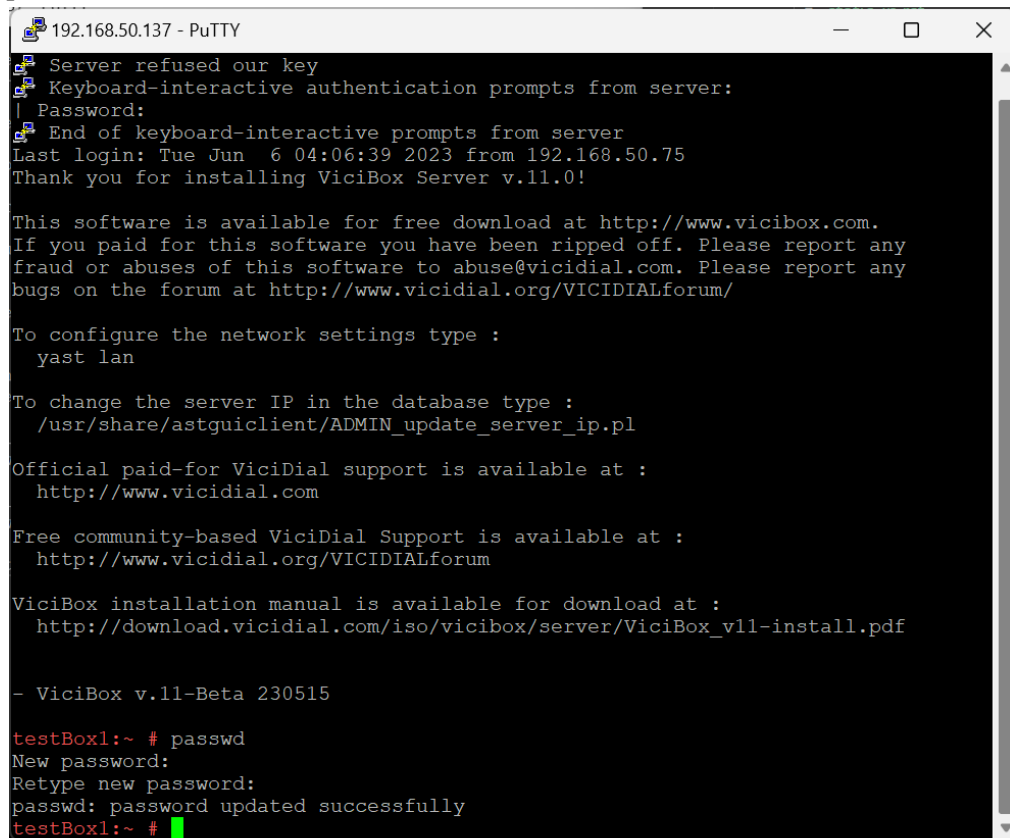
Tip: While a truly random password is the most secure, a password you can remember is more useful. I recommend basing the password around a 'phrase' to help. As an example, albeit a bad one, of this is the password 'ViciPass4U!'.

4.2.1 passwd

1. If not already, login as the root user to get to the # command prompt.
2. Type passwd and press ENTER to change the root password.
3. At the **New password:** prompt type in your new root password and press ENTER.
4. At the **Retype new password:** prompt type in the new root password again and press ENTER.

Screenshots

Run passwd



```

192.168.50.137 - PuTTY
Server refused our key
Keyboard-interactive authentication prompts from server:
| Password:
| End of keyboard-interactive prompts from server
Last login: Tue Jun  6 04:06:39 2023 from 192.168.50.75
Thank you for installing ViciBox Server v.11.0!

This software is available for free download at http://www.vicibox.com.
If you paid for this software you have been ripped off. Please report any
fraud or abuses of this software to abuse@vicidial.com. Please report any
bugs on the forum at http://www.vicidial.org/VICIDIALforum/

To configure the network settings type :
    yast lan

To change the server IP in the database type :
    /usr/share/astguiclient/ADMIN_update_server_ip.pl

Official paid-for ViciDial support is available at :
    http://www.vicidial.com

Free community-based ViciDial Support is available at :
    http://www.vicidial.org/VICIDIALforum

ViciBox installation manual is available for download at :
    http://download.vicidial.com/iso/vicibox/server/ViciBox\_v11-install.pdf

- ViciBox v.11-Beta 230515

testBox1:~ # passwd
New password:
Retype new password:
passwd: password updated successfully
testBox1:~ # █

```

4.3 Change External IP

Whenever the external IP is changed a few settings need to be changed in ViciBox to match. To help facilitate that the `vicibox-externip` script was added. This script will attempt to auto-detect the correct external IP and insert that into Asterisk. Alternatively, you can provide the new IP to the script when you run it.

4.3.1 vicibox-externip

1. If not already, login as the root user to get to the # command prompt.
2. Type vicibox-externip and press ENTER. Alternatively, type in the IP address to use as well, I.E. vicibox-externip 1.2.3.4
3. Review the IP summary information, and press Y and press ENTER to make the change and update asterisk.

4.3.2 Other Change

In addition to modifying the asterisk configuration, the following items will also need to be checked and possibly adjusted.

Items to check

- **External Server IP** under *Admin* → *Servers*
- DNS entries that pointed to the old server IP
- **Sounds Web Server** under *Admin* → *System Settings*

BUG FIXES

Bug fixes are rolled up into later releases. Therefore any fixes listed for ViciBox v.11.0.1 should not be applied to an older v.11.0.0 install as those fixes have already been applied. In comparison, a ViciBox v.11.0.0 system should get all fixes applied to it as none of those fixes has been applied.

The version of ViciBox used to install the server is shown just above the # command prompt after logging in as root, I.E. - **ViciBox v.11.0.1 230806**.

As a general rule the fixes are mainly for issues that can't reasonably be applied through a standard package update. The following sections are separated by ViciBox version and then the specific issue.

5.1 ViciBox 11.0

Bugfixes, Errata, and patch notes related to the ViciBox v.11.0 release.

5.1.1 11.0.0 AGI module

The res_speech.so module is needed for the res_agi.so module to load which ViciDial requires. An old modules.conf was inadvertently packaged with ViciBox v.11.0.0 which prevents res_speech.so from loading which further prevents res_agi.so from loading as well. Removing the noload => res_speech.so from /etc/asterisk/modules.conf and rebooting will fix things.

The fix should only be ran on servers that have already been installed. If zypper up was ran before vicibox-install was there should be no need to run the below fix.

Symptoms

Telephony servers with this issue will have log output stating that no application can be found for the AGI extension.

Listing 1: Example Log Output

```
[Jun 28 12:47:30] == Using SIP RTP CoS mark 5
[Jun 28 12:47:30] > 0x7fd550024340 -- Strict RTP learning after remote address
↪set to: 192.168.1.106:12722
[Jun 28 12:47:30] WARNING[25228][C-000000006]: pbx.c:2928 pbx_extension_helper:
↪No application 'AGI' for extension (defaultlog, 9684, 1)
[Jun 28 12:47:30] == Spawn extension (defaultlog, 9684, 1) exited non-zero on
↪'SIP/145-000000008'
[Jun 28 12:47:30] WARNING[25228][C-000000006]: pbx.c:2928 pbx_extension_helper:
```

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```
↪No application 'AGI' for extension (defaultlog, h, 1)
[Jun 28 12:47:30] == Spawn extension (defaultlog, h, 1) exited non-zero on
↪'SIP/145-000000008'
```

The Fix

1. If not already, login as the root user to get to the # command prompt.
2. Type the command `sed -i 's/^noload => res_speech.so/;noload => res_speech.so/' /etc/asterisk/modules.conf` and press ENTER.
3. Reboot the server by typing `reboot` and pressing ENTER or restart asterisk by running `asterisk -rx "core restart now"`.

5.1.2 11.0.0 MD Image

The MD installation image was getting a /boot directory that was only 200 megs in size. This prevented newer kernel updates from getting installed. The fix is to remove the separate /boot partition and just use the / root filesystem for /boot. This has been corrected in ViciBox v.11.0.1. These instructions should only be followed if a ViciBox v.11.0.0 system has already had vicibox-mdraid1 ran successfully.

Symptoms

When attempting to update the system using `zypper up` you will get an error when a new kernel attempts to install. This results in no new kernel updates being installed.

Listing 2: Example zypper Output

```
(167/212) Installing: kernel-firmware-amdgpu-20230724-150500.3.3.1.noarch_
↪[done]
(168/212) Installing: kernel-firmware-all-20230724-150500.3.3.1.noarch ...
↪[done]
installing package kernel-default-5.14.21-150500.55.12.1.x86_64 needs 26MB_
↪on the /boot filesystem
(169/212) Installing: kernel-default-5.14.21-150500.55.12.1.x86_64 .....
↪[error]
Installation of kernel-default-5.14.21-150500.55.12.1.x86_64 failed:
Error: Subprocess failed. Error: RPM failed: Command exited with status 1.
Abort, retry, ignore? [a/r/i] (a):
```

The Fix

1. If not already, login as the root user to get to the # command prompt.
2. Copy and paste or type the following commands in to fix the issue:

Listing 3: Remove /boot partition

```
cd /
umount /boot/efi
mkdir boot-orig
rsync -ravv /boot/ /boot-orig/
umount /boot
rsync -ravv /boot-orig/ /boot/
mount /boot/efi
cp /etc/fstab /etc/fstab.orig
sed -i '/boot ext4/c\' /etc/fstab
```

5.1.3 11.0.1 MariaDB Limits

The MariaDB limits config file was erroneously put in /etc/security instead of /etc/security/limits.d. The fix is to simply move the file to the right directory. This issue primarily effects larger cluster setups but it's possible for a single ViciBox Express setup to also have this issue.

Symptoms

There will be MariaDB logs stating that they cannot open a table, tmp file, can't spawn process, limit reached, etc.

The Fix

1. If not already, login as the root user to get to the # command prompt.
2. Type in `mv /etc/security/mysql.conf /etc/security/limits.d/mysql.conf` and press ENTER
3. When ready, type `reboot` and press ENTER to reboot and load new settings