

AstLinux: A User's Guide

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For AstLinux version 0.2.6
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Introduction

Welcome to the wonderful world of Linux, [Soekris], and Asterisk! In this document I will attempt to make the 0.2.6 version of AstLinux work for you (or at least help you make them work for you).

If you have experience with AstLinux 0.1.x you know that I could have made it smaller, cleaner, and easier to work with. I know that too. Previous releases of AstLinux were a proof of concept – an experiment – to see how viable Asterisk on the SC1100 platform was. After many downloads and happy “customers” I can tell you that it most certainly was. Now it is time to do it for real, and do it right. Welcome to AstLinux 0.2.6!

AstLinux 0.2 has been reworked from the ground up - built from scratch to make it smaller, leaner, and more flexible.

AstLinux 0.2 has the following features (in no order):

- Linux kernel 2.6.11.7
- dnsmasq
- watchdog (busybox)
- ssmtp
- cron (busybox)
- bash
- busybox (and everything with it...)
- TFTP server
- vsftpd FTP server
- mini_httpd (with SSL)
- PHP in CGI mode (patched for above)
- OpenSSH
- OpenSSL
- NTP (ntpd, ntpq, ntpd)
- syslog (busybox with remote log support)
- vi (from busybox)
- tc (kernel traffic shaping)
- iptables
- phpconfig-inspired web GUI
- Asterisk (with asterisk-sounds package)
- AstShape (my *wonderful* QoS/traffic shaping script)
- rsync
- nfs-utils (kernel modules and userspace tools for NFS support)

- Sangoma WANPIPE 2.3.2-1 (for use with A101 / 102 / 104 / S518)
- Zaptel
- ztdummy
- libpri
- rp-pppoe (PPPoE client)
- pppd
- and many, many more (download to find out!)

So you have all of this (and much more) in your regular Linux distro? I know that! The question is, does your Linux distro run on a 32mb compact flash card? Does it allow you to run the entire OS from read-only memory? Can you download and install it on a Soekris Net4801/i586 in no time at all? I didn't think so!

Really though, AstLinux is much more than that. AstLinux can also run on most hardware (i586-mmx and up). I have included a generic i586 kernel that should work with most systems, just not all. For now, I am focusing on the SC1100 series of SBC's (and the Soekris Net4801) in particular.

Installation

AstLinux can be installed by writing the compressed image file to a compact flash card of 32 megabytes or larger. Here is how you can write the image file under Linux:

```
gunzip -c /path/to/astlinux.img.gz > /dev/sda (assuming sda is your CF card)
```

Under Windows, you can use the AstLinuxSetup package from my website at www.kriscompanies.com. Once you have downloaded and installed it, you will find a new Programs group under the Start Menu called "AstLinux". Under this menu you will find several entries to write images to Compact Flash cards. With your CF reader/writer connected (and CF card inserted), select one of the entries from the list. Physdiskwrite will start and prompt you to select a device to write the image to. Make sure to select the proper destination disk. Physdiskwrite will not write to anything larger than 800mb without specifically overriding it. USE WITH CAUTION!!!

Once the image write-out has finished, press [enter] to close the DOS window, safely detach the USB reader/writer and insert the CF into your device. Have fun!

Configuration

I'm not going to lie to you: AstLinux does not need any configuration to boot properly and run. If you would like to customize certain aspects of AstLinux, I have tried to consolidate as much as possible into one file, rc.conf. FreeBSD people should recognize this immediately because that one file, rc.conf, gets sourced by every startup script in the OS. I like that idea, and I wanted to continue it.

When you initially boot your machine and AstLinux starts, you will see kernel messages and debug information scroll by until you see a login prompt (if you have the serial console connected, that is). If you were watching closely, you would have noticed that the error LED goes off as soon as you reach the login prompt. This is how you know that the system is ready if you do not have a serial console or any other means to monitor the system. By default, the startup process performs the following tasks:

- mounts all filesystems in /etc/fstab
- creates basic directories in tmpfs filesystems
- loads kernel modules for the clock and NatSemi ethernet chips
- brings up eth0 via DHCP (by default, change in rc.conf)
- sets the clock via ntp (from rc.conf)
- generates crucial system files: /etc/hosts, etc.
- starts all of the executable scripts in /etc/init.d:
- watchdog, syslog, iptables firewall, traffic shaping, dnsmasq, ntpd, sshd, inetd, asterisk, and mini_httpd

It really does a lot more than this, but you get the idea. It tries to be smart about things, for instance, if you specify a static IP address for the external interface in rc.conf it will not try to bring it up with DHCP, etc.

This is where things get tricky. Compact Flash has a limited number of read/write cycles. It is pretty up there, but I have had CF's die on me and it isn't pretty in what is otherwise a rock-solid device. This is why I have chosen to implement AstLinux the way that I have.

The recommended (highly recommended) way of using AstLinux is to have the base OS and programs run off of a 32mb (or larger) compact flash card. Nothing user or site specific will be stored on this flash card, and it should hardly (or never) have to be mounted read/write. This should prolong the life of the CF card by many magnitudes.

So how do I do writes on this thing? Simple: put the USB port to work... I am sure that many of you fellow geeks out there have a USB key disk (flash drive) that you have attached to your key chain.

The Soekris Net4801 has a OHCI USB 1.1 port on the back far edge of the case, past the power connector. It seems to work pretty well for small amounts of writes in combination with a USB key disk for storing things like voice mail, Asterisk configs, AstLinux configs, DHCP leases, etc. I will show you how to utilize this port and the tools at your disposal:

Step 1: Once you have installed AstLinux and it has booted, login to the system with the username root and the password "astlinux" (no quotes).

Step 2: You should now have a login prompt. Insert your USB keydisk into the USB connector on the Soekris. You should see some weird SCSI disk stuff scroll by on the console. Press enter a few times to see your prompt again.

THE NEXT STEP WILL DESTROY ANYTHING THAT IS ON YOUR USB FLASH DRIVE. YES I SAID DESTROY! BACK IT UP!

Step 3: Type "genkd" again with no quotes. Follow along.

Step 4: Reboot. I SAID REBOOT!

The genkd script will take care of partitioning, formatting, and copying the AstLinux config files onto your USB keydisk. When you reboot all of the init scripts will see what files are on the keydisk. If they are there, their respective software packages will use the keydisk. If not, they will use the AstLinux defaults. This applies to all of the software packages that I could see people wanting to configure often, as well as anything that needed to be written to non-volatile memory like voicemail, etc. This is all accomplished by using symlinks, and using them often. Please keep this in mind before you start manually moving files around and overwriting those symlinks. They are dearly important!

NOTE: You could just as easily use an external hard drive, internal IDE hard drive, NFS share, etc. This may require some tweaking, read on for information...

You can now start to configure your AstLinux installation. The single magical configuration file rc.conf, resides at "/etc/rc.conf". Once you complete the procedure above, you should be able to open this file in vi and make any changes that you want. It is pretty self-explanatory, and hopefully full of comments to make it easier to understand. If you make any changes to this file, the best way to apply them is just to restart. I know that some people like to report mad uptimes but I like my stuff to work when it has to coldboot. That is why I want you to restart the entire system.

Asterisk can be configured as always, by editing the various configuration files in /etc/asterisk from the shell. Or can it... I have included a phpconfig-like GUI. It is a simple PHP interface to the Asterisk configuration

text files that is accessible from any web browser that supports SSL. You can access it by going to the IP address (on the LAN interface) of the machine and using “https://[insert ip here]”. The default is 192.168.101.1, so the full URL is <https://192.168.101.1>. You should see some warning messages about the certificate not being trusted, not matching the site, having an IP address of 0.0.0.0, etc. That's okay. We know who the Soekris is. We just want to make sure that the session is encrypted. That's what this certificate accomplishes.

You will then be prompted for a username and password. The default is “admin” and “astlinux”.

PHP Nuts: You can see how I compiled PHP by going to [https://\[ip address\]/phpinfo.php](https://[ip address]/phpinfo.php)

Advanced Usage: I know some of you are wondering “Hey, can I use multiple USB key disks to store different sets of configuration?” The answer is: “You know it”! There are some caveats, however:

- 1) Never connect more than one at a time unless you know what you are doing.
- 2) Make sure to “initialize” each of them separately with “genkd”. I am not responsible if you do it some other way.
- 3) You still need to reboot to change configurations.

Let's say that you need to demo the power of Asterisk for a client. Config up a new key disk, configure everything, and demo away! Label that thing, and repeat from step one for the next client until you need to start over. There are a lot of other uses, but you get the idea... ALL of the user configs are stored on the key disk. Think of it as a personality for AstLinux, like a SIM card in a GSM phone.

To make other changes elsewhere on the filesystem (including changing the password), you will need to mount the root filesystem read-write, make your changes, and remount the filesystem read-only:

- 1) `mount -o rw,remount /`
- 2) Make changes...
- 3) `mount -o ro,remount /`

AstLinux -Opt

Over time, people have asked for features that either just won't fit in the base install, or most users won't need for ordinary operation. This is why I created AstLinux-Opt. AstLinux-Opt includes software that many people will find useful, including:

- strace
- screen

- tcpdump
- Full zoneinfo (timezones)
- ncftpput
- sox (with MP3 support)
- soxmix (with MP3 support)
- GNU nano (easy to use text editor)
- racoon & setkey IKE support
- openvpn (no LZO support)
- openssl binary
- Asterisk-Sounds package

To get AstLinux-Opt, you will need to know how to use fdisk. I would like to make it easier, but unfortunately I don't know how big your compact flash card is! Currently, I recommend making the AstLinux-Opt partition at least 32mb, but you can make it as big or small as you wish, as long as it is larger than the size of AstLinux-Opt (currently ~5mb).

Here's what you can do to get AstLinux-Opt:

- 1) Open your CF card in fdisk - "fdisk /dev/hda" (where hda is your CF card)
- 2) Press "n" to make a new partition.
- 3) Press "p" for a primary partition.
- 4) Press "2" for partition 2.
- 5) Press "w" to save your changes and exit.
- 6) Reboot.
- 7) From the GRUB boot menu, make sure that your selection has "astopt=/dev/hda2" on the kernel command line.
- 8) Create the filesystem on /dev/hda2 - "mke2fs /dev/hda2".
- 9) Mount it - "mount -t ext2 /dev/hda2 /mnt/opt".
- 10) When the filesystem has mounted, run the "mkopt" script to download the AstLinux-Opt package to your new partition.
- 11) Done! (You may want to reboot to make sure, but it isn't necessary).

Asterisk-Only Mode

Many people don't want to use the firewall, QoS, and DHCP server features of AstLinux. That's fine. When editing rc.conf, comment out the INTIF variable and reboot. AstLinux will only use the EXTIF interface, and many services/daemons will not be started. SSH, mini_httpd, inetd, and Asterisk will still be started.

Special notes for "Generic i586" users

AstLinux will by default not work with all of the hardware out there. I have created this image to enable you to use AstLinux on SOME pc hardware. I

have included support for most IDE controllers and NICs. In order for AstLinux to work with your hardware, some tweaking may be involved. One thing that I know you will have to change is the module(s) that is/are loaded for your network card(s). The default from previous versions has changed. When the i586 image starts up, it will try to load all of the available network modules. This is to insure that at least one network card is detected. I have tried this method on several machines with no problem, but it is still a good idea to disable/reorder the modules. The file `/etc/rc.modules` is a list of modules that are loaded when the system boots. Modify this file to suit your needs:

```
mount -o rw,remount /  
vi /etc/rc.modules  
mount -o ro,remount /
```

Reboot.

Your hardware will have to be similar to the following:

i586-mmx + up (Asterisk will die without MMX!)
ATA Controller (Intel, AMD, VIA, Nvidia, and generics)
NIC (e100/eepro100, tulip, e1000, tigon 3, 3c59x, and many more)
usb-ohci, uhci, or ehci (pretty much all of them)

For an more accurate view, take a look at the modules in `/lib/modules`.

You can now pass the path of your keydisk on the GRUB command line. Similar to above, when the system boots you can modify the `astkd=` variable to change your keydisk device. The “genkd” script mentioned above now also uses this variable and also accepts the option to override the `astkd=` variable. If you want to use a device other than the one specified on the kernel command line for your “keydisk”, all you have to do is pass the device name on the command line like so:

```
genkd /dev/hda1
```

This will use the first IDE hard disk on the machine for your “key disk”. Remember to select the right option when you boot your system!

Booting from USB

AstLinux 0.2.4 and later provide support for booting from USB (if the machine's BIOS supports it). The only change needed is very simple. After writing the i586 image to a USB flash drive, set the BIOS to boot from it (USB hard disk). When the system first boots, you have a few seconds to chose the AstLinux boot options. You will need to select the “Boot from USB” option.

This will be saved as your default entry.

NOTE: If you see errors about not being able to mount the root device, that is normal. I had to patch the kernel so that it would automatically retry to mount the root filesystem every 1 second until successful. This is needed because it usually takes a few seconds for the USB, usb-storage, and SCSI disk code to detect the USB controller and USB device(s).

UPDATE: As of AstLinux 0.2.6, this doesn't seem to work any more. If anyone knows how to get a 2.6 kernel to boot from USB, please let me know!

Booting from CD

AstLinux 0.2.4 and later provide support for booting from CD (if the machine's BIOS supports it). You will need to download the ISO cd-rom image from www.kriscompanies.com, and burn it to a cd using "cdrecord" under Linux, or Nero/Roxio under Windows. Please note that just placing this image on a cd is not sufficient to make it work. You will need to use the "create cd from image" (or similar) option. A free program that does this under Windows is DVD Decrypter.

When the cd boots, you will need to specify what device your cd-rom drive is. In the future I will be adding an "auto-detect" feature, at which time this will no longer be necessary. But for now, you will need to pass the correct root= option to isolinux.

Upgrading

Upgrading has traditionally been a problem with AstLinux. I have attempted to make it easier in this release. With the introduction of a "keydisk" system, there is now a clear separation between "user data" and the rest of the system. This makes my update script, astup, easier to use and design. Astup uses rsync to update your system from my AstLinux repositories at krisk.org.

The file /etc/astup.ex defines a list of files and directories that astup will never touch. This includes the obvious (proc, dev, etc.) as well as anything on your keydisk (or whatever is mounted at /mnt/kd). ANYTHING ELSE IS FAIR GAME TO BE OVERWRITTEN. Upon execution (with no arguments) astup will determine which AstLinux build you are running, and display a list of files that will be transferred/deleted/etc. If this is acceptable, simply type "yes" and astup will update your system. You will need to reboot for some changes to apply. If you make any changes to any "non-expected" area of the system, you will need to add that file/path to "/etc/astup.ex". Otherwise your changes will be overwritten.

To insure a complete upgrade, it is recommended that you run astup again if you see usr/sbin/astup in the list of files to be transferred on the first run. This helps to make your system as consistent as possible.

To-Do's

Setup wizard, BRISstuff, VASTLY improved web interface, better VPN support, and more. Remember to keep checking KrisCompanies.com for updates.

So you want more...

AstLinux got to where it is today because of feedback from people like yourself. Please feel free to contact me via e-mail with feature requests and bug reports. I will try to get back to you as soon as I can. If you need some feature or software added, I will probably add it to the next release. If you need something major done with AstLinux, Linux, Asterisk, etc, KrisCompanies specializes in these types of things and we would be happy to help you out.

Support

While I cannot possibly help everyone with every possible problem, I enjoy helping whoever I can. I have setup mailing lists so that any help that I provide people can be public to possibly help others. Hopefully then people can start helping other people, etc. The mailing lists can be found at:

<http://lists.kriscompanies.com/>

Credits

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Donations may be sent via PayPal to paypal@kris.com. Thanks!