



Samos Installation Guide

Contents

1. Requirements	2
2. Operating System	3
2.1. Download software	3
2.2. Prepare SD Card.....	3
3. Booting and configuring Orange Pi Prime	4
4. Storage	6
4.1. Direct Attached Storage	6
4.2. Network Attached Storage	7
5. Samos software	9
6. Router configuration	11
7. Backup your configuration	12

1. Requirements

Before beginning the setup of the Samos node, make sure you have met the following requirements:

- Basic Linux skills
- Admin Access to your home or office network router (SOHO)
- An Orange Pi Prime or equal hardware
- Network cable
- Hard drive with at least 100 Gb free disk space or available hard disk space provided by Network Attached Storage (NAS)
- SD Card (minimum size 8 Gb)

2. Operating System

2.1. Download software

To install the operating system of the Orange Pi you need a PC or MAC. Before we can install the OS on the SD card it is necessary to download the image and the software to write the image on the SD card.

Download the latest release of Armbian for the Orange Pi on the following location:

<https://www.armbian.com/orange-pi-prime/>

In this guide I use the Xenial kernel for Orange Pi Prime.

The software to write the image on the SD card (Rufus) can be found on

<https://rufus.akeo.ie/downloads/>

Choose the latest portable version (currently rufus-3.1p.exe, where P stands for portable)

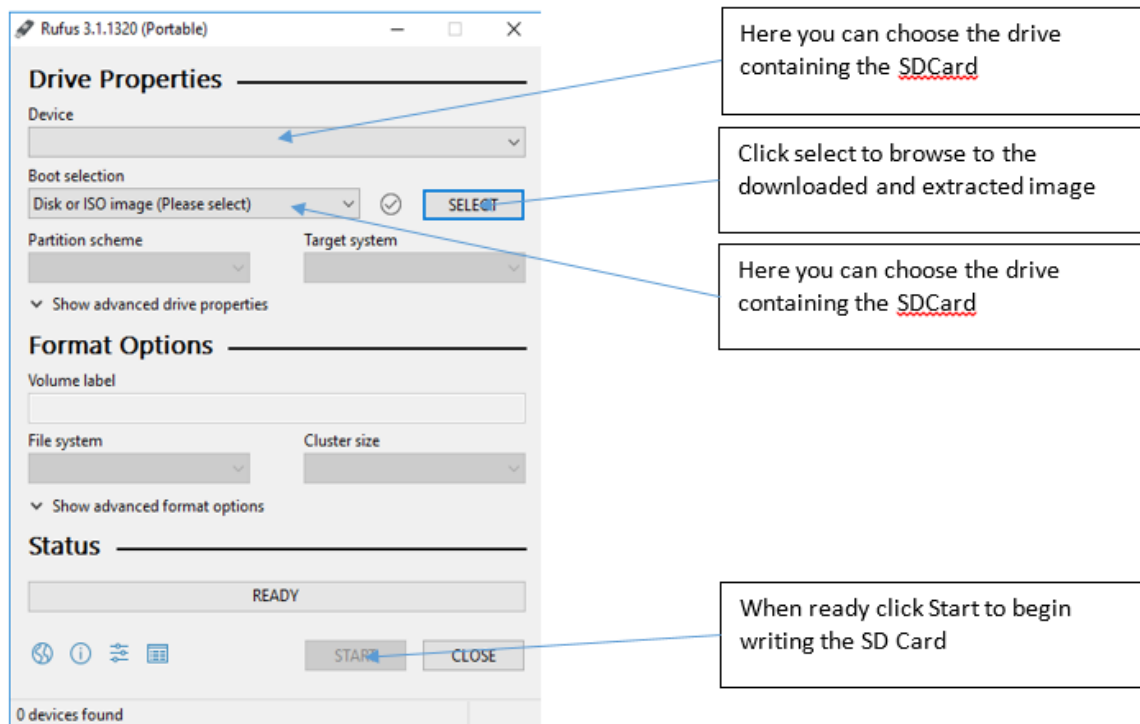
The downloaded image is zipped and should be extracted before we can use it. If you don't have an unzip program, use 7Zip to extract the image. (<https://www.7-zip.org/>)

With 7Zip you can extract the image by right-clicking the image, and choose 7zip, extract to Ubuntu_xenial_next_desktop.

Now we are ready to write the image to the SD card.

2.2. Prepare SD Card

Start the Rufus software by double-clicking on the executable file downloaded in 1.1. The following window will open:



When the SD Card is written, you can eject the card.

3. Booting and configuring Orange Pi Prime

Insert the prepared SD Card in the SD Card slot on the Orange Pi Prime. Connect the network cable to the Ethernet port on the Orange Pi Prime and an available Ethernet port on your router. Connect the power cable from the Orange Pi Prime. The Orange Pi Prime will now boot from the SD Card. After a few seconds the Orange Pi Prime has booted. If you have connected a display and keyboard to the Orange Pi Prime you will see the console booting. After booting the Orange Pi Prime is ready to be configured.

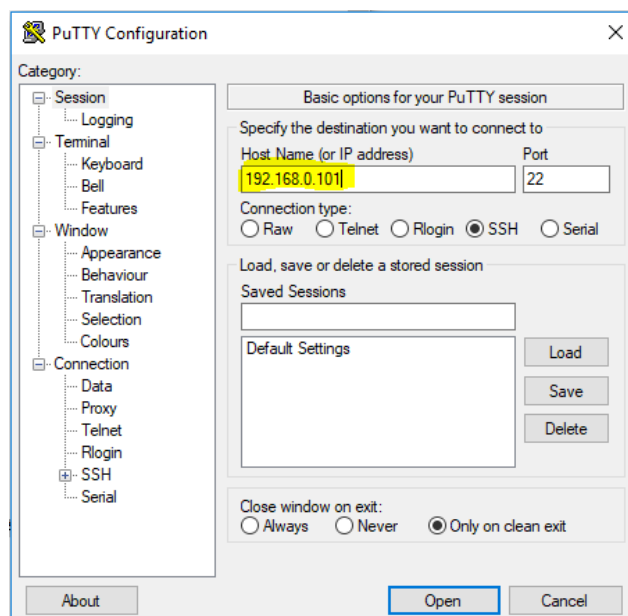
If you don't have a display connected you have to find the IP address that has been assigned from the router to the Orange Pi Prime. Most routers will have a web interface that can be used to track down the issued IP addresses from the router.

In this tutorial we assume you can find the IP address of the Orange Pi Prime. When the IP address is found you can use putty to connect to the Orange Pi Prime. Putty can be downloaded here:

X86: <https://the.earth.li/~sgtatham/putty/latest/w32/putty.exe>

x64: <https://the.earth.li/~sgtatham/putty/latest/w64/putty.exe>

After downloading Putty, double click on it and put the IP address of the Orange Pi in the Hostname or IP address field. Click Open to connect to the Orange Pi Prime.



After connecting enter the username and password of the Armbian Operating System. The default username and password are root / 1234

Because this is the first login, you must change the password for root. First Enter the default password (1234) and enter the new password (twice)

After the password is changed you have to create a new user. Give the new user account a name and enter a password twice.

```
login as: root
root@192.168.0.101's password:

Welcome to ARMBIAN 5.38 stable Ubuntu 16.04.5 LTS 4.14.48-sunxi64
System load:  0.00 0.02 0.01   Up time:    21 days
Memory usage:  4 % of 2002MB   IP:      192.168.0.101
CPU temp:      21°C
Usage of /:    16% of 15G

[ 0 security updates available, 6 updates total: apt upgrade ]
Last check: 2018-09-16 00:00

[ General system configuration (beta): armbian-config ]

Last login: Sun Sep 16 13:04:21 2018 from 172.16.0.240
root@ ~# [
```

The console is now ready for further configuration. The easiest way of configuring Armbian is to enter the command `armbian-config`

armbian-config <ENTER>

Now you are in the System configuration Utility. Here you can change all system configuration parameters. If you want to set a static IP address instead of DHCP (static is preferred because we must forward a port from the router to the Orange Pi Prime) you can choose the Network option in the menu. If you want to set the Time zone or hostname you can select the Personal option in the menu.

When you're finished setting the options you want, you can exit the menu. When you're back on the console, reboot the Orange Pi Prime to let the new configuration take effect. To reboot enter the command `reboot`.

Reboot <ENTER>

Wait a few seconds to let the Orange Pi Prime boot, and right click in the title bar of the Putty program. Click reconnect if you haven't changed the IP address. If you changed the IP address of the Orange Pi Prime, please put the new address in the hostname or IP address section and click Open.

Now your Orange Pi Prime is ready to install the Samos software.

4. Storage

In this chapter we create storage space that can be used by the Samos Node software. There are two options to provide space. Direct attached storage (USB Disk or a very large SD Card, minimum 100 Gb) or network attached storage that is mounted on the Orange Pi Prime.

4.1. Direct Attached Storage

This storage is directly connected to your Orange Pi Prime. In this tutorial we use an USB disk attached to one of the USB ports of the Orange Pi Prime.

Insert the USB disk into one of the unused USB ports of the Orange Pi Prime. Use the following command to identify the inserted USB disk. Make sure that you know the correct size of the USB disk you are using.

`lsblk <ENTER>`

You will see the following:

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINT
zram3	254:3	0	250.3M	0	disk	[SWAP]
zram1	254:1	0	250.3M	0	disk	[SWAP]
sda	8:0	1	7.4G	0	disk	
zram2	254:2	0	250.3M	0	disk	[SWAP]
zram0	254:0	0	250.3M	0	disk	[SWAP]
mmcblk0	179:0	0	14.9G	0	disk	
└─mmcblk0p1	179:1	0	14.7G	0	part	/

In this case I have used an 8 GB USB disk. It is visible as sda with the size of 7.4G. Now we know the name of the disk in Linux we can use the parted command to give the disk a partition standard.

`parted /dev/sda mklabel gpt <ENTER>` (use the correct name for your disk)

Enter Y to confirm that all data on the disk will be destroyed.

The USB disk now has a partition standard, now we can create a partition that expands the whole USB drive. Issue the following command to create the partition:

`sudo parted -a opt /dev/sda mkpart primary ext4 0% 100% <ENTER>`

Enter the lsblk command again to verify the newly created partition:

`lsblk <ENTER>`

As you can see the partition is created on the device. It has the same size as the disk size.

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINT
zram3	254:3	0	250.3M	0	disk	[SWAP]
zram1	254:1	0	250.3M	0	disk	[SWAP]
sda	8:0	1	7.4G	0	disk	
└─sda1	8:1	1	7.4G	0	part	
zram2	254:2	0	250.3M	0	disk	[SWAP]
zram0	254:0	0	250.3M	0	disk	[SWAP]
mmcblk0	179:0	0	14.9G	0	disk	
└─mmcblk0p1	179:1	0	14.7G	0	part	/

Now we can format the partition (NOT THE DISK) with the EXT filesystem and give the partition a volume name.

```
mkfs.ext4 -L samosdata /dev/sda1 <ENTER>
```

If the disk was previously used and already has a volume name assigned, enter Y to confirm the overwrite of the volume name and format the drive.

The volume is ready to use, but to use the volume with samos it needs to be mounted. Mounting can be done manually each time your Orange Pi Prime restarts, but we prefer to mount it automatically at system reboot. Therefore, we need to edit the fstab file. We use nano to make changes to this file:

```
nano /etc/fstab <ENTER>
```

Add the following line to the existing lines:

```
LABEL=samosdata /media/samos ext4 defaults 0 2
```

```
UID=de518a38-30b6-4f56-aafe-aaa3609b40aa / ext4 defaults,noatime,nodiratime,commit=600,errors=remount-ro 0 1
LABEL=samosdata /media/samos ext4 defaults 0 2
```

Use CTRL-X to exit the nano editor and press Y to save the file fstab.

When you restart your Orange Pi Prime, the newly created partition will be mounted as /media/samos. Because this directory does not exist, we first must create it. Enter the command `mkdir /media/samos` <ENTER>

Now we have an USB disk with a partition and a mountpoint ready for use. To force the mount directly you can use the command:

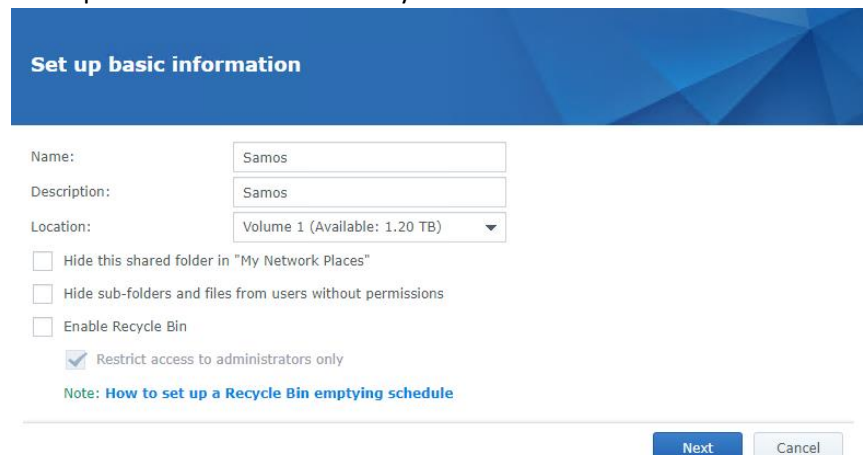
```
mount -a <ENTER>
```

4.2. Network Attached Storage

First, we must create the NFS folder on the NAS device. We assume you know how to create NFS folders on your own NAS. For people having a Synology NAS you can use these instructions:

Login to your Synology NAS with the admin account.

Go to Control Panel, Shared Folder and Click on Create. Enter the name of the folder and give it a description. Uncheck Enable Recycle Bin and click Next.



The screenshot shows the 'Set up basic information' step of the Synology Shared Folder creation wizard. The form includes the following fields and options:

- Name:** Text input field containing 'Samos'.
- Description:** Text input field containing 'Samos'.
- Location:** Dropdown menu showing 'Volume 1 (Available: 1.20 TB)'.
- Options:**
 - ☐ Hide this shared folder in "My Network Places"
 - ☐ Hide sub-folders and files from users without permissions
 - ☐ Enable Recycle Bin
 - ☒ Restrict access to administrators only
- Note:** A link labeled 'How to set up a Recycle Bin emptying schedule'.
- Buttons:** 'Next' and 'Cancel' buttons at the bottom right.

Make sure the checkbox next to Encrypt this shared folder is unchecked and click Next

Uncheck all checkboxes in the Advanced Settings screen and click Next.

Review your settings and click Apply

In the Edit Shared Folder Samos screen Grant access to your local users or groups and click on the tab NFS Permissions.

Click Create to create NFS permissions for the folder.

Enter the hostname or IP address of the Orange Pi Prime.

Select the Read/Write privilege.

Click OK to save the configuration. Write down the Mount path in the left corner. (case sensitive!)

Click OK again to return to the Control Panel.

Create an NFS rule

NFS rule

Hostname or IP*:

Privilege:

Squash:

Security:

☒ Enable asynchronous

☐ Allow connections from non-privileged ports (ports higher than 1024)

☐ Allow users to access mounted subfolders

* You may specify a host in three ways:

- Single host
- Wildcards: *, *.synology.com
- Network segment: 203.74.205.32/255.255.255.0, 203.74.205.32/24

OK **Cancel**

On the Orange Pi Prime you need to create a mount point for the NFS share where the Samos node can store data. In this example we will create the mountpoint /media/samos (just the same as in the USB disk version). Enter the following command:

```
mkdir /media/samos <ENTER>
```

Before we can mount an NFS share, we need to install the NFS tools for Linux. Enter the following command to install these tools:

```
apt-get install nfs-common <ENTER>
```

To let the Operating System know that the NFS share must be mounted at every reboot, we will edit the /etc/fstab file

```
nano /etc/fstab <ENTER>
```

To mount the NFS share we created on the Synology (or your own NAS) we will add the following line to the fstab file:

<NAS server IP>:/mount/path> /media/samos>nfs> 0 0. In our example we add the following line:

```
172.16.0.200:/volume1/samos /media/samos nfs rw,nfsvers=3,hard,intr 0 0
```

Press CTRL-X together to exit the editor and save the file with Y. To force the mount of the NFS share immediate, enter

```
mount -a <ENTER>
```

5. Samos software

First, we create a new folder where we can put the Samos node software.

```
mkdir samos <ENTER>
```

Change your working directory/folder to the newly created folder:

```
cd samos <ENTER>
```

Now we must download the latest Samos node software. On your desktop browse to the following website: <https://github.com/samoslab/nebula/releases/>

You can find many different versions of the nebula-provider software. For the Armbian Operating System on your Orange Pi Prime you can choose the Linux-ARM64 or the Linux-ARMv7 version. Right click on the version you want to download and click copy URL.

Back on the console of the Orange Pi Prime type `wget` and paste the copied URL by right click on the terminal window.

```
wget https://github.com/samoslab/nebula/releases/download/0.8/nebula-provider-0.8.2-linux-armv7.tar.bz2
```

```
wget https://github.com/samoslab/nebula/releases/download/0.8/nebula-provider-0.8.2-linux-armv7.tar.bz2 <ENTER>
```

Now the software is downloaded to the `samos` folder on the Orange Pi Prime. Before we can use the software, it needs to be extracted. Enter the following command to extract the software:

```
tar xvjf nebula-provider-0.8.2-linux-armv7.tar.bz2 <ENTER>
```

If this step returns an error, make sure you used the correct filename of the file you have downloaded in the previous step.

Now the software is ready to use. We must register the Samos Node by using the `nebula-provider` command. Make sure you use your own email address and wallet address.

When registering your node, you need to supply some information about your setup. Make sure you know what the bandwidth is of your internet connection. In case you don't know, you can use a speed test to determine the up- and download bandwidth. (<http://www.speedtest.net>).



Enter the following command to register, use your own e-mail address and wallet address.

```
./nebula-provider register -availability 99% -billEmail your@email.address -downBandwidth 45 -upBandwidth 41 -walletAddress yourwalletaddress -mainStoragePath /media/samos -mainStorageVolume 800GB <ENTER>
```

DownBandwidth = The download speed of your internet connection

upBandwidth = The upload speed of your internet connection

WalletAddress = The (34 characters) address of your Samos wallet

MainStoragePath = The mountpoint we created earlier in this tutorial (in this tutorial `/media/samos`)

MainStorageVolume = The available amount of disk space you want to use for Samos

When you have entered the above command with the correct parameters your Samos node is registered.

*Register success, please get verify-code email to verify bill email and backup your config file:
/path_to/config.json Please make a copy of the .json file for backup!*

You have to confirm the registration by entering the code sent to the provided email address. This can be done by using the nebula-provider command again with the following parameter:

```
./nebula-provider verifyEmail -verifyCode code_from_email <ENTER>
```

Now your Samos node is fully registered and can be started.

Start your node with the following command:

```
./nebula-provider daemon <ENTER>
```

Make sure that your node is running without errors. If so, you can abort the daemon by pressing CTRL-C.

Best practice is to start the daemon with the nohup command so the daemon keeps running when logging off. It is possible to start the daemon automatically at start-up of the Orange Pi Prime.

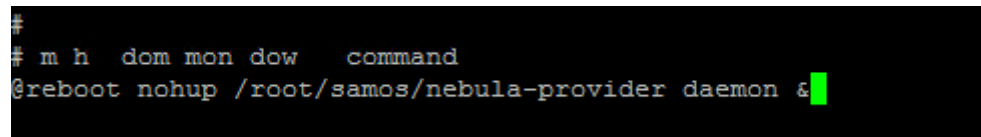
To configure this, you can enter the following command:

```
crontab -e <ENTER>
```

If this is your first use of crontab, the program asks what your default editor should be. Most simple editor is Nano.

In the crontab file add the following lines to the existing lines:

```
@reboot nohup /root/samos/nebula-provider daemon &
```



```
#  
# m h dom mon dow    command  
@reboot nohup /root/samos/nebula-provider daemon &
```

Use CTRL-X to exit the editor and save the file with Y.

6. Router configuration

Now your Samos node is running it must be reachable from the internet. This is done by connecting to the node by TCP port 6666. By default, your router cannot route traffic from the internet to your internal devices. Therefore, it's necessary to forward port 6666 on your router to your Orange Pi Prime hosting the Samos software.

Because most of you are using different routers it is not possible to guide you through this process. You can find additional information on the internet, look on this site:

<https://portforward.com/help/portforwarding.htm>

Most common used routers can be found under List of all routers. Search your own router and follow the instructions on the website.

After forwarding the port on your router to your Orange Pi Prime, you can check if the forwarding is successful. Make sure the daemon is running on your Orange Pi Prime and find your public IP (www.whatismyip.com)

Go to the website: <https://www.yougetsignal.com/tools/open-ports/>

Type your public IP on the Remote Address field and enter 6666 on the port number field. Click check and if your forwarding is successful, you'll see the following:

 Port 6666 is open on I

7. Backup your configuration

As mentioned before it is recommended to create a backup of your config.json file. The exact location of this file is provided when you registered your node. In case you missed the location you can find the file again by entering the following command:

```
find / -name config.json <ENTER>
```

```
~# find / -name config.json  
/root/.samos-nebula-provider/config.json
```

The file location is displayed. To create a copy of this file, enter the following command:

```
cat /root/.samos-nebula-provider/config.json <ENTER>
```

The content of the file is displayed on the screen, select the full text on the screen (it automatically copies) and paste it to a file on your computer.