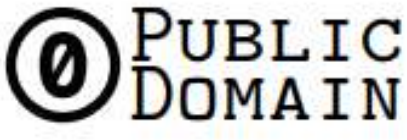

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S9 ANTMINER

INSTALLATION GUIDE

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Summary

The goal was the installation of Bitcoin mining room using S9 antminer. It was a pilot project to implement a mining room with specific aspects like acoustic isolation, thermic isolation, power optimization, input air refrigeration and heat exhaust.

The setup started in last January 25th with planning the room architecture to install nine S9 Antminers.

Introduction

In last January 25th we started the mining room setup, reusing an actual space in small village in north of Portugal.

The power consumption was the first obstacle and concern because the house has 6.9 kVa installation, corresponding to 31.36 A at 220V. Each S9 has power consumption of 1.4 kW/h or 6.36A and this means we can operate only five S9 Antminer. We started to design the setup of new 41.4 kVa three-phase to support 60 A to load more nine S9 Antminer machine. Resuming we can run in this space with low voltage before to run medium voltage (we need to present a project and the power company needs to do an inspection). To avoid the inspection, we will start with maximum load of fifteen S9 Antminer.

To avoid the noise in the house and in neighbors, we apply in the room a geo acoustic material with textile recycled with 20mm, a layer of plasterboard and eggs covets in internal coating. We made a small hall in the room entrance in plywood geo acoustic material, plasterboard and eggs covets in internal coating.

To heat exhauster, we made a small window with 12.5 cm radius to remove the heat inside the room. Connected to this window we setup a pipe structure with 12.5 cm radium and connected each S9 (6cm cooler radium) to the main exhaust tube.

After finished the heat exhaust we need to provide air to the room, at least in same quantity like the output air. We opened a new window to circulate the air to the room.

S9 ANTMINER

SOURCE: https://www.bitcoinmining.com/bitmain-antminer-s9-review-bitcoin-mining/

PROS

At 14 TH/s, it has the highest available hashrate

At 0.1 Joule per GH/s, it is very efficient

CONS

At $2100 (USD), it is considered expensive

Sold separately, you need to another $170 - $200 for Power Supply

AntMiner S9: Game Changer for Hobbyist Miners?

Since its creation, Bitcoin's Difficulty has recorded several strong and often consecutive monthly increases , especially from late November 2015. It climbed from 520,569,941 GH/s to the present record high of 1,426,731,353 GH/s, which means Difficulty has nearly tripled since then. This peak was attained on May 24th 2016. That enormous growth has been spurred by major investment into Bitcoin mining technology and operations.

Having that spectacular growth, it has made Bitcoin the world's most powerful computing network by far, but one unintentional consequence of that rapid growth was increased centralization. There was accumulation of profits, in China, where mining is most profitable that resulted to several contenders (e.g. KNC) being kicked out of the industry.

We have tried to calculate the amount of money that the Chinese have invested in mining; we estimate it to be in the hundreds of millions of dollars. Even with free electricity we cannot see how they will ever get this money back. Either they don't know what they are doing, but that is not very likely at this scale or they have some secret advantage that we don't know about.

- Sam Cole, KNC CEO

The same Chinese competitive advantage has been even more effective at extracting the profit-dependent hobbyist miner from the market. At this stage, in order to support the network, aid decentralization and possibly even to heat space, most home or office miners aren't even hashing for the purpose of obtaining money.

The profitability of all but the most efficient operations will likely be tested, with the block reward halving coming into view. Will the new S9 be a game changer for smaller and hobby miners and return their lost profitability given that profits derived from the current generation of mining hardware are decreasing and will likely reach negative returns after halving?

The S9's 16 Nanometer Technological Advantage

Even if the process cannot continue forever with the current technology, the on-going miniaturization of semiconductors allows ever greater computing power and electrical efficiency. Many have declared that Moore's law is no longer true, because the rate of computing speed advancement has slowed as it reaches the physical limitations of silicon semiconductor technology.

A vital enhancement upon the 28 nm design usual to other modern mining devices is the 16 nm fabrication process used in the manufacture of the S9. Even though a 10nm process is just around the corner for 2017, further increases beyond that remain theoretical. Also, the design and manufacture of any 10nm Bitcoin mining hardware is likely to take at least a year.

Power Supply

The great news is that existing power supplies, at least those of sufficient wattage, are fully compatible with the S9.

Recommended for use with the S9 are:

1. AntMiner APW-12 1600 Watt Bitcoin Miner PSU, which is sold for just under $200 on Amazon, and

2. The EVGA SuperNOVA 1300 Watt GPU PSU, which is also priced for about $170 still on Amazon. Be reminded that the 1600 Watt EVGA PSU is significantly more costly, by about $115, compared to Ant Miner's equivalently-powered offering.

Bitcoins / Month (Profitability)

Compared to any previous device crammed into its silicon, the S9 has more hashing power which is a massive 14 TH/s (TeraHash per second). We combined a total of 189 chips, spread over 3 circuit boards to achieve this phenomenal hashrate. Not to include the 15 brief TH/s spike that happened late 2011, a single S9 unit boasts a hashrate equivalent to the peak capacity of the entire Bitcoin network from its bootstrapping until mid-2012!

Let's compute the projected profits from all that hashpower via CoinWarz' Bitcoin mining calculator:

Bear in mind that Power Cost will be depending to your location and that Difficulty differs every two weeks, usually to the upside. Always remember that during post-halving, a number of marginal miners will most likely be pushed to either upgrade to a better hardware or shut down.

Your mining pool will decide your Pool fees; when solo-mining, a single unit is highly unlikely to find any blocks although the S9 is highly powerful. Finally, the Bitcoin to Dollar (USD) price is notorious for its constant continuous change.

As per the inputs discussed above, the S9 will yield 0.285 BTC / €300 per month and 3.36 BTC / $3600 in a year.

These puts return on Investment (ROI) slightly above one year! Of course, supposing that all factors were to stay constant for such impressive result despite the fact that it is very unlikely in the constant-changing world of Bitcoin!

Power Consumption

What makes the S9 the most electrically-efficient mining device to date is the cutting-edge manufacturing process. It uses a mere 0.1 Joules per Gigahash, making it roughly 2.5 times more efficient than the Antminer S7. The total power consumption of the device works out to around 1350 watts, although this figure is subject to about 7% of variance. The S9 consumes about 300W more than the S7.

Temperature

The S9 is air-cooled and due to its sturdy design, it is fairly easy to maintain and service. As long as it is in a place with great ventilation, the S9 performs reliably, whether only one or several unit(s) is kept in a spare room or hundreds to thousands of units in a huge mining center. The operation temperature has range between 25ºC and 40ºC

S9 Specifications:

1. Hash Rate: 13.5TH/s ±5%

2. Power Consumption: 1350W + 12% (at the wall, with APW3 PSU ,93% efficiency, 25C ambient temp)

3. Power Efficiency: 0.1 J/GH + 12%(at the wall, with APW3 PSU 93% efficiency, 25°C ambient temp)

4. Rated Voltage: 11.60 ~13.00V

5. Chip quantity per unit: 189x BM1387

6. Dimensions: 350mm(L)*135mm(W)*158mm(H)

7. Cooling: 2x 12038 fan

8. Operating Temperature: 25 °C to 40 °C

9. Network Connection: Ethernet

Notes:

1. Power consumption figures will vary with your PSU's efficiency, the ambient operating temperature and the accuracy of the power meter.

Power Setup

The power necessities to run nine S9 Antminer are 57.24 A / 12.6 kW/h. At the moment the house has 6.9 kVa / 31.4A covering five S9 Antminer (1.4 kW/h per each).

For the first phase we put a differential power and ten power breaker of 10A, nine to power the network equipment and nine to power the S9.

In the future we will install three-phase of 41.4 kVa / 60A to support the rest of four S9 and will be ready to install more 6 S9 Antmine.

Each power break is connected to the S9 socket protected by 10A via trunking connecting the main panel border to the rack.

Photovoltaic power analyses

To support the Photovoltaic power necessities we need 4.3 panel of 330W per each (0.98x1.33cm) this means to support ten S9 Antmine during daylight we need 43 panels installed in 56 sq meters.

Acoustic isolation

To avoid the noise in the house and in neighbors, we apply in the room a geo acoustic material with textile recycled with 20mm, a layer of plasterboard and eggs covets in internal coating. We made a small hall in the room entrance in plywood geo acoustic material, plasterboard and eggs covets in internal coating.

The Geo acoustic material glued to plasterboard and the combination was fixed to the wall only in the roof to reuse this material in another place.

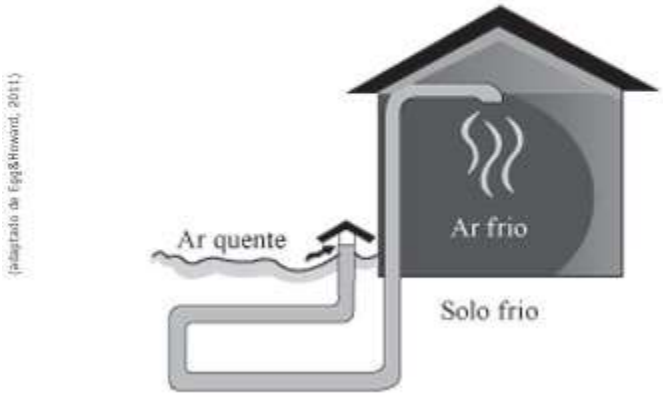
Between the external room door and the mining room, we setup with plywood another space to reduce the noise in exterior.

With different materials the result was acceptable reducing the noise almost less than 20 db.

Air refrigeration

To refresh the input air to the room, we made a hole in the ground with 3 meter depth with 10 meter length to refrigerate the air to earth temperature. We know the variation of temperature at 3 meters depth only varies between 1ºC to 2ºC during all year. Taking this idea we can reduce the air temperature running the air inside the earth.

Figura 1- Sistema aberto de resfriamento geotérmico com ar como fluido de trabalho



Heat exhaust

To exhaust the hot air we opened a circular window in the room all to conduct the hot air to exterior.

The option to conduct the hot air to exterior was install a 25cm diameter pipe with tow outputs summing 50cm of diameter equivalent.

Each S9 has 12cm of diameter cooler and wend all of them are started the air molecules are compressed to send the air to 50cm of diameter output, because the total natural output cooler are 108cm.

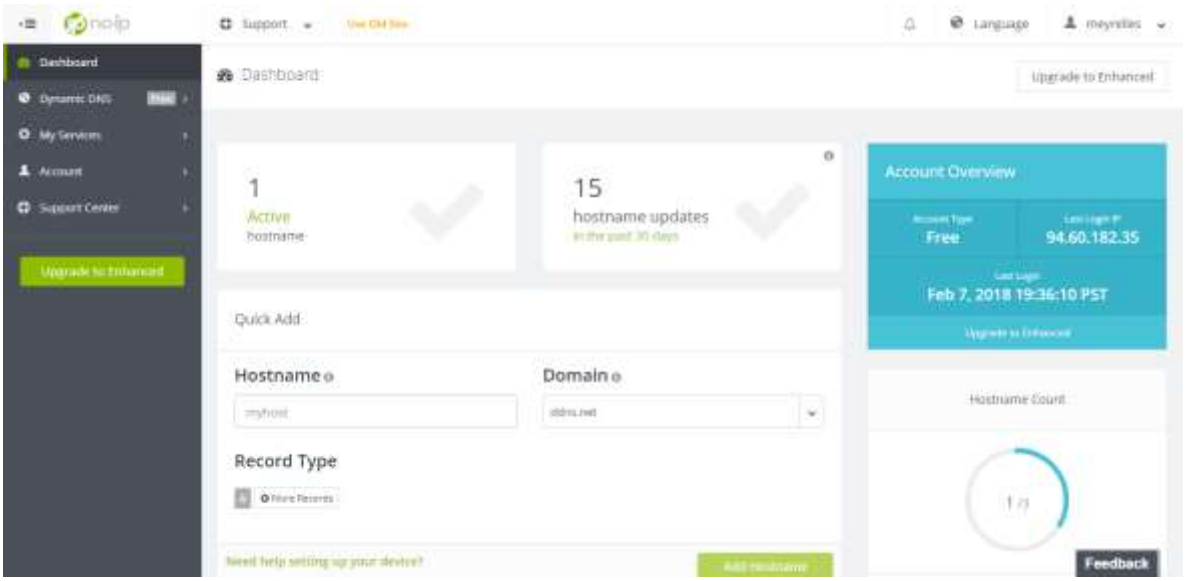
Network setup

Network access has privilege to access the private network with VPN (Virtual Private Network) working as Ethernet, permitting internal management of all devices.

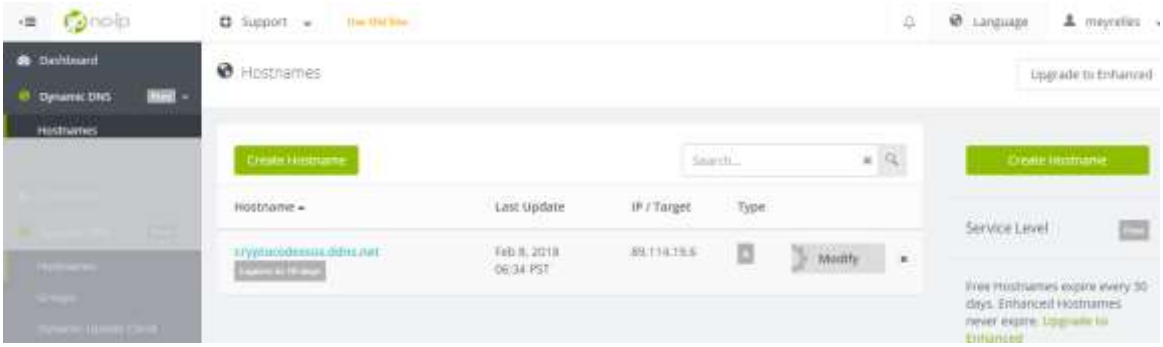
Avoiding fixed IP, the setup starts with virtual domain configuration in www.noip.com DDNS provider.

The steps to do the configuration are:

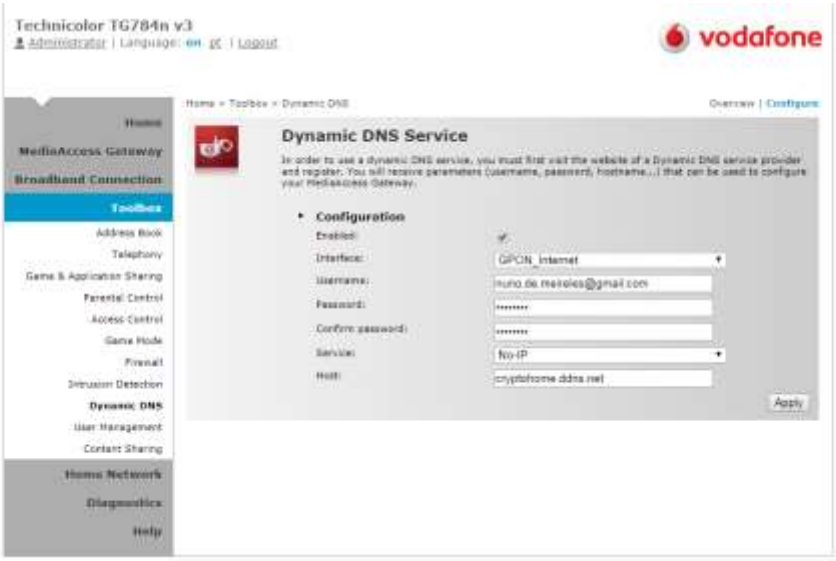
1. Create account in NOIP



2. Inside noip.com manager area, in menu “Dynamic DNS” (free service) we setup the virtual domain.

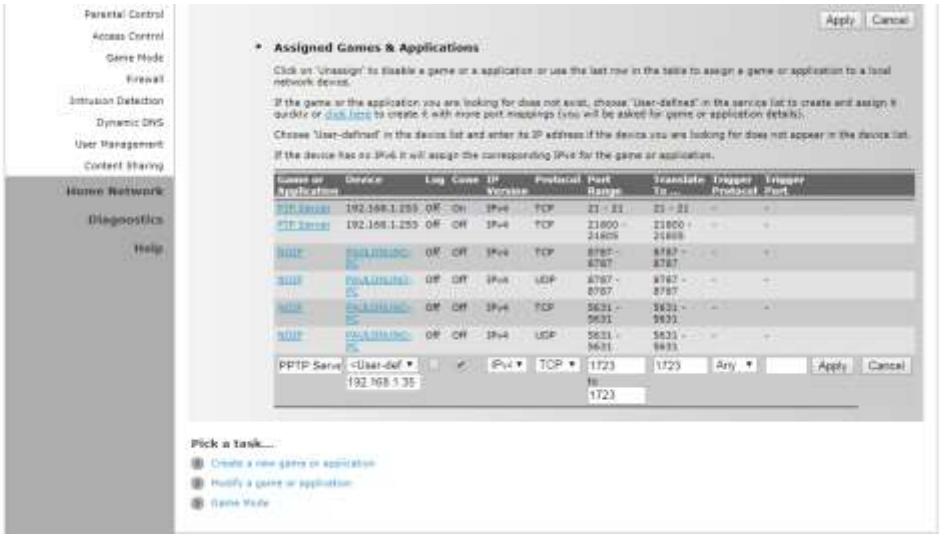


3. Configure the DDNS in internet provider router to update the dynamic IP in noip.com.

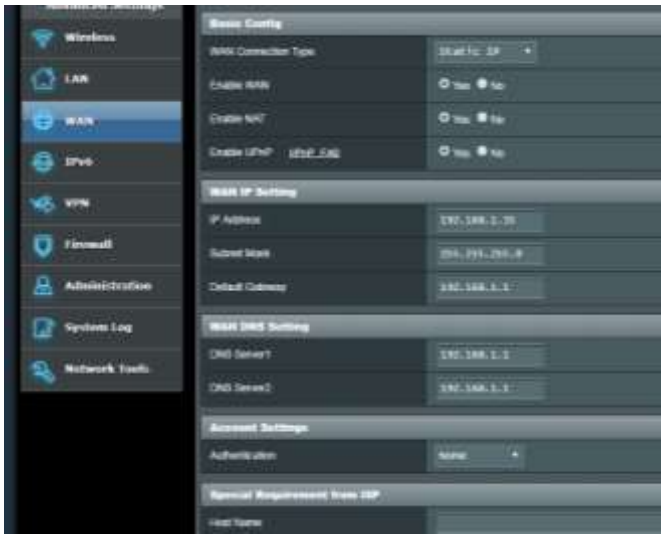


In next main step, needs to configure the port forwards in internet provider router. In this case we just configure VPN PPTP forwarding port (TCP 1723) to VPN server router in internal network:

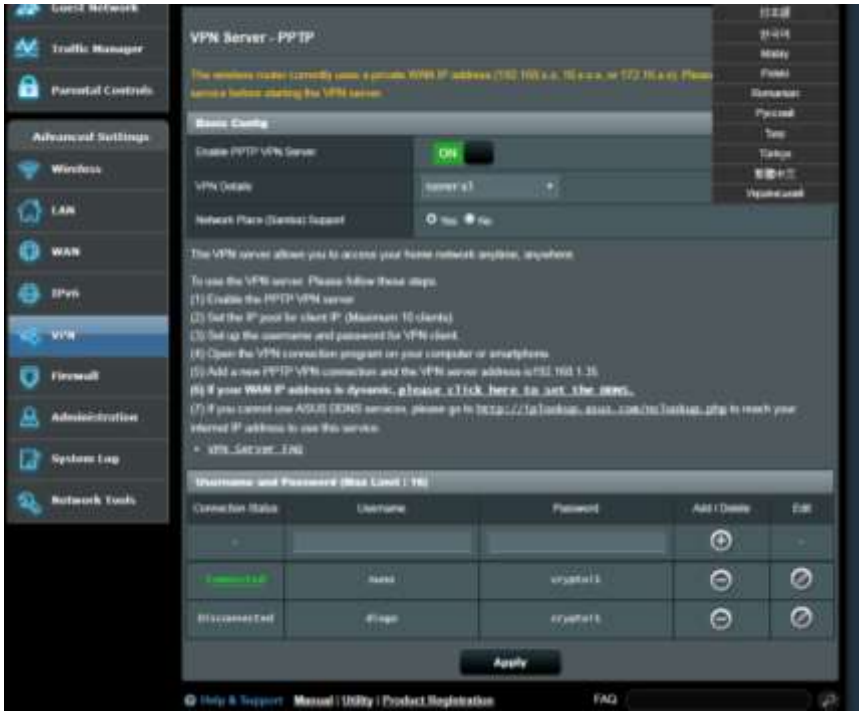
1. Setup PPTP port to internal VPN server



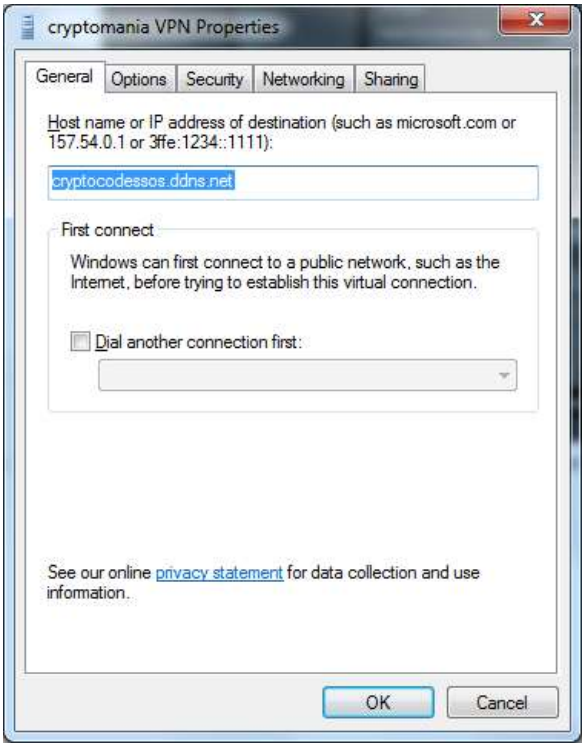
2. Configure a VPN server (could be router like ASUS RT-N12+ or PC) in our case we use ASUS router.
    a. Firstly configure an internal fixed IP in WAN port



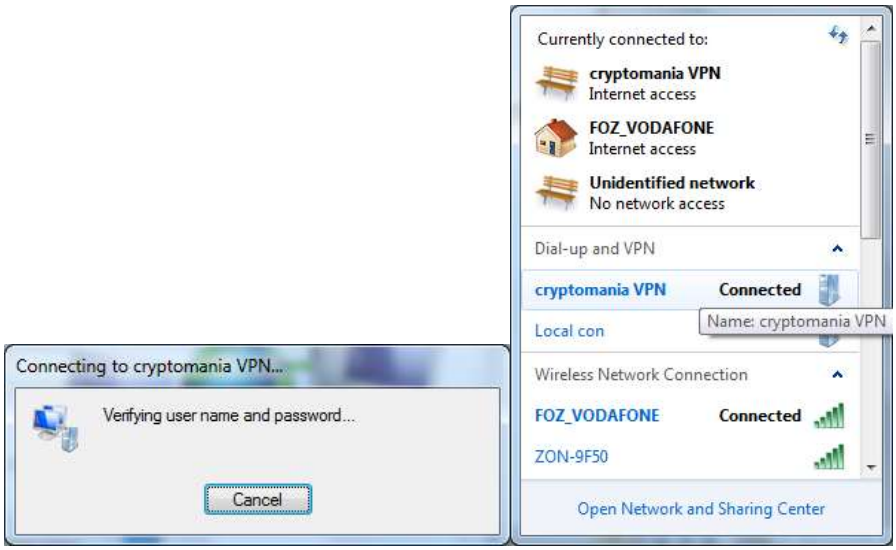
    b. Next, configure the VPN server



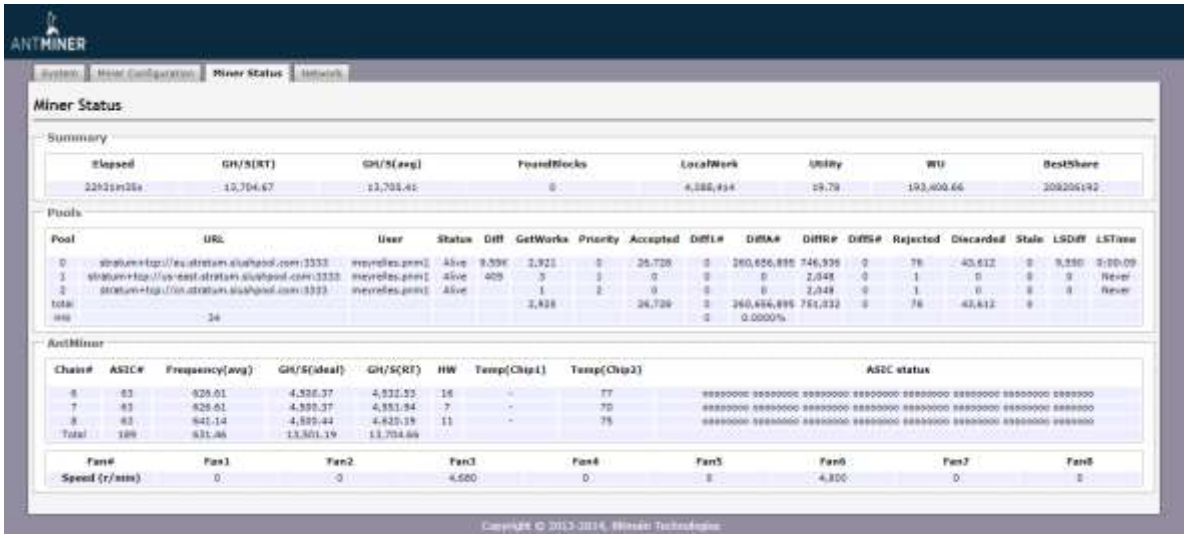
3. Configure VPN Client in personal computer, mobile device or other router to connect local networks.
    a. Configure windows VPN connection



    b. Connect to VPN



4. Now can access to S9 Antminer in address 192.168.10.x (internal mining room subnet) to configure / monitoring



To access the network we can configure direct access to FTP, HTTP, SSH, etc. just need to forwarding the Internet provider router ports.

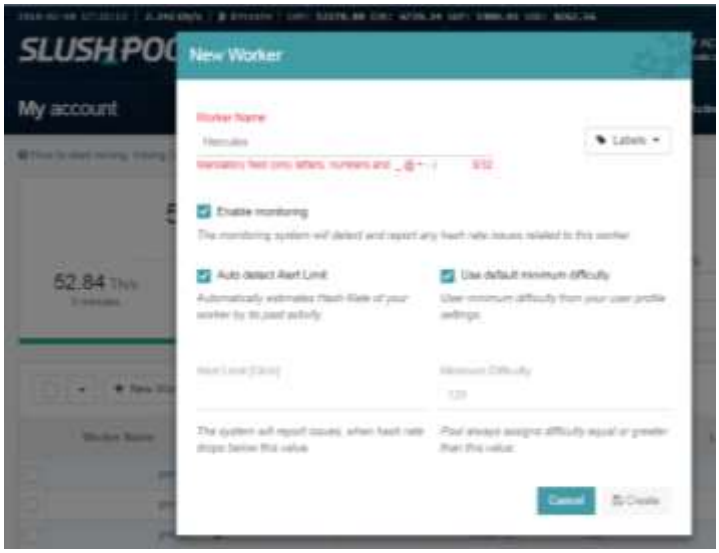
S9 Antminer Mining setup

Mining HA 256 cryptocurrencies needs to join a pool because in the context of cryptocurrency **mining**, a **mining pool** is the pooling of resources by **miners**, who share their processing power over a network, to split the reward equally, according to the amount of work they contributed to the probability of finding a block.

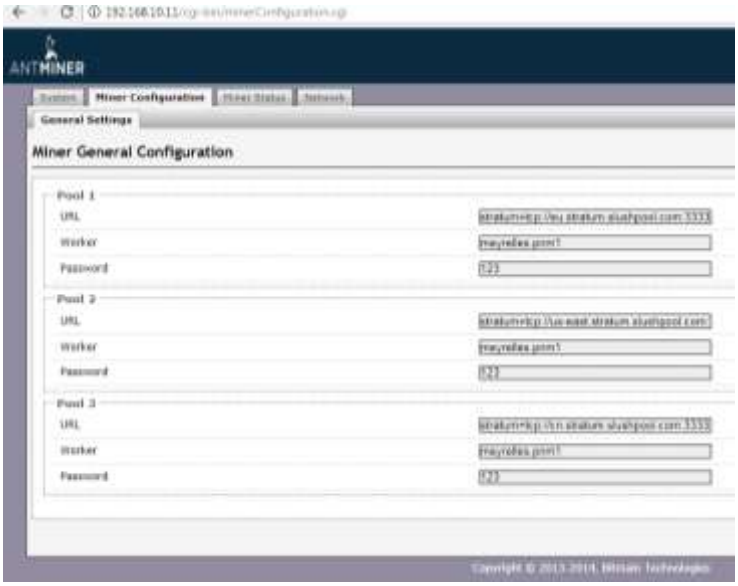
The process starts creating an account in a mining pool like slushpool.com, viabtc.com or other and mix more than one pool in S9 to avoid lost communication.

1. let's create an account in slushpool:

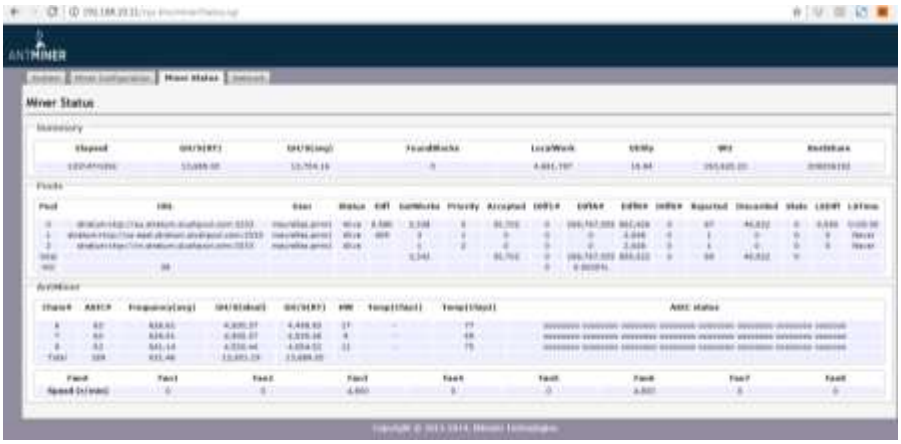
2. After the account was create, the next step is to create workers:

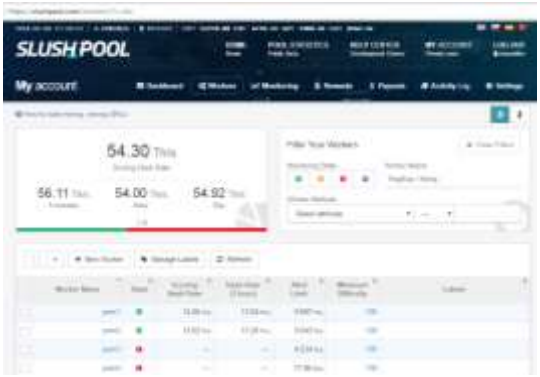


3. In S9 Antminer, just need to configure the miner with data of pool like URL and username.worker. The password should be anything.



4. Finally, check after 5 minutes if the S9 starts in Miner Status tab and check in pool dashboard shows the new worker.





Electronic devices

This section of mining room setup is not yet implemented. Will be developed the idea to implement in near future to control the mining room effectively, automating the maximum operations of security and system performance.

- Arduino acquisition board to connect sensors and develop software to give us data like temperature, intrusion, smoke sensor, etc. to give management parameter about the system, open a door to integrate all system as only one.
- Sonoff to remotely power on/off the S9 Antminer and other devices in mining room. (https://www.itead.cc/sonoff-wifi-wireless-switch.html)
- WATTHOUR METER to check the instant, average and total power consumption to computation the power cost.
- Web cams to check the production environment.

After everything working, I will develop software to create a control dashboard and automation processes to control the mining room or simply send alerts by email or sms.

Conclusion

The process will continue in develop state and will be updated wend setup news features or changes. It was hard to implement, owing power consumption and noise. The first step is almost done and ready for the second step (integration and control).

This is like pilot to measure the necessities and mining specification, resulting in some ideas (will publish in another document) to compensate the costs of cryptocurrencies mining. It will be important to identify other things to increase the ROI of this project.

Any question email / call me: nuno.de.meireles@gmail.com / +351 929096300