Checking Your Logs

1. Background

OK….. Now this may sound harsh….. But no one will care what “Explorer”, “Hotspotty” or “Helium Geek” says….. The only accurate way to get information is FROM THE DEVICE ITSELF, DIRECTLY VIA THE LOGS. Please only reference the information you gather using this guide for Discord advice.

Please know that the UG65 has the information you need. Other sources of information are outdated/inaccurate at best, misleading at worst….. By all means, use the information from these API-reporting applications as a first-pass method of deciding whether or not further investigation is required. However, use YOUR LOGS to find out what (if anything) is wrong. ☺

Miner Setup/Onboarding:

https://denniscrawford.com/2022/02/milesight-ug65-configuration-frequently-asked-questions-faq/#onboarding

Another great resource are m0j0martini’s Reddit threads:

https://www.reddit.com/r/MilesightMiners/

You can find command line access (ssh)

Please follow these guides to get you up and running.

*****DO NOT PROCEED UNTIL YOU HAVE ONBOARDED*****

Section A – Information Gathering

1.1 Firmware

By typing your miner's IP address into a browser, you can access the Graphical User Interface (GUI). The defaults are:

Username: admin. Password: password

But you already knew that…. Because you followed DCs guide above…

If this is your first time looking into anything, take note of your Miner's Firmware….

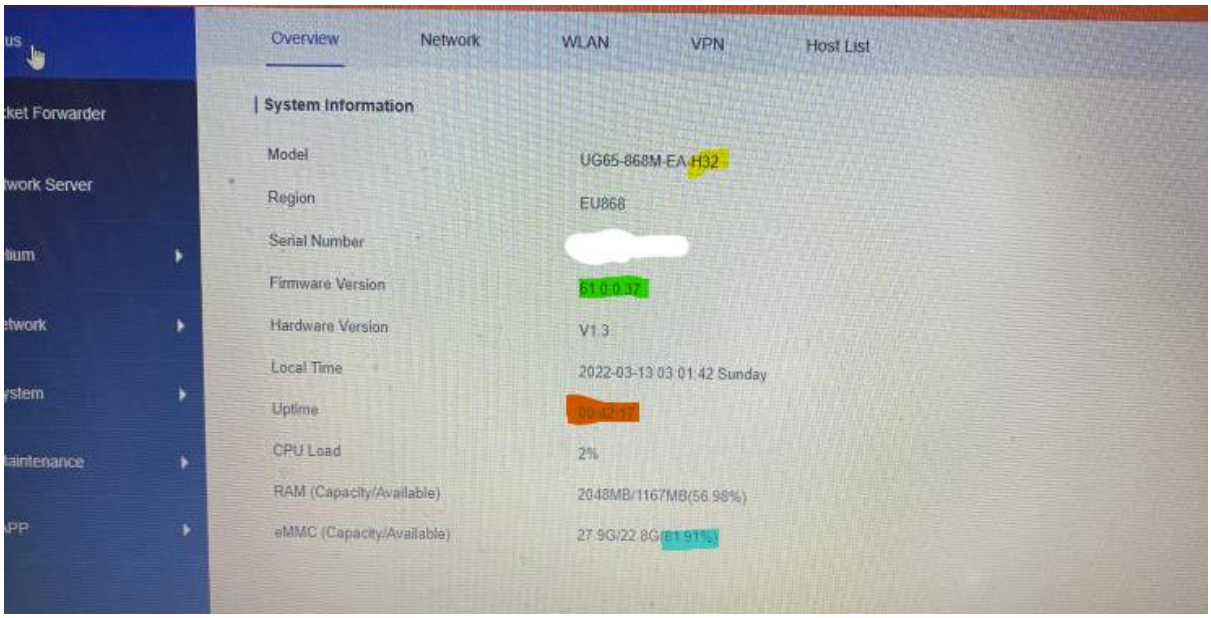

Figure 1: "Status" section (LHS), Overview tab (Top)

Here, in Figure 1 highlighted in green, you can see that the firmware on this miner is 61.0.0.37. If you haven't updated your Firmware yet (default is 61.0.0.36-r2), please note that if you want to maintain SSH access, you should change your root password prior to upgrading. Default root password is LoRaWAN@2018. If you don't know what SSH is…. Don't worry, you can do everything in this guide via the GUI.

The only place to ensure you are getting approved firmware is via the Discord:
https://discordapp.com/channels/920883777138458755/920883777138458758

If you require help in the Discord, include your firmware version in your question.

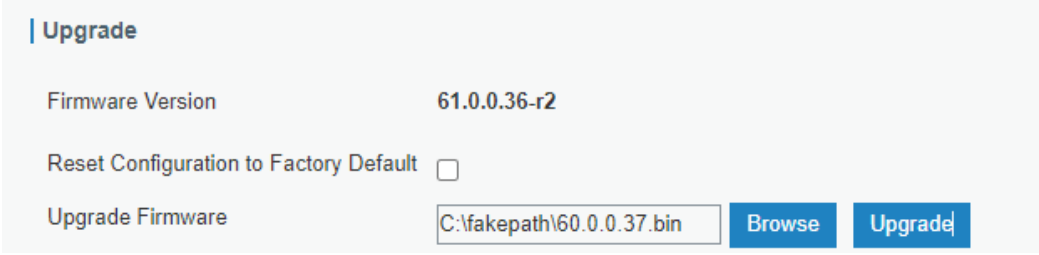

Figure 1a) Where to update firmware (don't worry about "fakepath"…. That is normal)

1.2 Helium version of UG65

The UG65 has been manufactured by Milesight for LORAWAN applications well before they modified it for use in the helium network. Please don't confuse models and firmware versions for the 'non-helium' UG65. You can see in Figure 1, highlighted in yellow, that the model has "H32" which is the helium version of the UG65. If you don't have this in your model number…. You may have been sold a lemon and I hope you can return it.

If you require help in the Discord, include the fact that you've checked this is a Helium version UG65 miner.

1.3 Helium Version

See Figure 2, highlighted in yellow for your helium version number. It's basically just the date of release.

If you are requesting help in the Discord, please include your Helium Version.

1.4 eMMc Available

The UG65 uses eMMc storage (NOT AN SD CARD!!!!). With firmware 61.0.0.37 or later, the miner cleans out the eMMc at 15% remaining which is highlighted in Blue in Figure 1 (85% used). After it runs this cleaning script, it will attempt to do a fast sync so that you can participate in Proof of Coverage (PoC) activity, and ultimately, rewards. Fast Sync will be covered in a subsequent section.

If you are requesting help in the Discord, please include your eMMc Available percentage.

1.5 Power Cycling Your Miner

Power cycling is something a lot of people seem to do when the miner isn't performing to their expectations. You can see how long this miner has been without a power cycle by the figure highlighted in Red in Figure 1.

If you are requesting help in the Discord, please include your Uptime number.

1.6 Downloading your Console.log

In order to diagnose accurately, it is best to download your console.log from the helium section of the GUI. See Figure 2 outlined in green, and download the Helium Log file. Make sure you download this log, and not the system log.

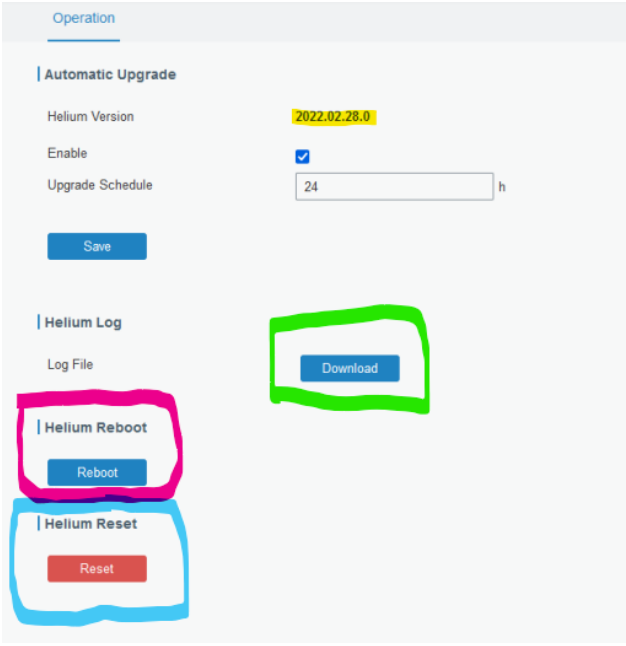

Figure 2: "Helium" Section "Operation" Tab

If using ssh you can use: cat / mnt/mmcblk0p1/miner_data/log/console.log

There is a lot of information in this console log. It may seem overwhelming, but this is where you can find out what is actually happening in your miner. All the LoRa (PoC) traffic, blockchain traffic, peer to peer (p2p) activity, etc. Please note that this console log is reset at 00:00 UTC. For longer logs, try to download them close to (but not after) the UTC reset time.

If you are requesting help in Discord, please indicate you have downloaded this in 1.6.

1.7 Connection Method from your Computer → Milesight

If you are experiencing connection issues to your device, you may be able to alleviate this by connecting via the ETH port, directly to your computer. This may be a request of those offering troubleshooting assistance to minimise other errors. Default ETH Milesight IPv4 was 192.168.23.150

So when seeking help on Discord, please include a header in your message similar to this:

1.1. Firmware 61.0.0.37
1.2. Helium Model Number Confirmed
1.3. Helium Version 2022.03.15
1.4. eMMc 50% available
1.5. Uptime 4 Days, 12 Hours
1.6. Console Log Downloaded
1.7. Connected to Miner via ETH directly (not via router)

Section B – Log Analysis

2. Confirming Your Miner Is Syncing

If you syncing a new miner or if your miner has been recently cleaned and/or performed a helium reset, you will want to know if you miner is syncing.

2.1 Confirming Your Miner Is Syncing via GUI

When you are performing a fast sync from scratch, there will be no reference to syncing, as you are absorbing blocks from the fast sync repository. Not a lot of information here… Best to go for the logs ☺. If you see "Absorbing", just give it a while to download the snapshot, and upload to your miner.

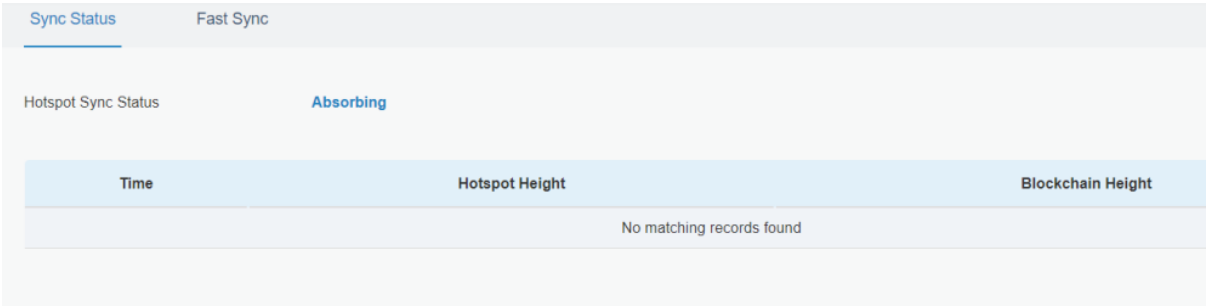

Figure 3: Absorbing the snapshot (not getting data from the blockchain yet. Not yet syncing)

2.2 Confirming Your Miner Is Syncing via SSH or console.log

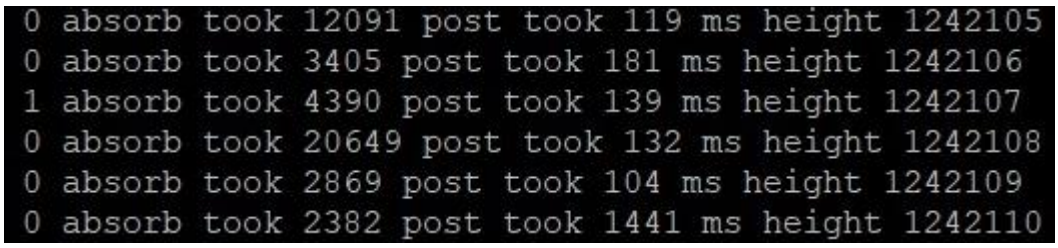

Figure 4: Absorbing events via SSH

Watch live via SSH: tail –f /mnt/mmcblk0p1/miner_data/log/console.log | grep absorb

Look through past logs via SSH: cat /mnt/mmcblk0p1/miner_data/log/console.log | grep absorb

2.3 Confirming Your Miner Is Syncing via console.log

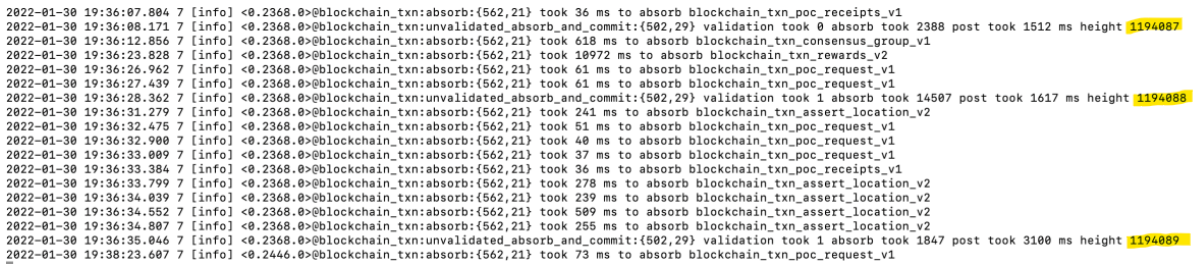

Figure 5: showing the block height in the miner increase via the console log

3 Confirming Your Miner Height Is Increasing.

After your miner has completed its “fast sync”, it may still need to continue catching up to the current blockchain height before earning rewards.

3.1 Confirming Increase of Miner Height via GUI

On the Helium Sync section, Sync Status Tab, you can see the hotspot height is catching up at a certain rate. You can do a quick calculation to project syncing time if you do a comparison of data at 2 different times. The longer the timeframe, the better. Using the example below, say between Time 1: 10:33 and Time 2: 10:58.

$$\Delta_1 = Hotspot\ Lag\ at\ Time_1 = blockchain - hotspot = 1220469 - 1220328 = 141\ blocks$$

$$\Delta_2 = Hotspot\ Lag\ at\ Time_2 = blockchain - hotspot = 1220494 - 1220402 = 92\ blocks$$

$$\Delta_t = Time_2 - Time_1 = 10{:}58 - 10{:}33 = 25\ minutes$$

$$Approximate\ Sync\ Time\ Remaining = \left(\frac{\Delta_t}{\Delta_1 - \Delta_2} * \Delta_2\right) = \left(\frac{25}{141 - 92} * 92\right) = 46.94\ minutes$$

Sync Status Fast Sync

Hotspot Sync Status Synced

Time	Hotspot Height	Blockchain Height
2022-02-11 10:58:33	1220402	1220494
2022-02-11 10:53:33	1220392	1220488
2022-02-11 10:48:32	1220377	1220484
2022-02-11 10:43:32	1220362	1220479
2022-02-11 10:38:31	1220342	1220470
2022-02-11 10:33:30	1220328	1220469

Figure 6: Block Height Increasing in GUI

In spite of the miner being behind by 96 blocks, it will be classified as “synced” well before you have fully caught up to the blockchain height, as is evidenced in Figure 6.

Q. Miner Height Not Increasing?

Hotspot Sync Status Syncing

Time	Hotspot Height	Blockchain Height
2022-03-03 23:15:45	1025021	1252155
2022-03-03 23:10:42	1025021	1252151
2022-03-03 23:05:40	1025021	1252143
2022-03-03 23:00:38	1025021	1252135
2022-03-03 22:55:35	1025021	1252135

Figure 7: Hotspot Height Stagnancy

- Perform a Helium Reboot highlighted in Pink in Figure 1. Monitor your miner for 30 minutes. If still no progress….
- Attempt a manual fast sync, via the helium tab. Monitor your miner for 30 minutes. If still stuck…….

- Perform a Helium Restart highlighted in Blue in Figure 1. This will take a while…. And then a while longer. It's wiping the entire blockchain from your miner and starting a fast sync again. Be sure to note which fast sync repository you are using, and perhaps change to an alternate source. Feel free to consult the discord for alternate snapshots or recommendations.

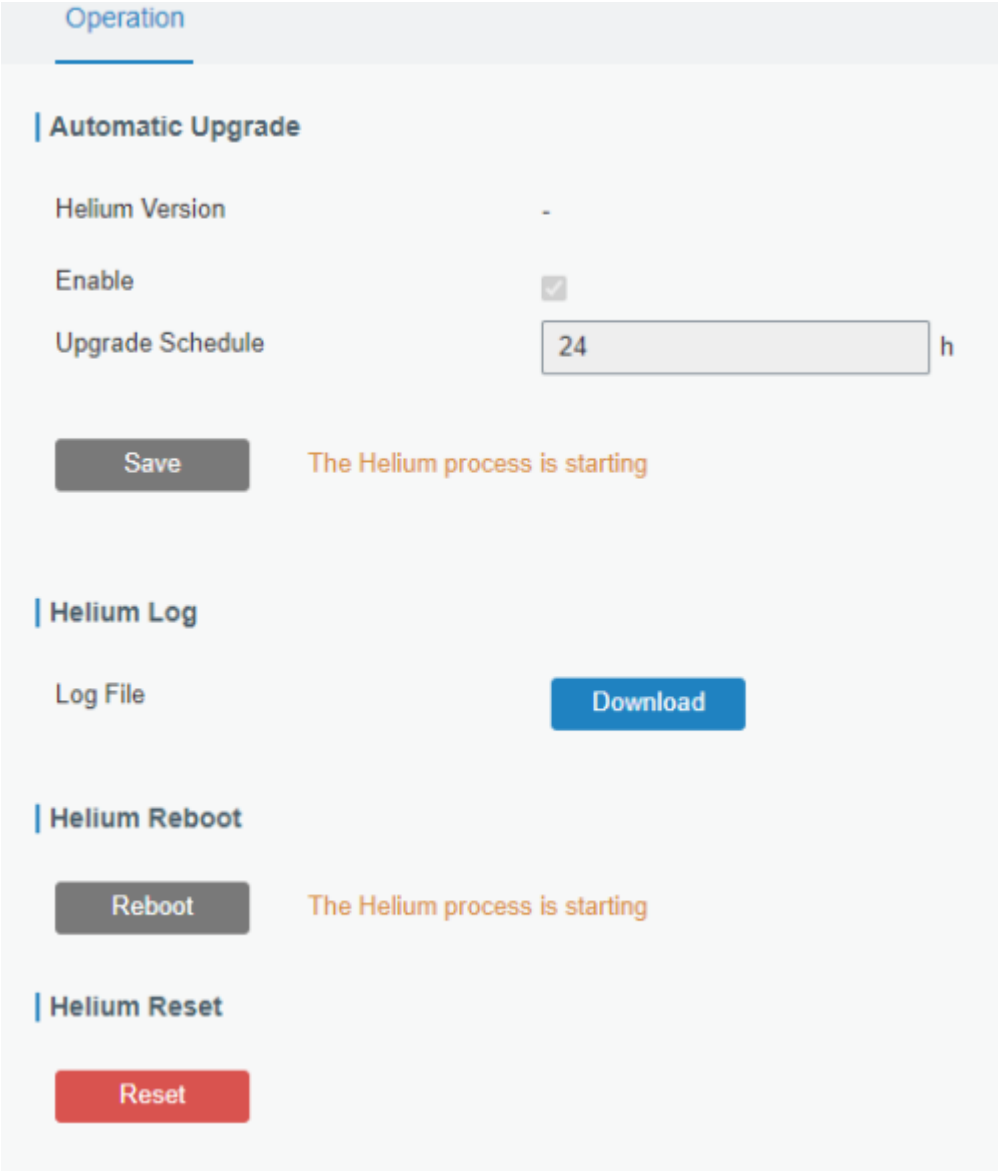

Figure 8: Hotspot Rebooting the Helium Process

3.2 Confirming Increase of Miner Height via console.log and ssh

Have a look through your logs and search for “absorb_and_commit”. You will hopefully have some evidence of your height increasing in here. Take note that a lot of transactions and activity can occur between these times, so be prepared to scroll between them ☺.

```
2022-03-18 00:54:18.265 7 [info] <0.13082.40>@blockchain_txn:absorb:{564,21} took 334 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:18.275 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 43 ms to absorb blockchain_txn_poc_receipts_v1
2022-03-18 00:54:19.125 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 657 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:19.437 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 312 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:19.739 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 302 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:20.023 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 284 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:20.627 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 604 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:20.950 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 323 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:22.268 7 [info] <0.14986.40>@blockchain_txn:unvalidated_absorb_and_commit:{504,29} validation took 1 absorb took 5422 post took 138 ms height 1270723
2022-03-18 00:54:22.270 7 [info] <0.2008.0>@miner:handle_info:{473,13} non-consensus block 1270723
2022-03-18 00:54:22.600 7 [info] <0.2035.0>@miner_lora:handle_json_data:{564,5} got status #{<<"ackr">> => 100.0,<<"dwnb">> => 0,<<"rxfw">> => 0,<<"rxnb">> => 3,<<"rxok
2022-03-18 00:54:22.601 7 [info] <0.2035.0>@miner_lora:handle_json_data:{565,5} Gateway #gateway{mac=265744593703794O109,ip={172,17,0,1},port=57101,sent=0,received=1095
2022-03-18 00:54:22.648 7 [info] <0.1919.0>@blockchain_txn:validate:{294,5} valid: [], invalid: []
2022-03-18 00:54:24.386 7 [info] <0.14986.40>@blockchain_txn:validate:{294,5} valid: [], invalid: []
2022-03-18 00:54:25.039 7 [info] <0.7971.40>@blockchain_txn:absorb:{564,21} took 25 ms to absorb blockchain_txn_poc_request_v1
2022-03-18 00:54:25.638 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 54 ms to absorb blockchain_txn_poc_request_v1
2022-03-18 00:54:26.308 7 [info] <0.7971.40>@blockchain_txn:absorb:{564,21} took 301 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:26.719 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 287 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:26.991 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 267 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:27.539 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 541 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:27.845 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 305 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:28.153 7 [info] <0.14986.40>@blockchain_txn:absorb:{564,21} took 307 ms to absorb blockchain_txn_assert_location_v2
2022-03-18 00:54:28.995 7 [info] <0.14986.40>@blockchain_txn:unvalidated_absorb_and_commit:{504,29} validation took 1 absorb took 4553 post took 56 ms height 1270724
2022-03-18 00:54:28.997 7 [info] <0.2008.0>@miner:handle_info:{473,13} non-consensus block 1270724
2022-03-18 00:54:29.340 7 [info] <0.1919.0>@blockchain_txn:validate:{294,5} valid: [], invalid: []
2022-03-18 00:54:34.677 7 [info] <0.15052.40>@blockchain_sync_handler:handle_data:{197,29} sending blocks [1270723,1270724] to sync peer
```

Figure 9: Hotspot increasing height over time in the console.log

If you are delving into the logs via ssh, use the same commands listed in Figure 4.

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4. Confirming your beaconing history via console.log

You can see when you’ve beaconed a long time before it shows up on any API service. The API waits a defined time to allow witnesses to submit their receipts to the challenger as well as multiple validation steps regarding PoC.

Do a search for “spreading” or “miner_lora:send_packet” within your logs to find out when (UTC time) your miner has beaconed. Keep in mind that logs reset at 00:00 UTC, so save local copies if you’d like some history.

```
2022-03-1  01:41:09.941 7 [info] <0.26777.14>@miner_onion_handler:init:{56,5} started miner_onion_handler server
2022-03-1  01:41:10.600 7 [info] <0.2034.0>@miner_onion_server:try_decrypt:{466,13} found poc. attempting to decrypt
2022-03-1  01:41:10.667 7 [info] <0.2034.0>@miner_onion_server:decrypt:{375,13} decrypted a layer: <<44,96>> received via p2p
2022-03-1  01:41:10.684 7 [info] <0.2034.0>@miner_onion_server:decrypt:{397,37} Params: [{blockchain_region_param_v1_pb,916800000,125000,300,{blockchain_region_spreading_v1_pb,[{tagged_spreading_pb,'SF12',25},{tagged_spreadi
egion_spreading_v1_pb,[{tagged_spreading_pb,'SF12',25},{tagged_spreading_pb,'SF11',25},{tagged_spreading_pb,'SF10',25},{tagged_spreading_pb,'SF9',67},{tagged_spreading_pb,'SF8',139},{tagged_spreading_pb,'SF7',256}]}},{blocko
ged_spreading_pb,'SF8',139},{tagged_spreading_pb,'SF7',256}]}}},{blockchain_region_param_v1_pb,918200000,125000,300,{blockchain_region_spreading_v1_pb,[{tagged_spreading_pb,'SF12',25},{tagged_spreading_pb,'SF11',25},{tagged_s
2022-03-1  01:41:10.686 7 [info] <0.2034.0>@miner_onion_server:tx_power:{508,21} Region: 'AU915', Gain: 5.0, MaxEIRP: 30.0, EIRP: 25
2022-03-1  01:41:10.728 7 [info] <0.2034.0>@miner_onion_server:decrypt:{416,61} sending receipt with observed power: 30 with radio power 25
2022-03-1  01:41:10.826 7 [info] <0.26777.14>@miner_onion_handler:handle_info:{75,5} server sending data: <<10,125,10,33,0,128,11,185,215,226,153,94,49,19,77,137,67,227,102,230,17,15,178,71,124,50,188,155,93,208,239,195,23,3
```

Figure 10: Showing a beaconing event via the console.log

Watch onion events live via SSH: tail –f /mnt/mmcblk0p1/miner_data/log/console.log | grep onion

Look through past logs via SSH: cat /mnt/mmcblk0p1/miner_data/log/console.log | grep onion

Just note that searching by “onion” will also yield witnessing events….you can use “spreading”

Q. Why did my beacon get no witnesses?

- There is a possibility that your physical setup is not conducive to good witnessing or beaconing (antenna is inside, or topographically you live in a crater).
- Check your connections…. It is possible to buy mating pairs that connect, but the actual coaxial connection is not continuous. See Figure 11 below for an example of a poor connection.

Figure 11: Left: RP-SMA Male Connector Right: SMA Female Connector

- Check the Challenger is not relayed. When the beacon event shows up in explorer, click on the challenger to investigate their history. If they are relayed, or it looks like they may have a dodgy internet connection…. This may be why.
- Check your history of beaconing…. If you regularly get 14 witnesses per beacon, it is less-likely to be you. If you regularly get less than 14 witnesses per beacon, and you are surrounded by hotspots….. Your setup is probably the issue.

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5. Confirming your witnessing history via console.log and Miner Tools

Have a look through your console log for "witness". Unfortunately it may be difficult to keep track of individual events due to how much information is in the log, and how long it takes to send a witness receipt back to the challenger.

Now before continuing any further: if you don't understand the Helium PoC process, please stop and go **read Appendix B, part C)**. The Helium Website has a lot more information that is accurate; this document is just a simplified, basic overview.

See below for an initial, failed attempt to send a witness receipt back to the Challenger

```
39:59.456 7 [info] <0.2034.0>@miner_onion_server:try_decrypt:{466,13} found poc. attempting to decrypt
39:59.515 7 [info] <0.2034.0>@miner_onion_server:decrypt:{362,13} sending witness at RSSI: -107, Frequency: 917.4, SNR: 6.2
39:59.515 7 [info] <0.2034.0>@miner_onion_server:decrypt:{372,13} could not decrypt packet received via radio: treating as a witness
39:59.517 7 [info] <0.8564.40>@miner_onion_server:send_witness:{188,13} sending witness at RSSI: -107, Frequency: 917.4, SNR: 6.2
39:59.671 7 [info] <0.12484.40>@blockchain_txn:absorb:{564,21} took 678 ms to absorb blockchain_txn_assert_location_v2
39:59.787 7 [info] <0.8564.40>@libp2p_transport_relay:connect_to:{71,5} init relay transport with ["/p2p/112YvcUFDA9WCybBc75K8wT8FmT1Gruw2mW2BZgCr9CwukMdGfEw/p2p-circuit/p2p/11ffSkvGSjVYhs5FWGhfxXdrPNwnYvW29T
39:59.819 7 [warning] <0.8564.40>@miner_onion_server:send_witness:{243,37} failed to dial challenger "/p2p/11ffSkvGSjVYhs5FWGhfxXdrPNwnYvW29TXHS8WT9YVkPK6Mjvf": [{"/p2p/112YvcUFDA9WCybBc75K8wT8FmT1Gruw2mW2B2g
```

Figure 12: Failed to dial Challenger. It is completely normal for this p2p network to fail a few times.

After multiple attempts, your attempts will time out and not continue.

```
59.682 7 [info] <0.2008.0>@miner:handle_info:{473,13} non-consensus block 1270730
00.139 7 [info] <0.1919.0>@blockchain_txn:validate:{294,5} valid: [], invalid: []
00.875 7 [info] <0.15071.40>@blockchain_sync_handler:handle_data:{176,29} sending blocks [1270723,1270724,1270725,1270726,1270727] to sync peer
01.000 7 [info] <0.15531.40>@blockchain_sync_handler:handle_data:{176,29} sending blocks [1270729,1270730] to sync peer
09.592 7 [info] <0.11343.40>@miner_onion_server:send_witness:{246,37} re-sending witness at RSSI: -117, Frequency: 918.2, SNR: -4.2
09.592 7 [error] <0.11343.40>@miner_onion_server:send_witness:{207,5} failed to send witness, max retry
11.949 7 [info] <0.1736.0>@blockchain_worker:target_sync:{833,5} targeted block sync starting with Pid: <0.15774.40>, Ref: #Ref<0.2130498738.151
22.291 7 [info] <0.2035.0>@miner_lora:handle_json_data:{564,5} got status #{<<"ackr">> => 100.0,<<"dwnb">> => 0,<<"rxfw">> => 0,<<"rxnb">> => 0,
22.292 7 [info] <0.2035.0>@miner_lora:handle_json_data:{565,5} Gateway #gateway{mac=2657445937037940109,ip={172,17,0,1},port=57101,sent=0,receiv
29.923 7 [info] <0.15900.40>@blockchain_sync_handler:handle_data:{132,5} adding sync blocks [1270731]
30.864 7 [info] <0.15900.40>@blockchain_sync_handler:handle_data:{142,13} Eagerly re-gossiping 1270731
31.847 7 [info] <0.15760.40>@blockchain:build:{1458,21} Found 1 plausibles at height 1270731
32.148 7 [info] <0.15760.40>@blockchain_sync_handler:handle_data:{176,29} sending blocks [1270731] to sync peer
32.479 7 [info] <0.15821.40>@blockchain:build:{1458,21} Found 1 plausibles at height 1270731
```

Figure 13: Failed to send witness, max retry. This happens after 10 attempts and will not attempt any more.

Example of a successful witness receipt send can be found below. This one was sent in under 0.3 seconds.

```
08:42.015 7 [info] <0.2034.0>@miner_onion_server:decrypt:{362,13} sending witness at RSSI: -102, Frequency: 917.8, SNR: 7.8
08:42.016 7 [info] <0.2034.0>@miner_onion_server:decrypt:{372,13} could not decrypt packet received via radio: treating as a witness
08:42.017 7 [info] <0.16152.40>@miner_onion_server:send_witness:{188,13} sending witness at RSSI: -102, Frequency: 917.8, SNR: 7.8
08:44.370 7 [info] <0.16152.40>@miner_onion_server:send_witness:{251,37} successfully sent witness to challenger "/p2p/11GS8Fcud6w2GsWN7YVUzG3sehgCfdMwYo5Z8yajNRyxhoX6Xe" with RSSI: -102, Frequency: 917.8, SNR: 7.8
```

Figure 14: Successfully sent witness to Challenger. Hopefully you get chosen as one of the lucky 14.

Miner Tools by Secarius (With Integrated witnessing analyser) and the guideline can be found in Appendix A. This shows the ratio of successful witness sends, along with the reasoning behind the failures. It's great, and you should check it out.

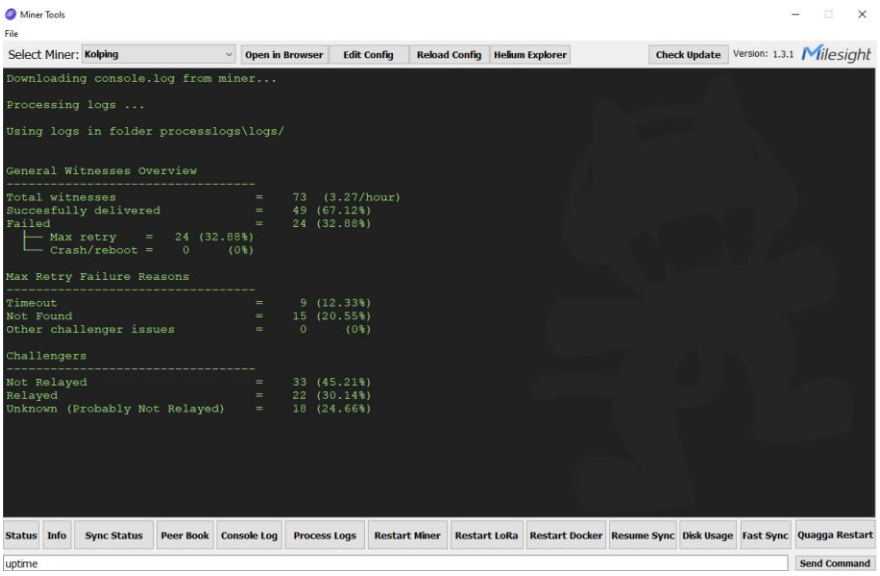

Figure 15: Miner Tools by Secarius. You need this in your life.

Watch witnessing live via SSH: tail –f /mnt/mmcblk0p1/miner_data/log/console.log | grep witness

Look through past logs via SSH: cat /mnt/mmcblk0p1/miner_data/log/console.log | grep witness

Q. Why is my witnessing so low?

- There is a possibility that your physical setup is not conducive to good witnessing or beaconing (antenna is inside, or topographically you live in a crater).
- Check your connections…. It is possible to buy mating pairs that connect, but the actual coaxial connection is not continuous. See Figure 11 below for an example of a poor connection.
- Check the Challenger is not relayed. Type the p2p address into explorer, click on the challenger to investigate their history. If they are relayed, or it looks like they may have a dodgy internet connection…. This may be why. DC wrote a whole page on it here: https://denniscrawford.com/2022/02/helium-miner-no-or-low-witnesses-why-check-the-logs/

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6. Confirming your challenge construction history via console.log

Have a look through your console log for "handle_challenging". Unfortunately it may be difficult to keep track of individual events due to how much information is in the log, and how long it takes to send a witness receipt back to the challenger.

```
<0.2036.0>@miner_poc_statem:handle_challenging:{562,13} onion of length 42 created <<122,188,0,114,26,99,187,121,215,23,21,205,196,91,176,199,44,199,210,106,37,237,53,121,173,100,62,188,
<0.31057.40>@miner_onion_handler:init:{52,5} started miner_onion_handler client
<0.2036.0>@miner_poc_statem:send_onion:{1013,13} onion sent
```

Figure 16: Challenge creation and sent

Watch challenging via SSH: tail –f /mnt/mmcblk0p1/miner_data/log/console.log | grep challenging

Look through past logs via SSH: cat /mnt/mmcblk0p1/miner_data/log/console.log | grep challenging

Appendix A: Useful Links

Miner Tools by Secarius. Analyse your witnessing events:

https://discordapp.com/channels/920883777138458755/939230368115093556

Miner Tools Guideline by DC (including download links for Miner Tools):

https://denniscrawford.com/2022/02/milesight-ug65-minertools-guide-multiple-miner-config-by-secarius/

Milesight Miners FAQ and Discussions

https://www.reddit.com/r/MilesightMiners/

DC's Blog and Helpful Topics

https://denniscrawford.com/category/helium-mining/

Appendix B: PoC Events

A) Your Miner Challenging

- Your miner gets selected to construct a challenge by the blockchain at random. You cannot change, influence, or alter this behaviour.
- You encrypt (construct) a secret hash, and attach your p2p details to this….
- You then return this challenge to the blockchain…… then the blockchain randomly selects a Challengee (Beaconer)
- You also validate your secret hash is returned to you after a Witness submits a receipt to you.

B) Your Miner Beaconing

- Your miner is randomly selected by the blockchain to prove coverage at random. You cannot change, influence, or alter this behaviour.
- You are sent the information from step A), which your miner then broadcasts (beacons) from your antenna.
- If other miners are within broadcasting reach, they will hear this data (Witness) and act….

C) Your Miner Witnessing

- Your miner "hears" a beacon, similar to the one listed in B).
- It immediately decrypts the information embedded in the signal (secret hash, p2p address of the challenger in A))
- Your miner attaches the signal properties (RSSI, frequency, SNR) it received and then…
- Attempts to send all this information back to the address of the Challenger
- If successful, and validated by the Challenger. The blockchain will reward a maximum of 14 (at time of writing) Witnesses to the individual beacon. You cannot change, influence, or alter this result.

Important Messaging:

- **No, you cannot increase your amount of challenge construction**
- **No, you cannot increase your amount of beaconing**
- **No, you cannot ensure you are selected as 1 of the 14 witnesses**