Transcript

July 28, 2023, 12:35PM

Interviewer:
Again, thank you for agreeing to take part in our study, the main purpose is to get a sense of how different storage providers in the Filecoin network operate and hopefully estimate their power consumption and how much power goes into sealing a sector, for example, or storing the data.

Storage Provider:
Yes.

Interviewer:
So maybe firstly you can tell me a little bit about your operations, whether you rent out space in a co-located data center, or if you have your own data center.

Storage Provider:
Yeah, so we operate out of a couple of colocation facilities.
So none of these would be be our own.
So we are only using colocation facilities.

Interviewer:
Multiple, not just one, right?

Storage Provider:
Yeah, we currently have three data centers that we're running out of for production.

Interviewer:
Are they roughly in the same location or are they in different countries?

Storage Provider:
Well, our main operation is out of the *anonymized world region*.
So basically our three locations would be *anonymized location 1*, *anonymized location 2* and *anonymized location 3*.

Interviewer:
And do these data centers provide information about their PUE, that's a power usage effectiveness?

Storage Provider:
Yeah.
So we have gone through the Filecoin Green process and we currently have the silver tier and part of that was using the PUE measurements that we could get from *anonymized location 1* and the data center is called *anonymized DC name*.
They gave us a number which is 1.3, which we have in a document from them.
So that's basically what we are operating with, a majority of our data center and our Filecoin SP operation is in *anonymized location 1*, so that's why that was used.

Interviewer:
Also, because I saw a part of the data that you provided to Filecoin for the energy validation process is publicly available, so the minerIDs that you have listed on there are all the minerIDs that are operated from *anonymized location 1* or all of your minerIDs in total?

Storage Provider:
We do have some minerIDs that are operated from *anonymized location 2* and therefore we do have a few additional, we have I think one in *anonymized location 3* currently.
So yeah, so it's not a lot.
So out of that very long list of SPs, we might have a couple in *anonymized location 2*, one in *anonymized location 3*, and basically the rest would be in *anonymized location 1*, which is our main place, yeah.

Interviewer:
And the energy consumption information is only for *anonymized location 1* though, right?

Storage Provider:
Yeah.

So the problem that we had about *anonymized location 2* is that they don't really have a system to share this with us.
So therefore it is basically, with them we have sort of a power cap and we can use that or not, but that's basically what we get out of it.
So the idea was for *anonymized location 2* that we just used that cap as a proxy for what we would probably be using there but the real numbers would actually come out of *anonymized location 1*.

Interviewer:
I understand.
And would it be a problem if you gave me a list of all of your miners and their corresponding locations after the interview. This data will remain private, it will not be shared publicly, of course. Just because I am taking the energy consumption for *anonymized location 1*, and I need to know exactly which miners are operated from there?

Storage Provider:
Sure, yeah.
And *anonymized Filecoin Green employee* has asked me the same for the Filecoin Green reaudit process that needs to run here now, over the next month or so.
So I think it kind of makes sense that we just need to gather that data once more to make sure that it's totally up to date and then we can provide it for the Filecoin Green recertification and we could probably also provide that list for you then.

Interviewer:
Yeah, I guess so, for the list of the minerIDs, I guess it depends how much time it would take because my project runs until mid-September. So if I can get that as soon as possible that would be great, but if you cannot do that, that's not a big problem.

Storage Provider:
Sure. No, it's just like, you have already seen the list of, SP IDs, right?

Interviewer:
Yeah.

Storage Provider:
Yeah. So you know, that's a lot.
So for us to compile that data it takes a little bit more time than if you ask me about my basement miner because I only have one ID there, it's much easier, whereas it is a much larger set up at *anonymized SP name*.

Interviewer:
Yeah, I understand.
No problem, if it happens in time, then that's good.
Otherwise I'll just use the data that I have currently, as you said, the majority is still in *anonymized location 1*, so that the the most important thing.

Storage Provider:
Yeah, exactly.
We would hope that we get it updated in time.

Interviewer:
Since we're talking about the minerIDs, do you know if your raw byte power is evenly or somewhat evenly distributed between minerIDs and if that's the case, what is the reasoning of dividing power between different miners?

Storage Provider:
Yeah, it is for sure not evenly distributed.
Basically, the reason why we have that many minerIDs is because we have our own SPs which we are operating, we basically have Filecoin as a service, so that would be other clients where you basically sell them a service where we manage a Filecoin miner/node for them on their behalf, they provide the collateral and then we make sure that it's online, data is attached, all that kind of things.
So they would be individual, how much data they want to onboard, raw byte power, or quality adjusted power or whatever, it's up to them and we basically charge them for those kind of services.
And then the last big bucket and the reason why we have so many SP IDs is because *anonymized SP name* is running the ESPA program (the enterprise storage provider accelerator) which is basically a program where we have new participants coming in

and some of these participants, as part of their onboarding we are also setting up a new SP ID for them which will onboard 1PiB of QAP and I think all the new ones get 1PiB QAP out of Filplus and the old one, the first generation that we did was 1PiB raw byte power that we created with them, but again every cohort we have, every quarter it comes in, we are getting new SP IDs that we are managing and therefore obviously there's a lot to do.

Interviewer:
Do you also provide sealing as a service or not?

Storage Provider:
Yes, we do that, which in this case would be more like an internal thing.
So think of it a bit like if we have internal clients like that and then we would offer them that they can seal with us and for us it's the same as if this was our own SP. So, in that sense, it does not look that different, if that makes sense.

Interviewer:
And the data center that you use, do they incorporate incorporate any additional non-IT processes that are somewhat specific to that data center in particular, or is it just the typical cooling and lights, that type of stuff.

Storage Provider:
Do the colocation facility provide that you mean?

Interviewer:
Yeah. I guess if you don't know anything specific, it just operates like a traditional data center.
Do you know if it's a hyperscale DC or how large the data centers are that you use?

Storage Provider:
Right. Yeah, I guess I don't have the exact numbers on the sizes here.
But I would guess that for example, *anonymized location 1 DC* is probably one of the biggest, I don't know how many campuses they have around *anonymized location 1*, but it's extremely big.
Now in terms of if it's hyperscale or not, then no, this is a co-location facility,

meaning that people can put whatever they want in the racks.
So that might not be highly efficient, you will not see a thousands and thousands of identical servers all optimized against storage, for example.
In *anonymized SP name*'s racks, we would have a lot of storage, obviously, and then we have a sort of like rows, where we have all sealing hardware.
I wouldn't consider it being hyperscale in that design.
It is more like a general compute, general storage that we're using.

Interviewer:
You mentioned that you use different machines for sealing and storage.
Can you tell me a little bit more about the hardware that you use?

Storage Provider:
So we have been running a kind of reference architecture through ESPA for the last couple of years.
And I've also been doing that from the very beginning of the Filecoin network.
We use some now a little bit outdated, but still relevant hardware configurations where we tend to use for the PC1 process, the first part part of the sealing, these 64-core CPUs together with 1TB of memory, a couple of NVMe drives and our setup would be using a 1U server for that.
So that server is capable of handling 15 sectors in parallel and I think with the current setup it takes around 5 hours to do a PC1 like that.
But the 5 hours for 15 PC1 jobs per server is also because we have PC2 two servers with GPUs, which are basically attached to the same storage. So, on the hardware front, we on one hand have what we would call CPU-only 1U server, 64 cores, 1TB of memory and then on the PC2 and C2 we have GPU servers and for GPU servers we are using Supermicros 2U2N servers where basically it's like a 2U server but inside it you have 2 nodes. Each of these nodes looks a little bit like a 1U server but it holds three GPUs in there and we tend to use a 24-core CPU instead, so more like a mid-tier CPU.
Our GPUs are A5000, all of them, and then we usually have around half a TB memory, in those if they're doing PC2, we also have machines that only do C2, which hold 1TB of memory. That's basically our configuration for the sealing hardware.

On the storage hardware we have a lot of JBODs, so basically these big boxes with a lot of disks in and the storage servers attached to them would be similar: 1U server with 24-core CPU and maybe 256GB of memory. The good design about this is that our PC1 servers are basically the same as our storage servers, it's just a matter of what CPU we put in and how much memory, but it's sort of all the same, so that leaves us to only having a couple of different server types in our data center in *anonymized location 1*.

Interviewer:
And on average, do you know how many sectors you seal daily, for example? Or does it vary a lot?

Storage Provider:
It does, it's it really comes down to what clients has and wants to start sealing. And for the last period, I think it has been extremely inconsistent because of the higher base fees that has basically meant that a lot of our SPs, a lot of our participants from ESPA have basically been holding back and not provided the required collateral for the SP, so not transferred funds into the SP, so that we could keep sealing. That has been because there has been a very high burn of FIL and they basically do not want to spend a lot of FIL on on the gas fees.
And as it works right now because we don't have the sealing-as-a-service fully implemented where it's just like an open marketplace, then it does mean that we attach workers, so hardware resources into an SP with the idea that they're gonna seal.
And if they're not sealing, it's just standing idle there and then we can move it over to somebody else, but a lot of these SPs have been idle over the last half year. So that makes our power usage versus sealing throughput pretty hard to kind of figure out out of the last half year because there has been so much idle time and almost none of them have really been sealing to the full extent.
What I do know is our metrics on how fast we can seal on our hardware.
So we actually have that.
So for basically new sectors with deals on and that is what everyone wants right now, nobody's doing CC. So everyone is asking for the capability of sealing with data inside when we're sealing.
And we know that we can do about 70TiB per rack.

Interviewer:
And do you seal 32/64GiB sectors?

Storage Provider:
Only 32, we have 1 64GiB miner from legacy and nobody is using it and I don't see anyone using it to a big extent. The problem is it's using the double amount of resources for the double amount of time and that is 2 pieces, but it's only generating the double amount of data, so that's one. So basically it takes a double amount of resources to create a 64GiB sector versus 32.
So you should really have a big benefit on the gas fees because you're basically throwing double amount of hardware after generating 64GiB sectors.

Interviewer:
Yeah, that makes sense.
And do you know what the power consumption of your sealing hardware is while sealing or also when it's in idle state?

Storage Provider:
Yeah, I don't think we have calculated with that precision yet, but I think we might be able to do that because we have something that is running right now. That has not been the ask so far from Filecoin Green, so that's probably why we have not harvested that data, but it might be that we can actually do that, that would be out of *anonymized location 1*, but we would have to manage that on some of the active racks in terms of what is actually the power consumption when running at these loads that we're talking about.
And I think the good thing about *anonymized location 1* is that there is 10 or 12 racks configured like this that can all do these 70TiB a day and basically each of these racks are in balance.
So, when we're sealing, we should be using pretty much all the hardware, meaning that whatever energy consumption you have on that rack, you can basically, you know, compare that to the throughput of about those 70TiB today and that should be doable.

Interviewer:

And do you know what the the power consumption of a storage rack in your system is and the capacity of the racks in TB for example?

Storage Provider:
I don't think so, but I mean these two questions because what we were asked for is just like more general numbers. I think if you could write me those two questions about the storage rack and a compute rack, we can probably find a rack which is like usual config, I don't know if that's like 7 JBODs in a rack, something like that.
And then basically try to figure out what is the consumption on these because I think that should also be a pretty good metric for how much power we are actually using.
And they are fairly dense, both the compute racks, but also the storage racks.

Interviewer:
Yeah, I guess it's useful if you can get this information for me, because for example for the model that I'm creating right now for the Filecoin energy consumption, the two main sources of information that I have at all times, the Filecoin on-chain data, is for each minerID, how many sectors they have sealed and also how much data they're storing.
So I'm trying to figure out the relationship between the total energy consumption, the PUE of different storage providers and also these two variables that are how much data they're sealing and storing.
But yeah, so these two questions are already in the list that I have sent to you via email but I can send them again if you want, or you can just take them from there.

Storage Provider:
Yeah, maybe just so we know that that is what I owe you to answer.

Interviewer:
Sure, no problem.

Storage Provider:
It's just because I'm on holiday now, so basically, I have to look into it in a week when I'm back.
So just to make sure that I don't forget in the meantime.

Interviewer:
No worries.
I'll send them over again.
Do you reuse the same hardware to also mine other cryptocurrencies or run Ethereum validator nodes, anything like this?

Storage Provider:
No, not currently.
What we do use our hardware for is to sell for other infrastructure as a service projects, but we don't care what the client uses it for in that case.
So yes, we do have clients that basically run other cryptocurrencies, but that's sort of not our business and that would not be what is in these numbers.
Well, if we're talking about a rack of storage for Filecoin, we have a rack of storage used for Filecoin.
And if we talk about sealing, we have a rack doing sealing and and yes, we can convert these racks into doing something else, but we have plenty of free racks that would be running Filecoin and not be doing something else.
And we're not co-mining, if that's also what you're asking about.
So it's not like these racks that run Filecoin, they also mine other tokens at the same time.

Interviewer:
Thank you.
That's great.
And then lastly, I guess my last question is are you aware of your energy mix that is provided to the data centers that you use and if it's not already completely green, do you also buy renewable energy certificates or produce renewable energy on-site?

Storage Provider:
Yeah, I hope that that should be covered by our Filecoin Green certification because we tried basically to provide as much info as we could, but that basically comes out of our colocation facilities and I believe *anonymized location 1 DC* is 100% green because they produce more green energy than they consume.
But I'm pretty sure that that is like an accounting thing where doing night time they

are basically using grid power, but they have an extremely large solar park outside *anonymized location 1*.
Anonymized FIlecoin Green employee would know, but I think it's doubling now to almost 500MW or something like that.
And I think their total park in other regions including this is reaching 1GW or so.
So they are extremely big.
So yeah, there areas obviously that they're running green, but I don't know exactly how green the mix is, but for *anonymized location 1*, I do believe that it is mainly green power that they running on from hydro and also obviously the solar power as well.
In our data center in *anonymized location 2* I am not too sure how much we are able to get there but I think they as well as the *anonymized location 2* data center, it usually just says that they offset the energy and they buy green power.
But yeah, it's not really like they have solar panels on the facility and are actually providing their own power. I think there was a question about if we provide our own power and we do not do that because that would be on the colocation facility. So we do not produce any green power ourselves.

Interviewer:
OK, great.
Thank you.
Those were all of my questions, I believe.
Do you have any other remarks or questions for me?

Storage Provider:
No, I think we're good.
I sent you the signed form, I don't know if you've received it.

Interviewer:
I did, yeah, thanks.

Storage Provider:
And then basically I think we just need to go back and see if we can find some numbers on what the power usage is.
Then we can get back to you on that.

I can forward it and ask our infrastructure lead on if he does know what these numbers are and then we'll see, if we're lucky, if there is like an easy way for him just to look it up, we can give it a shot.

Interviewer:
OK, great.
Thank you so much.