

As the Eth1.0 finalization working group is forming, I would like to investigate the technical pro and cons of introducing full POS to Eth1.0 by making Eth1.0 a shard of the Beacon chain.

Architecture description

In this section I am description the infrastructure and changes needed to make Eth1.0 the shard 0:

- The Beacon chain can stay like it is currently specified. It will assign randomly validators to all shards, especially also validators to shard 0.
- These validators of shard 0 will be in charge of proposing blocks for the Eth1.0, instead of blocks for shard 0.
- The Eth1.0 clients have to implement the "latest message driven GHOST" fork choice rule, such that they follow the proposed blocks of the beacon chain validators.
- In order to fully verify the correctness of the state of the validators, the Eth1.0 clients also would have to follow the Beacon chain and its finalization.
- While the shard 1-1023 would support - after phase 2 - complicated receipt creations for inter-shard communication, the shard 0 would only generate the [receipts](#) for becoming a validator, as the Eth1.0 chain is planned to do anyways.

Analysis

Pros:

- This approach would unify the two different chains eth1.0 and eth2.0
- It would introduce full POS to the Eth1.0 chain with relatively small effort. POS would offer better security and finalization to the Eth1.0 chain
- As Beacon chain clients anyways need to be aware of the eth1.0 chain, there is no substantial additional load on the clients.
- Compared to the proposals of the current working group of eth1.0 finalization, the shard 0 approach seems cleaner, as it is introducing pure POS, instead of mixtures of POS and POW.

Cons

- The introduction of full POS bears a lot of potential risks, especially as the new fork choice rule has not yet been tested.
- Shards are no longer homogenous

Personal conclusion

Personally, I think that the benefits outweigh the involved risks. Ending this wasteful and insecure POW period should have one of the highest priorities. I suggest to start the implementation of such solutions or similar ones early and do substantial testing to migrate the risks. These fork choices rules and this POS system is the result of 4 years research and I am convinced that it is much better than the status quo.

I am really looking forward to getting the involved challenges of this proposal highlighted in this thread.