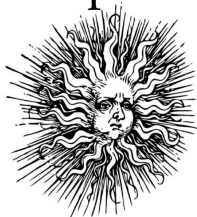


Increase the MAX_EFFECTIVE_BALANCE; EIP-7251

A Modest Proposal



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november 13, 2023

Outline

- Problem
 - What is MAX_EFFECTIVE_BALANCE?
 - What is the partial withdrawals sweep?
 - What happens as a result?
- Solution
 - Increase the MAX_EFFECTIVE_BALANCE.
 - Allow validator index merging.
 - Enable custom ceilings and/or EL partial withdrawals.
 - Modify the slashing penalty. (maybe?)
- Results
 - Network stability.
 - Autocompounding for solo-stakers.
 - Path towards Single Slot Finality.



Problem

What is MAX_EFFECTIVE_BALANCE? (abbr. MAXEB)

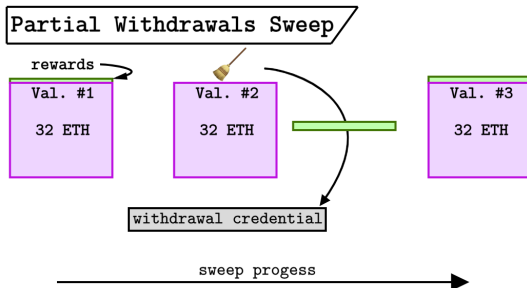
Gwei values

Name	Value
MIN_DEPOSIT_AMOUNT	<code>Gwei(2**0 * 10**9)</code> (= 1,000,000,000)
MAX_EFFECTIVE_BALANCE	<code>Gwei(2**5 * 10**9)</code> (= 32,000,000,000)
EFFECTIVE_BALANCE_INCREMENT	<code>Gwei(2**0 * 10**9)</code> (= 1,000,000,000)

- Upper bound on the “effective balance” of a validator.
- The minimum balance to become a validator *is the same as* the MAXEB (32 ETH)

Problem

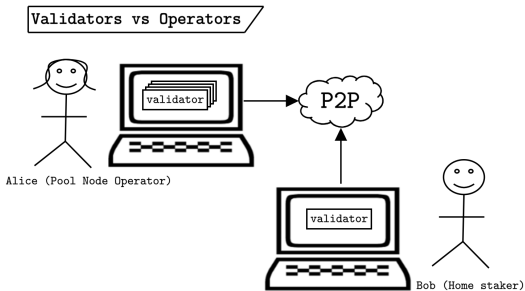
What is the partial withdrawals sweep?



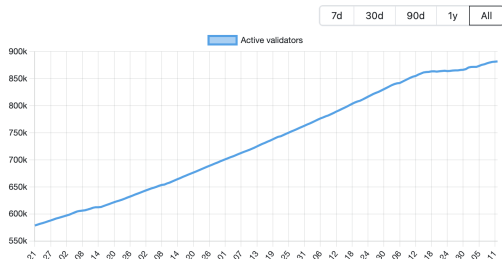
Epoch	↕	Slot	↕	Time	↕	Recipient Address	↕	Amount
~ 242,359		~ 7,755,513		~ in 18 hrs 22 mins		0x3d84a4...0e36C8		② 0.014990 ETH
240,703		7,702,503		6 days 14 hrs ago		0x3d84a4...0e36C8		0.016229 ETH
239,041		7,649,321		13 days 23 hrs ago		0x3d84a4...0e36C8		0.016900 ETH
237,386		7,596,368		21 days 8 hrs ago		0x3d84a4...0e36C8		0.016822 ETH
235,743		7,543,798		28 days 15 hrs ago		0x3d84a4...0e36C8		0.016517 ETH
234,125		7,492,007		35 days 19 hrs ago		0x3d84a4...0e36C8		0.016449 ETH

Problem

What happens as a result?



Active Validators



Problem

What happens as a result? part 2

bigboi-beaconchain-test-1

Details:

- 2.1M validators total
 - 420 nodes
 - 16c/32Gb each machine
 - 5k keys/node
 - {Prism,Lighthouse}-{Geth,Nethermind} = 1M validators together, equally split
 - 28% = prism, 28% = lighthouse, 14% each - all others

Overall health:

Epoch 4:

Proposals: 26/32 (81.25%)

Attestations: 801006/2100000 (38.14%)

Source timely: 773796/2100000 (36.85%)

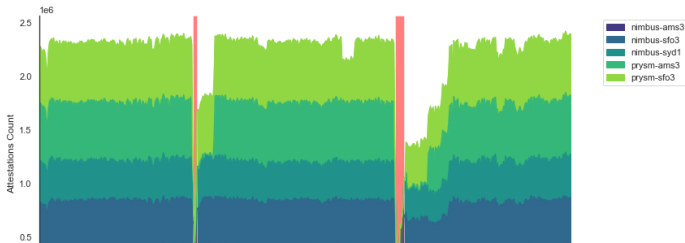
Target correct: 800764/2100000 (38.13%)

Target timely: 800764/2100000 (38.13%)

Head correct: 760119/2100000 (36.20%)

Head timely: 592021/2100000 (28.19%)

Sync committees: 8674/13312 (65.16%)



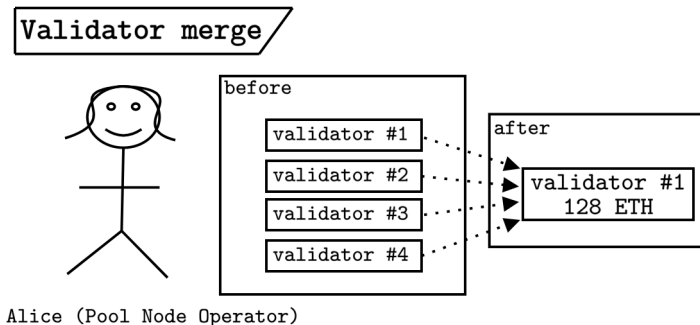
Solution

- well... increase the MAX_EFFECTIVE_BALANCE.

```
194 + MAX_EFFECTIVE_BALANCE = Gwei(2048000000000)
195 + MIN_ACTIVATION_BALANCE = Gwei(320000000000)
```

Solution

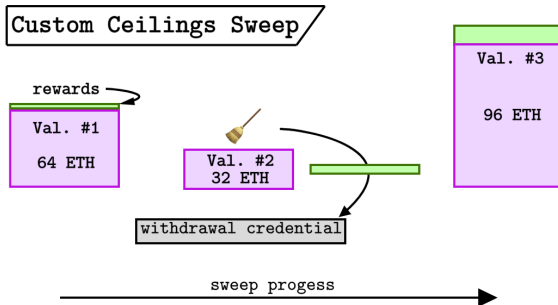
Allow validator index merging



- Need the participation of staking pools!
- Merge validators without exiting the consensus layer.

Solution

Enable custom ceilings and/or EL partial withdrawals



- Each validator could set their own balance ceiling.
- Alternatively, allow execution layer partial withdrawals (extend EIP-7002).



Add EIP: Execution layer triggerable exits 104

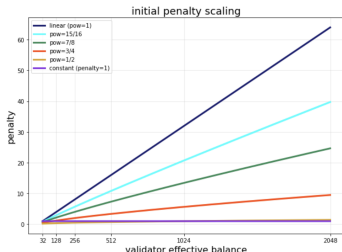
ethereum:master ← djrtwo:el-exits

opened 🌐 May 9, 2023 L djrtwo +369 -0

Solution

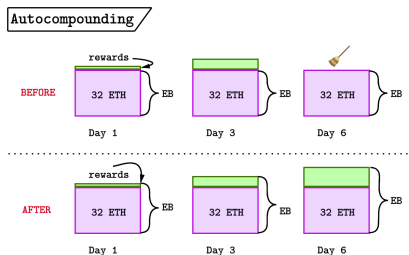
Modify the slashing penalty (maybe?)

$$\text{Initial Penalty} = \frac{EB^{\text{pow}}}{32}$$



- Currently, $\text{pow} = 1$, so slashing is 1 ETH.
- Linear scaling of the penalty is extremely punitive.
- We could scale the initial penalty sub-linearly.

Results



- Clean up historical tech debt.
- Improve network stability.
- Enable autocompounding and flexible balances for solo-stakers.
- Open the path to Single Slot Finality.
- Aim to decrease the `MIN_ACTIVATION_BALANCE`. (ambitious)

https://notes.ethereum.org/@vbuterin/single_slot_finality

<https://ethresear.ch/t/a-simple-single-slot-finality-protocol/14920>

thanks! :-)



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