CESS

Cumulus Encrypted Storage System

CESS Course Week 4 - Episode 7

Storage Miner

CESS Official Website

Table of Content

CESS
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Two Types of Miner in CESS

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- Storage miner and Consensus miner
- There are two decentralized layers in CESS, that miners can participate
  - **Storage layer**: A peer-to-peer network that each peer node is contributing part of the node storage to the network.
  - **Consensus layer**: A Substrate-based chain storing all miner information, CESS platform metadata, and user file metadata.

In this module we will focus on the **Storage layer**. Next module we will discuss about the **Consensus layer**.

Why Be a Storage Miner?

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- Web3 movement, so run a validator node to empower the network and CESS community.
- The economics and being rewarded by running a storage node

CESS Tokenomics

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- 1st year, **1.59 bil** CESS will be minted, so **4.36 mil** CESS minted per day.
- Currently block time = 6 sec, so **302.5** CESS will be minted per block.
- Annual mint growth decay = 0.841. Newly minted tokens will be halved every 4 yrs. Eventually reaching **10 bil CESS** (sum of GP: 1.59 bil / (1-.841)) circulating.

- 30% is rewarded to storage miners, 15% rewarded to consensus miners.
- So about **1.31 mil** CESS per day is rewarded to storage miners, or **90.8** CESS per block to storage miners.

Reward Mechanism - 1

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The reward of a storage miner in *k-th* round is determined based on:

- **TotalReward**: the total reward across the CESS network in *k-th* round.
- **ServiceSpace**: the utilized space of the storage miner in *k-th* round.
- **IdleSpace**: the idle space of the storage miner in *k-th* round.
- **TotalStoragePower**: sum of all storage miner power in *k-th* round.

$$StoragePower_k = IdleSpace_k * 0.3 + ServiceSpace_k * 0.7$$

$$RewardOrder_k = TotalReward_k * \frac{StoragePower_k}{TotalStoragePower_k}$$

Reward Mechanism - 2

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Reward order is the reward for the storage miner in that round. Once the reward is determined, 20% of the reward order is distributed right away and the rest is distributed in the subsequent 180 rounds, each time 1/180 of the remaining amount.

The available reward for a storage miner in *k-th* round is computed below:

$$AvailableReward_k = (RewardOrder_k * 20\%) + \sum_{t=k-180}^{k-1} \frac{RewardOrder_t}{180}$$

A reward order will be removed after fully distributed. So a storage miner can receive rewards from at most 181 orders.

Reward Mechanism - 3

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```
jimmychu@hkwtf-dev:~$ sudo cess bucket reward
+------------------+-------------------------+
| total reward     | 1_386_087_909_756_800 |
| claimed reward   | 289_535_681_384_295   |
| available reward | 0                       |
+------------------+-------------------------+
```

Slash Mechanism - 1

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- A storage challenge is issued every **one min**. (10 blocks), toward **a single randomly chosen storage node**.
- Each day there are 1,440 challenges being issued.
- If there are **200 storage nodes** running within the network, a node is very likely to be challenged **at least once** within 919 challenges (>99%)

Slash Mechanism - 2

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Minimum Deposit: **4,000 CESS per TB** (in testnet)

Slashing:

Before service space is allocated

- Fail for **one challenge**: **500 CESS** slashed
- Fail consecutively for **three challenges**, deposit slashed and excluded from storage group.

After service space is allocated

- Fail for **one challenge: 5%** staking deposit slashed
- Fail consecutively for **three challenges**, deposit slashed and excluded from storage group.

When drop below the min deposit, miner need to refill back the deposit to claim rewards.

Preparation

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- A CESS staking account, with its mnemonic
- 4,000 TCESS in the staking account
- A linux server with a certain amount of storage. For demo purpose, we are using Ubuntu v22, with 50 GB storage space allocated to CESS testnet.

Demo: Running a Storage Node

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- Download `cess-nodeadm`
- Account Preparation
- Run the `cess config`
- Start the cess program
- Review log and status on the console
- Review status on-chain

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End