

Become a Validator on 5ire

1. Become a Validator

5irechain's primary goal is to create a user-centric sustainability-driven ecosystem. This is achieved by embedding sustainability in the network's base layers and the upper decision-making that democratically commands the network. 5irechain is a Nominated Proof-of-Stake blockchain with validators that bring sustainability from the off-chain and governance mechanisms that assure the empowerment of working groups and decentralized organizations that work toward the implementation of the 2030 Agenda, thus bringing a shift from a for-profit paradigm to a for-benefit.

2. How to become a Validator

Anyone and everyone can join a public blockchain and become a validator for the network's consensus, while individuals need permissions in private and consortium blockchains. The most commonly trusted and implemented consensus is PoS (Proof of Stake), where it randomly selects validators for block creation and validation and ensures that validators cannot predict their turn. The 5irechain uses Sustainable PoS as its consensus protocol. There are a few factors on the basis of which, one node's eligibility to become a validator are determined. These are; reliability, stake, ESG score, randomized vote, and previous nomination. These factors are taken into account in computation of the "total weight" of a node which quantifies a node's eligibility score. Stake carries 50% of the total weight of a node, ESG score and randomized voting carries 20% of the total weights, whereas reliability carries 10% of the total weight. If a node was previously nominated to become a validator, her total score is deducted by a factor of 2%. A node that wishes to become a validator Nodes that wish to become a validator needs to create a transaction in this regard. Then the total weights of all nodes who have expressed their desire to become validators are computed from the factors associated with them. Once the total weights of all the nodes are available, the top 25-30 nodes in terms of total weights are chosen to become validators for the next epoch that lasts 48 hours.

3. How validators achieve consensus

Validators act as both block assemblers and block attesters in 5irechain. As discussed above, top 25 nodes in terms of total weights are chosen to become validators in an epoch lasting 48 hours. An epoch is divided into slots of length 3 seconds each. Slots are randomly distributed among validators in a decentralized fashion. One slot is allocated to one validator who creates one block in that time slot. All other validators function as block attesters who attest the block. Once a

block is attested, it is appended to the existing 5irechain and are considered as accepted by the network.

4. Requirements

A validator needs to accumulate a sufficient amount of weights in order to be eligible to become a validator. These weights are calculated on the basis of a few factors like reliability, ESG score, randomized vote etc. Nodes reliability directly depends upon the time for which it has been remaining online. The ESG score is calculated in a decentralized way whereby the node submits a report on its ESG compliance, and all other nodes review the report and provide ratings on it. Finally all the ratings are aggregated and an overall score is computed which forms the basis of the node's ESG score. There is also a randomized voting factor that carries 20% of the total weight where all nodes randomly vote for the nodes that have opted to become validators. Depending upon all these factors a node is chosen to become a validator.

5. Any Software installation

5ire ecosystem ensures that all the nodes in the blockchain ecosystem establish a certain level of trust. We are introducing a hardware based root of trust based on Trusted Platform Module (TPM). A TPM device will allow the 5ire nodes to remotely attest the devices for any malicious code. TPM contains a key pair called Endorsement Key (EK). This is burned inside the TPM device at the time of manufacturing and even the manufacturer does not know the private key as it is generated inside the TPM device using a random seed. EK cannot be used directly to sign any piece of data, rather it is used to generate another key pair called the attestation key (AK). AK can be used to sign attestation data inside the TPM device. This data is stored into platform configuration registers (PCR). It is the hash of applications that start when the node starts and can help us identify malicious applications running on a node. 5ire blockchain will ensure that all the block assembling nodes participating in the network are running the similar applications when they boot.

6. Validators reward

Validators are rewarded for both assembling and attesting blocks. They receive incentives as transactions fee and 70% of the fee goes to the block assemblers whereas 30% goes to the attesters who verify the assembled block.

7. If a Validator cheats

In case, if a validator is caught being dishonest in his/her decisions, inactive or double signing, then that validator will be punished. If a validator cheats or underperforms, then she can be blacklisted for a specific period of time and he/she won't be allowed to become validator for that period of time. Whenever a validator

misbehaves, the system moderators may take away their voting rights for a certain period of time or permanently based upon the severity of the misconduct. In the worst-case scenarios where the validator may miscommunicate and be involved in fraudulent activities (double signing), the validator can be permanently blocked from accessing the network while losing all his stakes at the same time.

8. If a Validator underperforms or fails

The overall reputation of the validator in the network will be damaged and his/her chances of being voted 2nd/3rd times could be reduced. When a validator loses reputation, his/her chances of being chosen as a proposer are reduced to null.

9. Hardware Recommendations

- CPU
 - Cores: 32
 - Threads: 64
 - Base clock: 3.7GHz
 - Boost clock: 4.5GHz
 - Total cache: 144MB
 - TDP: 280W
 - AVX2 instruction support (to use official release binaries, self-compile otherwise)
 - Support for AVX512f and/or SHA-NI instructions is helpful
 - AMD Ryzen 3X / AMD TRX40 series are popular in validator community
- RAM
 - 128GB, or more
 - Motherboard with 256GB capacity suggested
- Disk
 - PCIe Gen3 x4 NVME SSD, or better
 - Accounts: 500GB, or larger. High TBW (Total Bytes Written)
 - Ledger: 1TB or larger. High TBW suggested
 - OS: (Optional) 500GB, or larger. SATA OK
 - The OS may be installed on the ledger disk, though testing has shown better performance with the ledger on its own disk
 - Accounts and ledger *can* be stored on the same disk, however due to high IOPS, this is not recommended
 - The Samsung 970 and 980 Pro series SSDs are popular with the validator community
- GPUs
 - Not strictly necessary at this time
 - Motherboard and power supply speed to add one or more high-end GPUs in the future suggested