Sharder Consensus

v1.0

CONTENTS

1、 Sharder Consensus

To provide a fair environment for Sharder nodes to generate blocks, more stable nodes will be added to the network to promote network dispersion. DPoS and PoC (Proof-of-Credit) consensus will also be an addition to the already established PoS consensus.

DPoS Operating Principles：

- The Sharder Pool is created by nodes that possess the authority to create Sharder Pools.
- Each Sharder account can stake their SS to the Sharder Pool.
- The amount of SS within the Sharder Pool will determine the relevant nodes' block generation rate.
- The block generation rewards obtained from the Sharder Pool will be distributed in accordance to the amount of SS staked from each Sharder account. Simply put, every user can participate in mining when they stake SS to the Sharder Pool even if they didn’t run a node. The pool creator is the “proxy” for every participant in the pool.

PoC Operating Principles：

- The PoC score of nodes in the Sharder Network is calculated with the PoC equation at section 4.5.

- Block generation rights in the Sharder Network are determined by a node's PoC score. The amount of SS held will no longer be the sole factor in determining the block generation rate.

The weighted table and relevant functions will be revised in accordance to the community's proposals during testing and after mainnet release.

2、 Nodes

Sharder Foundation Nodes (Sharder Node)： A node operated by the Sharder Foundation. Other than competing for block generation rights, it maintains the minimum amount of nodes in the network, provide guidance to nodes, and provide basic functions such as business APIs and etc.

Community Nodes： Stable nodes approved by Sharder and the community. Nodes must be able to maintain a 99%, 24/7 uptime status and meet the following hardware & network configuration requirements are able to apply to become a community node: 3.1GHz+ Quad-core processor, 8GB+ RAM, and a 5+ Mbps internet connection with a public IP.

Hub Nodes： A node operated from the Sharder Hub, it has the ability to start up Sharder Pools. The Hub client will be ran off the Hub node, the hub client will continue to be updated and will gain additional functionality to mine storage tokens such as File Coin, etc.

Box Nodes： A node operated from the Sharder Box, the Box client will be ran off the Box node. (TBA)

Normal Nodes： Any personal computers or servers running a node off the Sharder client will be recognized as a normal node.

3、 DPoS

3.1 Sharder Pool

The Sharder Pool is composed of the following four transactions: pool-creation, pool-deletion, pool-join, pool-exit.

Pool-creation transactions are transactions created by miners. Pool-deletion transactions are transactions created by the system in accordance to the pool's lifecycle. Pool-join and pool-exit transactions are transactions created by Sharder users.

Sharder Pool Creation Rights：

1.Method 1: Link Sharder account with the Hub/Box, these Sharder accounts can only operate on the Hub/Box's node linked to the account.

2. Method 2: Apply and pay a specific amount of SS (ERC-20), these Sharder accounts can operate on nodes other than Hub/Box nodes.

Note: Sharder will announce the amount of SS (ERC-20) required for method 2 to the community at a later date, it’ll be realized through the COS client update.

Sharder Pool Attributes：

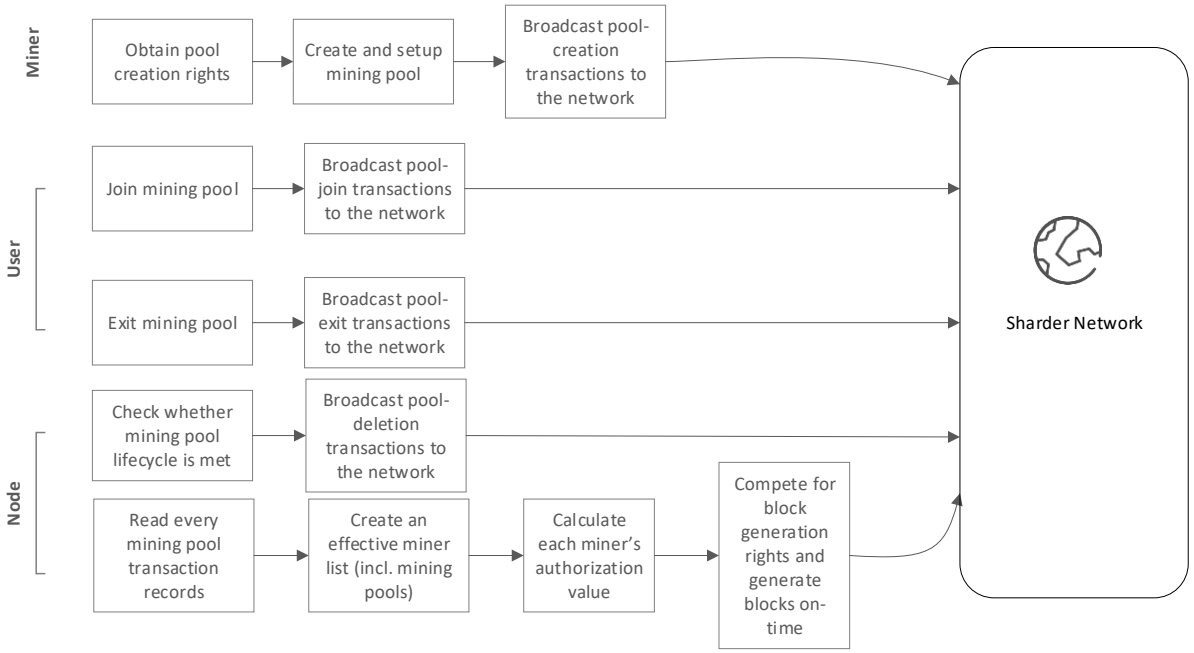
1. Pool creators can set the earnings distribution ratio, creators can earn a maximum of 30% pool earnings.

2. A maximum of 1000 pools can be operated.

3. A single pool can hold a maximum of 300,000 SS.

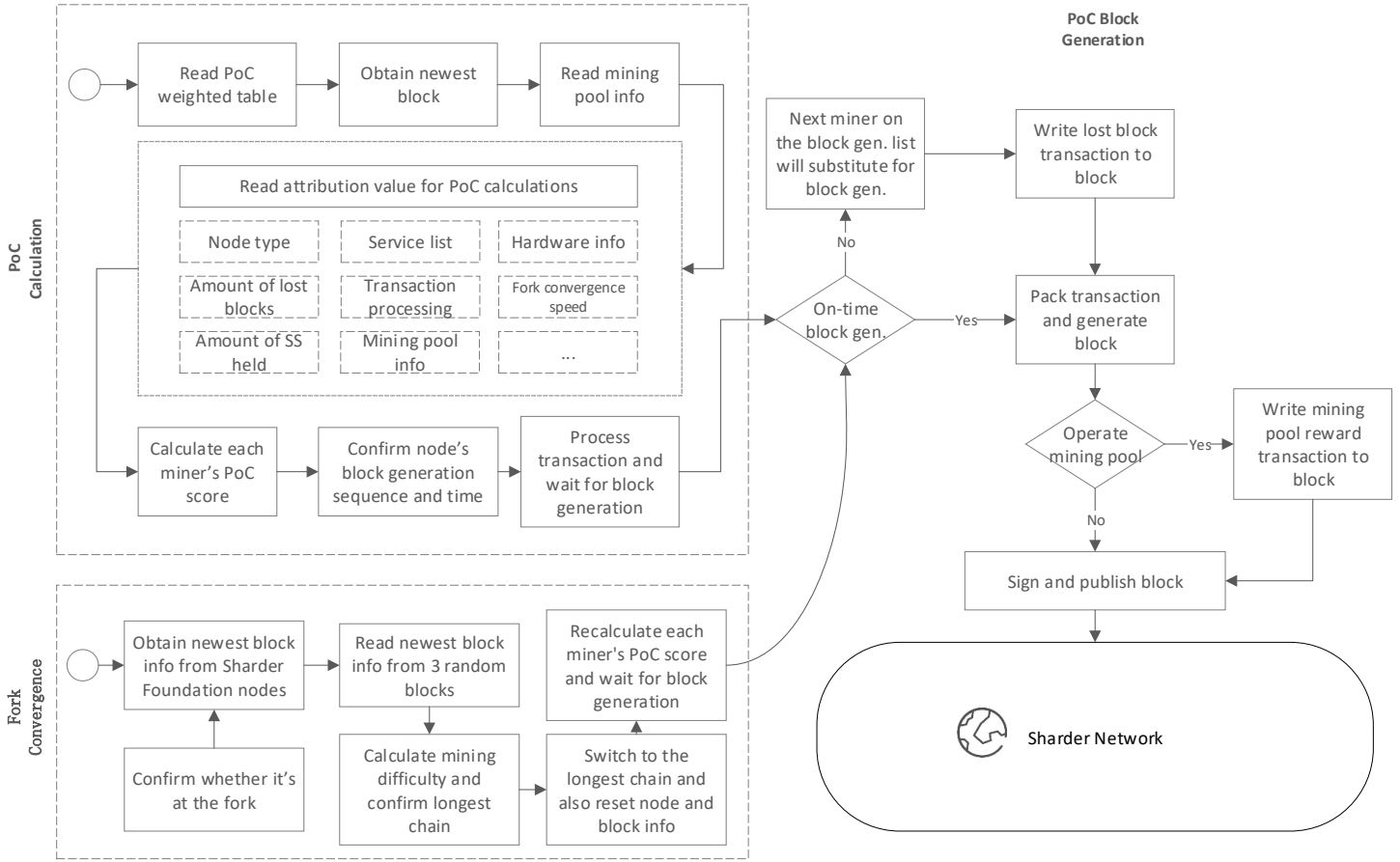
Note: The guidelines above will be adjusted in accordance to the testnet conditions and the feedback of the community and hub users.

3.2 DPoS Realization



4、 PoC

4.1 PoC Realization



4.2 PoC Weighted Table

Distribution	Weighted Category	Weighted Value				
25%	Node Type	A. Sharder Node; B. Community Node; C. Hub Node; D. Box Node; E. Normal Node				
20%	Role	A. Miner; B. Watcher (Sharder and community nodes); C. Traversal (TBR); D. Storer (TBR); E. Prover (TBR)				
40%	SS Held	SS held in the Sharder account or within the Sharder Pool				
5%	Hardware Config	Low: 2.7GHz+ Dual-core 4 threads processor; 4GB+ DDR3 RAM;100GB 5400RPM HDD/SSD	Mid: 3.1GHz+ Quad-core 4 threads processor; 8GB+ DDR4 RAM; 1TB+ 5400RPM HDD/SSD	High: 3.6GHz+ Octa-core 8 threads processor; 16GB+ DDR4 RAM; 10TB+ 7200+RPM HDD/SSD		
5%	Network Config	Very Low: Non-Public IP	Low: Public IP, 1-5MBps	Mid: Public IP, 5-10Mbps	High: Public IP, 10+Mbps	
5%	Tx Processing Performance	Low 100-300 TPS	Mid 500-1000 TPS	High 1000+TPS		
/	Amount of Loss Blocks	Zero	Low: 1 block/month Less than 3 accumulated lost blocks	Med: Less than 3 blocks/week Less than 10 accumulated lost blocks	High: 3+ blocks/week 10+ accumulated lost blocks	
/	Fork Convergence Speed	Hard Fork	Slow: Over 10 blocks	Medium: Less than 5 blocks	Fast: Less than 2 blocks	
/	Uptime	99.99%: 8751.24 hours/year 167.832 hours/week	99%: 8672.4 hours/year 166.32 hours/week	97%: 8497.2 hours/year 162.96 hours/week	90%: 7257.6 hours/year 151.2 hours/week	

- **Node Type：** The Sharder Node is deployed by the Sharder Foundation and partners, it maintains the minimum amount of nodes necessary and provide stable online services. Community nodes are deployed by Sharder community members and validates proposals via Task Hall, a node will be approved by the community after passing the community voting process. Hub and Box nodes are operated by a person or the team after purchasing a Hub or Box. Normal nodes are personal computers or servers running a Sharder client.
- **Uptime：** Sharder nodes are required to achieve a 99.99% online status, community nodes are required to achieve a 99.00% online status, Hub and Box nodes are required to achieve a 97.00% online status, and normal nodes are required to achieve a 90.00% online status.
- **Hardware Configuration：** The Sharder client will automatically obtain and rate a system's hardware configuration.
- **Network Configuration:** Categorized as non-public IP or public IP, networks with a public IP will be categorized into 3 classes.
- **Transaction Processing Performance：** When the Sharder node and community node connect online, they will be tested on their performance while they're being validated and will be rated based on their test results. After they're connected, they will undergo periodic performance evaluations (at present, timeframe is set to quarterly) and their ratings will be adjusted accordingly.
- **Amount of Loss Blocks：** The amount of loss blocks will increase by 1 if a miner fails to generate a block at its scheduled block generation time.
- **Fork Convergence Speed：** The nodes in the fork will automatically report the amount and duration of blocks that are: currently in the fork and blocks that will eventually return to the main chain.
- **SS Held:** There are no limits to solo-mine on a single account. At present, each mining pool will be able to hold a maximum of 300,000 SS.

4.3 PoC Scoring Table and Score Function

Normal Weighted Distribution Table									
Node Category		**Role**		**Transaction Processing Performance**		**Hardware Config.**		**Network Config.**	
Category	Score	Role	Score	Class	Score	Config.	Score	Bandwidth	Score
Sharder Node	10	Miner	+4	Low	3	Low	3	Very Low	0
Community Node	8	Watcher	+4	Mid	6	Mid	6	Low	3
Hub Node	6	Traversal	+4	High	10	High	10	Mid	6
Box Node	6	Storer	+4					High	10
Normal Node	3	Prover	+4						

4.4 Rewards & Penalties Table and Function

Normal Rewards & Penalties Table			
Amount of Loss Blocks		Fork Convergence	
Loss	Deduction	Loss	Deduction
High	-10	High	-10
Med	-6	Med	-6
Low	-3	Low	-3

Uptime Rewards & Penalties Table		
Node Category	Threshold	Score
Sharder Node	99.00%<Uptime<99.99%	-2
	97.00%< Uptime <99.00%	-5
	Uptime <97.00%	-10
Community Node	97.00%< Uptime <99.00%	-2
	90.00%< Uptime <97.00%	-5
	Uptime <90.00%	-10
Hub/Box Node	Uptime >99.00%	+5
	Uptime >97.00%	+3
	Uptime <90.00%	-5
Normal Node	Uptime >97.00%	+5
	Uptime >90.00%	+3

4.5 PoC Equation

PoC：Credibility Score， WP_n：Weighted Distribution， WI_n：Weighted Category， $f(WI_n)$：Score Function， RP_n：Rewards & Penalties Category， $f(RP_n)$：Rewards & Penalties Function

Equation $PoC = \sum_{n=1}^{6} (f(WI_n) * WP_n) + \sum_{n=1}^{3} f(RP_n)$

5、 Systematic Rewards

Only block generation rewards are available on the testnet at this time.

5.1 Block Generation Rewards

At present, the average block generation time on the testnet is set to 7 minutes, approximately 205 blocks can be generated per day. Each block's block generation reward is 300 TSS (Sharder Testnet Token), TSS can be converted to SS (ERC-20) within the Sharder client or through CAMP. Conversion details and guidelines is subject to change by the Sharder Foundation and will be announced when available.

5.2 Other Rewards

Details regarding systematic rewards for watchers, traversals, storers, provers, etc. will be updated along with Sharder client and testnet updates. More details will be announced at a later date.