

RCHAIN NODE VALIDATION SERVICES AGREEMENT

This Node Validation Services Agreement (the “**Agreement**”), effective as of the date this Agreement is signed by both Parties (the “Effective Date”), is entered into by and between Node Validator and RChain, Cooperative a Washington cooperative association (“**RChain**”). Node Validator and RChain may also be referred to herein, from time to time, collectively as the “Parties” or individually as a “Party.”

WHEREAS, Node Validator has the interest, capability, and expertise in the areas of proof of stake node validation on the RChain blockchain; and

WHEREAS, RChain desires to engage Node Validator’s expertise in order to build its node validation network;

NOW, THEREFORE, in consideration for the Services to be provided by Node Validator to RChain, the Parties agree as follows:

1. DUTIES OF NODE VALIDATOR. In addition to Node Validator’s purchase of RHOC from RChain, Node Validator shall also provide to RChain the following services (the “**Services**”):

- 1.1 Perform node validation tasks by using the proof of stake method to validate transactions on the RChain blockchain based on Node Validator’s node validating tier requirements as set forth in **Exhibit A** (the “**Node Validation Overview**”);

The RChain Node Validation Tiers include:

- **Tier 1 (“Professional”)**: a minimum purchase of the USD equivalent of \$1,000,000 or more in RHOC in connection with this Agreement;
 - **Tier 2 (“Business”)**: a purchase of the USD equivalent of \$250,000 to \$999,999 in RHOC in connection with this Agreement; and
 - **Tier 3 (“Enthusiasts”)**: a purchase of the USD equivalent of \$1,500 to \$249,999 in RHOC in connection with this Agreement.
- 1.2 In order to stake the REV token on the RChain blockchain and to fuel the Services, Node Validator must purchase RHOC (the “**Stake**”). Node Validator may purchase RHOC by sending BTC, ETH, or USD to the cryptographic wallet address provided by RChain at the time of purchase. Upon the launch of RChain’s mainnet (the “**Network Launch**”), the RHOC purchased pursuant to this Agreement shall convert into REV on a one-to-one basis. While the RHOC, as an ERC-20 token, will not be used to stake on the RChain blockchain, RHOC ownerships allows Node Validator to have immediate access to REV at the time REV becomes available.
 - 1.3 Comply with Anti-Money Laundering (“**AML**”) and Know Your Customer (“**KYC**”) requirements.

1.4 Become a member of the RChain Cooperative;

1.5 Perform node validation tasks pursuant to the node validating equipment and hardware specifications set forth in **Exhibit A**. The Node Validating Overview is a “living” document and will be refined and updated. The current version of the Node Validating Overview will be posted at <https://github.com/rchain>.

1.5.1 Node Validator shall provide to RChain written notice prior to making any change to its node validating equipment and hardware specifications (“**Notice of Change**”) for RChain’s written approval of the change. RChain shall provide to Node Validator written approval or rejection of the change within thirty (30) days of RChain’s receipt of Node Validators Notice of Change.

2. PERFORMANCE OF NODE VALIDATION SERVICES. Services will be deemed completed by the Node Validator when Node Validator has completed its requisite level of staking and transaction validation as set forth in **Exhibit A**.

2.1 If Node Validator improperly validates a transaction, due to its sole negligence, whether intentionally or not, then the improper validation will lead to some or all of Node Validator’s stake being slashed. In the event that there is an error in the RChain software that causes Node Validator to improperly validate a transaction, RChain will remedy the situation and prevent Node Validator’s stake from being erroneously slashed.

2.2 To participate in a Namespace, an individual or entity shall become a Node Validator. Different Namespaces will have different validation requirements as set forth by RChain. Node Validator shall abide by and meet the requirements set forth in each Namespace in which it serves as Node Validator.

3. PAYMENT FROM RCHAIN.

3.1 **Payment Terms.** In exchange for the Services, RChain shall pay to Node Validator pursuant to the Node Validating Overview set forth in **Exhibit A** and **Exhibit B**.

3.1.1 **Exchange Rate:** For the purpose of this Agreement, Node Validator’s minimum purchase amount and Node Validation Tier will be based on the USD-RHOC exchange rate as listed on www.coinmarketcap.com at the time of Node Validator’s payment. Any changes in the exchange rate after Node Validator’s payment will not impact the Node Validation Tier.

3.1.2 **No Refunds.** All RHOC purchases are final. RChain will not refund any amount of RHOC.

3.1.3 **Staking Existing RHOC.** If Node Validator chooses to use its existing RHOC in order to bond such RHOC to Node Validator’s nodes, then

RChain will apply the discount rate associated with the stake's Node Validation Tier purchase minimum as set forth in **Exhibit B**. Please note that Node Validator will receive its RHOC associated with the discount *at Network Launch*.

Node Validator may stake its existing holding of RHOC and the RHOC it purchases pursuant to this Agreement; however, the applicable discount rate will differ and will apply separately to the existing RHOC and the newly purchased RHOC. For example, if the Node Validator would like to stake its existing USD equivalent of \$800,000 of RHOC that it purchased outside of this Agreement such that it qualifies for a Tier 2 purchase ("**Existing RHOC**") and later decides to purchase the USD equivalent of \$200,000 of RHOC pursuant to this Agreement ("**Validator Purchase**"), then Node Validator shall receive the discount rate associated with a Tier 2 on the Existing RHOC and the discount rate associated with a Tier 3 on its Validator Purchase. In addition, Node Validator will be responsible for (i) Tier 2 validating duties and obligations and, separately, (ii) Tier 3 duties and obligations. *Node Validator cannot combine Existing RHOC and its Validator Purchase for purposes of qualifying for a different Node Validation Tier.*

In the event that Node Validator stakes both existing RHOC and RHOC purchased pursuant to this Agreement, Node Validator will immediately receive the RHOC associated with the its Validator Purchase transaction and discount. Node Validator will separately receive the RHOC associated with the discount applied to Existing RHOC *at Network Launch*.

- 3.1.4 **Acquiring Additional Stake.** If Node Validator has already purchased RHOC in connection with this Agreement and would like to purchase additional RHOC in order to qualify for a higher Node Validation Tier, then it may contact Kenny Rowe at kenny.rowe@rchain.coop.

The discount rate associated with the purchases of RHOC will be based on the aggregate amount of RHOC purchased. For example, if the Node Validator purchases an amount of RHOC pursuant to this Agreement such that it qualifies for a Tier 2 purchase and later purchases additional RHOC pursuant to this Agreement such that it qualifies for a Tier 1 purchase, then RChain will apply a prorated discount rate to the second purchase such that the discount rate associated with a Tier 1 purchase will effectively apply to both transactions.

- 3.1.5 **Distribution of RHOC Stake Across Nodes.** RChain may distribute, or require Node Validator to allocate, Node Validator's Stake across different nodes such that the amount of the top Stake in any given node is no greater than thirty (30) times of the amount of the smallest Stake.

- 3.2 Lock Up. RHOC purchased in connection with this Agreement shall be locked until RChain's Mainnet launch, contemplated to take place in Q1 2019. Upon Network Launch, the RHOC will automatically convert into REV on a one-to-one basis ("**Converted Payment**"). This Converted Payment will be staked for an additional Six (6) months after Network Launch (the "**Staking Period**"). During the Staking Period, Node Validators will still be able to earn and receive revenue from other node validation revenue opportunities as discussed in Section 3.3 of this Agreement.
- 3.3 Other Node Validation Revenue Opportunities. In addition to the potential revenue opportunities set forth in the Node Validator Sale and Stake Economic Detail document, Node Validator will also have the opportunity to earn revenue through other payment streams, such as seigniorage fees as set forth in **Exhibit B**. The Node Validator Sale and Stake Economic Detail document is a "living" document and will be refined and updated. The current version of the Node Validator Sale and Stake Economic Detail document will be posted at <https://github.com/rchain>.

4 TERM/TERMINATION.

- 4.1 Term. This Agreement shall be effective upon the Effective Date and remain in effect until the end of the Staking Period unless terminated by the Parties pursuant to Sections 4.2 or 4.3 or this Agreement.
- 4.2 Mutual Termination. This Agreement may be terminated with a Party's provision of thirty (30) days' notice and written consent by both Parties.
- 4.3 Termination for Cause. This Agreement may be terminated by either Node Validator or RChain if a material breach of any provision of this Agreement has been committed by the other Party and such breach has not been cured (if curable) within Fifteen (15) days of the defaulting Party's receipt of written notice that adequately describes the alleged breach, or the breach has not been waived by the defaulting Party.
- 4.4 Termination and Payment. Upon any termination or expiration of this Agreement, Node Validator and RChain agree and understand that all requisite consideration associated with the provision of the Services by RChain to Node Validator shall have been provided and no further payment shall be due or owed to RChain. Upon termination, Node Validator and RChain shall agree to the provision and delivery of any further outstanding Services due pursuant to the Agreement and complete such provision and delivery in a timely manner within 15 days from the date of the termination or expiration.
- 4.5 Assignment/Termination Upon Death or Disability. This Agreement is a business services agreement between Node Validator and RChain and is not assignable by either Party to a third party without the express written consent of both Node Validator and RChain.

- 5 CONTRACTUAL AUTHORITY.** Node Validator shall not have any authority to enter into any contract or agreement on behalf of RChain or to create any obligations on the part RChain unless specifically authorized by RChain in writing.
- 6 CONFIDENTIALITY.** Node Validator and RChain agree that during the course of this Agreement, information that is confidential or of a proprietary nature may be disclosed to the other Party, including, but not limited to, business and operational plans, financial dealings and confidentiality discussions, unpublished communications and financial information, projections, and marketing data (“**Confidential Information**”). Confidential Information shall not include information that the receiving Party can demonstrate (i) is, as of the time of its disclosure, or thereafter becomes part of the public domain through a source other than the receiving Party, (ii) was known to the receiving Party as of the time of its disclosure, (ii) is independently developed by the receiving Party, or (iv) is subsequently learned from a third party not under a confidentiality obligation to the providing Party. Confidential Information need not be marked as confidential at the time of disclosure to receive “Confidential Information” protection as required herein. Rather, all information disclosed that, given the nature of the information or the circumstances surrounding its disclosure reasonably should be considered as confidential, shall receive “Confidential Information” protection. In connection with the disclosure of any Confidential Information, each Party agrees that it will not at any time or in any manner, either directly or indirectly, use any Confidential Information for its own benefit, or divulge, disclose, or communicate in any manner any Confidential Information to any third party without the prior consent of the other Party. Each Party will protect the Confidential Information of the other Party and treat it as strictly confidential.
- 7 INDEMNIFICATION.** Node Validator agrees to indemnify, defend, and hold harmless RChain and defend any action brought against RChain with respect to any claim, demand, cause of action, debt or liability, including reasonable attorneys' fees, to the extent that such an action arises out of or caused by the act or omission of Node Validator or of any of Node Validator's employees, agents or contractors. In claiming any indemnification hereunder, RChain shall promptly provide Node Validator with written notice of any claim, which RChain believes falls within the scope of this section. RChain may, at its expense, assist in the defense if it so chooses, provided that Node Validator shall control such defense, and all negotiations relative to the settlement of any such claim. Any settlement intended to bind RChain shall not be final without RChain's written consent, which shall not be unreasonably withheld.

RChain agrees to indemnify, defend, and hold harmless Node Validator and defend any action brought against Node Validator with respect to any claim, demand, cause of action, debt or liability, including reasonable attorneys' fees, to the extent that such an action arises out of or caused by an error in the RChain protocol. In claiming any indemnification hereunder, Node Validator shall promptly provide RChain with written notice of any claim which Node Validator believes falls within the scope of this section. Node Validator may, at its expense, assist in the defense if it so chooses, provided that RChain shall control such defense, and all

negotiations relative to the settlement of any such claim. Any settlement intended to bind Node Validator shall not be final without Node Validator's written consent, which shall not be unreasonably withheld.

- 3 REMEDIES.** In the event Node Validator or RChain at any time materially fails to provide to the other Party any payments due under this Agreement, the unpaid Party shall have the right to seek remedies, including but not limited to damages incurred by the paying Party's failure and other liquidated damages to be established by unpaid Party.

4 MISCELLANEOUS.

- 9.1 Rights Cumulative; Waivers. The rights of each of the Parties under this Agreement are cumulative. The rights of each of the Parties hereunder shall not be capable of being waived or varied other than by an express waiver or variation in writing. Any failure to exercise or any delay in exercising any of such rights shall not operate as a waiver or variation of that or any other such right. Any defective or partial exercise of any of such rights shall not preclude any other or further exercise of that or any other such right. No act or course of conduct or negotiation on the part of any Party shall in any way preclude such Party from exercising any such right or constitute a suspension or any variation of any such right.
- 9.2 Benefit; Successors Bound. This Agreement and the terms, covenants, conditions, provisions, obligations, undertakings, rights, and benefits hereof, shall be binding upon, and shall only inure to the benefit of, the undersigned Parties. No benefit, right or obligation under this Agreement shall inure to the benefit the heirs, executors, administrators, representatives, successors, and permitted assigns of either Node Validator or RChain without the express written consent of both Node Validator and RChain.
- 9.3 Entire Agreement. This Agreement contains the entire agreement between the Parties with respect to the subject matter hereof. There are no promises, agreements, conditions, undertakings, understandings, warranties, covenants or representations, oral or written, express or implied, between them with respect to this Agreement or the matters described in this Agreement, except as set forth in this Agreement. Any such negotiations, promises, or understandings shall not be used to interpret or constitute this Agreement.
- 9.4 Assignment. Neither this Agreement nor any other benefit to accrue hereunder shall be assigned or transferred by either Party, either in whole or in part, without the written consent of the other Party, and any purported assignment in violation hereof shall be void.
- 9.5 Amendment. This Agreement may be amended only by an instrument in writing executed by all the Parties hereto.

- 9.6 Severability. Each part of this Agreement is intended to be severable. In the event that any provision of this Agreement is found by any court or other authority of competent jurisdiction to be illegal or unenforceable, such provision shall be severed or modified to the extent necessary to render it enforceable and as so severed or modified, this Agreement shall continue in full force and effect.
- 9.7 Section Headings. The Section headings in this Agreement are for reference purposes only and shall not affect in any way the meaning or interpretation of this Agreement.
- 9.8 Construction. Unless the context otherwise requires, when used herein, the singular shall be deemed to include the plural, the plural shall be deemed to include each of the singular, and pronouns of one or no gender shall be deemed to include the equivalent pronoun of the other or no gender.
- 9.9 Further Assurances. In addition to the instruments and documents to be made, executed and delivered pursuant to this Agreement, the Parties hereto agree to make, execute and deliver or cause to be made, executed and delivered, to the requesting Party such other instruments and to take such other actions as the requesting Party may reasonably require to carry out the terms of this Agreement and the transactions contemplated hereby.
- 9.10 Notices. Any notice which is required or desired under this Agreement shall be given in writing and may be sent by email, personal delivery or by mail, either via United States mail, postage prepaid, or Federal Express or similar generally recognized overnight carrier, addressed as follows (subject to the right to designate a different address by notice similarly given):

If to RChain:
1200 Westlake Ave N, Suite 802
Seattle, WA 98109
Phone: (206) 906-9346
Email: dotto@martindavislaw.com

If to Node Validator:
Notice shall be provided to the email or physical address provided by the Node Validator on the Signature Page of this Agreement.

- 9.11 Governing Law and Jurisdiction. This Agreement shall be governed by and interpreted in accordance with the laws of the State of Washington without reference to its conflicts of laws rules or principles. Each of the Parties consents to the exclusive jurisdiction of the Superior Courts of King County, Washington or the federal court for the Western District of the State of Washington in connection with any dispute arising under this Agreement and hereby waives, to the maximum extent

permitted by law, any objection, including any objection based on *forum non conveniens*, to the bringing of any such proceeding in such jurisdictions.

- 9.12 Consents. The person signing this Agreement on behalf of each Party hereby represents and warrants that he has the necessary power, consent and authority to execute and deliver this Agreement on behalf of such Party.
- 9.13 Survival of Provisions. The provisions contained in Sections 6, 7, 8, and 9 of this Agreement shall survive the termination of this Agreement.
- 9.14 Execution in Counterparts. This Agreement may be executed via facsimile and in any number of counterparts, each of which shall be deemed an original and all of which together shall constitute one and the same agreement.

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IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed and have agreed to and accepted the terms herein:

RCHAIN COOPERATIVE:

By: **Greg Meredith**
Its: President

By: **Kate Gonsalves**
Its: Treasurer

Node Validator:

_____ (“Node Validator”)

By: _____
Its: _____
Email: _____
Contact Address: _____

If entity, place of incorporation: _____

Price per token: \$ _____

USD Equivalent of RHOC Purchase: \$ _____

Fractional amounts of RHOC will be rounded up to the nearest whole number.

Payment Method (BTC/ETH/USD): _____

Notice:

If to Node Validator:

Node Validator:

Phone: _____

Email: _____

EXHIBIT A
Node Validator Overview

EXHIBIT B
Node Validator Sale and Stake Economic Detail

RChain Node Validator Overview



RChain
COOPERATIVE

August 2018

Copyright Notice

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Audience

The distribution of this document is unlimited. It should be of interest to technical and executive members of the RChain community, who are currently planning or considering participating in the network as validators.

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Executive Summary

RChain is creating a next-generation blockchain with the goal of creating a protocol that allows for faster transactions on a public blockchain, the implementation of more complex smart contracts, and the building of more scalable functions. To accomplish its goal, RChain will use a proof-of-stake consensus mechanism. The proof-of-stake consensus mechanism requires a distributed group of node validators to secure the RChain network.

There are three levels of node validation: (1) Professional (\$1,000,000 minimum staking requirement), (2) Business (\$250,000 minimum staking requirement), and (3) Enthusiasts (\$1,500 minimum staking requirement), which are based on the level of the node validator's RHOC stake (or REV after the MainNet launch). As a node validator, a node validator must validate transactions and add blocks to the RChain blockchain at a level that is commensurate with its node validation level.

In order to become a node validator, an interested party—which may be an individual, a group of individuals, or an entity—must be verified by undergoing Know Your Customer (“**KYC**”), Anti-Money Laundering (“**AML**”), and other national and international sanction list evaluations. Once verified, the prospective node validator must then (1) become a member of the RChain Cooperative, (2) agree to the terms of the Node Validator Agreement, and (3) purchase the RHOC/REV needed to stake on the RChain blockchain.

In purchasing RHOC/REV, a node validator receives an asset granting the node validator with the requisite cryptographic token to stake on the RChain blockchain in proportion to the amount of RHOC/REV it holds. The RHOC purchased in connection with the Node Validation Agreement shall be locked until RChain's MainNet launch, RChain's initial launch (also referred to as “**Mercury**”), contemplated to take place in December 2018, in a multi-signature cryptographic wallet, where Node Validator and RChain hold the two requisite private keys. This REV, into which the RHOC shall convert on a 1-for-1 basis at the MainNet Launch, will be staked for an additional Eighteen (18) months after the MainNet Launch (the “**Staking Period**”). During the Staking Period, Node Validators will still be able to earn and receive revenue from other node validation revenue opportunities as discussed further in this document.

To perform its validation duties, a node validator may use a variety of different hardware and storage options, but all of the hardware, server, storage, and other validating equipment (collectively, “**Node Validation Specs**”) must be approved by RChain in writing before a node validator can use the Node Validation Specs in connection with staking and validating on the RChain blockchain.

How to Become an RChain Node Validator

If you are not yet a member of the RChain Cooperative:

1. Complete the RChain Validator Registration: <https://staking.rchain.coop/signup>
2. Undergo KYC, AML, and other identity verification
3. Become a member of the RChain Cooperative
4. Agree to the terms of the Node Validation Agreement
5. Purchase RHOC for staking purposes
6. Receive written approval for and purchase Node Validation Specs

If you are already a member of the RChain Cooperative:

1. Complete the RChain Validator Registration: <https://staking.rchain.coop/signup>
2. Agree to the terms of the Node Validation Agreement
3. Purchase RHOC for staking purposes
4. Receive written approval for and purchase Node Validation Specs

Casper Proof-of-Stake in RChain

RChain uses a pure proof-of-stake version of the correct-by-construction (“**CBC**”) Casper consensus framework.^[1] Many details remain to be finalized; as a result, readers are encouraged to consider the following to be a DRAFT proposal and are politely asked to provide feedback and suggestions addressing any concerns they may have.

On RChain, each shard is an independent blockchain, all running their own Casper consensus protocols. This enables complete parallelism for operations local to different shards. All shards will share the same currency, called REV, for staking and purchasing computation. Transferring REV between shards is made possible by cross-shard relationships which form a tree data structure.^[2]

Parameters for RChain’s Casper

1. A shard’s validator set is unlimited and may contain as many validators as wish to bond (and are accepted by the current validators).
2. Validators must deposit their stake by providing a purse that will be bonded for the entire time they are resident in the validator set.
3. Bonds are fixed for each shard such that all nodes must stake the same amount. - -
 - a. There is complexity in managing how a shard’s stake amount changes over time, which needs to be resolved in future protocol designs.
4. Bond amounts vary between shards. The expected root shard bond amount is between \$1,000 and \$2,000 dollars. However, subsidiary shards may have arbitrarily high bonds.
5. Validators may attempt to bond to any shard at any time and the root shard should admit all validators that wish to bond. However, subsidiary shards may refuse validators that attempt to join. This can happen under various circumstances, e.g. if the shard requires specific hardware that the joining validator has not deployed.
6. There are no global minimum amounts for shard bonds.
7. Bonds for the root shard must be set by the community during genesis and are updated by the validators thereafter.-
8. When a validator requests unbonding, the validator must wait between 3 and 6 months for their purse to be returned.

- a. Validators may, from time to time, request “redemption” of funds within their bonded purse above the shard’s stake parameter. E.g., if the stake requirement is 1,000 REV and the validator’s bonded purse contains 1,500 REV, then the validator may request a “redemption” of 500 REV.
 - b. Redemptions are time-locked in the same way as funds being released during unbonding, so validators must wait an extended period to spend such funds.
9. Unbonded validators may re-apply for validation during their unbonding period using their original stake. E.g., if a validator is ejected for downtime, then when they come back online again they may re-apply to become a validator.
10. RChain’s Casper includes periodic monetary expansion.
- a. It should be noted that while monetary expansion is desired by the RChain Cooperative, technical limitations exist that may prevent implementation in the Casper algorithm. Additional work is needed to determine how expansion can be made to work with RChain’s sharding architecture.
 - b. No specific rate of monetary expansion has been established.
11. RChain’s Casper includes sender-proposed transaction fees. -
12. In MainNet, shards may not change their stake amounts, but in future versions we expect staking requirements to vary over time.
13. During bonding, a new validator must pay a “joining fee” that is distributed among the existing validators and deposited to their bonded purses.

Fee Structures on RChain

Transaction Fees

RChain uses the following transaction fee structure:

- Each transaction fee is proposed by the originator of the transaction, typically referred to as a “deployer.”
- Fees are split among the validators according to the following equations:
 - $b := (1 + k)(fee/(n + k))$
 - $e := fee/(n + k)$
 - Where:
 - **b** is the block proposer whose block introduces a transaction,
 - **e** is any validator that is not **b**
 - **n** is the number of validators,
 - **k** is a shard-specific “fee structure” parameter,
 - **fee** is the proposed transaction fee.
 - Notice: when **k=0**, all validators receive the same payment, and in the limit as **k** tends to infinity only the block proposer receives the entire fee.
- Calculating **b** and **e** will provide an Initial weight W_x For Each Validator X .
- For Each Validator X with stake equal to S_x , the final distributed fee will be calculated as
$$fee_x = \frac{fee * W_x * S_x}{\sum_{x=1}^n W_x * S_x}$$
- It is expected that for RChain’s root shard, the fee structure parameter **k** will be low, but that **k** may be larger in other shards
- 0.01% of all transaction fees are delivered to certain bonded wallets owned by the RChain Cooperative, to help fund maintenance and development of the software and the core network components.

Validator Joining Fees

One very serious attack on proof-of-stake networks occurs when a single investor deploys many nodes as validators, thus overwhelming the original validator set. Depending on the fault tolerance thresholds set by validators in the shard, it may be possible to launch this sort of attack by deploying

$n/3$ validators where n is the number of current validators. This is sometimes referred to a Sybil attack or an “ant army” attack. To avoid ant army attacks, the RChain fee structure requires that new

validators pay a fee to existing validators. These fees are structured as follows:

- The joining fee f is equal to the stake for the shard equal to $\frac{1}{n}$.
- Each current validator is awarded a part of the fee, which is deposited in their bonded purse.
- Validators are ordered from 1 to n in order of their validation tenure (i.e., the amount of time they have been validating the shard) such that the oldest validator is known as v_1 and the newest validator is v_n .
 - Validators that join at genesis will be ordered randomly.
- The amount awarded to validator k given by the function: $award(v_k) = 2f(n - k)/(n(n - 1))$

Slashing Conditions

Validators in the RChain network that do not follow the protocol will correctly have their bonded stake revoked. This is called “slashing.” Slashing improves the security of the network because it imposes a cost for failing to follow the protocol. The initial RChain Casper algorithm has only a single slashing condition:

- Equivocation^[3]

In the general case, equivocation is when a validator signs two incompatible blocks or signs a block containing an invalid update to the Rholang state. It is also considered equivocation if a validator uses two incompatible blocks or a block with invalid Rholang updates in the justification of a new block. The node software produced by RChain should never equivocate. Therefore, any equivocation is considered a deliberate attempt by a validator to manipulate the proof-of-stake algorithm to their own benefit and results in slashing of the entire contents of the validator’s bonded wallet. -

Eventually, the RChain software will be updated to include the following additional slashing conditions:

- Producing an invalid block
 - Not eventually linked to the genesis block
 - Repeated transaction (“double spend”)
 - Invalid Rholang computation (e.g. forging unforgeable name)
 - Incorrectly executing the fork-choice rule (i.e. justification does not match choice of parent)
 - Invalid data fields (e.g. hash, block number, etc.)
- Ignoring a slashable offense (i.e. not slashing when you’re supposed to is slashable).

Early in the network, the RChain node software is subject to a higher probability of bugs that result in validators producing invalid blocks. While RChain and its partners would like to identify and eliminate all such bugs during the TestNet phase, in practice we should account for bugs of this type at the protocol layer to ensure that validators do not lose stake as the result of identifiable problems in the software. Early in the main network’s lifetime, production of invalid blocks will not be considered a slashing offense. However, validators should expect that sometime between MainNet and subsequent releases, this policy will change, and invalid blocks will be considered a slashing offense.

Verification of Work

Validation is a resource intensive task, because the validator must store and compute the state of the Rholang tuplespace before and after every comm event, handle rollbacks correctly, and so forth. As a result, validators have an incentive to “cheat” by receiving blocks without ever proposing any. In this way, the validator avoids having to maintain the tuplespace.

To prevent this, RChain’s Casper algorithm will allow validators to produce “challenges” in the form of

deliberately bad blocks which are sent only to a specific validator. The validator in question must reject the bad block, at which time the originating validator “proves” that it was a challenge rather than equivocation.

Ejection Criteria

Sometimes, validators fail to perform correctly, even though they haven’t been guilty of a slashable offense. In this case, the validator may be removed from the validator set automatically by the other validators. This is called “validator ejection.”

Validator ejection does not result in slashing but acts as if the validator itself requested unbonding. Eventually, the validator’s stake will be returned to an unbonded wallet just as if the validator had voluntarily left the shard.

Ejection criteria have not yet been determined, but are expected to include situations such as the following:

- Validators experiencing unusually high latency.
- Validators experiencing extended downtime.
- Validators who propose no new blocks for an extended period, even if they are online.
- Validators that send a block with an invalid signature, since this can be caused by a hardware or networking fault. Specific ejection criteria parameters are expected to vary from shard to shard.

The RChain Network

RChain’s MainNet is a proof-of-stake smart contracting blockchain with hierarchical sharding that operates at global scale. At the heart of the network is a highly decentralized “root shard” that provides robust economic security as the result of hundreds or thousands of individually staked transaction validators operating in parallel. RChain’s unique sharding architecture allows other shards to be deployed from the root shard, each with its own economic and technical parameters.

Unlike the smart contracting blockchains of today, RChain implements a next-generation processing architecture based on the rho-calculus^[4], and can leverage significant computational power to allow large-scale distributed applications to run in and coordinate with a decentralized, economically secured blockchain.

RChain’s unique sharding architecture further allows both private and semi-private blockchains to integrate directly with the public blockchain. This will allow a variety of enterprise and traditional finance applications to seamlessly interact with blockchain technology for the very first time.

The RChain Root Shard

The RChain network’s security begins and ends with the root shard. On its own, the root shard looks

and performs much like current smart contracting blockchains. The root shard must have thousands of individual validators staking a sufficient amount to eliminate the incentive for validators to form coalitions.

The Root Shard will have the following general characteristics: -

- Many global validators to ensure maximum decentralization, transaction, and wallet security.
- Slow block propagation times due to the large number of heterogeneous validators.
- Low total transaction throughput due to slow block propagation times (only around 10x current Ethereum throughputs, e.g.)
- Expensive transactions due to the large number of validators.
- Very low staking requirements to encourage large numbers of validators.
- Very low validator joining fees to encourage validators at various levels of participation.

High Performance Shards

In order to accomplish our performance goals, the RChain Cooperative and Pyroflex intend to roll out a number of high-performance shards with regional focus. The first of these shards will be deployed in the United States, but RChain encourages validator groups to form across the world and deploy their own regional shards.

A regional shard may have fewer individual validators who each stake larger amounts than is typical for the root shard. This makes these shards suitable for applications that need both acceptable levels of transaction security and performance. But, applications that are willing to sacrifice performance for security should consider the root shard, instead.

High Performance Shards will have the following general characteristics:

- Sufficient validators to ensure regional decentralization, transaction, and wallet security.
- Rapid block propagation times due to high levels of backbone bandwidth.
- High total transaction throughput due to rapid block propagation times (perhaps as much as 1,000x current Ethereum transaction rates)
- Moderate transaction fees due to the good balance of security and performance.
- Higher staking requirements to encourage validators to make effective infrastructure investments.
- Higher validator joining fees to protect against “ant army” attacks.

Peering in the RChain Network's Root Shard

RChain's network is intended to be extremely low latency, with block confirmation times on the order of just a few seconds. It is also intended to be extremely high capacity, targeting 40,000 total transactions per second. Unlike most existing blockchains, RChain has the convenience of a single governance organization that we can leverage to help split the difference between these competing, but equally valuable goals.

To accomplish this, the RChain's peer-to-peer network is split into the following parts:

Backbone Validators

- Local Validators
- Observers (or "Watchers")

Backbone Validation

RChain's backbone validators form a core network of extremely well-provisioned infrastructure that is capable of handling a large amount of global traffic at exceptional latency and throughput. Backbone validators SHOULD follow these rules:

1. Backbone validators deliver transactions to each other in a fully-connected mesh.
2. Backbone validators will accept transactions from any user.
3. Backbone validators will deliver current block updates to any user.

It is notable that backbone validators are not required to provide any user with a full copy of the entire validation history. This can be downloaded by users from the local validators as described below.

None of these rules are slashing conditions.

Local Validation

RChain's local validators form a peripheral network of locally provisioned infrastructure that is capable of handling regional traffic levels at acceptable latency and throughput. Local validators SHOULD follow these rules:

1. Local validators should provide complete chain history downloads to users in their own region.
2. Local validators deliver transactions to other local validators in the same region and to backbone validators with as high a graph connection level as is practical.

3. Local validators will deliver current block updates to any user in their region.

Local validators are not required to be promiscuous outside of their region and, due to the variation in local regional network architecture, may not be able to do so reliably in any case.

None of these rules are slashing conditions.

Observers

RChain Observers are nodes that receive and validate a shard's entire block graph. Observers must receive block updates from their upstream validators and may choose to provide local services, but are not required to do so. Observers may not participate in the Casper protocol and must use out of band mechanisms if they detect slashable offenses.

The RChain TestNet

The test network is slated to launch at the RCon3 conference in Berlin on September 5th. The test network will consist of the single root shard (a.k.a. `"/`) and, possibly, a single subordinate in the Western United States (a.k.a. `"/us/west`").

Approximate TestNetwork Specifications

The test network infrastructure is intended to provide sufficient capacity to test the RChain network across many small nodes as well as across fewer large nodes. Pyroflex intends to coordinate testing with the RChain Cooperative to measure performance details such as the consumption of CPU, RAM, and disk resources as well as the amount and variety of Casper traffic in various configurations and application environments. Actual rollout of the main network backbone capacity will vary based on actual test results. The following is included for reference only. Final specifications and acquisition of Node Validation Specs should be made based on real-world test results.

- 200 AMD Naples 7401 cores
- 4 TB DDR4-2666
- 200TB SATA HDD
- 25Gbps Ethernet between hosted nodes

The RChain MainNet

The RChain MainNet design is expected to change based on information gleaned during test net launch and burn in. The rollout process for RChain's main network will be completed in stages. Pyrofex and the RChain Cooperative will coordinate with validators large and small to ensure the main network rollout is smooth.

The RChain Backbone

A select group of large-scale validators will coordinate to create a backbone of high-performance infrastructure that handles the bulk of global traffic management, validation, and end-user services. This does not imply that RChain is centralized, merely that some network services can be obtained with higher performance from the backbone than from local providers.

The RChain backbone will MINIMALLY consist of nodes operated by RChain Cooperative, Reflective Ventures, and Pyrofex Corporation with the following footprint. Please note that capacity is expressed in "cores" here without regard to RAM, disk, etc. Those wishing to perform capacity planning for initial deployments may take the suggested numbers from TestNet as described above but are encouraged to wait until test results have been obtained before making final calculations for their rollout.

The following table is provisional.

Exchange Point	City	Country	Capacity (in cores)
SIX	Seattle, Salt Lake City	USA	300
LINX	Northern VA	USA	300
LINX	London	UK	300
Equinix	Los Angeles	USA	300
Equinix	Singapore	Singapore	300

Validators are encouraged to coordinate with RChain, Reflective, or Pyrofex if they wish to deploy hardware in these locations. Service estimates are available upon request, if needed.

[1] <https://github.com/ethereum/cbc-casper/wiki>

[2] <https://rchain.atlassian.net/wiki/spaces/CORE/pages/488243367/Cross-shard+transfers>

[3] <https://github.com/ethereum/cbc-casper/wiki/FAQ#wait-what-about-faulty-validators>

[4] <https://www.sciencedirect.com/science/article/pii/S1571066105051893>

RChain Validator Sale and Staking Economic Detail



Sale commencing September 2018 through Main-net launch

Last version :: v1.5 August 30th 2018 Last Author : M Manohar

Disclaimer:: This document is a living document and may be subject to revisions and updates. In particular, we will continually update the FAQ section as we receive more questions. The most current version of this document will be posted at <https://github.com/rchain/legaldocs/tree/master/validator-sale> . RChain will also notify potential and current node validators of any revisions

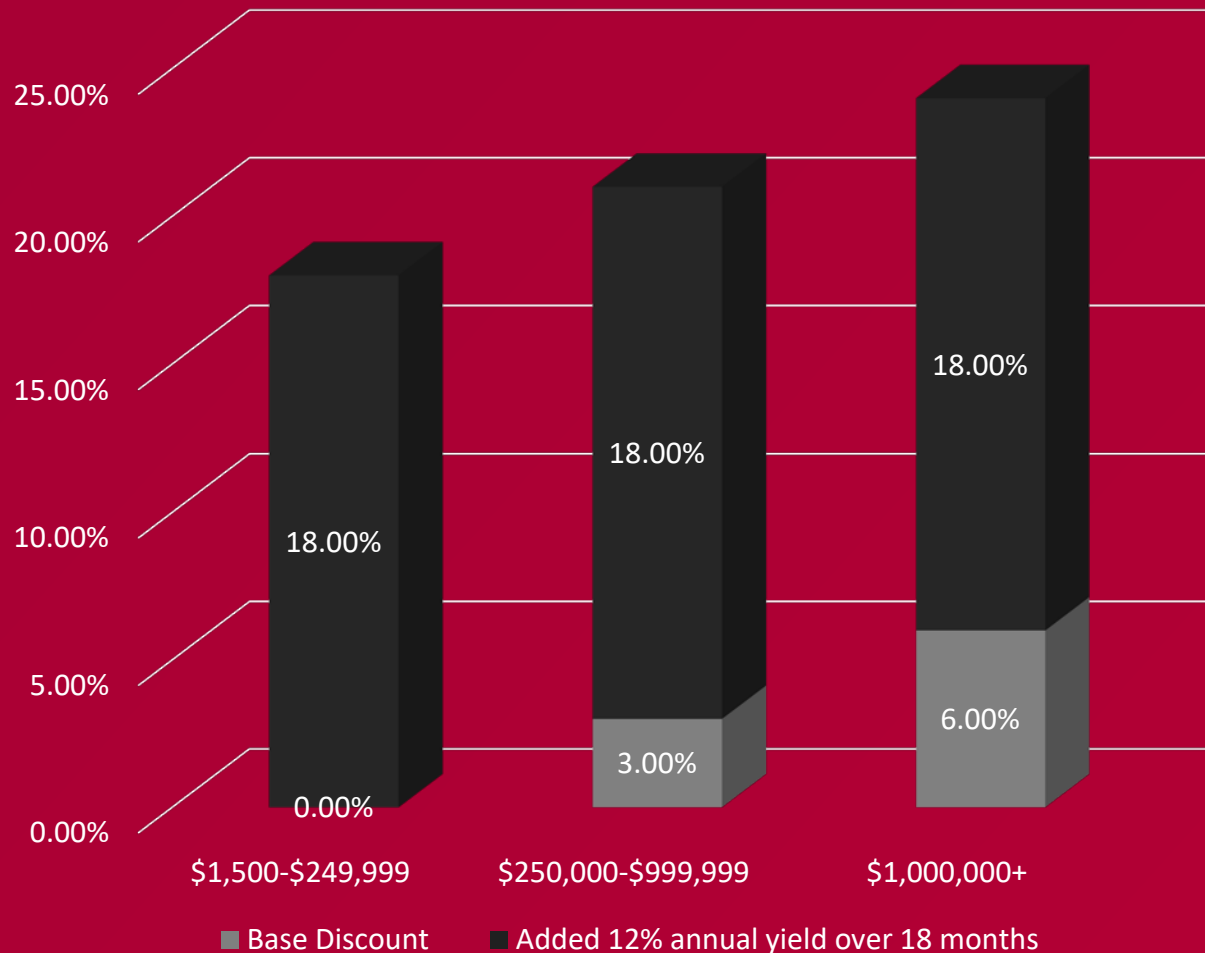
Pricing and Reward Principles Summary



- Economics will flow to validators from 3 key sources
 - Discounts
 - This is offered to incentivize participation in securing the RChain network
 - A pricing discount scaling based on size will be offered to participants in the validator sale
 - Existing RHOC holders who sign the contract with a 6 month lockup will be made whole
 - Seigniorage / Interest
 - This is offered to bootstrap the network during the early days as Tx volumes are expected to grow over time, but will be lower at launch given the network is incipient
 - This will be paid monthly at an annual 7% rate for the first 18 months from main-net launch
 - In addition the same rate will be offered through the test-net period incentivizing securing the network during the test phase
 - This will be sent to an unbonded wallet and will be collectible roughly every month
 - Tx Fees / Storage
 - Validators will also receive fees based on Tx Fees and Storage
 - Values are TBD, but the goal is to offer significantly reduced rates versus other protocols, ensured via RChain's differentiated scalability and throughput
 - Over time we expect this to become a more significant part of economics versus Seigniorage / Interest

Discounts

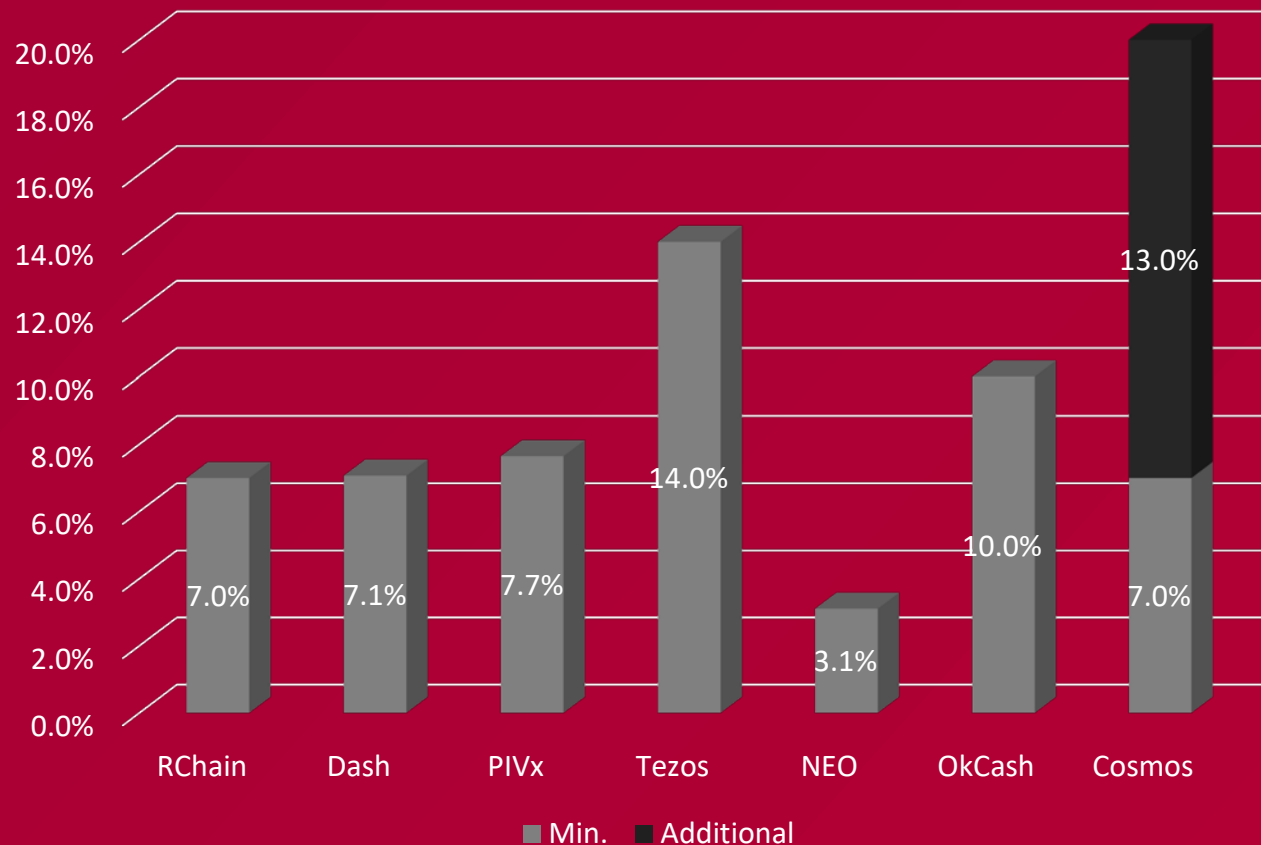
Purchase discount



- The purchase discount consists of 2 elements
 - A base discount of 0-6% based on size of purchase
 - An added discount of 18% will be added in exchange for committing to a 6 month lockup ("lockup" refers to a 6 month lockup from the date of main-net launch)
- Existing RHOC holders that sign the contract and commit to a 6 month lock-up period against validation, will receive tokens equivalent to this discount commensurate with the size of the stake they lock-up
 - These will be deposited into a co-op controlled wallet and will be distributed at the time of bonding
- The discount will be relative to spot price at close, as determined by 2 week trading average on coinmarketcap
- We believe these discount incentives are in line with the commitments being requested from validators

Seigniorage / Interest

Staking Yield*



*Staking schematics / methods vary by project

- In addition we will provide a 7% annualized seigniorage payment to validators out of additional issuance. This is consistent with ongoing yield at other projects
 - This will be in an unbonded wallet external to the bonding wallet that holds your stake
 - Payment will be made ~monthly and will be commensurate with the amount in the bonded wallet
 - Payments can be moved/spent ~monthly, the system will shorten the period based on past monthly rolling average of Tx volume. I.e., continually increasing transaction volumes, lead to disbursements that occur more frequently than every month and vice versa

Return Example (1)

Starting Conditions

Discount tranches	Start	End	% Discount	Segniorage Rate (year 0-1.5)	Effective monthly simple rate
Low Stakes	1500	249,999	8.00%	7.00%	0.57%
Medium Stakes	250,000	999,999	21.00%	7.00%	0.57%
High Stakes	1,000,000	1,000,000	24.00%	7.00%	0.57%

Committed dollar amount	2,000,000
RHOC / REV Price at sale close	0.40
Discount applied	24.00%
Discounted RHOC / REV Price	0.30
RHOC / REV Delivered during sale	6,578,947
RHOC / REV Monthly Price Increase during staking	0.00%

18 Month Return Calculation

Date (start from today)	\$ Inflow	RHOC / REV Held in bonded wallet (B.O.P)	RHOC / REV added through Segniorage	RHOC / REV Held in bonded wallet (E.O.P)	\$ Outflow	RHOC / REV Price (During the month)	Total Cash Flow (Actual)
8/ 27/ 2018	2,000,000	-	-	6,578,947	-	0.40	(2,000,000)
9/ 27/ 2018	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
10/ 27/ 2018	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
11/ 27/ 2018	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
12/ 27/ 2018	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
1/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
2/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
3/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
4/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
5/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
6/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
7/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
8/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
9/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
10/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
11/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
12/ 27/ 2019	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
1/ 27/ 2020	0	6,578,947	37,988	6,578,947	14,879	0.40	14,879
2/ 27/ 2020	0	6,578,947	37,988	6,578,947	14,879	0.40	2,646,468

Internal rate of Return 29.65%
Dollar Demoninated Return 899,407
MoM 145x

- Members of the high stakes/professional tranche will see a true Cash flow IRR of ~30% on the RHOC purchase prior to any Tx /Storage Fees
- This is a “locked in” return and does not depend on price appreciation of the token or a specific quantum of transactions
- Please use (or request) the “RChain Validator Sale and Staking Detail” spreadsheet for the ability to run return simulations on your own

Return Example (2)

Starting Conditions					
Discount tranches	Start	End	% Discount	Segniorage Rate (year 0-1.5)	Effective monthly simple rate
Low Stakes	1500	249,999	8.00%	7.00%	0.57%
Medium Stakes	250,000	999,999	2100%	7.00%	0.57%
High Stakes	1,000,000	1,000,000	2400%	7.00%	0.57%

Committed dollar amount	500,000
RHOC/ REV Price at sale close	0.40
Discount applied	2100%
Discounted RHOC/ REV Price	0.32
RHOC/ REV Delivered during sale	1582,278
RHOC/ REV Monthly Price Increase during staking	0.00%

18 Month Return Calculation							
Date (start from today)	\$ Inflow	RHOC / REV Held in bonded wallet (B.O.P)	RHOC / REV added through Segniorage	RHOC / REV Held in bonded wallet (E.O.P)	\$ Outflow	RHOC / REV Price (During the month)	Total Cash Flow (Actual)
8/ 27/ 2018	500,000	-	-	1582,278	-	0.40	(500,000)
9/ 27/ 2018	0	1582,278	8,946	1582,278	3,579	0.40	3,579
10/ 27/ 2018	0	1582,278	8,946	1582,278	3,579	0.40	3,579
11/ 27/ 2018	0	1582,278	8,946	1582,278	3,579	0.40	3,579
12/ 27/ 2018	0	1582,278	8,946	1582,278	3,579	0.40	3,579
1/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
2/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
3/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
4/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
5/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
6/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
7/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
8/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
9/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
10/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
11/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
12/ 27/ 2019	0	1582,278	8,946	1582,278	3,579	0.40	3,579
1/ 27/ 2020	0	1582,278	8,946	1582,278	3,579	0.40	3,579
2/ 27/ 2020	0	1582,278	8,946	1582,278	3,579	0.40	636,490

Internal rate of Return	26.17%
Dollar Demoninated Return MoM	197,326 139x

- Members of the medium stakes / business tranche will see a true Cash flow IRR of ~26% on the RHOC purchase prior to any Tx /Storage Fees
- This is a “locked in” return and does not depend on price appreciation of the token or a specific quantum of transactions
- Please use (or request) the “RChain Validator Sale and Staking Detail” spreadsheet for the ability to run return simulations on your own

Return Example (3)

Starting Conditions					
Discount tranches	Start	End	% Discount	Segniorage Rate (year 0-1.5)	Effective monthly simple rate
Low Stakes	1500	249,999	8.00%	7.00%	0.57%
Medium Stakes	250,000	999,999	2100%	7.00%	0.57%
High Stakes	1000,000	1,000,000	2400%	7.00%	0.57%
Committed dollar amount	200,000				
RHOC/ REV Price at sale close	0.40				
Discount applied	8.00%				
Discounted RHOC/ REV Price	0.33				
RHOC/ REV Delivered during sale	609,756				
RHOC/ REV Monthly Price Increase during staking	0.00%				

18 Month Return Calculation							
Date (start from today)	\$ Inflow	RHOC / REV Held in bonded wallet (B.O.P)	RHOC / REV added through Segniorage	RHOC / REV Held in bonded wallet (E.O.P)	\$ Outflow	RHOC / REV Price (During the month)	Total Cash Flow (Actual)
8/ 27/ 2018	200,000	-	-	609,756	-	0.40	(200,000)
9/ 27/ 2018	0	609,756	3,448	609,756	1379	0.40	1379
10/ 27/ 2018	0	609,756	3,448	609,756	1379	0.40	1379
11/ 27/ 2018	0	609,756	3,448	609,756	1379	0.40	1379
12/ 27/ 2018	0	609,756	3,448	609,756	1379	0.40	1379
1/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
2/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
3/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
4/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
5/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
6/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
7/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
8/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
9/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
10/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
11/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
12/ 27/ 2019	0	609,756	3,448	609,756	1379	0.40	1379
1/ 27/ 2020	0	609,756	3,448	609,756	1379	0.40	1379
2/ 27/ 2020	0	609,756	3,448	609,756	1379	0.40	245,281

Internal rate of Return 22.91%
Dollar Demoninated Return 68,726
MoM 134x

- Members of the low stakes / enthusiast tranche will see a true Cash flow IRR of ~23% on the RHOC purchase prior to any Tx /Storage Fees
- This is a “locked in” return and does not depend on price appreciation of the token or a specific quantum of transactions
- Please use (or request) the “RChain Validator Sale and Staking Detail” spreadsheet for the ability to run return simulations on your own

Tx Fee Schema

- Each transaction fee is proposed by the originator of the transaction, typically referred to as a “deployer.”
- Fees are split among the validators according to the following equations:
 - $b := (1 + k) * (\text{fee} / (n + k))$
 - $e := \text{fee} / (n + k)$
- Once b and e are determined they will be stake weighted to distribute the fee
- Where:
 - b is the block proposer whose block introduces a transaction
 - e is any validator that is not b
 - n is the number of validators
 - k is a shard-specific “fee structure” parameter
 - fee is the proposed transaction fee
 - This is proposed by the block proposer “ b ”
 - This will be governed by the free market but we are targeting fees at 1/3rd of Ethereum at launch
 - One exception will be storage fees which will be shared evenly across all members
- Notice: when $k=0$, all validators receive the same payment, and in the limit as k tends to infinity only the block proposer receives the entire fee.
- It is expected that for RChain’s root shard, the fee structure parameter k will be low, but that k may be larger in other shards.
- 0.01% of all transaction fees are delivered to certain bonded wallets owned by the RChain Cooperative, in order to help fund maintenance and development of the software and the core network

Stake weighting:

Calculating b and e will provide an Initial weight W_x For Each Validator X

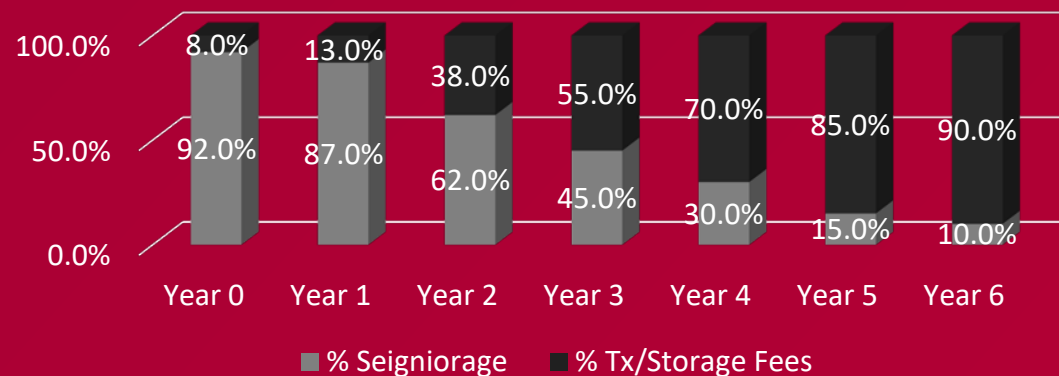
For Each Validator X with stake equal to S_x The final distributed fee will be calculated as

$$\text{fee}_x = \frac{\text{fee} * W_x * S_x}{\sum_{x=1}^n W_x * S_x}$$

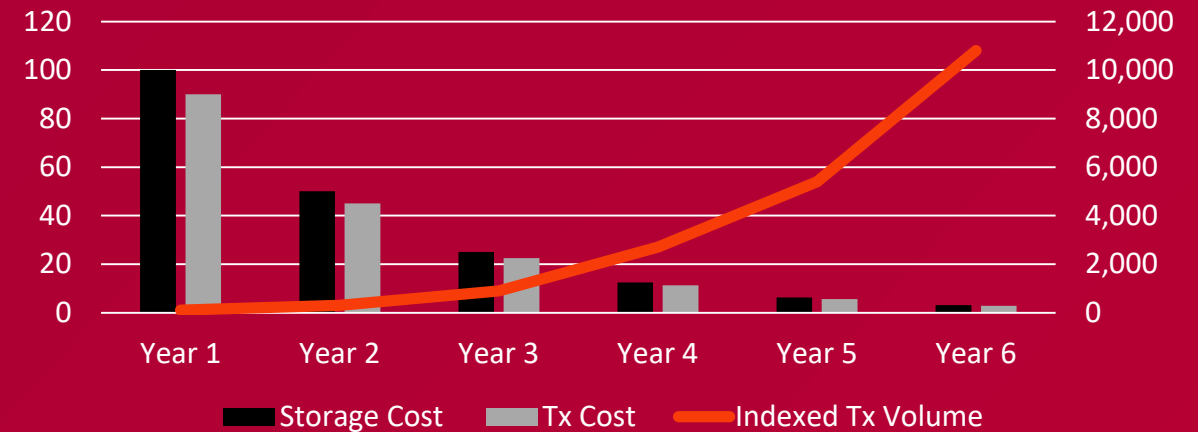
Tx Fee Expectations

- We are seeding economics for validators through the discount and seigniorage
- However as the network grows we expect the volume of transactions to grow rapidly; this should have 2 distinct effects
 - As volume increases, cost per transaction and storage will reduce as capital investments are spread over greater volume

Illustrative Economics Evolution



Illustrative Tx/Storage Fee Evolution



- We expect that over time Tx/ Storage fees will become the main source of ongoing economics versus seigniorage
- Policy will be to maintain outcomes that are neutral to superior economically
- Factors that will be considered while governing this balance are
 - Transaction volume
 - Transaction cost
 - Percent of token supply currently staked

Resources



- Step by step guide to becoming a validator
 - <https://blog.rchain.coop/become-a-validator-and-acquire-rhoc-for-staking/>
- Validator document and contract repo
 - <https://github.com/rchain/legaldocs/tree/master/validator-sale>
- Technical Documentation
 - <https://developer.rchain.coop>

General Questions



This will be continually updated as we receive questions

- Is Bonding an open process? Can it happen at any time? What does it look like?
 - Yes, it's a submitted transaction, as long as the existing validators approve the transaction bonding will occur
- Is there a set commitment period before which stake can be unbonded
 - Yes 6 months
- How long is the up front discount given to existing RHOC holders who commit for 6 months
 - This will extend as long as the validator sale lasts which is expected to occur through the launch of main-net
- Will all shards receive the same level of economic incentive (outside of Tx /Storage fees of course which are shard dependent)?
 - Yes
- Do we want “Backbone” validators to only be in the high stakes pool?
 - Most likely given the proportional cost of hardware to stake

Outstanding Questions - Hardware

This will be continually updated as we receive questions

- When will be able to announce hardware requirements?
 - Specific details will be released during the test phase

Backup on other projects

Staked Min			
Project	(\$)	Yield	Source
DASH	\$235,000	7.07%	https://masternodes.online/currencies/DASH/
PIVX	\$20,000	7.65%	https://masternodes.online/currencies/PIVX/
Tezos		14.00%	https://staked.us/yields/
NEO		3.11%	https://neotogas.com/?p=profit
OkCash		10.00%	https://okcashblockhalf.com/
Cosmos		7-20%	https://cosmos.network/docs/resources/delegator-faq.html#directives-of-delegators