ROCKETPOOL

DECENTRALISED ETHEREUM PROOF OF STAKE NETWORK

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Overview

Rocket Pool is a first of its kind Ethereum Proof of Stake (PoS) infrastructure service, designed to be highly decentralised, distributed and compatible with staking in Ethereum 2.0. It was first conceived in late 2016 and has since had several successful public betas over the life span of ETH2 development.

The staking network allows any *individual, business, defi dapp, wallet provider, SaaS provider, exchange* — just about any service — the ability to provide their users with the option to earn staking rewards on their ETH holdings without worrying about maintaining an extensive staking infrastructure, just plug and play.

Staking with the Rocket Pool network is very flexible and unlike any other staking infrastructure for Ethereum 2.0 to date. When depositing ETH into the Rocket Pool smart contracts, you will be instantly issued a token called **rETH** which represents a tokenised staking deposit in the network. You can hold this for any duration, sell it, trade it or do as you wish and its value will be reflected by the work each individual decentralised node operator gives the Rocket Pool network.

Rocket Pool's unique decentralised staking infrastructure is economically bonded to both be secure and scalable. It works by aligning the interests of two groups:

- ***Stakers*** - are individuals or users from API integrated businesses. They deposit ETH which is automatically assigned to Node Operators for staking.

  They instantly receive **rETH** when depositing which represents their deposit and its staking rewards generated by the network overtime.

- ***Node Operators*** - maintain server infrastructure in the Rocket Pool network by running our smart node software stack that includes an ETH1 client, an ETH2 client and a Rocket Pool client to coordinate activity in the network. To be assigned deposits, a node operator must stake their own ETH in multiples of 16 ETH which economically bonds them to behave and provide a good service, while still allowing them to earn rewards on their own ETH.

  Each of these 16 ETH deposits creates a validator which is matched with 16 ETH from stakers. For providing the service, node operators receive a commission that is sourced from deposits coming into the network, so they earn additional income & interest on their own ETH at the same time, which in turn allows them to generate a higher ROI than they would staking solo.

Rocket Pool is composed of 3 primary elements; Smart Contracts, Smart Nodes, and Minipool Validators. All three integrate to form an innovative global ETH2 staking network that reduces staking risk by spreading deposits across multiple nodes in a highly distributed way.

Rocket Pool boasts several first-to-market user features for ETH2 staking, such as:

- rETH – an tokenised staking deposit and its rewards earned over time.
- Stake with less than 32 ETH, only 0.01 ETH needed.
- Stake with more than 32 ETH, unlimited deposit size.
- Deposit safety mechanisms to socialise losses and prevent deposits being wiped out from slashing conditions on poor performing nodes.

Rocket Pool is currently in beta and is developing compatibility with Ethereum 2.0, which is due in 2020.

Goals

The aim of Rocket Pool is to be the primary staking infrastructure for Ethereum, by providing a decentralised, easy to use staking network for individuals and businesses.

The primary goals of Rocket Pool are:

- Democratise and decentralise staking in Ethereum 2.0 – stake with as much or as little as you wish, run a node or don't, the choice is yours.
- To ensure full compatibility with Ethereum 2.0 and take advantage of scaling improvements.
- To minimise deposit risk by socialising staking losses across the network in the event of deposits being assigned to nodes which incur failures, penalties or malicious activity.
- To incentivise node operators to perform well and in return, generate a higher ROI staking return than they would staking solo.
- To democratise the Rocket Pool development, governance and node security using staking with RPL tokenomics.
- To ensure staking infrastructure and components are as decentralised as possible, in keeping with Ethereum's philosophy and security.
- To create a scalable staking network capable of handling intense demand for proof of stake services.

Design

Rocket Pool 2.5 has evolved from the previous milestone versions of Rocket Pool, both the 1.0 release and 2.0 release. It is now more flexible than ever for anyone participating, be it just staking some ETH or running a node.

Overview

The decentralised staking network in Rocket Pool 2.5 offers continuous staking which allows stakers and node operators the ability to participate in the network for as long or short as they wish.

Users whom deposit ETH to be staked by node operators will instantly receive the **rETH** token which represents a tokenised staking deposit, it can be held, traded or sold and does not need to be locked with Rocket Pool to gain staking rewards over time. It will be able to be traded for BETH when **Phase 2** of the Ethereum 2.0 roll out occurs and smart contracts on Ethereum 2.0 are enabled.

Node operators will receive the **nETH** token when they complete their node operator staking and decide to leave the network, this token can be traded 1:1 for BETH when available in **Phase 2** of the Ethereum 2.0 roll-out or can be sold/traded on the open market as well. This token will be phased out when Phase 2 arrives as it will be replaced with native ETH on the Ethereum 2 blockchain.

Components

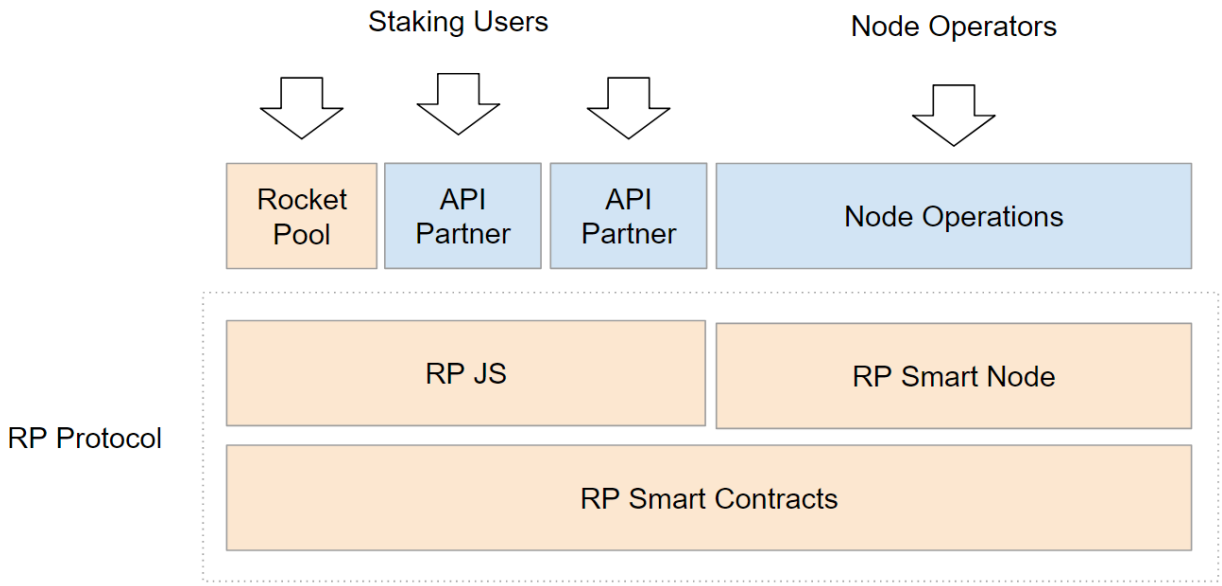
The Rocket Pool protocol defines what interactions are necessary for the Rocket Pool network to meet its design goals.

It is implemented as a set of software components:

- Smart Contracts (Ethereum)
- Smart Node Software – CLI and GUI
- JavaScript library for interacting with the smart contracts

All software components that implement the Rocket Pool protocol are open source or will eventually be open source.

Here is an overview of these components and the changes made in Rocket Pool 2.5



Smart Contracts

Rocket Pool has a variety of smart contracts that enable users to deposit ETH for staking, have those deposits assigned to node operators which handle all required interactions with ETH2.0 and much more.

Rocket Pool smart contracts are upgradeable; this allows the network to be highly flexible. If an issue manifests within a smart contract, a new version of the contract can be deployed as a replacement – the old contract is no longer an authorised member of the network.

Node operator up-time is a crucial requirement for reliable staking infrastructure. Rocket Pool requires all its node operators to stake as much ETH themselves as they receive from us, so they are economically bonded to provide a reliable service or they stand just as much to lose. Our smart contracts will also detect when a node becomes unresponsive, then stop

sending new user deposits to the node. This helps to minimise any penalties the network may incur due to server reliability.

Our smart contracts also further reduce risk to large deposits by breaking them up into ‘chunks’ of 16 ether and distributing them to various nodes. If a single node has issues and is penalised by ETH2, only a portion of this deposit is affected and the loss is socialised across the network to minimise the size of the loss for any single staker. Socialising any losses through penalties or slashing conditions also provides each single staker with peace of mind that their deposit will not be effected greatly in the event the deposit ends up on a poorly performing node.

In the interests of transparency, all our smart contracts and smart node software are all open source. View our GitHub Repositories for more information.

Smart Nodes

To participate in ETH2.0 Proof of Stake, node operators are required to run node software. In the Rocket Pool network, a node isn’t just an ordinary node, it’s a smart node. Rocket Pool’s smart node software listens to everything occurring on the network and features a full CLI that allows node operators to run various commands and monitor the status of deposits staking on their node. There is also a GUI version of this CLI in development that will allow smart node operators to install Rocket Pool smart node stack on local or remote servers, then manage them from one interface on their desktop.

The smart node also automatically checks in with the Rocket Pool smart contracts intermittently to prove the server is still online to receive deposits. Too many missed check-ins will get the node banned from receiving new deposits until it performs another successful check-in.

There are two types of smart node operators in Rocket Pool.

Untrusted Node Operator

An untrusted node operator can join the network at any time and requires no registration or approval process.

An untrusted node operator receives the following benefits:

- They require only 16 ETH to stake (as opposed to 32 ether outside of Rocket Pool), since the network assigns them 16 ETH of staker deposits.
- They earn extra ETH by receiving a commission for deposits that enter the network from stakers. The amount of commission earned is determined by the capacity of the network. If there are a lot of deposits arriving, but not many node operators with capacity to accommodate them, commission rates automatically rise. The opposite also stands true.
- They have the ability to stake RPL as a security deposit on their node alongside their ETH and receive an extra commission proportional to their stake size. This provides an additional security / uptime incentive as penalties for excessive downtime or slashing will burn their staking RPL tokens proportionally if they have performed poorly when exiting the network.
- They can stake their own ETH and require no RPL to do so.
- Can utilise our smart node software CLI & GUI for easy staking.
- They are always in control of their own node.

Trusted Node Operator

Rocket Pool user deposits are always assigned to Untrusted Node Operators first; any surplus is assigned to Trusted Node Operators. Trusted Node Operators are a backup; they ensure the network can continue to onboard new users if there is no capacity with Untrusted Node Operators. Trusted Node Operators are not required to match user deposit stakes.

These node operators also act as oracles for beacon chain data. Our smart contracts reside on ETH1 and need reliable information about the state of ETH2, so this information is provided by them and will be until ETH1 and ETH2 are merged together at a later date of the ETH2 roll-out.

Minipool Validators

A minipool validator is a type of smart contract that is created by Rocket Pool when a node operator makes a deposit of their own ETH on their node. These contracts are used to pool ETH from various stakers until they reach enough to stake with ETH2. Node operators never have access to user funds, as they are handled by the minipool validator smart contracts.

Minipool validators become active when they reach the 32 ETH required by ETH2.0 to operate. At this time a native ETH 2 validator is created automatically on the smart node using the node operators selected ETH2 client, the deposit is sent to the ETH1 deposit contract and that validator then begins performing its ETH2 consensus duties.

Tokenomics

Rocket Pool has several tokens, each of which plays an integral role in the functioning and security of the decentralised network.

RPL

RPL is the primary protocol token and can be staked on a Rocket Pool node if you wish to provide the network with an additional security promise. It is ***not*** required to run a smart node or as a user to stake ETH on the Rocket Pool network.

Node operators that stake RPL on their node provide this additional security deposit earn an extra commission from the network proportional to the size of their security deposit. If they fail to perform their network duties and through penalties or slashing conditions end up with < 32 ETH from their original 32 ETH deposit, their RPL security deposit is burned proportional to their ETH losses for failing to provide the promised additional security for their node.

A Rocket Pool DAO will be formed in the future to allow RPL stakers the ability to participate in a Decentralised Autonomous Organisation which will be used to help govern important aspects of the decentralised network from smart contract upgrades to more minor changes in settings across the network.

rETH

When a user deposits into the Rocket Pool network, they will instantly receive the rETH token which represents their deposit and the rewards it gains over time in the Rocket Pool network. This token does not need to be locked within the network and it can be traded, sold or held as the user desires.

When smart contracts are natively enabled on ETH2, a smart contract will be deployed that will allow users with the rETH token to burn it for ETH. This is expected to occur during Phase 2 on the ETH2 roll out map.

nETH

For Phase 0 and 1 of the ETH2 rollout, if you run a node in Rocket Pool and withdraw from the network, you will receive the nETH token which is a 1:1 token representing your deposit, rewards + commissions earned in the network for the time you participated.

This is not the same as rETH which represents tokenised staking deposits + rewards earned by the whole network and is not 1:1.

When smart contracts are natively enabled on ETH2, a smart contract will be deployed that will allow users with the nETH token to burn it for ETH. This is expected to occur during Phase 2 on the ETH2 roll out map.

User Types

Overview

Rocket Pool 2.5 will feature two main types of user; both have aligned interests which can help sustain and grow the network. Reliance on Rocket Pool as a central entity is minimised greatly with this approach, and as such, the network can function in a highly decentralised way.

Staking Users

Overview

The majority of users with Rocket Pool with be staking users. This type of user wants to participate in proof of stake, earning rewards on their ETH but:

- The user does not have the minimum 32 ether to stake themselves.
- The user is not technical or does not want to keep a full node online and secure 24 hours a day, 7 days a week.
- The user is from an API-integrated business or dApp who is using the Rocket Pool infrastructure to earn rewards for their users.
- The user simply wishes to use Rocket Pool because it is convenient.

Rocket Pool allows staking users to earn interest on as little as 0.01 ETH, without any hassle. When depositing the user will receive rETH tokens, these represent the value over time of their deposit + rewards earned in the network.

Staking Process

The staking process is very easy for staking users; they can deposit their ETH:

- Using the Rocket Pool website.
- Via a 3rd Party integration directly into the smart contracts. This could be DeFi Apps, SaaS Providers, Wallets, DEXs and more which provide staking services to their users and leverage the Rocket Pool staking infrastructure to accomplish this without needing any of their own.

  Easy as that!

Deposit Safety

All deposits into the Rocket Pool network are assigned to node operators who provide the staking services for these deposits. Deposits are assigned in a pseudo-random fashion around the network to help keep the network decentralised. For large deposits of > 16 ETH in size, these are broken up into ‘chunks’ of 16 ETH and spread throughout the network.

All untrusted node operators in Rocket Pool are required to stake in multiples of 16 ETH. These 16 ETH deposits are matched with 16 ETH of user deposits, making the 32 ETH required to stake. Node operators are therefor economically bonded to provide a good service as they have just as much on the line as any user staking on their node.

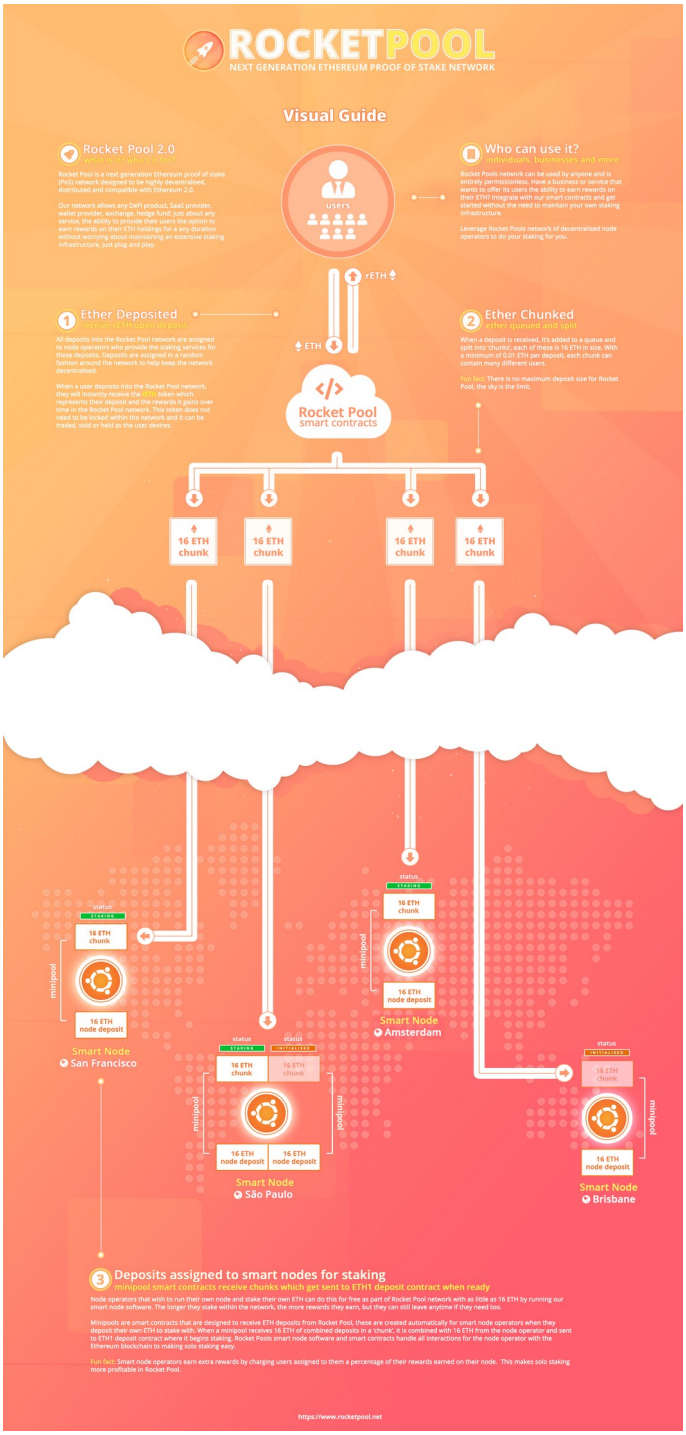
If a deposit ends up on a very poorly performing node that incurs significant penalties and finishes staking with < 32 ETH but > 16 ETH, the missing ETH from the deposit is refunded back to the network from the node operators original 16 ETH deposit as compensation.

Eg: A node finishes staking with 28 ETH. The node operator will receive 12 ETH and the network will receive 4 ETH as compensation for the missing ETH.

If a deposit ends up on a node which has had its total 32 ETH deposit slashed for attempting to cheat ETH2 consensus, the network will be refunded the entire 16 ETH deposit from the original node operators deposit and the loss of 16 ETH will be socialised across the network, so users who were on this unfortunate node will not lose their entire deposit as the whole network absorbs this loss equally.

Infographic

To further explain how deposits in the Rocket Pool network are distributed to node operators, we've created this infographic below. [The full version can be seen here](#).



Node Operators

Overview

There are major benefits to node operators who supply a node and stake their ETH with the Rocket Pool network, rather than solo staking.

Users / businesses will be able to stake using their own node in the Rocket Pool network with as little as **16 ETH**. After adding their node to our network and installing the Rocket Pool smart node software, it will be able to stake ETH and will be assigned an equal amount of ETH from Rocket Pool's staking users. No network commissions are applied to the node operators own ETH.

In addition to rewards earned on their own ETH, the node operator will receive a set percentage of the rewards earned by staking users on their node. Consequently, a node operator will make a better ROI in Rocket Pool than if they ran their own staking node outside of the Rocket Pool network due to the commission charged to users who stake on their node.

Setup

Users who wish to run a smart node in the Rocket Pool network will have the option of doing so via a command line interface or via a GUI client which is currently in production. For a full guide on the CLI commands and how to make deposits using it, please read the current documentation.

CLI Package

Rocket Pool will provide an easy to install package that will configure all dependencies needed for a Rocket Pool Smart Node to operate in the network.

This will include at least:

- Ethereum mainnet client (Geth)

- Ethereum beacon chain client
- Rocket Pool client

On installation it will register a Rocket Pool service that will:

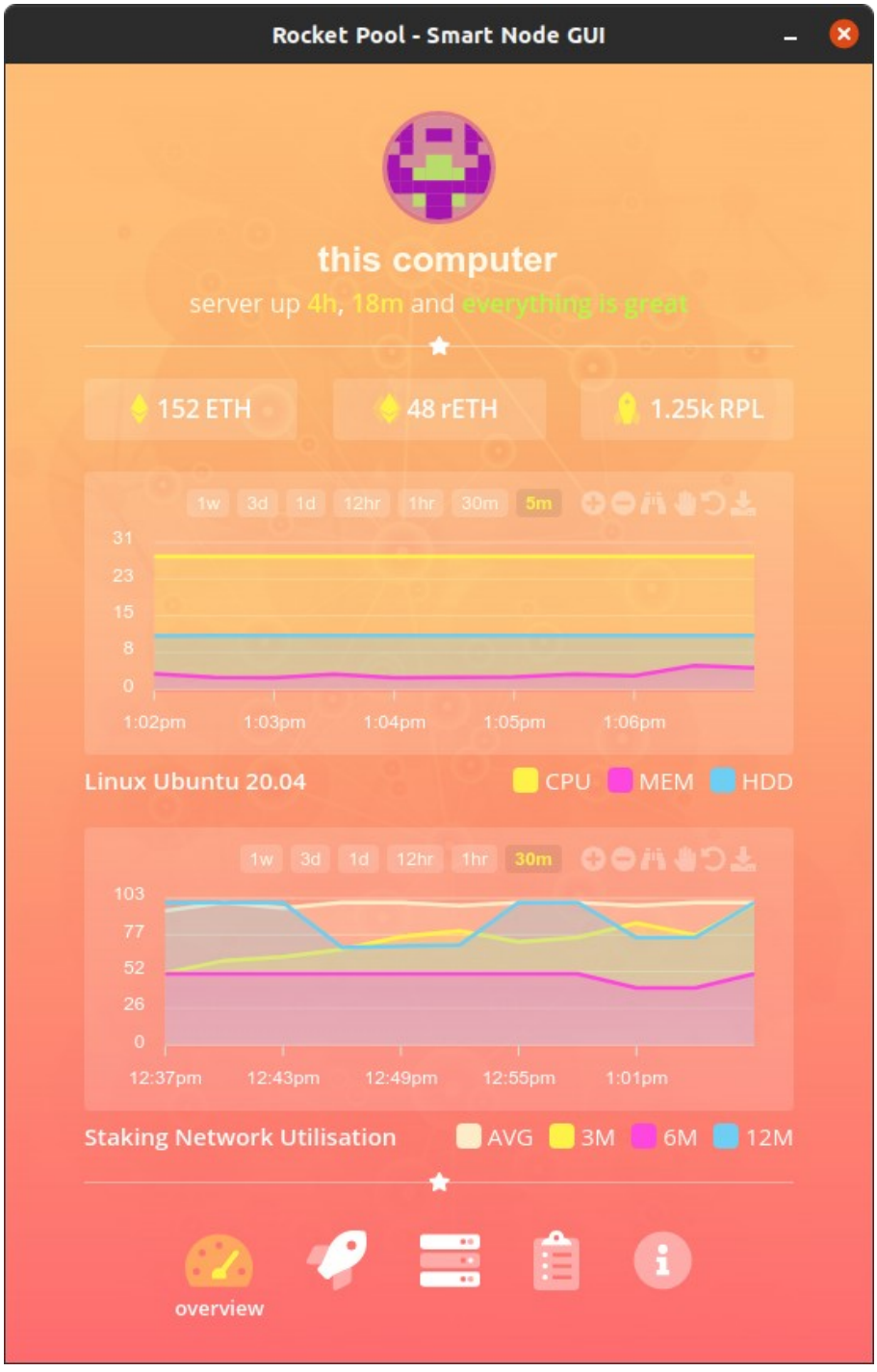
- Automatically start on server restart
- Automatically restart on application crash
- Be globally available

This smart node package is a docker stack and support for Linux (Ubuntu) and OSX will be available on launch as a CLI package.

Smart Node Docker Stack Design

GUI Package

A full desktop client which can be used to run and monitor smart nodes on local or remote servers is currently under production and will hopefully be available for our mainnet release. See updates on our GUI client on Medium.



Upcoming GUI Client Dashboard

Commission Structure

Overview

Users who stake in Rocket Pool by sending ETH to the smart contracts for assignment to node operators, pay a commission for their staking duties that are performed for them. This total commission rate charged is calculated based on two primary factors; the first and biggest being the capacity of the network to accommodate their deposit and the latter being the staking security being provided to the network by node operators staking RPL.

Network Capacity

Node operators earn a commission from deposits that are sent to the network for staking. It is variable and determined by the current capacity of the network to receive a new deposit, the amount of deposits currently awaiting assignment and the amount of node operators with capacity to receive these deposits. An example of two scenarios where the amount might be low and might be high:

- **Low Commission:** The network has a lot of node operators with space to accommodate deposits and you have a small deposit to make, the network can easily absorb this, so the network utilisation commission is low.
- **High Commission:** The network has few node operators to accept deposits, so node operators that come online during this time to meet demand can receive a higher commission. This extra capacity needed can come from a very large deposit, a backlog of queued deposits awaiting assignment or a combination of both.

Node operators will collect this commission on a daily basis so long as they are staking ETH themselves in one or more minipool validators. The collection is done when their node performs a 24hr checkin with the smart contracts, so they don't need to manually collect it.

Security

Node operators who are staking ETH can provide the network and its users with an additional security promise to make sure the network is as efficient and secure as possible. To do this the node operator can choose to stake RPL on their node contract and provided they have at least 1 minipool validator running, can earn an extra security commission rate.

Commission from rewards earned on the network would be proportionally split between all users who stake an amount of RPL on their node, failure to provide this additional security can result in that users RPL being burned proportionally to the penalties or from slashing occurring to deposits on this node while performing Ethereum consensus duties.

Audits

In order to ensure the security and safety of users ETH and the smart nodes themselves, Rocket Pool is committing to subjecting its platform to a comprehensive security audit before launching on the Ethereum mainnet.

All Rocket Pool contracts have been open source since alpha, longer than any other Ethereum 2 compatible network. As well as allowing the public to examine the contract code, there are several planned code audits, bug bounties on the contracts, and smart node penetration tests planned for Rocket Pool's future beta release. All audit results and applicable post mortem actions will be made publicly available.

Team

David Rugendyke | Project Founder, CTO

David has over 18 years commercial experience developing high end web applications, has been featured twice in Australia Personal Computer (APC) magazine for projects he's built, and is currently committed to working on Rocket Pool full time.

Thriving on a challenge and with a long list of software projects behind him, David has acquired a very proficient knowledge of Cryptocurrency and DevOps as well, a unique combination of skills that lead to the creation of Rocket Pool, a project with scope spread across several of these unique fields.

David also loves to homebrew beer and when not working on Rocket Pool, can be found enjoying a beer or brewing another all grain batch over the course of a day. David's favourite beer style is a good American Wheat Ale, followed closely by an IPA.

Jake Pospischil | Senior Developer

Jake is a full-stack developer with over 10 years' professional experience. He has a background in visual design and started his career in front-end development, but quickly progressed to building robust back-ends and provisioning servers.

Jake has had a keen interest in Cryptocurrency for several years and has been developing Ethereum applications since 2017. He is also proficient with a number of web technologies including MVC frameworks, reactive view frameworks, and various modern build pipelines.

When he's not writing code, Jake can usually be found at the gym or sitting around a table playing D&D with his friends.

Darren Langley | Senior Developer

Darren has over 16 years of software development experience. As a technical lead & architect, he has built exciting digital products for government, financial services, and professional services.

Darren has considerable Ethereum experience and has delivered several proof-of-concept projects for the public service and finance industries. With Rocket Pool, he is on the cutting-edge of cryptocurrency and blockchain development.

When Darren is not sitting at a laptop, he is usually at the beach with his family.