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THE REBL AUDIT NETWORK FACILITATES AND SECURES BLOCKCHAIN SERVICES WITH MASTERNODES

Executive summary

The cryptocurrency industry has been going through turbulent times, with growing interest from mainstream media, tech enthusiasts and businesses worldwide. Speculative hype aside, the cryptocurrency market has generated great interest in the applications of blockchain technology. History has proven that whenever technological innovation emerges at this pace, it is faced with challenges. Blockchain technology is no different. Some challenges still lie in the functional utility of the technology; it is often required to go through a series of iterations before a technology is usable and reaches its full potential. Although current discussions of Bitcoin and Ethereum focus mainly on the applied use of these cryptocurrencies in society, the underlying blockchain technology that supports these coins has gained enough legitimacy that major companies like IBM and Microsoft are getting involved.

Other challenges hindering mass adoption of blockchain include a high cost of innovation and a significant threshold to adopt and implement the technology—not to mention the scalability of the networks and the highly speculative nature of the market are considered to be a difficulty. REBL attempts to tackle the challenges inherent in this technology with individualised service and expertise, and by building customised blockchains as standalone environments that are scalable for a wide variety of use cases. By providing clients the option to build private or consortium blockchain networks, blockchain technology can be successfully implemented, even when the client's use case is not viable in the speculative market.

The main goal of REBL as a company is to provide the most user-friendly Blockchain-as-a-Service, building customisable blockchains for e-commerce retailers and any other businesses in need of one, accompanied by end-to-end service. The REBL blockchain is a fast and secure blockchain that is powered by masternodes and fuelled by the REBL cryptocurrency. The REBL blockchain is the core protocol of the concept that functions as the base technology. It is used as the framework to mould customisable blockchain solutions to the specific needs of each client. Gaining a foothold in this fast-paced, dynamic market can be difficult. That's why we have deliberately opted for an adaptive approach in our strategy, putting the token holder at the heart of everything we do. The REBL team has many years of experience in the e-commerce market, as well as in cryptocurrencies. We believe a cryptocurrency developed by crypto-enthusiasts for crypto-enthusiasts could change the current market for the better. Together with a dedicated community, we aim to become the most progressive blockchain solution on the market.

CONTENT

Our motivation

Blockchain technology has revolutionised the way we see government currency monopolies. Currencies like Bitcoin and Ethereum have shown us that we don't need to rely on central governing powers to transfer money around the globe, maintain financial privacy/security, and verify ownership. The global financial system is changing and the role of cryptocurrencies within this system has long been filled with hopes, questions, and plenty of risks. However, it's finally becoming clear that blockchain could be the heart of a wide variety of decentralised infrastructures, including everything from cloud databases and social media platforms to mesh networks and share economies. Together with the internet, blockchain technology is proving to be one of the largest leaps forward since the industrial revolution and the foundation of a free and prosperous planet. But this future isn't something to be predicted or hoped for - it's something to be achieved.

Our motivation

At REBL, we believe in the power of cryptocurrency and more so in the blockchain technology behind it. And we believe now is the time to push this technology further. In recent years, we already saw huge changes that impact the future of cryptocurrencies and economies on a global scale. With a lot of experience in the E-commerce markets, we ourselves have experienced how the mass adoption of cryptocurrencies and blockchain technology in general still has a very long path ahead of it. However, we feel the current path the market is traveling is not leading towards this end goal of mainstream adoption. Blockchain technology is being misused as a product to feed a very speculative and manipulative market. The combination of rapidly increasing prices, individual speculation in the crypto marketplace, and widely available venture capital has created an environment in which many investors are willing to overlook traditional metrics, such as price-to-earnings ratio and confidence in technological advancements in favour of getting rich quick by speculating in the bubble market.

The absence of infrastructure and a lack of understanding were two major obstacles that previously obstructed mass connectivity for the internet market. For these reasons, individuals and businesses had limited capabilities in what they could do and what they could achieve in accessing the technology. A lack of knowledge also brings in more risk and security problems.
Right now, we see these problems occurring in the Blockchain industry. Due to these limitations, lots of businesses are side-lined during this technological revolution, even though they would like to enter the playing field.

REBL will provide the building blocks that can better the infrastructure and increase the understanding of the blockchains' fundamentals and its immense potential. By doing so, the wall that's holding businesses back from blockchain adoption will be brought down. Education leads to understanding, and finally, with the right tools in hand, adoption.

Challenges

2.1 Traditional markets

Every day, millions of transactions take place either electronically or by hand. However, not every transaction is done with cold, hard cash—a sizable chunk of these transactions are performed using with vouchers, coupons, or chips. It is also worth noting that not every transaction involves an equal exchange of value. A good example would be loyalty or rewards programs like frequent flyer miles. These transactions are essentially a one-way interaction. Nearly all types of transaction take place within their own respective ecosystem, facilitated by private companies that each have a processing system only compatible with their specific transactional "token", thus creating a kind of miniature economy. Transactions in fiat currency (a.k.a. "regular" money) are governed by a commonly accepted framework of regulation, legislation, and (international) norms and guidelines determined by banks and governments. However, this framework does not apply to the transactions mentioned above. A business that uses these moneyless transactions often encounters the following problems:

- The transactional systems are provided by private companies.
- They require big investments as they often require a purpose-built device.
- They are labour-intensive as they often require manual handling.
- They are more susceptible to fraud as they are not controlled by governments or banks.

Challenges

2.1.1 Blockchain opportunities for traditional markets

With the development of blockchain technology, these problems can now be addressed. A blockchain can be considered as a public ledger of transactions that have been executed within the network. It is constantly growing as completed blocks are added to the chain of previously formed blocks. These blocks are added and "stored" in a linear and chronological order.

With a fully functional (private) blockchain network, this opens a door with a wide variety of benefits for businesses. If you have your own blockchain, there is no need for an intermediary to validate transactions; a consensus mechanism is used to validate transactions instead. A blockchain is very cost-efficient. Within the blockchain network, transaction fees can be limited. Peer-to-peer transfers allow the involved parties to avoid paying fees to the middleman. The only hardware investment required is the cost of a server and bandwidth. Once a blockchain is up and running, it requires little to no manual interference. Save for routine server maintenance, the blockchain basically runs itself.

The complete distribution and transaction history can be monitored in the blockchain ledger. Movements can be tracked back and forth. As blockchains are shared, everyone (within the scope of the blockchain) can track changes on the blockchain. All events that occur on the blockchain are public providing transparency. As a result trust is established and the risk of fraud is much lower.

On top of that, a blockchain plays a crucial role by providing quicker settlement of transactions. There is no need for verification, clearance, and reconciliation because the agreed upon data is already available on a shared ledger between the involved parties. This saves a huge amount of time, especially in the financial industry. Instant peer-to-peer transfers allow for a quick exchange of funds.

Challenges

2.2 Cost of innovation

One of the most significant drawbacks of blockchain technology uptake is the ability to integrate it seamlessly into current systems. Even in business sectors that would benefit substantially from the encrypted and secure algorithms at the heart of blockchains, the technology needs to be financially viable for them to adopt it. Lack of knowledge and understanding simply make it impossible for the layman business owner to integrate this into their business. Due to this shortage a significant investment of time and money in research and development is necessary to even start. Several aspects that can be thought of:

General blockchain knowledge—How does the blockchain function?
Effect on the client's business model—What happens with existing and future business models?
Software knowledge—New programming languages.
Legal & risk—Especially in decentralised settings, new risks and various legal issues will be addressed.

Those disadvantages are slowly becoming drawbacks of the past as blockchain companies like REBL offer a means of tailoring the technology to suit businesses, rather than companies having to adapt their structure to suit blockchains. As companies would need to change or alter internal systems or processes to successfully integrate blockchain into their operations, the cost, expertise, and overall financial gains never matched up, and as such, widespread use has faltered. Unless you could make this technology accessible of course.

Challenges

2.3 Current challenges in the cryptocurrency space

2.3.1 External factors affecting public blockchains

The idealistic public blockchain of Bitcoin—a blockchain that is uncontrolled, fully decentralised and immutable, serves its cause. It is a revolutionary concept as the first digitally scarce asset. However, a problem that is currently holding back mainstream adoption is the fact that some of the components that come with this public blockchain are not an optimal solution for a lot of industries. For example, a completely decentralised public blockchain is vulnerable to the degree of economic resources one can use to influence the consensus process mechanisms like proof-of-work or proof-of-stake. In some cases, a degree of private control is necessary.

Challenges

2.3.2 Network scalability

Public blockchains have scaling issues due to the accelerated growth they have experienced in recent years. Even though these will most likely be solved, for the foreseeable future these problems will occur when the adoption rate grows exponentially—which is likely in the coming years. Blockchains with low throughput and transaction per second rates limit the capacity and potential adoption.

In the recent past we have seen price swings and network clogging on the open Ethereum and Bitcoin networks. Transactions could take up to hours or even days costing up to 10 dollar plus per transaction. This is undesirable for economical use.

A solution for a more scalable network is the trade-off of decentralisation. One way this trade-off works is by changing the consensus protocol. For instance, a consensus protocol that allows for a small selection of nodes to act as delegates for the community to validate the network, thus making the network more efficient and the transaction throughput significantly better. For now, these protocols and the "democratic" voting system have proven to be highly sensitive to manipulation.

However, by creating a standalone environment utilising a hybrid or private blockchain specifically designed to the user's preference, this could become much more efficient.

Challenges

2.3.3 Market speculation

Using blockchain as means to speculatively boost a company's value seems to have the market in its grip. The result is a marginalisation of product and technological development. This is a huge hurdle to overcome for regular businesses. Integrating a network that is uncertain and volatile is very discouraging, and rationally this hurdle will not be undertaken by shrewd businesses.

At the moment, most cryptocurrencies are still primarily held by investors and speculators pursuing profits from price appreciation. These cryptocurrencies are not utilised for their true utility purpose. This is partly due to the fact that most platforms are still in development, and the utility is simply not there yet.

Another reason for the lack of actual crypto utility lies within the significant day-to-day price fluctuations. This makes a lot of use cases inefficient, sometimes even completely useless.

Solution

To make blockchain technology a success, adoption on all levels is a business must. Instead of creating a blockchain that asks users to mould their business around it, each client's blockchain will be customisable—whether that be central, decentralised, or hybrid. It will work in tandem with outputs to match your needs via wallets, modules, and payment terminals. The functionality will expand to accommodate your requirements.

Mainstream adoption is at the very core of the business model behind REBL and our revolutionary blockchain network.

Each blockchain developed by us is its own standalone ecosystem, containing its own ledger, transactions, and if desired, its own currency. One associated risk with blockchain technology is verifying the legitimacy of transactions and preventing the blockchain from being tampered with.

Our solution is simple; storing parts of the custom blockchain on the central REBL blockchain. With privacy and integrity being paramount, we will never retain large or revealing amounts of data; instead, just enough to be able to monitor the validity of our customer's blockchains, providing them with peace of mind.

Solution

3.1 Core development

The core technical development of a client's blockchain can be programmed and customised to the detail. This customisation process is preceded by an extensive decision-making process. A selection of questions that need to be answered:

Do you need a (shared) database?
Does it require multiple actors to write? Do you know the writers and trust them?
Do you want a trusted 3rd party?
Does the blockchain need to be tokenized? (vs non-tokenized)
Are smart contracts required? Do we need external data (Oracles) to trigger smart contract executions?
Do you want transactions to be hidden or transparent?
What is required to make the project scalable?

There are endless variables and parameters to consider. A summary of some of the parameters:

Permission basis—Run a private network with private transactions, or a public network in which any peer can join?
More on this subject in section 3.3.

Network capacity—Scalability is crucial for long-term growth and success.
- Target block time; e.g. 1 minute.
- Maximum block size; e.g. 1 megabyte.

Tokenomics—An economic model must be in place to create a healthy network. E.g. variables to consider:
- Initial coin supply; e.g. pre-mine.
- Max coin supply; e.g. inflation.
- Block rewards; e.g. block halving or a static model.

Solution

3.2 REBL's Blockchain-as-a-Service

The development and implementation of blockchain technology into a business model is costly and time-consuming. For multinational companies, small businesses, or individuals to adopt blockchain networks, a new type of service exists that is gaining outstanding traction: BaaS, or Blockchain-as-a-Service. Tackling the technical and financial outlay required to set up a blockchain, blockchain providers manage and customise blockchain systems for companies, rather than businesses doing it themselves.

With the right blockchain solution, it is possible for every business, regardless of the industry, to formulate a logical and cost-effective business case for blockchain integration. Security risks, significant financial cost, and the substantial resource cost of running a blockchain are outsourced—in much the same way companies currently outsource recruitment, consultancy, and cloud-based services on a daily basis.

So, in addition to the in 3.1 described technical developments, our focus is to provide the service that is required for business integration. With BaaS, REBL maintains the core principles of a blockchain network. This usually includes bandwidth management, allocation of resources, security protocols, and any hosting requirements. The client agrees for REBL to manage these aspects of the blockchain in exchange for a service fee. The infrastructure is facilitated by REBL, leaving you, the client, to focus on blockchain functionality and encouraging a consortium of users.

Solution

With the right aftercare, technical support, and blockchain functionality, it is possible for the technology to become an integral part of a business model, rather than a financial risk. While some blockchains offer the basic level of service listed above, REBL provides an unparalleled suite of tools and services to aid successful blockchain integration.

Our consultation process includes discussion and planning of how a client chain could be built into your company's infrastructure, how that solution would integrate with your current operations, and which features would be most suitable. REBL isn't just a blockchain service; it is an end-to-end solution to blockchain integration that has the wants and needs of your business at its very core.

The success of your business is the success of ours!

Solution

3.3 Structure settings & permission rights

REBL creates standalone environments specifically designed to the client's preferences. With minor changes to the decentralised character of current public blockchains, this will improve performance and abate scalability issues. This will be beneficial for transaction throughput, as well as transaction fees, which will become negligible.

3.3.1 Centralised blockchain

A centralised or fully private blockchain is one where write permissions are kept centralised to one organisation. Read permissions may be public or restricted to an arbitrary extent. Likely applications include database management and auditing internal to a single company, and so public readability may not be necessary in many cases, though in other cases public auditability is desired. [3]

The core aim for a centralised blockchain is threefold: (a) to ensure that the blockchain's activity is only visible to chosen participants, (b) to introduce controls over which transactions are permitted, and (c) to enable mining to take place securely without proof-of-work or proof-of-stake and their associated costs. Once a blockchain is private, problems relating to scale are easily resolved since the chain's participants can control the maximum block size. In addition, as a closed system, the blockchain will only contain transactions which are of interest to the participants. [9]

Solution

3.3.2 Hybrid blockchain

A hybrid or consortium blockchain is one where the consensus process is controlled by a pre-selected set of nodes; for example, one might imagine a consortium of 15 financial institutions, each of which operates a node, and of which 10 must sign every block in order for the block to be valid. The right to read the blockchain may be public or restricted to the participants. There are also hybrid routes. For example, the root hashes of the blocks being public together with an API that allows members of the public to make a limited number of queries. This way the members get back cryptographic proof of some parts of the blockchain state. These blockchains may be considered “partially decentralised”. [3]

3.3.3 Decentralised blockchain

A decentralised or public blockchain is a blockchain that anyone in the world can read, anyone in the world can send transactions to and expect to see them included if they are valid, and anyone in the world can participate in the consensus process—the process of determining what blocks get added to the chain and what the current state is. As a substitute for centralised or quasi-centralised trust, public blockchains are secured by cryptoeconomics—the combination of economic incentives and cryptographic verification using mechanisms such as proof-of-work or proof-of-stake, following a general principle that the degree to which someone can have an influence in the consensus process is proportional to the quantity of economic resources they can bring to bear. These blockchains are generally considered to be “fully decentralised”. [3]

Therefore, we will be offering blockchains tailored to the exact needs of the industry or business. Whether this is a completely public blockchain with a fully decentralised character or a completely private and centralised blockchain, there are endless versions possible that combine characteristics of both to create a hybrid blockchain that perfectly suits the given case.

Solution

3.4 Value options

The tokens generated for plug-and-play blockchains can either be valued by supply and demand or can be fixed-value utility tokens—that means no speculation, no trading. The fixed-value tokens will be designed merely for the end-goal of the client. The prices of most cryptocurrencies are determined by supply and demand. Some variables in the cryptocurrency space make it so that we experience significant day-to-day price fluctuations.

By using a fixed-value system, a business can rely on the tokens that have been distributed amongst their customers to be solely used for the intended use case. This will allow for a great number of use cases for blockchain and cryptocurrency.

Solution

3.5 Blockchain tools

Part of the service that REBL offers clients is the development of a complete blockchain platform—a business infrastructure with all the tools needed for smooth business integration and continuation. These tools will be fully customised per client and integrated with end-to-end service. This chapter is a summary of the tools that are included in the complete package REBL offers.

3.5.1 Business dashboard

The business dashboard is a backend portal that provides clients with a platform to manage all business on the blockchain.

Online payment plugins
Will be developed for payment platforms (e.g. Prestashop, WooCommerce, Shopify, BigCommerce, Magento).

Loyalty program
A user-friendly, tokenized loyalty program. Easily deployable in both the desktop and mobile wallets.

Analytic tools
Can be integrated to monitor the business and the concurrence with the blockchain. Examples are sales, loyalty program and expenses, etc.

Solution

3.5.2 Hardware integration

Point of sale solution
Will be available. Payment terminals can be created for direct mobile payments.

3.5.3 Wallets

Every client will have the option to add wallets—desktop and/or mobile. Wallets can be customised to the client's preferences. As such, they can vary from a simple but secure method of storage, up to advanced wallets with complex functionalities. The different features are not possible for all blockchains. Dependent on the protocol settings of the customised blockchain, the wallet functionality also varies. This section will provide a brief introduction of the possibilities the various types of wallet have.

3.5.3.1 Desktop wallet

Basic desktop wallets will provide the following features:

Secure storage—You can access your desktop wallet with a private key and/or JSON-file. The wallet has built-in SSL encryption, which adds an extra level of security.
Transactions—You can send cryptocurrency as an ordinary (public) transaction.
Additional features:
Staking rewards—The desktop wallet can function as a node in the network, helping in keeping the blockchain secure. In return a reward is giving to the node for participating in the process
Masternode rewards—The desktop wallet can function as a masternode in the network, providing more network stability and extra functionalities. In return a reward is giving to the masternode for participating in the process.
Instant transaction—Instant transactions will be facilitated through masternodes.

Solution

3.5.3.2 Mobile wallet

Mobile wallet—Provides easy access to your cryptocurrency, enabling fast, in-store mobile payments and peer-to-peer (P2P) transactions.

3.5.4 Blockchain explorer

A blockchain explorer is a convenient tool that facilitates the transparency of the ledger. It will be possible to have a customised explorer that provides all those with permission an opportunity to look into the blockchain ledger. Permission rights can of course be implemented with different gradations.

3.6 Fully branded

The ability to communicate with consumers and/or end-users will become an important factor for blockchain technology to go mainstream. Branding is a very effective tool to translate all the technical know-how into the comprehensible.

Although almost every company will have experience with marketing, communication via new technologies is a challenge. Blockchain tech is often very abstractly communicated, and since you are mostly communicating with non-experts, communication should be very clear and understandable.

Solution

We believe for a cryptocurrency project to be successful, the community behind the project is the most important. You can have the strongest project with the best use case, but if you don't communicate and build a community in the cryptocurrency space, it will be very difficult to compete.

If you can educate and intrigue your targeted audience, cryptocurrency can be a great tool to grow your community. However, in this process it is very important to build legitimacy and trust.

The tools and applications built for our clients will be completely ready for customisation and "branding". We want companies to be able to create as much value and exposure with this as they would like.

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Technology REBL blockchain

REBL is developing its own native blockchain. The development started in Q1 2018 and, at the time of writing, is currently in an extensive testing phase. The projected release of the REBL mainnet is planned for Q4 2018.

As described in chapter 3, REBL wants to offer clients a wide variety of blockchain applications that are completely customisable. This ranges from protocol settings to the end-consumer's experience. Blockchain technology will develop rapidly in the coming years. A day without innovation seems a step back. After the mainnet is released, the REBL blockchain will remain in a continuous development phase. REBL will always be developing and innovating to facilitate the most advanced tech available.

4.1 Type of blockchains

The core of the concept is the REBL Blockchain, but the ecosystem will expand in the future with multiple client blockchains. The client blockchains are standalone environments but will have a clear and direct interaction with the REBL blockchain.

Technology
REBL blockchain

4.1.1 REBL blockchain

An open-source blockchain validated and secured by the nodes in the network that run on the REBL proof-of-stake consensus protocol. You can read all about the REBL blockchain architecture in section 4.2, and more on the network consensus in chapter 5.

4.1.2 Decentralised client blockchain

A blockchain designed for the client with public blockchain characteristics. A fully decentralised network as a standalone environment. Some core characteristics:

The decentralised blockchains will run on the standard proof-of-stake consensus protocol for network verification.
The cryptocurrency coin created for the decentralised blockchain is publicly tradable and is valued by supply and demand.
The decentralised blockchain is freely accessible for peers to join.

4.1.2.1 Challenges with decentralised client blockchains

Decentralised networks will require a network of nodes for verification. The more active nodes present in the network, the more decentralised and secure the network is. However, it can be challenging for businesses to have a well-functioning network of nodes.

4.1.2.2 REBL's solution for decentralised client blockchains

All REBL masternode holders will have the chance to run a masternode of a client chain. This will provide a stable base of masternodes on which clients can build and expand on.nodes.

Technology REBL blockchain

4.1.3 Centralised client blockchain

A blockchain designed for the client with private blockchain characteristics. A centralised network as a standalone environment. Some core characteristics:

- Write permissions are kept centralised to the client.
- Read permissions may be public or restricted to an arbitrary extent.
- An important criterion for the centralised blockchain is fixed value token economics. As a result, the coins created will not be publicly tradable.

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4.1.3.1 Challenges with centralised blockchains

Centralised blockchains that are permissioned lack a form of transparency. This is obviously the way to go if you have information that you do not wish to share with every random peer. However, work counterproductively for trust with other parties involved in the network, or for example regulatory compliance. With writing permissions kept central, there is need for proof that the blockchain is not being tampered with.

The need for an additional third-party to audit activity on the chain is therefore required. However, with traditional third-party interaction, a private blockchain can be expensive and slow to audit.

4.1.3.2 REBL's solution for centralised client blockchains

The REBL chain functions as a dedicated metachain for the client chains. It periodically validates block header hashes of the client chains that form metablocks and act as anchors on the REBL chain.

In other words, REBL will function as a trustless audit for centralised blockchains. To comply with the integrity that is required with permissioned, private blockchains, all information provided on the REBL chain will be on the basis of zero-knowledge proof. This way, REBL can provide a public audit without the need to share any potentially sensitive information.

At the moment of writing we are working on a model to substantiate the above described solution. The current version of the white paper will be updated with technical information as soon as more data is available. The audit functionality will be added first to the testnet. The testnet will always remain active alongside the mainnet. Once the functionality is thoroughly tested and approved it can be migrated to the mainnet.

Technology REBL blockchain

4.1.4 Hybrid client blockchain

The hybrid or consortium blockchain will be specifically developed for each unique client. The blockchain can be designed to specific preferences of the client and can involve both centralized and decentralized characteristics.

4.2 Blockchain technical specifications

The REBL blockchain is built using the open-source code of the Bitcoin core protocol. The masternode functionalities are based on the DASH open-source code for masternodes. Therefore, there are technical similarities to Bitcoin and DASH. However, with the implementation of the proof-of-stake consensus, there are some crucial deviations to be found as well. This all serves as a good base for REBL to build upon.

Launch date: TBA
Blockchain type: Public, Decentralised, UTXO based
Ticker symbol: REBL
Algorithm: PHI 1612

Block data
Block time: 30 seconds
Block size maximum: 6 MB
Block reward distribution:
60% masternodes/40% proof-of-stake
Difficulty retargeting:
Continuous (after each block)

Coin supply data
Initial supply: 326.000.000*
Circulating supply: 170.000.000*
Max supply: 569.300.000*
Inflation rate: 10% --) 0%

More information on the economic model is available in section 7.4.

*These numbers may differ since they depend on the token swap participation rate. In addition, the circulating supply may vary due to extra coins that are transferred from the reserve fund into the circulating supply.

Technology
REBL blockchain

4.2.1 Definitions

PHI 1612—A multi-hashing or hybrid hashing algorithm. It is built using a combination of 6 different hashing algorithms. The algorithms that make up PHI1612 are: Skein, JH, Cubehash, Fungue, Gost, and Echo.

Hash—A hash is a cryptographic algorithm which takes an arbitrary amount of input data, performs a lot of processing of it, and outputs a fixed-size "digest" of that data. It is impossible to figure out the input data with just the digest.

Nonce—The counter used by proof-of-work miners to generate a correct hash.

Unspent transaction output—Unspent transaction outputs (UTXO) are all the spendable outputs for a given address available to be used in new transactions. Instead of storing balances, digital currencies maintain a complete history of users' transactions, which can be used to work out each user's balance at any point in time, as well as the state of the blockchain as a whole. The account balance is of unspent transaction outputs (UTXOs), with each output locked, requiring the user to provide proof of ownership to spend a UTXO.

Technology REBL blockchain

4.3 Block structure

This section describes a simplified version of a block in the REBL proof-of-stake blockchain and discusses the noteworthy differences with a Bitcoin Proof-of-Work block.

A newly generated block contains a “block header”, as well as some standard parameters and data.

- The block height value
- The block size
- Number of transactions in the current block
- Transaction output value
- Difficulty

The difficulty shows the change in the target from its original value. The difficulty is a number that regulates how long it takes for Proof-of-Stake ‘miners’ to add a new block of transactions to the blockchain.

If a block is ‘mined’ in less than 30 seconds (on average), the target moves lower.

If a block is ‘mined’ in more than 30 seconds (on average), the target moves higher.

So, the difficulty is an easy way for the blockchain to modify the height of target. It ensures that blocks of transactions are added to the blockchain at regular intervals.

The target is the threshold below which a block header hash must be in order for the block to be valid, and Bits is the encoded form of the target threshold as it appears in the block header.
The bits field is thus a compact way of storing the target in the block header.

Technology REBL blockchain

4.3.1 Block Header

- Version - The version number is used to keep track of upgrades and changes in the protocol.
- Bits - The difficulty target for the block.
- Previous block Hash - The previous block header hash.
- Merkle root - A hash of the root of the Merkle tree of the block's transactions.
- Kernel Hash - A hash of the current's block timestamp, the staking transaction's input and the staking modifier.

4.3.1.1 Previous block hash

Previous block hash—This is a digital fingerprint (hash) of the block header of the previous (last added) block of the blockchain. It is calculated by taking all the fields of the header together and applying a cryptographic function (PHI1612) twice by rearranging the bytes of the individual fields.

4.3.1.2 Merkle root hash

When a transaction is performed on the REBL blockchain, it is not added to the blockchain immediate. At first, it is added to a transaction pool. The nodes that participate in the Proof-of-Stake gather all transaction from the transaction pool and hash them together to form a single line of numbers. This is done using a hash tree or 'Merkle tree'.

The hash of the root of the Merkle tree of the current block's transactions basically provides a single-line summary of all the transactions in the block.

Once the latest transaction of a coin is buried under enough blocks, the transactions before it can be discarded to save disk space. To facilitate this without breaking the block's hash, transactions are hashed in a Merkle tree, with only the root included in the block's hash. Old blocks can then be compacted by stubbing off branches of the tree. The interior hashes do not need to be stored. [1]

Technology REBL blockchain

4.3.1.3 Kernel hash

- **Timestamp**—The time of the current block's generation.

- **The staking transaction data**—The input to the staking transaction.
- **Stake modifier**—The purpose of stake modifier is to prevent a coin owner from computing future proof-of-stake generated by this coin's transaction output at the time of transaction confirmation. The stake modifier consists of bits, each of which is contributed from a selected block of a given block group from the past. The stake modifier is recomputed at a fixed time interval instead of every block. This is to make it difficult for an attacker to gain control of additional bits in the stake modifier, even after generating a chain of blocks.

Finally, all the data for the kernel is hashed together. [10]

Technology REBL blockchain

4.3.2 PoW vs PoS—nonce removal

Proof-of-stake can definitely be compared to proof-of-work at a technical level. It also is based on a mechanism comparable to a sort of lottery, but the difficulty of this lottery is different. With proof-of-work, miners iterate through a large amount of hashes by changing the nonce.

With proof-of-stake, the difficulty of the lottery is weighted depending on how many coins you are staking.

Therefore, the big difference is that it is not possible to “get more tickets” to the lottery by simply changing some data in the block. Instead of the block hash being the lottery ticket to judge against a target, PoS invents the notion of the kernel hash. The kernel hash is composed of several pieces of data that are not readily modifiable in the current block. [10]

Technology REBL blockchain

4.4 Proof-of-stake process

This section describes a simplified process of proof-of-stake “mining”. The creation of a block, the computing process and completion of the process.

4.4.1 Block creation

Add a Coinbase transaction — this is always the first transaction in a block that will allow for claiming the block reward.

Staking transaction — is a special transaction that is not possible on the normal Bitcoin blockchain. It includes the concept of negative fees. Because all stakers know the reward, they add this reward to this transaction, meaning that there are more output coins than input coins. This kind of transaction is only valid in a staking context. [10]

At this point, the node collects all new transaction into a block.

4.4.2 Computing in proof-of-stake

Base difficulty & Staking difficulty — to win the right to generate a block, all active nodes “compete” by attempting to generate a hash value that is lower than a given base target value. It involves the following steps:

- Compute the PoS “kernel” hash.
- Compute the “staking difficulty”, which is the base difficulty, reduced by a ratio of how many coins you are staking.
- Compare the kernel’s hash against the staking difficulty.
- If the hash meets the difficulty then continue, otherwise go back to step 1 trying other UTXOs in your wallet that are suitable for staking
- Now you have a valid PoS block. The final step is to sign the block header, proving that you own the staking transaction from the first step in creating the block. [10]

Network consensus

Consensus in a decentralised digital currency like Bitcoin [1] is achieved by requiring generated blocks to contain a proof that the node which generated the block solved a computational hard task. Unfortunately, the concept of the proof-of-work-based system tends to lean toward eventual self-destruction [4].

Proof-of-stake aims to replace the method of achieving consensus in a distributed system; instead of solving the PoW, the node which generates a block must provide proof that it has access to a certain amount of coins before being accepted by the network. Generating a block involves sending coins to oneself, which proves the ownership. The required amount of coins (also called target) is specified by the network through a difficulty adjustment process similar to PoW that ensures an approximate, constant block time. [2]

5.1 Design goal

We believe for a cryptocurrency project to be successful, the community behind the project is the most important. The consensus algorithm is a crucial element of the blockchain and the network. To match these two significant variables, we have designed the REBL consensus algorithm in a way that, in our opinion, is the fairest to the community—not to mention fast and secure.

Some crucial properties we have considered:

- Rewards should be proportional for all REBLs involved in the network. This means “bigger” players do not get disproportionately larger rewards for their stake.
- More computing power should not be useful for creating the blocks.
- It should be impossible for a single member of the network to control the entire blockchain.

Network consensus

5.2 Defects of proof-of-work consensus

The PoW consensus algorithm is a zero-sum game which uses the competitive hash calculation to determine the bookkeeper, rendering a great amount of wasted electric power when any blocks are fed out, and thus, the mining cost is high, and the speed is restricted. With the increase of nodes involved in mining, the probability of each node obtaining the bookkeeping rights will be reduced, leading to a continuous rise in the cost of stable feed-out of blocks under the PoW protocol. Bitcoin, which continues to increase the difficulty of mining, has to face the situation sooner or later where the mining machine cannot make ends meet, while Ethereum has long been considering the use of the new PoS consensus algorithm Casper to gradually replace the current PoW consensus. [7]

5.3 Proof-of-stake—the coin age defect and improvements in PoS 3.0

REBL has implemented the PoS 3.0 consensus protocol as we believe it to be one of the most secure and efficient systems out there. The protocol is robust and keeps nodes connected to the network. It disincentives inactive nodes. We highly recommend reading the research conducted by Blackcoin on the proof-of-stake consensus for more in-depth information. The research [2] can be found in the bibliography, chapter 14. This section provides a simplified summary to explain the basic principles of the proof-of-stake consensus mechanism.

With proof-of-stake, you first prove you have access to coins, and from that point you can compete to win blocks randomly. The more people that are competing, the more secure the block. Coin age is the idea that the longer you hold coins, the higher the probability you can win a block.

Coin age is calculated using the weight of unspent coins and the time they have been dormant. The calculation is simply “proofhash < coins · age · target”

Network consensus

The proof hash, or kernel hash, is the hash of an obfuscation sum that depends on a stake modifier, the unspent output, and the current time.

Its original intention was to incentivise dormant holders of coins. However, this does not encourage a node to stay connected to the network in practice since they can wait for the reward to increase.

Therefore, a solution was proposed by Blackcoin for PoS 2.0:
Remove coin age from the equation—"proofhash < coins · target".

However, this system does not work because nodes can stay disconnected and with many split inputs, reconnect to the network and game the reward system. Also, it does not give nodes any incentive to stay connected. In a decentralised system, the more nodes connected, the better the security since it shifts trust from a single entity to the network itself.

Therefore, the block reward was made a constant per block in the PoS 3.0 update. The block reward is proportional to the supply of coins, maintaining a target rate of interest.

The elimination of block reward based on time is a noticeable improvement. If the number of nodes staking drops, yearly interest increases proportionally to the disconnected nodes. For example, if only ⍰ of the network is staking, you can expect up to 5 times the reward. Since many coins do not have enough nodes, this is a significant advantage even to smaller shareholders. Although statistical data on all relevant coins would be time-consuming to obtain, it is self-evident that there is usually a lot less than 20% of shareholders staking. We think this increase in incentive will undoubtedly keep the nodes more competitive. [2]

To summarise, the proof-of-stake algorithm is a generalisation of the proof-of-work algorithm. In PoS, the nodes are known as the "validators", and rather than mining the blockchain, they validate the transactions to earn a transaction fee.

The more coins you stake, the better chance you have at successfully creating a block because of the weighted difficulty.

Network incentives

Any blockchain must pay validators to economically participate in its consensus protocol, whether PoW or PoS, all participants or "nodes" will be continually incentivised to participate. The REBL network consists of two types of nodes. The staking node, further described as the full node, and the masternode. This chapter describes the different nodes in the REBL network and how these are incentivised or rewarded for participation.

For REBL to grow and succeed, we need to synergise our success and the holder's success into one flowing entity.

6.1 Full Nodes

A staking node or "full node" is a program that operates on the network by validating transactions and blocks and relaying them. The full nodes on the REBL blockchain run on the aforementioned PoS consensus protocol. Basically, PoS transforms all stakeholders into miners. All they need to do to collect block rewards is to leave their wallets running and connected to the PoS network.

6.2 REBL Masternodes

Alongside the full nodes, the REBL network will have masternodes run on it. A masternode is a type of full node that offers various services to the network and is compensated by the network for this service. Masternodes are dedicated servers that stabilise and secure the network.

Network incentives

6.2.1 Masternode functionalities

Masternodes are an extension of the regular full nodes on the network. The masternodes offer extra functionality to the REBL network, and thus optionally provide all clients that add masternodes into their network these additional functionalities.

InstantSend is a feature of the REBL protocol that utilizes transaction locking and masternode consensus to facilitate instantaneous transactions on the REBL blockchain.

6.2.2 Masternode requirements

A masternode is a server with a full copy of the blockchain, which guarantees a certain minimum level of performance and functionality. The Masternodes can be run by anyone; however, there is an entry barrier in the form of collateral. The collateral never leaves the user's possession, it can be moved at any time, however doing so will disconnect the Masternode from the network. The 100.000 REBL collateral is used as a type of "trust" for the network. The collateral serves to prevent Sybil attacks on the network, whereby an attacker could create numerous masternodes and interfere with network operations. Nodes with so called "skin in the game" are therefore less likely to act maliciously. If the owner moves or spends the collateralised coins, the masternode disconnects and stops working. To run a Masternode, the following is required:

- Masternode collateral: 100.000 REBL
- A VPS or server to host the wallet 24/7
- A Dedicated IP address
- Storage space to save all blockchain data

Network incentives

6.3 Client Masternodes

The most prominent feature of our ecosystem: REBL masternode holders can optionally add a masternode from each new client that implements masternodes. The client will provide the collateral, the REBL masternode holder runs the masternodes. The more clients REBL adds to the portfolio, the more masternodes a REBL masternode holder will add to their portfolio.

6.4 Block reward split

The block reward, as well as any transaction fees, are allocated in a 60%/40% structure. This means for each block, 60% of the block reward allocates to a masternode, and 40% allocates to a full node.

6.5 PoS incentive structure

The reward expectation for full nodes is dependent on multiple variables. REBL aims for each full node to receive an approximate 10% interest rate on a yearly basis. This calculation is dependent on the number of masternodes active in the network, as well as the number of full nodes active in the network. The model will be implemented with the structure mentioned above; however, it will be closely monitored and, if necessary, revised. This is done to create a healthy ecosystem in the long-run.

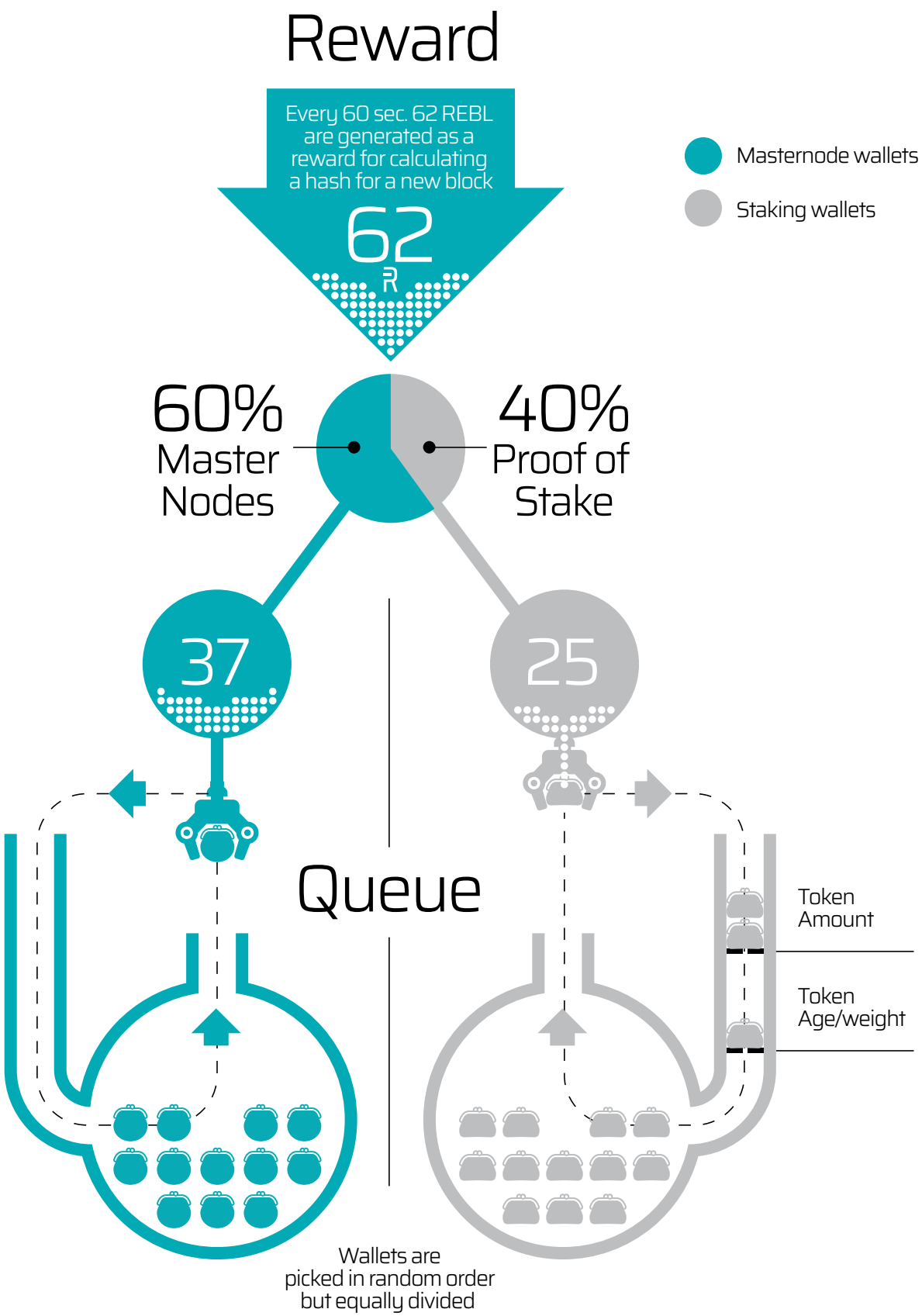
Network incentives

6.6 Masternode incentive structure

With each block that is created, 60% of the block reward is assigned to a masternode. The chances of you as a masternode receiving this reward depends on the number of masternodes active in the network. If, for example, 1000 masternodes are active at a given time, your chance of receiving the reward is 1 out of 1000, or 0.1%.

Theoretically, your ROI can be calculated given the number of masternodes active in the network. The table above shows this calculation. Depending on the number of clients you run nodes for and the number of masternodes you own, this reward can increase significantly.

Reward



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The REBL ecosystem

Chapter 6 described the incentive mechanism to provide a continuous healthy network with active nodes. This mechanism inevitably incurs some cost for the network. There are two ways to pay for this cost: inflation and circulation.

To ensure the development phase has a stable foundation it will be fuelled by inflation. This essentially means that the economic incentive—the block rewards—for validators will consist of newly generated coins, hence inflation. This inflation model will decrease the inflation rate over time. The REBL coin supply will reach a maximum supply, and the generation of new coins stops. Thus, the inflation rate will decline and eventually go to zero.

To keep all nodes in the network incentivised there must be compensation for the diminishing block rewards. Partially by the increasing number of transactions on the network, thus increasing the fees per block as well. But mainly, the block rewards will be filled by the clients who fill the block rewards with fees for REBL's services as described in chapter 8.

The REBL ecosystem

7.1 Cryptocurrency coin—REBL

The REBL token was initially launched as an ERC20 token on the Ethereum network. We are currently preparing the launch of our own native REBL blockchain, which is planned for Q4 2018.

The current ERC20 tokens will be swapped at a 1:1 ratio for REBL coins. The amount of coins that will be in circulation is as yet unknown*. This is dependent on the conversion rate of the token swap.

*This section will be updated once the required data is available.

7.2 Coin utility

The principal cryptocurrency of the REBL blockchain is the REBL coin. This is a utility coin that serves multiple functions in the network. It serves as the fuel for the blockchain as a digital currency; it is used for transaction fees and gas payments (i.e. smart-contract message processing fees). But it will also continually be used by our clients to serve the smart-fee system for all business applications.

More information on the business model and the smart-fee system can be found in chapter 8.

7.3 Coin distribution

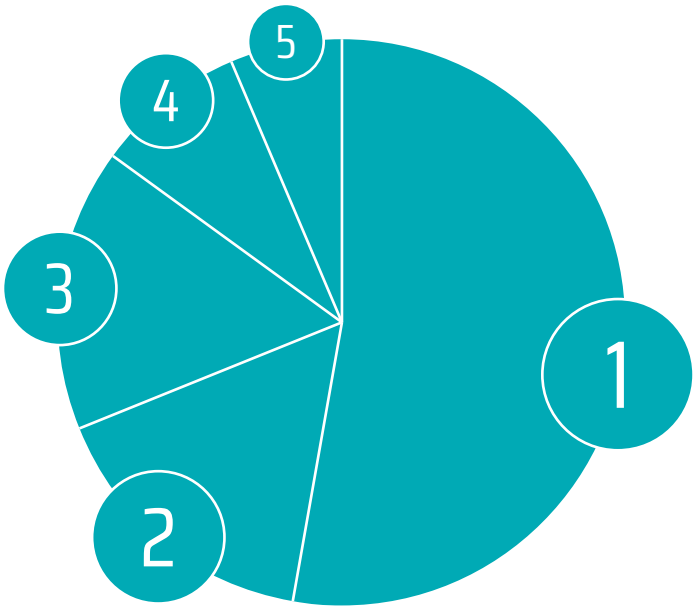
The coin distribution shows the circulating tokens that were airdropped to the community at the initial stage of the project. Furthermore, a divided reserve fund is displayed.

The current coin distribution is based on the ERC20 token. The coin distribution will be revised once the token swap is completed.

The REBL ecosystem

After the tokens are swapped to the REBL blockchain, the coin distribution will provide a better insight of true circulation as a distinction can be made between coins in circulation and coins locked in masternodes.

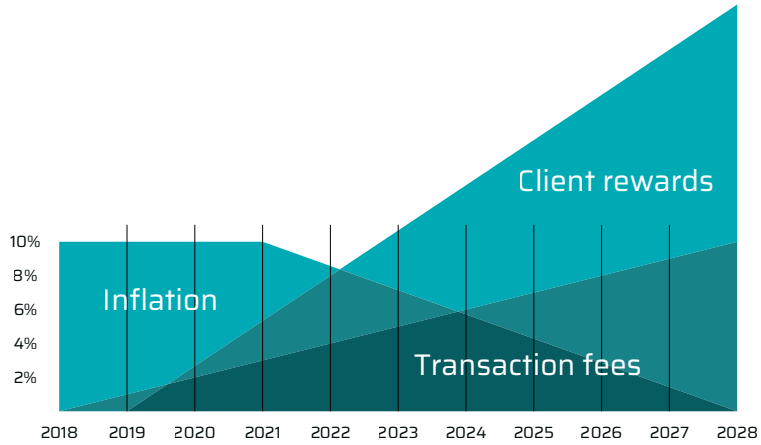
1. **165.000.000 tokens**
   have been airdropped to the community
2. **50.000.000 tokens**
   will be given as rewards to the community
3. **50.000.000 tokens**
   will be used to pay external costs
4. **26.200.000 tokens**
   are reserved for unexpected costs
5. **19.800.000 tokens**
   will be reserved for the Rebellious team



The REBL ecosystem

7.4 Economic model—coin generation (inflation) vs fee model (circulation)

At first, the distribution of this economic model will be rolled out in what we believe to be the most optimal way to create a stable network and have the reward system in balance. It is nearly impossible to develop a multi-year model like this with multiple unknown variables. Therefore, this model will be regularly revised on feedback loops.



7.5 Reserve funds

The reserve fund of REBL tokens will be swapped entirely to the REBL blockchain. These coins are and will be in full control of the REBL team. The team wants to state that it has no intention of ever selling off the reserve fund.

The reserve fund will be solely used for activities that serve the REBL project, e.g. community work, exchange listings, advisory services, etc. REBL will always be transparent about these activities and will openly communicate with the community. The addresses of the funds will be communicated after the swap and can thus be easily monitored by the community.

Business model

REBL's business model is close to a BaaS solution, Blockchain-as-a-Service. BaaS is an offering that allows customers to leverage cloud-based solutions to build, host, and use their own blockchain apps, smart contracts, and functions on the blockchain while REBL manages all the necessary tasks and activities to keep the infrastructure agile and operational.

Individuals and businesses are increasingly willing to adapt to blockchain technology. However, the technical complexities and operational overhead involved in creating, configuring, and operating the blockchain and maintaining its infrastructure often act as deterrents to its mass adoption. [8]

Most BaaS solutions primarily offer developer platforms designed for developers to start their own development of blockchain applications. The implementation process still requires knowledge and understanding, and a lot of time and money to execute.

REBL distinguishes itself in the market by offering a complete end-to-end serviced solution.

The REBL business model is designed to actively stimulate coin circulation, and thus create ongoing demand and utility for the REBL coin. The earnings model will be separate from the token value. REBL is a business with an earnings model that will not be affected by market price fluctuations.

The business model runs on a smart-fee system entirely fuelled by the REBL coin executed by smart contracts. The smart-fee system is divided into a few different categories considered revenue streams for REBL.

Business model

8.1 Product fee

We consider the plug and play customisable blockchain as the core “product” in the model.
Our clients will initially pay a standard fee for the blockchain (+ tools) development and customisation.
Furthermore, via our end-to-end service, REBL can be actively involved in the implementation process. This starts with use case development up until mainnet release and will continually remain a service.

8.2 Client blockchain audit fee

For a client chain that runs in a private environment, the nodes in the REBL network can validate blocks in a structured system, and thus function as an audit for the client chains. These blocks will be added to the REBL blockchain algorithm. The client is required to pay audit fees for this service.

In practice, the client will buy REBL coins from the open market and use these to fill up the block rewards for the blocks that are inserted into the REBL blockchain.

As one of our customers, you will have an independent and decentralised notary in all REBL holdings. The purpose of REBL coins is clear and concise in our model; the more customers attracted, the more widespread the use of the REBL cryptocurrency will become. So, as our customer, you will pay a notary fee, something we refer to as the “audit fee”. Demand and volume are all accounted for in our market-leading business model.

8.3 Service fee

The service fee is a periodical fee for infrastructural maintenance and performance-related services. In other words, REBL provides aftercare once the blockchain is fully functional. Some key activities to consider are for example consultancy, support, maintenance, performance, and security.

REBL Labs

REBL Labs is a side project that is focused on developing products that support the community. The current primary focus for REBL Labs is enhancing the usability of blockchain-related products. REBL wants to stimulate mainstream cryptocurrency adoption, and ease of use is one of the most significant drawbacks at present.

The first project that is currently in development is the Multi-Wallet, a user-friendly multi-cryptocurrency wallet.

One of the features of the Multi-Wallet will be the automatic convert function. This will interact with smart contracts to perform simple token swaps within the wallet. An easy and safe option to convert your tokens.

We encourage our community to contact us with ideas and suggestions. Contact us via dev@rebellious.io.

Marketing approach

10.1 Brand vision: defining REBL as a Blockchain-as-a-Service company.

With the recent explosion of software-based companies in general, one should not forget that blockchain can and will be offered as a service by REBL. Hence, we're a BaaS company. This is an integral part of our identity.

10.2 Use case development/product to market fit

In the following months, we'll be working toward educating the market about the possibilities of the blockchain. The most important aspect of this is to convince end clients that REBL is a viable business solution that can be applied over a broad field of operations, relating to a company's tech infrastructure having a transactional nature. Clients can set up various token platform incentivisation mechanisms with the benefits of usage in mind.

A short list of examples of use cases, this list is of course not exhaustive:

Custom Event Tokens as a Payment Solution—fraud resistance and customer experience

Festivals or events which incorporate tokens as a payment method often encounter two main problems for the user: waiting time to receive the tokens and the exclusivity of the token — only letting it be swappable at that specific event. With events setting up their own tokens, they'll be able to get more insight into their transactional data compared to issuing traditional tokens, which are also not always subject to refund.

The Loyalty Market—cost savings and faster incentivisation structure

Creating a loyalty-focused application offers versatility, as it allows you to reward customers before purchasing a product, as well as giving you insight into your promotional campaign. Most importantly, it prevents overspend on your loyalty campaign.

Marketing approach

10.3 Marketing Strategy

REBL will expand in the following efforts to maintain REBL's exposure, and these efforts will be supported continuously.
General marketing efforts: advertising, sponsorships, promotions and events.
Community building/brand engagement: content production, community building, maintenance and expansion.
Market making: Creating demand, availability on exchanges, liquidity

10.3.1 Sponsorships

The goals of sponsorships are as follows:

To increase brand awareness
To strengthen brand image
To show good citizenship
To add value to a product
To increase sales
To reach a specific target audience

We believe that having our name present on major events will help with contributing toward becoming a global brand. We've started small with community-initiated initiatives, and we'd like to continue developing our brand image.

Our primary goal for sponsorship marketing also consists of creating strategic synergies, which in turn will help our target audience become associated with both the sponsored brand and our own brand. Since we're engaging with many young tech enthusiasts, we'll most likely be present at events visited by these people.

Marketing approach

10.3.2 Promotions and events

Blockchain and cryptocurrency events at which enthusiasts and professionals come together will be an important catalyst for getting the REBL brand known across the globe.

10.3.3 Collaborations

The importance of collaborating with like-minded projects is as crucial as getting our customer base growing steadily, meaning it is very likely you'll see us featured among other leading cryptocurrency projects.

Development roadmap

Q1 2018

- Listing Bit-Z
- Wallet 0.02
- Whitepaper 2.0
- Token Burn
- Rebranding

Q2 2018

- Wallet 0.03 Ledger wallet support
- Alpha testing REBL Blockchain
- Wallet 0.04 Trezor wallet support
- Listing on Upcoin

Q3 2018

- Listing on IDEX
- Listing on Ethershift
- Closed beta testnet release
- Whitepaper 3.0

Q4 2018

- Launch mainnet REBL blockchain
- Token swap
- Blockchain wallet release - masternodes included
- Expected go-live of Shardax and listing of REBL

Q1 2019

- Multiwallet integrates ERC20 functionalities
- Expected go-live of Eterbase and listing of REBL

Q2 2019

- Business Dashboard and blockchain business tools
- IOS and Android Mobile wallets

Q3 2019

- Hardware development – Point of sale solutions

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Community and involvement

The REBL project is led by a group of true crypto enthusiasts who intended to build a cryptocurrency platform driven by the community. The REBL core team consists of 16 members, each of whom shares a common background in the e-commerce space. A diverse collaboration of individuals with varying disciplines, the team can be divided into 4 categories but operates as a flat organisation.

The technology team:
Consists of 6 senior developers with a background in web, app, and blockchain development.

The marketing & communications team:
Consists of 6 employees. All blockchain enthusiasts with former experience in e-commerce and a background in marketing & communications, graphic design, and content creation.

The community management team:
Consists of 4 core members who manage the community and the community moderators.

REBL has a strong social media presence. While Twitter is our main announcement channel, we are also present on FaceBook, CryptoCompare, Youtube, VKontakte, Reddit, BitCoinGarden, Medium and Github.

Furthermore, we have 14 active Telegram channels with over 35 moderators in 13 languages. Twitter and Telegram are our main channels due to their ease of interaction. GitHub will be our code repository and medium will be used to post our blogs.

At REBL we have acknowledged that having an active, involved community is the key to success. REBL started unorthodox by building a community first. Hence, we believe that these initiatives give us an advantage. It is also known that to make crypto successful, one should have a substantial user base to make it a considerable part of the tech landscape.

Community and involvement

We have dedicated community telegram channels, REBL offers the following language palettes:

English	**Russian**	**Japanese**	**Dutch**	**French**
German	**Turkish**	**Portuguese**	**Arabic**	**Filipino**
Spanish	**Balkan Region**	**Hebrew**	**Romanian**	

Every community has a native community admin present to give you a local vibe. With the factors that a community should identify with oneself and have a somewhat local feel, we're confident that this strategy is an excellent approach.

For an up-to-date list of our Telegram groups, see https://www.rebellious.io/community/

FaceBook: https://www.facebook.com/RebelliousCoin
CryptoCompare: https://www.cryptocompare.com/coins/rebl/influence/BTC
BitCoinGarden: https://bitcoingarden.org/forum/index.php?topic=24090.0
Youtube: https://www.youtube.com/RebelliousCoin
VKontakte: https://vk.com/rebelliouscoin
Reddit: https://www.reddit.com/r/RebelliousCoin
Medium: https://medium.com/@REBLCoin
GitHub: https://github.com/RebelliousToken

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