2022

Decimal White Paper

version 2.0

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1. Philosophy of Decimal

To build a sturdy house you need a foundation, therefore to build a reliable project you need a fundamental idea, a philosophy, which, like a foundation, will maintain the integrity of the project and serve as a guide in difficult moments. Our project is based on the motto: keep it simple, and people will reach out to you!

Decimal's philosophy is to create a project for people, ordinary users. We, the Decimal team, consider ourselves “one” with the ordinary users. We believe we have similar origins and upbringings.

Such users, the people, live in a world oversaturated with information.

Drowning in a stream of different and contradictory data, forced to engage in constant communication with strangers. These exchanges are short, in an environment without trust or authentication, with enormous potential for toxicity and with far-reaching consequences. The simple human needs and values of the user run the risk of being attacked and irrevocably alienated. The average person wastes an enormous amount of time, constantly lacking and running out of time, desperately working around the imposing threats. Often they are simply overwhelmed by their realityThat is why we are focused on providing everyone with a tool to withstand external influences. A universal technical solution to the difficulties and challenges of modern society. A tool that is technically complex, but easy to use and apply. The consumer should not spend time mastering our product, but on solving their immediate problems. So that the user doesn't need to develop his blockchain network and encode transaction logic. Decimal will provide this functionality already "out of the box". Just generate a wallet and receive or send tokens.

The following will describe the concept of the new and better version of Decimal — Decimal Smart Chain. Seeing as the market is rapidly moving towards smartchains, multichains, we conceptually refined our product: we added the option of using smart contracts, and compatibility with EVM, IBC, and BSC. You can visually assess our growth by comparing the scope of plans and goals of the first

(https://decimalchain.com/WPengV1.pdf)[1] version of White Paper Decimal with the new one. The first WP release was conservative and its main goal was to lay a reliable foundation for further product development. The goals of the first version were achieved. And now the Decimal team is confidently aiming at new, large-scale heights that seemed impossible 2 years ago. More comparative information can be seen in the section — "Intermediate results".

2. Mission

Technological progress in the last 30 years has made a revolutionary leap: our daily life is becoming more complex, and the flow of information that people deal with in the 21st century can't be compared with the flow of information in the 20th century. In the work — “The Sum of Technology”, S. Lem, inspecting the ethical aspects of technological evolution, notes that it is often evil because it provokes an unfair distribution of benefits and devalues culture[2].

In this regard, society stratifies into "enthusiastic ideologues" who are in the epicenter of events, and those who are forced to work against time in order to keep up with the changes.

Observing this injustice, we realized that our mission is to level the playing field, to give all people an equal opportunity to benefit from technical goods, without spending hundreds of hours studying technology. The first step toward accomplishing this mission would be to create a convenient, unconstrained tool for sharing value.

What does "convenient" mean? First of all, it is simple, optimized in terms of usage. And by frameworks, we mean that the values (in the

[1] as well as the Yellow Paper and the Economics Guide
[2] S. Lem, "The Sum of Technology," chapter "Two Evolutions," section "A Few Naive Questions

form of tokens), in most projects, cannot go beyond these projects, which limits the freedom of users.

In the example of the user, equality will ensure that there is no need for initial product selection, as it will be possible to move an entity between blockchains after implementation. This will provide an opportunity for developers to benefit from the infrastructure and features of interconnected networks. In this case, it would provide better usability of some of its functionality, using the potential of other networks.

3. Decimal Values

1) Saving time

You have your own project. You have thought through its financial model and business processes. You've described the interaction scenarios and channels of value flow between all the participants. A few clicks on the Decimal website and your project has its own coin.

Instead of thinking through the details of the technical implementation of your project, spend time on more useful things for you.

2) Accuracy and certainty in everything

The floating exchange rate of coins in the Decimal network is based on the mathematical formulas of John Keynes, the most famous economist of the first half of the 20th century. A strict mathematical relationship determines the value of tokens depending on the balance of supply/demand in the market.

3) Stability and reliability

DPoS (Delegated Proof-of-Stake) consensus allows rapid verification of transactions by a set of specialized network participants, and validators. Validators operate under a strict system of penalties and incentives.

4) Speed

Large number of transactions and no delays. Validator software and the very fact of a limited set of validators ensure the verification and validation of a massive number of transactions. As the Decimal network grows, the number of validators grows with it.

5) Freedom of Conversion

Thanks to the collateral mechanism (CRR[3]), every coin in the Decimal ecosystem can be exchanged for any other coin in the network at any time. The asset will not stay in your wallet forever, despite you wanting to exclude them from your portfolio.

6) Accessibility to a wide audience of users

Blockchain Decimal is built on Tendermint, a software for secure and consistent application replication on a computer network. Tendermint works even if up to 1/3 of the computers on the network are not working correctly. Each computer sees the same transaction log and the same network state.

Tendermint is the underlying technology in the Cosmos blockchain network.

[3] Constant Reserve Ratio (CRR) — constant reserve ratio, a parameter regulating the provisioning of custom coins with DEL coins.

Thus, Decimal is compatible with all blockchains within the Cosmos network, which has more than 100 projects, 49 of which are already communicating via IBC (Inter Blockchain Communication Protocol).

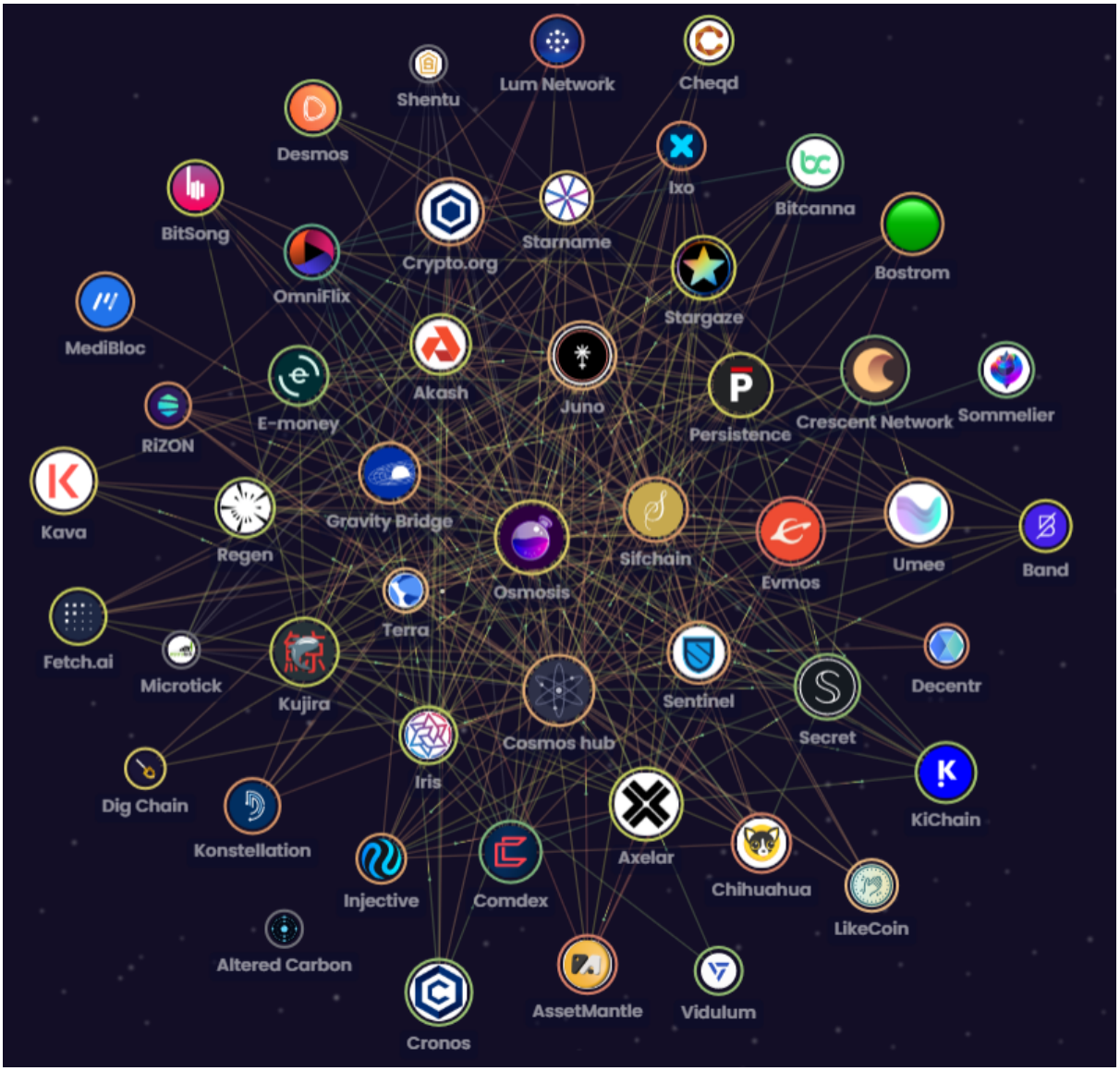

Fig. 1 — Cosmos network.

7) Variety

The Decimal team is working to continually expand the selection of decentralized applications, both through its development resources and through the involvement of third-party teams and the motivation of enthusiasts.

8) The right to vote for the common user participant

It is possible to delegate any coins to a validator, increasing his share (stake). The validator is rewarded for its work in verifying transactions and forming blocks, and distributes it proportionally among the participants who delegated their coins to it. But that's not all. By choosing one validator or another, users decide who is more trustworthy and whose work they think is more effective. By doing so, users have a direct impact on the blockchain's performance and improve its quality.

9) Flexibility

Because each coin is backed up by the DEL coin, it becomes possible to pay transaction fees on the network with any coin in the Decimal ecosystem.

10) Team spirit and openness to cooperation

Anyone whose views are similar to ours can contribute their computing power to the cause. If a network member is willing to install and run the Masternode on his own equipment, he will be rewarded for each unit he signs, as he helps organize the network.

4. Goals

Our development team has set a goal to bring something new to the common cause and to implement useful solutions into the network. And first of all, we mean tokenization:

- easy and fast issuance of your own token/coin;
- guarantee to exchange token at any time for any other token/coin;
- an unambiguous rate formation mechanism for each coin.

The name Decimal itself reflects the strict deterministic processes within the technology and the mathematical certainty. As we strive for high accuracy to the smallest details and reliability of all computational processes.

Studying the work and ideas of the best in our field, we have chosen to embrace the ideology of union. Our Web 3.0 vision involves the union of protocols and standards, and seamless use of the specifics and benefits provided by different blockchains.

Just imagine, a transport protocol that allows information to be broken down into tiny atoms, move and store data in a completely independent infrastructure of unified chains, and at the same time guarantee the integrity and security of the information being moved. For example tokenization of countless assets, points in loyalty systems, cashback services, user identification, proof of ownership, authentication of certificates and other documents, tracking of goods through supply chains, open and honest algorithms for the gambling industry, automatic performance of contractual obligations, guaranteeing payment of funds, ensuring access to certain resources, ensuring security of values, honest voting, cross-border transactions, access to salary opportunities

5. Overview of the technical background

To understand why our team decided to develop a Decimal Smart Chain based on the Cosmos SDK, we need to delve into theory.

Blockchain platforms are divided into several generations, each generation has its own features and solves a certain range of problems.

First Generation

First-generation blockchains include Bitcoin, Litecoin, and ZCash. The main task of this generation is to create decentralized money. Functionality is limited to receiving and sending crypto assets.

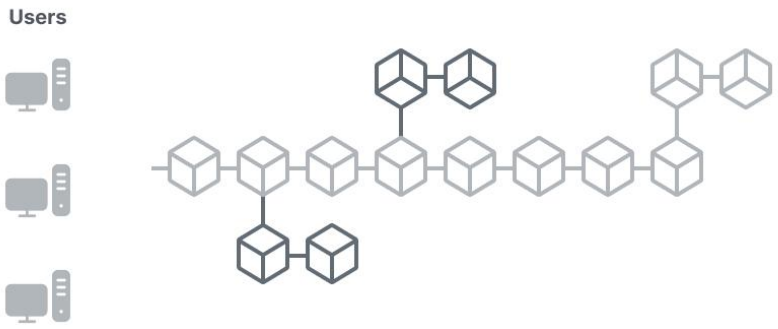

Fig. 2 — The first generation of blockchains.

Over time, the cryptocurrency community didn't get enough of this and second-generation blockchains emerged.

Second Generation

Second-generation blockchains include Ethereum, Tezos, EOS and others. The functionality has greatly expanded, there is software logic for creating and managing their decentralized data. Many unique projects with their own features have appeared.

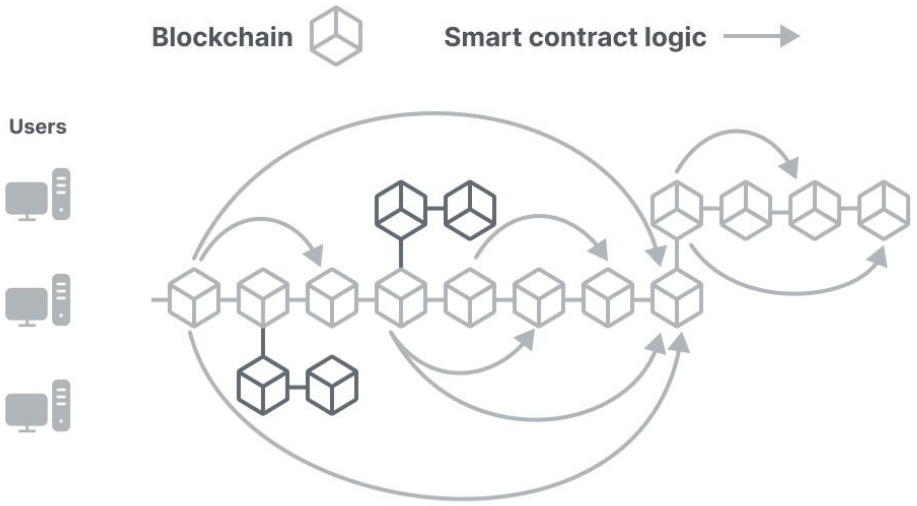

Fig. 3 — The second generation of blockchains.

This led to a significant increase in the popularity of blockchain projects and the industry ran into problems:

- Low performance — a huge flow of users slows down the system and complicates block generation;
- The lack of convenience — the novelty and complexity of the technology, discourages many users;
- Poor power efficiency — the second generation still uses the PoW (proof-of-work) protocol when generating blocks, which requires a constant increase in computing power;
- Cost — because of the low network throughput , a limited number of people can make transactions at a time, at such times the commission for transactions is very high.

The emergence of layers (L1, L2,...) is to expand the capabilities of blockchain projects and optimize processes, developers add "Add-ons", they are commonly referred to as layers.

Layer L1 is the source blockchain. The other layers interact with L1 with varying frequency, but their operations are essentially off-chain operations, i.e., performed outside the source blockchain. These layers are external to the source layer. This solution provides significant advantages by offloading the first layer, but also brings significant disadvantages.

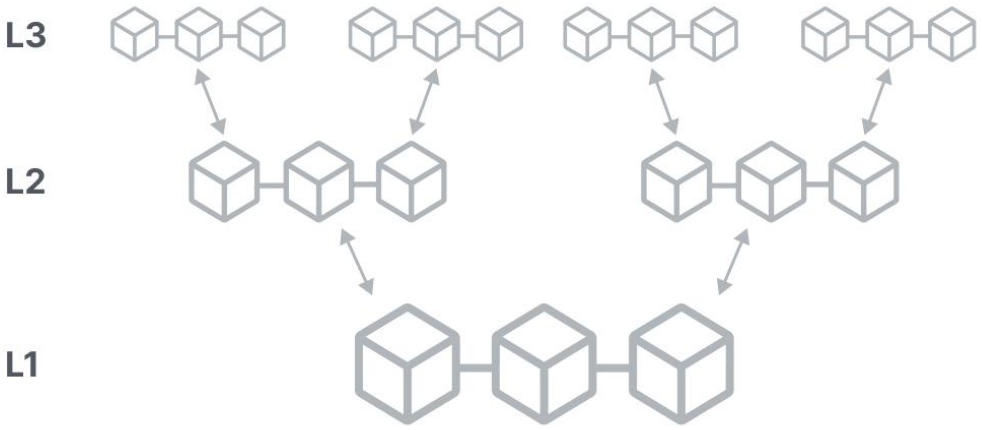

Fig. 4 — Blockchain superstructures (layers).

The main problems with blockchain layers:

- architectural complexity;
- increased centralization;
- transaction delay;
- need to regularly compare balances with the main network;
- calculations outside the main/main layer (off-chain);
- focus on microtransactions and other problems.

Ethereum Plasma[4] and Bitcoin Lightning Network[5] are examples of such architecture.

[4] https://ethereum.org/en/developers/docs/scaling/plasma/
[5] https://lightning.network/

Both Bitcoin and Etherium have a market capitalization of billions of dollars, and the users of these services operate with huge amounts of money every day. Therefore, there is no point in complicating the process with unnecessary code and experimentation.

Third Generation

The third generation of blockchain aims to eliminate the problems of the first and second generations and is currently at the forefront of our field.

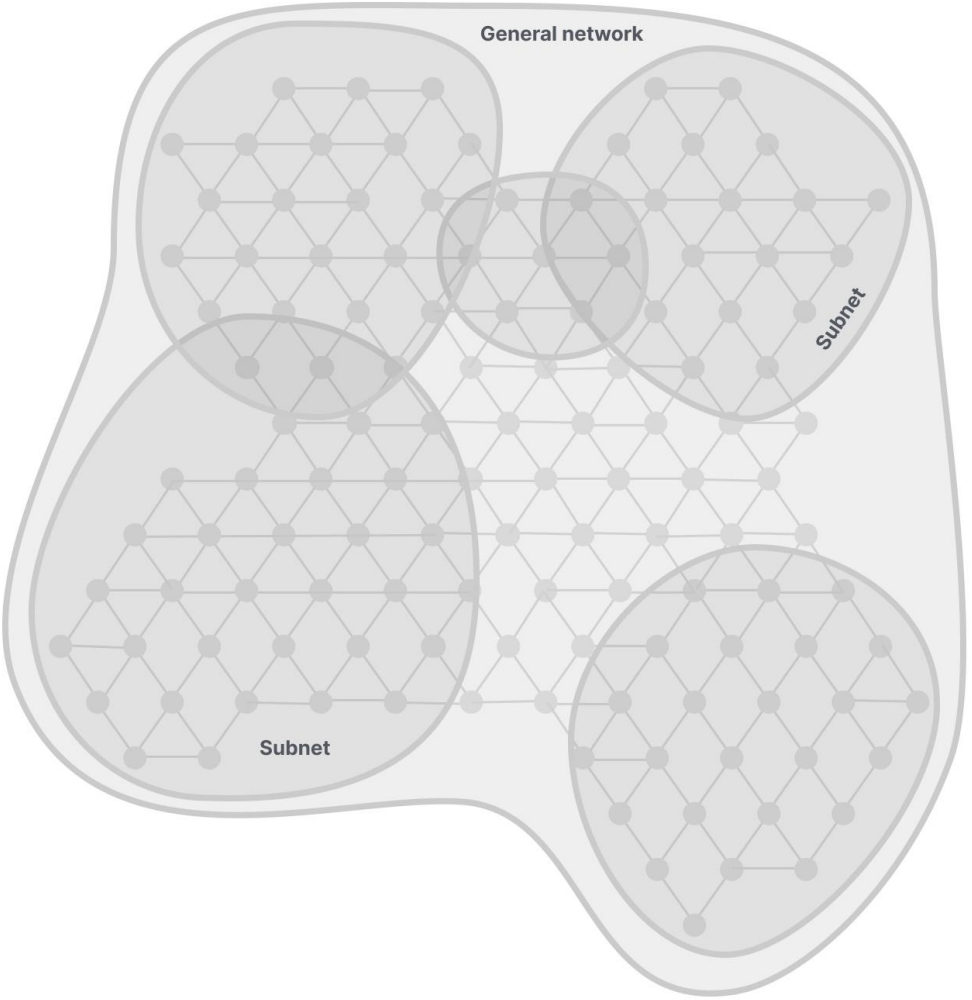

Fig. 5 — Avalanche network architecture.

Such projects include Cosmos, Polkadot and Avalanche, which have rather unusual infrastructures. These platforms focus on horizontal scaling with an asynchronous heterogeneous network model, where subject-specific blockchains coexist within a common network model and interact with each other when necessary.

In simple terms, these are multichain systems in which blockchain projects can interact with each other, thereby breaking the cross-chain barrier. The development of such systems does not occur by layering systems, but by adding new projects to a single ecosystem.

What can it do for users?

The answer is simple enough, it’s freedom! An ordinary user can choose which projects he likes, which project’s values align with their own, and redirect his resources and finances in one direction or another without trouble, which creates a consolidated flow of crypto-assets. Such simplicity of interaction creates an open market. As the market of goods and services declines, low-quality projects drop out, and a process of "Natural Selection" takes place.

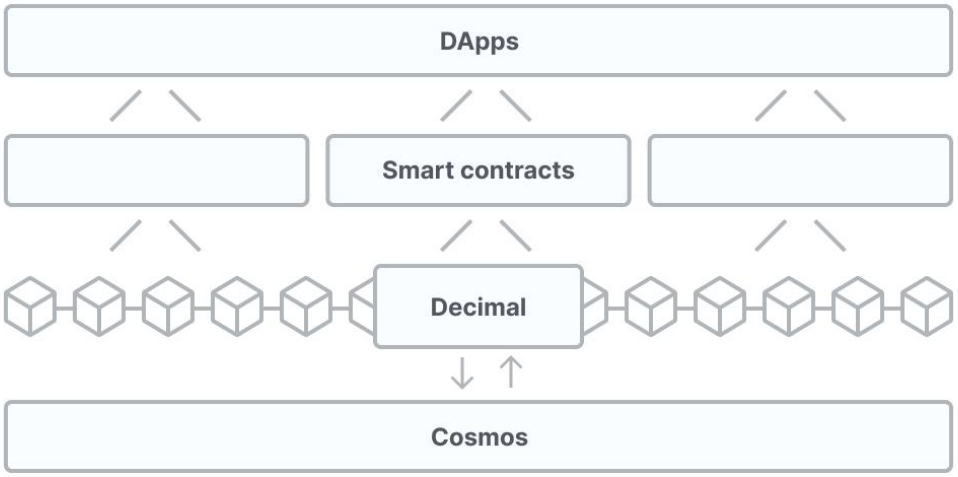

Fig. 6 — Decimal architecture.

Here we come to what is Decimal. It is a third-generation blockchain based on the Cosmos SDK.

The underlying technology base Cosmos SDK is for the construction of blockchains and the implementation of custom project architecture. Tokenomics and key logic are implemented directly in the Decimal blockchain. The integrated smart contract module is the foundation of the customised logic for the target end user. And the final user interacts with the system via a decentralised application interface.

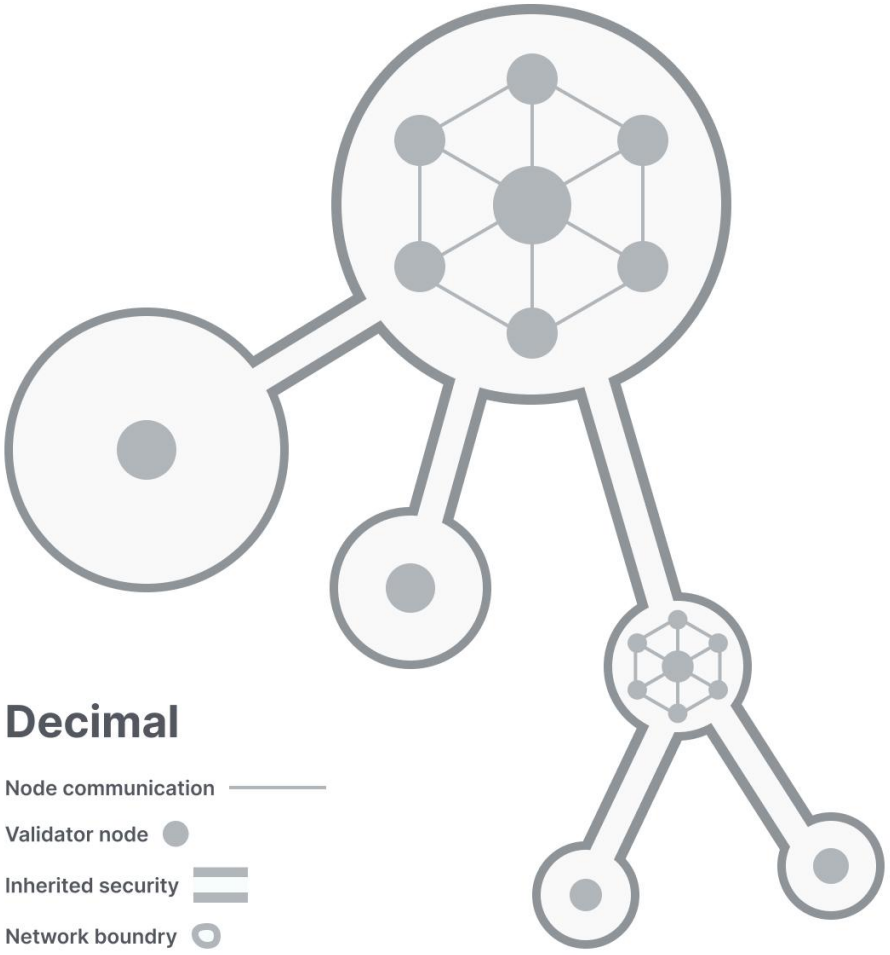

Fig. 7 — Heterogeneous blockchain model.

Decimal, that built on the Cosmos SDK, with the implementation of the Inter Blockchain Communication (IBC) protocol, will be integrated into the Cosmos ecosystem[6] and simultaneously combined with the EVM (Ethereum Virtual Machine) module, which will provide access to the

[6] https://mapofzones.com/ — Cosmos Ecosystem Zones.

Ethereum infrastructure and compatibility with all EVM-based projects (including BSC).

The core of Decimal is the Tendermint Core.

Tendermint is software for secure and consistent application replication across many machines. By secure, we mean that Tendermint works even if up to 1/3 of the machines fail randomly. By consistent, we mean that each machine in good working order sees the same transaction log and computes the same state. Secure and consistent replication is a fundamental problem in distributed systems.

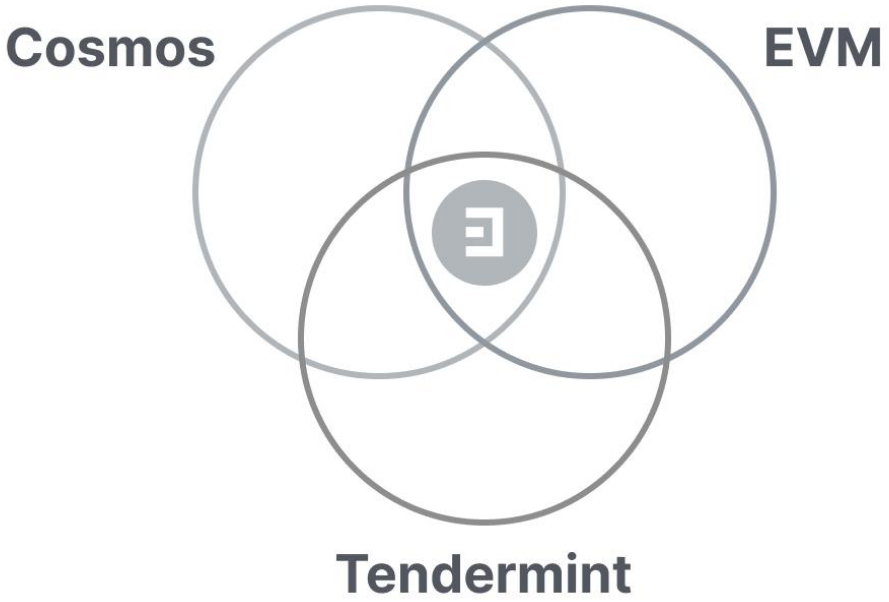

Fig. 8 — Key Components.

Tendermint consists of two main technical components: a blockchain consensus mechanism and a universal application interface. The consensus mechanism, called the Tendermint Core, ensures that the same transactions are recorded on each machine in the same order. The application interface, called Application BlockChain Interface (ABCI), allows transactions to be processed in any programming language. Unlike other blockchain and consensus solutions that come

pre-packaged with built-in finite state machines (such as a fancy key store or fancy scripting language), developers can use Tendermint to replicate a finite state machine BFT application written in any programming language and their development environment fits.

But we went further and integrated EVM (Ethereum Virtual Machine) into our blockchain. At the time of writing, only one project in the blockchain market has such an implementation, which shows our determination to be at the forefront of technology development.

What are the opportunities offered by the use of smart contracts? The parties sign a smart contract using methods similar to the signing of funds in current cryptocurrency networks. Once signed by the parties, the contract is saved in a blockchain and takes effect. Automated contract fulfilment necessarily requires an existence environment (blockchain nodes) that can fully automate the execution of the terms of the contract. This means that smart contracts can only exist within an environment that has seamless executable code access to the smart contract objects.

All contract conditions must have a program description and clear execution logic. With unrestricted access to the items, the smart contract determines the achievement or violation of items under the specified conditions and makes independent decisions based on the programmed conditions. Thus, the main principle of the smart contract is the complete automation and reliability of the contractual relationship. This makes it possible to interact with other ether-like blockchains, creating collateral-free ERC20 tokens, NFT ERC721 and ERC1155 tokens that can be sent seamlessly to other networks. That's not all, see the Decimal Smart Chain section for more details.

6. DEL Coin

DEL is the token of the Decimal blockchain. It means that DEL is a base token at the core of the blockchain (in the node), it is a condition for the execution of the program logic of the blockchain itself. To execute any program logic (sending coins, creating a custom token, delegating, etc.) it is required to have DEL[7] to consume gas in transaction fees for executing that logic.

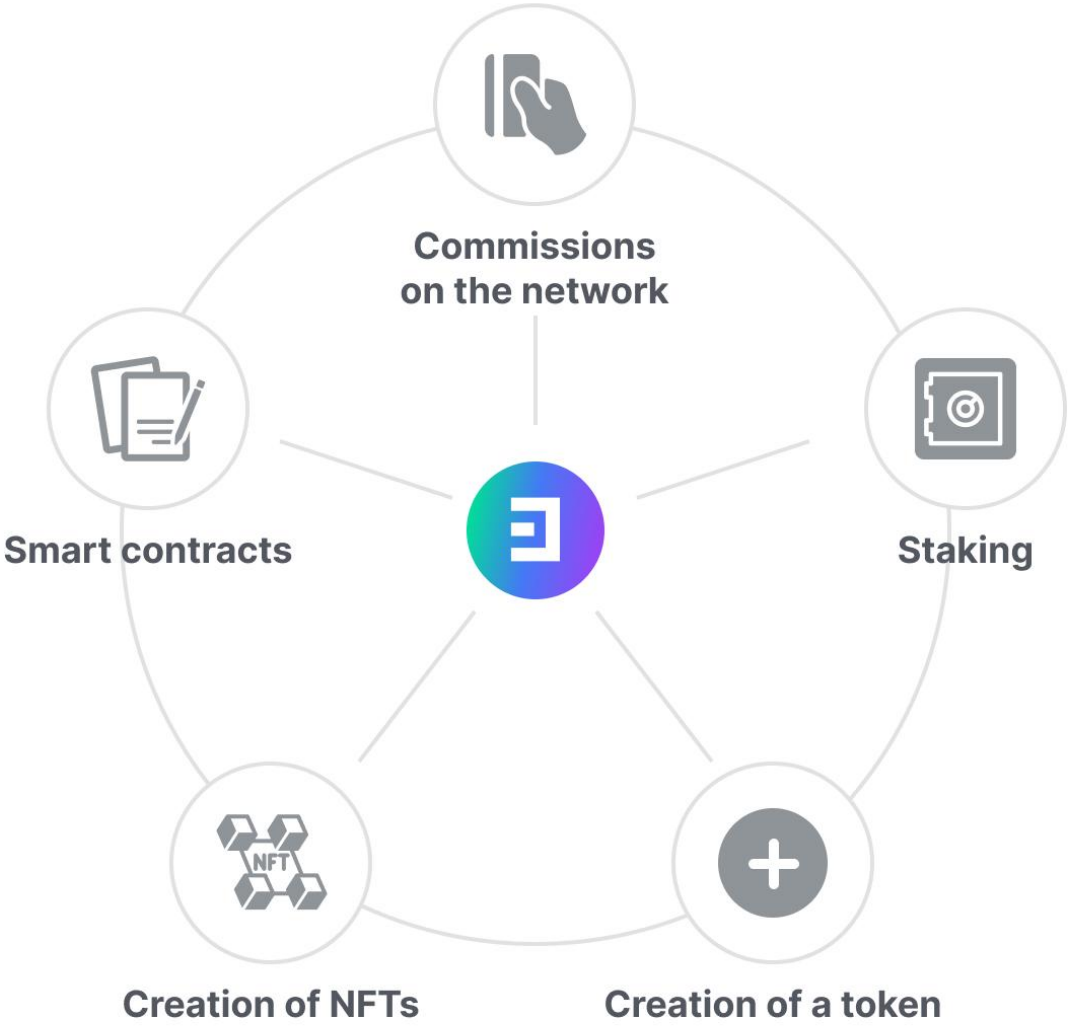

Fig. 9 — DEL token and its functions.

[7] In the form of a DEL balance on the wallet or DEL reserve for custom coins.

In other words, the DEL coin is an integral part of Decimal's blockchain software, without which the logic of the blockchain would be broken. Existence, spending in the blockchain, mining the coin are the motivation and incentives for the user's actions within the blockchain.

DEL coin cannot be a means of payment in the real world and is valuable only in our blockchain because it gives the user access to the platform's services. By analogy, oil is a valuable material, but only within certain industries (automotive, construction, etc.), so you cannot pay with oil in a store. Money, for example, is a universal means of payment, so you can use it to pay for oil and generally any good or service.

But then why does a coin have a price? It's very simple, the price of a coin is formed by the number of users for whom it is valuable. If there are a lot of active users and few coins are in free circulation, the price of a coin or token becomes high due to the demand. Conversely, if user interest in the platform drops, there are fewer active transactions and the price decreases.

DEL is the catalyst for all ecosystem processes. The following chapter is enhanced "Functionality". There is observed in detail the variety of functions of the Decimal platform, and everything is possible due to DEL.

7. Intermediate result

Decimal's main network has been up and running since August 1, 2020, it’s been two years[8]. Who doesn't know their history has no future. And we remember how it all began and are proud of the path we've taken.

Basic functionality was provided at the start:

1. Coin Creation;
2. Sending Coins;
3. Coin minting[9]/burning;
4. Delegation;
5. Creation and repayment of receipts;
6. Validator node management.

This functionality is now available through the Console and Block Explorer interfaces.

Broadening horizons:

January 2021

Voting: making suggestions for improvements for the development team to consider.

May 2021

Cross-chain swap: coin transfers between Decimal, Ethereum and Binance Smart Chain networks.

[8] As of August 2022
[9] from "mint" — generation or issuance of coins in blockchain

June 2021

Public NFTs are non-interchangeable tokens with a publicly available token fragment.

October 2021

Private NFTs are non-interchangeable tokens that are fully viewable only by the current owner of the token.

Statistical data

The Decimal Observer pages provide up-to-date statistics on the main metrics of network performance at the moment[10].

Delegated coins

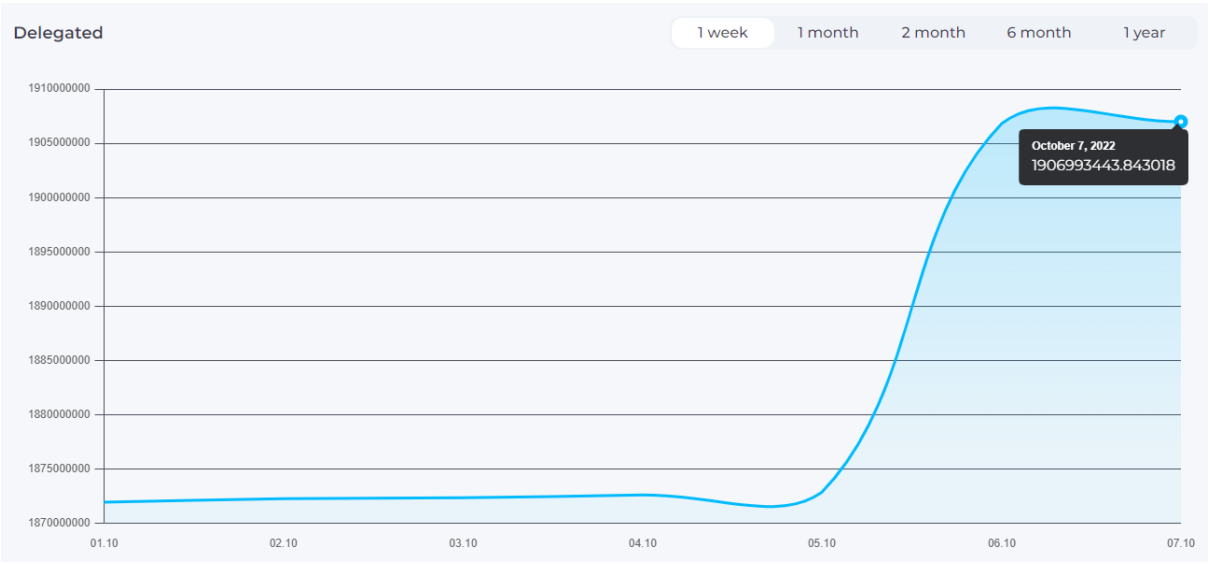

Fig. 10 — Coin Delegation Graph.

Over 1,906,993,443 coins have been delegated (link).

[10] August 2022

Number of validators

Fig. 11 — Graph of the number of validators.

46 validators (link).

Total emission

Fig. 12 — DEL emission graph.

The total issue is more than 2,000,000,000 DEL (link).

Number of blocks per day

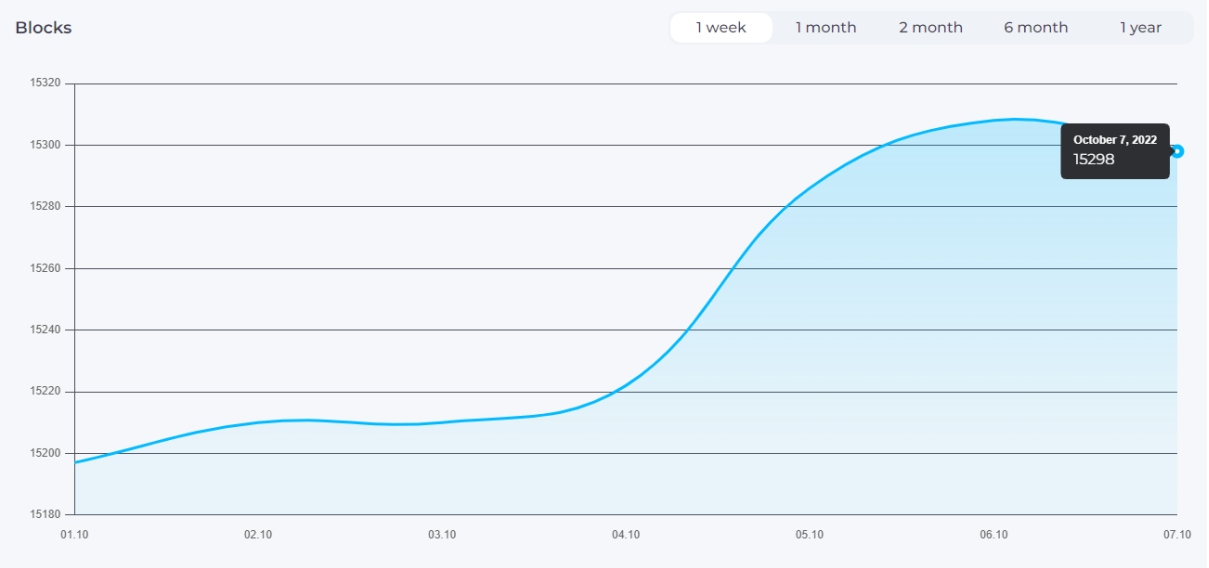

Fig. 13 — Graph of the number of blocks.

On average, ~15,500 blocks are generated per day (link).

Number of transactions per day

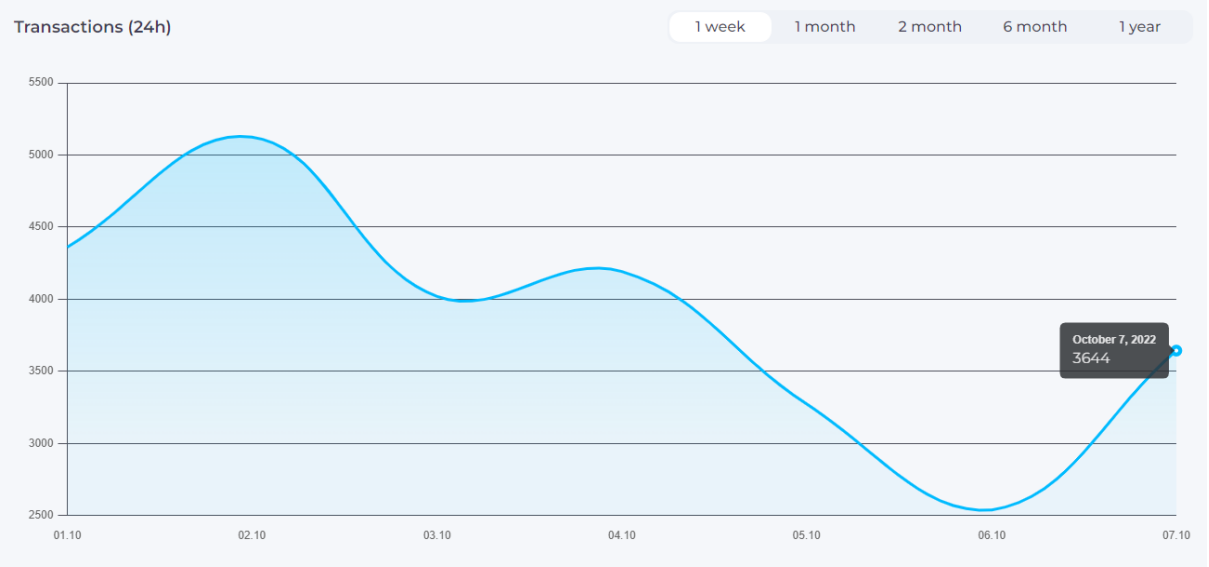

Fig. 14 — Graph of the number of transactions per day.

An average of about 2,500 and more transactions per day (link).

Project capitalization

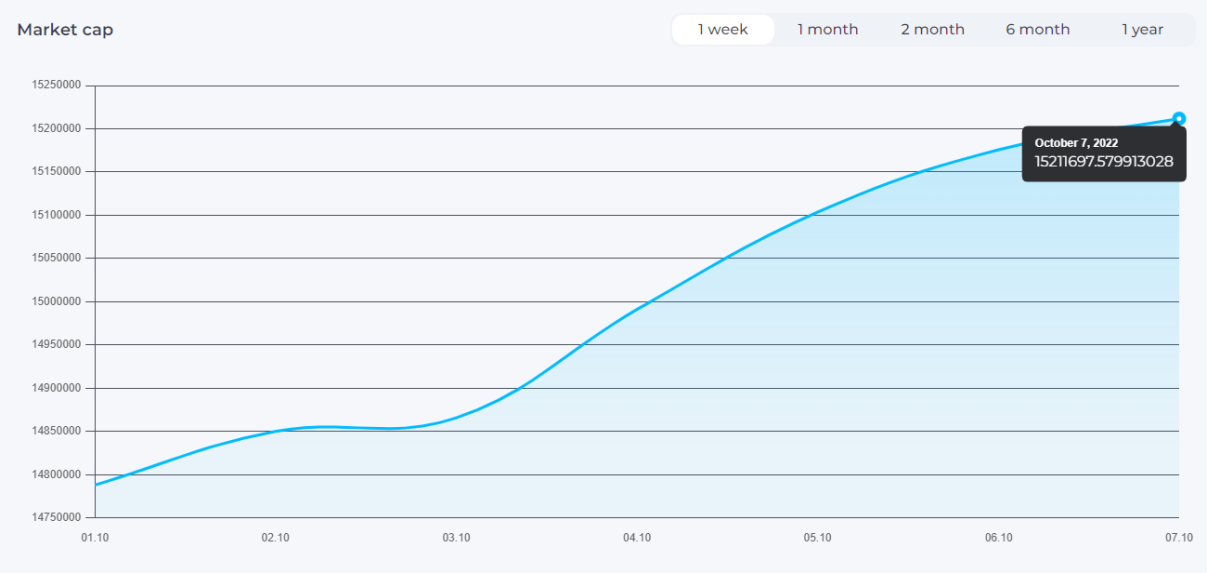

Fig. 15 — Capitalization graph of the project.

Capitalization of the project is more than $15,000,000 (link).

Number of unique addresses

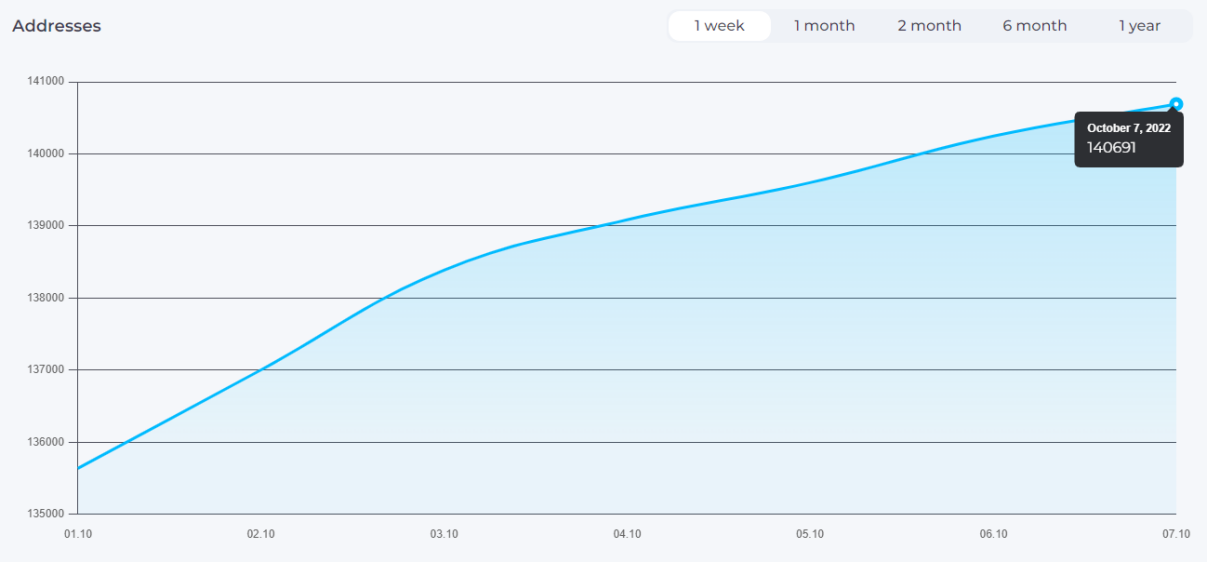

Fig. 16 — Graph of the number of unique addresses.

At the time of writing, the number of unique addresses was 140,691 (link).

Conclusion

Over the course of time, the project has shown its reliability by surviving several bear markets, and expanding its functionality at the same time. Studying metrics, we can conclude that despite the situation on the market, the number of unique addresses continues to grow. The number of delegated coins is growing, which means that the number of users and like-minded people who join our ranks is growing.

7. Functionality

We keep pace with the times, adhere to market trends and improve the Decimal system in a timely manner. The functionality of Decimal can be divided into basic and new conditionally. The new functionality is based on the implementation of EVM (Ethereum Virtual Machine) into our blockchain, which enables the use of smart contracts.

Among the advantages of smart contracts, there are:

- protection against unauthorized changes;
- transparency means tracking the execution stages of a smart contract in real time;
- privacy means that despite all contracts being kept in a public distribution registry, the parties may remain anonymous;
- high-speed performance;
- self-execution.

7.1 Basic functionality

7.1.1 Creating custom coins

Every user can create his own crypto coin on our platform. It takes three simple steps:

1) come up with a name for the coin;
2) set the parameters of the coin (CRR, initial and maximum issue, the size of the reserve in DEL);
3) confirm the sending of a coin creation transaction.

7.1.1.1 Changing the Maximum Issuance of Custom Coins

The user may want to increase the initially specified "Maximum Issue" parameter. This is easily done with the "Coin Issue" section and in the settings of the token to increase the issuance by adding DEL.

7.1.1.2 Commission payment with custom coin

It is possible to pay commissions for transactions on the network with custom coins, as they are backed by DEL.

And if you decide that too many coins are in circulation, then each participant has the opportunity to burn (destroy) the coins.

7.1.2 Creating NFTs (non-fungible tokens)

Decimal's blockchain supports creating, sending, storing, burning and delegating NFT/SFT tokens. As well as changing the reserve of created tokens. Any user, using a general console interface, can upload an image, audio or video file.

NFT (Non-fungible token) is a unique token that proves ownership of a digital asset. Unlike interchangeable tokens, such as Ether in Ethereum,

each instance of NFT is unique and cannot be replaced by another similar token.

SFT (Semi-fungible token) is a semi-replaceable token issued in limited collections. Such tokens are interchangeable only with other tokens of the same issue (collection). The collections themselves are unique.

NFT and SFT demos, such as a cover or a demo excerpt, are available to all Decimal users via Explorer. The token holder has access to the full-size file through a convenient console interface.

NFT and SFT can be private. Private tokens have restrictions on viewing — only the owners of the token have access to such files. Other users can only view information about transactions related to the token through Explorer. Owners of private tokens can also view/listen to files associated with their tokens in the console.

The files downloaded when creating NFTs and SFTs are stored securely on stable servers. If a user has a need to store data in their own storage, they can do so through the API.

In the future, the team plans to organize data storage in a distributed file system IPFS. This will further increase the decentralized approach to NFT creation.

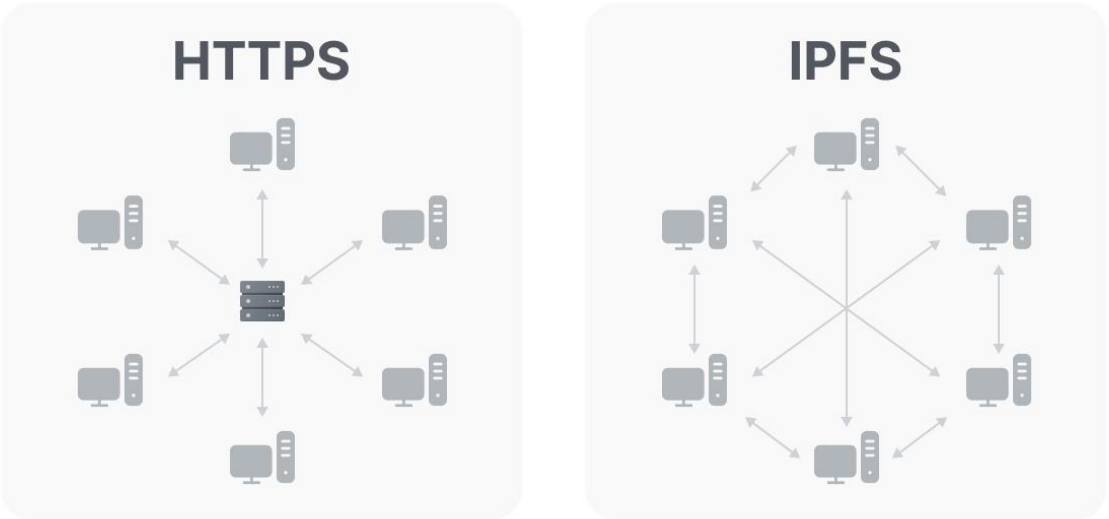

Fig. 17 — Architecture of centralized (left) and distributed data storage (right).

IPFS is a peer-to-peer distributed file system that connects all computing devices with a single file system. In a sense, IPFS is similar to the World Wide Web. IPFS can be thought of as a single BitTorrent-rooy, exchanging files from a single Git repository. In other words, IPFS provides a content-addressable block storage model. In simple words, instead of downloading files from individual servers, IPFS queries peer nodes on the network and they specify the path to a specific file, rather than accessing a central server, reducing the load on the server. This allows large amounts of data to be distributed with high efficiency, while giving the user maximum security because only the NFT owner can access the file.

7.1.3 Storing and sending coins and tokens

In the Decimal console, the user can create, burn, receive, store, and send DEL, custom tokens, and non-exchangeable tokens.

7.1.4 Delegation and Unbonding

Validators generate blocks and get paid for that. A validator could be delegated with more coins. So, the more coins are delegated the more chances the validator has to create and put a block. Each member of Decimal can be rewarded by delegating assets (DEL, coins, and even NFT) to the validator, but the choice of validator should be made responsibly since the validator shares not only rewards but also distributes fines between users.

7.1.5 Multisig Wallet

A multisig wallet is a shared account accessed by multiple wallets. The voting from participants with access is required to withdraw tokens. Voting guarantees that none of the participants can not solely dispose of the funds[11].

[11] provided that the weight of that participant's vote is not greater than that required to make the decision unilaterally.

7.1.6. Cross-Chain Transactions

With cross-chain swap, Decimal users can transfer coins between Decimal, Ethereum and Binance Smart Chain blockchains. By sending a coin to another network, the user will receive tokens of the target blockchain in his wallet.

There is no exchange rate for such a transaction. If you send 10 DEL from Decimal, you will receive 10 DEL, only already in the target blockchain (Ethereum or BSC).

Transfers can be made to the following destinations:

Decimal > Ethereum;

Ethereum > Decimal;

Decimal > BSC;

BSC > Decimal;

BSC > Ethereum;

Ethereum > BSC.

The swap fee is paid by the sender. It is important to note that the fee is imposed for two transactions — in the target and source blockchains. It is absolutely free for the recipient. It is possible to receive a transfer transaction even if the wallet is completely empty.

Making a cross-chain swap is simple. The sender only needs to specify the recipient's address, select a coin, specify the amount to be sent, and confirm the sending of the swap in the user console.

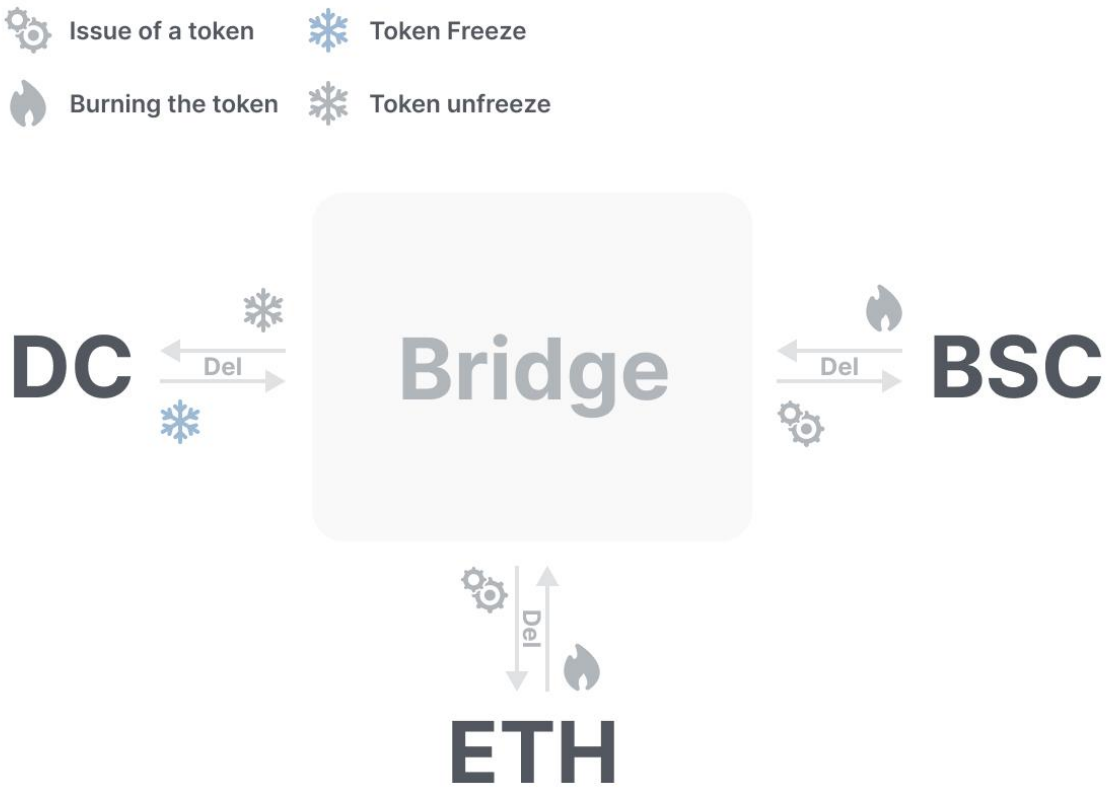

Fig. 18 — Cross-chain bridge connection architecture.

Also, Decimal's near-term plans include the implementation of interaction with other Cosmos blockchains via the IBC protocol, which will allow for coin transfers and swaps within a common network.

The Inter-Blockchain Communication (IBC) protocol[12] is a protocol for authentication and data transfer between blockchains. IBC requires the minimum set of features specified in Interchain Standards (ICS)[13].

The IBC can be used with a wide range of blockchains or state machines[14]. The IBC protocol provides a permission-neutral way of relaying data packets between blockchains, unlike most bridging technologies. IBC security comes down to the security of the circuits involved.

[12] https://tutorials.cosmos.network/academy/4-ibc/what-is-ibc.html
[13] https://github.com/cosmos/ibc/tree/main/spec/ics-001-ics-standard
[14] It is an abstract behavioral model that can be in exactly one of a finite number of states at any given time.

Fig. 19 — Architecture of interblockchain communications.

The transport layer (TAO) provides the necessary infrastructure to establish secure connections and authenticate data packets between chains. The application layer builds on top of the transport layer and defines exactly how data packets are to be packetized and interpreted by the sending and receiving chains.

7.1.7 Voting validators

The block proposal is made by a block producer, who is assigned by a probabilistic algorithm.

To approve a block, the number of votes for the block must be at least 2/3 of the total number of votes — this condition is denoted by 2/3+. Otherwise, an alternative block will be proposed, and the next block, and more, until the condition on the number of votes is met.

This is where the Voice Power plays a big part.

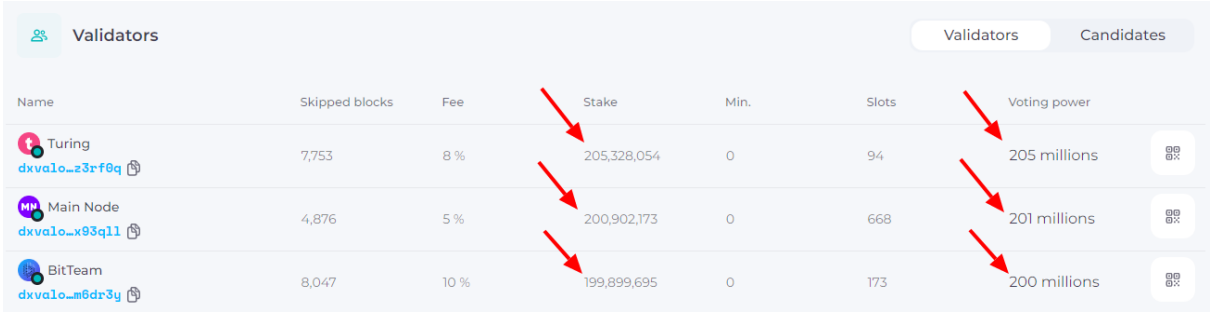

Fig. 20 — Validator list screen.

Each validator has a stake, which, on the one hand, he risks in case of his incorrect behaviour, on the other hand, in proportion to which the reward for creating the block is distributed.

In the Decimal blockchain, 1 vote equals 1 DEL of a steak. Thus, the strength of a vote is the size of the validator steak, expressed in DEL.

The larger the validator's stake, the more weight the validator will have in relation to other validators, the more likely he is to become and be appointed as a block producer and the more of the reward he will take for himself.

In turn, the validator's stake consists of his own money and the number of coins delegated to the validator. The better the validator performs his duties, the fewer fines he receives, the greedier the commission, the more people trust him with their coins, and the greater his Power of Voice.

7.2 Decimal Smart Chain

Interactions between participants in processes can be programmed in the form of smart contracts. As a set of virtual promises accompanied by enforced protocols, they were first proposed in the 1990s by Nick Szabo, a pioneer of modern computer science. An early version of the smart contract implementation can be seen in the Bitcoin protocol, which records evidence of payments.

Blockchain-based smart contracts store all terms in a distributed database that cannot be changed. In addition, payments and counterparties are automated in the blockchain. With EVM (Ethereum Virtual Machine), smart contracts can be created and executed more easily than ever before because complex transactions can be coded into the system.

Decimal Smart Chain is the second generation of Decimal. In addition to all the current functionality, we will add an EVM module, a software platform that developers can use to create decentralized applications (dApps) based on Decimal.

7.2.1 DEX

The availability of smart contracts opens the door to the big world of decentralized finance (DeFi). One of the typical and popular modern dApp is the decentralized exchange (DEX)[15].

[15] https://uniswap.org/, https://pancakeswap.finance/ and others.

On such an exchange, it will be possible to exchange coins/tokens of the Decimal ecosystem, as well as to participate in liquidity pools. This would include decentralized and algorithmic stackcoins that exist in the Decimal blockchain, as well as other coins and tokens created on other blockchains.

7.2.2 DAO

DAO (DAO) is a decentralized autonomous organization, a software built on Decimal smart contracts.

The point of the DAO is for the Decimal user community to own the entire issue of DEL coins mined and held by early investors, and to participate in project management and process organization.

Namely:

- votes for the appointment of the CEO;
- votes to update the network and its functionality;
- the right to change the development team;
- makes suggestions for updates;
- pays "dividends"-rewards to network members;
- issues an algorithmic stablecoin;
- redeems the DEL coin from the market to provide an algorithmic stablecoin;
- and more[16].

7.2.3 Stablecoin

Decimal blockchain was developed by Decimal PTE. LTD.[17] registered in Singapore.

[16] More details about DAO will soon be outlined in a separate document.
[17] As of August 2022, the company has submitted documents to MAS and is awaiting confirmation.

Because of the Standard Payment Institution Licence, the company can provide the following services:

- Digital payment token service — the ability to buy/sell cryptocurrencies (digital payment tokens) or providing a platform that allows people to exchange cryptocurrencies (DPTs);
- A merchant acquisition service — providing a processing service — payment gateway and POS terminals (the ability to connect merchants of goods/services and accept money as payment for their services using bank cards);
- An e-money issuance service — the ability to issue electronic money, which the customer can use as a means of payment for goods and services from the merchant or use to send to others (registration of e-wallets, replenishment of his account, withdrawal to his account, transfers between purses within the system).

This opens up the possibility of creating stablecoins according to the classical model — the issuing company provides the acceptance of funds against the pledge of the issued stablecoins. As well as organizing the processing of this stablecoin.

The development of Decimal in this direction will lead to a system of derivatives, that is, a variety of assets, with understandable for any user and specific scenarios of use, such as but not limited to, wrapped tokens. And, of course, it will attract additional liquidity to the ecosystem.

7.2.3.1 Algorithmic Stablecoin

The problem of stability of cryptocurrencies is still quite high. In the near future, we can hardly expect this situation to stabilize. Many have tried to find a solution, for example, Tether released a secured cryptocurrency USDT. However, it has been criticized for centralization. Having a single manager leads to risks.

This is where algorithms and classical mathematics came to the community's aid, leading to the emergence of algorithmic stablecoins.

Even though the Decimal team is in favour of the "one Bitcoin = one Bitcoin" theory, we do not deny the fact that we live in a world where there is an equivalent price to the national currencies of the country in which we live. And in our system, we need some semblance of stability in order to have some kind of foundation from which or to which we can make calculations.

Algorithmic Stablecoins involve an economic incentive for the users themselves to maintain a stable token value.

- If the value rises, it is profitable for the user to issue new coins and sell them on the market.

- If the value falls, it is profitable to burn the tokens, repaying the loan at a cheaper price.

These processes are controlled by a chain of smart contracts and the Oracle service, which stabilizes the price in two cases:

1) excessive growth of collateral;

2) a significant drop in collateral.

Growth of collateral:

Stage 1. As long as the price is within acceptable limits, stabilization occurs by changing the profitability of buying stablecoin.

Stage 2. The price growth has exceeded the upper limits, the mechanism of minting (issue) of stablecoins is launched, users are invited to take the excess tokens.

Falling rate of collateral:

Stage 1. The mechanism is the same.

Stage 2. Start of liquidation. Those collaterals, the amount of which is critically low, are liquidated. They are put up for auction, but the user can save his collateral by replenishing the collateral.

Stage 3. The tokens received for selling the pledge are burned, thereby stabilizing the price.

7.2.4 Launchpad

Crypto Launchpads are platforms that help investors find new crypto projects and help crypto projects find investors (crowdfunding). They are also places where developers and creators can showcase their products and get quick access to the market.

Due to their decentralization, accessibility and low cost, launchpads have gained attention and secured their status as the "standard" tokensale.

Benefits:

- Security — projects are thoroughly checked, so there is virtually no scam;
- in the case of IDO — simplified technical side of the issue, because you can make a purchase already from a registered account;
- guaranteed listing in the future;
- simplicity and accessibility — potential investors can choose the project they like;
- Minimal restrictions — not only professional traders can buy a new token;
- Minimal costs — smart contracts are responsible for most of the processes;
- Transparent terms of cooperation.

7.2.5. Integration with Ledger

Ledger[18] is a global manufacturer of hardware wallets.

It supports dozens of the most popular cryptocurrencies. So many users around the world are used to these devices, which are very convenient. Being in the pool of supported cryptocurrencies is not only prestigious but also a modern necessity if the project strives to provide the highest level of security and convenience of ownership for its users.

We have developed an application to support Decimalchain coin in Ledger devices. As of this writing (August 2022), the Decimal build is being audited by the hardware wallet vendor.

7.2.6 Support for the collateral-free token (ERC20)

The implementation of the EVM module greatly expands the scope of Decimal. It is possible to implement any logic. Including all kinds and standards of tokens.

As a special case, a collateral-free token does not require DEL as a reserve. Such a token can be endowed with any qualities and tokenomics. It can be created by any developer in the EVM compatible blockchain ecosystem who knows the Solidity programming language, but we went further and made it possible without any help for the average user who has no programming skills. Now you don't need to look for developers to develop a smart token contract for you, but create it on our platform.

[18] https://www.ledger.com/

7.2.7. Dynamic transaction fee

Ethereum charges for transactions based on gas to execute smart contracts. The problem is that whether you perform a simple transfer or a complex transaction settlement, they are all processed on the same network. As a result, when traffic on the network increases, transaction fees increase even for simple actions, user transactions compete with each other, and transactions with higher fees are confirmed faster.

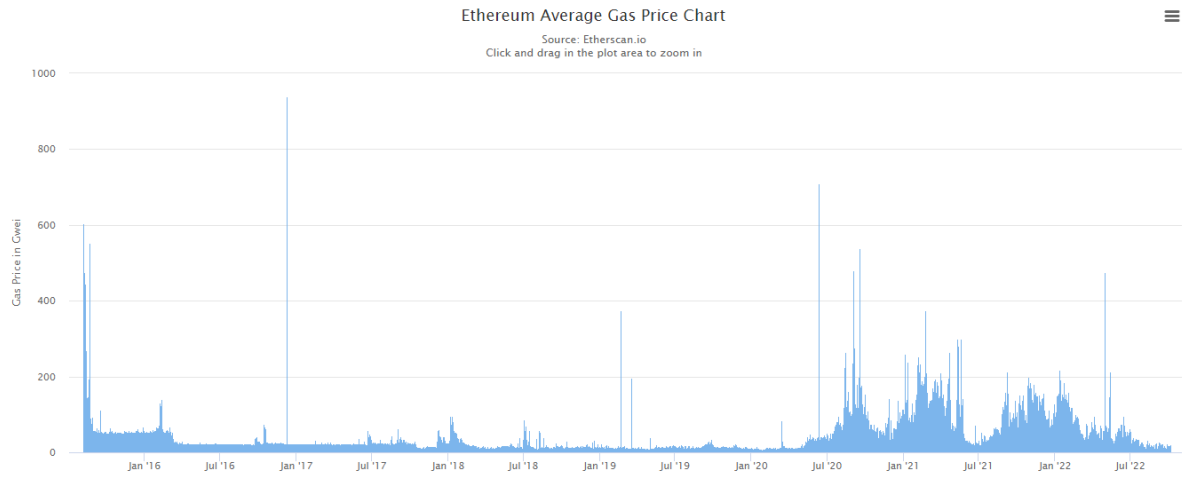

Fig. 21 — Ethereum Average Gas Price Chart.

https://etherscan.io/chart/gasprice

The cost of ETH itself to pay fees is also very volatile and high at times of high network load. This causes great discomfort to users of various Ethereum decentralized applications due to large, and sometimes even huge, transaction fees or long transaction confirmations on the network.

Decimal offers to buy out/eliminate the risks associated with the cost of transactions on the network.

Fig. 22 - Graph of ETH exchange rate to USD.

https://coinmarketcap.com/currencies/ethereum/

We will fix transaction fees relative to the U.S. dollar exchange rate ~ $0.04 (the cost of DEL native coin sending transaction). If your transaction costs 4 cents today, it will cost the same tomorrow, and the day after tomorrow too[19].

A special service (Oracle) monitors such rating agencies with DEL/USD rates as CoinMarketCap, CoinGecko, CoinMarketRate, CoinPaprika and others. When DEL becomes more expensive the commission amount in DEL is recalculated downward. And vice versa, when DEL becomes cheaper relative to USD the commission in DEL will be increased.

[19] with the DEL transaction fee will change in proportion to the current DEL to USD exchange rate.

Calculated examples of commission costs are shown in the table below.

Asset Types	Transaction type	Average amount of gas	Gas quantity reduced to values in Decimal	Commission in $
ERC20	contract depletion	1178246	1178246000000	2.24
	token mining	51349	51349000000	0.10
	transfer	40158	40158000000	0.08
	transfer approval	33024.33333	33024333333	0.06
	transfer From	36355.66667	36355666667	0.07
ERC721 (NFT)	contract depletion	1712211	1712211000000	3.26
	token mining	153379	153379000000	0.29
	transfer	49464	49464000000	0.09
	transfer approval	35522.33333	35522333333	0.07
	transfer From	50204	50204000000	0.10
ERC1155 (NFT)	contract depletion	2241618	2241618000000	4.27
	token mining	64755	64755000000	0.12
	transfer approval	46291	46291000000	0.09
	transfer From	53895	53895000000	0.10
Any	min transaction	26513	26513000000	0.05
Any	max transaction	19529391	19529391000000	37.20
DEX	min transaction	180000	180000000000	0.34
DEX	max transaction	300000	300000000000	0.57
DEL	transfer	21000	21000000000	0.04

7.2.8 Dynamic Coin Creation Commission

The current coin creation functionality assumes fixed creation fees depending on the length of the ticker:

3 letters — 1,000,000 DEL (was) => $100,000 (became)

4 letters — 100,000 DEL (was) => $10,000 (became)

5 letters — 10,000 DEL (was) => $1,000 (became)

6 letters — 1,000 DEL (was) => $100 (became)

7-10 letters — 100 DEL (was) => $10 (became)

Similar to dynamic transaction fees and using the same technology under the hood, these numbers will be revised.

The cost of the transaction, in dollar terms, remains the same, but the price in DEL may change depending on the exchange rate of the coin. When the exchange rate is high, the price is lower, and when the exchange rate is low, the price is higher.

7.2.9 Extended NFT/SFT capabilities

The new version expands the user experience for non-interchangeable tokens.

NFT/SFTs can be sent in multi-send transactions — one sender, many recipients;

NFT/SFT can be sent to Ethereum and Binance Smart Chain blockchains using the cross-chain transaction feature.

7.2.9 Burning Coins

Any user can directly affect the value of his custom coin, and even the DEL price, with the token burn feature. How does this happen? We created a wallet with a zero address, the tokens sent to that address are irretrievably gone, they cannot be used. In the case of a custom coin, the coin itself is burned and the reserve in DEL is not changed, thus there are fewer coins for the same security and their value increases. The user can only burn the tokens they have in their wallet. With DEL burning the mechanism is simpler, the user simply burns the DEL.

7.2.10. Validator change by delegate

An additional option for delegation will be the ability to move a steak from one validator to another within 7 days.

8. User scenarios

8.1.Unit of accounting (cashback, loyalty points, bonuses)

Any coins or tokens can be a unit of account in the economics of the project, just a quantitative metric to assess value (loyalty to the company, involvement in processes, brand promotion, and so on) that can be converted into the main product, receive discounts or unique bonuses.

- BTT — BitTeam token

This is a token of the BitTeam company. The company gives out this token as a reward to attract users. The token is accepted back as a loyalty point or similar for certain actions/features. The initial issue is given away and accepted tokens are burned.

The idea is that the user is motivated to hold the coins as long as possible and after some time can safely use them when receiving services on the site. It is also envisaged that users can independently emit and burn coins within the maximum issuance in the blockchain itself by investing or withdrawing from the DEL reserve by changing the token price to DEL, which introduces gamification into token circulation and creates an advertising effect for the site and the project.

An example of token distribution is:

- Bounty Program;

- Referral program;

- Subscriptions to chats and channels (social networks).

Example of token withdrawal from circulation:

- Using a token when connecting the "PRO status" service of a user;
- Boosts;
- Exchange for the opportunity to get an avatar;
- Using token when paying commissions (with 50% discount);
- Listings (listing on $3k Tether and $17k in BTT users must vote token on the site).

The economics of the BTT token.

Maximum emission 500k BTT

Initial Reserve 1.2k Del

CRR 80%

Burning once a quarter 20% of all Bitteam revenues

If the company did not get that 20% in token, then it must redeem the token from the market for the missing amount within 1 week, but no later than the burn date.

The maximum issue will be reduced by the number of burned coins with each burning.

The number of tokens held by the company and not included in the number of tokens burned can be re-distributed as part of the actions described above.

8.2 Storing and transmitting information

The crypto industry is evolving toward more decentralization. The case of "uniqueness" (assets, qualities, parameters of something) has already been implemented in the network in the form of NFT. The logical development of this idea will be the implementation of uniqueness for the individual in the network and the construction of a decentralized society.

Vitalik Buterin in his article[20] outlined the concept and example of the implementation of special Soulbound tokens (SBT), which will bring the uniqueness and uniqueness of each individual to the network.

- Decimal ID

The issues of network security and identity authentication become relevant when interacting with various services that require identification,

[20] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4105763

both governmental and commercial. Decimal ID will allow organizing your identity confirmation safely and reliably, with unambiguous correct identification, but without disclosure of personal information (passport data and so on).

Your counterparties will always be able to understand that they are interacting with you and not someone else.

Decimal ID will give you full control over your personal data. Share your data as much as is acceptable to you.

And be yourself in the network and society of the future.

8.3 Derivatives (transfer of rights to valuables)

By derivatives we mean derivatives of various kinds. That is, not "raw" technology, but something ready-made for a particular relatively simple and transparent user scenario.

- Stablecoin Decimal
- Algorithmic Stablecoin Decimal

Descriptions are provided here and here.

- NFT (non-fungible tokens)

The first implementation of NFT (non-interchangeable tokens) in Decimal implied a reserve only in the form of a DEL token. To expand the possibilities, the NFT reserve can be expressed in any custom coin and entered when the NFT is created.

The further mechanism is similar to the usual work with custom coins via CRR, for which the actual equivalent in DEL is calculated, the price of delegation is determined and the rewards are calculated.

8.4 Cross-platform

This is all sorts of interactions with other blockchains, heterogeneous or not, within one or more ecosystems. This includes bridges, cross-blockchain protocols, cross-chain transfers, and atomic swaps. In simple words, the ability to transfer tokens is made both inside and outside of a single blockchain.

Bridges allow cryptocurrency holders to "move" (or "flip") their assets between different blockchains. These cases are listed for the sake of an example, and the integration of functionality will happen soon (more details in the Roadmap section).

- Keplr Wallet

keplr.app is an open-source browser extension wallet that supports the Cosmos cross-network ecosystem. It provides account and wallet management features for all Cosmos-SDK-based blockchains.

- Osmosis DEX

Osmosis is a decentralized exchange (DEX) based on a next-generation automated market maker (AMM).

Osmosis introduces the new Adaptive Automated Market Maker (AMM) model running in the Cosmos ecosystem. The Osmosis cryptographic ecosystem, appealing to both sellers/buyers and developers, offers multiple use cases and compatible modular tools for developers.

In conjunction with Decimal via IBC, the Osmosis protocol allows for cross-network swaps and liquidity pools with tokens from any blockchain connected to the Cosmos ecosystem.

8.5. DeFi

It’s a wide range of decentralized applications for the financial sector, such as decentralized exchanges (DEX), exchange platforms, loans and instant loans (flash loans), liquidity pools and so on.

- DEX

The launch of the first decentralized Decimal service is scheduled for early 2023. A detailed description will be provided closer to the target dates. The main points are described here.

- Launchpad

In conjunction with the previous item organizes the cycle of development of the cryptoproject from the idea, attracting the audience and rounds of investment to the exit to the open market.

For more on the Decimal team's plans, see the Launchpad section.

- Crypto loans

Allow you to unlock the value of digital assets by using them as collateral for a loan. A very wide audience gets access to credit. Such loans can be disbursed very quickly.

Including instant loans that do not require collateral, such as leveraged arbitrage deals on DEX.

The details and economics of this case are being worked out by the Decimal team.

8. 6. Come up with your own custom script

Custom scenarios are not limited to the list above. On the basis of Decimal, an unlimited range of such scenarios is possible. We offer you, those who are closest to their audience and understand their needs and format of communication, to provide the specifics. And the Decimal team is always ready to support initiatives, including in terms of refining or customizing the functionality of our blockchain.

9. Mathematics

Every custom coin in the Decimal ecosystem is backed with DEL coin. The CRR parameter allows you to determine the value of a custom coin in relation to any other coin in the Decimal network and directly to DEL, to guarantee the possibility to exchange with any other coin and to adjust the price variability (volatility) of the coin. For different business models of user projects, it is possible to provide a different measure of riskiness/profitability of coins in terms of their value.
CRR (Constant Reserve Ratio) is the security percentage of your coin. For an initial issuance of 100 coins worth 1 DEL each, 30 DEL is required to set the CRR=30%. It directly affects the coin's price and its growth rate.
In Decimal, due to the pledged financial collateral, which guarantees the reliability of the issuer, the coin can be traded immediately after it is

created. Collateral is deposited when the asset (coin) is created and, in proportion to the CRR, rises when you buy it and falls when you sell it.
This mechanism helps you calculate the current price of an asset using a mathematical formula rather than the stock market. It helps you make more informed decisions.
Let's say we release Happy Coin, to reward bypassers for smiles, in the amount of 1,000,000 coins. We give it a liquidity of 20% of the issue by putting 200,000 DEL into the blockchain when we create the token. In this case CRR = 20%. And the value of 1 HPC = 1 DEL.

Buy an additional 1,000 HPCs:

Purchase amount = Reserve * (-1+(((wantBuy + Issue) / Issue) ^ (100 / CRR)) = 200000 * (-1+(((1000 + 1000000) / 1000000) ^ (100 / 20)) = 1002 DEL
That is, to buy 1,000 HPCs we would spend 1,002 DEL.
Now Reserve = 200,000 + 1,002 = 201,002 DEL.
And the issue of HPC = 1 000 000 + 1 000 = 1 001 000 HPC. In this case, let's calculate the cost of 1 HPC using the formula Price = Reserve * (1-(1-1/ Issue)^ (100 / CRR)) = 201,002 * (1-(1-1/1,001,000)^(100/20)) = 1,004 DEL.

Now sell 1,000 HPCs:

Sales Amount = Reserve * (1 — (1 — Want to Sell / Issue) ^ (100/ CRR)) = 201002 * (1 — (1 — 1000 / 1001000) ^ (100/20)) = 1,002 DEL.
That is, for the sale of 1,000 HPCs we gained 1,002 DEL. The reserve has decreased and is again equal to 200,000 DEL. The issue also decreased to 1,000,000 HPC. Again calculate the value of 1 HPC
Price = Reserve * (1-(1-1/ Issue)^ (100 / CRR)) = 200,000 * (1-(1-1/1,000,000)^(100/20)) = 1 DEL.
The price of 1 coin again became equal to 1 DEL.

It is worth noting that with the appearance of smart contract functionality, it is possible to create any type of token (Ethereum ERC-20, ERC-721, ERC-1155 and others). The author of a smart contract is free to put any functionality into his tokens, so the mandatory reserve requirement in

DEL does not apply to such tokens. Consequently, the economics of such tokens are not governed by the mathematical formulas above. These are tokens without reserve. For more details, see section 7.2.6 Supporting a collateral-free token (erc20).

Transaction fee calculation

The transaction fee on the Decimalchain is the sum of a fixed rate of the transaction type and the cost per unit of transaction volume in bytes.

Fixed rate: 1 unit = 0.001 DEL

For example[21]

send — 10 units — 0.01 DEL

Multisend — 10+(n-1)x5 units (n — number of recipients) — 15 units (2 recipients)

sell — 100 units — 0.1 DEL

sell — 100 units — 0.1 DEL

buy — 100 units — 0.1 DEL

A transaction is simply an informational message. It specifies what, how much, to whom, and from whom it is sent, as well as service data. The volume of a transaction is the volume of all the information the transaction consists of:

[21] for more information, see https://help.decimalchain.com/decimal-txs-fees/

- service (signatures, parameters, etc.);
- custom (sending coin ticker length, commission coin ticker length, sending amount, text message).

The cost of 1 byte of the total transaction volume: 2 units (0.002 DEL)

This mathematics for calculating transaction fees is retained, but adjusted by the new functionality described in 7.2.7 Dynamic Transaction Fees.

More information about the math and principles of the project can be found in the Decimal Yellow Paper and the Decimal Economy Guide.

10. Roadmap

Q3 2022

1. Smart contracts — placement of smart contracts in the blockchain, verification of smart contracts, interaction through transactions, display in the Observer;
2. Moving your delegated coins from one validator to another validator;
3. Wallet branding (a public signature of the owner of the wallet/contract address in the blockchain);
4. Ability to put custom tokens in the NFT reserve
5. Dynamic commission for transactions and coin creation.

Q4 2022

1. Integration into the Metamask browser extension;
2. Integration with Ledger — storage, sending transactions and DEL delegation on Ledger devices
3. The function of creating tokens (collateral-free ERC standards) in the Decimal Console, including the ability to change the issue after creation;
4. Cosmos IBC — integration of Decimal into the Cosmos network via the IBC protocol.

Q1 2023

1. NFT bridge from Decimal to the Cosmos network and back via the IBC protocol;
2. Coin transfer from Decimal to the Cosmos network and back via the IBC protocol;
3. Transfer tokens from Decimal to the Cosmos network and back via the IBC protocol;

4. DEX is a decentralized exchange similar to Uniswap and Pancakeswap;
5. Launchpad is a platform for promoting and seeking funding for various crypto projects. Developers and creators can demonstrate their products and get quick access to the market with placement on Decimal, a decentralized exchange.

Q2 2023

1. Creating an algorithmic Stablecoin Decimal;
2. DAO is a decentralized autonomous organization, software built on Decimal smart contracts;
3. The Decimal user community owns the issue and participates in project management and process organization.

Q3 2023

1. Running a sidechain for NFT with IPFS implementation.

Q4 2023

1. Browser Extension Wallet Decimal is a decentralized application for storing coins, Decimal tokens, secure and convenient interaction with the blockchain and Decimal services.

11. Additional information

https://decimalchain.com/WPengV1.pdf — White Paper, Version 1

https://decimalchain.com/YPeng.pdf — Yellow Paper, Version 1

https://decimalchain.com/EGeng.pdf — Decimal Economics, Version 1

https://decimalchain.com/wiki — Wiki Decimal

https://help.decimalchain.com — help page

DAO — (document under development, will be available soon)

Launchpad — (document under development, will be available soon)

Algocoin — (document under development, will be available soon)

Stablecoin — (document in development, will be available soon)

12. Glossary

A validator is a Decimal user involved in consensus reaching.

A delegator is a Decimal user who entrusts his coins to the validator and receives a proportional share of the reward for doing so.

A coiner is a Decimal user who issues his own tokens.

Broadcast is a Decimal service that allows you to create a transaction offline and then send it to the blockchain network.

Multichain is the ultimate router for web3, allowing almost all blockchains to interact. To meet the clear needs of different and diverse blockchains to communicate with each other. Each blockchain has its own unique services it provides, its own community and its own development ecosystem.

A coin is an digital unit of value that is cryptographically protected and exists in a blockchain.

Minting is a way and process of generating or issuing new coins in exchange for organizing and maintaining the Decimal network, namely establishing consensus by voting.

Mining is a way and process of generating/issuing new coins through solving computational problems.

PoS (Proof-of-Stake) is an algorithm for reaching a consensus between network participants based on a participant's security deposit at risk.

pBFT is a consensus algorithm based on the voting process for a block of candidates.

A masternode is a node in the Decimal network that stores a blockchain replica and participates in consensus building.

Finalization is the process of final approval of a transaction. The transaction in the Decimal network couldn’t be cancelled right after the respective block is added into chain.

Confirmation is the process of approving a transaction and writing it to the blockchain.

A native token/coin is a basic and key blockchain coin.

Transaction — information message about sending funds in the blockchain network.

Blockchain is a decentralized database in which all records (blocks) are linked together by cryptography.

A custodial wallet is a way of storing money, where the private keys of crypto addresses are owned by the service provider.

A non-custodial wallet is a way of storing funds, where the private keys of crypto addresses are owned exclusively by the owner of these funds.

Consensus is the fact of asserting agreement between participants in a suspicious environment.

Sidechain is a technology under active development that allows tokens and other digital assets from one blockchain to be securely used in another blockchain and then (if necessary) returned to the original blockchain.

13. Contact information

We are always happy to see you on our resources, communicate and share opinions.

Official homepage:

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Pages in social networks:
Telegram — https://t.me/decimalchain_en
Youtube — https://www.youtube.com/channel/UCIw9u4WWIU3x6qrtqkg81MA
Twitter — https://twitter.com/DecimalChain
Facebook — https://www.facebook.com/decimalchain
Medium — https://decimalchain.medium.com/
Reddit — https://www.reddit.com/user/DecimalChain/
Discord — https://discord.gg/WhnrTMbrCe
BitBucket — https://bitbucket.org/decimalteam

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