StorX

Distributed Cloud Storage Powered by XinFin Blockchain Network

Build on XinFin (XDC) Blockchain Network as an open source initiative.

Whitepaper V.1

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1. Disclaimer

The purpose of this document is to present information about StorX Project. The information set forth above may not be exhaustive and does not imply any elements of a contractual relationship. Its sole purpose is to provide relevant and reasonable information on whether to undertake a thorough analysis of the company with the intent of acquiring tokens.

Whilst every effort is made to ensure that statements of facts made in this document are accurate, all estimates, projections, forecasts, prospects, expressions of opinion, and other subjective judgments contained in this paper are based on assumptions considered to be reasonable as of the date of the document in which they are contained and must not be construed as a representation that the matters referred to therein will occur. Any plans, projections, or forecasts mentioned in this paper may not be achieved due to multiple risk factors. No information in this Whitepaper should be considered to be business, legal, financial, or tax advice. You should consult your own legal, financial, tax, or other professional advisers regarding the SRX Tokens and their respective businesses and operations.

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2. Market Opportunity

In today's information-driven business environment, data is the fuel for growth. The more decision-makers know about their employees' needs, changes in the industry, and the demands of customers, the more prudently they can strategize for future expansion. This requirement has fueled the enormous growth of cloud storage.

The global cloud storage market is projected to grow from USD 50.1 billion in 2020 to USD 137.3 billion by 2025, at a Compound Annual Growth Rate (CAGR) of 22.3% ++. The major factor driving growth for this market would be the need for achieving scalability and flexibility while significantly reducing data storage infrastructure costs. Due to the significant rise in data volumes across enterprises, the rising need for providing the remote workforce with ubiquitous access to data and files, and cost-saving and low Total Cost of Ownership (TCO) benefits of cloud storage solutions. Solutions segment to hold a larger market size in 2020.

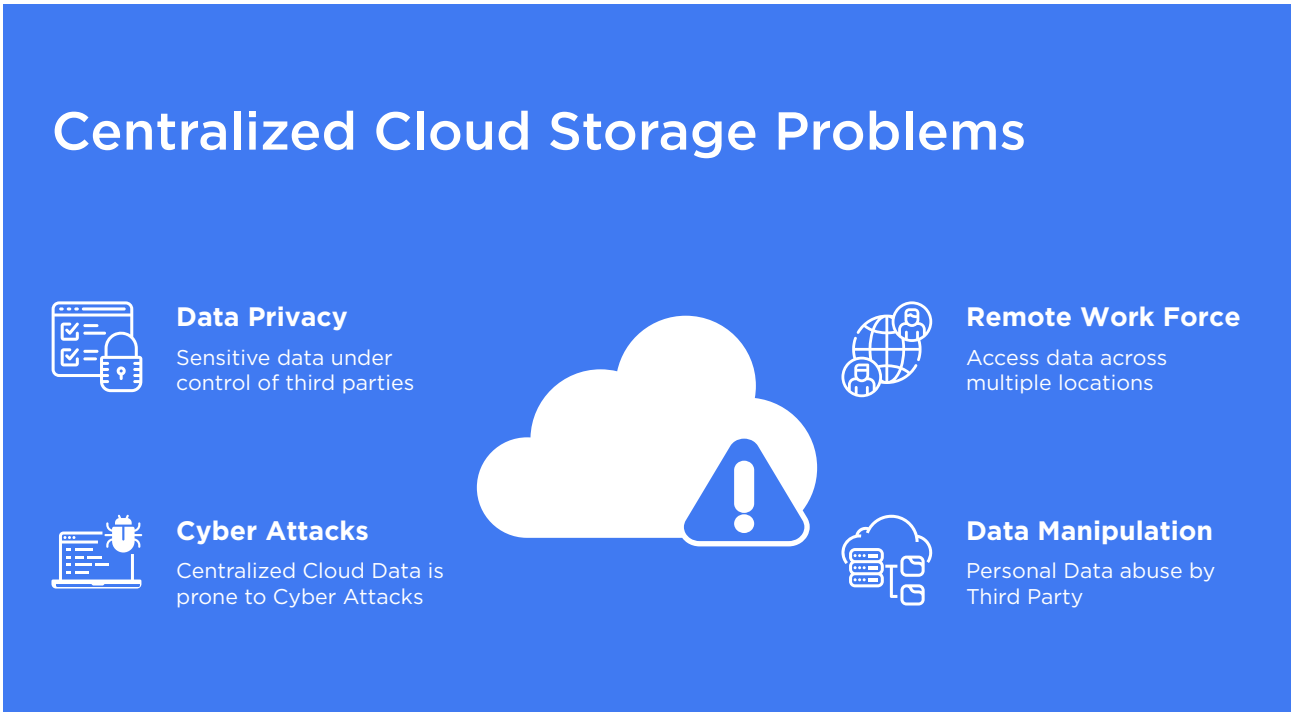
The solutions segment is projected to contribute majorly to the market, while the services segment is projected to witness a higher growth rate during the forecast period. This growth is supported by the rising transition of enterprises from hardware-based storage to cloud environments for 24X7 access, cost efficiency, and scalability along with the rising demand for data backup and disaster recovery solutions.

In the light of what's happening with services like WhatsApp, where third-parties keep abusing their position and gaining more information about you, we believe that the world needs services provided by Decentralized Entities, Where no single entity monopolistic has the right to access or interpret personal data.

++++ (**Source:** www.researchandmarkets.com)

3. Problems of Centralized Cloud Storage

Global Cloud storage is currently serviced by companies like Dropbox, Apple, and Google have revolutionized company operations thanks to their cloud storage service. Not only has third-party cloud storage met the ever-increasing demand for more storage, but they have managed to save businesses thousands of dollars in IT investments. Unfortunately, despite their obvious utilities, they do suffer from a lot of issues.



3.1 Data Privacy

By agreeing to use monopolistic cloud computing, We are forced to provide complete control of our proprietary data to third-party cloud storage provider services, It's like the company hands over their data to a third-party for storing services. Since the data is outside the company's control, the data privacy settings are beyond their control as well. All cloud storage companies have built-in data sniffing clauses in their privacy settings.

3.2 Cyber Attacks

Since all the data is stored inside a third-party, centralized server, they are susceptible to hackings. Over the years there has been a significant rise in cyber attacks, These can be simple hacks to more sophisticated attacks like ransomware. This not just some random assumption, third-party servers have been repeatedly hacked to obtain sensitive and private information. There have been multiple counts of data hacks on personal data, including social security and driver license numbers.

3.3 Data Manipulation

Facebook's Cambridge Analytica debacle is the best example of a third-party mismanaging their client's data. Cambridge Analytica was able to get their hands on the personal data of a staggering 87 million Facebook users, of which 70.6 million were from the United States. In another infamous case, media analytics company "Deep Roots Analytics," used the Amazon cloud server to store information about as much as 61% of the US population without password protection for almost two weeks. This information included names, email and home addresses, telephone numbers, voter ID, etc.

3.4 Remote Work Force

Pandemic made staggering changes to lives of employees/business Many companies have now encouraged employees to work from home, This has significant security risks. Employers can lose or misuse enterprise networks and access critical data from home, which will once again compromise the client's privacy. Also, if a data breach does occur, then it is quite difficult to track down all the employee devices and discover the point of failure.

Our Mission at StorX:

Develop Worlds most reliable decentralized Cloud Storage Services.

4. What is Decentralized Cloud Storage

Decentralized cloud storage is a Democractize way of storing data across multiple storage providers, The service is powered by hundreds of individuals/enterprise who have spare cloud space available for leasing, The services have no single operator, nor single entity is solely responsible for running the service or interruption for other users. One of the main motivations for preferring decentralization is to drive cloud computing markets out of monopolistic powers currently vested with few corporations, who currently not only own major traffic on the internet but address security concerns around privacy and personal data protection. drive down infrastructure costs for maintenance, utilities, and bandwidth.

Our research suggests there are significant underutilized resources at the edge of the network for many smaller operators, who have a long tail of resources that are presently unused or underused that could provide affordable and geographically distributed cloud storage. Conceivably, some operators might have access to less-expensive electricity than standard data centers or another individual operator could have access to less-expensive cooling. Many of these small operator environments are not substantial enough to run an entire datacenter-like storage system but collectively can empower much larger Decentralized cloud computing operations.

5. StorX

StorX is committed to becoming an industry-leading, Decentralized cloud storage platform. Our technology combines the convenience and ease of use of enterprise-grade storage solutions like Google Drive with reliable open source technology. We aim to democratize the highly monopolized market of cloud service providers. Our platform provides an alternative for users to look at renting storage from individual farmers, instead of a centralized service provider.

5.1 Core Focus of StorX Platform

1. Creating storage supply for the network via recruiting storage node operators.
2. Creating demand for cloud storage from paying users.

5.2 StorX for Node Operators

We at StorX intend to provide an additional earning opportunity to small business or Network Attached Storage (NAS) operators, who have enough excess electricity to run ten hard drives but not more. We have found that in aggregate, enough small operator environments exist such that their combination over the internet constitutes significant opportunity and advantage for less-expensive and faster storage.

5.3 StorX for Customers

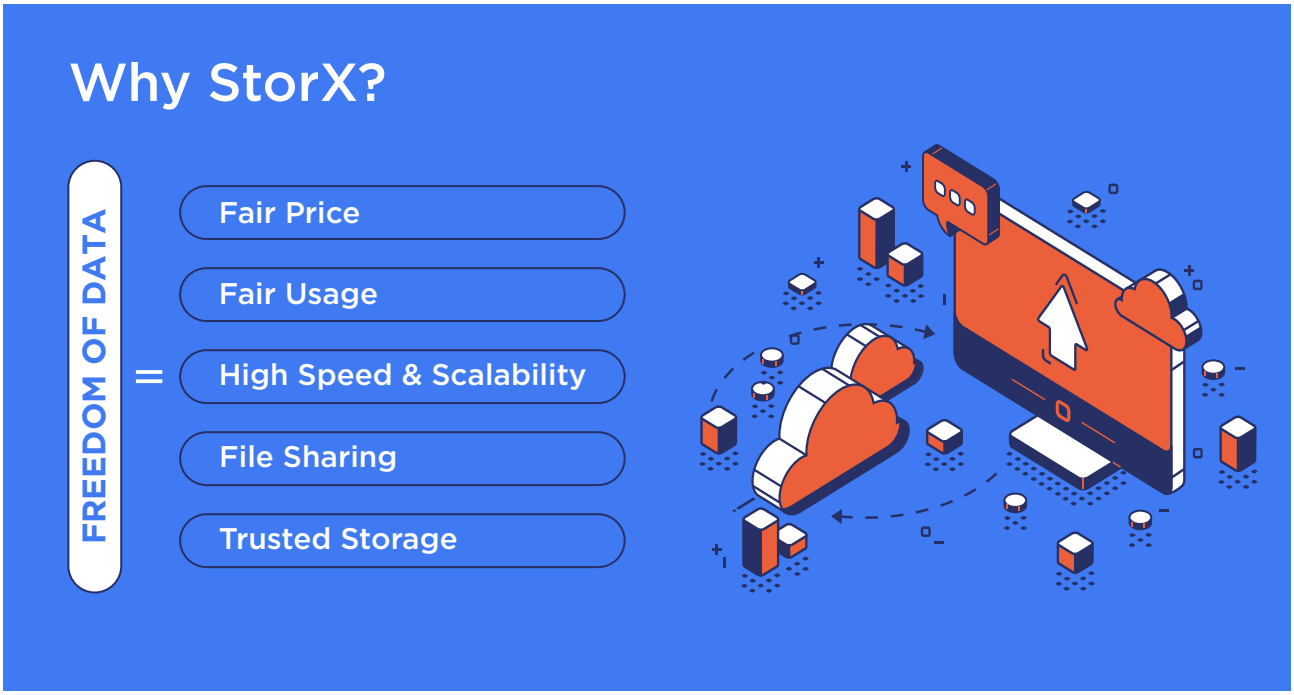
StorX helps you securely encrypt, fragment, and then distribute important data across multiple hosting nodes spread worldwide. StorX provides a democratic marketplace for hosting data, replacing the centralized intermediaries with a decentralized blockchain network. Exercise complete control and grant access over your data sets without any centralized intermediary.

5.4 StorX Guarantees

- Thoroughly Tested Platform for Quality Assurance
- Dedicated support delivered directly by our engineers
- Enterprise-grade SLA up to 24/7

5.5 Our Support Channels

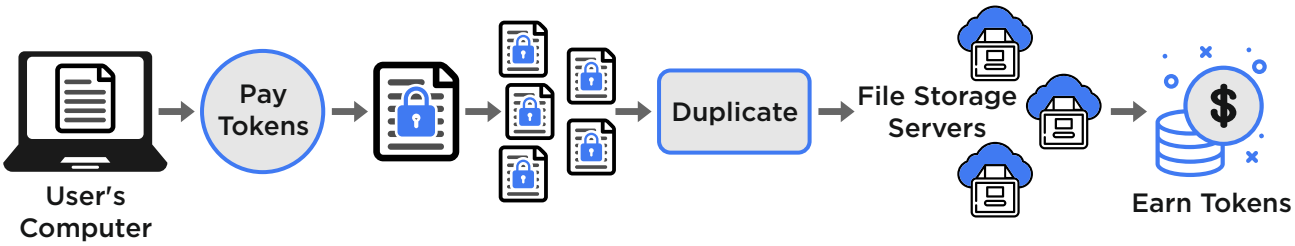
- Easy Documentation to help you migrate to StorX
- Access to expertise around scaling, security, and best practices
- Access to optional workshops and training

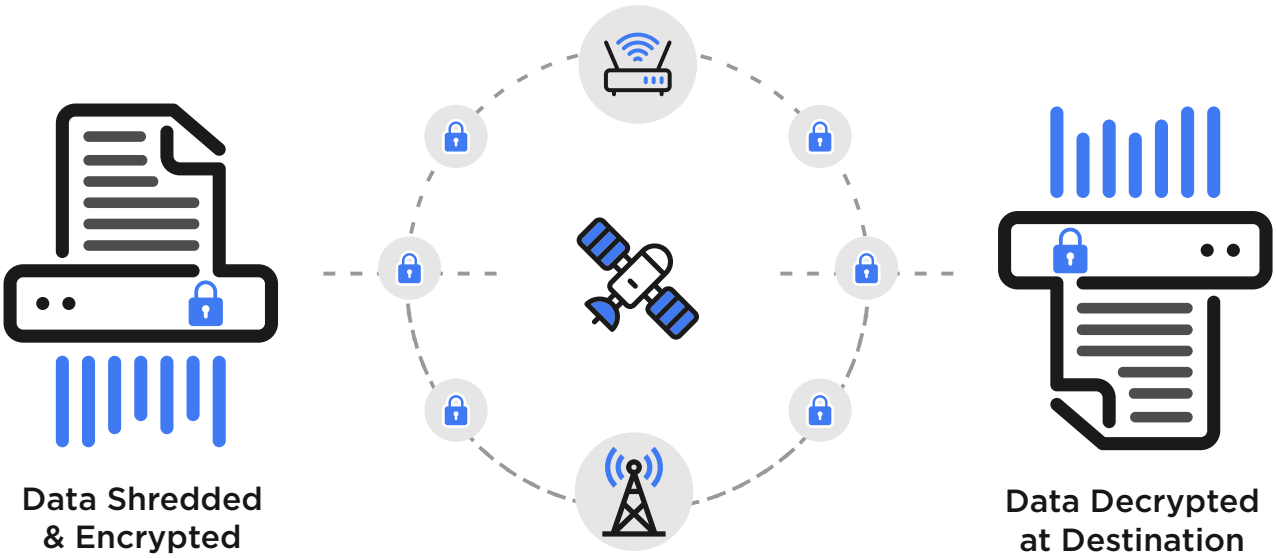


By forming a contract, a storage provider agrees to store a client's data and to periodically submit proof of their continued storage until the contract expires. The host is compensated for every proof they submit and penalized for missing proof. Since these proofs are publicly verifiable network consensus can be used

to automatically enforce storage contracts. Importantly, this means that clients do not need to personally verify storage proofs; they can simply upload their file and let the network do the rest

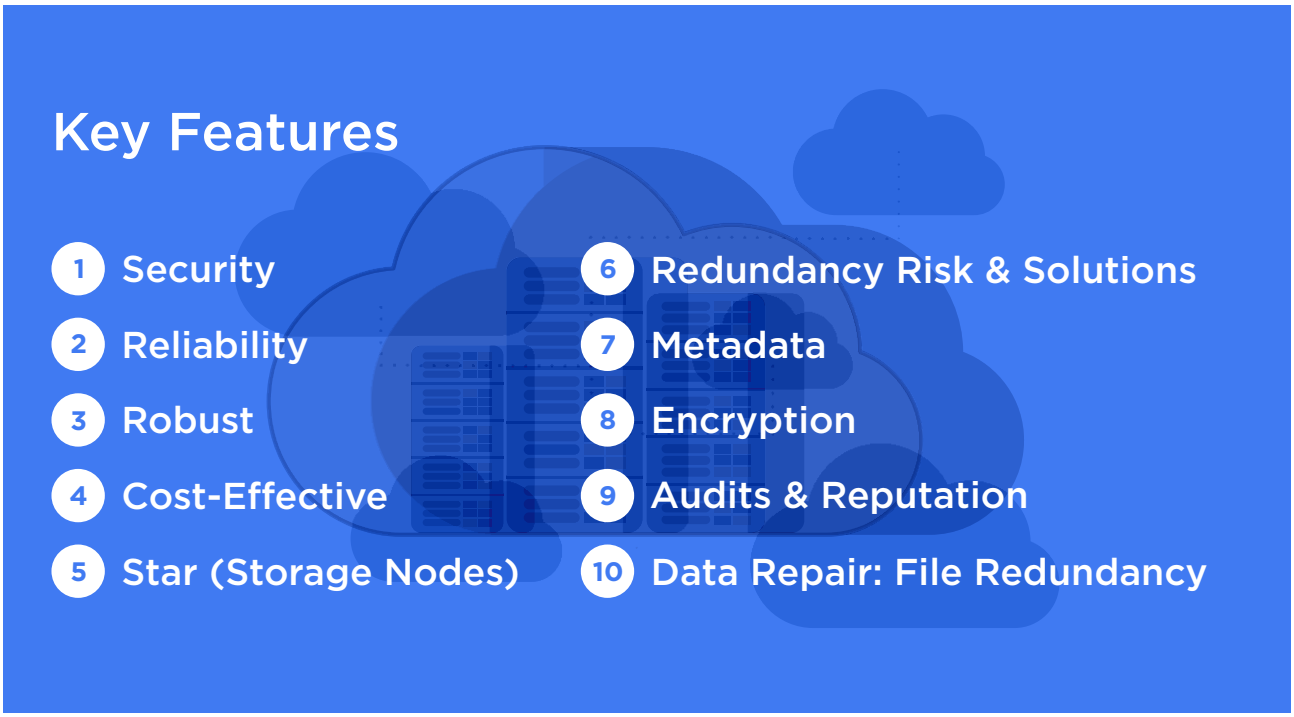
To avoid failures that can be caused due to storing data on a single untrusted host, We would store data across multiple points that guarantees data redundantly across multiple hosts.





6. StorX Features

StorX stands out from the crowd of data storage technologies with these ten major key features.



6.1 Security

We are fully aware that security is the most important aspect that clients look for when they think of moving any data off-premise. Our system is designed to be the equivalent of spreading an encrypted droplet of water in the vast ocean. All data is encrypted client-side before reaching our system. Data is shredded and distributed across a large number of independently operated disk drives which are part of a much larger network of independently operated storage nodes. In a typical scenario (with a 20/40 Reed-Solomon setup), each file is distributed across40 different disk drives in a global network of thousands of independently operated nodes.

6.2 Reliability

Data colocated on a Decentralized cloud by its design is duplicated and deduplicated across multiple nodes spread across multiple geographical locations and networks, this helps us provide immunity over system-wide events. Storms, power outages, floods, earthquakes, operator error, design flaws, network overload, or attacks can compromise entire data centers. While the centralized providers may calculate and publish theoretically high availability numbers, these calculations depend on drive failures being uncorrelated.

6.3 Robust

Data stored across the StorX network can provide superior read-intensive performance by deploying parallelism. The storage nodes are located close to "the edge," reducing the latency experienced when recipients of data are physically far from the data center that houses the data. The particular erasure coding scheme that we use ensures that slow drives, slow networks, or networks and drives experiencing temporarily high load do not limit throughput. We can adjust the k/n ratio so that we dramatically improve download and streaming speeds, without imposing the kinds of high costs associated with CDN networks.

6.4 Cost-Effective

Storage Node Operators on a Decentralized network are hosted by Individuals, Which reduces the investments significantly. In our experience, the vast majority of operators are using existing live equipment with significant spare capacity. There is no additional cost to a storage node operator in terms of capital or personnel. The operator does not have to make any investments to run storage drive at full capacity, Which helps him offer storage at comparatively cheaper rates than those put up by Public cloud storage operators who make large capital investments in building out a network of data centers and must incur significant costs for power, personnel, security, fire suppression, and so forth.

Even after providing a healthy margin to Star operators, demand partners, and Satellite operators, we believe we should be able to provide profitable storage services at a fraction of the cost of equivalent centralized cloud storage providers.

6.4 Star (Storage Nodes)

Storage Node manages the supply side of the ecosystem. The primary function of the storage node is to store and return data. Aside from reliably storing data, nodes should provide network bandwidth and appropriate responsiveness. Storage nodes are selected to store data based on various criteria: ping time, latency, throughput, bandwidth caps, sufficient disk space, geographic location, uptime, history of responding accurately to audits, and so forth. In return for their service, nodes are paid.

6.5 Redundancy Risk & Solutions

Since the Storage Nodes are operated by individual operators, There are higher chances of any storage node could go offline permanently, due to uncontrollable reasons. Our redundancy strategy must store data in a way that provides access to the data with high probability, even though any given number of individual nodes may be in an offline state. To achieve a specific level of durability (defined as the probability that data remains available in the face of failures), many products in this space use simple replication. Unfortunately, this ties durability to the network expansion factor, which is the storage overhead for reliably storing data. This significantly increases the total cost relative to the stored data.

The platform divides files into multiple fragments and then encrypted using secure, high-performance encryption standard.” before uploading, each targeted for distribution to hosts across the world. This distribution assures that no one host represents a single point of failure and reinforces overall network uptime and redundancy.

File segments are created using a technology called Reed-Solomon erasure coding, It empowers StorX to divide files in a redundant manner, where any 10 of 30 segments can fully recover a user's files. This means that if 20 out of 30 hosts go offline, a StorX user is still able to download her files. Before leaving a renter's computer, each file segment is encrypted. This ensures that hosts only store encrypted segments of user data.

6.6 Metadata

"Once we split an object up with erasure codes and select storage nodes on which to store the new pieces, we now need to keep track of which storage nodes we selected. We allow users to choose storage based on geographic location, performance characteristics, available space, and other features. Additionally, to maintain Amazon S3 compatibility, the user must be able to choose an arbitrary key, often treated as a path, to identify this mapping of data pieces to the node. These features imply the necessity of a metadata storage system."

6.7 Encryption

The client generates a new secured Private key and uses it to encrypt the file. This "file key" is, in turn, encrypted by a master key that is only retrievable with the user's password stored on the satellites, allowing the user to sign in and retrieve their keys from any device. "Regardless of the storage system, our design constraints require total security and privacy. All data or metadata will be encrypted. Data is encrypted before the data leaves the source computer. This means that an Amazon S3-compatible interface or appropriate similar client library should run colocated on the same computer as the user's application."

6.8 Audits and Reputation

Incentivizing storage nodes to accurately store data is of paramount importance

to the viability of this whole system. It is essential to be able to validate and verify that storage nodes are accurately storing what they have been asked to store.

6.9 Data Repair: File Redundancy

Data loss is an ever-present risk in any distributed storage system. While there are many potential causes for file loss, storage node churn (storage nodes joining and leaving the network) is the largest leading risk by a significant degree compared to other causes.

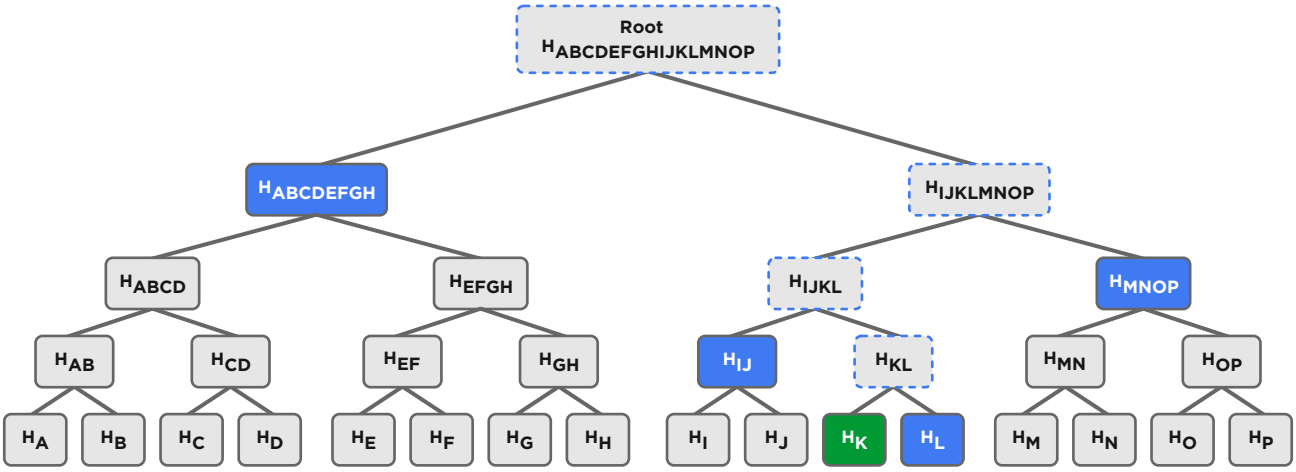
To ensure redundancy, The encrypted file is split into N chunks and then processed into K additional redundancy shards through Reed Solomon error-correcting codes. This procedure allows the retrieval of the payload even if individual cells go offline, as long as you can reach any set of N cells. Parameters are dynamically chosen and optimized such that the probability of downtime is lower than 10^-6.

“Using the StorX blockchain, renters form file contracts with hosts. These contracts set pricing, uptime commitments, and other aspects of the relationship between the renters and the hosts. File contracts are a type of smart contract. They allow StorX to create cryptographic service level agreements (SLAs) that are stored on the blockchain.

Since file contracts are automatically enforced by the network, We do not need intermediaries or trusted third parties. “Both renters and hosts use SRX, a unique cryptocurrency built on XRC-20 that powers StorX Data Storage Marketplace. Renters use SRX token to buy storage capacity from hosts, while hosts deposit SRX token into file contract as collateral”.

Micropayments flow between renters and hosts using a technology called payment channels, which is similar to Bitcoin’s Lightning Network. Payments between renters and hosts occur off-chain, greatly increasing network efficiency and scalability.

Since hosts pay collateral into every storage contract, they have a strong disincentive to go offline. “Renters prepay for storage within file contracts, setting aside a fixed amount of SRX token to be spent on storing and transferring data". File contracts typically last 90 days. StorX automatically renews contracts when they are within a certain window of expiring. If contracts are not renewed, StorX returns any unused tokens to the renter at the end of the contract period.



7. StorX Ecosystem

StorX Ecosystems incorporates the following components: The User, The Star, The Satellites.

7.1 User

The user access StorX directly via your chosen device (computer or phone) to upload data on the Decentralized Storage System.

7.2 Star (Node)

Storage Nodes consist of individuals or companies which desire to lease out spare computing space on StorX network to earn SRX tokens.

7.3 Constellation

A distributed, P2P network of Star (Nodes) where data is stored. Satellite: Suite of machine learning algorithms that plans, optimize payload distribution on the star, while also taking care of security and metadata. It's also in charge of triggering the recovery procedure for files on the Star.

These components interact to enable safe and private decentralized cloud storage inside a zero-knowledge architecture, ensuring that no one in the system, not even the satellites, can access the users' data.

7.4 Environmental Impact

The internet infrastructure is responsible, as of today, for the enormous amount of energy demands worldwide. Data centers account for one-third of it, making "the Cloud", despite the ephemeral name, an ecological monster that consumes as much as the entire United Kingdom. Our architecture enables small, optimized single-board computers, to replace the storage requirement for users, which is 10 times smaller than data center racks. Moreover, it can leverage geographical proximity to avoid long data transfers, which, in certain cases, can be as consuming as storage itself.

8. StorX Token

8.1 Token Supply

Unlimited there will never be a cap on the number of SRX tokens generated. Humans produce so much data that it is effectively a limitless amount — and when StorX is the industry-standard storage layer of the Internet, we'll need lots of SRX to fulfill all those contracts. Additionally, the Proof of Burn mechanic functions to eliminate tokens from the supply, so there needs to be a constant allowance of new SRX being created.

"We've built inflation in with StorX to account for the many factors over time that will cause coins to disappear, such as the Proof of Burn mechanic, lost coins, and un-refunded collateral due to bad hosting. This inflation becomes very small over time, but still provides security to the network in the form of block rewards for the miners."

8.2 Tokenomics

On the StorX platform, The SRX token would serve as a payment currency, The user hosting data would have to make payments in SRX and the farmer hosting node would also receive payments in SRX.

Name	Symbol	Blockchain
StorX	**SRX**	**XinFin (XDC) Protocol**

- Private Placement - **7%**
- Seed Round - **10%**
- Community Placement - **23%**
- Core Team - **17.50%**
- Technology Ops - **2.50%**
- Data Farming Reward - **12.30%**
- Ecosystems Adoption Rewards - **12.70%**
- Contingency - **10%**
- Partnership, Market Making & Listing - **5%**

9. Staking

StorX holders stake SRX token to secure the StorX network and in exchange earn rewards. Early adopters naturally gain higher rewards. Rewards comprise inflationary rewards and will include a share of the total network spend (Take Income) users pay. Users can earn guaranteed returns of up to 7 % on staking.

The staking system provides a prohibitive monetary disincentive for bad actors who consider participating in our network. To start with even we have decided to keep $ 500 as the minimum staking amount, but participation in Network governance is proportional to a provider's stake, taken as a fraction of the sum of all stakes. Additionally, stake contribution is factored into a provider's reputation score, which tenants may use as a deployment criterion.

10. Project Milestone

2020

Q1

- Business Concept Development

Q4

- Project Development Starts

2021

Q3

- Launch of MVP & Testnet
- Testing Node Integration
- Testing Blockchain
- Exchange Listing
- Marketing Campaign

Q4

- Onboarding Testing Client
- Partnerships
- StorX Security Enhancements

2022

Q1

- Mainnet Project Launch
- Client Onboarding
- Pre-Mine Distribution
- Bounty & Bug Launch
- Product Research & Development

Q2

- Software 2.0 Upgrade

Q3

- sDrive SAAS Development
- Ecosystem Enhancement

11. References

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[3] “Analysis of Centralized and Decentralized Cloud Architectures” by the School of Computing, University of South Alabama (2016).