

Internxt

Experience what's next.

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Abstract

There is a growing demand for more aspects of the modern Internet to be decentralized. Though Internet applications are built on top of protocols like TCP/IP and HTTP, a large portion of the Internet stack remains centralized. Much of the desire for more decentralized computing systems comes from concerns regarding mass surveillance over the web and security of the files on the cloud. At Internxt we are helping new, more secure, private and efficient Internet services. With the use of blockchain and decentralized technology, we strive to create internet services that give users the privacy and security they deserve. We believe that right now the cloud is relatively easy to access by hackers trying to retrieve someone's files. Additionally, we believe that Governments and Corporations have too much access to people's data. Although there needs to be regulation to avoid unethical and illegal activities, as of now, control over people is excessive. Overall, we believe it's time for better Internet services. In the following sections, we explain more about our work and give details about what and how it will be completed. Internxt – Experience what's next.

Introduction

In an attempt to create decentralized Internet services, Internxt has created X Core, a Peer-To-Peer (P2P) cloud computing network that allows users from all over the globe to cooperate in the creation of a decentralized, [more secure](#) Internet. Users can sell the resources of their machines to those looking to Host their data in a more private, secure and efficient way. X Cloud is the first of a wider range of services that will be making use of X Core. Internxt's cloud platform, X Cloud, not only offers a superior technology to that one of traditional cloud services, but it also strives to be competitive in terms of price and user experience. The solutions we provide correlate perfectly with the Web 3.0 paradigm where the decentralization prevails. We emphasize the security and accessibility of the users' information distributed among numerous computers throughout the Internet. Being cryptographically encrypted all files in our P2P network are reliably protected against hacks and leaks. The very architecture of our system provides the secure storage of any data. Since all our code is open source (AGPL and LGPL licenses, depending on the product), it is available for peer review in our [GitHub](#). Internxt strives to make an intuitive technology that's as user-friendly as the one from already existing top-tier services. Internxt wants to make sure this new Internet is accessible by everyone, regardless of their knowledge. A great focus is being put on providing a seamless transition from traditional services to Internxt. Internxt is registered in C/ San Vicente Mártir 85, 46007, Valencia, Spain, as Internxt Universal Technologies SLU (B98936354).

Why

There are many online industries where decentralized computing systems are uprooting existing businesses. With the rise Bitcoin and its underlying technology, industries like e-commerce or file storage amongst many more, are being disrupted by shifting to more decentralized models. Blockchain technology enables many of such applications to be decentralized. P2P systems differ from other distributed systems in enabling the user network to function without the need for an entity monitoring them. In pure P2P architectures, there are no centralized services or control mechanisms dictating the actions of other nodes. Each user decides with how many computing resources he/she will contribute to the network, as well as when and for how long. The architecture is designed to handle large numbers of nodes joining or leaving the network at the same time. In addition, these systems emphasize equality and balance the load across nodes. This flexibility, self-determination and low participation cost encourage a much larger number of participants, which, in turn, greatly increases the number and value of the services provided by the system to all. We plan to make use of such architecture and create a robust network that will be the foundation stone of our technology. Everything ran on Internxt's network will be built using P2P technology. By spreading the files over the network and removing the central points of failure, we remove data centralization and get enhanced security, which is a big flaw of cloud computing that is present today.

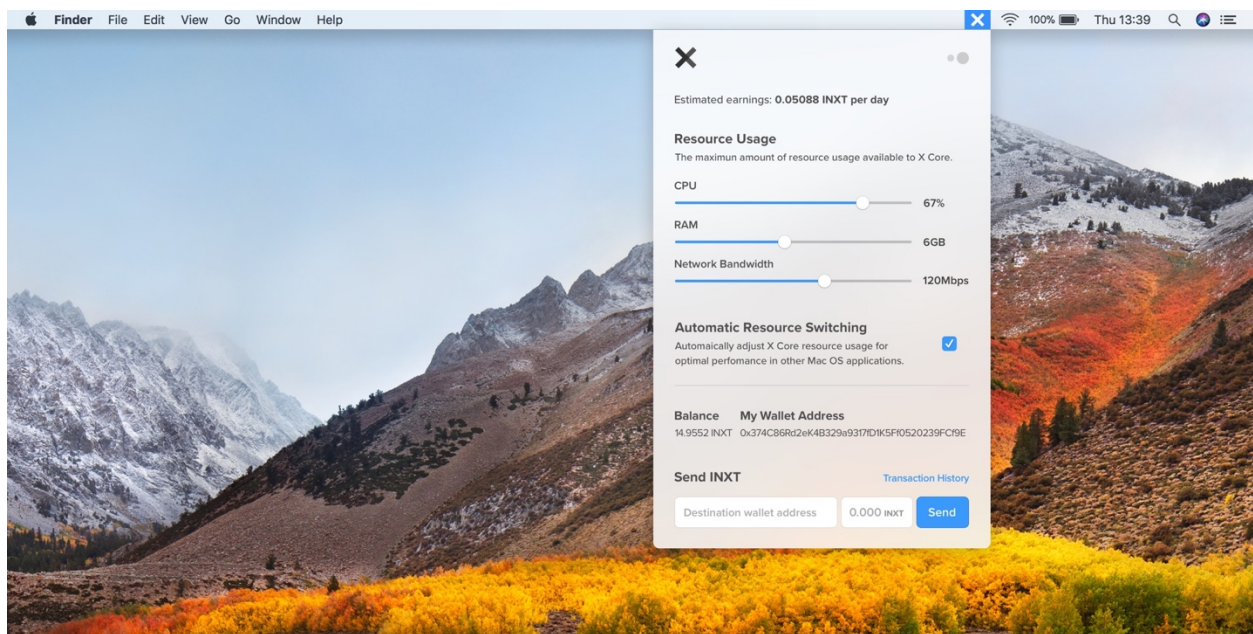
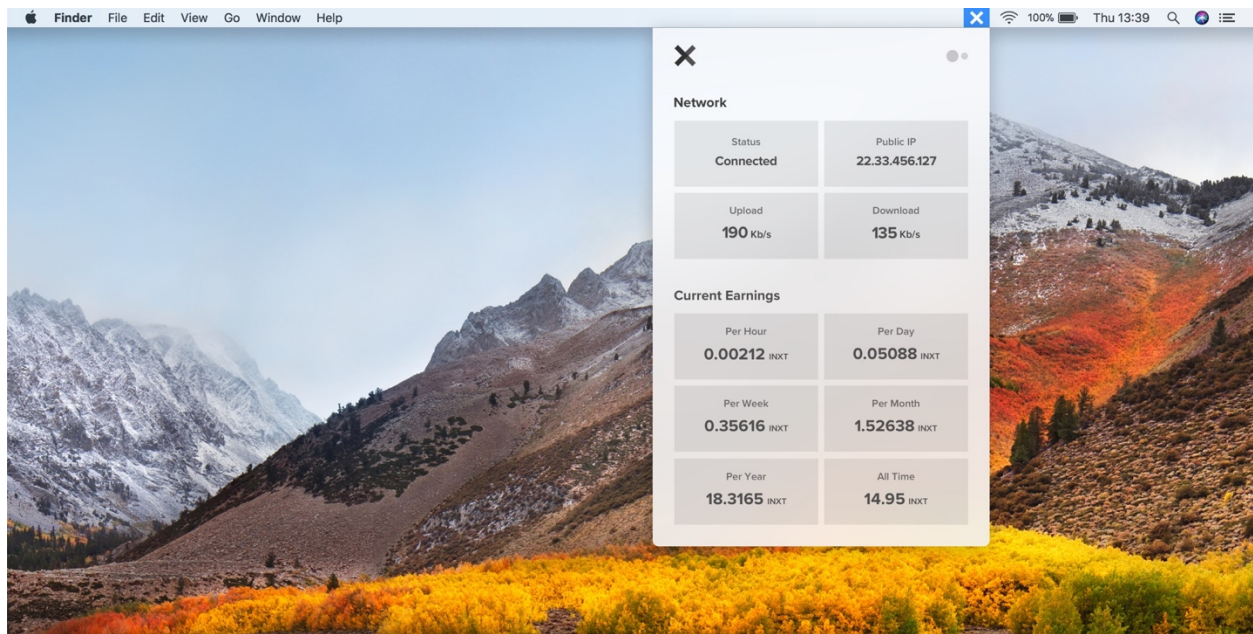
A major issue with existing cloud platforms is security and data centralization. In fact, cloud computing is a computing paradigm, an abstraction where data and services are accessible all over the network to authorized users and processes. Abstraction of computing away from the physical Host entails a loss of control of corporate data and loss of visibility into where the data lives and who has access to it. Another dimension to cloud computing with very serious implications for security is the deployment model: who owns the infrastructure and how is it accessed. A Private cloud refers to a collection of resources used by a single organization. This is typically owned and managed by the organization itself, and hence in practical terms is little different than any other data owned and managed by that enterprise. A Public cloud refers to resources accessible by anyone usually over the public Internet, managed and owned by a third party. A third category, Hybrid cloud, refers to a combination of private and public clouds along with the connecting fabric between the two. Our cloud brings a new and revolutionary solution into this. The data is spread on public network ran by users, but all the files are encrypted before being sent out. There are no single points for the hackers to attack, it is very hard for someone to grab a hold of files, and even if they do get them, they cannot use them without the private key held by the user. We want to fight this security and privacy issues the current Internet is facing with the development of Internxt.

What

X Core

X Core sits at the very core of Internxt's products and services, giving life to the decentralized era of the Internet. X Core is formulated by Hosts. This eliminates the need for a central controller, as each Host is important as one another. Hosts donate the unused resources of their computer creating a global network of storage and computing servers. By Hosting unused computer resources on the X Core network, users are paid in our token, INXT. Users do not need to be on their computer, they can leave it running in the background and the computer will earn a passive income. X Core is a simple downloadable open-source application that enables anyone to act as a decentralized node to store and transfer data. Financial rewards for Hosting encourages more people to sign up and grow the X Core network. The more Hosts, the better the network will run. The system detects failing nodes and transparently adjusts and corrects the impacted blocks automatically. This removes the destructivity of having data stored in a central location and ensures the network always functions optimally. User files are end-to-end encrypted and split into small pieces when Hosted in the P2P network.

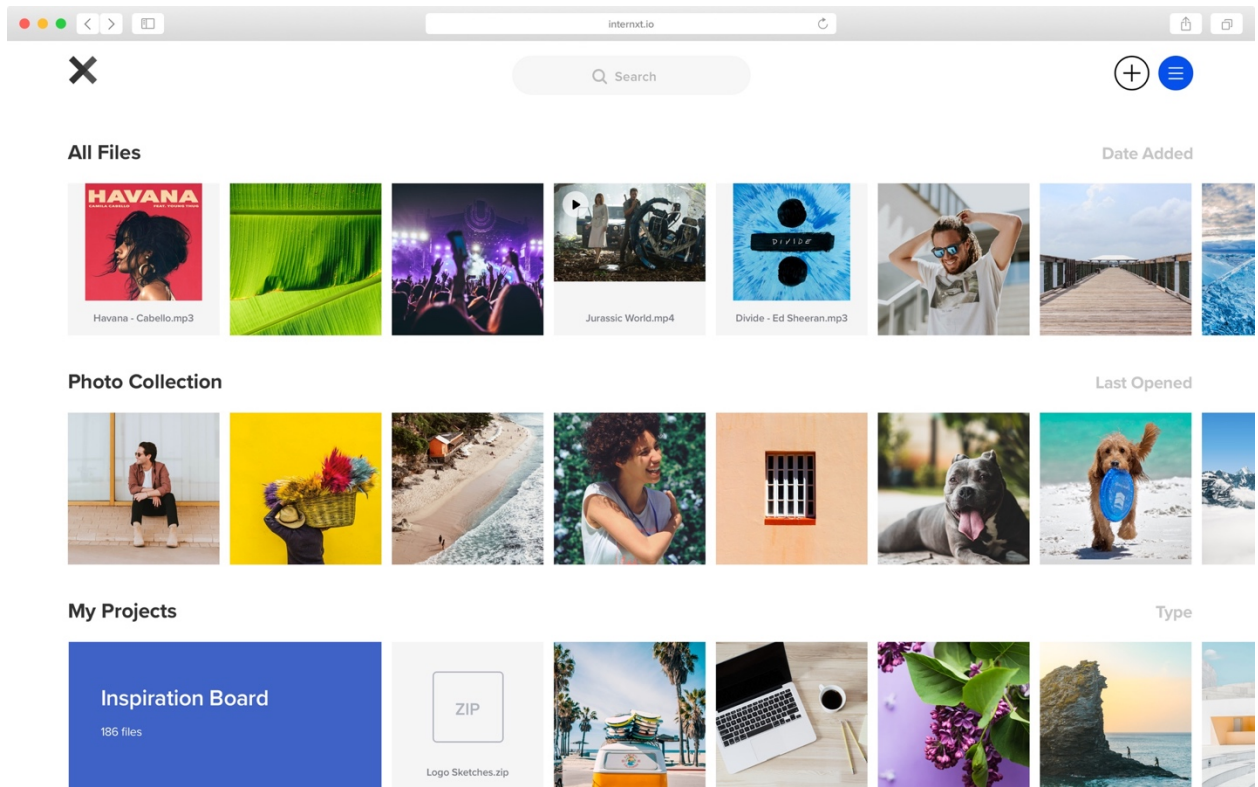
Each Host decides how much computer resources they designate to the network, as well as when and how long for. X Core automatically finds the optimum Host specific to the user location, so the data is retrieved much faster. Designed to handle large numbers of Hosts joining the network by balancing the data-load across multiple nodes. Since the number of the running nodes may vary in the course of time, the feature of an automatic adjustment enables X Core to regulate the workload of each networked computer efficiently. It means that the fluctuations in the number of users online don't affect the usability of the entire network nor the working capacity of each particular computer within the network. Thus, the system automatically maintains the right balance between all available users in order to provide them with an equal operability of the network making the overall functionality of the system faster than the rest analogs. Additionally, a much higher download speed is achieved through a simultaneous synchronization with many different nodes. X Core features desktop interfaces available for Windows, Mac, and Linux.



X Cloud

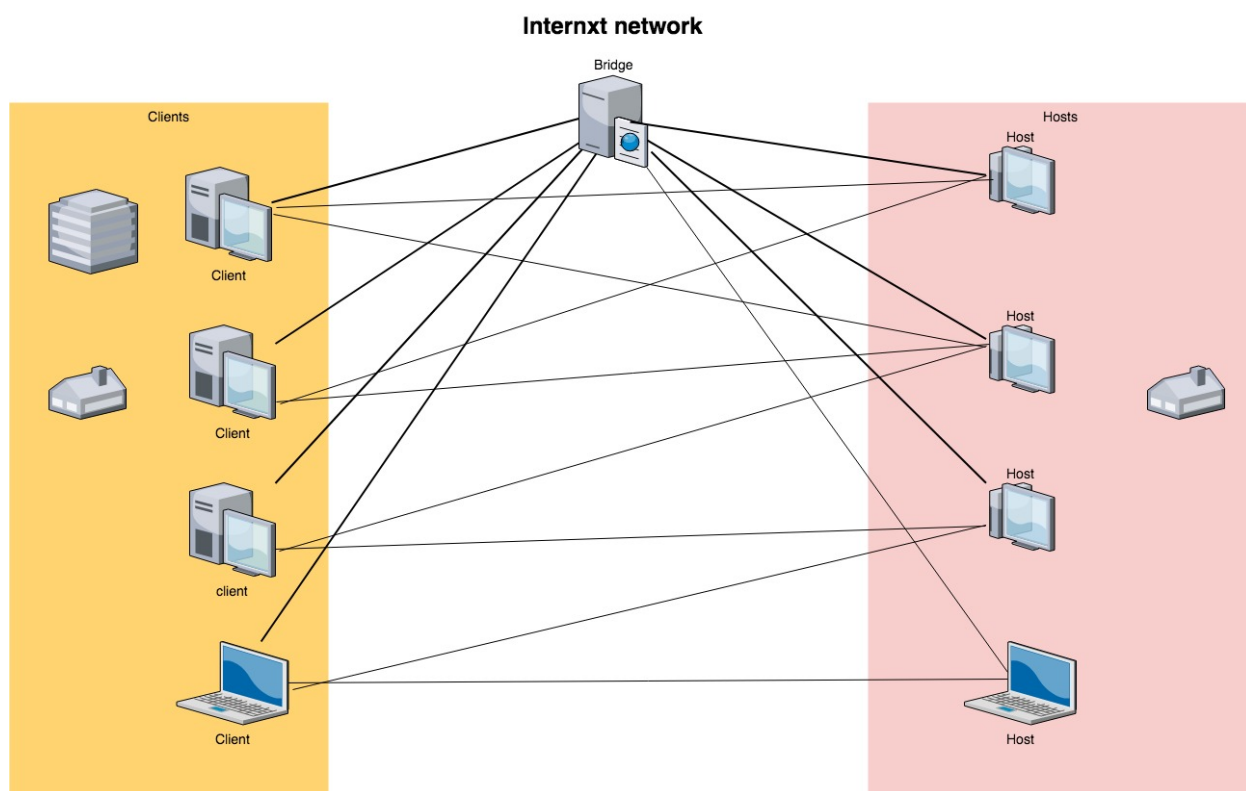
Internxt's X Cloud lets the user store files in a truly secure, private and reliable cloud, without compromising on user experience. Make the switch from Google Drive, Amazon S3 or Dropbox to the ultimate cloud file storage. X Cloud is faster, cheaper, and more secure than traditional cloud storage platforms. We believe the intention of creating beautiful design not only ensures pleasing aesthetics but a joyful product experience. We built X Cloud to be simple, intuitive, yet powerful and customizable. We created web and mobile interfaces that can dynamically change to suit the personalized user taste, to allow for a more limitless workflow. X Cloud's desktop interface consists of an easy-to-use folder where files are automatically synchronized with X Core. The fast synchronization of various files throughout numerous computers runs with Qt/C++ technology. With X Cloud, user data is no longer stored in a central location, but instead end-to-end encrypted, split into pieces, and then distributed amongst different machines all around the world. So now, only the user has access to his/her digital possessions, the way it should have always been. Today's adopted cloud is vulnerable to a variety of attacks which can lead to encryption walls being bypassed, which makes user personal information accessible to hackers.

With X Cloud, stored personal information is also a part of the distributed network, meaning customer information is no longer just sitting in one central location, but split and distributed across thousands of locations. Having multiple machines simultaneously acting together means it's much faster at retrieving files due to having far more computer power serving the user at any one time. The serverless architecture is what distinguishes X Cloud from the conventional data storage providers. In contrast to the digital behemoths such as Google and Amazon where datacentres provide storage space on their servers, X Cloud offers a different approach to where the users' files are to be located. In fact, all files within X Cloud are stored nowhere and everywhere at the same time. Before being dispersed among all nodes of the Internxt's network, all files are split and encrypted with the help of the X Core software. In such a distributed state, the information becomes instantly accessible via a special web-based solution which holds the structure and the location of each piece of data stored in X Cloud. Hence, only an owner of a file possesses all necessary attributes to reassemble the file from the ultimately distributed and highly secure X Cloud. In addition to the unprecedented security our system offers, the efficient utilization of the computing resources is achieved through the minimization of both the network traffic and the CPU runtime. Even the tiniest aspects of our users' experience matter for us.



How

In order to arrange the interaction of all users within our network, we established two agents capable of managing the data movement between all network entities. One agent is responsible for making nodes interconnected. We call this functional unit the Bridge. On the other hand, Hosts offer their computer capacity for the clients. Hosts constitute the second main agent of our network structure. Our software solution provides everybody with an ability to become a Host in the network. It implies sharing a computer to store data of clients running X Cloud. In order to keep the data private and secure, distributed ledger technology is applied to the process. Before placing a file in a Host's computer, we encrypt it with AES 256 CTR along with the subsequent sharding the data into separate pieces. Such an approach goes in line with the very essence of the serverless decentralization of our services.



Any kind of file can be uploaded using X Cloud into our X Core platform. The encrypted shards are dispersed among separate Hosts, while the Bridge holds information about both the entire structure and the location of each distributed data. Thus, nobody but the data owner is able to read the files since all shards should be collected and decrypted back to reassemble the file. It is technically impossible to read a piece of information stored at a separate Host's computer. The security of our network correlates directly with its size. The bigger number of Hosts that participate as nodes, the more complex the entire system becomes and, therefore, the bigger number of shards all data can be divided in. At the same time, the P2P network

protocol we use provides parallel data transfers making bandwidth demands irrelevant. Besides, the multiple mirroring of shards adds extra security to X Cloud where data availability is enforced proportionally to the growing number of nodes. This translates in an incredibly fast, reliable and resilient network.

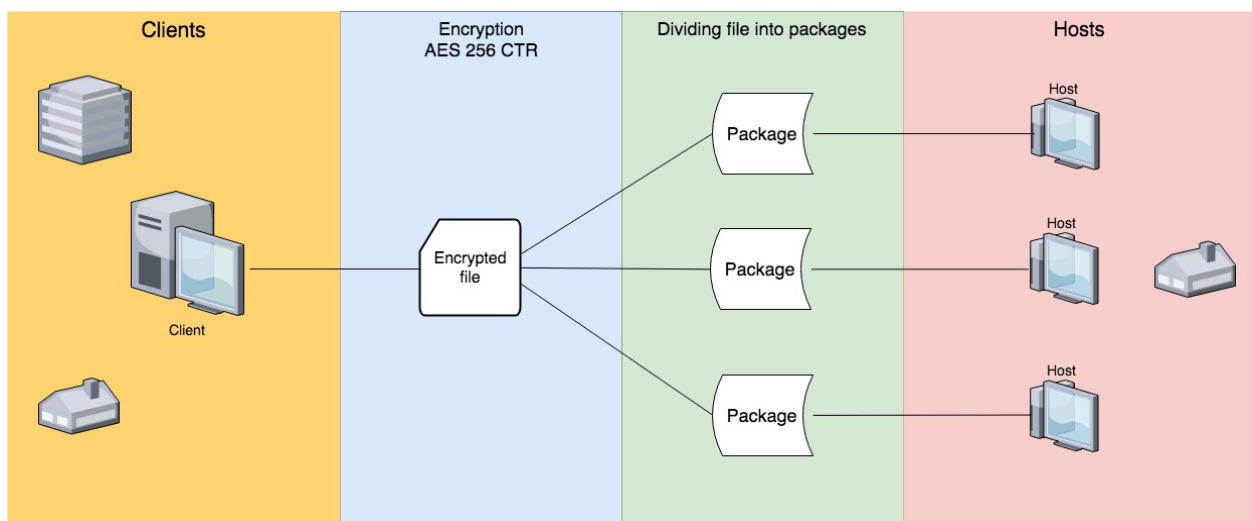
X Core was forked from Storj, and some of its core features were kept as Storj developed them. Our task is on improving their network speed, reliability, adding features, creating intuitive interfaces and transmitting a message that the mass-market understands. We also implemented JSON data-interchange technology, which enables users to work with their files within a highly structured filesystem tree where both a root folder and numerous subfolders can be created in a very simple manner. X Core is uses distributed technology and will be constantly maintained and updated to meet the requirements of our future services. In contrast to the ordinary cloud platforms, our system is empowered with several types of cryptographic encryption at almost every stage of our processes. Files, shards, access passwords, and other textual data are protected with either SHA 256 or AES 256 CTR cryptographic methods. Both algorithms are applied to hashing and encryption of various data. While SHA256 creates digital signatures when the user's passwords are to be hashed, AES (Advanced Encryption Standard) is used for both encryption and decryption of files and shards. Even if a hypothetical hacker is able to figure out the exact location of a particular shard or a set of shards, the AES encryption protects the user's data from being read by an unauthorized person. In addition to the huge computation power necessary to hack even a single AES-encrypted shard, hackers should spend unprecedented efforts to select all dedicated shards that constitute a definite file from a huge amount of data randomly distributed among various Hosts. Besides, the difficulty of the hacker's task is multiplied many times over due to numerous mirrors available for each shard that are distributed among different Hosts. Different Hosts can also change their state from active to inactive and vice versa over unpredictable periods, thus the complexity of figuring out the exact location of all shards of every single file comes to the verge of exhaustion.

Since users interact with our data management unit, the Bridge, they are relieved from a necessity to perform many operations manually. For example, they don't have to worry about the available storage space because no single Host can limit the overall size of the cloud. This is the task of the Bridge, to collect information about all available disk space throughout the active Hosts. Hence, the data on storage space, velocity, and bandwidth all currently running Hosts can offer is managed automatically by the Bridge. A data owner needs to announce the size of a file to be placed in the cloud. It is performed when a file from a local computer is uploaded to the X Cloud app. After that, the Bridge as a smart agent "decides" in which number of shards the file should be divided as well as among which Hosts the shards along with all their mirrors should be distributed.

A similar process in the opposite direction occurs when a data owner wants to retrieve a file from the cloud. In such a case, the data owner's X Cloud app informs the system about a particular file residing somewhere in the cloud. Holding the encrypted keys of both the user and the file the Bridge collects all necessary shards through the X Core apps installed on the Hosts' computers. Neither the Bridge nor any Host is able to read the encrypted content of the file since the decryption process is executed only with the X Cloud app holding the unique keys on a local computer of the data owner. The system cannot mistakenly confuse a particular data owner and another person's file. No mistake is possible because the Bridge connects a particular data

owner only with those Hosts where the necessary shards reside. This process can be called a proof of availability since the data owner's X Cloud app shares shards along with the specifically hashed keys with the X Core apps of the selected Hosts. Any action where both a particular data owner and dedicated Hosts are involved implies exchanging the shards' hashes between them. The hashed keys are automatically updated in the course of action between data owners and Hosts. The whole process runs on a programmatic level when the users from both sides are not involved in such a precise and secure proof of availability. Thus, the entire functionality of the system provides human-factor-free workflows when both premeditated and inadvertent errors are excluded.

Hosting files



Thanks to AES 256 CTR, we are able to decrypt the file for the user when we get it back. The file is divided into packages only after it's encrypted to be sure that a Host has an amount of data that can't be interpreted anyhow. It is not possible to decrypt one package and see any relevant part of the complete file's data. The maximum possible package size is to be set to 2MB. To be sure that a package saved by a Host was not modified, we use SHA 256 hashing. This is a one-way encryption technology. When we download a file from a Host, we calculate its hash and check if coincides with that one received from the Bridge. If it's not, we download the file from a mirrored Host.

Market position

We are providing a completely revolutionary technology that outperforms the current solutions in the market. As it has already been mentioned, our main competitive advantages are privacy, security, and efficiency, providing a price at least as good as the one traditional solutions provide. We also want to provide a user experience at least as good as the ones they offer. There already exist a few direct competitors to X Cloud, which provide a decentralized cloud solution that aims to improve the way the Internet is organized. Although there are not many competitors, their decentralized technologies are sometimes outstanding. Even though this is the case, these competitors have not yet become mainstream. We believe that the main issue resides in user experience and marketing. The reality is that, although decentralized technology is overall better than the traditional technology we use, it is too complex for the average user to make a transition from one technology to the other. We are focusing on providing an outstanding user interface, that's as easy to use as the current solutions offered by big corporations. By providing a competitive price and a seamless user experience, we believe that our decentralized internet services will become mainstream.

Token

Internxt's team worked on budgeting how many funds would be needed to create X Core, X Cloud and start marketing and commercializing these. We then ran a small and regulated crowdsale that would fit our realistic needs. The crowdsale took place from September 7th – 28th, 2017, and a total of 629,610 INXT were distributed. The unsold crowdsale tokens were locked forever (effectively burned), as can be seen in the [INXT audit](#) an independent company ran. No more INXT will be generated, thus 629,610 INXT is the circulating and maximum supply of INXT. INXT will be used as a means of payment for all our services using X Core. All revenue generated from our decentralized services is directly converted into Internxt's token, INXT, fundamentally the same as customers purchasing INXT directly. For instance, a \$50m in revenue generated from our products and services during 2018, would mean a direct \$50m in buy orders for INXT on public exchanges. These INXT get then distributed amongst Hosts. Customers also have the possibility to pay Hosts directly in INXT at a discount price. INXT is also divisible by 8 decimal places, allowing it to have decimal exponents if needed in the future. Gold has value due to its reliable demand, as gold is always likely to be desirable. Some cryptocurrencies rely on everybody agreeing they have value, which may change, particularly if a currency with vastly improved technology becomes available. In contrast, INXT is designed to function as an economy with reliable demand, as all revenue generated from Internxt's products are to be converted into INXT.