



SELF-GOVERNED COMPUTING INFRASTRUCTURE MARKET

WHITE PAPER

v0.9.5

Roman Mandryk, David Kvas

Abstract

The internet is continually evolving. Twenty years ago, only large enterprises owned big data centres and startups needed to invest large sums into their own servers. If they became successful, they had a very short time to increase their capacity by spending even more in infrastructure. Times were quite difficult for innovation.

Today there are multiple cloud providers which allow startups and large organizations to rent “servers,” or rather computing resources, on a per-second basis and to adjust capacity in a few clicks. However, cloud providers are dominated by a few large players. There is a risk of the whole server hosting market being consumed and dominated by them. Although there is a price war at the moment that is lowering cost, it may change in the future leading to decreased competition, price increases and dangerous centralization of the power in the hands of a few.

We present a solution which will help individuals, hosting providers, companies owning unutilized datacenters to get worldwide reach within minutes by connecting to the Unchainet network, renting their available server resources to a broad audience, and earning money while supporting the open internet. We call this **beneficial mining**. The consumed energy brings value (benefit) to clients and is not wasted in large amounts just to keep the network running.

Cloud clients will at the same time be able to access substantial computational power for research, AI training, or for web and API hosting at better prices. These will be based on current market pricing and very low Unchainet network maintenance fees.

Unchainet aims to be more than “just another” cloud provider. The Unchainet network will be built with blockchain technologies at its heart, allowing resource trading in its **UNET cryptocurrency**, which will run on a fast custom-made blockchain with **Proof of Beneficial Work** algorithm. **Introducing a cryptocurrency as a mean of exchange will enable true cross-border and real-time sharing of computing power without restrictions.** Quality and trustworthiness of nodes (i.e., providers) will be consistently and transparently monitored by **QoS Chain technology** allowing free transactions on a massive scale while keeping true decentralization backed by resource trading crypto-economy.

In later phases of the project, this will allow UNET tokens to be used outside of Unchainet platform, powering **microtransactions** in other apps. Modular Unchainet blockchain architecture and our “blockchain as a service” offering will enable developers to create **custom blockchain apps** with significantly more use cases than current smart contract platforms.

Contents

Abstract	2
1. Introduction.....	5
1.1. Why is the cloud ready for a major disruption?.....	5
1.2. Cloud.....	5
1.3. Cryptocurrency Payments	6
1.4. Decentralized blockchain apps.....	8
1.5. Note on decentralization	8
2. The Unchainet platform	8
2.1. Unchainet for Providers	9
2.2. Unchainet for Clients	9
2.2.1. The compute purchase process.....	9
2.2.2. Wallets vs. service accounts.....	10
2.2.3. Unchainet clients.....	11
2.3. Unchainet developers	11
3. Business overview.....	12
3.1. Business model	12
3.1.1. Key Partners.....	12
3.1.2. Key Activities	13
3.1.3. Key resources.....	13
3.1.4. Value Propositions	13
3.1.5. Customer Relationships	14
3.1.6. Channels.....	14
3.1.7. Customer Segments.....	14
3.1.8. Cost Structure.....	15
3.1.9. Revenue Streams.....	15
3.2. Cost & Revenue model	15
3.2.1. Model computing unit.....	15
3.2.2. Monthly revenue forecast.....	17
3.2.3. Cost & Revenue forecast.....	19
3.3. Competitor Analysis	20
3.3.1. Unchainet's Differentiation	21

4.	Technical overview	21
	Introducing QoS Chain; automated quality control of cloud providers	22
4.1.1.	Quality parameters	22
4.1.2.	Quality rating process	23
4.1.3.	Participant and Voter lists	23
4.2.	The main “UNET” chain.....	24
4.2.1.	Consensus algorithm - Proof of Beneficial Work (PoBW).....	25
4.2.2.	Proof of beneficial work and Sybil attacks	26
4.3.	Computing Rental Blockchain App	26
4.4.	General Blockchain Apps (decentralized apps, dApps).....	27
4.4.1.	Example blockchain apps: Comparing Ethereum and Unchainet platform 28	
4.5.	Development phases	30
4.5.1.	First phase	30
4.5.2.	Second phase.....	31
4.5.3.	Third phase.....	31
5.	Token issuance.....	32
5.1.	UNET Tokens (UNETs)	32
5.2.	Seed Round	32
5.3.	Private Sale	32
5.4.	Token Distribution	32
5.5.	CRC tokens	33
5.6.	UNET and CRC comparison.....	34
6.	Summary	34

1. Introduction

1.1. Why is the cloud ready for a major disruption?

In 2006 Amazon Web Services started with a then new business model of public cloud. With the promise to convert the high capital expenditure of businesses investing in private data centres into an operational expenditure, it was a revolutionary concept. Businesses simply didn't have to invest tens of thousands of dollars upfront into an infrastructure with a high risk of losing the investment. Instead, they could run their workloads for a fraction of the cost on an hourly basis. It was truly a remarkable shift which enabled a significant amount of innovation. Shortly after that Microsoft, Google, IBM and other large players entered the field and started to bring small and large businesses into their platform.

However, in 2018 we see the original promises of lower costs being left unfulfilled. Cloud companies are generating huge profits, yet many companies that were originally bullish on cloud transformation are pulling back as they realize it is no longer profitable.¹ Pricing of the current cloud services is the biggest concern for clients, but there is more to worry about. Companies have concerns about their data ownership as well as security and thus, hybrid and private clouds emerged. This, however, leads to pre-2006 problems with CapEx. Companies end up having a big problem of underutilized 'zombie' servers (estimated 1/3rd of all servers in North America are underutilized).^{2 3} Additionally, there is a unhealthy market consolidation that is centralizing computing power in the Big 4 cloud providers and stifling competition from smaller providers.⁴

1.2. Cloud

Unchainet defines a new status quo by providing an open source software for cloud providers supported by a network of individuals, hosting providers, companies with unutilized datacenters, and "ex-cryptocurrency-miners." By combining computing resources, this network is capable of competing with large cloud providers by combining existing open source technologies with the Unchainet platform and **QoS Chain**.

Unchainet monitors the quality of individual nodes in the network with **QoS Chain (see Chapter 4)**, a blockchain for measuring and transparently storing node reputational data in the public distributed ledger. This key technology allows clients to choose their level of

¹ <https://www.crn.com.au/feature/why-australian-companies-reverse-out-of-the-cloud-468197>

² <http://whatis.techtarget.com/definition/zombie-server-comatose-server>

³ https://anthesisgroup.com/wp-content/uploads/2015/06/Case-Study_DataSupports30PercentComatoseEstimate-FINAL_06032015.pdf

⁴ <https://www.crn.com.au/news/the-big-four-continue-to-dominate-cloud-infrastructure-wars-470427>

service and pricing based on their needs and allows Unchainet to serve even mission-critical workloads on high-quality nodes.

Clients can purchase computing resources in the same way they are familiar with on current cloud platforms. The Unchainet MVP will focus on spot instance pricing (or pre-emptible VMs) which is an auction-based platform where clients bid to use resources and can use them until a higher bidder comes in. In later phases, after enough test data is available, we will introduce guaranteed per-minute pricing and long-term bookings.

The optimal use cases for the bidding platform and lower quality nodes are workloads involving large-scale computations with frequent state commits. These tasks do not suffer from sudden shutdowns as clients design their computations to save progress frequently. Example tasks are research computations, deep neural network training or 3D and video rendering.

Higher quality tasks are standard longer-term resource allocations where high availability, durability, and security are important. Classic website hosting is a great example of such a task as it requires high availability and no dropouts.

1.3. Cryptocurrency Payments

Unchainet's key value proposition for clients is cost-savings. This will be achieved by market pricing based on a liquid provider/client market and by very low 2.5-10% fees (based on provider quality) on resource bookings, compared to an estimated 32% EBITDA of AWS.⁵ With such a tight margin (i.e. 2.5-10%), credit card, PayPal, and bank transfer fees are too high. For this reason, we believe that developing a cryptocurrency can provide an elegant and cost-effective solution to trading Unchainet computing resources which is why we are launching the UNET cryptocurrency.

UNET will initially be an Ethereum based ERC20 token, but after implementing Unchainet blockchain main network, it will be migrated in 1:1 ratio to the native token. The reasons why the world needs a better cryptocurrency than Bitcoin and Ether are:

- Transaction times - it can take an hour to transfer bitcoins from one account (wallet) to another
- Transaction costs - average bitcoin transaction fees are over \$10 and still rising - this makes bitcoins unusable for microtransactions⁶

⁵ <https://www.forbes.com/sites/greatspeculations/2017/10/25/aws-to-help-drive-amazons-top-line-growth-margins-to-remain-under-pressure/#55b5887068ed>

⁶ <https://twitter.com/Blockchair>

- Capacity – currently, bitcoin can only handle 3-4 transactions per second. Compared to Visa which makes up to 24000 transactions per second⁷, there is a lot of room for improvement
- Energy cost - in the early bitcoin days it was possible to run bitcoin software on personal computers. Today, to process the aforementioned 3-4 transactions per second, the bitcoin network requires large specialized computer farms which consume significant energy⁸
- Decentralization – the original idea of bitcoin as a decentralized currency is now endangered by large mining pools who have power over bitcoin decisions and can sabotage the future development of the network as a whole⁹

While we love the original idea of bitcoin being a decentralized payment platform, there are clearly too many shortcomings to make it viable as an everyday transaction platform.

Unchainet addresses these issues in the following way:

- Transaction times and capacity - Using a revolutionary Unchainet blockchain engine (inspired by Tendermint and Red Belly blockchain¹⁰) we will be able to process more than 10,000 TPS (transactions per second) on the current network. As we grow our network (i.e. a number of high quality nodes), the TPS will increase as well.
- Transaction cost – the platform is funded by fees from compute resource trading so we can offer transactions on the main UNET blockchain for individuals for free (subject to DDoS protection) and will charge low transaction fees for organizations who need bulk processing.
- Energy cost - running the Unchainet blockchain engine is comparable to running a large server application. Total energy consumption and costs are negligible in comparison.
- Decentralization – our network solves the decentralization problem not only on the algorithm layer, but also on a network layer by evenly distributing voting power between geographic regions, data centers, and providers.

⁷ <https://usa.visa.com/run-your-business/small-business-tools/retail.html>

⁸ <https://digiconomist.net/bitcoin-energy-consumption>

⁹ <https://blockchain.info/pools>

¹⁰ <http://poseidon.it.usyd.edu.au/~concurrentsystems/rbbc/Benchmark.html>

1.4. Decentralized blockchain apps

Unchainet also provides a modular blockchain as a service. Clients, startups, and new projects can base their blockchain application on Unchainet blockchain platform to take advantage of the high transaction speed as well as the flexibility to use their own storage mechanism, consensus algorithm or programming language.

Ethereum, Neo, and Golem have similar goals: to create a worldwide computer to enable decentralized apps. From our perspective, all of them share a large disadvantage: they are creating new, untested technologies for problems that have already been solved like storage, networking, and computing resource allocation. We believe the best alternative is to use existing, proven open-source technologies (like OpenStack and Kubernetes) and modify them to intersect with the blockchain only where payments, contracts and quality score is involved.

1.5. Note on decentralization

Unchainet provides software for cloud and hosting providers which allows them to participate in the verified network and rent their computing/storage/network capacity to Unchainet clients. Small amounts of provider capacity are set aside and used to power the Unchainet network.

Cloud providers are independent businesses or individuals who meet basic quality criteria. They can participate in the network simply by installing Unchainet software to provision capacity to the network.

As installing software is voluntary and cloud providers are individuals and independent businesses incentivized to run the software with high availability, reliability, security, and other criteria, in short, Quality. Unchainet is a **unique decentralized system based on Proof of Beneficial work (abv. PoBW)** which stands and falls on high-quality providers.

Many competing blockchain projects only describe their consensus algorithm as a way of ensuring decentralization. They are often quiet about where the nodes of their blockchain are located and who owns them. They can be under the control of a few people, or running in a single datacenter, which puts the network in danger. Unchainet's low entry costs, which ensure a network of independent nodes, and consensus, are both crucial elements for network stability and distribution of voting power. Information about the vote distribution across regions, datacenters, and individual providers is always available on the public QoS chain.

2. The Unchainet platform

Unchainet is *the platform* for renting and buying computing resources anywhere in the world with high quality and security standards in mind. It hosts a fast blockchain designed

to support 10,000+ transactions per second used internally for trading compute resources and externally for third-party developers to build decentralized apps.

2.1. Unchainet for Providers

Compute providers install the Unchainet platform on their hardware. Installation is recommended on bare-metal, but the platform can be installed on virtual machines in existing environments. Providers can then allocate all or partial resources to be available to the network.

When the initial setup and allocation is completed, providers receive a unique ID on the network and start collecting reputation (quality score) which is determined by constant checks from peer nodes. They monitor availability, network throughput, latency, and also ask for various checksums and puzzle solving to verify that the software running on the node is genuine and not tampered with.

When a node consistently delivers good quality, it is selected into a closed pool of approved nodes which can be elected to propose and verify transactions on the network. Higher quality and presence on the network gives better returns to providers so they are motivated to keep the quality up.

Providers are paid in UNET tokens which can be exchanged to any other cryptocurrency or fiat currency.

2.2. Unchainet for Clients

Clients have access to the Unchainet web console and CLI which is similar to existing cloud providers but with a simplified UI for launching new instances.

Unchainet's primary use-case after launch, will be for research, AI training, video rendering and special web services workloads where we can provide better pricing and clients expect interruptions when higher bidders enter the market for computing resources. After the launch and collection of sufficient data, the team will focus on highly reliable instances to match industry standard 99.99% availability, which can be used for any purpose, including website and mission-critical service hosting.

2.2.1. The compute purchase process

The purchase process is as follows:

1. The client logs into the Unchainet platform and selects a number of resources like CPU, GPU cores, memory and storage
2. Client selects a specific provider, region, or global provider search

3. Client is presented with options to select availability:
 - **Eventual availability** - price fluctuates with supply and demand and a client's instance can be shut down when a higher bidder enters the market. This is suitable and cost-effective for research, AI training, video rendering, or similar workloads. Clients who are already using AWS spot instances or Google pre-emptible VMs can expect the same behavior but lower prices.
 - **Guaranteed availability** – the client pays per minute of workload - prices are highest of the 3 purchase options but availability is guaranteed and instances cannot be pre-empted or stopped at anytime.
 - **Long-term booking** - pre-paid option to book resources for a longer term (1 month to 5 years) with discounts for longer durations.
4. Client will need to purchase the computing resources with UNET tokens which can either be transferred from an existing wallet or purchased in the Unchainet client platform using the most popular cryptocurrencies (e.g. Bitcoin, Ethereum) or even by a credit card. UNET tokens are not issued but rather bought from the exchange on the client's behalf with a small fee.
5. UNET tokens are required immediately for a long-term booking or will be continuously spent, in the case of eventual and guaranteed availability purchases. When the client is close to depleting his account holdings, the platform will alert them with information on how much time is left for his workload until it is shut down.

2.2.2. Wallets vs. service accounts

Anyone can download the desktop or mobile Unchainet **wallet** and send or receive UNET tokens peer to peer, similar to existing Bitcoin and Ethereum wallets.

Service accounts on the other hand, are like online wallets. Their primary purpose is to buy computing resources from Unchainet.

Users can withdraw money from a service account unless the amount was used to reserve services. They can choose to keep their balances in UNET (can be volatile), CRC (more on CRC in Chapter 5) or to split holdings in any ratio to minimize the risk and make spending on computational resources more predictable.

2.2.3. Unchainet clients

The cloud services market is predicted to surpass \$500b in 2020¹¹. Clients using cloud services are individuals, start-ups, small and medium businesses, enterprises, universities, research facilities, and even governments. While we do not expect governments and mission-critical enterprise applications to migrate to Unchainet from day one, all other groups will benefit from lower prices and automatic scaling.

We are on a mission to be on par with and to exceed large names such as AWS, Google, and Microsoft in terms of quality of services, efficiency ease of use and pricing. While they are a few years ahead, Unchainet can close the gap in a couple of years by providing a reliable platform with core infrastructure and leaving the doors open for other developers to deploy new and existing applications to the Unchainet platform. Clients will benefit from extensive core services, consolidated billing, and identity management. A couple of years is not an exaggerated timeframe as we have a head start with open-source technologies such as OpenStack and Kubernetes which were not available ten years ago when cloud started.

2.3. Unchainet developers

In the first phase, the platform will provide basic resource allocation capabilities on the infrastructure as a service (IAAS) and platform as a service (PAAS) levels. Developers and system administrators can book computing, storage, and network resources for a fixed price or by bidding their max price. Developers can also easily run single containers, shell scripts, or kubernetes configurations on the Unchainet cloud in a similar way as they do on the existing cloud platforms.

In the second phase, we will add services such as serverless computing, databases as a service, and most interestingly, the Unchainet blockchain service. Developers will be able to use the existing Unchainet blockchain which is optimized for fast transactions, and create new blockchain applications with:

- Choice of Programming language - most modern languages like C++, Go, JavaScript, Java, .NET, and more
- Choice of Data storage structure - custom designed and optimized storage for a specific problem (few data points for financial transaction vs. structured and indexed data backed by PDF documentation)
- Choice of publicity/anonymization of transactions and permission systems
- Seamless interaction with existing Unchainet wallets and identity services

¹¹ <https://www.forbes.com/sites/alexkonrad/2015/06/18/byron-deeter-state-of-the-cloud/#66788ac2767c>

3. Business overview

Unchainet's success stands and falls with the economics in cloud and hosting space. A growing number of providers and paying clients are the building blocks of the Unchainet network's value. The software platform will enable various B2B and B2C services with the quality and reliability of the platform as a value multiplier.

3.1. Business model

Unchainet's primary revenue stream comes from fees (average 2-5%) and rented computing resources paid by clients. The main estimated expenses include development, B2B sales team, and training of a broad network of external consultants which will provide technical support and implementations on the Unchainet platform.

Other components are displayed in the Business canvas. (all sections are broken down below for a better overview).

The Business Model Canvas		Designed for	UNCHAINET	Designed by	Date	Iteration	
				Roman M.	31.1.2018	3	
Key Partners <small>Who are key partners? Who are key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?</small> <p>Cloud / hosting providers - key resource - computing, storage, network res. Investor / venture capitalists - key activity - funding, network growth, key clients Cloud enterprise consumers - building trust in the platform, liquidity of workloads Blockchain advisors/promoters - network growth, advertising, PR Cloud consultants - Individuals and agencies - build on Unchainet cloud and supporting clients</p>	Key Activities <small>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue streams?</small> <p>Build liquid market with computing resources - build network of providers and reserve capacity - acquire paying clients Grow the platform Build and improve open source platform Support blockchain app ecosystem Analyze data and improve</p>	Value Propositions <small>What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?</small> <p>For providers: - income generation - investment into high growth blockchain company - supporting open decentralized internet - we provide easy to install software for automatic resource allocation and automatic payouts</p> <p>For clients: - lower cost of computation resources, high quality - variety of standard and niche services - supporting open decentralized internet</p> <p>For blockchain businesses - reliable and modular blockchain platform to raise funds and operate high Tx volume business - partnerships and funding</p> <p>For consultants - steady stream of client work</p>	Customer Relationships <small>What type of relationships does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</small> <p>Enterprise account management and support - internal professionals caring for strategic clients Certified customer support consultant network - affordable professionals supporting small clients Free training platform - self-help resources</p>	Customer Segments <small>For whom are we creating value? Who are our most important customers?</small> <p>By company size - enterprise, small By required service - research, webhosting, critical workloads By demographic - local, global, special regional legislation By relation - strategic, invested, long-term, short-term</p>	Key Resources <small>What Key Resources do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?</small> <p>Large, global compute & storage network - true decentralization, incentivized for high quality Automatic quality control system - network self-regulating unique QoS chain Internal base of professionals - in the cloud and blockchain fields Consulting network of certified professionals</p>	Cost Structure <small>What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?</small> <p>Development & expansion Sales & referral programs Payroll & contractors Customer support Consultant training</p>	Revenue Streams <small>For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?</small> <p>Clients pay 2-5% fee for resource usage - 5% for low quality or short presence providers, 2% for high quality - this is main revenue stream working from early stage Referral fees for hardware sold to providers Referral fees from recommended co-location datacenters Returns from investment into blockchain apps on Unchainet platform - later phase stream</p>

3.1.1. Key Partners

Cloud / hosting providers: key resource: computing, storage, network res.

Investors: key activity: funding, network growth, key clients

Cloud enterprise consumers: key activity: building trust in the platform, the liquidity of workloads

Blockchain advisors/promoters: network growth, advertising, PR

Cloud consultants: individuals and agencies - build on Unchainet cloud and support clients

3.1.2. Key Activities

Building a liquid market with computing resources

- building a network of providers and reserve capacity
- acquiring paying clients

Growing the platform

Building and improving an open source platform

Supporting the blockchain app ecosystem

Analyzing and improving data

3.1.3. Key resources

Large global compute & storage network: true decentralization, incentivized for high quality

Automatic quality control system: network self-regulating unique QoS chain

Internal team of professionals: in the cloud and blockchain fields and business growth

Consulting a network of certified professionals

3.1.4. Value Propositions

For providers

- income generation
- investment into high growth blockchain company
- supporting open decentralized internet
- easy to install software for automatic resource allocation and automatic payouts

For clients

- lower cost of computation resources of higher quality
- variety of standard and niche services
- supporting open decentralized internet

For blockchain businesses

- reliable modular blockchain platform to
raise funds and to operate high Tx volume business
- partnerships and funding

For consultants

- a steady stream of client work

3.1.5. Customer Relationships

Enterprise account management and support: internal professionals caring for strategic clients

Certified customer support consultant network: affordable professionals supporting small clients

Free Training platform: self-help resources

3.1.6. Channels

Sales to large clients: the highest priority channel for the first 2 years

Ads and referrals for small clients

Developer/Consultant network

Cloud & crypto influencers

Emails, notifications to re-activate

3.1.7. Customer Segments

By company size - enterprise, small

By required service - research, web hosting, critical workloads

By demographic - local, global, special regional legislation

By relation - strategic, invested, long-term, short-term

3.1.8. Cost Structure

Platform Development - 40%

Sales & marketing - 35%

Training & support programs (consultant training) - 20%

Admin, Legal & Operations - 10%

3.1.9. Revenue Streams

Clients pay 2-10% fee for resource usage

- up to 10% for low quality or short-term providers, 2% for high quality and long-term providers

- this is the main revenue stream working from the early stages

Referral fees for hardware sold to providers

Referral fees from recommended co-location datacenters

Returns from investment into blockchain apps on Unchainet platform - later phase stream

3.2. Cost & Revenue model

3.2.1. Model computing unit

We have based our modeling on the server unit with 64 virtual CPU cores, 64GB RAM, 400 GB SSD and comparing it with AWS pricing.

Note: All prices are in US dollars. All AWS prices are valid for Sydney region as for 1.10.2018.

AWS reference instance

Instance Type	c4.8xlarge ¹²
Configuration	
vCPU	32
RAM (GB)	60
Storage per month (400 GB SSD)	\$48 ¹³
Spot pricing	
Spot pricing per hour without storage	\$0.4907
Spot pricing per month without storage	\$353.30
Spot pricing per month – total costs	\$401.30 ¹⁴
On-demand pricing	
On-demand pricing per hour without storage	\$2.0850
On-demand pricing per month without storage	\$1,501.20
On-demand pricing per month – total costs	\$1,549.20

Unchainet reference instance – refurbished server¹⁵

Configuration	
Refurbished Dell PowerEdge R910 4 x X7560 2.26Ghz 8-CORE 64GB RAM 8x146GB PERC H700 32-CORES	
vCPU	32
RAM (GB)	60 ¹⁶
Storage (8 hot plug drives - GB)	1168
Server price	~\$3,750.00
Colocation costs	\$119 ¹⁷

¹² <https://aws.amazon.com/ec2/pricing/on-demand/>

¹³ <https://aws.amazon.com/ebs/pricing/>

¹⁴ The data transfer costs were omitted from the modelling as they are either higher or similar on AWS.

¹⁵ Available on eBay.

¹⁶ We expect 4 GB to be reserved for Unchainet software.

¹⁷ <https://www.serversaustralia.com.au/colocation-australia.php>

Unchainet reference instance – new server ¹⁸

Configuration	
HP ProLiant DL380 G9 2U Rack Server - 2 x Intel Xeon E5-2670 v3 2.30 GHz ¹⁹ + 400 GB SSD ²⁰	
vCPU	32
RAM (GB)	60 ²¹
Storage (SAS SSD - GB)	400
Server price	~\$6,650.00
Colocation costs	\$119

3.2.2. Monthly revenue forecast

Cost & Income comparison for reference Unchainet instance

Availability Type	Monthly costs for AWS Reference Instance	Gross income ²² (paid by client to Unchainet)	Monthly colocation costs
Spot Instances (Min revenue) ²³	\$401.30	\$361	\$119
On-Demand (Max revenue)	\$1,549.20	\$1,394	\$119
Approximate average returns (10% spot, 80% on-demand, 10% long-term)		\$1,260	\$119

¹⁸ Available on eBay.

¹⁹ <https://www.newegg.com/Product/Product.aspx?Item=N82E16859108637>

²⁰ <https://www.newegg.com/Product/Product.aspx?Item=9SIAA0T6PK1147>

²¹ We expect 4 GB to be reserved for Unchainet software.

²² We expect 10% less than a price of AWS instance. This value will fluctuate depending on available resources and the quality of available resources.

²³ Spot instances are the least expensive computational resources which means they will generate minimal revenue.

Typical revenue scenario for reference Unchainet instance / average Quality Score 60 (i.e. Unchainet fee 5%)

Availability Type	Monthly Provider Net Income	Unchainet income
Spot Instances (Min revenue)	\$224	\$18
On-Demand (Max revenue)	\$1,206	\$70
Approximate average returns (10% spot, 80% on-demand, 10% long-term)	\$1,078	\$63

Unchainet income for number of cores - for Quality score 60 (i.e. Unchainet fee 5%)

Availability Type	Number of cores (vCPU)		
	10000	100000	1000000
Spot Instances (Min revenue)	\$5,643	\$56,433	\$564,334
On-Demand (Max revenue)	\$21,786	\$217,856	\$2,178,563
Approximate average returns (10% spot, 80% on-demand, 10% long-term)	\$19,687	\$196,873	\$1,968,727

Payback period in months for providers – for Quality score 60 (i.e. Unchainet fee 5%)

Availability Type	Refurbished instance	New instance
Spot Instances (Min revenue)	17	30
On-Demand (Max revenue)	3	6
Approximate average returns (40% spot, 40% on-demand, 20% long-term)	5	9

3.2.3. Cost & Revenue forecast

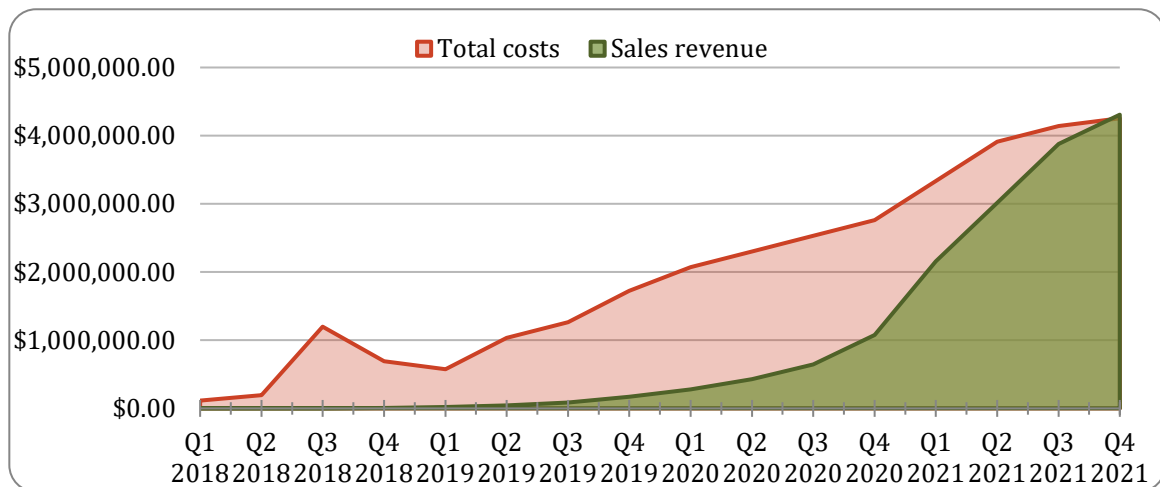
	2018	2019	2020	2021
Development costs *	\$600,000	\$1,600,000	\$3,400,000	\$5,800,000
Sales & marketing costs **	\$270,000	\$2,000,000	\$4,200,000	\$6,600,000
Training & support costs ***	\$200,000	\$400,000	\$800,000	\$1,200,000
Other costs (15% overhead)	\$160,500	\$600,000	\$1,260,000	\$2,040,000
Total costs	\$1,230,500	\$4,600,000	\$9,660,000	\$15,640,000
Estimated CPU cores in use ****	2000	40000	250000	1000000
Sales revenue	\$47,249	\$944,989	\$5,906,181	\$23,624,726
Profit/Burn	-\$1,183,251	-\$3,655,011	-\$3,753,819	\$7,984,726

* Estimated average developer salary \$120,000 pa.

** Estimated average sales professional salary \$120,000 pa. This will vary greatly based on region

*** Estimated investment in to learning materials and training staff

**** AWS was estimated to have 2M servers (64M cores in 2014) - <https://www.bloomberg.com/news/2014-11-14/5-numbers-that-illustrate-the-mind-bending-size-of-amazon-s-cloud.html> Our estimates are relatively conservative compared to AWS and are based on the number of sales professionals and growing maturity of the platform



3.3. Competitor Analysis

We have researched several decentralized cloud, storage and supercomputer competitors in the field. All of them fit in the *decentralized cloud* bucket, but each addresses the market differently.

The majority of competitors create proprietary platforms which are extremely hard to migrate for clients. Unchainet focuses on open source technologies like containers and Kubernetes and provides bridging interfaces in to existing cloud platform APIs.

Most of competing projects offer web site hosting, CDN, video streaming, etc. from the beginning, but none of them explains how they match the 99.99% availability compared to established cloud platforms.

Another weak selling point is connecting mobile phones, gaming systems and laptops in to the network without a node quality monitoring system. It is a sub-par offering for the majority of cloud clients and makes 99.99% availability and high internet speeds close to impossible.

Unchainet will focus on the niche cloud market called the "spot pricing market" in the early phase. Clients who want to run their research, AI training, rendering or other workloads bid the price they are willing to pay for the required amount of computing power and they run their workloads until a higher bidder comes in.

Their workloads are already optimized for dropouts so our offering is a 100% fit for their needs. We have also identified and partnered with several "Cloud cost optimization" companies. They optimize website hosting costs across all cloud platforms for their clients and they are willing to connect to our network making an excellent reseller partner.

	Golem golem.net work	Substratum substratum.net	Theta thetatoken.org	SONM sonm.com	Dadi dadi.cloud	UNCHAINET unchainet.com
Niche market	worldwide super-computer	decentralized web	Online video streaming	Supercomputer Organized by Network Mining	Web services	Spot & on-demand infrastructure
Native blockchain	no	no	yes	no	yes	yes
Provider quality checking (reputation)	no	no	yes	no	no	yes
Supporting existing client workloads	no	no	no	no	yes (Docker)	yes (Docker & Kubernetes)

Extra features						easy migration from AWS, Azure, GC.
						Support for mission critical workloads
						Network transparency (keeping privacy)

3.3.1. Unchainet's Differentiation

Unchainet provides a distributed cloud platform with QoS chain technology which controls the quality of individual providers and rewards them based on quality. Our unique positioning is in the "spot pricing infrastructure" cloud niche which has become increasingly popular and is where we can guarantee great availability even for mission-critical workloads on our high-quality nodes. Having access to the wide network with real economy gives us a unique opportunity to create a fast, free and truly decentralized blockchain platform which will enable a new breed of blockchain dApps.

4. Technical overview

This section describes the technical solution of the Unchainet platform and its main components:

- Cloud services
 - IAAS/PAAS
 - Additional services (CDN, serverless computing, and databases)
 - B2C services (website hosting, mobile backend)
- Blockchain services
 - QoS chain
 - UNET chain
 - blockchain as a service and first computing rental blockchain app

Introducing QoS Chain; automated quality control of cloud providers

The Unchainet network reliability is determined by **QoS Chain** (Quality of Service chain); a blockchain where nodes periodically check on each other to make sure clients are paying for expected quality and that only reliable cloud providers have “votes” to confirm transactions.

4.1.1. Quality parameters

The formula to determine quality works with multiple inputs and returns a quality score. It checks **technical parameters** of the node:

- Compute type and capacity
- Storage type and capacity
- Network throughput
- Reliability of service
- Security

and compares claimed values by providers with real values measured by peers.

The quality score will range from 0 to 100.

Another factor is a **time of consistent quality** which means providers are consistently online without outages, and their reported values correspond to peer-measured values.

Verified business registration - Verified businesses are considered higher quality as there is less risk of turning to a hacker organization with malicious means. Anonymous individuals will have lower scores and therefore lower chance to have a “vote.” However, long-term quality in other parameters will make business registration less important.

Adding only **correct transactions**. If a node adds only transactions which are later recognized as correct by consensus of votes, it will achieve a higher score than a node which tries to confirm transactions that are refused by the majority.

Ad Hoc checksums. The reported version of the Unchainet software needs to be consistent with expected checksums. Checksums are hash functions which are calculated on different levels (container, host OS, storage, in memory) and can be added dynamically to keep on top of possible malicious versions.

4.1.2. Quality rating process

We will be generally rewarding nodes for:

- being consistently online, without outages
- being honest about provided capacity/throughput
- being honest about business registration
- not adding transactions which are inconsistent with the majority of nodes
- Having ad hoc checksums always right

Unchainet will penalize nodes which break the rules and remove their "vote" if their quality score drops below the threshold.

The quality score will determine how many "votes" a given provider has, or technically how many nodes he can connect to the Unchainet blockchain network.

The number of nodes a provider contributes is zero after registration and is only added some time (weeks or months) after reaching the quality threshold.

Providers receive extra rewards on top of the basic hosting reward for maintaining a high-quality score and for having voting power.

4.1.3. Participant and Voter lists

Quality is determined automatically by periodic QoS chain checks. These frequently update the **Blockchain Participant List** to remove low-quality and malicious nodes from the consensus and keep high transaction speed and security. The list contains public keys of all participating nodes, so all communication between nodes can be verified, and votes can be trusted.

While the Participant List can be large and include all high-quality nodes on the network, we also keep a **Blockchain Voter List** which is the core list of currently active nodes participating in the consensus. The number of active nodes will be at sweet spot for both widespread decentralization and transaction speed. Keeping all nodes active would slow down the commit (block) time, while having fewer nodes could be perceived as the accumulation of too much voting power in too few hands.

This is an improved version of Tendermint validators²⁴ where we introduce automatic active node management to achieve geographical spread, provider neutrality, and optimal node capacity.

²⁴ <https://github.com/tendermint/tendermint/wiki/Validators>

4.2. The main “UNET” chain

The main Unchainet blockchain has a single purpose - to transfer UNET tokens between offline wallets and web accounts quickly, securely, and without cost.

Our blockchain platform is inspired by Tendermint blockchain²⁵, Hyperledger Fabric, and Red Belly Blockchain technologies which made great progress on on-chain transaction speed.

Tendermint gives us a way to create a modular blockchain technology and to introduce new consensus algorithms based on Quality of Service and Proof of Beneficial Work. We also think modular storage is essential for modern blockchain apps, so they can be optimized for speed based on business requirements. This will be an essential technology to provide our Blockchain as a service offering.

UNET chain, after a wide network adoption, will run on at least 500 geographically distributed nodes (ideally over 1,000) participating in consensus and on at least 10k backup nodes which have full transaction history and can immediately take over a voting role. That is 2x-4x more than the proposed Ethereum Casper update which is limited at 256 nodes without further thought of geographical node distribution.²⁶

Tendermint and Red Belly blockchain implementations do not have an upper limit for number of validators (deciders) and were tested with 300+ nodes^{27 28}

UNET transactions are anonymous by default, using a zero-proof algorithm but the sender can include watchers (which can be a specific ID or public) who can identify participants and numbers of transactions. This will allow advanced use cases like transparent accounts.

Transactions are free. Proof of Beneficial Work (PoBW) is a variation of the BFT (Byzantine Fault Tolerance) algorithm with emphasis on high quality nodes and even geographical distribution, which doesn't require high computing power to verify transactions. Costs required to verify transactions are covered from Unchainet resource rental fees. Several limitations will be imposed on individual transactions to avoid DDoS attacks on the network. Bulk transactions will be possible as a special type of transaction - this, however, will be paid (mostly for large payment processors - costs will be orders of magnitude smaller than current Bitcoin or Ethereum fees).

Transaction speeds - Tendermint implementation with Proof of Stake is capable of several thousand transactions per second. We are inspired by the work of Red Belly blockchain which claims to achieve 660,000 Tx/s on a limited number of nodes.²⁸ The chart below shows that with known algorithms, numbers of nodes negatively affect blockchain

²⁵ <https://github.com/tendermint>

²⁶ https://www.reddit.com/r/ethereum/comments/42ufc0/casper_162_node_limit_pos_pools/

²⁷ <https://blog.cosmos.network/consensus-compare-tendermint-bft-vs-eos-dpos-46c5bca7204b>

²⁸ <https://www.ccn.com/university-sydneys-red-belly-blockchain-scales-660000-transactionssec/>

performance. Our goal is to refine our algorithm and parameters to achieve at least 10,000 Tx/s with a 3-second latency and at least 500 geographically distributed voting nodes to serve as a fast, reliable and trusted network for microtransactions.

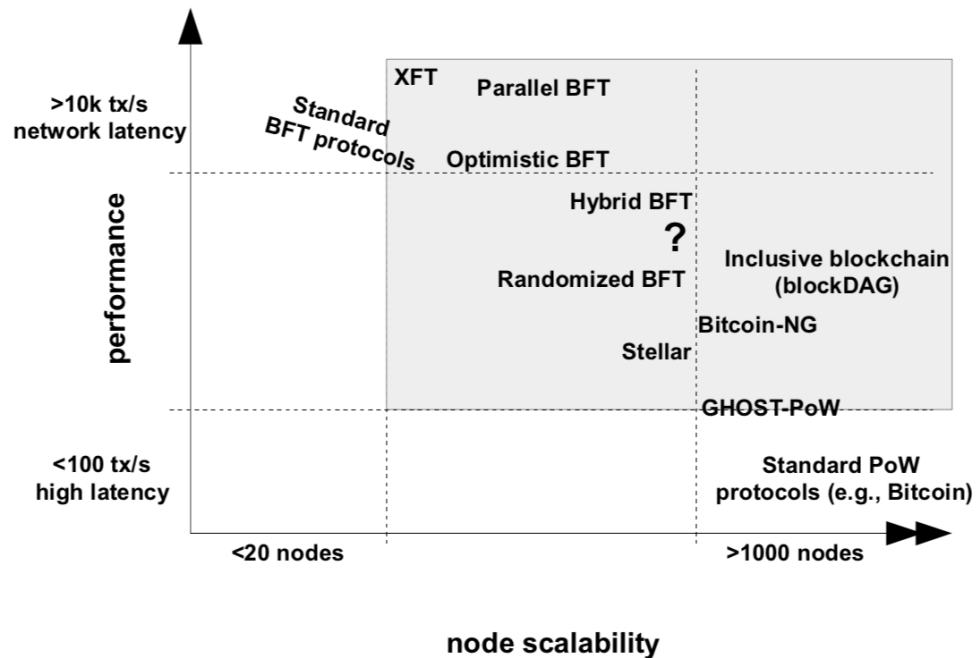


Chart - Consensus algorithms - decentralization vs. speed²⁹.

4.2.1. Consensus algorithm - Proof of Beneficial Work (PoBW)

The consensus algorithm for the Unchainet main chain is called Proof of Beneficial Work which is based on the BFT (Byzantine fault tolerance) algorithm, while trustworthiness of individual nodes is validated by the underlying concept of Quality of Service chain which defines which nodes are trusted and currently participating in voting. Querying the QoS chain is fast so in cases of malicious behavior or connection dropouts of some nodes, the QoS chain is responsible for updating participant and voter lists quickly so the main chain is not blocked.

The Unchainet blockchain is public. That means everyone can install and download the full blockchain. Transactions are anonymous, so only public transactions or transactions where users are owners or watchers can be viewed.

²⁹ <https://allquantor.at/blockchainbib/pdf/vukolic2015quest.pdf>

While reading from the blockchain is available for everyone, participating in the consensus process will require time and quality of service to get on the Blockchain Participant List as described in the QoS section.

	PoW consensus	BFT consensus
Node identity management	open, entirely decentralized	permissioned, nodes need to know IDs of all other nodes
Consensus finality	no	yes
Scalability (no. of nodes)	excellent (thousands of nodes)	limited, not well explored (tested only up to $n \leq 20$ nodes)
Scalability (no. of clients)	excellent (thousands of clients)	excellent (thousands of clients)
Performance (throughput)	limited (due to possible of chain forks)	excellent (tens of thousands tx/sec)
Performance (latency)	high latency (due to multi-block confirmations)	excellent (matches network latency)
Power consumption	very poor (PoW wastes energy)	good
Tolerated power of an adversary	$\leq 25\%$ computing power	$\leq 33\%$ voting power
Network synchrony assumptions	physical clock timestamps (e.g., for block validity)	none for consensus safety (synchrony needed for liveness)
Correctness proofs	no	yes

Table - comparison of PoW algorithm (used in Bitcoin and Ethereum) and BFT³⁰.

4.2.2. Proof of beneficial work and Sybil attacks³¹

Assuming Unchainet has at some point 10,000 CPU cores as processing power and it runs 1,000 voting nodes (1/10 ratio) and it takes about 1 month of high-quality service (non-interrupted, high throughput network) to obtain voting power, an attacker would have to connect at least 5,000 CPUs to the network in several geographical locations for a period of more than 1 month to put the network in danger. ($\frac{1}{3}$ of byzantine nodes - 5000/15000) which would be too high a cost to be profitable or to DDoS the network.

4.3. Computing Rental Blockchain App

While the UNET chain is a generic payments blockchain, we need a specific blockchain app which lists available resources and maintains an order book with records of resources and current ownership.

Records (or contracts) describe:

³⁰ <https://allquantor.at/blockchainbib/pdf/vukolic2015quest.pdf>

³¹ https://en.wikipedia.org/wiki/Sybil_attack

- resource availability - long-term, guaranteed, eventual (explained in “Unchainet for clients”) and guarantees access to the specific pool of resources to the client.
- Resource location - can be very generic, like 10 CPU cores anywhere in the world) or specific - 10 CPU cores from a specific provider in the specific datacenter.
- Conditions - like enough balance on client’s service account or high enough bid to overcome counter-bidders.
- Resource minimum quality score - clients choose a minimum quality score which affects price but also guarantees better service. If a specific resource loses quality, it is replaced, or the client is refunded.

The rental blockchain app will be a reference implementation of a modular blockchain app on the platform and will feature:

- Fast and free transactions
- Custom-built backend to store information about contracts
- Anonymous transaction participants, but public amounts (allowing transparency and network growth auditing)

4.4. General Blockchain Apps (decentralized apps, dApps)

In the second phase, we will open our blockchain platform for developers to build custom blockchain apps. Blockchain apps will generally consist of these components:

- **Consensus algorithm** - By default a PoBW backed by Unchainet providers, but can be complemented or completely changed by specific “strategic nodes” with extra privileges. (For example, a blockchain application serving as a source of truth of asset ownership might choose asset producers to have a special vote when adding assets to the blockchain)
- **Transaction anonymity** - choice of public, anonymous, hybrid (some information is public), auditable by specific 3rd party etc.
- **Transaction costs** - developers can choose if they want to charge fees for every transaction or keep them free.

Our goal when designing a modular blockchain is to free developers to write their code in any language, but to create a platform with boundaries and checks. Users and auditors can verify the code and make an informed decision if the app is trustworthy.

4.4.1. Example blockchain apps: Comparing Ethereum and Unchainet platform

The Ethereum network introduced a revolutionary smart contract concept which allows processing of program code on the blockchain. There are limitations imposed by transaction speed and costs though. There is also a limitation in using a custom programming language called Solidity.

Here we present some examples of simple escrow contracts and how existing well-known apps such as UBER (which is a great candidate for decentralization) could work on Ethereum and Unchainet networks:

4.4.2. Escrow

Ethereum³²

(example from Cost of real world Ethereum contract)

User deposits 0.5 Ether - cost \$3.21 at \$300/ETH

Sender confirms - \$0.28 at \$300/ETH

Arbitrator confirms and 0.5 is released to recipient - \$0.49 at \$300/ETH

Time to send initial ether to smart contract can take around 15 minutes and sending 2 consecutive messages will take a few seconds. The release of the funds to the recipient can take another 15 minutes - so this is a pretty good outcome for a simple smart contract.

Unchainet

User Deposits \$150 equivalent in UNET (unchainet token) - free, 1-3 seconds

Sender confirms - free - sub second

Arbitrator confirms - free (small fee if Arbitrator runs a business and confirms many transactions a day), time 1-3 seconds to deliver the funds to the recipient.

Total costs and time on Ethereum network: \$3.98, time around 30 minutes

Total costs and time on Unchainet network: \$0 (or \$0.001), time around 3 - 8 seconds

³² <https://hackernoon.com/costs-of-a-real-world-ethereum-contract-2033511b3214>

4.4.2.1. Decentralized Uber - simplified for the purpose of the example

Ethereum³³

(there is no real example to refer to, estimated costs and time taken from <https://ethgasstation.info/>)

We assume \$0.3 and 10 seconds for average transaction which just sends a message and doesn't move Ether (money))

As a driver

- registration - \$0.3 and 10 s
- update position every 5 seconds - \$0.3 and 10s
- accept job - \$0.3 and 10s
- get paid - \$0 and 10s

As a user

- sign up to the app - \$0.3 and 10 s
- search driver database with the location, update every 5 seconds (impossible in a scalable way to implement on Ethereum network so most probably has to be off-chain) - \$0.3 and 10 s if on chain
- accept driver - \$0.3 and 10 s
- pay driver -- \$1 and 15 minutes
- leave review - \$0.3 and 10 s

Unchainet

All mentioned transactions above are free.

As a driver

- registration - if the DU app uses Unchainet identity service, it takes 1-3 seconds to receive a time based token which is valid only for DU app for a limited time.

³³ <https://ethgasstation.info/>

- update position, accept job - these transactions are off the Unchainet blockchain and are managed by the app itself while using authentication service from Unchainet network. (This is optional for the app - it can use another login service)

As a user

- sign up to the app - 1-3 seconds - user receives a time-based token to communicate further with the app

- search driver database, accept driver, leave review - sub second as it uses off-chain service

- pay driver - 1-3 seconds

In this example, it is clear, that the Ethereum network is hardly capable of the processing needs of a massively scaled app such as Uber while the Unchainet network is designed specifically to work efficiently and securely with just such an app.

4.5. Development phases

4.5.1. First phase

The Unchainet platform is currently running as a pilot with selected clients and allows to run custom workloads on OS or container level.

This marks the beginning of the first phase of the platform.

Our goal in the first phase is to open the platform for everyday clients and to create easy to install software for providers to connect their hardware to the network.

Features:

IAAS/PAAS - fully implemented - allowing clients to book resources as they are used to on competing platforms while running compatible containerized workloads.

Additional cloud services - in development

At this stage **UNET tokens** are based on the Ethereum platform, and CRC coins are kept in an internal centralized database.

QoS chain is in the prototype phase and is largely complemented by manual checks which help to tune the chain to be an autonomous quality control system.

Unchainet main blockchain is in development or running on test networks.

Computing rental blockchain app is in development and a centralized solution is temporarily used.

4.5.2. Second phase

The second phase will mark a significant milestone in platform development.

Features:

Additional cloud services like serverless computing and databases are running, B2C services are tested with a few selected partners.

QoS chain is fully working, secure, and modular enough to add ad-hoc tests and remove non-performing and easy-to-work-around tests.

UNET chain

- secure, well tested with best penetration testers and bounty programs.

- fast, performance tested with minimum 10k Tx/s and sub-5-second commit time.

First blockchain app - computing resource allocation will be fully moved from the centralized solution to the blockchain, which will bring transparency to the platform. The first blockchain app will be open source and will be a great starting guide for developers to create their blockchain apps on the Unchainet platform.

4.5.3. Third phase

This phase is not well defined on the development roadmap. On the business timeline it can be characterized as a period when we start training an external consultant network to help build on and migrate customers to the Unchainet platform.

Businesses will build on **Unchainet infrastructure**, either with their own teams or by hiring certified consultants.

UNET payment solution will be able to integrate with several businesses requiring fast microtransactions.

Blockchain startups will be able to build their solution and funding on the Unchainet platform.

5. Token issuance

5.1. UNET Tokens (UNETs)

UNET tokens are ERC20 standard tokens, created after the private sale and will be used to facilitate compute resource trading on Unchainet platform. After launching our proprietary blockchain main network, ERC20 tokens will be migrated in 1:1 ratio to Unchainet blockchain platform.

Unchainet will organize a crowd sale with a maximum supply of 200,000,000 UNET tokens with the goal to sell 67% of UNET tokens worth **\$18,000,000 USD**. No further tokens will be generated beyond 200,000,000 UNET's.

**The base price for ICO will be \$1 USD = 6.06 UNET,
1 UNET = \$0.165 USD.**

5.2. Seed Round

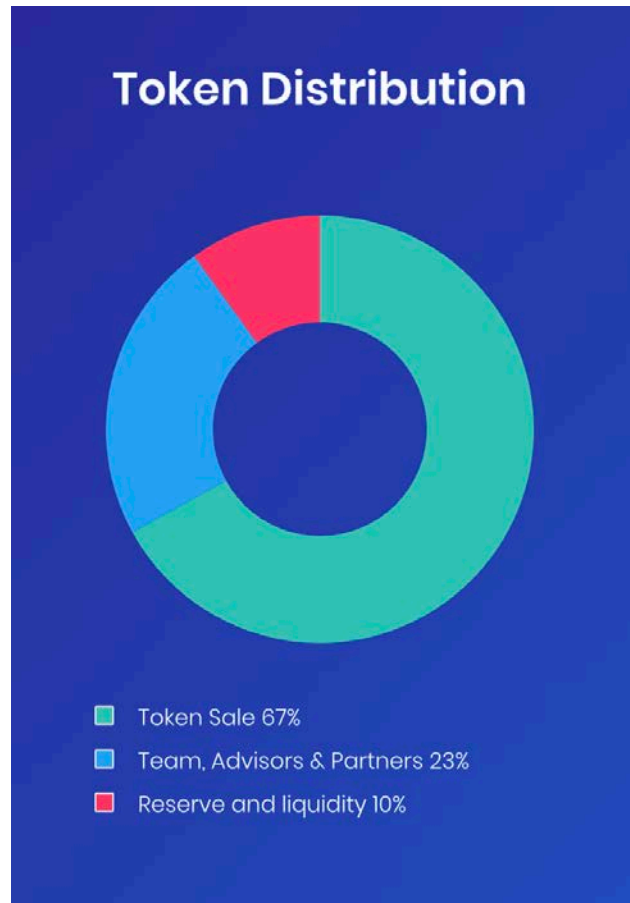
We have organized a seed round of UNET tokens. We will raise \$1,500,000 in the Seed Round which started on 5/24/18 and will end when our goal is reached.

5.3. Private Sale

Our Private Sale will begin when the seed round is fully funded. The private sale will be conducted through AmerX, a NY based registered broker-dealer. Private Sale dates and process will be announced on the <https://www.unchainet.com> website.

5.4. Token Distribution

The chart describes token distribution. 67% will be sold while the rest will be retained in the company for future growth, team, advisors and partners. Tokens allocated for the team will be under a graded vesting plan for 30 months with 20% of total holdings released every 6 months.



5.5. CRC tokens

We also introduce a secondary coin called CRC (computing resource coin). CRC value is pegged to the current market value of one hour rental of our reference instance machine (32 CPU cores, 64GB RAM, 512GB SSD) on guaranteed availability. (approximate value of 1 CRC = \$1.6 USD)

CRC tokens are:

- internal to the Unchainet platform
- locked to a specific service account
- NOT transferable.

Their only purpose is to be exchanged for computation resources. Then CRC tokens are exchanged back to UNETs and paid out to providers.

There are a few reasons we need to introduce this second coin:

1. We don't want clients to be exposed to volatility which is common with cryptocurrencies. CRC coins always represent the concrete value of computing resources and is very close to fiat currency trends. This will facilitate long-term compute budgeting capabilities for our clients.
2. We need a non-transferable coin to use as an incentive for startups and blockchain projects to run on the Unchainet platform. CRCs can be gifted to a specific account and must be used on the platform

5.6. UNET and CRC comparison

	UNET	CRC
Can be held in offline wallet	YES	NO
Can be withdrawn and traded	YES	NO
Can be held in service account	YES	YES
Exposed to market volatility	YES	NO

6. Summary

There is a huge and growing demand for cloud services. Currently, there are only a few major cloud providers who dominate the field, but there are thousands of providers who are on par with quality and offer a better price. They just don't have marketing and sales budgets to connect with big spenders like large enterprises, research facilities, and governments.

There is also a growing demand for a decentralized platform which allows fast transactions and is not controlled by governments or large corporations.

Unchainet is connecting these two fields by providing a blockchain-governed cloud platform which connects thousands of existing and emerging datacenters with big clients and runs a blockchain platform capable of running 10,000+ transactions per second (more than Visa). Current market capitalization of cloud and hosting services is about \$250 billion and is predicted to double by 2020. Market capitalization of cryptocurrencies is \$500 billion and rapidly growing beyond rational expectations.

We believe that efficiently working individuals, small and medium-size businesses governed by a blockchain and Proof of Beneficial Work algorithms will outperform the existing oligopoly of large cloud players.

The Unchainet platform allows small businesses and individuals to start AirBnb-like business with their own small data center with very low barriers to entry. It will support a hyper-scale, fast and free blockchain network which will revolutionize everyday payments and will become the de facto platform for decentralized businesses and applications.