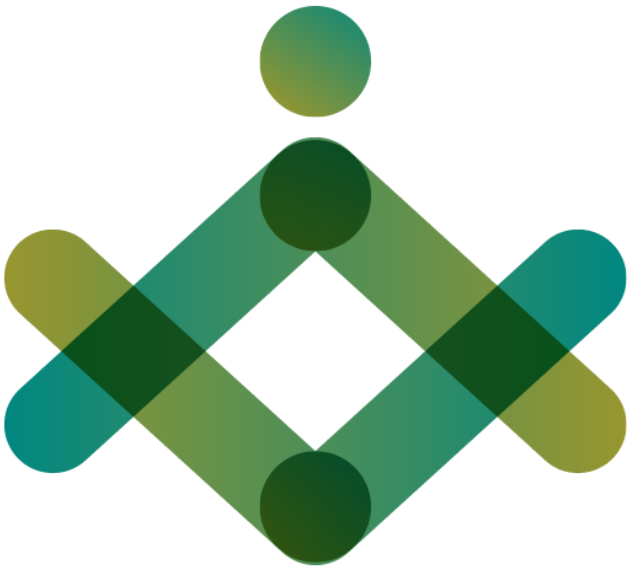


FACTOSHI

Manifesto

FACTOSHI

1. Introduction

With the rise of the Internet came the dawn of the Age of Information, but so too came the Age of Misinformation. Factom is a network built to reestablish reliable truths. It is a network to enforce accountability. To prove authenticity. If honesty is subversive, Factom is the catalyst of subversion.

Factom is at an exciting turning point. Years of careful, consistent work are beginning to bear fruit. The pending release of Milestone 3 (M3) is part of the larger Factom success story unfolding before us.

Factoshi want to be a part of that story. We recognise the revolutionary potential of blockchain technology and have identified Factom as the protocol which best leverages the immutable characteristic of blockchain to fundamentally change how we manage and authenticate data.

Factoshi are therefore delighted to present for your consideration our campaign to run two servers within the authority set on the Factom mainnet following the launch of M3.

2. Pledge

Factoshi recognise the trust that would be placed in us if we are elected to the Authority Set and/or win development grants to further the expansion of the ecosystem. Therefore, we make the following pledge to the community.

Factoshi will:

i. Always act in the best interests of the Factom network.
ii. Donate 50% of the gross revenue awarded to us by the protocol to the Factom development pool for the first year following our acceptance into the authority set (figure to be reviewed thereafter).
iii. Target greater than 99.99% availability.
iv. Ensure server hardware capabilities scale with the needs of the network.
v. Always have available a member of the team on call who can respond immediately to any unplanned downtime.
vi. Act judiciously, attentively and with caution in network governance decisions.
vii. Always target a constant exchange rate between Entry Credits and the target fiat currency, which is currently USD.
viii. Contribute to the wider ecosystem beyond our role as server operators.

We have committed our pledge to the Factom blockchain.

Entry Hash: 1b50fabb6216d9da1e80d0aedc1b911dbba599bbe7eac7e83e7788ea8814e4c3

https://explorer.factom.com/chains/2c0bdfb918232d13306f3f0d2c3ff9442aabf7c2d062a6794fe067558a27bef2/entries/1b50fabb6216d9da1e80d0aedc1b911dbba599bbe7eac7e83e7788ea8814e4c3

3. Who We Are

3.1. Company

Factoshi is a new company. We will incorporate in the UK as Factoshi Ltd. immediately following a successful application to the authority set. Under the umbrella of Factoshi Ltd. we will include all of Factoshi's authority hosting, data analytics and development work.

3.2. Team

i. DC - SysAdmin and Data Analytics

DC currently holds a position as Director of Big Data Analytics at a large US-based AdTech firm. She has years of hands-on experience using petabyte scale data mainly focusing on Machine Learning Based Audience Targeting.

DC holds a BSc. in Mathematics and a Master of Sciences in Computer Science from New York University. DC began her career as systems administrator at CBI Connect followed by aQuantive & Microsoft Publishing Solutions.

DC is planning to transition to working full time on Factoshi's data analytics project, which is outlined in detail in the Ecosystem Development section of this manifesto.

ii. Alex Carrithers - SysAdmin and Development

Alex has a history of working in finance. Graduating from university in 2012 with a First Class Bachelor's degree in Political Science, he then went on to work for the Lloyds Banking Group in graduate roles.

Alex has pivoted away from his role in finance and is currently developing applications in node.js. He is using those skills to build Factom applications, and will continue to do so with funding from the authority set (more details in the Ecosystem Development section).

Alex has a close relationship with the Factom community, where he has spent much of his time learning about Factom and contributing to discussion. He is currently a co-Interim Testnet Administrator.

4. Track Record

4.1. Our servers

We have been running servers on the Community Testnet from an early stage, and have been running a stable follower node on the mainnet for even longer.

i. **Factoshi testnet authority node** - http://178.62.80.38:8090/
Our primary node on the community testnet, this server has been live since the beginning of March. Since then, it has spent significant time within the authority set, and has had no unplanned downtime other than where there has been network-wide faults.

ii. **Factoshi testnet follower node -** http://159.65.88.145:8090/
Our secondary node on the community testnet, we use this node to run tests and gain more experience in operating a node. It has been an invaluable resource in refining our understanding of factomd and in nailing down our security and availability architecture (see below).

iii. **Factoshi mainnet follower node** - http://138.68.145.245:8090/
Predating the community testnet, this server has been operational since the end of 2017. We used it to gain early experience of factomd and to have a way to interact with the protocol. We have used it to become familiar with the API, which has been critical in expanding our understanding of the Factom protocol.

4.2. Development

i. Factoshi Node Monitoring and Alert Tool
We have built and open-sourced an application to alert factomd node operators by call or text in the event that their node hangs or the blockchain stalls. You can view the application here: https://github.com/Factoshi/Node-Monitor

ii. Automated Filesystem Object Hashing Tool
We are building an application which automatically hashes and commits specified file system objects following a change in object state. You can read more about it in the ecosystem development section of this manifesto.

4.3. Community involvement

Alex is Factoshi's face for the Factom community.

i. **Co-Interim Testnet Admin**
Primary responsibilities are finalising the Community Testnet Governance Document for ratification by the community, as well as onboarding new members and liaising with the working group chairmen. Alex will run for Testnet Admin in the first Testnet election.

ii. **Support Working Group and community involvement**
Alex is a member of the Support Working Group and has long provided support informally to the community by engaging with people new to Factom.

5. Security, Availability and Architecture

Security and availability are of the utmost importance for Factoshi. We believe that good security and availability are products of careful server construction and monitoring, as well as diligently adhering to established best practices. To that end, we have devised the following strategy.

5.1. Firewalls

We will introduce a dual firewall system on each of our servers with the aim of creating redundancy should one fail. Furthermore, we will control rules to ensure that only those ports absolutely essential to server operation are open.

5.2. Permissions

Server access will be restricted only to those people mentioned within the team section of this document. Where outside contractors are hired, we will restrict server access to non-authority nodes. New employees will undergo a 3 month probation period prior to being considered for SSH access to the authority set. All SSH keys will be managed by hardware wallet applications to mitigate the vulnerability of local machines and to ensure hard copies of private keys are backed up via the hardware wallet seed.

5.3. Audits

Our servers and security practices will undergo regular auditing to identify early any security vulnerabilities that could lead to a breach. This will include file system auditing, service auditing, and auditing of the procedural guidelines that must be followed when interacting with our servers.

Factoshi is committed to transparency. That is why we will commit a hash of known good file state for key security files to Factom at regular intervals. In the event of a security breach, the community can probe changes to that file state to determine the cause of the breach.

We will use a prototype of the filesystem object hashing tool mentioned in the Track Record section for this purpose, which we will eventually build out into a full application (see the Ecosystem Development section).

5.4. Disaster Recovery Plan

Factoshi is designing and testing a Disaster Recovery Plan (DRP). The DRP will consider many possible eventualities, including server intrusion from a malicious actor, data centre outages and compromised security keys. The aims of the DRP will vary depending on the hypothetical scenario being addressed, but the overarching aim will be to neutralise security threats to our servers and to ensure maximum uptime.

5.5. Maintenance team

Factoshi will have at least one team member on call 24-hours a day to respond to any unplanned downtime. We are geographically distributed between UTC+0 and UTC-5, which will us assist us in managing our rota.

5.6. Guard nodes

Our authority nodes will be hidden behind guard nodes. The objective is to reduce the attack surface on our authority nodes by ensuring they are exclusively connected to friendly peers. These guard nodes will be standard follower nodes, which will be instructed to connect to the authority node. We will establish symmetrical factomd rules on our authority node and also set firewall to ensure that only traffic from the guard nodes will be accepted.

5.7. Failover

Each authority node will have a failover server. In the event of the catastrophic failure of the authority node, failover will be initiated manually. The failover server will be situated behind the same guard nodes as its corresponding authority server, and will have the factomd.conf of the authority server ready to be loaded.

We considered the role of automation in the process, but the difficulty of eliminating both false positives and negatives and the negative ramifications of bringing up two authority nodes with the same ID means a human element is required at this early stage of development. We will support a grant to include automated failover in factomd.

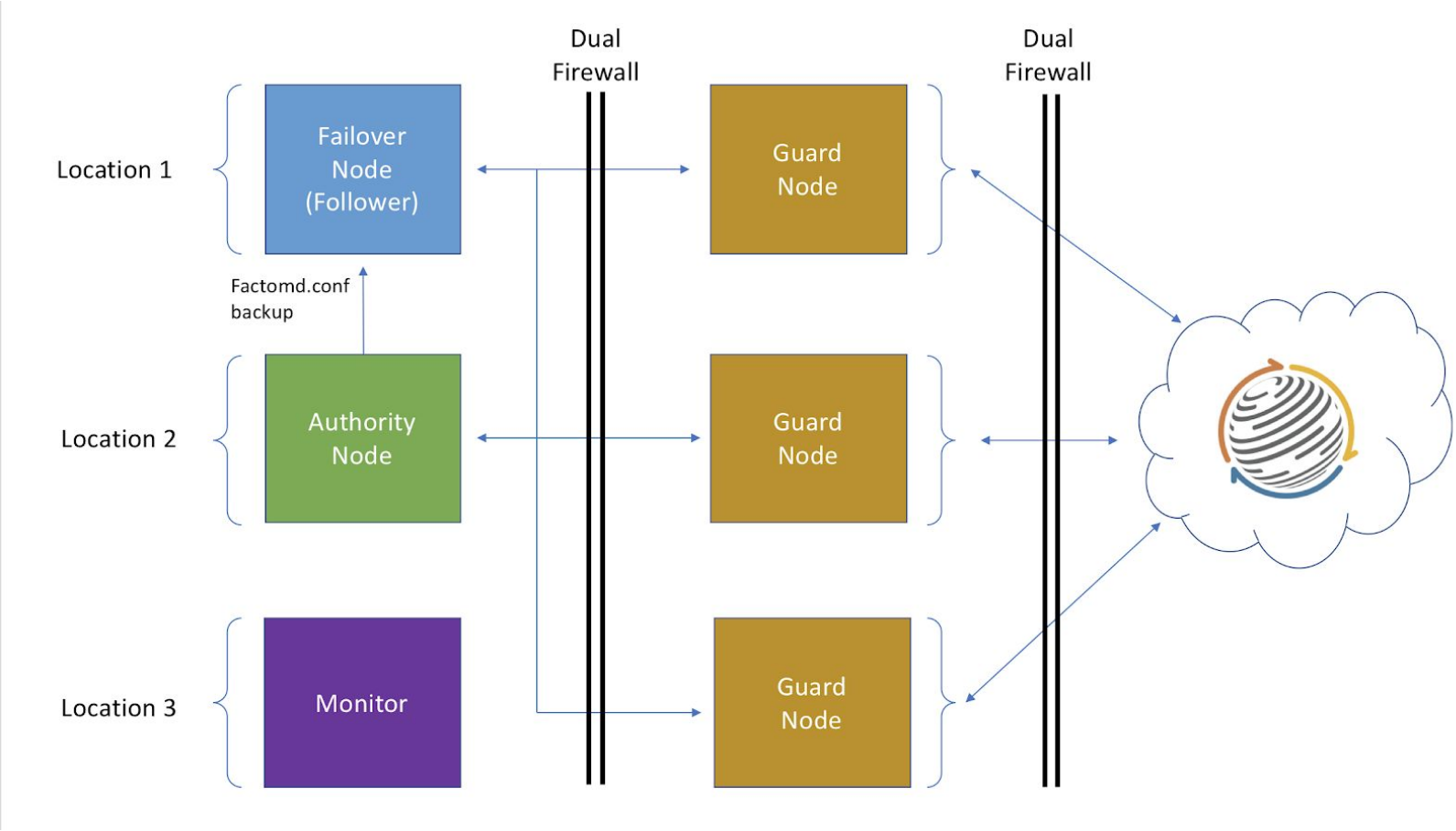
5.8. Monitoring

As mentioned in the Track Records section of this manifesto, we have built and open-sourced a lightweight monitoring tool written in node.js to alert us both network stalls and factomd failures.

The tool will be hosted on its own dedicated VPS. In the event of authority node failure, we will receive telephone calls and text message alerts to help us respond quickly.

Furthermore, we will use standard monitoring tools to give us insight into the status of our node hardware. We will therefore be able to respond immediately to anything that puts undue strain on our hardware (whether that be due to adoption, a bug, or an attack on the network).

5.9. Architecture



This diagram outlines our server architecture as described above. We have prepared a base image for each element of our network architecture to ensure we can deploy as quickly and smoothly as possible.

6. Hardware and Location

6.1. Server specification

Factoshi will host our authority nodes and backup nodes on servers with the following spec:

i. RAM: 32 GB
ii. CPU: 8 vCores - Intel Xeon E5-2650 v4 @ 2.20GHz (released Q1 2016)
iii. SSD: 640 GB
iv. Connectivity: 10 Gbit.
v. Static IP
vi. 99.99% uptime SLA

At the outset we expect these specifications to be vastly in excess of what is needed to run a node in the authority set. However, we are planning for a step-change in Factom's throughput within the relatively near term. Moreover, it is important that our servers remain stable in the event that a zero-day exploit or other edge-case scenario causes a surge in network resource usage. Our server specifications will leave a sufficient margin of safety to deal with a black swan event.

6.2. Service provider and data centres

Factoshi has chosen to use DigitalOcean as our service provider and have targeted their locations operating within Equinix data centres.

Equinix London 5

i. N+1 power redundancy
ii. N+1 cooling redundancy
iii. Despite the name, it is actually located in Slough (30 miles outside Central London), thereby reducing geographical collision with other authority node operators in London.

Equinix Amsterdam 5

i. N+1 power redundancy
ii. N+2 cooling redundancy
iii. Home to a colocation of the Amsterdam Internet Exchange, we will have excellent connectivity to global peers.

6.3. Scaling

As mentioned previously, we expect to see a step-change in network throughput within the near term, but we don't think it will stop there. Factom has the potential to revolutionise our relationship with data. For Factom to fill its potential, hardware capabilities will have to scale to with the network.

There are a few options available to us for future scaling. We are keeping those options open for now so that we can make decisions based on what information we have available at the time. However, those options include:

i. Continuing to utilise the higher tiers available to us, either with DigitalOcean or other service providers depending on costs and our experience with the service up to that point.
ii. The rental of a dedicated server from a cloud hosting provider with spec to match Factom's growth trajectory.
iii. Taking our server-hosting in house, where we can more easily manage hardware and the physical environment.

We will use data from different channels to judge when and how we will scale. We will use server monitoring software to judge how our servers are managing the load and whether there continues to be a sufficient margin of safety in hardware capability following a sudden or unexpected increase in network throughput. Furthermore, we will use our data analytics tool set (described below) to monitor sentiment changes. Where there is a sudden uptick in positive sentiment towards Factom, we will decide whether we need to expand our hardware capabilities to maintain a healthy safety margin.

7. Costs

The current monthly revenue per server valued in dollars is substantial. As of this writing, Factoids are worth around $20, which puts the total monthly revenue per server (before contributions to the development pool) at $22460.

However, the price of the Factoid has not always been so high. Furthermore, the underlying usage of the protocol does not yet organically support the current price, and the tremendous volatility and high correlation in the cryptocurrency market implies that we need to be prepared for monthly revenue to fall substantially.

Here we have costed our servers based on different scenarios for the price of the Factoid. Values are monthly per server cluster.

Revenue						
Price per Factoid	**$ 20.00**	**$ 15.00**	**$ 10.00**	**$ 5.00**	**$ 2.00**	**$ 1.00**
Revenue per authority node	$22,461.54	$ 16,846.15	$11,230.77	$ 5,615.38	$ 2,246.15	$ 1,123.08
Less 50% pool donation	$11,230.77	$ 8,423.08	$ 5,615.38	$ 2,807.69	$ 1,123.08	$ 561.54
Cost						
Cost per server cluster	560	560	560	560	560	560
Factoshi Development	10000	7500	5000	2200	560	0
Total Costs	10560	8060	5560	2760	1120	560
Totals						
Buffer (shortfall)	$ 670.77	$ 363.08	$ 55.38	$ 47.69	$ 3.08	$ 1.54

The table demonstrates that monthly revenue, less the 50% pool contribution, will be sufficient to fund our servers within the authority set even where there is a 95% fall in the price of the Factoid. We can achieve this by cutting back on Factoshi's ecosystem development costs for the projects discussed in the next section of this manifesto.

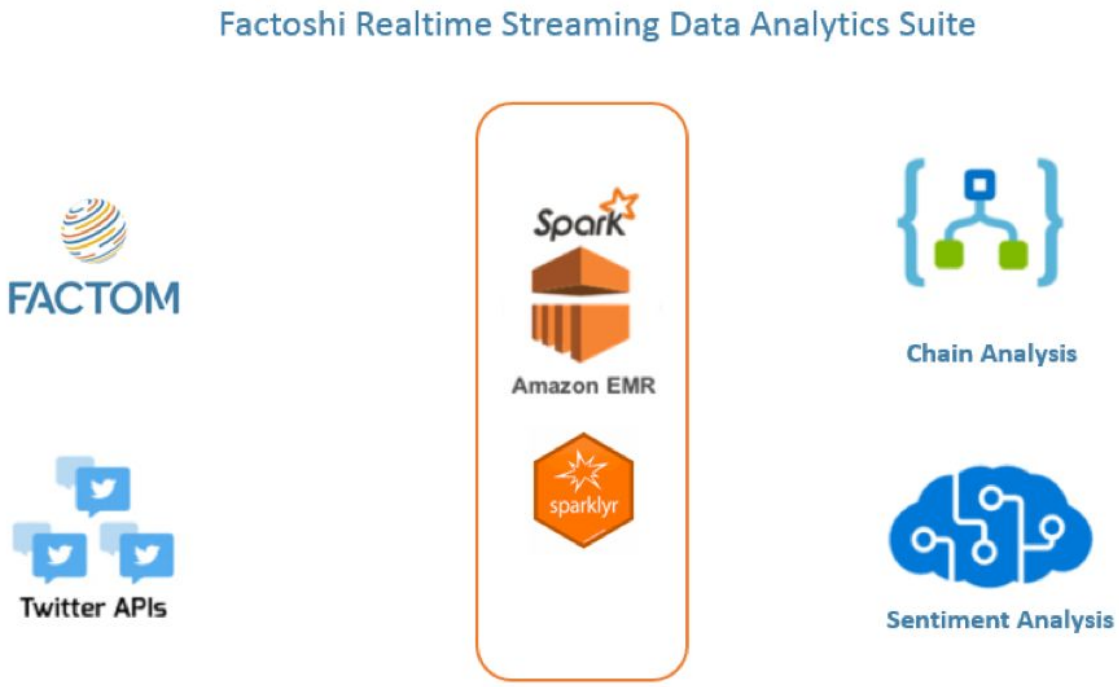
These projections do not consider scenarios where a substantial buffer has already been built, which would allow us to continue our development even when the price of the Factoid has fallen precipitously.

8. Ecosystem Development

Factoshi will deliver three projects that will assist in the expansion of the Factom ecosystem.

8.1. Data Analytics

Factom occupies a unique position within the blockchain space as a purely data-based platform. Factom's CEO, Paul Snow, estimates that Factom has the potential to generate up to 200 billion new data entries per month after 10 years[1]. That data would come from diverse sources in both the public and private sector: government agencies, finance, insurance, supply chain, digital identities - any sector that puts value in data integrity has the potential to use Factom.



Factoshi are extremely fortunate to have on our team a senior data analyst with years of experience working for large clients in AdTech. We plan to leverage her skills to create a web application that can provide new insights into how the Factom network is being used in addition to social media sentiment surrounding Factom.

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1 https://docs.google.com/spreadsheets/d/1MibYMHPILA9svwWtMO5ZgguZRhHOP_Cy-f8AOdDuFRg/edit#gid=0

8.2. SME Intellectual Property Tools

Intellectual property within the EU is a legal right at the moment of creation: no registration is necessary and rights are not contingent on a public record of creation. This is in contrast to other jurisdictions such as US, where intellectual property must be registered with government bodies such as the US Copyright Office.

Whilst the EU's approach reduces bureaucratic overhead, it leaves a void where a public witness can make testament to the provenance and authenticity of intellectual property. Instead, provenance must proved with data held in the private domain that is subject to manipulation and fraud.

At its core, Factom acts as a neutral public witness to data. We plan to leverage that core feature by developing an open source application that will commit a hash of digital intellectual property to the Factom network at pre-defined triggers or intervals (such as when a change is made). We have discussed the development of this project in earlier sections of this document; we will use the prototype to create secure auditability of Factoshi's servers.

Our target market for adoption will be innovative small and medium sized enterprises (SMEs) whose business model is reliant on a steady stream of newly developed intellectual property.

8.3. Entry Credit Sales

One of the key features of Factom is the ability for users to distance themselves from the volatility and regulatory hurdles associated with cryptocurrency. However, for Factom to achieve its full potential, there needs to be a liquid market in Entry Credits.

We plan to increase the liquidity of Entry Credits by by selling directly to end users. This has a two-fold benefit. First, it reduces barriers to adoption of the protocol. Second, it will allow us to monetise our open-source intellectual property application, thereby ensuring the sustainability of Factoshi as a business.