



2018

# PATH NETWORK WHITEPAPER

Redefining internet visibility through blockchain.



USING COMMODITY ELECTRONICS ALREADY  
LOCATED AROUND THE WORLD TO MONITOR  
THE HEALTH OF THE INTERNET.

STRATEGIC PARTNERS



# CONTENTS

DISCLAIMER .....	4
ABSTRACT .....	5
DEFINITIONS .....	6
1: THE OLD PATH .....	8
2: THE NEW PATH (SOLUTION) .....	10
3: PATH NETWORK FUNCTIONALITY .....	15
4: PATH NETWORK PLATFORM .....	16
5: APPLICATIONS/AGENTS .....	21
6: MARKET STRATEGY .....	22
7: DEVELOPMENT ROADMAP .....	27
8.1: TOKEN SALE .....	29
8.2: TOKEN DISTRIBUTION .....	30
9: USE OF FUNDS .....	31
10: OUR TEAM .....	33
11: ADVISORS .....	36
12: COMMUNITY AND INVOLVEMENT .....	38
13: BIBLIOGRAPHY AND REFERENCES .....	39
14: APPENDIX A PLATFORM ARCHITECTURE .....	40
15: APPENDIX B MINING NODE PLATFORMS .....	44
16: APPENDIX C MINING REWARD SYSTEM .....	45

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This document herein is a whitepaper which provides technical specific overview of the current and potential future state of the Path Platform and token ecosystem. This whitepaper is for informational and educational usage only, and as our technology and development may change is not a statement of future intentions.

Unless explicitly stated otherwise, the products and platforms detailed, mentioned, and/or referred to within this paper are currently under development. Several of said products are either currently open sourced and available on GitHub or are intended to be soon available as open source software.

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# ABSTRACT

The 21st century has seen a revolution in the scope of the internet. A technology designed for the use of thousands now supports billions, and with it the scale and scope of network infrastructure has changed to deliver the growing demand for information. To keep up with this flow of data, networks have increased in complexity. However, the capability to effectively monitor the health and performance of this new interconnected world has not kept pace.

Traditional network monitoring remains an industry ripe for disruption. Centralized, low-resolution enterprise platforms provide poor visibility into true network states, while only observing a modicum of telemetry. Path Network is designed to change this, bringing about a true solution for the modern web. Built as a skunkworks project at an established ISP, Path Network was brought to market as the combined utility and commercial viability of the platform became apparent.

The premise of Path Network is simple: use commodity electronics already located around the world to monitor the health of the internet. This is incentivized through the reward of "PATH" tokens to miners that choose to participate by running our software on their devices at home. In return, our customers have their own networks and online services monitored by this array of devices.

Path Network redefines internet intelligence with unparalleled visibility into connectivity by applying blockchain technology to immediately serve a core business need of mid-market internet service providers (ISPs) and cloud service providers (CSPs) as well as internet-powered companies.

Path Network's competition relies on expensive data centers or requires nodes to run their services on peer to peer VPN which opens them up to possible complications. Path Network's decentralized approach offers better network insights at a lower cost. This unique paradigm gives Path Network a competitive edge previously unseen in this space, raising quality while reducing overhead.

# DEFINITIONS

## Autonomous system (AS)

A group of IP networks operated by one or more network operator(s) that has a single and clearly defined external routing policy.

## Autonomous system numbers (ASNs)

Globally unique number associated with a public AS used both in the exchange of exterior routing information (between neighboring Autonomous Systems) and as an identifier of the AS itself.

## Backend API

The interface to a core platform service, generally used for external transactions with a database.

## Cloud Service Provider (CSP)

A company that offers network services, infrastructure, or business applications in the cloud.

## Domain Name System (DNS)

The Internet's process for converting alphabetic names into numeric IP addresses. For example, the DNS converts the URL <https://path.network/> into the IP address xxx.x.x.xx..

## Granular insight

Granular insight is the fine level/high resolution view of computer system connectivity details and parameters across the internet down to the residential 'user' level. Current uptime monitoring services and legacy systems' insight usually lacks granularity and provides generalized data from the vantage point of a limited number of data-centers around the world; not from a user level.

## Internet bandwidth

The maximum data transfer rate of a network or Internet connection.. Greater bandwidth indicates a greater capacity; however, full capacity is rarely utilized and doesn't necessarily indicate higher performance.

Factors that determine actual speed:

- Location
- Quality of the infrastructure
- Number of people on the network

# DEFINITIONS CONT.

## Internet Service Provider (ISP)

A company that provides services for accessing in the internet.

## Network analytics

Process and procedures for obtaining a deep understanding of the network activities while enabling smarter, data-driven decisions.

## Node network

A central network point from where data is redistributed.

## Network uptime

The metric that represents the percentage of time that the network is successfully operational

## Web Host

A service that provides storage space and access for websites.

## Path Operator

A user who has installed the Path Miner application or Node on their computer, tablet, mobile or IOT device.

# 1 | THE OLD PATH

## 24/7 availability is crucial for today's online businesses

As the internet has continued to evolve from the early days of archaic services like Usenet, so also have the layers surrounding the different protocols on which the internet runs. One of the increasingly more crucial requirements in today's web-centric world is to ensure that websites, and their related services are running smoothly, securely and without interruption, 24 hours a day, 7 days a week.

If a website or web service takes longer than a couple of seconds to load, there is a 50% likelihood the user will take their traffic to another competing site.<sup>1</sup>

Unknown downtime results in a direct loss of e-commerce revenue. It is estimated that Amazon's downtime costs exceed 100,000 USD per minute. In 2010, the airline Virgin Blue lost \$20 million due to an IT outage lasting 11 days.<sup>2</sup>

Additional costs associated with network outages downtime are contract penalties due to missed Service Level Agreements, lower customer satisfaction and less efficient supply chains. According to a report of IDC cited by TechRadar, total costs of network downtime amount to at least \$20,000 (about £11,500, AU\$21,300) per hour for most (80%) small and medium-sized businesses.<sup>3</sup>

Given this impact, one would assume downtime issues are closely monitored and addressed. Unfortunately, that is not the case. Downtime problems are often hard to pinpoint and it can take months before providers realize there is an issue within a certain region. Therefore, uptime monitoring is an absolute must for any company that wishes to maintain a world-wide online presence which, in the digital-age, is virtually all companies. The global IT Infrastructure Monitoring Market is likely to reach a market value of US\$ 34.1B by 2024.

## The science of uptime monitoring

Uptime monitoring is not a simple binary function of connection vs. non-connection. Several qualitative and quantitative data points must be monitored and relayed efficiently in real-time to clients when there are degradations or interruptions.

For instance, in a situation regarding delayed service or site access, it is possible that it is not the users' service provider or router causing the connection issue, but instead the issue may be at the Web Host or Cloud Service Provider that a service utilizes.

Conversely, the problem could be reversed, and the Web Host or Cloud Service Provider (CSP) is fully functional, while the user's service provider is throttling their connection in relation to bandwidth usage caps or post Net-Neutrality Repeal restrictions on streaming services. Current systems do not give this level of insight because they are viewing the problem from a higher more generalized vantage point. This lack of insight is a result of the fundamentally outdated design.

## Current solution: Uptime monitoring from centralized nodes

The underlying issue with the current model is that prevailing systems monitor from “trusted” centralized nodes, i.e. several data centers in different geographical locations. There are several disadvantages to this network model. The first issue is that centralized nodes are points of failure. If one is hacked, or the company decides to act maliciously, data may be compromised, and uptime may be interrupted. Secondly, by using these limited nodes, companies cast a smaller net by have a limited number of data points. Also , the physical infrastructure or hardware required for the current systems is very costly and leads to limited uses of the monitoring services.

This model worked ‘well enough’ in the past, but it has been outpaced by internet growth and usership.

Example: A service runs within a datacenter located in New York, which has its internet serviced by Verizon and is online; however, Time Warner has a misconfiguration in their network and Time Warner ISP users' are unable to access the service. To users' of all other ISPs, it looks like the service is online and reachable, but the service and the network it belongs to is unreachable by a user base within a particular geographic region, whom all seem to use the same ISP - in this case, Time Warner. This user base relies on the product more heavily than those who can access the service. This figure summarizes the significant problems within the network monitoring space:



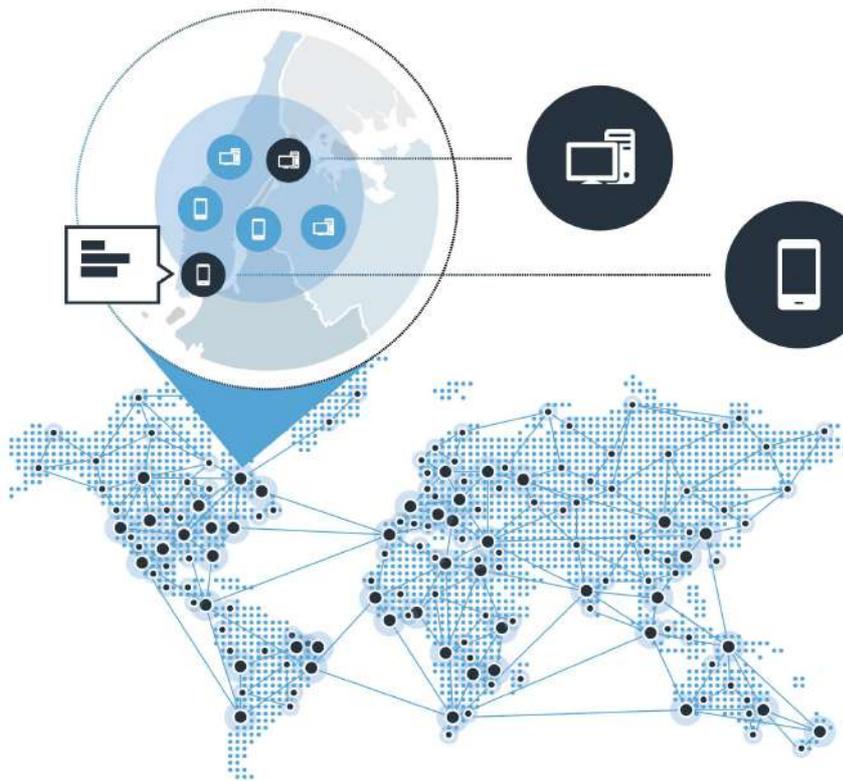
# 2 | THE NEW PATH

Path's solution to these problems is to create a globally distributed monitoring and analytics node network that connects unused bandwidth and computational power to companies and service providers looking for intelligence and analytics. The core product will be uptime and performance monitoring for any type of online service.

## Current model

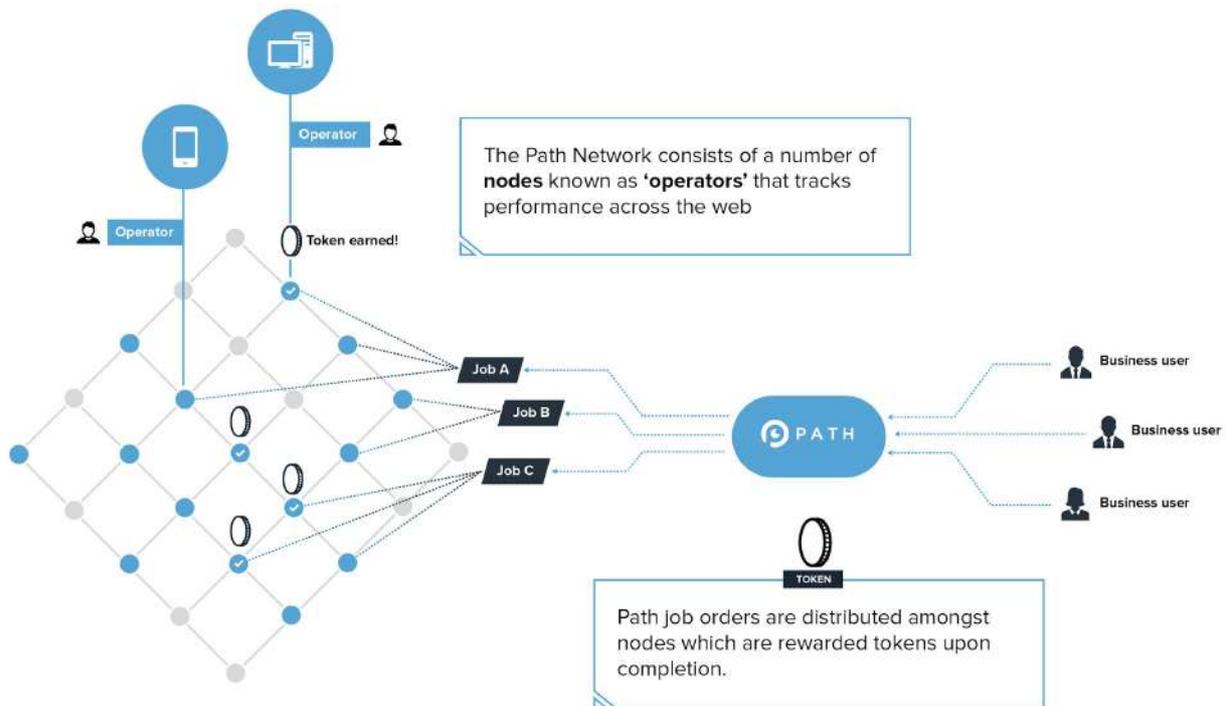


## New model



# PATH ARCHITECTURE OVERVIEW

Path works similarly to traditional uptime and performance monitoring solutions by creating a network consisting of monitoring nodes around the world. However, unlike traditional networks, the nodes used to monitor and collect information are made up of distributed, independent applications located at the end user level rather than the data center level. This allows for a wider variety of data gathering points with built in redundancy, end-to-end visibility, and an unprecedented number of locations around the world.



The Path solution offers the following benefits over traditional uptime monitoring solutions:

## Redundancy

An unprecedented number of independent data collection points

## Global efficiency

Operators can run the mining application from anywhere in the world on any internet connected device. Thus bringing massive global efficiency to deficiencies in local monitoring coverage not currently addressed by any network monitoring service providers

## Full network visibility

All monitoring nodes are end user level and independent

## Deep network intelligence

Our advanced network analytics / telemetry results from data collected on standard workstations, IOT systems and mobile devices, providing a level of network analysis insight previously thought unobtainable

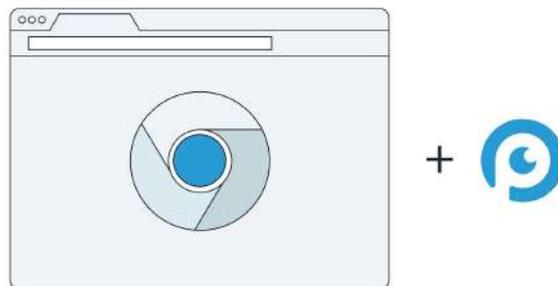
# PATH ECOSYSTEM OVERVIEW

Clients wanting to use Path's monitoring services can do so directly through Path's online dashboard. Client deposit PATH tokens into their Path Network account and then select the services they would like performed. Path's monitoring nodes are tasked with completing those services and reporting their findings to the Path Network. Path node operators are paid PATH tokens for completing them. The information requested by the client is processed by Path's centralized database where the client can then access the information through their customizable Path dashboard.

## MINING/MONITORING NODES

The initial version of the Path monitor node is a Chrome browser plugin. Node Operators will install the application on their desktops and laptops. As Path's services mature, node clients will be developed for different browser plugins, for Apple and Android phones, and finally as standalone OS clients. In addition, advanced API features will be opened to the public so that nodes can easily be run directly from code embedded in websites and/or phone applications.

The application/client runs in the background to complete the assigned jobs and forward the encrypted information it collects to Path's database. This all occurs without negatively impacting the node operator's internet browsing or any other computational activities.



Once the task has been performed and the data has been sent to the Path servers, the node will be paid a prescribed amount of PATH token (see for technical details Appendix C). Payment will be made after the completion of 250,000 tasks in order to minimize daily token transaction fees and to insure node data output validity.. Operators can run as many nodes as they want and at any number of locations to maximize their earning potential. (Node installation is limited to one node per internet connected device). Operators are encouraged to link each of their nodes to the same wallet into which they want their earned PATH tokens deposited.

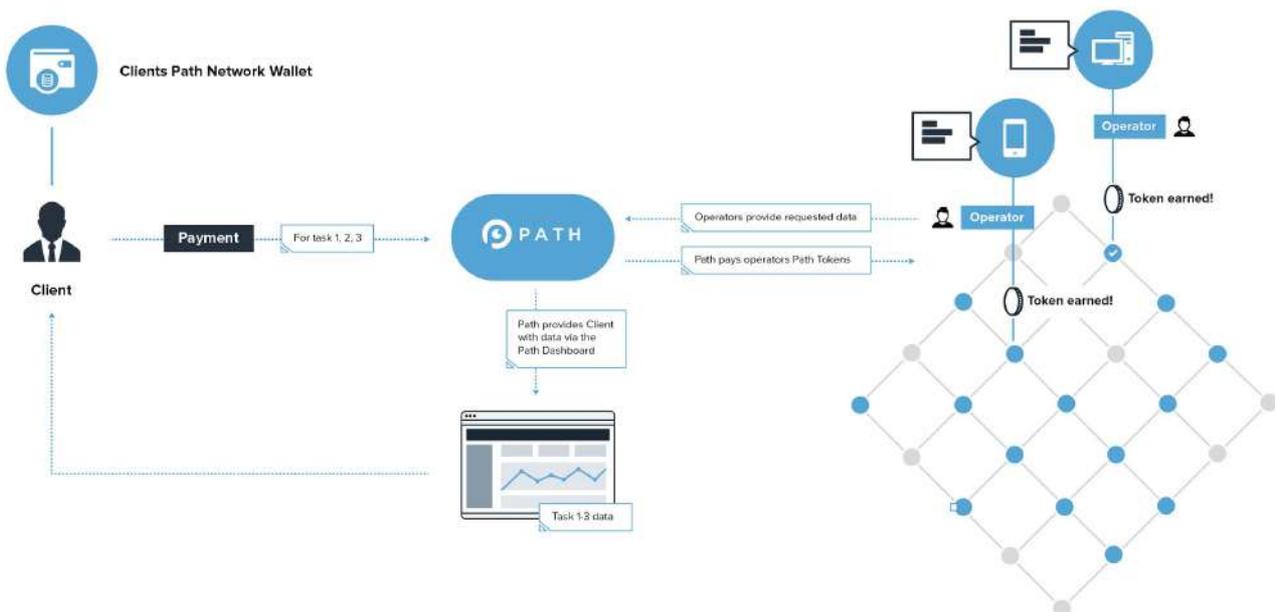
# PAYMENT SERVICES OVERVIEW

Cost of services is dependent on the type of services that are being requested. Some services have different base prices due to varying factors, required data sets and duration of collection. Other factors could include how many locations/nodes are being used to monitor a service and frequency of log collection. As such the price for each service is tied to the direct cost incurred by Path to perform the requested services.

Additional capabilities will be added to the platform over time to compliment the core service. Planned capabilities include SMS updates based on predefined uptime and performance monitoring rules and cyber attack detection.

Clients will utilize PATH tokens to pay for their requested services. A client may purchase PATH from the open market or directly from Path Network. These tokens will be deposited into a locked Path Network wallet and used to pay for the requested services. Once the PATH is deposited into the Path Network wallet, they can not be withdrawn by the client for any reason. The PATH will only be extracted as a form of payment to Path Network for the services requested.

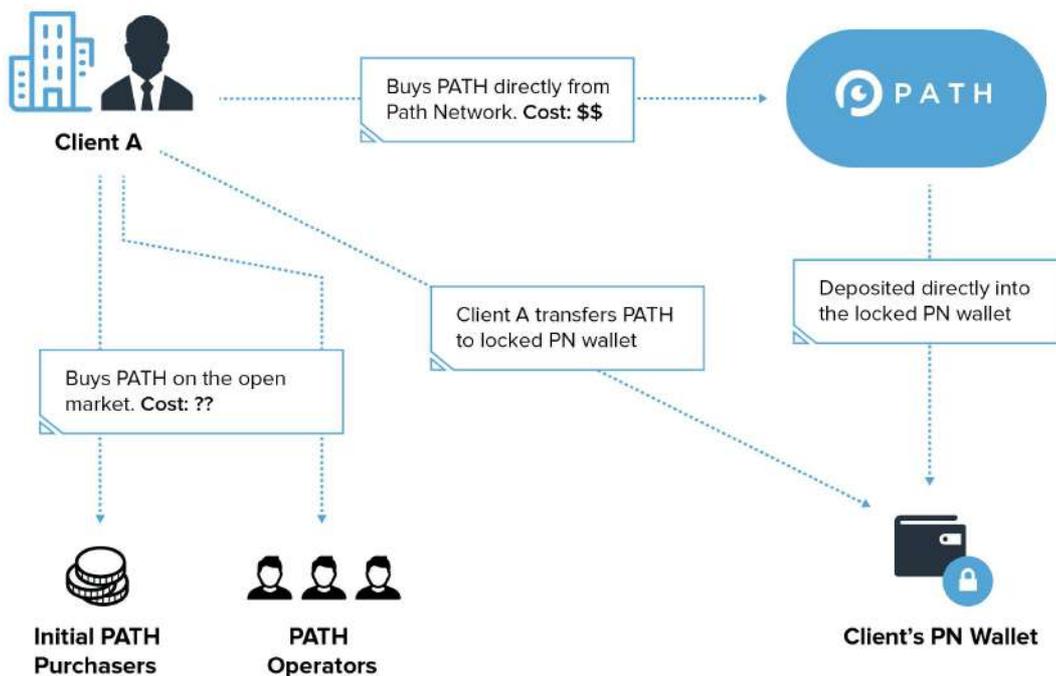
Nodes will collect PATH at a value based on the types of jobs they are completing, where the nodes are located, and how often they are completing jobs. PATH will be paid out in blocks to ensure that the transaction cost of awarding PATH does not exceed the value of the PATH awarded.



As stated before and depicted above, Path Network will task various Path Operators with the clients requested tasks. Operators will return the data to the Path Network, where it will be processed and made available to Client A via the Path Network Dashboard Path Operators are paid in PATH tokens for the completion of the assigned task.

# PATH Token Marketplace

In order to engage Path Network (PN) services clients must have PATH in their PN wallet, clients have multiple options to obtain PATH tokens. The options available are portrayed below recognizing a key factor will be the cost of PATH tokens on the open market in comparison to the cost to purchase directly from Path Network.



For example, Client A wants to see how fast their website is rendered at the user level in Fiji, Wisconsin and the UAE. They enter into an agreement with Path Network to provide that information. In order to make this happen they need the PATH token. PATH can be obtained 2 ways:

**Option 1:** Client A obtains PATH from an Initial Path Purchaser (IPP) or Path Operator and eventually deposits the PATH into their locked PN wallet. (The price of PATH from IPPs or Operators will be market driven. Path Network will not offer a PATH buy-back program.)

**Option 2:** Client A buys PATH tokens directly from PN by providing USD. Any PATH purchased in this manner will be deposited directly into Client A's locked PN wallet. (The price of PATH purchased PN will be tied to the cost of task completion and data processing.)

Note: Once deposited into the client's PN wallet, the PATH cannot be withdrawn by the client.

# 3 | PATH NETWORK FUNCTIONALITY

The core of Path Network's functionality lies in our ability to incorporate the strengths of a centralized platform backed by a decentralized and globally distributed network of monitoring agents. This creates a self-reinforcing global ecosystem of mining nodes that continuously refines itself as more operators join the system. The Path Network is a worldwide ecosystem for network performance monitoring using PATH tokens to power infinite network check.

Our global distribution of operators ensures the network remains fast and performant. This decentralized node network continuously feeds data into a highly scalable real-time streaming data analytics pipeline.

Leveraging bleeding-edge technological solutions designed with scale in mind, Path Network can sustain millions of nodes connected concurrently without missing a beat.

With this infrastructure there are two primary participants:

## Business Clients

Those who redeem tokens to receive updates on both the availability and performance of the network. Typical clients are Internet Service Providers, Content Delivery Networks, Multinational corporations and other internet-driven companies.

## Operators

Those who operate nodes and perform requested tasks on websites and networks such as operational and performance assessments..

Path Network's centralized platform aggregates this local information and automatically reports the results to clients based on the most specific prefix announced, all the while keeping identifiable node information private. Path is a platform where operators share information with clients quickly and securely.

# 4 | PATH NETWORK PLATFORM

## Online Web Portal

The Path Network platform facilitates uptime and performance monitoring for websites and networks. The following features and more will be available on the Path Platform.

## Uptime Monitoring

Use Path's network of nodes to test user site's or network 's infrastructure availability from anywhere in the world as often as it would like.

## Synthetic Interaction Testing

Ensure that site interactions such as sign up or check out flows are working as intended.

## Page Rendering Assessment

Track and analyze user website's page load time.

## Real Time Alerting

Receive immediate notification if the service becomes unreachable.

## DDoS Attack Reporting

Gain external perspective into service's performance during DDoS attacks from data gathered around the globe.

## Path and Route Visualization

Gain advanced insight into network outages and route optimization by visualizing node to service paths, packet loss, and latency.

## CDN Performance

Measure CDN performance from users to a network's edge.

## BGP Routing Review

Oversee routing in and out of a network to identify issues

## ISP Service Validation

Make sure user's service providers adhere to their SLA's with actionable outage data.

Plus many more features

## PATH Users

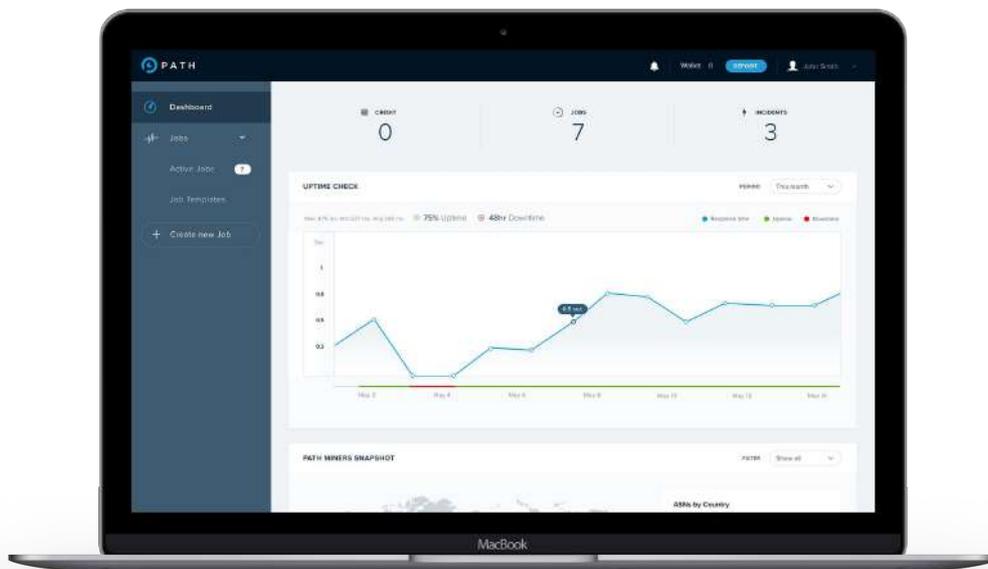
Operators act as nodes branching off of the Path Platform. These individuals activate their devices including desktops, mobile products, and smart appliances in order to mine PATH tokens and send signals on the performance of the network(s) where they are located.

The Path Network has two primary business clients in addition to its operators. ISP / CSPs provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned. These users benefit from clear visibility and deep insights into the performance of their networks so they can address problems efficiently. Content delivery networks are the transparent backbone of the Internet in charge of content delivery. Examples include Netflix which has open access appliances around the world it relies upon in addition to using ISPs.<sup>4</sup>

Similar to ISPs/CSPs, content delivery networks also have significant vested interest in how their content is being processed because it could mean disruptions or lower quality to their users if there is an outage or their content is being throttled. With more granular information comes the ability to work towards smoothing out connectivity issues for their customers.

## Online Web Dashboard

All client services will be centralized in Path's online web portal. To start, Path will offer users uptime monitoring services but quickly add more performance and in-depth data gathering services to the platform.



From the dashboard panel the user can view active "jobs" and select from existing "job templates" or create their own template. These jobs unleash the capabilities of the platform discussed in more depth below.

## Telemetry

Path Network's platform offers advanced telemetry which is essentially an automated communications process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring. This real time telemetry is then condensed and boiled down into readily understood analytics for interpretation by Network Engineers.

## Collection

Data is collected in real-time and archived for future analysis. Collection occurs at our platform's edge, as agent results are forwarded back to our edge. Transmission occurs via both asynchronous and synchronous sockets depending on the client, ensuring a both performance oriented and scalable solution.

## Archiving

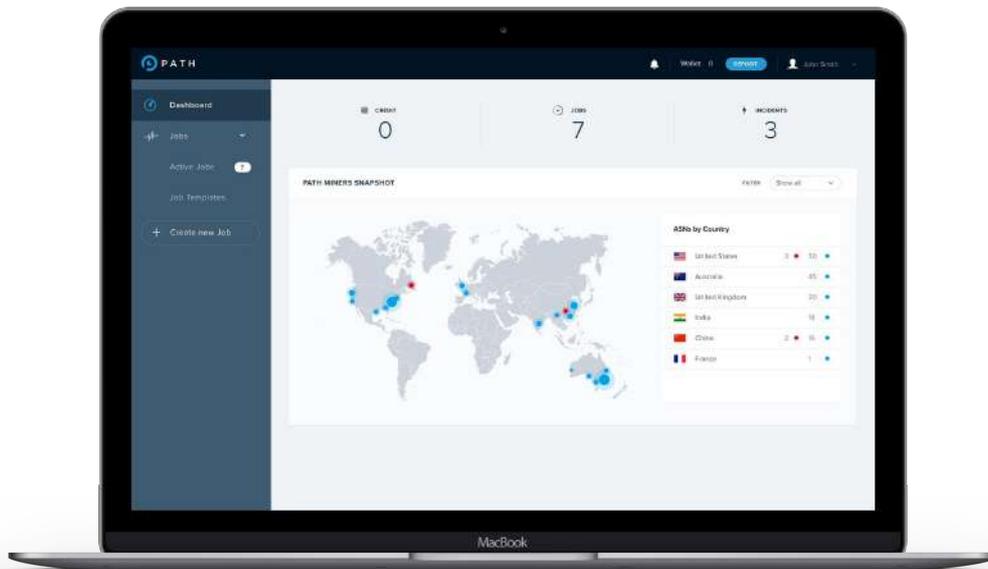
Telemetry is recorded in raw form, allowing new analytical techniques to be applied to historical data as they are made available. As refinement allows new insight into old data over time, Path Network's centralized storage and archiving ensures that trending metrics is as simple as a few clicks on our web platform. Path Network's unique archiving also provides compliance in regions where long-term data retention may be required.

## Analytics

One of the strongest features of Path Network's integrated solution, Path's uniquely tailored analytics engine allows our clients to paint a mosaic of their online presence. Trend changes in network attributes over time, compare and contrast routing optimizations and gain control of peering in ways previously unavailable in the commercial market.

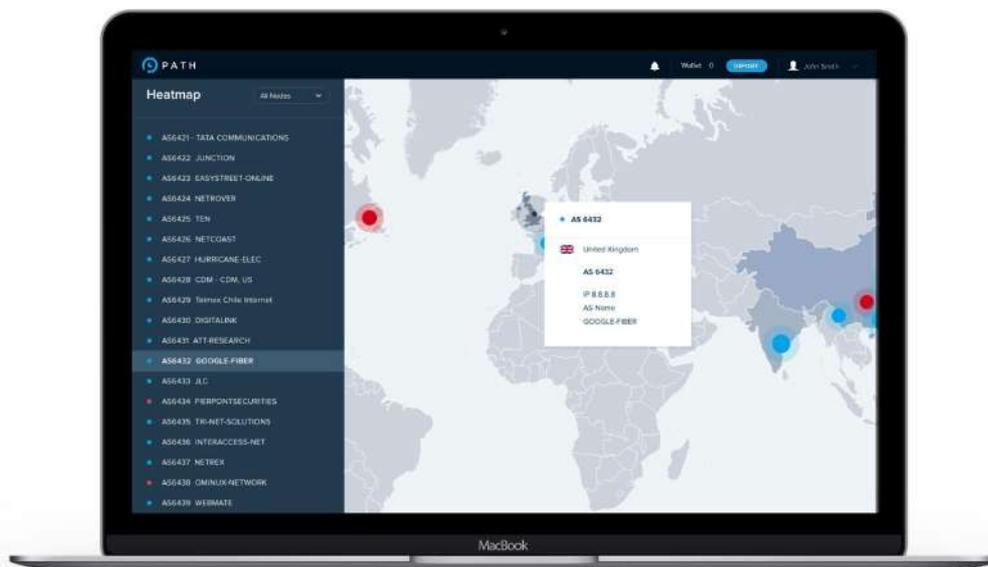
## Real-time Visualization

In addition to historical look backs and alerts, users have the ability to access crystal clear visualizations of their network presence as seen from anywhere across the world. View downtime, problem-areas or see routing information in real-time as probes are launched. This makes it easy to narrow down the information required to solve a problem, or plan out future expansion of the user's network.



## Alerting

When downtime strikes, every second is crucial. Path ensures that our user's NOC teams will be alerted immediately. Through Email, SMS and API Callbacks to in-house or 3rd party services, our continuous real-time monitoring of the user's network ensures that problems are handled through the quickest means possible. Path Network's unparalleled visibility also ensures that engineers are armed with the information required to solve issues. With the analytics they require to quickly get the job done sent out with each alert, precious hours are saved.



## PATH Tokens

PATH Tokens (market abbreviation PATH) is a native, ERC-20 compatible token and supports all activities and functionality on the Path Network Platform. PATH Token is a platform utility medium that enables users to request node reports. The application of PATH Token is entirely focused on this function, and developed to strongly enforce security during this process. There is no transaction fee on top of the redemption of the token itself. When PATH Tokens are redeemed it gets converted into panel credits. All PATH Token holders have the ability to transfer PATH Tokens between themselves and other users. Since PATH Token is divisible to 18 decimal places (10<sup>-18</sup>), the transfer of PATH Token also allows for microsettlements.

## Reward systems

The reward system for Path Network operators is calculated based on relative value and opportunity cost for the operators who have "rented out" their bandwidth and computing power. This rewarding system is specifically designed to incentivize a broad geographic distribution of Path Network operators, thus making the network as a whole more robust. Factors include difficulty in number of jobs completed per block, base difficulty level, difficulty modulation multiplier, and other variable coefficients.

The whole world is broken into 50 square kilometer quadrants utilized in the reward algorithm's calculations. Over 3.5 billion people are using the internet with over 9 billion mobile devices currently active yet Path Network only requires 1 million nodes for comprehensive global coverage. This objective is easily achievable with the adoption strategy discussed below. Our reward algorithm is purposefully designed to incentivize people to install the Path miner in areas that are "black" or have ISP coverage deficiencies. Similarly, regions saturated with operators decreases the incentive for operators to mine.

Appendix C further describes the calculation for the Mining Rewards System.

# 5 | APPLICATIONS/AGENTS

The Path team has developed a number of clients to ensure that the Path Network mining application can operate on a multitude of platforms. These include clients for both Mobile and Desktop environments, as well as a browser extension for popular distributions. At the heart of the Path Network agent is a simple core, extended to perform network-related tasks associated with monitoring jobs issued by our customers.

## Mobile Agent

The mobile agent consists two separate releases, covering both Android and iOS. Thanks to the permissive nature of both devices, our mobile agent supports all functionality and can perform all of the network checks featured on the Path Network platform. For Path Network, mobile agents are especially valuable as mobile users typically connect to multiple residential networks throughout the course of a day, as they move between Wireless connections and hotspots.

The other benefit to mobile adoption is the precision of location data. GPS integrated in all modern handsets ensures that reporting is accurate, which is far superior to GeoIP/Geolocation data publicly available with IP allocations and routing advertisements. This makes mobile adoption one of the most attractive avenues of future growth for the network.

## Desktop Agent

The Path Network desktop agent has been developed using ElectronJS, allowing for full native cross-platform support across Windows, Mac and Linux devices. Underlying features are not limited, which means that Desktop operators are eligible for all Path Network tasks, ensuring consistent work and subsequently maximizing payouts for each node operator.

## Browser Extension

The browser extension for Google Chrome was the first Path Network agent released on the platform, and has received a number of significant enhancements since it's initial release. The Browser Extension agent although limited, can perform a number of the core platform tasks and is generally eligible for a steady number of jobs.

# 6 | MARKET STRATEGY

Path will provide an easy, and inclusive onboarding solution for both participating operators and users which will be bolstered by a strong community, partnership, and marketing campaigns. The value proposition for operators to join the ecosystem is compelling: earn tokens for giving up very small piece of their bandwidth and processing power (<1%). On the business user side, the incentive to switch to Path Network is gaining access to a cost effective, high resolution, robust suite of monitoring services. The Path Network is superior to traditional data monitoring in every 'under the hood' aspect. The team will use a professional community-focused marketing strategy to solidify it's first mover position in the next generation of network monitoring services.

## Effective Marketing

The Path team has begun executing a multi-tiered marketing program. Members of the team have been touring speaking at several international conferences, as well as throwing networking events with major influencers and have gained tremendous community following which started primarily in Asia. The team is now focusing on growth in the US, Europe, and other key regions. The community is growing rapidly and boasts a combined total of over 40,000+ members in the International and English speaking telegram groups, as well as 30,000+ followers on Twitter.

## Strategic Partnerships

An integral part of the market strategy will be to utilize valuable strategic partnerships through the teams deep industry ties including players in tech, media, and crypto industries. Path Network will come out of the gate with a strong advantage that will aid in breaking into the network monitoring industry from day one with a founder with an ISP of his own. Partnerships with major players like early investor Bitmain as well as INBlockchain, Crypto Capital, BitForex, Eastern Capital, Hash Finance (财经), Currency World (币槽网), Mars Finance (财经), and Happy East Capital give large businesses the confidence needed to join the ecosystem early. The Path team is already in talks with several other key partnerships that will be released as contracts are secured.

Path is working on gaining partnerships from three different angles; 1. Partners on the investing, marketing, and collaboration side; 2. Large monitoring service clients who will receive discounted rates for being early adopter partners; and 3. Commercial level node operators which have massive customer/player bases which can be utilized to run the distributed software as part of pre-installed applications and games. (All installations will require an opt-in by any users/operators)

## Market Ripe for Disruption

Uptime and performance monitoring are a must for companies operating internet-based services. Since availability and user experience directly correlate with revenue, companies must immediately be notified when their services experience degradation, throttling or downtime. It is only then that companies know there is a problem that must be fixed. Companies struggle to monitor network transmission at the end user level creating the ideal market conditions for Path Network to revolutionize this large industry.

## Current Market Landscape

Uptime and performance monitoring are a must for companies operating internet-based services. Since availability IDC forecasts the total global spend on cloud services alone to reach a whopping \$160 billion in 2018, an increase of 23% compared to 2017. For 2021 it is projected the market will have grown to \$277 billion.<sup>5</sup> The market is complicated with businesses servicing a variety of different, sometimes complementary needs.



Over \$311 million in yearly revenue with a valuation of approximately \$15.9 billion.



Approximately \$1 billion in yearly revenue with a valuation of approximately \$14.8 billion.



Approximately \$668 million in yearly revenue with an approximate valuation of \$12.94 billion



Received approximately \$217.5 million in funding with a total valuation of approximately \$1 billion.



Received approximately \$200.4 million in funding with an approximate total valuation of \$1 billion.



Received approximately \$147.9 million in funding with an approximate total valuation of \$700 million.



Received approximately \$60 million in funding with a total valuation of approximately \$273 million.



Received approximately \$48 million in funding with a total valuation of approximately \$250 million.



Received approximately \$38.2 million in funding with a total valuation of approximately \$180 million.

There are many companies in the traffic monitoring space with a total of 30.5B Billion in valuations.<sup>6</sup> Some of the larger companies from which Path plans to take market share include CA Technologies, Akamai, Splunk, Solar Winds, SevOne Inc., Data Dog, Thousand-Eyes, Catchpoint, and Kentick. These companies are practically all limited to traffic monitoring at the data centers level which gives no last mile coverage equalling huge constraints on network visibility. This lack of insight is a direct result of their infrastructure design using the old client-server model. One of these companies is attempting to implement pseudo-peer-to-peer monitoring but does not use blockchain technology, which so far, has resulted in costly services and also creates traffic and networking complications as their services are run on a peer to peer VPN. Utilizing distributed ledger technologies and Nakamoto consensus algorithms, Path is overcoming these obstacles in ways that weren't possible before and are positioning themselves to become a leader in the market quickly (See section 7.7 Sustainable Competitive Advantage).

## Estimated Market Share

Based on current internal data including solidified partnership deals, potential partnerships, as well as firsthand experience by team members through ownership of a traditional uptime monitoring company; Path team projects an initial revenue of \$10k per month from 200 clients for 12 months = \$24 million by end of year one. Estimated projections for year two are \$10k per month from 1000 clients for 12 months = \$120 million. By end of third year, the team estimates \$10k per month from 5000 clients for 12 months = \$600 million in revenue (See section 7.6 Adoption below).



# ADOPTION

## Incentivized Easy to Use Product

Path Network expects to achieve the previously stated market share and adoption through a series of steps. The first and most important piece to the strategy is to have a product that works well, with easy onboarding, and sufficient incentives for participation in the network. Path Network's beta has been live for two months. The Chrome browser extension can be found on the chrome store, with several other applications in the works on GitHub for other platforms like Android, IOS, and desktop cross platform services (See technical whitepaper for details).

## Community Following

The Team has already engaged in creating a strong community following through several social media outlets including Telegram; with over 40k followers between the international and English version, and Twitter; with over 30k followers as well as Weibo in China and other outlets. They are in the process of a 1,000,000 PATH Token airdrop for following and participating on the Path social media channels, which has been very successful in attracting new followers thus far. The Path Team also possesses deep relationships in the ISP and CSP community, with both individual providers as well as aggregators, built over many years. Path has already begun the process of leveraging its existing network to engage the community around feedback on the overall roadmap and each release along the way. By providing leadership at conferences and events, hosting educational webinars, using both inside and outside sales techniques, and being a leading advocate for transparent network performance data, Path will drive adoption of its platform and growth of a provider ecosystem focused on heightened internet visibility. Mid-market players have both the budget and desire for this service in order to compete more effectively and in many cases, show superior performance attributes previously unverifiable.

## Gaming and App Bundling

Path is in talks with several gaming and applications companies to establish partnerships to gain large network participation early on. These applications and games will bundle the Path mining software into their products with user opt-in agreements. The incentive for users will be payment for their anonymously donated network monitoring information via PATH Tokens with almost no bandwidth or processing degradation. Gaming companies could also use the software to create internal revenue instead of charging for games.

# SUSTAINABLE COMPETITIVE ADVANTAGE

## Best In Class Solution

Using Path, operators can run the mining application from anywhere in the world using mobile devices, bringing massive global efficiency to deficiencies in local monitoring coverage not currently addressed by any network monitoring service providers. By using mobile devices to cover each ISP and CSP, Path Network can get to a level of network analysis insight never previously obtainable. Path will offer high resolution uptime monitoring, custom protocol queries, last-mile route analysis, SLA enforcement, Net-Neutrality checks, anycast optimization and a host of other services that will be built on top of the expandable platform. No companies using standard technology protocols are able to perform services of this nature at this capacity.

In the United States alone, there are currently over 2500 ISPs on the market. As the issuance of autonomous system numbers (ASNs) continues to grow rapidly, more and more ISPs and CSPs are entering the market and looking for a competitive edge. Network monitoring is a core necessity and potential differentiator, as greater visibility translates directly into efficiency. Furthermore, network aggregators thrive on giving their clients, ISPs and CPSs, better service.

## First Mover Advantage and The Future

By becoming the market leader and shining a light on true network performance, Path positions itself as a credible and reliable source of insight for both ISPs and CSPs. Consumers looking to leverage increased visibility for overcoming the black-box of network interconnection will now have a reliable means of doing so. This opens up the potential for broader data and analytics services for both consumers and service providers. It is important to keep in mind that using the Path infrastructure and network, new services may be developed that have not been thought of previously due to limitations of current systems. Blockchain, and the distributed peer to peer nature of the protocol, will open a world of new possibilities. Path aims to be the world's first truly decentralized data monitoring network, and will have a first mover and network effect advantage over future companies whom will inevitably see the benefits to blockchain protocol in the network monitoring space.

# 7 | DEVELOPMENT ROADMAP

Path will provide an easy, and inclusive onboarding solution for both participating operators and users which will be bolstered by a strong community, partnership, and marketing campaigns. The value proposition for operators to join the ecosystem is compelling: earn tokens for giving up very small piece of their bandwidth and processing power (<1%). On the business user side, the incentive to switch to Path Network is gaining access to a cost effective, high resolution, robust suite of monitoring services. The Path Network is superior to traditional data monitoring in every 'under the hood' aspect. The team will use a professional community-focused marketing strategy to solidify it's first mover position in the next generation of network monitoring services.

## PRE TOKEN SALE

The goal of this stage is to complete a minimum viable product to showcase the core system architecture of the Path Network. We will have a functional uptime monitoring platform that users can participate in and earn path tokens for their jobs completed.

### Development Goals | Pre Token Sale

(Released on GitHub: [github.com/path-network-token](https://github.com/path-network-token))

- Smart Contracts V1.0
- Payment flow from websites to pools to miner nodes
- Path Client V1.0 - Browser Extension Released
- Ability to earn PATH completing jobs
- Path Web Portal
- Ability to pay for uptime monitoring services

## PHASE 1

The goal of this stage is to complete a working first iteration of a complete uptime and performance monitoring network with mining nodes in every country in the world. Once Phase I is complete, there will be a complete and comprehensive network that is capable of monitoring uptime and performance of any type internet service.

Note: This stage will be usable by pre-approved users and will be considered our "beta" platform. Additional features are scheduled to be added to this version.

## Development Goals | Phase 1

- Working uptime and performance monitoring reporting on the Path Panel
- Android Application
- Traceroute Support
- Initial Monitoring of Public Services

## PHASE 2 | ETA August 2018

The aim of Phase 2 is to finalize the network from Phase 1 and make it commercially viable on a global scale. This means we will have mining nodes spread throughout the world located on android and apple phones, as well as Linux based operating systems. Additionally, Path's client facing panel will have increased granular analytic features for monitoring internet services, especially on the network level. Once Phase II is complete, the network will have matured to handle tens of thousands of clients located anywhere in the world. Additional features and services will be added as the network continues to grow, providing even more benefits to Path's users as well as the implementation of Path's free global internet monitoring service.

Note: This stage will be immediately usable by purchased tokens. This is our core product for the Path Token. Additional features are scheduled to be added to this version.

## Development Goals | Phase 2

- Production Launch
- Additional Website performance monitoring features
- Additional Network performance monitoring features
- iOS Application
- Chrome Sockets Support
- iOS Application
- Initial Metadata Collection

## PHASE 3 | ETA January 2019+

The goal of this stage is to expand features on the Path Network

## Development Goals | Phase 3

- Release free public internet monitoring map
- Android Application
- Add additional network monitoring and performance features
- Expand website analytic features
- Roll out advanced raw-socket features (proxies, post support, etc)

# 8.1 | TOKEN SALE

June 15th, 2018 |  
Path Private Token Presale

July 16th, 2018 |  
Private-Sale Ends

July 16th, 2018 |  
Network Launch

Tokens are issued via fiat value at the time of the ETH deposit.

In order to avoid scammers be reminded that we will display any official wallet addresses on our website: path.network and in your Token Purchaser Agreement. Do NOT send ETH to any other address you see. We will also never ask you for your private keys!

Unsold PATH tokens will be burned.

Conversion rate of 1 PATH : \$1 USD

All PATH tokens will be distributed in accordance with SEC regulations at the end of the Token Generation Event (TGE).

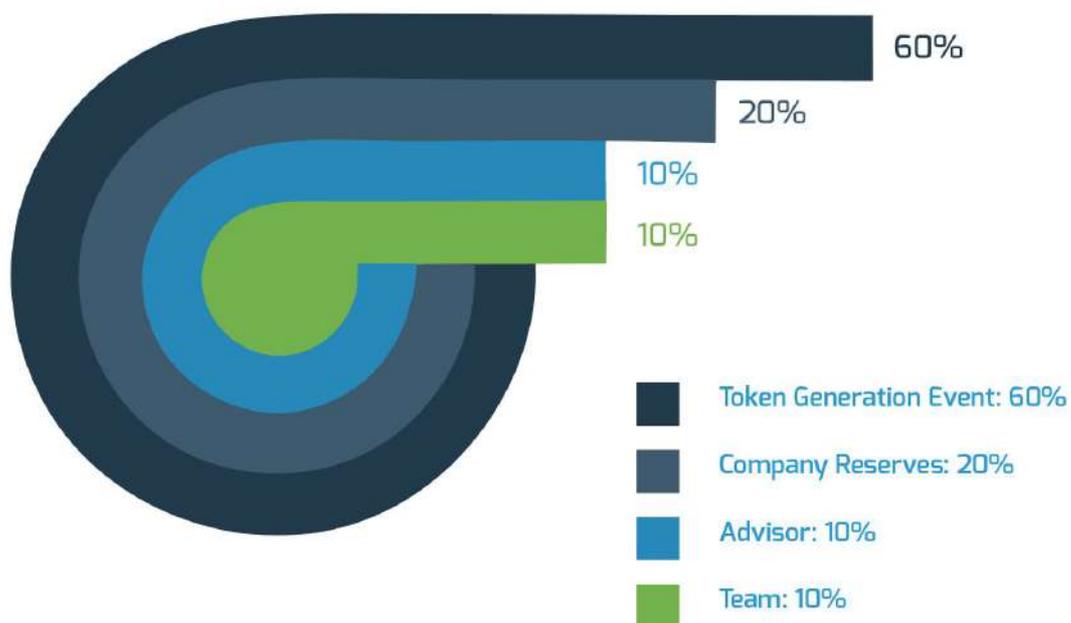
Once distributed, PATH tokens will be readily usable on our platform in exchange for all Path services..

## **IT IS IMPORTANT TO REMEMBER THAT**

- Only ETH will be accepted during the Token sale in order to acquire PATH Tokens.
- KYC/AML checks will be conducted on all PATH Token purchasers.

## 8.2 | TOKEN DISTRIBUTION

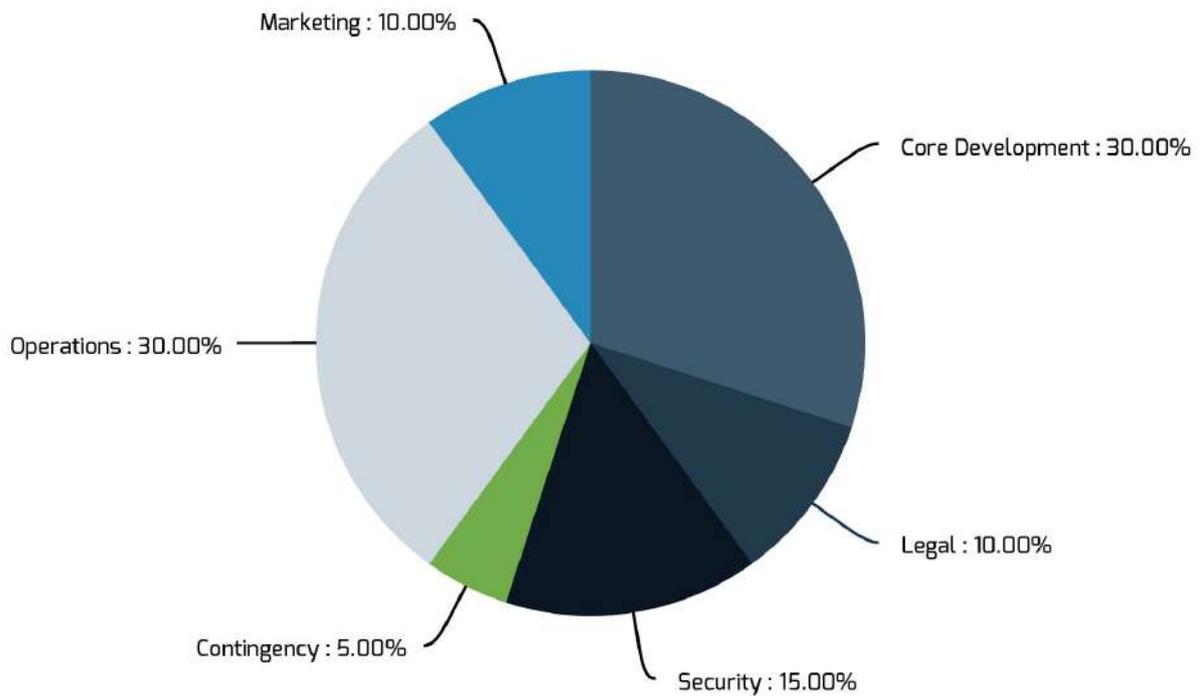
Tokens will adhere to the following distribution. After the funding period is complete, all Path tokens will be distributed in accordance with SEC regulations and as agreed in the purchaser's respective Token Purchase Agreements..



All advisors, owners and employees are under the legally required hold period while senior executives' vesting period is 18 months from their employment date.

# 9 | USE OF FUNDS

Funds acquired from Path's token sale will help with the development of the Path Network and services. The following is a tentative breakdown of how we are planning to use funds for development.



## Core Development | 30%

The largest portion of funds will go to completing the development of the Path Network and panel described in this whitepaper. This includes the Path node network, panel, analytic reporting, smart contract system, support protocols and systems, end user applications, etc.

## Security | 15%

Since clients will rely on us to report to them if their service is down as well as keep their information safe, it is imperative that we ourselves are impenetrable as possible. We will invest in security such as DDoS mitigation, core infrastructure, encapsulation of information, and more.

## Operations | 30%

Operational costs will cover the day-to-day expenses incurred for a fully functional global platform. Costs include hosting, infrastructure, staffing, outsourcing, management, and other related expenses.

## Legal | 10%

To comply with the industry regulations and file for protective patents we will need legal counsel to ensure the longevity and success of the company.

## Marketing | 10%

The marketing budget will be used for strategic partnerships and directly marketing to consumers. This will lead to a larger network with more mining nodes, and more users using the services. Overall more money will be running through the system and going to the node owners.

## Contingency | 5%

The contingency budget will be set aside for future events or circumstances that are possible, but cannot be predicted with certainty.

# 10 | OUR TEAM



## **E.J. Hilbert** | CEO

Prior to his role at Path, E.J. has served as Vice President of the Cyber Security Division at Gavin de Becker and Associates, Director of Cyber Security and Privacy for PricewaterhouseCoopers, and Director of Security Enforcement for Myspace.com/Fox Interactive media. In addition, E.J., spent 8 years as a Special Agent for FBI based in Southern California, where he was the lead case agent for numerous cyber-crime, white collar and counterterrorism investigations.

E.J. has been cited as an expert in Cyber and Counterterrorism by Rolling Stone Magazine, The Washington Post, Wired Magazine, The Financial Times, The Wall Street Journal, CNN, The NY Times, CNBC, The BBC, MSNBC, The History Channel and The Science Channel.



## **Marshal Webb** | CTO & Co-Founder

Information security expert and three-time award winner of government sponsored bug bounties, Marshal has been involved in the crypto space since Bitcoin's inception in 2010. Featured on Reuters, VICE, Ars Technica, Politico, CNBC and many other publications for his work in security, Marshal was recently thanked by both Microsoft and Valve Software for uncovering critical vulnerabilities in their products.



## **Matt Flannery** | Director of Technology

Matthew Flannery is a Technology, Strategy and Architecture consulting specialist and public speaker. Prior to his position at Path, Matthew was in a management role with Big 4 Consulting firm, Deloitte, and was a manager of their Blockchain practice. He has worked for companies such as Google, Australian Stock Exchange, various banks etc. He brings a wealth of experience in consulting across many areas including Cybersecurity, DevOps, Cloud, Software Architecture, Network Engineering and others to companies of varying sizes, from small to Enterprise. Matthew frequently speaks at international conferences on engineering focused topics. Featured on BBC, ABC, CNN, NBC, ARS Technica, RT, Kotaku, SC Magazine, CRN, The Register, Channel 10, Channel 7, ABC 7:30 Program, The Herald, Sydney Morning Herald and many others.



## Jake McDonald | Director of Engineering

Jake is a passionate and experienced engineer with a multitude of experience leading teams in bleeding edge solutions.



## Mark Paone | Lead Software Engineer

A jack of all trades with over a decade of experience in the tech startup scene, Mark has been following cryptocurrency trends since first learning about Bitcoin in 2010. He has held a variety of development and managerial positions, most recently in the ad tech industry designing highly scalable servers responsible for processing billions of online advertisements daily.



## John Welander | UI/UX Lead

20 years in the digital media landscape specialized in UX/UI with focus on industry disruptors and startups. John comes with a wealth of experience working in corporate sector on projects for clients such as Macquarie Bank, Westpac, Commonwealth Bank, Boston Consulting, Fairfax Media and Vodafone.



## Joshua Keating | Senior Software Engineer

Josh is a software engineer specializing in client-side technologies. He is approaching a decade of industry experience, and has worked on projects with Deloitte, Google, NAB Bank and Telstra.



## Michael Knyazev | Senior Software Engineer

A passionate software engineer with 18 years of experience. Michael is a keen learner with a Ph.D. in Computer Science and holds many certificates, including AWS Certified Big Data and Sun Certified Enterprise Architect.



## Travis Armstrong | Developer

With over 20 years of experience in all things software and hardware, Travis brings a broad spectrum of experience to the team. He's worked on projects ranging from custom enterprise applications to engineering support for a top 5 PC manufacturer. His acute attention to detail helps to ensure projects are completed efficiently and effectively.



## Austin Woods | Economic Analyst

Austin is an economics graduate from the University of Georgia with a background in econometric research and applied statistical modelling. Originally drawn to cryptocurrency by reading Satoshi Nakamoto's seminal white paper regarding Bitcoin around the year 2012, he has been fascinated since. He is currently involved in research pertaining to the foundational notion of value within cryptocurrency and further utilization of Blockchain technology.

# 11 | ADVISORS



## Eric Taylor | Media Advisor

aka Cosmo The God, is a cybersecurity researcher specializing in Information Security, Penetration Testing, Computer Forensics, Social-Engineering, and Cyber Threat Intelligence. He was initiated into Google's Security Hall of Fame in 2012 at the age of 15. Eric served as Chief Technology Officer of Cinder Cyber Security, as well as Chief Information Security Officer at VIRAL. He possesses sophisticated levels of expertise in the realm of public relations having appeared in Wired, TechCrunch, CNBC, CNN, Vice, BuzzFeed, PBS, and Washington Post among other media outlets.



## Bryce Case Jr. | Token Ambassador

Bryce Case, Jr., the "Bitcoin Baron," has served as a cryptocurrency evangelist since 2012, giving the first talks on bitcoin at DEFCON and SkyTalks, as well as participating in many of the seminal cryptocurrency-focused conferences. As a co-founder of the 501(c)(3) nonprofit Unsung.Org with Jason King (the spiritual successor to Sean's Outpost and one of the first successful bitcoin-based charities), Bryce has pushed for blockchain technology to be used in nonprofits for higher degrees of transparency, eliminating waste and potential misuse of funds by administrators. He currently serves as an advisor to a select group of blockchain-based companies dedicated to disrupting the status quo. Bryce has an established and colorful background in computer security and internet marketing.



## Paul Kim | ICO Advisor

Paul Kim is a 15 year gaming executive veteran having served companies such as GoPets, ZAM Network, and Gazillion Entertainment. He has then served as the CEO of Xfire, the world's largest gaming community site with over 24 Million registered users and then COO of Oomba, a cutting edge SaaS based Tournament platform. He has taken his extensive background in game based virtual currencies and eco-systems into the world of Blockchain. Having advised on a number of successful ICO's such as Paragon, Blockex and Academy, raising over \$150M in total token sales, he currently serves as the Managing Director of ICO's for Blockchain Industries.



## Shawn Zandi | Infrastructure Advisor

Shawn Zandi is LinkedIn's Principal Infrastructure Architect, leading and responsible for design and delivery of mega scale data centers, internet edge & backbone and LinkedIn's global infrastructure architecture and strategy. For the past two decades, Shawn has worked as a consultant for various Fortune 500 companies from Dubai to Silicon Valley, building infrastructure for universities, hospitals, airports, luxury hotels, service providers, and large scale data centers. Shawn holds multiple patents, has published several papers, frequently speaks at international conferences, and is board member and advisor to tech companies in California.



## Branden Hampton | Partnership Advisor

Branden has been in the social media space for 9 years and has amassed over 35 million social media followers; he was one of the very first social media influencers. Branden was a #1 rated influencer by Forbes. He's currently CEO of Elevator Studio, a social media agency & production company in Hollywood that works with over 200 influencers and celebrities. He's an active angel investor, advisor, and got started in cryptocurrency in 2013.



## Nathaniel Wakelam | Security Advisor

Nathaniel is an accomplished security expert who has given numerous talks at international security conferences and has consistently maintained top 10 placements on HackerOne, the world's leading bug bounty platform.

# 12 | COMMUNITY AND INVOLVEMENT

An active community is the driving force of adoption. Without a strong community backing even the best of projects have little chances of succeeding. Fortunately, we have a very dedicated and strong community behind our backs.

Come join and become part of our community:

**Website** | <https://path.network>

**Telegram** - International | <https://t.me/pathnetwork>

**Telegram** - English | <https://t.me/pathnetworkenglish>

**Twitter** | [https://twitter.com/path\\_network](https://twitter.com/path_network)

**Facebook** | <https://www.facebook.com/pathtoken/>

**Medium** | <https://medium.com/@pathnetwork>

**GitHub** | <https://github.com/path-network-token/chrome-miner>

**Email** | [contact@path.network](mailto:contact@path.network)

# 13 | BIBLIOGRAPHY AND REFERENCES

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## PLATFORM ARCHITECTURE

The Path panel architecture follows microservices architecture design paradigms and consists of multiple backend services which provide webscale real-time data streaming capabilities, big data pipeline, and event analytics.

### Technology Overview

The Path Network platform architecture is built to scale and utilizes a combination of the following technologies and architectural patterns. There are of course the client miner nodes, which consistently communicate via WebSockets to a load balanced Elixir / Erlang based "Operator" API capable of handling millions concurrent connections with our mining nodes. This API provides jobs to the clients (miners), retrieves reports and job results, and performs health checks of clients (miners)

And then there is of course the Panel frontend website - which is a ReactJS Single Page Application hosted in S3, behind CloudFront which is a frontend serving an administrative panel for business customers - this interfaces with our serverless backend on AWS via GraphQL API served by AWS AppSync, which is used for a range of things for example, pushing jobs to miners through our backend architecture.

These jobs are pushed to Kafka topics, where we leverage a modified implementation of the Kappa architecture paradigm for the backend data pipeline. Within our Kafka architecture for example, we have Kafka Streams aggregation lying within the core of a high performance EC2 deployed Kubernetes cluster, which powers our Kafka brokers, Zookeeper zNodes, Confluent Schema Registry, Kafka Connect Cluster and Kafka REST Proxy, and we make use of the Confluent Kafka Operator paradigm for management within Kubernetes. Our Kafka brokers and zookeepers autoscale horizontally, both replicating new pods across the Kubernetes cluster, and also horizontally scaling the Kubernetes cluster by provisioning new Kubernetes nodes when there is insufficient compute / throughput available.

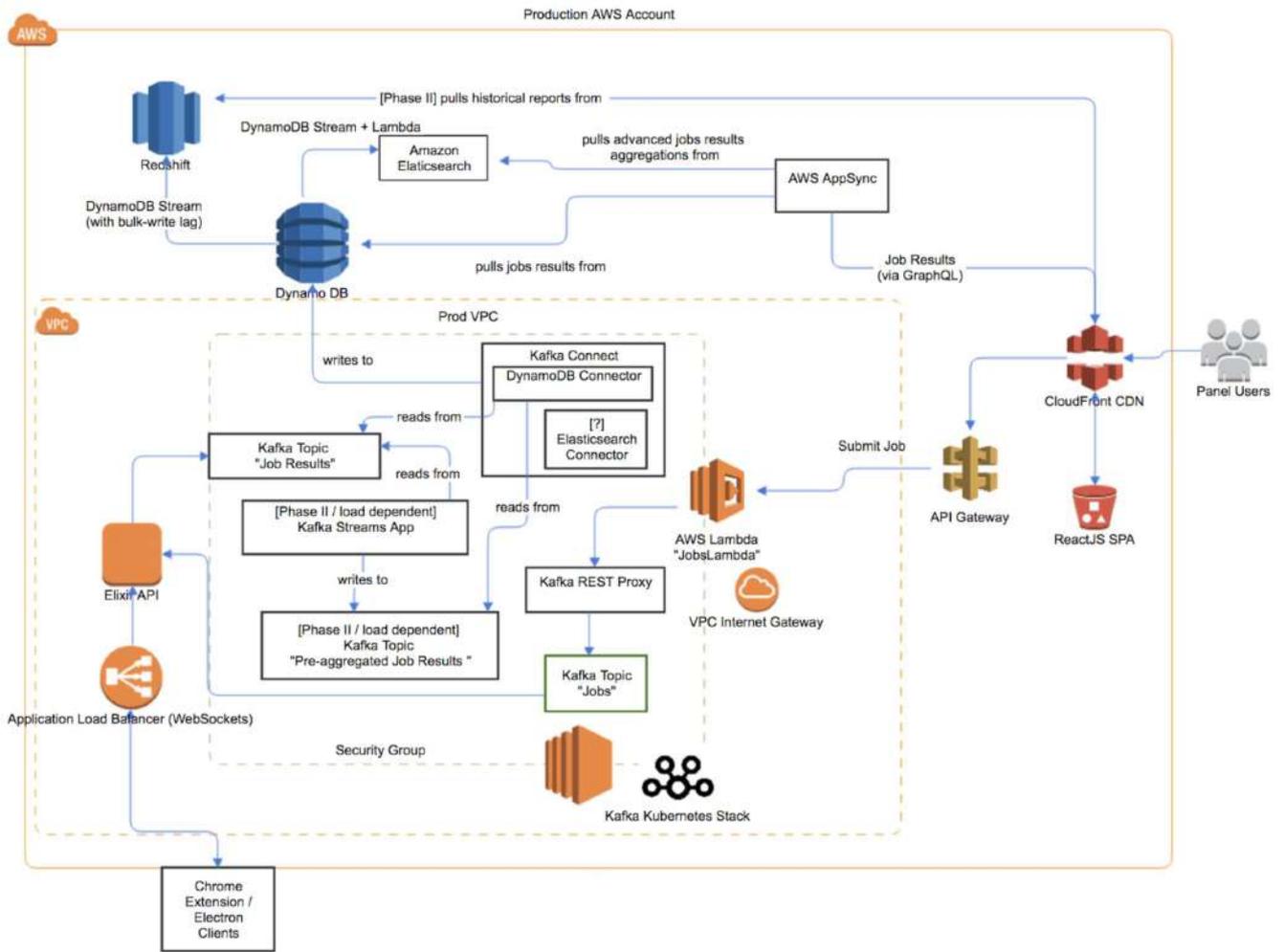
Aggregated monitoring job results are streamed in near real-time through the Kafka cluster into DynamoDB for serving to the Panel UI via AWS Lambda functions exposed via AppSync GraphQL. This data persists within DynamoDB for a one month period. DynamoDB streams are efficiently replicating the aggregated job results into our data warehouse, Redshift and are then available for internal audit via solutions such as Chartio Cloud ETL.

When Panel users want to analyze historical periods within the Dashboard, our backend loads corresponding aggregated results from our warehouse into DynamoDB and Amazon Elasticsearch, so that Panel users can work with historical periods without delays typical of data warehouses. Raw job execution results are persisted forever in the S3 based Data Lake via AWS Kinesis Firehose and eventually archived to S3 Glacier per our lifecycle management policies.

No batch processing is required, either: when we are improving our aggregation algorithms we simply re-process the raw job results from the Data Lake through a clone of the Kubernetes cluster. We are planning to use our Data Lake and the aggregations in the warehouse for our ML models training (using Amazon SageMaker, Spark's MLlib) for advanced anomaly detection analytics and forecasts.

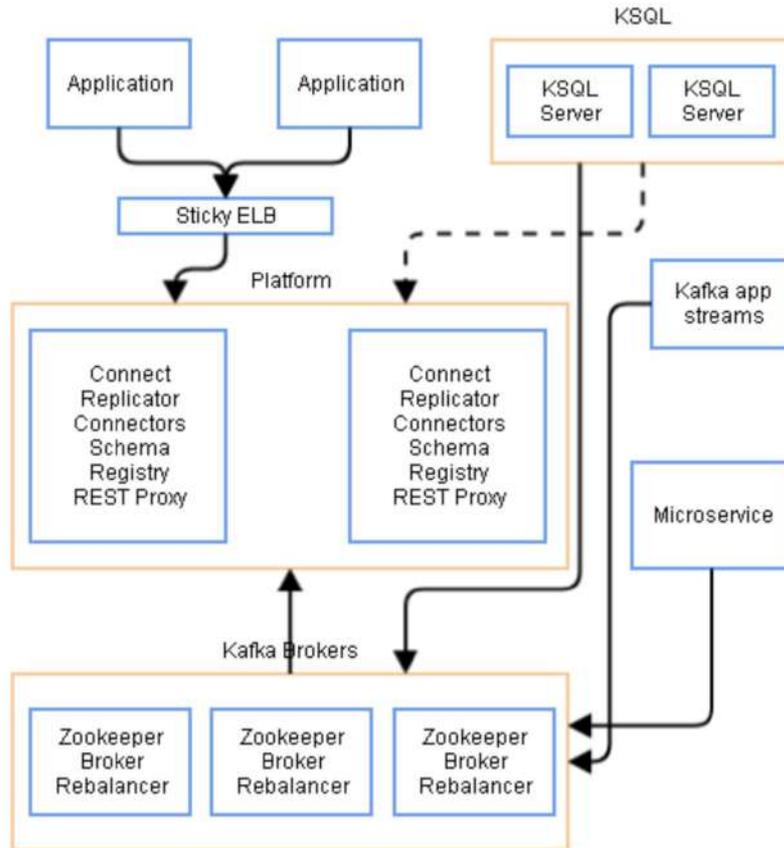
# Panel Reference Architecture

The below diagram illustrates a high level design for our backend architecture.



## Kafka Cluster Reference Architecture

The below diagram illustrates our a high level Kafka architecture for our development environment. Production environment is horizontally scaled further, fault tolerant, highly available and autoscaling.



## Current Job Types

As mentioned, we are continuously improving the platform and introducing new types of jobs, however as of right now our immediate focus is to provide the following features:

Tier 1 Ping/General Requests	Tier 2 Routing	Tier 3 Content Validation	Tier 4 Interactive Testing
Uptime Monitoring	DNS Poisoning	Censorship	Synthetic interaction testing
Page Speed Monitoring	BGP Hijacks	Ad Fraud Detection	-
DDoS Attack Reporting	BGP Routing Visualization	Ad Verification	-
CDN Performance	-	Website Malware Detection	-
SLA Monitoring	-	Brand Protection	-
ISP throttling	-	Web Scraping	-

## Job Tiers

Different types of jobs will require differing amount amounts of bandwidth, therefore we have grouped similar job types into tiers. This plays a role in determining the amount of completed jobs needed to earn tokens. The different tiers that these jobs have been grouped into are displayed in the chart directly above. In addition, the tiering of jobs is integral to the reward system that is further described in this technical documentation.

# 15 | APPENDIX B

## MINING NODE PLATFORMS

### Mining Node Platforms

Each software distribution of our mining node client will be publicly available as open source software available on GitHub. The primary benefit of installing the mining node client on any device is to mine PATH tokens, of which this reward is paid by the Path Platform upon completion on varying jobs, as detailed in the Panel section above.

By implementing a distributed node architecture, we are able to take monitoring and analytics to a truly next generation state as never before have Internet denizens been able to gain such valuable insight to their services, and the internet as a whole.

### Browser Plugin

The cross-platform browser plugin allows users to easily mine PATH tokens, silently running in the background while they surf the web. It can be toggled on, or off at discretion.

The Chrome browser plugin is available as open source software on GitHub (<https://github.com/path-network-token/chrome-miner>) and is written in JavaScript. It is a Chrome browser plugin that is written as a ReactJS SPA (Single Page Application) with a Redux state store and Redux actions, utilizes WebSockets for communication with Path's Jobs API (i.e. consumption of various monitoring tasks), leverages the Jest framework for testing purposes, Flow for bug-checking/static typing, is built using Webpack/Yarn, and is compiled as an ElectronJS application. With a few minor tweaks, it can be modified to run as a Firefox plugin. We have plans to port to Edge and Safari.

### Mobile App

The mobile app is available as open source software on GitHub. Both the iOS application and the Android application are written using React Native, and takes advantage of lower level APIs for performance. The mobile app runs as a background process accepting and processing jobs. Appium is leveraged for testing purposes on both iOS and Android, as well as regular physical device testing.

### Cross Platform Desktop App

ElectronJS application available as open source software on GitHub. Due to the advanced nature of Interactive Testing and Content Validation, the desktop application will be sandboxed on a user's system.

# 16 | APPENDIX C

## MINING REWARD SYSTEM

The reward system for Path Network miners is enumerated and described below. The system for these rewards was calculated based on relative value and opportunity cost for the miners who have “rented out” their bandwidth and computing power.

This rewarding system is specifically designed to incentivize a broad geographic distribution of Path Network miners, thus making the network as a whole more robust.

Below are the components of the mining difficulty adjustment algorithm used to incentivize a broad network distribution, along with descriptions of the variables included:

$$\delta = \tau\beta_0 + \gamma\beta_1$$

$$\Sigma = \max(\zeta_{1..n})$$

$$\zeta_x = \Sigma \rightarrow \beta_0 = 1$$

$$\zeta_x \neq \Sigma \rightarrow \beta_0 = 1/(\Sigma_u / \zeta_x)$$

### Legend

- $\delta$  = difficulty in number of jobs completed per block  
 $\tau$  = base difficulty level  
 $\gamma$  = difficulty modulation multiplier  
 $\beta$  = variable coefficients  
 $\Sigma$  = region (50 km<sup>2</sup> block) with most PATH users at time of difficulty calculation  
 $\Sigma_u$  = users in region with most PATH users  
 $\zeta_{1..n}$  = unique region identifier with # of users
- If region is  $\Sigma$  then:  $\beta_0 = 1$   
If region is not  $\Sigma$  then:  $\beta_0 = 1 / ( (\# \text{ of } \Sigma \text{ users}) / (\# \text{ of users in specific region}) )$   
Lower limit for  $\beta_0 = 0.25$
- If  $0 < U_i \leq 100$ : then  $\beta_1 = 0$   
If  $100 < U_i \leq 250$ : then  $\beta_1 = 2$   
If  $250 < U_i \leq 500$ : then  $\beta_1 = 4$   
If  $500 < U_i \leq 1,000$ : then  $\beta_1 = 8$   
If  $1,000 < U_i$ : then  $\beta_1 = 10$   
 $U_i$  = user iteration within region (i.e. if person is the 1,200th to install the miner in their region then their  $U_i = 1,200$ )

With the above algorithm being the determining algorithm for Path operator difficulty, the mathematical relationship between the rewards to the mining pool as a total and as individual miners will be as follows:

$$f(R_t) = \sum_{m=1}^{10\,000} ((\gamma\eta_m)/\delta_m)$$

Function of total tokens paid out to group of operators (ex. 10,000 here) for performance of work requested

$$f(R_i) = (\gamma\eta_m)/\delta_m$$

Simplified token reward function for single operator upon completion of a requested task (example for understanding the logic of the model)

## Legend

$f(R_t)$

= function for tokens paid out as reward  
Subscript t = total  
Subscript i = individual

$\sum_{m=1}^{10\,000}$

= sum all iterations of the following equation (e.g. miners 1 to 10,000 in this case)

$((\gamma\eta_m)/\delta_m)$

= demand-adjusted work accomplished by miner "m" divided by the total required work for one PATH token in terms of weighted jobs completed; or in the case of the function of "total tokens paid out" this accounts for every single one of the "x different miners" so as to get the properly weighted and algorithmically correct  $\delta_m$

# CONTACT US

[HTTPS://PATH.NETWORK/  
CONTACT@PATH.NETWORK](https://path.network/contact)