



iomob.

THE INTERNET OF MOBILITY

WHITE PAPER

Please note that this document is outdated. Some content, especially regarding Token staking is no longer valid

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Opportunity: Integrating Mobility Markets

Today, for the first time in human history, more than half of all human beings live in cities. By the middle of the century, that number is expected to rise to more than two thirds.¹ There are now 46 megacities - those with over ten million inhabitants - in the world, the majority in developing countries.² While Maglev trains and hyperloops make headlines, the reality is that many cities around the world face a growing mobility crisis.

This problem runs through all cities: rich and poor, transit-rich and car-dependent, European, Asian, North and South American. The negative ramifications of inefficient transportation are significant: studies have shown that adding 20 minutes to a person's commute causes the same emotional distress as a 19% pay cut.³ The average commute in Manila is over 45 minutes; in Moscow, 43; in Jakarta, 42; it is greater than 35 minutes in London, New York, San Francisco, and Rio. An alarming number of people around the world face commute times much longer than 60 minutes.

So it should come as no surprise that the global Mobility-as-a-Service market is projected to grow nearly 10 times to over \$358 billion between now and 2027, from \$38.7 billion in 2017.⁴ A multitude of mobility providers have sprung up in recent years to supplement and compete with existing road, rail, and mass transit systems. These include ridesharing apps such as Uber, with a market cap of \$51 billion and 40 million monthly active riders, and Lyft, currently valued at \$7.5 billion with 75 million monthly active riders.

In 2018, scooter-sharing apps stormed into the public awareness, with startups Bird and Lime now valued at \$2 billion and \$1.1 billion, respectively.⁵ Meanwhile, the global bike-sharing market is estimated to grow to over \$6 billion dollars⁶ by 2020. There are apps for carpooling, parking space sharing, and even, in Barcelona, boat sharing - all while urban transit systems continue to operate at or near record ridership.

"We need an integrated system that uses real-time data to optimize personal mobility on a massive scale, without hassle or compromises for travelers." Bill Ford, Executive Chairman of Ford Motor Company⁷

But these myriad transportation modes operate in a landscape of fragmentation and mutual hostility. In Barcelona alone there are more than 50 shared mobility services, each with its own technology stack,

¹. Source: U.N. Department of Economic and Social Affairs

². Source: United Nations

³. Source: University of the West of England

⁴. Source: Research and Markets

⁵. Source: CNBC

⁶. Source: Statista

⁷. https://www.ted.com/talks/bill_ford_a_future_beyond_traffic_gridlock#t-601050



all competing with one another to achieve network effects within their own individual silos. Mobility as a service is fragmented and broken. Public transit networks can never be comprehensive: there will always be gaps in services, particularly in the “first and last mile” between transit access points and homes and offices.

The phalanx of startups that has stepped in to address this need requires massive capital investments to be viable and discoverable and to achieve critical mass. Because barriers to entry are so high and competition so fierce, the overall transportation experience for consumers, who must download a different app for each service, remains highly inefficient. It is not easy to discover, sign up for, and download each separate mobility service, and there is no mechanism for intermodal routing that utilizes multiple modes of transport to offer the best overall route to the user. Mobility faces a crisis not of capabilities but of collaboration.

This presents a golden opportunity to connect mobility providers and end-users. How can this best be achieved? Some companies clearly intend to grow into vertically-integrated pseudo-monopolies, evident in moves like Uber’s purchase of the bike-sharing startup Jump. But this is likely to lead to a future of less choice and higher prices for consumers, as is already the case in Singapore, where a single company - Grab - now controls 40% or more of the market.⁸ Businesses are reluctant to enter into mutual point-to-point agreements because of a lack of trust as well as the difficulty in integrating different apps. An alternative is to rely on intermediaries, but this carries the risk of rent-seeking.

Mobility services as a whole would be significantly more efficient if network effects were more tightly united. Users would always be able to find better combinations of operators for a given trip. Increased user satisfaction would lead to an increased user base, which in turn would benefit all providers involved. The world needs a solution that can harness all of the different modes of transport and the tremendous innovation of the mobility space to offer integrated, end-to-end solutions that benefit both the providers and the consumers of transportation.

⁸.Source: TechCrunch



iomob: The Internet of Mobility

iomob offers the solution to the problem of mobility in the 21st century. It integrates transportation services within a blockchain-based commons in which every mobility provider can operate without the need for intermediaries, legal agreements, or proprietary apps. **iomob** provides end-users an integrated experience even if the landscape of mobility providers - transit, ridesharing, bike-sharing, etc. - stays fragmented. Indeed, **iomob** transforms market fragmentation into a benefit, as it allows a multitude of actors to offer services, innovate, and compete, while removing the friction that leads to today's inefficiencies.

In the mobility sphere, as in many other industries, companies simultaneously compete and, implicitly, cooperate. For example, many major cities have a public transit network, consisting of buses and subways, as well as multiple private mobility operators such as taxis, electric scooters, and bike-share services. These act as competitors to the extent that their services overlap. But they collaborate at the same time: the best plan often involves a combination of several providers, with secondary players filling gaps left by primary services. (For example, if a subway line is shut down for repairs, a traveler may take a taxi instead.) From a macro perspective, the more comprehensive a mobility network is, the more valuable it becomes as a whole.

iomob allows transit providers to compete as well as cooperate to make urban mobility more efficient for customers and fairer for providers. It unlocks untapped value by enabling cooperation in a way that is more practical, safer and cheaper to articulate than the status quo. It allows the first mile-last mile problem mentioned in the previous section to be solved through the enabling of public-private intermodal routing, booking, and payment with the full constellation of mobility services interconnected through an open app.

What does this mean? Upon full build-out, **iomob** has the potential to integrate transit tickets and multiple mobility apps with a single protocol interface. An end-user can simply open one of the apps powered by the protocol to access a mobility universe that is fully interconnected across modes and integrated with private providers and local transit authorities. Mobility providers - taxi services, urban bus networks, intercity rail systems, bike and scooter sharing services and individual drivers - will be able to enter a marketplace in which the barriers that currently exist are transformed into benefits, as each piece of the system benefits from the success of the whole. The foundation of the system is the **iomob**



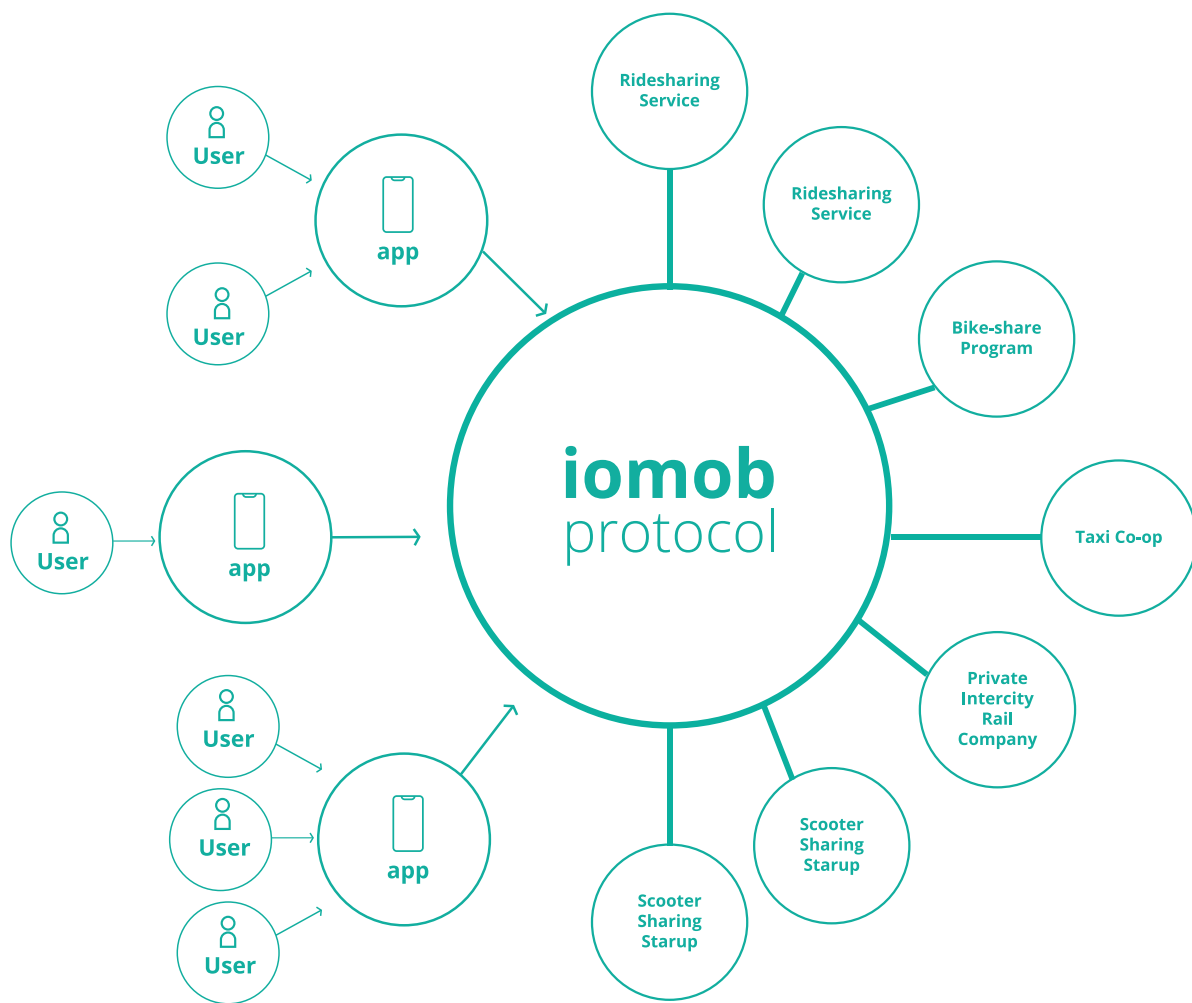
protocol. This is a blockchain architecture that connects user-facing apps to the different mobility providers through regional mobility “hubs”. These three players - providers, hubs, and apps - form the spine of the **iomob** system. For example, a taxi cab can declare its availability and current location, a bus can announce its route and schedule, and a ridesharing company can publish the position of the cars in its fleet. The local hub will offer these options to users, who interface through third-party apps, and connect them appropriately. **iomob** is designed to let any organization or individual participate in the network. The protocol itself is provider-agnostic and unbiased on which service best serves the needs of the end-user.

Hubs have a defined geographical scope, and their main purpose is to connect mobility demand with supply. They are also responsible for acting within the regulatory framework of that scope. For example, in an area where taxi services require a license, only taxis in possession of a valid license are allowed into the hub. They do this with the support of “validators”, who confirm in real time that service providers are eligible. Validators also ensure that end-users have submitted the information required by service providers. This way, users can onboard new services without having to sign up separately for each, offering an integrated experience from a single app.

Hubs also provide a means for end-users and mobility providers to communicate, since they have established communication channels with both. Additionally, they can relay mobility requests to other hubs to attempt to service mobility requests they cannot fulfill. In this situation, both parties share in the revenue generated.

Any kind of mobility provider can participate in **iomob**. This can include taxi companies, ridesharing companies, public transport networks, car rental companies, scooter sharing services, carpooling or bicycle rental shops. Mobility providers connect to the user-facing apps that comprise the front-end layer of **iomob**.

iomob will produce an open-source universal mobility end-user app, which will be open for forking, rebranding, and integration with other mobility services created by third parties. These apps can take any number of forms, but the key is that they are all connected through the protocol. This creates a connected universe in which end-users can seamlessly toggle and choose between different transportation options depending on circumstances. **iomob**'s token ecosystem ensures that all parties enjoy some economic benefit from this collaboration, and offers direct incentives to participants, including providers and end-users, for the growth of the ecosystem.



Overview of *iomob* Protocol

Each of the three stakeholders - hubs, providers, and apps - provides value to the end-user. Therefore, they must be compensated for their efforts in order for the ecosystem to be sustainable. Usually, the mobility provider offers the bulk of the value in actually delivering the required mobility service. Hubs contribute to the discoverability of such services, and incur costs in building and operating the computer infrastructure to that end. Finally, applications offer an interface for end-users to request mobility services, usually via apps that they have to develop, maintain, and promote to grow their user base.

iomob is agnostic as to how revenues are split among the players. It allows parties to establish appropriate revenue splits and enforces the agreed terms via smart contracts. Because of this, participants do not need to establish explicit partnerships or trust a counterparty to respect any agreements.

Model: Community Token Economies

iomob's fundamental business model revolves around the embrace of Community Token Economics (CTE). This encompasses a pragmatic, rather than a dogmatic, approach to development in which participants naturally create a center of gravity that regulates activity without the need for top-down dictation. Even in the blockchain space, we have seen many cases in which a small number of arbiters make decisions on behalf of the whole. CTE aligns the activities of various actors in an ecosystem - even when they are competitors - toward a common goal by harnessing their separate contributions. In this way it fosters a dynamic economy that is both equitable and non-zero-sum.


Mobility is a perfect vertical for CTE. The different providers certainly compete, but they also offer complementary services in the eyes of the end-user. The right token economics can incentivize them to operate in a system that functions more efficiently and beneficially while maintaining the competitive incentives that drive innovation and performance. Because CTE requires a Minimum Viable Community to gain enough momentum to succeed, success in gaining adoption for **iomob** will be crucial, and is discussed later in this white paper.

Blockchain Layer and Smart Contracts

iomob is underpinned by smart contracts. Any action involving a fee is cryptographically signed, making it impossible for any party to forge or modify them. In order to participate in the protocol, every stakeholder must escrow funds in an **iomob** smart contract. Any stakeholder that attempts to participate in the network without maintaining a sufficient balance in the smart contract will be ignored. At any time, a party can demand that the smart contract transfer to it any funds that are owed by a counterparty by submitting proof of an agreed fee.

iomob's architecture is split into two layers. The blockchain-powered layer is primarily concerned with overseeing economic transactions, with most interactions between stakeholders performed in an off-chain layer. This way, most of the messages exchanged between players do not hit the blockchain and therefore do not experience the associated delays or transaction costs. By contrast, micropayments are not implemented via on-chain transactions. Instead, they are periodically settled through payment channels in which, essentially, parties exchange cryptographically signed IOUs that can at any time be relayed to a smart contract that holds funds in escrow.

iomob's blockchain layer builds on Ethereum and its Ethereum Virtual Machine as a core technology. The end scenario is the deployment of **iomob** on a public blockchain such as the Ethereum mainnet.



However, current transaction costs on Ethereum are too high, and scalability remains an active area of research in the blockchain space. In the interim, **iomob** will be deployed on a sidechain with Proof-of-Authority consensus, which offers predictably contained transaction costs. To guide our future choices and navigate the tradeoffs between scalability and decentralization that blockchain tech will offer, we will observe the following principles:

1. Practicality **iomob** is first and foremost a production network that aims to solve needs for its users now. We will prioritize working technology over theoretically superior alternatives that lack a usable, production-ready implementation.

2. Decentralization We are promoting a self-sustaining ecosystem that does not depend on our team to function. We therefore aim to remove our control over the ecosystem to the maximum degree.

Payments Infrastructure

End-users of mobility services should not be expected to be aware of the existence of the **iomob** token or of the intricacies of the underlying blockchain technologies. Instead, user-facing apps hide **iomob** from the user, and payments from end-users must therefore be able to be made using fiat currencies. **iomob** is designed to support fiat payments on the part of end-users and is implementing the necessary infrastructure. For example, in the case of credit card payments, where there is a risk of chargebacks, a payment processor can absorb this risk and charge the appropriate fees for it. To avoid exchange rate risk, if a party collects payment in crypto from a user on behalf of another party, payments are converted to stablecoins until the transaction is complete.

Credentialing and Validation

The credentials of parties operating in the system are verified by a set of actors called compliance validators. In **iomob**, hubs must obtain the necessary level of validation according to the regulatory frameworks of the localities in which they operate. The organization managing a hub establishes relationships of trust with compliance validators, who in turn are in charge of actually verifying mobility providers.

A hub only deals with mobility providers that have been vetted by validators it trusts. In parallel, providers

may rely on validators to ensure their customers are in compliance as well. For example, a car rental company may require verifying that drivers are adults in possession of a valid driver's license for the intended use. They may choose to do that internally, but trusting validators enables network effects: customers validated in other countries, or who were validated in connection with services originally offered by themselves or their competitors in the same or other hubs, can be readily onboarded. In exchange for their contribution, validators obtain fees from each service as agreed between parties, and their compensation is ingrained in the **iomob** protocol.

Reputation, Arbitration and Dispute Resolution

Despite - and because of - **iomob's** commitment to decentralization, we recognize that situations and disagreements will arise that cannot be predicted or satisfied by smart contracts alone. Therefore, the protocol will feature mechanisms for arbitrating disputes. In the case that a mobility service enters a "disputed" state, arbitrators may be appointed to determine a verdict. Certain outcomes may be enforced programmatically (such as a refund) or not (such as the payment of a penalty). Arbitrators may escalate a complaint to a regulator, and simply communicate the outcome to the **iomob** network.

However, in low-value modes of mobility, manual dispute resolution is often too expensive to be practical. To promote the best user experience for all parties, from users to providers, the network includes reputation mechanisms designed to promote desirable behavior. Cancellations on either side of a service are recorded. When a mobility service finishes, users and providers rate one another. Such ratings are stored on smart contracts. This way, a hub can penalize users and providers who tend to cancel booked services or fail to show up. Ratings also reflect upon user-facing and provider-facing applications. If certain apps result in bad user experiences, hubs have a direct interest in penalizing them, since the higher the frequency of cancellations and user dissatisfaction, the less fees the hub can expect to collect in the future.

Importantly, reputation will be stored by the **iomob** network globally, not by either the specific hub where a service is booked or by a mobility provider. This enables an actor's reputation to be used by other counterparties to make more informed decisions, further strengthening the network effect. For example, an insurance provider for ridesharing may leverage the reputation that an end-user has gained while using other **iomob**-enabled services in its assessment of the risk associated to said end-user.

Summary Use Cases

Suburban Commuter

One of the challenges of mass transit, especially in the low density cities of North America and Australasia, is “first-mile/last-mile transport”. Essentially, no matter how many lines a municipality builds, it is virtually impossible to bring transit within easy walking distance of the vast number of suburban commuters. As a result, an average resident of these areas has the option of driving directly from home to work, or of using a ride-sharing or other mobility app, either to get him to a transit node or for the entire journey. The problem for a commuter is that there is currently no single interface to plan an entire optimal journey. He/she must toggle between various siloed apps or simply drive himself.

With **iomob**, a suburban commuter can open an app integrated with our blockchain protocol and optimize his route to work, using a rideshare app for the outermost section to the railway station, then taking a train to a station near his office, and if necessary, grabbing a bikeshare or scooter to reach the office. Schedules, routes, and payments (in fiat) are all handled through the app, and the user has a seamless experience. Behind the scenes, each participant in the transaction - the ride-share app, the municipal transit authority, and the validators who confirmed that all the pieces are in compliance with local law - share in the revenue through **iomob**'s token ecosystem. The commuter saves time and money and the various actors in the ecosystem all share in the upside.

App-less Provider

Today, most user-facing startups publish apps designed to connect people with the services they provide. Fundamentally, though, the development of an app often bears no relation to the actual service being provided other than the imperative of reaching an audience. **iomob** removes this imperative and allows entrepreneurs to focus on their core products.

Imagine, for example, an entrepreneur has an idea to introduce a fleet of electric urban vehicles to a city where **iomob** has an active hub and ecosystem. Instead of attempting to build a fully integrated and self-contained app that enables identity, routing, booking, and payment for this new pilot service, she can directly connect her vehicles to the **iomob** protocol as soon as the local hub has validated them as legal. The **iomob** ecosystem can then take on the task of ensuring the identity and payment of users is handled.

Meanwhile, integration with the Protocol means that her vehicles can now be discovered by any user of **iomob** in her city. In choosing to be immediately discoverable via the **iomob** Protocol, she gains instant access to its associated network effects. She has been saved the time and resources needed to design and build a proprietary app, and at the same time has gained automatic access to a much larger, well-established pool of potential users with strong network effects that she would have been unlikely to achieve in a silo.



Offloading Excess Demand

A surprising obstacle to startup growth can be excess demand. For example, if a bike-sharing startup is looking to launch in a new city, it is likely to be more concerned about inability to meet demand than how to onboard more users. The reason is that end-users downloading the app who find bikes unavailable more than once or twice are likely to delete the app forever - the startup only gets one chance to please its audience.

With **iomob**, this problem can be solved. If there are enough total bikes in a geographic area (or similar services amenable to the user, like scooters), the businesses providing them can connect to the **iomob** protocol. Now, if a user logs into one of the separate bike-share apps, but that particular company has no bikes available, they can see options from competitors. The **iomob** protocol ensures that the originating company shares in the revenue sent to the second company. It is a win-win, since the second company would never have gotten any revenue from the customer if she had not been redirected through the protocol. Both companies see revenue that would otherwise have been lost, the user gains mobility she would not otherwise have had, and the urban area functions more efficiently.

It should also be noted that lack of coordination among industry participants can cause failure for an entire vertical. In Australia, for example, bike sharing failed to achieve mass adoption because in the early stages many people disrespected the bikes and their surroundings by dumping them in rivers or leaving them in the way of public pathways. As a result, bike share apps like O-Bike were asked to leave the cities due to the public nuisance this posed. If the bike share apps had been connected to a wider network such as **iomob**, failure to properly return bikes would have been recorded, and would deter this kind of anti-social behaviour. This is because low reputation scores would impact the perpetrators' ability to use not just a particular bike share service but any service connected to the **iomob** protocol.

Decentralized Taxi (dTaxi)

Many individual drivers - including those who work for urban taxi companies as well as ridesharing apps - are at an acute disadvantage because they lack the clout or collective bargaining capability to compete in the market on their own terms. They are price takers, at the mercy of the pseudo-monopolistic titans that dominate the industry. Today, it would be nearly impossible for a single individual to offer a solution in the marketplace for mobility. The barriers to entry, as demonstrated in this paper, are too high.

But with **iomob**, any individual with a car can enter the marketplace and compete. **iomob** does not require mobility providers to have an app or even to be incorporated as businesses. Indeed, they can consist of a single taxi driver with just one vehicle. This entrepreneur can connect straight to the **iomob**



Protocol without the need to belong to a larger organization. **iomob**'s app-less connectivity model - in which an entrepreneur is able to forego building her own app and technology stack - allows this driver to connect directly to the protocol, where third-party apps drive users to her service.

On-Demand Bus Routing

The **iomob** Protocol will in the course of its operation collect enormous amounts of data from its users. **iomob** is committed to using this data responsibly. It will always be shared in an anonymized form, and with its originators' consent: this is coded into the architecture of the system. However, this anonymized data can be used to optimize transit systems and respond to demand in real time. In the same way apps like Waze understand real time traffic and direct drivers accordingly, **iomob** can mobilize transport resources to effectively respond to on-the-ground need.

Mass transit systems today are organized using relatively clumsy scheduling techniques based on fixed routes and predefined schedules. So, frequency is increased during hours when more people tend to commute and decreased when fewer people tend to commute. **iomob** can greatly improve this scheduling. If a surge in users is requesting journeys along a certain route, or between two points, **iomob** can relay this information to urban transit systems, which can in turn dynamically route buses to those nodes to meet the demand. This offers a potential revolution in urban mobility.

Token Economics



iomob's cryptoeconomics are designed with the following goals in mind:

- To make it possible to hide the underlying complexity of the network from end-users
- To facilitate the secure exchange of value and payments between stakeholders
- To implement economic incentives to reward/penalize wanted/unwanted behaviors
- To promote early adoption and continued growth of the **iomob** network
- To enable the funding of the development, maintenance and improvement of **iomob**

A key design objective is to make it possible to hide the underlying complexity of the network from end-users. To do this, we constrain ourselves to designs that are eminently practical and would not thwart adoption, considering the current state of adoption of tokens and cryptocurrencies, or lack thereof, by end-users. We expect an array of independently developed, competing end-user applications that serve as a front-end for end-users to the **iomob** network to appear.

The IOM Token

While end-users will not be required to hold tokens, and will be able to conduct all their transactions in fiat, iomob does introduce a network-specific token called **IOM**. The introduction of a token with a value that free-floats other tokens and currencies introduces a degree of freedom in its cryptoeconomic design and, in particular, enables the implementation of incentives for the adoption of iomob that would not be otherwise possible.

iomob tokens are implemented on the Ethereum public network and are compatible with the ERC-20 token standard. **IOM** is therefore interoperable with mainstream Ethereum wallets, and can readily be listed for trading by cryptocurrency exchanges with minimal effort from their side.

Token Utility

Although it is not required in end-user transactions, all other participants in the network must hold **IOM**. It serves the following primary purposes:

- Locking a stake of IOM is required to participate in the protocol
- IOM tokens must be spent to perform certain operations as a measure against transaction spam
- It enables participation in the governance of the network
- IOM tokens can be awarded to end-users as a crypto-incentive, as a form of loyalty points that users can spend to obtain discounts

Transacting on the **iomob** network will require holding a balance of tokens, a small amount of which will be spent on each transaction to prevent spam. To register as a hub, validator, mobility provider, or end-user app, users must lock an amount of tokens in escrow for a period of time to incentivize constructive behavior. For example, if a hub fails to publish trip data that end-users authorized for publication, or a provider features consistently low ratings, their deposit can be slashed. This creates a stronger incentive to respect the protocol than rewards alone, since deviating from the protocol results in a direct financial loss and, potentially, the loss of the privilege of operating on the network.

Governance

The founders of **iomob** will design, implement and oversee the **iomob** network in its infancy. However, in the long term, the governance of the protocol will shift to token holders to ensure **iomob** endures as a Decentralized Application. Token holders will vote on platform fees, staking requirements, required token microburns, and other parameters. In the interim, governance will be handed to a nonprofit foundation.

Data Collection

Data sharing is a requirement of the platform, and businesses that integrate with the **iomob** protocol will benefit from the large amounts of data the various participants will generate. Participants will be able to target and optimize their services based on granular feedback created by all parties that integrate with **iomob**, rather than just users in a particular silo as is the case with Web 2.0 apps. This means that small players will benefit from the high volumes of information related to major corporates' customer bases, while larger companies will in turn benefit from insights generated by incipient, nimble startups.

iomob will set a network-wide price at which hubs are able to sell their data. This is to prevent these major actors from exploiting their positions to monetize information at unreasonable levels of profit. We believe the **iomob** network can produce a trove of data that can help cities operate more efficiently by regulating the controlled release of information on mobility patterns at a reasonable price, so that entities - startups, large companies, government bodies, or research institutions alike - have access to it.

This is an important feature for the aggregate value of the network. For this reason, the protocol will ensure that hubs release the information they collect, and if hubs fail to provide an unbiased, random sample of mobility services they have offered, they will be penalized by losing part of the deposit they have put forward to participate in the network.

iomob is committed to privacy and anti-monopolism, as well as to promoting the responsible and beneficial use of data. Through the design of its protocol, **iomob** will ensure that the large amounts of data that will be generated by the various actors, especially hubs, will be made accessible to interested parties to utilize in a responsible and equitable way. For example, hubs will offer samples of trips to interested counterparties at a network-wide set maximum price per sample. Data on samples will be obfuscated according to anonymization policies set by end-users. The proceeds obtained by hubs will be shared with the end-users that authorized the publication of their data. Users will then be able to use these tokens to pay for mobility services, serving as a rebate.

iomob is consulting with experts on an ongoing basis to ensure the final design will be compliant with all relevant privacy regulations, guidelines, and best practices, including GDPR.



Token Generation Event

At the outset, 2 billion tokens will be minted. These tokens will be allocated to founders, advisors, and early strategic partners. To avoid perverse incentives, these tokens will not immediately come under the control of their recipients. Tokens for founders are time-locked, so that they act as a financial incentive that is aligned with the mid to long-term success of **iomob**. Specifically, 25% of a founder's token allocation will be released 12 months after the conclusion of the ICO, with the remainder unlocked in equal monthly installments over the following two years. The use of tokens by early investors is also restricted in order to properly align incentives.


Once **iomob** is operational, an additional 5.5 billion tokens will be minted, for a total of 7.5 billion tokens. Of these newly minted tokens, 3.5 billion will be offered to ICO participants, and 2 billion will be retained by **iomob** to fund further development. **iomob** will be free to use these tokens for various tasks, including but not limited to building open source software, researching solutions to open problems, subsidizing the adoption of **iomob** by big players, funding startups in the mobility space, and operations.

Mining

One of the main advantages of a cryptoeconomic design that features an **iomob**-specific token throughout the network is that it introduces the freedom to mine additional tokens to incentivize the growth of the network. A maximum of 2.5 billion tokens will be mined, bounding the total number of tokens at 10 billion.

Tokens will be mined when actions that benefit the adoption and growth of the **iomob** network as a whole, which we call conversions, take place. Examples of conversions include the verification of an end-user's cell phone number and/or credit card, the validation of a taxi driver's license, or the delivery of a mobility service handled through a hub involving the coordination of independent providers. Each kind of conversion will lead to the mining of a certain amount of tokens, according to factors such as the difficulty, desirability, verifiability, and resistance to fraud of the associated conversion.

In order to prevent fraud (that is, bad actors trying to trick the network into awarding mining rewards for artificial or entirely fictitious conversions), we intend to establish requirements around the collection of mining rewards. For example, only identities verified by approved validators will be considered eligible, and only mobility services that were verifiably carried out and resulted in verifiable payments made by approved payment processors will be considered eligible.



Eligibility will ultimately be determined by The **iomob** Foundation. While we recognize that this could be viewed as introducing a measure of unwanted centralization into **iomob**, it must be considered that these rewards 1) are opt-in, so the network remains permissionless if rewards are disregarded, and 2) these rewards are a temporary mechanism in place to incentivize the early growth of the network, and are not intended to be permanent.

Mining rewards are shared by the players that intervene in a conversion. In the case of the verification of an end-user, these are the app and the validator. In the case of a mobility service, this corresponds to all the stakeholders involved: apps, hubs, validators, payment processors, mobility providers, and so on. We expect end-user apps to pass part of the incentives to end-users; for example, they can award a discount on the first mobility service they perform, or otherwise reward them as part of their marketing strategy.

Token Mining rates will diminish with time and with the growth of the network, since incentivizing that growth is their main objective. As explained, a maximum of 2.5 billion tokens will be mined. The **iomob** Foundation will retain the freedom to dynamically define conversions, how many tokens are mined for them, eligibility for providers, and how they are split among participants. These should follow from opportunities detected in the market. Example strategies include activating token mining in particular geographical locations, such as the first major cities where an opportunity to grow **iomob** is detected or ongoing, or rewarding existing mobility aggregators that adopt **iomob** and contribute to its network effect.

Use of ICO Proceeds

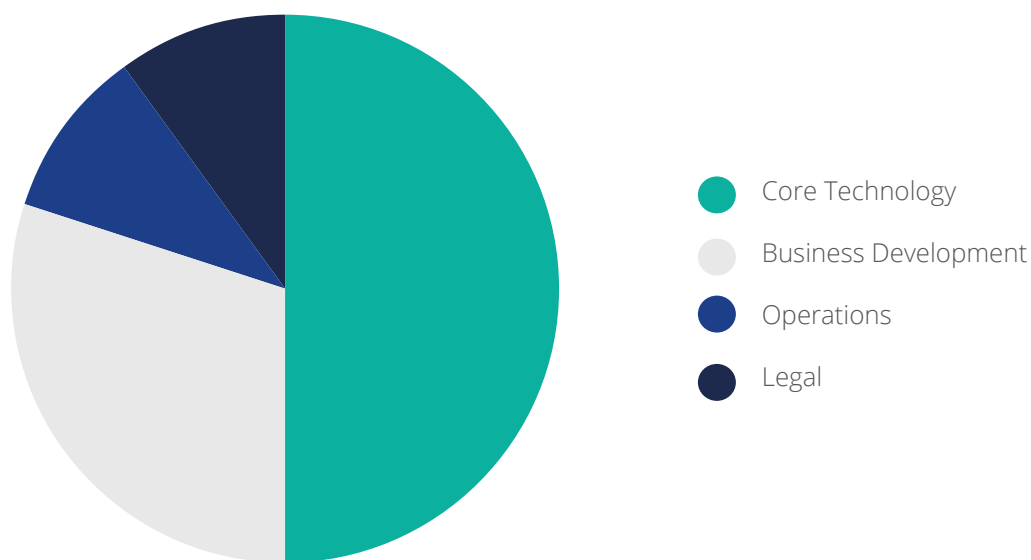
iomob aims to build a global, open, decentralized mobility protocol which can be adopted in any city in the world - an ambitious goal by any measure. At the core of our vision is the need to build all the pieces of the mobility ecosystem to function properly. As explained, this includes:

- The specification of the protocol
- The implementation of smart contracts that lie within the blockchain layer
- A hub
- The data commons infrastructure
- Software to run validators
- End-user and provider-facing mobile apps that act as front ends to **iomob**.



To this end, to meet our development needs, an estimated 50% of ICO proceeds will be allocated to the development and release of software.

The remaining proceeds are intended to go toward supporting adoption of the **iomob** protocol in cities around the globe, as well as supporting the governance and administration of the **iomob** foundation. Business development activities will represent around 30% of the proceeds. This includes between \$450,000 and \$600,000 of ICO proceeds that are intended to go towards the development of Senta Mobility, a joint venture formed between **iomob** and Centrality, discussed in detail later in this white paper, with the explicit purpose of achieving further adoption of the **iomob** protocol. Additionally, 1% of ICO proceeds will be allocated to supporting the growth of the Blockchain Cities Alliance, which serves as a vehicle to help cities understand the value of decentralised solutions.



Proposed Use of ICO Proceeds

Market Conditions and Competitive Landscape



We have already demonstrated the need for an integrated mobility solution to meet the demands of 21st-century cities, users, and mobility providers. **iomob** is not the only group to recognize the need for intermodality: major players including Bosch and Daimler have launched programs to improve intermodal connections and help travelers negotiate the various transport means at their disposal.⁹ Clearly, we are not the only ones to see the need for an integrated solution.

We believe, however, that a blockchain platform is the only way to effectively meet the needs of all parties involved in an intermodal solution. Our protocol is able to work with any third-party app, potentially transforming possible competitors into allies. As such, we do not view any individual mobility service, app, or system as a competitor, but rather as a potential participant in the **iomob** protocol. Indeed, **iomob** itself will not be positioned as a business offering its own mobility services, but as a facilitator of integrated, end-to-end mobility that connects mobility consumers with mobility providers to one another in a mutually beneficial interaction.

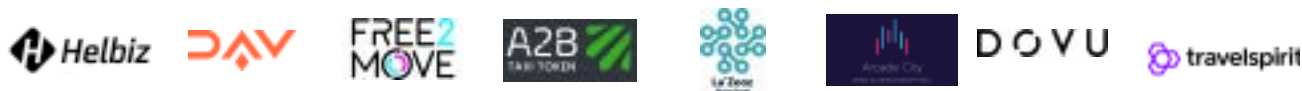
It is our view that the entry of decentralized “Web 3.0” services is likely to begin a more collaborative, less winner-take-all era in mobility services. Decentralized mobility providers pose no threat to, and should perceive no threat from, the **iomob** Protocol. Rather, these businesses can benefit from integration with **iomob**, since it will connect them to pools of users they would not otherwise have access to, and offer them a share of revenues derived from users they have connected with other providers. The principles of Community Token Economics will create a win-win environment for all market entrants.

We do, however, believe that a battle is emerging between the centralized, monopolized “web 2.0” models, exemplified by behemoths such as Uber and Google that leverage their enormous power and



wealth to influence human behaviors and force smaller players out of the market, and the decentralized, blockchain-based “web 3.0” players. The incumbents will not go quietly, but we believe the decentralized, secure, trust-based platforms of the latter will eventually win out in most cases.

Overview of Competitors



Focus	P2p Car Rental	Autonomous vehicles	Carsharing scooters, bikes	Ridehailing	Ridesharing	Ridehailing	Urban Mobility	Travel
ICO	Feb 15, 2018	March/April 2018	Not Blockchain	March 1, 2018	Zoo tokens	\$ARCD	DOVU	March 16, 2018
Evaluation	Potential hub	Competitor but too futuristic	Competitor without crypto incentives	Niche competitor	Niche competitor/Potential hub	Niche competitor/Low cres	Direct Competitor	Direct Competitor

Path to Global Adoption



Recognizing Potential Challenges

iomob recognizes that technological excellence alone is not enough for a platform to succeed. In order to take off, **iomob** must gain broad adoption on the part of both mobility providers and end-users. This poses the challenge of a two-sided marketplace problem: in order to succeed, **iomob** must have both pieces (providers and users) in place. There are several key challenges to achieving this:

Municipal Governments and Transit Authorities Are Slow to Adopt New Technologies **iomob** believes that engaging local governments early and often is required. While many cities are increasingly tech-savvy and have good APIs with near-real-time data on public transit services, not all are prepared to enable payments integration. Furthermore, cities are uniquely positioned to erect barriers to adoption of **iomob** if they do not appreciate the value of the protocol.

Established Mobility Providers Can Be Hostile to Collaboration Mobility businesses, even early-stage ones, have a tendency to be committed to their existing business models. This usually includes building their own proprietary technology stacks and network effects and erecting moats around them. As a result they are often wary of open, decentralized infrastructure like that of **iomob**, since they fear it will eliminate their competitive advantage and render their carefully-won user bases meaningless.

Achieving a Critical Mass of End-Users Can Be Difficult “If you build it they will come” unfortunately does not apply to most new technology platforms. Businesses must take steps to identify and reach a potential user base. At the early stages, this can pose challenges, as many user-facing platforms - particularly in the mobility space - rely on a robust community of users and their associated network effects to generate sufficient ongoing activity. Once this critical mass is attained, exponential growth can occur.

To address these challenges, **iomob** plans to establish the following vectors for adoption:



Technology That Invites Adoption

To spur the acquisition of providers and end-users, and particularly of small market entrants, **iomob** will build all of the technology required for adoption, from the core layer to user-facing apps. This will allow large businesses to integrate their existing apps, ecosystems, and user bases into **iomob**'s framework. It will simultaneously lower barriers for smaller entrants, who can connect to the protocol directly without needing to build proprietary apps or create their own network effects. The software components will be released under permissive licenses so that others can modify and rebrand them to create profitable businesses.

Outreach and Engagement

iomob is leveraging its existing networks in municipalities around the globe to seek partners that have pioneered new technologies to be "early adopter" cities. Some of these cities, such as Singapore, will also serve as beachheads for **iomob**. Since many other cities in their regions or even globally look to these early adopters for leadership, we believe that if **iomob** can demonstrate its value to these urban leaders, others will follow them onto the protocol.

However, in the event a target city is not prepared to embrace **iomob**, we are still able proceed. If we ensure that validators and hubs are in place that will incorporate open public APIs, cities over time will see the benefits it brings to the decentralized mobility market. In particular, if we are able to demonstrably solve the first mile/last mile problem, we believe municipalities will ultimately embrace the model.

In addition to our strategy of direct municipal engagement, **iomob** has begun hosting meet-ups with mobility communities in high target cities to explain the protocol and its benefits. One has already been hosted successfully in Barcelona.

We have found that once providers understand the knock-on benefits of connectedness - particularly the ability to reach whole audiences of riders outside of a siloed user network - their hesitancy weakens considerably.

Finally, **iomob** intends to identify and target "low-hanging fruit" providers who demonstrate immediate interest in participating. In high value cities, **iomob**, together with its partners, will initiate services already connected to the protocol.

Centrality Partnership

In July 2018, **iomob** finalized a partnership with Centrality, a New Zealand-based dApp protocol that raised over US\$150m in January of this year. The protocol already supports an ecosystem of more than a dozen dApps and has numerous partnerships with major businesses, including in the mobility space. When the two sides met, Centrality was developing its own mobility protocol with a significant overlap in vision with **iomob**. Instead of developing competing protocols, Centrality agreed to invest in **iomob**. Centrality will focus on encouraging adoption of **iomob** via the formation of a joint venture called Senta to explore commercial opportunities to help the **iomob** protocol gain faster and wider adoption globally.

Centrality has already demonstrated a clear interest and capability in the mobility arena. UShare, one of the dApps in Centrality's ecosystem of 400,000 active users, is a live app for connecting passengers with licensed taxi drivers and, when desired, for users to share a ride when traveling in the same direction. As part of the agreement with Centrality, the two parties will work together to first connect UShare to the **iomob** protocol and then to support UShare's introduction in key target markets where it is deemed valuable to seed the market. This effort will pair an **iomob**-connected ride-hailing service to public transit and other potential MSPs.

The Senta joint venture will initially bear much of the responsibility for gaining adoption of the **iomob** Protocol. Our partners at Centrality have a broad and deep network of industry relationships and a robust business development team with experience growing dozens of apps. This expertise will now be brought to bear in bringing the **iomob** Protocol successfully to market. Given the strength of the two teams, we are confident in our ability to execute on our rollout and user acquisition strategy and roadmap.

Local and Regional Partnerships

Barcelona

For the last several months **iomob** has been in discussions with policymakers in the Spanish city of Barcelona. During this time **iomob** hosted a meetup with public and private MSPs in Barcelona and has had several meetings with different agencies responsible for mobility in the city and the region. Given **iomob**'s strong presence in the city, with three of the founders based there, we consider Barcelona a beachhead city in Europe and believe we are well positioned to roll out the Protocol there in the near term.

Germany

In Germany, **iomob** is building a consortium to apply for funding from a government fund called mFund. The consortium is seeking to launch a pilot in the cities of Frankfurt, Berlin, and Munich that would test **iomob** in each of these municipalities. It would also allow **iomob** to explore the potential benefits of integrating the Protocol into multiple cities in the same country, possibly incorporating intercity solutions.



Singapore

iomob has had a number of conversations with officials representing multiple key agencies of the Government of Singapore, including the Ministry of Foreign Affairs, the Smart Cities Agency known as GovTech, and the transit authority, LTA. As a result of these meetings, **iomob** has been given permission by LTA to proceed with an implementation of **iomob** in Singapore. In doing so, the agency has granted **iomob** access to its APIs, which offer near-real-time data on the city's services, as well as the city's fare integration service when it becomes available. The Future Cities Lab, part of ETH Zurich's presence on the National University of Singapore campus, also aims to be part of the implementation, primarily as an independent research group assessing the impact of the **iomob** implementation on Singapore's mobility patterns. This testing phase is intended to serve as a first step toward the eventual full-scale launch of the **iomob** Protocol in Singapore.

United Kingdom

In August 2018 **iomob** was selected by Wayra, a large international startup accelerator, to take part in the Intelligent Mobility Acceleration Programme in London. **iomob** was selected from among a large pool of applicants to join the programme. The accelerator has deep relationships with major British mobility players, including Catapult Transport Systems and Network Rail.

In addition to participating in the Wayra program, **iomob** is also in discussions to partner with CityMaas, a London-based technology company with plans to develop a mobility-as-a-service model on the **iomob** Protocol. The service will initially focus on aggregating mobility services for disabled people.

Fiji

iomob's partner Centrality has concluded an agreement with the government of Fiji to help that nation optimize its transportation networks. Under the agreement, Fiji agreed to embrace Ushare as well as a mobility protocol as part of the process. **iomob** will be the mobility protocol implemented under this deal.

Other Candidates

Centrality has also made significant progress on potential adoption of the Protocol in New Zealand as well as in the U.S. city of Portland, Oregon.

Cryptoeconomic Incentives

As discussed earlier in this White Paper, **iomob**'s token structure will incentivize participation in the network. Specifically, following the initial Token Generation Event, participants will be able to mine additional tokens by performing tasks according to guidelines set by the **iomob** Foundation.

These tasks will be designed to encourage user adoption and the growth of network effects: providing mobility, verification, and other key services. These incentives can be altered and optimized by the Foundation, ensuring that economic incentives continue to be appropriate at each stage of **iomob**'s growth.

Blockchain Cities Alliance

iomob's early experiences conducting business development with smart cities enabled us to recognize that most cities, even those at the forefront of technological innovation, are still trying to understand blockchain and what it can do for them and their citizens.

iomob, as an early player in the application of blockchain in a key smart cities arena - mobility - recognizes that lack of understanding of blockchain technology has the potential to serve as an ongoing barrier to entry with cities. Recognizing that a group consortium was more likely than any single organization to gain traction and offer guidance to these cities, **iomob** spearheaded the creation of the Blockchain Cities Alliance (BCA). BCA is an entity focused on raising awareness among smart cities about innovative use cases, exploring standards adoption and regulatory models, and designing and implementing collaborative projects. At the time of writing, more than a dozen organizations around the world have committed to founding the BCA. **iomob**'s role in this has already started paying dividends, including a recent invitation to join ConsenSys at the Regenerative Cities Summit in New York City in September. **iomob** has also been invited to host a half-day workshop on Blockchain Cities at the Smart City World Expo in Barcelona - the largest event of its kind in the world, attracting nearly 20,000 technologists and city leaders.



Management Team



Boyd Cohen, Ph.D., Co-Founder and CEO. Boyd is a globally recognized expert in smart cities and smart mobility. He has published three books, has the highest cited peer reviewed paper on shared mobility and has co-founded two previous software companies.



Josep Sanjuas, Ph.D., Co-Founder and CTO. Josep has a Ph.D. in Computer Science. Before joining **iomob**, he co-founded and was CEO and CTO of startup Talaia, a spinoff of UPC-BarcelonaTech that applies big data & SaaS to Internet traffic analysis.



Victor Lopez, Ph.D. (ABD), Co-Founder and Director of Software Engineering. Victor has recently finished his Ph.D. in computer science. He is an expert in algorithms and machine learning. Victor was Talaia's first employee before commencing his doctoral studies.



Akasha Indream, Engagement Director. Akasha, a lawyer by training, has developed expertise in communications, corporate strategy and social media management for blockchain projects, and is based in Australia. Akasha is also a pioneer in the Women in Blockchain movement.



Boris Lunoff, Senior Operations Manager. Boris has twenty years in the transportation and shipping industry. He is capable of overseeing a range of projects from web administration to banking and KYC. Boris started immersing himself in blockchain tech in 2017 and had been incubating his own transportation blockchain project when **iomob** recruited him.

Advisors



Bo Shen, Founder and Managing Partner, Fenbushi Capital, Advisor. Bo is a leading voice in the blockchain investment community as one of the founders of Fenbushi Capital, widely regarded as one of the top 10 blockchain VCs in the world. Bo is based in Shanghai.



David Lee, Co-Founder, Block Asset, Advisor. David Lee has been an advisor and mentor to **iomob** since its inception and was the impetus for **iomob**'s first investment from BlockAsset, a baby fund of Fenbushi Capital. He is a passionate advocate for decentralization and financial inclusion. David is based in Singapore.



Susan Shaheen, UC Berkeley, Advisor. Susan is widely regarded as the world's leading expert in shared mobility. Susan is Director of the Sustainable Transportation and Research Center at UC Berkeley. Susan and **iomob** CEO, Boyd Cohen, have had a working relationship in the shared mobility space since 2013.



Antonio Cantalapiedra, Former CEO, mytaxi Iberia, Advisor. Antonio was former head of mytaxi for all of the Iberian peninsula. Mytaxi is a major player in the European taxi aggregation market. Antonio has been working on his own non-competitive blockchain startup since mid 2018.



Praveen Subramani, Principal Product Manager, Turo, Advisor. Praveen as a graduate of MIT's Media Lab and is senior at San Francisco-based Turo, the world's largest P2P carsharing network.



Jim Frazer, Gridaptive Technologies, Advisor



Sol Salinas, Managing Director - Accenture Digital, Advisor. Is the global head of Accenture Digital and their smart cities and smart mobility group.



Jason Nelson, Executive Director Partnership Engagement - Smart Cities Council, Advisor. Jason is a senior executive at the Smart Cities Council, a global member network for the smart cities industry.



Eujern Lim, Blockchain Engineer, Advisor. Eujern holds a bachelor's degree in Computer Science from Carnegie Mellon University and has 10 years of experience of Software Engineering in high-profile startups such as OkCupid, Squarespace and Sevenrooms. He now works as a freelance Blockchain Engineer, after graduating from ConsenSys Academy.



Neil McClaren, Blockchain Engineer, Advisor. Neil holds a first class degree in Mathematics and Computer Science from University of Edinburgh. He has more than 10 years' experience as a software architect working in telecoms and banking. He now indulges his passion for decentralization as a Full Stack Blockchain Engineer, having graduated from ConsenSys Academy in 2017.

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Further Reading

We invite you to read our product white paper [here](#).



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