## **MOBILIO**

# A CRYPTOCURRENCY DIVIDEND FOR SAFE DRIVING

Invented and designed by the team at Dolphin Technologies

www.mobilio.cc team@mobilio.cc

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## ABOUT US

Here at Dolphin Technologies we believe that nobody should die or get injured because of distracted driving. Since 2001 we design, develop, implement and operate scalable platforms, products, and services in the field of Telematics, Mobility, and Marketing Automation (www.dolph.in).

## ABSTRACT

Over a million people die every year in car crashes (Fact Sheet. Road traffic injuries. 2018), and traffic accidents are the leading cause of death for children and young adults aged 5 to 29 years (Global Status Report on Road Safety 2018). Drunk driving and speeding have long been recognized as serious problems, but distracted driving due to smartphone use is a relatively new phenomenon. Despite its recent emergence however, this phenomenon now plays a role in 26% of all car accidents (US National Safety Council 2015), making it the leading cause of road accidents. Young drivers are particularly susceptible, being both more attracted to continuous smartphone use and less able to handle the added distraction while driving (Klauer, et al. 2014).

This paper describes a system for rewarding and monetizing safe driving behavior as a superior method of reducing traffic accidents and mediating the alarming damage caused by distracted driving. Leveraging our experience in insurance telematics, we explore the relative merits of rewards and punishment, and how they can be applied to change negative behaviors using technology and cryptocurrency. For our application, we follow psychological research that favors rewards over penalties. With Mobilio, we want to motivate drivers to avoid using their phones while driving and thus drastically reduce the number of road accidents, deaths, injuries, and material and environmental damage. With the Mobilio app - available for Apple and Android smartphones – drivers collect points for distraction-free driving that can be exchanged for a cryptocurrency called Mobilio (MOB). We have developed an app that allows peerto-peer transfer of this currency. MOB is an ERC-20 token that is generated on the Ethereum blockchain, but it is not a fundraising mechanism for our endeavor. MOB tokens derive their value purely from their utility in the network. Market participants, such as insurance companies interested in reducing traffic accidents as part of their bottom line, can accept Mobilio as a means of payment and use it in turn to reward positive behavior.

Mobilio is a coin that meets a serious need. It fits seamlessly into a user ecosystem that includes not only everyone who drives, but also government and business entities with a stake in reducing traffic accidents.

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### **1 DISTRACTED DRIVING**

When your phone alerts you to a message while you are behind the wheel, there is an overwhelming urge to respond. Who is it? What do they have to share? Checking on your phone while driving may only take five seconds, but at 55 mph, your car travels the length of a football field during that time. Using your phone while driving causes physical and cognitive distraction that kills. For those under 30, traffic accidents are the primary cause of death, according to the WHO in their Global Status Report on Road Safety 2018, with smartphones named as a factor in over a quarter of all car accidents (US National Safety Council 2015).

Distracted driving also has dramatic economic consequences. The global financial losses from auto accidents are estimated at 518 billion USD per year (Jacobs, Aeron-Thomas and Astrop 2000). When all related costs are tabulated - including medical, legal, and administrative costs, plus losses to quality of life - in the U.S. alone, the cumulative costs of auto accidents in 2010 exceeded 800 billion USD (Blincoe, et al. 2015).

#### 1.1 PENALTIES HAVE LITTLE EFFECT

Many people seem addicted to their smartphones (Kwon, et al. 2013) and compulsive behaviors are difficult to control, especially with penalties. Penalties are already in place in many jurisdictions, and while the rate of smartphone-use while driving generally decreases immediately after laws are introduced, this response is transient (Foss, et al. 2009). Penalties don't seem to work (Lawpoolsri, Li and Braver 2008; Hösslinger and Berger 2012). While drivers are aware of the law, the lack of a direct link between risk and punishment weakens the motivation of drivers to follow the rules.

For many drivers, the consequences of distracted driving are hypothetical and distant while the reward for using their phone is immediate. We can think of smartphone use while driving as a carrot (reward) dangled in front of drivers. The temptation to eat the carrot is constantly balanced in the minds of drivers against the threat of the stick (punishment). People weigh the penalty, mediated by the probability of getting caught, balancing it against the reward for acting as they want (Ankers 2001). For most people, this calculation skews towards the immediate reward. Afterall, traffic stops are relatively rare, and penalties, although financially significant, are tolerable relative to the constant rewards of using the phone.

#### **1.2 INCENTIVES WORK**

Studies show that incentivizing safe driving behavior leads to positive changes (Reagan, et al. 2013; Mullen, et al. 2015; Geyer, et al. 2019). Insurance companies have already acted upon the fact by offering pay-as-you-drive insurance policies which are, amongst other things, shown to reduce excessive speeding (Hultkrantz and Lindberg 2011; Bolderdijk, et al. 2011). App-based feedback, together with monetary incentives, has a positive impact on the driving skills of young drivers (Peer, et al. 2019). A common factor in most studies is the conclusion that behavioral change can only be reached if the provided incentives are strong enough. Using a smartphone offers a connection that people crave and triggers a pleasure response in the brain. The reward is small but cumulatively significant. Delaying the need for gratification until it is safe must involve providing a counter-reward to alter behavior. By creating a token that will gain value, we have the means to provide these small rewards that can accumulate into real money and real behavioral change.

### 1.3 PROOF OF CONCEPT - POINTS AND INCENTIVES

The news that mobile phone use has become the main cause of traffic accidents when driving prompted us to address this issue in 2015. Despite constantly rising traffic fines, the number of offences continued to rise. If punishment could not deter accidents, we postulated, then perhaps rewards would work. To test our hypothesis, we developed a smartphone app (goSmart, www.getgosmart.com) that could measure smartphone usage while driving and offered the user points for distraction free minutes. Points could then be exchanged for so-called 'Goodies', i.e. products and services from retailers and brands (e.g. free coffee or soda at gas stations). The high acceptance of the app and our experience with tens of thousands of users helped us to perfect our technology. Meanwhile, our apps and services are used by insurance companies that offer up to 50% discount on Motor Third-Party Liability Insurance for distraction-free driving (e.g. www.safeline.at). With the solid performance of the goSmart app, we decided to take it to the next level with Mobilio.

### **2 MOBILIO CONCEPT**

We have learned a great deal in recent years, especially that immediate reward provides the best way to resist the temptation to pick up the phone while driving. When designing a reward system, however, identifying and convincing new partners to participate is expensive, and not all users are satisfied with the products and services offered. Our solution is to create an open-source 'Rewards Protocol' with a currency earned through 'Proof of Safe Driving.' This protocol and currency can be easily adopted by any and all stakeholders. By joining the network, businesses experience increased economic activity, and - thanks to the reward mechanism - consumers happily change their behavior. For society, the growth of this network translates into lives saved, injuries prevented, and economic burden reduced.

Reward points systems, or loyalty rewards systems, are increasingly used as a method to attract and retain customers and boost sales. The industry ballooned over the last decade in the US particularly, where it experienced year-over-year growth between 10 and 20 percent (Fruend 2017, p. 7). The growth and popularity of these rewards systems is driven in part by the same psychological factors behind smartphone addiction. Just as with social media apps, games, and even messages from friends, people collecting loyalty rewards experience a slow but cumulative pleasure response. The dopamine boost is often enough to drive people to make the considerable effort typically required to collect seemingly small rewards. Our rewards protocol leverages the same 'phenomenon' of human psychology with the notable difference that instead of advancing the interests of businesses, it drives positive behavior that benefits society, and may save your life.

#### 2.1 TRADITIONAL REWARD POINTS SYSTEMS

From a marketing perspective, traditional loyalty rewards appear at first glance to be an effective tactic. A 2018 sample of loyalty rewards programs showed 95% of companies reporting their loyalty program members spend more than non-members annually (Loyalty One 2018, p. 10). Further, the value of data gathered in loyalty rewards systems is increasingly seen as integral for developing new products and creating personalized offers.

However, in recent years the effectiveness of loyalty programs has come into question. First, the setup and maintenance costs of such programs - which include marketing, staff training, call centers and technology support - are high, with companies spending on average 2% of annual sales to do so (Loyalty One 2018, p. 11). Second, customer fatigue is a growing trend, with 38% of US loyalty program participants saying they left a program merely to avoid spam (Fruend 2017, pp. 10-11).

Critically, the effectiveness of status quo loyalty programs is limited by the difficulty of coordinating them across separated businesses. In the current dominant model, each business spends significant resources developing its own loyalty points scheme with each business' system varying significantly on factors such as the value of points and the period of expiration. The unavoidable result is the proliferation of walled-garden point systems that have become a serious inconvenience for consumers. This is evidenced by the fact that although there are currently 3.8 billion individual loyalty rewards accounts in the US, 54% are inactive (Fruend 2017, p. 3) and 28% of consumers have left a rewards program without receiving a single reward (Fruend 2017, p. 9).

### 2.2 AN OPEN-SOURCE REWARDS PROTOCOL WITH CURRENCY EARNED BY 'PROOF OF SAFE DRIVING'

The above analysis points to a missed opportunity for businesses in coordinating their points systems. Indeed, 'coalition loyalty rewards systems' - where many companies use a single rewards currency - are preferred by consumers (Loyalty One 2018, p. 21). When consumers earning points from one business have the opportunity to use those points in another business (and vice-versa), the increased economic activity benefits the entire network. Money itself naturally performs this function, and consequently forms the backbone of economic activity. However, while money can be accepted by any business or partner without technical hurdles, it cannot form the basis of a traditional loyalty network. The reality is that traditional loyalty points systems run counter to creating a shared currency because they are designed to encourage consumers to use only a limited number of airlines, gas stations, supermarkets, and so on.

Coordinating points systems across businesses is only really possible when a neutral currency is used. Thanks to the advances in cryptography that enable the cost-effective minting of secure and transparent cryptocurrencies, it is now possible to design neutral and trusted money. Among the significant differences between the old model of issuing currencies and the new model enabled by the advent of cryptocurrencies, is that the design parameters for these new currencies are wildly more extensive than what was previously possible. In our case, the currency is minted not by government fiat, not by a coalition of self-interested corporations, not even by a well-meaning non-profit. Instead it is transparently minted on a predefined unalterable schedule, then earned solely by time spent driving without a phone. We have coined the term "Proof of Safe Driving" to describe the mechanism for earning and distributing Mobilio - users who own Mobilio have proved that they are safe drivers.

The Mobilio rewards protocol has real economic, personal and societal value: every minute that the user's phone sits idle while driving, reduces the risk of a traffic accident and lowers the burden on society.

To add to the inherent utility of Mobilio token, we offer insurance companies and others the ability to accept it as a means of payment for smaller insurance products such as travel insurance. This is important, as any currency requires users to trust that it has value. Since safe driving is in the interest of insurance companies, they can provide this value by backing it with benefits to users. In return, we offer the use of our technology for contextual risk management. For example, if a user parks in a place where hail is forecast, their insurer can offer a reward in the form of Mobilio tokens for moving the car to a garage. To this end, we offer our services in the areas of predictive analytics, segmentation, automated customer communication, and remuneration in order to reduce the individual risk of insurance customers. This benefits both end-users and insurance companies.



The earning of Mobilio tokens in exchange for undistracted driving has only been made possible through recent technological innovations. Challenges previously preventing the success of such a currency included counterfeiting, security, and the so-called "double spend" or duplication problem. In a digital environment - where copies are free - it was previously impossible to ensure that when A sends money to B, A doesn't retain a copy of the money they sent.

Modern cryptocurrencies eliminate the double-spend problem without having to rely on a central authority. This enables the transparency and neutrality that are necessary to allow widely varied stakeholders to trust in the currency. With a verifiably secure, digitally native currency as a foundation, we can now build a reward system that mimics a marketplace, thereby enabling businesses and consumers to coordinate behavior - to everyone's advantage.

## **3 TECHNOLOGY**

#### 3.1 MOBILIO SMARTPHONE APP

The Mobilio App is available for iOS and Android smartphones and offers three distinct functions for the user: it measures distraction free driving to create points, it converts these points to Mobilio, and it allows users to spend the cryptocurrency that they have earned to purchase goods and services.

#### 3.1.1 MEASURING DISTRACTION FREE DRIVING

The Mobilio app uses proprietary algorithms and system APIs to detect whether a person uses their phone while driving. Drivers who avoid this temptation are rewarded with points. Points are calculated by deducting distracted driving minutes (DDM) from distraction-free minutes (DFM). This means that points are only collected if the phone has been used less than 50% of the driving time (DT). However, there are no penalties, and no trip will be rated negatively. In other words, even if the phone was used for 5 minutes during an 8 minute trip, no points would be deducted and the trip would be scored 0. (Points = max (0, DFM – DDM) or Points = max (0, DT – 2\*DDM).)

Example A: trip duration is 20 minutes and the driver used her phone for 4 minutes. She therefore avoided her phone for 16 minutes, which results in 16 - 4 = 12 points (or 20 - 2\*4 = 12 points).

Example B: trip duration is 20 minutes and the driver used his phone for 15 minutes. He therefore avoided his phone for 5 minutes, which results in 5 - 15 = -10, resulting in 0 points.

The Mobilio app utilizes the available smartphone sensors to create an aggregated data set for every second the car is in motion. The recorded data includes measurements from the accelerometer, magnetometer, gyroscope, and GPS. It is then indexed with touch-screen events to capture a distinct picture of usage. All tracking is performed unobtrusively in the background and the app is optimized for low data transfer and battery consumption.

#### 3.1.2 CONVERTING POINTS TO MOBILIO

Points collected within the Mobilio App can be converted to MOB tokens. The number of points necessary to buy one token (conversion rate) is referred to as the "Difficulty". As tokens are generated linearly over time while points depend on the number of users and their distraction-free minutes driven, the Difficulty is a variable (see our Yellow Paper "Mobilio Difficulty - Conversion Rate between Points and MOB"). The user can exchange points for Mobilio at any time. However, as the Difficulty depends on supply and demand, it is continually adjusting. Nevertheless, the app secures the conversion rate within 60 second intervals. Any transaction must be completed within this timeframe, or be reinitiated. Executing the conversion triggers the deduction of points and their conversion into MOB tokens in the user's account.



#### 3.1.3 TRANSFERRING MOBILIO

Users can transfer Mobilio with the app. To transfer MOB tokens to another user, the sending app has to know the receiver's wallet address, which can be obtained by scanning a QR-code in the recipient's Mobilio app. It is also possible to copy and forward the wallet's address to the sender. In the future it will be possible to transfer MOB tokens to an ETH wallet that can store ERC-20 tokens.

### 3.2 MOBILIO TOKEN

The Mobilio token (MOB) is designed as a decentralized ERC-20 token on the Ethereum blockchain, issued on a continuous time-controlled basis. The minting process is unique in the way it is performed. While the tokens are not pre-generated, it is not required to continuously issue transactions onto the blockchain. Instead, the smart contract is coded as a time-dependent calculation, which assigns the minted tokens (14.26003 per second) to the so-called Bank wallet (see our Yellow Paper "Mobilio Difficulty - Conversion Rate between Points and MOB"). The total supply of MOB tokens is 50 billion. The smallest unit of the MOB token is one "trautsch": one quintillionth of a single Mobilio (10^18 trautsch for 1 MOB).

#### 3.3 MOBILIO FRAMEWORK

The Mobilio infrastructure contains the Mobilio smartphone app, the Mobilio backend system and the Mobilio smart contract executed on the Ethereum blockchain.



There are three Blockchain wallets administered by the Mobilio system:

- Dolphin wallet
- Bank wallet
- Master wallet

Five billion MOB are minted in the Token Generation Event to the Dolphin wallet, with the remaining 45 Billion minted continuously over 100 years into the Bank wallet.

The Dolphin wallet acts as a reserve for later actions. The Master wallet represents the sum of all tokens owned by users of the Mobilio app. All transactions on the Mobilio backend system within a specified time frame are clustered, with a single on-chain transfer made in each interval in order to save on transaction costs while still retaining full transparency. For now, customer wallets are built off-chain in the Mobilio backend system, and the total sum is stored in the Master wallet on-chain. At a later stage, customer wallets could be split out of this wallet.

The Mobilio backend utilizes a custom blockchain backend service (BBS) that offers a representational state transfer (REST) application programming interface (API) to communicate with the Ethereum blockchain. This backend holds the private keys to the Bank and the Master wallet in a secure storage and is therefore the only way to transfer MOB tokens between wallets on-chain.

The Mobilio smart contract handles the transactions among the three major wallets and the user wallets via the standard ERC-20 interfaces. To enable the BBS to communicate transactions onto the Ethereum blockchain we use a docker-based Ethereum client called Parity, which is a widely used open-source software tool for Ethereum.

#### 3.4 WHY BLOCKCHAIN?

Blockchain, created in 2008 to support Bitcoin, provides the infrastructure on which cryptocurrencies exist. As the name implies, blocks of records are linked together, cryptographically, across the internet, and these records are timestamped, fixed and immutable. They are also public. Blockchain can be used to create an unhackable public ledger, upon which business transactions are completely transparent. This transparency is key to the Mobilio concept, because we want everyone to know how many coins are minted and how they are distributed. This is important for the establishment of trust from our users, but also for insurance companies who may build systems to reward their customers for safe driving, based on Mobilio.

Note that a powerful advantage of a cryptocurrency built on a public blockchain is that its supply schedule is both predetermined and entirely transparent. Monitoring the issuance of new tokens is trivial so, unlike with currencies issued by fiat, it's impossible to change the money supply (print money) without all stakeholders instantly knowing. This feature enables stakeholders in the Mobilio ecosystem to rest assured that their holdings are not being arbitrarily diluted.

### **4 BUSINESS MODEL**

We launched Mobilio to prevent traffic accidents and save lives. To achieve that goal, we leverage economic incentives and gamification. By creating an engaging marketplace for automobile safety, we encourage market participants acting in their own best interests to drive more safely. With the Mobilio app we reward drivers for attentive driving. Measuring smartphone use while driving addresses the most prominent cause of accidents. Nevertheless, there are a number of other causes of road accidents that we would also like to consider.

We have described how traffic accidents happen, based on the following hypothesis:

#### "A self-inflicted accident is always the result of wrong decisions or a lack of information".

Therefore, the following formula is proposed to prevent accidents:

- A Prediction regarding who is exposed to which risk and when?
- Communicating risks to warn users
- Remuneration or rewards to encourage change in risky behavior

We offer insurance companies the use of the Mobilio App to provide the answers to exactly these three points.

**Prediction:** The app has the capacity to monitor the position data of its users. Using machine learning and AI, we can also predict future locations. In combination with data from third-party providers (e.g. weather), dangerous situations can be anticipated.

**Communication:** Segmentation can be used to identify affected drivers. A warning can then be issued using various communication channels (e.g. text message, push message, etc.).

**Remuneration:** For an insurance customer to actively avoid a possible risk, a reward may sometimes be necessary in addition to the information. In this case it makes sense to use a remuneration concept such as Mobilio instead of a complicated integration into existing ERP systems. On the one hand, customers can be remunerated directly with tokens, and on the other hand, the insurance company can offer services that in turn can be purchased with MOB tokens.





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