White Paper

1. Overview

The Drone Market, forecasted to surpass 12 billion dollars in sales by 2021, lacks the infrastructure to efficiently support the rapid rise and creation of new applications in this space.

Lack of regulation and inefficient protocols regarding safety and automation make the process of implementing new uses for drones difficult and slow. Despite this barrier to entry, the Drone Market continues to rapidly grow. The market for commercial and civilian drones is slated to grow at a compound annual growth rate (CAGR) of 19% between 2015 and 2020.

BlockchainTaxi's platform will become the scaffolding upon which the automated drone superhighway system of the future is built. BlockchainTaxi will provide the framework for smart contracts to be built that use blockchain technology to automate operations like air traffic control, pre-arranged inspections of structures, disaster responses and any other large scale drone application that requires logistical coordination on a macro level. BlockchainTaxi's Coin will act as the currency and medium of exchange for payments between service providers and customers (for uses such as air taxis and drone deliveries).

By being the exclusive partner of Passenger Drone, BlockchainTaxi will be implemented in a real world setting in the near future. Access to Passenger Drone's hardware infrastructure will allow BlockchainTaxi to be one of the first end to end, intelligent eco systems for drones. Other manned drone manufactures such as eHang, Kitty Hawk, Volocopter and Airbus can become time and cost optimized by building upon the BlockchainTaxi framework - a framework which will already have been proven in a real world setting. By adapting and expanding the Passenger Drone model to other aeronautic industries and manufacturers, BlockchainTaxi will become the foundation of a worldwide intelligent network of drones.

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1.1 Introduction: Why the drone market needs the blockchain

The expanding use of autonomous flying machines:

As early as 6 years ago, drone production and operation was expensive, arduous and reserved only for military and research organizations with enormous budgets. Rapid advances in mobile communication technology, such as accelerometers, and gyroscopic sensors (commonly found in cell phones), have made technology that was once elite and expensive commonly accessible. This lead to the democratization of drones. We are witnessing the dawn of the consumer drone, very similar to the personal computer in the 1970's.

As Chris Anderson, former Editor of WIRED magazine and CEO of 3D Robotics said:

"The military created the Internet, but the people colonized it and created the web for their own purposes. The amateur UAV community has done the same with drones — demilitarize and democratize them so they can find their full potential. Just as the 1970's saw the birth and rise of the personal computer, this decade will see the ascendance of the personal drone. We're entering the Drone Age."

1.2 Evolution of non-military drone capabilities

- **Generation 1:** Basic remote control aircraft of all forms
- **Generation 2**: Static design, fixed camera mount, video recording and still photos, manual piloting control
- **Generation 3:** Static design, two-axis gimbals, HD video, basic safety models, assisted piloting
- **Generation 4:** Transformative designs, Three-axis gimbals, 1080P HD video or higher-value instrumentation, improved safety modes, autopilot modes.
- **Generation 5:** Transformative designs, 360° gimbals, 4K video or higher-value instrumentation, intelligent piloting modes.
- **Generation 6:** Commercial suitability, safety and regulatory standards based design, platform and payload adaptability, automated safety modes, intelligent piloting models and full autonomy, airspace awareness
- **Generation 7:** Complete commercial suitability, fully compliant safety and regulatory standards-based design, platform and payload interchangeability, automated safety modes, enhanced intelligent piloting models and full autonomy, full airspace awareness, auto action (takeoff, land, and mission execution)

1.3 Applications for non-military drones

The Drone Age is much more than just an explosion of consumer drones for recreational purposes. Much like the computer did, the drone is automating a number of processes across existing industries, helping make them safer and more efficient. At present, drones are being used for;

Real Estate Promotion: Real Estate sales brokers of both commercial and private properties use UAVs to capture stunning aerial videos and photographs of their properties.

Agriculture: Farmers use drones to detect crop moisture, irrigation coverage, crop health, insect population and yield calculations.

Land Development and Mapping: UAVs are used to create geospatial maps and high resolution Digital Elevation Models, Digital Surface Models, Orthomosaic and Point Cloud. Geo-spatial measurements allow land developers to make informed decisions in relation to the scoping, planning, design and maintenance of sites. In addition, 3D models of sites aid developers in the placement of power generation facilities, electricity substations, power transmission lines and oil and gas pipelines.

Industrial Inspection: UAVs provide high-resolution detailed photographs of complex structures, for the purpose of inspection, where land based access is difficult or hazardous. Examples are refineries, live flare stacks, are tips; flare booms, bridges and oil and gas production platforms. The benefit of using a UAV over traditional models of industrial inspection is that you can perform an inspection while the asset is still online. UAVs are non invasive and allow for the asset to remain operational as inspection takes place. The use of this technology reduces the need for people to be placed in potentially dangerous locations and reduces cost. Furthermore UAVs are able to provide faster and more detailed reports that can be delivered from the field.

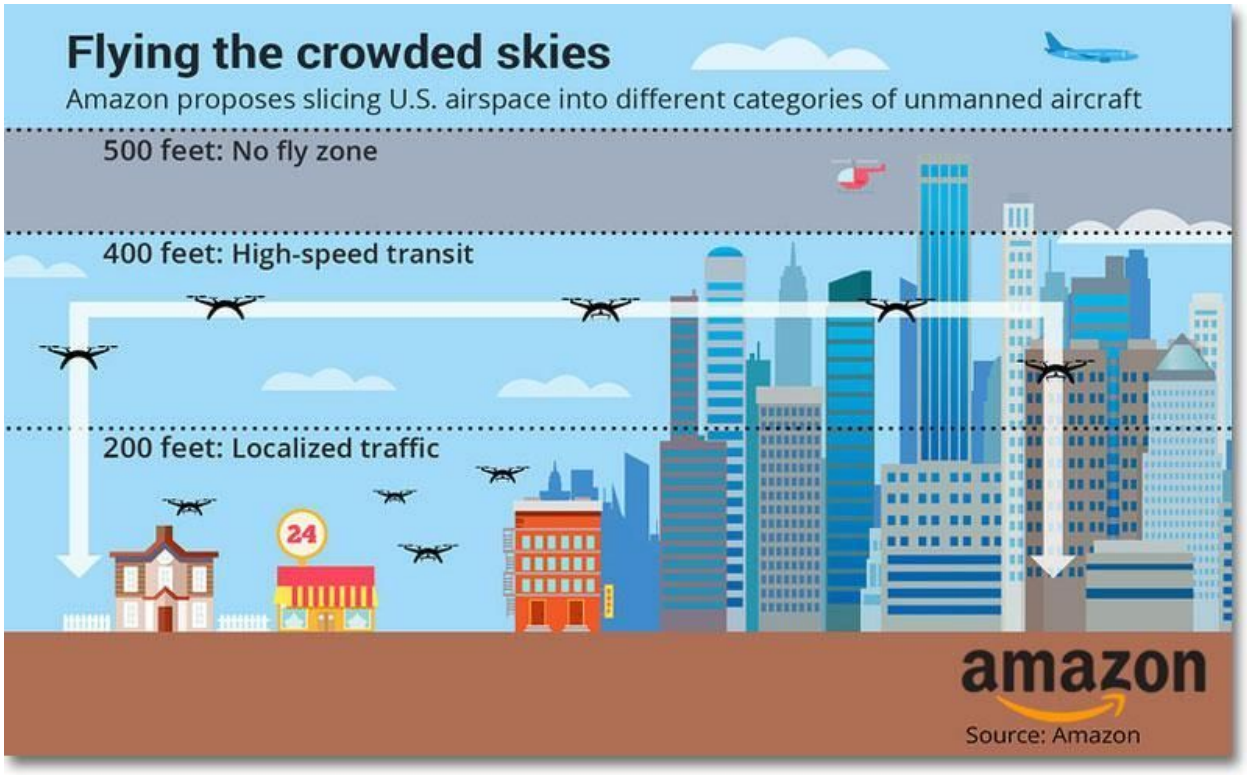
Film and Digital Media: UAVs provide an adaptive flying camera platform for aerial photography and videography. Their heavy-payload capability can support large camera systems. These camera platforms fly high in the sky to capture sweeping panoramas but are also able to get much closer to the subject, giving the ability to capture intimate shots with more depth and dimension. They are frequently used in films, commercials, music videos and documentaries. In addition, drones are used to film live events such as weddings, concerts, and sporting events.

Forestry, Wildlife Management and Precision Agriculture: Topographical images assist with monitoring animal migration and wildlife density, tree growth monitoring, tree illness monitoring, vegetation identification, deforestation monitoring, watershed and many other applications.

Unmanned Cargo Transport (Delivery)

Amazon Deliveries: Amazon is developing Prime Air:

Prime Air is a delivery system from Amazon designed to safely get packages to customers in 30 minutes or less using unmanned aerial vehicles, also called drones. Prime Air has great potential to enhance the services we already provide to millions of customers by providing rapid parcel delivery that will also increase the overall safety and efficiency of the transportation system.



(image source https://www.amazon.com/Amazon-Prime-Air/b?node=8037720011)

Medical Supplies:

In the east African country of Rwanda a company called Zipline is using drones to deliver emergency medical supplies and even blood to remote villages in mountainous terrain. The supplies reach their destination in minutes, instead of the hours it would take a terrestrial vehicle to arrive.

In Switzerland a California company called Matternet is implementing an autonomous drone delivery network across the entire country. The system known as The Matternet Station is a two square foot robotic drone loading dock and smart launching and landing pad that enables hospitals to quickly send and receive crucial medical samples and resources, all by drone.

In March 2017, the Swiss government gave Matternet authorization to operate a "drone logistics network" over densely populated cities. But it is the station that actually forms the network between healthcare facilities, since drones will load their cargo on, take off from, be guided to, and land at the stations — all while communicating with users via an app.

Matternet Drone and Station

(Image source http://mashable.com/2017/09/20/matternet-drone-delivery-switzerland/#IbWgbC6RB5qi)

For example: Say a patient needs to receive a blood transfusion immediately, but an on-site test isn't able to determine his or her blood type. Ordinarily, according to Matternet, the hospital would have to deploy a car or even a taxi to ferry its sensitive cargo and receive urgent test results- which is both costly and inefficient, especially in heavily trafficked areas.

So instead of relying on roads for transportation, doctors, nurses, and technicians can send and receive test samples and results via the drone, and the system's accompanying app.

Using the Matternet system, a technician would package the blood sample in a standardized box bearing a QR code. They would then scan the QR code on the station and deposit the box. The station would then affix the box to the drone, and send it to the appropriate test facility's station, guided with a signal to enable precision landing.

The technician on the other end would be notified via the app that the package had arrived. They would then scan a QR code on their phone to unlock the Matternet Station and receive the blood samples. Finally, they could send the test results back to the hospital in the app, since it's a cloud-based communication and logistics platform. No roads, traffic jams, or driving involved.

Air Flights (Air Taxi)

Manned and unmanned flights are currently present in the marketplace as well as being developed for use in the near future:

1. BlockchainTaxi's partner, Passenger Drone is developing a fleet of unmanned aerial vehicles that will serve as air taxis.

2. The government of Dubai is using Daimler backed German firm Volocopters unmanned aerial vehicles to create air taxis as soon as 2021.

3. German firm Volocopter, which is backed by fellow German company Daimler. The automated vehicle, which lifts and lands vertically like a helicopter, took Dubai Crown Prince Sheikh Hamdan bin Mohammed for a five-minute flight 200 meters above a patch of sand.

It was a short exhibition, but Dubai and Volocopter ultimately want to be able to offer longer rides that last up to 30 minutes. They envision a future wherein you'll be able to hail a flying taxi like an Uber -- simply book one through an app and wait for it at a nearby "voloport."

4. Kitty Hawk, a California based startup, backed by Google's Larry Page, has already released footage of their manned multi-rotor aircraft (Flyer) hovering over a lake. The Flyer weighs only 220 pounds and counts as an "ultralight aircraft," which means you won't need a license from the FAA to fly it. Powered by eight propellers, Flyer can reach speeds of 25 miles per hour.

While the Kitty Hawk Flyer is only meant to be flown over water, Kitty Hawk's CEO, Sebastian Thrun sees the company building the transport of the future.

5. Chinese drone manufacturer eHang makes the manned aerial vehicle eHang 184 and has already made over 100 successful manned test flights. eHang 184 has enough room for a small suitcase and will be controlled through 4G mobile Internet. It is able to carry a single passenger who weighs less than 220 pounds over short distances at 62 miles per hour with a fully-charged battery.

6. Airbus's Vahana flying autonomous vehicle project is a concept design created in partnership with Italdesign. The demonstration vehicle offers modular functionality, meaning it can operate both on the ground and in the air.

The concept vehicle is intended to work with others to form a network that can be summoned on demand, with passengers hailing a ride from an app on their mobile device. The capsule-based design can connect to either ground or air conveyance modules, letting customers specific their preferred method of transit. It's also designed to be used in concert with other, existing transportation methods for maximum efficiency.

Airbus and Italdesign call their creation the ‘Pop.Up System,’ which includes the artificial intelligence platform that uses what it knows about any individual user, and available routes and transit options to determine the best travel options. The main vehicle itself is a passenger capsule, which holds the rider and which can be paired with either ground and air modules.

(image source https://techcrunch.com/2017/03/07/airbus-reveals-a-modular-self-piloting-flying-car-concept/)

7. Uber Elevate is Uber’s answer to the air taxi

Within a decade Uber will have a network, called "Elevate”, of on-demand, fully electric aircraft that take off and land vertically. Instead of slogging down the 101, you and a few other flyers will get from San Francisco to Silicon Valley in about 15 minutes—for the price of private ride on the ground with UberX.

Airborne Wireless Internet

Aquila is the flying drone Facebook’s Mark Zuckerberg and company are designing to provide Internet access in remote parts of the world. It's made of carbon fiber and it tops the wingspan of a 737.

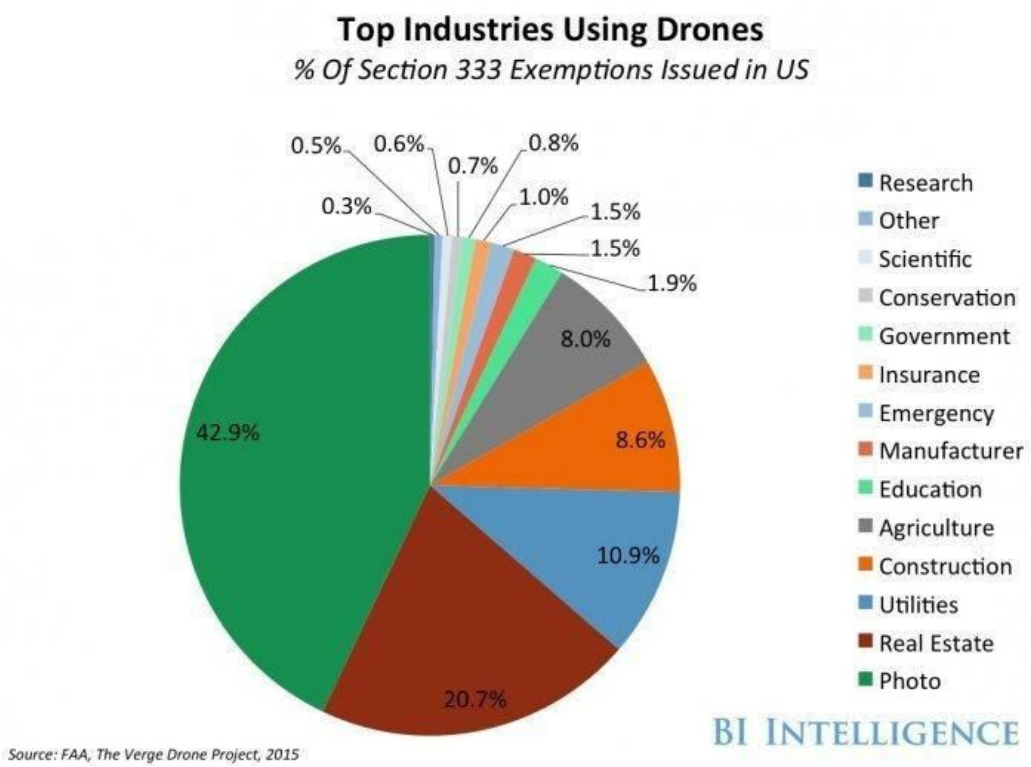
Google’s project Skybender plans to beam internet connectivity from solar powered drones. Project Skybender is currently using an "optionally piloted aircraft (OPA)" called Centaur and a solar-powered drone called Solara 50 made by Titan Aerospace to deliver 5G internet from solar drones. Mountain View has reportedly begun experimenting with millimeter wave-based

internet in Virgin Galactic's Gateway to Space terminal at Spaceport America in New Mexico. Millimeter waves are believed to be capable of transmitting data 40 times faster than LTE.

Storm Tracking and Forecasting

US meteorologists are working on drone technology to better predict severe weather phenomena. While a minor portion of the total drone market, weather applications are very important for scientific research.

Other Applications and Costs



(Image source https://www.uasvision.com/2016/04/29/top-industries-using-drones-in-the-us/)

In order for all these different Drone applications to safely share the air with not only each other but with existing air traffic like planes and helicopters, a shared distributed network, where drones and aircrafts can communicate and share information needs to exist.

1.4 The Drone Super Highway

Enter the drone super highway: The FAA is working to build a Next Generation Air Transport Control System that includes special pathways for delivery drones in urban environments. The FAA has taken important steps to lay the foundations for drone flights in controlled airspace by releasing digital maps that show acceptable altitude limits for operation in areas near certain airports. This will eventually be part of a Low Altitude Authorization and Notification Capability

(LAANC) system that when fully operational will automatically authorize drone flight as part of the whole NextGen system.

1.5 How the NextGen System Would Work

This NextGen System could serve as the model for integrating Drones into existing airways worldwide. But there exist a number of challenges to this integration. The leading challenge among them is compliance.

Legislators can issue regulations, but ensuring drones automatically comply with these regulations across different geographical location requires drones speak a central language. Unlike airplanes and helicopters in which human operators can communicate with each other and air traffic control to assure compliance, drones must rely on a system of automated commands for safety. The blockchain is perfectly suited for this application

2. How The Blockchain Works

There are three principal technologies that combine to create a blockchain. None of them are new. Rather, it is their orchestration and application that is new. These technologies are:

1) Private key cryptography

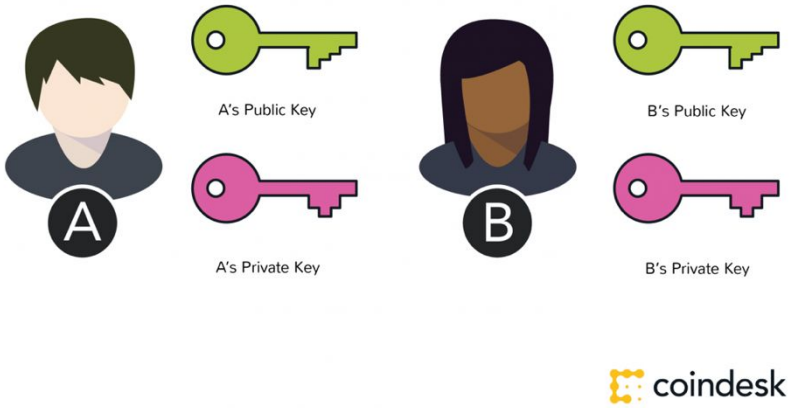
2) A distributed network with a shared ledger and

3) An incentive to service the network's transactions, record-keeping and security.

The following is an explanation of how these technologies work together to secure digital relationships.

2.1 Cryptographic keys

Two people wish to transact over the internet. Each of them holds a private key and a public key.



(*image source https://www.coindesk.com/information/how-does-blockchain-technology-work/)*

The main purpose of this component of blockchain technology is to create a secure digital identity reference. Identity is based on possession of a combination of private and public cryptographic keys.

The combination of these keys can be seen as a dexterous form of consent, creating an extremely useful digital signature.

In turn, this digital signature provides strong control of ownership.

(*image source https://www.coindesk.com/information/how-does-blockchain-technology-work/)*

2.2 Identity

But strong control of ownership is not enough to secure digital relationships. While authentication is solved, it must be combined with a means of approving transactions and permissions (authorization). For blockchains, this begins with a distributed network.

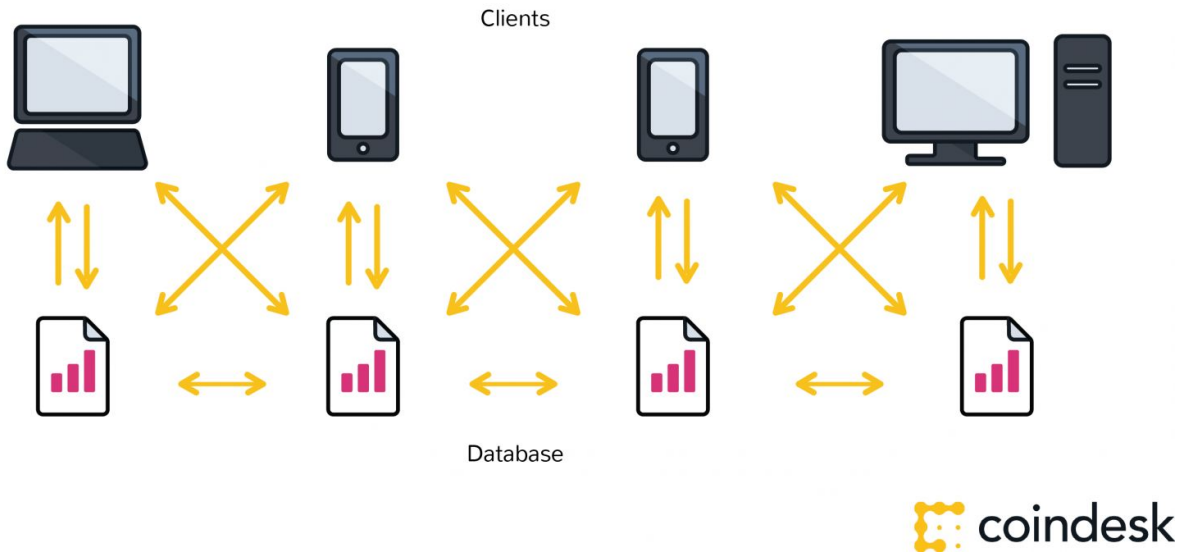
2.3 A Distributed Network

The benefit and need for a distributed network can be understood by the 'if a tree falls in the forest' thought experiment. If a tree falls in a forest, with cameras to record its fall, we can be pretty certain that the tree fell. We have visual evidence, even if the particulars (why or how) may be unclear.

Much of the value of the bitcoin blockchain is that it is a large network where validators, like the cameras in the analogy, reach a consensus that they witnessed the same thing at the same time. Instead of cameras, they use mathematical verification. In short, the size of the network is important to secure the network.

That is one of the bitcoin blockchain's most attractive qualities — it is so large and has amassed so much computing power. At time of writing, bitcoin is secured by 3,500,000 TH/s, more than the 10,000 largest banks in the world combined. Ethereum, which is still more immature, is secured by about 12.5 TH/s, more than Google and it is only two years old and still basically in test mode.

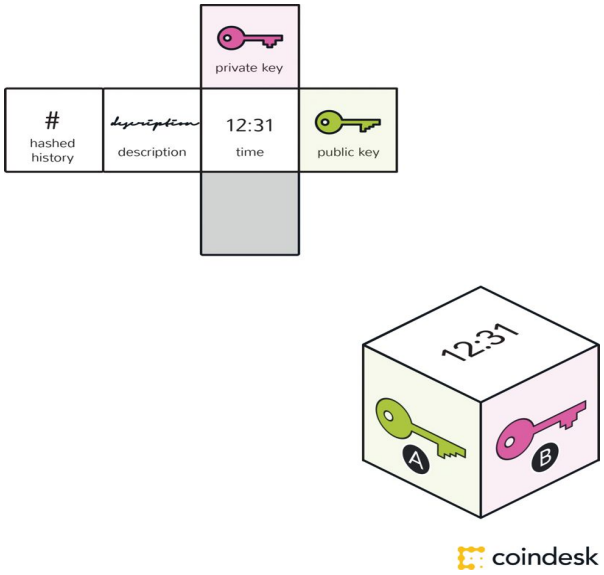
2.4 System of Record



(*image source https://www.coindesk.com/information/how-does-blockchain-technology-work/)*

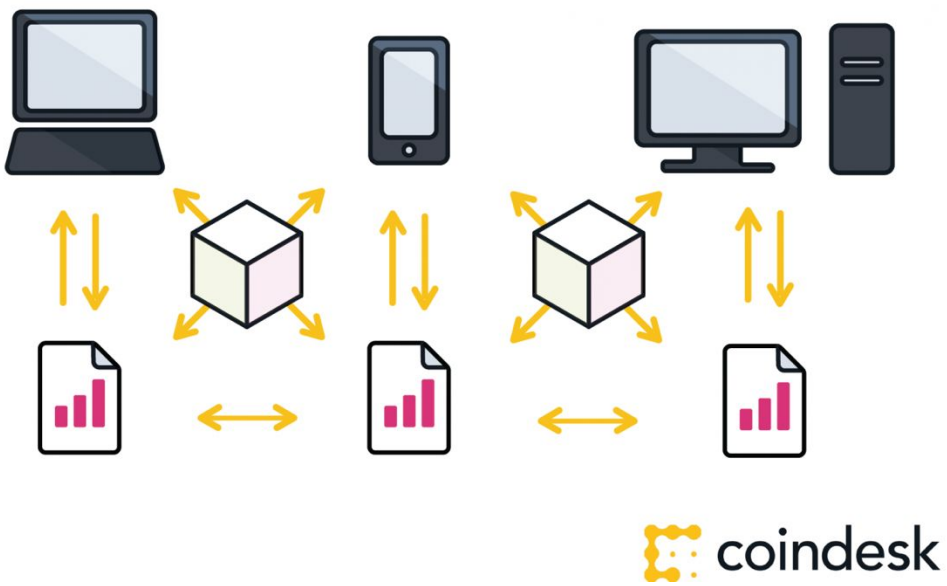
When cryptographic keys are combined with this network, a super useful form of digital interactions emerges. The process begins with A taking their private key, making an announcement of some sort — in the case of bitcoin, that you are sending a sum of the cryptocurrency — and attach it to B's public key.

2.5 Protocol



(*image source https://www.coindesk.com/information/how-does-blockchain-technology-work/)*

A block – containing a digital signature, timestamp and relevant information – is then broadcast to all nodes in the network.



2.6 Network servicing protocol

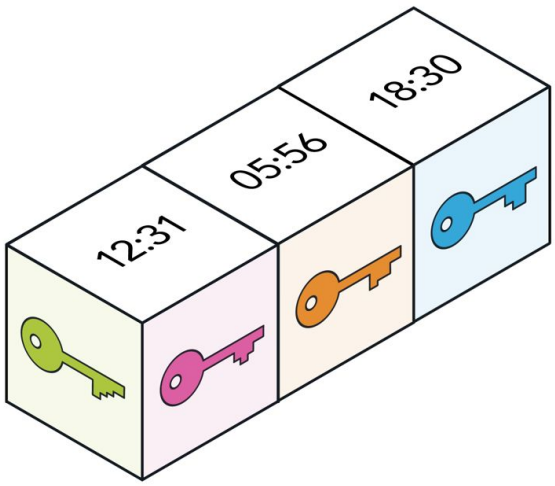
A realist might challenge the tree falling in the forest thought experiment with the following question: Why would there be a million computers with cameras waiting to record whether a tree fell? In other words, how do you attract computing power to service the network to make it secure?

For open, public blockchains, this involves mining. Mining is built off a unique approach to an ancient question of economics — the tragedy of the commons.

With blockchains, by offering your computer processing power to service the network, there is a reward available for one of the computers. A person's self-interest is being used to help service the public need.

With bitcoin, the goal of the protocol is to eliminate the possibility that the same bitcoin is used in separate transactions at the same time, in such a way that this would be difficult to detect. This is how bitcoin seeks to act as gold, as property. Bitcoins and their base units (satoshis) must be unique to be owned and have value. To achieve this, the nodes serving the network create and maintain a history of transactions for each bitcoin by working to solve proof-of-work mathematical problems.

They basically vote with their CPU power, expressing their agreement about new blocks or rejecting invalid blocks. When a majority of the miners arrive at the same solution, they add a new block to the chain. This block is timestamped, and can also contain data or messages. Here's a chain of blocks:



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The type, amount and verification can be different for each blockchain. It is a matter of the blockchain's protocol – or rules for what is and is not a valid transaction, or a valid creation of a new block. The process of verification can be tailored for each blockchain. Any needed rules and incentives can be created when enough nodes arrive at a consensus on how transactions ought to be verified.

It's a taster's choice situation, and people are only starting to experiment.

We are currently in a period of blockchain development where many such experiments are being run. The only conclusions drawn so far are that we are yet to fully understand the dexterity of blockchain protocols.

3. How BlockchainTaxi Works

BlockchainTaxi applies the blockchain to the drone space and can be used for the following applications:

3.1 Smart navigation protocol

Flight protocols like height and flying area restrictions can be written on the same platform in the same language but vary depending on their location. For example, New York City can have different flight protocols than Paris, but both use the BlockchainTaxi platforms to create smart contracts enabling the same drone to fly in both locations while remaining compliant with the individual air traffic regulations.

Additionally, the BlockchainTaxi application can store navigation route data recorded during manned test flights. Navigation data on an immutable blockchain ledger cannot be tampered with. Meaning the smart drone ecosystem can be informed by countless hours of human flight.

3.2 As an ecosystem for contract compliance

Ethereum for the aerial robotics industry. BlockchainTaxi provides the scaffolding to build Smart contracts on top of that can govern autonomous drone operations like inspection of bridges, wildlife and agriculture as well as maintenance of drones, pricing for services and any yet undiscovered future drone applications.

3.3 As an ecosystem for economic transactions

Smart contracts can be used to automate payments for those same drone services. The entire network of inspection, maintenance and services (like air taxi rides) and payments for said services can be automated and executed by the BlockchainTaxi platform for both small scale applications, like paying for your air taxi, or large scale operations, like paying for the inspection of structures and other recurring services.

3.4 Regulation friendly model

Additionally, BlockchainTaxi helps the entire drone industry move forward by ensuring compliance with local flying regulations as information on the blockchain cannot be tampered with. This gives regulators the ability to create sensible legislation with complete confidence that compliance will be mandatory.

4. Token Sale Overview

The token sale will begin in December 2017. 60 Million BCT will be available per SAFT agreement during the presale and token sale, for total of 25,000 ETH. The token sale will be structured in 3 tiers: Presale, Tier 1 and Tier 2.

All tiers will be governed by smart contract. Presale will be capped to 2,500 ETH and will automatically end when all tokens are sold. In the case that not all tokens are sold, the remainder tokens will be added to Tier 1 with Tier 1 conditions. As soon as the all tokens from Tier 1 are all sold, Tier 2 conditions automatically come into effect. More details are below:

4.1 Presale

10 million BlockchainTaxi Tokens (BCT) will be available during the presale at a cost of 1 ETH per 2,500 BCT and will be capped at 4,000 ETH. The Presale will start on 15.12.2017 at 09:00 UTC and run until 15.01.2018 or until all 10 million tokens are sold.

4.2 Token Sale

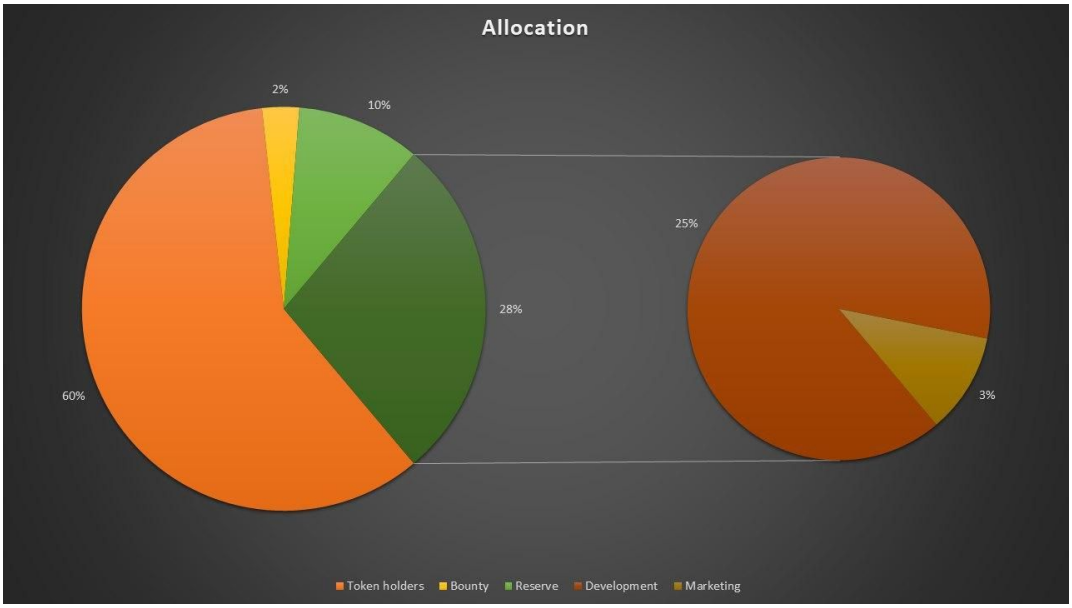
The token Sale will take place at the end of January and will be separated into two tiers:

Tier 1 of the token sale will start on 20.01.2018 at 09:00 UTC and run until either: all tokens are sold, which is when Tier 2 will automatically start, or 20.01.2018 23:59 UTC. In Tier 1, 20 Million BCT will be available at a cost of 2,222 BCT per 1 ETH and capped at 9,000 ETH.

Tier 2 will start immediately upon completion of Tier 1, independent of how many days of token sale are left until the final closing date of 20.02.2018 23:59 UTC. In Tier 2, 30 Million BCT will be available at a cost of 1,818 BCT per 1 ETH and will be capped at 16,500 ETH.

5. Distribution of Funds

28% of the total supply will be held by the team, used directly for development (25%) and future marketing (3%) of the BlockchainTaxi application. 10% is held in reserve for liquidity / unforeseen costs, bringing the total held by the team at 38%. 2% will be allocated to various bounty programs: 1% for Country Managers and 1% for media bounties. This brings the total held by token holders to 62%.



We strongly intend to uphold this division of total token supply, no matter the amount sold. The funds collected during the ICO will be allocated to developing the following aspects of BlockchainTaxi's platform and will be executed in sequential order.

5.1 Ongoing Application Deployment

In order for the BlockchainTaxi pilot app to function optimally it needs to collect a large cache of data from human pilots. This cache of data is critical to BlockchainTaxi's functionality and is the cornerstone of BlockchainTaxi's interconnected global network. Further perfecting the UX design and growing the user base will be BlockchainTaxi's first cycle of focus.

BlockchainTaxi's initial round of funding will be used to hire a devel team, build out the app and grow the initial audience.

5.2 Ongoing passenger drone development

As BlockchainTaxi perfects it platform its hardware partner Passenger Drone will work to fully integrate BlockchainTaxi into its line of manned drones (air taxis).

To this end BlockchainTaxi will dedicate its second cycle of focus and funding. This will require additional developers that can integrate BlockchainTaxi's platform into Passenger Drone's functional protocol.

5.3 Regulatory approvals and establishing new routes

A large part of BlockchainTaxi's value is the framework it provides legislators with which to pass regulation and ensure compliance. To this end BlockchainTaxi will lobby legislators to be

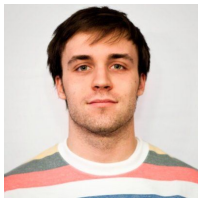
integrated into the FAA's NextGen system and will use this as a model for integration into air traffic control systems worldwide.

5.4 Marketing BlockchainTaxi Service

Once BlockchainTaxi's infrastructure (platform, app and initial user base) have been solidified BlockchainTaxi will focus its efforts and resources on mass adoption. This will require a marketing campaign to convince new users to trust both BlockchainTaxi and the overall safety of air taxis. A large part of this marketing effort will take place in conjunction with passenger drone.

6. BlockchainTaxi Team

Stefan Petrov, Co-Founder
Stefan is an experienced project manager and business development manager who co-founded Passenger Drone in February 2015.



Nikolai Ivanov, CTO
Nokolai brings 10 years of experience as an engineer, including for Vueling (consultant), Thomson Airways (consultant) and Bulgaria Air (airworthiness engineer).

Venelin Genadiev, Software Developer
Venelin is a Java Developer with over 7 years of experience working in IT as a developer. He holds a degree in computer science.

Jordan Nikolov, Software Developer
Jordan is a PHP and web application developer with a Master's Degree in Computer Science from Moscow Institute of Physics and Technology.

Angel Adamovic, Avionics Engineer
Angel brings over 6 years of experience working as an avionics engineer for leading airlines such as Singapore Airlines and Swiss Airlines. He leads engineering efforts.

Petar Stamenov, Carbon Fiber Specialist 3D Molding
Peter is an experienced software architect focusing on Passenger Drone's prototyping and 3D molding, with a heavy focus on carbon fiber.