



# Bringing the Blockchain to Hotels

## A White Paper

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## Executive Summary

Nocturus is a decentralized travel distribution network developed using blockchain technology to significantly reduce the high costs of distribution in the hotel industry returning profits back to hotels and value back to customers. Our technology aims to break free the stranglehold the current companies have on hotels due to the highly-concentrated and centralized nature of the current travel distribution market by reducing the high-barriers to entry thereby increasing competition and innovation in this space.

The worldwide hotel booking market generates approximately 550 billion USD in gross bookings per year with the vast majority of all hotel rooms are booked online using the current distribution network. The major companies operating in this sector have reported record breaking revenues and some have shown over 30% year-over-year EBITDA growth.

A number of companies that have been developing applications of blockchain technology in hopes of "disrupting" an industry and using ICOs to fund these ventures, have been too focused on the technology and its use rather than the needs of the market they hope to operate in. The primary characteristic of our company that sets us apart from our competition and will provide us a sustainable competitive advantage is our team. Comprised of a perfect balance of industry veterans, technology wizards and business development/finance geeks, our team has attacked this project with one focus and one focus alone: create value. This value comes in the form of increased profits for hotels through cost reduction, lowering the barrier to entry in the OTA industry and restoring the cost to value relationship customers deserve when booking hotel rooms. We believe that in business, creating value in the marketplace is the single most efficient and effective method to increasing and retaining market share.

Our technology, once successfully implemented, will more efficiently and effectively match hotels containing available capacity with customers looking for accommodations versus the existing distribution system. The reduction in cost to property owners using our technology as opposed to the existing network should alone encourage early adoption of our system and allow us to acquire significant market share. Even though we are looking to charge significantly less for similar access as compared to the existing distribution network, the use of our technology allows our company to employ a low cost business model. Based on our projections, not only will our model exceed our estimated break-even point, but generate significant profits.

There are other companies currently developing applications of blockchain technology just like we are to compete in this market. Although these companies will be competing in the same market with us using similar technology, their applications primarily aim to eliminate the existing distribution network and allow customers to more easily book directly with hotels. We considered this strategy in early stages of development, but while this sounds like a good strategy in theory, we believe that there are inherent hurdles within the market too great to allow for significant adoption.

Once we have developed and successfully implemented our technology we will pursue options to protect our intellectual property. We feel that rushing to patent our technology while it is still in the beta phase would be

foolish and fiscally negligent. Based on our current market strategy, we are expecting to reach technological feasibility and successful implementation in Q42018. Our team and advisors

In this white paper we will take a deeper dive into how the current market works as well as further explain how our technology will benefit all parties involved.

## I Our Business

The worldwide hotel booking market generates approximately 550 billion USD in gross bookings per year. Despite the size of the industry, in many markets, it is considered a "mature" market with only minimal growth rates. The US hotel industry, for example, has only averaged 1.6% year-over-year growth for the last 20 years while US Real GDP growth rate for the same period was 2.3%. In fact, a recent study of US hotels found that the inflation-adjusted average daily rate (ADR, a key industry metric) fell by 10 USD in the period 2000-2015. To best understand why this industry has exhibited slow growth rates and decreasing ADR, it is best to understand and analyze the five major forces that affect profits as defined by Michael Porter.

The first competitive force is the threat of entrants. High barriers to entry characterize the hotel industry due to high capital costs, high proportion of fixed costs to variable costs and the limited availability of suitable locations.

The next competitive force to evaluate is the availability of substitute products. The overall economy has experienced a shift in recent years as a result of the emergence of a new sharing economy. As a result of the sharing economy, peer-to-peer lodging platforms such as Airbnb, VRBO, Homelink and HomeAway have been experiencing double-digit growth rates, reducing demand from traditional hotels. It is also expected that the peer-to-peer lodging platforms may limit the number of high demand nights during which traditional hotels can charge rate premiums.

The third for is the bargaining power of suppliers. While some small and independent hotels may face higher demand from suppliers, the hotel industry overall relative to other industries are not significantly subject to the bargaining power of suppliers. There many vendors in the market supplying the goods and services hotels need to operate and while experienced trained personnel can sometimes be limited in some markets, a quality onboarding and training program can mitigate this factor.

Next, we will evaluate the rivalry among existing competitors. The hotel industry faces intense rivalry among existing competitors primarily due to the high fixed cost nature of the industry. This causes strong pressures to fill open rooms by price-cutting, often to the point of break-even rates just to cover the fixed costs.

The last competitive force and to us, the one we hope to reduce, is the bargaining power of buyers. In the US, approximately 72% of customers book hotels using online travel agencies (OTAs). OTAs book rooms through Global Distribution Systems (GDS) which charge significant fees to broker these transactions. There is a significant concentration of power as the two largest OTAs control 95% of the OTA market and the top three GDSs have 99% combined market share allowing them to charge virtually whatever they want to the hotels in booking fees.

We feel that the bargaining power of buyers through the concentration of power in the GDSs is the greatest force decreasing profitability in the hotel industry. This is where we come in. We believe that our technology, when implemented, can restore significant profits back to the hotels as well as value back to the customer. In this section we will take a deeper dive into how the current market works as well as further explain how our technology will benefit all parties involved.

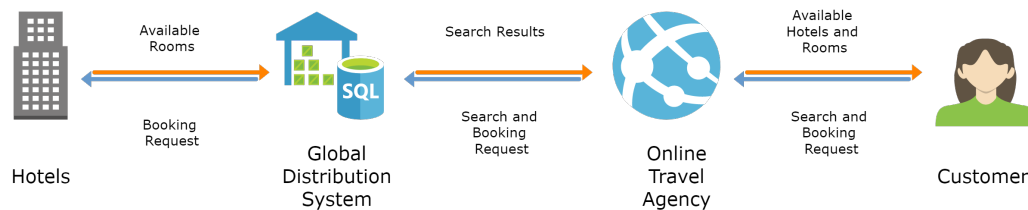


Figure 1: The GDS is a middleman between OTAs and hotels, keeping track of what rooms are available, and charging a hefty fee for the service.

### 1.1 The Current Booking System

There are three major channels that hotel rooms are sold through: travel agents, online travel agents (OTAs), and directly to customers (phone, fax, website, etc). The proportion of total bookings handled by each channel varies by the type of hotel. Although it appears that there is strong competition in the OTA market, in reality, most of these websites are owned by the same company. For example, the largest OTA in the United States is Expedia, which also owns hotels.com, hotwire.com, Trip Advisor, as well as many others, and the two largest OTAs in the US together control 95% of the OTA market. Globally, the proportion of bookings handled by OTAs varies depending on chain size, with small chains and independents predominantly selling through OTAs (up to 70% of bookings) large chains depending on OTAs for around 25% of the total bookings.

Through a combination of their dominant position in the booking market and the lack of competition in the OTA market itself, OTAs are able to force high commissions and onerous contract terms onto even the largest hotel chain. Booking commissions for OTAs can run from 10-50% of the booking price, with an average of 20% for major chains and 25% for independents. These types of commissions would normally leave a large amount of leeway for hotels to undercut the OTA through direct sales, however OTA contracts also require price parity. Price parity clauses restrict hotels from offering rooms through other channels at a lower rate than through the OTA which limits the hotel's ability to charge rate premiums in high demand periods .

Hotels have fought hard but to reverse this trend and drive traffic to their own sites, with only a few large chains having success. With price parity hampering their ability to compete on price, and the inability to compete with the diversity of properties OTAs can offer, they have been unable erode the stranglehold of the OTAs.

### 1.2 Global Distribution Systems

While some room inventory is handled by direct contracts between hotels and OTAs, much of the OTA inventory comes from a middleman: Global Distribution Systems(GDS) (see figure 1.) The first GDS was created in the 1950's as a centralized database of hotels for travel agents, and has since evolved to serve OTAs. There

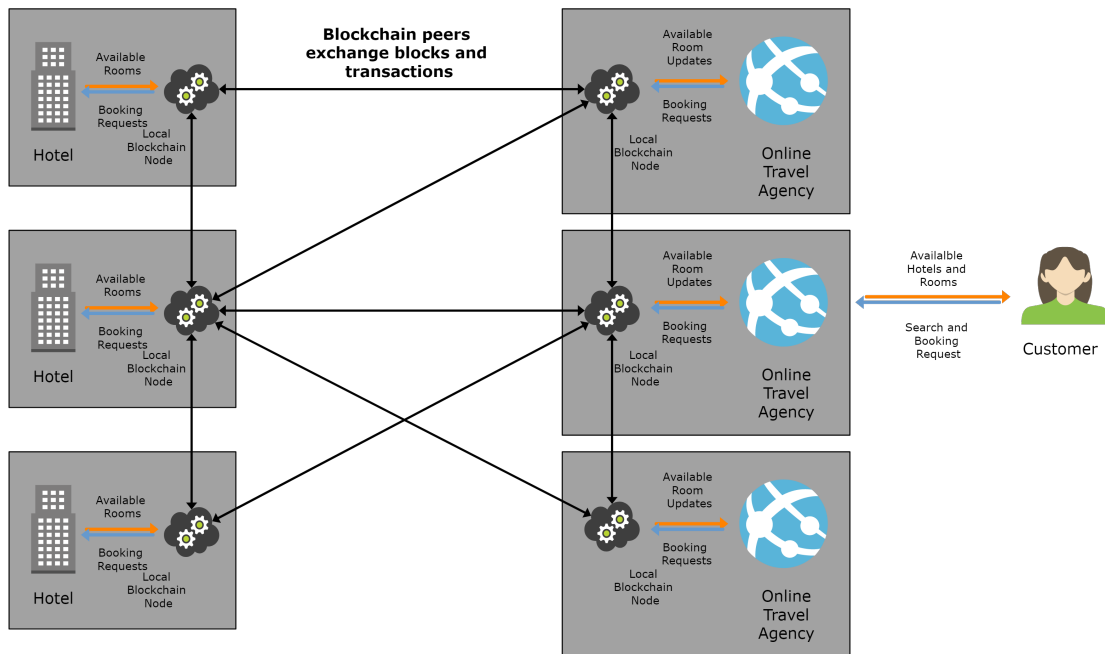


Figure 2: The blockchain is a distributed ledger, with peers exchanging booking and availability information among themselves, no middleman required.

are multiple GDSs, but they have contractual agreements and peering arrangements to share data and limit competition. When a hotel has rooms to sell, they list these rooms in the GDS, where they can be searched and booked by OTAs. GDSs also handle almost all booking done by travel agents or travel agencies.

As middlemen, GDSs enable the market, but also have a negative impact in that they impose another layer of high fees. As the gatekeepers of booking data, they exploit their position and charge fees for everything: listings, searches, bookings, etc. For example, in the North American market Sabre, the largest GDS, charges 12 USD per booking. Given that the average room cost in the US is 120 USD, this is an additional 10% fee on top of the OTA or travel agent commission, on average, and as it is a flat rate, a much higher percentage for cheaper rooms.

While it would seem natural that GDSs would form the perfect partner for new OTAs or distribution channels, this is not the case. Instead, they form a formidable barrier to entry to new OTAs seeking to enter the market. In addition to fees for data access, GDSs also charge large startup fees, monthly fees, and require a strict integration testing before OTAs are allowed to access their data. This precludes all but the most well-funded startups from entering the OTA market.

### 1.3 How We Want to Change Things

It is our opinion that the core of the problems with the current hotel booking system lies with the GDS system. This role as keeper of access to the data allows them to charge crippling fees, that both hotels and OTAs are forced to pay to do business. Further, the onerous financial and technical requirements to connect to a GDS allows OTAs to limit the ability of small competitors to enter the OTA market, which gives the dominant OTA players the ability to charge high commissions and control contract negotiations with hotels.

Our solution to this is simple: we will replace the GDS system with an open *blockchain* solution (see figure 2.) Our blockchain will be decentralized and will run primarily on hotel and OTA hardware, allowing us to charge only a small (2%) fee on booking transactions and no fees for listing, searching, or other operations, which is a significant savings over the current GDS model. Furthermore, we can replace paper contracts with smart contracts, allowing us to remove the need for expensive legal negotiations and allowing hotels to conduct business with unknown and untrusted OTAs. This creation of new OTAs and other sales channels should increase competitive pressure on existing OTAs, decreasing their leverage with hotels, and decreasing OTA commissions.

### 1.4 How We'll Make Money for (almost) Everyone

The core question from a business perspective is "Why would OTAs and hotels do business with your blockchain instead of the GDS?" In the following section, we will take a look at this question from each party's perspective..

#### 1.4.1 From the Hotel Perspective

Because we will initially have fewer OTAs using our blockchain, we expect hotels to initially list both on our blockchain and the traditional GDS and OTAs at the same time. However, while the price parity clauses of hotel-OTA contracts will still apply, rooms listed on our blockchain are not subject to agreed OTA commission rates, and can be listed with reduced commissions vs GDS listings. If the room is booked through the GDS, they pay the normal commission and fee, and nothing to us. If it books through our blockchain, they pay a reduced commission, and no fee to the GDS, increasing their profit margin significantly. Thus, adding the blockchain to their sales channel is risk free, and potentially will increase their profitability significantly.

To see an example of this, consider the average room in North America, with a room rate of 120 USD. The profit margin on a room rental (not including foods, drinks, and is 17% on average, meaning the average profit per room is only 20 USD per night. Now assume the room is booked through our blockchain, with a commission of 10% and a transaction fee of 2%, with no GDS booking fee. This reduces the total fees from 20% + 12 USD to 12%, going from 36 USD in total fees to 14.40 USD in fees and the total profit per room from 20 USD to 41.60 USD, a more than 100% increase. Even in the case that the commission is unchanged, the reduction of the 12 USD fee to 2.40 USD represents a 50% increase in per room profit for the hotel that has the potential to go straight to the bottom line.

To put this savings in perspective, there are a little over 5 million hotel room in the United States, with an average occupancy rate of 65% and approximately 60% of rooms booked through either OTAs or the GDS. Based on these numbers, the US hotel industry would save approximately 7.2 billion dollars a year, and just the difference in booking fees, with no change in OTA commission. The biggest winners in this change would be small hotel chains and independent hotels, who often get the worst deal from the current system because of their size and lack of bargaining power.

#### 1.4.2 From the OTA Perspective

How things will play out for OTAs is largely speculative. From the existing OTA perspective, it will be difficult to ignore the blockchain. Hotels will have a strong financial incentive to switch to the blockchain, given the large profit increase they would see from the switch, even at identical commission rates. If existing OTAs ignore this channel and allow competition to build, they run the risk of losing market share to existing competitors and new market entrants who are using our technology. On the other hand, while it would initially seem that for OTAs that the blockchain would be a negative thing, this is not necessarily the case. While increased competition in the OTA space will probably reduce commissions, the current GDS system includes numerous fees that OTAs must pay: fees to search, fees to get detailed listings, monthly connection fees, etc. The elimination of these fees could largely offset the reduced commissions from a larger OTA market. Also, if existing OTAs switch early, they may successfully hold their market position and they can continue to command the same commissions, with reduced fees, increasing their profit margins.

### 1.5 Why Nocturus?

There are several competitors in the hotel space for blockchain based solutions. It's natural to ask "Why Nocturus?" In this section we will discuss what we think are the key differentiators between us and our competition.

#### 1.5.1 Our Business Perspective

We feel that the core difference between us and our competition is our team and how we approach the problem. Many blockchain companies focus on the tech aspects and ignore the realities of the business environment they operate in. At Nocturus, we realize that it's not enough to talk about "disrupting" and building pie-in-the-sky technology. To break into an established and conservative industry like the hotel industry, you have to have a deep understanding of how they think, how they do business, and the ability to build a system which will allow them to transition to your technology as painlessly and as risk-free as possible. That why we plan to build transitional systems and to integrate with existing hotel systems as much as possible, to ease the pain of transition and encourage adoption.

### 1.5.2 Our Team

At Nocturus, our team reflects our business-centric philosophy. Our CEO is a hotel industry veteran with over 25 years of experience. He's worked for some of the biggest names in the business, including senior management positions at Intercontinental Hotel Group, the largest hotel chain in the world. He looks at our technology through the eyes of a hotel owner and manager, and works with our tech team to build software that not only innovates, but solves real business problems that hotel chains face. This perspective and deep knowledge of not only the management of a hotel but the day-to-day operations has helped us develop a system that integrates with a hotel's existing work flow, while allowing them to transition without risking their profits.

On the tech side, our team is world-class as well, led by our CTO, who has more than 20 years experience in software development, most of it at startups, and a PhD in computer science from one of the top ten universities in the world. About 25% of our engineers have PhD degrees, and 100% of them are smart and hardworking, ranging from grizzled veterans to fresh, enthusiastic, new grads. With this mixture of experience and brain power, there is nothing we can't build.

We also believe that financial management is key to a successful business. That's why we've recruited a CFO who is a certified public accountant with extensive experience in accounting, auditing and advisory services in 25+ industries including hospitality and gaming. Just prior to working at Nocturus he was part of the strategic planning and budgeting group for a major US corporation. (Due to a non-compete clause in his previous employment contract, we can't officially bring him on board or publish his information until the end of his cooling-off period.)

### 1.5.3 Our Operating Environment

We currently have offices in two locations, with our main office in Miami, Florida. This is an excellent location for us, because Florida is a major vacation destination in the US, with a high density of hotels, both large and small chains. This gives us an excellent opportunity to find US partners and collaborators. Miami is also considered the "Gateway to Latin America", giving us access to the hotel markets of Central and South America. Our CEO is fluent in Spanish and has strong ties to the region, having managed revenue growth for the Latin American region for Intercontinental Hotel Group for several years, making this a key advantage for us in growing our market.

Our development office is located in Suzhou, China. Suzhou is a city of 12 million people, located 25 minutes outside Shanghai. Its nearness to Shanghai, similar standard but lower cost of living, and its large number of universities makes it ideal for recruiting high quality technical staff at a reasonable cost. Suzhou is home to branch offices of several multinational tech companies, with the newest being the Microsoft Research Asia office. The Suzhou government is extremely tech friendly, actively encouraging tech development through matching funds and grants.

In addition to providing a perfect, cost-effective environment for software development, Suzhou also gives us excellent access to the Asia Pacific hotel market, which, because of its high growth rate and dynamic nature,



provides many potential collaborators for us. The Chinese market in particular has enormous potential. There are a large number of independent hotel chains in China, which are the most affected by high middleman fees. In addition, there is only one GDS, TravelSky, and the recent purchase of Elong and Qunar by Ctrip means there is now only one OTA in China. This combination of limited options and a high density of independents is an ideal market for us to break into.

## 1.6 Roadmap



## 1.7 Risk Analysis

In this section we will analyze the risks to our proposed business mode and discuss how we plan to mitigate those risks. We have identified five risk areas that we feel are most relevant:

- Execution Risk- the risk of not being able to successfully enter a market or introduce a new product.
- Operation Risk - risk due to breakdowns in internal processes, people or systems.
- Financial Risk - risk we have insufficient money to bring our product to market.
- Market Risk - risk to declines in our operating market.
- Compliance Risk - exposure to legal penalties, financial forfeiture and material loss for failing to act in accordance with industry laws and regulations, internal policies or prescribed best practices.

### 1.7.1 Execution Risk

Execution risk is the most risk any start-up company faces. We intend to mitigate this by having a strong product that provides value for both OTAs and hotels, and is also easy to integrate into their respective operations. We

also have a strong business development team in both our US/Latin America and Asia markets, and several soon-to-be-announced partnerships with hotels and travel agencies on both side of the Pacific.

#### 1.7.2 Operation Risk

Our executive management team is well-seasoned with more than 20 years of experience in their respective areas. We do not anticipate any operational issues.

#### 1.7.3 Financial Risk

We are currently internally funded and have funds to last at least six months. While we think our ICO sale is the best way to raise the funding to complete development, we also have been approached by several investors who have expressed interest in buying an equity stake in Nocturus, giving us multiple avenues to continue the project.

#### 1.7.4 Market Risk

The hotel market is remarkable stable and mature. We feel there is little risk to a substantial decline in hotel room bookings. The only threat to hotels would possibly be AirBnB, or similar companies, but due to the inherently limited quantity of rooms these services can offer, we don't feel they will put substantial pressure on the hotel industry.

#### 1.7.5 Compliance Risk

Compliance risk is an enormous issue at the moment for companies seeking to ICO, particularly with recent comments by the US SEC regarding ICO status as securities. While some ICOs seek to avoid SEC issues by avoiding the US market completely s unrealistic, given the reach of the SEC and broad interpretation of US securities laws. Instead, we plan to be completely compliant with SEC regulations for securities sales, even though we feel that our coins do not represent a security. Our US sale will follow the rules for Regulation D 506(c) exempt unregistered securities and only be available to accredited US investors. Our international sale will follow SEC Regulation S exemption rules for sale of unregistered securities to foreign entities.

While this clearly limits who we can purchase our coins, we feel that given the uncertainty in the ICO market, and the enormous penalties for lack of compliance, if ICOs are deemed to be securities by the SEC, it would be irresponsible to fail to mitigate this risk.

## 2 Blockchain Basics

To understand how our company works, some basic knowledge of blockchain technology is required. While we can't comprehensively survey all blockchain technologies, we will attempt to give a basic overview, with the caveat that in some cases we may introduce minor inaccuracies for the purpose of simplifying the content.

A blockchain is a continuously growing list of records, called blocks, which are linked and secured cryptographically. These blocks can be used to record transactions across a collection of computers and cannot be altered retroactively without altering all subsequent blocks, and without the collusion of the network. A computer that participates in the blockchain network is called a node. The nodes in the network collaborate to add new blocks to the list, preventing conflicting transactions from being posted (for example, double spending). The algorithm that they use to decide which blocks to add is called a consensus algorithm. Because the blockchain is decentralized, there is no single point of failure or control. Compromising a blockchain system requires compromising 51% or more of the nodes, thereby controlling enough "votes" to decide on your own which blocks are accepted.

## 2.1 Adding blocks to the chain

One key design consideration for blockchains is which consensus algorithm to use. Many cryptocurrency systems use what is called a proof-of-work system, where each block is part of a cryptographic puzzle that all nodes try to solve. The first node that finds the solution to the puzzle has its block added to the chain. Competing blocks are thrown away, and work on the next puzzle begins. Statistically speaking, this means that on average the block with the most compute power supporting it "wins" the majority of the time.

While proof-of-work dominates in cryptocurrency mining, it is less-than-ideal for more general blockchain systems, primarily because solving these cryptographic puzzles requires a significant amount of hardware and electricity, which increases the cost of operating the network. Fortunately there are several alternatives to proof-of-work that don't have these drawbacks. In our case, we will use proof-of-stake, which randomly selects a block to add to the chain based on the relative stake of the node attempting to add it, with nodes with larger stakes having a higher chance of being selected.

## 2.2 Smart contracts

While there are many somewhat theoretical definitions of smart contracts, essentially smart contracts are small programs that execute on all nodes of the network, used to enforce terms of a transaction. The results of the smart contract are posted as transactions on the blockchain. The protocol for a smart contract is published, allowing anyone using the blockchain to use it. Smart contracts can store internal state (for example a list of all available rooms for a hotel) as part of the blockchain, to be used in later calculations.

A good example of this would be a smart contract to allow someone to book a room. The protocol could specify that the smart contract should be given the booker's address and information about which hotel room they wish to book. The smart contract would then check that booker has sufficient currency to pay for the booking and check its internal list of hotel inventory to verify that the room is available before transferring payment from the booker's wallet to the hotel's and marking the room as booked. Similar to database transactions, this is an all-or-nothing process: it either all succeeds atomically, or it all fails. It can never be the case that the room is booked but the payment fails or vice versa.

### 2.3 Blockchain implementations

There are many existing implementations of blockchain and smart contract technology, some tied to cryptocurrencies such as Bitcoin or Ethereum and others, such as HyperLedger Fabric, simply provide blockchain services. When choosing a blockchain technology there are several things to consider. As we mentioned in an earlier section, the type of proof system used is one such consideration. Another is the cost to post transactions on the chain. This can be broken into two components: the cost to execute a smart contract and the cost to add your transaction to a block. Both of these costs are generally driven by the current demand.

Another factor is the transaction rate the blockchain can support, which is a function of several parameters in the blockchain design. For example, the popular Ethereum network can currently handle 10-30 transactions per second, shared across all applications running on it. This is extremely low for many applications, and has caused slow transaction rates and increased transaction prices on the network. While there are proposed solutions to increase the transaction rate for the Ethereum network, none are currently available.

Finally, the security and privacy models of the network are also factors. Networks can be permissioned, meaning membership and access rights can be controlled, or public, with no control over membership. They can also be public, in the sense that all transactions are viewable to anyone, anonymous, meaning anyone can view transactions but not who made the transaction, or confidential, where transactions are only viewable to parties who have permission.

### 2.4 Cryptocurrency

A cryptocurrency is a digital form of money often associated with blockchains. Unlike traditional currency where the owner has physical possession, cryptocurrencies are more like bank accounts, where the balance in the account is recorded on the blockchain itself. While it is not required that a blockchain have an associated cryptocurrency, it can be useful for financial transactions.

Given this brief overview of relevant terms and issues, we will now explain how we can leverage the blockchain to improve efficiency in the hotel booking industry and reduce costs for hotels and consumers.

## 3 Our Design

Much of the way the current hotel booking industry works is an artifact of the state of technology when these systems were created. Companies like Sabre exist because reservations are done through transactional databases, which are inherently centralized entities. They're also intrinsically insecure, and prone to corruption if used improperly, meaning that access to them needs to be limited to trusted actors and carefully verified. The OTA hegemony exists because access to the data sources required to do online booking is prohibitively expensive and complex, limiting the ability of startup companies to enter the market.

Our goal as a company is to leverage the power of the blockchain to break this paradigm and lower the barrier of entry for new companies to enter the hotel booking market. By enabling competition in the OTA market, we will lower the fees charged by the current dominant players, increasing profits for property owners and lowering costs for travelers.

### 3.1 Building a Middleware to For Hotels

In order to enable new entrants to the OTA market, we plan to build a middleware based on blockchain technology. A middleware is a software layer that acts as a go-between between two software entities. In our case, we plan to build a distributed ledger based on blockchain technology that will allow hotels to list rooms they wish to sell, allow third party OTA websites to search and display those listings, and finally allow booking and payment for these rooms. This is similar to the role that Sabre and other global distribution systems play in the current market, with three key differences:

Our blockchain based ledger will be distributed and open, with all actors in the system serving as nodes, and anyone allowed to list, view, or book rooms. Security and integrity will be enforced by smart contracts. For example, with smart contracts we can enforce the requirement that payment for a room be irrevocably transferred to the hotel as part of the booking transaction, freeing hotels from worry about fraudulent bookings, chargebacks, etc. Similarly we can constrain hotels from double-listing rooms, or similar practices, guaranteeing for the booker that once booked, the room is available.

We will integrate payment and booking into a single transaction. The medium for payment in our system will be NoctCash, an internal-use-only cryptocurrency that we will both buy and sell. This currency will have its value pegged to fiat currency with no fees other than bank transfer fees. OTA companies will buy these coins and transmit them as part of the booking transaction to the hotel, which can then sell them for fiat currency. The use of these coins provides an irrevocable transfer of money from the OTA to the hotel.

Given these basic building blocks of our design, it's useful to consider how this enables competition in the OTA market. The most essential feature is the ability of any entity to search listings and make bookings. No negotiated contracts or intricate connections with global distribution systems or hotel chains are required. This means any company can install the software required to become a blockchain node, build a presentation layer for the available listings, use an off-the-shelf payment processing solution, and enter the OTA market; a significant reduction in cost and complexity vs the current system. This is possible because smart contracts will enforce the requirement that payment is transferred as NoctCash to the hotel when the reservation is made. Because the payment cannot be reversed or charged-back without the consent of the hotel and is directly convertible to US dollars, the hotel can accept reservations from an untrusted OTA without fear of fraud or loss of revenue.

### 3.2 Design Details

The easiest way to understand how the system operates is to consider it from a workflow perspective. To start the process the hotel uses a smart contract to list or update a listing for a block of rooms, including the following details:

- Room class (single, double, superior, etc)
- Room quantity
- Available dates
- Room rate in one or more currency (payable in Noctcash)
- Offered booking fee
- Booking terms (prepaid, reservation with deposit, reservation only, etc)
- Whether or not the room is cross-listed with a GDS (see the section on transitioning for details)
- A link to room details (photos, description, location, etc)
- A wallet ID for payment
- Proof of NoctToken ownership

We will discuss Noctokens and how they work in the next section, but for now it's sufficient to say that NoctTokens are our ICO coin, and that in order to list or book rooms on the network, you need to prove that you own sufficient NoctTokens. After an initial booking, hotels are free to update the room rates as needed.

OTA's can then search these listings and advertise them on their site. When a customer is found, the OTA will process payment from the customer (if required), then use a smart contract to book the room, specifying:

- Listing ID for the room being booked
- Booking dates
- Customer information
- A wallet for payment
- Proof of NoctToken ownership

The smart contract will then:

- Check that the room is available on the dates requested
- That the wallet has sufficient funds for payment
- That the OTA has sufficient NoctTokens for the booking

If so, it will then:

- Debit the OTA's wallet
- Transfer it either to the hotel's wallet or escrow, depending on the booking terms
- Post a booking transaction on the block chain
- Update the room inventory
- Put the put the booking fee in escrow
- Return a booking code that the customer can use to check into the hotel

When the customer arrives at the hotel, they present the booking code. This will release the payment to the hotel from escrow (if needed) and will release the booking fee to the OTA. If the booking terms allow for refunds, this will also be handled by a smart contract, with the OTA requesting the refund and the smart contract verifying that the refund terms of the booking are met before reversing the transaction.

Nocturus will take a 2% transaction fee from every completed hotel booking.

### 3.3 NoctCash vs NoctTokens

We've mentioned two different cryptocurrencies so far: NoctCash and NoctTokens, and we would like to explain why we feel there is a need for two currencies, and what the role of each is.

#### 3.3.1 NoctCash

NoctCash is our internal currency. Each Noctcash coin will have a currency associated with it, for example, USD, RMB, etc, to facilitate international OTA's and hotel transactions. This will not be traded on any exchange, but will be sold directly by us for no fee, other than bank transfer costs, bought back at the same rate and in the same currency it was bought with. This currency is only to facilitate secure exchange of money between parties on the network. While we realize that some systems use the same currency they ICO with, we feel that from a business perspective this is untenable. Using a currency without a fixed value means that any time there is a delay in-between payment and the hotel converting to fiat currency there can be fluctuations in the value of the currency, and this type of delay is inevitable in hotel booking systems. For example, there are numerous

use cases where funds should be held in escrow, and in some cases several months may elapse between the booking and the hotel stay, which may result in significant loss of revenue for the hotel. Noctcash will always be purchased by us for the same amount of fiat currency that it was sold for, making it safe to hold as long as required.

As an alternative to NoctCash, we could use bank transaction IDs, credit card numbers, or similar indicators of offline money transfer, however these options would expose hotels to undue risk. For example, bad actors could book large number of rooms with stole credit card numbers or make other fraudulent bookings, either for financial gain or as part of a denial of service attack. With our system, Noctcash is transferred irreversibly and there is no risk of fraud, even with untrusted OTAs.

### 3.3.2 NoctTokens

NoctTokens are our ICO coins, and they represent a capability in the system: the ability to list rooms or make bookings. Each 100 USD of room listing or room booking will require proof of possession of 1 NoctToken. Hotels will need to maintain a sufficient balance of NoctTokens for the number of listings they have active. For example, if a hotel lists 10 rooms at 100 *per night for 10 nights, they will need to show proof of ownership of*  $100 \times 10 \times 10 / 100 = 100$  NoctTokens. Additional listings will require additional NoctTokens. Similarly, OTA's will be required to show proof of ownership of NoctTokens in order to make room bookings at the same rate.

These tokens have three goals in the system. The first is to disincentivize malicious actors in the system. For example, with no stake at risk, individuals could list fraudulent rooms on the blockchain, or make bad-faith reservations to tie-up rooms, then cancel them at the last minute. This type of manipulation could be extremely costly to both hotels and OTA's. The token system makes this type of behavior prohibitively expensive, both because of the cost of purchasing the tokens, and also because the abuser risks his tokens being blacklisted by the network.

The second goal is provide a framework for consensus on network. All blockchain networks are decentralized by design, and transactions on the network need to be approved by the majority of the participating nodes. However, defining exactly what is a majority requires careful thought. If the majority is simply based on the number of nodes participating in the network, it is vulnerable to large numbers of nodes joining the network simply to control the network. Cryptocurrency networks solve this by equating majority to the majority of the computational power of the network, which requires investment in hardware, but in our case we don't use proof-of-work because of the low transaction rates it results in. Instead, we use proof-of-stake, with NoctTokens serving as stake in the network. This means to compromise the network, you would need to purchase 51% of all NoctTokens, making it cost prohibitive.

The third goal of the NoctToken is to encourage early adoption. Unlike NoctCash, NoctTokens will be listed on exchanges and the values allowed to fluctuate. To maintain the financial barrier to bad actors, we only plan to create 10 billion NotTokens ever, which is approximately enough to allow listing and booking for all current hotels.



However, as inflation pushes hotels room higher and new hotels open, we speculate that the price of these tokens may increase. Thus we expect that hotels and OTAs that join the system early will receive significant reduction on the cost to join the network.

### 3.4 Technology Selection

As we discussed in the introduction to blockchain technology, there are many blockchain implementations to choose from. To select a suitable implementation, it is necessary to consider the design constraints on the system. In this section we will discuss how we believe the system should behave, from both practical and business perspectives.

#### 3.4.1 Privacy and Security

One of the most fundamental questions that needs to be asked is how secure and private the network is. Clearly, we need the ability to restrict access to booking transactions to interested parties, for privacy reasons. This means our network should be confidential. We also feel that, from a business perspective, it is essential that it be permissioned, and network participants be able to control who has access to the network. While this might seem counterintuitive for a network that we claim to be "open", it is nevertheless our experience that there are always bad actors who will attempt to exploit or disrupt these types of services. The ability to control who has access to the network is essential to safeguard the financial well-being of the participants. However, the default permission for all parties will be to have full access to the blockchain, with bad actors being banned by majority vote of the network nodes.

#### 3.4.2 Network Performance and Cost of Operation

Another important concern is the number of transactions per second the network can support. Many popular network like Ethereum or Bitcoin can only support transaction rates far lower than what we would require. While there are proposed extensions to these networks, none are currently available, and it remains to be seen what the transaction rates will be on these enhanced networks, or what the cost of the transactions or network use would be.

#### 3.4.3 Blockchain Base Selection

Based on these constraints, we have based our implementation on Hyperledger Fabric, an open source blockchain framework developed by the Linux Foundation and IBM specifically for business applications. This framework supports permissioned, confidential networks, smart contracts, and transactions rates in excess of our requirements. While by default it uses Practical Byzantine Fault Tolerance(PBFT) as its consensus algorithm, this is pluggable, and we will replace it with proof-of-stake, which does not require expensive computations or hardware. Finally, because Hyperledger Fabric is a framework, rather than a existing network, there are no associ-

ated network costs or fees, meaning we can control the costs directly. Because we will not be building on an existing network, all participants in our network will run as nodes in the system, though we will initially provide cloud-hosted nodes to bootstrap the network.

## 4 What We Will Build

We realize that it is impossible for hotels to instantly transition to a blockchain technology. In fact, there are many barriers to entry such as existing OTA contracts, concerns about profit loss from the transition, as well as the need to gain buy in from owner-operators and franchisees, by minimally disrupting hotel workflow.

One common impediment to the adoption of new technologies is the chicken-or-the-egg problem of how to transition from the existing system to the new one. One on hand you need significant users on the system to make it usable, but until it is usable it is difficult to convince users to switch. The transition from centralized database to a blockchain solution is no different. In order for hotels to begin selling on the blockchain system, they need sufficient third party OTA's to move their inventory. Otherwise they stand to lose significant revenue. On the other hand, it is difficult to attract OTA's to the blockchain without hotel listings to sell.

Our solution to this is to construct a bridge between the existing Global Distribution Systems and our blockchain solution. This bridge would track changes to the blockchain and update the GDS with posted reservations, and similarly update the blockchain with GDS updates. Presumably this bridge would be an interim solution until we had sufficient momentum to completely replace the GDS. To encourage this, we will allow hotels to specify if they want this listing synchronized with the GDS or not, with the benefit of not synchronizing being a significant cost savings in the form of the approximately \$12 per booking fee the GDS charges.

While we plan to design and build interfaces for hotels to list on the blockchain directly, maintaining two systems during the transition would be tedious and error prone for hotels. Because of this, we plan to interface the Opera, the predominant room listing management software used by hotels currently. This will allow us to provide a single user interface for hotels to make both blockchain and traditional GDS listings.

We also plan to build systems to allow OTAs and hotels to purchase and sell NoctCash. Because these are currency specific, we will build these as needed, as we expand our operating territory. Because most international chains use the USD as their preferred currency, we will start with our USD portal.

## 5 Token generation and sales

In this section, we are going to summarize the process of Nocturus token model, distribution and utilization. More detailed terms and conditions will be set out in the terms and conditions of the Nocturus token sale which will be made available on our website <http://www.nocturus.com>.

### 5.1 The Purpose of Nocturus Token

Nocturus token is NOT AN ASSET, NOR A SECURITY. It is a utility token. Nocturus tokens do not represent or confer any ownership right or stake, share, security, or equivalent rights, or any right to receive dividends, other payments, intellectual property rights, or any other form of participation in or relating to the project described in this white paper and/or in Nocturus or any of its affiliates. The holders of Nocturus token are only entitled to use Nocturus products as described in this document if successfully developed, or to resell the tokens.

The NoctToken itself will be based on Ethereum, a blockchain-based computing platform. NoctTokens are distributed and kept on the main Ethereum network. While we will not be using the Etheruem network for performance and cost reasons, keeping our tokens on the Ethereum network facilitates transfer, and enables them to be easily used to verify access to the system.

### 5.2 How is the NoctToken Going to be Used?

### 5.3 Rules of the ICO

Nocturus will launch only ONE public initial coin offering (ICO) during which a token sale will be held. It will take place on <https://www.nocturus.com>. The ICO will start on the date which will be determined soon. Contributors who plan to purchase up to 2,5 ETH worth of NoctTokens will not be required to get whitelisted. The hard cap of the Nocturus ICO is 19000 ETH. The soft cap is 2500 ETH. The pre-ICO stage is 1500 ETH.

Nocturus public token sale will be executed in 5 waves. The first wave is considered a pre-ICO and is worth 1500 ETH. All funds contributed during the pre-ICO wave will be used for marketing and legal expenses of the Nocturus ICO campaign. These funds will **NOT** be returned. even if we fail to reach the soft cap.

Wave 2 (2500 ETH) is considered the soft cap (Total with Wave 1 - 4000 ETH). If the company does not reach soft cap (End of Wave 2), all Wave 2 contributions will be refunded. All pre-ICO (wave 1) contributors will not be able to refund their donations.

All waves will be executed by ERC-20 standard and the token sale will be distributed via smart contracts on the Ethereum Network. The smart contract will cover all five waves including pre-ICO stage (Wave 1). The smart contract will automatically close in 200 days after the start of second wave. NoctTokens will be distributed to all contributors only after the end date of the smart contract or if the token crowdsale reaches its hard cap (19000 ETH).

Individual minimum purchase cap - 0.1 ETH.

Additionally, during the registration an intended to be used Ethereum wallet address should be provided. It will be used for transferring ether and receiving Nocturus tokens. The address provided and beneficiary address must be the same. One contributor will be able to make only one transfer. The wallet must be ERC-20 approved. A list of recommended wallets is provided below.

DO NOT PARTICIPATE IN TOKEN SALES DIRECTLY FROM CRYPTOCURRENCY EXCHANGE ADDRESSES. YOU NEED A TOKEN COMPATIBLE ETHEREUM WALLET.

NoctTokens will be transferred after the reach of the soft cap. After the soft cap is reached, the NoctTokens will be transferred immediately after the transaction is made. During the ICO, Nocturus tokens will be locked, until the end of the ICO. NoctTokens will be listed in exchanges a minimum of 12 weeks after the ICO is finished. If not all the NoctTokens are sold during our token sale, the remaining tokens will be held for future sale. In an unlikely event, if the soft cap is not reached, contributors will get refunded automatically (except wave 1 - soft cap).

## 5.4 Regulatory Compliance

While we do not believe that our tokens represent securities, the legal status of ICOs is unclear, with the US SEC stating they believe that ICOs are often unregistered security sales. In order to protect both Nocturus and our coin purchasers from future penalties or legal actions, we will follow the SEC rules for Regulation D exempted sales of unregistered securities for our US customers and Regulation S exempted sales for our international customers. The implications of are outlined below.

**This section is provided as reference only and does not represent legal advice. You are strongly recommended to consult with an attorney or CPA regarding your responsibilities and legal obligations.**

### 5.4.1 US Customers

Under Regulation D 506(c) exemption from registration rules, sales to US customers are limited to accredited investors. The SEC defines accredited investors as:

- earned income that exceeded \$200,000 (or \$300,000 together with a spouse) in each of the prior two years, and reasonably expects the same for the current year
- **OR** has a net worth over \$1 million, either alone or together with a spouse (excluding the value of the person's primary residence)

As part of the KYC process, US customers will be asked to provide documentation demonstrating their status as accredited investors.

This can consist any of the following:

- W2 or tax returns for the last two years demonstrating that you meet income requirements and a statement that you reasonable expect to meet these requirements for the coming year
- Documents demonstrating you meet net worth requirements from within the last 3 months which can include: bank statements, brokerage statements, CDs, tax assessments and credit report as well as a written representation from the investor

- Written confirmation from a registered broker-dealer, an SEC-registered investment adviser, a licensed attorney or a certified public accountant stating that such person or entity has taken reasonable steps to verify that the purchaser is an accredited investor within the last three months and has determined that such purchaser is an accredited investor

Additionally, coins purchased by US customers will be subject to a one year holding period from the date of the initial sale offering before they can be resold.

#### 5.4.2 International Customers

International customers do not need to be accredited investors or supply any documentation over and above what is required for KYC. International customers are restricted from offering our coins for resale in the US market, and are subject to a 40 day holding period during which they may not resale these coins, beginning from the start of our Pre-ICO.

#### 5.5 What Is KYC and Why Is it Needed?

COMPANY WILL EXECUTE POST FACT KYC PROCESS. KYC PROCESS WILL BE EXECUTED ONLY FOR THAT PART OF CONTRIBUTIONS WHICH WILL BE CONVERTED TO FIAT AND TRANSFERRED TO BANK. The primary objective of token sale registration is to enforce a mandatory Know-Your-Customer (KYC) check to prevent identity theft, terrorist financing, money laundering, and financial fraud. It also allows our team to understand our token holders better and manage risks prudently.

At Nocturus we take social responsibility very seriously, thus, we believe that it is important to play our part in combating money laundering and terrorism financing. That is why we have benchmarked ourselves to the same KYC standards typically adopted by banks and financial institutions globally. The due diligence process includes screening against international sanction/terrorist lists, politically exposed persons, and people with adverse reputation. Risk assessment and onboarding outcome will be performed and determined through the use of a proprietary software. The KYC process is comprised of two parts, in the following order:

- Automated. Your details, as provided by you, will be checked against public sanctions and alert lists. This step will be performed by a KYC solution firm based in Singapore.
- Manual. If the automated step is successful, we will manually verify that the information provided matches the identification document photos submitted by you.

#### 5.6 Privacy and Security during KYC

Our members' privacy and security are of utmost importance to us. As such, please find below the measures which will be employed to ensure your privacy and security:

- Only an encrypted version of your data is stored in our public servers. The decryption key is stored in a private server. The public servers cannot initiate connections to this private server. All decryption happens in our private server which only the founding team has access to.
- Email addresses will not be stored in our public servers, instead, only a hash of each email will be stored in those servers. All emails sent in regards to the registration processes will be sent from the private server.
- Your data is not retrievable even if the password is compromised. Your password does not give you access to your data, but rather only enables you to re-submit your data if, and only if, requested by the Nocturus team.
- All data collected during the manual KYC will be only and exclusively stored on our company computers, as the entire process will be performed in our offices. For this purpose, new computers dedicated solely to this task will be acquired and all information will be wiped out from the memory drives of these machines after the checks are completed.

Once process is finished, data will be encrypted and stored privately for potential future audit requests from authorities.

Neither Nocturus, nor Onfido will share members' personal data with 3rd parties without prior consent. You should take these precautions:

Never send Ethereum to any address during the registration process.

- There is only ONE public token sale date and it is specified on our website: <https://www.nocturus.com>.
- Bookmark the registration, and never visit the registration site following any email links.
- Never trust emails related to the particular sale details (such as the hard cap, Ethereum address to send to, etc.). Remember that sender's email address can be easily forged.
- Never reply to our emails. Perform all your operations on our website only. You can check your registration status on our website using your account.

## 5.7 Registration for ICO

Registration for Nocturus ICO and token sale will be held on our website <https://www.nocturus.com>. When the token sale is launched, please doublecheck the address in the browser, because scammers might create similar websites to trick you.

Some contributors who are planning to purchase up to 2,5 ether worth of cV will be asked to do post fact KYC process. KYC process will be made only for that part of contributions which will be fixated and converted to FIAT and send to Bank account Registration to ICO and purchase:

- Visit our website <https://www.nocturus.com>;
- Choose "Contribute Now";
- Enter your personal details and ERC20 standard wallet (recommended MyEtherWallet.com);
- Select the type of currency you want to use for contribution;
- Read and agree to Terms & Conditions;
- Contribute;
- Make the transfer and you will receive NoctTokens after the soft cap is reached (if it is reached, you will receive them immediately). Warning: Only send ETH from ERC-20 compliant wallets which allow you to control your private key. Make sure to backup your private key. Do NOT send them from an exchange, because your ETH will be lost.

## 5.8 Token Sale

Our main goal is to establish a working company with cash positive revenue stream in the shortest period possible and achieve a stable growth of the company and community. This sale will proceed in five waves:

Wave	Coins Per Etherium	Total Etherium in Wave
Pre-ICO	208000	1500
Wave 2	190000	2500
Wave 3	180000	5000
Wave 4	167000	5000
Wave 5	153000	5000

Noctokens will be distributed as follows:

Percentage	Recipient
33%	ICO
10%	Founders
10%	Team
37%	Future Partners and Hires
5%	Advisors
5%	Charity

**Team and Founders** - These tokens will be vested over a 3-year period with 1/3 vesting annually to show our commitment to the overall success of Nocturus.

**ICO** - The total pool of NoctTokens dedicated for token sale.

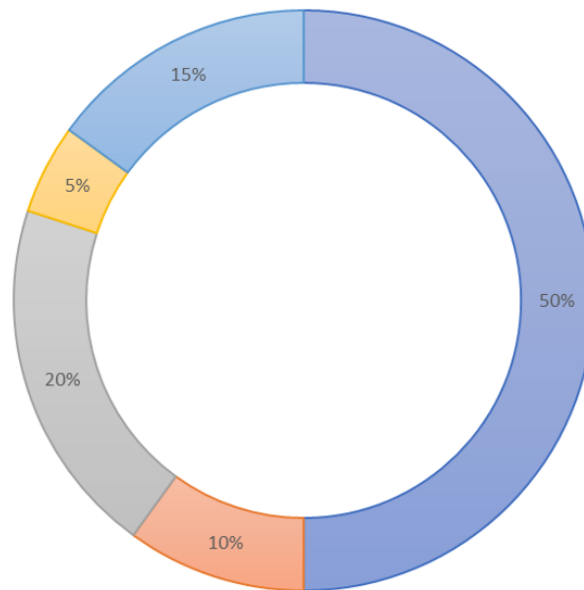
**Future Partners and Hires** - These tokens will be given to early partners to incentivize early deployment of our software. They may also be used as equity incentive for new strategic new hires.



**Advisors** - These tokens will be given to advisors to compensate them for their contributions to our company. These tokens will also vest over a 3 year period, vesting 1/3 annually.

**Charity** - These coins will be sold one year after the ICO and the proceeds donated to Ronald McDonald House, which provides housing for families of critically ill children while they are receiving hospital treatment nearby.

### 5.9 Use of Funds



■ Software Development ■ Operations ■ Sales and Marketing ■ Accounting, Legal, Compliance ■ Business Development

**Software Development 50%**

Used to develop our application.

**Sales and Marketing 20%**

Used to advertise our service.

**Business Development 15%**

Used to build our hotel and distribution channel partner list. (Including legal fees for contract negotiation, trial installations, etc.)

**Operations**

General overhead and administrative costs for our business.

**Legal, Compliance, Accounting**

Important to maintain our high standards for operations and to provide transparency.

### 5.10 Are Nocturus Tokens Securities?

No, Nocturus tokens are not and are not intended to be securities, financial instruments, or investment products of any kind. For example, with purposes of financial regulation in the European Union a "security" is often defined with a reference to "transferable security" within the meaning of the EU Directive on markets in financial instruments (MiFID). According to MiFID, "transferable securities" means those classes of securities which are negotiable on the capital market, with an exception of instruments of payment, such as:

- shares in companies and other securities equivalent to shares in companies, partnerships or other entities, and depositary receipts in respect of shares;
- bonds or other forms of securitized debt, including depositary receipts in respect of such securities;
- any other securities giving the right to acquire or sell any such transferable securities or giving rise to a cash settlement determined by reference to transferable securities, currencies, interest rates or yields, commodities or other indices or measures.

Nocturus does not qualify as "transferable security" for the above purposes. Nocturus as a utility token in the future will only provide opportunity to access Nocturus services of. The aim of the Nocturus token is to make it possible for people to use Nocturus products.

If Nocturus was not based on the blockchain technology, it would be similar to purchasing a ticket or other document which proves that the person has a right to use a particular service.

## 6 Our Team

Our team is constantly growing. For the most up-to-date list of our team members, please check our website at <http://www.nocturus.com/#team>

## 7 Risk Disclosures

Please carefully read and evaluate the risks that Nocturus Platform describes below.

The realization of any one or more of the risks described in this White Paper, or other risks whether unforeseen or unforeseeable, could significantly reduce or eliminate the utility or value of NOCT and a participant (each, a "Participant") in the proposed sale of NOCT (the "Token Sale") could lose their entire amount paid for NOCT. Nocturus Platform does not represent that this White Paper discloses all risks and other significant aspects of the Token Sale, including risks which may be personal to proposed Participants and thus unknown to Nocturus Platform.

Proposed Participants who do not fully understand or are not comfortable with any of the risks described in this White Paper should consult their legal, commercial, financial, tax, or other professional advisers; otherwise, they should not participate in the Token Sale.

To the maximum extent permitted by all applicable laws and regulations, Nocturus Platform and its affiliates and its and their founders, directors, officers, employees, advisers, agents, and representatives (the "Nocturus Related Parties") shall not be liable for any direct or indirect loss of revenue, income, profits, business, business opportunity, anticipated saving, data, reputation, or goodwill; or any indirect, special, incidental, reliance, consequential, punitive, or other losses or damages of any kind, in tort, contract, strict liability, or otherwise, arising out of or in connection with any loss or damage of a Participant (or a proposed Participant) relating to the risks associated with the Token Sale or in connection with erroneous or insufficient consultation with or advice received from any adviser, even if Nocturus Platform and the Nocturus Related Parties have been advised of the possibility of such losses or damages.

References to 'Nocturus Platform' in the risk factors discussed in this section include, where the context permits or requires, any Nocturus Related Party involved in the operation of Nocturus or the conduct of the Token Sale. References to "discretion" mean "sole and absolute discretion", unless otherwise qualified.

### 7.1 Company Risks

**Company Failure.** As a consequence of the realization of one or more of the other risks in this White Paper or of risks not described in this White Paper, Nocturus Platform's business could fail and Nocturus Platform could be wound up or dissolved. If Nocturus Platform's business fails and Nocturus or the software platform on which it operates (the "Application") is not transferred to and operated by another company, Nocturus would terminate and any NOCT would have no utility or value. Nocturus Platform does not commit that it can or will transfer the Application or Nocturus to another company if its business fails. If Nocturus Platform does transfer the Application or Nocturus to another company, Nocturus Platform does not commit that the other company will operate Nocturus to a Participant's satisfaction or at all, or will continue to accept NOCT for use in Nocturus.

#### **Management Failures.**

Nocturus Platform's management may fail to manage its personnel, finances, facilities, information, technology, and other resources to effectively develop, operate, maintain, support, improve, market, and sell the Application and Nocturus, or to manage the growth of Nocturus or its business, or to adapt the Application or its business to changes in technology or the markets in which it operates, or to identify and effectively respond to the risks described in this White Paper or otherwise, the realization of any or all of which could adversely affect Nocturus.

**No Governance Rights.**

NOCT confer no governance or similar rights with respect to Nocturus Platform, the Application, or Nocturus. Nocturus Platform will, at its discretion, make all decisions concerning its business, the Application, and Nocturus, including decisions to fork or discontinue Nocturus; to change any pricing, parameter, or feature of Nocturus; to subcontract or outsource the development, maintenance, support, and operation of the Application; to sell the Application; and to sell, merge, or liquidate Nocturus Platform or all or a material part of Nocturus Platform's assets, any of which decisions may not be consistent with a Participant's expectations or interests.

**Business Model Risks.**

Nocturus Platform designed Nocturus (including the Application and NOCT) according to a specific business model. In particular, the adoption and success of Nocturus depends on several factors, including:

- Nocturus Platform's ability to hire top engineers to develop the Application and Nocturus;
- the number of users providing resources to support the functions of Nocturus;
- the availability of NOCT to Nocturus users after the Token Sale; and
- the number of users perceiving NOCT to be valuable and thus willing to use Nocturus as either providers of resources or consumers of Nocturus.

If the business model of Nocturus is flawed, or if the assumptions underlying that business model are incorrect, Nocturus may under-perform or fail. Nocturus Platform may at its discretion elect to change the business model of Nocturus in response to competition or market requirements, to address perceived flaws, to optimize the model, or otherwise. Any such changes to the business model of Nocturus may fail to achieve their purpose and could adversely affect Nocturus.

**Insufficient Funding.**

Nocturus Platform will depend on the proceeds of the Token Sale to fund its operations until such time, if ever, that Nocturus Platform earns sufficient revenue from Nocturus or other activities. The proceeds of the Token Sale are cryptocurrencies that may increase or decrease in value. Nocturus Platform may, at its discretion, engage in hedging or similar activities to manage the risk of cryptocurrency fluctuations, but those activities may not be sufficient, may fail, or may worsen the consequences of those fluctuations. In addition, the cryptocurrencies held by Nocturus Platform may not be convertible to fiat currencies or other cryptocurrencies at rates Nocturus

Platform considers favorable or at all. The cryptocurrencies held by Nocturus Platform are also subject to loss or theft despite security precautions taken by Nocturus Platform. If for any reason Nocturus Platform's funds are not sufficient to sustain its operations, Nocturus Platform may have to reduce or suspend its operations, which would adversely affect Nocturus Platform's ability to develop and operate Platform at the intended level or at all.

**Unanticipated Risks.**

Nocturus will be launched and will evolve in technology, business, economic, and legal environments that are uncertain and subject to rapid, unpredictable, and potentially contradictory evolution. The future risks associated with those environments, their respective evolutions, and the interactions among them are unknown and unknowable but they could threaten the viability or existence of Nocturus.

## 7.2 Product Risks

**Delay.**

Nocturus Platform may not develop and deploy the Application according to its intended schedule. Delays in deploying the Application may adversely affect the acceptance of Nocturus in the market and ultimately the viability of Nocturus. Inability to Use NOCT. Holders of NOCT will not be able to use them with Nocturus until Nocturus Platform makes it them available ("Launch"). Launch may be delayed, or may not occur at all. Even after Launch, the availability of certain services will be limited.

**Failure to Develop and Support the Service.**

As a consequence of the realization of one or more of the other risks in this White Paper or of risks not described in this White Paper, or because of business or technical decisions taken by Nocturus Platform in good faith, Nocturus Platform may fail to launch Nocturus with a full set of intended features and functions or at all, may discontinue certain features and functions of Nocturus, may not improve or add to the features and functions of Nocturus over time, may not adequately support Nocturus, and may not fix bugs in Nocturus in a timely way or at all. Nocturus (including NOCT) may therefore not have the utility described in this White Paper or expected by a Participant.

**Service Issues.**

Nocturus may be degraded, interrupted, or fail because of hardware, software, or network defects, security breaches, hacking, viruses or other malicious code, natural disasters, congestion in underlying networks, and other causes. Nocturus Platform may be unable to restore Nocturus to normal operation in a timely way or at all. Service Updates. Nocturus Platform may not update Nocturus in a timely way or at all to fix bugs, address incompatibilities arising because of changes in underlying technologies and services, respond to user feedback, or react to competitive threats. Any such delays or failures could adversely affect Nocturus.

**Failure to Meet Expectations.**

The initial and future versions of Nocturus may not meet a Participant's expectations regarding features, functions, performance, availability, quality, security, scale, price, or other attributes that are important to a Participant.

**Reliance on Third Parties and Third Party Systems.**

Nocturus Platform relies on third parties and third party systems it does not control to operate the Application and Nocturus and to provide services on which Nocturus depends. Those third parties and third party systems may be unable or unwilling to act as Nocturus Platform needs and expects, may themselves act maliciously, or may be adversely affected by other parties acting intentionally, unintentionally, or maliciously or by other events outside their control. The failure of those third parties or third party systems to perform according to Nocturus Platform's needs and expectations could adversely affect Nocturus.

**Privacy Risks.**

Nocturus will rely in part on Ethereum and other public, decentralized platforms. Anyone with Internet access can inspect all transactions and other information stored in those platforms that is not encrypted. A Participant's transactions involving NOCT, and other information about a Participant or that belongs to a Participant that may be processed by or stored in those platforms in connection with a Participant's use of Nocturus, may be inspected by the public. Certain information may, even if encrypted, be associated with a Participant by combining it with other public or non-public information.

### 7.3 Technology Risks

**Core Technology Risks.**

Nocturus is built with core technologies that are in some cases immature and unproven, including the Ethereum blockchain platform and various open source software applications and libraries. If those core technologies do not perform according to Nocturus Platform's needs or expectations, have bugs or security vulnerabilities that are not or cannot be fixed, become unstable, degraded, or unavailable, are changed or forked in a way that is incompatible with Nocturus, or are not further developed or supported, Nocturus Platform may be required to change the specifications of Nocturus and to reduce or eliminate features and functions that are important to Participants, or to discontinue Nocturus.

**Integration Risks.**

Nocturus will be integrated using some essential third party services. If the integrations with those services fail, or those services are unreliable or do not perform as expected, those features within Nocturus, or Nocturus generally, may be adversely affected or delayed.

**Smart Contract Risks.**

Certain key features of Nocturus will be implemented in smart contracts on the Application and on the Ethereum blockchain platform. The nature of smart contracts makes them difficult to change to fix bugs, improve performance, or add features and functions. Nocturus Platform may therefore not correct defects in Nocturus or

improve Nocturus to meet market needs or respond to competition fast enough or at all, which could adversely affect the utility or viability of Nocturus.

**Hacking.**

All software systems, including the Application and the Ethereum blockchain platform, have security vulnerabilities. Malicious actors may (a) disrupt, corrupt, or interfere with the Application, Nocturus, or the Ethereum blockchain platform, (b) defraud Nocturus Platform or other stakeholders in Nocturus, including Participants or NOCT holders, and (c) steal NOCT or other valuable data stored in the Application, Nocturus, or the Ethereum blockchain platform, some of which may belong to or involve Participants or NOCT holders.

**Mining Attacks.**

Certain features of Nocturus depend on the Ethereum blockchain platform. Ethereum is a decentralised service comprising a global peer-to-peer network of many independent node operators. Coordination or collusion among node operators could subject Nocturus and its stakeholders, including Participants or NOCT holders, to a variety of attacks that could compromise the integrity of Nocturus, cause loss, theft, or corruption of NOCT and other valuable data stored in Nocturus, including Participants or NOCT holders, or increase the cost of using the platform to levels that make operation of Nocturus uneconomic and unsustainable.

**Security Risks.**

The security and integrity of essential components of Nocturus depend on cryptography. Known and currently unknown weaknesses in the cryptographic algorithms used in Nocturus and its underlying core technologies, and advances in techniques or computing power to circumvent those algorithms, may compromise the security and integrity of Nocturus, cause the loss, theft, or corruption of NOCT and other valuable data stored in Nocturus, including Participants or NOCT holders, and require the suspension or discontinuation of Nocturus. The existence or future development of stronger cryptographic algorithms to replace compromised algorithms, and the feasibility of implementing those stronger algorithms in Nocturus and its underlying core technologies, is uncertain.

**Prohibitively High Transaction Costs.**

All transactions on the Ethereum blockchain platform, including the transfer of NOCT, have a cost in Ether ("Gas"). As at the date of this White Paper, Gas prices for basic transactions on the Ethereum blockchain platform are nominal. However, Gas prices may increase and make the trading of NOCT on the Ethereum blockchain platform commercially unfeasible.

**Ethereum May be Superseded.**

In Nocturus Platform's view, the Ethereum blockchain platform is the optimum blockchain platform from which to issue NOCT. However, the Ethereum blockchain platform may be superseded by competing blockchain platforms that improve on the Ethereum technology. It is not known whether the Ethereum blockchain platform will remain

the predominant platform for token issuances. If Ethereum is superseded, NOCT could be adversely affected as usage and adoption declines.

## 7.4 Regulatory Risks

### **Regulatory Status.**

The regulatory status of the Application, Nocturus, NOCT, and the Token Sale is unclear or unsettled in many jurisdictions. Regulators in many jurisdictions have announced their intention to consider the adoption of regulations to cover cryptographic tokens and the markets for them. It is not known if, when, or to what degree different jurisdictions will interpret existing laws and regulations or adopt new laws and regulations that could adversely affect the Application, Nocturus, NOCT, and the Token Sale, or whether those laws or regulations would be applied retroactively. Adverse laws or regulations and/or the financial and other costs of regulation could cause Nocturus Platform to modify or discontinue certain features or functions of Nocturus, or cause Nocturus Platform to discontinue the Application or Nocturus in certain jurisdictions or entirely, or make dealing in NOCT regulated or illegal in certain jurisdictions.

### **Excluded Jurisdictions.**

The Token Sale will only be open to Participants of jurisdictions where the Token Sale (or similar cryptographic token offerings) is not prohibited or otherwise restricted. It is a Participant's sole responsibility to determine if they are prohibited or restricted from participating in the Token Sale, or if such participation constitutes a breach of the laws or regulations of their jurisdiction, whether by virtue of their citizenship, residency, or other association with a jurisdiction which prohibits or otherwise restricts the conduct of the Token Sale (or similar cryptographic token offerings). Violation of those prohibitions or restrictions may result in criminal and/or administrative penalties being imposed on the breaching Participants.

### **Compliance Risks.**

Complying with laws and regulations that apply to Nocturus Platform, the Application and/or Nocturus may be costly and may divert a significant portion of Nocturus Platform's attention and resources. If Nocturus Platform must have a license or other government registration or approval to operate the Application or Nocturus in a jurisdiction, there is no guarantee that Nocturus Platform will qualify for or be granted the necessary license, registration, or approval. The lack of the necessary license, registration or approval would restrict or prevent Nocturus Platform from operating Nocturus in that jurisdiction. If Nocturus Platform fails to comply with applicable laws or regulations, Nocturus Platform could be subject to significant legal liability and financial and reputational losses which may adversely affect the Application, Nocturus, and/or NOCT.

### **Tax.**

The tax status of the Application, Nocturus, NOCT, and the Token Sale is unclear or unsettled in many jurisdictions. Adverse interpretation of existing tax laws and regulations or adoption of new adverse tax laws and



regulations could result in unanticipated and potentially retroactive tax liability for Nocturus Platform and other stakeholders in Nocturus, including Participants and NOCT holders. Those adverse tax consequences could cause Nocturus Platform to modify or discontinue certain features or functions of Nocturus or increase prices for Nocturus, or cause Nocturus Platform to make the Application or Nocturus unavailable in certain jurisdictions, or make dealing in NOCT subject to tax in certain jurisdictions.

## 7.5 Market Risks

### **Lack of Market Penetration.**

Nocturus may not attract users and/or third parties providing services to Nocturus at the intended level or at a level sufficient to become or remain useful or viable. Any such lack of use or interest could negatively affect the development of Nocturus and/or the utility or value of Nocturus and/or NOCT.

### **Competition.**

Other organizations may develop (a) services that compete with Nocturus, and may do so with some or all of the open source software underlying Nocturus or (b) cryptographic tokens that can be used in blockchain platform-based database services similar to Nocturus. Those competing services and cryptographic tokens may adversely affect the adoption and use of Nocturus and/or the adoption, utility, and/or value of NOCT, and ultimately the viability and continued existence of Nocturus and/or NOCT. It is unknown whether or to what extent, if any, those competing services and cryptographic tokens may be inter-operable with Nocturus or may accept NOCT.

### **Secondary Markets for NOCT.**

As at the date of this White Paper, there is no public market for NOCT. Virtual currency exchanges and other secondary markets for NOCT may never exist. Even if NOCT are listed or traded on a secondary market, there is no assurance that an active or liquid trading market for NOCT will develop or, if developed, will be sustained. Unless Nocturus Platform publicly states otherwise, Nocturus Platform has no financial or other relationship with, and does not endorse, any such exchange or secondary market that elects to transact in NOCT. Exchanges and secondary markets may be new, under-capitalised, illiquid, volatile, operated by persons with minimal or no relevant experience, and subject to minimal or no regulatory oversight, making use of them susceptible to a variety of market, financial, fraud, and other risks that could result in Participants' or NOCT holders' loss of NOCT or other losses.

### **Price Volatility.**

The price of NOCT in the Token Sale may not be indicative of the price of NOCT on public markets. NOCT have no intrinsic value at the time they are created. The price of NOCT on public markets may be extremely volatile, may decline below the price a Participant will pay for NOCT, or may diminish to zero in response to various factors, some of which are outside Nocturus Platform's control, including, among others, the following:

- the volatility of the prices of cryptographic tokens generally and in response to events that have little or nothing to do with Nocturus Platform;
- general economic conditions and macroeconomic changes;
- changes and innovations in blockchain technology, the industry sectors in which Nocturus Platform operates, and other technologies and markets;
- Nocturus Platform's announcements pertaining to strategic direction, key personnel, financial and operational results, partnerships, significant transactions, new products, and other events;
- activities and announcements of Nocturus Platform's competitors; and
- third-party reports, recommendations, and statements regarding NOCT, the Application, Nocturus, or Nocturus Platform.

**Risk of Dilution.**

Nocturus Platform will create and distribute NOCT other than via the Token Sale. In many cases those other NOCT will be distributed for less consideration per NOCT than a Participant will pay for NOCT in the Token Sale. The distribution of those other NOCT will increase the overall supply of NOCT in the market, and may affect as well as result in downward pressure on the market price of NOCT. In addition, Nocturus Platform reserves the right to create and distribute new NOCT in one or more other token sales.

**Market Perception.**

The market price of NOCT could be adversely affected by negative publicity, social media commentary, rumours, and other information, whether or not true, about Nocturus Platform, the Application, Nocturus, NOCT, the technology on which Nocturus is based (including Ethereum), and/or the legal or regulatory environment in which the Application or Nocturus operates. General Economic and Market Risks. Adverse changes in general global and regional economic and market conditions may adversely affect Nocturus Platform, the suppliers and third parties on which Nocturus Platform depends, and users and prospective users of Nocturus, all of which may adversely affect the availability, reliability, performance, adoption, and the success of Nocturus.

## 7.6 Participant Risks

**Private Key Risks.**

Each Participant, not Nocturus Platform, is responsible for securing the private key that controls their NOCT. If a Participant does not know their private key, they will permanently lose their NOCT. If their private key is lost or stolen, they could permanently lose their NOCT. If they store their private key with a third party wallet or vault service, they will permanently lose their NOCT if they forget and are unable to recover their credentials to access the third party service, or if the third party service malfunctions, is corrupted or compromised, makes

their credentials or private key available to others, ceases operations, is hacked, or otherwise cannot make their private key available to them or loses control of their private key.

**Token Sale Process Risks.**

The process for participating in the Token Sale will be described in the terms and conditions applicable to the Token Sale ("Token Sale Terms") which Nocturus Platform will make available separately from this White Paper. If a Participant does not carefully follow that process, they may not be able to participate in the Token Sale or purchase NOCT, they may permanently lose the funds which they intend to submit as payment for NOCT, or they may permanently lose NOCT which they have purchased. The digital wallet to which payment for NOCT will be made ("Payment Address"), like all software systems, has security vulnerabilities. Malicious actors may attempt to steal funds from the Payment Address, including by hacking it. Funds in the Payment Address are also subject to loss or theft by other means. Each Participant accepts all risk of loss or theft of their payments from the Payment Address.

**Incompatible Wallet.**

The technical requirements for receiving NOCT will be described in the Token Sale Terms. If a Participant uses a wallet or other technology that does not conform to those technical requirements, or if they use a third party service whose wallet or other technology does not conform to those technical requirements, their NOCT may be permanently lost.

**Uninsured Losses.**

NOCT are not insured by Nocturus Platform or by any public agency, and there is no institution supervising and controlling the economy for cryptographic tokens. If a Participant's or NOCT holder's NOCT are lost or stolen, they will have no recourse unless they insure them at their expense. Nocturus Platform cannot issue new or substitute NOCT to replace lost or stolen NOCT.