Vacation Rentals on the Blockchain

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Decentralized Peer-to-Peer
Real Estate Booking-Renting Network

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1 Abstract

The StayBit team is working on the new generation peer-to-peer (P2P) real estate booking system based on blockchain technology. Our goal is to provide a decentralized, borderless, fast and low-

cost system allowing users to find and book properties from private owners (landlords). Our primary focus is short term vacation rentals – mansions, houses, duplexes, condominiums, flats, private rooms, etc.

Our aim is to build an open and proxyless system based on trust. End users of this system will be enjoying great benefits of a low transaction cost, ability to easily list and book vacation rentals across any countries' borders without the fear of blocking transaction by their bank or money transfer institution. People in developing countries who do not have credit cards or banking accounts will be able to use this system as well. Wide adoption of this system will definitely affect and even disrupt the existing vacation rentals markets on the global scale: more offers will be available; booking will be easier and safer; consumers will be able to afford better quality properties because of reduced transaction costs; and more consumers will be able to enter the market globally.

Currently available vacation rental platforms are heavily centralized. Their role in general is to match renters to property owners and in some cases to handle payments, provide escrow services and manage disputes. This whole nature of operation takes its toll and it is carried over to the end users: landlords and tenants. Typical fees charged for a transaction by vacation rental platforms today range between 10-15% and in case when transaction is made across country borders and currency conversion fees is applied as well, fees may reach 20% or even higher.

At StayBit we strongly believe that such revolutionary principles as decentralization and blockchain technology, when applied to the global market of vacation rentals, will easily help to bring transaction cost down to a half or one third of what it is now.

Our initial team has more than enough qualifications to conduct strategical planning of the new system, build the whole world-class infrastructure on top of the core idea, attract the best talent from other subject areas to the project and to promote the end solution to the public.

StayBit project was started by two experienced IT industry professionals and cryptocurrency early adapters who worked for such well-known companies as Apple, Verizon, Hewlett Packard, AT&T and DirecTV and have vast expertise in the areas of project management, software design and development applied to Finance, Internet, Equipment Manufacturing, Telecom, Entertainment, and other industries.

2 INTRODUCTION

StayBit is a decentralized service connecting landlords and tenants build on top of Ethereum platform – a next generation implementation of the blockchain technology introduced in 2014 by Vitalik Buterin, Gavin Wood, and Jeffrey Wilcke. Key actors of the system are identified by their personal public keys and have their own wallets. The whole transaction based interaction between landlords and tenants takes place on the public Ethereum blockchain in the form of auto

executing smart contracts. Smart contracts represent the main trading token – ERC20 standart token and escrow services. Matching tenants to landlords will be done partially through the website operated by StayBit, although landlords will not be required to use only our particular website to advertise their listings. We are planning to make it beneficial to the users to stay on our website by adding social network features such as profiles, messaging, voting and reviewing. Users will be given ability to log on to our system with their existing Facebook profiles and create public keys representing themselves (single sign-on).

Bad actors of the system such as non-performing tenants or landlords misrepresenting their properties will be visible to other participants, since all transactions are recorded on the blockchain and are immutable. This also applies to the good actors as well, we can only summarize that asking referrals from previous landlords and doing property research on the internet will be outdated, since all verified user feedback will be recorded as part of every transaction on the blockchain.

We believe that by creating a decentralized system based on trust and crowd self-governance we can afford to invest less effort into centralized moderation of bad actors. We may deploy several incentive-based mechanisms to encourage users' engagement by describing their experiences about their landlord - tenant relationships. Our task as a platform operator will be more focused to prevent bad actors to create multiple identities and if we suspect somebody using multiple identities then to warn other involved party about it.

The minimum requirement from the landlord would be to have an Ethereum-compatible wallet, register their properties on StayBit platform and accept transactions with ERC20 token only. Advertising properties can be done on any websites and blogs: craigslist, classifieds, etc. The added value of our system versus simply using Bitcoin and Ether to pay landlords is that we are going to build an entire user-friendly infrastructure tailored to short term vacation rentals. Key elements of this infrastructure will be: a socially enabled listings website, automated escrow service, mobile apps for landlords and tenants with built in wallets – all of it aiming to make the whole process a breeze.

All key elements of renting property in exchange for cryptocurrency exist today and each element itself is functional and mature enough, and there are enthusiasts who already do it today. But there is no single unified platform that offers peace of mind while hides excessive intricacies at the same time. Bitcoin and Ether transactions are secure ways of payment but once you send funds to other party there is no way of chargeback. There are escrow services working with cryptocurrencies now, but it takes an effort to reach an agreement between tenant and landlord about following the right process and the whole cryptocurrency adoption by the general public is at the very early stage.

By other words, if we compare renting properties or providing any other real word services in exchange for cryptocurrency to let's say online messaging over the Internet then we can say that

we are still in the early 90-ies when users already able to create simple personal HTML pages, discover each other and send E-mails. But it will require to invent dozens of social networks in order to bring it to an entire new level.

3 TEAM

The team behind StayBit project has worked together and independently on many high-profile projects: Online Banking System, Internet Accelerator & Tools Suite, Data Leak Prevention System, Online Flight Reservation System, Interactive Television Applications for Olympics, Soccer World Cup, Grand Slam Tennis Tournaments. The end software products developed with the significant contribution by our team members are used by millions of people.

Project founders - Andrei Jagodin and Victor Yurchenko - have extensive expertise in the area of Software Design and Development, Project Management, Quality Assurance, Cryptography, Network Protocols and Database Management Systems. In our lives, we had a chance to be renters as well as landlords and we are familiar with both sides of this business.

Our vision of modern IT technologies and the way it can be applied to our daily life, backed by our combined experience acquired during working in large corporate and startup environments - all of it will be a key factor to the success of the whole project.

StayBit team is being consulted by influential and well known Vacation Rental industry guru Matt Landau and by his Vacation Rental Marketing Blog. We are proud that our opinion of how Blockchain may affect Vacation Rental industry was mentioned in the article outlining trends for 2018 year.

StayBit team is working together with BlockBuyer - a startup developing Real Estate crowdfunding platform. We envision our joint solution to benefit not only guests and landlords, but also Real Estate investors, contractors and realtors.

4 BUSINESS JUSTIFICATION

Vacation Rental market is usually considered as an alternative to the well-established hotel business. Entire houses, farms, condominiums, apartments, flats appeal to travelers more because of the comfortable stay especially for travelling families with kids while providing hosting region's sense of community and local flavor. When choosing a short-term rental vs hotel travelers are getting more benefits: they are often offered a kitchen where they can cook their own food and save by not going to restaurants, there is usually more space and even possibility to set up a temporary remote office, kids can be accommodated in the separate room, etc. Vacation rental market has been experiencing a strong period of growth: in 2016, the market was estimated at $100 billion with the expected annual growth rate of 7% [1]. Research and markets

report issued in 2016 estimates that the global vacation rental market would reach $169.7 billion by 2019 [2].

Vacation rental market is unique in terms of the fact that it is dominated by mostly private non-corporate landlords or moms and pops businesses. This will contribute greatly to the successful adoption of our project because as with any major innovation there is a lot of friction and fear from the end users at the very early stage. Selling innovative products to the corporations requires a whole lot of efforts because when there is nobody using such product yet, nobody wants to take responsibility to be the first one or lose their job in case of anything goes wrong and as a result it takes a lot of people and time to make a decision within a corporation. In case of a typical vacation rental there is usually only one decision maker – the owner. At StayBit we believe that for such an innovative idea as to book and rent properties with the help of cryptocurrency, blockchain and smart contracts, vacation rental market fits perfectly from the point of view of future adoption.

Despite of its attractiveness and strong growth vacation rental market is not prone to various problems. We are creating StayBit smart contracts in order to address these problems and make vacation rental market to appear even more attractive to travelers.

4.1 Today's Landscape

Currently there are dozens if not hundreds of platforms offering service to match tenants to vacation rental properties [4]. The most prominent websites are *homeaway.com*, *vrbo.com*, *flipkey.com*, *tripadvisor.com*, *airbnb.com*, *booking.com*, etc. Building and promoting a merely just another website providing similar services will require tremendous efforts during user acquisition phase, since the market is saturated by the existing players. None of the platforms right now utilize cryptocurrencies and smart contract based escrow services in a decentralized way at the same time. Only small fraction of websites will allow tenants to pay in bitcoin only to convert payment in fiat money right away or transfer the full amount to the landlord. All market leaders right now sticking to centralized model, meaning they provide a lot of censorship, moderation, and dispute mediation and charge too much for a transaction made through their websites.

At present time anybody who will offer a more democratic, decentralized model while charging substantially less for a transaction will immediately get upper hand in terms of media attention and therefore in building their customer base. This is exactly where StayBit system is planning to find its market niche.

4.2 Problem 1: Trust

Unlike major hotel chains, single property owners have no established names and travelers rely only on ratings and reviews. Sites like *expedia.com*, *yelp.com* cannot verify whether users submit actual or paid fake reviews. There is always more risk of running into fraud or misrepresentation than compared to a hotel.

Solution: Transactions recorded on the blockchain will be able to easily prove that reviewer who is posting a review was a real customer. We can even restrict reviews to be written by actual customers only. Payments will be done in ERC20 tokens via automated self-executing escrow accounts. Landlords will be able to see proof of funds, but funds will be released in phases, for example if traveler confirmed that they got access to the property and the property is exactly the same as advertised, etc. Landlords and tenants will be able to choose predefined escrow account types and slightly customize them through our website to better fit their needs. We will be able to show real stats for each property: how many total bookings were done, and out of that amount how many times tenants were happy, neutral, or unhappy.

4.3 Problem 2: Central Regulation

All popular platforms today heavily rely on central regulation and restrictive policies. There are lots of complaints that listings get removed without an explanation, policies regarding cancellation set up by property owners get overridden by platform moderators [3].

Solution: User-Powered Governance. Peer-2-Peer platform, which focuses on preventing outright fraud, duplicate identities, maintains transaction history and ratings for its actual end users is able to reach rate of trust comparable to centrally regulated platforms. Level of central moderation can be reduced by partially offsetting this responsibility and overhead to end users, giving them power to decide what is right and what is wrong.

4.4 Problem 3: Payments and Cost

Some platforms handle payments, like *airbnb.com*, but some do not. When platform handles payments then they charge additional fees ranging in 12-15% from the transaction amount. Not all methods of payment are accepted, but only the common ones: credit cards and PayPal. If a platform does not handle payments and if traveler goes to another country, then it may become real hassle: not all private property owners take credit cards, credit card transactions can be blocked, and cards themselves can be locked. And if a deal falls through both parties suffer: landlord loses unrealized income, and traveler has to quickly find a hotel to stay for a night.

Solution: Cryptocurrency. Payments made in cryptocurrencies are handled fast and cannot be blocked by any centralized authority such as bank, because the whole nature of blockchain is decentralized, without any single “owner” and there is no such obstacles as country borders.

4.5 Problem 4: Bad Actors, Fraud, and Disputes

There are bad landlords who misrepresent their properties: use false pictures from other properties, state false facts about square footage, number of rooms, bathrooms, accuse tenants for no reason in order to keep cleaning deposit, etc. There are even people who do not really

own a property, but gain access to it illegally without the real owner's consent and try to rent it out to multiple tenants, collect the money and run away with it. There are also bad renters who mess up properties, accuse landlords for no reason and chargeback their credit card transactions.

> **Solution:** Currently only the platforms who handle transactions and manage identities of landlords and tenants can efficiently fight this problem by centralized moderation and removing known bad actors from the system. We are planning to start using this approach right after the system's initial deployment, however some decentralization efforts may be done after some period of time, such as introducing incentive based independent moderators.

Although there is no single solution for all of these schemes, customizable escrow accounts and ratings calculated based on previous behavior, verified by immutable records on blockchain can help significantly. Centralized moderation, although still required at first, will become less relevant, since after some time when system becomes operational and user base growth, lots of end users will have their ratings developed. And they will be adjusting escrow accounts accordingly: if for example landlord finds request from a tenant with low rating, he may either reject them right away or request to use escrow account which will allocate higher amount as a security deposit and will not let tenant to withdraw all of the funds after he or she moved in. Same applies to the tenant as well: if for example there are complaints that some appliance inside the property does not work and often required owner's help to fix, then tenant may request that escrow was modified in order to withhold some amount from the owner in case that appliance was broken again and owner would have failed to fix it. The whole nature of cryptocurrency transaction is that no chargebacks are physically possible, once funds disbursed from one account to another one, there will be no one to complain in order to reverse the transaction. Only receiver of the funds transfer transaction may voluntary send funds back either in full or partially in case there is any mistake or overcharge. Our goal is to educate end users of the system about how smart contracts representing escrow accounts work, so that users can delegate issues related to mistrust and possible disputes to the algorithms operating within blockchain.

Since there is no risk for a landlord that tenant will charge back the whole amount after he enjoyed his stay at the rental and moved out, entire system will look appealing to them right away. However, there are still minor risks associated with the transaction: 1) Tenant will book 2 or more properties at the same time and pick the property which he likes the best during actual visit and inspection. In order not to pay reservation fees for other property, he may falsely claim misrepresentation by the landlord for the property he did not choose. 2) Landlord may falsely claim damage to the property in order to keep security or cleaning deposit.

At StayBit we may introduce the following policies to our escrow accounts: in case of a dispute between parties regarding reservation fees when, for example, tenant declined to move in based on his misrepresentation claim: if multiple previous tenants with good established history and rating have evaluated that particular property as fairly presented, i.e. pictures submitted to our

website, actual description such as square footage, number of bedrooms and bathrooms are true and correct then we may automatically deny misrepresentation claims for this property if and only if we can prove that property description on our system did not change since the time these reviews were made, and last positive review was recorded fairly recently. We are intending to use blockchain's proof of existence feature to build a proof that property description with supporting media materials was submitted at certain date and has not changed since then on our system. If, for example, a prospective tenant made a decision not to move in to the property based on misrepresentation claim after the visit and property does not have a good rental history in our system, then we may withhold reservation fees partially or in full from the owner and return that balance to the tenant.

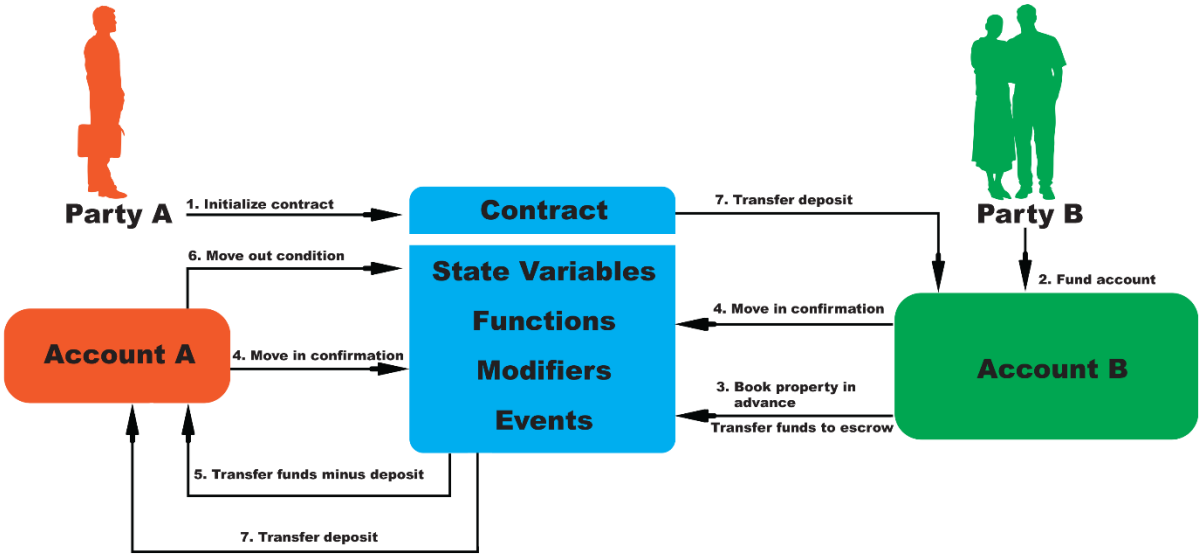
Claims related to security deposits usually will be resolved through the third party, since tenants with good history may still accidentally damage the property. At the early stage our escrow accounts will give the full power to release security / cleaning deposit to the landlord only. But if we can attract the third parties as mediators, for example if property required excessive cleaning after moving out, then cleaning agency or an independent handyman may create an account on our system as a mediator. If tenant and landlord agree on who will be the move out 3rd party mediator, then responsible 3rd party will submit invoice into our system and close the escrow associated with the dispute. Leftovers from cleaning or security deposit (if any) will be returned back to tenant after cleaning and repairs were actually done.

4.6 Smart Contracts

Customizable Escrow accounts will be written in Solidity programming language, then deployed and executed within Ethereum public blockchain. Potential mistrust will be resolved by reaching consensus between landlord and prospective tenant by selecting an appropriate type of escrow account and customizing its properties. Escrow account types may be more favorable either to the landlord or to the tenant. Customizable fields within an escrow account could be amounts representing rent per day, reservation fee, security deposit, or inconvenience fee (inconvenience fee applies only if tenant agreed to move in, but something did not work exactly as advertised during his stay and owner failed to fix it) as well as periods of time when reservation fee will be applied if tenant changed his mind, or the date when security deposit will be returned to the tenant. The whole model driving the smart contract's inner state will be event driven with the following typical path:

1) Tenant sends request to book a property.
2) Host accepts or rejects request.
3) If host accepts request, an escrow account is created with tenant funding the whole amount of transaction.
4) Both tenant and host submit confirmation at the time of move-in.

5) Host submits confirmation when tenant moves out and evaluates property condition.
6) Escrow account is terminated with possible refund (security or cleaning deposit) sent to tenant, host or split between them.



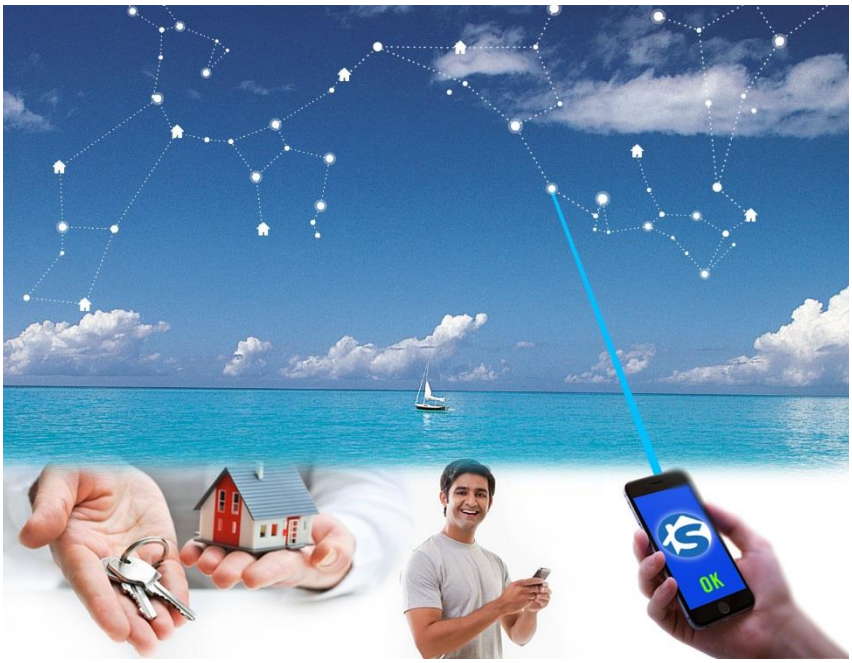
Pic. 1: One-to-One Smart Contract. Party A – Landlord. Party B - Tenant

Landlord and tenant will negotiate an escrow account and its parameters at stages 1 and 2 and it will be our responsibility to visually present and quantify all possible outcomes on our website for the involved parties: before what date tenant can cancel reservation for free; if tenant does not show up at the time of check-in and cancels, how much reservation fee he will pay; what happens if owner does not show up and fails to provide access to the property; can and when tenant claim misrepresentation; if tenant claims inconvenience like pests, noise, and moves out in the middle of his term, how money will be split between parties.

Smart Contracts for sure will prevent outright scams: tenants will not be able to charge back entire payment through their credit card or bounced back check and tenants will not lose their entire payment in case landlord never showed up. So, it is a win-win solution protecting both parties.

Smart Contracts do not in any way represent legal documents nor do they bear any legal power, but it is an attempt to automate most common disputes between parties in a fast and predictable way. We will make it clear to the end users of our system, that by entering into any Smart Contract they have to be fully familiar with the way their particular Smart Contract works. If any party will be not happy by the way how funds were distributed after the escrow account was closed, for example property was damaged beyond the amount that could be covered by security

or cleaning deposit, or landlord thinks that tenant claims inconveniences unfairly, then their case, backed by evidence recorded on the blockchain must be settled in small claims court. StayBit will not be involved in resolving any disputes between parties, but if parties unable to settle a dispute between them, our system can provide trusted record of the whole transaction as an evidence for prospective court hearing.



Pic. 2: Tenant confirms check in with his smartphone. Check in event will be stored on blockchain

Events driving Smart Contract's inner state can add proof of action such as tenant - landlord showed up near the property. Since we will be developing mobile apps for smartphones, we will be able to log GPS coordinates and present a proof that tenant - landlord was near the property at specific date and time. IoT devices can also communicate with Ethereum-based contracts and provide proof of action such as the fact that tenant was able to enter the property. Smart door locks based on IoT architecture and supporting Ethereum Smart Contracts developed by startup slack.it will be able to automatically unlock the door thus removing the need of the landlord to be physically present and transfer the keys to the tenant during check-in.

4.7 User Identity

StayBit system will collect and store personal data from its end users such as exact property address, name, last name, phone numbers, address, and links to social network accounts, if any. Each user will be able to control what information display to the public on our website. For example, owners may not display their last names, phone numbers and exact property address when they appear in search results. And tenants may not display their real names and last names

when writing reviews. But when owner and tenant enter into escrow, then their real names, last names, phone numbers and addresses used during the registration process will be automatically exchanged between them by our system.

When user creates new account and supplies all required personal information, then hot Ethereum compatible wallet will be automatically created together with public and private keys.

User identities and property addresses can be partially verified by installing mobile app into user smartphone (verify phone number and other personal data) and by sending paper postcards to property owners with randomly generated pin number (verify physical address and that owner has access to it).

StayBit platform will invest effort into ensuring that no duplicate identities are created and if we suspect duplicate identity, we will advise other involved party. For example, landlord who was engaged in shady practices, earned bad rating and decided to re-list his property under the name with different spelling or different name. In this case we may detect possible match and show its past history next to the newly created listing.

4.8 Summary

Apparently, the modern platforms for renting vacation properties have some disadvantages to both landlords and tenants, and this can be addressed by our innovative platform. Less transaction cost, higher trust and frictionless transactions across any countries' borders - these are key advantages our platform will offer to end uses.

5 StayBit Solution

5.1 User Ratings

StayBit system will keep track of each user's ratings. Each user will be rated as a landlord and as a tenant. Cumulative Rating will be calculated by StayBit system in attempt to give each user a level of credibility. Cumulative Rating will be a numerical variable with values from one to five and will be calculated using a complex formula. Following events will be taken into consideration during calculating Cumulative Rating: other parties reviews and ratings, in how many transactions user participated, and out of that amount how many transactions were completed "as expected" or without other party's complaints. During calculating Cumulative Rating each type of event will have different weight, and entire algorithm will be continuously adjusted during the first phases of operation. Cumulative Ratings may be applied when there is a need to calculate how funds will be distributed during conflict situations, for example when tenant claims misrepresentation and cancels his stay. Cumulative Ratings will be updated for each involved party after each escrow account closing.

5.2 TOKEN

Within our ecosystem only the ERC20 standard token will be used as a method of payment for rental properties. Tenants will be required to buy ERC20 tokens on popular crypto exchange websites like *poloniex.com*, *kraken.com*, etc. and use these tokens as a payment to landlords. After escrow account is closed, landlords will sell ERC20 tokens from their Ethereum based wallet for fiat money through the same crypto exchange websites.

Some actions within our network will be incentivized by paying tokens to those who committed these actions. For example, 3rd party move out mediator who helps to close escrow by providing cleaning and/ or repair services will receive payment in ERC20 tokens.

5.3 TECHNOLOGY

ERC20 token standard itself is based on Ethereum, a blockchain distributed transactional computing system. Ethereum system has a built-in capability to deploy smart contracts, meaning it can execute binary code in a distributed way on top of transactions dedicated to crypto currency transfer between user accounts. Ethereum is an open source system, which offers available cryptographic solutions for common peer-2-peer problems like double spending, lack of trust, traceability and verification of the transaction history.

Ethereum blockchain platform despite of being developed fairly recently in 2014, is already adopted by hi-tech industry leaders as Microsoft, IBM as well as financial industry leaders such as JP Morgan, Deloitte and many other players.

Smart contracts are what enables the core idea of StayBit platform, basically it is a distributed computer program which executes within a context of blockchain node making sure that the result of their execution is always transparent and cannot be manipulated. Economic model behind the distributed system is that transaction originator pays certain amount for each transaction requiring any change of state. Transaction fees in Ether are paid to miners who provide their hardware to execute smart contracts. Any tokens built on top of Ethereum platform allow to utilize existing large community of Ether miners. Thus, the whole model does not have any single “owner” who can imply censorship or excessive moderation, also there is not any single regulating entity which could prevent transfer of funds between any accounts, freeze accounts, etc.

The technology removes the need of an intermediary between two involved parties: landlord and tenant and thus, reduces the need of StayBit foundation to maintain hardware infrastructure and minimizes the need to be involved in disputes mediation.

Our goal is to use public blockchain wisely. It is well understood that storing excessive data on blockchain is expensive – 1MB may cost up to several hundred US Dollars on public Ethereum network. Thus, we will be using off-chain solutions for large data storage and distributed file storage IPFS once it becomes more widely adopted. Public blockchain will be used only for most

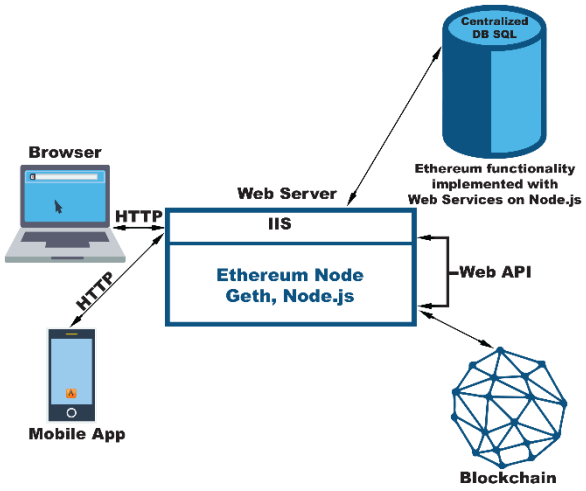
critical data such as balance transfers, escrow accounts, transaction history, proof of existence, etc. At the early stage our system will be hybrid in terms of centralized/decentralized and still will be more centralized than decentralized, meaning a lot of data will be stored off of public blockchain. Once data storage/retrieval solutions (Swarm, IFPS, etc.) mature overtime and new solutions become available, decisions will be made to port data storage segments on a case-by-case basis. During the first phase of the development we will be focused more on delivering the outstanding application allowing the end users to outsource the problems related to trust to blockchain, and after the system becomes operational and gains popularity from the users we will be focusing on further decentralizing data storage.

We call the set of smart contracts deployed on the public blockchain the "StayBit Core". It includes ERC20 token itself and escrow accounts. We will keep the code within the StayBit Core as Open Source and available for multiple security reviews by members of cryptographic community.

Our system will consist of the following major components: StayBit Core, API, Landlord's Portal, Landlord's Mobile Application, Tenants Portal, Tenants Mobile Application and Centralized SQL Database.

5.4 INFRASTRUCTURE

StayBit infrastructure implementation will be typical to any other common distributed/hybrid application built on Ethereum network: web server instance will have a full Ethereum node installed (Geth), Node.js and Microsoft Internet Informational Server (IIS). Relational database management system such as Microsoft SQL server will be used for off-chain data storage. Web servers handling content for StayBit front end applications and relational SQL Server database will be hosted on cloud service provider, such as Amazon AWS or Microsoft Azure. Load balancers provided by AWS or Azure will be utilized to evenly distribute load and create new server instances on demand when StayBit system starts acquiring more and more users.



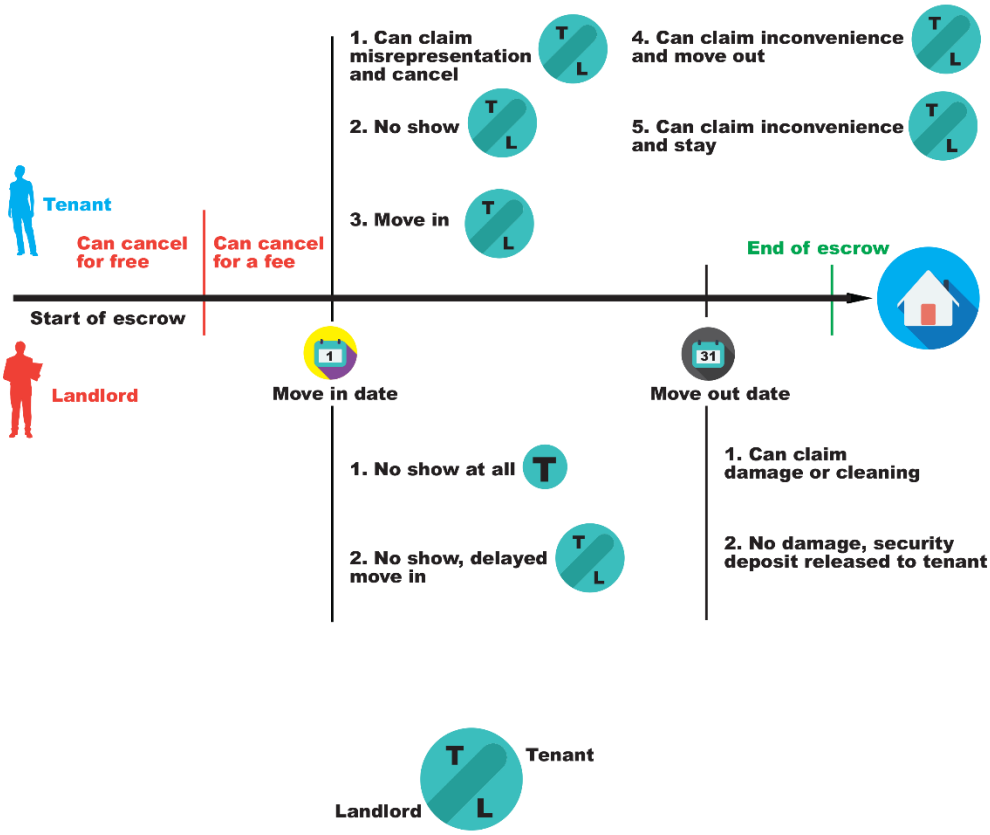
Pic. 3: Backend infrastructure diagram

5.5 LANDLORD'S PORTAL

On this portal landlords will be able to create their accounts, enter their personal information, create listing for each property, maintain listings, update availability, upload media files for advertising purposes and communicate with tenants. When landlord's account is created, then a new Ethereum based hot wallet will be created on our system. Wallet will be integrated into the portal and it will allow to see the current balance and transfer funds anywhere else, for example, to the crypto currency exchange's wallet in order to sell ERC20 tokens for fiat money.

Landlords may choose to add additional verification of their property – in this case we will send a postcard with PIN to their property address, and once landlord completes verification process, their listing will be marked with the special "verified" logo.

We will provide graphical representation of chosen and customized escrow to both landlord and tenant. This graphical representation will inform both parties how funds will be distributed in each possible case: tenant moved in, cancelled, claimed misrepresentation, inconvenience, etc.



Pic. 4: Example of graphical representation of escrow. T/L label means actual numbers how funds will be distributed between tenant and landlord when particular event is detected. Cumulative Ratings may be applied during calculating T/L numbers

Landlord will be able to see tenants' requests to book his properties and make a decision whether accept or deny their requests. Decisions can be made based on previous rental history and landlords will be able to use options like "auto accept tenant if its rating is higher than average and no duplicate identity detected". When tenant moves out, landlord will be able to give them a rating and to write a review. Once ratings are given and reviews written, they will be submitted to the blockchain and nobody will be able to remove or alter them. Landlord's portal will provide the opportunity to submit events to smart contracts, for example signaling events that tenant moved in/moved out and that security deposit can be released/withheld.

5.6 Landlord's Mobile Application

Landlord's Mobile Application will provide the same functionality as Landlord's Portal, adding the opportunity to verify phone number. GPS coordinates may be used to help verify events for smart contracts, such as landlord was near the property's address at check-in date and time in case of any dispute.

5.7 Tenant's Portal

On this portal tenants will be able to create their accounts, enter their personal information and search listings. Listings may be sorted and filtered by ratings, thus making popular and fairly represented properties to appear first. When tenant's account is created, then a new Ethereum based hot wallet will be created on our system. Wallet will be integrated into the portal and it will allow to see the current balance and receive funds from anywhere else, for example, buy ERC20 tokens on the crypto currency exchange for fiat money and transfer tokens to our system's wallet.

Before attempting to book a property, a tenant will see its escrow type and reviews submitted by other tenants. If he sees that property had a history of minor problems, but he still wants to procced with it, then tenant will be able to request landlord to change escrow type in tenants favor: decrease security deposit, enable or increase inconvenience fees, etc. When tenant agrees to book a property with a chosen escrow type, then escrow account of this type will be created on the blockchain, with funds transferred from tenant's wallet.

Tenant's Portal will provide the opportunity to submit events to smart contracts, for example, signaling events that tenant moved in/moved out and that funds from escrow account can be unlocked and transferred to the landlord.

Tenant will be able to give ratings and write reviews for every property he initiated an escrow account. Tenant will have the option to cancel his stay right after initial visit if and only if he found that property was misrepresented by the landlord or there is some major inconvenience found in the property: pests, smell, noisy neighbors, etc. If cancellation took place after or at the move-in date, then writing review will be mandatory for the tenant.

5.8 Tenant's Mobile Application

Tenant's Mobile app will provide the same functionality as Tenant's Portal, adding the opportunity to verify phone number. GPS coordinates may be used to help verify events for smart contracts, such as tenant was near the property's address at check-in date and time in case of any dispute.

5.9 Application Programming Interface (API)

API will allow landlords to copy and paste a snippet of JavaScript code or URL to any web page. The web page with embedded snippet or URL will display the single property listing with its rating and expandable list of reviews. If user clicks on the listing, he will be redirected to the Tenant's Portal where he will be able to login or create a new account to book that property. Such snippets will be useful to advertise on any message boards, craigslist, social networks, etc.

Another use case of API would be to submit blockchain verified reviews into sites like *yelp.com*. Tenant may select whether to disclose his identity when posting a review for a property advertised on any other third-party website.

6 REFERENCES

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