

Property2chain Whitepaper

Version 3.3

Abstract.

Property in its nature, since transfers were overseen by tribal chiefs up until now, it has remained a very illiquid asset class, requiring numerous third parties to authenticate transfer of ownership.

The common problem in real estate transactions is very similar to the double spending problem solved by Satoshi Nakamoto a few years ago with the introduction of the Bitcoin Whitepaper. How do we ensure that a proposed seller is not simultaneously signing agreements of sale with numerous brokers on a single piece of property using the same title deed replicated into copies or through a series of meetings strung together in which the same deed is shown to various unsuspecting brokers and buyers.

We propose a system that would increase buyer confidence and decrease broker liability by accompanying every paper deed with a corresponding digital copy agreed upon in a decentralized manner. The digital deed can be transferred from seller to buyer within days or even hours upon concluding an agreement. This limits the window period for any double spending should there be a bad actor attempting to sign two or more agreements of sale on the same piece of property to two or more susceptible buyers. We believe Web3 will enable the creation of next generation marketplaces through peer to peer interactions.

This whitepaper examines the necessary components required to power The Property2chain Platform and establish the decentralized ownership transfer protocol which will ultimately allow properties to be bought and sold online.

1. The Current State of Real Estate Transactions

Real estate Transactions and Real Estate itself underline most economic activity in a manner little understood by most. Its effects far reaching to all human life more than any other asset class, from the average person's primary residence to massive companies that offer purely online services utilizing land in the form of data centres and offices.

According to the Fortune Magazine, the real estate market is worth a staggering \$217 Trillion with 75% of that value realized in the Residential Property Sector.¹ This chapter will primarily focus on the numerous third parties involved to mitigate risk and ultimately bring together buyers and sellers to interact in this gigantic market. This involvement of third parties usually comes with a fee that should be paid for by the two parties in agreement.

For this reason, real estate has long been described as a very illiquid asset class due to the liquidity discounts and the sheer time it takes to buy a property, spanning from weeks to many months in some cases. Because property brokers function in isolation, buyers and sellers are left with very little market information to make informed decisions, this works in favour of property brokers who in turn charge fees to share that information with buyers and sellers.

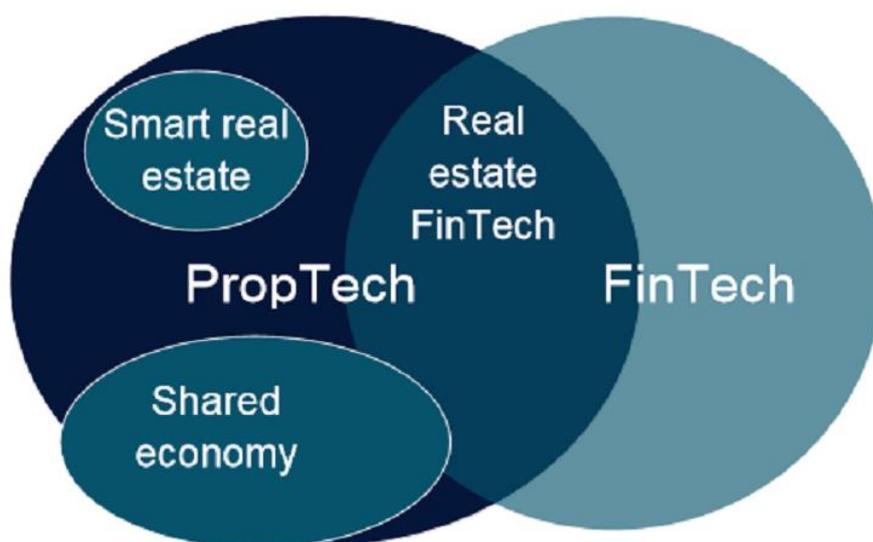
This realization has led a lot of companies to innovate towards providing more market information and perhaps eliminate the roles of some of the third parties involved. To better understand where most innovation has been focused, here's a list of the various parties involved in any one given real estate transaction in the UK.²

- > Estate agents
- > Conveyancing lawyers
- > Structural surveyors
- > The Land Registry (title deeds)
- > Local authorities (multiple searches)
- > The Environment Agency
- > HMRC (Stamp Duty)
- > Banks (financing and exchange of money)
- > Credit Rating Agencies (on behalf of banks)
- > Utilities (outstanding accounts)

¹ Global Property Value according to Fortune Magazine <http://fortune.com/2016/01/26/rea-estate-global-economy/>

² Amount of 3rd parties in any one real estate transaction in the UK
https://www.sbs.ox.ac.uk/sites/default/files/Press_Office/Images/proptechreport/PropTech%20%20-%20The%20Future%20of%20Real%20Estate.pdf

The need to free up market information and increase efficiency in interacting with third parties has ushered a new industry with lots of promise. PropTech first emerged in the 1980's with many companies innovating toward publicizing listings beyond geographical time limitations of transported paper through the use of computers. Today, activity in the PropTech Sector can be classified across many segments, as shown in the diagram below by the Said Business School at Oxford.³



The PropTech Industry Verticals according to a Paper from The Said Business School at Oxford.

Zillow has fundamentally increased market information for participants with the ease at which listings can be created and searched up online from anywhere.⁴ In another example, Airbnb has enabled the sharing Economy, allowing property owners to profit from underutilized space within their vicinity.⁵ This time Airbnb going as far as facilitating the exchange of funds between the two parties in agreement, an activity which falls under Real Estate FinTech, the foremost motivation behind the Property2chain marketplace to lower transactional friction and decrease broker liability in real estate transactions.

However, there remains an unsolved problem in all PropTech segments, the amount of time it takes to transfer ownership of title deeds which can average 2-3 months in the UK and as long as 12

³ https://www.sbs.ox.ac.uk/sites/default/files/Press_Office/Images/proptechreport/PropTech%203%20-%20The%20Future%20of%20Real%20Estate.pdf

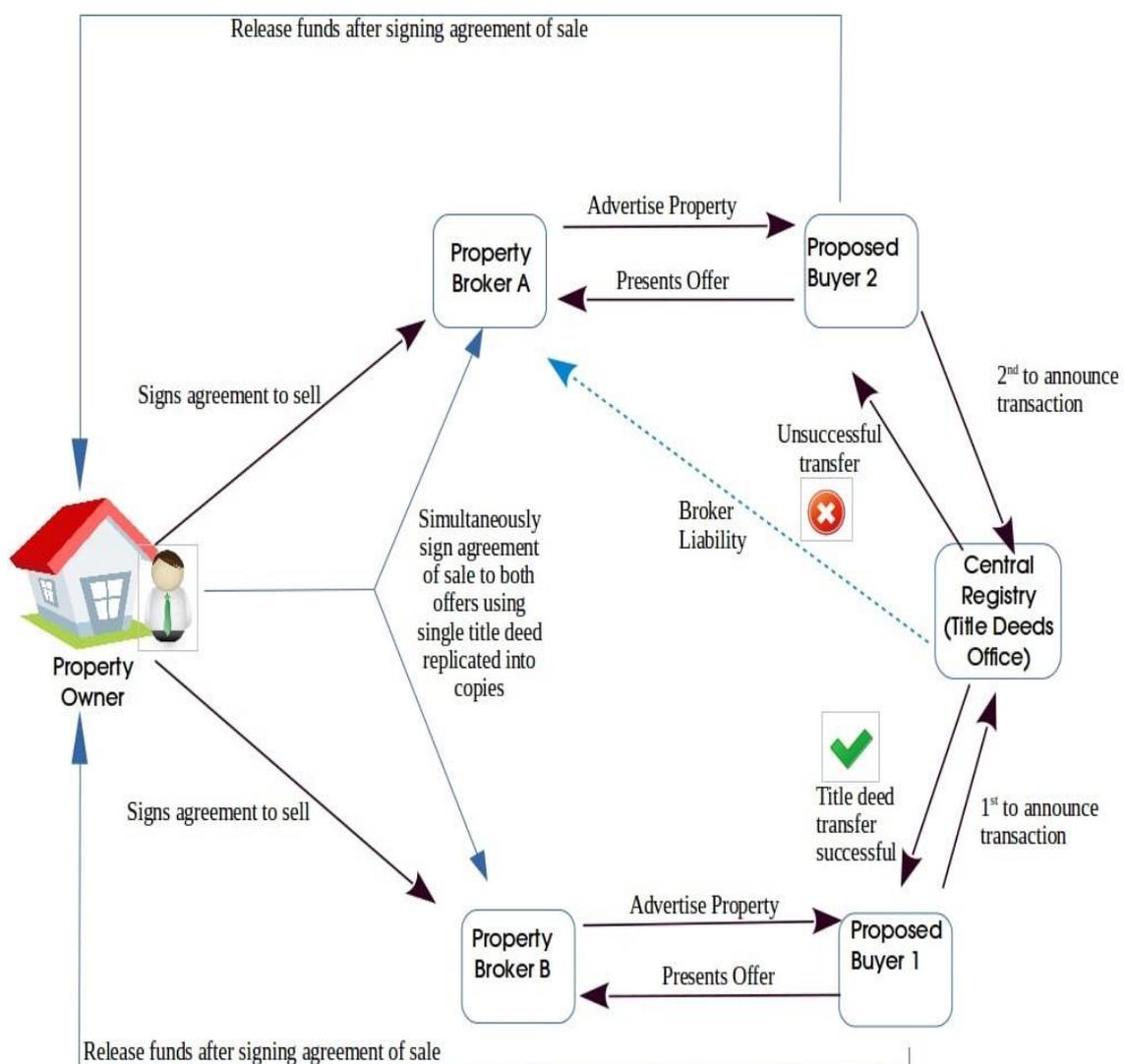
⁴ <https://www.zillow.com/>

⁵ <https://www.airbnb.com/>

months in China.⁶ This creates a fundamental flow in how transactions are managed and verified today.

2. The Double Spending Problem In Real Estate Transactions

Despite the involvement of numerous third parties to mitigate risk and verify authenticity of the documents in the transaction, the agreements to transfer ownership only take effect weeks or even months as highlighted before. On the other hand, the exchange of money is effective immediately upon signing agreements of sale in a transaction which is funded by the buyer.



⁶ Amount of times it takes to process transfer of ownership in various countries.

https://www.sbs.ox.ac.uk/sites/default/files/Press_Office/Images/proptechreport/PropTech%20%20-%20The%20Future%20of%20Real%20Estate.pdf

Because transfers are only effective months after the exchange of money, there is ample time for bad actors to replicate the same deed for which they have received the proceeds from sale. This paper deed can be replicated into copies and used to enter different agreements with different brokers and different buyers before any one of the transfers are brought into effect on the central registry as illustrated in the above diagram.

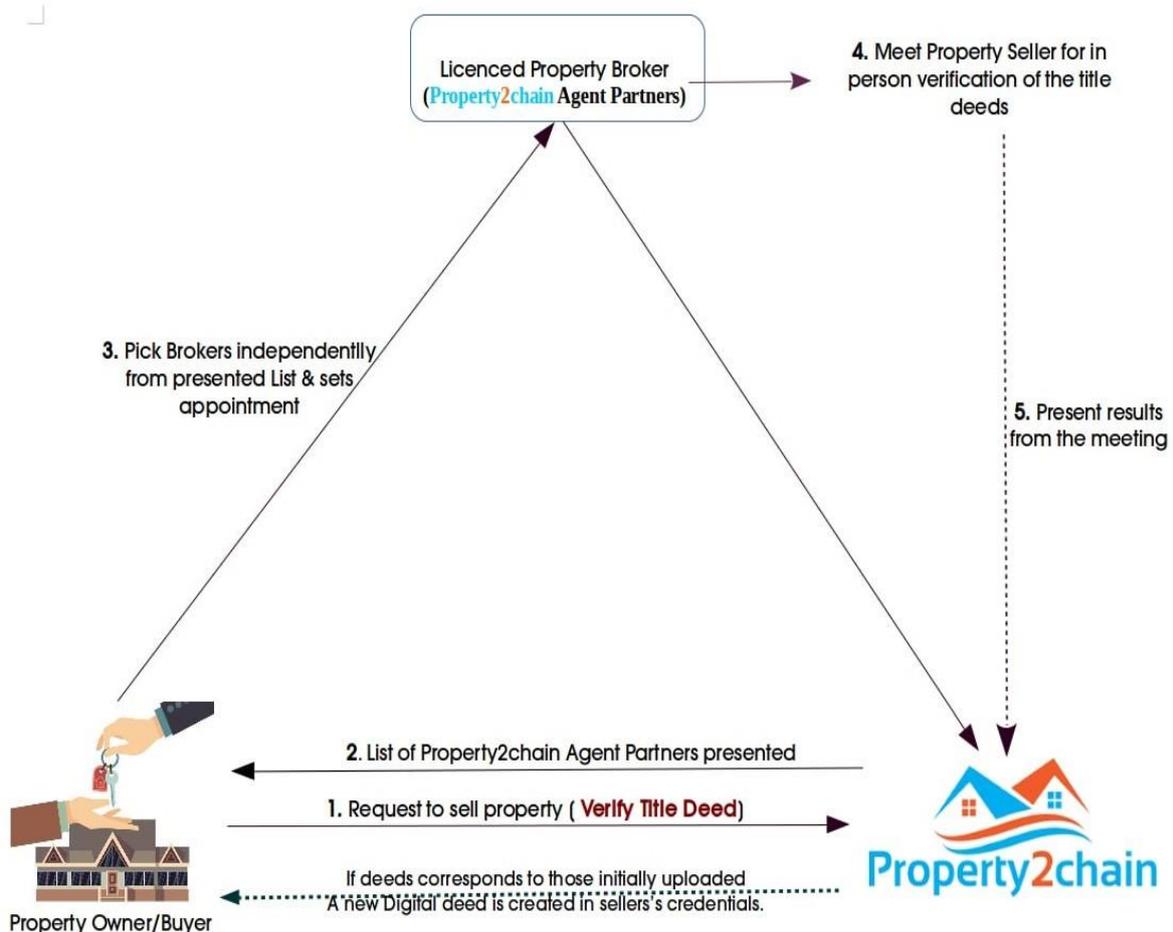
In the example above, Buyer II's first point of reference once the transfer is unsuccessful, is the property broker who assisted them with the transaction. This is in part the main reason property brokers interact with the various 3rd parties that make up the transaction, mainly Conveyancing Lawyers and Structural Surveyors. This liability on the broker is often undermined by rent seeking critics who fail to understand that brokers also have to cover these bills in the form of extended 3rd parties.

Our mission is to enable residential property transactions with the click of a button. Solving this double spending problem will enable a scalable marketplace for residential properties powered by the Ethereum Blockchain.

3. Decentralizing Title Deed Verification

From the detailed role of the broker explained earlier, the ability to verify the authenticity of the title deeds either by calling the deeds office to physically look up the deeds or even visiting the central registry to cross check records cannot be ignored. The human ability to perform due diligence and perhaps verify identities offline remains the core of what makes up a property broker, this will be later expanded on in the next chapter.

However there is currently no efficient means to ensure that one single paper deed cannot be replicated into copies and used in numerous transactions to unknowing buyers, this leaves the property broker with massive liability, something that has to be factored when pricing commissions. We are solving this problem by corresponding every paper title deed to a unique digital copy using the ERC 721 Standard.⁷ This in turn makes it very difficult to replicate a single paper deed into numerous identical digital copies.



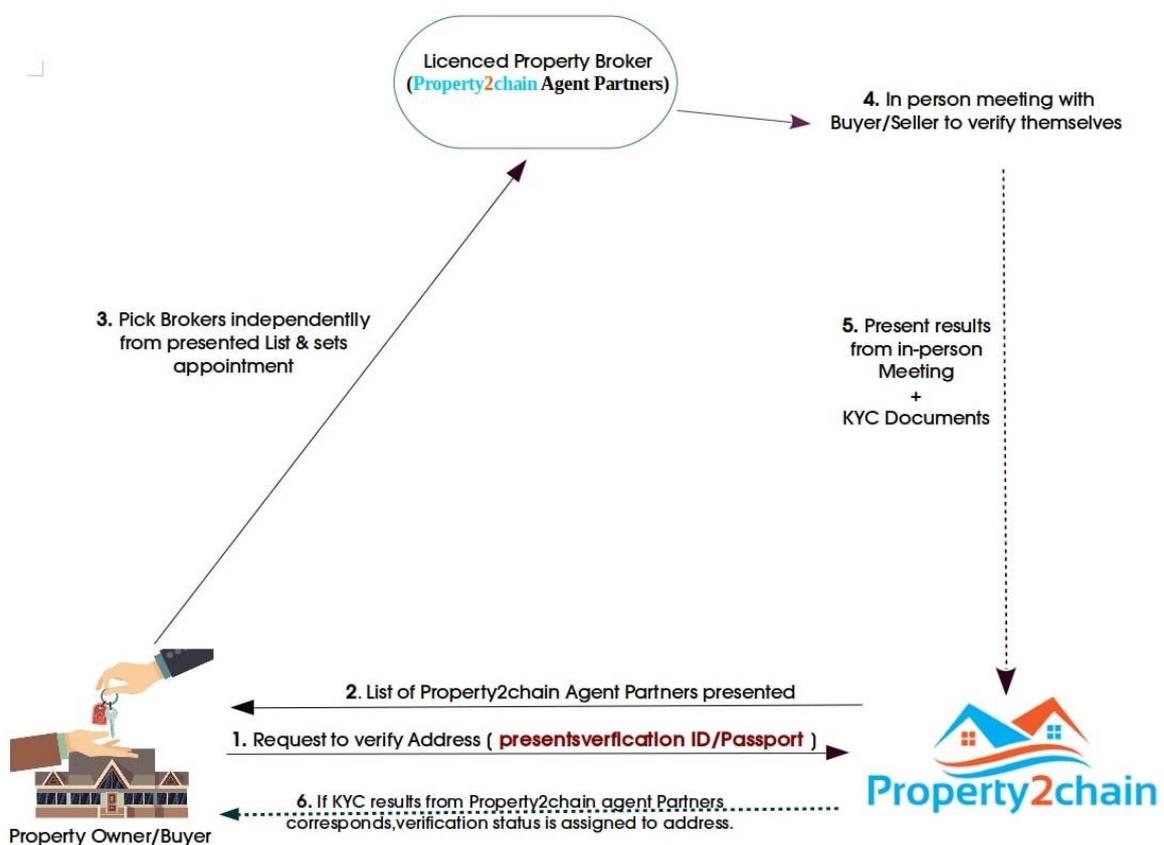
⁷ <http://erc721.org/>

In this model, property brokers can charge participants as nodes powering the decentralized ownership transfer protocol. New nodes (property brokers) can join the network subject to licensed broker status, after the initial verification, they can leave or join the network at will, as long as their broker license is still valid. These property brokers working in conjunction with the dApp to ensure maximum security will be known as Property2chain Agent Partners.

Over the years, property brokers will benefit most from their more human capabilities while streamlining their workload, as a result we will witness more velocity in transactions while incurring very little liquidity discounts. These savings via low commissions will be enjoyed by all the participants in the ecosystem while encouraging property brokers to factor in the decreased liability in their commission fees, this will be later expanded on in Chapter 5. Once the digital deed is created representing a paper deed, it is virtually impossible to create an identical digital copy using the same details on the paper deed, this is made possible by utilizing cryptographic hashes. Properties could now be traded with no 3rd party interference on the Property2chain dApp with a smart contract handling the transfer of money and the digital deed, in turn lowering transaction fees to as low as 1% of the property value instead of the industry average of 5- 10% today.

4. Architecture Overview

One of the main reasons we have chosen to build a decentralized application is because of the ease at which buyers and sellers can interact with each other along with numerous third parties in a transparent manner, something missing from the Real Estate Industry today. We are using the Ethereum Blockchain to track the title deeds in the form of ERC721 Contracts, this will serve as a clear and transparent record for all property transactions for anyone interested. Inadvertently this poses a great incentive for Capital Gains Tax Collectors around the world. With the reference of property transactions within their jurisdiction accessible on the Ethereum Blockchain at any point in time, they can update their debtors list accordingly in real time.



For this reason it is of great importance to tie every address on the Property2chain Platform to an offline verified identity. The KYC process is depicted in the diagram above, the incentive powering the process is later explained in the next chapter.

To ensure maximum security, a verification process is hardcoded into the transferability of every digital deed on the Property2chain Platform. For this purpose we are looking to implement the R-Token Standard initially proposed under the compatibility of ERC-20 Tokens.⁸

Should that prove inefficient to implement under the ERC 721 Standard, similar address checks proposed in both the ERC 725 and ERC 735 provide viable alternatives.⁹

To balance out the supply side, an interested buyer can register a Property2chain dApp Whitelisted (KYC-Verified) address by verifying their offline identities in the same manner that new sellers are introduced on the platform, through the decentralized network of licensed brokers [Property2chain Agent Partners] as illustrated in the diagram above. We are welcoming of the fact that Agent Partners might choose to charge a fee for this service, this will be further expanded on in the next chapter. Through a series of distributed partnerships with VR Service Providers, Virtual Reality will be implemented as a value add service on the Property2chain Platform. A property sold with a Virtual tour could potentially sell for more than a similar property without a virtual tour purely based on the increased customer traffic using a virtual tour.

Sellers on the Property2chain Platform will be able to maximize their property value while paying very little in transaction fees, this is a step in the right direction towards addressing liquidity discounts. Because sellers can reach a global audience just by announcing the sale on our dApp, much of the fees involved in advertising a property across multiple sites today will lead to more savings from sellers. Instead of property brokers having to charge clients for advertising, the Property2chain Platform will be a gateway for brokers to provide free marketing to their clients.

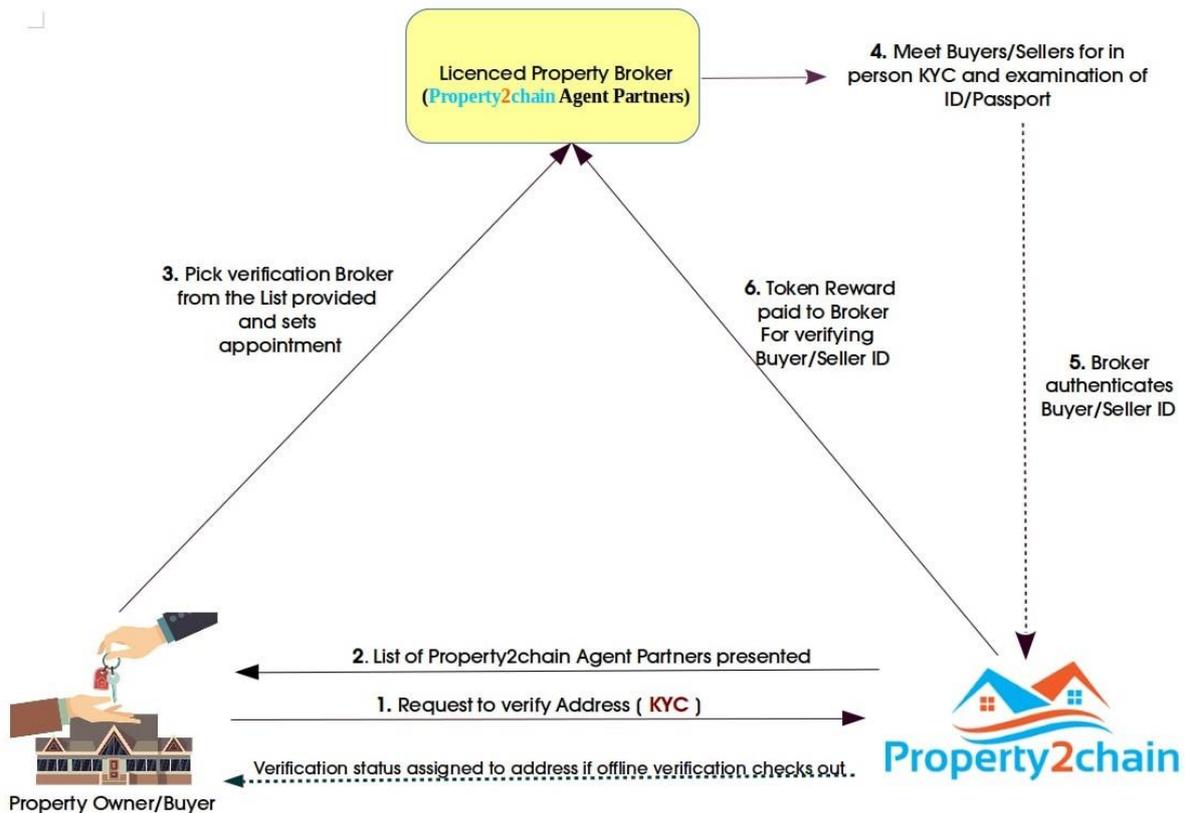
Just as computers eradicated the need to go around collecting property listing in paper form from brokerages, Virtual Reality presents a well-rounded alternative to how we currently conduct property viewings, a repetitive task which consumes much of the broker role.

⁸ <https://github.com/harborhq/r-token/blob/master/contracts/RegulatedToken.sol>

⁹ ERC 725 <https://github.com/ethereum/EIPs/blob/master/EIPS/eip-725.md> and ERC 735 <https://github.com/ethereum/EIPs/issues/735> Standards for Managing Identity on the Ethereum Blockchain.

5. Incentive

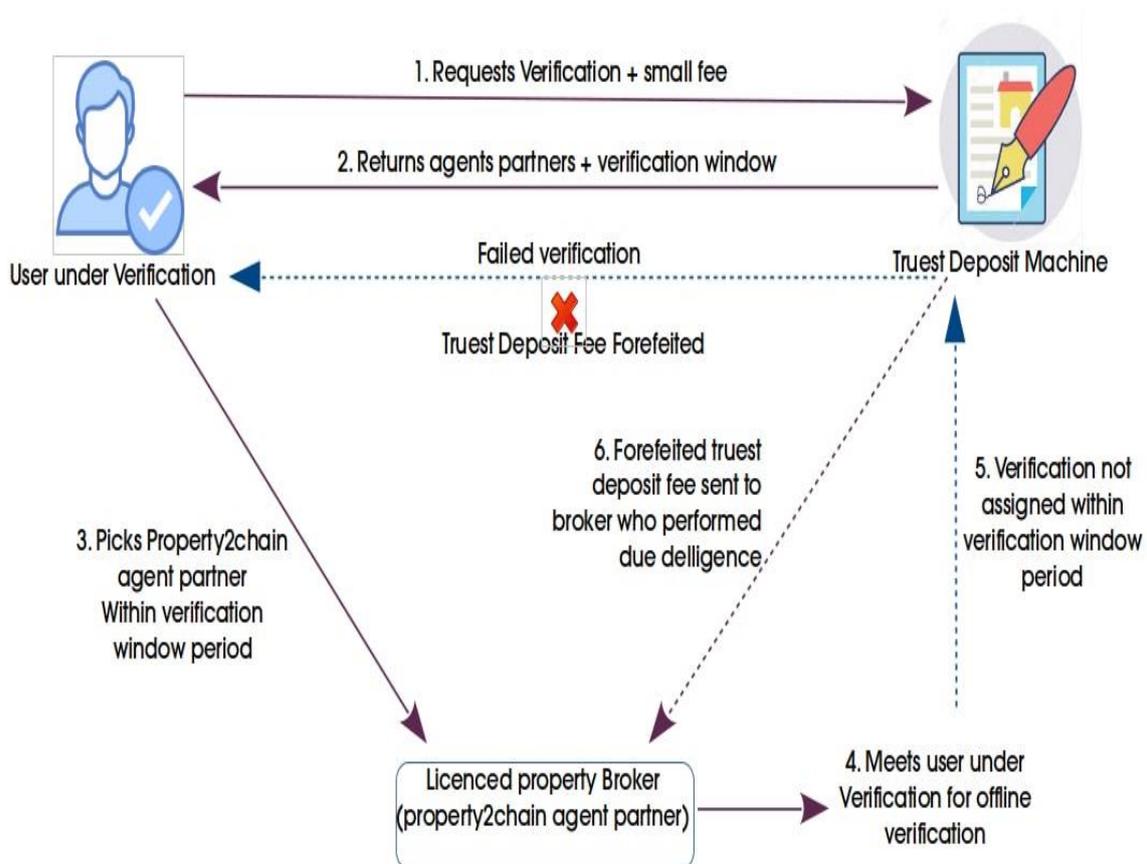
In the previous chapter we briefly outlined the incentive to both the Lands Registry and Tax Collecting Authorities. This chapter will serve to expand on the manner in which market participants and perhaps more importantly how the 3rd parties are incentivized to work in favour of the greater ecosystem. The diagram below illustrates how brokers will be encouraged to function in a more consumer centric manner in order to attract volumes.



The diagram above details how Property2chain Agent Partners will be encouraged to work in favour of the buyers and sellers in pursuit of the token reward. It should be noted that, since Property2chain agent Partners have leeway to charge additional fees for their verification service, innovative business models can be built purely on receiving a token reward for each user verified without charging any extra fees to do so to the market participants, this can in turn lead to more user verification volumes for the zero-fee brokers. As long as the zero-fee Agent Partners maintain a high standard of customer care, users will be more inclined to interact with them over those charging absurd prices. As a result both the zero-fee agents and market participants will benefit, decreased liquidity discounts for sellers and increased token rewards for the Property2chain Agent Partner via increasing volumes.

We will also introduce disincentives to restrict market participants from creating fake listings and/or fake identities via a Truest Deposit Machine, a smart contract which is called with every request to verify identity or creating a digital deed. Each time a user requests verification, either of their identity or a title deed which they might be holding, a small deposit fee will be required to 1) Guarantee the authenticity of the documents in question and 2) In the case of a new digital deed being issued, establish the verified address to be given control over the newly created digital deed. Should the Property2chain Agent Partners independently chosen for the offline verification by the user authenticate their information after the in-person meeting, the respective address will be verified and the deposit in the Truest Deposit Machine will be sent back to the newly verified address.

However, if the in-person verification with the Property2chain Agent Partners is failed or forfeited by the user under verification, the funds in the Truest Deposit Machine deposited by the user in the initial request for verification will be forfeited and given to the Property2chain Agent Partner that conducted the in person verification or was scheduled to, again as a reward for being proactive and keeping the platform free from fake listing and fake identities.



We are going to introduce 'verification window periods'. Once a request to verify either identity or title deed, a window period will be established within which the user under verification can authenticate either their identity or title deed in person with the Property2chain Agent Partner they have independently chosen for their verification. Should the user under verification fail to conclusively verify either their identity or title deed within the verification window period, the contract forfeits funds in the Trust Deposit Machine to the Property2chain Agent Partner who was initially delegated the offline verification. The reward to the Property2chain Agent in the form of forfeited deposit fee from the user under verification is a significantly small fraction of the Property2chain Token Reward the broker would have received had the verification been successful. This in itself serves to ensure property brokers do not act out of bad faith in pursuit of forfeited funds from the user under verification.

6. The Property2chain Token.

Much to the benefit of the ecosystem as a whole, cryptocurrencies can now gain traction in the biggest existing asset class while addressing the slow moving and conservative nature of Real Estate Transactions and by further allowing settlements to be done in cryptocurrency, by default we're creating a bridge to allow cryptocurrency holders to diversify into a long standing asset class while allowing property owners exposure to a relatively new asset class. We realize that in reaching mainstream market participants, not everyone will be comfortable holding cryptocurrency for their just sold property.

To work in favour of such participants, we will be partnering with fiat enabled exchanges to provide swift exchange between cryptocurrencies and fiat. Major Cryptocurrencies such as Ethereum and other ERC-20 tokens will be accepted along with Bitcoin. We are also exploring the use of a stable coin such as Dai. The Property2chain token will be implemented under the ERC-20 Standard as a utility token and will serve as the backbone of the decentralized verification process via token rewards to Property2chain Agent Partners and the initial market participants as a reward for interacting with the various value add services offered on the Property2chain Platform. For example, if a user has successfully registered a digital deed and they choose to upload a virtual tour using a value add service on the Property2chain Platform, a small amount of Property2chain tokens will be rewarded to the property owner for adding value to the greater ecosystem because buyers can now make more informed decisions as a result of the virtual tour. This reward will in due course decrease as the market develops consensus on the foremost necessary value add services required to transact property.

Our brief mention of liquidity discounts earlier on did not actually factor in fees incurred in the actual transfer of funds via a series of financial institutions and escrow agents. Cryptocurrencies provide a means for individuals to transact massive value without the involvement of any 3rd parties. For this reason we have naturally chosen cryptocurrencies to be used in settlements to further address the liquidity discounts currently incurred in many real estate transactions today. Property2chain Agent partners who choose to employ the fee-based verification model can in turn charge for their services using the Property2chain Token should they choose to do so. Another great utility of the Property2chain token is its use in the Truest Deposit Machine as highlighted in the previous chapter.