Concept Paper on Property Chain

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1. Background

In India, Citizen's ownership on property is presumptive in nature; that is onus of proving ownership is on the owner, unlike conclusive system where in Government takes responsibility. There is a huge ambiguity in establishing ownership due to isolated records maintained by the stakeholders. Even in case of digitized systems, most of the documents are in silos having minimum electronic integration with each other.

1.1 The Property eco-system.

The ownership of the land, the cultivators, the crop grown, and the source of irrigation, rights and liabilities are what is stored and maintained by the Land Records System in what is called as the Record of Rights (RoR) document. This documents is used by the farmers to obtain benefit from the Government in the form of subsidy for seeds, fertilizers and for other purposes like securing loan, for sale etc.

The registration of the sale or change in the ownership of the land parcel is done by the registration department. The details of the change are sent to the Land records system for approval by the Revenue officers before it is updated in the land records system.

The banks provide loan to the farmers based on the RoR and the liabilities then get updated in the RoR by the Revenue officials.

Similarly, the Land Acquisition, Land Conversion systems also use the RoR data to ascertain the ownership details before initiating the process.

Thus , there is a need for a fool-proof storage system which could be used by various agencies to ascertain the correctness of the information before providing the benefit / initiating transactions. The same is also true for other property such as residential buildings and residential plots. The Judiciary uses these documents to settle disputes on property matters.

2. Problems in the existing system

i. The problem of fake property documents

Knowingly or Un-knowingly there are lots of fake property documents in the country and to verify the legality of the documents is a time-consuming process. Added to this different

property documents are maintained by different departments in various formats. Modern technology and the rise of the internet have undoubtedly contributed to the wide-spread trend of property fraud and fake documents. History shows that duplicate registration documents are generated by tampering original documents and the properties are being sold on the basis of the tampered documents. Also, one property is being sold to multiple purchasers by keeping each other under dark. This has resulted in increase in the number of Land related litigations

ii. Land encroachment

Unoccupied land and old houses are prone to encroachment, with the use of fake documents. Moreover, the property of the elderly and the NRI are the most natural target for land encroachment.

iii. Rights and Liabilities

In the existing property management system, the property buyer cannot ascertain existing dues on the property and will purchase the property assuming that all the property dues are clear.

iv. Middle man

Middle man charges a considerable amount to smoothen the property registry process. In some cases, the middle man can sell the property with fake documents. Due to this reason a big chunk of assets remains unutilized and unregistered.

v. Delay in verification

Ascertaining the authenticity of property documents issued by various stake holders have become a major cause of concern these days due to prevalence of malpractices like fraud and misrepresentation of records.

vi. Data can be changed, hacked

With data being stored in a centralized location with respective stakeholders involved in property management, there are chances of the data being tampered in addition to be a single point of failure.

vii. Need for carrying of original property document to verify the authenticity

The citizen needs to produce the original documents to various stake holders. Loss or damage to these property documents during travel is a cause for concern.

viii. Delay in processing of loan applications

Lot of paper work for obtaining loan from banks using land as collateral security needs to be done. Financial institutions do not get the factual picture of the piece of land for providing loan as they rely heavily on property for collateral security. Ascertaining the authenticity of the documents produced is a great challenge for the financial institutions.

ix. Lack of single source of tamper proof data on land / property

There is a need to ensure that the data in the land records system, registration system etc. are not susceptible to alteration as each of these departments rely totally on the integrity of the other to initiate transactions. Hence there is a need for trust to use a common source of data to perform approvals for different activities so as to avoid the problem.

3. Property Chain – The Solution

Property Chain is a concept designed and developed by 'Centre of Excellence in Block Chain Technology, National Informatics Centre', to record and store the property/land records in secured manner using the Blockchain Technology. Property Chain has been established using the Blockchain Technology to record the property transactions of various stake holders involved in property management, by linking them like a chain. Property Chain records the property transactions in distributed manner in multiple locations. Attempt to tamper the data is not possible as all the distributed locations need to be updated as per the agreement to synchronise the data between them.

4. Features of Property Chain

Property Chain records the property transactions in the shared/distributed manner with all the participating stakeholders. The property transactions are recorded in the chain based on the consensus with the stakeholders. This eliminates the need for dependency on the third party or intermediary to approve the transactions. The property transactions are linked and stored with cryptographic security so that they are immutable and traceable. The linking of

the blocks (group of transactions) in the Blockchain ensures that they cannot be tampered with. The property transactions are trustable as they can be verified across the participating stakeholders, resulting in a system that is -

- Secured
- Trusted
- Immutable
- Traceable
- Verifiable

5. Benefits of Property Chain

Property Chain provides the trustable, immutable and traceable property transactions. It can be used by the various organizations like Financial Institutions, Government, Citizen, Stake holder involved in Property Management to verify property documents. The financial institutions and Government can use this system for sanctioning/providing of loans. Citizen can ascertain their property document, rights and liabilities on the property, Legality of the property documents is ascertained without hassles. Added to this it has the following qualities: -

- Transparent
- Tamper Proof
- Paperless
- No dependency on third party

Specifically, the benefits include

- The availability of data in a distributed fashion that can be accessed by all departments would enable faster disposal of requests for subsidy, mutation.
- There would be no need for trusted authority like notaries to provide attested copies of documents.
- The farmers will be assured that their land ownership cannot be changed by spurious persons.

- The farmers can obtain loans quickly. The transactions related to loan/loan repayment by farmers can be updated by financial institutions as soon as the farmer obtains the loan/repays the same. This will facilitate the farmer/financial institutions easy access to up-to date information.
- The Blockchain data of the property registration will be made available in the work flow system of the Registration software as well as the public for verification through APIs. This will provide the complete details of the property chain right from the first purchaser to latest one. The Purchaser need not depend on any non-reliable personnel/agency to verify the authenticity of the document provided by the seller.
- Using blockchain, the registration department will be able to verify the integrity of the document in their document repository which can be used not only by themselves, but also by other agencies.
- Citizens can verify the ownership details & complete history of the property before going in for purchase of the property.
- The availability of property chain will eliminate registration based on bogus documents.
- The number of land related cases filed in the different courts of the country will reduce drastically and thus reduce the pendency in the courts.

6. Stakeholders of Property Chain

Property Chain provides the mechanism for all the stake holders involved in the system to verify online the details of the property documents and the creation/updations on the properties carried out and transactions in pipeline. It also helps in property transaction process, by integrating the systems with plug-in interfaces. The property chain eliminates the need to depend upon the third party to carry out the verification and authentication.

The Property Chain contains the digitally signed details of the property documents issued by Government departments involved in Property Management System. Property Documents are issued by Revenue Office, Rural Development and Panchayat Raj Offices, Urban Local Bodies, Urban Development Authority etc. As and when the new property documents are creation or updated, they will send the signed property documents to the Property Chain and Property Chain will link these signed property documents and build the chain and will store securely in the property Chain.

The stakeholders in the Property chain include

- Property owners
- Property Buyers and Sellers
- Government departments
- Judiciary / Arbitrators
- Financial Institutions

7. Contents in Property Chain

As indicated above, the Property Chain contains the property details such as ownership, extents, rights & liabilities etc. As and when the details are changed due to any mutation in the property such as sale, inheritance, change in rights and liabilities etc, new document is issued by the concerned authority. These documents will be digitally signed and sent to the Property Chain. Property Chain will link these documents to the parent document and build the chain and store it securely. This will help any stakeholder to view the complete history of changes and establish the provenance.

The following document types of property are stored in the property chain

- Sale transactions carried out at registration offices
- Inheritance transactions initiated by the citizens
- Mutations carried out by the revenue officers
- Survey updated carried out by the survey offices
- Court orders passed by the revenue/civil courts
- Rights and liabilities transactions of the banks

- Acquisition orders of the acquisition offices
- Conversion orders of the revenue offices

8. Approach for Storage of Property Documents

The process of storing documents in Blockchain will be supplementary to the existing process followed by the stakeholders. As and when the property details are updated in the computerised system of the respective stakeholder, the same can be digitally signed and submitted to the Blockchain system. It is suggested that the submission can be done in an asynchronous manner to enable the existing processes to function as before.

Initially property details need to be populated in Block chain. Subsequently, as and when transactions like loans, loan repayments are done by the financial institutions these transactions will be recorded in the Blockchain against the property details. Similarly, even in case of Registrar Office transaction against property, details will be recorded in the Blockchain. In case the property mutation is rejected (for example an external agency like sub-registrar office may perform a transaction of registering a sale deed. However the custodian of the land records, say revenue office, rejects the mutation on the property), the same is recorded in Blockchain. Though the transactions will be recorded in the Blockchain the details of the property details will be changed as per the land records system.

9. Format / schema of the documents stored in the Blockchain

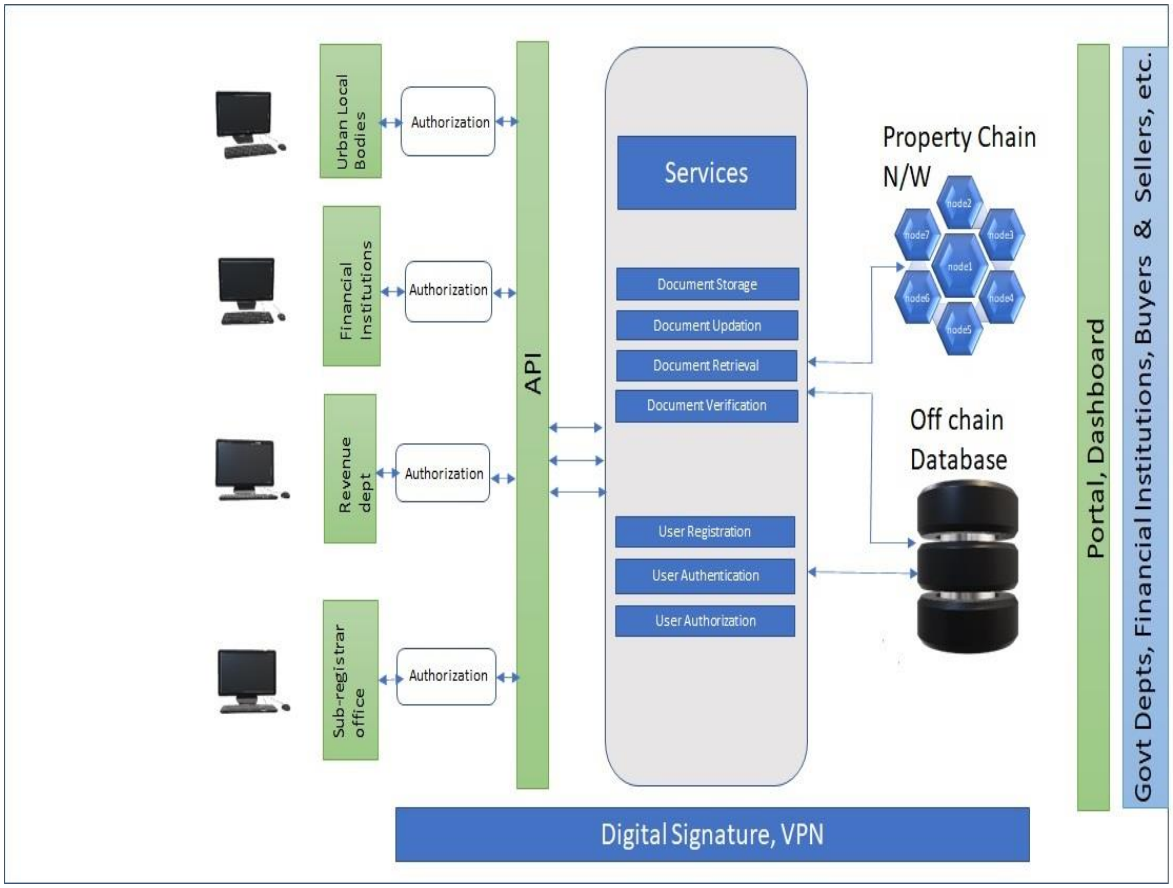
It is proposed to store the cryptographically hash value of the document in the Blockchain, while the actual document (PDF / XML / JSON) can be stored in the 'offchain' database such as a relational database system. The hash is irreversible and would enable the system to verify if the document has been altered.

Since every department of each State in the Country would adopt different data attributes for each document, the property chain platform will enable the stakeholders to define the schema of the document as part of the on-boarding process. Whenever, the actual document is submitted to Blockchain, the platform will confirm if the same conforms to the schema registered. Thus the platform is very generic to facilitate easy on-boarding and does not mandate every State to follow a common format of the document. However, some

recommended attributes of the property and transaction details will be prescribed to enable any verifier to get value out of the blockchain system.

10. Solution Architecture

While the Citizens, Financial institutions, Government would be the stakeholders of the system, the Offices of Revenue Department, Offices of Rural Development & Panchayat Raj Department, Urban Development Authority, Urban Local Bodies will necessarily be the owners of the nodes who participate in the block creation process. The other stakeholders will be able to retrieve property records based on the authorization provided by the owners of the nodes. The on-boarding of these agencies who wish to verify property record or use the API for verification will be done by using a portal. The architecture diagram for facilitating these activities is as given below



11. Portal & API for Verification Agencies & Citizens

Retrieval of property documents from the Blockchain can be enabled through portal for any verifying agency or other Government Departments and citizens who would be retrieving details of property. The verifying authority will be able to view the property details on the portal without depending on a third party for verification. The history of changes to the property can also viewed.

Alternatively, API can be used to fetch the property data and integrate with their applications to build the logic for automatic verification or use them for preparing eligibility list for various benefits to be provided by the Government to the citizens.

12. Conclusion

Blockchain is a technology that clearly is verifiable and secure. Property purchase and sale should be made available using Blockchain. All property documents should be initially moved to block chain where in one can ascertain previous owners, rights and liabilities on the property. It really is a disintermediation technology.
