GBA

# Government Blockchain Association

## Land Titling Working Group

Blockchain Maturity Model

# Property Titling Supplement

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Approval

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# 1 Introduction

This document is not intended to be a stand-alone document. It is intended to be a supplement to the Blockchain Maturity Model (BMM).

## 1.1 Purpose

This document is used as a supplement to the Blockchain Maturity Model (BMM) and is used to assess solutions, using blockchain technology to maintain the register of real property[1] record, process transfer of ownership, update record of ownership and notify to all parties concerned.

## 1.2 Use

The full set of requirements defined in this document may exceed the scope of a solution being assessed. For example, a solution may not address financial transactions. In that case, the requirements would be non-applicable. Consequently, using this document is a two-step process. First, select the features of the solution that are related to this supplement. Then compare the solution to the applicable requirements described in paragraph 3 of this document.

# 2 Scope

Solutions in-scope for this supplement facilitate the ownership, administration or transfer of real property rights.

# 3 Requirements

The following requirements are defined associated with the features of the blockchain enabled solution.

- Document Management
- Encumbrances
- Environment Information
- Financial Exchanges
- Fractional Ownership
- GIS Data/Record of Surveys Updates
- Interoperability
- Land Transfer
- Land Valuation
- Legacy System
- Legal Compliance
- Paper Record
- Property & Title Ownership
- Property Chain of Custody Verification
- Property Description Verification
- Real Property Asset Types
- Speed of Title Record System
- Title Transfer

[1] See Appendix A for a definition of Real Property

The detailed requirements for each solution feature are described in the following sub-paragraphs.

## 3.1 Document Management

For solutions that facilitate the storage, analysis, retrieval and printing of documents for due diligence purposes the following requirements apply.

### 3.1.1 High Resolution Images

The solution shall maintain copies of paper record in the form of high-resolution images to ensure readability and clarity, for accurate store in appropriate digital system within the blockchain.

### 3.1.2 Document Storage

### 3.1.3 Printable Records

The solution shall be capable of providing printed record of title with system generated endorsed stamp or special mark.

**Examples include:**

- Tax certificate
- Deed
- Encumbrances
- Plat maps
- Contingencies
- Inspection Documentation, including but not limited to objections, resolutions, extension on dates and deadlines, receipts
- Any and all public notice documentation
- Any settlement, disputed or contested claims documentation
- Documentation of any certificates, related to the property such HOAs, development plans, plat maps, permits, easements or encroachment documentation
- High Resolution Mapping and zoning information or change of zoning, use permits, special use permits etc.
- County and state measurements in Square Feet, acres - if applicable - or Meters, depending on location.
- Surveys, ILCs
- Property description and breakdown of internal layout (Bedrooms bathrooms, etc), external layout (Sheds, barns etc.)
- Any bill of sale tied to the sale of the personal property of a sale.

## 3.2 Encumbrances

For solutions that define and record encumbrances on real property the solution shall categorize and prioritize various encumbrances.

| |
|---|
| Examples of encumbrances include easements, judgements, liens, leases, mortgages, right-of-way and servitudes. |

support advanced search and retrieval functions and ensure compliance with legal standards.

It must include secure user authentication, detailed audit trails, and integration with public and financial systems.

The user interface should be intuitive and multilingual, with features for automated notifications and customizable reports. Scalability, regular maintenance, and comprehensive analytics are also crucial to accommodate growth and provide insights into encumbrance trends.

Implement standardized data fields, validation,

## 3.3 Environment Information

Solutions that record environmental data shall record proof of the data integrity on an immutable ledger.

Examples of nonmental information include:

- **Soil Quality** - Data on soil composition, contamination levels, and suitability for agriculture or construction.
- **Water Resources** - Information on nearby water bodies, water rights, and water quality.
- Flood Zones and Risk Areas - Mapping of flood-prone areas and historical flood data.
- **Air Quality** - Data on air pollution levels and sources of air contaminants.
- Topography and Geology - Information on the physical terrain, geological stability, and any seismic activity.
- **Vegetation and Land Cover** - Details on types of vegetation, forest cover, and protected areas.
- **Climate Data** - Historical and current climate information, including temperature, rainfall patterns, and climate change projections.
- **Biodiversity** - Data on local wildlife, endangered species, and ecological importance.
- **Hazardous Materials** - Information on any hazardous materials present on or near the property.
- **Environmental Restrictions and Regulations** - Information on environmental laws, zoning restrictions, and conservation easements affecting the property.

## 3.4 Financial Exchanges

For solutions that record financial transactions related to the transfer of property on an immutable ledger. This includes:

- Records of the history and details of monetary exchange for property,
- Source of funds to prevent the use or housing of illegal and unreported money in all real estate sectors.

**Examples** include loan, debt, cash transfer, institution used to facilitate transaction including but not limited to exchange QI fees (Qualified Intermediary), closing fees, DST QI fees, settlement statements from lenders or Title and Bill of Sale tied to transactions.

## 3.5 Fractional Ownership

Fractional ownership applies to condos, co-ops, timeshare, and equities.

### 3.5.1 Fractional Rights

The solution shall define the rights being fractionalized that meet regulatory requirements in the jurisdiction of the real property location.

**Notes:**
Examples include equity, specific rights of use etc. Also proving authority to exercise fractionalized ownership within the rights afforded to the fractional owner.

### 3.5.2 Fractional Revocation

The solution shall address the revocation of fractional rights by legal authority based on established rules.

## 3.6 GIS Data/Record of Surveys Updates

A solution that facilitates the data collection, storage, and retrieval of graphical information system (GIS) or survey data shall:

- Integrate with GIS system
- Allow for the update of data
- Record GIS/Survey data to an immutable ledger
- Support the reading of on chain GIS/Survey data to assure data integrity.

## 3.7 Interoperability

For a solution that interface to external systems it shall:

- Support standardized data formats and protocols for reading and writing data to external systems.
- Have a mechanism to ensure the consistency and integrity of data exchanged with external systems and to detect and resolve data conflicts.
- Be compatible with Geographic Information System (GIS) platforms to accurately manage and represent spatial data.
- Geometric data of properties shall be exchanged in standard GIS formats.
- Include API documentation to facilitate integration with external systems.
- Developer support and resources (e.g., SDKs, code samples) shall be made available to assist in the integration process.

**Examples:**
Standardized formats include JSON, XML, RESTful APIs
GIS formats include shapefiles and GeoJSON)
Developer support and resources include SDKs, and code samples

## 3.8 Legacy system

System must be able to inherit all features and functions of legacy system and new system should not limit or eliminate the feature and productivity provided by the existing system, but instead improve it's capabilities.

## 3.9 Land Transfer

A Property Transfer is the act of changing the ownership record of a parcel of land between two entities.

The solution shall:

- Provide proof of property transaction certified by a third-party
- Import and record spatial information.
- Prohibit the transfer of property without the consent of the property stakeholders or the lawful order from the legal authority with jurisdiction over the property.
- Describe the specific rights associated with the property.
- Update the chain of custody records.
- Notify property stakeholders of any change to the property ownership status.

- Identify and report any related encumbrances on the property.

## 3.10 Land Valuation

For solutions that determine market-based land valuation based on comparable in the identified property market, staying within a certain perimeter.

The solution shall:

- Record the minimum transaction value
- Record the collection of duties and taxes
- Record the market value payment by Government upon compulsory land acquisition or private equity, individual or institutional buyers.
- Calculate for accurate taxes, duty, liability and encumbrances as evidenced in the public record.
- Record the last transferred sales price of property, and acquisition or private equity, individual or institutional buyers.

## 3.11 Legal Compliance

The solution shall:

- Inheritance Law – The solution shall be able to incorporate inheritance law and any other applicable valid law of the land, the system should have further capacity to accommodate special court orders on account of inheritance transfer.
- Court Orders – The solution shall record the orders issued by the court of law about the real estate asset e.g. stay order, transfer order, ban on transfer, acquisition order etc. etc.

## 3.12 Property Chain of Custody Verification

Property Chain of Custody Verification is the process of verifying the historical ownership of a land parcel sufficient to establish a legal, just title is held by the purported owner.

The solution shall:

- Include geographic and physical attributes (coordinates, beacons, landmarks, etc.) of the property
- Include the legal description including the title/deed information.
- Maintain a date/time stamped image of previous ownership records.
- Certify duplicates of the applicable documents for best practices immutable evidencing.

Notes:

1. Best practices include the incorporation of Geographic Information System (GIS) data and use by assessors, appraisers, and modelers.

2. Computer Aided Mass Appraisal (CAMA) software is used to support chain of custody verification.

## 3.13 Property Description Verification

For solutions that identify unique properties, the solution shall record:

- Geographic and physical attributes (coordinates, landmarks, etc.) of the property.
- Legal description if applicable and incorporate GIS data
- Identification of property stakeholders.

Examples:

1. CAMA software is used by assessors, appraisers and modelers to record property descriptions.
2. Property data can include a court ordered transfer, purchase or sale, gifted or next of kin, or anything that would result in a change of ownership.
3. Property stakeholders may include the buyer, seller, insurer, bank, and governing authorities

## 3.14 Title Transfer

A Title Transfer is the act of transferring ownership interests of a property.

The solution shall:

- Record the following details of a title transfer:
    - **Property Description** - The metes and bounds of the property to be transferred, providing a precise legal description of the property's boundaries and characteristics.
    - **Parties Involved** - The identities of the grantor (current owner) and grantee (new owner) along with the verification methods for the identities of both parties, including the stakeholders involved in the verification process.
    - **Jurisdictional Compliance**
        - Compliance with the specific legal requirements of the jurisdiction where the property is located, which may vary for different types of transfers, leases, or other real property rights.
        - Accommodate various jurisdictional requirements, such as notarization, witnessing, and other legal validations.
    - **Transfer Details** - The method of transfer, such as sale, gift, inheritance, court order, or government acquisition along with the date and time stamp of the transfer, ensuring a verifiable record of when the transfer occurred.

## 3.15 Real Property Asset Types

The solution has the capability to identify and record the attributes of a real property including the corresponding rights, encumbrances, and constraints for:

a. Agricultural Property
b. Commercial Property
c. Residential Property
d. Government Property

## 3.16 Property & Title Ownership

The solution shall be capable of recording the details of the chain of ownership, including the ownership type and the instrument(s) used to prove chain of ownership.

The solution shall also record the rights, encumbrances, and constraints described in instruments used to demonstrate, change or transfer ownership that are used to show, alter, or transfer property ownership.

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| Examples include general warranty deed, special warranty deed, inheritance transfer, gifts, court order |

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|---|
| Examples of ownership types include Life estate, Leasehold agreement, Cooperative Ownership, Condominium Ownership, Joint Tenancy, Tenancy in Common, Trust Ownership. Community property |

| |
|---|
| Examples of rights include (but not limited to): ownership, usage, fruits[2] and mineral. |

| |
|---|
| Examples of encumbrances and restrictions include (but not limited to): servitudes, easements, restrictive covenants, mortgages, leans, and judgements. |

[2] Fruits include the results yielded by the property which may include agricultural and other types of outputs.

# Appendix A: Glossary

The following definitions apply to terms used in the Blockchain Maturity Model (BMM) Land Titling Supplement. Legal definitions and property rights may vary by jurisdiction. Where applicable law establishes a different meaning, the governing legal definition takes precedence.

**Application Programming Interface (API)**

A defined method that allows software systems to exchange information and interact with one another.

**Blockchain**

A distributed ledger technology that maintains records of transactions or information in cryptographically linked data structures. Blockchain systems may provide mechanisms for verifying data integrity, maintaining historical records, and enabling transactions among multiple participants.

**Blockchain Maturity Model (BMM)**

An assessment framework developed by the Government Blockchain Association (GBA) to evaluate the maturity of blockchain solutions and services against established requirements.

**Chain of Ownership**

The documented historical sequence of individuals or entities that have held ownership interests in a property.

**Computer-Assisted Mass Appraisal (CAMA)**

Software used by property assessors and valuation professionals to collect, manage, and analyze property information and support the valuation of multiple properties.

**Condominium Ownership**

A form of property ownership in which an individual owns a designated unit and holds an associated interest in common areas or shared property.

**Cooperative Ownership**

An ownership arrangement in which individuals hold shares or membership interests in an entity that owns property, providing specified rights to occupy or use portions of that property.

**Deed**

A legal instrument used to convey or establish an interest in real property, subject to applicable legal requirements.

**Document Management**

The processes and capabilities used to store, organize, retrieve, verify, and reproduce documents associated with real property.

**Easement**

A legal right allowing a person or entity to use another party's property for a specified purpose without necessarily owning that property.

**Encumbrance**

A claim, restriction, obligation, or legal interest that affects property ownership, use, or transfer. Examples include mortgages, liens, easements, leases, and restrictive covenants.

**Environmental Information**

Information describing environmental characteristics, conditions, or restrictions affecting real property. Examples include soil quality, water resources, flood risks, contamination, and protected areas.

**Financial Exchange**

A monetary transaction associated with property ownership or transfer. Examples include purchase payments, loans, closing costs, taxes, and settlement transactions.

**Fractional Ownership**

An arrangement in which ownership interests or specified rights associated with a property are divided among multiple parties.

**Fractional Rights**

The specific ownership, usage, economic, or other legally recognized rights allocated to participants in a fractional ownership arrangement.

**Fractional Revocation**

The cancellation or termination of fractional ownership rights in accordance with established rules and applicable legal authority.

**Fruits of Property**

The products, income, or other benefits derived from property, including agricultural production, rental income, or other legally recognized proceeds.

**Geographic Information System (GIS)**

A technology system used to collect, store, manage, analyze, and display geographically referenced information, including property boundaries, land parcels, and spatial characteristics.

**GeoJSON**

A standardized format for representing geographic features and their associated attributes using JavaScript Object Notation (JSON).

**Grantee**

The person or entity receiving a property interest through a deed or other conveyance.

**Grantor**

The person or entity transferring a property interest through a deed or other conveyance.

**Immutable Ledger**

A recordkeeping system designed to preserve historical entries and provide evidence of unauthorized changes or alterations. In blockchain systems, immutability supports the verification of recorded information.

**Interoperability**

The ability of different software applications, information systems, or blockchain networks to exchange and use information while maintaining appropriate data integrity and consistency.

**Joint Tenancy**

A form of shared property ownership in which two or more parties hold ownership interests, potentially including rights of survivorship depending on applicable law.

**Jurisdiction**

The geographic area or legal authority under which laws and regulations governing property ownership, registration, and transfer apply.

**Land Registry**

An official system or repository used to maintain information about real property, including ownership interests, registered rights, and applicable encumbrances.

**Land Transfer**

The process of changing the recorded ownership of a parcel of land from one person or entity to another.

**Land Valuation**

The process of determining the economic or market value of land or real property using relevant information, including comparable transactions, property characteristics, and market conditions.

**Leasehold**

A property interest that grants a person or entity the right to possess or use property for a defined period under the terms of a lease.

**Legacy System**

An existing information technology system used to perform organizational functions, such as property registration or land record management, that may require integration with or replacement by a newer solution.

**Legal Description**

A formally recognized description that identifies a specific parcel of real property using boundaries, measurements, coordinates, survey references, or other legally accepted methods.

**Lien**

A legal claim against property that may secure payment of a debt or satisfaction of an obligation.

**Life Estate**

A property interest that grants a person the right to possess or use property during the lifetime of a designated individual, subject to applicable legal conditions.

**Metes and Bounds**

A method of legally describing real property by identifying its boundaries using distances, directions, and reference points.

**Mortgage**

A legal instrument or arrangement that establishes an interest in real property as security for repayment of a loan or performance of an obligation.

**Paper Record**

A physical document containing information related to property ownership, rights, transactions, surveys, or other land administration matters.

**Parcel**

A defined area of land identified as a distinct unit for legal, administrative, registration, or valuation purposes.

**Plat Map**

A map illustrating the boundaries, subdivisions, dimensions, or other geographic characteristics of one or more land parcels.

**Property Chain of Custody Verification**

The process of examining historical ownership records and supporting documentation to establish the sequence and legitimacy of property ownership.

**Property Description Verification**

The process of confirming that geographic, physical, and legal descriptions accurately identify a particular property.

**Property Stakeholder**

An individual, organization, or government authority with a legal, financial, administrative, or other recognized interest in a property or associated transaction. Examples include owners, buyers, sellers, lenders, insurers, and regulatory authorities.

**Qualified Intermediary (QI)**

A person or organization that facilitates qualifying property exchange transactions under applicable legal or tax rules.

**Real Property**

Land and the buildings, improvements, fixtures, and other interests legally classified as part of the land. Real property may also include associated ownership, usage, mineral, and other rights recognized under applicable law.

**Real Property Rights**

Legally recognized interests or entitlements associated with real property, including ownership, possession, use, transfer, and rights to derive benefits from the property.

**Record of Survey**

A documented representation of a land survey identifying property boundaries, measurements, reference points, or other spatial information.

**Restrictive Covenant**

A legally enforceable limitation on the use, development, or transfer of property established through a deed, agreement, or other recognized instrument.

**Right-of-Way**

A legal right permitting passage or access across property for purposes such as transportation, utilities, or access to another parcel.

**Servitude**

A legal right, obligation, or restriction affecting the use or enjoyment of real property, typically benefiting another property or party.

**Software Development Kit (SDK)**

A collection of software tools, libraries, documentation, and examples used by developers to integrate applications or develop software for a particular platform.

**Spatial Data**

Information describing the geographic location, boundaries, dimensions, or physical relationships of objects or areas, including land parcels.

**Tenancy in Common**

A form of shared property ownership in which two or more parties hold separate, potentially unequal ownership interests that generally may be transferred independently.

**Title**

The legal basis for ownership of, or a recognized interest in, real property.

**Title Record**

An official or otherwise recognized record containing information about property ownership, registered interests, transactions, and associated legal instruments.

**Title Transfer**

The legal process of transferring an ownership interest in real property from one party to another through an authorized transaction or legal action.

**Trust Ownership**

A property ownership arrangement in which a trustee holds legal title to property for the benefit of designated beneficiaries, subject to the terms of the trust and applicable law.

**Verification**

The process of establishing the accuracy, authenticity, integrity, or validity of information, documents, transactions, or property rights using appropriate evidence and procedures.