

BC Land Title & Survey Authority (LTSA)  
Digital ID Design Challenge (DIAC)

**Blockchain Use Case Submission**

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**For the  
[LTSA Use Case Challenge](#)**

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# LTSA Private Blockchain System

This use case submission recommends the LTSA run a semi-private blockchain system. Every LTSA office has a copy of the blockchain

In later phases of the project, willing partners like banks or real estate firms can apply to run an instance of the LTSA blockchain application (See LTSA eSTC Application)

## Issuing the eSTC

The first part of the use case has a client requesting an eSTC from the LTSA office.

### eSTC Requesting Procedure

This procedure outlines the steps for issuing an eSTC to a requesting client. The request is entered into a blockchain system.

### Use Case Participants

Client - Anyone requesting an eSTC that fits the LTSA criteria of STC requesters.

LTSA officer - The LTSA employee that has the authority to process the eSTC issuing request.

### Requesting Use Case

1. Client provides LTSA officer with a piece of Gov. Issued ID and a 4-7 Digit PIN.
2. LTSA officer performs the title search and creates the eSTC, entering:
  - The type of ID (Passport, Care Card, Drivers License)
  - The number on the ID.
  - The PIN selected by the User
  - Email address of the user
3. The LTSA officer then performs the land title search. When the land title has been found the LTSA officer will enter that into the eSTC issuing screen, which includes the client's information.
4. System generates the eSTC.
  - The land title becomes the sender of the transaction.
  - The client's email address is used to establish an account in the LTSA system which becomes the receiver of the eSTC transaction.
  - The client government ID number and PIN are used to seed a hash that encrypts the eSTC.

- The transaction is sent to the private LTSA blockchain
5. System emails a copy of the eSTC to the User.

## View eSTC

### Use Case Participants

Client - Anyone who has been issued an eSTC.

Officer - The party interested in the eSTC (Mortgage specialist, lawyer, real estate agent, etc.)

LTSA Portal - Web UI interface where the eSTC can be viewed.

### View eSTC Use Case

1. The client visits the institution where they need to present the STC and provides the officer with the following information:
  - Email address
  - Gov. ID with number used to create the eSTC
  - Pin number used to create the eSTC
2. The officer uses the LTSA web portal and requests to view an eSTC. They enter the information that the client provided.

The LTSA System will scan the blockchain for the eSTCs associated with the email address of the User. It then creates the hash with the ID and PIN. If the hash matches the hash of the encryption of the contract then the contract is sent to the officer's LTSA portal.

## eSTC Smart Contract Implementation

The eSTC document will be implemented as a Smart Contract within the LTSA blockchain system. What this means is the document can go through a change of states. This will enhance the ability of the eSTC document to convey information about the land title.

A smart contract implementation for eSTCs can make the eSTC aware of changes to the land title after the eSTC has been created. The eSTC will still expire after a set amount of time, however the writer's hypothesis is the additional signal that the land title has changed can support fast resolution of discrepancies. Trust is also increased with the system as participants will know that the system will report changes in the land title, reducing doubt during land title negotiations.

State	Comments
Active	The eSTC has not reached the 12 month expiration date.
Expired	The 12 month expiration date for the contract has elapsed. The eSTC is no longer valid.
Amended	<p>New feature: If the land title has been updated since the state of title certificate has been created then the notation will be displayed on the LTSA web interface. (Not on the eSTC itself).</p> <p>The purpose is:</p> <ol style="list-style-type: none"> <li>1) to signal to interested parties that a change has been made to the land title since the eSTC was generated. Interested parties can request further information from the LTSA if the change is unexpected.</li> <li>2) Provide additional utility to the eSTCs via this updated use case. The intent is to increase trust and transparency with the eSTC system.</li> </ol>

## eSTC Expiration

In this proposal, the eSTC is coded as a Smart Document in the blockchain system. Every day, the LTSA network time service is queried (as well as a secondary service for redundancy purposes). eSTC contracts that reach expiration will have a transaction entered against them to set the status to Expired.

## Trust Concerns

The current implementation where the eSTC leaves LTSA trusted systems to the control of the client reduces trust in the eSTC document. The document numbers or link may be modified so they misrepresent the land title. In the latter case the link may lead to a malicious system masquerading as an LTSA service and compromise 3rd party systems.

This paper proposes a semi-private blockchain system that is under the control of the LTSA or LTSA certified 3rd party systems. The cryptology inherent in the blockchain creates an unbreakable chain between the eSTC issuer (LTSA) and the client recipient.

Education will be a main component of a change program that adopts blockchain technology. A goal of this paper is to provide early education that can lead to a pilot program.

## Questions and Answers

### **Why does the eSTC access request require a PIN and government ID?**

The current implementation of the eSTC system requires the client to retain a copy of the eSTC document. From the sharing pain point ([DIDC Use Case](#)), third party agencies do not trust the PDF as it is carried outside of the trusted source (LTSA IT Systems) so an alternate system has been proposed.

The solution this paper proposes is a web UI interface or API that requires a government ID number and client supplied PIN. The data resides on a semi-private blockchain that resides on LTSA trusted systems. The client no longer carries a copy of the eSTC document which removes the concern that the integrity of the document has been compromised.

### **What happens if the client forgets the PIN?**

The eSTC document cannot be recovered. Given that the LTSA website for eSTC retrieval is open then a level of security must be provided to ensure eSTC document remain private. A user defined PIN was the best option considered at the time of writing this paper.

### **What happens with the 7 day window where the eSTC is made available?**

The use cases proposed in this paper no longer require the 7 day period. By entering the document as a blockchain transaction, that transaction will always be displayed in the blockchain. The client's government ID number and PIN used during the creation of the document will unlock the document.

### **What happens if there is a network outage?**

A benefit of using a blockchain system and placing a node at each LTSA office is immediate redundancy. If a central server goes down then the overall operations are not impacted. Blockchains are self-healing, meaning they will reconnect with the network, load all of the missing transactions then verify those transactions.

There is a time delay for the transactions to be replicated to all the LTSA offices, however this time delay will be in the order of minutes.

### **How can the LTSA portal be trusted?**

The portal will run from the ltsa.ca domain. Look for the "Secure" icon in the URL browser and ensure the URL starts with https:// rather than http:// as the s represents a secure, encrypted connection.

### **How does the blockchain mining work if this is a semi-private system?**

Each LTSA office will have a copy of the blockchain and control the block mining process.

Keeping the participant number low means the “mining” process can be performed on lesser hardware, unlike the Bitcoin blockchain that requires immense power requirements due to the number of computers participating in block mining.

**Will this system use an existing blockchain like Bitcoin or Ethereum?**

The LTSA blockchain will be created specifically for the purpose of the LTSA land title system. The benefit of this is fees will not need to be paid to an existing blockchain infrastructure.

**I heard that a blockchain can be “stolen”. Can this happen with the LTSA blockchain?**

This is another benefit of keeping the blockchain on LTSA systems. Public blockchains run the risk of the most powerful computing network taking control of a blockchain if they can maintain 51% of the overall mining computing power.

The solution in this paper places the mining nodes under the control of the LTSA. Third party participants only have view access to the blockchain via the LTSA API. In this configuration, the LTSA eSTC network cannot be “stolen”.

**If this is a semi private system, why use Blockchain at all?**

Blockchain has the ability to solve the use case presented in this paper. It is a new technology that requires exploration and application. Blockchain provides the basis for universal identity systems. Like any emerging technology, there is a period of adoption, learning and adaptation.

The LTSA eSTC use case is an excellent proof of concept example as it can easily be adapted to a small pilot project that runs alongside the legacy system.

As the blockchain eSTC implementation becomes more mature, then it has the potential to be extended to include projects like the [BCeID](#) system.

The LTSA blockchain can be the genesis of a wider BC Identity system as the components of the system are extendable to include a broad range of identity and contractual use cases.

## LTSA eSTC Application

Qualified organizations can apply to run the LTSA eSTC application. This application provides a copy of the LTSA blockchain to the organization along with the software API as well as front end UI.

The assumption this paper makes is an LTSA branded website that resolves to the LTSA certified domain will provide the confidence of trust for their parties to access. The DIDC use

case mentions the eSTC PDF document was not to be trusted so the alternative approach to provide a web portal is proposed.

## Solution Extension - LTSA Mobile App

LTSA eSTC Mobile App can store a receipt of the eSTC and the PIN. The User must authenticate into the app using an email & password pair (or fingerprint authentication if the smartphone supports it).

The purpose of this solution is to allow for PIN storage as the LTSA will not store the Gov. ID number and PIN combination. Placing the eSTC behind a user authentication step provides a necessary layer of security for the eSTC documents.