**DL-Tags: DLT and Smart Tags for Decentralized, Privacy-Preserving, and Verifiable Supply Chain Management**

**Alternative Title**: Product Tracking and Tracing with Decentralised Blockchain.

**Aim:**

The main aim of this project is to provide evidences of products origin and its journey across the supply chain by preventing tag duplication and manipulation.

**Synopsis:**

In a supply chain management system the smart tags(like QR,NFC) are used in order to store the product details. By that the consumers can also track the products during entire life cycle. Product consumers have no knowledge about the data’s that is provided in the smart tags by the smart tag creators and stack holders are true or not. The DL-Tags solution steps into this environment to offer a decentralized, privacy-preserving, and verifiable management of Smart Tags during a product’s lifecycle. The solution is based on distributed ledger technology(DLT) and uses the Block chain to mediate interactions between the stakeholders during a product’s exchange process. The paper describes the DL-Tags solution and includes a cost analysis of all implemented transactions on the Blockchain. The proposed solution provides evidence of the product’s origin and its journey across the supply chain while preventing tag duplication and manipulation. It is among the first documented practical solutions using DLT and IoT for supply chain management, which is designed to be distributed ledger agnostic.

**Existing System:**

The TagItSmart (TIS) system is an IoT-based solution for supply chain management which issues product’s Smart Tags and supports sharing of product-related information between stakeholders involved in a product lifecycle using such tags. Smart Tags are typically provided in the form of dynamic QR codes printed with special ink. Dynamic QR codes change due to specific environmental conditions (e.g., temperature, humidity, light intensity), and are adequate for tracking of fast moving consumer goods (FMCG) and their surrounding conditions. However, by using the TIS infrastructure in a centralized setup, a product consumer has to implicitly trust the TIS platform as the Smart Tag creator, as well as other stakeholders in the supply chain, that they are providing authentic data about a product without tempering with its Smart Tag.

**Problem definition:**

* As TIS infrastructure is an centralized setup, Smart Tag duplication which might arise during a product lifecycle is a situation when a fraudulent retailer duplicates the Smart Tags .
* Smart Tags are typically provided in the form of dynamic QR codes printed with special ink. Dynamic QR codes change due to specific environmental conditions (e.g., temperature, humidity).

**Proposed System:**

Our proposed system uses the DL-Tags (distributed ledger technology) to offer a decentralized, privacy-preserving, and verifiable management of Smart Tags during a product’s lifecycle. The solution relies on IoT technologies for data collection, and stores product related data in the Blockchain, which is a private decentralized data storage layer. DLT enables the maintenance of a global, append only, data structure by a set of mutually untrusted participants in a distributed environment .i.e, if a consumer wants to buy a product which is duplicated by a fradulant retailer by changing the data’s in the smart tags. In case if a distributed ledger technology is used change is detected and products with duplicated smart tags will not be sold regularly. Here whenever a transaction is made between different participants , the legal agreement will be signed in the smart contracts. And the transaction details will be stored inside the Decentralised Blockchain Network.

**Advantages:**

* By using the distributed ledger technology the smart tag duplication can be prevented.
* Data exchange process between involved stakeholders to ensure data authenticity and integrity. Each interaction between stakeholders during the product item exchange is stored (logged) on block chain.

**Algorithm:**

1. SHA (Secure Hash algorithm)-256
2. Base64

**Module Titles:**

* **Creating Suppliers**
* **Manufacturer Process**
* **Distributors Transactions**
* **Product Verification**

**Consumer**

**Module Description:**

**Creating Suppliers**

First registration. The registration form contains supplier details. Then login. Supplier sells the products to all manufactures what the produce.

**Manufacturer Process**

The manufacturer initially creates the account. They will analyze the raw materials and the manufacturer will request the quantity of raw materials to the supplier. Then suppliers will accept the request from manufacturer and raw material will be added to the manufacturer inventory. The manufacture will send the product ID to the block chain and then the created product will be added to manufacturer shipment. From the block chain the manufacturer will retrieve the product.

**Distributors Transactions**

The registration part contains distributer details. And login. The distributer will be seeing the product in the manufacturer cart and then buying product by the distributer will be added to the block chain. The distributers maintains the KYC form for adding duplicate products, it cannot be stored in blockchain.

**Product Verification**

There are two types of consumers. One is order the product without knowing the product details. So they cannot identify the product is duplicate or original. The second type of customer i8s view the full details of the product what they are buying so they view the blockchain content.

**Software Requirements**

* Windows 7 and above
* JDK 1.7
* JDK 1.8
* J2EE
* Tomcat 7.0
* Mysql

**Hardware Requirements**

* Hard Disk : 80GB and Above
* RAM : 4GB and Above
* Processor : P IV and Above

**Technology Used**

* + - J2EE (JSP, Servlet), JavaScript, HTML, CSS, AJAX.
    - Hibernate Framework
    - MVC Pattern
    - Design Pattern**e**
    - **S**pring



BlockChain

Seller adds the Electronic Gadgets

Buying Electronics devices

Assemble products



Transport details



Storage



Market



RFID or qr code scanner



User

All information are stored into blockchain

All Information are Stored into Blockchain

Scan and View product details

Collect products

Banking

