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AUTHENTICITY AND LIFETIME OF PRODUCTS

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ABSTRACT

Current Supply Chain management lacks in providing authenticity of the vendor and product purchased to the end user (customer). Also there are no evaluation to predict lifetime of the resold/refurbished product to the end user. The techniques presented herein is to use Holochain technology to provide authenticity of the vendor (i.e., whether vendor is certified by company or not) and product is legitimate/genuine or not, along with predicting lifetime of resold/refurbished products. This method for Supply Chain can guarantee that a sold or resold product is original and backed by company. It also certifies that vendors are authentic.

DETAILED DESCRIPTION

As we know, large product vendors (companies) do not sell most of their products directly to the end user (customer). Approximately 80% of such company products are sold through distribution channels. The distribution channels can be spread globally throughput numerous vendors (suppliers). There are multiple instances where knockoff products are being sold to the end users as original products. These knockoff products cause revenue loss to company and lower quality products to the end user. This is with respect to sales use case.

Also, over the time, products may need maintenance or replacement. When end users return their products (due to replacement or in exchange for a new product), these products are often capable of being resold. Most of the end users, for example, discard their products because they no longer satisfy their new requirements and not because the products no longer work. These used or refurbished products are sold through distribution channel. This resale process also called as reverse logistics in the "sales team" prospective. Also, as part of company’s green technology initiative (i.e., recycling and achieving 100% renewable energy) can add extra revenue streams from these refurbished/gently used products as they are sold to other companies, users, etc.,

However, there are multiple instances where knockoff products are being sold to the end users as original products. As part of maintenance or replacement, these knockoff products could be returned to the company to get serviced, resulting in company's revenue loss (for example, most products are simply exchanged to send out replaced products quickly due to SLA (Service Level Agreement) terms, to avoid lengthy process to evaluate the real root cause of the issue by sending to engineers etc.,). This is with respect to resale use case.

In general, currently there are no ways for the end user to confirm, (i) whether a vendor is certified by the original company or (ii) whether the product is an authentic product. Hence end user should be aware of the authenticity of the vendors/suppliers and the purchased products. Similarly, company does not know who the end user is since the products are sold through numerous distribution channels. Hence company should be aware of the authenticity of the product sold to the end user. And need to determine whether the product received from the end user for replacement/exchange is genuine product or not. Along with the above, currently there are no ways to predict the lifetime of Used/Refurbished products resold by company to the end users. In short, current Supply Chain management lacks in providing authenticity of the vendor and product purchased is legitimate product to the end user (customer). Also, there are no evaluation to predict lifetime of the resold/refurbished product to the end user.

The techniques presented herein is to use Holochain technology to provide authenticity of the vendor (i.e., whether vendor is certified by company or not) and product is legitimate/genuine or not, along with predicting lifetime of resold/refurbished products. This method for Supply Chain can guarantee that a sold or resold product is original and backed by company. It also certifies that vendors are authentic. The Holochain uses secure and fully distributed ledger (distributed across many node), one point of failure cannot provide a false certification.

Figure-1 below shows an example Holochain environment that includes multiple vendors:

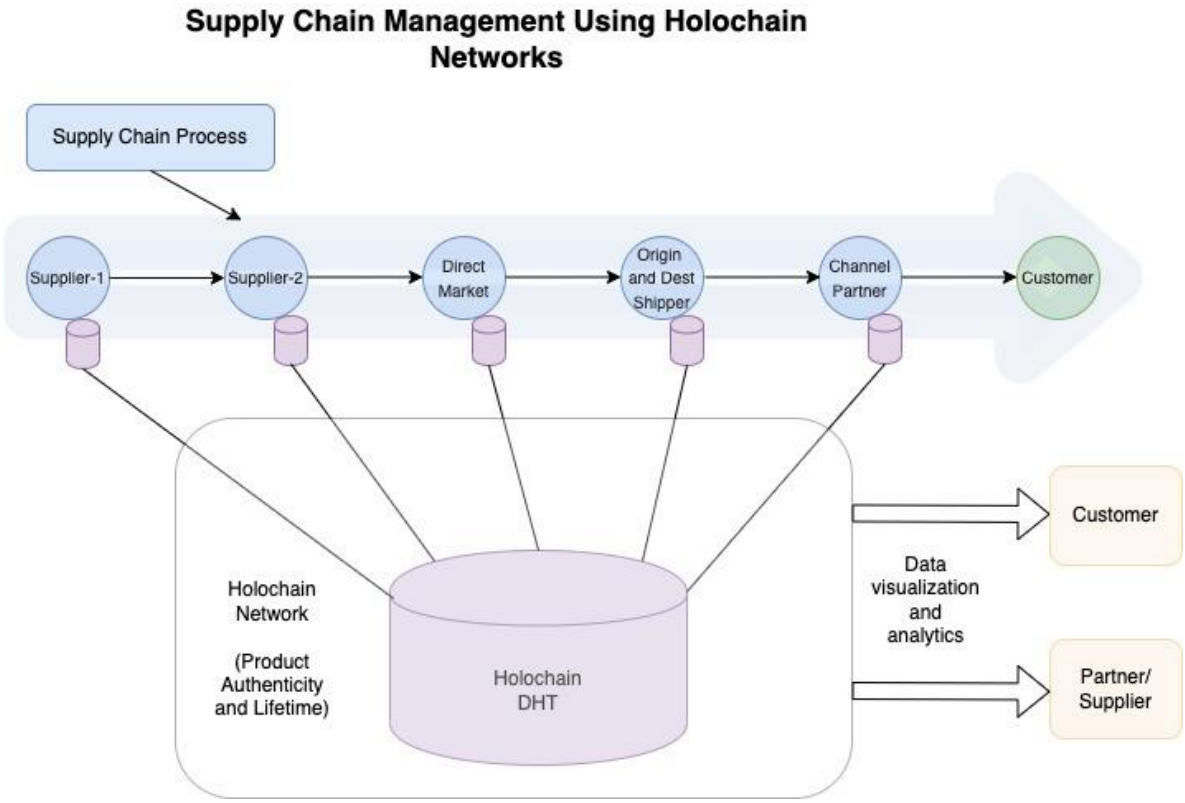

Figure-1

The techniques presented herein is explained in detail as below:

A. Authenticity of the Vendor:

- Company would supply a unique Digital Token (Seal) to the Vendor. This Digital Token serves as a unique identifier.
- Company would be running Happ. Optionally vendors also would be running Happ.
- The digital token generated for the specific vendor would be added to the local hash-chain of the node running the Happ.
- This digital token shall be published (appended) to the Holochain DHT and shall be used later for verifying the authenticity.
- Vendor shall receive the digital token from the Holochain DHT.

- Vendor shall present the Digital Token in the form of "Seal" on their websites for the end user to verify the authenticity.
- The "Seal" shall have a link that connects back to the company's Holochain DHT to verify if the associated unique Digital Token matches an entry in its distributed ledger (i.e., Holochain DHT).
- When an end user wants to do business with the vendor, they can click on the "Seal" to verify that the vendor is a certified supplier for company.
- This provides the end user to trust the website and hence vendor that they are buying from, is a legitimate one.
- The vendors who are certified participant of selling company products are linked together using generic Validation Rules.
- The vendors can be differentiated with specific Validation Rules such as related to fixed or variable pricing based on the purchase order (e.g., bulk order would be given more discounts than retail etc.,). This would in-turn provide privacy to the vendor even if all other vendors are able to access shared distributed ledger (i.e., Holochain DHT).

B. Authenticity of the Product:

- Company knows the product details (inventory) such as PID (Product ID), VID (Version ID), Serial Number (SN) etc.,
- Company manufacturing team shall install SUDI (TPM) certificate to the product in secure location (tamper proof chip).
- Company manufacturing team also generate signature using SUDI certificate along with the parameters of inventory. In other words, the signature would be linked to the product (via PID, VID, SN etc.,).
- Once the signature coupled to the product, it would be added to the local hash-chain.
- Also, this signature would be published/appended to the Holochain DHT.
- The end user can verify that the product is genuine by looking into Holochain through the website of vendor or company.

C. Product Lifetime Prediction:

- Whenever product is shipped, its inventory details, manufacturing year, signature signed by SUDI would be updated to the Holochain DHT by the company's manufacturing team.
- When end users return their old products (due to replacement or in exchange for a new product), these old products are often capable of being resold.
- Using Holochain DHT, company can verify the authenticity of the product returned by the end user.
- Using the information available in the Holochain with respect to manufacturing year, serial number etc., company can calculate the remaining life of the product.
- Along with this, company can use telemetry data associated with the product to predict the exact remaining life of the product.
    - The telemetry data can be collected once the product is turned-on and subsequent update (event based etc.,) to the telemetry.
    - Telemetry data can be appended/published to the Holochain DHT.
    - These telemetry data include power consumption, usage over a period (e.g., used only 60% of the year), average load on the product etc.,
    - Company can use these telemetry data to deduce/predict lifetime of the product.
- The company directly or through vendor shall present the lifetime of resold product using the Holochain DHT.
- End user can see lifetime of resold product (i.e., number of years left from the original life of the product) and can use to buy accordingly.

Figure-2 shows the Holochain enabled track and trace capabilities to provide authenticity of the vendors, product, and lifetime of the product.

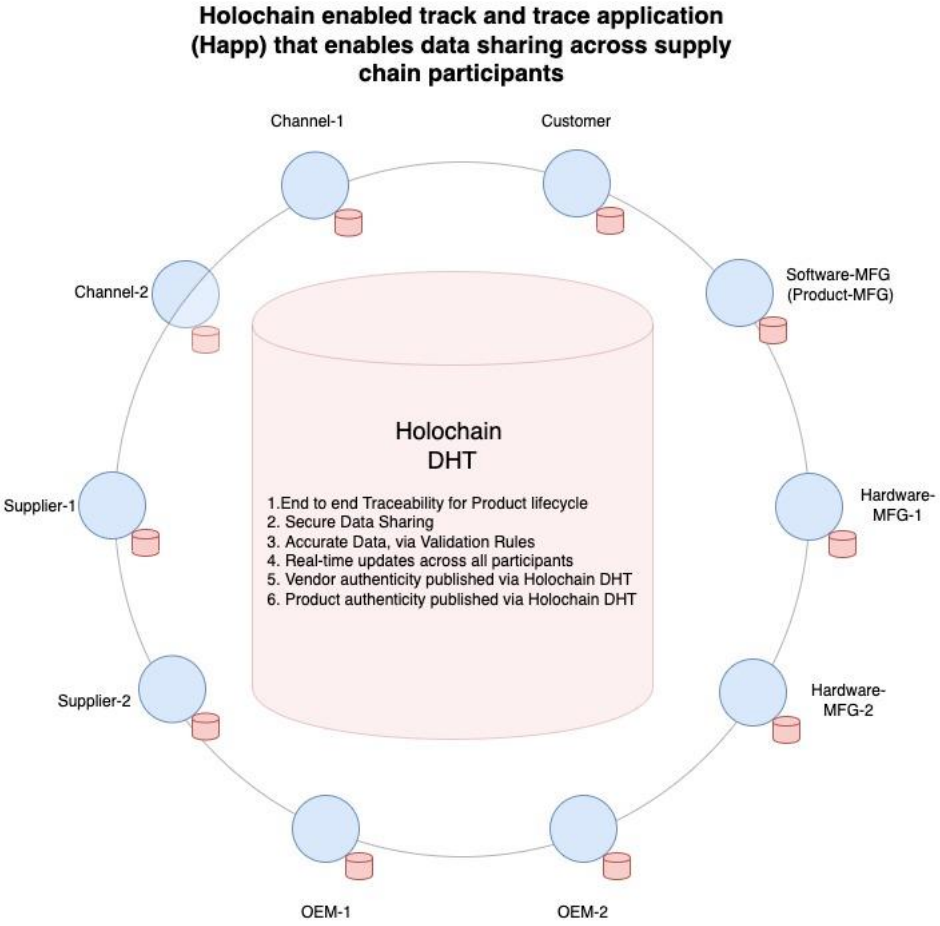

Figure-2

The technique presented herein, guarantees to end user that a purchased products are original and backed by company. This method certifies the products as well as vendor who supplied the product. Moreover, this method guarantees to company that products received from the end user for exchange/replacement are authentic. Additionally, this method provides lifetime of resold products and present it to the end user, using number of years left from the original life of the product provided by company and data analytics to predict the remaining life by analysing telemetry data. This method provides authenticity, security, and scalability to the Supply Chain Management. Here, trust established in the overall product life cycle of the Supply Chain Management.