Blockchain in Global Trade

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Abstract. This paper summarizes the actual adaptation of the Blockchain (BC) technology in the global trade space. Each product with a unique identification is tracked from the source manufacturer to the end user across countries. Data is collected from manufacturers, logistics providers and end users. A third-party company serves as the BC network operator so that each transaction is recorded in a private BC network with periodical hash saved onto a public BC network to ensure data immutability. This paper further explores the use of BC to manage the owner and users of data sources. There are two business applications for this system: (1) track and deliver using direct-to-consumer model for over 100 premium California wineries to over 20 countries in the world; (2) track and deliver using direct-to-hospital model for specialty pharmaceuticals (cancer drugs, etc.) from the US to designated hospitals in China.

Keywords: Blockchain · Global trade · Supply chain · Self-sovereign identity
Decentralized identity

1 Global Trade

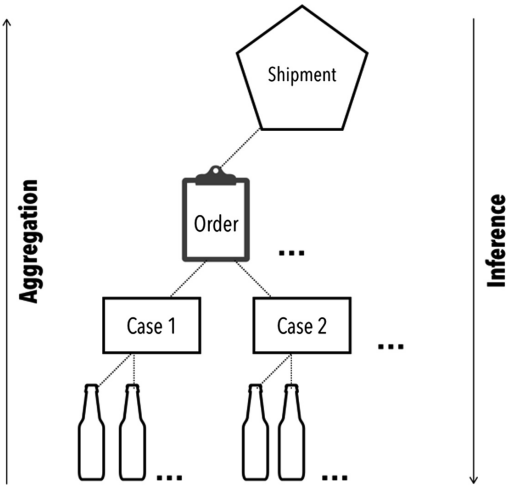
1.1 Pre-identification and Tracking

In the origination country, each product item once manufactured is labeled with a unique identification number. Traditionally each product is identified with an industry classified UPC code, but this new level of identification makes each product uniquely marked. For example, if there are 12 bottles of the same vintage wine, traditionally they will share the same UPC code, but with per-item tracking, there are 12 unique codes, with each assigned to every bottle. These identification codes will be saved in the BC network.

1.2 Aggregation and Inference

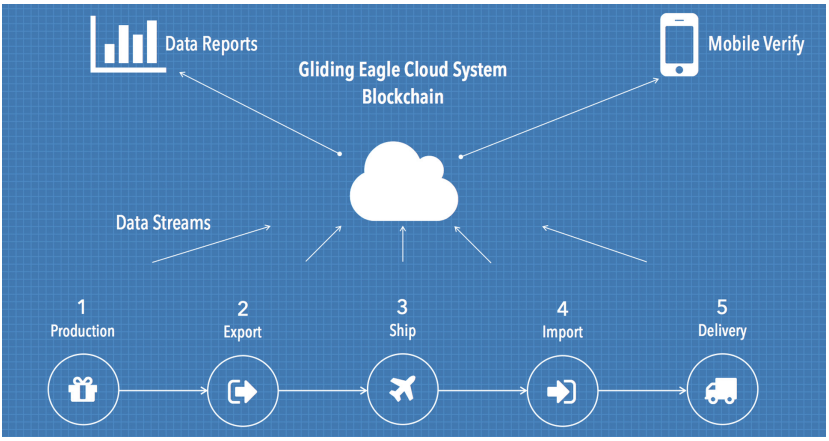
Using the same example above for 12 bottles of wines. They will be aggregated into a case, which also has a unique identification code. This case will be linked to an order. And an order (or orders) will be further aggregated at the shipment level. Once a shipment is being transported from one party (e.g. manufacturer) to another party (e.g. shipper), an actual transaction activity occurs. If the links are preserved, we can infer that all connected orders, cases and bottles will have the same transaction activity recorded.

S. Chen et al. (Eds.): ICBC 2018, LNCS 10974, pp. 293–296, 2018.
https://doi.org/10.1007/978-3-319-94478-4_23



1.3 Data Collection from Multiple Parties in Global Supply Chain

Initially the BC network is a private one; with all participants defer peer manageability to a mutually trusted third-party (i.e. Gliding Eagle) as the network operator. This is due to the initial high cost for each party (manufacturer, shipper and end user) to host their own peers. With increased data volume in the future, many parties have the option to fully host and manage their own peers to replicate data. Each party uploads data to the private BC network hosted in the global cloud infrastructure using well-defined API calls. These transactional data can be recorded at any aggregation/inference levels, i.e., bottle, case, order, or shipment. The entire data set consists aggregation links, data source and owner identity, and transactional activity data over time.



1.4 Data Reporting

Data once recorded in BC network in ledger format and in traditional SQL structured format, two applications are used to manage and report data to relevant parties. For manufacturers and other participants (logistics providers, exporter and importers, retailers, etc.) a desktop and mobile-based reporting application can display data based on proper access authorizations. The network operator manages all data access permissions based on participants' consensus. For the end user, a subset of accessible data will be displayed on a mobile application. For example, when the end consumer uses a mobile phone to scan the unique label on the wine bottle, the product information along with most essential logistical steps in global trade supply chain is displayed pertinent to that particular bottle.

1.5 Identity Management

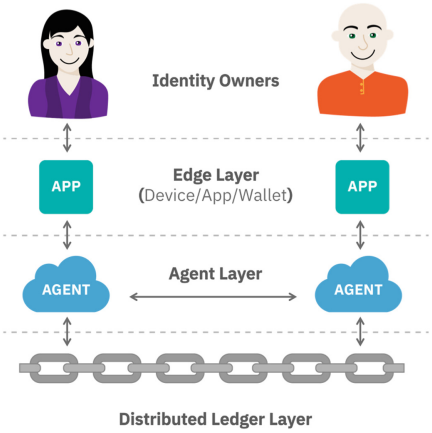
Today, each participant within a BC network requires trust with other participants to do business with confidence. That trust today is based on knowing the participants, either through previous interactions or through a scaled down "web of trust".

As BC networks look to scale to open the aperture of participation in business networks beyond participants who are already "known", deficiencies are created in having to perform "Know your customer/participant" to onboard other potential participants onto the network that are not previously known to existing participants. Certain attestations will be required from trusted institutions, such as governments, banks, and more to prove participants are who they say they are.

In global trade, establishing trust among participating parties is paramount to facilitate high efficiency in both product logistics flow and money transfers. These participants such as manufacturers, exporters, transporters, retailers, government agencies and end users will benefit from the higher efficiency in trade, which means lower transactional cost economically.

As the spectrum is broadened, in a world with many BC networks that are built on use case specificity, each network will be considered a "mini city" with specific network defined governance and policies. The question then becomes, not only, how do participants of BC networks identity themselves within a network but also how do participants identity other participants across different BC networks. For example, one manufacturer can belong to a number of different BC networks as different trade networks where different lines of business are conducted. Identity could be shared among different BC networks, predicated on standards and interoperability rooted with trust and non-correlation.

BC is also accelerating the evolution of identity. Identity is entrenched in every interaction. Enablers such as BC have now made decentralized, self-sovereign identity a reality. It can also accelerate in rebooting the web of trust at scale and trust is not compromised. As every identity owner creates their own identity and permissioning of keys, blockchain provides an immutable, distributed ledger allowing the identity of people, organizations, and things to be resolved, ensuring trust in direct, point to point relationships.



Identification is global trade can leverage self-sovereign, decentralized identity to ensure more trust and control over how information is exchanged in a more secured manner. For example, manufacturers can trust shippers to decrease fraud and time in the shipment of wine. Retailers and buyers can transact with more transparently knowing who they are doing business with, in point to point relationships. The identities can be shared between different BC networks, along with their established trust as an asset to decrease friction in conducting business in global trade.

2 Conclusion

Blockchain as a distributed peer based network with immutable ledger based data storage is useful for transactional data for global trade. This has been shown for premium American wines and specialty pharmaceuticals (both are highly regulated products) use from the US to other countries. The unique direct-to-user business model simplifies the traditional export and import business models. With all data saved in BC network it benefits all participates with much trusted channel accountability, product authenticity, and logistical efficiency. With further BC based identity management features becoming mature, exchange of identity in global transactions will be more secured and under the control of identity owners.