

There's more to blockchain than traceability of parts

Blockchain will also bring efficiency, greater accuracy and streamline the exchange of information and data in the electronics supply chain

Some large electronic component manufacturers, distributors and OEMs are using blockchain to enable them to trace parts through the supply chain from the time the components are made until they are scrapped.

Many other companies are researching blockchain to determine how to best use it but have not made large investments to implement it.

With blockchain, an electronic ledger is created when a component is manufactured. Blockchain uses cryptography and timestamps along with QR codes and RFID tags to provide a permanent, immutable record of all transactions involving the component as it moves through the supply chain. The ledger records each transaction including when the part is bought, shipped and used or if it is modified such as when a chipmaker sends a die to be packaged, marked and tested.

For buyers, the ability to trace parts back to the original component manufacturer virtually guarantees that the parts in the blockchain are genuine and not counterfeit because it provides a permanent, unalterable record of every transaction involving the parts. That type of visibility and history of the part is especially valuable for

buyers who purchase parts that are in short supply or obsolete parts that are no longer manufactured.

While traceability is important, there are other benefits to blockchain. "Blockchain will bring efficiency to the industry that is not there today," said Don Elario, vice president industry practices for the Electronic Components Industry Association (ECIA). "It's going to bring accuracy and streamline the exchange of data and information. There is no question about that," he said.

Data and transaction information concerning the part will be streamlined because there will be a distributed digital ledger. Any time the part is bought, shipped or used, the transaction will be entered into the ledger. In addition, component certificates of compliance (CoCs) to environmental laws and regulations and other regulations concerning components would be in the ledger.

Christophe Begue, director business development and solution strategy global electronics industry, IBM, notes that there are many parties that "touch" a component after it is manufactured, sold and

shipped. For example, if a component is made in China and shipped to California, "you have the company selling the component and then you would have the freight forwarder and at least one shipping company," he said. There would also be one custom agency at the port of departure and another one at the receiving port and "probably another logistics company for local distribution and finally a warehouse somewhere," he said.

Simplify the process

"There are probably five, six or seven parties touching the transaction" and there is paperwork involved with each transaction, said Begue. "There's a lot of paperwork associated with the transaction and none of it is residing in a single place." Blockchain is a central place for all the documentation.

"Blockchain is about bringing efficiency and simplification on the inter-company processes," said Begue.

IBM uses blockchain and has developed platforms called Trust Your Supplier and TradeLens that it sells on a subscription basis to companies looking for blockchain solutions. TradeLens is an open industry platform using blockchain technology. It uses a digital platform that provides a



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single, secure source of shipping data and allows that data to be shared with blockchain encryption and permission-based sharing.

Trust Your Supplier blockchain simplifies and accelerates supplier onboarding and lifecycle management, according to Begue. The tool allows users to identify, verify, and maintain supplier information in a secure, decentralized network resulting in less supplier risk, improved compliance and faster audits, he said.

Pioneers wanted

Some companies, including electronics distributors are researching blockchain to determine how best to implement it in their supply chains while others have pilot programs with some partners.

“We talk about it at ECIA board meetings,” said Elario. ECIA formed a team that is studying blockchain to see how

it could be implemented with distributors and component manufacturers. There is interest in blockchain, but many companies are reluctant to be a “pioneer” and make the investment, he said.

“There will be some upfront investment but the return on investment will be there,” said Elario. “It’s like anything else. When something new comes out, a lot of people will sit back and watch, because they don’t want to put up the upfront money. They don’t want to be the pioneer. What they want is to be the recipient of the pioneer’s work,” he said.

Elario said there will be a two-pronged approach in the electronics industry with blockchain. Some companies are going to develop their own solution using blockchain that they will use for their company and their customer base,” said Elario. “They may see that as a competitive

advantage for a while.” Others may use existing platforms developed by companies such as IBM.

Eventually there will be more industry-wide blockchain solutions. He said it will likely be three to five years before blockchain is widely used. Some companies put blockchain research and development plans on hold after the COVID-19 pandemic disrupted the supply chain.

Some large electronics OEMs and semiconductor manufacturers are already using blockchain to some degree for some functions and processes, said Begue. “Big names companies like IBM, HP and Intel, Cisco all have done projects and, in some cases, have established a solution, usually around the supply chain or some variation of supply chain like procurement visibility. Everyone is doing something,” he said.

However, not everyone is bullish about how ubiquitous blockchain will become in the electronics supply chain. Some believe it will be used in parts of the supply chain or in smaller private blockchains with OEMs and a limited number of key suppliers.

“Blockchain is really being touted as a potential be-all and end-all for securing the supply chain,” said Paul Romano, COO of Fusion Worldwide, based in Boston. “I think in certain supply chains it is being more implemented, such as the food supply chain. But the food supply chain is much more simplified than the electronics supply chain,” said Romano.

Not customer driven

He said in electronics, blockchain is being talked about, but not by customers. “At this point we are not hearing our customers talk about blockchain and no one is demanding it. If customers

were, that would be the first sign that something starting to happen with it,' he said.

One reason there has not been a groundswell so far for blockchain is many companies that design, fab, assemble, sell and buy a part may not want to put in information about their involvement in the digital ledger which is a crucial part of blockchain.

"It's a big issue," said Romano. "No one wants to put information into a centralized database. We can't get suppliers to confirm markings on parts let alone putting information into a centralized database so people can have access to it," he said.

For blockchain to be effective, "we need to be able to trace the part every step of the way," said Romano. A chip company designs a part and information about the die needs to be put into the ledger. When the die is sent to the packaging house, the company needs to say they have the lot and submit data about how they assembled the die into the package. The part then has to be sent to a testing house where it is marked, he said.

Every step has to be documented and "all that traceability has to be contained somewhere so that you can look back to the blockchain and validate the authenticity. That in itself is really difficult," said Romano. "It's really hard to get every player to put that information in. You may get some players to put some information but it's hard to get everyone to play," he said.

Reluctance to disclose

Many companies sell excess inventory and some companies may not want to disclose in a block chain ledger that they sold excess inventory. Some

distributors may not want to disclose they sold parts to certain companies or other distributors.

"These companies are competitors so providing competitive information about what's shipping, and where it is shipping is a big challenge," said Romano.

While tracing parts to mitigate counterfeiting is a benefit of blockchain, a key issue to supply chain security is the ability to identify a single part.

"If you have a chip, how are you going to identify it? By date and lot codes? There could be 1 million parts that have the same part marking with the same lot code and date code," said Romano. Blockchain, and DNA marking, have to be able to identify a single device and they can't."

Another impediment to blockchain rollout is cost. "I don't see people rushing out to build these blockchains because it's going to cost money," he said. Also, it will require people to make changes to do things differently. All of that is difficult," he said.

However, some companies in certain industries have private blockchains with a number of key partners. For instance, a defense and aerospace company may establish a blockchain with some strategic suppliers. The OEM may work with a particular original component manufacturer to design a part.

A blockchain would be created and the design will be sent to a contract fab that would make the part and then send it to another company for packaging and testing before it is shipped. Each company involved in each step would submit documentation about its involvement with the part.

However, a key issue in defense and aerospace is obsolete parts, some of which were designed 20 to 30 years ago. Such parts would not be included in blockchain.

"Blockchain is a promising technology, but I think we are years away from using it to secure the supply-chain goods," said Romano.

What Blockchain means for buyers

Blockchain can be a useful tool for electronics purchasers who are concerned about buying counterfeit parts because it provides cradle-to-grave visibility into lifespan of a component. Here are some key attributes of a reliable, robust blockchain.

Digital ledger: When a blockchain is created for a part by a component manufacturer, every transaction involving the component is recorded through its lifecycle on an electronic ledger. The transactions are unalterable. This allows buyers to trace the component back to its original source virtually guaranteeing the part is genuine and not counterfeit. It also allows buyers to see if production materials such as tantalum powder, tin, gold or tungsten powder came from conflict-free zones which is mandated by certain laws such as Dodd-Frank.

Transparency and shared information: Every participant in a blockchain has access to the information concerning the part in the electronic ledger including the certificates of compliance, ownership transfer, shipping documentation or any transaction involving the part.

Security: Blockchain uses cryptographic mechanisms to guarantee the digital identity of the network participants and

secure the privacy of the data stored without the need for a centralized third party.

Smart Contracts: Smart contracts, or embedded business logic, can be added to a blockchain. They enable automation and secure handling contracts.

Planning and forecasting: Manufacturers may use blockchain solutions for collaborative planning and forecasting in pre-production which can enable suppliers to replenish supplies before they run low.

Shipping: Suppliers can combine blockchain with IoT sensors on shipping containers to provide a record of shipping conditions. This could be used to ensure that temperature and humidity tolerances for materials are not exceeded during transit from the supplier.

Environmental regulation: The identity and materials in components and subcomponents of manufacturing equipment could be collected on a blockchain to verify compliance with environmental regulations.