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Blockchain Technology for Business: A Lenovo Point of View

Enhance transaction trust, security, performance, and cost-efficiency via blockchain

Discover how business are using blockchain today

Find out about some potential use cases for blockchain

Learn how Lenovo improved internal supply chain efficiency using blockchain

Mark T. Chapman



Abstract

Billions of transactions of all types take place every day. These transactions must be secure, verifiable, fast, and efficient, and every stage of a transaction requires a level of trust. Yet, these requirements are not always achieved. Invoices can get lost or delayed, Web sites can be hacked, fraud can be committed, and there often is too much manual intervention and a lack of transparency among all parties.

Blockchain technology promises to improve many aspects of how organizations conduct business. Blockchains have been used for nearly a decade as the underlying foundation of cryptocurrencies and more recently in medical, cybersecurity, music, farming, shipping, and other industries.

This paper describes how some companies are using blockchain today to streamline their supply chains, improve royalty tracking, make food safer, and more. It also describes other potential use cases.

The target audience for this high-level overview is anyone considering implementing blockchain technology, and anyone looking to improve their organization's transaction processes. The reader should have some familiarity with the problems and limitations afflicting their current business processes.

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Business and Blockchain

One of the essential underpinnings of modern society is commerce. Every day, billions of transactions of all types take place: retail purchases via credit card, stock market buy/sell orders, business-to-business (B2B) sales via purchase order, bank-to-bank money transfers, payroll direct deposits, automated bill payments, and many others. These transactions must be secure, verifiable, fast, and efficient in all stages of the transaction and for all parties involved.

Every stage of a transaction requires a level of trust: trust that the other parties are honorable and will put forth their best effort; trust that errors will be minimal; trust that each step of the transaction will be processed quickly and efficiently; trust that sensitive data will be protected at all stages of the transaction; and so on.

Today, these requirements are not always achieved. For example:

- ▶ Invoices can get lost in transit or delayed by infrastructure disruptions (such as earthquakes, typhoons, and floods)
- ▶ Web sites can be hacked, compromising sensitive customer, employee, and business data
- ▶ Many transactions require too much manual intervention, wasting time and money, introducing errors, and potentially enabling fraud
- ▶ There is often a lack of transparency, with parties not always knowing what is happening in the other parts of the transaction

Blockchain technology promises to improve all aspects of commerce—and not only commerce. Although still relatively new in the enterprise, blockchains have been used for nearly a decade as the underlying foundation of cryptocurrencies such as Bitcoin and Ethereum, and more recently in medical, cybersecurity, music, farming, shipping, and other industries.

What is a Blockchain?

A blockchain is a digital, decentralized ledger database that records and stores all transactions among users on a given network. Transaction records (or 'blocks') are timestamped and cryptographically secured, locking them in a linear, chronological order. This provides a transparent, immutable collection of every record, safeguarded against tampering.

Typically, transactions require a central authority, such as a bank, clearing house, or other neutral third party, to ensure that each step of the transaction can be trusted and that the expected outcome is reached. With a blockchain, all parties on the network maintain real-time current copies of the blockchain on their server nodes. A party will often have multiple nodes containing copies, for redundancy. Therefore, it is impossible for one party (or an outsider) to add, delete, or alter any of the blocks without detection (and correction) by the other trusted parties. As a result, the third-party middleman is no longer needed, saving time and money.

How is Blockchain used today?

Cryptocurrencies are perhaps the most familiar example of current public blockchain usage. Like the Internet, a public blockchain is available to anyone. Businesses can also make use of private blockchains (think intranets), for both internal use and to transact with customers, suppliers, distributors, and other parties. Private blockchains give businesses more control over privacy and security, more consistent performance, and a broader palette for innovation.

Although blockchain technology is still evolving, many businesses, across multiple industries, run applications today that rely on blockchain technology for security/privacy, accountability, performance, cost savings, and other benefits.

Here are a few examples of how some businesses are making good use of blockchains today:

- ▶ **Goldman Sachs** created an application to provide near-instantaneous equity trade settlements.
- ▶ **Seagate** is using blockchain to trace and authenticate hard drives to thwart counterfeiting.
- ▶ **Singapore Airlines** has shifted its frequent-flyer program to a blockchain, enabling passengers to use its loyalty points at participating retailers that share the blockchain.
- ▶ **Walmart** and its suppliers are using blockchain technology to track shipments of pigs, mangos, and more than a million other products. By using blockchain, Walmart's mango source tracking implementation, for example, has cut the time to trace supplies from a week to about two seconds. Walmart procurement managers can track all information about the products and shipments, including farm origination, fertilizers used, warehouse temperatures, batch numbers, expiration dates, and more.

By tracking these products, Walmart can:

- Reduce food spoilage and ensure that food is delivered in a timely fashion.
 - Prevent or limit the transmission of disease from contaminated foods.
 - Prevent fraud, such as substituting inferior ingredients in place of high-quality ones.
- ▶ **FedEx** uses blockchain technology to help solve customer disputes.
 - ▶ The **U.S. Centers for Disease Control (CDC)** use blockchain to monitor infectious diseases, protect medical records, and provide patients with control over their records and genomic data.
 - ▶ In **media**, applications such as Mycelia use blockchains to ensure the accuracy of royalty payments to music artists, and to combat piracy.
 - ▶ **Businesses, government agencies, and academia** are using blockchain-enabled applications to perform software tracking. The goal is to ensure that 1) the organizations follow the terms of the license agreement, and 2) that they are not overpaying for those licenses.

How Lenovo uses Blockchain for Supply Chain

When Lenovo found itself wasting time, effort, and labor dealing with delays and errors caused by excessive human interaction in supply chain transactions, the company turned to blockchain for a solution.

The old, cumbersome method of handling transactions went something like this:

1. A Lenovo ODM (original design manufacturer) mailed a printed raw materials purchase order (PO) to Lenovo.
2. Lenovo received the ODM PO then converted it to a Lenovo PO (also printed) and mailed it to a raw materials supplier.
3. The supplier received the Lenovo PO and responded to Lenovo with a PO confirmation (again, printed and mailed).
4. When the supplier completed the stock-up, it sent shipment information to Lenovo and shipped the physical goods directly to the ODM.
5. The ODM received the physical goods and responded to Lenovo and the supplier with a goods received (GR) letter.
6. Lenovo billed the ODM, and the ODM made payment. Lenovo received the supplier invoice and made payment to the supplier.

Notice how many times Lenovo had to touch this “simple” transaction. Lenovo had to confirm, approve, audit, bill, and pay. The company was the central authority that ensured accuracy and adherence to terms and created the necessary trust among the parties to the transaction. Mailing forms back and forth added weeks to the process and introduced possibilities for human error. This churn tied up resources that could have been used more productively.

This level of inefficiency was untenable long-term, so Lenovo set out to completely replace the process, using the inherent efficiencies of blockchains. The new process replaced printed paperwork with all-electronic transactions, which greatly reduced transaction times, increased auditability, decreased manual errors, and gave all parties transparency into what was happening at all stages of the process. The distributed design also eliminated the possibility that any one failure in the transaction chain (such as a PO lost in the mail) could cause the entire process to fail. Other benefits include the ease of implementing smart contracts and associated business logic, the ability to add specific security and audit related capabilities, enabling the data model to incorporate machine-learning techniques, and the intangible benefits of a faster, more trusted business process.

As Vishnu Kotipalli, Lenovo Global Supply Chain Strategist, noted: “From our perspective, blockchain means trust. It’s the ideal platform for recording supply chain transactions, as it makes it much easier to track and audit the movement of goods.”

The Future of Blockchain

Lenovo is enthusiastic about blockchain and believes its use will greatly improve the accuracy, trust, transparency, speed, and security of all types of business transactions.

In June 2018, Lenovo joined the open source Hyperledger project to explore blockchain-enabled innovations. More than 200 organizations from around the world, including leaders in finance, banking, IoT, supply chain, manufacturing, and technology, are members of Hyperledger. “Becoming a member of the Hyperledger community helps us

explore all the possibilities blockchain opens up across industries,” said Dr. Yong Rui, Lenovo’s Chief Technology Officer and Senior Vice-President. “We have identified this emerging technology as a key element in our investment strategy for cloud-enabled technologies.”

Lenovo actively works with partners to develop solutions that can help drive blockchain adoption by solving business problems. Over time, Lenovo plans to roll out various blockchain-based solutions, products, and services to its customers.

To this end, in August 2019 Lenovo joined IBM, GlaxoSmithKline, Nokia, and other major corporations in the Trust Your Supplier (TYS) blockchain project. TYS focuses on streamlining the largely manual supply chain onboarding process. Onboarding encompasses a wide range of supplier information, including bank account data, tax and ISO certifications, insurance certificates, and the other supplier data necessary for business transactions. A key technology of TYS is the “digital passport” that enables suppliers to share information with any permissioned buyer on the network. Widescale TYS availability is planned for later in 2019.

According to Renee Ure, Chief Supply Chain Officer for the Lenovo Data Center Group, “With Trust Your Supplier, both buyers and suppliers will see the procurement benefits of blockchain, through reductions in cost, complexity, and speed.”

Because the adoption of blockchain technology is still in the early stages, there are many potential uses for the technology that are only beginning to be explored. Some examples:

- ▶ The **New York Times** has launched what it calls The News Provenance Project, which will explore ways to combat misinformation in the news media. The first project will focus on using a blockchain to prove that photos are authentic.
- ▶ **Daimler** and blockchain firm **Riddle&Code** have partnered to produce a blockchain hardware wallet for automobiles. The wallet is a tamper-resistant box, powered by Riddle&Code hardware and software. The box has multiple use cases, including maintenance tracking, paying for tolls, and executing smart contracts for rental cars.
- ▶ Video game studio **Horizon Blockchain Games** has raised \$3.75 million in a seed round to enable blockchain-powered gaming.
- ▶ In government, blockchains can reduce or eliminate opportunities for “cooking the books” to hide fraudulent spending, secret bank accounts, campaign funding irregularities, and so on. For this and other reasons, the **City of Dubai** (United Arab Emirates) plans to have all government documents on blockchain by 2020.
- ▶ In 2018, **Sierra Leone** became the first country to use blockchain to verify the tabulation of votes as a proof-of-concept, paving the way for blockchain-enabled voting in the future.
- ▶ The **U.S. Food and Drug Administration (FDA)** selected IBM, KPMG, Merck, and Walmart to evaluate the use of blockchain for identifying, tracking, and tracing prescription drugs.

These are merely a few examples of ways in which organizations are creating solutions using blockchain. “I see the solution as having five layers,” explains Dr. Ajay Dholakia, Principal Engineer in Lenovo Data Center Group. “Infrastructure at the bottom, then the protocol platform, which could be Hyperledger, Ethereum, Corda, etc., followed by the data layer to record the transaction data. Next is the application layer, where we exploit the platform and data layers to become blockchain-enabled, and then the fifth layer is the business process you are putting onto this stack.” Blockchain has the potential to become a powerful disruptor, especially when combined with other technologies. As Dholakia notes, “On this system stack, you can see blockchain as one platform option; but AI, IoT, Edge, and the cloud are also available. So, more than one of these could be powering the layers up.”

Conclusion

Blockchain technology offers businesses of all sizes and types an opportunity to dramatically improve their business processes. Distributed ledgers, smart contracts, end-to-end cryptographic encryption, consensus-based updating of data, immutable content, and other traits of blockchain all work together to ensure accuracy, auditability, speed, security, and—perhaps most importantly—trust.

A major shift in technologies and business processes, such as this, requires diligent planning to get it right the first time. Through the lessons learned by implementing blockchain internally, Lenovo has developed the expertise to smooth your path to the efficiencies and benefits of blockchain.

For information about how Lenovo can help you transform your business, contact a Lenovo sales representative or authorized business partner.

And for a more light-hearted look at Lenovo's view of blockchain see "Extreme I.T. Blockchain":

<https://www.youtube.com/watch?v=VcanNiHUaIQ>

Author

Mark T. Chapman is a senior technical writer for Lenovo Data Center Group. He has written numerous technology papers for both Lenovo and IBM. Subjects include the future of retail, data center security, transforming the digital enterprise, and explanations of various hardware and software technologies. He has 40 years of experience working in the IT industry and has worked in technical and marketing positions for much of his career.

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