

Blockchain Basics

Blockchain: What is it?

Blockchain has become a fixture in technology news, with claims that it will revolutionize industries from health care to real estate, and everything in between. While the speculation offers the promise of innovation, two questions are frequently overlooked: What exactly is blockchain? How is it applicable to such a wide variety of uses?

At its essence, blockchain is a 21st-century variant of the transaction ledger, which has been a part of society since ancient times. Today, ledgers are used in a multitude of applications to determine ownership, establish valuations or delineate liabilities. The most common applications of ledgers are to track and chronologically journal any transaction that involves the exchange of value between parties, whether that value is rooted in monetary funds, stocks, bonds, real estate or commodities such as corn, rice or even pork bellies. Another common use of ledgers is to record birth and death certificates to provide an attestable record of these bookends of life events.

What makes blockchain unique and a potentially disruptive technology is that it is designed from the ground up to be fully distributed versus the centralized principle upon which traditional ledgers are based. For example, when a stock is bought or sold through a broker, the details of that transaction are sent to a centralized clearinghouse that acts as a trusted third party and journals the transaction in its ledger. This ensures the existence of an independent record of the transaction in order to prevent any subsequent disputes regarding the ownership of that security. The clearinghouse attests to the integrity of its records should any future dispute arise between the parties or the chain of custody be questioned by someone who was not a party to the transaction.



“Blockchain opens up a lot of new possibilities in the strategic domain with potential for new business models and dramatically streamlining value chain processes. For me, blockchain brings more than just another technology.”

LILIAN BOONSTRA, SECURITY PROGRAM MANAGER

While the value of transaction journaling remains the same in blockchain, the process by which it is achieved has significant differences. Foremost of these is that there is no centralized private clearinghouse or trusted third party to receive, process and journal transaction data. Instead, the ledger is made public and widely shared across a peer-to-peer network, with each member contributing and journaling transactions to the digital ledger. When a transaction is submitted to the ledger, it is signed using the submitting party's private cryptographic key. This ensures its integrity and makes the record immutable because any changes to the record after the fact would cause a mismatch in the signature.

Blockchain also allows for increased efficiency vs. traditional ledgers. By using blockchain, much of the cost associated with journaling transactions for business records and compliance purposes is eliminated. According to consulting firm Accenture, this could result in a net savings in operations cost of up to 30 percent¹ for mid-size to large commercial banks.

Another key area driving increased efficiency using blockchain is time. In the previous example of purchasing stock from a retail broker, the time required by the clearinghouse to settle that transaction is three business days. By using a commercial blockchain implementation instead of a clearinghouse, the time required to add the transaction to the ledger (thus asserting the transfer of ownership) and have it validated by other participants on the network is measured in seconds or minutes, depending on the maturity and scale of the blockchain used.



“Of all the emerging technologies we’re currently seeing, blockchain has the potential to have the biggest impact on businesses and society at large. Enterprises are increasingly looking at how they can adopt this technology and revolutionize how they deliver products and services.”

RON HALE, CHIEF RESEARCHER AT COORACLARE INSTITUTE

Business Impact of Blockchain

The predominant use of blockchain today is as the technology underpinning the Bitcoin cryptocurrency. Bitcoin has found widespread acceptance as an alternative to government fiat currencies and is in use for transactions as diverse as buying a cup of coffee or placing an online order. The Society for Worldwide Interbank Financial Telecommunication (SWIFT) network has taken notice of Bitcoin's growing popularity for fund transfers outside of traditional banking infrastructure and is currently piloting a blockchain-based system to reconcile and ledger interbank transfers in real time.² This approach could ultimately replace traditional automated clearinghouse (ACH) clearing processes.

Bitcoin may be the most well-known application of blockchain, but the technology has emerging applications outside of financial transactions as well:

- Canadian banks are collaborating with IBM³ to leverage the company's blockchain variant for identity management. In the proposed schema, blockchain records will be used to validate various aspects of a user's identity. For example, it may be used by a car rental agency to ascertain whether an individual is a legitimate renter or an identity thief.
- Blockchain has been proposed as a way to ensure the accuracy and integrity of electronic health records (EHRs) as they are exchanged between health care providers and as a method to prevent the filling of duplicative and fraudulent prescriptions.
- South African company Custos Media Technologies is using blockchain to create tracking technology designed to combat the redistribution of copyrighted content. This application is currently being used in the film industry, with plans to leverage the technology for eBooks as well.⁴

Blockchain Risk Considerations

Early adopters of blockchain face a multitude of risk factors that need to be fully understood and managed appropriately. First among these is that blockchain is an emerging technology with few large-scale implementations. This means that the limitations of the technology are unknown and still being explored. At present, it remains somewhat of an open question as to how effectively the model will scale to the hundreds of millions of equity security transactions the global markets experience in the course of a day without every participant on the peer network needing to make very large investments in infrastructure.

Another issue to consider is the average cost per transaction on any given blockchain at present and as the network scales. Using Bitcoin as an example, there has been wide variability in the cost per transaction. This variability needs to be monitored and managed closely, especially for lower-value transactions where the transaction fees could eclipse the overall value.

The emerging technology nature of blockchain means that the code base is evolving rapidly. This can create situations where organizations adopt features that are later unsupported. Such changes mandate that software initiatives looking to leverage blockchain get involved in its development and advocate for those aspects they have adopted. In the longer term, this risk is expected to subside as the software matures.

In addition, security risk to blockchain exists at multiple levels. Specific areas to consider include access control considerations, the strength of the hashing and encryption algorithms being used, the security of the blockchain nodes in the network, the possibility of a dominant processor controlling the blockchain, and potential vulnerabilities to denial of service.

Statistics

282,000 to
307,000

In March 2017, the Bitcoin Blockchain processed between 282,000 and 307,000 transactions per day.⁵

\$8-12
Billion

The typical large commercial bank could see savings of \$8-12 billion dollars per year by adopting Blockchain.⁶

\$1
Million

The average investment in blockchain projects in 2017 is expected to be about US \$1 million.⁷



“One of the most talked about advantages involving blockchain technology is how it can prevent future payment scams. For starters, it would protect both buyers and sellers by using ‘smart contracts.’ This procedure would avoid those instances where you purchase an item and the seller doesn’t follow through.”

KRIS SEEBURN, TECHNOLOGY EVANGELIST/PROFESSOR/ADVISORY CONSULTANT

Questions to Consider

Prior to making an investment in blockchain, here are a few questions to consider or ask potential providers:

- 1 How does blockchain compare to the current ledger infrastructure? Do enough potential savings exist to justify the investment?
- 2 Does our organization have the capabilities required to innovate alongside an emerging technology?
- 3 Does joining a blockchain collaborative such as Hyperledger make sense for our organization or should we leverage a commercial implementation?
- 4 How do we manage the cost per transaction when using a particular blockchain? Is this a fixed price or does it vary with volume?
- 5 Does our organization's industry group have a blockchain established or on the horizon?



“Blockchain technology presents opportunities for disruptive innovation. It enables global business to transact with less friction and more trust. Blockchain can transform businesses with the ability to digitize transaction work flows and transact more smoothly and efficiently.”

JAI SINGH ARUN, PROGRAM DIRECTOR, IBM BLOCKCHAIN, IDENTITY AND SECURITY SOLUTIONS

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