
Blockchain Basics: A Primer

Blockchain, the technology underlying the cryptocurrency Bitcoin, is poised to revolutionize how all commercial transactions are conducted.

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Blockchain Defined

You have probably heard of Bitcoin, a peer-to-peer, non-governmental currency. Bitcoin is the first money that is its own payment system. That is, no bank, money transmitter or intermediary of any kind is required to clear and settle its transactions, which complete in mere seconds. The technology upon which Bitcoin is built ensures this work is done in a decentralized manner.

*This technology, called “blockchain technology,” “distributed ledger technology,” or simply “DLT,” is just as good at clearing and settling transactions in other assets as for bitcoins. Indeed, it might be even better. What other assets? **Securities, commodities, deeds to property, ownership of artwork, even medical records.** The potential of this technology has been widely recognized.*

Bitcoin vs. Blockchain

Bitcoin is a so-called “virtual currency” intended to fill a similar role as currencies issued by governments. Indeed, the title of the original Bitcoin whitepaper is “Bitcoin: A Peer-to-Peer Electronic Cash System.”

Unlike government currencies, which are issued by central banks and backed by the taxing authority of governments, Bitcoins are not backed by any governmental institutions. Instead, they are generated through a process called “mining,” which is a process in which participants in the Bitcoin ecosystem generate Bitcoins pursuant to established protocols. The mining process is part and parcel of the system for verifying Bitcoin transactions: In exchange for verifying Bitcoin transactions, miners are automatically

rewarded by the network with new Bitcoins. Miners do this work with sophisticated computer hardware that performs complex mathematical computations. Thus the Bitcoin network incentivizes private parties to validate Bitcoin transactions – a process which simultaneously distributes bitcoins.

Bitcoins can be converted from and into conventional currencies using privately operated online exchange portals. Increasingly, however, businesses and individuals are accepting bitcoins as currency in transactions without first being converted into a conventional currency. All such transactions are grouped into “blocks” of transactions and recorded on a shared ledger, one after the other, forming a “chain”. This ledger is called a “blockchain.”

Blockchain vs Bitcoin

A **blockchain** is not a currency at all. Rather, it is a system for validating, clearing, settling, tracking and recording the ownership of assets as they are traded. The Bitcoin blockchain is just one of those systems. Currently, the Bitcoin Blockchain is the most widespread use of Blockchain Technology, but other blockchains exist as well and are being widely used for other purposes.

Blockchain Technology involves a ledger of transactions that are maintained on a network of servers called “nodes.” Each node maintains a ledger reflecting the ownership of assets. The ledger is “distributed” because it is maintained simultaneously on all of the nodes in the network. The ledger contains a continuous and complete record of all transactions dating back to the origination of the ledger (the “chain”). Validated transactions are added to the ledger in groups or “blocks” using cryptographic methods to ensure the integrity of the transactions. It is this recording of transactions in blocks to the chain of transactions reflected in the ledger that is the source of the term “blockchain.”

In the case of the Bitcoin blockchain, the distributed ledger reflects the current ownership of bitcoins at any given time, as well as all prior Bitcoin transactions going back to the creation of the Bitcoin blockchain. Thus, when a party transfers Bitcoins, the transaction is published to the network, which confirms with a very high degree of confidence that the transferring party owns the Bitcoins and hasn’t, for example, already transferred the Bitcoins to someone else. Transactions that are not validated across the network are rejected. In other words, the network establishes trust in the transaction without the involvement of a typical intermediary, such as a bank.

Transactions in the Bitcoin Blockchain are secure because the network employs sophisticated security algorithms, and because the transaction ledger is distributed across a network of unrelated computers. To compromise the security of the Bitcoin Blockchain, a hacker would need more computing power than half the nodes in the Bitcoin Blockchain. Due to the size of the Bitcoin Blockchain, this is difficult to do.

Other so-called “public” blockchains are secured not by mining (known as “proof-of-work”) but by demonstrating control over some of the assets native to the ledger (known as “proof-of-stake”). A blockchain need not be public, though. The blockchains that have captured the imaginations (and budgets) of many financial institutions are known as “private” blockchains because only certain pre-approved participants may join them. These blockchains use a variety of means to ensure the identity of parties to a transaction and to achieve consensus as to the validity of transactions.

How Blockchain Technology Will Revolutionize Transactions

Blockchain Technology is adaptable to a wide range of transactions including:

- Effectuating transfers of digital assets;
- Transactions in securities and derivatives;
- Recording sales of physical assets, such as tangible personal property and real property.

Blockchain also makes possible the use of so-called “smart contracts,” *i.e.*, contracts embedded in computer code that can implement themselves automatically upon the occurrence of discrete events.

Examples of smart contracts include:

- Automating rent payments in leases where rent is a function of revenue;
- Automatic coupon payments based on the calendar day;
- Automating royalty payments when payments are based on the number of seats currently in use for a software license; or
- Automating advertising payments for web clicks.

Blockchain Technology promises to automate many of the existing labor-intensive processes required to settle financial transactions, thereby increasing the speed at which such transactions can be conducted and lowering transaction costs. For example, manual processes of recording transactions in databases may be replaced with automated recording of transactions in the Blockchain ledger.

As applied to real property transactions, it is expected that Blockchain Technology will reduce deficiencies in current systems for tracking ownership of real property, including claims on real property such as easements and mineral rights. Accordingly, Blockchain Technology should allow for quicker settlements of real property sales and lease, and should also substantially reduce title insurance costs.

Who is exploring opportunities in Blockchain

Today, nearly all of the world’s leading financial institutions are engaged in research activities around the use of Blockchain. It is anticipated that Blockchain Technology will allow financial institutions to dramatically reduce infrastructure costs for fund transfers and securities trading. It is also expected that Blockchain Technology will reduce settlement times for financial transactions.

If you have any questions about the content of this advisory, please contact the Pillsbury attorney with whom you regularly work, or the authors below.

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