



# ACCOUNTING

CONTINUING EDUCATION

Blockchain Essentials – Impact on  
Modern Accounting  
(BLKC4)

# Blockchain Essentials – Impact on Modern Accounting

(BLKC4)

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BLOCKCHAIN ESSENTIALS - IMPACT ON MODERN ACCOUNTING (BLKC4)  
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## **INTRODUCTION**

This manual accompanies a four-hour course on the foundations of blockchain technology. Since its invention in 1990s, blockchain has become a noteworthy buzzword. Blockchain technology is used in many industries, particularly in the financial sector. Interest and investment in Bitcoin, the most notable cryptocurrency built on blockchain technology, has resulted in the value skyrocketing.

Despite the notoriety of Bitcoin, it is not the only cryptocurrency or use case of Blockchain technology. Based on blockchain's potential and success, many companies are exploring alternate uses for the technology. Blockchain is still fairly new, so there are a lot of misconceptions, gray areas, and opportunities. Blockchain is shaking up industries and revolutionizing how transactions are performed.

### **COURSE AUDIENCE**

No previous knowledge of blockchain is necessary to take this course. This course is designed for CPAs, accountants, auditors, practitioners, and others who want to gain a foundational understanding of

- how blockchain works,
- blockchain benefits,
- blockchain limitations,
- basics of cryptocurrency,
- other blockchain uses,
- compliance requirements, and
- the value of blockchain to accounting professionals.

### **COURSE VALUE**

Blockchain is growing quickly in a number of industries, disrupting the market, and changing the way transactions work with issues like less transparency to standard transactions. As a financial professional, you live and breathe transactions, whether it is on the audit or taxation side.

### **COURSE OBJECTIVES**

By the end of this course, participants will:

- Have a foundational understanding of blockchain technologies;
- Have a better grasp of the benefits, challenges, values, and opportunities available in blockchain;

- Be able to distinguish cryptocurrencies from other blockchain technologies and uses;
- Be aware of regulatory, governance, and compliance risk surrounding blockchain and
- Be familiar with AICPA and other authoritative guidance on cryptocurrencies.

## **MAJOR SUBJECTS**

- Background on blockchain
- Cryptocurrency
- Blockchain opportunities
- Blockchain use cases
- Regulatory and compliance (global, IRS, SEC)
- Accounting considerations (risks, opportunities, and demand)

# Unit

# 1

## Blockchain Basics, Background, and Origin

### LEARNING OBJECTIVES

*When you have completed this unit, you will be able to accomplish the following:*

- Compare traditional transactions with blockchain transactions.
- Explain why and how blockchain was developed.
- Define blockchain terminology.
- Recognize components of blockchain technology.
- List blockchain characteristics.
- Explain blockchain ledgers and models.
- Discuss the advantages and limitations of blockchain.

### TRADITIONAL TRANSACTIONS VS. BLOCKCHAIN TRANSACTIONS

This section will provide some context on how a traditional transaction works vs how blockchain technologies work.

## **Traditional Transactions**

In a traditional transaction, there is a buyer who offers to purchase a good or service from a seller for valuable consideration.<sup>1</sup> Outside of cash, most tenders of payment require a financial intermediary. A financial intermediary<sup>2</sup> is an entity that acts as the middleman between two parties, such as a commercial bank, payment processor, insurer, accountant, law firm, or other fiduciary, in a financial transaction.

## **Role of Intermediaries**

Traditionally, intermediaries solve the following problems:

- They act as financial intermediaries and play an important role in the financial and data transfer system.
- They solve the problem of trust in an online or digital environment.

Nonetheless, the use of intermediaries has its drawbacks. Intermediaries generally charge transaction fees, in addition to those charged/paid to the final financial institution. For example, if you use an ATM other than the one bank that has issued your card, you can expect to be charged by that institution in addition to the issuing bank. The ATM, payment/transaction, and overdraft fees collected by these intermediaries make up 40% of the revenue they generate in this billion-dollar industry.<sup>3</sup>

## **Blockchain Transactions**

Blockchain operates as a peer-to-peer structure rather than a client-to-server arrangement. The transaction flows from one party to another without the use of a financial intermediary. Verification tools such as personal identification, name, and address are not necessary. One of the biggest controversies surrounding blockchain, particularly cryptocurrencies, is anonymity.<sup>4</sup>

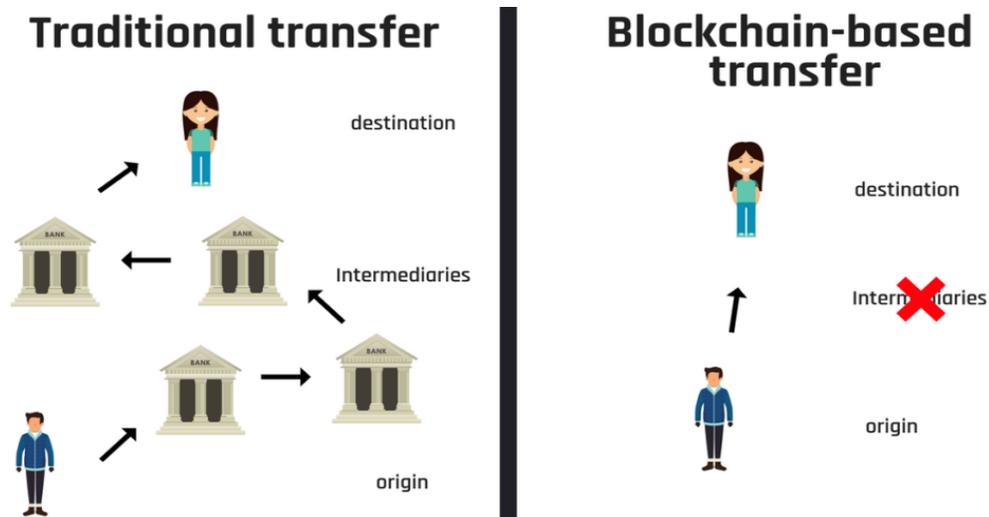
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<sup>1</sup> <https://legal-dictionary.thefreedictionary.com/Valuable+Consideration>

<sup>2</sup> <https://www.investopedia.com/terms/f/financialintermediary.asp>

<sup>3</sup> Bitcoin vs. Credit Card Transactions: What's the Difference?, Dan Blystone (2019), <https://www.investopedia.com/articles/forex/042215/bitcoin-transactions-vs-credit-card-transactions.asp>

<sup>4</sup> *ibid*



## BLOCKCHAIN ORIGIN

### When, How, Why Blockchain?

Blockchain development can be traced back to as early as 1991 when Stuart Haber and W. Scott Stornetta described a cryptographically secured chain of blocks.<sup>5</sup> Fast forward to 2008, when the U.S. was suffering from a major economic recession. In that same year, amidst growing mistrust with the U.S. banking system, a blockchain solution was developed.<sup>6</sup> Blockchain engineers sought to eliminate traditional transaction fees and increase the use of digital payments while providing a verified system of record for transactions.<sup>7</sup>

The components and technology used to create blockchain have been around for decades. Blockchain was developed using a mix of existing computer science technologies such as cryptography, hashing, timestamps, and programming languages. In 2008, an anonymous person or group using the pseudonym Satoshi Nakamoto wrote a 10-page white paper providing the information necessary to create the cryptocurrency Bitcoin, which is built on blockchain technology. Satoshi Nakamoto is the name used by the person or group of persons who authored a white paper on this topic and explaining how to develop blockchain and referenced the implementation of bitcoin as use case.<sup>8</sup>

## BLOCKCHAIN OBJECTIVES

The goal of blockchain is as follows:

- provide access to the masses (traditionally unbanked)

<sup>5</sup> History of Blockchain, The Institute of Chartered Accountants in England and Wales, <https://www.icaew.com/technical/technology/blockchain/blockchain-articles/what-is-blockchain/history>

<sup>6</sup> "Bank Fees Have Gone Crazy (2017)," Bob Pisani, <https://www.cnbc.com/2017/07/21/the-crazy-growth-of-bank-fees.html>

<sup>7</sup> The Recession of 2007–2009 (2012), Bureau of Labor Statistics, <https://www.bls.gov/spotlight/2012/recession/>

<sup>8</sup> Nakamoto, <https://bitcoin.org/bitcoin.pdf>

- eliminate the role of intermediaries
- lower the costs and fees associated with transactions
- secure way to create and send transactions
- trusted and verified transaction method
- preserve the integrity of recorded transactions

## **BLOCKCHAIN TERMINOLOGY<sup>9</sup>**

Defining critical blockchain terminology is tantamount to building a foundation on how the technology works.

### **Block**

A block is a package of data containing multiple transactions over a given period of time. A genesis block is a first block in a chain. Subsequent blocks contain a cryptographic hash of the previous block, a timestamp, and transaction data.

### **Chain**

A chain is a cryptographic link that keeps blocks together using a “hash” function.

### **Cryptography**

Cryptography is utilizing procedures, processes, methods, et cetera for the purpose of developing and using secret writing, such as codes or ciphers.

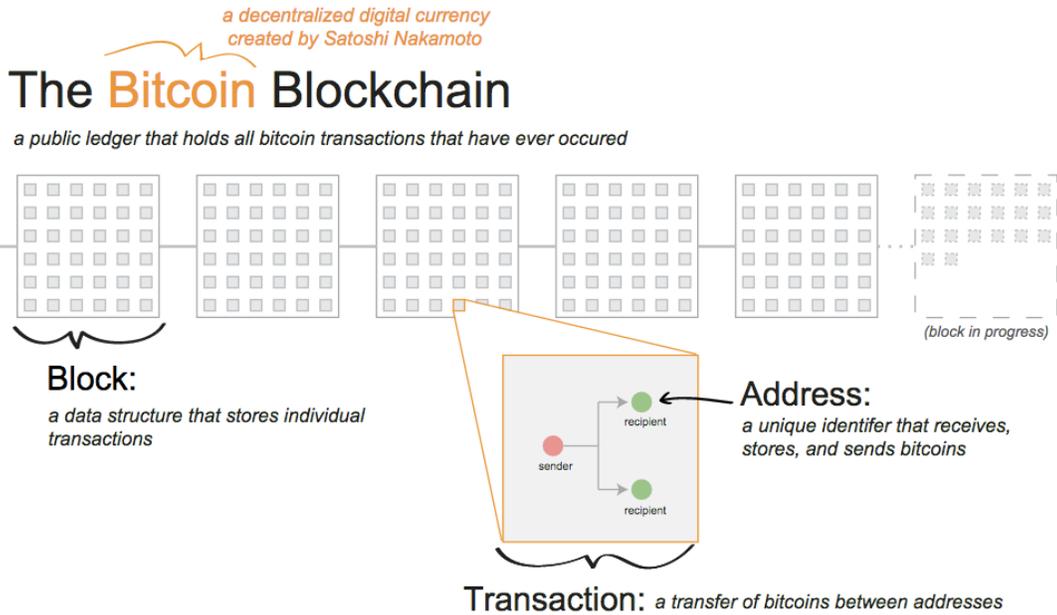
### **Blockchain**

Transactions are permanently recorded by adding blocks on a shared ledger (see distributed ledger). From the genesis block (first block) to subsequent blocks, the blockchain serves as a historical record of all transactions entered.<sup>10</sup>

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<sup>9</sup> ibid

<sup>10</sup> <https://blockgeeks.com/guides/blockchain-glossary-from-a-z/>



[<http://people.ischool.berkeley.edu/~bbloomer/coinviz.html>]

## Hash

A hash is an algorithmic function applied to data in order to convert it into a random string of numbers and letters. Hashes are unique and irreversible. It is impossible to decipher input based on the hash value.

This online tool allows you to generate the SHA256 hash of any string. SHA256 is designed by NSA, it's more reliable than SHA1.

Enter your text below:

the cat likes ice cream

Treat each line as a separate string

SHA256 Hash of your string:

**E0B44EBB7BBAAC2C23B7A7D733B6F19553C43CF9F3515F38916E7414B1AC49F2**

[Graphic credit: <https://passwordsgenerator.net/sha256-hash-generator/>]

## Mining

The act of validating blockchain transactions.

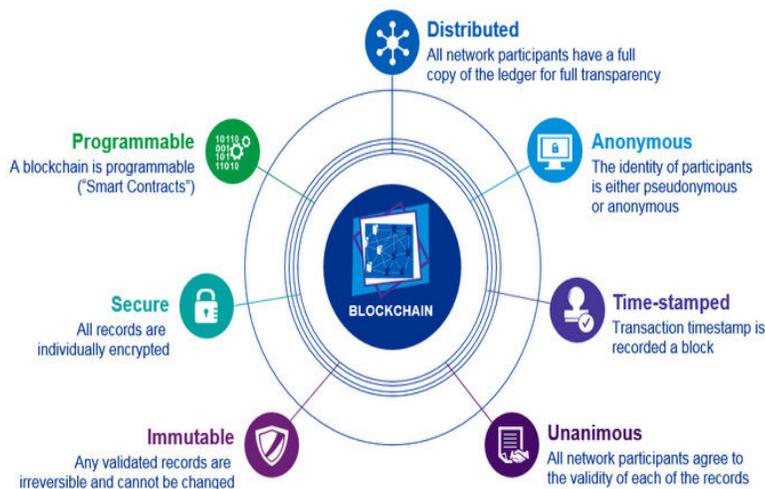
## Peer-to-Peer Network (P2P)

The direct sharing of data between nodes on a network, as opposed to via a central server.

## Distributed Ledger Technology

Distributed Ledger Technology (DLT) is a consensus of replicated, shared, and synchronized digital data geographically spread across multiple sites, countries, or institutions. In a DLT, data is stored across the network of nodes in what is called the DLT. Blockchain is a type of DLT. There is no central administrator in the blockchain. Copies of the ledger operated by a participant of the blockchain network are called nodes.

## Properties of Digital Ledger Technology (DLT)



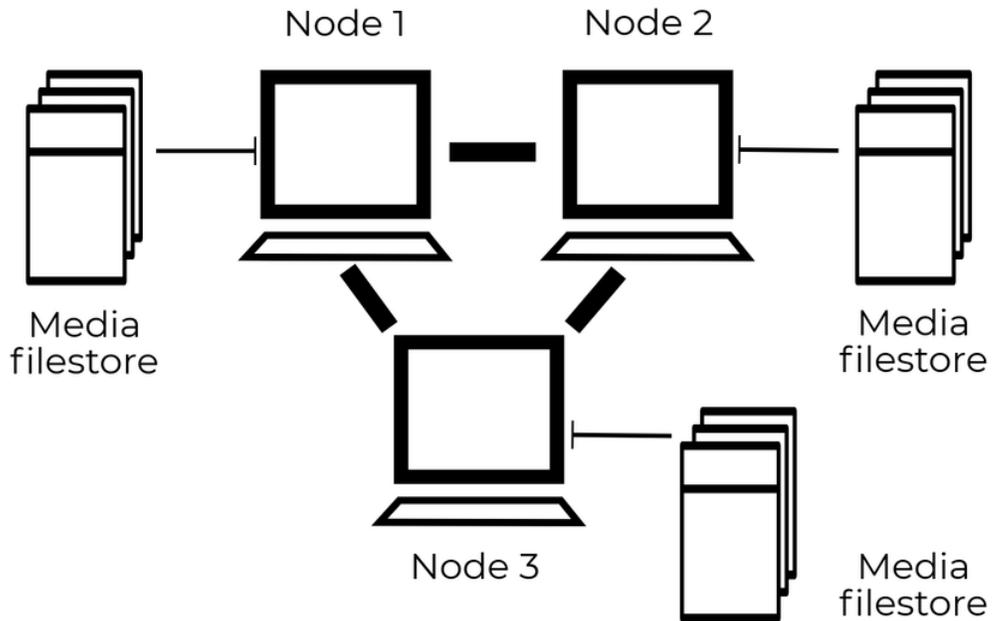
[<https://www.lpea.lu/2017/11/30/blockchain-unlocking-the-value-of-distributed-ledger-technology-in-private-equity/>]

## Triple-Entry Accounting

Triple-entry accounting builds on and extends the traditional double-entry accounting. In triple-entry accounting, the transaction is linked to two double-entry ledgers, and that link is publicly available. This type of entry makes the transaction visible for all to see and, therefore, makes it very tough for someone to lie since others are watching. It would be illogical for the transaction to be reflected the same in both ledgers.

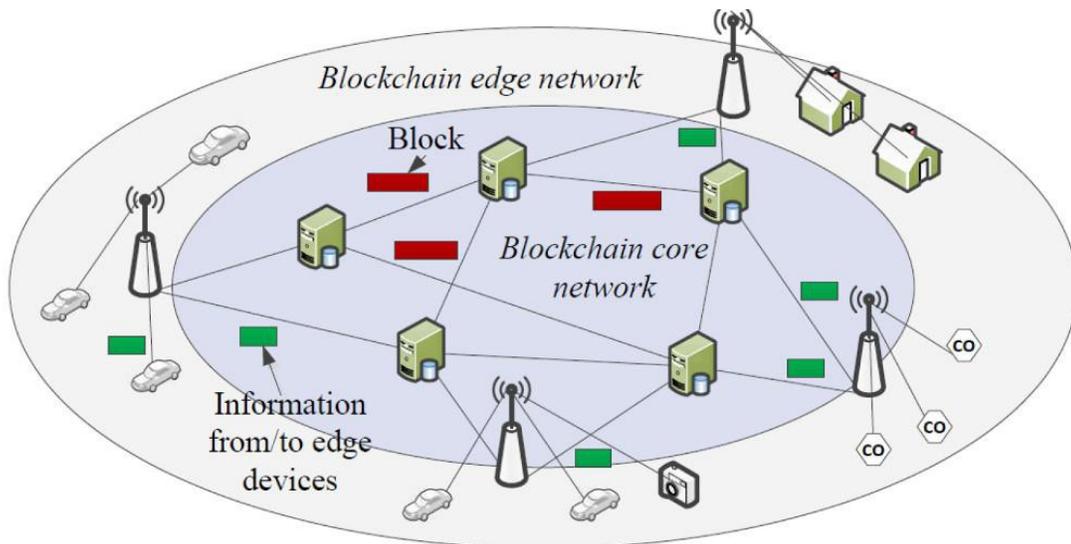
## Node

A node is a copy of the ledger containing a complete record of all the transactions recorded on the blockchain and operated by a participant of the blockchain network.



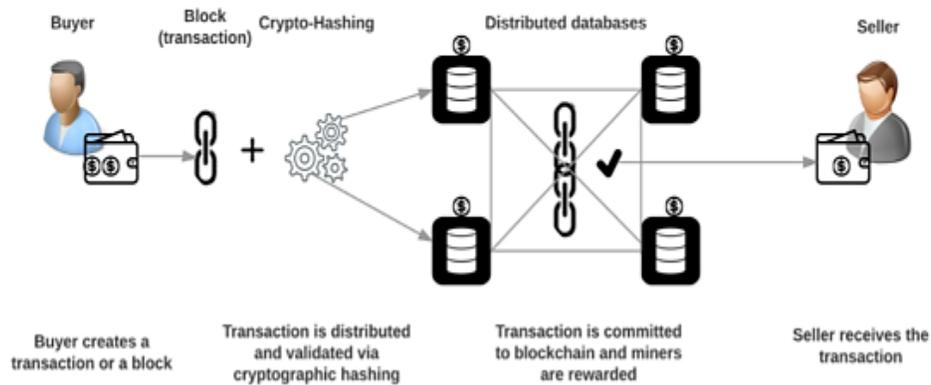
## Network

The network is made up of complete nodes.



# BLOCKCHAIN PROCESSES AND COMPONENTS

## Blockchain - Process



Now that we have discussed some important terminology, we can delve a little deeper into the mechanics of blockchain.

Blockchain technologies have the same four basic characteristics:

- Decentralization consisting of a peer-to-peer network;
- Immutability which means it is tamper proof;
- Hash values that prevent the alteration of transactions, and
- Consensus to check the validity of the transaction.

## CHARACTERISTICS OF BLOCKCHAIN

### Decentralized and Distributed

The first characteristic of blockchain is that it is decentralized and distributed. This means that there is no central administrator. Validation and processing of the transactions are dependent on a consensus validation.

A consensus of the network is necessary to process transactions. A consensus is achieved when at least 51% of members in a network approve a transaction.

## Immutable

Blockchain is immutable because of the time stamp validation feature. Immutability is the concept that integrity of the data is maintained because there are mechanisms in place to prevent alteration. Changes are identifiable since the hash numbers will not sync.



[Graphic credit: <https://blog.pryze.com/what-is-Blockchain-a-beginners-guide-cd974c4d3398>]

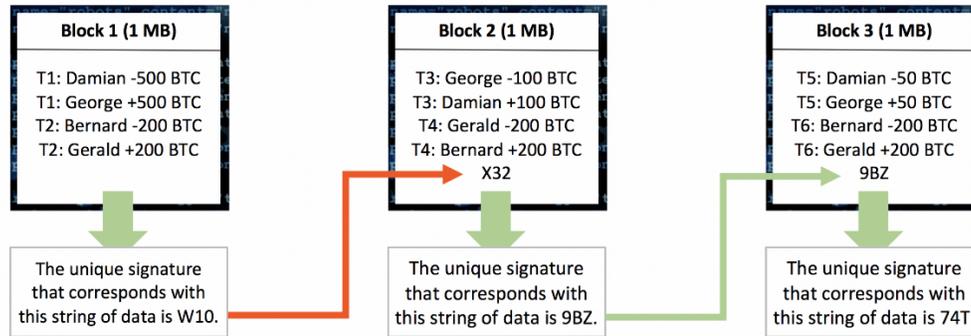
## Hash Identifier

Changes are identifiable since the hash numbers will not sync. Remember, hashes are unique, so if a block is altered once, it is accepted into a chain, and it will change the hash value. If a hash value is altered, the subsequent block will no longer refer to the previous block's hash in a sequence, and the entire blockchain will be invalidated. The hashing sequence is what validates that the blockchain has maintained its integrity and is valid.

Hash functions are built into the blocks to prevent tampering and to provide a historical record of transactions. The Hash function identifies the block. Block contains a cryptographic hash of the previous block, a timestamp, and transaction data.<sup>11</sup>

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<sup>11</sup> Bitcoin Hash Functions Explained, Corin Faife (2017), <https://www.coindesk.com/bitcoin-hash-functions-explained>



[<https://blog.goodaudience.com/blockchain-for-beginners-what-is-blockchain-519db8c6677a>]

## Peer-To-Peer to Network

### Consensus

Transactions require approval by a consensus. The consensus decision-making body develops and agrees to support decisions for the best interest of the group. In blockchain, a consensus of the network is necessary to process transactions. A consensus is achieved when at least 51% of members in a network approve a transaction.

Similar to a traditional transaction, blockchain transactions require both a sender and a receiver. Unlike traditional transactions, blockchain does not have financial intermediaries. Instead, there are people in the network who create blocks or participate in mining - who are rewarded for their participation in the network by either building and or verifying the blocks that are part of the blockchain.

The consensus mechanism is what makes the concept of blockchain more secure than other peer-to-peer networks or distributed computing. Generally, there are two ways in which the consensus is formed: proof of stake or proof of work.<sup>12</sup> Additional consensus mechanisms are also used, but these two tend to be the most commonly used.

The individuals who engage in mining activities are called miners. Miners verify transactions and create new ones (blocks), and they are often anonymous. Miners are compensated for maintaining the integrity of the network and insuring it is immutable – this compensation is called miners' income. There are two main compensation models: proof of work or proof of stake.

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<sup>12</sup> Blockchain Consensus: A Simple Explanation Anyone Can Understand, Ameer Rosic, <https://blockgeeks.com/guides/blockchain-consensus/>

## **Proof of Stake**

Proof of stake (POS) is the mechanism by which miners earn the right to add new blocks and earn new tokens (monetary compensation), based on how much of that currency they already hold.<sup>13</sup> In the cryptocurrency section of this manual we will define tokens.

Gridcoin is a cryptocurrency that rewards for specific work done on the BOINC (Berkeley Open Infrastructure for Network Computing) platform. The network runs by real work that helps researchers and scientists all around the world. Gridcoin is a Proof of Stake (POS) network, making it more energy efficient than a Proof of Work (POW) network. BOINC is a platform that has been around since 2002 and has an extensive user base. Projects like SETI@Home and World Community Grid have around 1.5 million users; roughly 500,000 are active on a daily basis.

The reward for work done on any project is done in the following way:

- Researchers Recent Average Credit (RAC)/The Total RAC on the project.
- This value is then multiplied with the projects Magnitude – The Magnitude Unit Value.
- Each time the user makes a new block (stakes), the owed reward will be sent.<sup>14</sup>

## **Proof of Work**

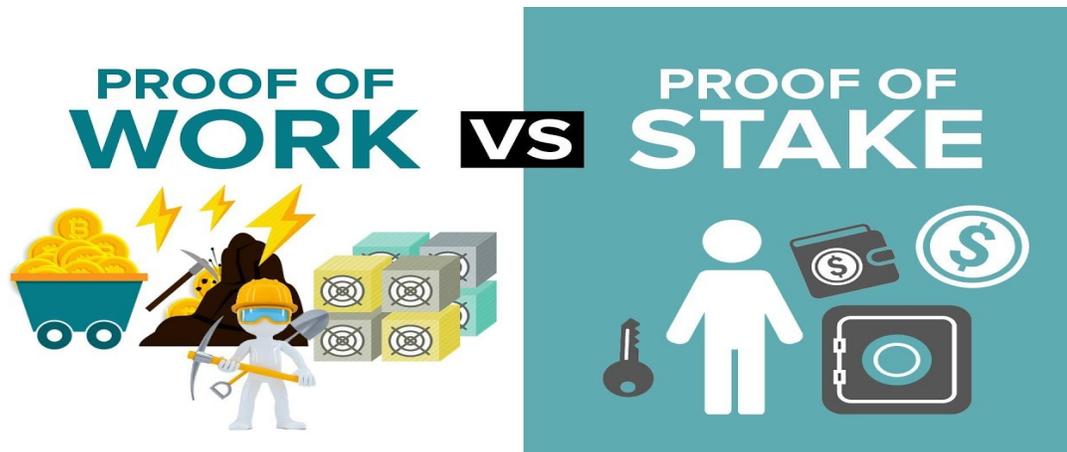
Proof of work (POW) is a consensus distribution algorithm that requires an active role in mining data blocks, often consuming resources such as electricity. Miners are compensated based on the amount of work or computational power provided. POW miners need to establish that they are invested in the game and must solve puzzles. These puzzles take a large amount of processing power to complete, and they are expensive to solve because large amounts of processing power consume a lot of electricity. A successful miner will be able to recover his expenses and make a profit in the process.<sup>15</sup>

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<sup>13</sup> <https://www.investopedia.com/terms/p/proof-stake-pos.asp>

<sup>14</sup> <https://gridcoinstats.eu/about.php>

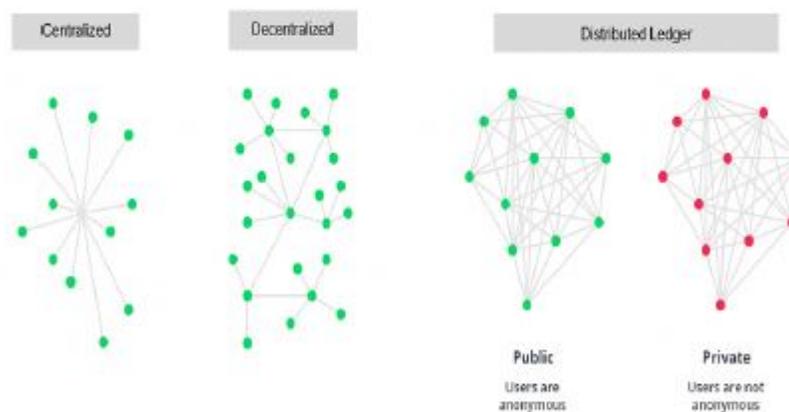
<sup>15</sup> <https://www.investopedia.com/terms/p/proof-work.asp>



Miners are currently awarded with 25 new litecoins per block, an amount which gets halved roughly every 4 years (every 840,000 blocks). The Litecoin network is therefore scheduled to produce 84 million litecoins, which is 4 times as many currency units as Bitcoin. In a sense, miners are intermediaries because they are compensated for their efforts. This begs the question of whether or not the blockchain really achieved the goal it set out to meet in the first place.

### Types of Ledgers

## Decentralized, Centralized & Distributed Ledger



A ledger is where transactions are recorded. Though the vast majority of blockchain ledgers are distributed, there are two other types.

In a central network, the owner is a single point of contact for information sharing. A centralized database has faster processing speed and allows for easier editing, data management, and increased security over data itself.

In the decentralized network, there are multiple central owners that have the copy of the resources.

A distributed network is a type of decentralized network where everyone gets equal access.<sup>16</sup>

## BLOCKCHAIN MODELS

The blockchain infrastructure and functionality are based on the model that is adopted. Currently, four blockchain models exist:<sup>17</sup>

- Public
- Public Permissioned
- Private
- Consortium

### Public Blockchain

A public blockchain is a decentralized and distributed ledger of encrypted information. It is more secure but more complex. Since miners are anonymous, they are paid using POW.<sup>18</sup>

### Private Blockchain

A private blockchain is managed by one firm or organization and is energy efficient. Since miners are known, they are paid using proof of stake.<sup>19</sup> The following charts show the differences between the two blockchain models.

	Public	Private
<b>Access</b>	Open read/write	Permissioned read and/or write
<b>Flexibility</b>	Scalable	Not very flexible

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<sup>16</sup> Oracle Blockchain Quick Start Guide, Vivek Acharya, Anand Eswararao Yerrapati, Nimesh Prakash (2019), <https://subscription.packtpub.com/book/data/9781789804164>

<sup>17</sup> "Everything You Need to Know About Public, Private, and Consortium Blockchain (2019)," Mazn Adnan Shkooor, <https://medium.com/swlh/everything-you-need-to-know-about-public-private-and-consortium-blockchain-54821c159c7a>

<sup>18</sup> "Types of Blockchain (2018)," Nidhi Chamria, <https://www.prolitus.com/blog/types-of-blockchain/>

<sup>19</sup> <https://www.investopedia.com/terms/p/proof-stake-pos.asp>

<b>Speed</b>	Slower	Faster
<b>Security</b>	Proof of Work Proof of Stake Other consensus mechanisms	Pre-approved miners
<b>Identity</b>	Anonymous Pseudonymous	Know identities
<b>Asset</b>	Native asset	Any asset
<b>Cost</b>	Expensive (labor intensive)	Controlled cost
<b>Centralized</b>	Decentralization (larger contribution)	Centralized (more internal control but less development)

<b>Public</b>	<b>Private</b>
<b>Open</b>	Restricted
<b>Each node has equal transmission power (distributed)</b>	Only certain nodes can create new transaction
<b>Low speed of transactions accomplishment</b>	Fast speed of transaction accomplishment
<b>Long transactions approval frequency</b>	Short transaction approval frequency
<b>High cost of each transaction</b>	Comparatively cheap cost of each transaction
<b>Proof-of-work</b>	Pre-approved miners initiate adding on a new block
<b>Anonymous</b>	Non-Anonymous
<b>No Trust</b>	Trust required
<b>Large Energy Consumption</b>	Low Energy Consumption

## Public Permissioned

A public permissioned blockchain is a hybrid between fully public and fully private blockchains. It allows almost anyone access to read or track transactions on the chain.

It also requires special permissions or access to edit or add data to the platform. In order to make changes or add to the results, there are extra steps required.<sup>20</sup>

### **Consortium/Federated**

A consortium is a joint venture that is co-managed and founded by the largest members of the network. It allows the spreading of risk, cost, and liability between the network participants.<sup>21</sup>

## **BLOCKCHAIN BENEFITS**

### **Transparency**

Blockchain promotes transparency because the ledger is logged and sent to multiple parties to prevent discrepancies.<sup>22</sup>

### **Integrity**

Rights and payment information is part of the block and cannot be severed, separated, lost, or altered. Blockchain is immutable. Blocks (information) are processed in a reliable manner and in such a way as to prevent tampering.<sup>23</sup>

### **Security**

There is no central point of attack in the network. No single person is responsible for maintaining the network. The collaboration (consensus) required for blockchain ensures the blockchain network is protected against hacking and fraud.<sup>24</sup>

### **Cost Savings**

Blockchain aim to provide cost savings by removing the need for an intermediary.<sup>25</sup>

### **Speed**

Traditionally, transactions can take a few days to process. Settlement and processing time in blockchain can occur within minutes or even seconds. Transaction speed depends on numerous other factors like block time, block size, traffic on the network, and transaction fees.

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<sup>20</sup> "Types of Blockchain (2018)," Nidhi Chamria, <https://www.prolitus.com/blog/types-of-blockchain/>

<sup>21</sup> Ibid

<sup>22</sup> "What are the potential benefits of blockchain? (2018)," Hogan Lovells, <https://www.lexology.com/library/detail.aspx?g=10f56b96-b249-4621-949c-f25514fc127a>

<sup>23</sup> Ibid

<sup>24</sup> Ibid

<sup>25</sup> Ibid

## Potential benefits of blockchain



Reduce costs of overall transactions



Reduction in systemic risks



Irrevocable and tamper-resistant transactions



Fraud minimisation



Improved security and efficiency of transactions



Enabling effective monitoring and auditing by participants, supervisors, and regulators

## BLOCKCHAIN LIMITATIONS

### Novel Technology

Blockchain is fairly new and still evolving. Over time, blockchain is expected to become more stable, simplified, understood, and easier to attain.<sup>26</sup>

### Irreversible

Blockchain transactions are tamper proof (immutable), consistent, and efficient. These qualities can also be viewed as a disadvantage because the transactions in the blockchain are irreversible for this very reason.<sup>27</sup>

### Compliance

Blockchain regulatory compliance is challenging, to say the least. The treatment of blockchain and cryptocurrencies varies by jurisdiction. Unit 4 of this text goes into further detail about blockchain regulatory status globally.<sup>28</sup>

### Costs

The goal of blockchain is to reduce transaction costs; however, the initial capital costs associated with acquiring and or participating in the mining process can be expensive.<sup>29</sup>

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<sup>26</sup> “Advantages and Disadvantages Of Blockchain Technology (2018),” DATAFLAIR TEAM, <https://data-flair.training/blogs/advantages-and-disadvantages-of-blockchain/>

<sup>27</sup> Ibid

<sup>28</sup> Ibid

<sup>29</sup> Ibid

## **Displacement and Automation**

Blockchain applications have the potential to disrupt jobs in various industries. Blockchain offers solutions that could potentially replace existing systems, which could result in the elimination of certain roles and industries.<sup>30</sup>

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<sup>30</sup> “Disadvantages of Blockchain (2018),” Day1Tech, <https://medium.com/@Day1Tech/disadvantages-of-blockchain-3fdbb0e32095>

## **NOTES**

# Unit

# 2

## Cryptocurrency

### LEARNING OBJECTIVES

*When you have completed this unit, you will be able to accomplish the following:*

- Explain what cryptocurrencies are and how they work.
- Recognize the difference between blockchain and cryptocurrency.
- Discuss how cryptocurrency are acquired and invested.
- List the advantages and disadvantages of cryptocurrency.

### CRYPTOCURRENCY BACKGROUND

#### Cryptocurrency Defined

Cryptocurrency is a digital currency that utilizes the encryption techniques found in all blockchain technologies. Blockchain technologies and the procedures we discussed in Unit 1 are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a central bank.<sup>31</sup>

#### Satoshi Nakamoto

There is no question that cryptocurrencies are the most well-known and developed of the blockchain technologies. Cryptocurrency was the first blockchain technology invented. An individual, or a group of individuals, using the pseudonym Satoshi Nakamoto penned a 10-page white paper explaining the mechanics of how it is developed and can be used. The author's identity has been kept secret by using the latest encryption and obfuscation methods.<sup>32</sup>

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<sup>31</sup> <https://www.investopedia.com/terms/c/cryptocurrency.asp>

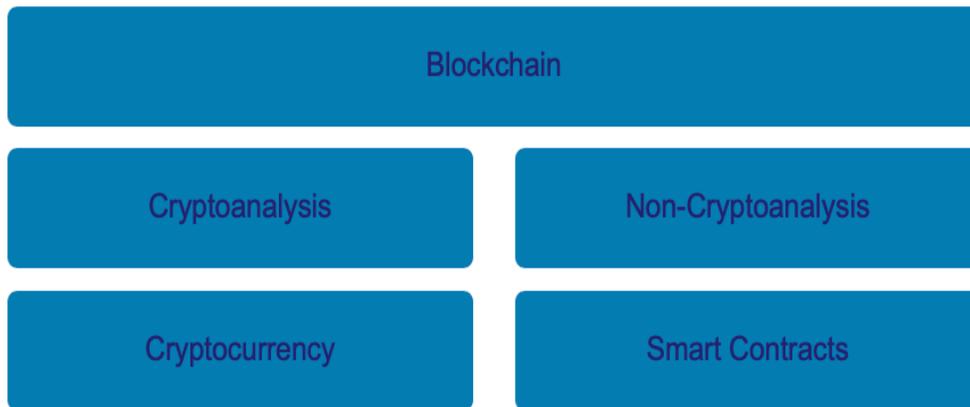
<sup>32</sup> Nakamoto, <https://bitcoin.org/bitcoin.pdf>

## Cryptocurrencies Are Blockchain Technologies

Cryptocurrencies are built on blockchain technology, but not all blockchain technologies are cryptocurrencies. Essentially, cryptocurrency is a subset of blockchain technology. The following diagrams provide visual representation of the blockchain eco system.

### Blockchain in Relation to Cryptocurrency

- Blockchain is the technology that enables the existence of cryptocurrency.



Blockchain vs. Cryptocurrency		
Description	Description	Description
<b>Nature</b>	Technology that records transactions.	The tools used in virtual transactions.
<b>Use</b>	Record transactions	Make payments and investments.

## CRYPTOCURRENCY TERMS

### Fiat

Fiat is currency that is generated and backed by a government. The following diagrams show the differences between FIAT currency and cryptocurrency.

	<b>FIAT</b>	<b>Cryptocurrency</b>
<b>Origin</b>	Government	Computer
<b>Centralized</b>	Y	N
<b>Transfer</b>	Physical	Digital
<b>Supply</b>	Unlimited	Limited

	<b>FIAT or Conventional Currency</b>	<b>Cryptocurrency</b>
<b>Security</b>	Moderate	High
<b>Availability (supply)</b>	High	Low
<b>Sovereign</b>	Yes, government backed	No
<b>Value</b>	Controlled within a market (central bank)	Free float rate
<b>Centralized</b>	Yes, controlled by a central bank	No, Controlled using algorithms
<b>Smart</b>	No	Yes
<b>Counterfeit</b>	High	Impossible
<b>Traceable</b>	Yes	

## Coins

A coin is a unit of digital currency.

<b>COINS</b>	
<b>Characteristic</b>	<b>Description</b>
<b>Fungible</b>	Each unit of the coin has the same value equal to another coin.
<b>Divisible</b>	Can be divided into much smaller units of significant worth.
<b>Acceptance</b>	Globally accepted payment.

<b>Supply</b>	Limited and constant supply.
<b>Portable</b>	Easy cross-borders transfers.
<b>Durability</b>	Coins are digital so they do not degrade.
<b>Uniform</b>	All versions of a similar category have a similar value.

## Token

A token is a digital asset.<sup>33</sup> New tokens are made by an individual or entity that already has Bitcoins or other kinds of cryptocurrency; in contrast, new Bitcoins are created through the mining and consensus processes. Tokens are used to help facilitate the creation of decentralized applications.<sup>34</sup>

<b>TOKENS</b>	
<b>Characteristic</b>	<b>Description</b>
Multipurpose	Tokens can be used in various applications such as payments, digital signatures (smart contracts).
Secure	Cryptographic hashing can be used to disguise things like passwords.
Accountable	Can be used for auditing shares or stock held by multiple users.
Recoverable	Tokens can be recovered if sent to the wrong user.
Types	<ul style="list-style-type: none"> <li>■ Utility tokens are used for a specific purpose, such as buying a particular good or service.</li> <li>■ Security token also known as “tokenized security” or a “crypto-security. Often represents ownership in an underlying real-world asset.<sup>35</sup></li> </ul>

<sup>33</sup> <https://bitcoin.org/en/glossary/token>

<sup>34</sup> <https://cointelegraph.com/tags/tokens>

<sup>35</sup> "What is a blockchain token?" Stephen McKeon, <https://theconversation.com/what-is-a-blockchain-token-98916>

COINS VS TOKENS		
<b>Definition</b>	A digital currency	Digital asset
<b>Characteristics</b>	Operates its own blockchain with its own protocol	Does not operate on its own blockchain
<b>Use Case</b>	Source of payment	<ul style="list-style-type: none"> <li>■ Payments</li> <li>■ Signing digital agreements</li> </ul>
<b>Brands</b>	Ripple, Ethereum	Bon, DAO

[<https://medium.com/coinscapture/what-is-the-difference-between-coins-altcoins-and-tokens-fef6a86638d8>]

## Wallet

A wallet is a software program that stores public and private keys, enabling users to send, receive, and store digital currencies. Simply put, a wallet is a location where cryptocurrency is stored. There are two types of wallets:

- A cold wallet involves storing a wallet offline (e.g., printing out a code and storing it in a safe or a USB drive).
- A hot wallet involves storing cryptocurrency in an online portable or accessible web tool that stores the private key.

The following diagram illustrates the differences between hot and cold wallets.

Hot Wallets	Cold Wallets
Connected to the internet	Offline wallets that live on hardware or paper
Allow instantaneous transfer of funds	More cumbersome and require more steps to transfer
Greater ease of use but more vulnerable to hacking	More secure

## CRYPTOCURRENCY COMPONENTS AND PROCESSES

### How does it work?

Cryptocurrency transactions follow the same process as any other blockchain transaction, except the data associated with the block is tied to a financial value. For example, someone requests a transaction, the requested transaction is broadcast to the

network, and the network validates the transaction. The following diagrams provide both a technical picture and a more practical visualization of the process.<sup>36</sup>

## Bitcoin Blockchain Header

A hash of the following information from the previous block:

- Version
- Previous block's hash
- Merkle root
- Time stamp
- Difficulty (hexed to bits)
- Nonce

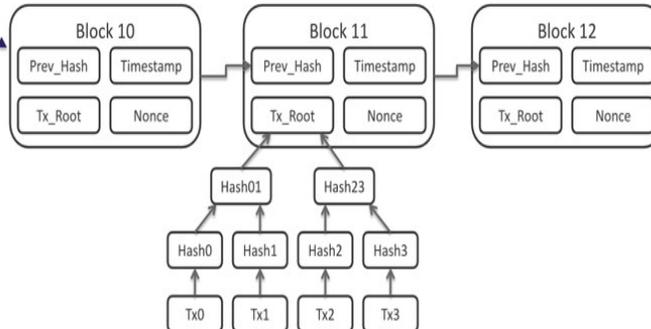


Image credit: [Wikimedia Commons](#)

## Acquiring Cryptocurrencies

Barring any regulatory restrictions, virtually anyone can start purchasing cryptocurrencies.

### **Set Up a Wallet**

Select and or install a cryptocurrency wallet. If you choose a hot wallet vendor, you will need to install an application. If you select a cold wallet, you either will need to purchase some sort of hardware or will be provided with a bar code.<sup>37</sup>

### **Choose a Trader**

The next step is to find a cryptocurrency trader to purchase the cryptocurrency. There are currently 22 marketplaces to buy and sell cryptocurrency.<sup>38</sup>

<sup>36</sup> What is Blockchain Technology (2018),” CBINSIGHTS, <https://www.cbinsights.com/research/what-is-blockchain-technology/>

<sup>37</sup> Best Bitcoin & Cryptocurrency Wallets, <https://www.buybitcoinworldwide.com/wallets/>

<sup>38</sup> <https://www.buybitcoinworldwide.com/exchanges/>

### **Select a payment method**

Trading platforms allow users to link both bank account and credit or debit card transfers for purchases and payments.<sup>39</sup>

### **Buy and Store in Wallet**

Users can buy tokens or fractions of token. If you remember from the previous section, we defined a token as a unit of cryptocurrency. Crypto transactions have to be recorded on the blockchain ledger and affirmed. Because of this, trades are not always instantons and may take a few hours, depending on the time of day.<sup>40</sup>

### **Using the Cryptocurrency**

Users can sell their tokens or shares back on the market whenever they want to. The irony is that transaction fees do apply to sales and transfers. Another option that users have is to use their tokens to purchase goods or services.<sup>41</sup>

## **TYPES OF CRYPTOCURRENCIES**

### **Bitcoin Derived**

Bitcoin was the first cryptocurrency and is open source. This means that it can be used without restriction, as it is licensed, trademarked, or patented by one person. For this reason, companies looking to develop their own currency based on cryptocurrencies can use Bitcoin's open-sourced technology to make subtle changes to the underlying codes in order to achieve an entirely new coin with a different set of features. These Bitcoin-derived currencies are referred to as *Altcoins*.<sup>42</sup>

### **Native Blockchain**

Native blockchain are cryptocurrencies that are built on their blockchain platform and support their native currency. Cryptocurrencies built of native blockchain are referred to as tokens.<sup>43</sup>

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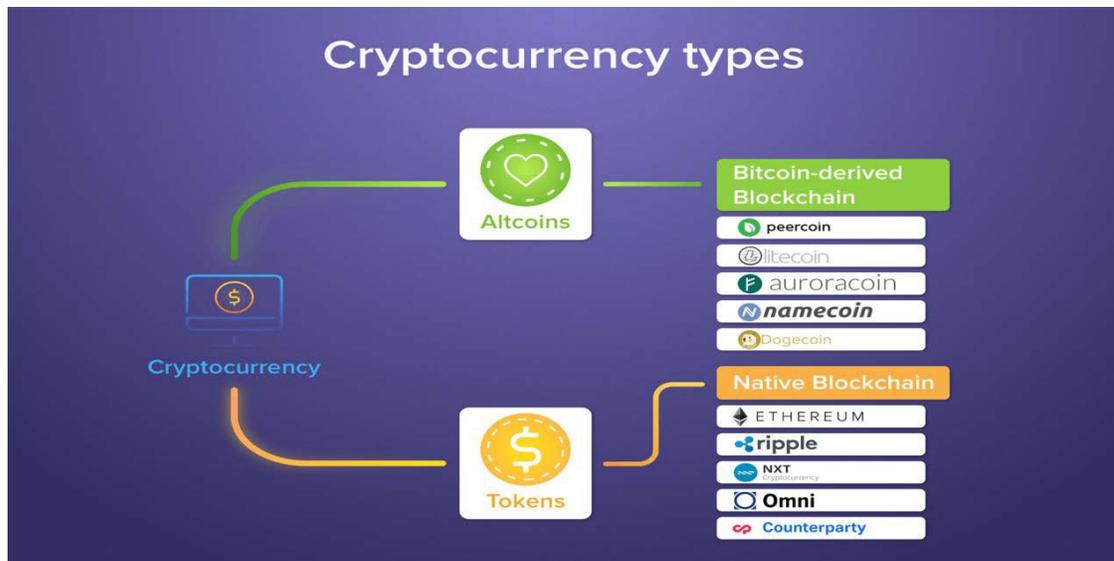
<sup>39</sup> How to buy Bitcoin, Tyler Lacoma (2019), <https://www.digitaltrends.com/computing/how-to-buy-bitcoin/>

<sup>40</sup> How to buy Bitcoin, Tyler Lacoma (2019), <https://www.digitaltrends.com/computing/how-to-buy-bitcoin/>

<sup>41</sup> How to buy Bitcoin, Tyler Lacoma (2019), <https://www.digitaltrends.com/computing/how-to-buy-bitcoin/>

<sup>42</sup> "Altcoins vs. Tokens: What's The Difference?" AZIZ, THE MASTER OF CRYPTO FOUNDER, <https://masterthecrypto.com/differences-between-cryptocurrency-coins-and-tokens/>

<sup>43</sup> Ibid



[Graphic credit <https://blog.citowise.com/the-basics-coin-vs-token-what-is-the-difference-5cd270591538>]

## GOALS OF CRYPTOCURRENCY

### Control

Generally, governments control fiat currencies. The government uses currency to stimulate investing, jobs and spending. Cryptocurrencies on the other hand are controlled by private entities: the blockchain network and users. Governments worry that if cryptocurrency are widely adopted, the entire banking system could collapse and become irrelevant.

### Security

In Unit 1, we discussed the immutability of transactions due to the built-in hash. This ensures that transactions cannot be altered as they are stamped. The hashing is irreversible, which prevents tampering.

Further, any changes to the ledger are immediately sent to all users to create a secure, established record.

There is a smaller chance of compromised cryptocurrency transactions, due to peer-to-peer nature of the network who perform the building and verifications based on the reward mechanisms we discussed in Unit 1.<sup>44</sup>

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<sup>44</sup> Nakamoto, <https://bitcoin.org/bitcoin.pdf>

## Stability

The inventors sought to create a medium to store funds to avoid the volatility of fiat currency. The value of fiat currency depends on a number of factors: jobs, markets, banking and other social political factors.<sup>45</sup>

## Fees

The overall goal is to reduce transactions imposed by intermediaries and other financial institutions. Though this is currently not the case, it is very expensive to buy and exchange cryptocurrency.<sup>46</sup>

## INVESTING IN CRYPTOCURRENCIES

Those wishing to invest in Bitcoin must first acquire and set up one of the two wallet types discussed previously.

Depending on the jurisdiction, buyers may need to register with a regulatory agency such as the Securities and Exchange Commission (SEC) in the U.S.

Buyers must establish a payment source to purchase the cryptocurrency, which can be purchased from online exchanges called *markets*.

In the early days, Bitcoin operated in anonymity, but now, buyers must identify themselves. Bitcoin is confidential, but it is not anonymous. There are other cryptocurrencies that are anonymous.<sup>47</sup>

## Valuations

Bitcoin market valuations depend on supply and demand. Alternatively, large dips and gains have been a result of investors reacting to news. A big risk in this area is a major investor or a group of smaller investors working together to manipulate the market and create a sharp gain or loss.<sup>48</sup>

Bitcoin is currently trading in 479 countries.<sup>49</sup> Bitcoin and other cryptocurrencies have experienced extraordinary returns over the past 10 years, especially since the start of 2021. In 2011, Bitcoin was trading roughly around \$100. In 2016, the value rose to \$710.09. In December of 2017, it reached a historic high of nearly \$20,000. In April of 2020, the value fell to \$6,748.00 per Bitcoin. The following diagram shows the value of bitcoin as of April, 2021:

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<sup>45</sup> Nakamoto, <https://bitcoin.org/bitcoin.pdf>

<sup>46</sup> Ibid

<sup>47</sup> "How to Buy Bitcoin (2019)," Luke Fortney, <https://www.investopedia.com/articles/investing/082914/basics-buying-and-investing-bitcoin.asp>

<sup>48</sup> What Causes Volatility In Bitcoin? <https://www.fxcm.com/markets/insights/what-causes-volatility-in-bitcoin/>

<sup>49</sup> <https://markets.businessinsider.com/currencies/btc-usd>



## Stablecoin

Stablecoin is a new class of cryptocurrencies that attempts to offer price stability and are backed by a reserve asset, such as a

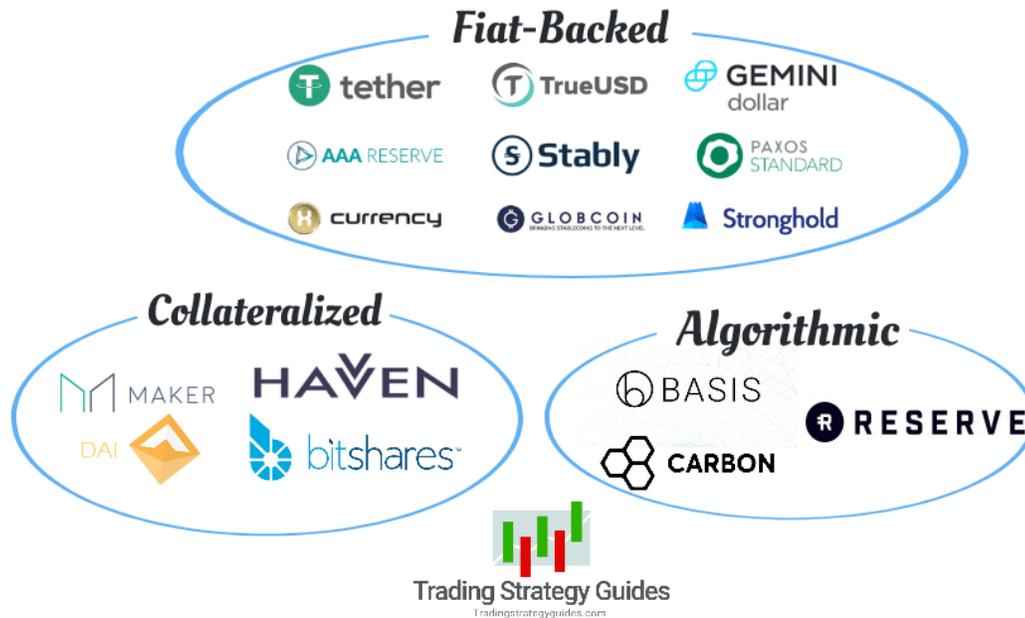
- Fiat currency or
- Another cryptocurrency or
- Algorithmic consensus mechanism that operates like a central bank to keep up with the supply of tokens.<sup>50</sup>

The following diagram shows types of stablecoin. Tether is the most popular stablecoin and represents almost 57% of the total stablecoin supply, or market cap. As of April 2021, the value of assets for all stablecoins surpassed \$89 billion.<sup>51</sup>

<sup>50</sup> <https://www.investopedia.com/terms/s/stablecoin.asp>

<sup>51</sup> Top Stablecoin Tokens by Market Capitalization (2020) <https://coinmarketcap.com/view/stablecoin/>

# StableCoins Types



[<https://tradingstrategyguides.com/what-are-stablecoins/>]

Advantages of stable coins are as follows:

- Fast withdrawal of funds;
- Low volatility;
- Global access and
- Peer-to-peer lending by using stablecoin as collateral.<sup>52</sup>

Stablecoin's inherent price stability advantage has spurred growth, despite current economic factors.

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<sup>52</sup> What Are Stablecoins And How Do They Work? (Stablecoin Explained) (2019) <https://tradingstrategyguides.com/what-are-stablecoins/>

## **ADVANTAGES OF CRYPTOCURRENCY**

### **Global**

Most cryptocurrencies are globally recognized and can be traded globally where cryptocurrencies are accepted and legal. It makes no difference where the cryptocurrency is exchanged; the valuation remains the same.

### **Access**

Not everyone has access to credit. Some countries have experienced the collapse of their fiat currency.<sup>53</sup> One of the major benefits of cryptocurrencies is accessibility. Depending on the jurisdiction, anyone can create an account to purchase them.<sup>54</sup>

### **Genuine**

Digital currencies generally cannot be reversed or counterfeited, which prevents fraud.<sup>55</sup>

### **Fees**

The objective of cryptocurrencies is to eliminate intermediaries, which eventually result in lower fees. Nonetheless, there are fees associated with purchasing and exchanging currencies in the market.<sup>56</sup>

### **Settlement**

Ideally, by eliminating the intermediaries, the cryptocurrency transactions should occur in minutes.<sup>57</sup>

## **DISADVANTAGES OF CRYPTOCURRENCY<sup>58</sup>**

### **Not Widely Accepted**

Some major brands like Walmart, Jet, Groupon, Overstock, GoDaddy, Macy's, and CVS are now accepting Bitcoin.<sup>59</sup> Cryptocurrencies are global in theory, but they are still not widely accepted by retailers or for other goods and services. Also, keep in mind that

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<sup>53</sup> "A Short History of Major Fiat Currency Collapses and What Triggered Them (2019)," Tanzeel Akhtar, <https://news.bitcoin.com/a-short-history-of-major-fiat-currency-collapses-and-what-triggered-them/>

<sup>54</sup> Fijan Team, <https://blog.finjan.com/advantages-of-cryptocurrency/>

<sup>55</sup> Ibid

<sup>56</sup> Ibid

<sup>57</sup> Fijan Team, <https://blog.finjan.com/advantages-of-cryptocurrency/>

<sup>58</sup> "Decentralized, Peer-to-peer, Cryptocurrency (2010)," Stanford University, <https://cs.stanford.edu/people/eroberts/courses/cs181/projects/2010-11/DigitalCurrencies/disadvantages/index.html>

<sup>59</sup> "13 Major Retailers and Services That Accept Bitcoin (2019)," Elise Moreau, <https://www.lifewire.com/big-sites-that-accept-bitcoin-payments-3485965>

because Bitcoin is still seen as volatile since exchange rates fluctuate often, some merchants only allow a 10-minute window to complete a purchase.

## Security Risks

Inherently, cryptocurrencies are themselves secure, but there are ways they can be stolen. One way is if the wallet is stolen. This is referred to as *cryptojacking*, which is the unauthorized use of someone else's computer for the purpose of stealing cryptocurrency. A hot wallet can be stolen if a malicious hacker obtains control over a user's device or computer. A cold wallet can be stolen if someone gets a hold of the medium (USB, document) on which the key is stored and uses it to access the wallet and cryptocurrency.<sup>60</sup>

## Frequently Used for Illegal Activities

Though other cryptocurrencies are available, criminals seem to gravitate toward Bitcoin.<sup>61</sup> A 2020 CipherTrac report revealed that hackers stole \$1.9 billion worth of cryptocurrency last year, with a Chinese Ponzi scheme accounting for the majority ( \$1.1 billion) of what was stolen. To evade detection, hackers will move the stolen cryptocurrency through a complex web of exchanges and personal wallets.<sup>62</sup>

Criminals use cryptocurrencies such as Bitcoin for various purposes: fraud, money laundering, scams, ransomware, or purchasing illicit goods or services. Bitcoin can be traced, but not enough to deter criminals. Law enforcement cannot immediately identify the parties involved in a Bitcoin transaction, but they can find transactions and study patterns in the movement of cryptocurrency to profile and de-anonymize suspects.<sup>63</sup>

Privacy-oriented digital currencies, such as Monero (XMR) and Zcash (ZEC), are being used for illegal transactions. Rand reports in 2020 still show that Bitcoin is still widely used Cryptocurrency for Dark Web Transactions. A reported \$2.8 billion in Bitcoin (BTC) was transferred to criminals via cryptocurrency exchanges in 2019.<sup>64</sup>

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<sup>60</sup> "What is cryptojacking? How to prevent, detect, and recover from it (2019)," Michael Nadeau, <https://www.csoonline.com/article/3253572/what-is-cryptojacking-how-to-prevent-detect-and-recover-from-it.html>

<sup>61</sup> "Bitcoin Accounts for 95% of Cryptocurrency Crime, Says Analyst (2019)," Jen Wiczner, <https://fortune.com/2019/04/24/bitcoin-cryptocurrency-crime/>

<sup>62</sup> "Crypto Criminals Bagged Nearly \$2 Billion in 2020 (2021)," Nivsh Rustgi, <https://cryptobriefing.com/crypto-criminals-bagged-nearly-2-billion-in-2020/>

<sup>63</sup> Here's how law enforcement catches cryptocurrency criminals, Yessi Bello Perez (2019), <https://thenextweb.com/hardfork/2019/12/26/bitcoin-cryptocurrency-criminals-law-enforcement/>

<sup>64</sup> Exploring the use of Zcash cryptocurrency for illicit or criminal purposes, Erik Silfversten, [https://www.rand.org/pubs/research\\_reports/RR4418.html](https://www.rand.org/pubs/research_reports/RR4418.html)

Current data shows that Bitcoin is still widely-used Cryptocurrency for Dark Web Transactions (2020), Omari Faridi, <https://www.crowdfundinsider.com/2020/05/161146-bitcoin-btc-remains-a-widely-used-cryptocurrency-for-dark-web-transactions-a-new-report-claims/>

## **Money Laundering**

A study found that 44% of Bitcoin transactions are for illegal activities. The growth of cryptocurrencies, coupled with the anonymity, created a perfect storm for cryptocurrencies to be used for illegal activities such as hacking, drugs, theft, pornography, terrorism, and money laundering.<sup>65</sup>

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<sup>65</sup> “Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed Through Cryptocurrencies? (2018),” Sean Foley, et al., [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3102645](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3102645)

# Unit

# 3

## Blockchain Opportunities and Use Cases

### LEARNING OBJECTIVES

*When you have completed this unit, you will be able to accomplish the following:*

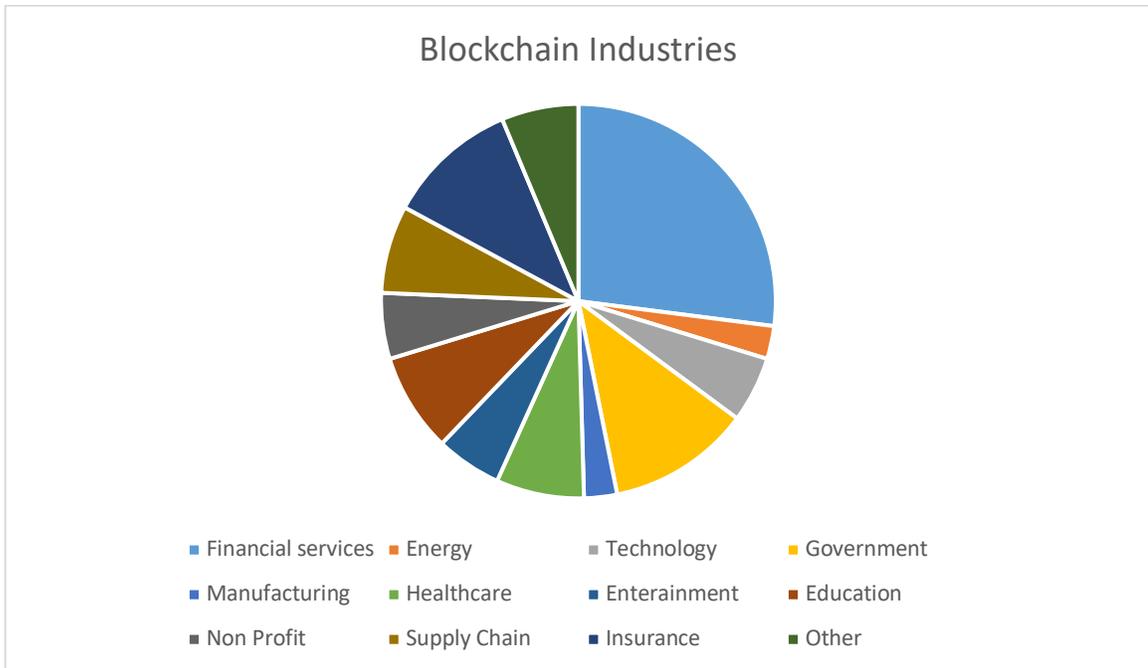
- Identify non-cryptocurrency uses for blockchain.
- List the industries currently exploring and using blockchain.
- Discuss blockchain opportunities and potential.

### BLOCKCHAIN INDUSTRIES

Since the invention of blockchain, several companies have developed blockchain-sourced services. The following chart highlights the industries that have currently adopted blockchain technologies in their operations.<sup>66</sup>

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<sup>66</sup> The Future of the Blockchain: Use Cases, Potential Risks, and Challenges, Maria Redka (2018), <https://dzone.com/articles/the-future-of-the-blockchain-technology-use-cases>



## CURRENT USES OF BLOCKCHAIN

In this section, we will discuss how organizations have adopted blockchain and delve deeper into existing use cases of the technology.

### Charity

In 2010, the Red Cross raised \$500 million to support the reconstruction of Haiti after the earthquake. The funds raised by Red Cross were mismanaged, and only a small fraction of the funds raised were used for relief efforts. Blockchain can be used to prevent misappropriation of charity funds, as blockchain eliminates the need of an intermediary. An example of this is holding charity funds in escrow and not releasing them until certain milestones are reached.<sup>67</sup>

### Energy

An electric grid is a network of synchronized power providers and consumers that are connected by transmission and distribution lines and operated by one or more control centers. Energy grids need ways to settle transactions and connect to various energy sources. Blockchain technology can potentially facilitate the integration of distributed grid

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<sup>67</sup> Snapshot of Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World, Don Tapscott and Alex Tapscott (2019), Pg. 8, <https://www.scribd.com/snapshot/423279808/Blockchain-Revolution-How-the-Technology-Behind-Bitcoin-is-Changing-Money-Business-and-the-World#>

systems. Blockchains can securely settle these transactions and link the disparate sources in one central system.<sup>68</sup>

Launched in December of 2018, Vakt is a consortium of leading energy companies and banks whose aim is to transform the global commodities trading industry. Vakt's purpose is to focus on blockchain post-trade processing of physical energy transactions, eliminating manual accounting practices and paper-based processes.<sup>69</sup>

## Letters of Credit

Letters of credit (LoC) are letters issued from a bank that serves as a guarantee for the payments being made. These are generally paper-intensive instruments and cumbersome. For example, the exporter will not ship goods until the buyer's lender provides an LoC guaranteeing payment. Currently, HSBC and ING, as part of a finance blockchain consortium Contour, backed letter of credit blockchain.<sup>70</sup>

## Human Resources

In January of 2020, Cornerstone OnDemand, Inc. announced joining the Velocity Network Foundation, a nonprofit organization committed to supporting research and development of blockchain applications. Cornerstone is planning to drive the development and adoption of blockchain in HR. Blockchain technology can be used to verify candidate and employee data through verified credentials. The blockchain network will assist organizations to identify, develop, and deploy their talent for the roles needed in the future and today.<sup>71</sup>

## Digital Identity

People can securely store their important personal information, such as a driver's license, Social Security number, passport, etc. in the blockchain application Lynked.World in a blockchain wallet.<sup>72</sup>

## Stocks

Currently, traders in the stock market must go through a cumbersome and costly process in which transaction completion takes at least three days because of intermediaries, operational trade clearance, and the regulatory processes. NASDAQ, ASX, the New York

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<sup>68</sup> "Blockchain technology in the energy sector: A systematic review of challenges and opportunities (2016)," Merlinda Andoni, et al., <https://reader.elsevier.com/reader/sd/pii/S1364032118307184?token=6C57FBE3A1EFADEA39E7C07E14AB5A5190D33AB8321CFD5BD5619E44DE89743B198289DA2312A124B0AB64DDE49BC731>

<sup>69</sup> Oil Giant Saudi Aramco Buys Into Blockchain Trading Platform Vakt, Andrey Shevchenko (2020), <https://cointelegraph.com/news/oil-giant-saudi-aramco-buys-into-blockchain-trading-platform-vakt>

<sup>70</sup> HSBC, ING backed letter of credit blockchain Contour launches in Singapore, (2020), <https://www.ledgerinsights.com/deutsche-bank-digital-currency/>

<sup>71</sup> Cornerstone Joins Velocity Network Foundation to Shape the Future of Blockchain in HR, (2020), <https://finance.yahoo.com/news/cornerstone-joins-velocity-network-foundation-121500105.html>

<sup>72</sup> [https://play.google.com/store/apps/details?id=com.world.lynkedworld&hl=en\\_US](https://play.google.com/store/apps/details?id=com.world.lynkedworld&hl=en_US)

Stock Exchange, and the Tokyo Stock Exchange are currently studying the uses of blockchain in trading.<sup>73</sup>

## **Supply Chain**

Blockchain-powered platforms are being built to support global trade, including logistic partners and shipping, which all benefit from a shared ledger that's updated and validated instantly with each network participant. The results are greater cooperation, efficient inventory management, and enhanced asset utilization.<sup>74</sup>

In early 2020, Accenture launched the True Supplier Marketplace to onboard suppliers. The marketplace has the following features:

- decentralized marketplace for suppliers and buyers;
- provides data synchronization and
- tamper resistant audit trail of transactions.<sup>75</sup>

## **Networking/Internet of Things (IoT)**

Samsung and IBM have teamed up to develop blockchain that will act as public ledger for a large number of devices. By eliminating the central hub, all of these devices can communicate with one another autonomously in order to manage software updates, bugs, patches, and battery power. These actions will lower device management.<sup>76</sup>

## **Voting**

Past votes have been rigged and voting systems have been hacked or invalidated. Blockchain could potentially resolve these issues by providing a way for voters to authenticate themselves and vote in a secure manner.<sup>77</sup> A Boston startup is building on a blockchain voting technology called Voatz, which is a mobile elections platform that will enable voting through mobile phones and the immutability of blockchain technology.<sup>78</sup>

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<sup>73</sup> Blockchain Technology Set To Revolutionize Global Stock Trading (2018), Eric Ervin, <https://www.forbes.com/sites/ericervin/2018/08/16/blockchain-technology-set-to-revolutionize-global-stock-trading/>

<sup>74</sup> <https://www.ibm.com/Blockchain/industries/supply-chain>

<sup>75</sup> Accenture launches blockchain-based marketplace to onboard suppliers, (2020), <https://tokenpost.com/Accenture-launches-blockchain-based-marketplace-to-onboard-suppliers-4918>

<sup>76</sup> IBM Reveals Proof of Concept for Blockchain-Powered Internet of Things (2015), Stan Higgins, <https://www.coindesk.com/ibm-reveals-proof-concept-Blockchain-powered-internet-things>

<sup>77</sup> "How Blockchain Could Secure Elections," CBINSIGHTS, <https://www.cbinsights.com/research/report/Blockchain-election-security/>

<sup>78</sup> <https://voatz.com/faq.html>

## Notary Services

Acronis Notary has developed a blockchain technology used to time stamp files and media and provide proof of integrity and ownership.<sup>79</sup>

## Real Estate

Another area where blockchain can be utilized is real estate. For example, assets can be tokenized to ensure that a seller actually owns property and that the buyer has sufficient funds to cover the transaction through smart contracts. A blockchain can seamlessly verify all this data instantly, saving time and the total cost of the transaction.<sup>80</sup>

## Application Development

All blockchain technologies are built as applications; the building of cryptocurrencies is essentially application development. Miners and validators who maintain the blockchain take data and create the block using blockchain methodology. In addition to cryptocurrencies, there are other types of applications being developed using blockchain technology.<sup>81</sup>

Launched in 2015, Ethereum is the world's largest and most active blockchain community in the world. ETH has many of the same features of Bitcoin, such as decentralization. Unlike Bitcoin, ETH can be used by developers to build new kinds of applications. Ethereum is maintained and improved by contributors all over the world, who work on everything from the core protocol to consumer applications.<sup>82</sup>

## BLOCKCHAIN OPPORTUNITIES

It is important to recognize that blockchain has a lot more potential than the current uses. Blockchain can be used in many industries to solve a number of problems. The diagram below provides a list of potential use cases by industry. The diagram below highlights future use cases for blockchain technologies by industry.

Industry	Uses	Organizations
FinTech	<ul style="list-style-type: none"><li>■ Financial transactions</li><li>■ Cross-border transfers</li></ul>	<ul style="list-style-type: none"><li>■ Banks, traders, MTF</li></ul>
Insurance	<ul style="list-style-type: none"><li>■ Claims processing</li><li>■ Compliance checks</li></ul>	<ul style="list-style-type: none"><li>■ Insurance companies, reinsurers</li></ul>

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<sup>79</sup> <https://www.blocknotary.com/timestamp>

<sup>80</sup> 4 blockchain real estate startups shaking up property investment, Jacob Dunn (2018), <https://espeoblockchain.com/blog/blockchain-real-estate-startups>

<sup>81</sup> Blockchain Technology Explained: Introduction, Meaning, and Applications (2018), Mayank Pratap, <https://hackernoon.com/blockchain-technology-explained-introduction-meaning-and-applications-edbd6759a2b2>

<sup>82</sup> <https://www.ethereum.org/beginners/>

<b>Legal</b>	<ul style="list-style-type: none"> <li>■ Smart contracts</li> </ul>	<ul style="list-style-type: none"> <li>■ Attorneys, B2B, B2C</li> </ul>
<b>Utilities</b>	<ul style="list-style-type: none"> <li>■ Smart grid</li> </ul>	<ul style="list-style-type: none"> <li>■ Utility companies</li> </ul>
<b>Supply Chain</b>	<ul style="list-style-type: none"> <li>■ Asset tracking</li> <li>■ Audit and inspection</li> </ul>	<ul style="list-style-type: none"> <li>■ Retailers, railways, airports, distributors and regulators</li> </ul>
<b>Health</b>	<ul style="list-style-type: none"> <li>■ Health records</li> </ul>	<ul style="list-style-type: none"> <li>■ Providers, insurance companies, patients</li> </ul>
<b>Public</b>	<ul style="list-style-type: none"> <li>■ Voting system</li> <li>■ Tax payments</li> </ul>	<ul style="list-style-type: none"> <li>■ NGO, contractors, governmental agencies</li> </ul>

## Document Storage

Blockchain technology can be used solely as a document repository system. In this use case, the blockchain network would be used to create a system to secure transfer information, ensuring the integrity and authenticity of the documents.<sup>83</sup>

## Real Estate

There are number of issues in traditional real estate transactions. For example:

- A need for common database
- Multiple entities can modify database
- Lack of trust
- Too many intermediaries
- Transaction dependence

In real estate, blockchain can be used to improve the process through the distributed ledger technology (DLT) by creating a common database of transactions (leases and purchases). Blockchain can save time, increase trust through transparency, decrease processing times, and reduce costs.<sup>84</sup>

## Healthcare

The healthcare industry is yet another industry suffering with cumbersome processes and inefficiency. Healthcare is plagued by rising costs, patient dissatisfaction, and frequent data breaches. Blockchain technology can alleviate these issues.

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<sup>83</sup> <https://www.recordskeeper.com/>

<sup>84</sup> "Blockchain companies boosting the real estate industry (2019)," Sam Daley, <https://builtin.com/Blockchain/Blockchain-real-estate-companies>

Blockchain can be used in healthcare for:

- maintaining consent management,
- payment processing,
- supply chain integrity, and
- integrity of medical records.<sup>85</sup>

## **Authentication Services**

Blockchain technology is being used to prevent duplication and counterfeiting, as well as provide verification measures.<sup>86</sup>

## **Minerals**

Blockchain can be used to prevent conflict minerals from being traded. Currently, some companies are using blockchain technology to track the shipments of minerals.<sup>87</sup>

## **Smart Contracts**

Smart contracts are essentially code built on the blockchain for the purpose of assisting, verifying, negotiating, or enforcing the performance of a contract. Retailer IKEA became the first to use smart contracts and licensed eMoney.<sup>88</sup> Smart contracts are written as code and committed to the blockchain. Conditions and commands are written into the code. When a condition listed in the contract occurs or is triggered, the code executes. The parties of the contract can watch contract activity on the blockchain.<sup>89</sup>

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<sup>85</sup> “10 predictions for the growth of blockchain in healthcare,” Fred Bazzoli,

<sup>86</sup> <http://www.blockverify.io/>

<sup>87</sup> Using Blockchain to Help Fight Conflict Minerals (2019), Stefan Nicola, <https://www.bloomberg.com/news/articles/2019-04-24/using-Blockchain-to-help-fight-conflict-minerals>

<sup>88</sup> IKEA in ‘World First’ Transaction Using Smart Contracts and Licensed eMoney (2019), Daniel Palmer, <https://www.coindesk.com/ikea-in-world-first-transaction-using-smart-contracts-and-licensed-e-money>

<sup>89</sup> “What are Smart Contracts on Blockchain? (2017),” Toshendra Kumar Sharma, <https://www.blockchain-council.org/ethereum/smart-contracts-Blockchain/>

## **NOTES**

# Unit

# 4

## Accounting and Regulatory Considerations

### LEARNING OBJECTIVES

*When you have completed this unit, you will be able to accomplish the following:*

- Explain how blockchain will impact the accounting profession.
- Review accounting and auditing considerations related to blockchain.
- Identify the risks associated with blockchain implementation.
- Discuss and understand legal regulations around blockchain.

### ACCOUNTING AND AUDITING CONSIDERATIONS

#### Benefits to the Accounting Professional

Blockchain can automate the bookkeeping, accounting, and auditing processes. By integrating blockchain, analytics, and artificial intelligence, inconsistencies can be discovered real time and not days, months, or years later. Blockchain will not eliminate the role of the accountant; instead, it will enhance the functions and services that accountants can provide to their clients.

There are various risks associated with blockchain technologies, and some major gaps are being discovered. An accountant's skill set is beyond tax preparation. They specialize in other areas such as bookkeeping, forensic accounting, auditing, managerial accounting, and information technology. As blockchain technology continues to develop, the demand for accountants with the specific knowledge and special skill sets to respond to this demand will grow. The accountant of tomorrow will help reduce the risks and challenges that blockchain users and businesses face.

## **BLOCKCHAIN ACCOUNTING USE CASES**

### **Bookkeeping**

Double entry accounting verifies that journal entries are accurate. Often times, companies hire external auditors to verify this information. With blockchain's DLT, journal entry process is verified and automated.

### **Forensic Accounting**

Forensic accounting involves accounting, auditing, and investigative skills to conduct an examination into the finances of an individual or business. It is used to detect fraud and embezzlement. Blockchain will not replace forensic accounting; it will supplement the field. There are now specialties referred to as blockchain forensics and cryptocurrency forensics accounting. Both involving tracking and interpreting the flow of cryptocurrency assets on blockchains.<sup>90</sup>

There are fraud schemes that blockchain may not detect:

- Expense reimbursements are not performed on the blockchain and not easily traced.
- Kickback Schemes are often not performed on a blockchain. Kickbacks often involve cash or some other collateral being exchanged for illicit activity.
- Altered check scheme. A check is a paper instrument and not part of the blockchain.<sup>91</sup>

## **BLOCKCHAIN AND AUDIT**

Accountants are necessary in blockchain industries and organizations, but their functions will not be the same. Blockchain will eliminate tedious tasks and improve productivity. Auditors will have more time to apply professional judgment and advise their clients.

### **Audit Objectives**

- Assess whether blockchain technology is adequately designed and operationally effective;
- Identify the material risks associated with blockchain technologies and industries; and
- Consider both technical and nontechnical factors of the blockchain when advising management.

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<sup>90</sup> Transaction Tracking and Investigation, <https://cipherblade.com/blockchain-forensics/>

<sup>91</sup> Why Blockchain Technology Won't Replace the Forensic Accountant (2018), <https://www.wipfli.com/insights/articles/cons-why-blockchain-technology-wont-replace-forensic-accountant>

## **Areas of Block Audit**

- Blockchain integrity and security
- Transaction verification and validations
- Code testing and review
- Anti-money laundering

Additional functions auditors can expect to have as a result of blockchain technologies include

- fraud detection services;
- auditing smart contracts;
- providing assurance on the stability of a system's architecture in private blockchain products;
- serving as a central access-granting administrator for blockchain requiring permission to join;
- serving as arbitrator among private blockchain participants;
- input and extraction of information control testing;
- merging blockchain compliance with compliance in other heavily regulated industries (healthcare, education, financial/banking); and
- completing SOC engagements.

Blockchain technology will have a large impact on the financial statement audit, though it will not eliminate it all together. Blockchain introduces alternatives to assurance services and new responsibility for the auditor in the blockchain ecosystem.

## **THE ROLE OF AN ACCOUNTANT IN THE BLOCKCHAIN ECOSYSTEM**

As blockchain technology develops and becomes more widely accepted and used, new opportunities and challenges will arise. There are some functions that will not be eliminated and will require the expertise of an accountant. For example, blockchain will not prevent

- unauthorized, fraudulent, or illegal transactions;
- related party transactions;
- transactions linked to a side agreement (off-chain); and
- transactions from being incorrectly classified in the financial statements.

Additional services offered by accountants for the blockchain industry include advisement on matters such as:

- acquisition,
- valuations,
- gain/loss,
- foreign currency transactions,
- foreign bank and financial reporting,
- payment for goods and services,
- miners' income,
- employee payments, and
- IRS enforcement actions.<sup>92</sup>

As the blockchain industry grows, so will the demand for accountants who can support blockchain companies, digital asset investment, and mining operators. Because very little guidance exists, today's accounting professionals are on the frontlines establishing policy and order for blockchain and crypto accounting and tax services.

## **ACCOUNTING BEST PRACTICES FOR BLOCKCHAIN**

Blockchain and cryptocurrencies present new and unique challenges to accounting firms that lack the same resources as those at the larger public firms. There are a number of things a practitioner at a small- or mid-sized firm can do to prepare and enter blockchain and cryptocurrency industries.

### **Preparation**

Are you prepared to respond to the demand of crypto companies and individuals? This includes background knowledge on how the technologies work, how income is derived, sales, transfers, and the software necessary to process these demands, as well as where security may be compromised.

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<sup>92</sup> Cryptocurrencies and Taxes (2018), Fagan & Fagan LLP, <https://www.faganfagan.com/blog/cryptocurrencies-and-taxes/43141>

## Service Offerings

Are your services unique from those of other firms? Concentrating on specific skills or services can help you distinguish your firm from the competition. Areas of concentration can include:

Business Industries in Need	
<ul style="list-style-type: none"><li>■ High net worth investors</li><li>■ Crypto mining operations</li><li>■ Crypto hedge funds</li><li>■ Crypto equity funds</li></ul>	<ul style="list-style-type: none"><li>■ Crypto ATMs</li><li>■ OTC traders</li><li>■ Post-ICO companies</li><li>■ Crypto exchanges and decentralized exchanges</li></ul>

## Evolving Strategies

You should be improving processes, policies, and advancing the services you offer by learning from common mistakes made by clients, new advisements, regulatory changes, and reviewing legal cases.

## TOP ACHIEVEMENTS OF PUBLIC ACCOUNTING

Has your firm developed automation or technology to detect missing or inaccurate data for reconciliation?

Accounting for crypto accounting will evolve and improve over time as more industry experience occurs and more guidance is issued from standard setters.

Various public firms are participating in blockchain development and research as well as partaking in consortium networks.

Here are a number of ways these public firms are integrating blockchain to their organizations by launching:

- blockchain advisory and development services division.<sup>93</sup>
- Digital Ledger Services, which is a suite of services designed to help financial service companies explore blockchain uses supported by Microsoft's blockchain as a service (BaaS) platform.<sup>94</sup>

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<sup>93</sup> <https://www2.deloitte.com/us/en/pages/consulting/solutions/blockchain-solutions-and-services.html>

<sup>94</sup> <https://advisory.kpmg.us/services/corporate-services/finance/digital-ledger-services.html>

- set of services and applications to support commercial use of blockchain technology that combines advisory, tax, and audit services in order to allow enterprises to digitize and automate their interactions with partners.<sup>95</sup>
- applications that enable digital assets to be used for everyday commerce, banking, and other currency asset-related services in collaboration with Libra, Bloq, and Netki.<sup>96</sup>

Additionally, in 2017, a number of firms began accepting Bitcoin as payment for services from clients.<sup>97</sup>

## STANDARDS AND GUIDANCE

### IASB

The International Accounting Standards Board (IASB) is the independent accounting standard-setting body of the IFRS Foundation. The IFRS Foundation is a nonprofit international organization responsible for developing global accounting standards. Currently, 140 jurisdictions require IFRS standards. In other jurisdictions, the use of IFRS standards are permitted.<sup>98</sup>

IFRS recently issued a letter of advisory on the following points:

- Cryptocurrencies are virtual currencies that are recorded on a distributed ledger and uses cryptography for security.
- Cryptocurrencies are not issued by governmental authorities nor are they backed by them.
- Possessing or exchanging cryptocurrency does not create a contractual relationship between the transferee and the transferor.

IFRS also noted that the standards require timely amendment in order to appropriately measure and value cryptocurrencies. IFRS contends that changes in fair value for cryptocurrencies with an active market (such as Bitcoins) generally should be reported as part of the loss (earnings) or profit for the period.<sup>99</sup>

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<sup>95</sup>“EY Ops Chain industrializes the blockchain at scale for enterprises (2019),” EY, [https://www.ey.com/en\\_gl/news/2019/04/ey-ops-chain-industrializes-the-Blockchain-at-scale-for-enterprises](https://www.ey.com/en_gl/news/2019/04/ey-ops-chain-industrializes-the-Blockchain-at-scale-for-enterprises)

<sup>96</sup>“PwC launches new FinTech capability called Vulcan Digital Asset Services (2016),” PwC <https://www.pwc.com/au/press-room/2016/vulcan-digital-asset-services-nov16.html>

<sup>97</sup>Accounting Weekly, <https://accountingweekly.com/pwc-joins-ey-accepting-bitcoin-services/>

<sup>98</sup><https://www.ifrs.org/about-us/>

<sup>99</sup>IFRS Holdings of Cryptocurrencies Comment Letters (2019), <https://cdn.crowdfundinsider.com/wp-content/uploads/2019/06/IFRS-Holdings-of-Cryptocurrencies-ap12a-comment-letters.pdf>

## **FASB, AICPA, and FinREC**

The Financial Accounting Standards Board (FASB) is one of the two main rule-setting bodies for accounting standards internationally. FASB establishes U.S. Generally Accepted Accounting Principles (GAAP). Founded in 1887, the American Institute of Certified Public Accountants (AICPA) is the largest global accounting professional association. AICPA recognizes opportunities and challenges posed by blockchain technologies and cryptocurrencies and has created a number of publications and educational information for CPAs in order to better serve clients.

The Financial Reporting Executive Committee (FinREC) is authorized to make public statements on behalf of the Institute on financial reporting matters. FinREC influences pronouncements FASB of IASB and other accounting boards. Additionally, FinREC with guidance from FASB and cooperation with AICPA identify financial accounting issues.<sup>100</sup>

CalCPA issued a letter in 2018 urging FASB to update the Generally Accepted Accounting Principles (GAAP) because it did not adequately capture accounting standards for cryptocurrencies.<sup>101</sup> CalCPA was concerned that FASB's delay in developing standards for cryptocurrencies could have dire consequences. For instance, CPAs will be unable to provide guidance to their clients. CalCPA's position is that increased use of cryptocurrencies will usher in new accounting opportunities and risk areas which require further guidance.<sup>102</sup> Additionally, businesses may be less likely to conduct transactions using cryptocurrencies.<sup>103</sup>

In late 2019, the AICPIA tackled digital assets in a new practice aid.<sup>104</sup> The AICPA will update the "nonauthoritative" guidance with additional content regularly, as topics are finalized and posted to [aicpa.org](https://aicpa.org). The practice aid was developed using FASB tools such as the ASC Master Glossary and was reviewed by FinREC. The practice Aid that covers six key areas:

- Classification and Measurement when an Entity Purchases Crypto Assets;

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<sup>100</sup> Financial Reporting Executive Committee Facts About FinREC AICPA (2019), <https://www.aicpa.org/content/dam/aicpa/interestareas/frc/accountingfinancialreporting/downloadabledocuments/finrec/facts-about-finrec.pdf>

<sup>101</sup> Technical Inquiry Request (2019), CalCPA, [https://www.fasb.org/cs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1175836008908&blobheader=application%2Fpdf&blobheadername2=Content-Length&blobheadername1=Content-Disposition&blobheadervalue2=566828&blobheadervalue1=filename%3DAR-2019.UNS.014.CALCPA\\_APAS\\_COMMITTEE\\_NANCY\\_A.\\_RIX.pdf&blobcol=urldata&blobtable=MungoBlobs](https://www.fasb.org/cs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1175836008908&blobheader=application%2Fpdf&blobheadername2=Content-Length&blobheadername1=Content-Disposition&blobheadervalue2=566828&blobheadervalue1=filename%3DAR-2019.UNS.014.CALCPA_APAS_COMMITTEE_NANCY_A._RIX.pdf&blobcol=urldata&blobtable=MungoBlobs)

<sup>102</sup> CPAs Pushing for Accounting and Disclosure Rules of Cryptocurrencies (2019), Thomson Reuters Tax and Accounting, <https://pbs.twimg.com/media/D8OM0ppW4AlsJkn.png>

<sup>103</sup> "International Accounting Standards Board believes Bitcoin will be gone within five years (2019)", Seth Goldfarb, <https://cryptoslate.com/international-accounting-standards-board-believes-bitcoin-will-be-gone-within-five-years/> 109 <https://www.ifrs.org/about-us/>

<sup>104</sup> Accounting for and auditing of digital assets, AICPA (2019), <https://www.aicpa.org/content/dam/aicpa/interestareas/informationtechnology/downloadabledocuments/accounting-for-and-auditing-of-digital-assets.pdf>

- Recognition and Initial Measurement when an Entity Receives Digital Assets that are Classified as Indefinite-Lived Intangible Assets;
- Accounting for Digital Assets Classified as Indefinite-Lived Intangible Assets;
- Measurement of Cost Basis of Digital Assets that are Classified as Indefinite-Lived Intangible Assets;
- Derecognition of Digital Asset Holdings that are Classified as Indefinite-Lived Intangible Assets and
- Recognition of Digital Assets When an Entity Uses a Third-Party Hosted Wallet Service.<sup>105</sup>

Additionally, the AICPA published an article on Not-For-Profit organizations accepting and valuing cryptocurrency gifts. The article describes the process of receiving and selling cryptocurrency and says it is very similar to receiving public stock. The article further states that NFPs should establish policies on the following:

- Incorporating cryptocurrency transactions in the anti-money laundering policy;
- Establishing an account with a reputable broker to receive donations;
- Providing the donor with an account number;
- What to do upon receipt of the donated asset;
- Providing instructions on how to sell the asset and wire the proceeds to the bank; and
- Determining the gift value and acknowledge the gift.<sup>106</sup>

The AICPA has been extremely active in this area and has published on topics that include foundational information on blockchain technology, U.S. tax implications on cryptocurrencies, and buying and selling cryptocurrencies.<sup>107</sup>

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<sup>105</sup> Accounting for and auditing of digital assets, AICPA (2019), <https://www.aicpa.org/content/dam/aicpa/interestareas/informationtechnology/downloadabledocuments/accounting-for-and-auditing-of-digital-assets.pdf>

<sup>106</sup> <https://www.aicpa.org/interestareas/notforprofit/resources/governancemanagement/bitcoin-basics-accepting-valuing-cryptocurrency-gifts.html>

<sup>107</sup> <https://www.aicpa.org/content/dam/aicpa/interestareas/personalfinancialplanning/cpeandevents/downloadabledocuments/20190206-blockchain.pdf>

## BLOCKCHAIN AREAS OF RISK

### Lack of Standardization

Blockchain technology is still in its infancy, and the limitations of the technology are unknown and still being explored. Standardization of an industry typically depends on:

- **Industry standardization.** According to the code repository site GitHub, it hosts more than 6,500 active blockchain projects that are built on a wide range of platforms, coding languages, consensus mechanisms, protocols, and privacy controls. As blockchain technologies are being developed on different networks, the lack of standardization prevents them from collaborating.<sup>108</sup> The lack of standardization threatens blockchain growth and opportunities.
- **Compliance.** Rapidly evolving organizations do not have time to perform due diligence in this area, nor is there any guidance. The lack of standardization means no self-regulatory bodies, codes, or certifications of quality exist.

### Custodial Services

With cryptocurrency there is a risk that wallets can be hacked and stolen, especially with hot wallets. Some crypto investors may elect to hire a custodian to protect their crypto assets. As a result, a number of custodian firms have emerged targeting individuals with high net values, as well as institutional clients.<sup>109</sup>

### Market Conditions

- **Variable cost per transaction.** One of the objectives of blockchain is cost savings. The reality, however, is that it is expensive and based on storage requirements, energy costs, and the shroud of uncertainty that accompanies any nascent technology. These factors make blockchain a less scalable solution than existing databases. These costs flow from blockchain developers and organizations to customers.<sup>110</sup>
- **Unstable cryptocurrency prices.** Cryptocurrencies come with some hidden fees. They are decentralized so users have to pay the standard network fee for using the blockchain, which is a transaction fee paid to miners. Though small, there are fees associated with wallets (around 0.001%). There is a 7% transaction fee associated with buying Bitcoin, for example. The fee for trading on a market exchange is far less at 0.25% per trade.<sup>111</sup> Further, supply and demand is a big factor in determining cryptocurrency prices, as there is a limited supply of cryptocurrency. Remember, it is

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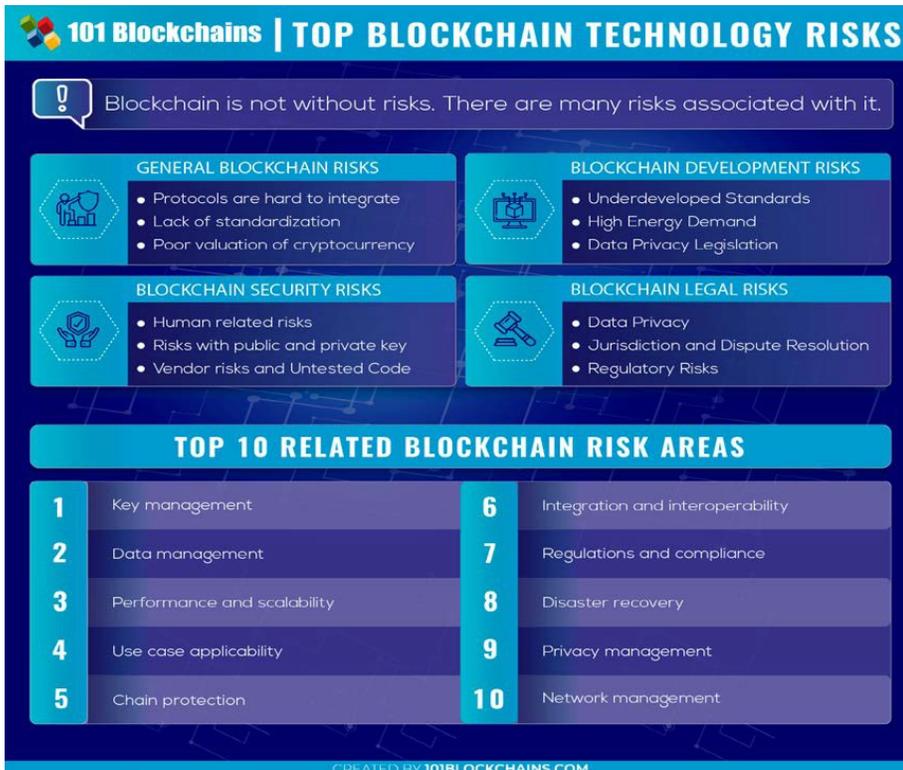
<sup>108</sup> <https://www.aicpa.org/interestareas/notforprofit/resources/governancemanagement/bitcoin-basics-accepting-valuing-cryptocurrency-gifts.html>

<sup>109</sup> "29 Crypto Custody," Kara Kennedy (2018), <https://www.bnymellon.com/us/en/our-thinking/crypto-custody.jsp>

<sup>110</sup> "Don't Let Blockchain Cost Savings Hype Fool You (2018)," Jason Bloomberg, Bloomberg, <https://www.forbes.com/sites/jasonbloomberg/2018/02/24/dont-let-blockchain-cost-savings-hype-fool-you/>

<sup>111</sup> "5 Hidden Costs when Acquiring Cryptocurrency (2019)," Kirill Shilov, Hackernoon, <https://hackernoon.com/5-hidden-costs-when-acquiring-cryptocurrency-d64f92232321>

built using blockchain. This means labor for the miner, high consumption of electricity, validation, and processes all cause the price of cryptocurrencies to be expensive.<sup>112</sup>



[Graphic credit: 101blockchains.com retrieved from <https://101blockchains.com/blockchain-risks/>]

## Money Laundering and Other Illegal Uses

Like cash transactions, cryptocurrencies offer a level of anonymity. Money laundering occurs when a criminal takes the proceeds of a crime and changes the nature of money through a series of transactions in order to make those proceeds seem legitimate.<sup>113</sup> Cryptocurrency is fairly new and has outpaced oversight and regulation. In the United States, cryptocurrency exchanges are considered money service businesses (MSB) and must comply with the Bank Secrecy Act (BSA) and other anti-money-laundering laws.<sup>114</sup>

<sup>112</sup> “How Cryptocurrency Prices Work, Explained (2018),” Chrisjan Pauw, <https://cointelegraph.com/explained/how-cryptocurrency-prices-work-explained>

<sup>113</sup> “Bitcoin Risks, Rewards and Regulation (2018),” Chris Rowland, ACAMS, [http://files.acams.org/pdfs/2018/Bitcoin\\_Risks\\_Rewards\\_and\\_Regulation\\_C\\_Rowland.pdf](http://files.acams.org/pdfs/2018/Bitcoin_Risks_Rewards_and_Regulation_C_Rowland.pdf)

<sup>114</sup> “Application of FinCEN’s Regulations to Certain Business Models Involving Convertible Virtual Currencies (2019),” FIN- 2019-G001, Financial Crimes Enforcement Network, <https://www.fincen.gov/sites/default/files/2019-05/FinCEN%20Guidance%20CVC%20FINAL%200508.pdf>

## **Security Risks<sup>115</sup>**

### ***Failure of Technology***

Blockchain technologies are built on code, so deploying code that is either insufficiently or not tested could result in blockchain function failure and/or a large security gap.

### ***Identity and Access Issues***

A user identity is tied to a cryptographic key and must keep the part secret. If an unauthorized party gets a hold of the key, he can impersonate the owner. Such a risk is the reason why some user/owners use cold wallets.<sup>116</sup>

### ***Employee Error***

In 2011, Bitomart Exchange's experience was one of the most expensive errors in crypto history. The Bitomart team updated its server via AWS Elastic Cloud, but the server was deleted inadvertently during the upgrade.<sup>117</sup>

### ***Vendor Security***

Proper vendor management is necessary to vet and monitor vendor access. Vendors with poor security policies, vulnerabilities related to personnel, or weak code can expose their clients' blockchain credentials and data to unauthorized persons.

### ***Hacking***

In 2012, hackers wrote malicious code designed to install a virus on users' PCs and steal information. This virus then looked for private keys and hot wallets on users' PCs. A total of 3,475 Bitcoins was transferred into an anonymous Bitcoin wallet address.<sup>118</sup> In 2014, the Pony botnet stole up to \$220,000 in cryptocurrencies from 85 wallets.<sup>119</sup>

The decentralized autonomous organization (DAO) launched in June 2016 with \$150 million in crowdfunding intended for venture capital funding. DAO was immediately hacked, and \$50 million in cryptocurrency was stolen.<sup>120</sup>

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<sup>115</sup> "5 Blockchain Security Risks and How to Reduce Them (2018)," Rick Martin, <https://igniteoutsourcing.com/blockchain/blockchain-security-vulnerabilities-risks/>

<sup>116</sup> "The hidden dangers of Blockchain: An essential guide for enterprise use," Peter Wayner, <https://techbeacon.com/security/hidden-dangers-Blockchain-essential-guide-enterprise-use>

<sup>117</sup> "Bitcoin Scams: Complete List of Cryptocurrency Hacks, History & Help," Bitcoin Exchange Guide, <https://bitcoinexchangeguide.com/bitcoin/scams-hacks/>

<sup>118</sup> Bitcoin Exchange Guide, <https://bitcoinexchangeguide.com/bitcoin/scams-hacks/>

<sup>119</sup> "Pony botnet steals bitcoins, digital currencies: Trustwave (2014)," Jim Finke, Reuters, <https://www.reuters.com/article/us-bitcoin-security/pony-botnet-steals-bitcoins-digital-currencies-trustwave-idUSBREA1N1JO20140224>

<sup>120</sup> "Hacker May Have Taken \$50 Million From Cybercurrency Project (2016)," Nathaniel Popper, The New York Times, <https://www.nytimes.com/2016/06/18/business/dealbook/hacker-may-have-removed-more-than-50-million-from-experimental-cybercurrency-project.html>

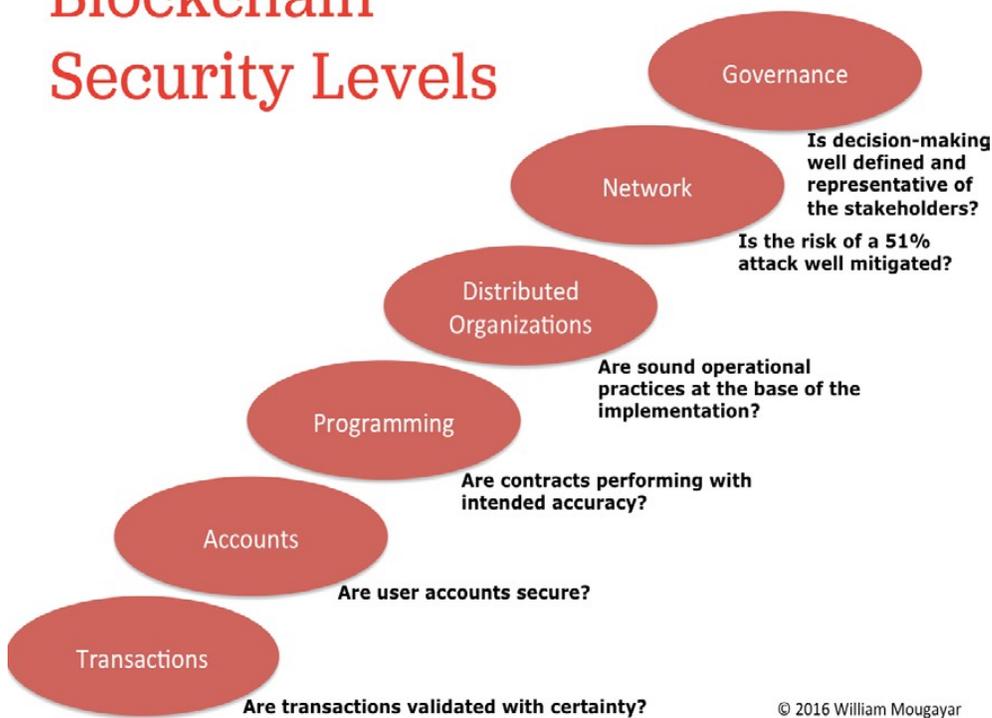
## Ransomware Attacks

Ransom attacks have become quite popular in the last decade. This occurs when attackers take control of machines and/or data, encrypt the information, and demand payment to decrypt the information and release the files. The payment in choice from these hijackers is typically Bitcoin.<sup>121</sup>

## Security of the Blockchain Network

The development of the blockchain network is a complicated process. If there is a mistake in these steps, a vulnerability in the technology exists. Malicious actors are constantly looking for weaknesses in systems in order to steal valuable information and, more importantly, money (cryptocurrency and wallets).

# Blockchain Security Levels



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<sup>121</sup> "Digital gold: why hackers love Bitcoin (2017)" Simon Usborne, <https://www.theguardian.com/technology/2017/may/15/digital-gold-why-hackers-love-bitcoin-ransomware>

## REGULATION AND LEGAL CONSIDERATIONS

Blockchain technology and cryptocurrencies are fairly new, so regulation in this area is still developing. However, there is great interest surrounding blockchain, and it is receiving global acceptance. On the other hand, cryptocurrencies are being met with resistance and emerging regulation.

The global response to blockchain varies. Most jurisdictions support research on blockchain, but the regulation in this area is still developing and unclear. With respect to cryptocurrencies, the treatment ranges from heavily regulated (U.S., EU) to banned (China).<sup>122</sup> Russia is currently working on legislation that will define but effectively ban the use of cryptocurrency for payment.<sup>123</sup>

The U.S. is at the forefront of regulation on cryptocurrencies, but state to state, the treatment and classification is vastly different.<sup>124</sup>

The inconsistent treatment globally affects the free flow of blockchain transactions, including cryptocurrencies.

### Global Regulation

Across the globe, governments are approaching how to regulate and treat blockchain and cryptocurrencies in three ways:

- Tightly regulate and oversee
- Wait-and-see approach
- Pro-blockchain adoption

Cryptocurrencies are absolutely banned in Algeria, Bolivia, Egypt, Iraq, Morocco, Nepal, Pakistan, UAE, and Vietnam.

Cryptocurrencies are implicitly banned in Bahrain, Bangladesh, China, Colombia, Dominican Republic, Indonesia, Iran, Kuwait, Lesotho, Lithuania, Marcau, Oman, Qatar, Saudi Arabia, Taiwan and Thailand. In Vietnam, Bitcoin is a not a legitimate payment method and is unregulated as an investment.

Chinese regulators do not recognize virtual currencies such as bitcoin as a tool for payments like paper bills, coins, or credit cards. Financial and payment institutions are prohibited from buying, selling, and using bitcoin pricing for services or products. China also prohibits the direct or indirect registering, trading, settling, clearing, or other services or trading bitcoins against the Chinese yuan or other foreign currencies.<sup>125</sup>

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<sup>122</sup> <https://www.loc.gov/law/help/cryptocurrency/china.php>

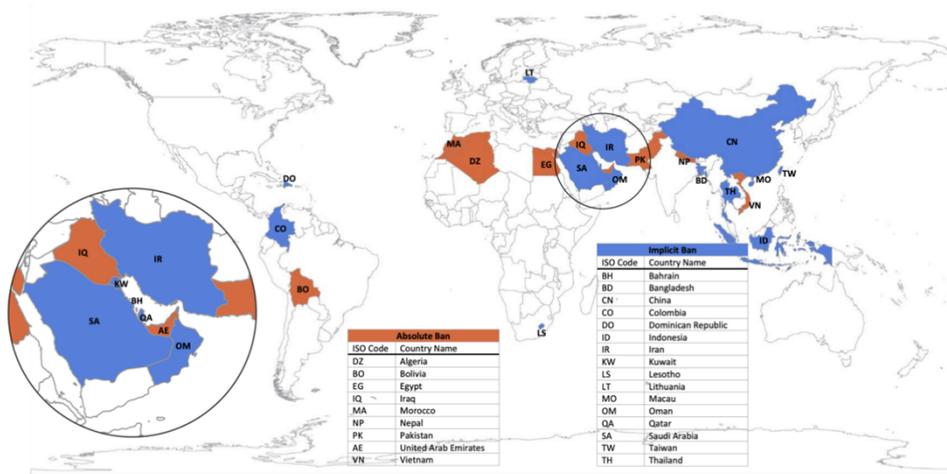
<sup>123</sup> <https://www.forbes.com/sites/billybambrough/2020/03/21/blow-to-bitcoin-as-russia-moves-to-effectively-ban-crypto/#3fd294735c63>

<sup>124</sup> <https://www.jdsupra.com/legalnews/blockchain-cryptocurrency-state-law-59816/>

<sup>125</sup> "Regulation of Cryptocurrency Around the World (2019)," The Law Library of Congress, <https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf>

Cryptocurrencies are unregulated in Saudi Arabia, Namibia, Zimbabwe, and Nicaragua, but may be traded.<sup>126</sup>

In Canada, U.S., Mexico, Japan, and the European Union, cryptocurrencies are legal and regulated.<sup>127</sup>



### Legal Status of Cryptocurrencies

Source: Created by the Law Library of Congress based on information provided in this report.



[<https://www.loc.gov/law/help/cryptocurrency/map1.pdf>]

In contrast, China’s view of blockchain in general is fairly receptive. In China, blockchain is supported via public-private partnerships in regional economics hubs. However, the trading, investing, and mining of cryptocurrency is banned entirely, and there was pending legislation in India about whether to ban or allow cryptocurrency.<sup>128</sup> 714 new blockchain companies have emerged in China in January 2020 alone. Currently 26,089 blockchain companies are operating in China.<sup>129</sup>

HM Revenue and Customs (HMRC), the U.K.’s tax authority, is working on a blockchain analytics tool that could help identify cybercriminals who are trading in cryptocurrencies. UK’s tax authority, HMRC, is looking to deploy a blockchain analytics tool to catch crypto cybercriminals. Last summer, HMRC requested customer and transaction information from crypto exchanges, including Coinbase, eToro, and CEX.IO. The tool will gather analytics, cluster crypto-asset transactions, and identify those linked to crypto-asset service providers.<sup>130</sup>

<sup>126</sup> The Law Library of Congress, <https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf>

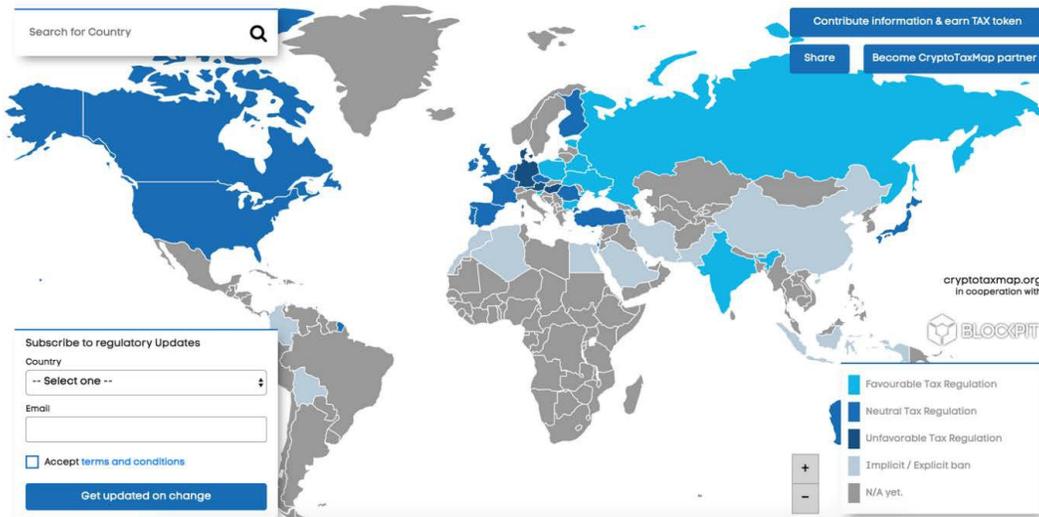
<sup>127</sup> The Law Library of Congress, <https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf>

<sup>128</sup> The Law Library of Congress, <https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf>

<sup>129</sup> More than 700 new blockchain companies launch in China in January alone, (2020), <https://finance.yahoo.com/news/more-700-blockchain-companies-launch-090011333.html>

<sup>130</sup> UK’s tax authority wants to deploy a blockchain analytics tool to catch crypto cybercriminals, Yogita Khatri, (2020), <https://www.theblockcrypto.com/post/53473/uks-tax-authority-wants-to-deploy-a-blockchain-analytics-tool-to-catch-crypto-cybercriminals>

Malta and the Isle of Man have put themselves forward as blockchain hubs and centers of innovation for blockchain and cryptocurrency. They have created incubators to encourage development, innovation, and investment. With these measures in place, there is a potential to replace private banking services.<sup>131</sup>



## U.S. Regulation

Blockchain spending is expected to increase by 1,000% between 2017 and 2022. IDC Government Insights projects that blockchain spending by U.S. federal branches will increase to nearly \$10 billion by 2021.<sup>132</sup> On the federal level, cryptocurrencies have been regulated by the Internal Revenue Service (IRS), Securities Exchange Commission (SEC), and Commodity Futures Trading Commission. A for-profit business issues tokens to back investments made in the business, and then those issuances are classified as securities.<sup>133</sup>

## Federal Bureau of Investigations (FBI)

The FBI takes the stance that cryptocurrency is a “significant issue” that is likely to become a “bigger and bigger” problem for the law enforcement agency. In 2018, the agency had an estimated 130 cases involving cryptocurrency under investigation, including ransomware to human trafficking.<sup>134</sup>

<sup>131</sup> The Law Library of Congress, <https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf>

<sup>132</sup> “Government Blockchain Spending to Increase Big by 2022 (2019),” Brandi Vincent, <https://www.nextgov.com/emerging-tech/2019/04/government-Blockchain-spending-increase-big-2022/156383/>

<sup>133</sup> <https://www.sec.gov/ICO>

<sup>134</sup> “FBI Director: Cryptocurrency Is ‘Significant Issue’ for Law Enforcement,” Coindesk (2019), <https://www.fbi.gov/news/pressrel/press-releases/fbi-expects-a-rise-in-scams-involving-cryptocurrency-related-to-the-covid-19-pandemic>

## **Department of Justice (DOJ)**

In late 2019, DOJ arrested three men in a \$722 million-dollar ponzi scheme involving the use of cryptocurrency. From 2014 through December 2019, the defendants operated BitClub Network, which was a fraudulent scheme that sold shares of crypto mining pools to investors and rewarded investors for recruiting new investors.<sup>135</sup>

In March of 2020, two Chinese nationals were charged with laundering over \$100 million in cryptocurrency through an exchange hack. The defendants' co-conspirators hacked into a virtual currency exchange and stole nearly \$250 million worth of virtual currency. The defendants helped the co-conspirators launder these funds, using cryptocurrency.<sup>136</sup>

## **Office of Foreign Asset Control (OFAC)**

The U.S. Office of Foreign Assets Control of the Treasury Department (OFAC), administers U.S. economic sanctions programs against foreign countries. During the past year, OFAC issued subpoenas to virtual currency businesses (exchange) regarding customers and transactions involving parties in sanctioned countries. OFAC indicated that they intend to devote more resources to cryptocurrency issues.<sup>137</sup>

## **Securities Exchange Commission (SEC)**

In September, Block.one agreed to pay the SEC a \$24 million penalty for operating an unregistered initial coin offering of digital tokens (ICO). Essentially, Block.one was fined for failing to register the sale of their token.<sup>138</sup> Ironically, the SEC released a statement stating that cryptocurrencies themselves are not necessarily securities. The SEC chairman, Jay Clayton, stated in a 2019 memo that "A digital asset may be offered and sold initially as a security because it meets the definition of an investment contract, but that designation may change over time if the digital asset later is offered and sold in such a way that it will no longer meet that definition."<sup>139</sup>

## **Commodities Future Trading Commission (CFTC)**

In 2017, the Commodities Futures Trading Commission's (CFTC) FinTech initiative issued a report that outlined the agency's relationship to virtual currency. The report explains that the agency determined the following:

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<sup>135</sup> Three Men Arrested in \$722 Million Cryptocurrency Fraud Scheme, DOJ (2019), <https://www.justice.gov/usao-nj/pr/three-men-arrested-722-million-cryptocurrency-fraud-scheme>

<sup>136</sup> Two Chinese Nationals Charged with Laundering Over \$100 Million in Cryptocurrency From Exchange Hack, DOJ (2020), <https://www.justice.gov/opa/pr/two-chinese-nationals-charged-laundering-over-100-million-cryptocurrency-exchange-hack>

<sup>137</sup> Cryptocurrency and OFAC: Beware of the Sanctions Risks, Orick (2020), <https://www.jdsupra.com/legalnews/cryptocurrency-and-ofac-beware-of-the-34002/>

<sup>138</sup> "SEC Orders Blockchain Company to Pay \$24 Million Penalty for Unregistered ICO" (2019), U.S. Securities Exchange Commission, <https://www.sec.gov/news/press-release/2019-202>

<sup>139</sup> "RE: Cipher Technologies Bitcoin Fund (2019)," Jacob E. Comer, U.S. Securities Exchange Commission, <https://www.sec.gov/Archives/edgar/data/1776589/999999999719007180/filename1.pdf>

- cryptocurrencies are commodities,
- the kinds of trading activities that fall under its purview,
- the activities requiring approval, and
- operation risks for cryptocurrency exchanges.

Generally, the CFTC has oversight over futures, options, and derivatives contracts. The CFTC has defined Bitcoin and other virtual currencies as commodities since 2015. The CFTC’s jurisdiction is triggered when a virtual currency is used in a derivatives contract or if there is fraud.<sup>140</sup>

## FinCEN

The Financial Crimes Enforcement Network (FinCEN) issues interpretive guidance to organizations that are subject to the Bank Secrecy Act (BSA), including FinCEN regulations relating to money services businesses (MSBs). In March 2018, FinCEN published a letter stating that token issuers were money transmitters required to follow federal money transmitter requirements.<sup>141</sup>

## Internal Revenue Service (IRS)

For purposes of IRS tax reporting, cryptocurrency gains and losses are treated like stocks and shares and are reported on a 1040 tax form as part of Schedule D. Generally, a gain or loss is the difference between the fair market value of the property received and the adjusted basis in the virtual currency exchanged.<sup>142</sup>

<b>Tax Basics</b>
Fair Market Value at the time of receipt
Basis at the time of receipt
FMV at the time of exchange
Gain loss use of cryptocurrency to purchase/pay

[Information credit: <https://www.irs.gov/pub/irs-utl/2018ntf-bitcoin-cryptocurrency-an-introduction-and-tax-consequences.pdf>]

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<sup>140</sup> “A CFTC Primer on Virtual Currencies (2017),” Commodity Future Trading Commission, [https://www.cftc.gov/sites/default/files/idc/groups/public/documents/file/labcfctc\\_primercurrencies100417.pdf](https://www.cftc.gov/sites/default/files/idc/groups/public/documents/file/labcfctc_primercurrencies100417.pdf)

<sup>141</sup> <https://www.fincen.gov/sites/default/files/2019-05/FinCEN%20Guidance%20CVC%20FINAL%20508.pdf>

<sup>142</sup> <https://www.irs.gov/pub/irs-drop/n-14-21.pdf>. See also <https://www.irs.gov/pub/irs-prior/p544--2018.pdf> and [Virtual Currencies | Internal Revenue Service \(irs.gov\)](#) and [Frequently Asked Questions on Virtual Currency Transactions | Internal Revenue Service \(irs.gov\)](#).

Unlike individuals, investors are those who buy and sell cryptocurrencies for speculative purposes, and they are issued a 1099-K if:

- proceeds are more than 20,000,
- there are more than 200 transactions in a calendar year, and
- these transactions are reported on Form 8949.

## Investors

- Investors are individuals who buy and sell crypto assets for speculative purposes.
- Gains and losses are capital in nature (not ordinary)
- The exchange will not issue a 1099-B
- 1099-K is issued if:
  - Gross proceeds are more than \$20,000 AND
  - More than 200 transactions in the calendar year
- FIFO is default, LIFO is acceptable as well
- Use a coin tracking software like BitTaxer. Tracking basis manually is virtually impossible

## Investors

### Form 8949 Presentation (Transactions not reported on Form 1099-B)

Form **8949** Sales and Other Dispositions of Capital Assets

OMB No. 1545-0074

Department of the Treasury Internal Revenue Service

Go to [www.irs.gov/Form8949](http://www.irs.gov/Form8949) for instructions and the latest information.

File with your Schedule D to list your transactions for lines 1b, 2, 3, 8b, 9, and 10 of Schedule D.

Name(s) shown on return: \_\_\_\_\_ Social security number or taxpayer identification number: \_\_\_\_\_

Before you check Box A, B, or C below, see whether you received any Form(s) 1099-B or substitute statement(s) from your broker. A substitute statement will have the same information as Form 1099-B. Either will show whether your basis (usually your cost) was reported to the IRS by your broker and may even tell you which box to check.

**Part I Short-Term.** Transactions involving capital assets you held 1 year or less are short term. For long-term transactions, see page 2.

**Note:** You may aggregate all short-term transactions reported on Form(s) 1099-B showing basis was reported to the IRS and for which no adjustments or codes are required. Enter the totals directly on Schedule D, line 1a; you aren't required to report these transactions on Form 8949 (see instructions).

You must check Box A, B, or C below. Check only one box. If more than one box applies for your short-term transactions, complete a separate Form 8949, page 1, for each applicable box. If you have more short-term transactions than will fit on this page for one or more of the boxes, complete as many forms with the same box checked as you need.

(A) Short-term transactions reported on Form(s) 1099-B showing basis was reported to the IRS (see Note above)

(B) Short-term transactions reported on Form(s) 1099-B showing basis **wasn't** reported to the IRS

(C) Short-term transactions not reported to you on Form 1099-B

1	(a) Description of property (Example: 100 sh. XYZ Co.)	(b) Date acquired (Mo., day, yr.)	(c) Date sold or disposed of (Mo., day, yr.)	(d) Proceeds (sales price) (see instructions)	(e) Cost or other basis. See the Note below and see Column (g) in the separate instructions	Adjustment, if any, to gain or loss. If you enter an amount in column (g), enter a code in column (f). See the separate instructions.	(f) Code(s) from instructions	(g) Amount of adjustment	(h) Date or (loss). Subtract column (g) from column (d) and combine the result with column (e)
	0.42913696 BTC	05/25/2017	06/02/2017	1,092.34	840.33			252.01	
	0.04518195 BTC	05/25/2017	06/02/2017	115.01	87.68			27.33	
	0.00836329 BTC	05/25/2017	06/02/2017	21.29	16.23			5.06	
	0.01342171 BTC	05/25/2017	06/02/2017	34.16	26.05			8.12	
	0.17499600 BTC	05/09/2017	06/02/2017	445.44	306.65			138.79	
	0.01633671 BTC	05/07/2017	06/02/2017	41.58	26.26			15.32	
	0.33679293 BTC	05/06/2017	06/02/2017	867.28	523.63			333.76	
	0.00521458 BTC	05/25/2017	06/02/2017	13.27	10.21			3.06	

[Graphic credit:

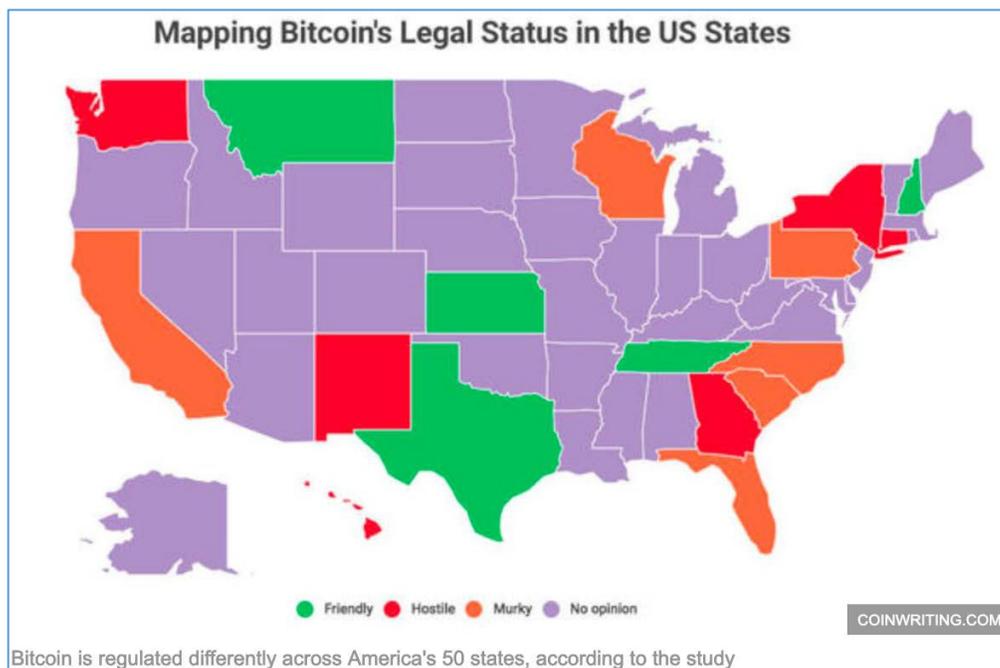
<https://www.aicpa.org/content/dam/aicpa/interestareas/personalfinancialplanning/cpeandevents/downloadabledocuments/20190206-Blockchain.pdf>]

In October of 2019, IRS issued additional guidance on the tax treatment of cryptocurrencies. A big area of concern for the IRS is the underreporting of cryptocurrency transactions, in instances where taxpayers have failed to report

transactions or reported them incorrectly. In 2019, the IRS went to court versus Coinbase and obtained the trading records of 14,000 users/traders who had used that platform. Even if there is anonymity using cryptocurrencies, taxpayers still have to register with the exchange and report activity on their tax returns. The IRS is addressing these areas of non-compliance by dispatching information by mail, sending notices, initiating audits, and issuing additional tax, penalties, and interest to taxpayer accounts when appropriate.<sup>143</sup>

## State Regulation

States' treatment of blockchain and cryptocurrency regulation varies. The U.S. is essentially a patchwork of regulators who are interested in different areas.



### Arizona

Arizona (HB 2702) is proposing a bill that imposes sales tax on marketplace facilitators that accept or require virtual currencies, following the lead of Rhode Island.<sup>144</sup>

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<sup>143</sup> "Virtual currency: IRS issues additional guidance on tax treatment and reminds taxpayers of reporting obligations (2019)", Internal Revenue Service, <https://www.irs.gov/newsroom/virtual-currency-irs-issues-additional-guidance-on-tax-treatment- and-reminds-taxpayers-of-reporting-obligations>

<sup>144</sup> "US: Arizona's Cryptocurrency Tax Bill Sees Rollback on Crypto Acceptance (2019)," Ana Alexandre, <https://cointelegraph.com/news/us-arizonas-cryptocurrency-tax-bill-sees-rollback-on-crypto-acceptance>

## **California**

AB 1489, if enacted, prohibits persons from engaging in business activities related to virtual currency unless they are registered with the Department of Business Oversight.<sup>145</sup>

## **Hawaii**

Hawaii's legislature updated the Money Transmitter Act to define Bitcoin and blockchain based technologies (decentralized ledgers). Additionally, they established a working group to study whether decentralized virtual currency should be regulated under the Money Transmitter Act pursuant to chapter 489D, Hawaii Revised Statutes, or remain unregulated by state government.<sup>146</sup>

## **New York**

New York has the most developed cryptocurrency law. Cryptocurrencies are regulated by New York Department of Financial Services (DFS). Bittrex's application to engage in the cryptocurrency business was denied by DFS because of its failure to meet licensing requirements and for a lack of AML compliance program.

As of 2016, New York State's BitLicense is required for (does not apply to consumers):

- virtual currency transmission;
- holding, storing, or maintaining control or custody of virtual currency on behalf of party(s);
- the commercial selling or purchasing of virtual currency;
- the controlling, administering, or issuing a virtual currency.

As of March, 2021, the NYDFS had approved 28 firms for virtual currency charters or licenses, including bitFlyer USA, Circle Internet Financial, Coinbase Inc., Genesis Global Trading Inc., Square, Inc., Xapo, Inc., and XRP II, and granted charters to Gemini Trust Company and Paxos (formerly itBit Trust Company).<sup>147</sup>

## **Ohio**

In the fall of 2018, Ohio was the first state to allow residents to pay state and local taxes via Bitcoin. In May 2019, Ohio announced that residents will be eligible to receive tax refunds in Bitcoin or other cryptocurrencies.<sup>148</sup>

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<sup>145</sup> [https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=201920200AB1489](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1489)

<sup>146</sup> Hawaii Money Transmitter License and Bitcoin Information, Shipkevich, PLC., <https://moneytransmitterlaw.com/state-laws/hawaii/>

<sup>147</sup> [https://www.dfs.ny.gov/apps\\_and\\_licensing/virtual\\_currency\\_businesses/bitlicense\\_faqs](https://www.dfs.ny.gov/apps_and_licensing/virtual_currency_businesses/bitlicense_faqs)

<sup>148</sup> "Ohio 'rolls out the red carpet' for blockchain businesses by accepting bitcoin this tax season (2018)," Kate Rooney, CNBC, Ohio 'rolls out the red carpet' for blockchain businesses by accepting bitcoin this tax season <https://cnb.cx/2Q0kOu5>

## **Rhode Island**

Rhode Island (RI) SB 251 imposes a sale and use tax on cryptocurrency transactions.<sup>149</sup> The Rhode Island General Assembly amended the state's money transmitter law to require licensing for currency transmission.<sup>150</sup>

## **Vermont**

In January 2019, Vermont launched a program to begin integrating blockchain into insurance applications and payouts.<sup>151</sup>

## **Wyoming**

Wyoming approved bill SF0125 in late 2019. The bill recognizes digital assets as property and clears the way for banks to act as cryptocurrency custodians.<sup>152</sup>

Wyoming also enables securities to be issued in tokenized form.<sup>153</sup>

In Wyoming, it is a crime to pledge coins/tokens/securities as collateral if one does not have outright ownership rights to them.<sup>154</sup>

In October, 2020, Wyoming granted a state bank charter to Avanti Bank and Trust, a crypto-based bank with its own virtual currency, the Avit. Avanti offers crypto-friendly services and traditional banking products and services, but bank deposits are not insured by the FDIC<sup>155</sup>

## **HIGH PROFILE CRYPTOCURRENCY CASES**

Over the past five years, a number of high-profile cases surrounding blockchain—particularly cryptocurrency—have emerged.

### **Binance**

In May 2019, Binance, a global cryptocurrency exchange, announced a large-scale data breach that resulted in hackers accessing and stealing 7,000 Bitcoins worth an estimated \$41 million in Bitcoin. Hackers were able to compromise users' hot wallets using

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<sup>149</sup> <https://legiscan.com/RI/text/S0251/2019>

<sup>150</sup> <https://legiscan.com/RI/text/H5847/id/2040720>

<sup>151</sup> "Vermont State Government Launching Blockchain Insurance Pilot (2019)," Yogita Khatri, <https://www.coindesk.com/vermont-state-government-launching-Blockchain-insurance-pilot>

<sup>152</sup> <https://www.wyoleg.gov/2019/Introduced/SF0125.pdf>

<sup>153</sup> <https://www.wyoleg.gov/2019/Introduced/HB0185.pdf>

<sup>154</sup> "What Do Wyoming's 13 New Blockchain Laws Mean? (2019)," Caitlin Long, <https://www.forbes.com/sites/caitlinlong/2019/03/04/what-do-wyomings-new-blockchain-laws-mean/#1056a3215fde>

<sup>155</sup> <https://avantibank.com/>

phishing and installing malware on Binance systems. Binance will be able to use emergency insurance to cover the incident, without users losing their funds.<sup>156</sup>

## **Bitfinex**

iFinex is the operator of Bitfinex, a cryptocurrency platform where Tether coins are traded. In April 2019, the New York Attorney General filed a complaint against iFinex, Bitfinex, and Tether alleging they defrauded investors by failing to disclose an \$850 million loss on the Bitfinex trading platform, in addition to commingling client and corporate funds.<sup>157</sup>

In October of 2019, Ivan Manuel Molina Lee, the President of Crypto Capital has been charged with using Bitfinex to siphon funds between Europe and Latin America and taking part in an international drug cartel involved in money laundering operations.<sup>158</sup>

## **QuadrigaCX**

After the sudden death of CEO Gerald Cotton of QuadrigaCX, Canada's largest cryptocurrency exchange, the company filed bankruptcy in 2019. An investigation found that the company lacked financial operational and reporting controls, which ultimately led to its demise. Hundreds of customers were owed millions in cash and cryptocurrency. The CEO mainly ran the company from his laptop and made a number of unsupported deposits that were used to trade within the platform using an alias, resulting in inflated revenue figures, artificial trades with users, and ultimately, the direction of cryptocurrency to Cotton and other related parties.<sup>159</sup>

## **Silkroad**

Silkroad was a Darknet marketplace where users paid for black market goods and services (murder, drugs, illegal pornography, hacking). Buyers and sellers conducted all transactions with Bitcoins (BTC), which provided a degree of anonymity. It was launched in 2011 but was shut down in 2013 by the FBI. The owner and operator, Ross Ulbricht, was convicted of eight charges and sentenced to life in prison.<sup>160</sup> ELIPTIC's study revealed that approximately 25% of Bitcoin users are involved in illegal activity, and 44% of Bitcoin transactions are conducted for the purpose of illegal activities.<sup>161</sup>

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<sup>156</sup> "Hackers Steal \$40 Million Worth of Bitcoin From Binance Exchange (2019)," Eric Lam, <https://www.bloomberg.com/news/articles/2019-05-08/crypto-exchange-giant-binance-reports-a-hack-of-7-000-bitcoin>

<sup>157</sup> "Attorney General James Announces Court Order Against 'Crypto' Currency Company Under Investigation For Fraud 2019" New York Attorney General, <https://ag.ny.gov/press-release/2019/attorney-general-james-announces-court-order-against-crypto-currency-company>

<sup>158</sup> "Crypto Capital's Ivan Manuel Molina Lee arrested in Poland (2019)", <https://finance.yahoo.com/news/crypto-capital-ivan-manuel-molina-233813639.html>

<sup>159</sup> "Investigation Uncovers Mystery of Quadriga's Missing Cryptocurrencies Worth Millions (2019)," Doug Alexander, <https://www.insurancejournal.com/news/international/2019/06/21/530149.htm>

<sup>160</sup> Sean Foley, et al., [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3102645](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3102645)

<sup>161</sup> Sean Foley, et al., [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3102645](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3102645)

## LIBRA

In 2018, Facebook began promoting a cryptocurrency called Libra. The members of the Libra Association include MasterCard, PayPal, Stripe, Visa, eBay, Facebook, Lyft, Uber, Spotify, Andreessen Horowitz, Vodafone Group, Kiva, Mercy Corps, Women's World Banking, and more. Facebook teams played a key role in the creation of the Libra Association and the Libra Blockchain.

Libra's target market was unbanked individuals and populations. The white paper written on Libra states that its mission was to build a scalable, reliable, and secure blockchain that is backed by a reserve of assets and governed by an independent Libra association.<sup>162</sup>

The following is a current Libra timeline of events:

- July 2, 2019: the committee Democrats asked Facebook to halt production of Libra.<sup>163</sup>
- July 17: A full committee hearing is held with David Marcus, head of Libra.<sup>164</sup>
- August 25, 2019: Committee Democrats travel to Switzerland to understand how the Libra Association would be regulated as a Swiss nonprofit.<sup>165</sup>
- September 24, 2019: A hearing with the SEC is held regarding the regulation and scrutiny applied to Libra.<sup>166</sup>
- October 4, 2019: PayPal, as one of 28 corporate backers of the project, withdraws its support.<sup>167</sup>
- January 31, 2020: Vodafone, another consortium member, has backed out of the Libra project, in order to focus on expanding their own cross-border payment system.<sup>168</sup>

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<sup>162</sup> <https://libra.org/en-US/white-paper/#introducing-libra>

<sup>163</sup> Congress Questions The SEC On Libra, Cryptocurrency, and "The Whole Blockchain Phenomenon (2019)," Jason Brett, Forbes, <https://www.forbes.com/sites/jasonbrett/2019/09/28/congress-questions-the-sec-on-libra-cryptocurrency-and-the-whole-Blockchain-phenomenon/#2ef4b1ac5135>

<sup>164</sup> Jason Brett, Forbes, <https://www.forbes.com/sites/jasonbrett/2019/09/28/congress-questions-the-sec-on-libra-cryptocurrency-and-the-whole-Blockchain-phenomenon/#2ef4b1ac5135>

<sup>165</sup> Jason Brett, Forbes, <https://www.forbes.com/sites/jasonbrett/2019/09/28/congress-questions-the-sec-on-libra-cryptocurrency-and-the-whole-Blockchain-phenomenon/#2ef4b1ac5135>

<sup>166</sup> Jason Brett, Forbes, <https://www.forbes.com/sites/jasonbrett/2019/09/28/congress-questions-the-sec-on-libra-cryptocurrency-and-the-whole-Blockchain-phenomenon/#2ef4b1ac5135>

<sup>167</sup> "Tech PayPal withdraws from Facebook's Libra cryptocurrency (2019)," Laura Feiner, CNBC, <https://www.cnbc.com/2019/10/04/paypal-withdraws-from-facebooks-libra-cryptocurrency.html>

<sup>168</sup> Vodafone ditches Facebook's 'cryptocurrency' to focus on M-Pesa, David Canellis (2020), <https://thenextweb.com/hardfork/2020/01/22/cryptocurrency-vodafone-libra-blockchain-association-mastercard-visa-calibra/>

According to Bloomberg, Stripe, MasterCard, and Visa have expressed reservations about cryptocurrency and are hesitant to sign the Libra Association's inaugural charter for fear of angering regulators.<sup>169</sup>

### **NFTs (Non-Fungible Tokens)**

NFTs are built on cryptographic tokens that are in turn built into an Ethereum blockchain/distributed ledger and feature a smart contract. Non-fungible means that an object is unique and irreplaceable, such as a work of art or a limited edition of objects. A token, as described earlier, is a

NFTs are best known today as an asset class relating to limited editions of art works. In a recent example, an investor paid for a Banksy painting which was digitized (digitally photographed) and then burnt and destroyed on a livestreamed video. The digitized version of the art was then tokenized into an NFT and sold for approximately \$380,000 in Ethereum cryptocurrency in March, 2021. Provenance (the "source"), ownership/ownership transfers (the owner holds the cryptographic key), non-repudiation, authentication, and integrity of the artwork NFT are confirmed through the Ethereum blockchain/distributed ledger. The value(s) of the NFT are determined by market demand.

The Swiss Federal Council is in the process of approving the issuance of ledger-based securities (cryptographic tokens on a blockchain) as part of the Corporate Law Reform of 2020. The tokens will be based on both fungible and non-fungible contractual obligations.

### **F-NFTs (Fractional Non-Fungible Tokens)**

F-NFTs (Fractional NFTs) take NFTs to another level. In these cases, investors may own a fraction of an NFT, such as a 10% fractional ownership share of a work of art. Hedera Token Service is a well-known F-NFT service provider that can issue F-NFT shares.

NFT Standards include ERC-721 and ERC-1155, both based on the Ethereum blockchain.

## **CONCLUSION**

When discussing or analyzing blockchain, it is important to remember key blockchain terms and functions such as consensus, immutability, distributed ledger, mining, proof of work, proof of stake, and wallets. It is also important to note the differences between cryptocurrencies and other blockchain uses. As blockchain technology matures, more defined processes, including accounting and auditing, will be factored in. Blockchain technology is not a fad; it is here to stay, and its uses will continue to grow. Blockchain technology will not replace the role of the accountant or the auditor; it will only expand it and create more opportunities.

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<sup>169</sup> Facebook Libra Payments Partners Waver on Cryptocurrency (2019)," Lydia Beyoud, Bloomberg, <https://www.bloomberg.com/news/articles/2019-10-01/facebook-libra-payments-partners-waver-on-cryptocurrency-support>

## **CASE STUDY**

John works as a software engineer for Google. He has become increasingly interested in cryptocurrencies, so as a result, he has started moonlighting as a miner for Peercoin. In 2018, John earned \$10,000 in Peercoin assets for efforts. The Peercoin are transferred to his hot wallet, as soon as it is earned. John has not sold or transferred any Peercoin in 2018. Does John have income? If so, how much will he need to report?

## **CASE STUDY ANSWER**

In accordance with IRS Notice 2014-21, John realizes income equal to the fair market value of the cryptocurrency on the date he successfully “mines” virtual currency. It makes no difference if John is paid under the proof of work or proof of stake model. John will need to report the income on his 2018 tax return, since he successfully mined the fair market value of \$10,000 Peercoin in that year. Additionally, Peercoin should issue John a 1099-MISC form and report this income to IRS.<sup>170</sup>

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<sup>170</sup> <https://www.irs.gov/pub/irs-drop/n-14-21.pdf>

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Tax	Information Technology
	Management Services and Decision Making
	Personal and Professional Development
	Tax

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“We have enjoyed [your] programs and have found the content to be an excellent learning tool, not only for current accounting and management issues, but also how these issues apply to our company and affect how our business is managed.”

—Debbie Y.

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