
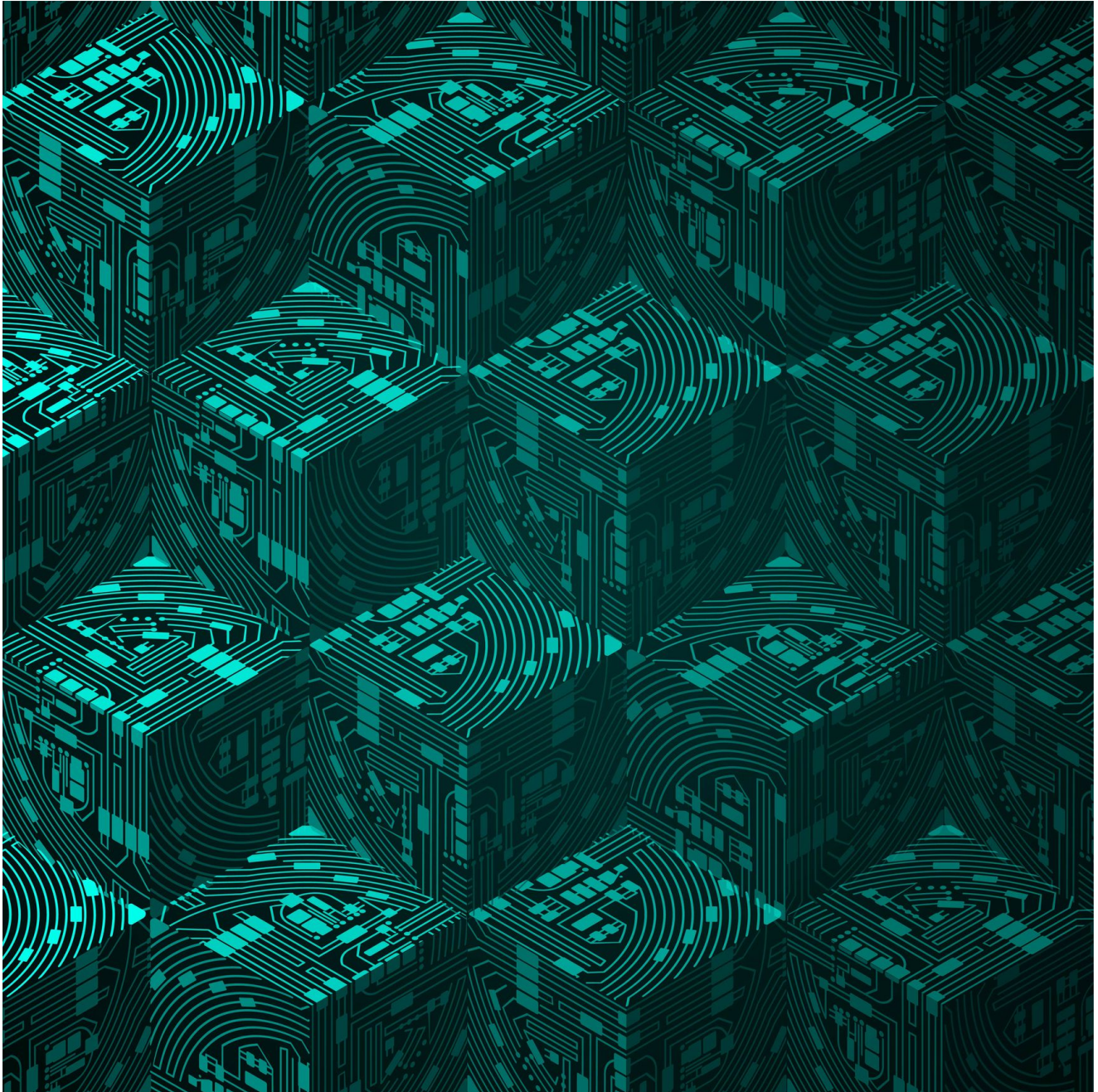


Public, Private, Permissioned Blockchains Compared

 [investopedia.com/news/public-private-permissioned-blockchains-compared](https://www.investopedia.com/news/public-private-permissioned-blockchains-compared)

Shobhit Seth



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By

[Shobhit Seth](#)

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Reviewed by

Erika Rasure

Blockchains are based on distributed ledgers, which have existed at the enterprise level for many years to manage data. However, they have only recently become popular and interesting because cryptocurrency introduced the concept to the public.

The content stored on the blocks of the blockchain—and the activities performed by the various participants—can be controlled depending on how the blockchain is configured. Generally, blockchains are designed for specific purposes, with users receiving multiple types of access or tasks.

Public blockchains allow anyone to access them; private blockchains are closed to only selected users; permissioned blockchains are a hybrid of public and private blockchains where anyone can access them as long as they have permission from the administrators to do so.

Here's a look at the key differences between public, private, and permissioned blockchains.

Key Takeaways

- In a public blockchain, anyone is free to join and participate in the core activities of the blockchain network.
- A private blockchain allows only selected and verified participants; the operator has the rights to override, edit, or delete entries on the blockchain.
- A permissioned blockchain has properties of both private and public blockchains.
- Permissioned blockchains have seen an increase in popularity thanks to their ability to allocate specific permissions to various users on the network.

Public Blockchain

A public blockchain is one where anyone is free to join and participate in the core activities of the blockchain network. Anyone can read, write, and audit the ongoing activities on a public blockchain network, which helps achieve the self-governed, decentralized nature often touted when blockchain is discussed.

Advantages

A public network operates on an incentivizing scheme that encourages new participants to join and keep the network agile. Public blockchains offer a particularly valuable solution from the point of view of a truly decentralized, democratized, and authority-free operation.

Public blockchains are extraordinarily valuable because they can serve as a backbone for nearly any decentralized solution. Additionally, the vast number of network participants joining a secured public blockchain keeps it safe from data breaches, hacking attempts, or

other cybersecurity issues. The more participants, the safer a blockchain is.

Public blockchains can be secured with automatic validation methods and encryption that keep single entities from changing information in the chain (like cryptocurrency blockchains), or they can allow anyone to make changes.

Disadvantages

The primary disadvantage to secured public blockchains is the heavy energy consumption required to maintain them. The concern is a consensus mechanism that requires participants to compete to validate the information and receive a reward for letting the network use their processing power. Not all blockchain networks use an energy-intensive validation process, so not all use enormous amounts of electricity.

Other issues include the lack of complete privacy and anonymity. Public blockchains allow anyone to view transaction amounts and the addresses involved. If the address owners become known, the user loses their anonymity.

Public blockchains also attract participants who may not be honest in their intentions. Most public blockchains are designed for cryptocurrencies, which by nature of their value are a prime target for hackers and thieves.

Private Blockchain

Participants can join a private blockchain network only through an invitation where their identity or other required information is authentic and verified. The validation is done by the network operator(s) or by a clearly defined set protocol implemented by the network through smart contracts or other automated approval methods.

Private blockchains control who is allowed to participate in the network. If the network is capable of mining, its private nature could control which users can execute the consensus protocol that decides the mining rights and rewards. Additionally, only select users might maintain the shared ledger. The owner or operator has the right to override, edit, or delete the necessary entries on the blockchain as required or as they see fit.

Advantages

A private blockchain is not decentralized. It is a distributed ledger that operates as a closed database secured with cryptographic concepts and the organization's needs. Only those with permission can run a full node, make transactions, or validate/authenticate the blockchain changes.

By reducing the focus on protecting user identities and promoting transparency, private blockchains prioritize efficiency and immutability—the state of not being able to be changed.

These are important features in supply, logistics, payroll, finances, accounting, and many other enterprise and business areas.

Disadvantages

While purposefully designed for enterprise applications, private blockchains lose out on many of the valuable attributes of permissionless systems simply because they are not widely applicable. They are instead built to accomplish specific tasks and functions.

In this respect, private blockchains are susceptible to data breaches and other security threats. This is because there is generally a limited number of validators used to reach a consensus about transactions and data if there is a consensus mechanism.

In a private blockchain, there may not be consensus but only the immutability of entered data unless an operator or administrator can make changes.

Permissioned Blockchain

Permissioned blockchains are a mix between the public and private blockchains and support many options for customization.

Advantages

Permissioned blockchain advantages include allowing anyone to join the permissioned network after a suitable identity verification process. Some give special and designated permissions to perform only specific activities on a network. This allows participants to perform particular functions such as reading, accessing, or entering information on the blockchain.

Permissioned blockchains allow for many functions, but one most interesting to businesses is Blockchain-as-a-Service (BaaS)—a blockchain designed to be scalable for the needs of many companies or tasks that the providers rent out to other businesses.

Blockchain-as-a-Service reduces costs for many businesses that can benefit from using blockchain technology in their business processes.

For example, say a business wants to improve transparency and accuracy in its accounting processes and financial reporting. It could rent blockchain accounting services from a BaaS provider. The blockchain would provide an interface where entries are made by end users and then automates the rest of the accounting processes.

In this way, there are fewer errors and no way for other parties to alter financial data after it is entered. As a result, financial reports to management and executives become more accurate, and the blockchain is accessible for viewing and generating real-time financial reports.

The business might choose to have its invoicing, payments, book-keeping, and tax reporting automated. Additionally, blockchain can prevent anyone with dishonest intentions from altering financial data or taking advantage of weaknesses in accounting processes.

Disadvantages

The disadvantages of permissioned blockchains mirror those of public and private blockchains, depending on how they are configured. One key disadvantage is that because permissioned blockchains require internet connections, they are vulnerable to hacking. By design, some might use immutability techniques such as cryptographic security measures and validation through consensus mechanisms.

While most blockchains are thought to be unhackable, there are weaknesses.

Cryptocurrency theft occurs when a network is hacked into, and private keys are stolen.

Permissioned blockchains also suffer this weakness because the networks that connect the users to the service depend on security measures that can be bypassed. User information can be stolen and accounts hacked into, similar to enterprise-level data breaches like the one Target suffered in 2013 when a third-party with access to the network was hacked.¹

What Are Private Blockchains?

Private blockchains are distributed ledgers only available to those given express permission to have specific access levels or abilities on a blockchain.

Are There Any Permissioned Blockchains?

Many companies have found utility and value in permissioned blockchains. For example, Walmart uses a custom version of Hyperledger Fabric, which was created as an open source project by IBM and the Linux Foundation for enterprise use, to track food origins much faster than it previously could.²

What Is the Difference Between and Permissioned and Private Blockchain?

A private blockchain is one in which only specific users have access and abilities and is generally used only by the entity it belongs to. A permissioned blockchain is a hybrid of public and private blockchains where multiple users are given permissions and abilities.

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