
Understanding Blockchain

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What is a blockchain?

Software that enables data sharing across a network of individual computers.

Think about an excel spreadsheet in the cloud accessible and transparent to a group of participants private or public.

Blockchain in technical terms

Shared digital ledger of records and transactions

- Lowers cost data management by spreading cost to all on the network
- Reduces burden of costly centralized databases for processing.

Secure network, data structures

- Cryptographically secured, shared network algorithms

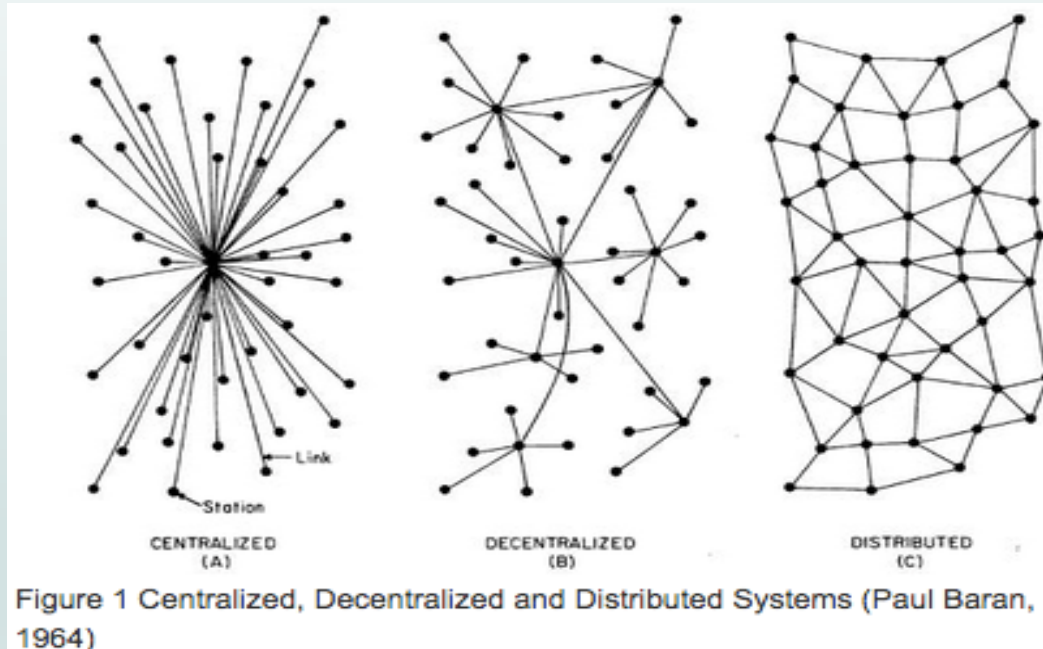
Records and certifies facts

- Information posted once, never can be changed. A “block” of information is digitally sealed forever.
- Includes ownership, asset registry and identity

Validates transactions

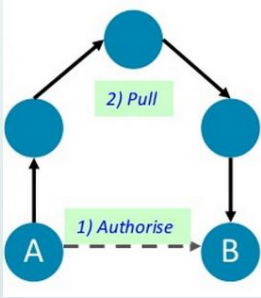
- Use of mathematical, consensus algorithms proofs, no need for central authority to do it like a bank, notary.

A decentralized and distributed system

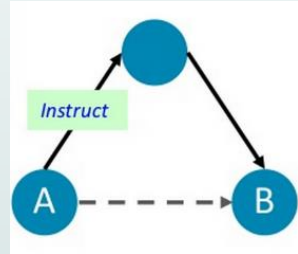


Through shared software infrastructure and trust. Users agree to a software protocol that describe the rules for the type, quality and transferability of data in addition to the rules for authorization, verification and permutation.

What started it all? The Bitcoin hype...



Visa, Banks, Payment Processors



Paypal, mobile pay



Bitcoin

Transactions 2.0

Eliminate all middlemen, costs and complexity of transactions through a shared ledger and network, cryptography, mathematical algorithms to confirm transactions and entities. The blockchain is the underlying technology that enables the occurrence.

How does blockchain work?

Figure 1. Blockchain: How it works

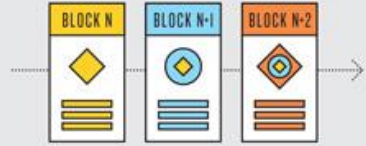
Blockchain allows for the secure management of a shared ledger, where transactions are verified and stored on a network without a governing central authority. Blockchains can come in different configurations, ranging from public, open-source networks to private blockchains that require explicit permission to read or write. Computer science and advanced mathematics (in the form of cryptographic hash functions) are what make blockchains tick, not just enabling transactions but also protecting a blockchain's integrity and anonymity.



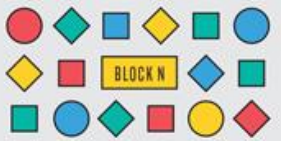
1 TRANSACTION Two parties exchange data; this could represent money, contracts, deeds, medical records, customer details, or any other asset that can be described in digital form.



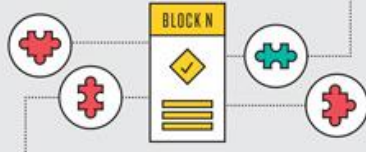
2 VERIFICATION Depending on the network's parameters, the transaction is either verified instantly or transcribed into a secured record and placed in a queue of pending transactions. In this case, nodes—the computers or servers in the network—determine if the transactions are valid based on a set of rules the network has agreed to.



3 STRUCTURE Each block is identified by a hash, a 256-bit number, created using an algorithm agreed upon by the network. A block contains a header, a reference to the previous block's hash, and a group of transactions. The sequence of linked hashes creates a secure, interdependent chain.



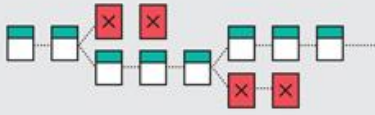
4 VALIDATION Blocks must first be validated to be added to the blockchain. The most accepted form of validation for open-source blockchains is proof of work—the solution to a mathematical puzzle derived from the block's header.



5 BLOCKCHAIN MINING Miners try to "solve" the block by making incremental changes to one variable until the solution satisfies a network-wide target. This is called "proof of work" because correct answers cannot be falsified; potential solutions must prove the appropriate level of computing power was drained in solving.

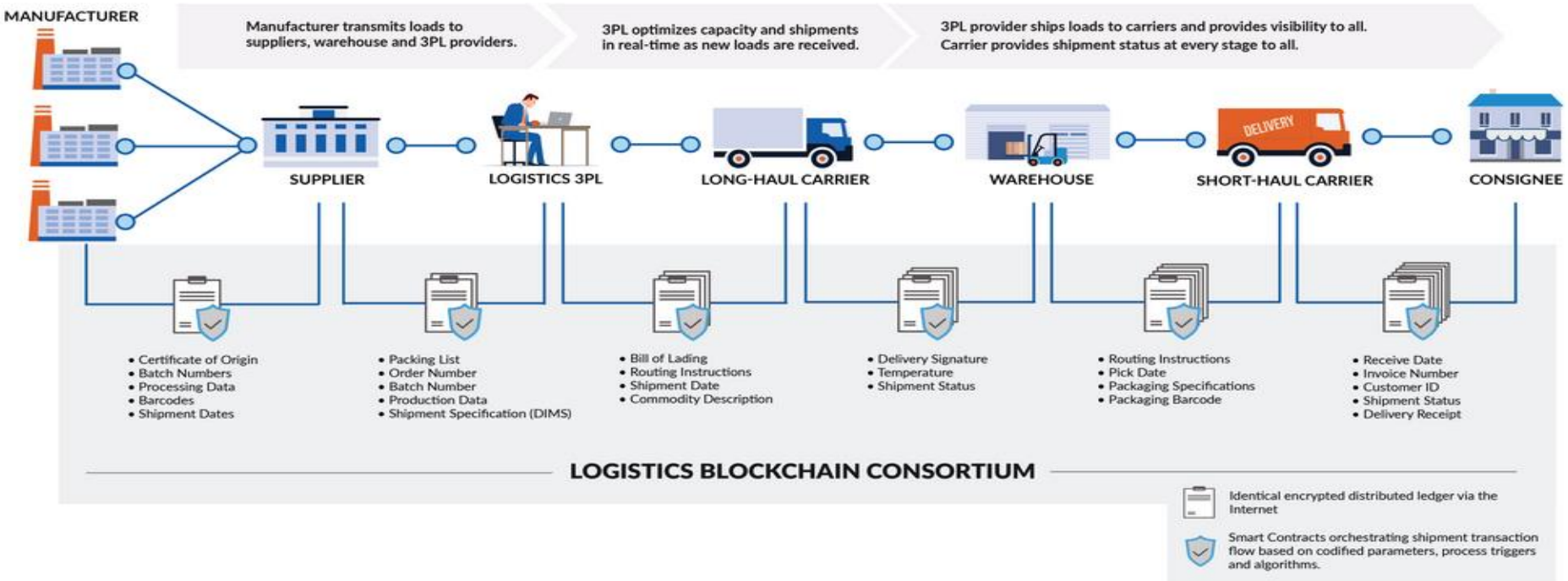


6 THE CHAIN When a block is validated, the miners that solved the puzzle are rewarded and the block is distributed through the network. Each node adds the block to the majority chain, the network's immutable and auditable blockchain.

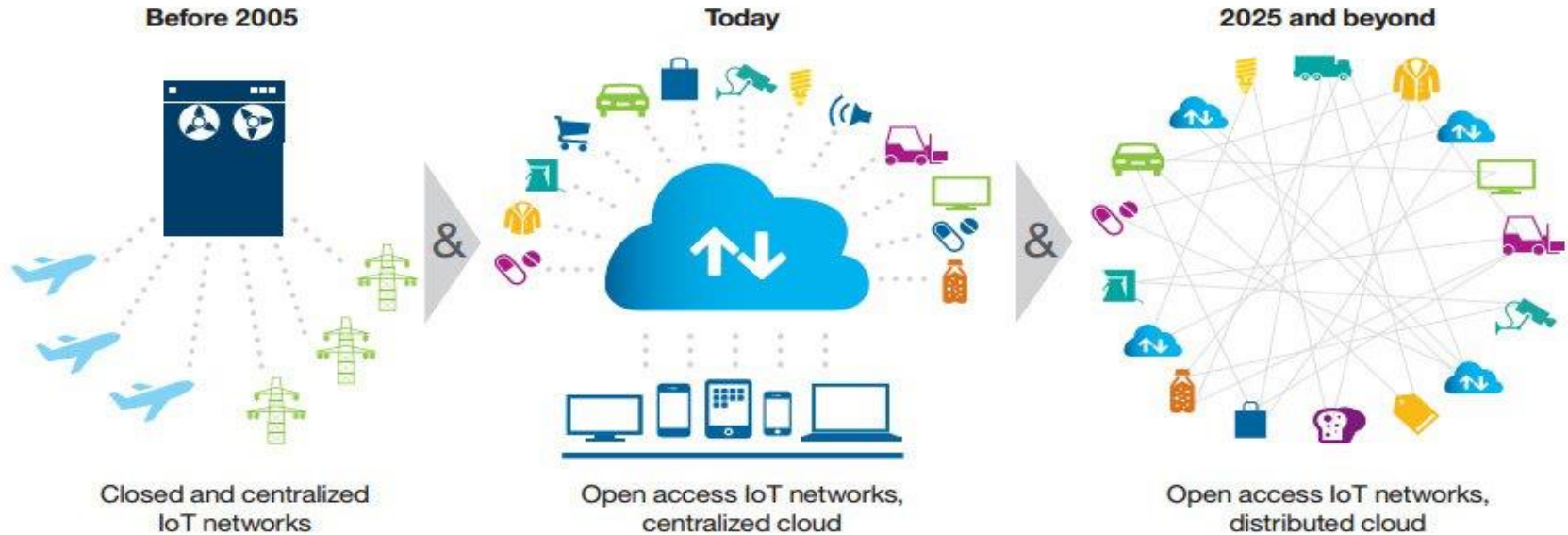


7 BUILT-IN DEFENSE If a malicious miner tries to submit an altered block to the chain, the hash function of that block, and all following blocks, would change. The other nodes would detect these changes and reject the block from the majority chain, preventing corruption.

Example: Logistics blockchain



What's the big fuss about Blockchain?



Its about new, low cost, distributed, collaborative, intelligent networks

It's where tokens represent the value of an asset being transferred between parties...

It's where a digital asset is tracked from its infancy, production, distribution, sale and/or consumption...

CHALLENGES

- Regulation
- Fraud
- Consensus
- Cybersecurity
- Scalability
- Trust
- Volatility of value
- Lack of consumer adoption

OPPORTUNITIES

- Eliminate intermediaries
- Time efficiency
- Cost reduction
- Profit enhancement
- Process improvement
- Open network protocol
- *Endless...*

Type -->	Public	Private Consortium	Semi-Private
Access	No permission required.	Members only, who could be co-founders.	Qualified users via online approvals.
Typical Implementation	As a public blockchain application.	Via a private blockchain implementation.	One company launches and acquires users after.
Innovation Target	New business models.	Processes within existing relationships.	Supporting existing models or launching new services.
Blockchain Governance	Public consensus.	Equal weight to all participants.	Controlled by a single owner.
Number of users	Millions.	Dozens to few hundreds.	Hundreds of thousands.



Token Economy

A business model which uses utility token as a way to perform different activities and provides an incentive to end users.

1



2

Blockchain as a Service(BaaS)

BaaS is all about providing an ecosystem for other companies to thrive and utilize blockchain technology.



3



Development Platforms

Development platforms provide blockchain technology stack to other organizations.



4



Blockchain Based Software Products

Companies develop blockchain based solutions and products in order to sell the solution to other organizations.



5



Network Fee Charge

A business model where network fee is charged from the end users or other entities in the blockchain.



6



Blockchain Professional Services

Professional services related to blockchain such as dApp development, consulting, auditing, etc.



7



P2P Blockchain Business Model

P2P based business model utilizes blockchain where peers are able to execute direct tasks.



Blockchain Use Cases: Comprehensive Analysis & Startups Involved



Enterprises Which Are Implementing Blockchain Technology



Apple
Patented blockchain technology for time stamping data.



Facebook
Exploring the use of blockchain to enhance data security and users privacy.



Google
Exploring the use of blockchain technology to enhance cloud service security and for data protection.



Baidu
Using blockchain to enhance intellectual rights management.



Ford
Leveraging blockchain technology to enhance the mobility of technologies.

Tencent 腾讯

Tencent
A Solution for verifying invoice authenticity and for ensuring tax compliance.



Alibaba
Using blockchain technology to track luxury goods in its e-commerce platforms.



Prudential
Unveils a blockchain-powered trading platform for small and medium-sized enterprises.



BHP Billiton
Leveraging blockchain technology for supply chains management.



FedEx
Working on blockchain solution for settling customer disputes.



Nestle
Using blockchain technology in supply management to track baby food products.



Maersk
Blockchain system for tracking movement of shipments between ports.



UPS
Blockchain-powered logistics monitoring and management solution.



Samsung
Intends to use blockchain technology to enhance supply chain management when it comes to electronics shipments.

Data Protection

eCommerce

Transportation

Trading

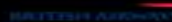
Data Integrity

Supply Chains

Healthcare



Toyota
Planning to use blockchain technology to enhance autonomous driving technology.



British Airways
Implementing blockchain to manage flight data as well as verifying travelers identity.



AAA Group
Launched the first of its kind blockchain for sharing policy data.



UnitedHealthcare
Using blockchain technology to improve doctors directories to enable accurate insurance claim filings.



MetLife
Using blockchain technology for storing patients medical records for insurance purposes.



Walmart
Using blockchain technology to track product movement from farmers to stores.



101 Blockchains
Created by 101blockchains.com

Great places to reference for further insights

- ❑ R3, Digital Asset Holdings, ConsenSys, Hyperledger, Linux Foundation
- ❑ The Muskoka Group
- ❑ IBM and Microsoft
- ❑ Coin Desk
- ❑ Morgan Stanley
- ❑ Kahn Academy
- ❑ Lets Talk Payments
- ❑ American Banker
- ❑ Blockchain Revolution/ Don and Alex Tapscott