

# Beyond the Blockchain, Distributed Ledger Technology and its Applications

This article is an extract of the  
CH&Co.'s Fintank yearly publication.

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This article is an extract of our CH&Co. Fintank yearly publication on Innovation for Financial Services. The 2018 edition addresses ways for incumbents to collaborate with Fintechs, Insurtechs and Regtechs through technologies driving the industry's digital transformation.

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# Beyond the Blockchain, Distributed Ledger Technology and its Applications

There has been a tremendous rise in interest from the Financial Services industry in Distributed Ledger Technology (DLT) and its uses. Pioneered by Bitcoin through its Blockchain technology, DLT is expected to transform the way information is transferred and verified. Banks, payments giants, insurance providers, exchange platforms as well as FinTech start-ups are working on implementing various forms of DLT in areas such as smart contracts for financial derivatives, hedging contracts, savings wallets, ownership transfer, global remittance services, compliance and many more...

DLT is a combination of existing technologies that together provide a trusted environment.

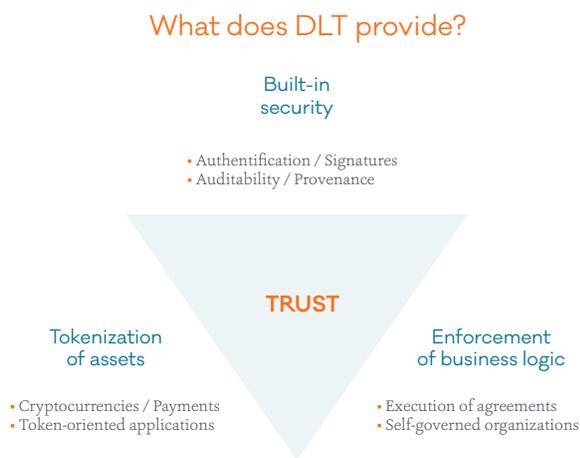
## WHAT IS DLT?

DLT refers to databases that are shared across a network of multiple sites simultaneously, whose assets are safeguarded cryptographically. To keep it simple, DLT is a combination of existing technologies that together provide a trusted environment.

Record of data + Cryptography + P2P protocol

The records of data in a DLT platform are replicated throughout the network of computers (known as nodes) that verify, and broadcast the information. The verification processes require the network to verify and arrive at a consensus that the transaction took place, thereby providing users with a trusted environment. This verification process is carried out with the use of **consensus protocols** that are used to solve the consensus problem (i.e. validating that a set of computers within the distributed network agree on a single value).

Distributed Ledger Technology brings accountability and auditability in adversarial environments with no central parties. These new technologies will profoundly affect all industries that rely on intermediaries and third-parties to carry out payments and transactions.



To understand how DLT works and how it may be used to transform current business processes, it is important to understand how the technology works and what its limitations are.

## Blockchain/Bitcoin main limitations

- **Scalability:** Blockchain is very energy intensive by design. As the ledger will become increasingly bigger, the network will require an increasing amount of power to verify the transactions. The Bitcoin community has addressed this concern through multiple initiatives, namely, the emergence of Bitcoin Cash (BCH) on August 1, 2017 which has an increased block size of 8MB, but more importantly, through its SegWit (Segregated Witness), which is a process wherein block size is limited.
- **Latency:** The transaction processing time is dependent on the time needed to generate a block. By design, block generation is set to be around 10 minutes. This limit was defined as a good consensus to account for slow connections in the network and avoid forks. Presently, Bitcoin can process about 7 transactions per second which is not enough for high volume transactions that need to clear in the seconds.
- **Governance:** Blockchain is an independent open source system. In theory, it is the community of users and core developers of the Blockchain who control the software. Yet, it is the mining power which is driving the adoption of new versions of the software. The concentration of miners and the structure of incentives around mining (which is a costly process) is a matter of concern.

To overcome Blockchain limitations and expand its use beyond the exchange of Bitcoin currency, various alternatives are being explored, from applications built on top of the Blockchain to new distributed infrastructure inspired by the Blockchain protocol.

## BEYOND THE BLOCKCHAIN, THE CASE FOR DLT

One example of the evolution and broad application of Blockchain, beyond digital currency, is the development of the Ethereum public Blockchain, which provides a way to execute peer-to-peer contracts.

### The Financial use-cases for DLT

We present below what we think are the four most promising use-cases for DLT in the Financial Services industry:

#### 1 Shared ledgers

Crypto-enabled shared databases could be used to design more efficient business processes such as multi-party accounting and market exchanges. Shared ledgers make sense in a private environment (B2C, B2B) as opposed to the other usages of DLT.

#### 2 P2P transactions

Transactions can be cleared and settled without any central third-party. P2P transactions enable the transfer of ownership of any digital token of value, assets and security. Applications include cross-border payments, especially correspondent banking, business-to-business payments and remittances.

#### 3 Immutable source of truth

Trusted registries of information that is time-stamped, authenticated and immutably stored. Applications include notarized database without any central third-party.

#### 4 Enforceable agreements

Automatic execution of simple business logic. “Smart contracts” are programs that automatically execute the terms of a contract, in other words, the terms of the contract are recorded in a computer language rather than legal language. They can have many applications in finance from syndicated lending to trade finance.

## DLT's main characteristics

The different DLT being explored vary in terms of ownership, type of access control and consensus protocol:

#### 1 Ownership

Refers to whether the network has no single owner or many owners. A public DLT allows anyone to run a node on their device and validate transactions whereas private DLT are operated by one entity or group of entities. The degree of ownership may also define the degree of anonymity of the validators.

#### 2 Type of access control

Refers to the permissions granted to make, write and validate transactions. Access can be permissionless or permissioned. Permissioned DLT are operated by known groups (or consortiums) and may provide the highest amount of benefits to the Financial Services industry as it allows them to retain control and privacy while taking advantage of the benefits of DLT.

#### 3 Consensus protocol

Refers to the specific set of rules that distributed ledgers run when considering the validity of transactions (in other words, it is the set of rules that solve the problem). As explained further in our article, the type of consensus protocols in DLT is in a way the choice of business model that the organization wishes to implement.

Distributed Ledger Technology brings accountability and auditability in adversarial environments with no central parties.



The following graph provides a summary of the options available in terms of ownership and type of access control:

Types of Distributed Ledgers	<p>Permissioned</p> <p>Private Distributed</p>	<p>Permissioned</p> <p>Public Distributed</p>	<p>Permissionless</p> <p>Public Distributed</p>
	<p>Consensus Protocol</p> <p>Federated Byzantine Agreement / Practical Byzantine Fault Tolerance</p>	<p>Consensus Protocol</p> <p>Federated Byzantine Agreement / Practical Byzantine Fault Tolerance</p>	<p>Consensus Protocol</p> <p>Proof-of-work / Proof-of-stake</p>
<p>Examples</p> <p>MultiChain</p>	<p>Examples</p> <p>ripple</p>	<p>Examples</p> <p>ethereum</p>	
<p>Description</p>	<p><b>MultiChain</b> is an open source platform for private DLT, which offers a rich set of features including extensive configurability, rapid deployment, permissions management, native assets and data streams.</p>	<p><b>Ripple</b> is an R3 project for the creation of a distributed ledger platform used for recording and managing financial agreements.</p>	<p><b>Ethereum</b> is a programming framework using its own token “Ether”, allowing a network of peers to manage their own smart contracts in the absence of a central authority.</p>

Source: Government Office for Science, “Distributed Ledger Technology: beyond block chain” Jan. 2016 (gov.uk/government/news/distributed-ledger-technology-beyond-block-chain); Multiple articles (BlockchainHub.net); CH&Co. Analysis

Many attempts have been made at classifying DLT platforms, all of which have been disputed, as it is hard to fit all technologies into specific buckets.

However, classification by consensus protocol may provide institutions looking into implementation of a DLT platform with the information required to make an initial decision.

	Players	Description
FBA	 chain.com	Chain is an enterprise-grade Blockchain infrastructure that enables for issue and transfer of financial assets on permissioned Blockchain. In May 2017, Chain entered a partnership with Citi for its payment settlement.
	 openchain	Openchain provides an open source, enterprise-ready Blockchain technology platform.
	 ripple	Ripple is an open source protocol allowing for payments, exchanges and remittances. It supports any kind of token (including fiat currency or any unit of value). Santander is one of Ripple's investor. Fidor Bank, CBW Bank, WestPac, ANZ Bank, Rabobank and Cross River bank are reported to be implementing or experimenting with Ripple's solution.
PBFT	 MultiChain	MultiChain is an open source platform for private Blockchain, which offers a rich set of features including extensive configurability, rapid deployment, permissions management, native assets and data streams.
	 symbiont	Symbiont is a Blockchain technology company based in New York City, that developed an issuance and trading platform for "smart securities", which are smart contracts modelling the complexity of financial instruments.
	 HydraChain	HydraChain is an extension of the Ethereum platform which adds support for creating Permissioned Distributed Ledgers. Its primary domain of application is private chain or consortium chain setups.
Proof of stake	 CREDITS BUILDING TRUSTED BLOCKCHAINS	Credits is a Blockchain platform provider supplying distributed ledger technology software to power enterprise and public sector applications.
	 MONAX	Monax is a controllable (permissionable), smart contract-enabled, proof-of-stake based blockchain design.
Proof of work	 ethereum	Ethereum is a programming framework using its own token "Ether", allowing a network of peers to manage their own smart contracts in the absence of a central authority. Microsoft has partnered with Consensus and Ethereum to provide development tools for Microsoft's enterprise customers.
	 litecoin	Litecoin is an experimental digital currency that enables instant payments to anyone, anywhere in the world. Litecoin uses peer-to-peer technology to operate with no central authority: managing transactions and issuing money are carried out collectively by the network. Litecoin Core is the name of open source software which enables the use of this currency.

Source: Company websites; CH&Co. analysis

## FINAL WORD

Distributed ledgers are setting the stage for smart contract execution, real-time settlements and international money transfers. When a viable solution becomes available with the approval from regulators, it will have a significant impact in the Financial Services value chain, starting with collateral management, custodian services and central counterparty clearing. In the long term, it may go way beyond and redefine our relationship with the concepts of identity and ownership.

Today, major financial institutions are experimenting with the technology, and consortiums are emerging hoping to control future standards. Indeed, it is key for financial institutions to stay alert and anticipate this wave of innovation.

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# Acknowledgements & Contacts

## CH&Co. Digital Expertise

We are deeply involved in growing the global FinTech community and use our knowledge to enhance our public Fintank.net database. We cofounded FinTech hubs, such as FinFusion in Montreal or Finance Innovation in Paris, and regularly co-organize FinTech meetups in New York, Singapore, France, London and Geneva. The events unite leaders from the Financial Services industry, startups and other innovators featuring panel discussions, demos and insights from our FinTech experts that are among the world's top influencers.

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