

# CBDC Part 4: An Introduction to JP Morgan's Quorum

## WEEKLY RECAP

- Total market cap. reached \$123bn (a 8% increase), and 7 day trading volume rose 7% for top 100 crypto

## THOUGHTS OF THE WEEK

How an enterprise blockchain achieves privacy is a question with many possible answers, ranging from the relative simplicity of bilateral channels to the use of data heavy zero knowledge proof transactions (txs). JP Morgan's Quorum sets out to transform Ethereum into an "enterprise-ready distributed ledger & smart contract platform".

The components Quorum differ somewhat from Ethereum. Foremost is the introduction of private state trees. The Quorum blockchain (just like Ethereum) saves information in the form of states, and txs modify states on the blockchain. Quorum nodes have a public and individual private state trees, with the public state tree storing vanilla Ethereum txs and hashes of encrypted private smart contract changes.

A Zero Knowledge Security Layer (ZSL) is another core component of Quorum. ZSL enables the transfer of assets on the network without revealing the sender, receiver, nor the quantity of the asset. Hashed values of the initial balance, tx amount, and final balance are submitted by the sender and receiver to a proof generator off-chain. They are subsequently submitted to the Quorum chain for verification by other nodes, after which the tx is confirmed & balances updated.

Quorum thus requires both private and public smart contract txs. The private contracts enable private txs between two parties, while public transactions are used to distribute ZSL proofs for verification on the Quorum network. The tx flow under Quorum is visualized in the Chart of the Week, and narrated most succinctly by the Ubin Phase 2 whitepaper: "A payment instruction for fund transfer is initiated from the sender's dApp. The dApp invokes the private contract to generate a private tx. The sender's dApp then invokes a public tx which will be executed by all nodes on the Quorum network. The public tx is created with the hash of payment instruction amounts which will be used as inputs to generate and verify proofs. Hashing is done to maintain data privacy since public txs are propagated to all nodes in the network."

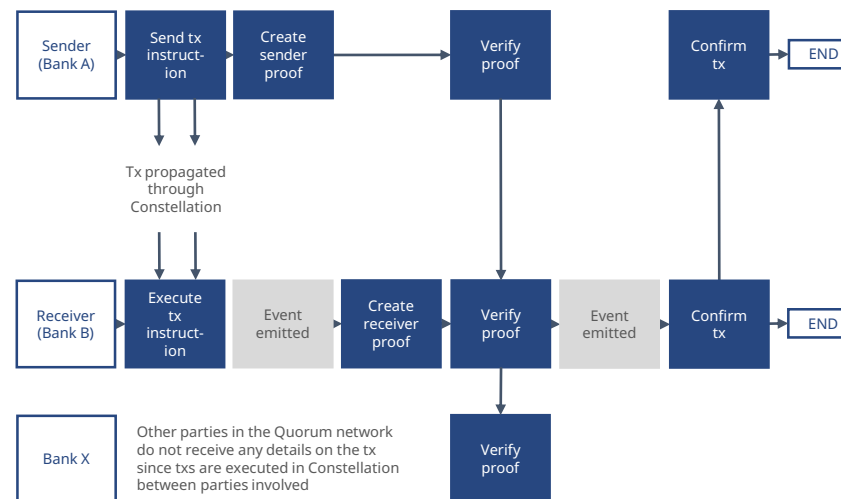
Tx finality is another characteristic that is of crucial importance in enterprise settings. Financial institutions are typically unable to handle probabilistic finality, and the probabilistic nature of finality under Ethereum's Proof-of-Work is thus unsuitable for enterprise applications. Quorum introduces alternative ways of achieving consensus, the one having been evaluated by Singapore's Monetary Authority for wholesale settlement purposes being "Raft". Raft has been used for many years in software such as Kubernetes. It relies on the concept of a single leader, who proposes blocks that others validate. This means there is no forking, and as such there is transaction finality. Also allows for block times that are significantly faster than is possible under Ethereum. Quorum will finally be compared to Corda and Fabric in part 5 of this series.

## TOP CRYPTO PERFORMANCE SUMMARY

Name	Price	7D%	Vol.	7D%	Mkt Cap.	% Total Mkt
BTC	\$3,690.19	6.51%	35.35bn	8.80%	64.69bn	52.58%
ETH	\$124.81	16.12%	16.77bn	7.97%	13.08bn	10.63%
XRP	\$0.31	2.70%	2.88bn	-15.46%	12.76bn	10.37%
LTC	\$46.83	39.36%	6.66bn	49.30%	2.83bn	2.30%
EOS	\$2.84	19.32%	4.44bn	10.59%	2.57bn	2.09%
BCH	\$127.59	7.40%	1.59bn	8.01%	2.25bn	1.83%
USDT	\$1.00	0.24%	27.22bn	15.70%	2.03bn	1.65%
TRX	\$0.03	1.44%	1.20bn	-14.32%	1.72bn	1.40%
XLM	\$0.08	-1.62%	0.77bn	-10.70%	1.54bn	1.25%
BSV	\$66.61	4.44%	0.52bn	20.96%	1.17bn	0.95%

## CHART OF THE WEEK

Transaction Flow of Fund Transfer in Quorum



## TOP CRYPTO NEWS AT A GLANCE

**Bakkt finalizes first acquisition:** The acquisition of Rosenthal Collins Group helps Bakkt to build out a trusted institutional infrastructure for digital assets.

**Bitcoin accepted by Argentina's state public transport card SUBE:** The partnership between Alto Viaje and Bitex enables SUBE cards to be funded by BTC.

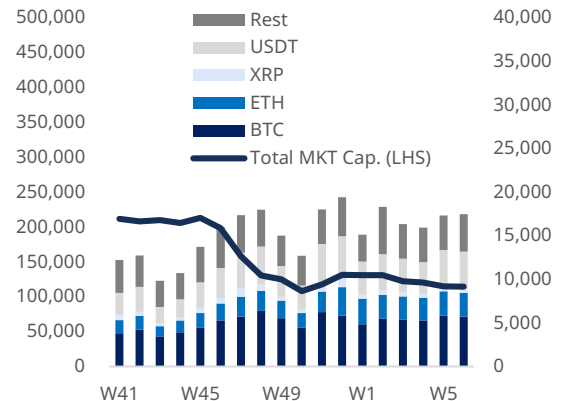
**Credit Suisse completes joint mutual fund transactions using blockchain:** The trade is processed via FundsDLT, which reduces the time between request and the settlement from delivery of the order to trade processing.

**Bitcoin trading reaches all time high in Venezuela:** Trading volumes reached above 2,000 BTC (about \$6.8 million) on LocalBitcoins. A large amount of trading is taking place on centralized exchanges in Columbia and Brazil.

## NETWORK FUNDAMENTALS

	BTC	ETH
<b>Hashrate</b>	44,719,919 TH/s (+5.9%)	138,005 GH/s (-3.6%)
<b># Wallet Users</b>	33,049,534 (+0.7%)	56,645,801 (+0.7%)
<b>Top 3 Miners</b>	BTC.com (16%) F2Pool (13%) AntPool (11%)	Ethermine (29%) SparkPool (15%) NanoPool (14%)

## MARKET CAP & TRADING VOL. (US\$ MN)



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WEEKLY SUMMARY | 4 – 10 FEBRUARY

## DISCLAIMER

**Abbreviations:** ADA: Cardano; BCH: Bitcoin ABC; BSV: Bitcoin Satoshi Vision; bn: billion; BTC: Bitcoin; Central Bank Digital Currency: CBDC; crypto: cryptocurrencies; ETH: Ethereum; ICO: Initial Coin Offerings; Market Cap: Market Capitalization; mn: million; Trading Vol.: Trading Volume; tx: transaction(s); US\$: United States Dollars; USDT: USD Tether; XLM: Stellar Lumens; XMR: Monero; XRP: Ripple; ZSL: Zero Knowledge Security Layer

**Chart of The Week:** Sources: Project Ubin Phase 2 whitepaper, Standard Kepler Research

**Market Cap & Trading Vol.:** Sources: Coinmarketcap, Standard Kepler Research  
The horizontal axis represents the week number in 2018. For instance, W41 indicates the forty first week in 2018. W1 indicates the first week in 2019. The primary vertical axis represents total market capitalization; and the secondary vertical axis represents total trading volume.

**Network Fundamentals:** Sources: Blockchain.com, Blocktrail, Etherchain.org, Etherscan.io, Standard Kepler Research

**Thought of The Week:** Sources: Quorum whitepaper, Project Jasper 1 whitepaper, Project Jasper 2 whitepaper, Project Jasper 3 whitepaper, Project Ubin 1 whitepaper, Project Ubin 2 whitepaper, Stella 1 whitepaper, Stella 2 whitepaper, Project Khokha whitepaper, Standard Kepler Research

**Top Crypto News At a Glance:** Sources: Blockcast.it, CCN, Coindesk, Cointelegraph, Standard Kepler Research

**Top Crypto Performance Summary:** Sources: Coinmarketcap, Standard Kepler Research

**Week Ahead:** Sources: Cryptocalendar.pro, Standard Kepler Research

**Weekly Recap:** Sources: Coinmarketcap, Standard Kepler Research

Past performance does not guarantee future results.

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The price of Bitcoin and other cryptocurrencies are highly volatile in nature. It is suggested that clients should perform their own due diligence and consult a fully qualified independent professional financial adviser before making any investments in cryptocurrencies.

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Unless otherwise stated, all data is as of February 10, 2019 or as of most recently available.

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