

CRYPTOCURRENCIES IN SPACE?

In the 10 years since its inception, Bitcoin has edged its way into the markets to such an extent that it's now a major disruptive factor. Almost daily, we're seeing newspapers reporting on the latest price trends, and why it's good or bad, depending on your point of view. While formerly remaining within its only small niche, of interest only to techy people, financial companies and speculators, today Bitcoin has started to become truly global with the help of satellite.

By now, most of us have heard the term 'Bitcoin' being bandied about pubs on Friday nights, or read snippets about it in the press. There's a general awareness of cryptocurrencies as a whole, and an understanding that those who got in on the ground floor ten years ago have done extremely well for themselves, but most people remain in the dark about how they work and the implications for the future.

Bitcoin was the first decentralised cryptocurrency available on the market, and as such is the most widely-known. It's had its fair share of ups and downs since its launch as investors rushed into the market, only to dump their stock at the first sign of a wobble. Back in March 2010, each Bitcoin was worth US\$0.003, while in May 2010, the first real-world transaction took place when Laszlo Hanyecz bought two pizzas for 10,000 Bitcoin (he must be looking back on that in horror). The first Bitcoin bubble saw prices peak at US\$31 in July 2011, followed by a crash down to US\$2 in December 2011. The latest peak came in December 2017, when prices hit US\$17,900. It's clear that Bitcoin trading is a volatile business to be in.

General distrust of banks, financial institutions and governments has played a key role in fuelling the rise of cryptocurrencies. There are many who believe that cryptocurrencies are the key to the future, and find immense value in a digital currency that is beyond the control of governments, banks and companies. A world

where each user directly owns their money, instead of the banks, is extremely attractive for much of the population, who mistrust financial institutions and/or fear for the future. In addition to providing what many see as a more fair and safe financial system, it's said that cryptocurrencies will solve the problem of weak and failing

currencies, such as Venezuela's Bolívar.

However, for Bitcoin to truly be used as a real currency in every day life, it requires several things:

- A stable price that does not fluctuate;
- To be widely-accepted as legal tender, for both public and private debts; and
- Easy and frictionless trading between people and entities.

None of these measures have been met, for Bitcoin or any other decentralised cryptocurrency. A stable price is an absolute must; for example, should a company move all its holdings from Dollars to Bitcoin, the value of those holdings could fall by a half in minutes, should the market swing in that direction. Currently, it is just not possible for entities to operate in Bitcoin alone. Even safe storage is a problem; all are held in a private digital wallet or exchange, so they are only as secure as your computer is to hacking. Hundreds of millions of Dollars of cryptocurrencies have famously already been stolen from both large corporations and individuals to date.

For now, Bitcoin and other cryptocurrencies remain a tool for speculators (and apparently a way for criminals to go about their drug dealing, cyberfraud, prostitution and gun-running businesses, depending on which news outlets you use). However, in the longer term, once the market has evened out and speculators are no longer



able to make a quick profit, cryptocurrencies have the potential to act as a viable alternative to cold hard cash.

Isn't it just about Bitcoin?

Back in 2009, Bitcoin changed the world, exciting investors and futurists alike. Today, however, there is a massive range of cryptocurrencies available, all unique in their own right.

Litecoin (LTC) was released in 2011, and while quite similar to Bitcoin in terms of technology, aims to process a block every 2.5 minutes compared with Bitcoin's 10 minutes, and has remained much more affordable than Bitcoin at a current price of £111.15 (3rd May 2018).

Ethereum (ETH), meanwhile, went live in 2015, and unlike its predecessors, is much more than just its cryptocurrency, known as Ether and currently valued at £522.99 (3rd May 2018). The decentralised Turing-complete virtual machine platform runs smart contracts, namely applications that run exactly as programmed with no possibility of downtime, censorship, fraud or third-party interference. A great many people are excited to see what the future holds with Ethereum.

Financial institutions, while outspokenly cynical on the topic of Bitcoin and its ilk, have nevertheless also jumped on board with the new technologies. Ripple, a real-time gross settlement system (RTGS), currency exchange and remittance network, is built upon a distributed open source Internet protocol, consensus ledger and native cryptocurrency called Ripples (XRP). Ripple claims to enable 'secure, instantly and nearly free global financial transactions of any size with no chargebacks.' It is increasingly being adopted by banks, payment networks and companies such as UniCredit, UBS and Santander.

Countries and cities, too, are getting in on the action by launching their own cryptocurrencies. Dubai launched emCash in October 2017, which works using the emWallet system. With it, consumers can achieve anything from buying their daily coffee to paying utility bills and money transfers. "A digital currency has varied advantages – faster processing, improved delivery time,

less complexity and cost, to name a few," said Dubai Economy Deputy Director General Ali Ibrahim. "It will change the way people live and do business in Dubai, and mark a giant leap for the city in harnessing game-changing innovations to improve ease of business and quality of life."

What is blockchain?

Blockchain has become a major technology to watch in the last few years. The word is bandied around a lot, but not many people are aware of what it means exactly, except that it has something to do with Bitcoin.

The first blockchain was famously conceptualised in 2008 and implemented in 2009 by Satoshi Nakamoto, a person or group who, to this day, has remained anonymous. This first blockchain system was the core component of Bitcoin, where it acts as the public ledger

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for every transaction. Since then, other entities have come on board with their own blockchain technologies for use in other cryptocurrencies or related systems.

A blockchain is a continuously-growing list of records or 'blocks,' which are linked and secured using cryptography. Each block usually contains a hash pointer as a link to a previous block, a timestamp, and transaction data. That means that, by design, blockchains are resistant to data modification. In the words of the *Harvard Business Review*, "...blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way." For

use as a distributed ledger, a blockchain is managed by a peer-to-peer network collectively adhering to a protocol for validating new blocks. Blockchains are, in effect, a distributed computing system delivering a decentralised consensus, making them suitable for recording events, transaction processing, food traceability, voting, and general record





Blockstream and Nexus both plan to bring cryptocurrencies into the space domain

management. So, while blockchain technology is absolutely critical for cryptocurrencies, we can expect to see many more applications emerging in the near and medium futures on the basis of blockchain. Many believe that, contrary to popular opinion, it is the blockchain technology itself, and not Bitcoin, which will deliver truly world-changing innovations in the years to come. Let's hope the apps become more useful than CryptoKitties, the most well-known application yet based on Ethereum's blockchain technology.

What do satellites have to do with it?

It wasn't until very recently that cryptocurrencies became a relevant topic for the satellite sector. However, two major stories have emerged in recent months which demonstrate the roles satellite can play in the blockchain/cryptocurrency market. Both use cases evidence that satellites can provide a capability that no other technology can; the ability to reach the unconnected, and the reliability and always-on connectivity that those of us in the satellite sector take for granted.

Blockstream utilises satellite network for more inclusive Bitcoin trading

Blockstream, a global leader in interoperable blockchain technologies, announced in August 2017 the availability of Blockstream Satellite, a new service which broadcasts real-time Bitcoin blockchain data from a network of satellites to two thirds of the Earth's population, rising to 99.999 percent once additional satellite capacity is integrated.

The new service will enable further participation in Bitcoin, namely the billions of people in the world without Internet access, as well as people in places where bandwidth costs make participating price prohibitive. According to CEO Adam Black, Blockstream

Satellite will put Bitcoin into the hands of those who need it most. He told *CoinDesk*: "There is some coincidence between countries with poor Internet infrastructure and unstable currencies. The people who are in direct need of Bitcoin are those who currently have unstable access to Bitcoin. This project will address that problem, and, we hope, will allow many more people to use bitcoin."

Blockstream Satellite is the world's first public satellite service that allows anyone to operate and maintain Bitcoin nodes, without the constraints of traditional network connectivity. Blockstream Satellite sends blocks in real-time, as well as recirculates older blocks, providing free access to the Bitcoin blockchain for both long-time and new users. In addition, Blockstream Satellite provides an additional layer of reliability for blockchain data in the event of a network partition.

"Bitcoin is a powerful and transformative Internet native digital money that has blazed a trail of disruption, with its full potential yet to unfold. Because it's permissionless, Bitcoin enables anyone to freely create new financial applications and other innovations that use the blockchain that haven't been possible before," said Adam Back, Co-Founder and CEO at Blockstream. "Today's launch of Blockstream Satellite gives even more people on the planet the choice to participate in Bitcoin. With more users accessing the Bitcoin blockchain with the free broadcast from Blockstream Satellite, we expect the global reach to drive more adoption and use cases for Bitcoin, while strengthening the overall robustness of the network."

The Blockstream Satellite network currently consists of three GEO satellites: Intelsat's Galaxy 18 covering North America, Eutelsat 113 covering South America, and Telstar 11N covering Africa and Europe. Capacity on additional satellites is expected to be added to the network shortly to expand coverage. Teleports uplink the public Bitcoin blockchain data to the satellites in the

network, which then broadcast the data to large areas across the globe. According to Blockstream, additional teleports are being built out in phases to enable worldwide coverage.

Blockstream Satellite makes extensive use of open source software. GNU Radio, an open source software development toolkit, enables the cross-platform implementation of software-defined radios (SDRs). The use of SDRs eliminates the need for specialized hardware, which greatly reduces cost and makes the technology widely-available.

To further ensure performance and reliability, Blockstream Satellite utilizes the Fast Internet Bitcoin Relay Engine (FIBRE), an open source protocol. Together, these open source technologies power the Blockstream Satellite network, enabling Blockstream to provide this free service reliably and cost effectively. Consumers require around US\$100 of equipment, including a USB SDR interface and a small satellite antenna (let's hope Blockstream's instructions for self-installation and pointing are accurate, otherwise we could be looking at a whole lot of new interference).

Nexus to launch first space-based cryptocurrency

Meanwhile, in December 2017, we received an announcement that nanosatellite launch company Vector had partnered with Nexus to host its decentralised cryptocurrency in space using Vector's GalacticSky software-defined satellite platform. This would make Nexus the first company to deploy a cryptocurrency, NXS, on a satellite.

"With Bitcoin's valuation at an all-time high, people are beginning to accept cryptocurrency as a real form of payment, but there are still problems with storage and ownership," said Colin Cantrell, Founder and Lead Core Developer of Nexus. "The capabilities provided by the GalacticSky platform, combined with the flexibility of Vector's launch model, bring us one step closer to

accomplishing our mission of providing the world with a decentralized currency that can be accessed virtually anywhere, anytime."

By hosting NXS in space via GalacticSky, Nexus will no longer be tied to a nation-state and can create the backbone for a more decentralised financial ecosystem. By utilising a satellite virtualisation platform through GalacticSky, Nexus can distribute its blockchain across multiple satellites, providing it enhanced reliability and performance. Nexus' secure cryptocurrency and decentralised peer-to-peer network will grant greater freedom and transactional transparency for global access to financial services.

By hosting Nexus' cryptocurrency on Vector's software-defined satellite, Nexus can further demonstrate the wide range of disruptive innovations that can be hosted on the GalacticSky platform. GalacticSky's mission is to provide unprecedented accessibility to entrepreneurs and space innovators, and the platform's additional level of reliability and scalability makes it a natural fit for cryptocurrency applications. Vector's first deployment of NXS is expected to take place in 2019.

"Over the last year, we've made many advancements in order to solidify our standing as a leading nanosatellite launch company," said Jim Cantrell, CEO and Co-Founder of Vector. "Housing Nexus' cryptocurrency on our GalacticSky platform not only validates our proof of concept, but demonstrates how prolific this opportunity is for start-ups looking to innovate in space without the need to build their own satellite."

According to the developers, Nexus provides improvements over existing blockchain systems like Bitcoin and Ethereum. It features SHA-3 cryptography with 571-bit keys, which reportedly provides 'quantum security' against next-generation quantum computers and hackers. Nexus is also working on a 3D Chain to address today's challenges of speed and scalability. ■

