



SECTOR OVERVIEW October 17, 2017

Blockchain: Coming of Age

Summary – 2017 has turned out to be the year of blockchain and cryptocurrencies.

- ▶ Blockchain, the underlying distributed ledger technology (DLT) of Bitcoin and other cryptocurrencies, is finally coming of age. In our view, blockchain is nearing a tipping point, as there are countless pilots underway to deploy this transformational and disruptive technology across a wide array of applications, with commercial deployments poised to ramp significantly in the next couple of years.
- ▶ Meanwhile, cryptocurrencies are rapidly gaining a broader audience, which is helping drive the dramatic rise in their prices, with the Bitcoin price roughly quintupling this year and Ether up more than 40-fold.
- ▶ In this note, we highlight some of the key developments in the blockchain and cryptocurrency space, including stances taken by various regulatory bodies and governments worldwide. We also take a look at the increasing number of ways investors can gain exposure to this space, with opportunities to date being somewhat limited and/or difficult/daunting for the average person.

Key Highlights:

- ▶ **Blockchain is getting ready for prime time.** After many years of talk about its potential, blockchain is now on the cusp of transforming many aspects our everyday lives given the plethora of applications for blockchain technology. Outside of the main current use with cryptocurrencies/digital currencies, there are many other applications including financial services (e.g., payments, money transfer, interbank payments/settlement, insurance), supply chain management, securities/commodity/currency trading (e.g., trade execution, audit/compliance), personal information management, and asset ownership/registry.
- ▶ **A vast array of applications for blockchain means there is plenty of room for vendors, both large and small.** Consolidation activity is likely to accelerate once the market achieves greater scale and maturity.
- ▶ **Cryptocurrencies...an emerging asset class.** Cryptocurrencies are finally becoming mainstream, helping drive prices through the roof. The surge in the price of many cryptocurrencies this year has been aided by increased individual investor in the space, including in Initial Coin Offerings (ICOs).
- ▶ **But buyer beware, as regulatory bodies step up their presence.** Many regulators worldwide seem to have been caught off guard by the rapid rise in popularity of cryptocurrencies and ICOs. Some countries have shut down exchanges and/or banned cryptocurrencies and ICOs, which has led to significant volatility in cryptocurrency prices.
- ▶ **Increasing options for people to gain exposure to blockchain and cryptocurrencies.** The rise in the number of blockchain/cryptocurrency investment vehicles/securities means people have more choices to gain exposure to this new asset class.

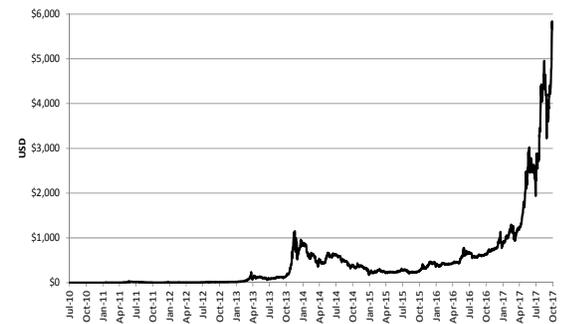
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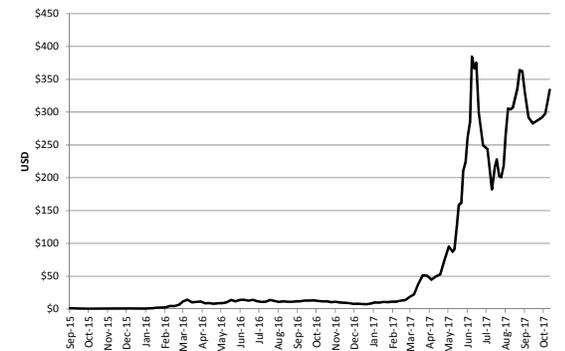
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Bitcoin (in USD)



Source: CoinDesk

Ether (in USD)



Source: CoinDesk

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A Disclosure fact sheet is available on Pages 6-8 of this report.



The blockchain proliferation. While cryptocurrencies have grabbed much of the headlines since Bitcoin’s launch at the start of 2009, blockchain is finally moving toward the forefront after several years of talk about blockchain’s enormous potential to revolutionize the world.

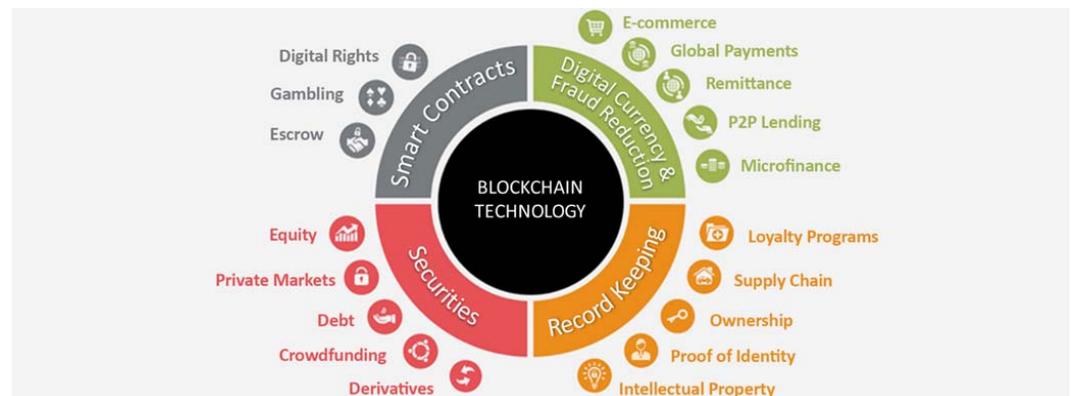
Blockchain is the distributed ledger technology (DLT) that underlies Bitcoin and other cryptocurrencies. Think of it as a decentralized database of transactions/records that are linked and grouped into “blocks” and stored across a network of nodes/computers worldwide. These nodes/computers are responsible for verifying/validating and storing these transactions, with each node/computer having the exact same copy of the blockchain, making it (near) impossible for someone to hack (e.g., if someone wanted to change one record/transaction, they would have to do it in all of the nodes/computers on the network) and thus there is no central authority that controls the blockchain and given the large network of nodes/computers, there is no single point of failure.

These nodes/computers on the network compete with each other to solve mathematical/computational puzzles that help verify/validate transactions that get added to the blockchain (i.e., mining) and in exchange for this work, they are rewarded with Bitcoin or another cryptocurrency.

The network is also public, as anyone can join and get a copy of the blockchain, and it reconciles itself at regular intervals with nodes/computers working together to achieve consensus.

Given the compelling and unique attributes of the blockchain, there has been no shortage of ideas on how it can be deployed to improve existing processes and applications, with Figure 1 highlighting just some of the numerous areas where blockchain is being applied.

Figure 1 – Some of the Many Potential Applications for Blockchain



Source: ACI Worldwide

The vast potential of the blockchain has attracted vendors of all sizes. The opportunity to deploy blockchain-based solutions targeting applications both big and small has attracted a wide array of vendors to the market ranging from small, private start-ups to blue-chip, multi-billion dollar technology companies looking for the next big thing to drive future growth.

IBM was amongst the first blue-chip technology companies to investigate opportunities in the blockchain space, as a small number of employees began working on their own version of Bitcoin in 2014 and realized the potential to use the underlying blockchain technology to help manage supply chains. The Company pushed ahead, hoping this initiative could ultimately help reverse the erosion in its core business. It made the technology (Hyperledger) open source and it has an impressive list of members that are working to deploy Hyperledger-based blockchain solutions across a vast array of applications. Earlier this week, IBM announced a new blockchain banking solution that targets cross-border payments to help reduce the settlement times and costs for



businesses and consumers. Given the enormous market opportunity in cross-border payments, we expect this space to see plenty of blockchain-based solutions come to market, with incumbent SWIFT also not standing still, as they made their own blockchain-based announcement last week.

Many other blue-chip tech companies have increased their focus on the blockchain space including Microsoft, HP Enterprise, Fujitsu, and Oracle.

In addition to Hyperledger, there are several other blockchain-based consortiums and companies looking to take the lead in this emerging space including Enterprise Ethereum Alliance (>150 members), Chain (working on a B2B payment solution with Visa), Ripple (>90 customers worldwide; focused on global money transfer/payments), and R3 CEV (>100 global financial institutions and regulators).

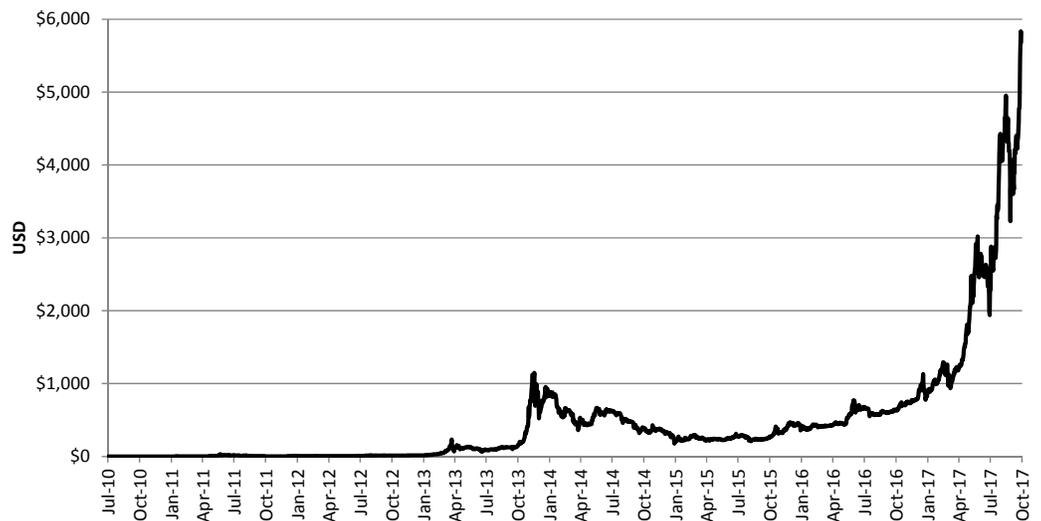
There are also what seems to be countless numbers of smaller companies working on blockchain-based solutions targeting both niche applications as well as enormous multi-billion dollar markets.

In the next few years, we will get a better sense of where blockchain is being or likely to be successfully deployed and possibly see a related shake-out in the industry. We are seeing an increasing number of companies announcing their plans for developing blockchain-based applications. Not all of these companies are going to make it and we believe investors must be wary of companies looking to get a boost to their valuation by conveying their “plans” for the blockchain.

Consolidation activity is also likely to accelerate once the market achieves greater scale and maturity.

2017 has been a breakout year for cryptocurrencies. Very few if anyone could have forecasted the blistering surge in cryptocurrency prices this year, especially Bitcoin which has roughly quintupled and Ether which is up more than 40-fold just this year alone.

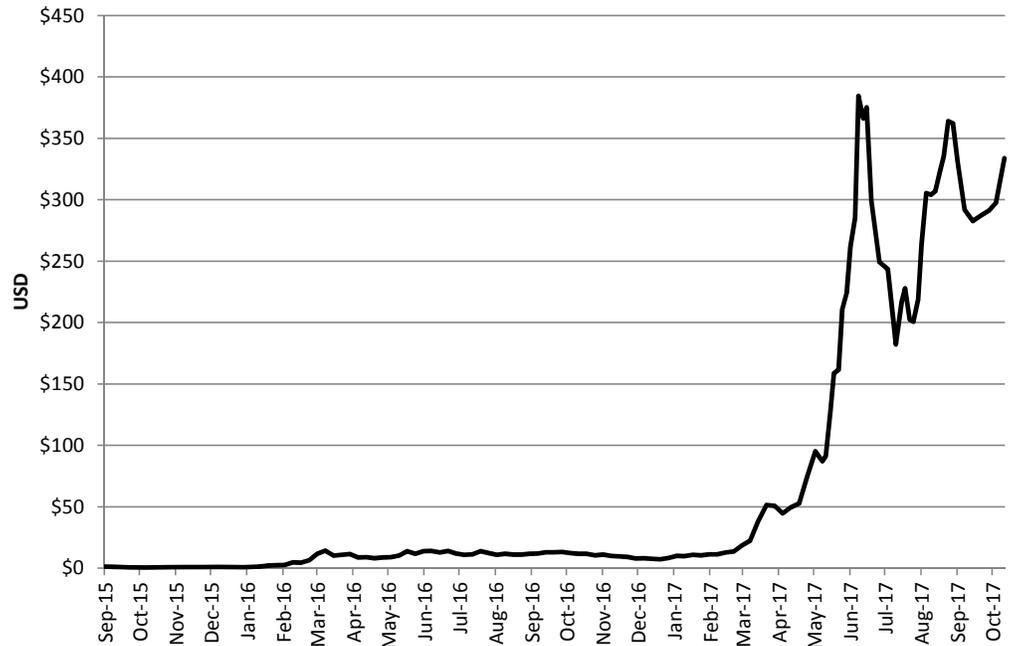
Figure 2 – Bitcoin’s Surge Continues to Hit New All-Time Highs...



Source: Coindesk



Figure 3 – ...Just Like Ether, Which is Up More Than 40-Fold This Year Alone



Source: Coindesk

The dramatic rise in cryptocurrency prices has been driven in part by increased investor interest in the space, as more people are getting drawn in given the breathtaking rise in cryptocurrency prices this year and the hope that the party will continue on for the foreseeable future.

Institutional investors, particularly hedge funds, have also been looking to get a piece of the action to help them generate alpha. Earlier this year, Abigail Johnson, CEO of Fidelity, one of the world’s largest asset management firms, indicated that she is a fan of Bitcoin and that Fidelity is mining Bitcoin and Ether as one of their projects that looks to help realize the potential of Bitcoin and other cryptocurrencies. Fidelity has also been integrating cryptocurrency features and functionality into their website for clients.

The mind-boggling rise in the price of Ether this year has also been bolstered by the recent surge in ICOs, as companies typically look for ICO buyers to pay for their coins/tokens with Ether. According to the Token Report, a database of cryptocurrencies, there were 105 ICOs last quarter (Q3) worth US\$1.32B, more than what was sold in all of the 1H CY17 (>US\$956M) and ~13x more than all that was sold in 2016 (~US\$100M).

There are well over 1,000 different cryptocurrencies that are being traded with a market cap of ~US\$175B. Bitcoin accounts for the largest chunk of the market (~55% of the total market cap) with Ether a distant second despite its enormous move up this year (~18% of the total market cap).



Figure 4 – Top 10 Cryptocurrencies by Market Cap

Name	Symbol	Market Cap (in US\$B)
 Bitcoin	BTC	\$94.1
 Ethereum	ETH	\$31.7
 Ripple	XRP	\$9.8
 Bitcoin Cash	BCH	\$5.2
 Litecoin	LTC	\$3.5
 Dash	DASH	\$2.3
 NEM	XEM	\$2.0
 Monero	XMR	\$1.4
 BitConnect	BCC	\$1.4
 NEO	NEO	\$1.4

As of October 16th, 2017

Source: Coinmarketcap.com

We note that there are numerous detractors of Bitcoin and cryptocurrencies, most notably JP Morgan CEO Jamie Dimon, who last month called Bitcoin a fraud, which led to Bitcoin trading at session lows on the back of his comments.

We also highlight that there could be additional headwinds (and volatility) from future regulatory announcements as well as risks from (high profile) hacks/thefts/security breaches involving the loss of Bitcoin and other cryptocurrencies (e.g. Mt. Gox, Bitfinex).

Finally, although there was not much of an impact on August 1st when Bitcoin last forked (Bitcoin Cash), there are a couple of upcoming forks (a split into two different cryptocurrencies, driven by differences among the various groups of developers/miners) that could cause some volatility. Bitcoin is set to fork again on October 25th (Bitcoin Gold) with arguably the more important fork happening just a few weeks later on Nov. 18th with the SegWit2x upgrade.

Meanwhile, the just completed ethereum Byzantium upgrade appears to be running smoothly and having minimal impact of the price of Ether.

No consensus from regulators on cryptocurrencies and ICOs. The seemingly rapid evolution of the cryptocurrency and ICO market has led many regulatory bodies and governments around the world reacting to the ever changing dynamics of the market instead of proactively determining how best to monitor and regulate it to help ensure that innovation is fostered and rewarded while at the same time ensuring that investors are protected from fraudulent activity.

Announcements by various countries and regulators have helped lead to increased volatility in cryptocurrency prices this year. The dramatic surge in the cryptocurrencies prices this year has not been a smooth ride up, as there have been some significant corrections, most notably following the announcements out of China in quick succession last month regarding a ban on ICOs and cryptocurrency exchanges that led to the price of Bitcoin falling by over one-third in just two weeks. However, in the following month, Bitcoin surged 80% to its recent all-time high.



The approaches taken by countries around the globe has varied significantly, with some countries banning cryptocurrencies, ICOs, mining, and related trading outright to others that have been more accepting albeit with reasonable levels of regulatory oversight.

For example, Japan has emerged as one of the most accommodative jurisdictions for cryptocurrencies, as it has recognized Bitcoin as legal tender and it has approved 11 cryptocurrency exchanges. This has helped the country grab an estimated +60% market share of Bitcoin trading worldwide. That said, Japan could still crackdown on ICOs and ban them similar to other countries in the region including China and South Korea.

As previously mentioned, China has also shut down cryptocurrency exchanges and it is concerned that cryptocurrencies like Bitcoin will allow its people to avoid limits on how much money they can send outside the country. However, China still allows cryptocurrency/Bitcoin mining, which the country considers a part of the burgeoning tech industry, helping bring jobs in regions that need it. The largest Bitcoin miner in the world is based in China (Bitmain) and the country is estimated to make more than two-thirds to three-quarters of all Bitcoin issued each day.

In 2015, the US Commodity Futures Trading Commission (CFTC) announced that Bitcoin and other digital currencies would be classified as commodities and thus covered by the Commodity Exchange Act (CEA). Furthermore, the SEC announced in July that some tokens/coins issued in ICOs may be considered securities and would accordingly need to comply with various regulations. In the same month, the CFTC granted approval to LedgerX LLC (operator of a cryptocurrency trading platform) to register as a clearing house for settling digital currency derivative contracts, thus enabling people to hedge their cryptocurrency exposure using options.

Meanwhile, in Canada, the Ontario Securities Commission (OSC) has announced its intentions to be supportive of the cryptocurrency industry and ICOs, as it looks to support the ongoing innovation in the market. It has set up Launchpad, a dedicated team focused on helping fintechs navigate the regulatory framework that may apply to their ICO. As well, the OSC has formed a team of OSC executives that in conjunction with the Launchpad team will quickly respond to inquiries on cryptocurrency offerings. The OSC has stated that their approach is consistent with many other regulatory bodies worldwide, as they look to find the right balance of helping fintechs raise capital in new and innovative ways while also helping protect people from high-risk and/or fraudulent activities.

We note that in the last couple of months, Impak Finance (focused on the social impact economy) became the first project to launch in the sandbox of Autorité des marchés financiers (AMF), Quebec's financial institutions regulator, and later became the first regulated ICO in Canada and the Americas.

It is getting easier to gain exposure to the blockchain and cryptocurrency space. Until the last year or so, the options available to average person to get exposure to the blockchain and cryptocurrency space were somewhat limited. Most of the larger, well-known blockchain organizations (e.g., Chain, Ripple) were private and there was a relatively small number of publicly traded blockchain companies, with almost all being relatively unknown quantities and in terms of size, they were microcaps (most had market caps less than \$10M) and thus highly risky.

For those that wanted to buy cryptocurrencies like Bitcoin and Ether, the process to do so was likely challenging/daunting (e.g., you could not buy them through your bank or full service/self-directed investment trading account) and typically carried elevated risks, especially as it related to the security of their cryptocurrency holdings, as there have been numerous high profile hacks that led to the loss of people's holdings in cryptocurrencies worth millions of dollars.

However, in the last year, we have seen an increasing number of options available to people looking to get exposure to the blockchain and cryptocurrency space. More publicly traded companies have shifted their focus/business model toward the blockchain space or incorporated



blockchain/cryptocurrencies into their business model (e.g., Goldmoney (T-XAU)), existing blockchain companies have continued to progress toward commercialization of their blockchain technology and have accordingly seen their share prices and market cap rise to levels that provide reasonable liquidity (e.g., BTL Group (V-BTL)), while others have or are on their way to going public via an IPO or RTO (e.g., HIVE Blockchain (v-HIVE) in the cryptocurrency mining space and eXeBlock Technology in the blockchain space).

We have also seen an explosion in the number of ICOs, which has given (blockchain) companies an alternative way to raise capital, although regulatory scrutiny has picked up significantly and could materially moderate ICO activity going forward.

Finally, there are an increasing number of investment vehicles that have been and are being created to allow both retail and institutional investors to get exposure to blockchain, ICOs, and cryptocurrencies, typically with stronger security (including allowing institutional investors to meet regulatory requirements). Examples include First Block Capital (FBC Bitcoin Trust will own Bitcoin) and NextBlock Global (investing in a diversified portfolio of cryptocurrencies used as a medium of exchange as well as tokens representing the infrastructure protocols and platform technology for the second generation of the internet and tokens for decentralized applications).

Going forward, we expect to see a continuation of the high volatility in the prices of both cryptocurrencies and share prices of blockchain companies, as speculative activity in the space continues to increase and investors (over)react to the plethora of news emerging from all over the ecosystem, particularly as it relates to various announcements by regulatory bodies worldwide as well as the advancement of blockchain pilots toward commercialization.

In Appendix A, we profile various publicly-traded as well as private companies/organizations (including blockchain and cryptocurrency investment vehicles) in the blockchain and cryptocurrency space, including some of the more well-known/higher profile players along with various Canadian companies operating in the space.



Appendix A: Profiles of Select Blockchain and Cryptocurrency Companies

Public Companies:

Acana Capital Corp. (CD-ACM) – Acana completed a RTO of Blockchain Intelligence Group (BIG) in September 2017. BIG is a developer of blockchain technology solutions, search and data analytics, targeting governments, law enforcement and the fintech sectors. It has two main products, Qlue and BitRank. Qlue is an API platform for law enforcement to aid in the fight against financial crimes involving Bitcoin. BitRank is a wallet scoring system that uses search and analytics systems to determine a safety level of a Bitcoin transaction by ranking the wallets involved in the transaction on the blockchain.

Bitcoin Investment Trust (PK-GBTC) – The Bitcoin Investment Trust’s shares are the first publicly quoted (on OTCQX) securities solely invested in and deriving value from the price of Bitcoin. It enables investors to gain exposure to the price movement of Bitcoin through a traditional investment vehicle, without the challenges of buying, storing, and safekeeping Bitcoins.

BTL Group Ltd. (V-BTL) – BTL is an enterprise technology platform provider that is developing Interbit, a proprietary private blockchain. Via the Interbit platform, BTL can help companies reduce risks and costs by securely streamlining existing IT infrastructures. To date, BTL has successfully demonstrated how Interbit can innovate system processes for leading companies in the finance, energy and gaming sectors. The company is planning to commence a go-to production phase this quarter following a successful European energy trading pilot with BP, Eni Trading & Shipping, and Wien Energy. BTL is also involved with Visa on an interbank cross-border settlement project. BTL operates out of Canada and the UK.

eXeBlock (Pending initial listing on CSE): eXeBlock is focused on the development and operation of blockchain software, also known as decentralized applications or DApps. The Company has a team of experienced blockchain programmers currently developing two innovative blockchain DApps, seven more in the pipeline, and has plans to launch a minimum of two blockchain based DApps each year. eXeBlock is focused on creating DApps that can be used across global markets and will generate recurring revenue on a ‘per-use’ basis.

Fintech Select Ltd. (V-FTEC) – Fintech Select is a provider of robust and disruptive Pre-Paid Card programs, mobile banking solutions and cryptocurrency technologies. Selectcoin is their POS cryptocurrency solution which provides easy and hassle free buying and selling of cryptocurrencies through their retail partners and it is interconnected with their Selectcoin card and POS footprint.

GFT Technologies SE (DE-GFTG) – GFT is a provider of advisory, business consulting, IT and software services. In early 2017, the Company launched a Blockchain prototype for commodities, allowing clients to track physical commodities assets through the use of a distributed ledger-based business model.

Global Blockchain Technologies Corp. (V-BLOC) – Formerly Carrus Capital Corp., BLOC is an investment fund that provides investors access to a basket of holdings within the blockchain space, managed by a team of industry early adopters and pioneers who have had a significant impact on the rise of the blockchain. Global Blockchain Technologies is focused on streamlining the complicated process that interested investors currently must undergo in order to gain exposure to the cryptocurrency space.

Goldmoney Inc. (T-XAU) – Goldmoney Inc. is a financial service company in precious metal investment services and the world’s largest precious metals payment network. The Company is safeguarding almost \$2 billion in assets for clients located in over 150 countries. The Goldmoney Holding is an online account that enables clients to invest, earn, or spend gold, silver, platinum,



palladium, and cryptocurrencies that are securely stored in insured vaults in seven countries. The Company recently announced that it has added Bitcoin and Ethereum to the Goldmoney Holding.

HIVE Blockchain Technologies Ltd. (V-HIVE) – HIVE is partnered with Genesis Mining Ltd., the cryptocurrency mining hashrate provider, to build the next generation of blockchain infrastructure. HIVE owns two GPU-based cryptocurrency mining facilities in Iceland, which produce mined cryptocurrencies like Ethereum. HIVE has an option to acquire additional facilities in Iceland or Sweden from Genesis. Genesis supports HIVE with data centre infrastructure expertise and is HIVE's largest shareholder.

LeoNovus Inc. (V-LTV) – LeoNovus was an early adopter of blockchain technologies and is a developer of ultrasecure enterprise-grade distributed storage technologies. In 2014, the Company produced and deployed a managed, loosely-coupled blockchain computation pool built from available idle resources. LeoNovus was also one of the first companies to marry the technologies of the Internet of Things (IoT) and the blockchain, when in August 2014, the Company leveraged its proprietary distributed computing technology to mine digital currency from low-end distributed devices, in that instance, digital light bulbs. In late September, LeoNovus also announced significant enhancements to its LeoNovus 3.0 product via the integration of blockchain technology.

NetCents Technology Inc. (CD-NC) – NetCents is a next generation online payment processing platform, offering consumers and merchants online services for managing electronic payments. The Company is focused on capturing the migration from cash to digital currency by utilizing blockchain technology to provide payment solutions that are simple to use, secure and worry free.

Victory Square Technologies Inc. (CSE-VST) – Victory Square invests in entrepreneurs focused in the areas of Blockchain Technology, Virtual Reality, Artificial Intelligence, Personalized Health, Gaming, and Film. These include entrepreneurs who provide access to education programs, global mentorship networks, distribution partners, creative workspaces, resources and other forms of operational support to help them scale internationally.

Private Companies

Blockchain Research Institute (private) – Funded by an impressive roster of blue-chip companies and governments worldwide, Blockchain Research Institute is a multi-million dollar Toronto-based research initiative that is undertaking the definitive investigation of blockchain strategy, opportunities, and implementation challenges.

Chain (private) – Chain partners with organizations to build, deploy, and operate blockchain networks that enable breakthrough financial products and services. They are authors of the open source Chain Protocol, which powers the Chain Core blockchain platform. Chain was founded in 2014 and has raised over US\$40 million in funding from Khosla Ventures, RRE Ventures, and strategic partners including Capital One, Citigroup, Fiserv, Nasdaq, Orange, and Visa. Chain is working on a B2B payment solution with Visa.

Digital Asset Holding (private) – Digital Asset Holding is focused on the development of proprietary programming language for development of Smart Contracts for financial institutions. Its Digital Asset Platform delivers flexible infrastructure for regulated financial institutions to share processes and data securely, on a need-to-know basis, without the need for reconciliation.

Digital Mint Group (DMG) Blockchain Solutions (private) – DMG Blockchain Solutions is a full service blockchain and cryptocurrency company that manages, operates and develops end-to-end digital solutions to monetize the blockchain ecosystem. DMG is also building a blockchain platform for the agricultural and other supply chain management reliant industries, providing end-to-end key trust-based functions in a frictionless way such as identity management, provenance, automated contract execution and rules compliance.



Enterprise Ethereum Alliance – Enterprise Ethereum Alliance has over 150 members and is the largest open-source blockchain initiative. Its members range from Fortune 500 enterprises, startups, academics, to technology vendors who are connected to Ethereum subject matter experts. Ethereum is the only smart contract supporting blockchain that is operating in real-world production and is capable of handling the most complex, highly-demanding applications.

First Block Capital (FBC) Investment Trust – FBC is focused on providing investment exposure to the emerging digital currency asset class based on blockchain technology. It is Canada's first fully registered cryptocurrency investment firm.

Monax – The monax platform is an open platform for developers and DevOps to build, ship, and run blockchain-based applications for business ecosystems. Monax sells legally compliant smart contract-based SDKs to accelerate your time to market with sophisticated ecosystem applications

NextBlock Global – NextBlock Global is a company dedicated to investing in the digital asset space, with a focus on assets like Bitcoin and Ethereum. Launch by the co-founder of Blockchain Research Institute, Alex Tapscott, NextBlock Global will buy cryptocurrencies and invest in startups focused on using blockchain technology.

Nuco (private) – Nuco designs modular blockchain infrastructure and software for enterprises. The Company recently launched Aion, an interoperable blockchain network and framework that allows communication between blockchains. Aion works to connect compatible blockchains that operate independently to allow the instant, global transfer and recording of data and value.

Openchain – Openchain is an open source, enterprise-ready Blockchain technology platform. It is suited for organizations wishing to issue and manage digital assets in a robust, secure and scalable way.

Paycase (private) – Paycase uses Bitcoin to help people transfer money around the world with fees that are 60-80% lower than those charged by traditional remittance companies. Paycase is currently in invite-only beta mode.

Ripple – Ripple provides one frictionless experience to send money globally using the power of blockchain. By joining Ripple's network, financial institutions can process their customers' payments anywhere in the world instantly, reliably and cost-effectively. Banks and payment providers can use the digital asset XRP to further reduce their costs and access new markets. The Company has offices in San Francisco, New York, London, Sydney, India, Singapore and Luxembourg. Ripple has more than 90 customers around the world.

Vanbex Group (private) – Vanbex is a professional services and strategic consulting firm that specializes in all aspects of the blockchain industry. The Company was established in 2013 to better tell the story of digital currency and blockchain-based companies, but has since evolved into a blockchain-based products and advisory services firm.

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