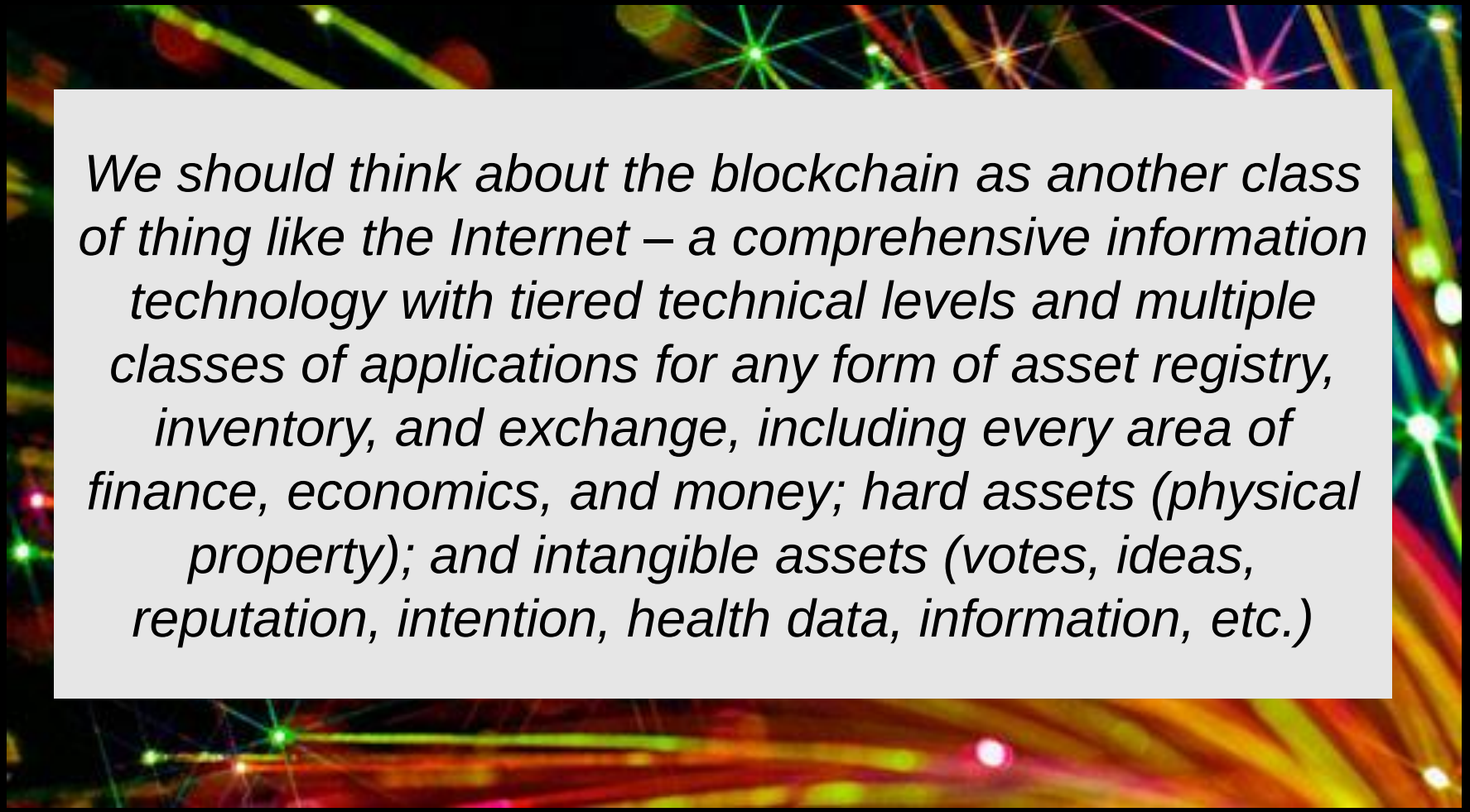
What is the Blockchain?



We should think about the blockchain as another class of thing like the Internet – a comprehensive information technology with tiered technical levels and multiple classes of applications for any form of asset registry, inventory, and exchange, including every area of finance, economics, and money; hard assets (physical property); and intangible assets (votes, ideas, reputation, intention, health data, information, etc.)

What is a block chain.

- *The block chain is a **shared public ledger** on which the entire Bitcoin network relies. All confirmed transactions are included in the block chain. This way, Bitcoin wallets can calculate their spendable balance and new transactions can be verified to be spending bitcoins that are actually owned by the spender. The integrity and the chronological order of the block chain are enforced with cryptography.*
- The original Bitcoin whitepaper by Satoshi Nakamoto

How does Bitcoin work on Blockchains

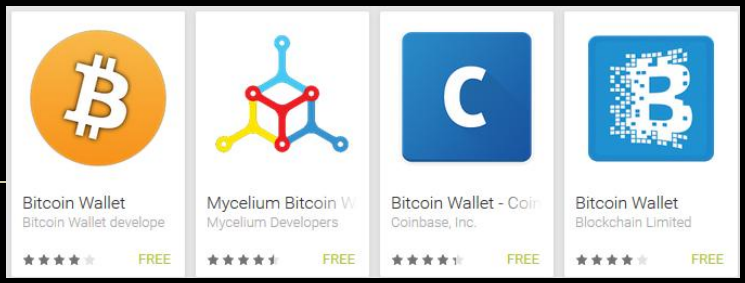
- *A transaction is **a transfer of value between Bitcoin wallets** that gets included in the block chain. Bitcoin wallets keep a secret piece of data called a private key or seed, which is used to sign transactions, providing a mathematical proof that they have come from the owner of the wallet. The signature also prevents the transaction from being altered by anybody once it has been issued. All transactions are broadcast between users and usually begin to be confirmed by the network in the following 10 minutes, through a process called mining.*

What is Bitcoin?

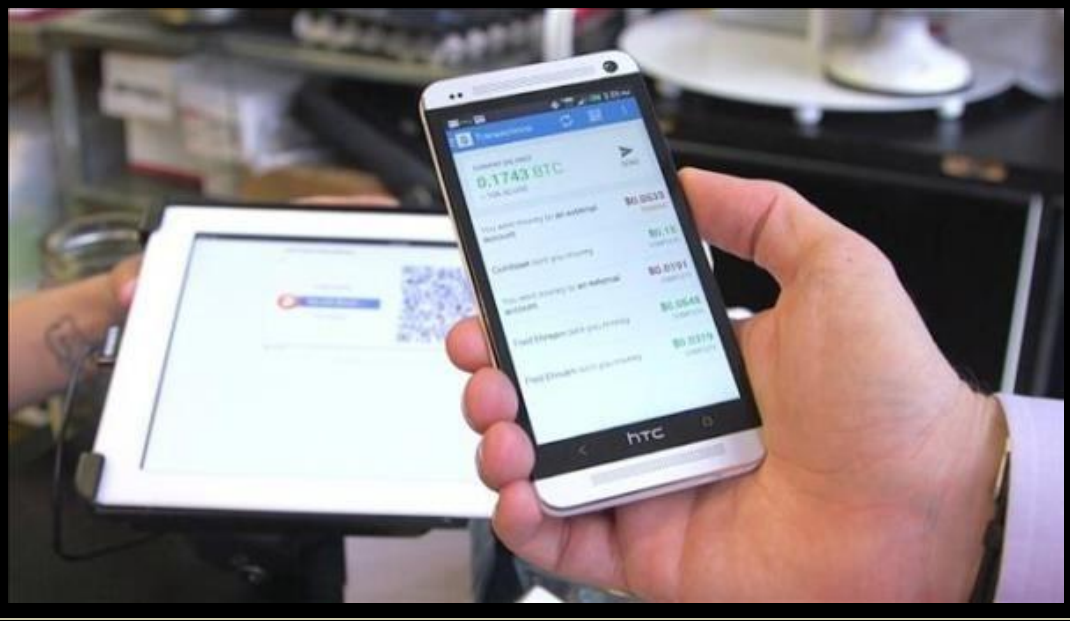
- Digital currency
- Combination of BitTorrent technology (peer-to-peer file sharing) and public key cryptography as solution to long-standing cryptography problems
- Double-spend problem
  - Copiability of digital assets; digital cash, like an image attached to an email, can be copied infinite times
  - Centralized third party required to issue and reconcile digital cash transactions to prevent cash from being spent multiply
- Byzantine Generals' Computing Problem
- Implication: any online transaction can be decentralized
  - Conducted in a peer-to-peer trustless manner without a controlling authority in the middle

Satoshi Nakamoto's original design for the blockchain (2008) https://bitcoin.org/bitcoin.pdf

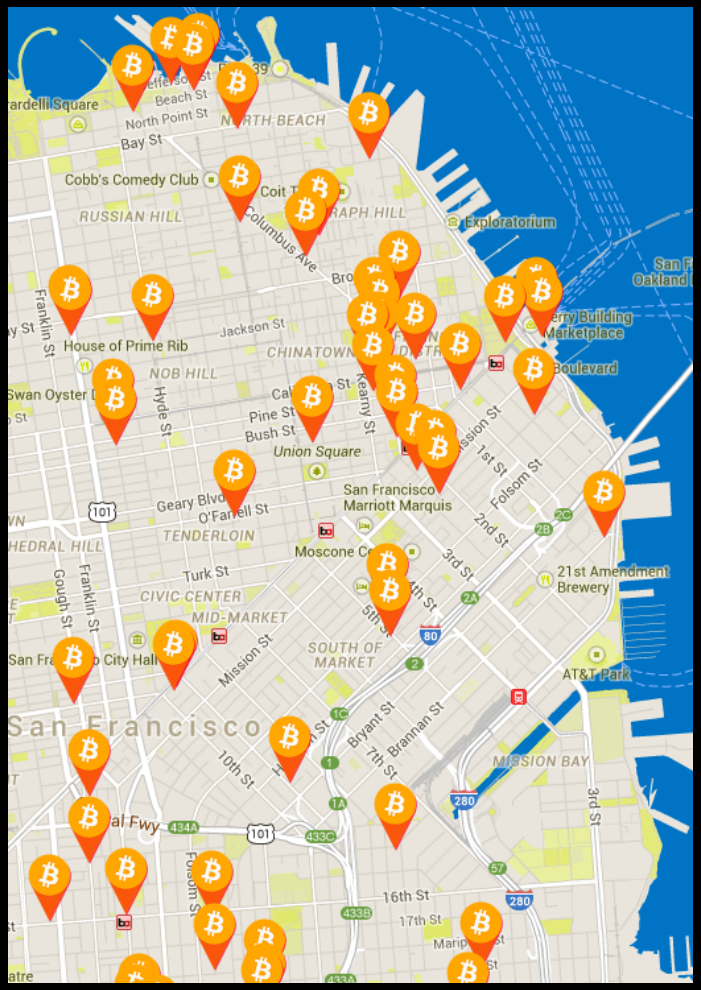
How does Bitcoin work?



1. Download software wallet app
   - Blockchain.info, Mycelium, etc.
2. Transfer Bitcoin via QR Code / public key address
3. See your transaction confirm, post to the blockchain

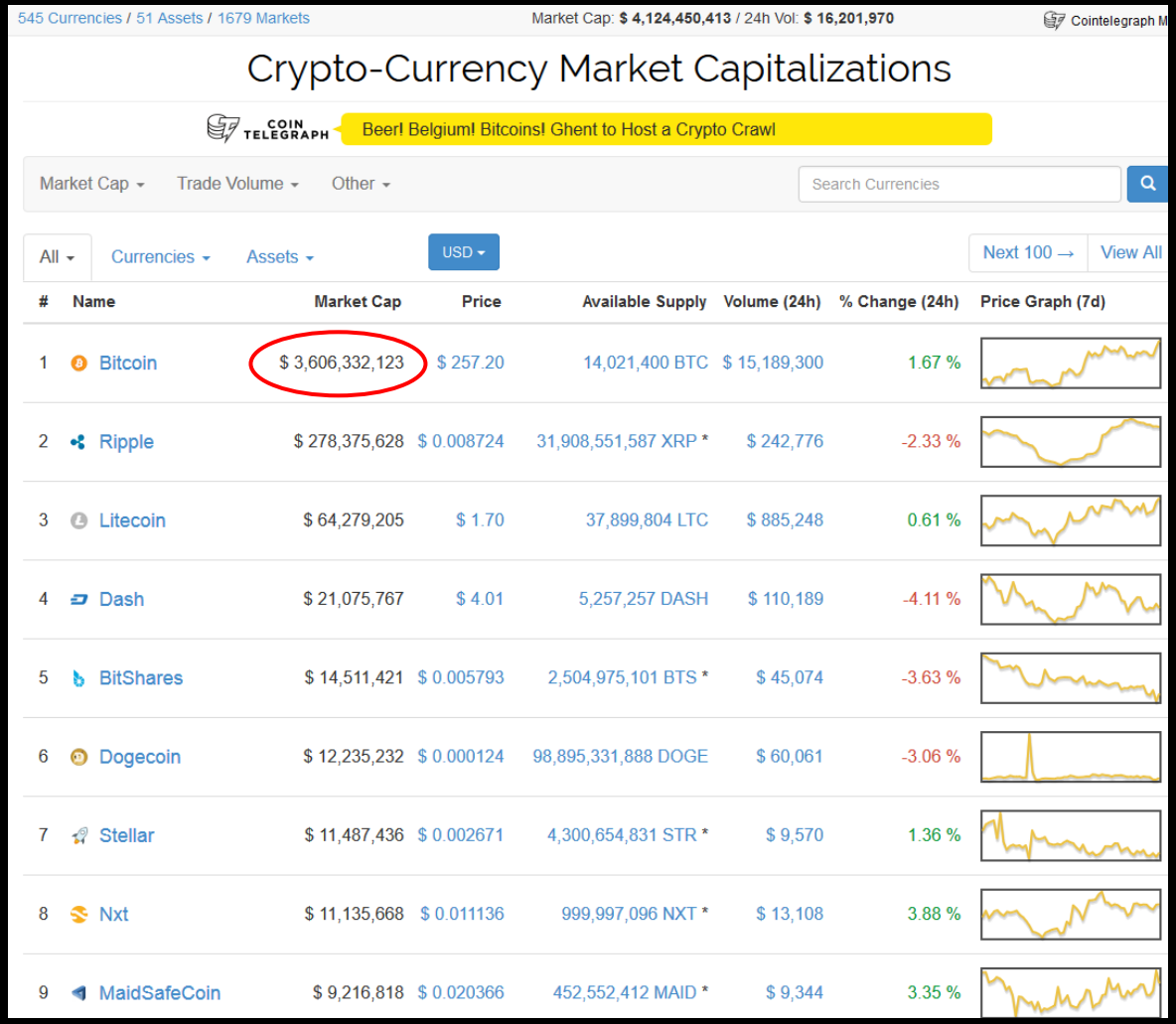


Where can I use Bitcoin?



http://bitcoinmaps.info/, http://coinmap.org/, https://airbitz.co/

How big is the market and is it liquid?



545 Currencies / 51 Assets / 1679 Markets — Market Cap: $ 4,124,450,413 / 24h Vol: $ 16,201,970 — Cointelegraph M

Crypto-Currency Market Capitalizations

COIN TELEGRAPH — Beer! Belgium! Bitcoins! Ghent to Host a Crypto Crawl

Market Cap ▾ | Trade Volume ▾ | Other ▾ | Search Currencies

All ▾ | Currencies ▾ | Assets ▾ | USD ▾ | Next 100 → | View All

#	Name	Market Cap	Price	Available Supply	Volume (24h)	% Change (24h)	Price Graph (7d)
1	Bitcoin	$ 3,606,332,123	$ 257.20	14,021,400 BTC	$ 15,189,300	1.67 %	
2	Ripple	$ 278,375,628	$ 0.008724	31,908,551,587 XRP *	$ 242,776	-2.33 %	
3	Litecoin	$ 64,279,205	$ 1.70	37,899,804 LTC	$ 885,248	0.61 %	
4	Dash	$ 21,075,767	$ 4.01	5,257,257 DASH	$ 110,189	-4.11 %	
5	BitShares	$ 14,511,421	$ 0.005793	2,504,975,101 BTS *	$ 45,074	-3.63 %	
6	Dogecoin	$ 12,235,232	$ 0.000124	98,895,331,888 DOGE	$ 60,061	-3.06 %	
7	Stellar	$ 11,487,436	$ 0.002671	4,300,654,831 STR *	$ 9,570	1.36 %	
8	Nxt	$ 11,135,668	$ 0.011136	999,997,096 NXT *	$ 13,108	3.88 %	
9	MaidSafeCoin	$ 9,216,818	$ 0.020366	452,552,412 MAID *	$ 9,344	3.35 %	

https://coinmarketcap.com/

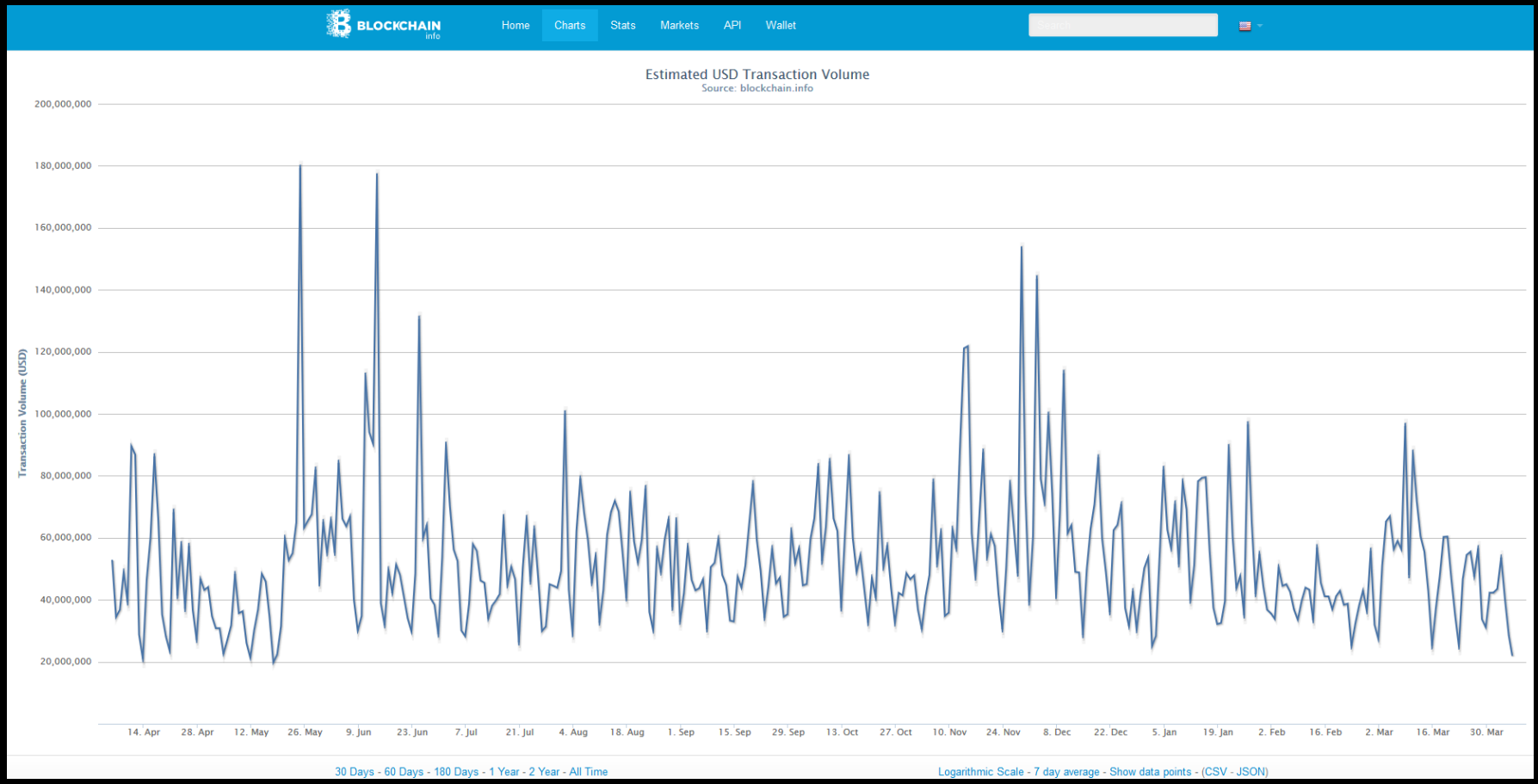
Bitcoin Price Chart (one year)

- Price ~stable around $250/1 Bitcoin so far in 2015

https://blockchain.info/charts/market-price

Bitcoin Transaction Volume Chart (one year)

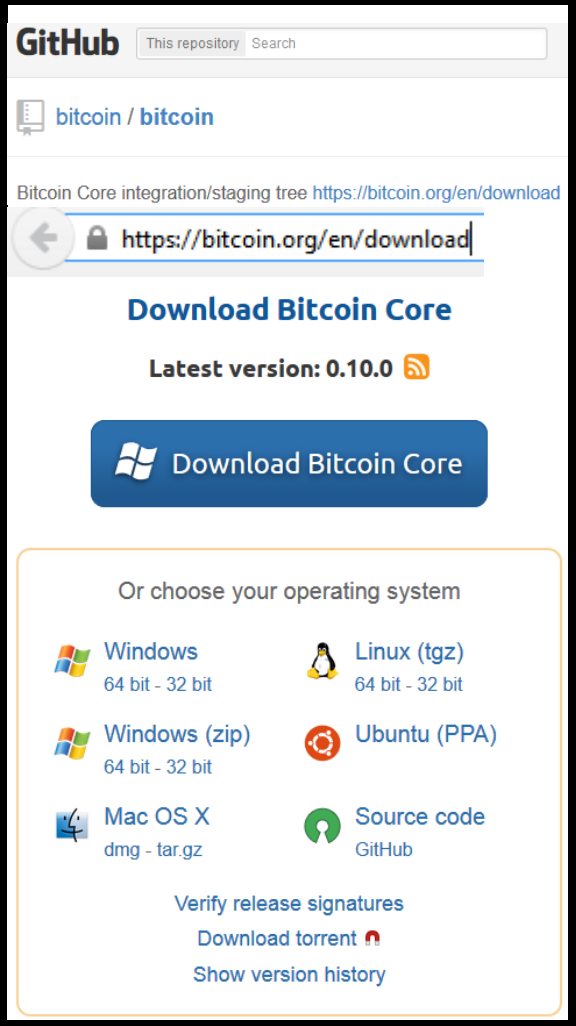
- Persistent transaction volume despite price volatility



https://blockchain.info/charts/estimated-transaction-volume-usd

What is the blockchain?

- The open-source software upon which Bitcoin runs
  - A technology protocol layer like TCP/IP
- A transaction database, decentralized public ledger of all transactions
  - Giant ‘interactive Google doc spreadsheet’ that anyone can view and administrators (miners) continually verify and update to confirm that each transaction is valid
- Literally blocks (batches of transactions) in a chain, a sequential ledger of transactions



https://github.com/bitcoin/bitcoin, https://bitcoin.org/en/download, https://getaddr.bitnodes.io/

How robust is the network?

- 6441 Global Nodes running full Bitcoin (April 2015)

BITNODES

Bitnodes is currently being developed to estimate the size of the Bitcoin network by finding all the reachable nodes in the network.

GLOBAL BITCOIN NODES DISTRIBUTION

Reachable nodes as of Sun Apr 05 2015 10:22:57 GMT-0700 (Pacific Standard Time).

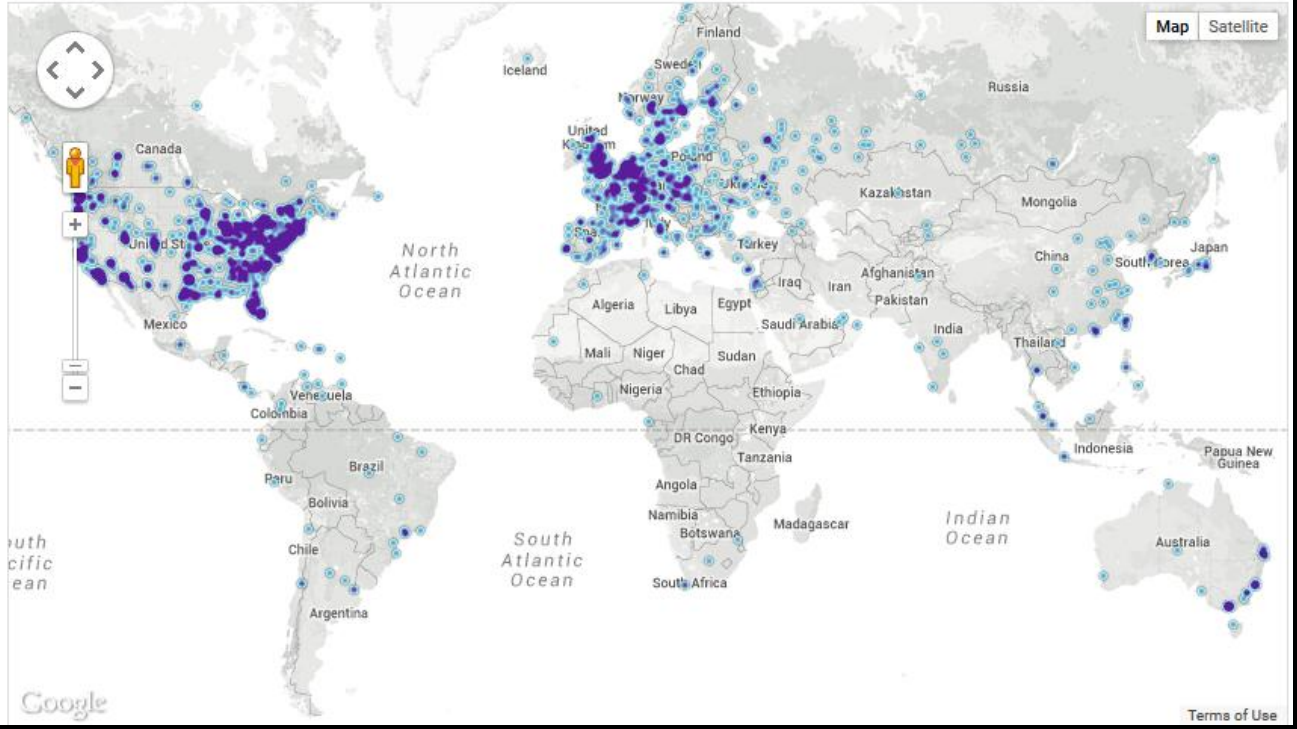
6441 nodes

24-hour charts »

Top 10 countries with their respective number of reachable nodes are as follow.

RANK	COUNTRY	NODES
1	United States	2521 (39.14%)
2	Germany	622 (9.66%)
3	France	471 (7.31%)
4	United Kingdom	404 (6.27%)
5	Canada	326 (5.06%)
6	Netherlands	291 (4.52%)
7	Russian Federation	189 (2.93%)
8	Ukraine	111 (1.72%)
9	Sweden	111 (1.72%)
10	Australia	109 (1.69%)

More (91) »



https://getaddr.bitnodes.io/

Economic and privacy arguments for Bitcoin

- Banking services market
  - 5 bn individuals worldwide without access to banking, financial, credit services
- Remittances market
  - $4 tn global market, 5-30% transaction fee; immediate funds transfer solution
- Vendor payments market
  - 1-3% merchant transaction fee
  - Hack-able ‘honey pot’ identity databases
- Successful examples suggest demand for digital payments
  - Starbucks mobile app, Apple Pay

overstock™

Overstock.com:
Now Accepting Bitcoins

bitpay

http://www.bitcoinvalues.net/who-accepts-bitcoins-payment-companies-stores-take-bitcoins.html

Financial and Public Records Applications

- Financial instruments
  1. Currency
  2. Private equities
  3. Public equities
  4. Bonds
  5. Derivatives commodities
  6. Spending records
  7. Trading records
  8. Mortgage/loan records
  9. Servicing records
  10. Crowdfunding
  11. Microfinance
  12. Proxy fights
- Public Records
  1. Land titles
  2. Vehicle registries
  3. Business incorporations
  4. Criminal records
  5. Passports
  6. Birth certificates
  7. Death certificates
  8. Voter Registration
  9. Voting Records
  10. Health/safety inspections
  11. Building permits
  12. Court records

http://forum.ethereum.org/discussion/1402/how-to-get-started-your-first-dapp-under-one-hour

What is Smart Property?

OpenBazaar

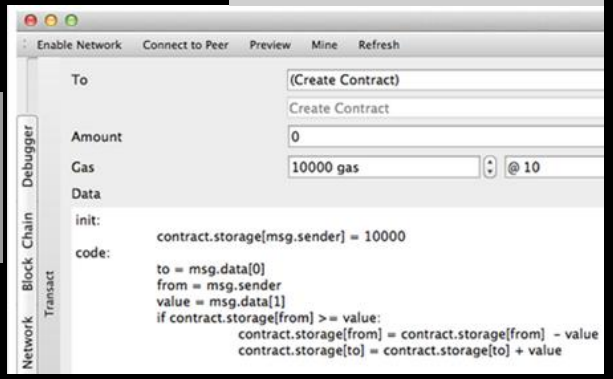
- Register assets to blockchain via unique key
  - Blocktrace ledger tracks diamonds
  - Real-time GPS LoJack tracking for any asset
- Blockchain becomes an inventory, tracking, and buy-sell mechanism for all hard assets
- Decentralized asset exchange
- Digital authentication access system
  - Blockchain-based keyless entry

https://openbazaar.org/, http://www.edgelogic.net/blocktrace

What are Smart Contracts?

- Agreements between parties posted to the blockchain for automated execution
- Examples
  - Bet on high temperature tomorrow
  - Inheritance pay-out at age 21 or death of benefactor
  - Mortgage with automatic interest-rate resets
  - Blockchain-based Greek tax receipts in Ricardian Contracts (Yanis Varoufakis)
  - Koinify (Factom software licenses)
- Code: Ethereum and Eris
  - https://github.com/ethereum/
    - http://www.etherparty.io/
  - https://erisindustries.com/

ethereum



ETHERPARTY

eris

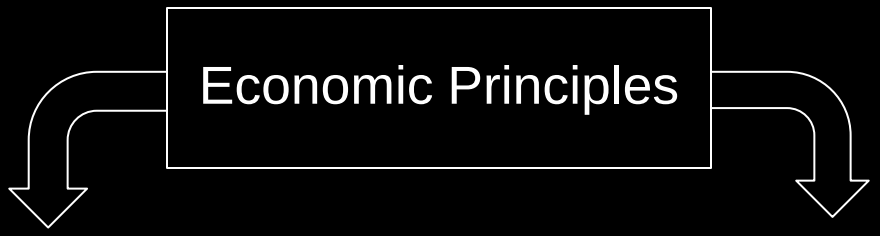
https://eng.erisindustries.com/smart%20contracts/2014/12/17/dennys-smart-contracting/ ,
http://forum.ethereum.org/discussion/1402/how-to-get-started-your-first-dapp-under-one-hour,
http://financialcryptography.com/mt/archives/001555.html

Decentralized Application (Dapp) Ecosystem

Project Name and URL	Activity	Centralized Equivalent
OpenBazaar *https://openbazaar.org*	Buy/sell items locally	Craigslist
LaZooz *http://lazooz.org*	On-demand ride service	Uber, Lyft
Twister *http://twister.net.co*	Social networking, peer-to-peer microblogging	Twitter, Facebook
Gems *http://getgems.org*	Social networking, private token-based social messaging	Twitter, SMS apps
Bitmessage *https://bitmessage.org*	Secure messaging (individual or broadcast)	SMS services
Storj *http://storj.io/*	File storage	Dropbox, Google Drive
Onename *https://onename.com/* BitID *https://github.com/bitid/bitid* Bithandle *http://www.hackathon.io/bithandle*	Digital identity verification	VeriFone, Verisign, Facebook

http://www.amazon.com/Bitcoin-Blueprint-New-World-Currency/dp/1491920491

Economic Principles: not just for Economics



- Traditional Deployment
  - Markets
- Blockchain Deployment
  - Any interaction is a discovery and exchange process
  - Abundance mindset and overcoming scarcity
  - Decentralized models supplement hierarchy
  - Demurrage incitatory potential and resource redistribution across network nodes
  - Reciprocal mining communities

Blockchain technology is prompting us to rethink economic principles in markets, and apply them much more extensibly to other situations in a non-monetary sense

Blockchain IOT

- M2M/IOT Bitcoin payment network to enable the machine economy
- IOT 2020: 26 bn devices in a $7 tn market
- The economic layer the web never had
- Smarthome IOT networks
  - Self-mining ecologies
  - Privacy orchestration: devices, robotics, digital personal health assistants
- Blockchains: economic principle-driven large-scale resource allocation and coordination mechanisms

Smarthome IOT and Personal Robotics Coordination

Smartcity Connected Car Coordination

http://www.zdnet.com/article/internet-of-things-market-to-hit-7-1-trillion-by-2020-idc/,
http://www.amazon.com/Bitcoin-Blueprint-New-World-Currency/dp/1491920491

Blockchains: Global and Liberty-enhancing

- Global governance for transnational organizations
  - WikiLeaks, ICANN, Wikipedia
- Benefits of blockchain administration
  - Uplift to cloud from local jurisdictional regulations
  - Universal administration mechanism for global organizations
  - Structure promotes transparency, accountability, freedom
  - Namecoin: decentralized DNS

namecoin

Snowden Affair

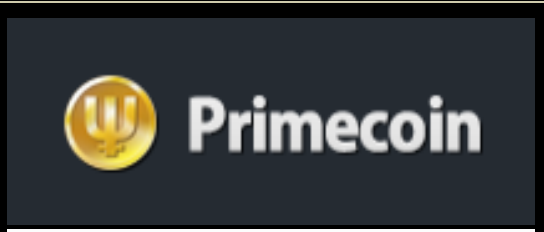
SECURITY 12/07/2010 @ 10:16AM | 11,906 views

Visa, MasterCard Move To Choke WikiLeaks

http://www.forbes.com/sites/andygreenberg/2010/12/07/visa-mastercard-move-to-choke-wikileaks/

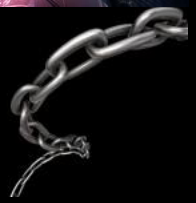
Blockchain Science and What is Mining?

- Mining is the process of adding transaction records to the public ledger by performing a computing task that is costly to execute but easy to verify
- Issue: mining is purposefully wasteful to deter malicious players
- ‘Green’ mining projects
  - Primecoin
  - Foldingcoin
  - Gridcoin
  - Zennet



http://www.righto.com/2014/02/bitcoin-mining-hard-way-algorithms.html,
http://codinginmysleep.com/bitcoin-mining-in-plain-english/

Summary: The blockchain is…



- A decentralized public transaction ledger
- A currency, finance, economic, smart property system
- An enabler of the M2M/IOT machine economy
- A registry, listing, and management system for all of the world's assets, smart property, and itemizable quanta
- A society's public records repository, a representative and participatory legal and governance system
- A tool for science, health, literacy, and art applications
- A new form of information technology, a decentralized system of checks and balances, an infrastructure, an organizing system that is universal and planetary-scale

http://www.melanieswan.com/documents/BlockchainThinking_SWAN.pdf

Conclusion

Blockchain technology, cryptocurrencies, and smart contracts are truly a new kind of thing…technically, conceptually, structurally, and socially…with tremendous potential to decentralize and transform the manner in which we conduct all activity…to realize futures that are more efficient and participative, scalable at a planetary level, and enhancing of core values such as liberty, equality, and innovation

http://www.amazon.com/Bitcoin-Blueprint-New-World-Currency/dp/1491920491

What can it mean for in Norway

- Use Blockchain to create an open ledger of real time transactions on the side of traditional ledgers.
- Connect payments eco system to various Blockchain currencies or services. Regulate and share
- The open nature of Blockchain gives regulators the shakes

Some applications relevant to Norway

- *Nasdaq will leverage the Open Assets Protocol, a colored coin innovation built upon the blockchain. In its first application expected later this year, Nasdaq will launch blockchain-enabled digital ledger technology that will be used to expand and enhance the equity management capabilities offered by its Nasdaq Private Market platform. Nasdaq's blockchain technology will offer efficient, fully-electronic services that facilitate the issuance, transfer, and management of private company securities.*

Fintech in Scandinavia