Crypto Assets and Distributed Ledger Technology: Vision to Reality

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Staff Draft - Pre-Decisional - Not for Distribution

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- All demonstrations are conducted on non-FDIC issued hardware and not on the FDIC network.

Agenda

- Crypto Asset Overview
- Distributed Ledger Technology Overview
- Distributed Ledger Technology in the Public Sector
- Demonstration

Crypto Assets Nomenclature

- **Common names for crypto assets are digital tokens, digital asset, digital coin, digital currency, virtual currency, virtual asset, virtual coin, crypto currency, and crypto token.**

Crypto Asset Overview

Crypto Asset History

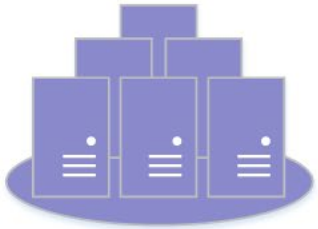
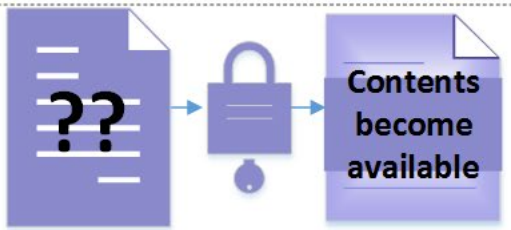
Cryptoasset Est. 2008	Bitcoin - Cryptoasset
Cryptoasset & Payment Platforms Est. 2013	Ethereum - Smart Contracts Ripple - Payments
Blockchain Developlents/ Consortiums Est. 2015	R3 & Corda Lenux & Hyperledger IBM / Bluemix Chain
Initial Coin Offerings, Asset Backed Crypto Assets, and Stablecoins Est. 2016	EOSIO Aspen Digital Token Mitsubishi Digital Token JP Morgan Coin

A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution.

What are Crypto Assets?

- **The Financial Crimes Enforcement Network (FinCEN)**
  - A medium of exchange that operates in some environments but **does not have all attributes of real currency**
    - No legal status
    - Traded digitally
    - No government guarantee

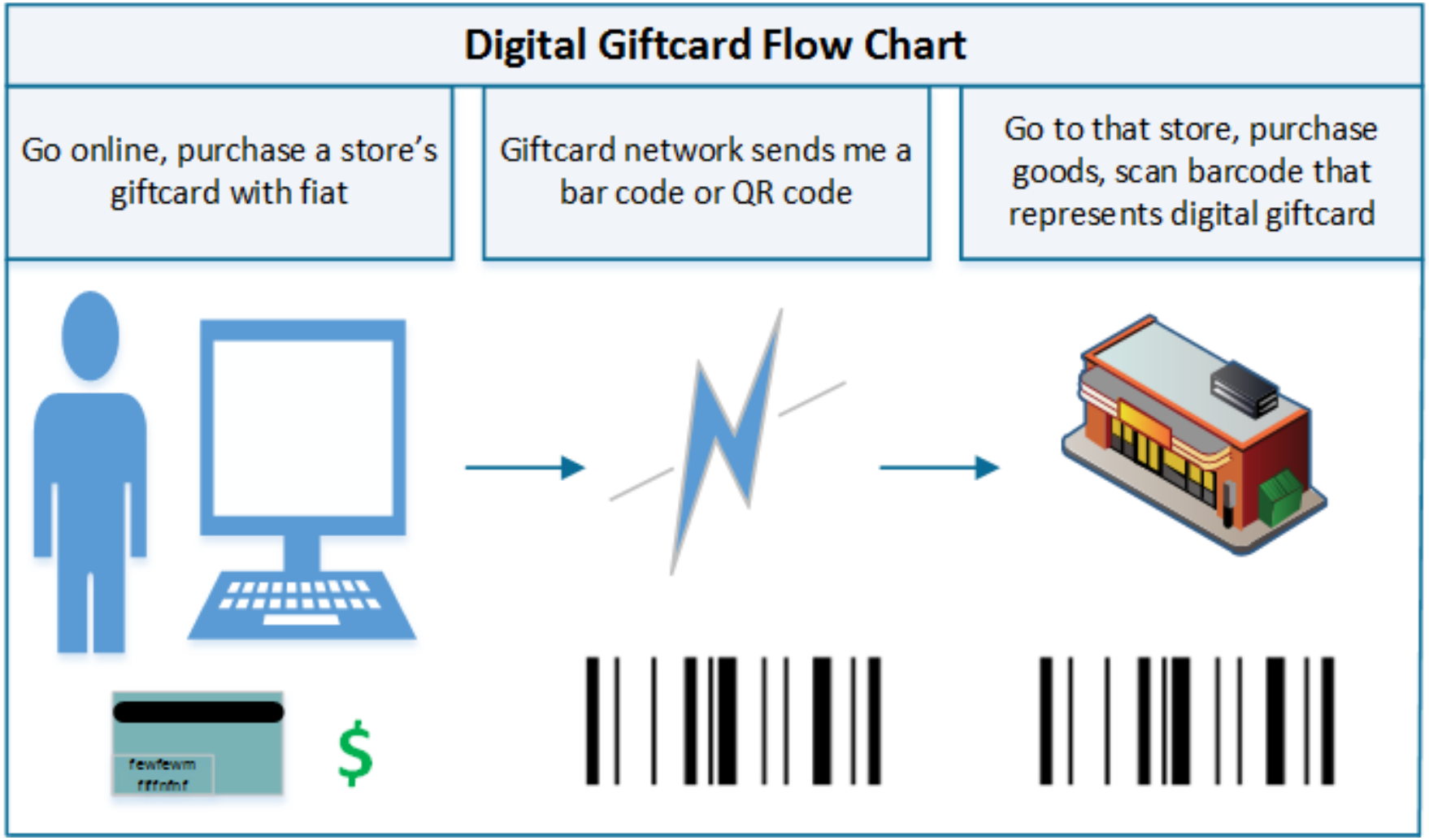
What are Crypto Assets?

Webster's Dictionary: Crypto Asset Definition	Government Issued Currency	Crypto Assets
Exists Digitally		
Has no **central issuing** or regulating authority. Instead uses a **decentralized system** to record transactions / manage the issuance of new units		
Relies on cryptography to prevent counterfeiting and fraudulent transactions		

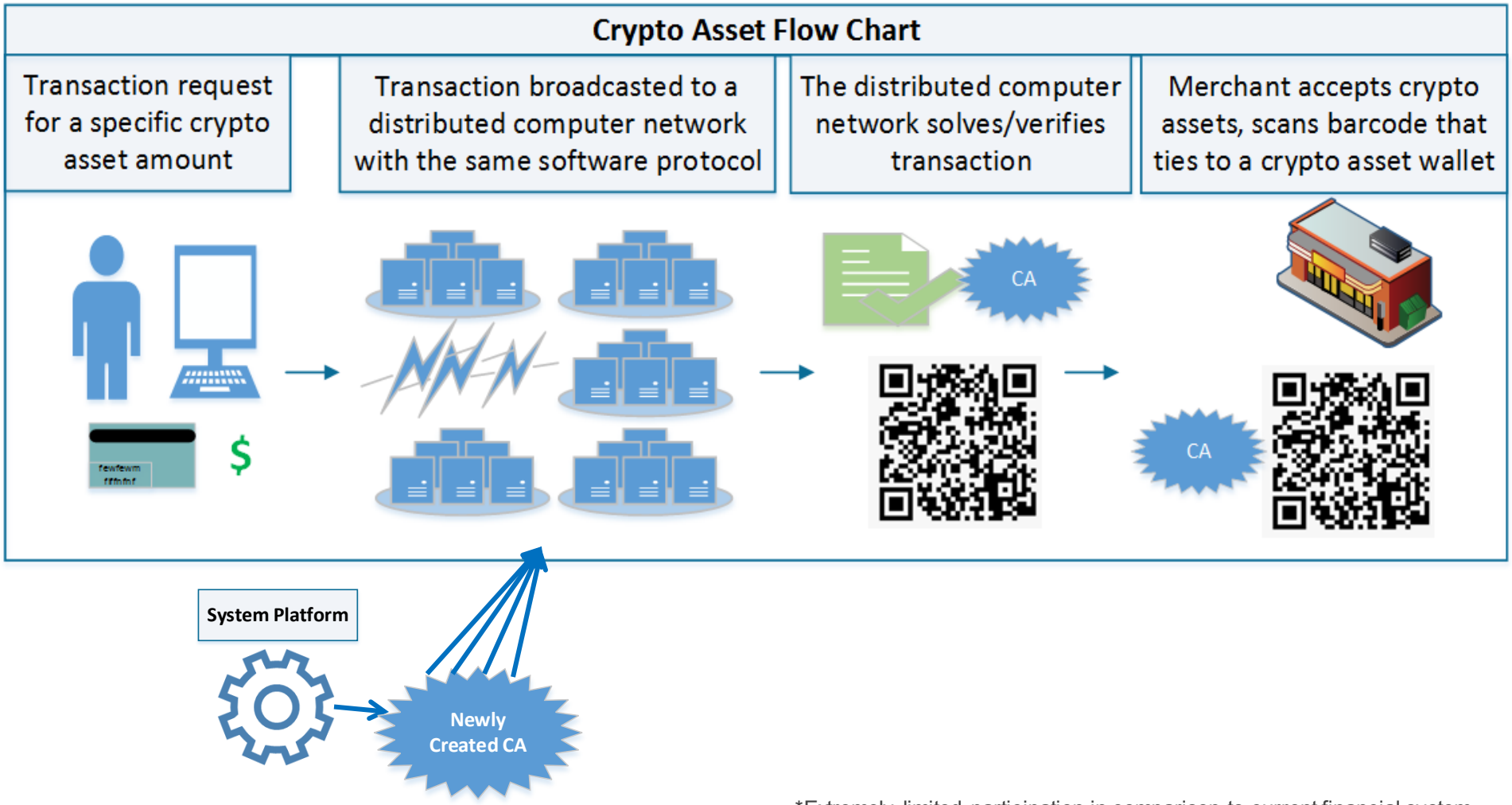
What are Crypto Assets?

	USD or Other Government Issued Fiat	Crypto Asset
Central Authority	Yes	No
Regulating Authority	Yes	Depends
Deposit Insurance	Varies based on where it is held	No, but movement for private insurance
Transaction Verification Source	Trusted party	Cryptographic software
Physical	Yes	No
Digital	No, but somewhat evolving	Yes

Is a Crypto Asset a Gift Card?



Is a Crypto Asset a Gift Card?



*Extremely limited participation in comparison to current financial system

What did Crypto Assets Introduce?

- **"New rail" (some argue a payments rail) to move information through the internet that is often:**
  - Encrypted
  - No reliance on central authority/ third party
    - Establish their own network
    - Establish their own rules and controls
  - Transparency, Traceability and Auditability

Transparency, Traceability and Auditability

GLOBAL BITCOIN NODES DISTRIBUTION

Reachable nodes as of Wed Aug 21 2019 12:16:10 GMT-0500 (Central Daylight Time).

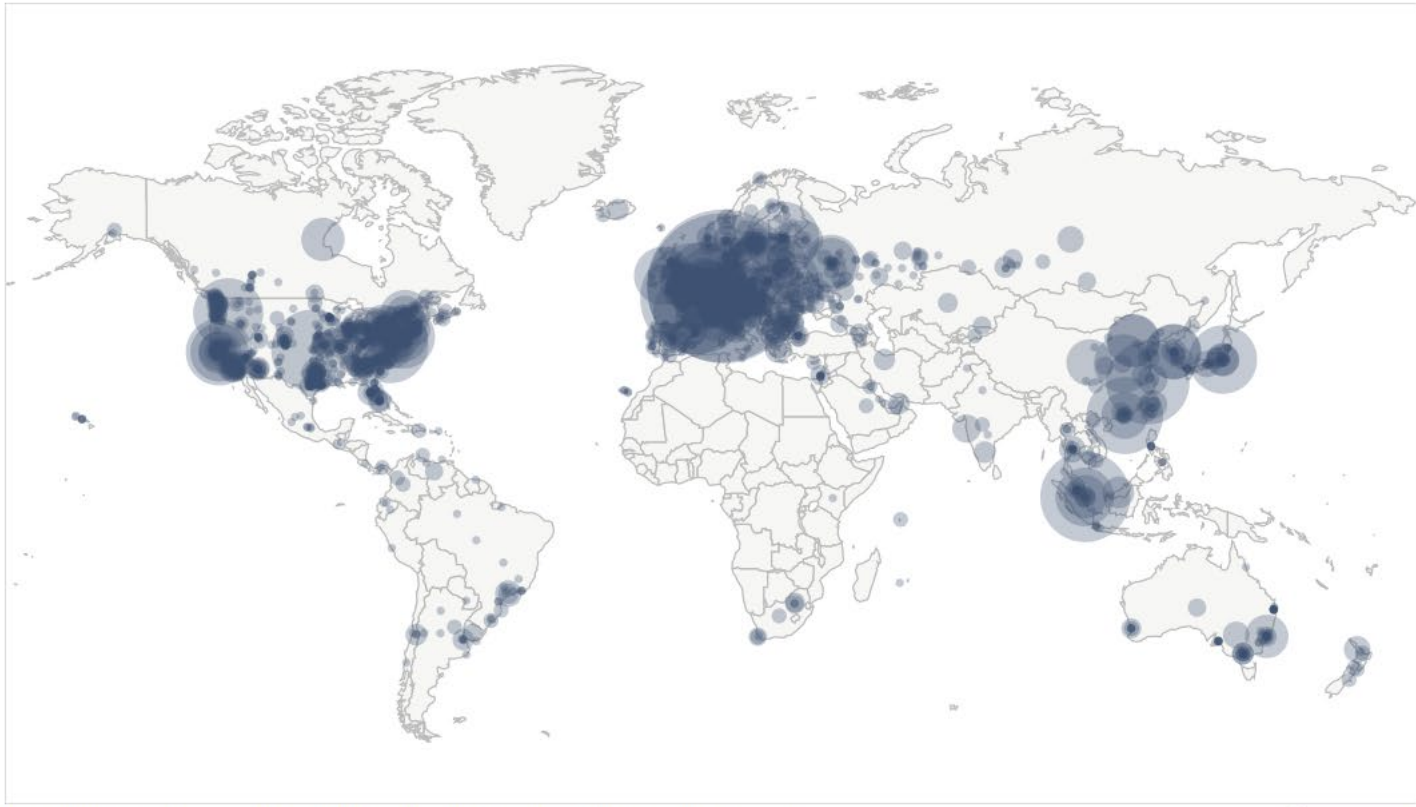
9489 NODES

24-hour charts »

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

RANK	COUNTRY	NODES
1	United States	2316 (24.41%)
2	Germany	1904 (20.07%)
3	France	602 (6.34%)
4	Netherlands	503 (5.30%)
5	China	388 (4.09%)
6	Canada	325 (3.43%)
7	Singapore	313 (3.30%)
8	United Kingdom	288 (3.04%)
9	Russian Federation	257 (2.71%)
10	n/a	233 (2.46%)

More (95) »



Map shows concentration of reachable Bitcoin nodes found in countries around the world.

LIVE MAP

Source: https://bitnodes.earn.com

Transparency, Traceability and Auditability

Transaction ID

Transaction View information about a bitcoin transaction

59e644a4af3398ce0b79293c5299b3dffec2fd92bf8c6f0316e1c81574826203

Amount

14wMXNVQ2qs2tk55p1pW2GFDSnDPzQVsWc → 1Q5csCtsXiA5mFEujG9n93ojzafARQ94Rz 0.01132658 BTC

From To

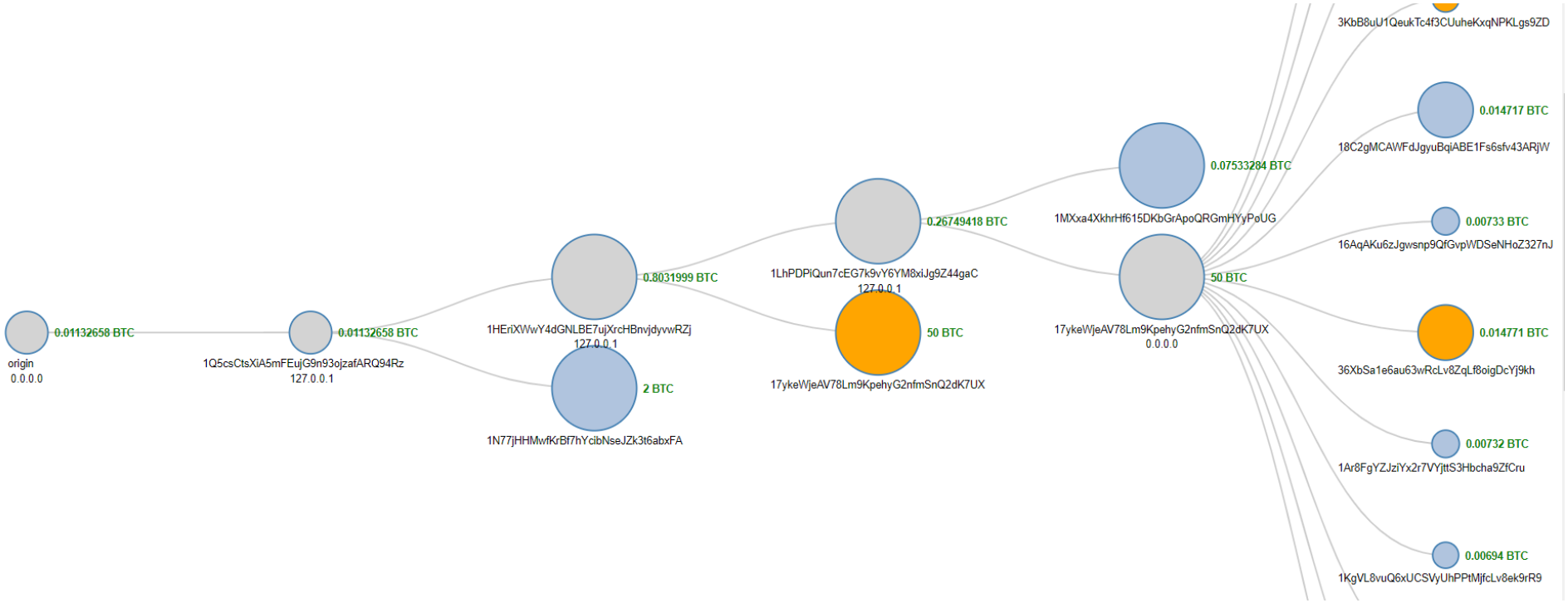
SPONSORED Crypto Credit 0.01132658 BTC

Summary	
Size	192 (bytes)
Weight	768
Received Time	2019-08-19 00:47:14
Included In Blocks	590716 (2019-08-19 00:47:30 + 0 minutes)
Confirmations	414 Blocks that have been processed since
Visualize	View Tree Chart

Inputs and Outputs	
Total Input	0.01162658 BTC
Total Output	0.01132658 BTC
Fees	0.0003 BTC Sending fee
Fee per byte	156.25 sat/B
Fee per weight unit	39.062 sat/WU
Estimated BTC Transacted	0.01132658 BTC
Scripts	Show scripts & coinbase

Source: blockchain.info

Transparency, Traceability and Auditability



Source: blockchain.info

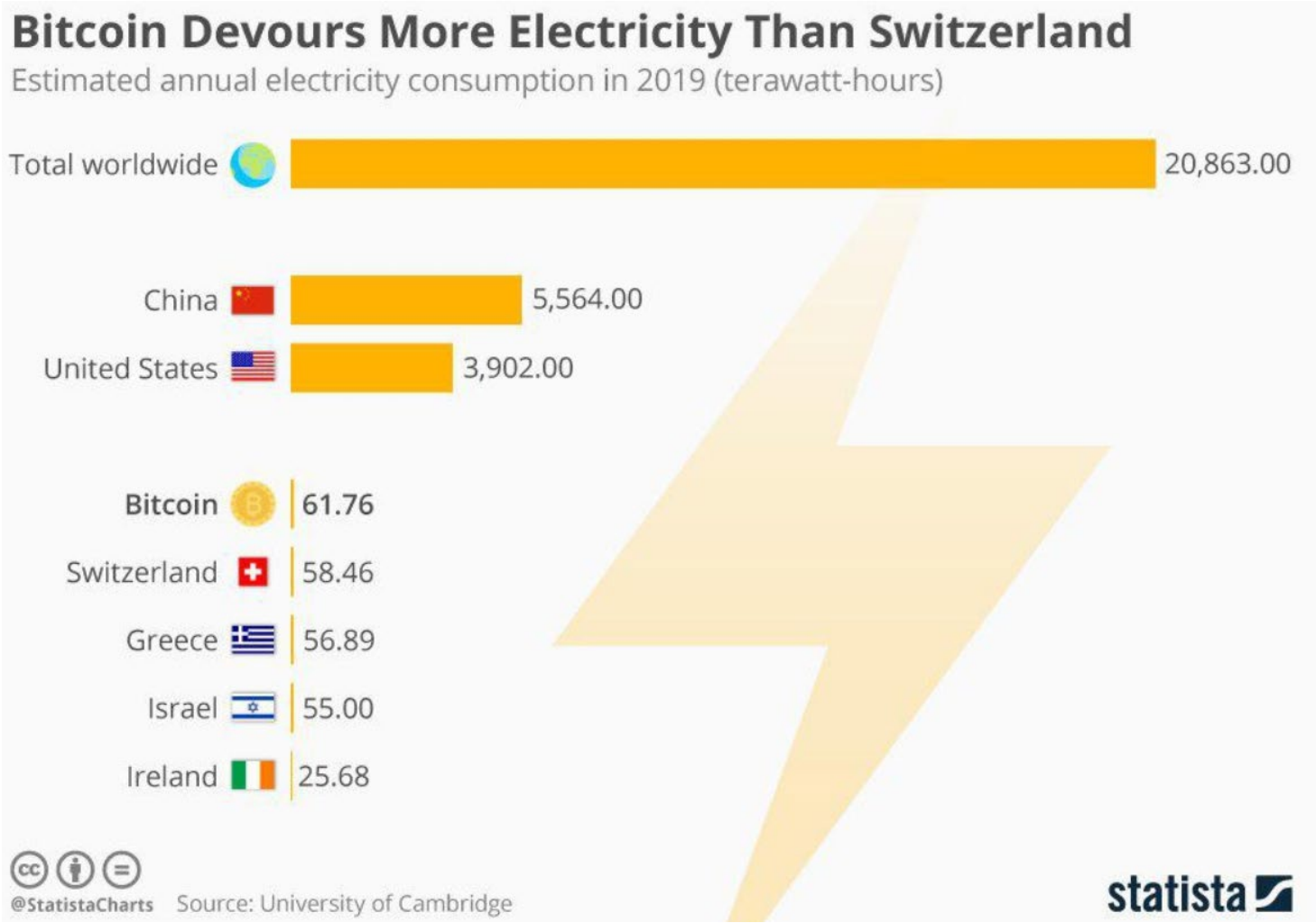
Different Crypto Assets

Crypto Asset	Market Cap**	1 Digital Token to (USD)**	Characteristics
Bitcoin (BTC)	$170 Billion	$9,530	Unknown creator(s); most common in market place; first to implement decentralized processing
Ether (ETH)	$22 Billion	$209	“2.0”; application development for new technology (smart contracts, token infrastructure)
Ripple (XRP)	$13 billion	$0.31	Company based in San Francisco, specific goals, consensus, & approval process
Bitcoin Cash (BCH)	$5 billion	$308	Certain software engineers helping maintain Bitcoin system did not agree with consensus, split, created own
Litecoin	$5 billion	$88	Uses different algorithm to process transactions compared to BTC

** As of July 29, 2019, CoinMarketCap

How Crypto Assets are Made?

Energy Consumption



Accounting for Crypto Assets

- **Australian Accounting Standards Board: *Digital currency — A case for standard setting activity.***
  - Cash or Cash Equivalents:
    - "It is fair to say that as a means of exchange, digital currencies have not yet achieved widespread acceptance, and they are clearly not supported by a central bank, or recognized as legal tender. Therefore, it is difficult to conclude that, at present, digital currencies meet the definition of cash"

Source: EY: IFRS Accounting for Cryptoassets; Australian Accounting Standards Board: Digital currency – A case for standard setting activity.

AASB: *Digital currency — A case for standard setting activity. (Cont.)*

- **Intangible Asset:**
  - Meets the definition of an intangible asset under IAS 38 as it is an identifiable non-monetary asset without physical substance.
  - "However, we do not believe that the accounting treatment under IAS 38 would provide relevant and useful financial information."

- **Inventory:**
  - "Could be scoped into IAS 2 as inventory, however, it is not clear how to interpret the measurement exception for commodity broker-traders in the context of digital currencies."
  - How is crypto asset being used in the course of business?

Source: EY: IFRS Accounting for Cryptoassets; Australian Accounting Standards Board: Digital currency – A case for standard setting activity.

Various Statements on Crypto Assets

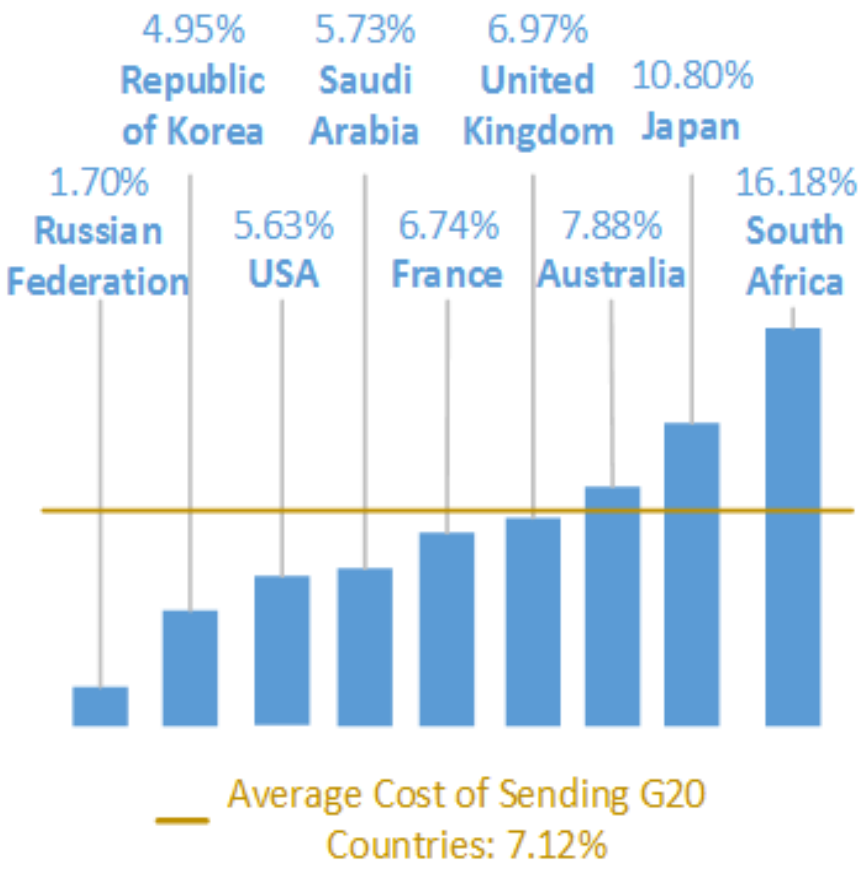
The Financial Crimes Enforcement Network (FinCEN)	A medium of exchange that operates like a currency in some environments, but does not have all the attributes of real currency. In particular, virtual currency does not have legal tender status in any jurisdiction.
Internal Revenue Service (IRS) & apparent references from Commodity Futures Trading Commission (CFTC)	A digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value. In some environments, it operates like 'real' currency . . . but it does not have legal tender status [in the U.S.].
Conference of State Bank Supervisors (CSBS)	A digital representation of value that is used as a medium of exchange, unit of account, or store of value and is not legal tender, whether or not denominated in legal tender. A virtual currency does not include a transaction in which a merchant grants value as part of an affinity or rewards program, which value cannot be taken from or exchanged with the merchant for legal tender, bank credit, or virtual currency; or a digital representation of value issued by or on behalf of the publisher and used within an online game, game platform, or family of games sold by the same publisher or offered on the same game platform.
Statement from Chairman Jay Clayton, Securities and Exchange Commission (SEC)	Speaking broadly, cryptocurrencies purport to be items of inherent value (similar, for instance, to cash or gold) that are designed to enable purchases, sales and other financial transactions. They are intended to provide many of the same functions as long-established currencies such as the U.S. dollar, euro or Japanese yen but do not have the backing of a government or other body. Although the design and maintenance of cryptocurrencies differ, proponents of cryptocurrencies highlight various potential benefits and features of them, including (1) the ability to make transfers without an intermediary and without geographic limitation, (2) finality of settlement, (3) lower transaction costs compared to other forms of payment and (4) the ability to publicly verify transactions.
U.S. Department of the Treasury	Virtual currency is a digital representation of value that functions as (i) a medium of exchange; (ii) a unit of account; and/or (iii) a store of value; is neither issued nor guaranteed by any jurisdiction; and does not have legal tender status in any jurisdiction.

What are Stablecoins?

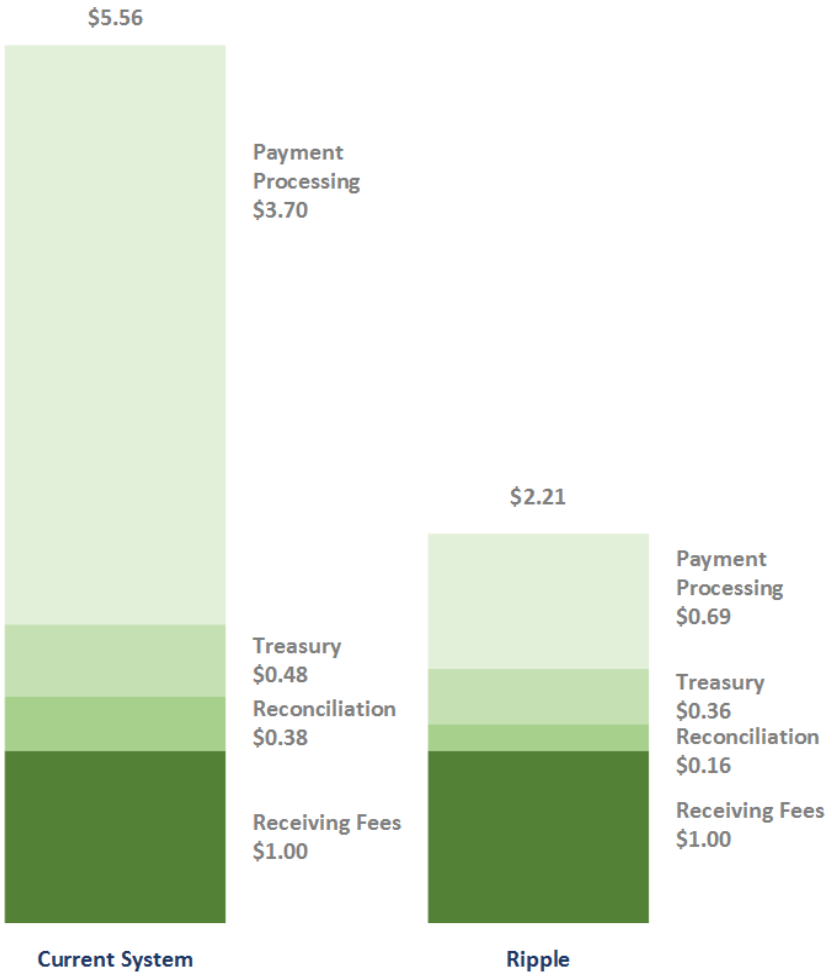
- **Crypto asset 'pegged to', or backed by, fiat currency, other cryptoassets or other forms of assets to stabilize their volatility.**
  - They can also be algorithmically stabilized for the purposes of exchange on a DLT network.
  - Pegged to a fiat currency, most commonly the USD, and most commonly with a 1:1 backing.

Why Stablecoins?

Payment Remittance in G20 Countries



Breakdown of Payment Costs, USA



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Source: World Bank 2017; Ripple Whitepaper

Stablecoin Examples

- Signature Bank (active)
- Tether (active)
- Gemini (active)

Stablecoin Examples (Cont.)

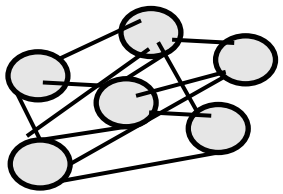
- **JP Morgan Chase (Proposed)**
  - US Patent Number *20180121911: A method for processing network payments on a distributed ledger*
    - Synchronizing the distributed ledger and the internal non-distributed ledger are synchronized
    - Payment transaction is conducted in a single currency or a form of currency conversion
- **Facebook (Proposed)**
- **Walmart (Proposed)**

Distributed Ledger Technology (DLT)*

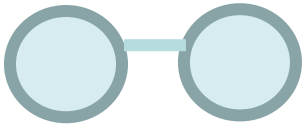
- *A decentralized & distributed database*
- *of transactions*
- *that are grouped into blocks*
- *and are 100% verifiable,*
- *irrefutable,*
- *and linked through chains of prior blocks.*

* Presenter working definition

Attributes of DLT

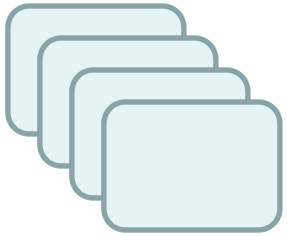


Decentralized / Distributed



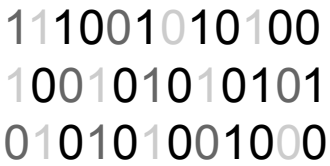
Transparency

Irrefutability



Transaction Linkage

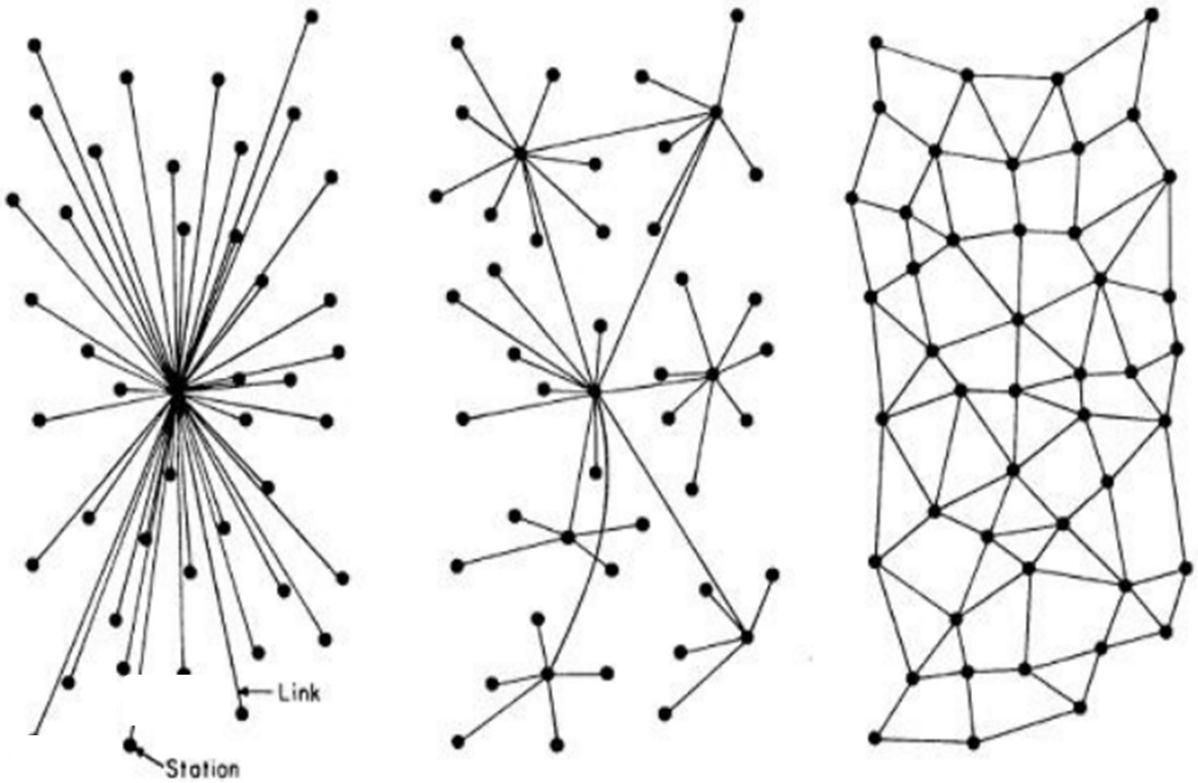
Validity



Cryptography

Consensus

DLT in a Picture



CENTRALIZED (A) DECENTRALIZED (B) DISTRIBUTED (C)

How are Companies Structuring Their DLTs

- **Permissionless / Public**
  - Open-source software: Anyone can submit and verify transactions
  - Anyone can view transactions
  - Anonymity & Transparency
- **Permissioned / Private**
  - Not able to join/create/view transactions without permission
  - Governance members of a DLT would set rules

Government Entities and DLT

Source: Datafoundation.org

Government Entities and DLT: Department of the Treasury

- **Mobile Device Tracking**
  - Cell phone is programmed to automatically record an action (call, text, etc.) on the blockchain each time one uses an assigned cell phone
    - Pings tend to confirm employee is taking government issued devices within the agency's control
    - Reduces manual labor in tracking and monitoring devices
  - Device can be rendered "inactive"
  - Helps manage transfer of assets between employees, as well returning to the agency

Source: Datafoundation.org

Government Entities and DLT

- Does a DLT offer a real benefit for information security, trust, or transparency?
- Can blockchain be practically and efficiently applied?
- What blockchain design is most appropriate?
- Is the cost of applying blockchain merited relative to information gains?
- Does the application satisfy applicable data sharing and confidentiality laws?

Source: Datafoundation.org

Demonstration

- Performed on presenter's personal computer and network
- No FDIC hardware, software, or network was used

Questions