Blockchain in Low Earth Orbit

Off Earth Atlas

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Who am I?

I'm an astronomer by training.

I've been working in cryptocurrency for the last 10 years.

VP of Engineering at Bloq, Inc (where we focus on Blockchain infrastructure).

A New Currency in a New Location

Humanity has been in space for less than 100 years.

Bitcoin (the oldest cryptocurrency) is less than 15 years old.

Outline

- Quick review of Cryptocurrency.
- Wallets in Space.
- Connections between things in Space.

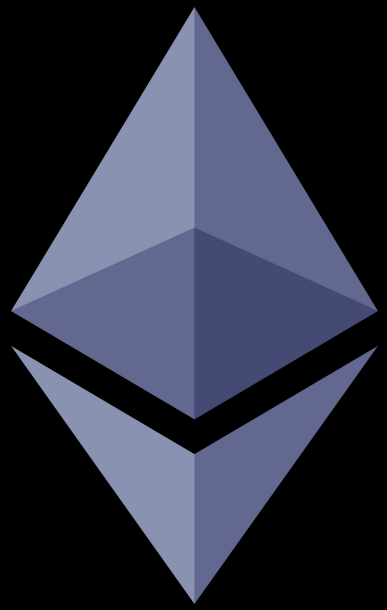
Blockchains

- Bitcoin
- Cryptocurrency
- Decentralized Ledger
- Just a fancy database?

Bitcoin

- Bitcoin: A Peer-to-Peer Electronic Cash System (Satoshi Nakamoto, October 2008).

Ethereum and Beyond



Programmable Money.

Digitally Native Currency

- Most money will never touch the physical world.
  - Only 9% of people (in US) primarily use cash or check according to `https://www.forbes.com/advisor/credit-cards/credit-card-statistics/`
- Most of us still think of money as the physical object.

Blockchain Basics

- Why?
- How?

Blockchain Basics: Why?

Can we agree on a shared state of the world without explicit trust?

- This lets us transfer value (money).
- More interesting things as well.

Blockchain Basics: Ledgers

- Most of our terminology comes from money (the first application of this).
- Decentralized Ledger.
- A database with Eventual Consistency
  - No single source of truth.

PoW/PoS

Consensus Mechanisms

- Instead of forcing good behavior incentivize it.
- Cheaper to be a good player than a bad player.
- Rewards for being 'good'.

Consensus Pt. 2

Proof of Work vs. Proof of Stake

Blockchain: Wallets

- Public key: `0xd4c...d9066`
- Sometimes a human readable name: `jcv.eth`
- Private key lets you do actions on chain since it proves you 'own' the public key.

Spacechain

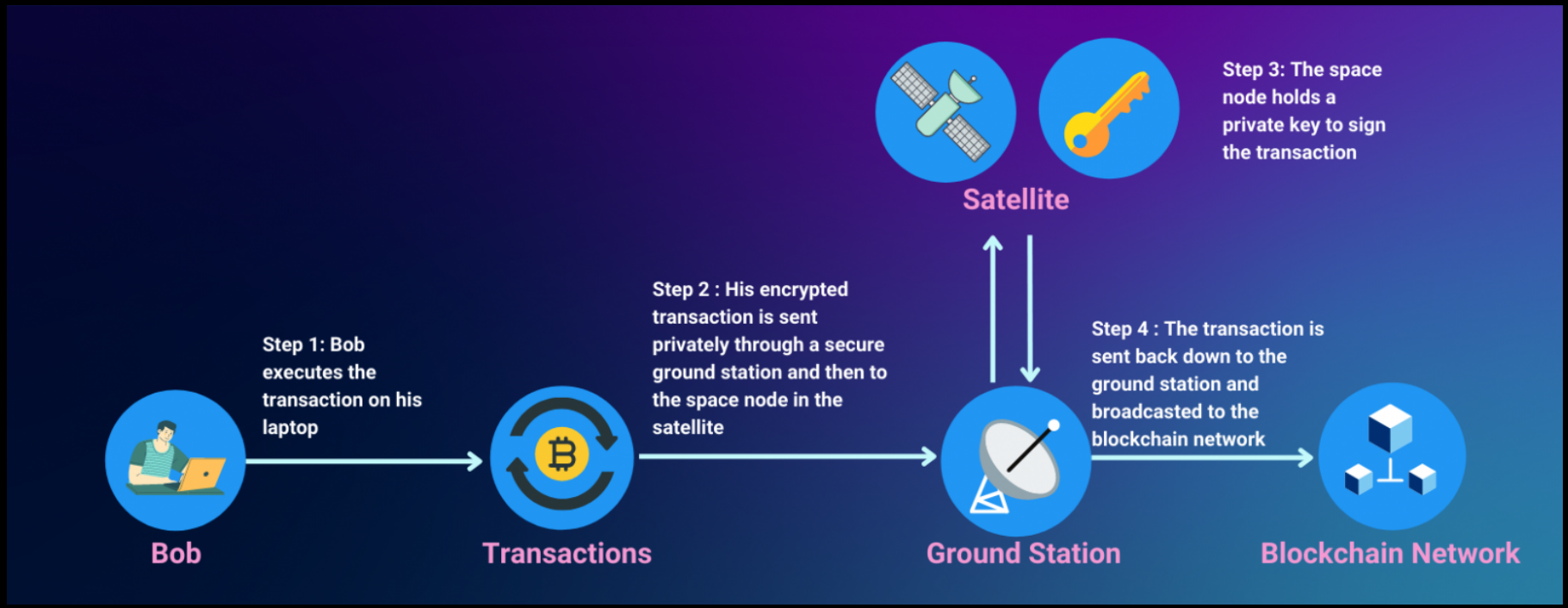
https://spacechain.com/

Nodes in space?

- Limited resources mean limited options for nodes.
- TB of fast storage needed for some chains.
- Power and heat requirements.
  - Space (even LEO) gives you a nearly limitless place to dump heat and no way to use it.
  - Terrestrial locations have limited heat syncs but they are easy to use.

Cheap Hardware

Keys in space



(multisig) Wallets on satellites.

Multisig

- Security through isolation.
- Security through time-delay.

But is there more?

Satellite to Satellite communication?

- Normally satellites communicate with the ground and most coordination happens there.
- This was one of our bottlenecks in astronomy satellites like Fermi and Swift.
- Eventually consistent db, p2p comms, conflict resolution all provide options to get around this.
- Needs new (but cheap hardware).

Economies and Infrastructure

We have the potential for doing both digitally native economic activities and decentralized infrastructure related activities on satellites or the ISS.