



College of Information Studies

University of Maryland Hornbake Library Building College Park, MD 20742-4345

Blockchain

Session 39

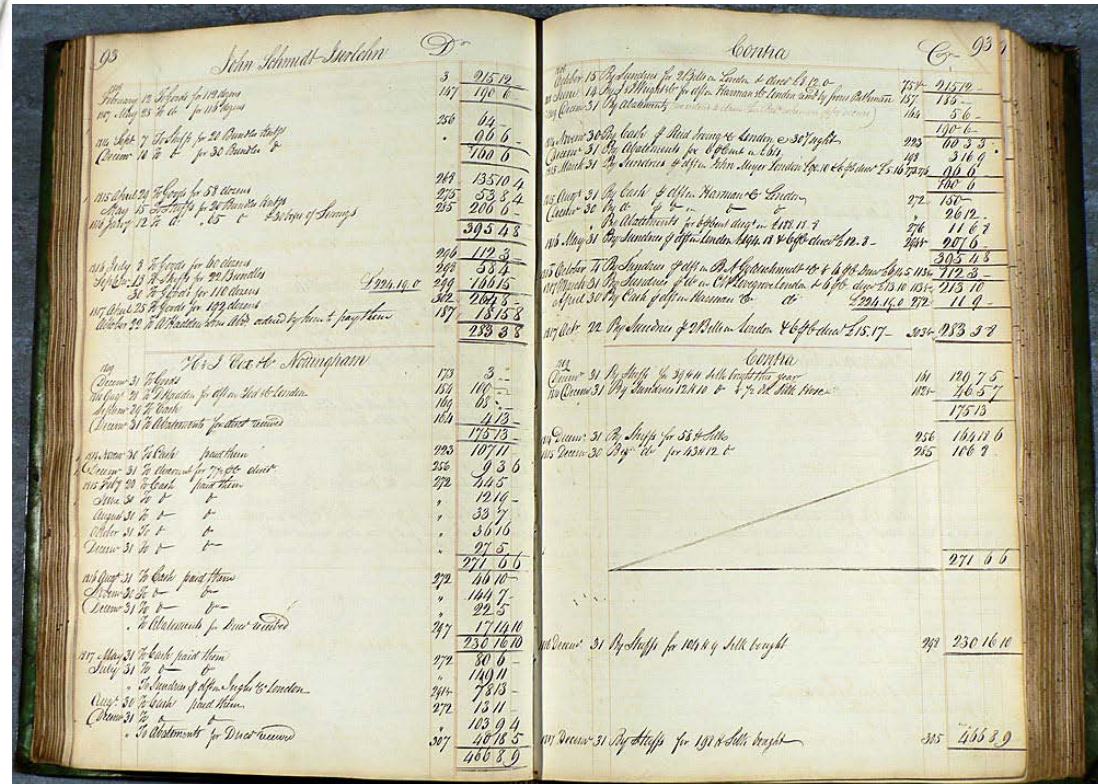
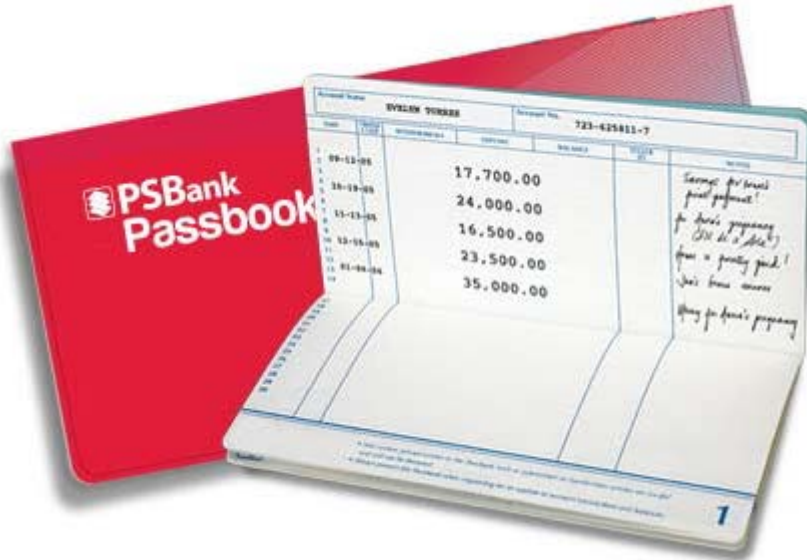
INST 346

Technologies, Infrastructure and Architecture

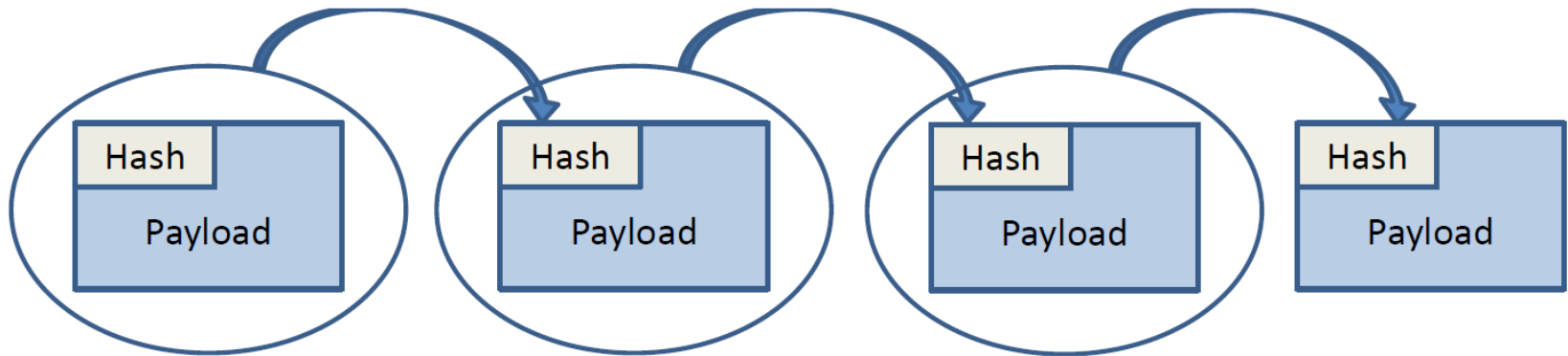
Goals for Today

- Ledger
- Hashchain
- Blockchain
- Distributed blockchain ledger
- Bitcoin
- Adoption

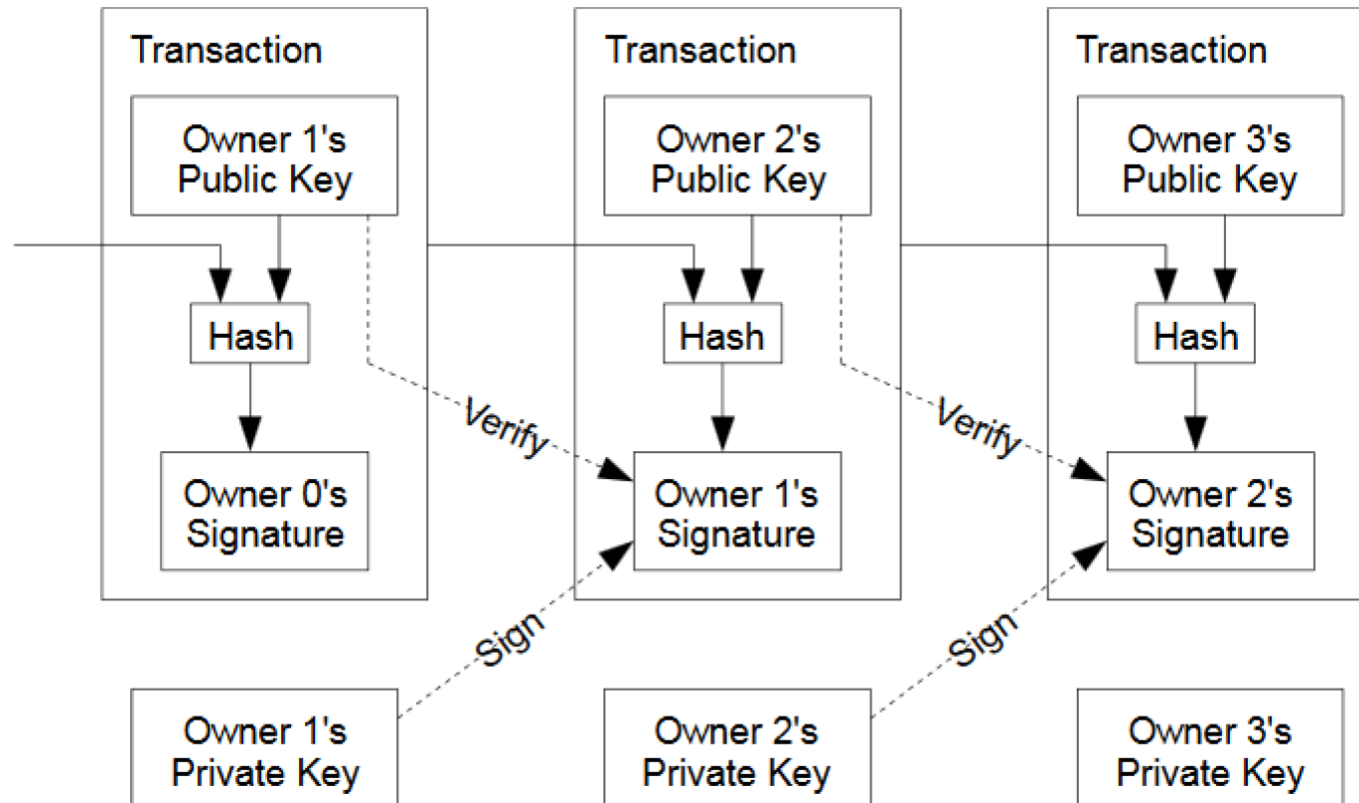
Ledgers



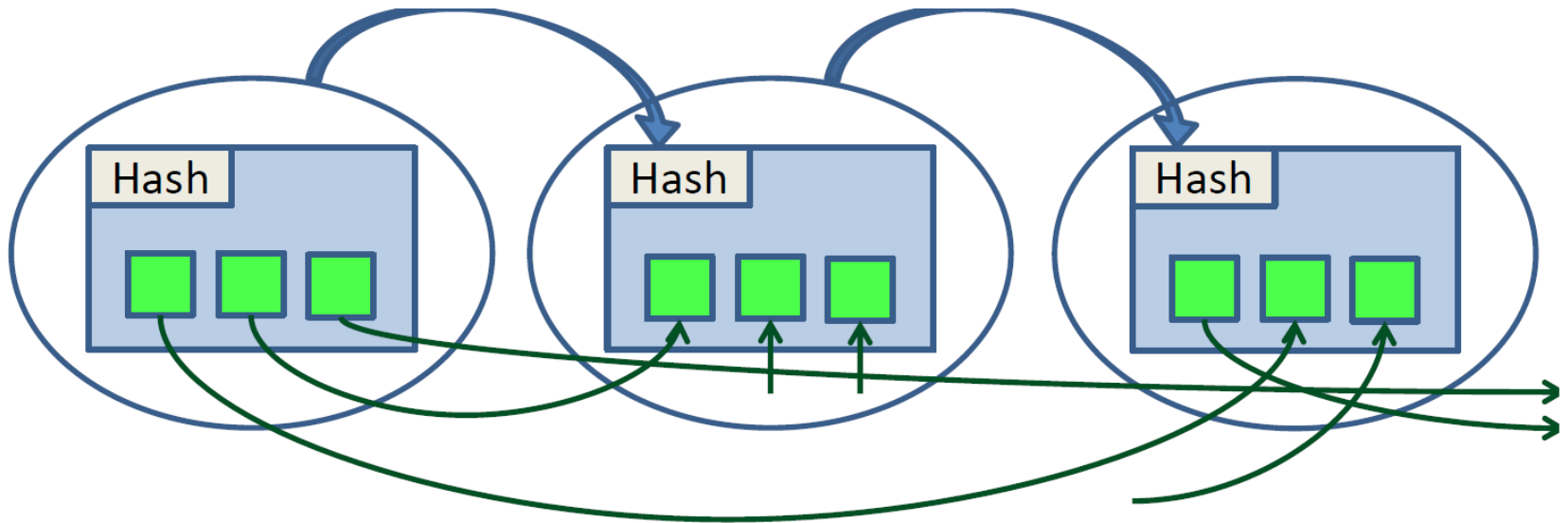
Hashchain



Signed Hashchain



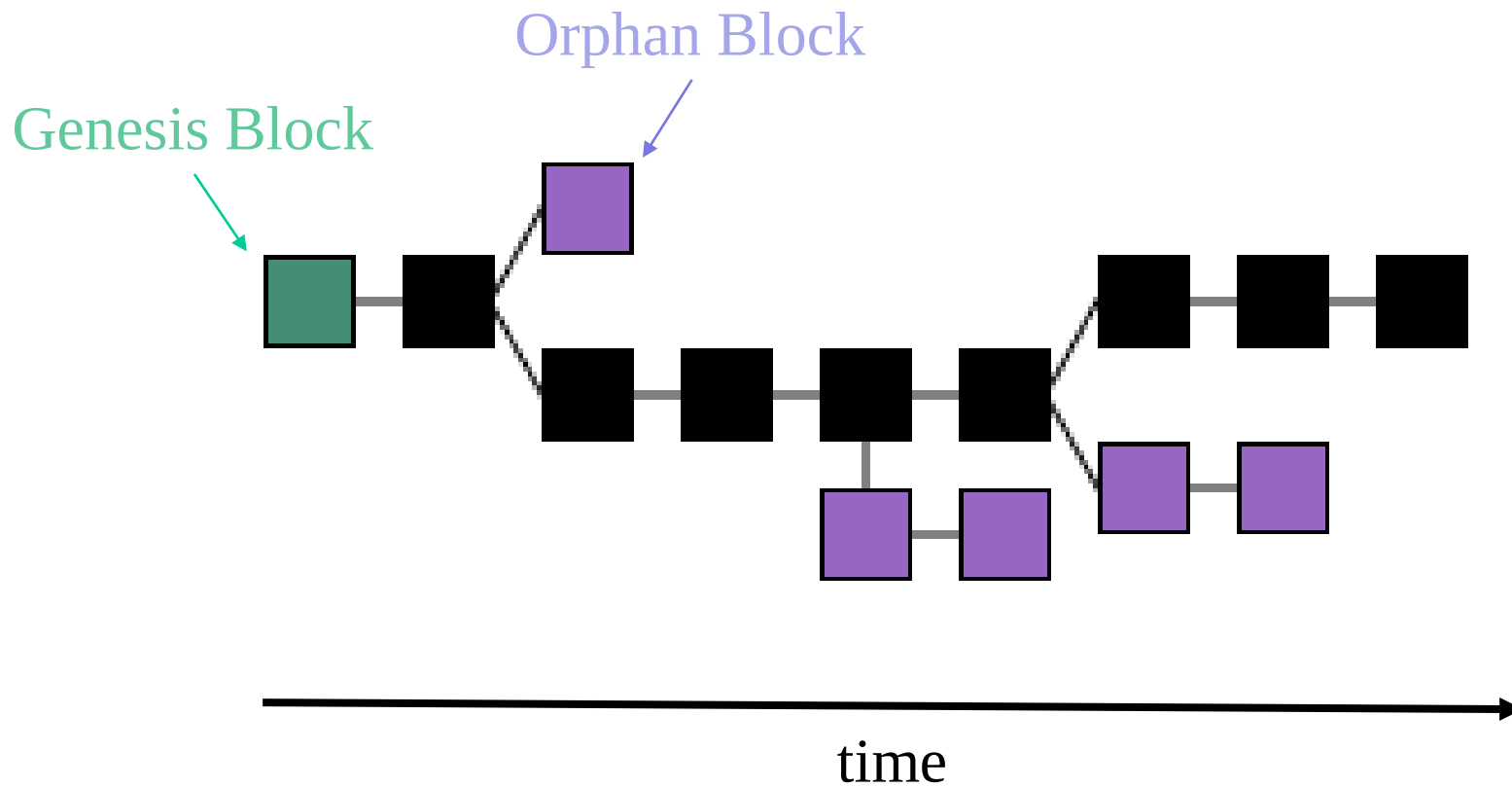
Blockchain



Block Linking

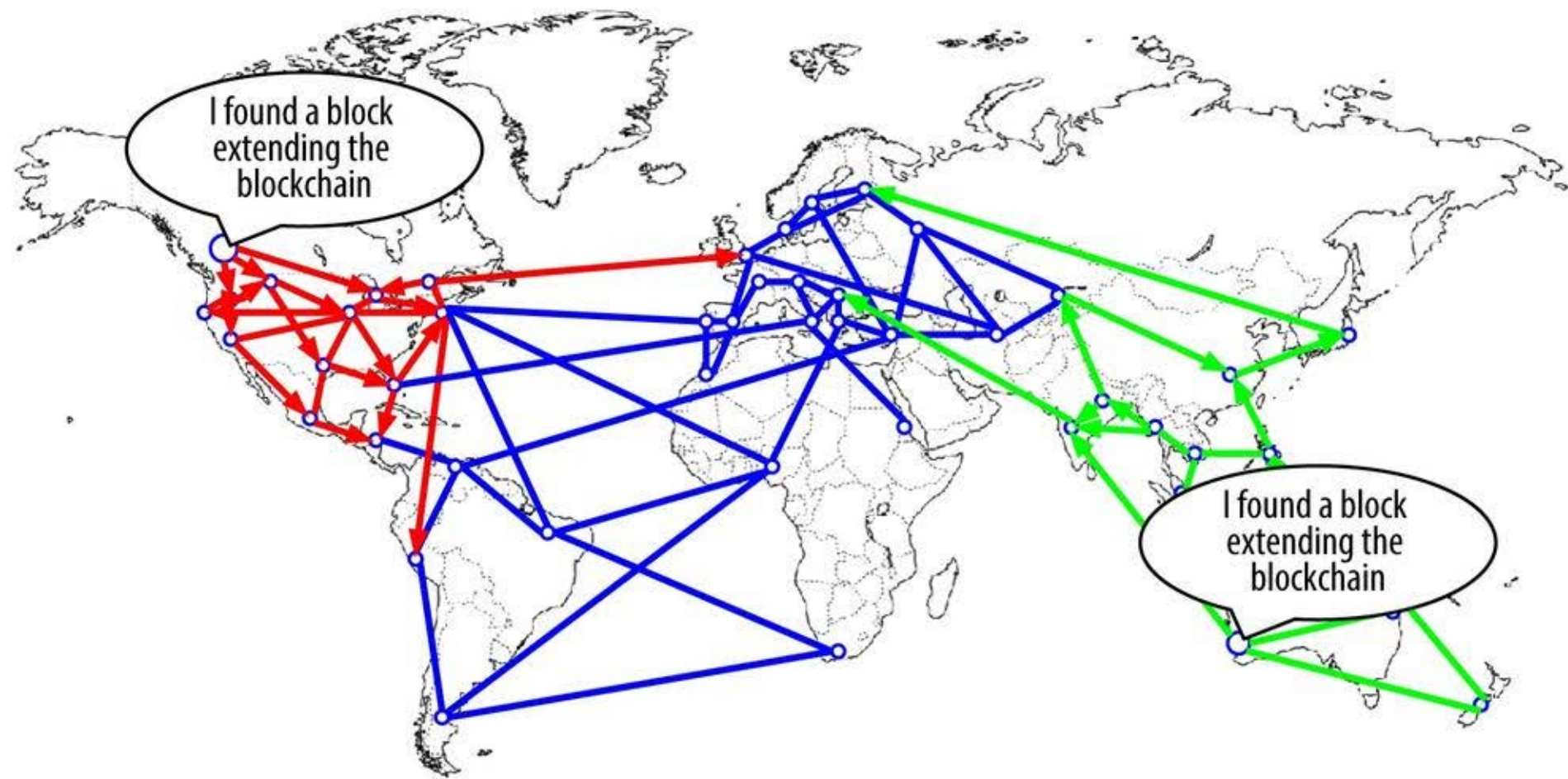
```
{
  "size" : 43560,
  "version" : 2,
  "previousblockhash" :
    "000000000000000027e7ba6fe7bad39faf3b5a83daed765f05f7d1b71a1632249",
  "merkleroot" :
    "5e049f4030e0ab2debb92378f53c0a6e09548aea083f3ab25e1d94ea1155e29d",
  "time" : 1388185038,
  "difficulty" : 1180923195.25802612,
  "nonce" : 4215469401,
  "tx" : [
    "257e7497fb8bc68421eb2c7b699dbab234831600e7352f0d9e6522c7cf3f6c77",
    #[... many more transactions omitted ...]
    "05cfd38f6ae6aa83674cc99e4d75a1458c165b7ab84725eda41d018a09176634"
  ]
}
```

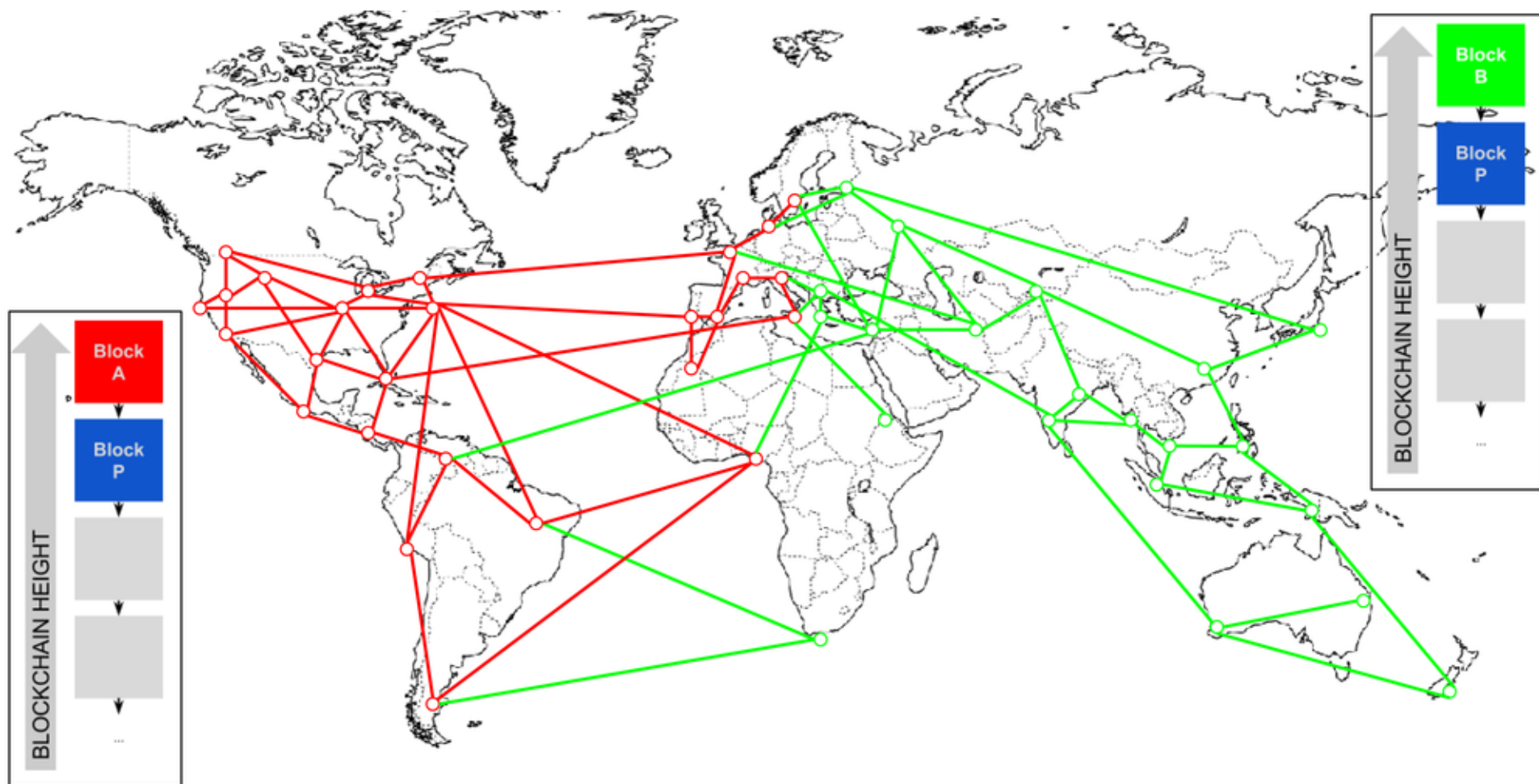
Branching Blockchains

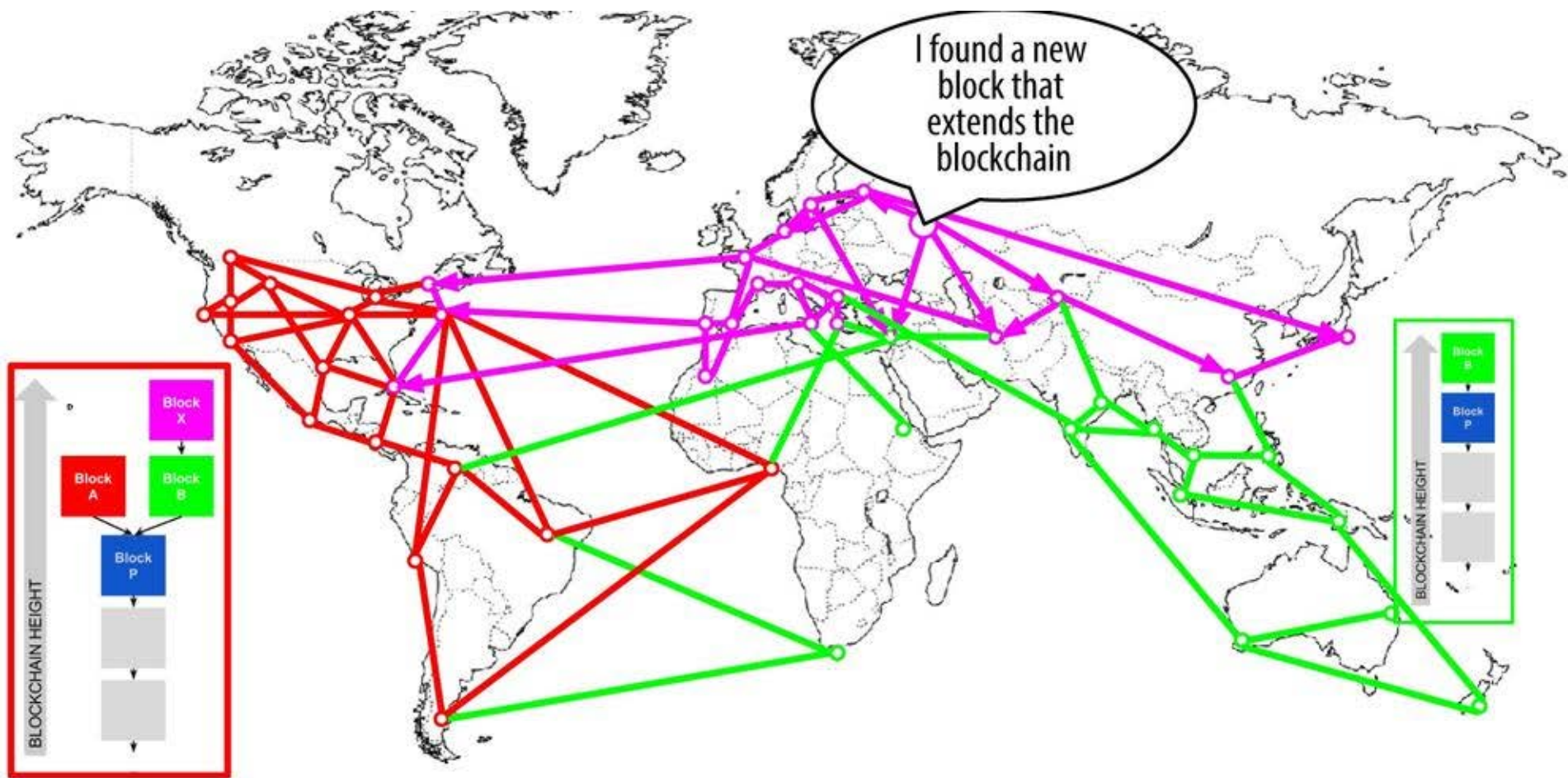


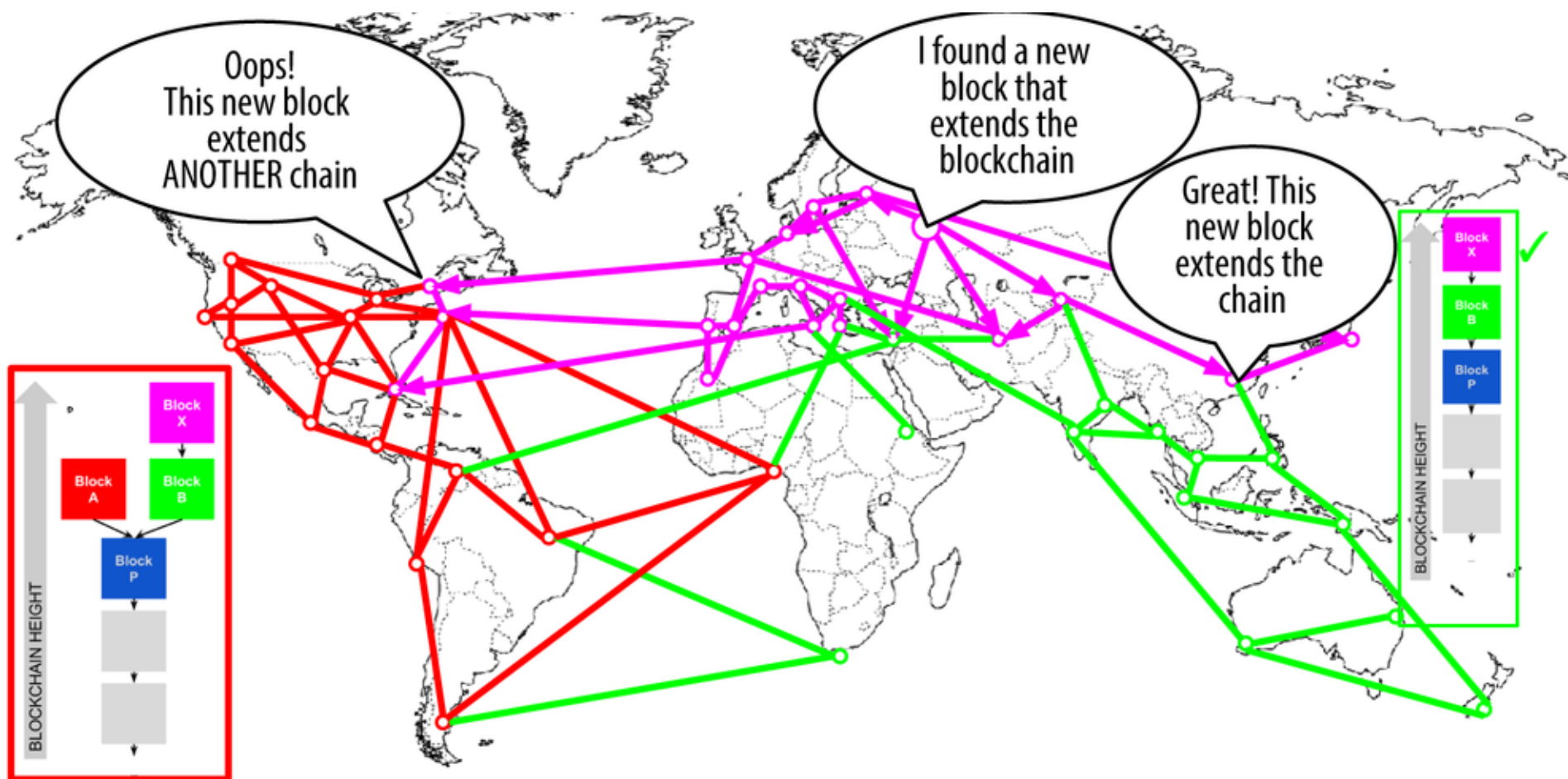
Distributed Blockchain Ledger





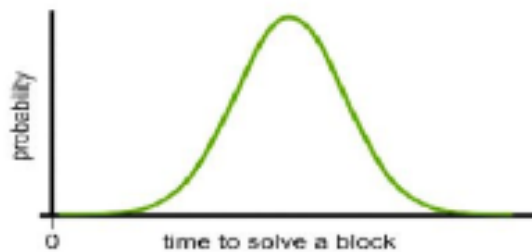




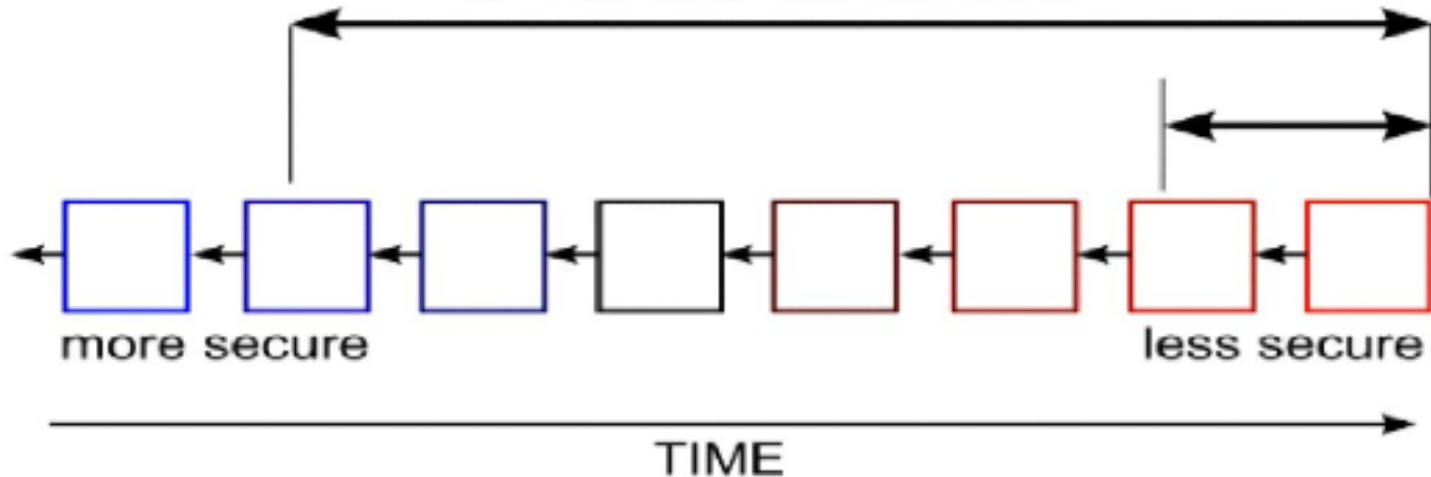


Proof of Work

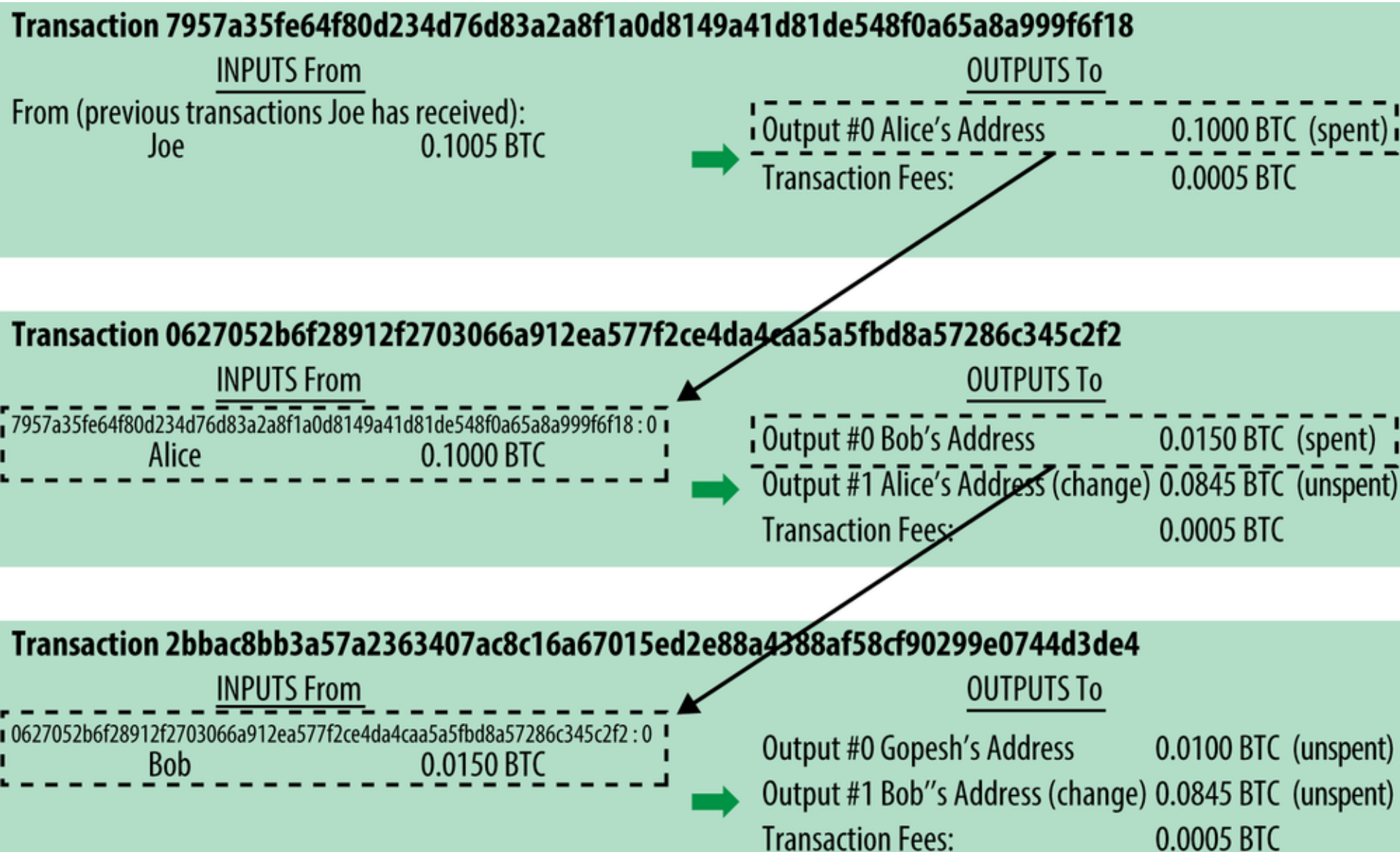
Probability Distribution of Block Solving Time



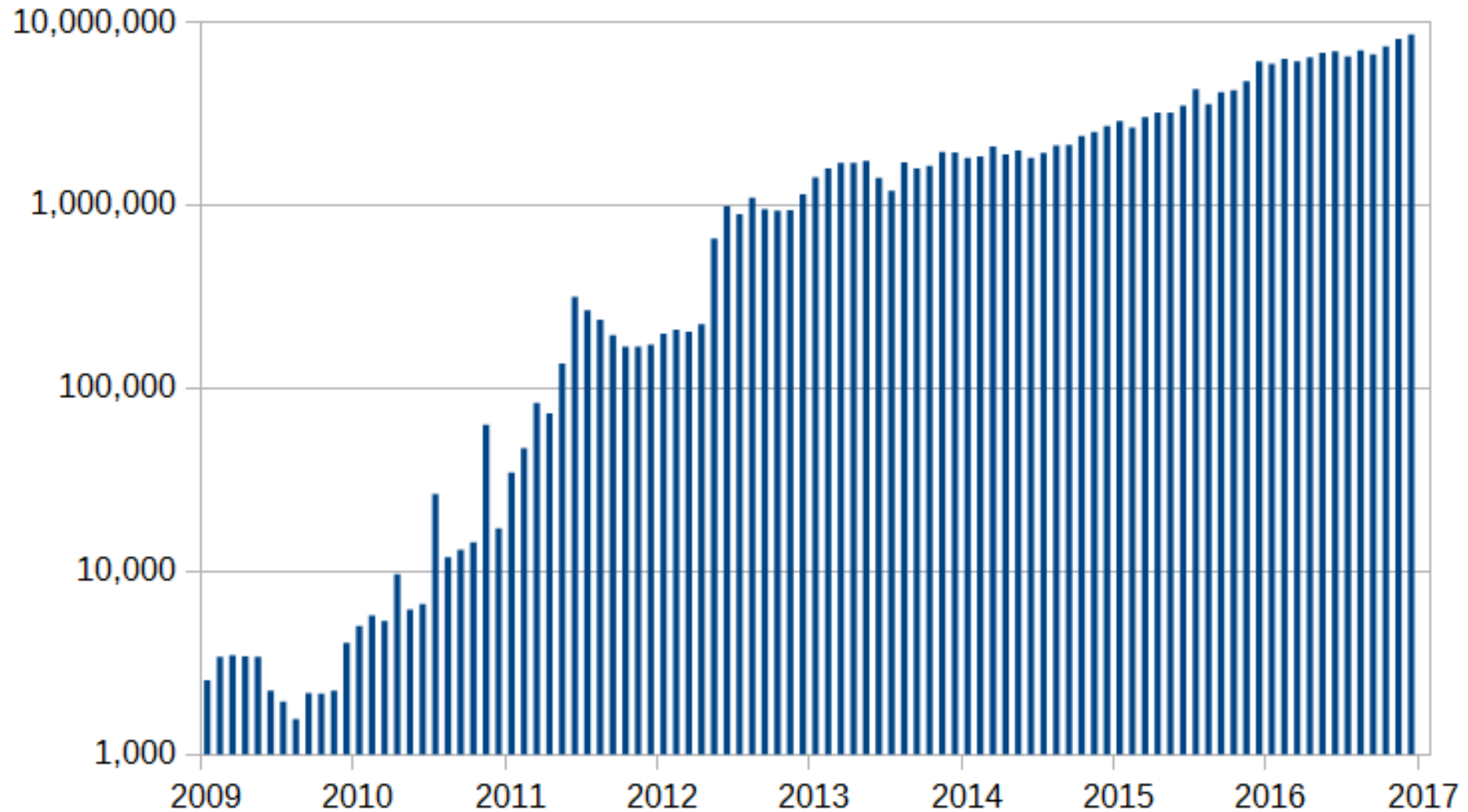
Time attacker must outpace
or "out luck" the network.



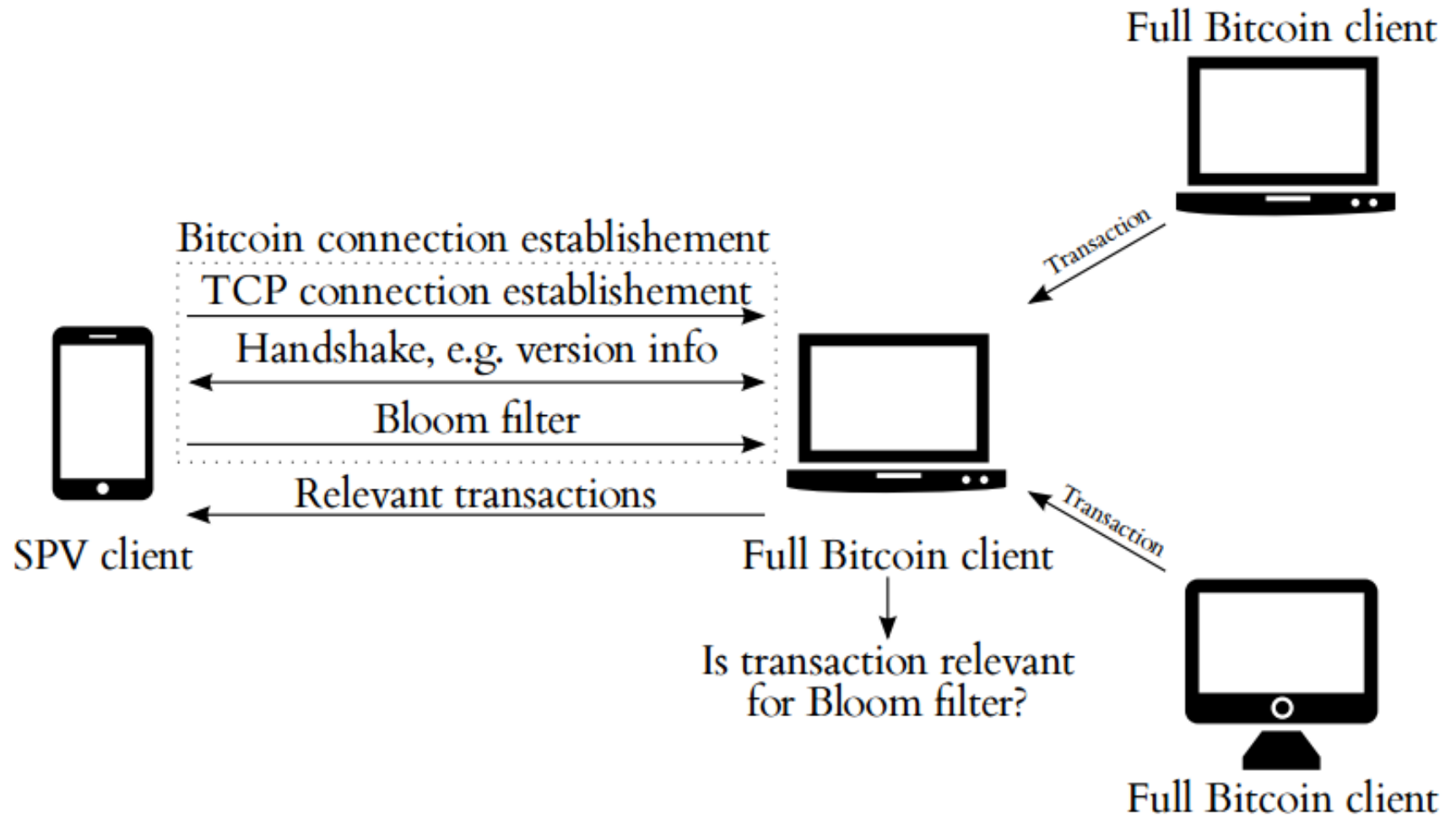
Bitcoin



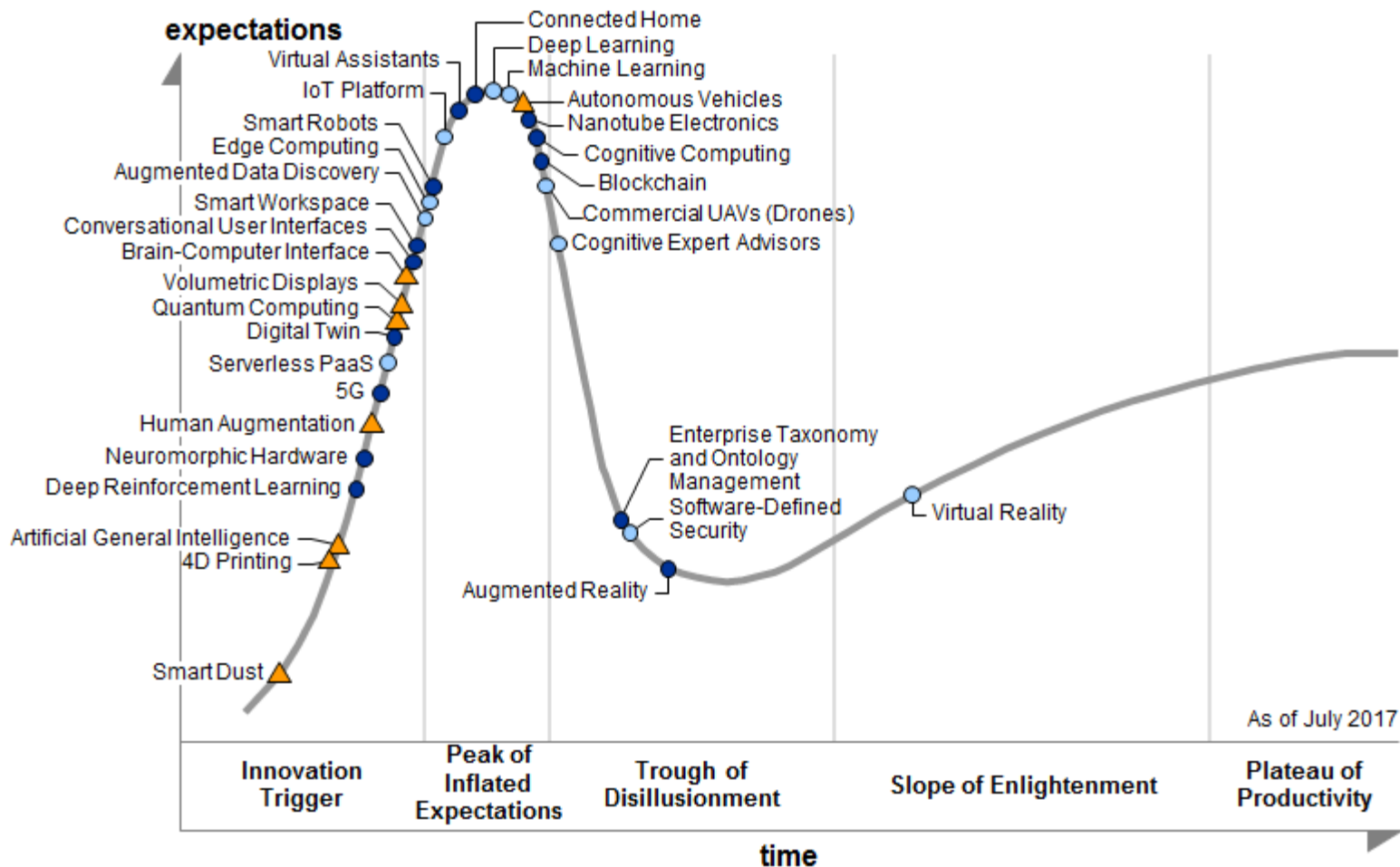
Monthly Bitcoin Transactions



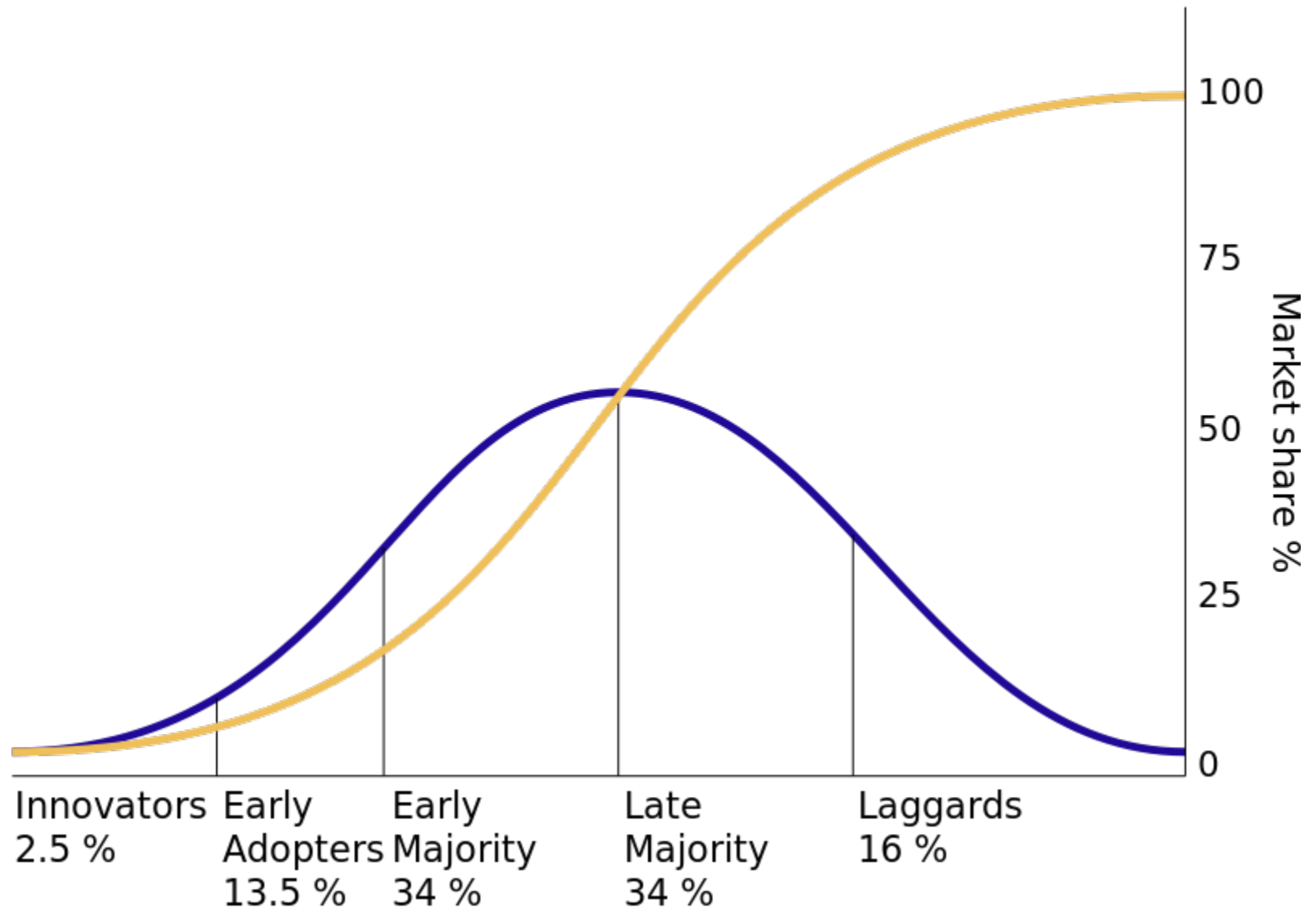
Simplified Payment Verification (SPV)



Gartner Hype Cycle



Adoption Curves



Some Predictors of Adoption

- Relative advantage
- Compatibility with existing systems
- Trialability
- Ease of learning
- Reinvention potential

Social Structure of Adoption

- Innovators
- Communicators
- Opinion leaders
- Early adopters

HIGH

AMOUNT OF COMPLEXITY AND COORDINATION

SUBSTITUTION

RETAILER GIFT CARDS
BASED ON BITCOIN

AMAZON ONLINE
BOOKSTORE

TRANSFORMATION

SELF-EXECUTING
SMART CONTRACTS

SKYPE

SINGLE USE

BITCOIN PAYMENTS
E-MAIL ON ARPANET

LOCALIZATION

PRIVATE ONLINE
LEDGERS FOR
PROCESSING FINANCIAL
TRANSACTIONS

INTERNAL CORPORATE
E-MAIL NETWORKS

LOW

DEGREE OF NOVELTY

HIGH