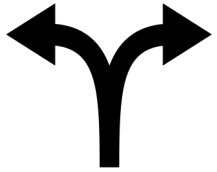
TEZOS
BLOCKCHAIN CAMP
BUSAN

테조스 플랫폼

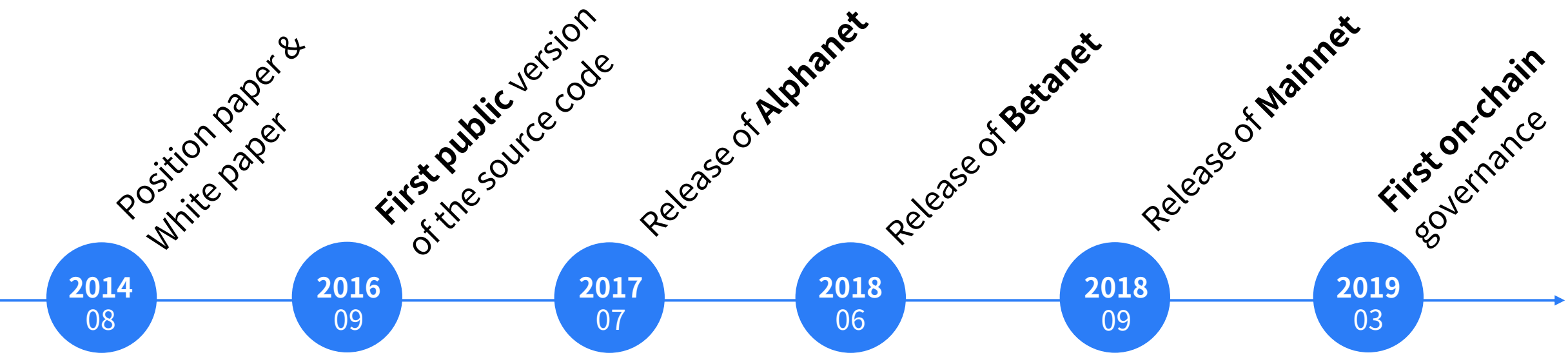
Formal verification
오류가 최소화된 스마트 컨트랙트



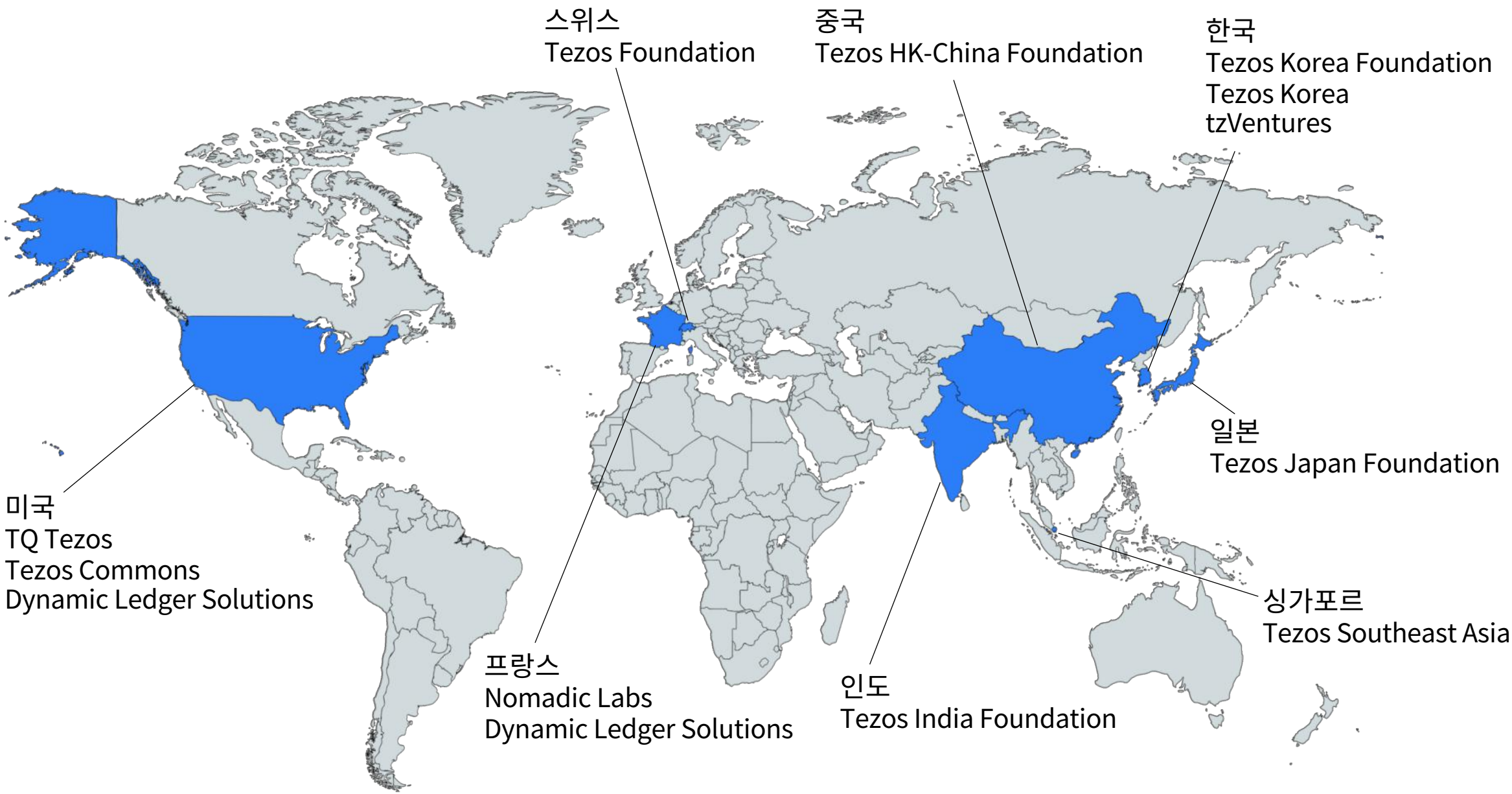
On-chain Governance
하드 포크의 위험성이 최소화

Business Logic Automation
비지니스 스마트 컨트랙트 플랫폼

테조스 네트워크 연혁


Position paper &
White paper
2014
08
First public version
of the source code
2016
09
Release of Alphanet
2017
07
Release of Betanet
2018
06
Release of Mainnet
2018
09
First on-chain
governance
2019
03

테조스 글로벌 생태계


스위스
Tezos Foundation
중국
Tezos HK-China Foundation
한국
Tezos Korea Foundation
Tezos Korea
tzVentures
일본
Tezos Japan Foundation
미국
TQ Tezos
Tezos Commons
Dynamic Ledger Solutions
프랑스
Nomadic Labs
Dynamic Ledger Solutions
인도
Tezos India Foundation
싱가포르
Tezos Southeast Asia

테조스 메인 네트워크*

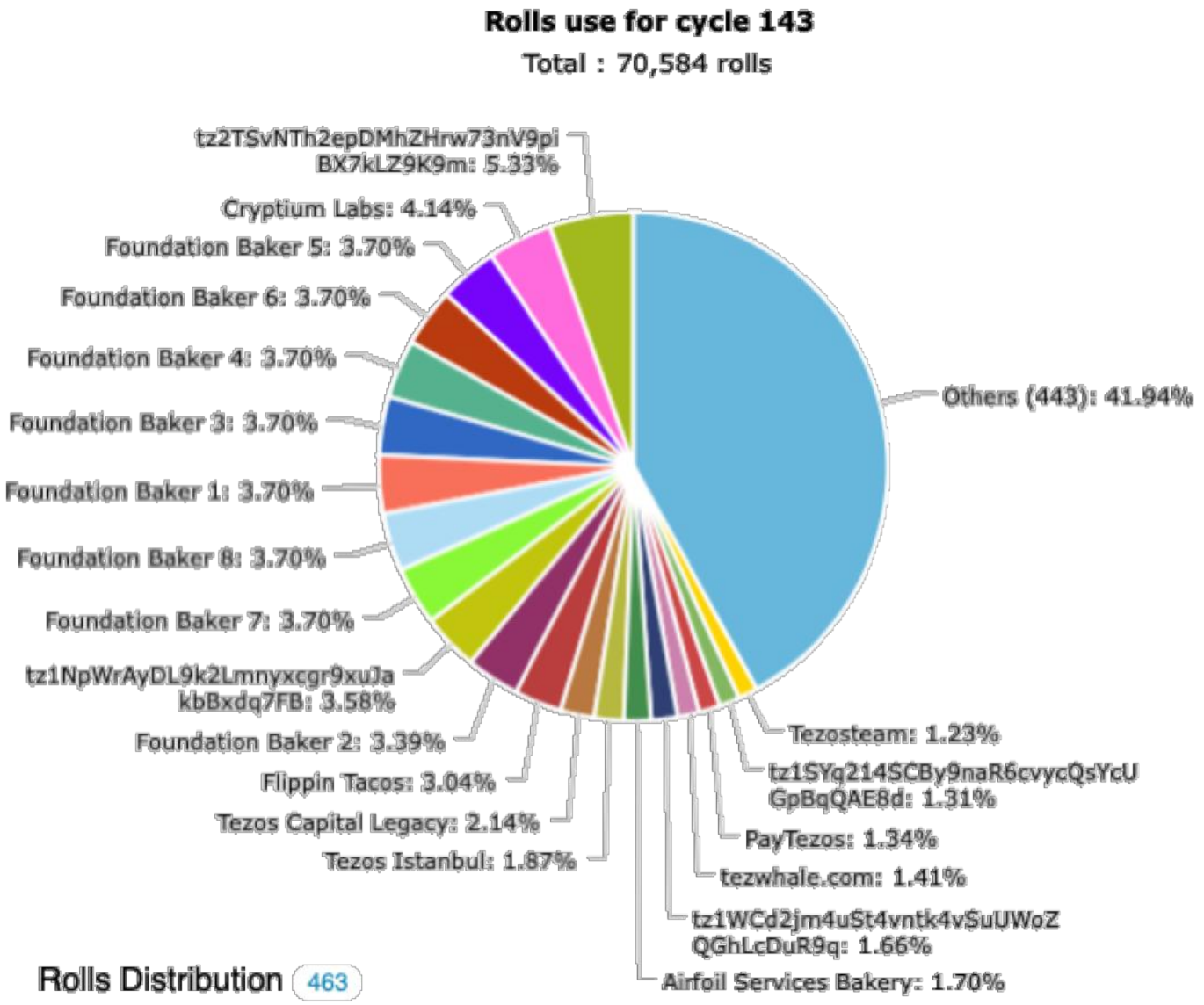
463 Bakers

8,546 Nodes

565,519 Blocks

804,110,000 ꜩ in total

564,672,000 ꜩ in staking



* As of 19.08.15

한국 내 테조스 조직 소개

테조스 한국 재단 (Tezos Korea Foundation)

한국 내 테조스 생태계 조성

교육 프로그램, 학계 지원

밋업, 컨퍼런스 기획 및 주최

(주)테조스코리아 (Tezos Korea Inc.)

테조스 한국 재단 산하 영리 기업

블록체인 컨설팅 및 기술 지원

tzVentures

글로벌 테조스 인큐베이터

스타트업 발굴, 지원, 데모 데이

Advisors & MOUs

김기천 교수, 박진하 교수 건국대학교 정보통신대학원 블록체인전공

- 정보통신 산업 발전 및 블록체인전공 교육과정 개발 협약

이광근 교수 서울대학교 컴퓨터공학, 소프트웨어 무결점 연구소

- Tezos 스마트 컨트랙트 Formal Verification 및 Audit

이재원 교수 KAIST/세종대 경영학과

- 블록체인 비즈니스 모델 및 인큐베이팅

정호진 교수 홍익대학교 경영학과

- 토큰 이코노미 및 Boundary / Allocation

박선주 교수 연세대학교 경영학과, 디지털 사회 연구센터

- 블록체인 인재양성 교육

(주)테조스코리아

서비스

스마트 컨트랙트 작성 및 검증(Formal verification)

비즈니스 모델 및 토큰 이코노미 설계

거래소 상장 및 스테이킹 기술 지원

블록체인 특강(기업, 공공기관, 학교)

테조스 장외(OTC) 거래

STO 플랫폼

파트너

서울대학교 SEOUL NATIONAL UNIVERSITY

연세대학교 YONSEIUNIVERSITY

KU 건국대학교 KONKUK UNIV.

ROSAEC center Research On Software Analysis for Error-free Computing 소프트웨어 무결점 연구센터 NRF ERC

산업과 예술의 만남 홍익대학교

멀티캠퍼스 The Best HR Service Partner

TEZOS SOUTHEAST ASIA

NOMADIC LABS

SEUM 법무법인 세움

테조스코리아 교육 프로그램

멀티캠퍼스
The Best HR Service Partner

KU 건국대학교 KONKUK UNIV.

sba

멀티캠퍼스 정규 과정 개설

10월 말 개설

블록체인 이론 및 실습

Tezos 스마트 컨트랙트

2019년 2학기 건국대학교

정보통신대학원 블록체인전공

석사과정 정규 강의 (2학점)

합의 알고리즘 개론 및 응용

캠퍼스 CEO 과정

서울산업진흥원 주관

19년 2학기, 20년 1학기

블록체인 기술 및 창업 과정 (3학점)

참고 자료

https://bit.ly/2KXcrKm

커뮤니티

https://tezoskoreacommunity.org

공모전

https://tezoskorea.co.kr/innovators

목차

TEZOS BLOCKCHAIN CAMP BUSAN

CHAPTER1 블록체인 기본

블록체인이란 무엇인가?

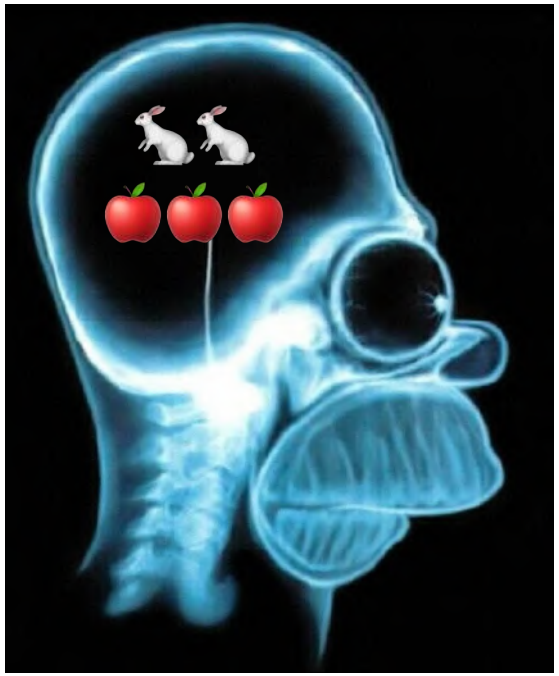
Blockchain is an **open distributed ledger**

Open Distributed Ledger

Open 누구에게나 공개되어 있고
Distributed 분산되어 있는
Ledger (거래의 기록을 담는) 장부
= Open Shared Database

기록 방식의 발전은 **효율성**을 위한 노력의 결과

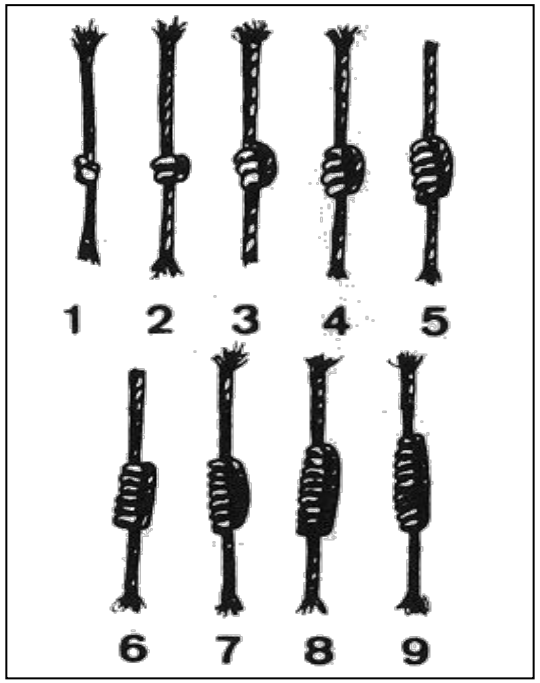
생산력의 발전
기존 방식의 한계



Memory

Cuneiform

새로운 기록 방식

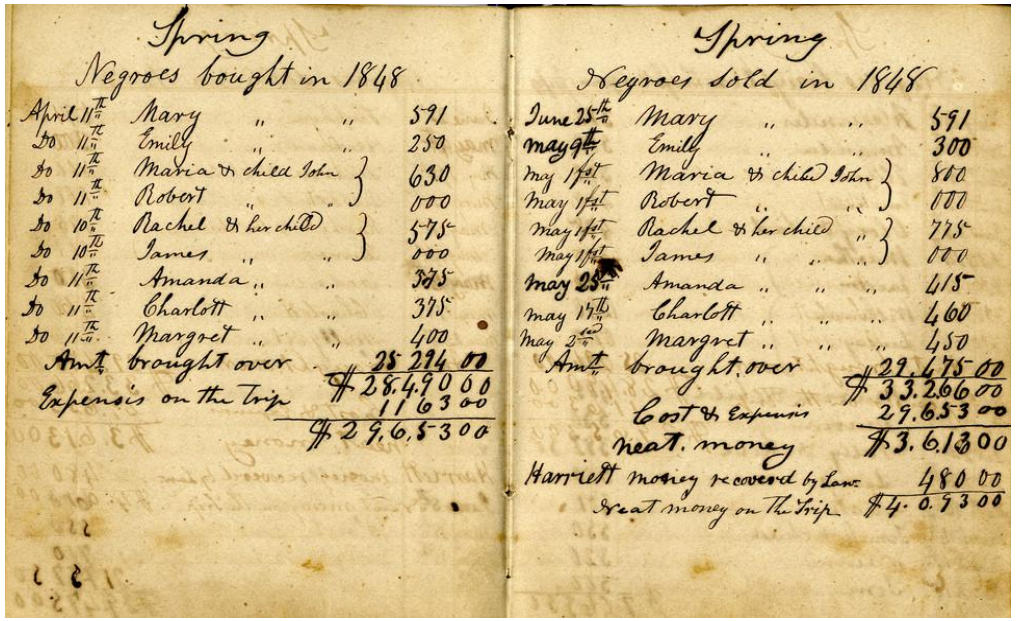


Knots

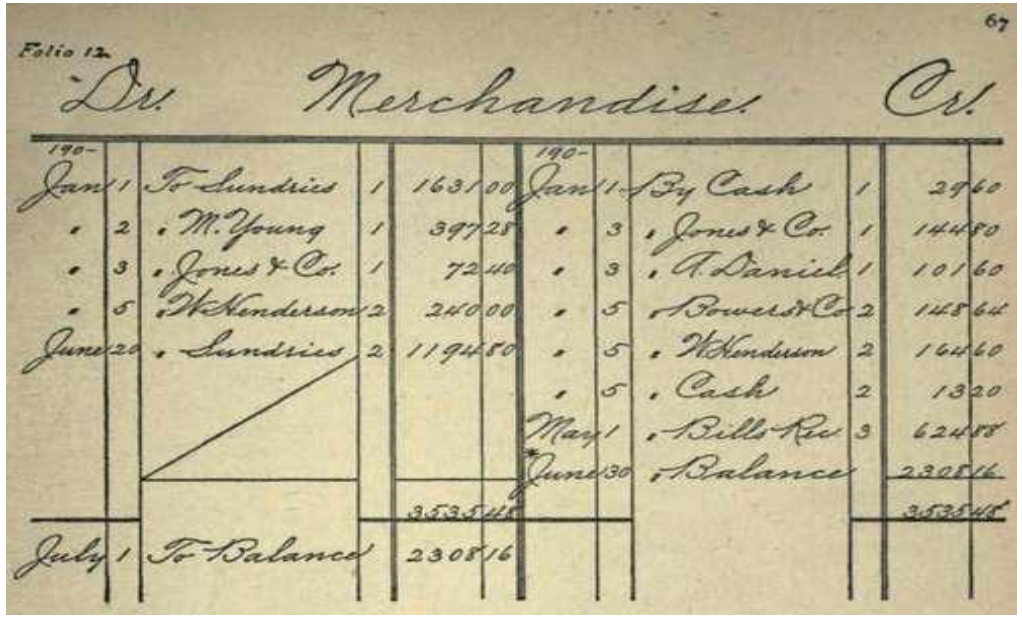
기록 방식의 발전은 **효율성**을 위한 노력의 결과

기업의 등장
소유/경영 분리

기록 관리인

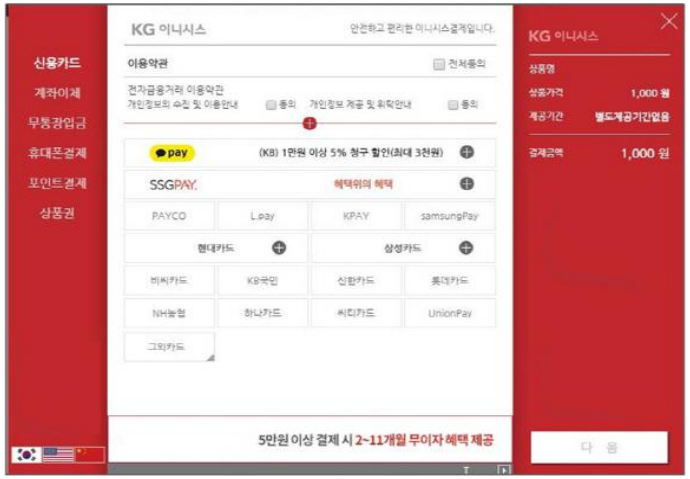


Single entry bookkeeping



Double entry bookkeeping

거래: 현대적, 효율적 삶을 위한 수단



거래의 기본은 **신뢰**

신뢰 비용의 증가

빈도
규모
지역

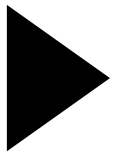
신탁

Middle man
TTP
Central authority

중앙화된 시스템은 많은 문제를 **해결**

금융시스템

신뢰가 없는 사람들
사이에 **신뢰**를 만들어
거래가 가능하게 함



믿을 수 있고
효율적이고
편리하고
문제가 최소화

거래 비용 감소

국가와 사회가 안정되고 제도와 규제가 정비됨에 따라 거래의 많은 문제가 해결되었다.

오늘날 우리는 인터넷을 통해 지구 반대편의 상품을 편하게 구매할 수 있다.

간편 결제, 간편 송금 서비스 등의 등장으로 거래 방식이 더욱 편리해졌다.

가끔 해킹, 피싱 등으로 피해가 발생하지만 전체 거래 규모에 비하면 매우 사소한 부분이며, 보안은 점점 발전 중이다.

…

블록체인이란 무엇인가? Open Distributed Ledger, 거래, 효율성, 신뢰, 중앙화

비트코인의 등장

비트코인, **P2P 전자화폐** 시스템의 출현 (ref #1)

2008년 10월 31일

Cryptography Mailing List

2009년 1월 SW 배포 및 네트워크 가동

Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. 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, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

1. Introduction

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust based model.

거인의 어깨 위에 서 있는 비트코인

Abstract. 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, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

거래가 **전자 서명**으로 보호되고, **타임스탬프**와 함께 **체인** 형태로 기록된다.

체인은 **작업**의 결과인 **해시** 값으로 연결되어 있다.

대다수의 컴퓨팅 파워가 **정직**하게 사용된다면, 기록이 **안전**하게 유지된다.

누구나 노드로 참여할 수 있고, **언제든** 그만둘 수 있다.

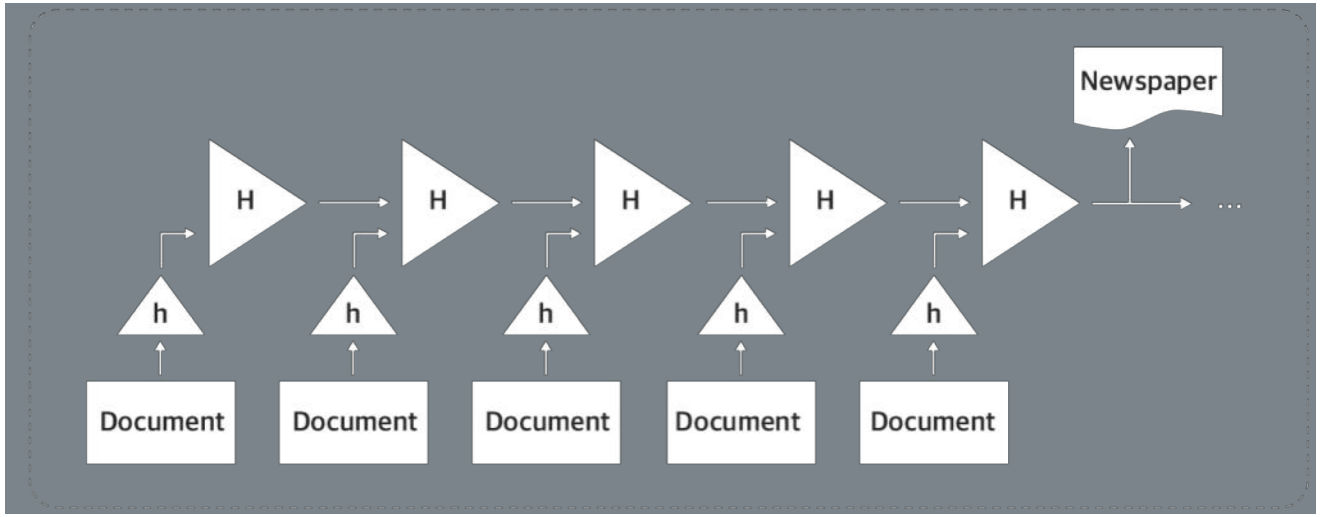
비트코인 탄생의 배경

1982 **Byzantine Generals Problem**
임의의 장애를 견딜 수 있는 (Byzantine fault tolerant) 분산 시스템(Synchronous)을 구현하기 위한 해결책 제시

1985 **FLP Impossibility**
비동기 분산 시스템에서, 하나의 프로세서라도 crash될 경우 safety와 liveness를 동시에 만족하는 알고리즘은 존재하지 않는다.

1989 **Paxos**
비동기(Asynchronous) 분산 시스템에서 Safety를 보장하는 합의 알고리즘 제시

1991 **A chain of cryptographically secured blocks**
디지털 정보를 조작이 불가능하도록 안전하고(hash pointer) 효율적으로(grouped into batches) 저장하는 방법 제시.
1992년에 Merkel Trees(1979) 추가



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1992년에 Merkel Trees(1979) 추가

1992 **A concept of proof of work**
디지털 서명을 이용해 서비스 요청자의 자원을 소모하도록 요구. 네트워크 자원 남용(Spam, Ddos)에 대한 해결책 제시

1997 **Hashcash**
효율적인 해시 함수 기반의 작업 증명 시스템. 여러 암호 화폐 채굴(PoW) 알고리즘의 일부

1999 **Proof of Work**
‘작업 증명’ 용어 등장 및 개념 정리(formalization)

2004 **A CHAIN OF BLOCKS 특허 만료**

Papers

Byzantine Generals Problem | Byzantine Generals Problem (L. Lamport)

FLP Impossibility | Impossibility of Distributed Consensus with One Faulty Process (MJ. Fischer)

Paxos | The Part-Time Parliament (L. Lamport)

A chain of cryptographically secured blocks | How to time-stamp a digital document (S. Haber)

A concept of proof of work | Pricing via Processing, Or, Combatting Junk Mail, Advances in Cryptology (C. Dwork)

Hashcash | A partial hash collision based postage scheme (A. Beck)

Proof of Work | Proof of Work and Bread Pudding Protocols (M. Jakobsson)

Digital Cash

1983 **Ecash (David Chaum)**
Anonymous cryptographic electronic money (Blind Signatures for untraceable payments)

1997 **Hashcash (Adam Beck)**
Proof of work to aid the generation and distribution of new coins

1998 **B-Money (Wei Dai)**
Anonymous, distributed electronic cash system

1998 **Bit Gold (Nick Szabo)**
Proof of work system. Aimed to avoid centralized authorities

2004 **RPOW Token (Hal Finney)**
Reusable PoW + Hashcash

Cryptography

1985 **ECDSA**
Elliptic Curve Digital Signature Algorithm. 256-bit ECC = 3072-bit RSA

1996 **RIPEME-160**
RIPE Message Digest of 160 bits used to make bitcoin addresses

2002 **SHA256**
Secure Hash Algorithm of 256 bits used to hash a block header and find nonce

블록체인이란 무엇인가?	Open Distributed Ledger, 거래, 효율성, 신뢰, 중앙화
비트코인의 등장	거인의 어깨, Byzantine generals, Hash, Digital signature, Chain

WHY

비트코인 개발 동기에 대한 추측: **금융 위기**

비트코인 개발 동기에 대한 추측: **금융 위기**

RAW HEX VERSION

```
01 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
00 00 00 00 3B A3 ED FD  7A 7B 12 B2 7A C7 2C 3E  ....;£íýz{.²zÇ,>
67 76 8F 61 7F C8 1B C3  88 8A 51 32 3A 9F B8 AA  gv.a.È.Ã^ŠQ2:Ÿ¸ª
4B 1E 5E 4A 29 AB 5F 49  FF FF 00 1D 1D AC 2B 7C  K.^J)«_Iÿÿ...¬+|
01 01 00 00 00 01 00 00  00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 FF FF  FF FF 4D 04 FF FF 00 1D  ......ÿÿÿÿM.ÿÿ..
01 04 45 54 68 65 20 54  69 6D 65 73 20 30 33 2F  ..EThe Times 03/
4A 61 6E 2F 32 30 30 39  20 43 68 61 6E 63 65 6C  Jan/2009 Chancel
6C 6F 72 20 6F 6E 20 62  72 69 6E 6B 20 6F 66 20  lor on brink of
73 65 63 6F 6E 64 20 62  61 69 6C 6F 75 74 20 66  second bailout f
6F 72 20 62 61 6E 6B 73  FF FF FF FF 01 00 F2 05  or banksÿÿÿÿ..ò.
2A 01 00 00 00 43 41 04  67 8A FD B0 FE 55 48 27  *....CA.gŠý°þUH'
19 67 F1 A6 71 30 B7 10  5C D6 A8 28 E0 39 09 A6  .gñ¦q0·.\Ö¨(à9.¦
79 62 E0 EA 1F 61 DE B6  49 F6 BC 3F 4C EF 38 C4  ybàê.aÞ¶Iö¼?Lï8Ä
F3 55 04 E5 1E C1 12 DE  5C 38 4D F7 BA 0B 8D 57  óU.å.Á.Þ\8M÷º..W
8A 4C 70 2B 6B F1 1D 5F  AC 00 00 00 00           ŠLp+kñ._¬....
```

비트코인 **제네시스(Genesis)** 블록

"두 번째 **구제 금융**을 앞두고 있는 재무 장관"

비트코인 개발 동기에 대한 추측: **Cyberpunk**

2008년 10월 31일 **Cryptography Mailing List**에 **백서** 공개

"전통적인 화폐의 **근본적인 문제**는 그것을 운용하기 위해 필요한 **신뢰 그 자체**이다."

Cyberpunk: **기술**을 통해 **자치, 자유**를 추구

정보 독점 사회

1980~90 급격한 기술 발전

정부 권력의 강화 (규제)

다국적 거대 기업의 등장

VS

사이버 펑크

개인 사생활 보호

자치를 위한 투쟁

Bitcoin open source implementation of P2P currency

Posted by Satoshi Nakamoto on February 11, 2009 at 22:27

View Discussions

(ref #2)

I've developed a new open source P2P e-cash system called Bitcoin. It's completely decentralized, with no central server or trusted parties, because everything is based on crypto proof instead of trust. Give it a try, or take a look at the screenshots and design paper: Download Bitcoin v0.1 at http://www.bitcoin.org

The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust. Banks must be trusted to hold our money and transfer it electronically, but they lend it out in waves of credit bubbles with barely a fraction in reserve. We have to trust them with our privacy, trust them not to let identity thieves drain our accounts. Their massive overhead costs make micropayments impossible.

A generation ago, multi-user time-sharing computer systems had a similar problem. Before strong encryption, users had to rely on password protection to secure their files, placing trust in the system administrator to keep their information private. Privacy could always be overridden by the admin based on his judgment call weighing the principle of privacy against other concerns, or at the behest of his superiors. Then strong encryption became available to the masses, and trust was no longer required. Data could be secured in a way that was physically impossible for others to access, no matter for what reason, no matter how good the excuse, no matter what.

It's time we had the same thing for money. With e-currency based on cryptographic proof, without the need to trust a third party middleman, money can be secure and transactions effortless.

One of the fundamental building blocks for such a system is digital signatures. A digital coin contains the public key of its owner. To transfer it, the owner signs the coin together with the public key of the next owner. Anyone can check the signatures to verify the chain of ownership. It works well to secure ownership, but leaves one big problem unsolved: double-spending. Any owner could try to re-spend an already spent coin by signing it again to another owner. The usual solution is for a trusted company with a central database to check for double-spending, but that just gets back to the trust model. In its central position, the company can override the users, and the fees needed to support the company make micropayments impractical.

Bitcoin's solution is to use a peer-to-peer network to check for double-spending. In a nutshell, the network works like a distributed timestamp server, stamping the first transaction to spend a coin. It takes advantage of the nature of information being easy to spread but hard to stifle. For details on how it works, see the design paper at http://www.bitcoin.org/bitcoin.pdf

The result is a distributed system with no single point of failure. Users hold the crypto keys to their own money and transact directly with each other, with the help of the P2P network to check for double-spending.

Satoshi Nakamoto http://www.bitcoin.org

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블록체인이란 무엇인가?	Open Distributed Ledger, 거래, 효율성, 신뢰, 중앙화
비트코인의 등장	거인의 어깨, Byzantine generals, Hash, Digital signature, Chain
개발 동기	제네시스 블록(금융위기), Cyberpunk, 중앙화, 신뢰, 프라이버시, 암호학

중앙화의 문제

중앙화의 문제: **Trust**

중앙화의 문제: **Trust**

김미영 팀장입니다.
고객님께서는 최저 이율로 최고
3,000만원까지 30분 이내
통장 입금 가능합니다.

중앙화의 문제: **Single point of failure**

화재로 인한 문화재 손실

중앙화의 문제: **Single point of failure**

먹물퐁당 감자치즈

중앙화의 문제: **Single point of failure**

1995 **Citibank**
러시아 해커 Vladimirr Levin이 시티뱅크 전산망을 해킹하여 천만달러를 전세계로 송금함.

2000 **Mafia Boy**
캐나다 10대 소년 Michel Calce에 의해 ahoo, Dell, CNN 등 다국적 기업들의 서비스가 중단(DoS)됨

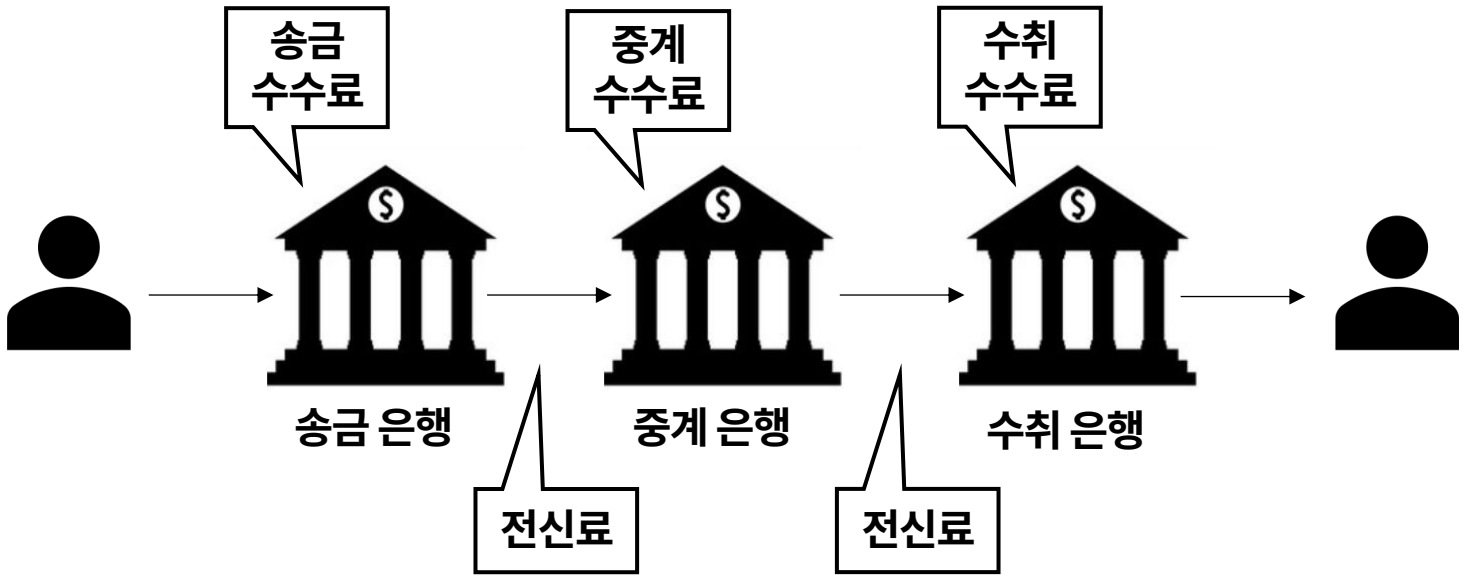
2004 **Delta Airline**
Sven Jaschan(당시 18세)가 델타 항공사의 운항 노선의 일부를 취소 시킴

2016 **Bangladesh Bank Heist**
방글라데시아 은행이 사용하는 SWIFT 시스템(국제 은행 간 송금 표준)이 해킹당해 8,100만 달러 손실

2017 **WannaCry**
‘비트코인을 요구하는 랜섬 웨어. 텔레포니카, 영국 국민 건강 서비스, 페덱스 등 150개 이상 국가의 대기업, 기관이 피해를 입음

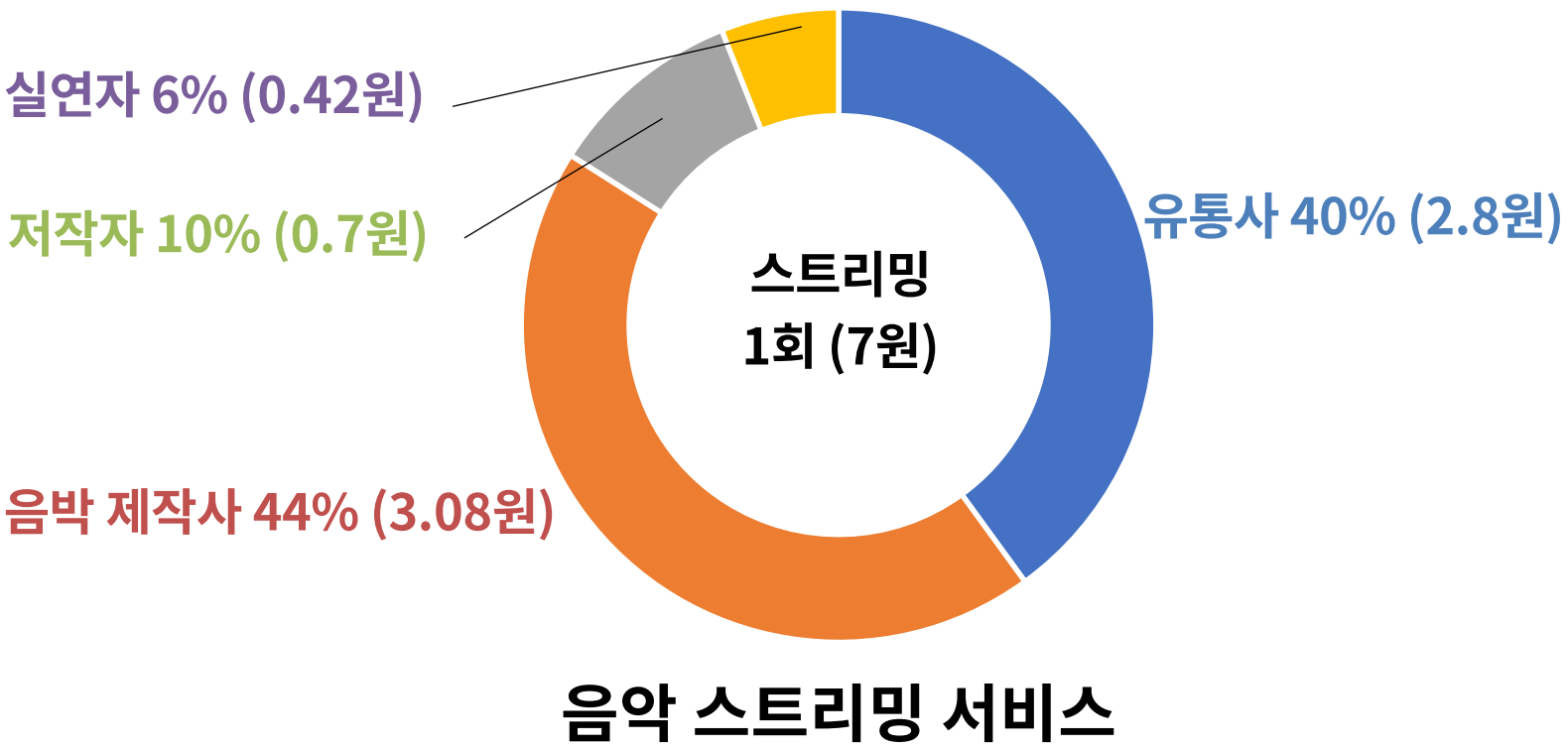
2018 **Facebook**
페이스북 서버 해킹으로 5천만명의 개인정보가 유출

중앙화의 문제: **Tyranny**



국제 송금

중앙화의 문제: **Tyranny**



중앙화의 문제

Trust

Efficiency, Authority, License

Single point of failure

Ownership of data

Tyranny

Network effect, Platform power

Overhead cost

Availability, Security, Regulation

블록체인이란 무엇인가?	Open Distributed Ledger, 거래, 효율성, 신뢰, 중앙화
비트코인의 등장	거인의 어깨, Byzantine generals, Hash, Digital signature, Chain
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중개자 없는 P2P 거래

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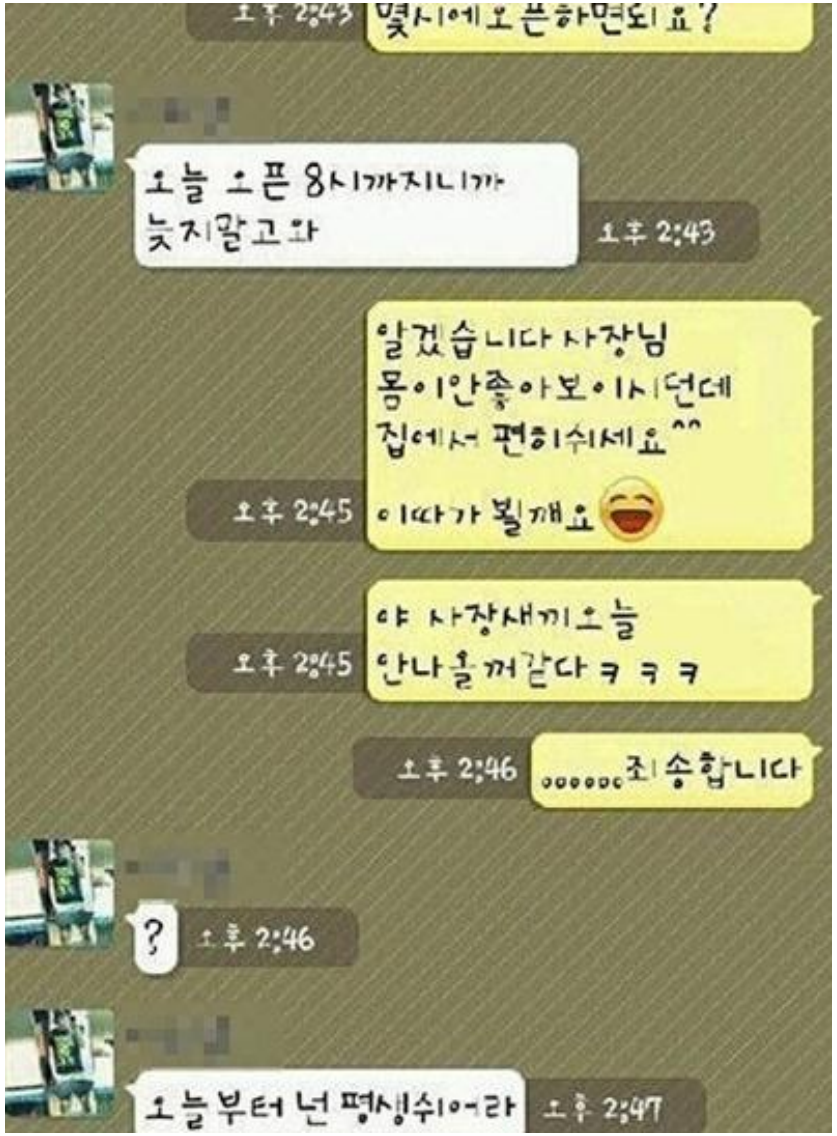
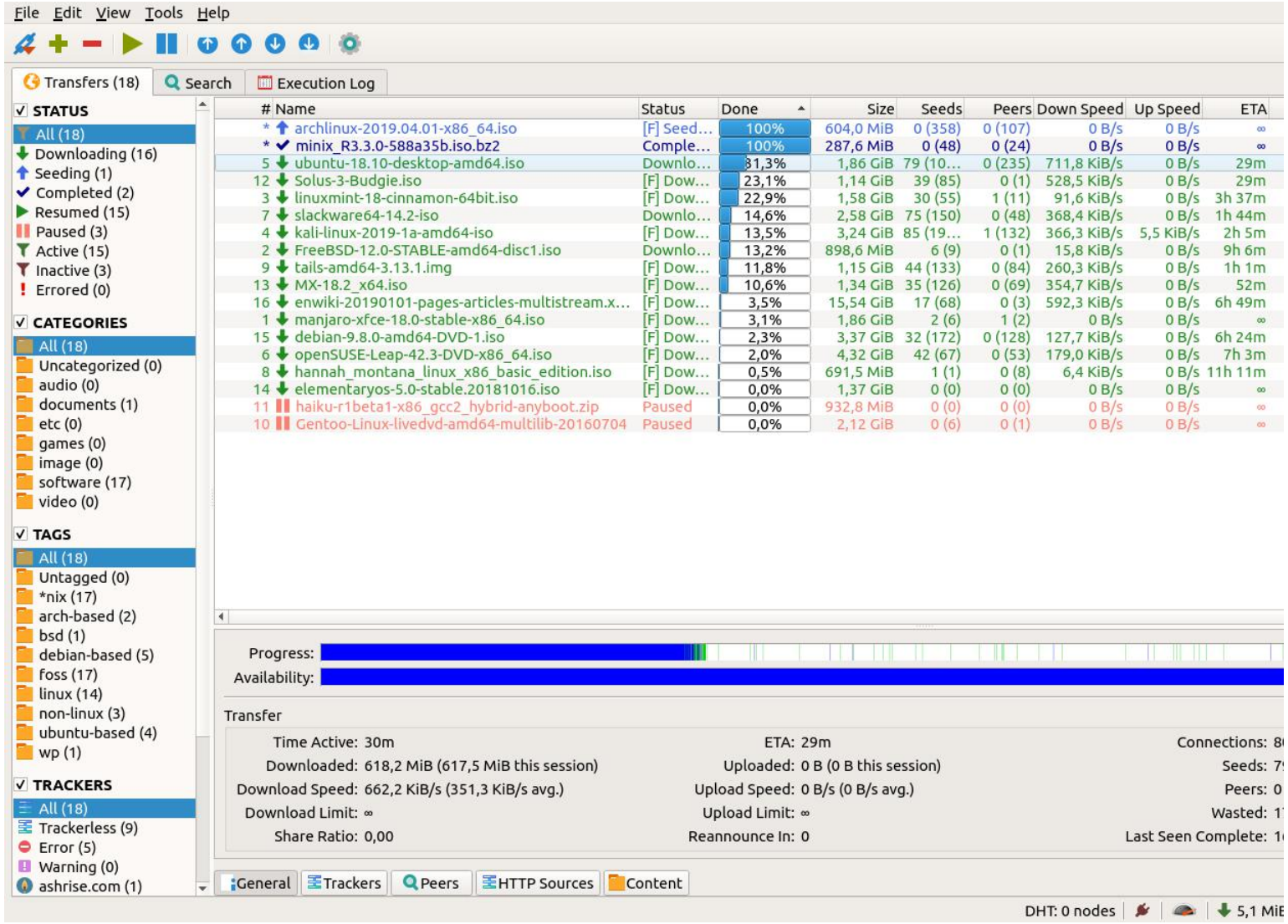
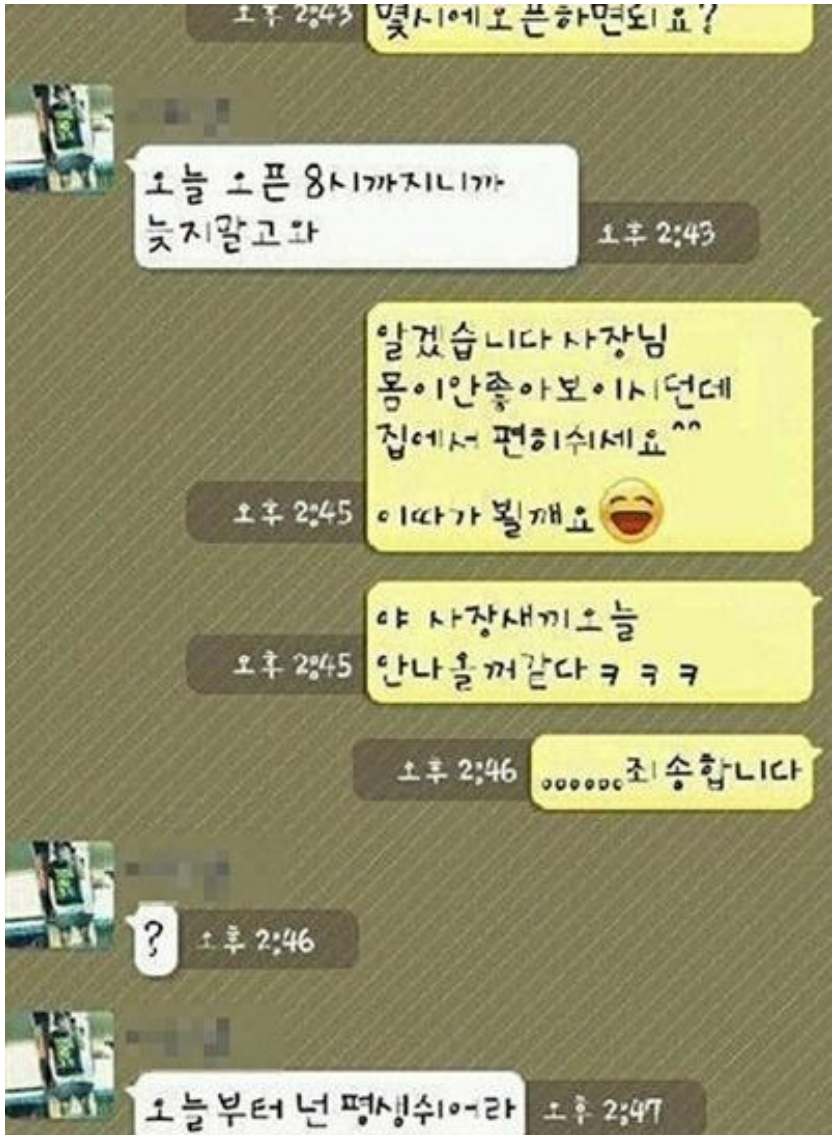
Users hold the crypto keys to their own money and **transact directly with each other**, with the help of the P2P network to check for double-spending.

Server-client vs. Peer-to-Peer

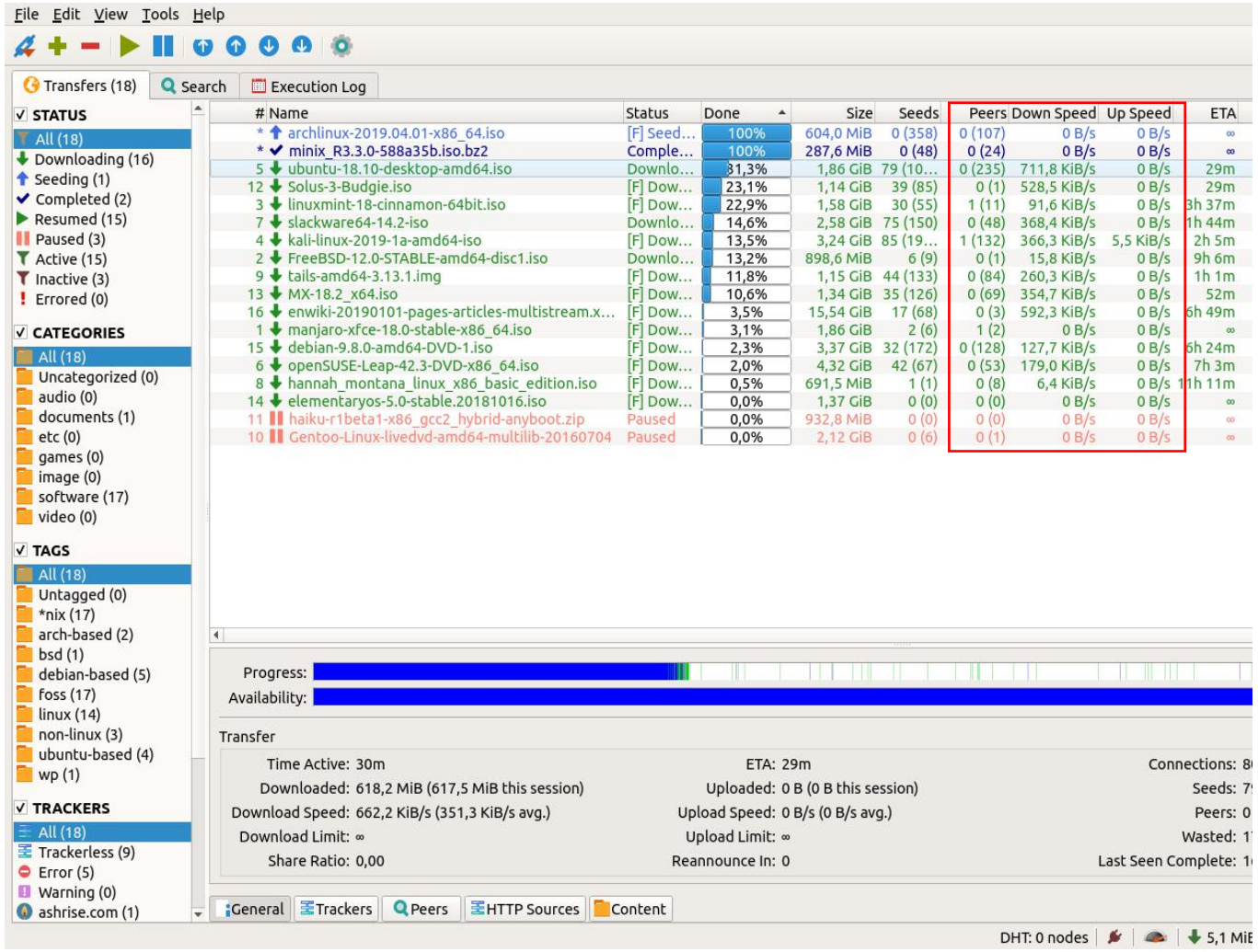


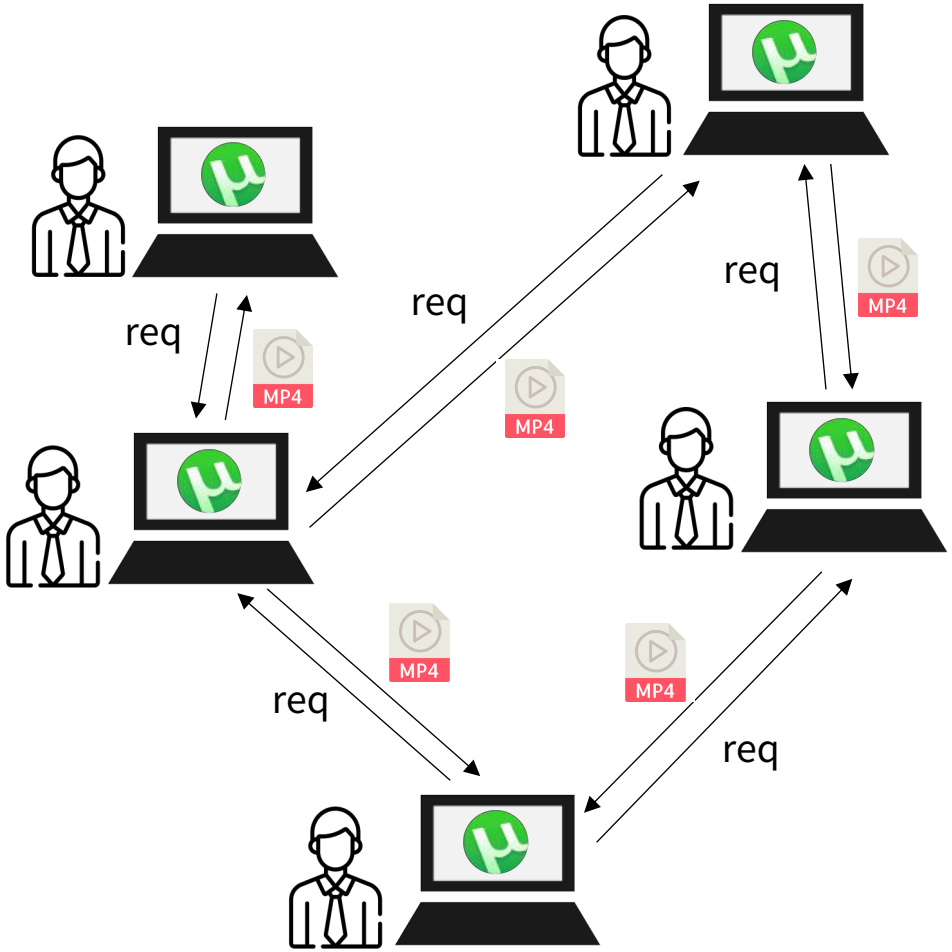


Server-client

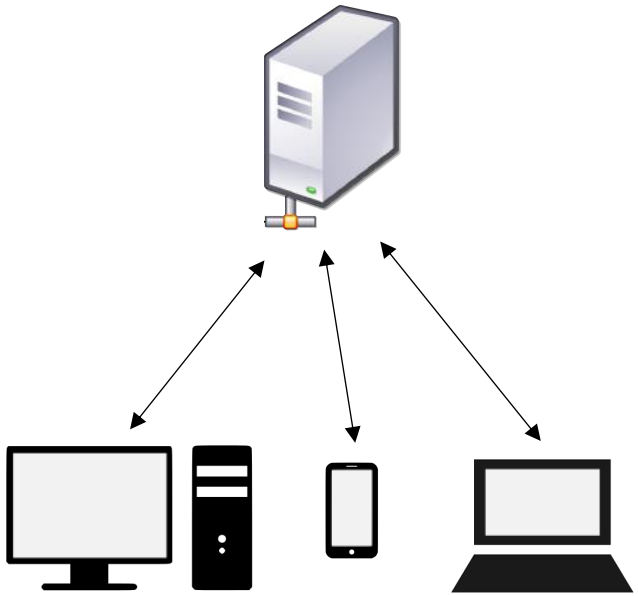


Peer-to-Peer (ref #3)

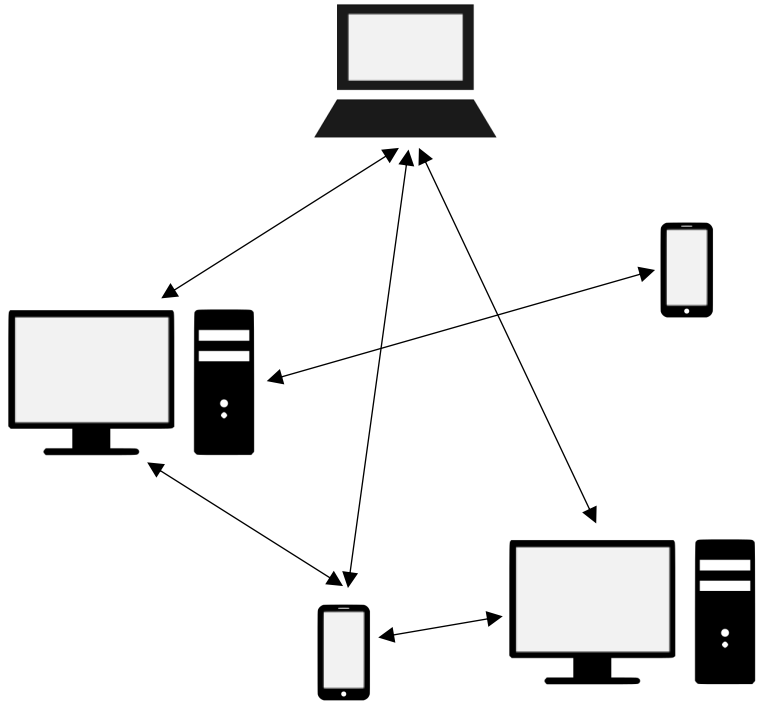




Server-client vs. Peer-to-Peer



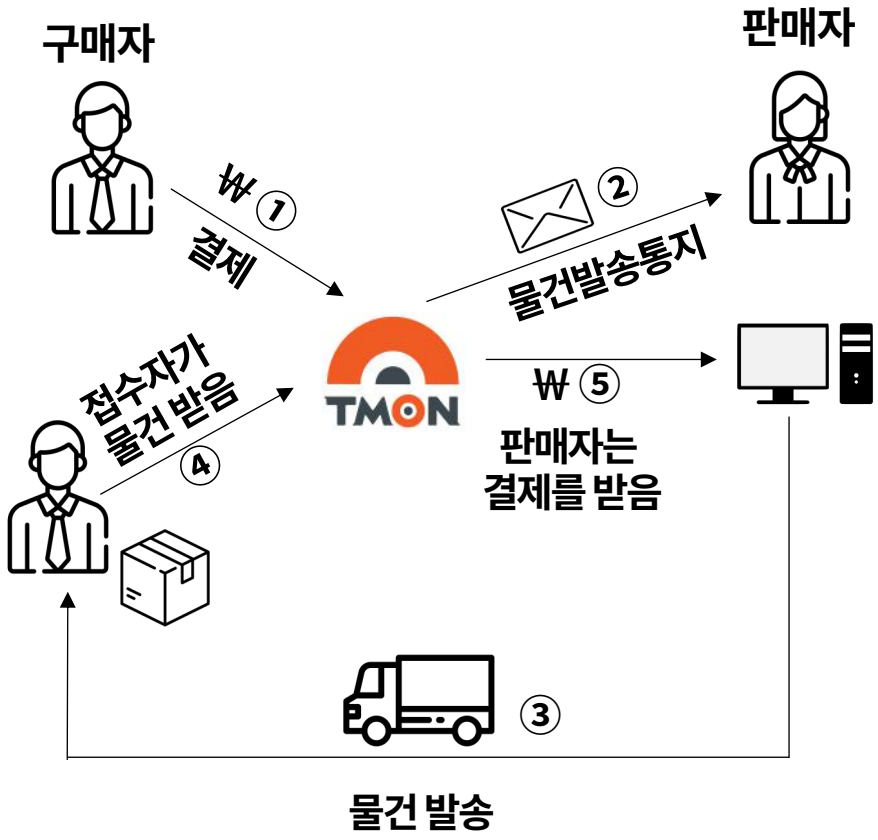
VS



Clients request
A server responses

Each peer request as a client
Each peer responses as a server

Server-client vs. Peer-to-Peer



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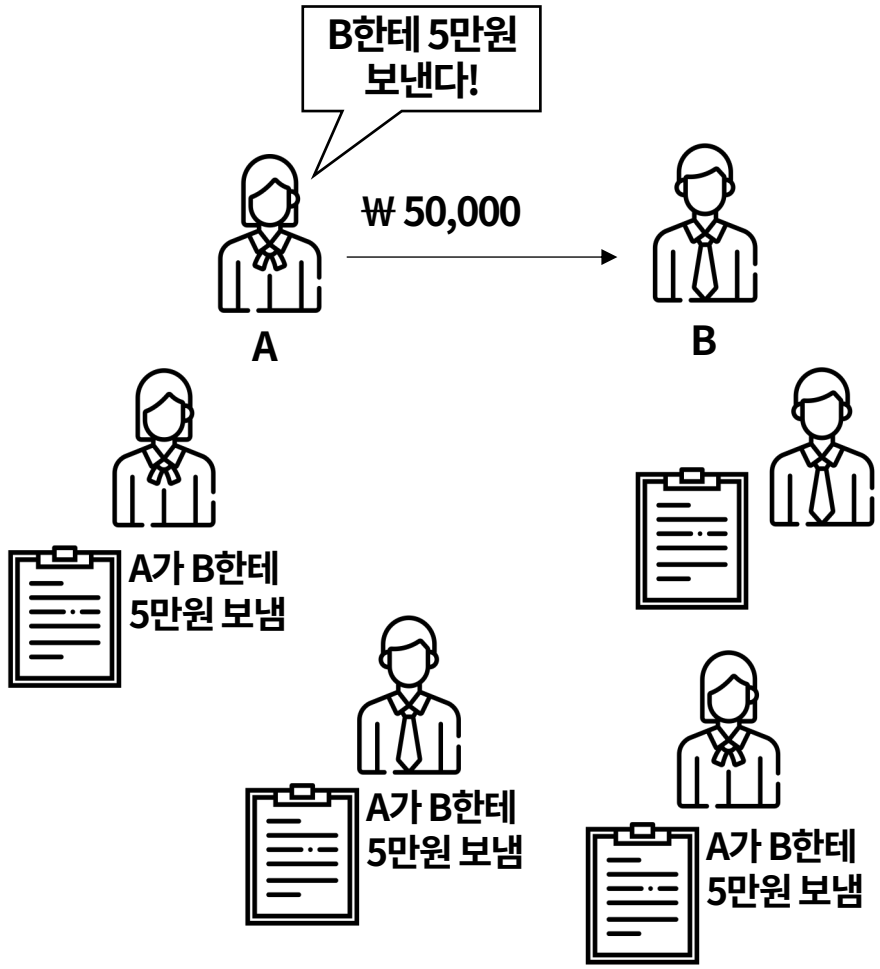
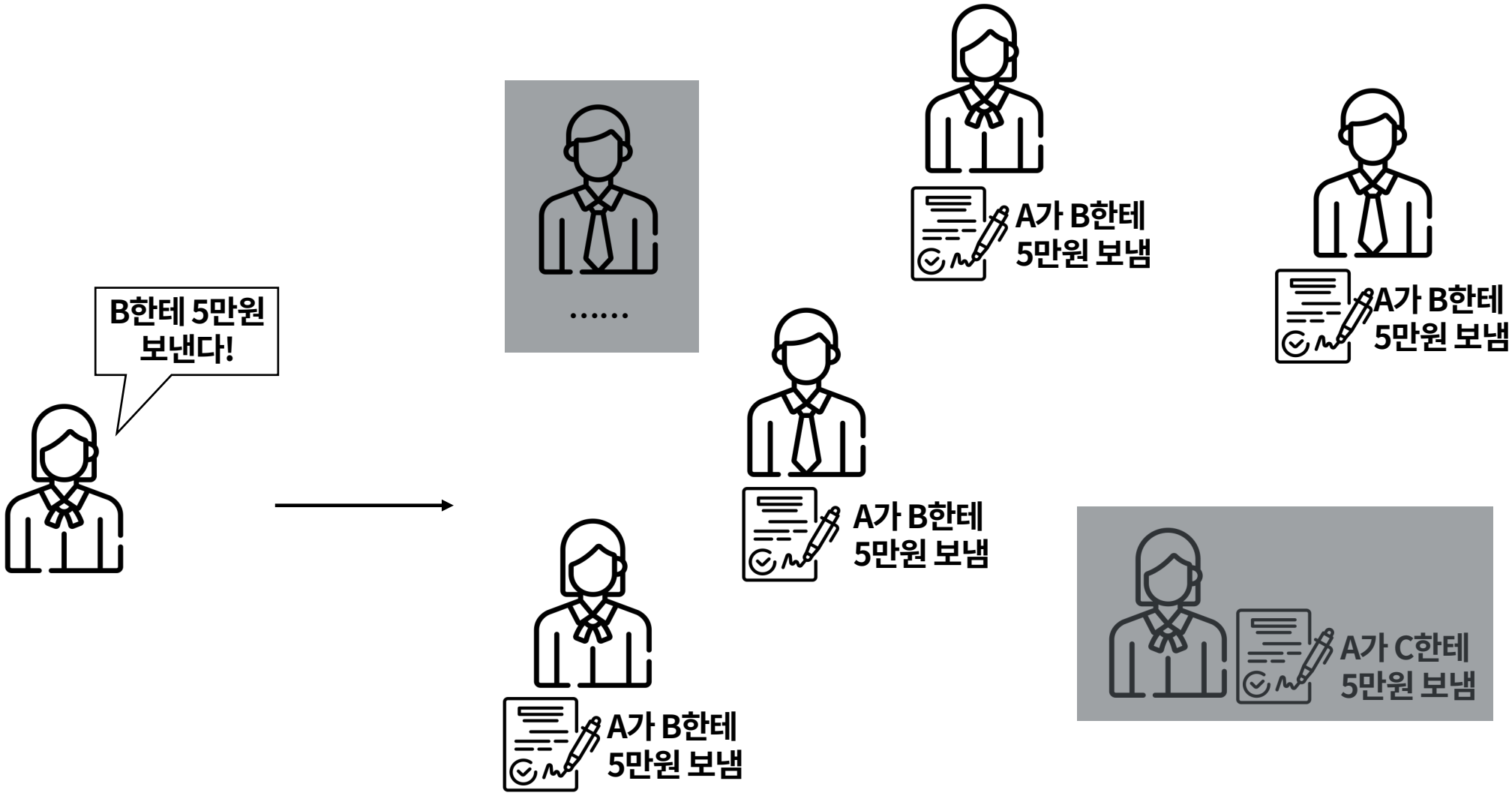


분산화의 장점: **대다수가 정직**한 경우



분산 장부의 목표: **동일한 장부**의 유지

언제나 대다수의 노드가 **동일한 장부에 합의**

합의를 위해서는 투표와 같은 **다수결 규칙**이 필요

합의 알고리즘

폐쇄 네트워크 vs. 공개 네트워크

소문과 평판

???

나카모토의 해결책

컴퓨팅 파워로 투표를 대체
보상 **인센티브**

Proof of Work

Bitcoin: 1st generation of blockchain

사이버 펑크 운동

2008년 금융위기

기술의 발전

컴퓨터 과학 + 암호학 + 경제학(게임이론)

블록체인을 활용한 애플리케이션

최초의 성공한 암호 화폐

Ethereum: Beyond Bitcoin

Vitalik Buterin

초기 비트코인 개발 기여

Bitcoin Magazine 공동 설립자 (11년 9월)

비트코인의 한계 극복 시도

13년 이더리움 백서 발표

14년 11월 월드 테크놀로지 어워드 IT/SW 수상

15년 7월 30일 이더리움 메인넷 런칭

Ethereum: 2nd generation of blockchain

비트코인의 한계 : Scripts, DDoS(서비스 거부 공격)

스마트 컨트랙트

닉 자보에 의해 처음 제안 (1994)

계약을 프로그래밍 언어로 작성

Not by court, but code

블록체인에 저장된 프로그램

가스 모델로 DDoS 방지

디지털 암호 화폐 -> 블록체인 플랫폼

블록체인이란 무엇인가?	Open Distributed Ledger, 거래, 효율성, 신뢰, 중앙화
비트코인의 등장	거인의 어깨, Byzantine generals, Hash, Digital signature, Chain
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중앙화의 문제	Trust, Single point of failure, Tyranny, Overhead cost
중개자 없는 P2P 거래	직접 거래, 대다수가 정직, 다수결, 합의 알고리즘, 컴퓨팅 파워, 보상 인센티브

SO WHAT

Key features

Decentralization → Disintermediation

Immutability → Verifiability

Transparency → Auditability

Programmability → Automation

Key advantages

Replacement of existing trust system

Reducing transaction cost by **standardization**

Cost cutting by **automation**

New business model of a form of **direct participation**

Considerations

Not (**yet**) for high transaction frequency & strict finality

Not only for fin-tech → New **transaction** models

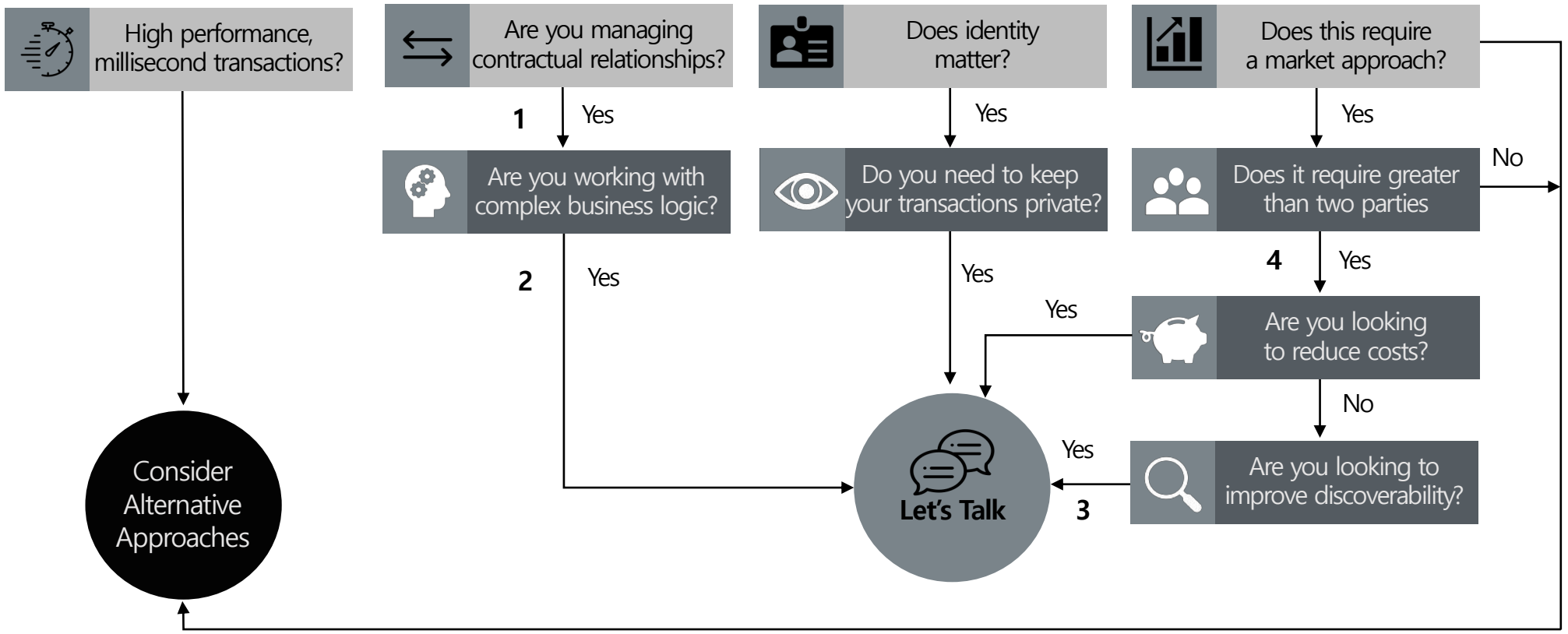
DLT-based applications in financial sector (WBG, ref #4)

Money & Payments	- Digital currencies - Payment authorization, clearance & settlement - International remittances and cross-border payments - Foreign exchange - Micropayments
Financial Services & Infrastructure	- Capital markets: digital issuance, trading & settlements of securities - Commodities trading - Notarization services (e.g. for mortgages) - Collateral / movable asset registries - Syndicated loans - Crowdfunding (as initial coin offerings) - Insurance for automating payouts and validation of occurrence of insured event
Collateral registries & ownership registers	- Land registries, property tiles & other collateral registries
Internal systems of financial service provider	- Replacing internal ledgers maintained by large, multinational financial service providers that record information across different departments, subsidiaries, or geographies

DLT-based applications in other sectors (WBG)

Identity	- Digital identity platforms - Storing personal records: birth, marriage & death certificates
Trade & Commerce	- Supply chain management (management of inventory and disputes) - Product provenance & authenticity (e.g. artworks, pharmaceuticals, diamonds) - Trade finance and Post-trade processing - Rewards & loyalty programs - Invoice management - Intellectual property registration - Internet of Things
Agriculture	- Financial services in the agricultural sector like insurance, crop finance and warehouse receipts - Provenance of cash crops - Safety net programs related to delivery of seeds, fertilizers and other inputs
Governance	- E-voting systems and E-Residence - Government record-keeping, e.g. criminal records - Reducing fraud and error in government payments and tax fraud - Protection of critical infrastructure against cyberattacks
Healthcare	- Electronic medical records
Humanitarian & Aid	- Tracking delivery & distribution of food, vaccinations, medications, etc. - Tracking distribution and expenditure of aid money

How to decide whether to use it? (IBM, ref #5)



1 By design, no one party can modify, delete, or even append any record without consensus, making the system useful for ensuring the immutability of contracts and other legal documents.

2 Smart contracts aim to provide security superior to traditional contract and reduce other Tx costs associated with contracting.

3 When everyone on an exchange can view the same ledger, it is easy to broadcast an intention (or offer) by appending it. For example, in a trading network, all ask and bids would be visible to every network participant.

4 Blockchain networks allow each participant to create customized solutions using their own proprietary business logic while running on the same common ledger.

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특징	Decentralization, Transparency, Programmability, Immutability

다양한 관점들

Blockchain is a particular type of **Distributed Ledger Technology**

Distributed Ledger Technology

The Internet of Value

Decentralized Autonomous Organization

Trustless

Bootstrapped

Protocol is fat

Anti-fragile

Blockchain is a particular type of **Distributed Ledger Technology**

Blockchain is a particular type of **Distributed Ledger Technology**

Blockchain gave rise to **The Internet of Value**

Blockchain is a **Decentralized Autonomous Organization**

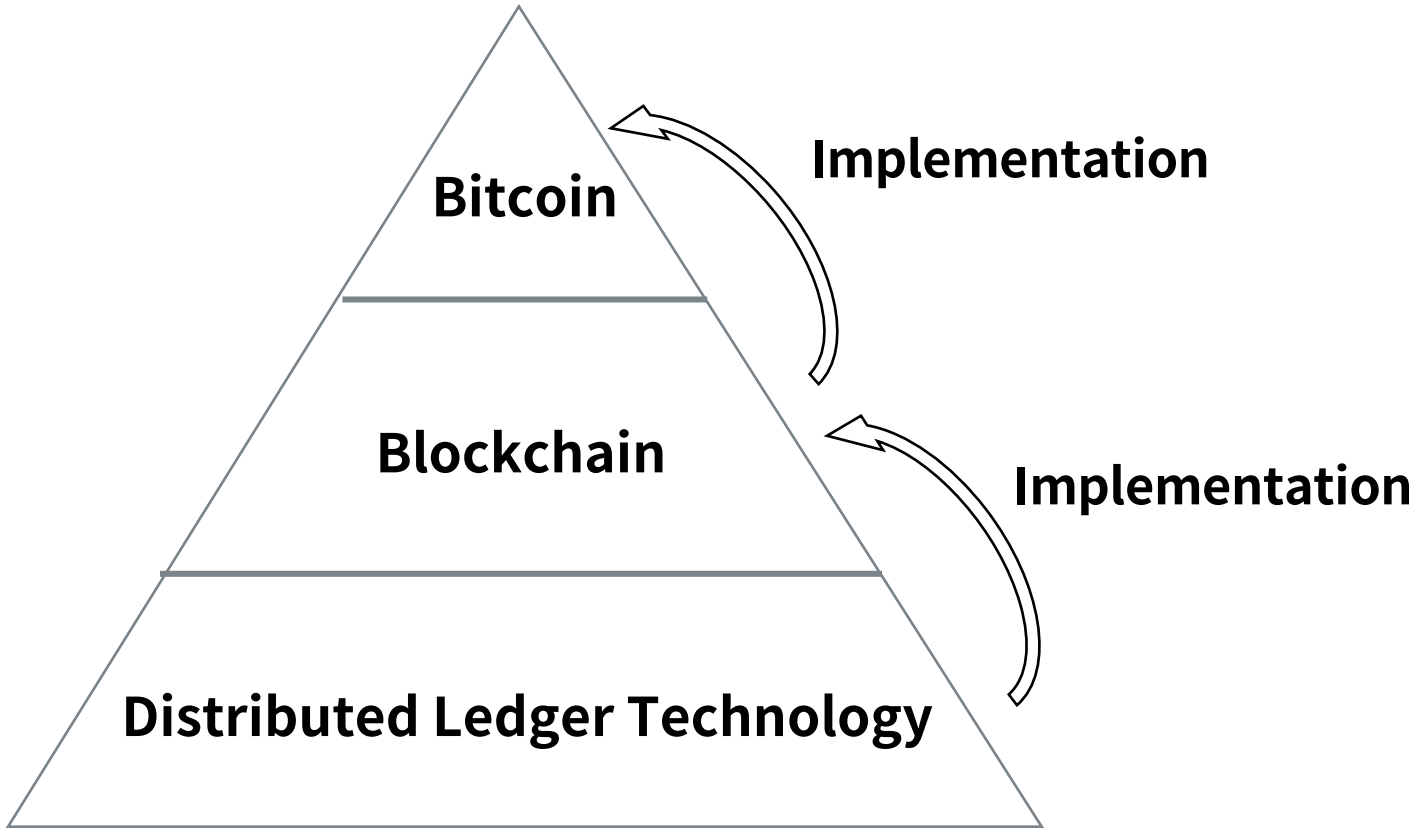
Blockchain is **Trustless**

Bitcoin is **bootstrapped**

Blockchain **protocol is fat**

Bitcoin is **anti-fragile**

Blockchain is a particular type of **Distributed Ledger Technology**



Blockchain is a particular type of **Distributed Ledger Technology**

Bitcoin ≠ Blockchain

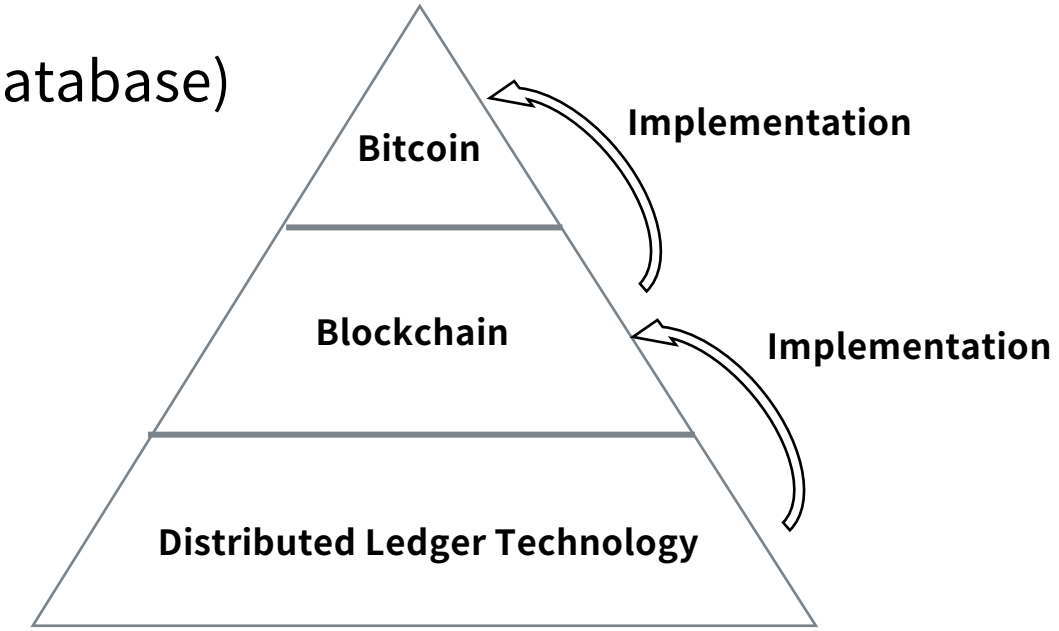
Bitcoin is a **cryptocurrency** implemented on top of blockchain

Blockchain is an **append-only data structure**

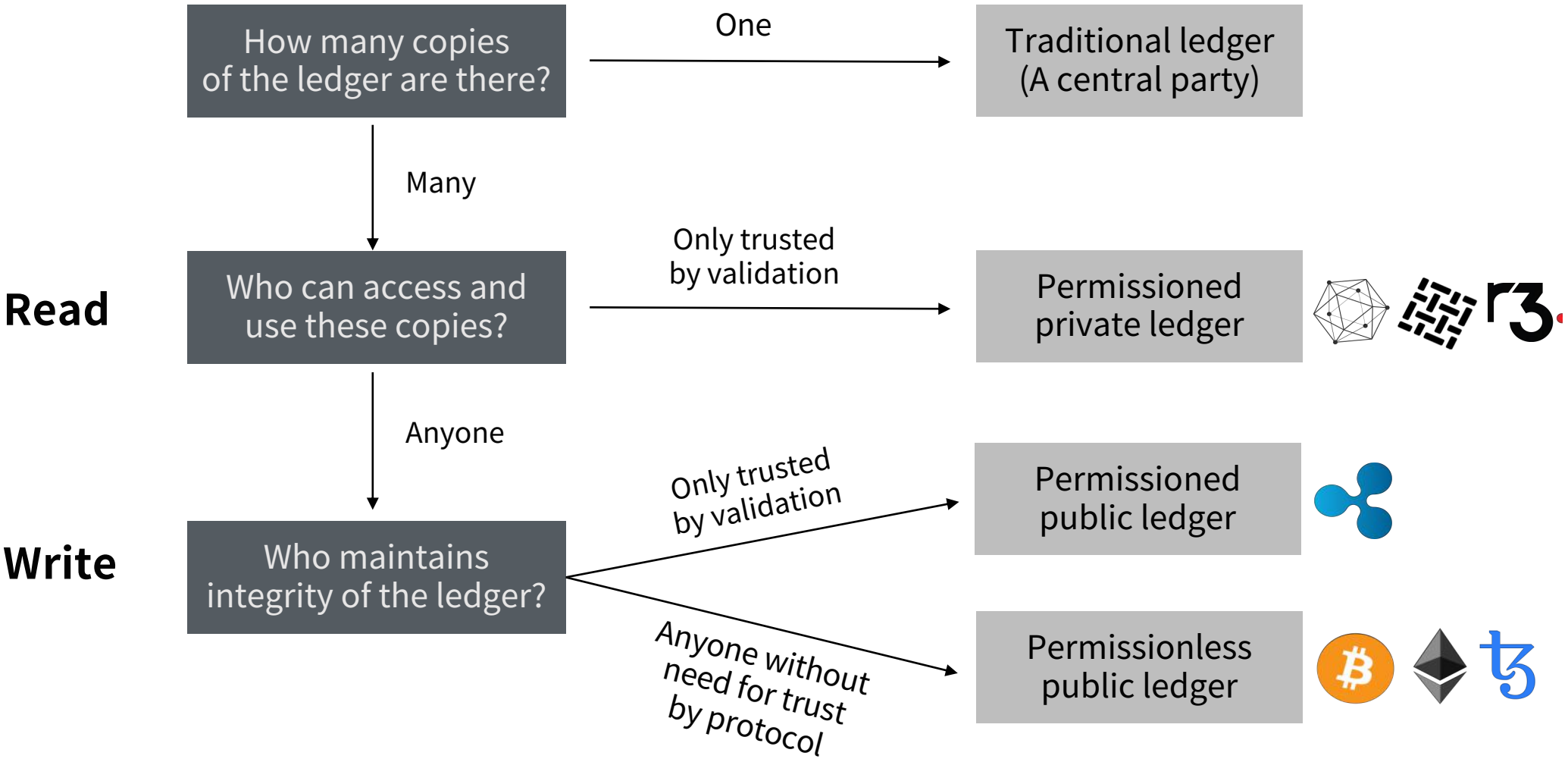
Some blockchains are open distributed ledgers (database)

Distributed ledger → Blockchain X

Blockchain → Distributed X



Types of blockchain (WBG)



Blockchain gave rise to **The Internet of Value**

정보는 순식간에 전 세계로 이동 가능

가치의 이전과 교환은 여전히 신뢰 시스템에 의존

The Internet of Information

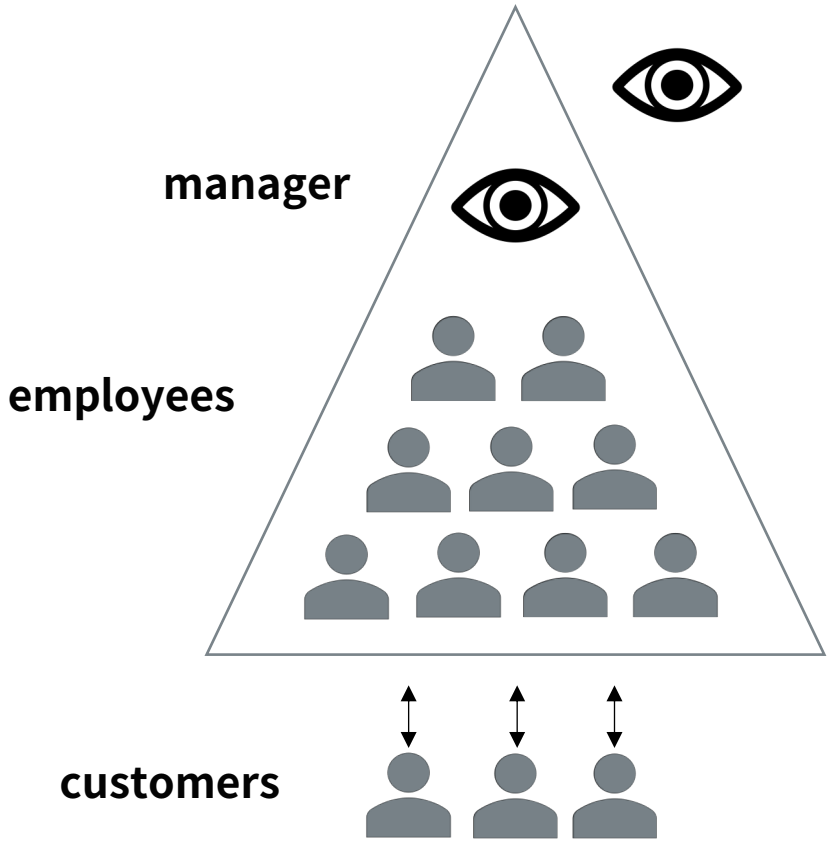
The Internet of Value

Bitcoin = Internet-like money

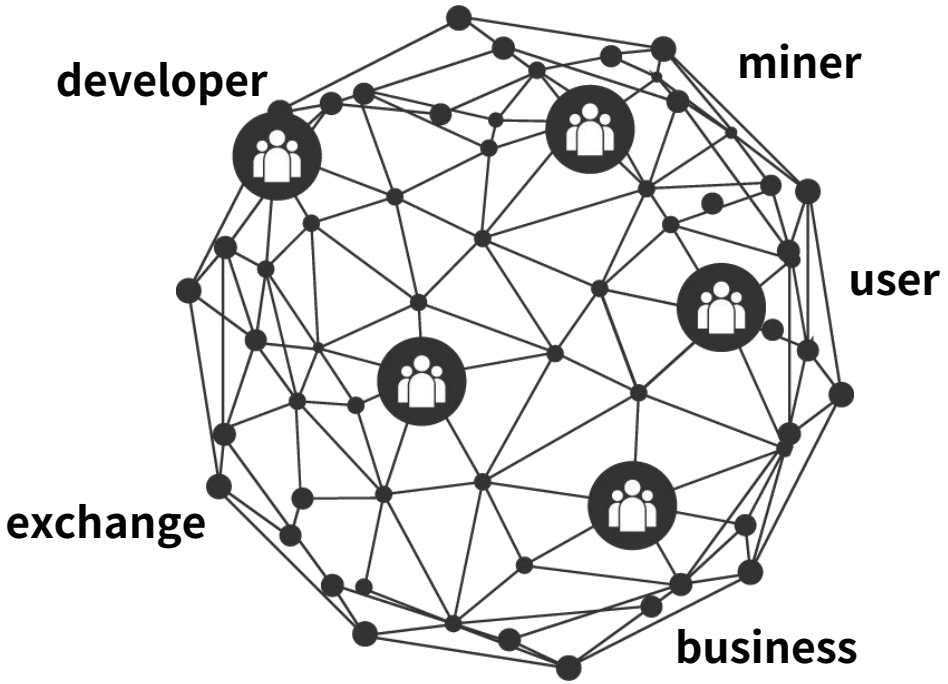
인터넷을 통해 모든 자산을 자유롭게 교환 가능

Blockchain is a **Decentralized Autonomous Organization**

Management by people
Automation by machine

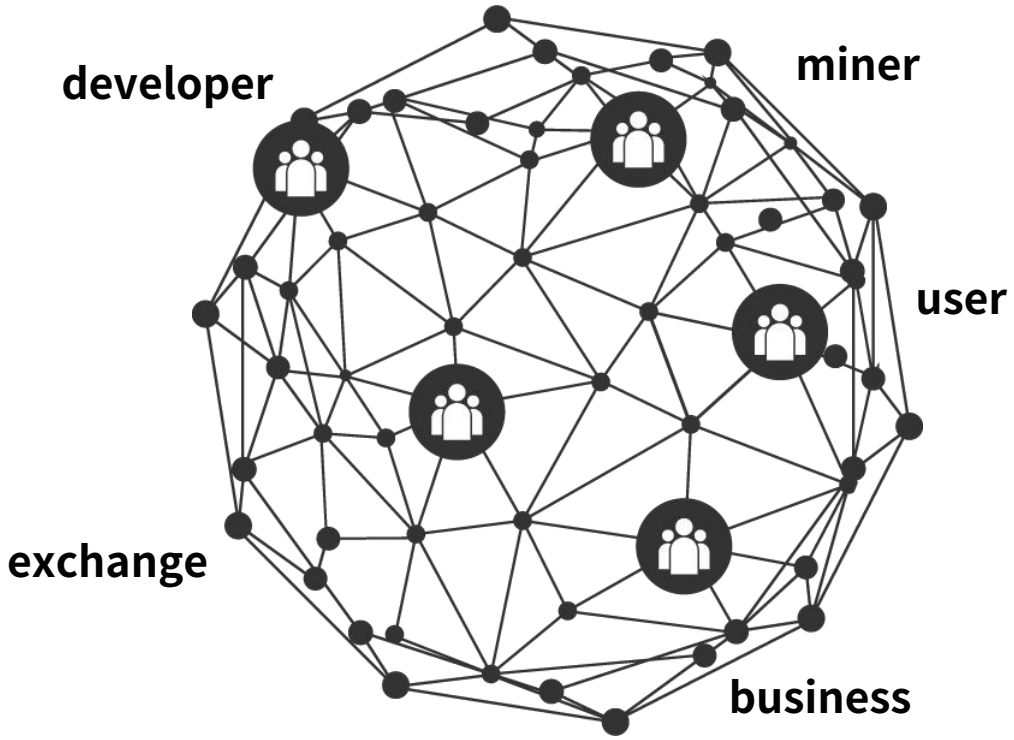


Watching each other
Governed by protocol



Blockchain is a **Decentralized Autonomous Organization**

Bitcoin network as a world biggest auto payment service



CEO / Managers:

Employees:

Salary:

Customers:

Stockholders:

Stocks:

Stock listing:

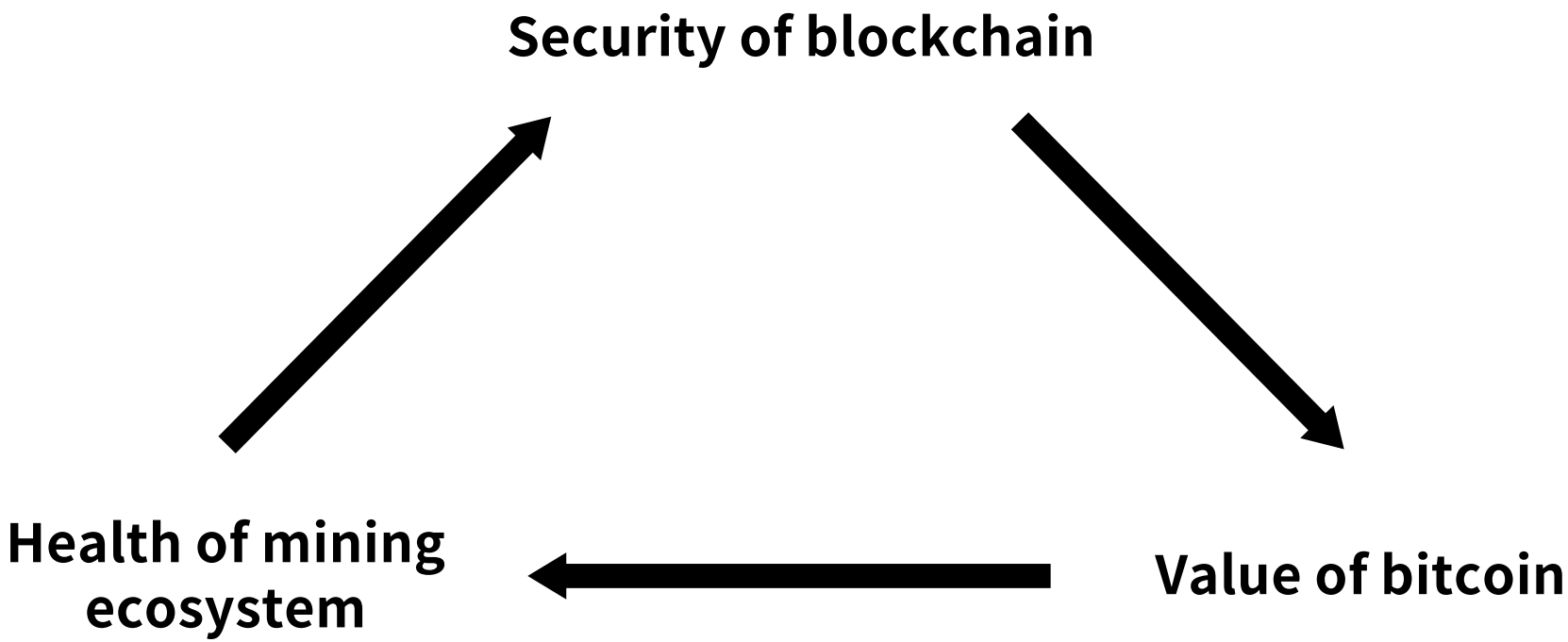
Capital gain:

Blockchain is **Trustless**

Trust		**Trustless**
제삼자에 대한 신용을 전제		신용이 필요 없음
리스크, 신용 증명 비용		신용 자체가 존재 X
규제, 감독, 처벌	**VS**	부정행위 자체가 불가능
제삼자에 의한 강제 집행		프로토콜에 의한 자동 집행
측정 가능한 신뢰의 범위		시스템의 분산
= 사회 발전의 범위		자율, 자치

Bitcoin is **bootstrapped** : from NOTHING to ALL

Interlocking interdependencies in Bitcoin



Blockchain **protocol is fat**

Protocol

통신이 가능한 네트워크 장비 사이에서 데이터, 메시지를 주고 받는 **규칙**

신호 체계, 인증, 오류 감지 및 수정

표준으로서 역할 (HTTP, TCP/IP, SMTP 등)

Blockchain protocol

네트워크에 참여한 **노드**들이 **연결**되는 **방식**

기록(트랜잭션, 블록)에 대한 노드들의 **검증과 합의**를 통해 블록 추가

예. 블록 사이즈, 트랜잭션 조건, 이중 지불 금지

Blockchain **protocol is fat**

Fat protocol*

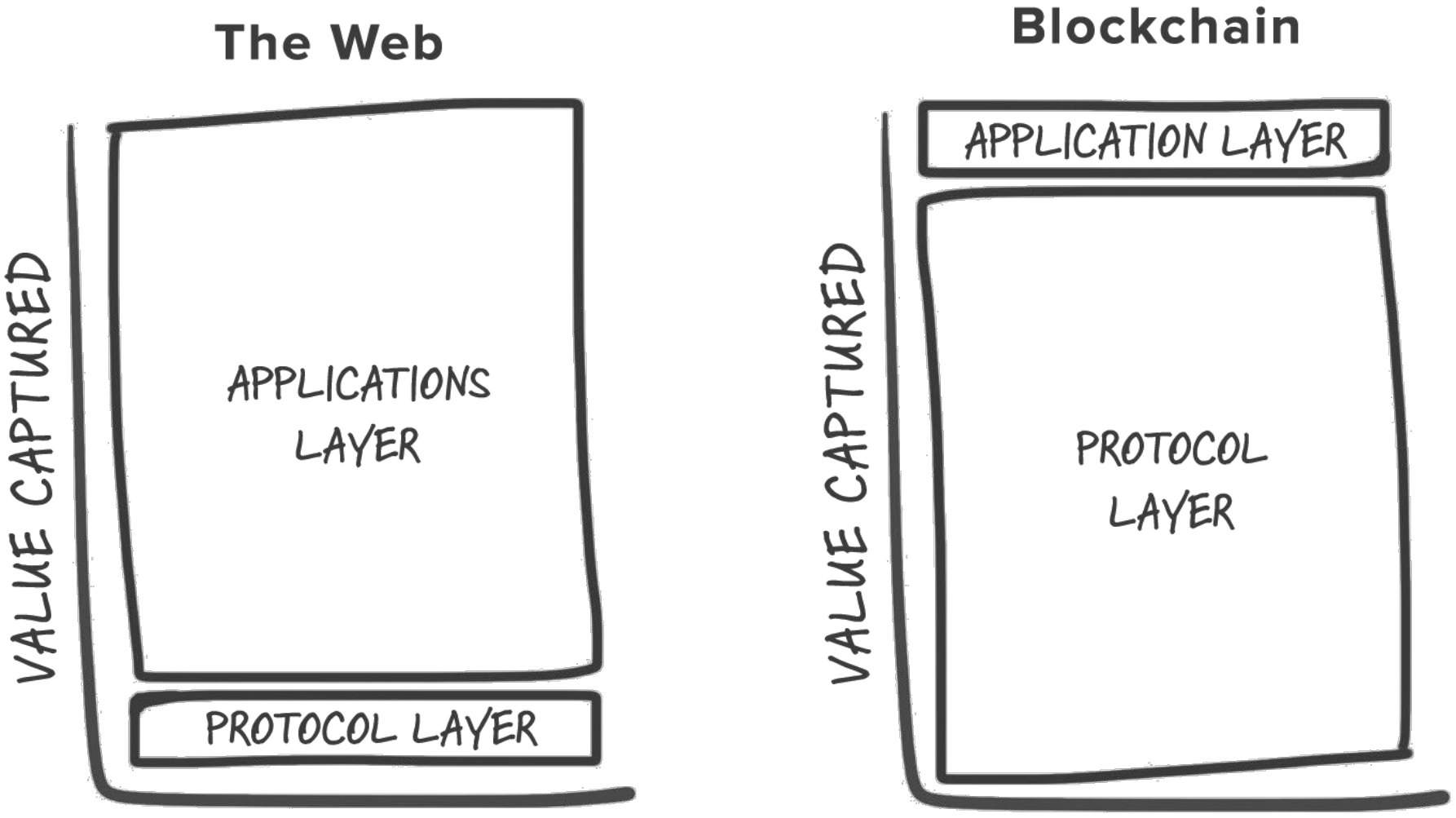
웹: 애플리케이션(아마존, 구글, 페이스북)에 가치가 집중

블록체인: dApp을 위한 **인프라****로서 프로토콜에 가치가 집중

* Joel Monégro

** Shared data, Cryptographic access token

Blockchain **protocol is fat**

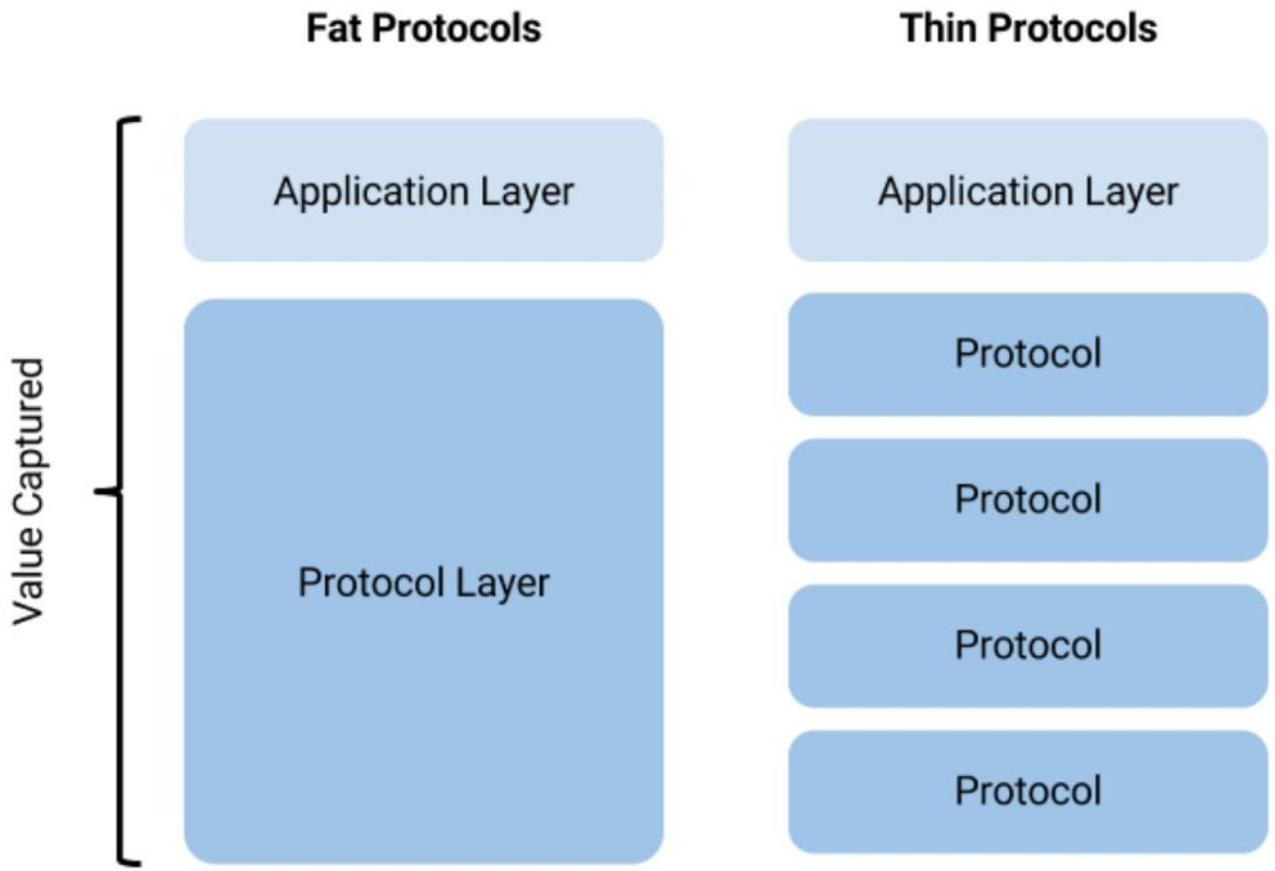


Thin protocol (Teemu Paivinen)

Protocols in aggregate is fat

Divided by **multiple protocols**

Forking competitive market



Thin protocol

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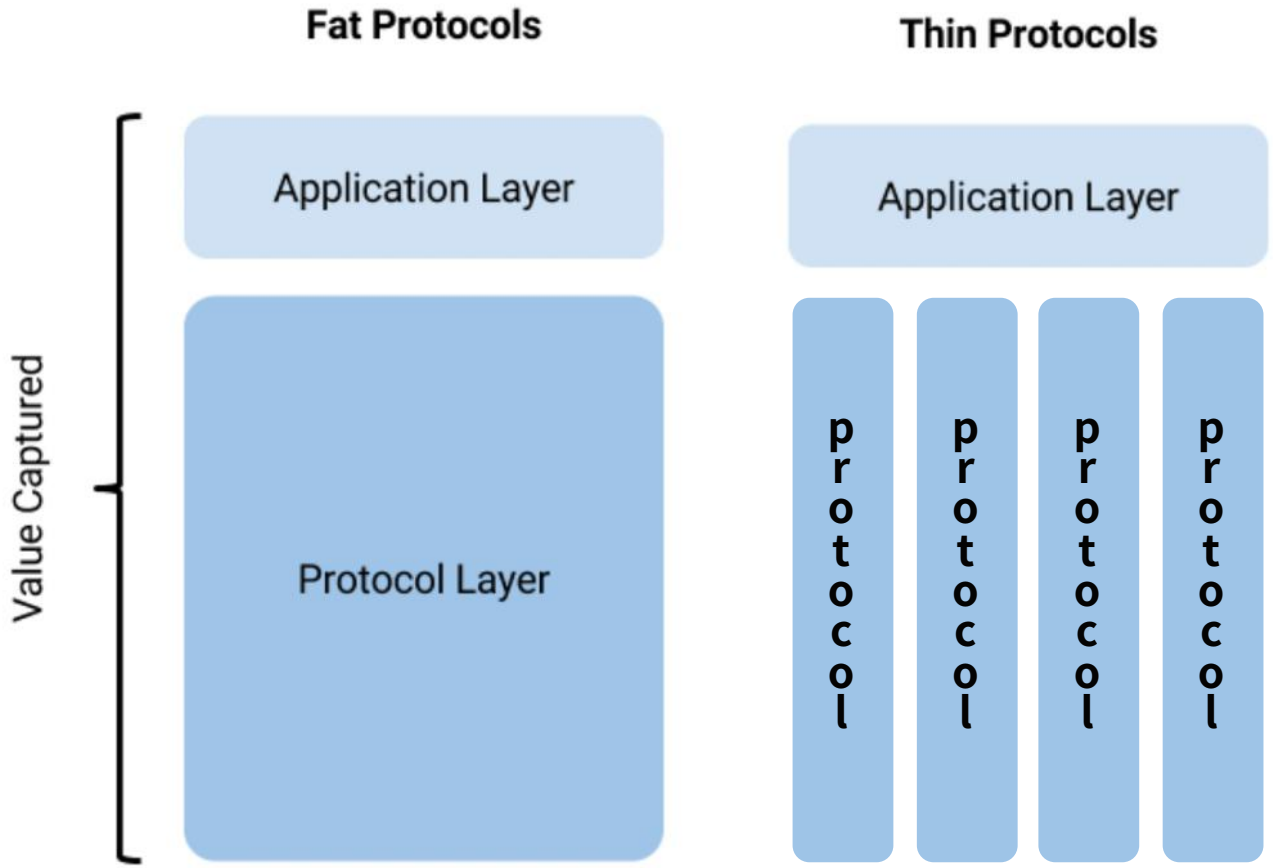


Bitcoin is **anti-fragile**

마운트곡스 파산

14년 2월 85만개의 비트코인 도난

(4억7400만 달러, 5천억)

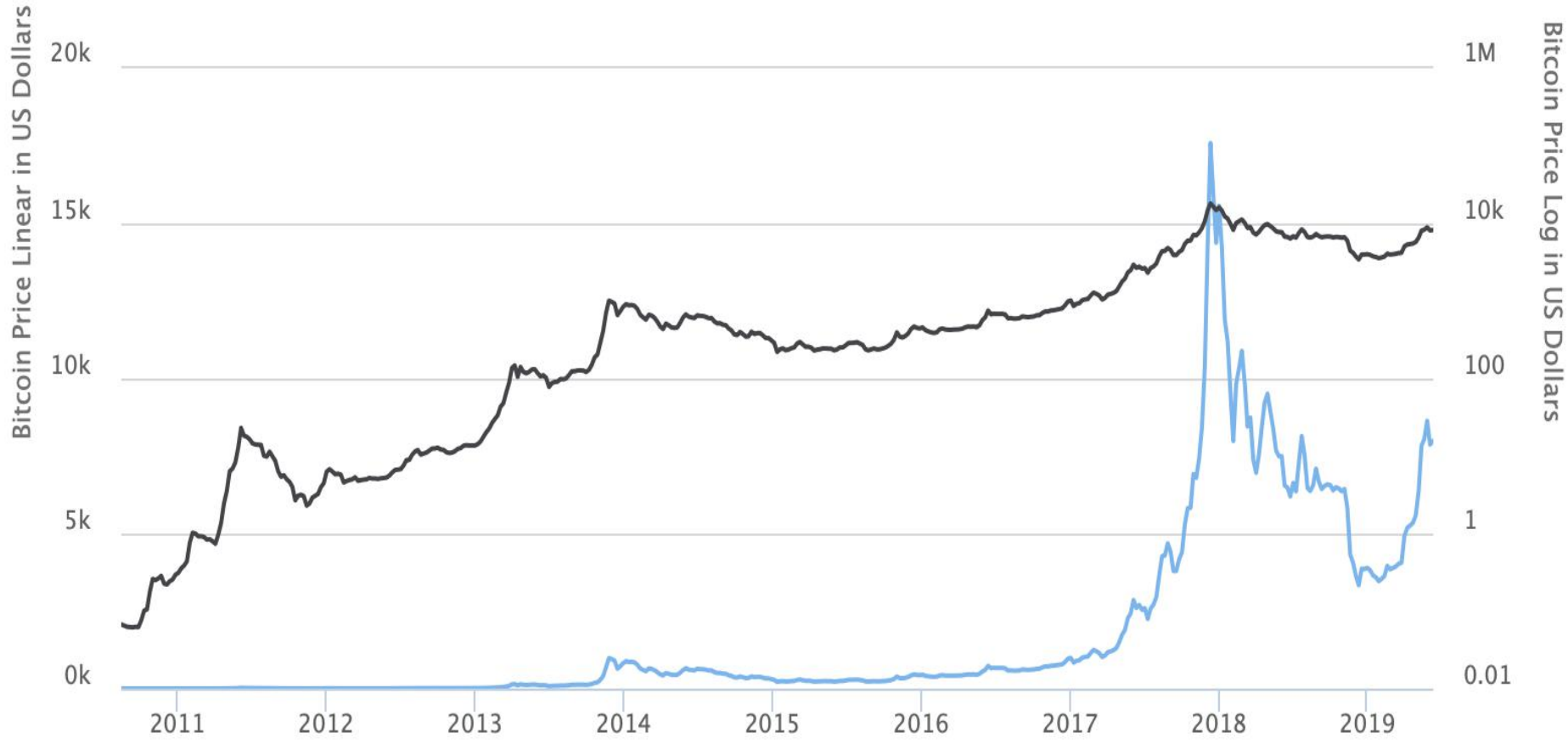
비트코인 네트워크 자체에 영향 X

일반 투자자는 기피

VC들은 투자

(14년 3.6억 달러, 15년 6.5억 달러)

Bitcoin is **anti-fragile**



블록체인이란 무엇인가?	Open Distributed Ledger, 거래, 효율성, 신뢰, 중앙화
비트코인의 등장	거인의 어깨, Byzantine generals, Hash, Digital signature, Chain
개발 동기	제네시스 블록(금융위기), Cyberpunk, 중앙화, 신뢰, 프라이버시, 암호학
중앙화의 문제	Trust, Single point of failure, Tyranny, Overhead cost
중개자 없는 P2P 거래	직접 거래, 대다수가 정직, 다수결, 합의 알고리즘, 컴퓨팅 파워, 보상 인센티브
특징	Decentralization, Immutability , Transparency, Programmability
의의	DLT, IoV, DAO, Trustless, Bootstrapped, Fat protocol, Anti-fragile

HOW