

## Bitcoin, Blockchain and the Internet of Value



**Veronika Kütt**  
Frankfurt School Blockchain Center

E-Mail: [veronika.kuett@fs-blockchain.de](mailto:veronika.kuett@fs-blockchain.de)  
Internet: [www.fs-blockchain.de](http://www.fs-blockchain.de)

An aerial view of a city skyline, likely Chicago, with a network of white lines and dots overlaid on the image. The text "About FSBC" is centered in a white box.

# About FSBC



The FSBC focuses on the following sectors:  
**banking, mobility, industry 4.0, internet of things,  
crypto assets, initial coin offerings**



1

### Research

Foster understanding of blockchain technology and their business potential for a variety of stakeholders.

2

### Education

Educate executives and students about blockchain technology.

3

### Prototypes

Develop prototypes to evaluate blockchain concepts and assess applicability in existing business processes.

4

### Community

Build a strong community of blockchain experts, corporates, industry experts and entrepreneurial talents.

5

### Start-ups

Supporting and cooperating with start-ups on blockchain and DLT related topics.

## Our Partners

COMMERZBANK 

 d-fine next

 **Frankfurt School**  
Blockchain Center

Supported by:

  
**pwc**

McDermott  
Will & Emery

  
ventum

 MAINFIRST

 **Hycon**

 **GLOSFER**



An aerial photograph of a city skyline, featuring several prominent skyscrapers. A semi-transparent network of white lines and dots is overlaid on the image, suggesting a digital or blockchain theme. The text is centered within a white rectangular border.

# Blockchain & The Internet of Value

“

Blockchain will do to the financial system  
what the Internet did to media

”

**What is it the internet did to  
media?**

**Which problem does blockchain  
actually solve?**

A city skyline at dusk, with buildings and a bridge reflected in a river. The sky is dark blue with some clouds. The text is overlaid on the image.

# Double-spend problem

How can we ensure digital value  
is not being spent twice?



A nighttime photograph of a city skyline reflected in a body of water. The sky is dark blue with some light clouds. The city lights are visible, including a prominent tall building with a spire on the right. The water in the foreground is calm, reflecting the city lights and the sky. The text is overlaid in the center of the image.

**Solution today:  
Trusted intermediaries**



**Leo Weese** 獅 草地

@LeoAW

Follow



Amazing how people suddenly realize they don't own their data on Facebook. Let's see how they react when they find out they don't own the money in their bank accounts either!

2:35 AM - 13 Apr 2018

3,284 Retweets 7,156 Likes



An aerial photograph of a city skyline, featuring several prominent skyscrapers. The image is overlaid with a semi-transparent blue filter and a white network diagram consisting of interconnected nodes and lines. A white rectangular box is centered horizontally across the middle of the image.

Bitcoin

## The birth of a libertarian-thought-driven cash system

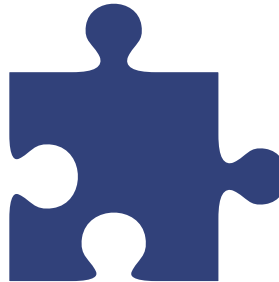
### Bitcoin: A Peer-to-Peer Electronic Cash System

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.

## The building blocks of Bitcoin

Game theory  
Strategic interaction between  
rational decision-makers





## The building blocks of Bitcoin

**Game theory**  
Strategic interaction between  
rational decision-makers

**Decentralization**  
Data is written down by  
everyone



## GLOBAL BITCOIN NODES DISTRIBUTION

Reachable nodes as of Fri Sep 21 2018 08:19:02 GMT+0300 (Eastern European Summer Time).

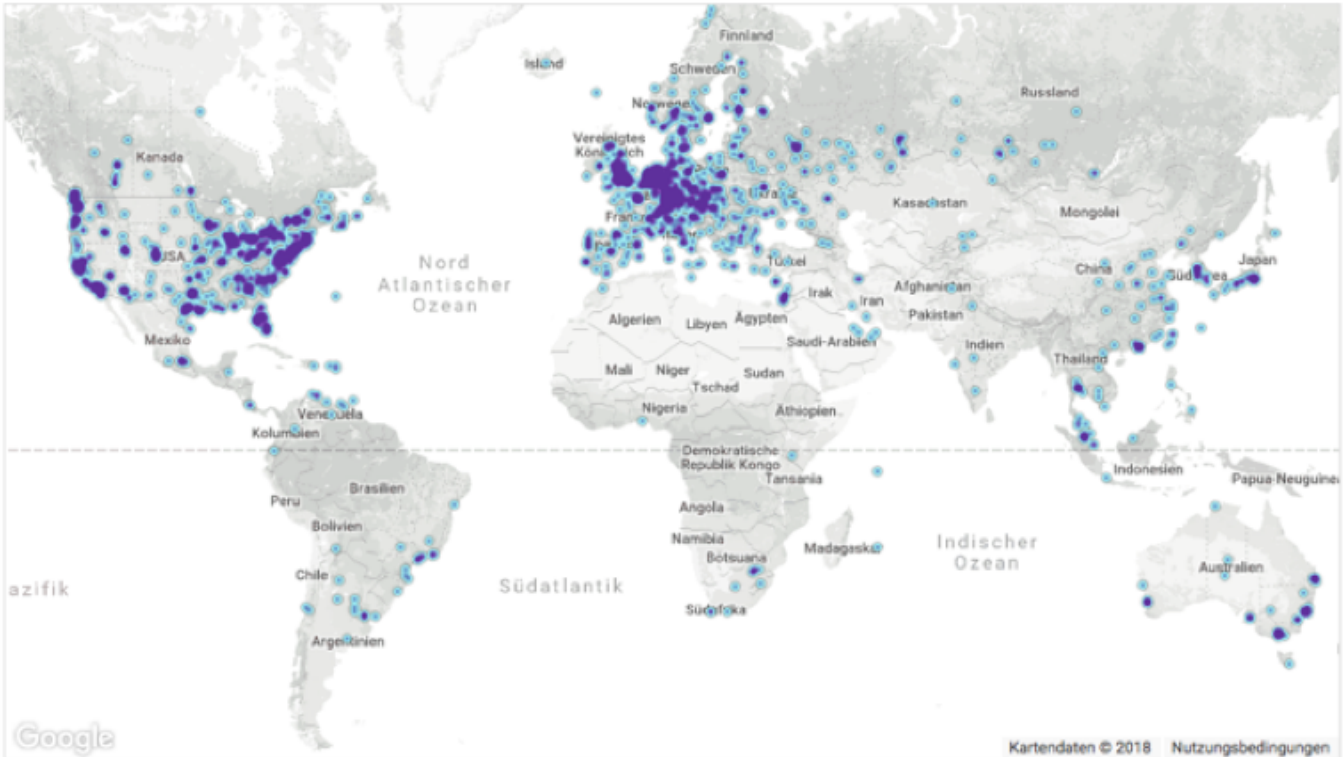
### 9781 NODES

24-hour charts »

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

RANK	COUNTRY	NODES
1	United States	2329 (23.81%)
2	Germany	1889 (19.31%)
3	France	643 (6.57%)
4	China	622 (6.36%)
5	Netherlands	478 (4.89%)
6	n/a	444 (4.54%)
7	Canada	365 (3.73%)
8	United Kingdom	296 (3.03%)
9	Russian Federation	265 (2.71%)
10	Japan	251 (2.57%)

More (99) »

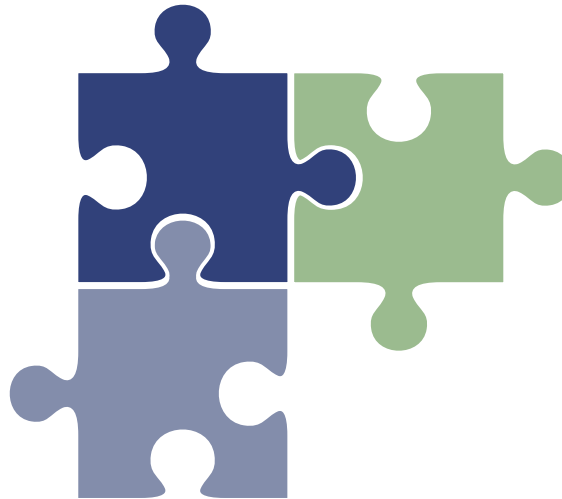


Source: <https://bitnodes.earn.com/>

## The building blocks of Bitcoin

**Game theory**  
Strategic interaction between  
rational decision-makers

**Decentralization**  
Data is written down by  
everyone



**Consensus mechanism**  
How do we make sure  
everyone is writing down the  
same data?

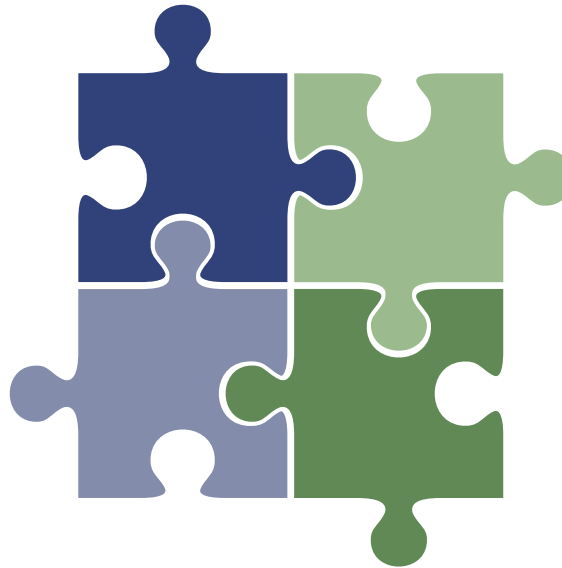
# A public ledger – the Bitcoin blockchain

e725b64143b59fef767cf96623971f695769c558208d844dbfe6fd212cfc2020		2018-09-21 05:11:58
Keine Eingänge (neu generierte Münzen)	➔ 1FVKW4rp5rN23dqFVK2tYGY4niAXMB8eZC Die Ausgangsadresse konnte nicht decodiert werden 137YB5cpBLxLKvy8T6qXsycJ699IJWCHH	12.47066646 BTC 0 BTC 0.11325529 BTC 12.58392175 BTC
b4c9929038409b61b51328eba578c2455b5c5d6d2137ad855df53bd037415a12		2018-09-21 05:06:14
16fjkGSvJcpA5UyYfIDuzJZE2W97MMebFI	➔ 1JlpZ5ShoDARx3QFodaSa891dc6J3A37q4 1KT9JtXZnXcMmZ9UGZCVZVdDw6qMsqlLkY	0.01276501 BTC 0.0002 BTC 0.01296501 BTC
06d31fb9cda7doc15a4f53a9d71b20007c5d7bcedb003b0ef8b684acb7ef3756		2018-09-21 05:08:12
14J5Q7ageKhM3miKd94DX44Kf6b7ko4BZe	➔ 3DEbe3AkKGKnSEcjhBq3pFiDtdVHgSgw9 18MBM8umeDF9DzEcgnCi7GkeqX2jyzUU8h	0.246 BTC 94.37262302 BTC 94.61862302 BTC
3bbb4e8cbced11c247750a7cd32a8da38b348fba0d356f9655e09e62782bebe9		2018-09-21 05:10:12
19KnKCYTqqiQxJrm84L1cShnvovuyom5yw	➔ 38KVe1tQHfYwAgesXyUHo1enmzj7WA2Bazt 1A8KG4hGAdgnPijYYP5Do8tSmt4er1hqts	0.0574 BTC 0.234412 BTC 0.291812 BTC

## The building blocks of Bitcoin

**Game theory**  
Strategic interaction between  
rational decision-makers

**Decentralization**  
Data is written down by  
everyone



**Consensus mechanism**  
How do we make sure  
everyone is writing down the  
same data?

**Economic incentives**  
Reward for securing the  
network



**the result**

**financial sovereignty**

A city skyline at dusk, reflected in a body of water. The sky is a deep blue with some clouds. The city lights are visible, and a large bridge is in the foreground. The text is overlaid on the image.

**Future. The Internet of Value**

**Value will be transferred as  
quickly and seamlessly as  
information**

## The information superhighway (1994)



Source: [Youtube](#) (2018)



(r)evolution ahead

Research Fellow

Veronika Kütt

Mathematician

Blockchain Center  
Frankfurt School of Finance & Management



veronikakuett



+49 151 416 415 48



Veronika.kuett@fs-blockchain.de



www.fs-blockchain.de