



**Exploring the Ethereum Blockchain
with etherchain.org**



- Founded in 2016
 - Based in Vienna
 - Focus on Blockchain Analytics and Mining Services
-

Mining Pool
 etherscan.io


Blockchain Explorer
 etherscan.io

Network Explorer
 etherscan.io

What is etherchain.org?

 2nd largest Ethereum Blockchain Explorer

 500.000 Active Users

 1.3 Mio. Page Hits

-
- Launched in 2014 based on Ethereum PoC-3
 - One of the oldest Ethereum based projects still active
 - Developed without any external funding
 - Ad-free

Etherchain [Ethereum](#) Blockchain Explorer

Note: etherchain.org is still under heavy development. Displayed information might be inaccurate or plain wrong. During development period it is linked to the most recent PoC Blockchain, currently PoC-3.

Ideas, comment or feedback: [Ethereum Forum Thread](#)

Recent blocks

#	Age	Transactions	Hash
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Ethereum Network Stats

Price	Difficulty	Block Time	Hash Rate	Tx per hour	Uncle Rate
\$7.91 ฿0.0176	31.238 T	14.3s	2.158 TH/s	2371	0.09

Recent blocks

Block	Miner	Age
1385392	coinotron	2 years ago
1385391	dwarfpool 2	2 years ago
1385390	dwarfpool 2	2 years ago
1385389	dwarfpool 1	2 years ago
1385388	dwarfpool 1	2 years ago
1385387	dwarfpool 1	2 years ago
1385386	dwarfpool 2	2 years ago
1385385	nanopool	2 years ago
1385384	ethpool	2 years ago
1385383	f2pool	2 years ago

Recent transactions

Hash	Block	From	To	Amount	Age
0xa8033c7ed...	1385387	0x965c707c0...	0xfbb1b73c4...	1.249 Ether	2 years ago
0xbe4ea6b65...	1385387	dwarfpool 1	0x4733f1324...	1.100 Ether	2 years ago
0x61ebd193b...	1385387	0x392c4bf1b...	0xeb3f3d609...	62.290 Ether	2 years ago
0x37d572448...	1385387	dwarfpool 1	0x83f3b9d1b...	1.102 Ether	2 years ago
0x435dd694b...	1385387	dwarfpool 1	0x69f5858a3...	1.101 Ether	2 years ago
0x421483164...	1385387	dwarfpool 1	0xe93fd961a...	1.100 Ether	2 years ago
0xe5997160e...	1385387	0x2910543af...	0x719cef7f8...	10.995 Ether	2 years ago
0xb21b43e4c...	1385387	dwarfpool 1	0xfc35de5de...	1.096 Ether	2 years ago
0x3194f732b...	1385387	dwarfpool 1	0x834cee00c...	1.100 Ether	2 years ago
0x93bd91013...	1385386	dwarfpool 1	0x51a84a03e...	1.115 Ether	2 years ago



Etherchain - The Ethereum Blockchain Explorer

\$ Price	Difficulty	Block time	Hashrate	TPS	Uncle rate
\$810.9 \$0.102 ▼13.5%	2,776 T ▲0.6%	14.7 s ▼0.2%	225.4 TH/s ▼0.4%	8.0 ▼12.5%	16.9 % ▼8.8%

Blocks

View more



Block 5034614

a minute ago

Mined by ✓ f2pool2 (0x829b...) in 17s.
Includes 153 Transactions and 0 Uncles.

3.23943 ETH



Block 5034613

a minute ago

Mined by ✓ ethfans.org2 (0x5a0b...) in 35s.
Includes 187 Transactions and 0 Uncles.

3.21319 ETH



Block 5034612

2 minutes ago

Mined by ✓ f2pool2 (0x829b...) in 28s.
Includes 183 Transactions and 0 Uncles.

3.30714 ETH



Block 5034611

2 minutes ago

Mined by ✓ Ethermine (0xea67...) in 32s.
Includes 181 Transactions and 1 Uncles.

3.30238 ETH



Block 5034610

3 minutes ago

Transactions

View more



Tx 0x9fb1f1c71ddda59...

a few seconds ago

0xc05d64842094B... → ✓ etherdelta2 (0x8d12...)

0 ETH



Tx 0xae9e13db921751b...

a few seconds ago

0x68eCc59100166... → 0xC43f442c8d95C...

3.50095 ETH



Tx 0x0f2ea314f7c4568...

a few seconds ago

0x49FFCd0dC3FD5... → 0x890Cafa0465D6...

3.4 ETH



Tx 0x4cb1d5923e3c6fe...

a few seconds ago

0x74c6F5F3b9671... → ✓ etherdelta2 (0x8d12...)

0 ETH



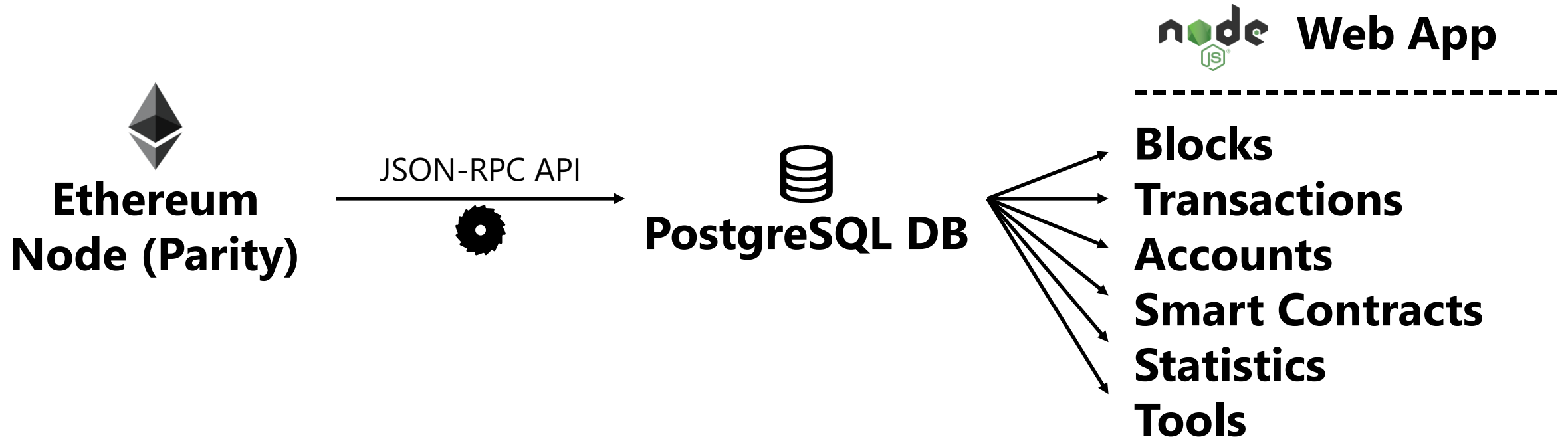
Tx 0x0b23d3492d5d861...

a few seconds ago

0x704d9201b1b52... → 0x7eD1E469fCb3E...

0.04899 ETH

How etherchain.org works?



Challenges

- Accessing “Contract Internal” transactions



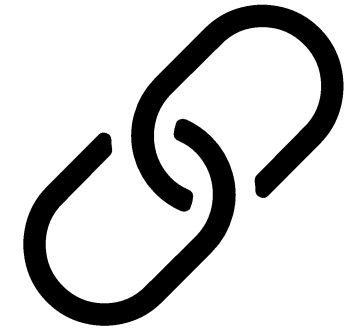
- Decoding ERC20 token transactions
- Completing a full node sync with tracing enabled – can take up to a week
- Amount of data – current SQL database size: 600 GB
- Optimizing data access
- Keeping up with demand – scaling from 23.000 users / month to 500.000 users / month within 1 year

Ethereum Blockchain Statistics

 >5 Mio. Blocks Mined (2 sextillion hashes)

 >155 Mio. Transactions Processed

 >26 Mio. Unique Addresses



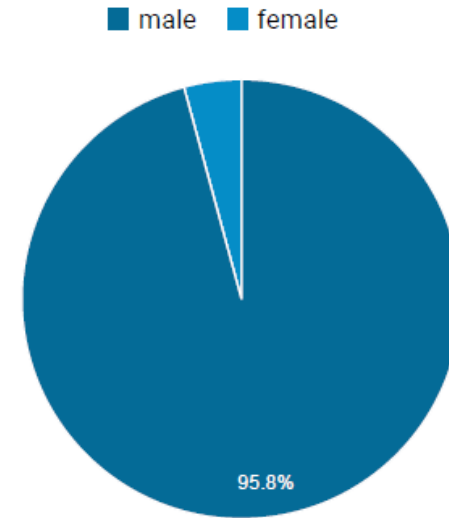
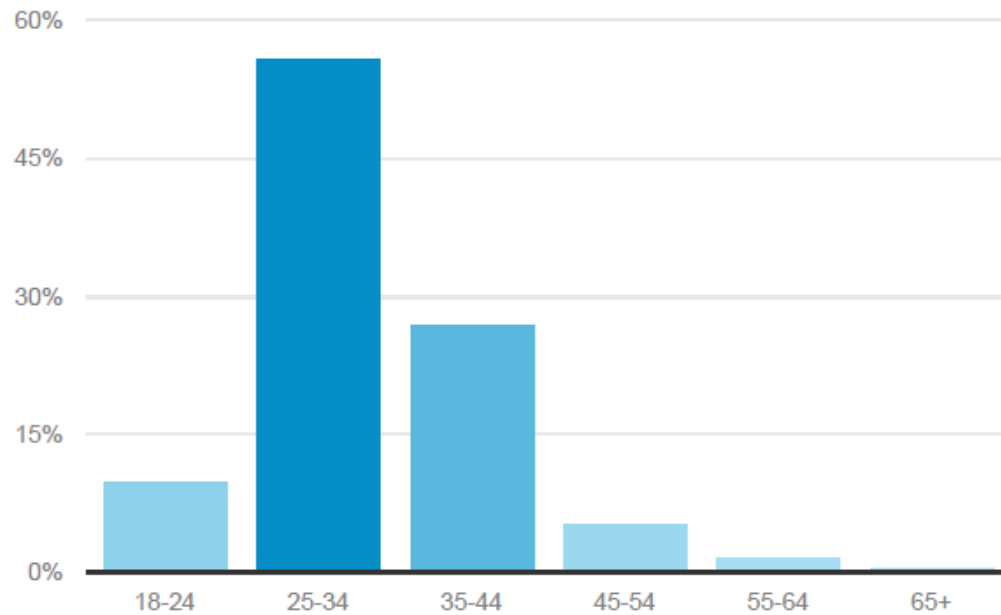
 22 Mio. Regular Accounts

 4 Mio. Smart Contracts

 20.000 ERC20 Tokens

etherchain User Statistics

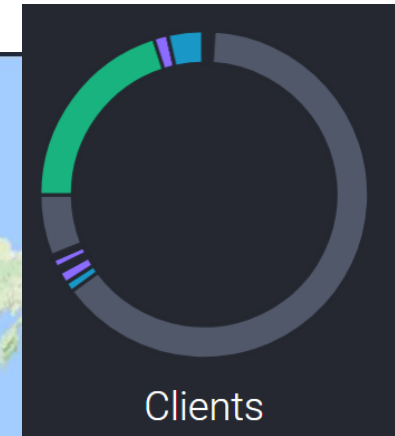
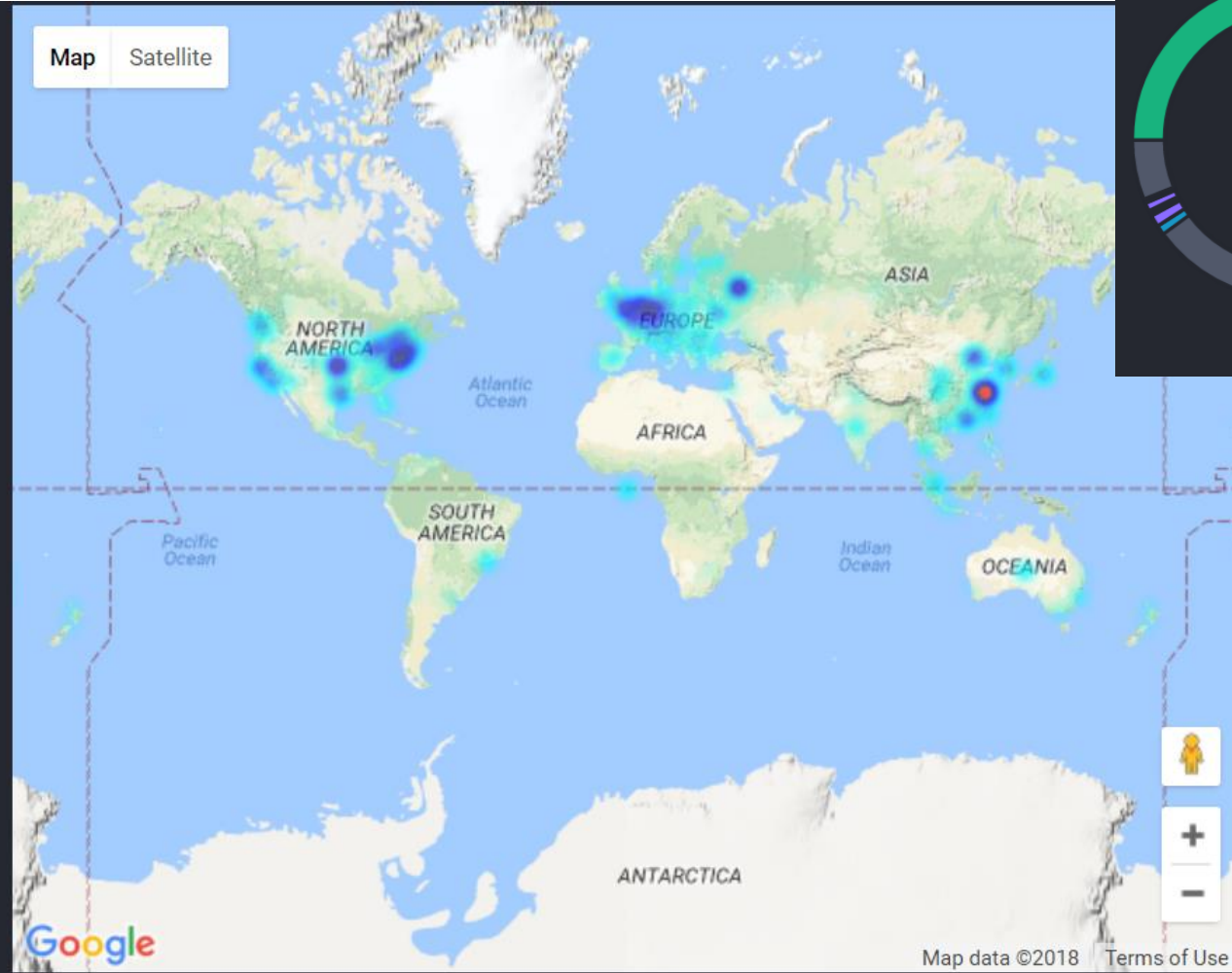
Age



Main interest: Financial & Investment Services

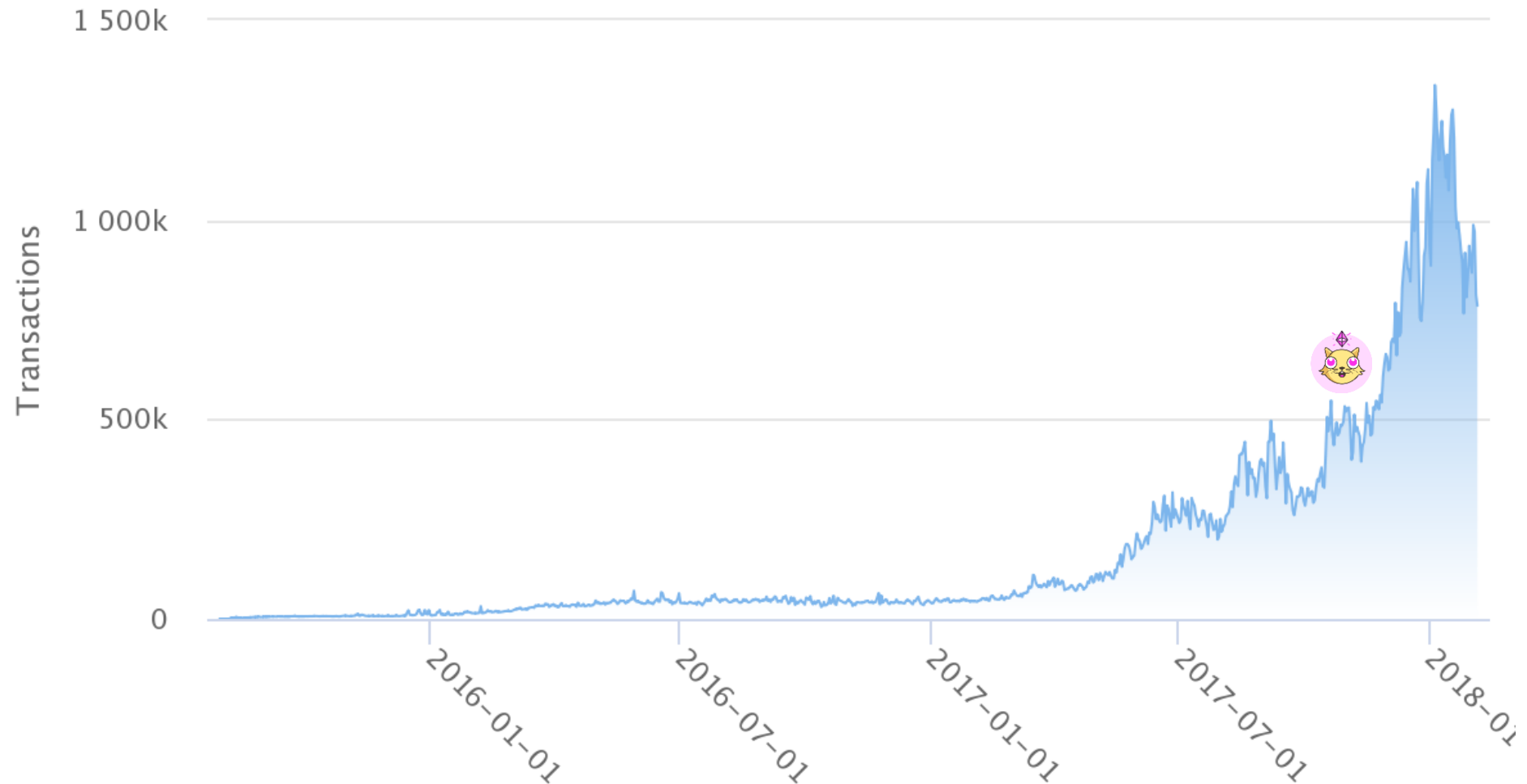
ethernodes Statistics

Total	25110 (100%)
United States	7284 (29.01%)
China	3786 (15.08%)
Germany	1525 (6.07%)
Russian Federation	1500 (5.97%)
Canada	1174 (4.68%)
United Kingdom	964 (3.84%)
Netherlands	665 (2.65%)
France	543 (2.16%)
Australia	490 (1.95%)
Ukraine	459 (1.83%)



Daily Ethereum Transaction Chart

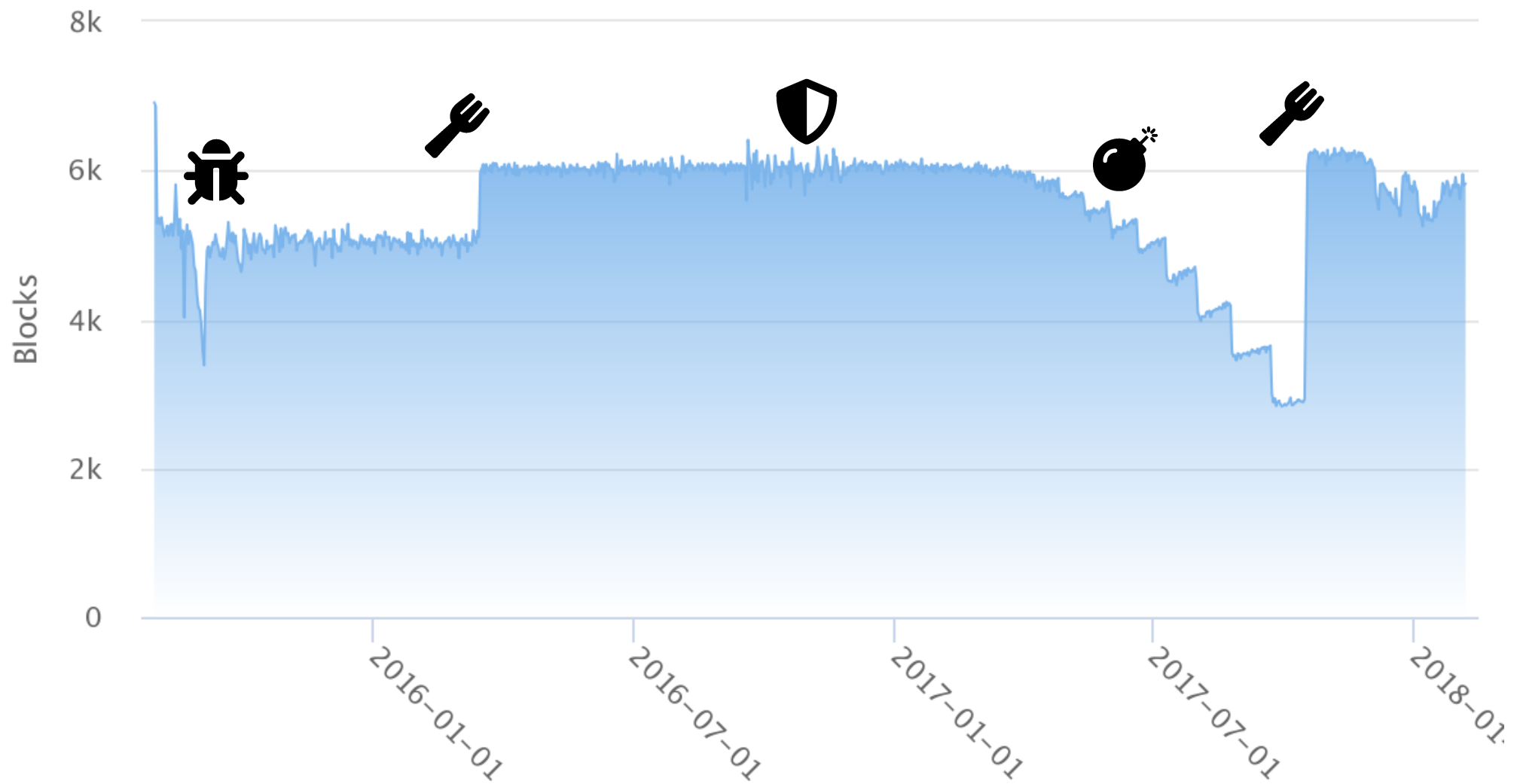
Lowest value: 1.329 Txs / 09.08.2015. Highest value: 1.337.257 Txs / 04.01.2018.



Highcharts.com

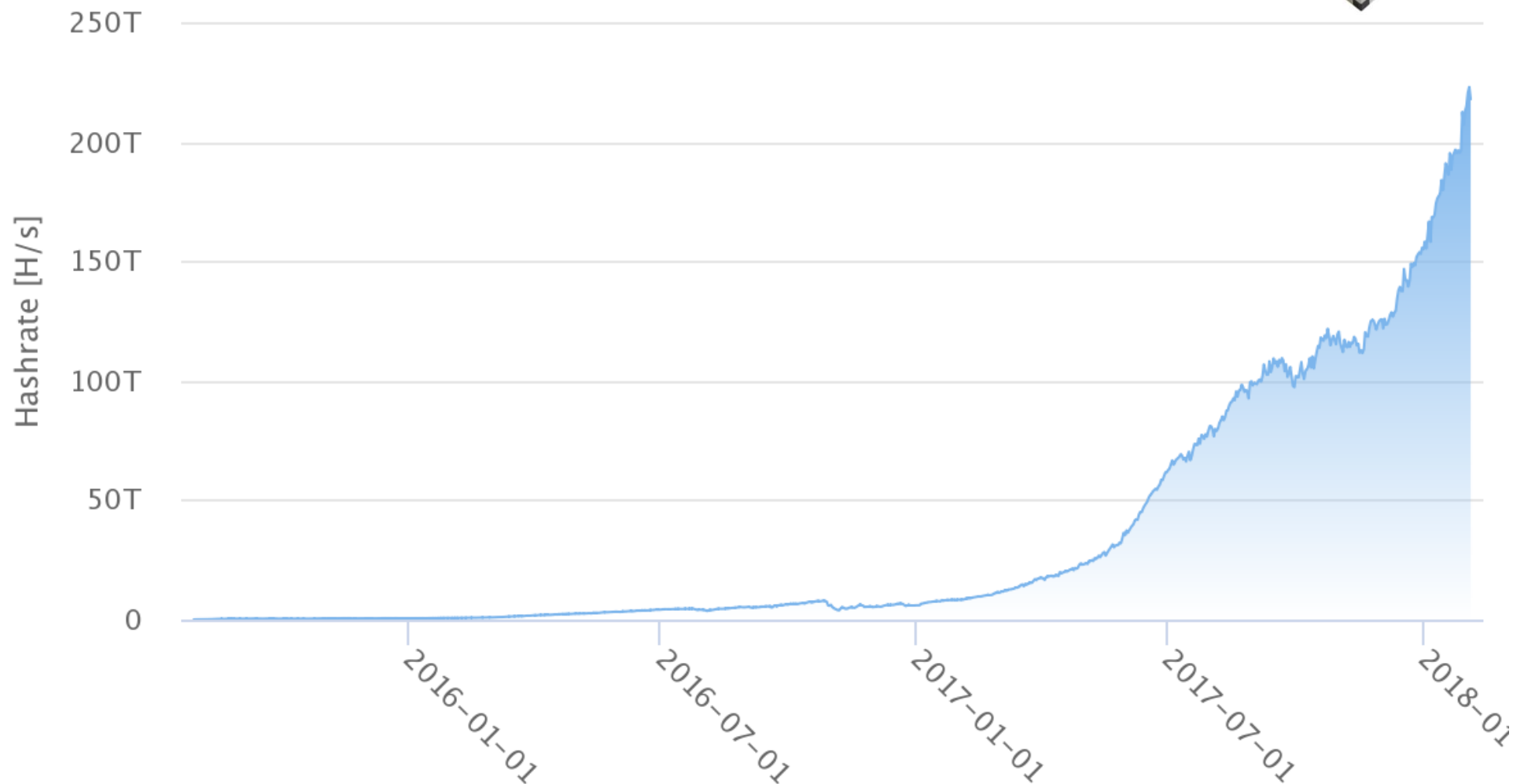
Daily Ethereum Blocks Chart

Lowest recorded value: 2.829 Blocks on the 29.09.2017. Highest recorded value: 6.912 Blocks on the 30.07.2015.



Network Hashrate

Highest value: 222 TH/sec / 03.02.2018 → More than 7 Mio GPUs are currently mining on the Ethereum Network



Highcharts.com

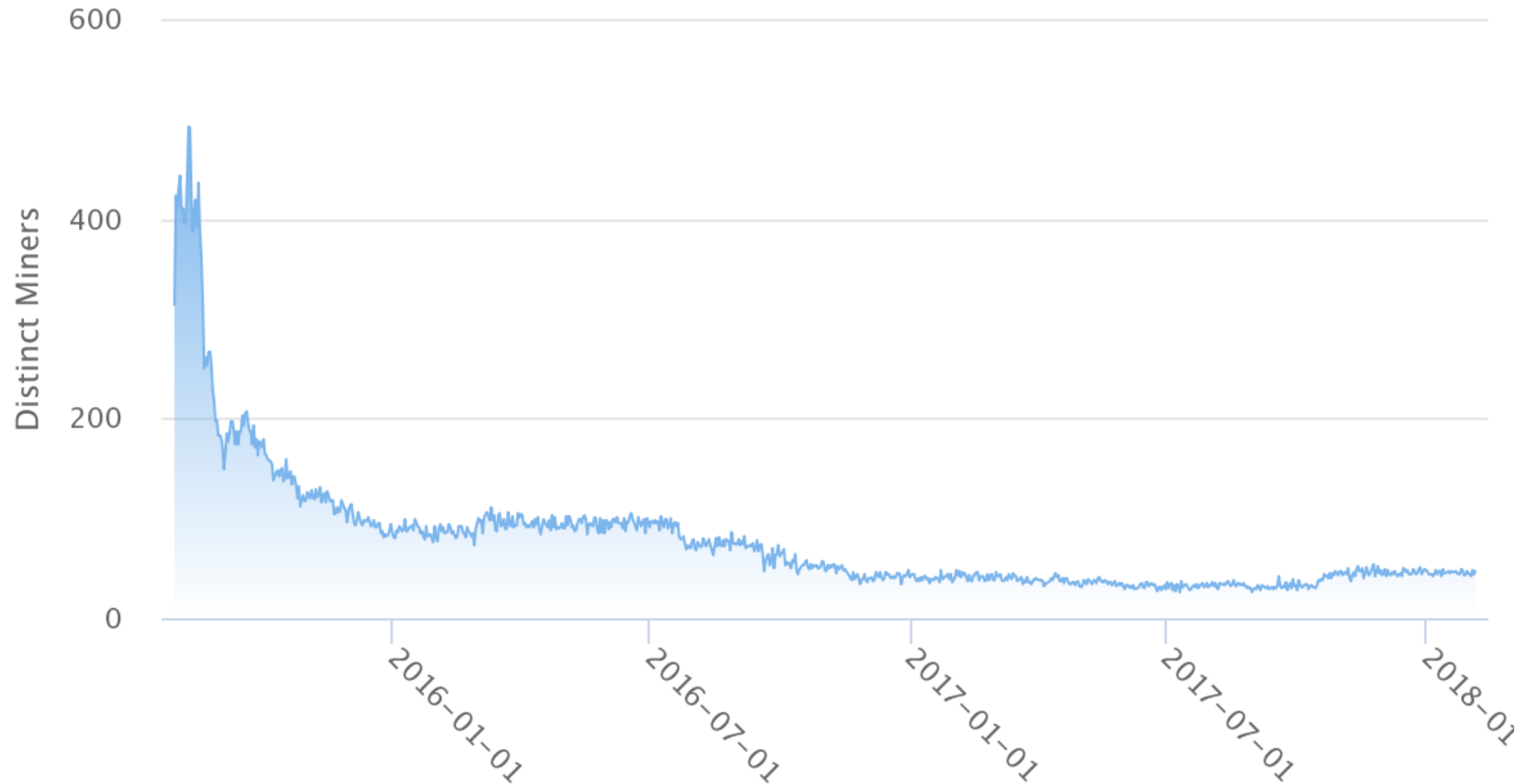
Mining Profitability

Daily Return in USD when mining with 1 GH/s (= ~35 GPUs)



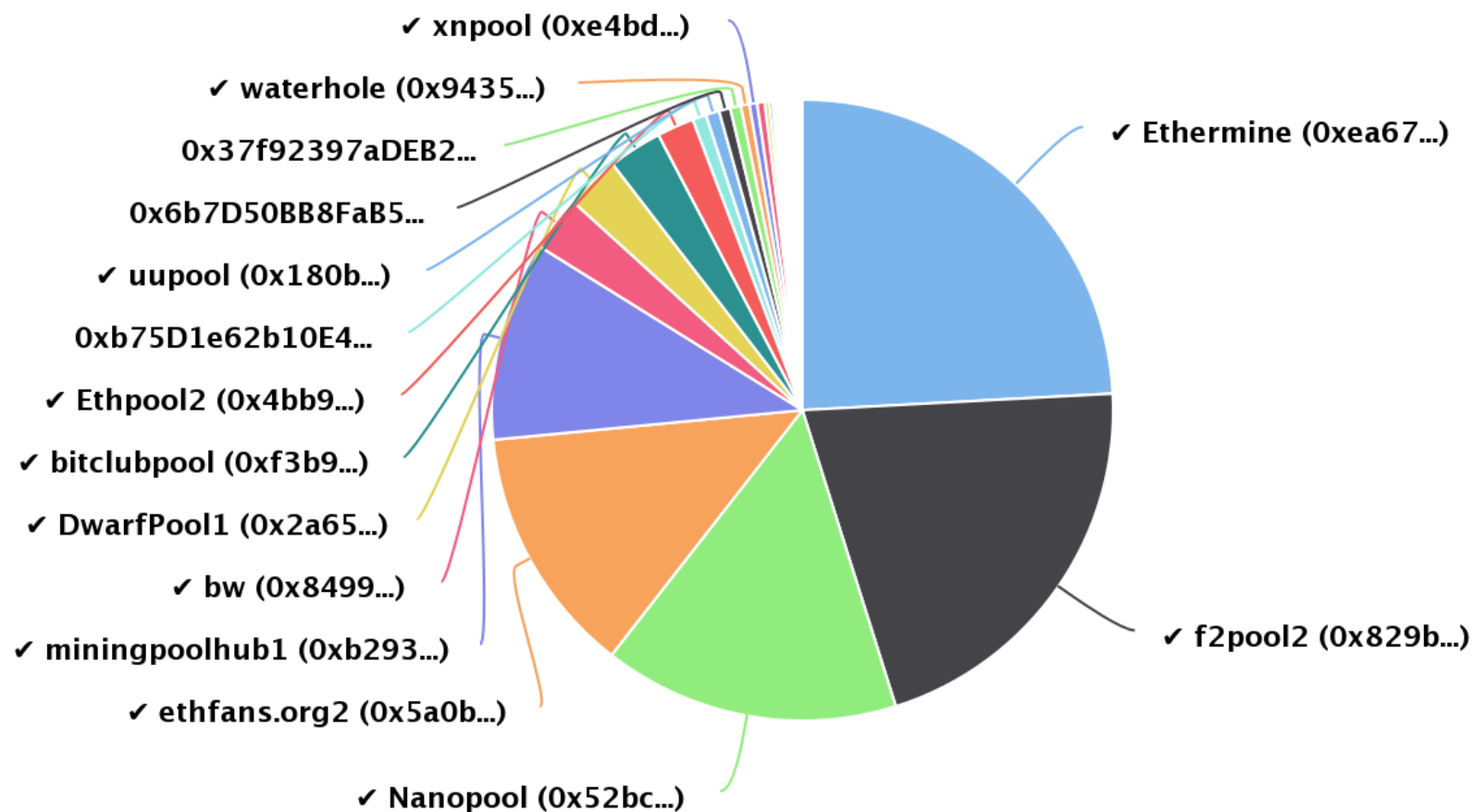
Unique Miners

Currently 40 – 50 miners (solo miners & pools) are mining on the Ethereum Network



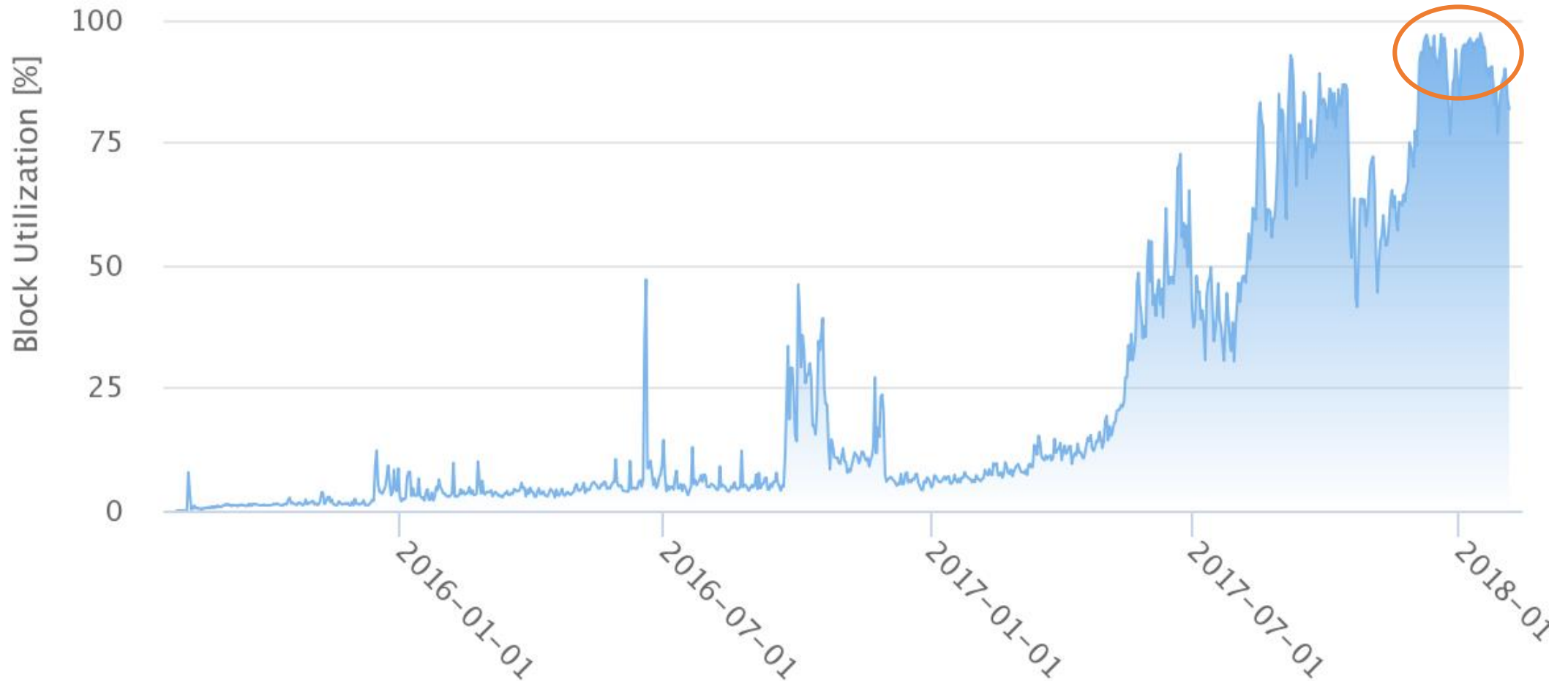
Mining Decentralization

Currently only 3 mining pools control 60% of the Ethereum Network Hashrate



Scalability Issues

Between December 2017 and January 2018 the Ethereum Network was nearly 100% utilized

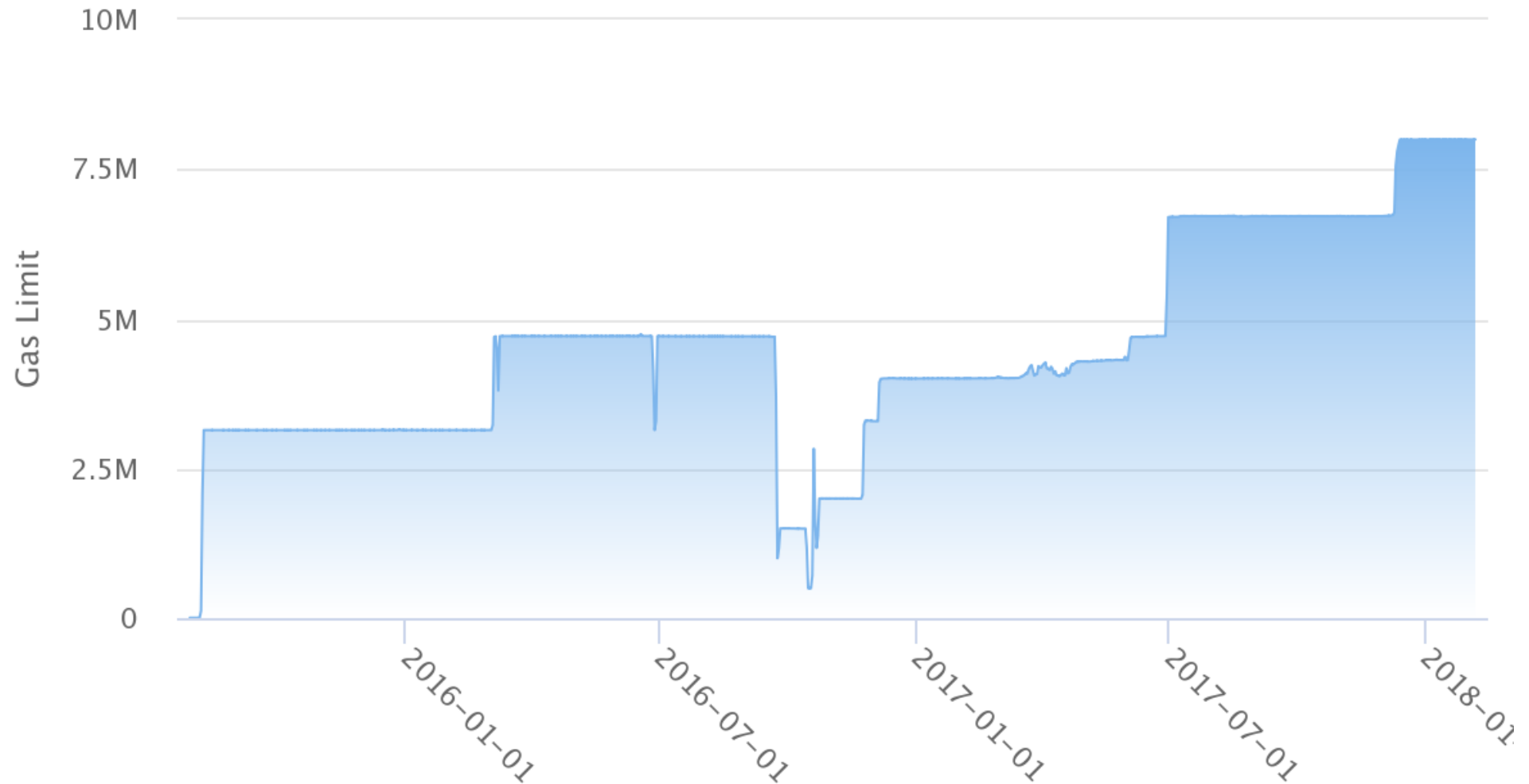


Scalability Issues

- Protocol limits how many transactions can be included in a block
- Every transaction consumes a certain amount of "gas"
- A standard transaction requires 21.000 gas, smart contract executions require much more
- The block gas limit defines how many transactions fit into a single block
- Current block gas limit: 8 Mio. → Max. 380 simple transactions / block → 25 Txs/Sec
- Miners vote on the block gas limit

Scalability Issues

Lowest recorded value: 5.000 on the 30.07.2015. Highest recorded value: 7.999.402 on the 18.01.2018.



Scalability Issues

Miner Block Gas Limit Voting

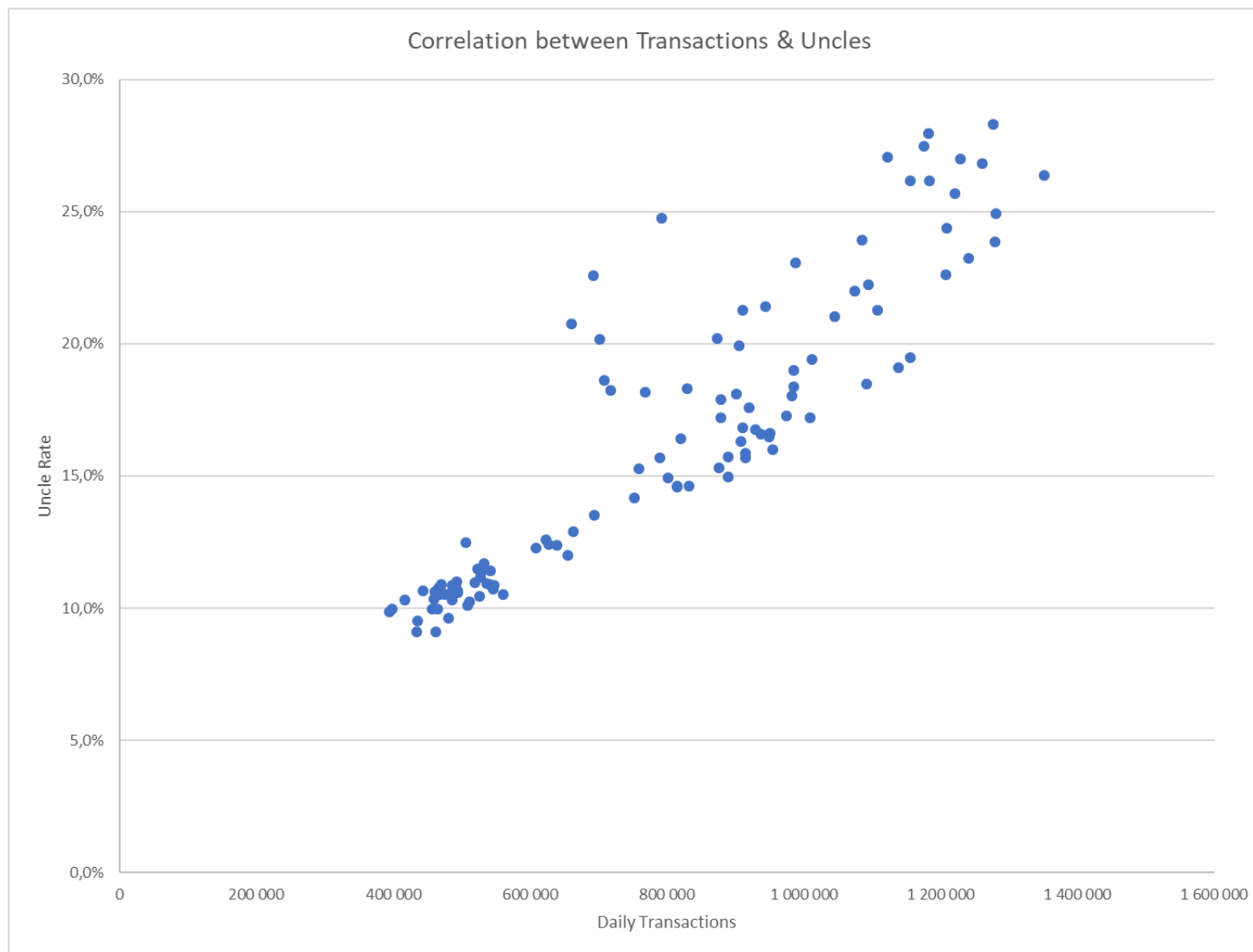
Miner	Votes Up	Votes Down	Largest Upvote	Lowest Downvote
✓ f2pool2 (0x829b...)	1084	174	8027300	8000000
✓ Ethermine (0xea67...)	710	285	8000029	7968912
✓ ethfans.org2 (0x5a0b...)	0	778	-	7957257
✓ Nanopool (0x52bc...)	381	116	8000029	8000029
✓ miningpoolhub1 (0xb293...)	252	88	8000029	8000029
✓ DwarfPool1 (0x2a65...)	48	133	8011647	7964334
✓ bw (0x8499...)	115	51	8011734	7959517
✓ bitclubpool (0xf3b9...)	0	145	-	7968912
✓ Ethpool2 (0x4bb9...)	32	33	8000029	7976682
0xb75D1e62b10E4ba91315C4aA3fACc536f8A922F5	0	58	-	7968912

Scalability Issues

- Every transaction a miner includes increases the chance of the block becoming orphaned
- Miners get a reward for orphaned blocks as they can be included as an uncle block
- Mining a large % of uncle blocks reduces mining profitability
- Uncles contain **no transactions** but are counted toward the **network difficulty**

→ **The more transactions a miner includes in a block the higher is the chance for the block to become an uncle**

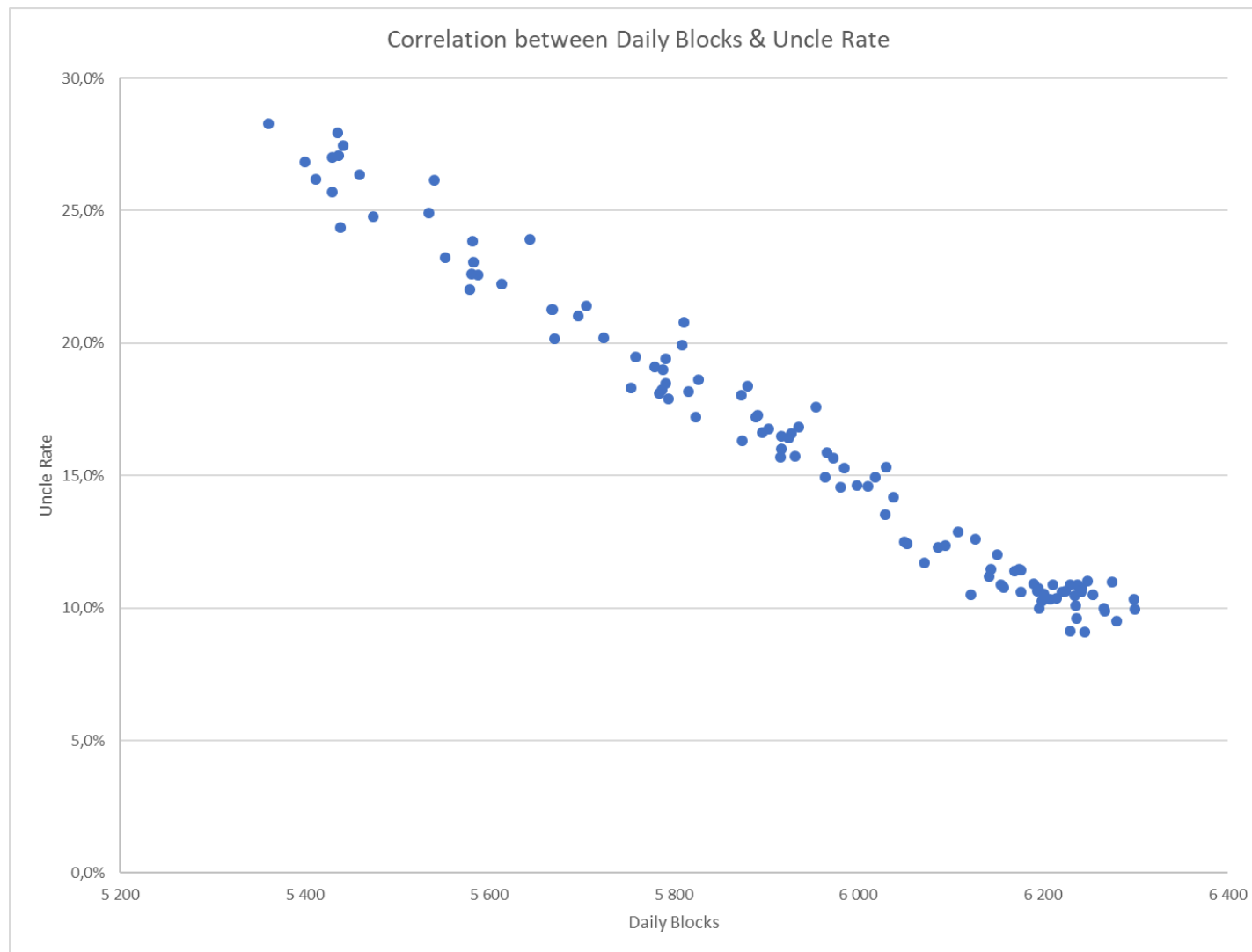
Scalability Issues



Scalability Issues

- As the Ethereum network utilization approached 100% the uncle rate increased to nearly 30%
- 30% of all mined blocks were orphaned
- As uncles are counted towards the network difficulty this caused a reduction in total mined blocks
- Less block capacity available to process transactions

Scalability Issues



Scalability Issues

- Processing 8 Mio. gas blocks already consumes significant computing resources
- On regular consumer hardware Parity is unable to process more than 2-3 8 Mio. gas blocks / second
- When syncing a new node it takes more than 30 minutes to process a single day of blocks
- Increasing the gas limit will further deteriorate the situation
- A very high gas limit might open the network up to DoS attacks

Ethereum should still be usable on consumer hardware

Scalability Issues – Solutions?

- Short term
 - Efficiency improvements in the client implementation (e.g. Turbo Geth by Alexey Akhunov)
 - Miner relay network
 - Faster adoption by mining pools and users
 - Better guidance from the Ethereum Client devs
- Long term
 - Sharding
 - Plasma
 - Payment channels

Scalability Issues – Tips

- Before sending a transaction always consult a gas price oracle for the most suitable tx fee

Gas Price Oracle (Based on transaction data from the last hour)

⌛ Save Low (< 30 mins to confirm)	⌚ Normal (< 5 mins to confirm)	▶ Fast (< 1 min to confirm)	▶▶ Fastest (Confirms in 1-2 blocks)
1 GWei	2 GWei	20 GWei	50 GWei

- If a transaction gets stuck, you can re-send it by sending another transaction with a higher gas price

and the same nonce

Gas Price	2 GWei
Gas Limit	133,237
Gas Used	88,825
Actions	↳ Invoked 0xEB9951021698B... sending 0 ETH consuming 30262 Gas of 75771
Token transfers	🏧 Transfer of 56 Lif from 0x00000000000000... to 0x1E45Ac6f02E02...
Logs	<pre>[{ "logindex": 88,</pre>
Tools	Parity Trace
Conflicting Tx	We found 1 transaction with the same nonce from the same account: <ul style="list-style-type: none">• 0x74db096546bb03f4c05b... (Not confirmed, Gas Price: 1 GWei)

Messages on the blockchain

- Miners can include arbitrary data in the block extradata field

Block	
1 (Uncle)	Yates Randall - EtherNinja
18	Bitcoin is THE Blockchain.
11176	nickycakes is the greatest
12938	your message here
13673	f**k yeah got one!!!
14726	sinnlos im weltraum
17754	in bewegung halten
19852	Will u marry me? misterigl
26870	www.ethereum.co.uk for sale

Messages on the blockchain

- Users can include arbitrary data in the tx input field

Block	
46270	Franko is Freedom.
51207	What we have done for ourselves alone dies with us; what we have done for others and the world remains and is immortal. -Albert Pike lineagee was here.
219162	Give my money back
256197	The Hacker's Manifesto ...
535625	Hi, mom! -Limeth
...	...
2283416	Fahrt nach Hause → geth node crash

Future Features for etherchain.org

- Solidity Function Fingerprinting
- ERC20 Token Explorer
- Browser for the Ethereum Name System (ENS)
- JSON-RPC proxy API

Need your own blockchain explorer?

etherchain-light (Open Source)

<https://github.com/gobitfly/etherchain-light>

erc20-explorer (Open Source)

<https://github.com/gobitfly/erc20-explorer>



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