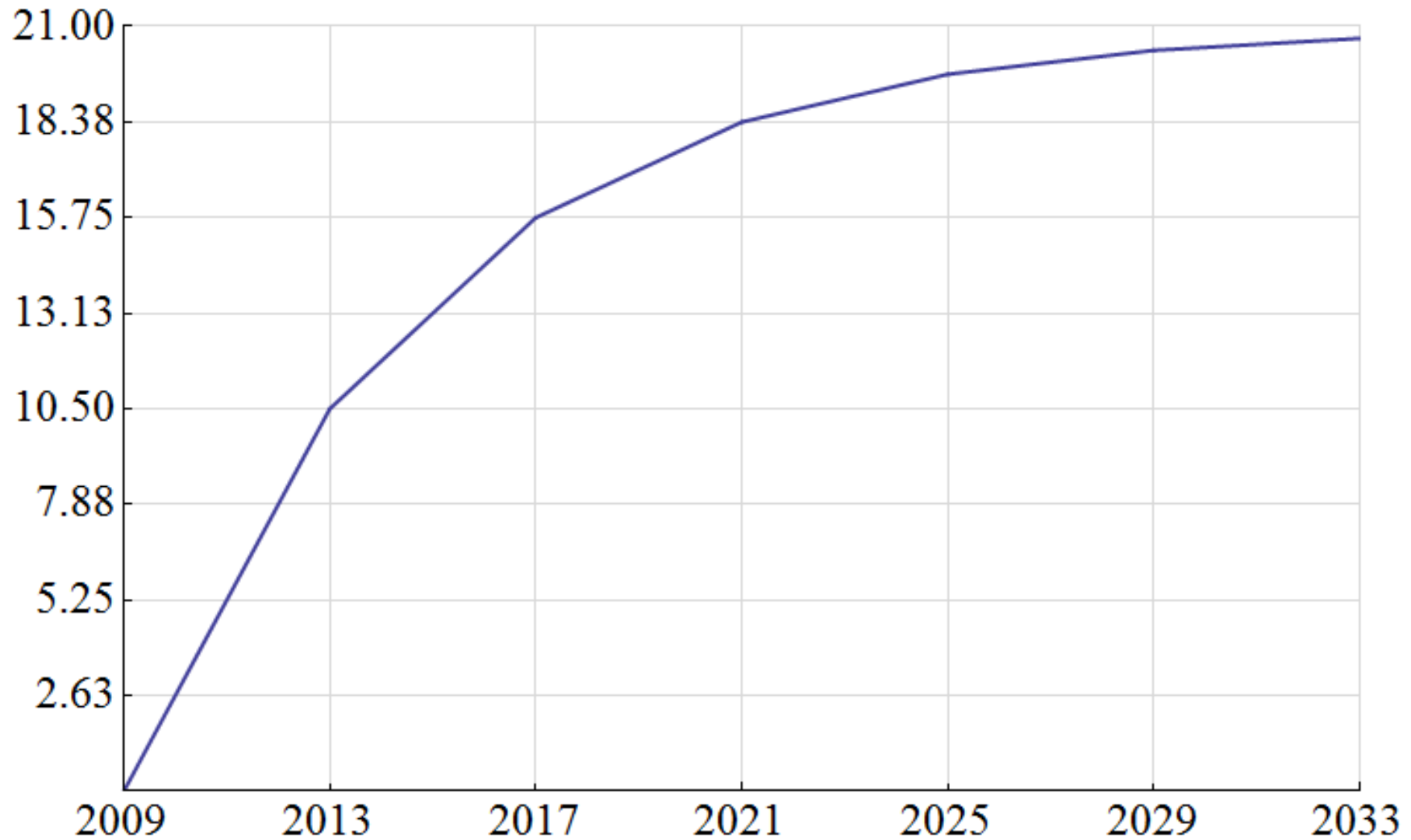


spondooliestech

Bitcoin Mining in Pictures

# Inflation schedule

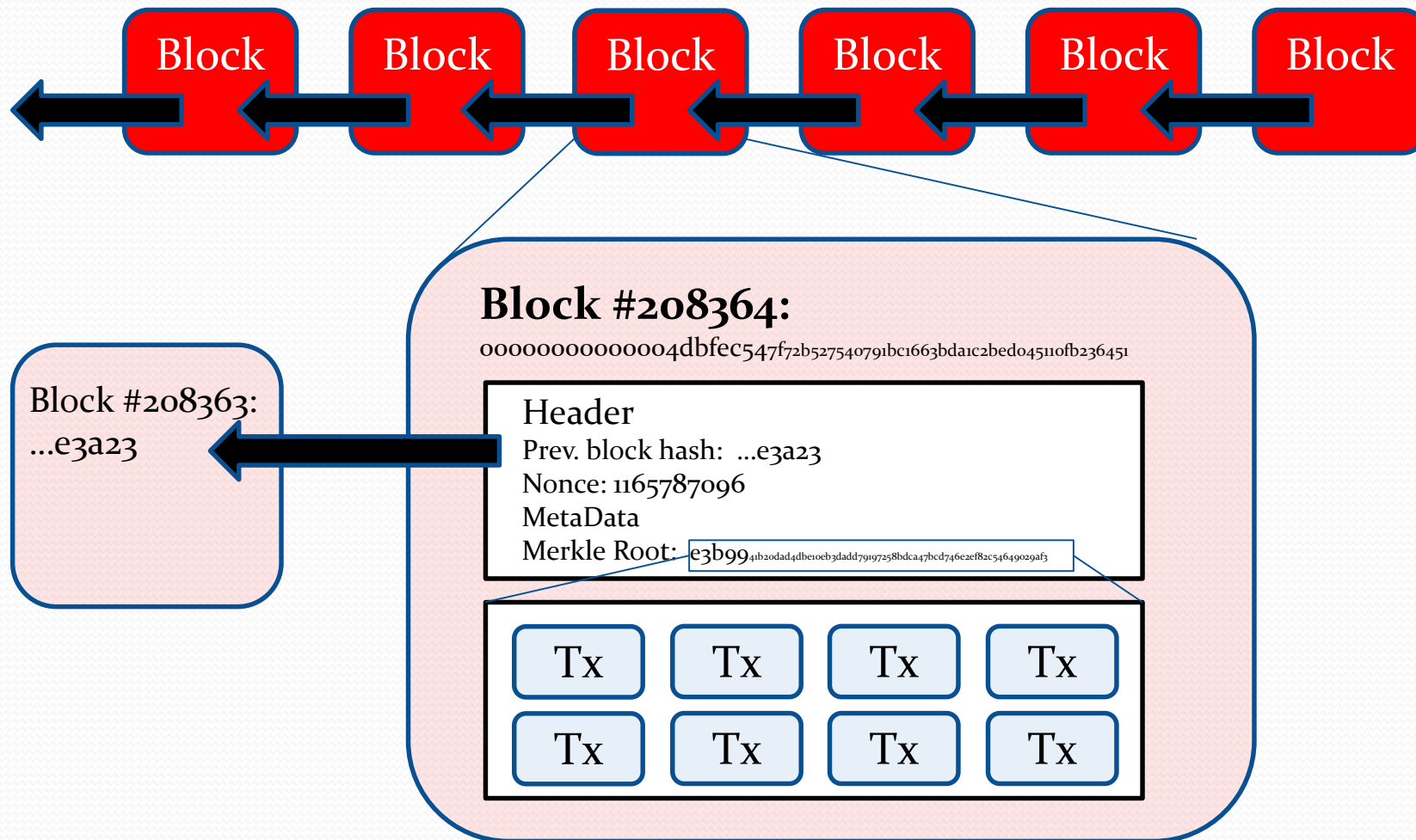
Total bitcoins in circulation over time (millions)



# Rai stone at Yap Island



# The Blockchain



# Bitcoin Mining Hardware

- Development and manufacturing of specialized hardware accelerated computers (“Mining Machines”) has huge Capex requirement (Example: 28nm “Tapeout” cost - \$2.5M, 16nm - \$6M)
- Operating those “Mining Machines” has huge Opex requirement (electricity, cooling and space)
- Two sources of incentives to offset the Capex and Opex
  - Minting of new Bitcoins (currently 25) per transactions block signing (~10 mins)
  - Sum of all the transactions fees in the signed block
- The miners has dual role:
  - Authorizing and synchronizing transactions on the Blockchain  
This is the miners main role – distributed clearing of transactions
  - Minting of new Bitcoins, according to pre-determined inflation schedule



# Block Example

## Block 277583<sup>2</sup>

Short link: <http://blockexplorer.com/b/277583>

Hash<sup>2</sup>: 00000000000000005bee6554b482505af391989921f7612fa79b4949197c646d

Previous block<sup>2</sup>: [0000000000000000591328469b75dcecfeba375b9592ac45dea97f290b2b702f](#)

Next block<sup>2</sup>: [000000000000000030f56bd01baffc1c2cc2b679db2b23ad0a75bbd54b9a4d0f9](#)

Time<sup>2</sup>: 2013-12-29 17:23:13

Difficulty<sup>2</sup>: 1 180 923 195.258026 ("Bits"<sup>2</sup>: 1903a30c)

Transactions<sup>2</sup>: 939

Total BTC<sup>2</sup>: 21915.11261698

Size<sup>2</sup>: 403.303 kilobytes

Merkle root<sup>2</sup>: 59b9b949f8d9639e8c3a39db54848c1fa19a0bc60d3347ad232241b8481c4884

Nonce<sup>2</sup>: 1963506763

[Raw block<sup>2</sup>](#)

### Transactions

Transaction <sup>2</sup>	Fee <sup>2</sup>	Size (kB) <sup>2</sup>	From (amount) <sup>2</sup>	To (amount) <sup>2</sup>
<a href="#">0be6185894...</a>	0	0.168	Generation: 25 + 0.30871887 total fees	<a href="#">14cZMQk89mRYQkDEj8Rn25AnGoBi5H6uer</a> : 25.30871887
<a href="#">261ed16575...</a>	0.0005	0.258	<a href="#">1A1TR1KAibq1iscDewtnkmmniwfJg36DM</a> : 47.9365	<a href="#">1LCkpCdvQJLBvBscYsafwXf6nBxGRYtxwG</a> : 0.01 <a href="#">13G4MGj3GJ3U84sH8CMzV3d7yJmXRBreSG</a> : 47.926
<a href="#">e9a73dcb10...</a>	0	0.258	<a href="#">1PNTiJvK3jThKg1FJyN5Ds3HtRs89jTpTw</a> : 32.62079019	<a href="#">15hHsQD6wG8UmNpRmQ5fbVAZFWxXQm4X5</a> : 32 <a href="#">1PNTiJvK3jThKg1FJyN5Ds3HtRs89jTpTw</a> : 0.62079019
<a href="#">ea5b2b76e5...</a>	0.001	0.259	<a href="#">1KA5wpcSCopi4pWnGrwuBuwYCGWZpSAWm3</a> : 6.92017047	<a href="#">17CBm9MYALotSgR7C72YiynGcfzUbd39Gb</a> : 0.92 <a href="#">1KA5wpcSCopi4pWnGrwuBuwYCGWZpSAWm3</a> : 5.99917047

# The “difficulty”

- The mining problem adjustment factor is called “Difficulty”
- The mining power of each miner (and the entire network) is called Hash-Rate. It is currently being measures by Peta Hash / Sec (PHs)
- The difficulty is being adjusted (recomputed by all the miners) every 2016 blocks (usually less than 2 weeks)
- If the network hash-rate will remain constant, the Difficulty will remain constant as well – it’s never the case

# 6 months Difficulty and Hash Rate

Date	Difficulty	Change	Hash Rate
May 03 2015	47,643,398,018	0.07%	341,044,727 GH/s
Apr 19 2015	47,610,564,513	-3.71%	340,809,696 GH/s
Apr 05 2015	49,446,390,688	5.84%	353,951,052 GH/s
Mar 22 2015	46,717,549,645	-1.50%	334,417,246 GH/s
Mar 08 2015	47,427,554,951	1.59%	339,499,662 GH/s
Feb 22 2015	46,684,376,317	5.01%	334,179,783 GH/s
Feb 09 2015	44,455,415,962	7.71%	318,224,263 GH/s
Jan 27 2015	41,272,873,895	-6.14%	295,442,739 GH/s
Jan 12 2015	43,971,662,056	8.20%	314,761,417 GH/s
Dec 30 2014	40,640,955,017	3.00%	290,919,288 GH/s
Dec 17 2014	39,457,671,307	-1.37%	282,449,013 GH/s
Dec 02 2014	40,007,470,271	-0.73%	286,384,627 GH/s
Nov 18 2014	40,300,030,328	1.76%	288,478,854 GH/s
Nov 05 2014	39,603,666,252	10.05%	283,494,086 GH/s
Oct 23 2014	35,985,640,265	2.81%	257,595,247 GH/s
Oct 09 2014	35,002,482,026	0.98%	250,557,526 GH/s



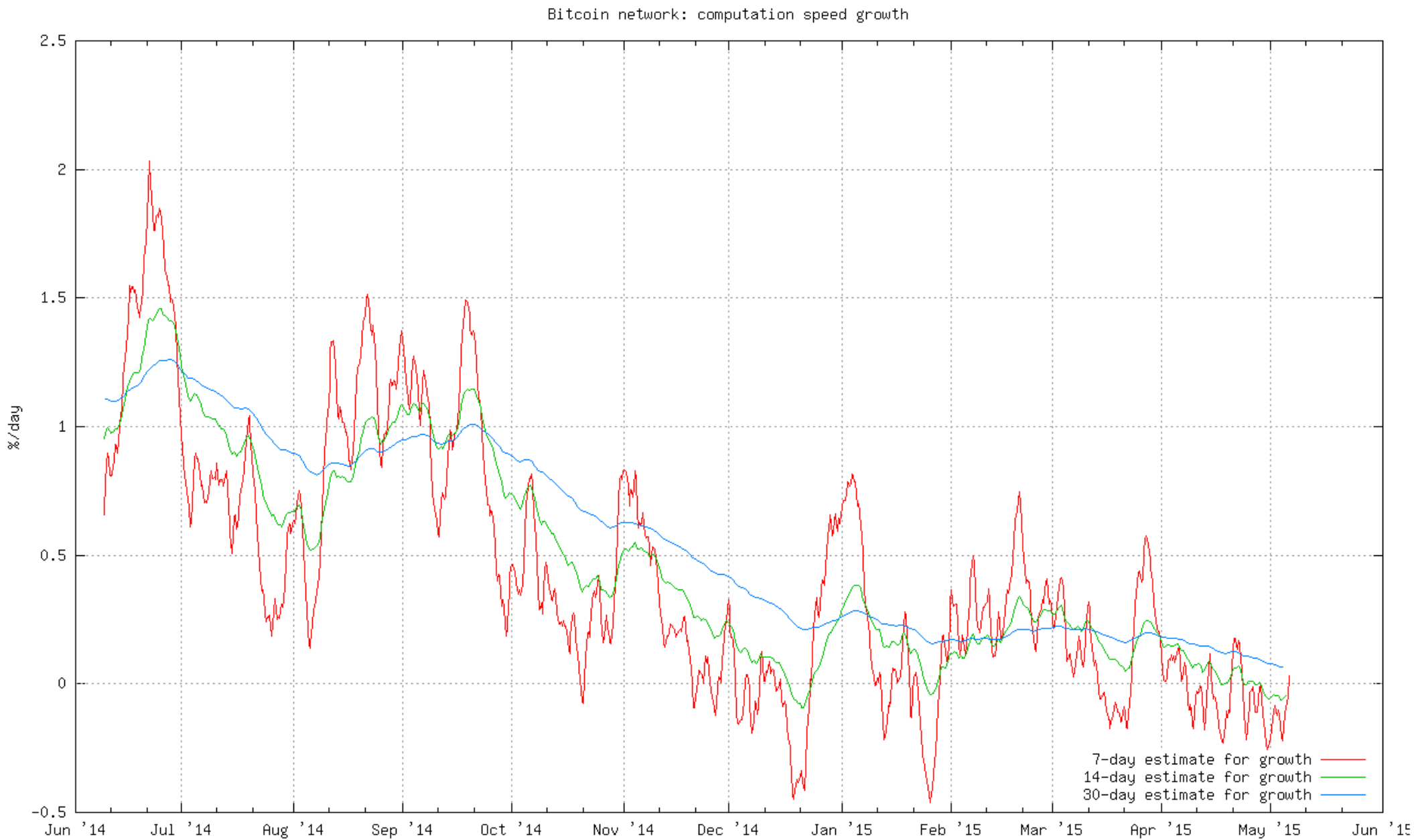
# Previous 6 months Difficulty and Hash Rate

Date	Difficulty	Change	Hash Rate
Oct 09 2014	35,002,482,026	0.98%	250,557,526 GH/s
Sep 25 2014	34,661,425,924	16.20%	248,116,151 GH/s
Sep 13 2014	29,829,733,124	8.75%	213,529,547 GH/s
Aug 31 2014	27,428,630,902	15.03%	196,341,788 GH/s
Aug 19 2014	23,844,670,039	20.86%	170,686,797 GH/s
Aug 08 2014	19,729,645,941	5.30%	141,230,307 GH/s
Jul 25 2014	18,736,441,558	8.08%	134,120,673 GH/s
Jul 12 2014	17,336,316,979	3.08%	124,098,191 GH/s
Jun 29 2014	16,818,461,371	24.93%	120,391,236 GH/s
Jun 18 2014	13,462,580,115	14.51%	96,368,902 GH/s
Jun 05 2014	11,756,551,917	12.44%	84,156,677 GH/s
May 24 2014	10,455,720,138	18.10%	74,844,960 GH/s
May 12 2014	8,853,416,309	10.66%	63,375,223 GH/s
Apr 29 2014	8,000,872,136	14.64%	57,272,474 GH/s
Apr 17 2014	6,978,842,650	14.04%	49,956,502 GH/s
Apr 05 2014	6,119,726,089	22.23%	43,806,706 GH/s

# 1 year Hash Rate Graph (7 days average)



# Hash-rate daily growth (%/day)



# The all important formula – Miner's revenues

Miner's daily revenues (\$)  $\cong$

$$\frac{\text{Miner's hash rate}}{\text{Network hash rate}} \times 3600^{(*)} \times \text{BTC Price } (\$)$$

(\*) 3,600 until ~ July 2016, 1,800 afterwards

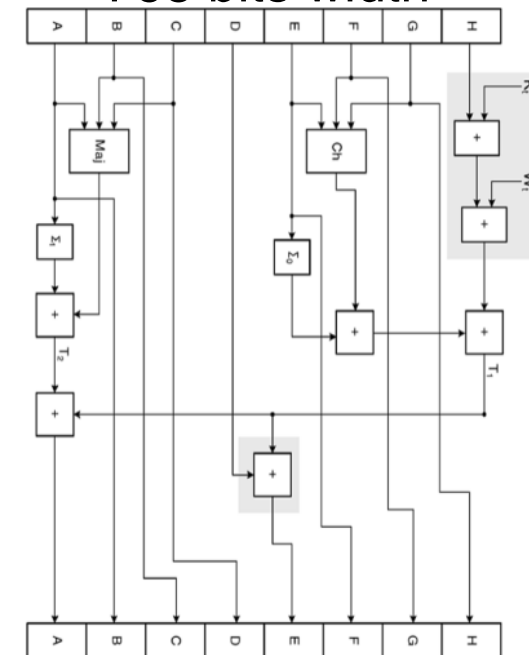
# Daily Miners Revenue (\$) in the last 2 years



# Mining with specialized ASICs

- Architecture
  - Bitcoin calculation is based on double SHA256
  - Many 128-stage pipelined engines, each generates a result every clock
  - Random data: high toggle rate
- Optimization: system cost/performance
  - Chip cost/performance: mostly silicon area
  - Power/performance: power affects system cost
  - Dynamic power is dominant
  - Performance: GigaHash/sec
- Short lifetime: a new generation every 6 months

One Pipeline stage  
768 bits width





# Some Pictures – SP30

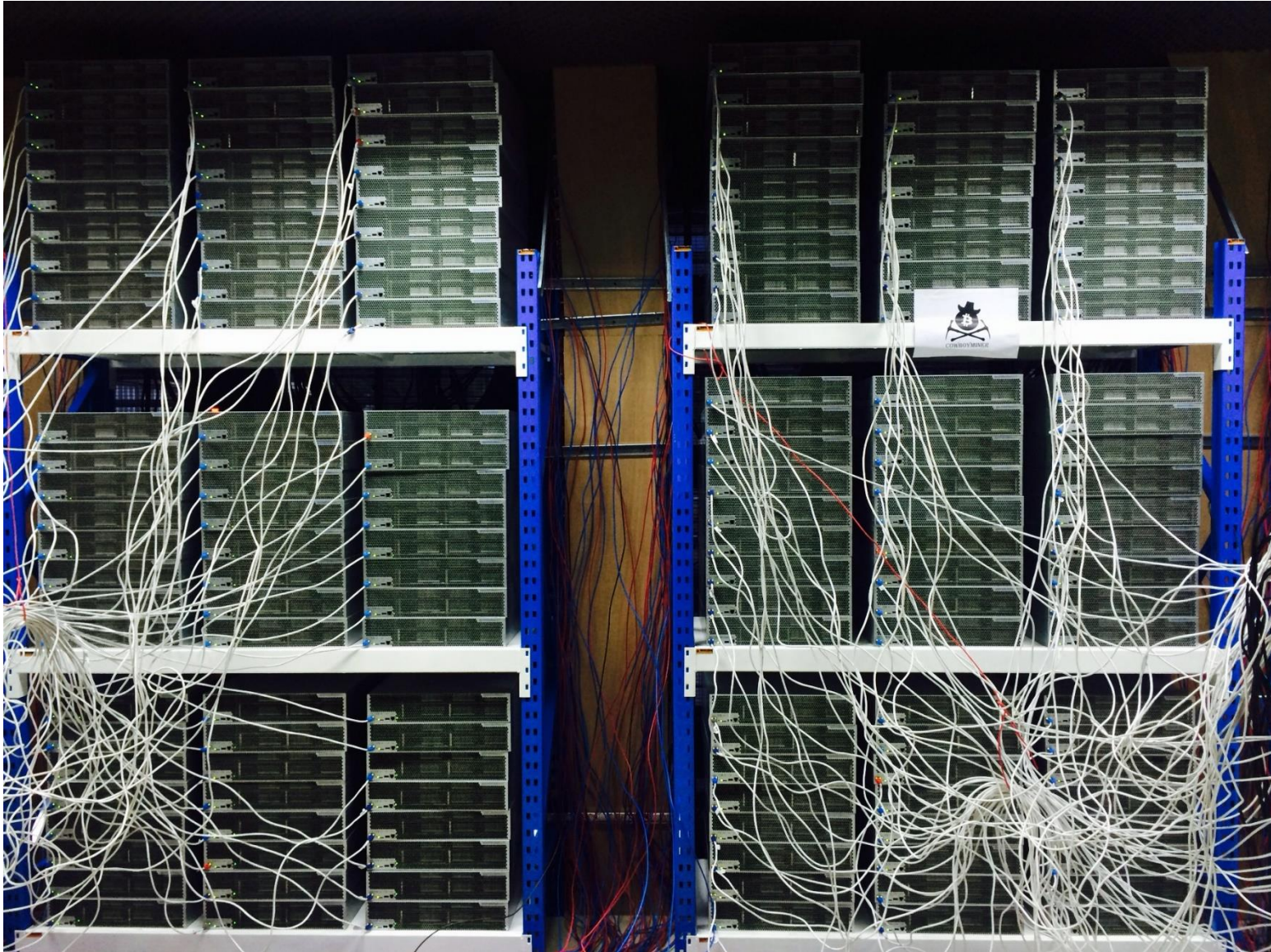


# Traditional DC with SP30





# Cowboy Miner cooperative – world record density



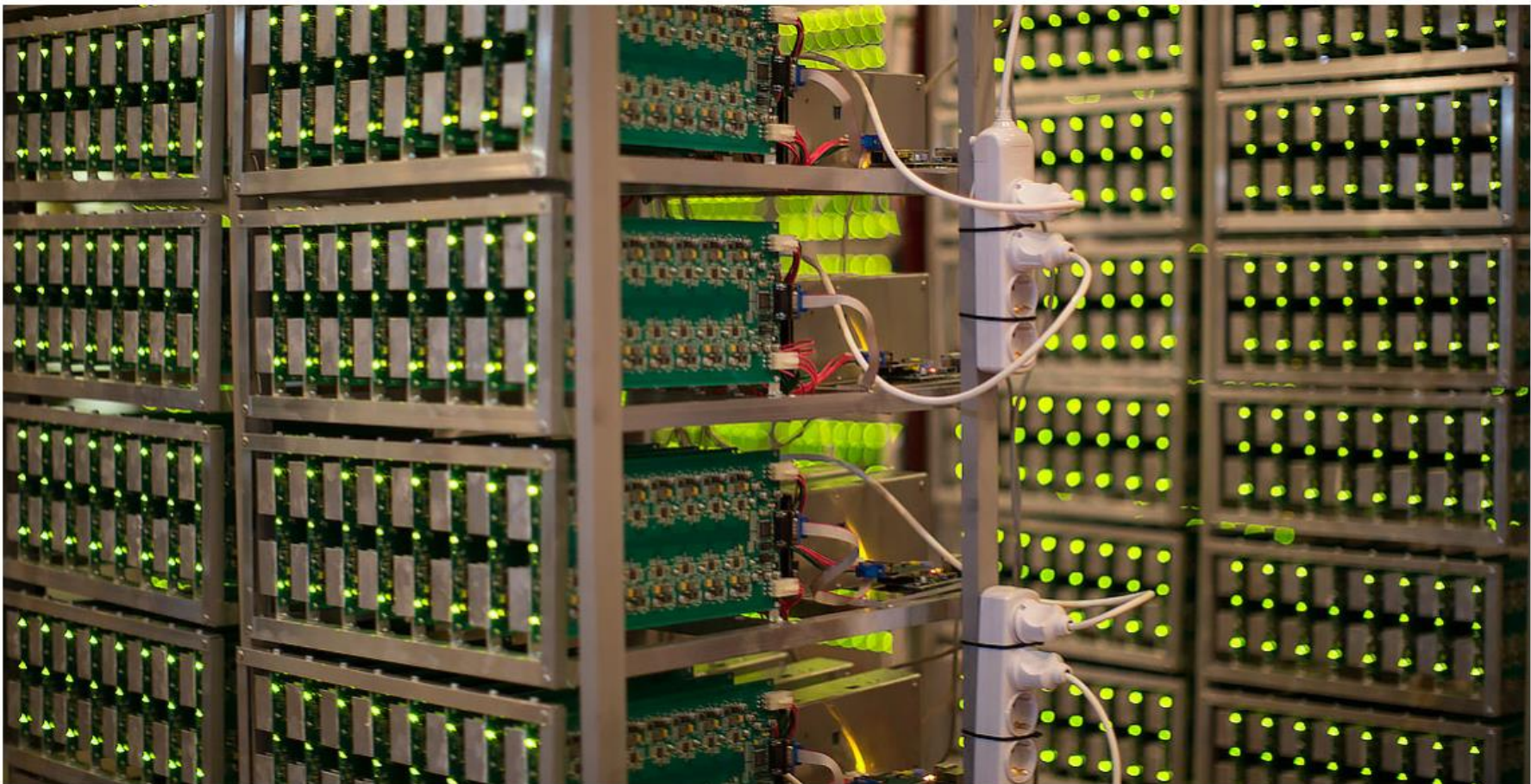


# BitFury rev 0.5 in the old days (CEX.IO)

## Redeem Hardware



Even though we provide great support and maintenance for our GH/s, you are still able to redeem your hardware, and get it delivered right to your doorstep!





# BitFury Icelandic buildup by Advania (1)





## BitFury Icelandic buildup by Advania (2)





# KNC “Chicken Farm” in the Node Pole (1)





## KNC “Chicken Farm” in the Node Pole (2)





# Old Chinese Mining farm





# New Chinese Mining farm at Inner Mongolia (1)





## New Chinese Mining farm at Inner Mongolia (2)



# New Chinese Mining farm at Inner Mongolia (3)





# New Chinese Mining farm at Inner Mongolia (4)

