

ETH mining - Misunderstanding on DAG limit for 3GB card

Epoch is a record of block number for every 30000 blocks mined. The DAG file saves the blockchain data and the size increases upon epoch update.

The latest Epoch is #140* (2017-08-28), indicated that DAG file size is 2239758208 bytes (~2.24GB)**.

Processes:						GPU Memory Usage
GPU	PID	Type	Process name			
0	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2285MiB
1	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB
2	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2285MiB
3	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB
4	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB
5	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB
6	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB
7	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB
8	5436	C	...er\Desktop\Claymore	9.7\EthDcrMiner64.exe		2263MiB

The above shows the GPU memory usage during mining by Claymore.

The DAG file size is linear to the block number changes.

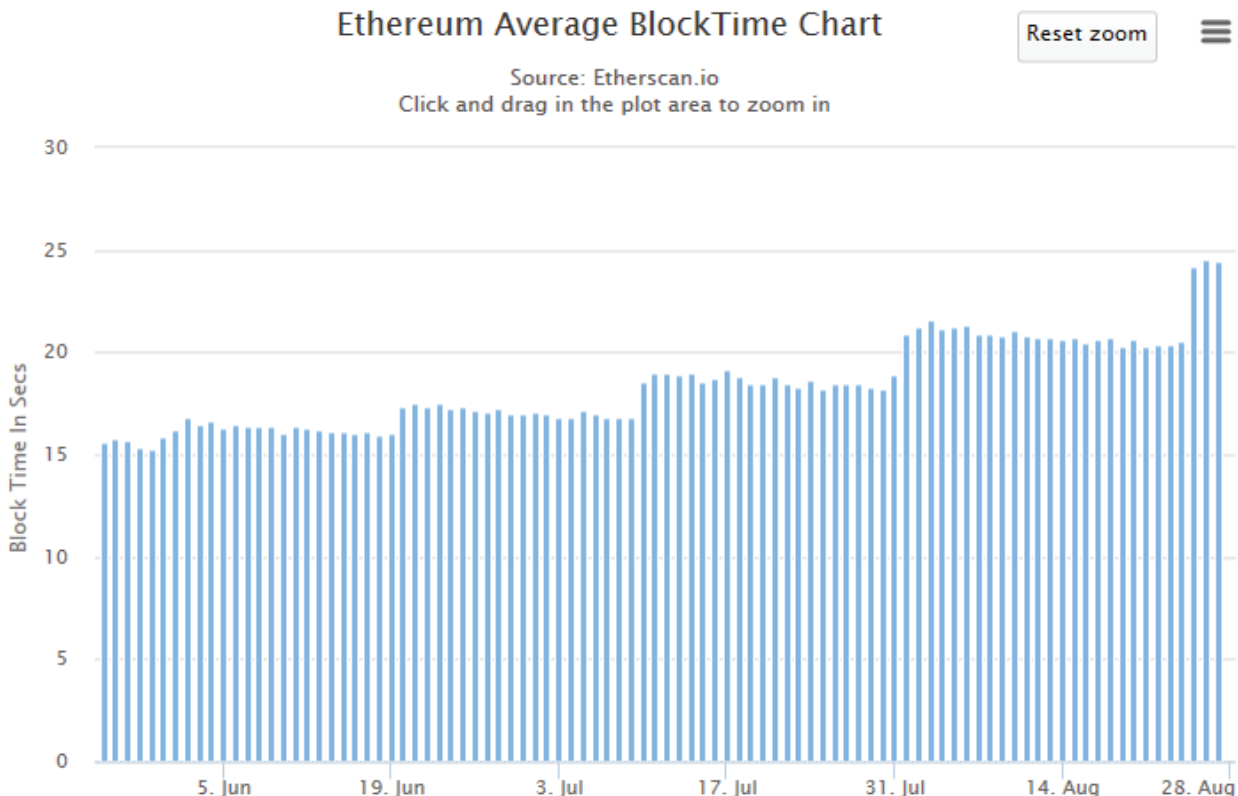
The block time (Time to discover/mine a block) is increasing from time to time due to difficulty factor increase and difficulty bomb.

Difficulty bomb happens to control mining speed and move to future Casper (Proof of Stake).

The latest significant difficulty boom happened in Jun 20th, July 10th and Aug 1st.

Another major difficulty bomb happened in Aug 25th.

The average block time in Aug 27th is 24.43s. (<https://etherscan.io/chart/blocktime>)



* Epoch number can be read from ETH mining software such as Claymore.

** Refer to DAG datasize list.

Time estimation for DAG file to reach 3GB.

Assumption:

1. Block time = 24.43s and it is constant during the whole period.
2. Difficulty factor is constant during the whole period.
3. Adopt 2.9GB as threshold limit to 3GB memory. Minority data also uptakes memory space.
Epoch #219 = 2902451584 bytes

The epoch difference: $219 - 140 = 79$

Number of blocks: $79 * 30,000 = 2,370,000$

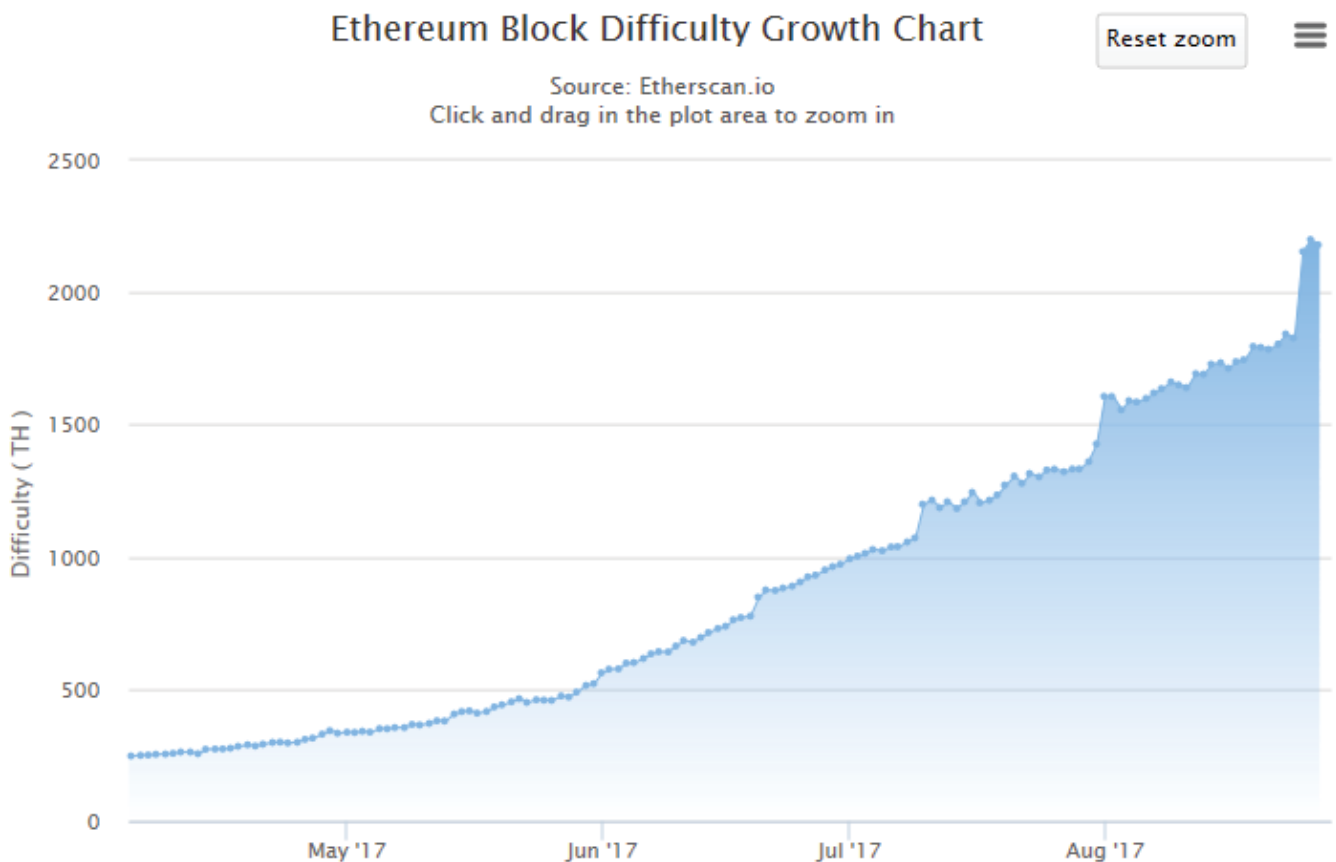
Time needed to mine: $2,370,000 * 24.43s / 60 / 60 / 24 = 670$ days

There is still 670 days from 2017-08-28 for 3GB card to becomes possiblity unuseable.
Proposed date is at least 2019-06-29.

Expectation:

1. Difficulty level keeps increasing dramatically.
2. Difficulty bomb is going to happen about once a month.
3. The DAG file size growth slows down due to block time increases.

So expected time for DAG file size to reach 3GB should be much longer than 670 days.



The rise of difficulty factor increases the block time thus reduces the DAG size growth.

ETH DAG data size table

```
def get_datasize(block_number):  
    return data_sizes[block_number // EPOCH_LENGTH]  
  
data_sizes = [  
1073739904, 1082130304, 1090514816, 1098906752, 1107293056,  
1115684224, 1124070016, 1132461952, 1140849536, 1149232768,  
1157627776, 1166013824, 1174404736, 1182786944, 1191180416,  
1199568512, 1207958912, 1216345216, 1224732032, 1233124736,  
1241513344, 1249902464, 1258290304, 1266673792, 1275067264,  
1283453312, 1291844992, 1300234112, 1308619904, 1317010048,  
1325397376, 1333787776, 1342176128, 1350561664, 1358954368,  
1367339392, 1375731584, 1384118144, 1392507008, 1400897408,  
1409284736, 1417673344, 1426062464, 1434451072, 1442839168,  
1451229056, 1459615616, 1468006016, 1476394112, 1484782976,  
1493171584, 1501559168, 1509948032, 1518337664, 1526726528,  
1535114624, 1543503488, 1551892096, 1560278656, 1568669056,  
1577056384, 1585446272, 1593831296, 1602219392, 1610610304,  
1619000192, 1627386752, 1635773824, 1644164224, 1652555648,  
1660943488, 1669332608, 1677721216, 1686109312, 1694497664,  
1702886272, 1711274624, 1719661184, 1728047744, 1736434816,  
1744829056, 1753218944, 1761606272, 1769995904, 1778382464,  
1786772864, 1795157888, 1803550592, 1811937664, 1820327552, Epoch 86-90  
1828711552, 1837102976, 1845488768, 1853879936, 1862269312,  
1870656896, 1879048064, 1887431552, 1895825024, 1904212096, Epoch 96-100  
1912601216, 1920988544, 1929379456, 1937765504, 1946156672,  
1954543232, 1962932096, 1971321728, 1979707264, 1988093056, Epoch 106-110  
1996487552, 2004874624, 2013262208, 2021653888, 2030039936,  
2038430848, 2046819968, 2055208576, 2063596672, 2071981952, Epoch 116-120  
2080373632, 2088762752, 2097149056, 2105539712, 2113928576,  
2122315136, 2130700672, 2139092608, 2147483264, 2155872128, Epoch 126-130  
2164257664, 2172642176, 2181035392, 2189426048, 2197814912,  
2206203008, 2214587264, 2222979712, 2231367808, 2239758208, Epoch 136-140  
2248145024, 2256527744, 2264922752, 2273312128, 2281701248,  
2290086272, 2298476672, 2306867072, 2315251072, 2323639168, Epoch 146-150  
2332032128, 2340420224, 2348808064, 2357196416, 2365580416,  
2373966976, 2382363008, 2390748544, 2399139968, 2407530368, Epoch 155-160  
2415918976, 2424307328, 2432695424, 2441084288, 2449472384,  
2457861248, 2466247808, 2474637184, 2483026816, 2491414144, Epoch 165-170  
2499803776, 2508191872, 2516582272, 2524970368, 2533359232,  
2541743488, 2550134144, 2558525056, 2566913408, 2575301504, Epoch 175-180  
2583686528, 2592073856, 2600467328, 2608856192, 2617240448,  
2625631616, 2634022016, 2642407552, 2650796416, 2659188352, Epoch 185-190  
2667574912, 2675965312, 2684352896, 2692738688, 2701130624,  
2709518464, 2717907328, 2726293376, 2734685056, 2743073152, Epoch 195-200  
2751462016, 2759851648, 2768232832, 2776625536, 2785017728,  
2793401984, 2801794432, 2810182016, 2818571648, 2826959488, Epoch 205-210  
2835349376, 2843734144, 2852121472, 2860514432, 2868900992,  
2877286784, 2885676928, 2894069632, 2902451584, 2910843008, Epoch 215-220  
2919234688, 2927622784, 2936011648, 2944400768, 2952789376,  
2961177728, 2969565568, 2977951616, 2986338944, 2994731392,  
3003120256, 3011508352, 3019895936, 3028287104, 3036675968,
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