Whitepaper

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The purpose of this White Paper is to present Node Haven Mining Company (NODE Haven) and NODE Token to potential token holders in connection with the proposed Token sale. The information set forth therein is not intended to be exhaustive and does not contain or imply any elements of a contractual relationship. The sole purpose of the White Paper is to provide relevant and educational information to potential token holders so that they may determine whether or not to purchase NODE Haven Tokens (NODE).

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NODE Token cannot be used for any purposes other than those provided in the White Paper, including but not limited to, any investment, speculative or other financial purposes.
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1. Introduction

Satoshi Nakamoto in his landmark paper, "Bitcoin: A Peer-to-Peer Electronic Cash System", spent considerable time outlining the likelihood that an attacker would try to change transactions. Satoshi addressed the likelihood that an attacker could double-spend or corrupt the blockchain supporting Bitcoin. As Satoshi explains, Bitcoin's main defense is the decentralization of mining computing power amongst "honest nodes" or participants in such a way that it is unlikely that anyone could carry out such an attack.

"The system is secure as long as honest nodes collectively control more CPU power than any cooperating group of attacker nodes." (Nakamoto, 2008)

Even as difficulty[1] and total hash-rate[2] on the Bitcoin system has increased exponentially, the same threat remains today. Such a threat is increasingly relevant as crypto-currency is adopted globally by merchants and the public as a whole. Market forces are driving traditionally structured Bitcoin equipment manufacturers to guide the flow of advanced ASIC crypto-miners into their own crypto-mines as well as bulk purchasers. This practice centralizes the crypto-computing power and is turning Bitcoin into a corporate fiat currency.

Before the bear market in 2014 there were many startups developing ASIC crypto-miners, but today there are only four ASIC crypto-miners currently shipping products, often with presales selling out in a matter of hours.[3] The rise in Bitcoin difficulty has forced the need for cutting-edge chip technology development, precipitously increasing upfront engineering costs to produce competitive equipment. Many startups have achieved relative success with initial design, yet have ultimately fizzled out due to lack of necessary capital. Crypto-mine operators are left with meager prospects for growth and an uncertain future because of dependence on manufacturers that have no incentive to be forthcoming, or transparent with roadmaps.

NODE Haven Mining (NODE Haven) aims to address these issues and the future of Bitcoin as a whole by tokenizing the ASIC miner development and manufacturing process. The decentralized model incentivizes NODE Haven to act in the independent crypto-mine operator's best interest as opposed to current chip manufacturers. The mining community deserves a better option and NODE Haven, together with miners everywhere, will decentralize the mining world.

[1] https://en.bitcoin.it/wiki/Difficulty
[2] https://blockchain.info/charts/hash-rate
[3] https://en.bitcoin.it/wiki/Mining_hardware_comparison

2. ASIC Manufacturer Mediation

Bitcoin is a digital currency and the first application of the distributed public ledger technology known as blockchain. Digital currencies are susceptible to a weakness known as double-spending where in which the same single digital token is spent more than once. Due to this threat, the transfer of tokens needs to be verified against a ledger that codifies transactions. Traditionally, the ledger is held by a centralized third-party mediator such as a bank. Satoshi Nakamoto's motivation behind Bitcoin was to forego fees charged by third-party mediators and neutralize their ability to reverse transactions. Bitcoin eliminated the need for a third-party mediator by creating a trustless, decentralized ledger that is distributed to many network nodes and is secured by a SHA-256 cryptographic Proof-of-Work (PoW) block-chain.

Many of the goals Satoshi set out to accomplish with Bitcoin have been achieved. However, since Bitcoin's inception, new issues have emerged. Initially, Bitcoin could be mined by personal computers (CPUs), but soon thereafter a race to maximize computing (hash) power took off. The first step-change in this technological arms-race was transitioning from mining with CPUs to video cards (GPUs). Eventually, GPUs were supplanted by vastly more powerful Application Specific Integrated Circuits (ASICs) chips that are designed solely for mining crypto-currency. Presently, the speed at which ASIC chips can process hashes is exponentially greater than any previous technology. To put things in perspective, the Bitmain Antminer S9[4] (ASIC) hashes 13,000 times faster than the best in class NVIDIA GTX 1080[5] (GPU). These extremely powerful ASICs bring into question Satoshi's original vision of, "one CPU one vote".

The engineering cost to develop single-purpose mining ASICs has led to the formation of niche manufacturers that have also began their own crypto-mining operations. Mining is especially advantageous for these Bitcoin ASIC manufacturers because they obtain equipment at production cost. This advantage has allowed certain ASIC manufacturers to influence a large of percentage of total hash-rate and control the distribution of mining equipment. Ironically, by deciding how many miners are sold to the market and who they are sold to, these ASIC manufacturers are operating as third-party intermediaries. Needless to say, Satoshi could not have foreseen this development when Bitcoin was created.

NODE Haven poses that profit-motive drives the aforementioned centralization of power and any PoW cryptocurrency that is reliant on the hardware that these ASIC manufacturers produce will suffer. The manufacturers' financial backing, governance structure and profit-seeking motives drive them to drain value from the associated crypto-currencies that they claim to serve.

In essence, the crypto-currency community is paying a *debt* to the ASIC manufacturers that invested into the development of the equipment they sell. The service of this *debt* is paid in profit-margin and control of how the ASIC equipment is distributed. In order to circumvent the control that these ASIC manufacturers have, NODE Haven proposes a co-operative business model where crypto-currency mine operators collectively invest in the development of the advanced mining equipment that they need. This model combats the control that centralized ASIC manufacturers exploit and facilitates the decentralization of PoW cryptocurrencies as intended.

[4] http://www.dogiecoin.com/bitmain-antminer-s9.html
[5] http://cryptomining-blog.com/tag/gtx-1080-ti-hashrate/

3. Decentralized Product Development

NODE Haven Mining will fund development and production of next generation ASIC miners (Bitcoin, AI, Etc) using an alternative, novel Product Development Vehicle (**PDV**). The PDV is capitalized by the purchasing of NODE tokens during the Initial Token Sale. NODE Haven will first use the funds generated during Initial Token Sale to develop and produce a 7nm ASIC Bitcoin miner. The Bitcoin miners will then be reserved and redeemed using the NODE tokens.

The most immediate benefit of using a token sale is the acceleration of the product development process by quickly funding the high, upfront engineering and production costs. This method bypasses the bureaucracy of traditional financing by going directly to the consumer.

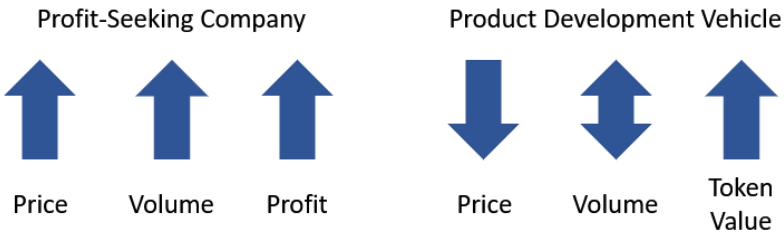
In addition to acceleration of development, the PDV model incentivizes the manufacturer to sell quality goods and services at the lowest cost to the consumer. This is in stark contrast to the Profit Seeking Company (**PSC**) that sells products at the highest price that the market will bear. Why is this? Don't both companies seek to produce products with the most value at the least expense? The difference lies in the relationship between how management is compensated and how products are priced.

Management compensation in a PSC is based on profit-margin in tandem with number of units produced. The profit-margin is the difference between the cost to produce the product and the price the consumer pays for that product. As shown before, the sale price is not considerate of the consumer's needs.

Within the PDV ecosystem, the managers are rewarded with the same tokens that will later be redeemed for products they are producing. Essentially, through the PDV structure, managers are also consumers and are incentivized to always act with the consumer in mind. This is in contrast to PSC managers that are incentivized to exploit market demand for maximum gain.

The buying power of each NODE token is maximized by creating valuable products and services at a lower cost. There is no incentive to charge more tokens for the same product as that decreases the inherent value of the token. Less NODE tokens per product equals more value per NODE token. Consequently, if managers of a PDV were to charge more tokens for the same product, the value of their token position would decrease. By creating a framework where managers are simultaneously consumers, efficiency of capital is encouraged, waste discouraged and quality of product, assured.

The cooperative arrangement of the NODE Haven PDV incentivizes management to act in the best interest of their fellow consumers rather than serve the best interests of a capital provider. The PDV token model effectively decentralizes the power that financial institutions have over companies and places it back in the consumers' hands. The net result is a quality product delivered at the lowest cost.



4. NODE Token Utility and Redemption

The design of the NODE token takes a principled approach to make a transparent, co-operative and decentralized product development apparatus. The sale of the NODE token during the Initial Token Sale (ITS) does not represent an equity stake in NODE Haven. The NODE tokens in aggregate function as a product development vehicle (PDV). The purchase of NODE tokens during the Initial Token Sale is a prepayment of goods and services developed through the PDV.

Redemption of goods and services developed using the NODE Haven PDV will take place according to the following system of equations:

$$BV = BookValue$$

$$Initial\ Run\ Size = \ Count_{total}(Units) > \frac{NRE(Product)}{VariableEx(Unit)}$$

$$BV(NODE) = Assets(PDV)/Circulation(NODE) = \$/NODE$$

$$BV(Unit) = \frac{NRE(Product)}{Count(Units)} + VariableEx(Unit) = \$/Unit$$

$$Z = \frac{BV(Unit)}{BV(NODE)} = \frac{\frac{\$}{Unit}}{\frac{\$}{NODE}} = \frac{NODE}{Unit}$$

$$Reservation_{NODE}(PDV) = 10\%\ of\ Z$$

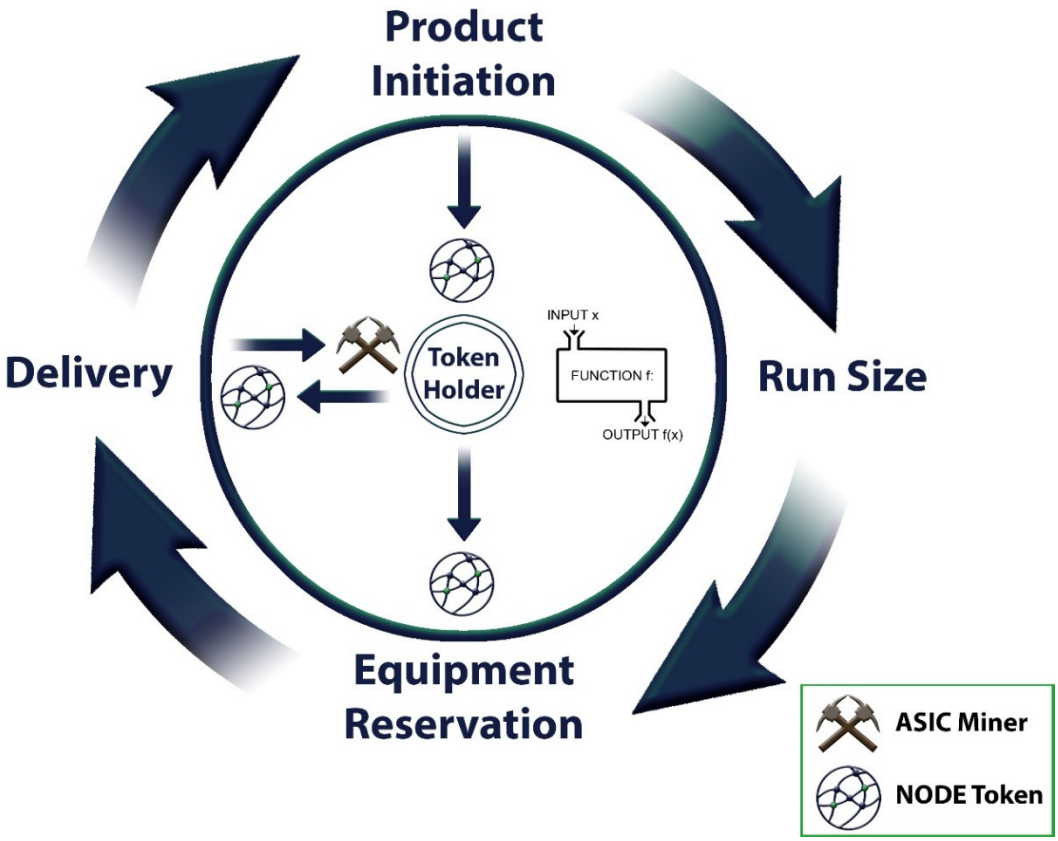
$$Price_{NODE}(PDV) = Z$$

$$Price_{Currency}(PDV) = Z * Price_{MainSale}(NODE)$$

$$Price_{Currency}(Public) > Price_{Currency}(PDV) * 110\%$$

The reservation fee of $Reservation_{NODE}(PDV)$ is awarded to NODE Haven to ensure proper stewardship of the PDV. At checkout, the customer will have the option to pay 10% of $Price_{Currency}(PDV)$ in currency other than NODE to re-purchase the NODE tokens used for reservation from NODE Haven. This option allows the customer to use the same NODE tokens to reserve equipment from each run.

Additional products will be offered for purchase with NODE that are not manufactured by NODE Haven. Products that are not manufactured through the PDV will follow the same pricing model but will not be subject to the $Initial\ Run\ Size$ or reservation rules. $BV(Unit)$ for these products will be the cost paid for the products from the third party. Stock may be limited for these items as they will not follow the reservation system. Examples of products offered that may not be manufactured through the PDV include accessories such as power supplies and NODE Haven branded apparel.



PDV Process

The initial run size of equipment will be sufficient to reduce non-recurring engineering cost per unit to less than the variable cost per unit. This ensures that the initial product run spreads out the high engineering cost of the advanced process technologies used to build a best-in-class ASICs and other mining equipment.

Detailed target specifications and initial run size will be released when engineering is complete. At that time a reservation period of one week will take place allowing first access to NODE holders. During the reservation period, NODE holders will reserve equipment for $Reservation_{NODE}(PDV)$ in NODE. Reserved purchases will be fulfilled first when production is complete.

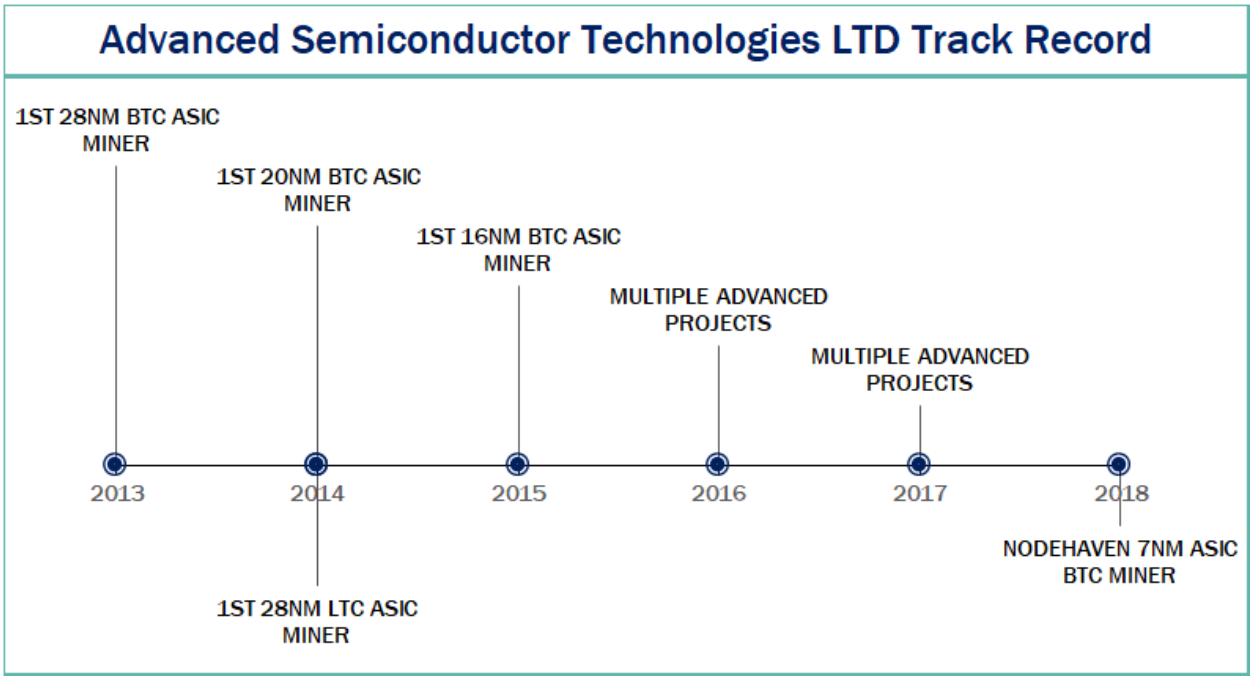
Following the reservation period, a payment period of 2 weeks will take place. Any equipment that was not reserved will be offered to the public for currency other than NODE at $Price_{Currency}(Public)$. If any reserved equipment is not paid for during the payment period, the reservation will lapse. If the reservation lapses, the reservation fee in NODE will be reimbursed and the equipment will be offered to the public at $Price_{Currency}(Public)$. A payment of $Price_{Currency}(PDV)$ will be made to the PDV upon sale to replenish the equipment value.

Shipping and handling must be paid in currency other than NODE at time of sale. It is important to note that NODE tokens will not be recirculated once they are used to purchase mining equipment. The $Price_{NODE}(PDV)$ paid in NODE will be taken out of circulation when units have been shipped.

5. NODE HAVEN Miner Development

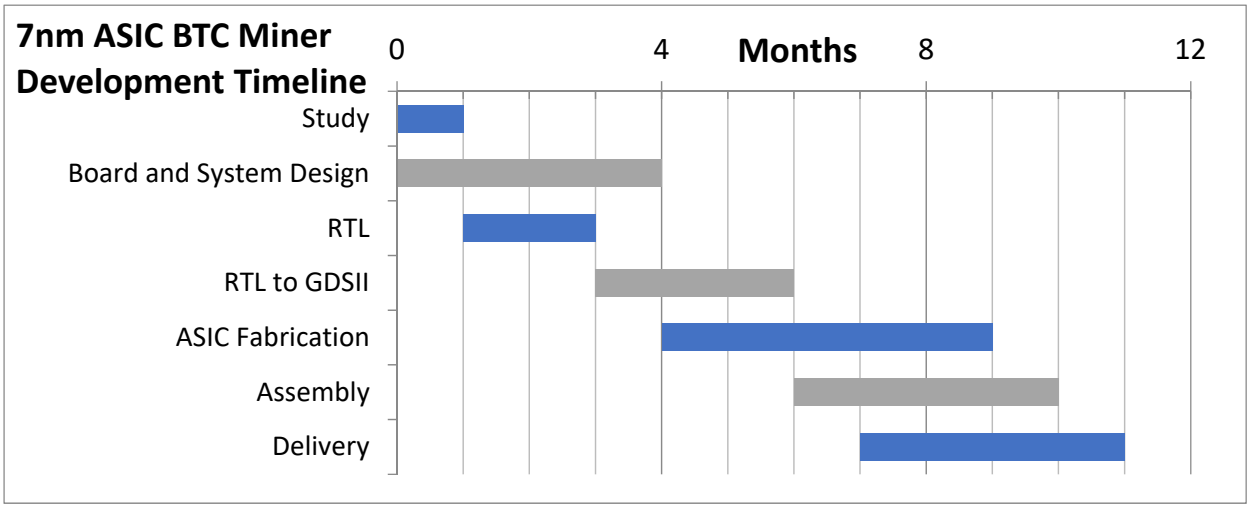
Track Record

Advanced Semiconductor Technologies LTD has led multiple bleeding-edge Bitcoin ASIC Developments

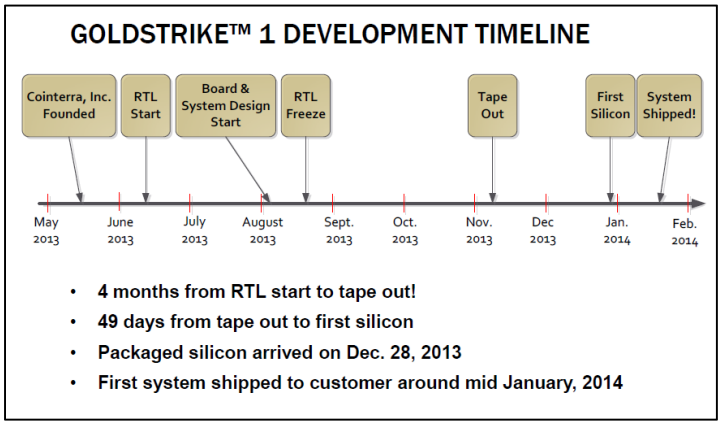


Timeline

Estimated Time-line with associated ranges. 1st Delivery of 7nm ASIC Bitcoin Miner could be as early as 7 months or as late as 11 months.



NODE Haven 7nm ASIC BTC Miner (AST)



(CoinTerra, 2015)

Cointerra went from founding of the company in April 2013 to the first shipment of their GOLDSTRIKE™ 1 ASIC miner in under 10 months. Advanced Semiconductor Technologies LTD has given NODE Haven ranges of development time that could potentially beat this by 3 months.

Efficiency and Speed Estimation

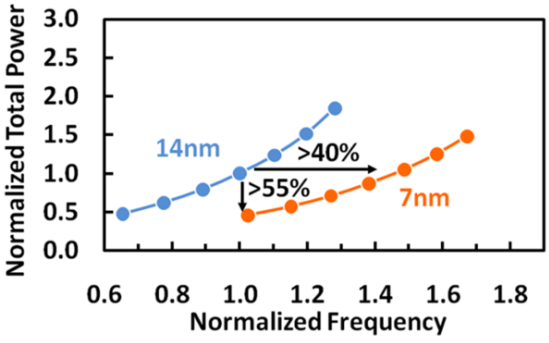
Bitmain Antminer S9 has 189 ASIC chips manufactured on the TSMC 16nm FFC platform. Based on information released by TSMC, NODE Haven has scaled performance by moving from TSMC 16nm (Bitmain Antminer S9), Samsung 10nm (Ebang E-Bit 10) to 7nm (NODE Haven NODE B7). Please note that these are early stage estimates, and that actual specifications will be announced prior to production run vote.

TSMC[6]	16nm	10nm	7nm
Speed	100%	115%	138%
Power	100%	65%	39%
Area	100%	50%	30%

Miner	TH/s	Watts	J/(GH/s)
Antminer S9	13.5	1,300	0.096
DragonMint 16T	16	1,480	0.0925
E-bit E10	18	1,650	0.092
NODE B7	30	1,300	0.05-0.07

According to TSMC, moving from 16nm to 7nm either increases the speed ~38% or decreases power consumption by 60% with a reduction in area of 70%. (NODE Haven estimates use a 55% Area Reduction and 50% better efficiency). Based on information released from the foundries, the lack of efficiency gains for the E-bit E10 is disappointing for an advertised Samsung 10nm process node chip. This may be due to choosing a speed increase over an efficiency increase. NODE Haven will not elect to increase the operating speed of the ASIC and will only go for better efficiency of 50% while taking advantage of the increased logic density to include more cores.

Please note that the specifications stated for the NODE B7 are preliminary estimates using published information released by foundries and are for comparison use only. The actual design of the NODE B7 will be necessarily be different that the specs stated. When initial studies are complete more refined estimates will be released.



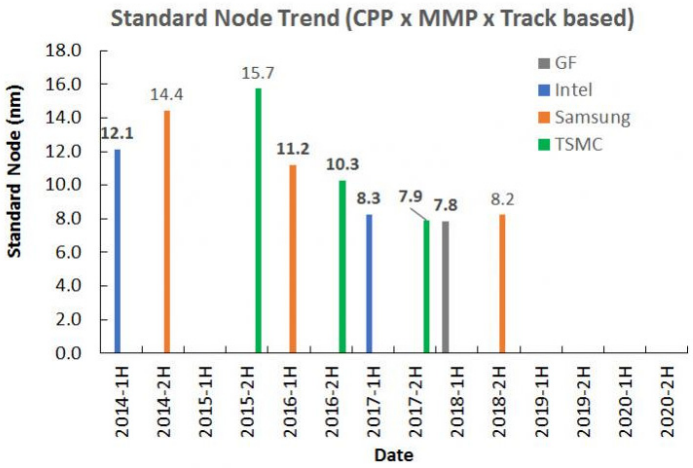
GlobalFoundries

[6] http://www.tsmc.com/english/dedicatedFoundry/technology/7nm.htm

NRE(Product)

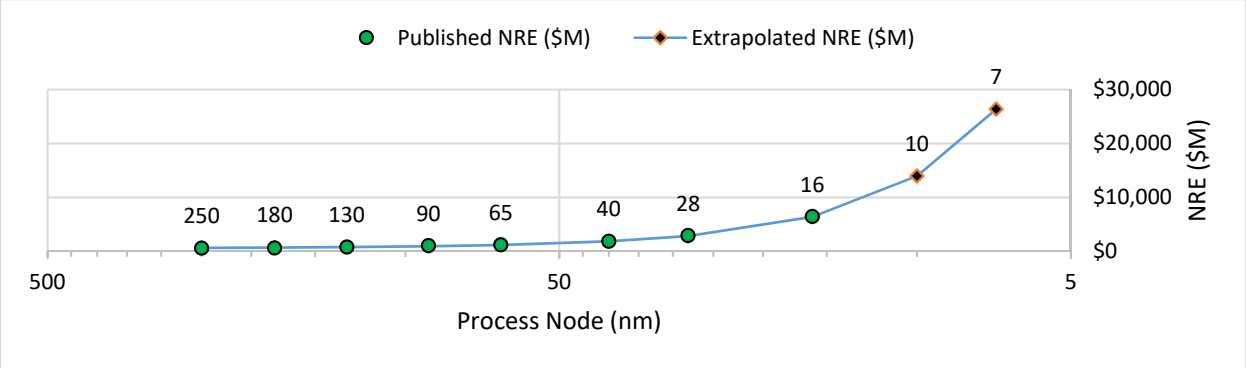
Based on research done by Scotten Jones of IC Knowledge[7] a normalization to what he coins the "Standard Node" must be done to compare advertised process node scales. (Jones, 2017)

The advertised 10nm Intel process, and the 7nm of Samsung, GlobalFoundries and TSMC, all center around the 8nm Standard Node. Scotten Jones has developed many tools that will be useful for ASIC development and will advise after Early Stage purchases takes place.



The graphic below shows published process node vs. NRE cost for Bitcoin ASIC chips as well as curve-fitted extrapolated NRE cost for future nodes. The data for the graph below came from a paper published by Prof. Michael B. Taylor's group within the UCSD Center for Dark Siliconand using a 450mm^2 die for the 16nm node.

NODE Haven took the Moonwalk data and extrapolated it to the 10nm and 7nm process nodes. Bitmain, according to an article in Medium[8], uses an estimated 20mm^2 die. Fixed NRE cost is in part a function of the number of gates. There are ~4.4% the number of gates per ASIC chip in the BM1387 Bitmain Bitcoin ASIC as the postulated Bitcoin ASIC in the Moonwalk paper. NODE Haven expects that this will bring down the expected NRE cost down from the extrapolation of the Moonwalk data. In combination, the Standard Node being 8nm as well as the reduced die-size, our estimate of NRE cost for the "7nm" node is $15MM. If 20,000 units are produced during the first batch of miners, NRE cost per unit may be $750/unit.



(Khazraee, Zhang, & Taylor, 2017)

Please be advised that these estimates are based on publicly available information and are provided for comparison purposes only. During the study phase AST will provide more detailed cost analysis. Any and all information allowed outside of standard practice Non-Disclosure Agreements will be disseminated to token holders.

[7] https://www.icknowledge.com
[8] https://medium.com/@jimmysong/just-how-profitable-is-bitmain-a9df82c761a

VariableEx(Unit)

The total cost for Bitmain to produce each Antminer S9 is roughly $500. There are an estimated $300 worth of ASICs and $200 worth of other components including controller, PCB, heatsinks, fans and housings.[9] Adding 50% of additional, unaccounted-for cost, a total cost of $750 is assumed.

Miner	TH/s	Watts	J/(GH/s)	Chips/Miner	Chips/Wafer	Miner/Wafer
Antminer S9	13.5	1,300	0.096	189	5,158	~27
NODE B7	30	1,300	0.07 – 0.05	189	5,158	~27

NODE Haven plans on using the same class of SoC as the XILINX Zynq 7000 SoC found in the Antminer S9 for the controller along with similar parts for PCB. The cost for the housing may increase moving from the "shoe-box" housing to a 3U or 4U server housing. The larger chassis will allow for more hashcards. The cooling design, which in the current Bitmain Antminer S9 uses densely pack individual heatsinks, may need to change to allow for more effective cooling. Because of these reasons, production cost for non-integrated parts may increase by 20% to provide a product that allows for use in modern server housings and a higher hash-rate density per volume of space. Although in this example we are assuming the same amount of silicon per miner as the Bitmain Antminer S9, the process cost at the foundry for 7nm vs 16nm will be increased due to the number of masks needed and the maturity of the process. With all of these factors taken into consideration, NODE Haven estimates VariableEx(Unit) for the NODE Haven NODE B7 will be $1,000. Assuming 20,000 units are produced during the first batch, preliminary *NRE(Unit)* = $750, *VariableEx(Unit)* = $1,000 and a total allocated production cost, *BV(Unit)* = $1,750.

Design Improvements

This exercise has been produced to give a comparative cost estimate in relation to the popular Bitmain Antminer S9. NODE Haven plans to improve the design of current cryptocurrency miners to provide vastly more versatile equipment that is as future-proof as possible. We have spent extensive time talking with crypto-currency mine operators and our best-in-class technical partners in order to propose the following improvements:

1) 7nm ASICs with on-chip temperature control logic allowing for multiple modes of operation
    a. Optimized for Speed (Max Operating Temperature)
    b. Optimized for Efficiency [Optimal Temperature for lowest J/(GH/s)]
2) Interchangeable Hash-Cards allowing for upgrades of the mining equipment
    a. BTC Hash-Card: 10 TH/s per card
3) Multiple Chassis Options
    a. Shoe-Box Antminer S9 Equivalent: ~30 TH/s (3 Hash-Cards)
    b. 4U Server Chassis: ~100 TH/s (10 Hash-Cards)
4) Air-cooled, Liquid-cooled and immersion cooling options
5) Upgraded SoC and controller to handle the extra hash-cards

[9] https://medium.com/@jimmysong/just-how-profitable-is-bitmain-a9df82c761a

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