Whitepaper (proposed)

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Contents

Disclaimer

This whitepaper does not provide a legally binding agreement. Neither the AEON development team, nor the community members, accept any legal liability arising from the material contained in this whitepaper. Anyone investing in cryptocurrency should first seek professional advice regarding tax laws and other legal regulations for their local area.

This whitepaper represents, at the date of the latest update, the current state and plans of the AEON community and developers. Since AEON is an open source project, details may change and should not be considered final.

1 Vision

AEON isn't just a currency. *It's a lifestyle.*

Technology impacts our financial lives in new ways every day, and the pace of change is accelerating. Only in the last 15 years has broadband internet become widely available, giving rise to the concept of online marketing and commerce. In the last 5 years, mobile phones have advanced to rival desktop usage for online purchases. Researchers are now estimating that by 2021 there may be over 2 billion mobile banking users.

Truly, we are realizing a more convenient reality with our personal finances.

This convenience, however, comes with many challenges. On any given day, it is not difficult to find a news story about financial accounts being hacked and/or personal identity information being stolen. And in spite of the technological advances, the current ecommerce solutions cannot solve the problems inherent with local currencies; such as the difficulty of transacting across national borders, and the occasions when centralized powers negatively impact economies via poor decisions or manipulation.

Enter the concept of decentralized digital currency.

Imagine a lifestyle where personal financial management is not only convenient and mobile, but also secure, private, and impervious to national borders and centralized control.

AEON is about enabling this era, enabling an age where all people everywhere have the freedom to privately send and receive money with whatever gadget they already own.

This lifestyle is closer than you think...

2 AEON Features

AEON stands for Anonymous Electronic ON-line Coin, and it was launched on June 6, 2014 at 6:00 PM UTC. The following features are critical to our vision of a digital currency for everyone.

2.1 Secure

AEON takes security seriously. Each transaction is secured with robust cryptography and distributed through a global peer-to-peer consensus network. The cryptographic implementation ensures that nobody is able to "steal" an online transaction, and a coin's owner is unable to spend the coin more than once.

2.2 Lightweight

AEON seeks to be **mobile-friendly** by implementing, among other things, the following technical features:

- A lightweight Proof-of-Work algorithm
- Blockchain pruning
- Optional lightweight traceable transactions

With this intentional focus, AEON requires a smaller technology footprint, and the time to sync with the blockchain on lower end devices improves by a factor of 10.

2.3 Private and Untraceable

Privacy is paramount. Funds are transferred without the identifying information of the user becoming visible on the blockchain. In addition, the receiving wallet addresses are obfuscated with ring signature technology and non-repeating one-time addresses derived from the receiving public key. These measures make the blockchain highly resistant to analysis.

2.4 Low Barrier to Participation

Founded as an Open Source project, AEON is free to use without restriction, and 100% of funding is by voluntary community donations; there is no Development Tax imposed on miners. In addition, there was no premine or instamine (a practice by which the developers gain a large percentage of the coins before allowing other miners to be involved). The network is resistant to specialized hardware, allowing more people to participate directly with their PC by mining or running a full node. Everyone is welcome to contribute to the ongoing effort, financially or otherwise.

NOTE: Many of the points referenced above will be covered in more detail in section 4 *AEON Implementation*.

3 AEON Differentiation

With the astounding plethora of "alt coins" now available, it is worth noting how AEON differs from others, and specifically how it improves upon some of the similar offerings.

The first thing to note is that within the alt coin universe, there are different classes of blockchain and coin. There are "smart contract" blockchains (i.e. Ethereum) which provide a mechanism to manage complex transactions such as business contracts and decentralized application ("dApp") hosting. There are also "token" coins (i.e. STEEM token) which supply a payment mechanism for use of a particular decentralized application or service.

AEON is a "currency" coin, intended to provide an alternative to local fiat currencies. Therefore, this section will provide comparisons only to other well-known currency coins.

(NOTE: for more details on the concepts in this section, see section 4 *AEON Implementation.*)

3.1 vs. Bitcoin

Bitcoin is the best-known of all crypto currency blockchains, as it was the first to achieve a measure of success. There are considerable differences between AEON and Bitcoin, in the areas of privacy and usability.

3.1.1 Privacy and Transaction Linkages

Regarding the critical feature of privacy, Bitcoin falls short of the AEON blockchain. In order to maintain privacy of individual expenditures, it must be exceedingly difficult for an outside party to link a transaction back to its owner.

Consider that each transaction consists of some *inputs* (coins which are being spent) and some *outputs* (one or more addresses which receive the spent coins). Additionally, each input in a transaction actually links to an output of a *previous* transaction, forming a set of transaction paths.

In Bitcoin, these transaction linkages are explicitly transparent on the blockchain. Any blockchain explorer can follow the graph, which has allowed for sophisticated analysis to de-anonymize transactions. This privacy issue is alleviated in various ways, such as creating a unique address for every transaction, using centralized "mixers" to randomly "mix up" several people's Bitcoins, and employing methods to hide IP addresses when making transactions. The fact remains, however, that the Bitcoin inputs and outputs can be directly followed on the blockchain.

AEON resolves this privacy concern by *intentionally obscuring* transaction linkages on the blockchain. Every transaction has a default of 3 false input and output links called **mixins**. Anyone making a transaction can request a higher number of mixins, to increase anonymity. As the blockchain grows over time, the increasing number of mixins will make the overall graph of transactions exceedingly difficult, if not impossible, to correctly decipher.

3.1.2 Mining and Barriers to Participation

Bitcoin uses a Proof-of-Work (PoW) algorithm which is dependent primarily on CPU power, and there are several specialized ASIC hardware devices made for mining Bitcoin. This has driven the

hashrate high enough that currently only ASIC hardware mining is profitable. The result is that the average person with a PC cannot readily participate in the transaction validation process of mining and acquiring Bitcoins.

AEON uses a CPU-friendly PoW algorithm that limits the advantage of GPU's and is ASIC resistant. This allows almost anyone with a PC to participate in mining and acquiring AEON.

3.1.3 General Usability and Transactions-Per-Second

Regarding usability and the vision of a lightweight digital currency for everyone, AEON has distinct advantages over Bitcoin.

The maximum blocksize of Bitcoin (1 MB) and the block creation time of 10 minutes limits the transactions-per-second (TPS) processing power to no more than 7 TPS. This low TPS severely hinders the ability of the Bitcoin blockchain to process transactions for the masses. While there are ways to remedy this limitation, the Bitcoin community has not achieved consensus on doing so. Thus, the coin has become more of a high-end investment with limited use as a currency, not unlike physical gold coins versus U.S. dollar bills.

AEON solves the TPS limitation by using an algorithm to automatically adjust the maximum block size up or down, based on the previous 100 blocks. When miners create a block size larger than the median, a reward penalty is assessed. When the transaction fees are greater than the penalty, miners are likely to increase the block size which also increases the speed at which those transactions are processed. This approach allows the AEON blockchain to self-adjust it's TPS throughput as transaction traffic increases and decreases over time, while also creating a dynamic market for transaction fees.

3.2 vs. Litecoin

Litecoin was started as a fork of the Bitcoin code in 2011, with the goal of being a lighter-weight currency, offering low-cost transactions with fast confirmation status.

3.2.1 Privacy and Transaction Linkages

See the description of the privacy issues in section 3.1 *vs. Bitcoin*. Litecoin has the same issues as Bitcoin.

3.2.2 Mining and Barriers to Participation

Litecoin uses a Proof-of-Work algorithm called **scrypt** which depends not only on the CPU, but also on fast access to a memory area. This PoW makes it difficult to develop specialized ASIC hardware, and renders GPU's to be only about 10X faster than CPU's. This is a great improvement over Bitcoin, but still leaves mining largely in the hands of those who purchase high end graphics cards.

AEON actually uses an improved version of the scrypt algorithm which employs a larger memory area. The result is that AEON is even more resistant than Litecoin to specialized hardware, and the GPU cards do not have as great an advantage over the CPU. This ensures that CPU mining with an average PC is an option for everyone.

3.2.3 General Usability and Transactions-Per-Second

Being a "lightweight Bitcoin" it is no surprise that Litecoin is able to boast roughly 8 times the TPS of Bitcoin. This brings the maximum capacity of Litecoin up to 56 transactions per second. For comparison, credit card processors typically see tens of thousands of transactions per second. While the Litecoin network can currently process transactions fast enough for its volume of users, at some point – long before Litecoin can become a currency for the masses – its TPS must be greatly increased.

See the prior section 3.1 *vs. Bitcoin* for a description of AEON's solution to the TPS limitation.

3.3 vs. Monero

It is fairly well-known that AEON is a fork of the open source Monero project, and it continues to incorporate improvements directly from the Monero code base. In fact, the Development team for AEON consists largely of Monero developers who also work on AEON. Since Monero itself is well-known as a security/privacy coin, it requires some attention, to address exactly why AEON might be preferred.

3.3.1 General Usability and Mobile-Friendliness

The advantages that AEON has over Monero are in the area of being lightweight and mobile-friendly. AEON has chosen a different Proof-of-Work algorithm which requires half the CPU memory and allows for faster verification of the blockchain. The blockchain is pruned in a manner that keeps it smaller than Monero's, which allows for faster blockchain synchronization. AEON also allows the option of fast, low-fee transfers (which are traceable on the blockchain) for non-sensitive payments. Monero, on the other hand, requires all payments to be fully anonymous which adds to the validation times and blockchain size.

All of these aspects, among others, put AEON in a better position to be the secure, private currency that can be used by the general public with their cell phones and tablets on the go.

3.4 vs. Dash

Dash stands for "digital cash" and is meant to work like physical cash when purchasing items online or in stores. Like AEON, Dash embraces the importance of Security and Privacy. There are some disadvantages, however, when comparing this coin to AEON.

3.4.1 General Usability and Transactions-Per-Second

In November, 2017, the Dash blockchain hard-forked to double it's maximum blocksize, to 2 MB. That change allowed Dash to process roughly 48 transactions per second. For comparison, credit card processors typically see tens of thousands of transactions per second. At some point the Dash TPS must be increased again, and likely again after that. This continued increasing of TPS via disruptive blockchain modifications is not conducive to massive adoption.

See section 3.1 *vs. Bitcoin* for a description of AEON's solution to the TPS limitation.

3.4.2 Mining, Governance and Barriers to Participation

Dash uses a Proof-of-Work algorithm which is dependent primarily on CPU power, and the network welcomes the use of specialized hardware for mining. This has driven the hashrate high enough that currently only ASIC hardware mining is profitable. The result is that the average person with a PC cannot readily participate in the transaction validation process of mining.

Additionally, Dash implements a complex form of Governance consisting of a 2nd tier network node, called a Masternode. In order to own a Masternode, one must obtain and hold 1000 Dash. (At the time of this writing, this is an investment of roughly $200,000 USD.) Only Masternode owners vote on proposed enhancements to the coin, as well as prioritize which projects get paid from the development fund. Similar to AEON, new coins are disbursed as a block reward when a miner successfully validates a block of transactions. But unlike AEON, the miner must split the block reward between the Masternodes and the Development Fund.

Because special hardware is required to mine Dash, and a large monetary investment is necessary to participate in the governance of the currency, the barriers to participation are much higher than with AEON's simple open source project model. Even to submit a proposal for a vote by the Masternode owners, costs a fee of 5 Dash (roughly $1000 USD at the time of this writing). These factors work against a true decentralization for a currency.

AEON uses the traditional Open Source Model of participation and governance, which has been shown to work well for many large technology efforts for many years. It allows a diverse community to grow organically, which is an advantage for AEON's plans to become widely used by all walks of life.

3.5 vs. Zcash

Zcash is another fork of the Bitcoin code base, with the intent of adding the element of privacy to the blockchain.

3.5.1 Privacy and Shielded Transactions

Zcash achieves privacy by using something called "zero-knowledge cryptography" to create "shielded transactions". However, this is not the default option, and there is no limit to the number of non-private transactions in each block. A recent report by ICO research firm Satis Group ("Cryptoasset Market Coverage Initiation: Valuation", August 30, 2018) states:

"Only 5% of the Zcash network uses 'shielded' addresses currently, with the rest of the addresses being used for transactions functionally and technically no different than Bitcoin."

The paper concludes that since there are so many more addresses in the blockchain that are not private, the Zcash network as a whole is not fungible. Meaning the coins in any given wallet could possibly be traced back to their prior transactions. (This is important, because nobody wants to find out that the coins in their wallet were used 2 years ago to commit a crime, etc.)

In contrast, the research states specifically that Monero – and therefore we can conclude AEON as well – is a fungible network. Both Monero and AEON default to a private transaction, and AEON only allows 10% of the transactions in any block to be switched to non-private.

3.5.2 Mining and Barriers to Participation

Zcash went away from the Bitcoin PoW algorithm, and implemented the Equihash PoW algorithm, to provide ASIC resistance, and allow people to mine with their GPU's and CPU's. The problems with the Equihash algorithm are that 1) it does not limit the advantage of GPU over CPU, and 2) an ASIC was recently developed which could mine Zcash, threatening the future viability of GPU and CPU mining. As of the date of this paper, the Zcash project has not created a fork of the blockchain to provide ASIC resistance once again.

AEON's PoW, as stated previously, is more CPU friendly, and more ASIC resistant. In addition, when an ASIC was successfully developed for the CryptoNight-Lite algorithm, the AEON developers quickly moved to fork the blockchain to regain ASIC resistance.

3.5.3 General Usability and Transactions-Per-Second

Zcash improved upon Bitcoin by doubling the maximum block size to 2 MB, and decreasing the block interval down to 2.5 minutes. However the transaction size is larger in Zcash, so the maximum TPS will only reach about 26, and could be far less if more of the transactions happen to be shielded. As with Bitcoin, the TPS throughput will need to be increased into the thousands before Zcash will become a currency used by the masses.

See section 3.1 *vs. Bitcoin* for a description of AEON's solution to the TPS limitation.

3.6 vs. Ripple

Of all the currencies discussed in this section, Ripple is one which may not belong. The Ripple blockchain is open source, but Ripple is also a private company. From their homepage: "Ripple connects banks, payment providers, digital asset exchanges and corporates via RippleNet to provide one frictionless experience to send money globally." Consider the ways in which Ripple's vision is different from AEON:

- Ripple does not decentralize the management of personal wealth; it seeks to strengthen the ability of central entities to control the movement of wealth on a global scale.
- Working with banks, Ripple does not provide privacy, but instead provides full traceability of funds.
- There is no mining process, by which individuals can receive coins for themselves. All coins have been produced, and the Ripple company releases a certain number of coins per month.

4 AEON Implementation

The implementation of AEON is derived from two other open source projects: **CryptoNote** and textbfMonero.

The CryptoNote technology focuses on the ability to create crypto-currencies with untraceable transactions, CPU-friendly proof-of-work algorithm, and the ability of self-adjusting parameters such as block size and difficulty. Several crypto coins have been based on the CryptoNote technology.

Monero is one of the earliest crypto currencies to use the features of CryptoNote, and has grown to be the most popular with a market cap well within the top 20 crypto coins. AEON was started from the Monero code base, and modified only in ways that meet the specific vision and goals of the AEON community.

This section will provide an overview of the implementation of the AEON cryptocurrency.

4.1 Proof of Work (PoW) Algorithm

AEON is a cryptocurrency which is distributed through a proof of work "mining" process. For a definition of PoW, the Bitcoin Wiki at https://en.bitcoin.it/wiki/Proof_of_work offers this:

"A **proof of work** is a piece of data which is difficult (costly, time-consuming) to produce but easy for others to verify and which satisfies certain requirements. Producing a proof of work can be a random process with low probability so that a lot of trial and error is required *on average* before a valid proof of work is generated."

The goal of the proof of work process, is to provide decentralization of both the distribution of coins and the validation of transactions. The difficult trial-and-error nature of producing the PoW is an effective means of randomizing which miner will correctly validate the next block of transactions and receive the reward of new coins.

A disadvantage of the PoW function for many cryptocurrencies (including Bitcoin) is that it relies solely on processor speed, which allows high-end GPU's and specialized mining hardware (ASICs) to have a great advantage in producing the correct proof of work. This condition leaves the majority of PC owners unable to participate in the mining process for coins, and creates an environment where relatively few miners control the network. Thus, the goal of decentralization is somewhat defeated.

An improved PoW algorithm, eventually called CryptoNight, was proposed in 2012 by the CryptoNote project. According to the CryptoNote whitepaper (https://cryptonote.org/whitepaper.pdf):

"Our primary goal is to close the gap between CPU (majority) and GPU/FPGA/ASIC (minority) miners. It is appropriate that some users can have a certain advantage over others, but their investments should grow at least linearly with the power. More generally, producing special-purpose devices has to be as less profitable as possible."

The algorithm accomplishes this goal in 2 primary ways.

- It uses built-in CPU instructions, which are difficult to implement in specialized hardware.
- It relies on access to unpredictable locations in a 2 MB "scratchpad" of CPU memory, rather than relying solely on CPU processing speed.

These factors effectively limit the advantages of GPU's over CPU's and make it too costly to produce specialized ASIC hardware for mining.

AEON implements the **CryptoNight-Lite** algorithm for its proof of work. As the name suggests, this is a lightweight version of the original CryptoNight algorithm, which utilizes a 1 MB scratchpad. This results in half the iterations needed to compute a hash, and half the required L3 cache CPU memory. Many lower end processors (on mobile devices) will have the required 1 MB of CPU cache, and desktop multi-core processors will see up to a 4X performance boost over the heavier CryptoNight algorithm.

4.2 Anonymous Transactions

One of the goals for AEON transactions is to have the properties of *physical cash* payments, as opposed to electronic payments.

Consider the example of paying for a meal at a restaurant. With electronic payment (i.e. a credit card), there is a trusted 3rd party (i.e. Visa) which carries out the transaction for the payer and receiver. The trusted party must know both the payer's and receiver's identities and account information to settle the transaction. Additionally, the receiver will know the payer's name and account number.

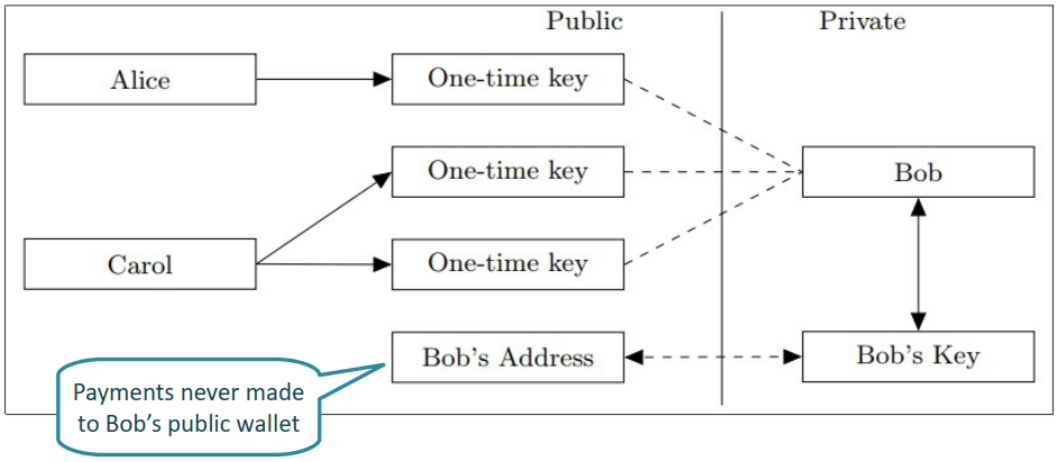
In contrast, paying for a meal with cash is *trustless* (requires no trusted 3rd party to carry out the transaction). It is also *anonymous* in that it does not require the payer to give their name or any other personal information to the receiver.

The previous section explained how the PoW algorithm creates a decentralized trustless network of miners to approve transactions. But to achieve anonymity we must keep the payer's and receiver's identities and account (wallet) information from being seen on the public blockchain.

4.2.1 One-Time-Use Keys

AEON uses the CryptoNote solution to receive payments at a one-time-use public key address, rather than the recipient's public wallet address. The public key is generated by the sender, using both the recipient's public wallet address and some random data. Once generated, funds are sent directly to this public key, which can be used only once. The recipient can later spend any received coins, by using a one-time-use private key (called a **ring signature**) which corresponds to the one-time public key.

The following picture, from the CryptoNote whitepaper, shows that the one-time public keys are never linked to the receiver's public wallet address on the blockchain. This effectively keeps the receiving wallet anonymous.



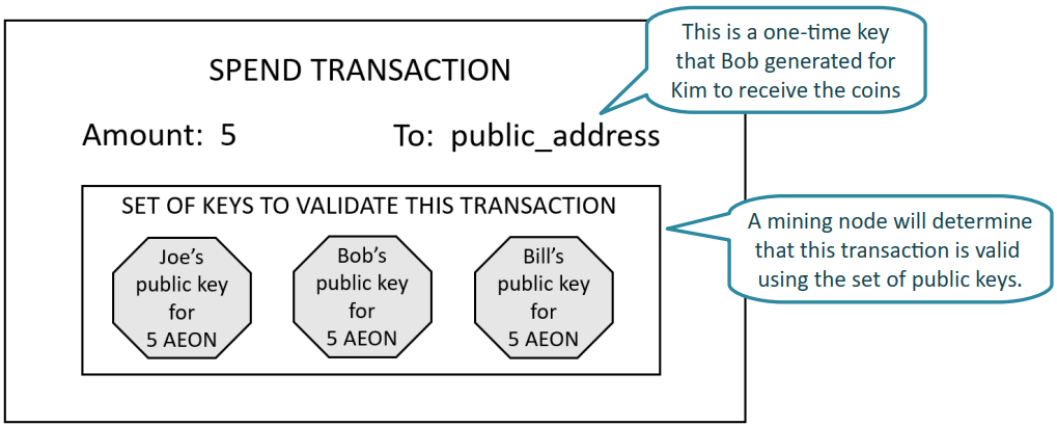
4.2.2 One-Time Ring Signatures

After funds are received via a one-time public key, the recipient is able to spend the funds at any time, using a one-time ring signature. The goal of the ring signature is to keep the sending address anonymous on the blockchain.

In non-private implementations, the sender will "sign" their payment transaction with a private key that can be validated only by using the sender's corresponding public key. Only the sender knows the private key, but the whole world can see that the sender's public key was used to validate the transaction.

The idea behind the ring signature is straightforward: a sender produces a signature which can be validated by a set of public keys rather than a unique public key. The identity of the one who produced the signature is indistinguishable from the owners of the additional public keys within the set.

Consider an example: Bob wishes to send 5 AEON to Kim. The picture below shows the ring signature concept for this transaction on the blockchain.



Note in the example, that the 2 "decoy" public signatures are actually past transaction outputs that are pulled from the AEON blockchain. Thus, all 3 inputs in the set are valid signed inputs for 5 AEON, but only Bob's is valid for this transaction. It is impossible for someone looking at this

transaction on the blockchain to determine which of the 3 inputs was the valid one. Additionally, all 3 of the inputs will likely show up as decoys in multiple other transactions.

In the AEON blockchain, the default number of decoys, known as **mixins**, is set to 3. The choosing of mixins is handled automatically by AEON. The sender may, however choose a different number of mixins for their transaction. More than 3 mixins will result in a higher level of anonymity, but will require a higher transaction fee. For non-sensitive transactions to be processed with a slightly lower fee, a mixin value of 0 can be chosen. To preserve overall blockchain anonymity the number of 0-mixin transactions is limited to no more than 10% of the transactions in each block. Additionally, a mixin value of 1 is not allowed since it does not provide a high enough assurance against blockchain analysis.

4.2.3 Known Weaknesses

One possible attack against Anonymity is analysis based on the amounts sent in a transaction. If a bad actor knows, for example, that 0.9 coins have been sent at a certain time, then they may search for transactions containing 0.9 coins to attempt to identify a sender. This is negated by the use of one-time keys and other factors, but the visibility of the amounts in the blockchain is a downside.

Furthermore, as seen in the illustration in the previous section, the ring signature approach requires the specific amount of each of the mixins to match. For less common amounts, there will be fewer public keys available for mixins, reducing the level of anonymity.

The Monero development team has created a solution for these weaknesses, known as **Ring Confidential Transactions** (RingCT). The AEON community plans to adopt this solution as soon as it can be validated. There are more details on the new RingCT protocol in the Monero publication "Ring Confidential Transactions." (See https://lab.getmonero.org/pubs/MRL-0005.pdf.)

4.3 Block Reward and Max Supply

TODO: write this section!

Will cover:

- Max Supply, including the tail emission, reasoning for the emission, etc.
- should include a pic showing a timeline of when we will hit the tail, including expected avg block rewards along the way as they decrease
- Describe the smoothly varying block reward, 4 min block time, difficulty retargeting.
- Describe transaction fee calculations in this section

5 AEON Community

5.1 Links

5.1.1 Social/Community

Website: https://www.aeon.cash/
BitcoinTalk ANN: https://bitcointalk.org/index.php?topic=641696.0
Discord invite: https://discord.gg/TM8mEsx
Github: https://github.com/aeonix (source, binaries, wallets)
IRC: https://webchat.freenode.net (channel: #aeon)
Medium blog: https://medium.com/@AEON_Community
Reddit: https://www.reddit.com/r/Aeon/ (high activity)
Telegram: https://telegram.me/AEONgroup
Twitter: https://twitter.com/AeonCoin

5.1.2 Block Explorers

AeonBlocks: https://aeonblocks.com/
Onion Aeon: http://aeon.lol/ or http://162.210.173.150/
Onion Aeon Testnet: http://testnet.aeon.lol/ or http://162.210.173.151/
Onion Aeon Stagenet: http://162.210.173.151:8083/
AEON Charts: https://stoffu.github.io/diff-chart/

5.2 Mining

5.2.1 Mining Applications

The most popular mining applications are **xmr-stak** and **xmrig**. For additional options, check with the community.

5.2.2 Mining Pools

There are several AEON mining pools operating. It is recommended to join a small to medium sized pool, to spread out the hashes across the network as much as possible. Look on the community sites to find links to current AEON mining pools.

5.3 Exchanges

Visit the AEON website to find a current list of exchanges which trade AEON.

5.4 Wallets

TODO: write this section!

5.5 Development Team

Lead developer: smooth
Contributing developer: stoffu

Community lead: katiecharm

5.6 Current Work and Future Plans

TODO: write this section!