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# AENCO Ecosystem

Global Healthtech Blockchain Financial Solutions

## BLOCKCHAIN POSITION PAPER



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Aenco is in the process of undertaking further legal and regulatory analysis of the functionality and mechanics of AEN Tokens. Following the conclusion of this analysis, we may be required to amend the functionality of AEN Tokens in order to ensure compliance with any legal or regulatory obligations that apply to us. We shall update this paper and publish a notice on our website in the event that any changes are made to the AEN Token.

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- 2) The People's Republic of China;
- 3) Samoa;
- 4) Any sanctioned countries as depicted within:  
<https://www.treasury.gov/resource-center/sanctions/Programs/Pages/Programs.aspx>; or
- 5) Hong Kong (except for "professional investors" , please see below)

Citizens and residents of Hong Kong SAR shall be further required to present "proof of wealth" to demonstrate that they are Professional Investors as defined under the Hong Kong Securities & Futures Ordinance ("SFO") before being eligible to subscribe.

Participants from rest of the world must self-declare to be sophisticated investors in having knowledge on cryptocurrencies, digital assets, token sales, initial coin offerings, blockchain technology, and smart contracts. Any decision to participate in the Token Sale should be based upon your independent assessment. You should obtain independent advice before making a purchase. You must not participate in the Token Sale unless you have read and fully understood these terms and all other relevant materials in particular, the paper and fully understand the purpose and process of AEN, the Platform and the Token Sale. You must monitor the <http://www.aencoin.com> website ("Website") for any announcements that relate to the Token Sale, as they may supplement these terms.

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## 1. Executive Summary

Blockchain, built upon the consensus based distributed ledger system, is going through rapid evolutions. At the point of writing this paper, there are already murmurs in the market talking about blockchain 3.x or 4.0 and so forth. One thing for certain is that blockchain will be here to stay and will seem to continue to take over many existing business processes and make possible novel project ideas implementation in real life. In many cases, blockchain has the effect of approaching data security in a new and more secured manner; some other blockchains also bring greater efficiency and transparency to transactions that revolutionising data processing and analytics.

There are now numerous types of community users looking to adopt blockchain based approach to support their desired applications, be it in the field of general business, financial, regulatory and even, in the field of healthcare and medical. Despite the promising nature and the current robust vision of where blockchains will take us in the near future, currently there are still limitation issues with some of the major blockchains that are challenges to the natural evolution process. For example, one technical issue with major blockchains is the “data clogging” issue, as such some current popular blockchains have already reached over 1TB to download! Other issues that need to be addressed include (the lack of) business customisation, friendliness and flexibility to build target applications on blockchains in real life, resulting in often lack of real life business usage of some newer blockchains these days. Other issues, which may become more secondary in nature due to the advancement in blockchain structures relative to Bitcoin and Ethereum, include low transaction speeds, limitations and vulnerabilities of the proof of work mining approach and the less than robust verification methods of new business projects and quality of participants in the mining network.

AENCO is a platform that will support real life business applications, particularly in the field of healthcare and medical technology and financial solutions. Aenco’s end-to-end platform comprises of two core sub-platforms: a) the “Aenco Blockchain” and b) the “Aenco Financial Solutions Application Platform”. In relation to b), Aenco’s financial solutions platform will be a real life use case of the Aenco Blockchain in itself and all the detailed information can be found on our separate paper (<https://www.aencoin.com/assets/docs/aenco-paper.pdf>) and on our website (<https://www.aencoin.com>).

Aenco Blockchain will introduce some exciting algorithmic approaches to address many of the issues highlighted above and the Aenco team will demonstrate the customisable real life business applications within the short term. In fact, at the point of this article, Aenco team has planned four major and impactful application projects in the field of healthcare research, medical services, drug development and healthcare real estate, to be launched from its blockchain all within the next 15 months. This will be in parallel to the announced launch of Aenco Financial Solutions Platform (the IB Solutions, Prime Solutions, Smartcap Solutions), to be supported by the Aenco Blockchain, which will include the launch of its own smart wallet (AEN Connect), support the roll out of v2.0 AEN token (AEN), healthtech centric crypto exchange (AENX), token launcher platform, p2p decentralised collateralised lending system, innovative margin management system, escrow account system, OTC product launcher (etc.). Through these applications, Aenco will demonstrate the robustness of its blockchain, flexibility in its support for business application customisation and the focus of our team in delivering real life usages. Aenco Blockchain will also demonstrate its capacity to service an ever-growing ecosystem and inter-connecting communities through our sharding (Hex), node and API mechanisms.



The Aenco Blockchain will be built upon an existing open source framework using C++ which will deliver a suite of exciting features as follows:

- (i) Industry-competitive transactions rates (currently up to 4,000 Tx/s),
- (ii) Flexible smart contract module,
- (iii) Master (trusted) node program for consistency and stability,
- (iv) A combination of permission based nodes and public based AEN stake leasing mechanism to cater for public growth and energy efficiency maintenance,
- (v) Data Decay Principle: removal of redundant / inactive data on the blockchain over a pre-defined period to reduce “data clogging” issues on blockchain;
- (vi) API gateway and business sharding: easy to use gateway interface to allow businesses to build customisable applications (“individual business shards”) supported by our blockchain;
- (vii) Multi-Mining Model: individual business shards can operate their own mineable token with customisable mining models that suit their business operations;
- (viii) Know-Your-Business Verification: to maintain consistency and integrity of the operating business shards, all such projects will be subject to a KYB of the team background/vision + technical audit process prior to going live;
- (ix) Proof of “iii” consensus algorithm: applies the principles of Integrity (e.g. genuine net transaction recorders), Innovative (e.g. creative community content / transaction contributors), Impactful (e.g. long term staking public AEN token holders) in determining the scores of the nodes, with higher the score higher the probability of successfully mining a block;
- (x) Mining tiers: introduces a tiered mining membership with vesting over a predefined period, ranging from Master-nodes (1,000,000 AEN, permissioned), Gold (500,000 AEN, permissioned), Silver (50,000 AEN, public), Bronze (10,000 AEN, public) and Green (10 AEN, public);
- (xi) “Trinity” Wallet Recovery system: to recover lost wallet or lost private keys to the tokens through a combination of public key and KYC data held on blockchain (requires prior registration).

The Aenco team is extremely excited to deliver to the community and healthtech industry the above exciting features and remains focus always to deliver some real life usages especially in the financial and healthtech industry. We believe in revolutionising much of the historically hard-to-launch but potentially promising healthcare and medical technology projects with the support of blockchain. Many of the anticipated financial utility, healthtech utility and general business utility have been explained in detail in our Aenco platform paper. However, by no means does it end there and we constantly welcome our community and potential business partners to explore with us how our blockchain can support their real life usages.

The Aenco team is comprised of very experienced financial and computational programming background personnel with generous support from our academic advisory and contractor networks in the cryptography space around the world, including (but not limited to) Hong Kong, United Kingdom and Silicon Valley in the United States. In particular, we are extremely thankful to our advisors, some acting in personal capacity, at the University of Hong Kong and the Chinese University of Hong Kong for their unwavering support of this immense project.



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#### Communication Channels

- Please find us on the following social media and community platforms:



[t.me/AENCO](https://t.me/AENCO)

[t.me/aencoin\\_announcements](https://t.me/aencoin_announcements)



[bitcointalk.org/index.php?topic=3710692](https://bitcointalk.org/index.php?topic=3710692)



[medium.com/@aencoin](https://medium.com/@aencoin)



[discord.gg/5nTn4rC](https://discord.gg/5nTn4rC)



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## 2. Introduction and Problem Statement

### Introduction

AENCO Blockchain in its more basic form is an eco-system network built on blockchain technology, under which the AENCO Blockchain integrates concepts from other open sourced ledgers such as Ethereum, Bitcoin and industry best practices and due diligence.

Aenco's primary contribution, in particular to the healthtech industry and financial industry, is to bring evolving blockchain technology with major improvements to help promote research collaboration and ultimately improve the quality of our day to day lives. Aenco does this by improving blockchain technology and bringing in solutions that make the eco-system usable, customisable, maintainable, secure and cost effective.

In addition, Aenco Blockchain introduces a Proof of "iii" consensus algorithm (the "i" being integrity, innovative, impactful) in scaling the rewards to genuine AEN token holders and those who make constructive contributions and transactions on our blockchain network.

Our blockchain is evolving and some of the decisions here may change based on transaction findings and community feedback. We will endeavour to keep our community updated along the way!

### Problem Statement

What problem are we trying to solve technically? There are many solutions in the market place, and the question we get asked often is why use your own blockchain? Or why not use "xyz system"? The simple answer is they all try to solve some major problems - scalability, longevity, performance, usability - but while solving those narrow issues, none come close to the unique vision that Aenco requires to have on these blockchains and certainly none that can support the special needs required by healthcare and medical technology projects combined with an all-encompassing financial solutions platform. In addition, these needs are constantly evolving and the community feedback will be a continuous process that will require our blockchain to have the flexibility to upgrade and improve as it takes on support for more projects.

As such, by building our own Aenco Blockchain, we can cherry pick the best approaches and evolve our blockchain technology by introducing innovative concepts during the construction.

Aenco's team has a diverse and open minded ability to think outside the box. We bring ground level user experience into the design and architectural decision making, while at the same time involve levels of participation from advisors, partners, and universities to critically think through the possibilities and pit falls of any approach taken.





Here are some of the identified problems on current public blockchains in the market that we are addressing:

**Zero knowledge participation (Wallets, Interfaces etc.):** the experience of both technical and non-technical users can be mixed and confusing at times due to the lack of understanding, with participation being limited or none;

**Scalability:** Once the usability is solved, the user capacity and data storage requirements will increase significantly, and thus causing most blockchains to collapse under their own success;

**Distributed to a Single Point:** Although blockchain technology based on P2P and distributed techniques are the selling points for security, they mostly suffer from a single controlled entry point for each use case (for example, If crypto-kitties company closed their website, your kitties would be trapped forever in the blockchain with no gateway to access them);

**Isolated smart contract execution:** In currently adopted systems, such as Ethereum, smart contracts are run everywhere at the same time, and even in Proof of Stake, they are still sandboxed and contained. Therefore, in effect they only run code within the ledger and interact only within its own box;

**Immutably for ever:** Most existing systems claim immutability, the problem with this statement is that you can never clean up the ledger, which in the case of over user or very popular system, would size itself out of available storage and bandwidth, making themselves dependent on others to solve the problem such as CPU, memory and bandwidth improvements;

**Sharing securely:** Within certain business industries, such as the healthtech industry, a few main issues continue to cause many practical real life problems. For one issue is privacy - how can an institute make medical data available, but still retain control and deny access at any time without the receiver being able to keep or make a copy of the information? While at the same time, it must ensure the integrity and privacy of the data, but also offer the benefit to the data owner?

**Allow Public Mining on Permissioned Chain:** Public mining allows improved computing power, and participation gives access to latest information, but the information can only be carried out by permissioned entities who may need the public's computing power.

The list above highlights some of the challenges and issues faced, but the solution is not available in any single blockchain use case and often scattered across a number of them, hence we are dedicated to develop our Aenco Blockchain ledger systems, with the objective to provide practical and implementable solutions to these problems.



### 3. Solution Statement

Aenco Blockchain will address each of the problems with its unique algorithmic and design solutions. We have hereby list out a succinct summary of our approaches to each of these problems:

**Zero Knowledge (AEN Connect) Smart Wallet:** aimed at easy user experience and friendly integrated mining / leasing interface, with excellent UI engineers and designers working closely with a focus group in a tight development cycle;

**Scalability:** a “Side Chain” approach will be adopted alongside the code ledger so that it does not get overloaded, and has the final last word of truth. This will be implemented in conjunction with Immutable objective and business sharding objective below;

**Immutable Forever:** a “Data Decay” algorithm will be implemented at the core, in essence, to support the removal and archiving of inactive or redundant data from the core blockchain after a certain pre-defined period determined by a function of AEN cost spent (for example, a default period of 1 AEN cost = [3] years be defined); such period can be extended with mechanisms such as active and genuine calling of such data by users and/or uses of AEN to purchase further storage time. In other words, this means that all engagement with Aenco Blockchain ledger will have a life cycle, and the creator will need to consider the life of their entry, when an Item has decayed, it will be moved to our side chain for a pre-defined period (i.e. archive nodes). All deleted Items & transactions will still be maintained on our side chain archive nodes, and if such a reactivation is required, then the relevant participants will need to spend AEN to implement the data back in the core blockchain for subsequent usage;

**Liquidity and Trust:** through a delegated Proof of “iii” model, permissioned nodes will be validators and public stake holders can earn rewards by leasing their tokens to remote mining nodes and to account for successfully mining a block collectively; this is further elaborated below:

**Proof of “iii” consensus algorithm and leasing mechanism:** a novel algorithm that introduces a scoring approach to each node on the blockchain network, with higher the score, higher the probability of successfully mining a block. Unlike the usual Proof of Work (PoW) or Proof of Stake (PoS) models, which have their own limitations such as computer power, coin hoarding, or energy consumption, Proof of “iii” applies the principles of Integrity (e.g. genuine net transaction recorders), being Innovative (e.g. creative community content / transaction contributors), and being Impactful (e.g. long term staking public AEN token holders) in determining the scores and probability of such permitted node. In addition, through the leasing mechanism, the public may lease their stakes to such permitted remote nodes to pool the mining power and share the rewards, with just the public keys required (i.e. without needing to disclose the private keys). This brings a number of advantages such as not requiring the computer to be constantly running at all times and that mining rewards will be automatically credited to the smart AEN Connect wallet;

**Master-nodes and Mining Tiers:** new algorithms will introduce a tiered master nodes model on a combination of permission basis (for senior tiers) and public basis (for junior tiers). Minimum AEN token thresholds are counted based on the tokens being vested over the defined period; however, for transaction spending or transfers perspectives during the vesting period, AEN will be deducted or added on a pro-rata basis between the vested and unvested pot in the wallet. The tier thresholds are currently anticipated to be as below, but this amount is potentially subject to change depending on adoption, token price, and community requests.



| MINING TIERS | MINIMUM AEN<br>TOKEN REQUIRED | VESTED PERIOD<br>(DAYS) | PERMISSION /<br>PUBLIC BASIS |
|--------------|-------------------------------|-------------------------|------------------------------|
| Master-nodes | 1,000,000 AEN                 | Over 10 days            | Permission + KYC             |
| Gold         | 500,000 AEN                   | Over 5 days             | Permission + KYC             |
| Silver       | 50,000 AEN                    | Over 5 days             | Public                       |
| Bronze       | 10,000 AEN                    | Over 1 day              | Public                       |
| Green        | 10 AEN                        | Over 1 day              | Public                       |

**Distributed to a Single Point:** Aenco will have distributed access to all mining nodes from the client applications. Therefore, upon connection, the client will receive a full list of available nodes, thus always being able to choose and connect to the fastest, most rewarding, or nearest available node to our blockchain ledger;

**API Gateway, Business Sharding, Multi-Mining Model:** to cater for flexibility, simplification and friendliness for customising business applications, an API gateway will be implemented to interface applications with the core Aenco Blockchain. Through the API gateway, businesses can build unlimited applications ("business shards") as well as the launch of its own mineable token (supported by the smart contract module) whose mining mechanism can be customised and supported through the API gateway.

**Isolated Smart Contracts:** In our system we call these "Smart Contract Modules", and they are targeted execution. For example, if a smart Artificial intelligence module (or business shard) needs to run against certain medical imaging data (such as X-Ray), only those permissioned nodes that have relevant X-Ray data will execute the code. Additionally further in the future, we will implement the ability to break code into "Asynchronous Modules", where any miner or wallet may execute and return a result.

**Sharing, Secured Remote and Distributed Execution:** allows a data owner to make their data available for analytical purposes (as optional), without releasing the source data or ownership. In addition, the source cannot be copied, removed, or deleted. The owner can grant or remove access rights to his/her data and can even approve outgoing results from the executed smart module. This will be done via a customisable administrative interface that the data owner will use to manage the permission and operation of their gateway.

**Business Shards and Side Chains:** As previously mentioned, the Aenco Blockchain can support customisable business applications and mineable tokens through the "Side Chain" feature. As some business nodes are specific to particular use cases and tiers, to create or to join them, the participants will need to receive a permission key. This is achieved through a Know-Your-Customer ("KYC") or Know-Your-Business ("KYB") process where, prior to live implementation, the participant needs to apply for permission from the network. In other words, in order to filter out "bad" nodes or "bad" business shards from infiltrating and unsuitable data to our blockchain, and to maintain consistency of the model, the robust KYC/KYB process (with an inherent technical audit process, involving a scoring approach to take into account the quality of the project individual



or team background, vision, and objectives) is completed prior to being deployed live on our network. Once approved, they can be trusted to do validation, as well as nodes that can accept end users and miners staking their coins and administer the reward sharing program.

**Trinity (KYC) Wallet Recovery Process:** a common issue currently associated with tokens is the risk of losing information absolutely paramount to the safekeeping of digital assets (For example, a loss of private keys to wallets makes recovery of tokens impossible and often lost forever). The Aenco Blockchain together with its AEN Connect SmartWallet will introduce a recovery process called the “Trinity” system. In effect this combines a trio of factors being: (i) A wallet’s public key, (ii) Know-Your-Customer ID, and (iii) User’s personal data such as date of birth or address proof. As a pre-requisite owners must perform standardised KYC procedures and provide personal data to associate the user to the wallet’s public key to enable the backup and recovery of vital information; all of such said information will be held in encryption on the blockchain.

These are some of the simpler explanations of what is being undertaken, and the next section will highlight some of the technical solutions being adopted.



## 4. Summary Features

For the purposes of this paper, we have summarised in the below table some of the key strengths, features, and useful information for the Aenco Blockchain. The blockchain has been developed based on open source ledger frameworks and constantly being improved with Aenco's visions and targets, all designed to make the Aenco Blockchain an extremely user friendly and flexible system for real life business applications, such as the healthtech industry and financial industry. Fuelled by the AEN token, the Aenco Blockchain will be able to support multiple ecosystems and communities (through the business side chains) and unite these various networks within one umbrella.

The below figures are based on the latest approach in our development cycle and internal testing. The final figures and features maybe subject to change as we progress through the testing phase and based on community feedback.

| NAME OF TOKEN:                                       | AEN   |
|--|---|
| First version of launch under ICO:                   | ERC 223 based   |
| Second version of launch under the Aenco Blockchain: | AEN v2.0<br>Existing AEN (ERC223) will be replaced on a 1:1 basis through the AEN Connect smart wallet. Further implementation of exchange will be announced in due course. |
| Minimum denomination:                                | 0.00000001  |
| Maximum supply:                                      | 4,000,000,000   |
| Reserved for mining:                                 | 1,994,000,000 (49.85% of maximum supply)  |

| NAME OF BLOCKCHAIN:        | AENCO BLOCKCHAIN   |
|----------------------------|--|
| Hash function type:        | 512 bit SHA3   |
| Programming Language:      | C++  |
| Expected transaction rate: | 4,000 Tx/s<br>(Further improvements will be planned to further upgrade the transaction speed)  |
| Block Time:                | 1 minute   |
| Consensus:                 | Proof of "iii"<br>(scoring approach based on i for integrity, innovation, impactful)   |
| Privacy Capability:        | Privacy via the Decay functionality will allow individual implementations to prune transactions and history, in addition the contents of non-fund transfers will be encoded. |



|                                |  |
|--------------------------------|--|
| Data Decay Principle:          | <p>A user pays for the Ledger entry, the decay will tick <math>e^{10}/\text{users per second}</math> per 0.00000001 AEN based on the time elapse of now - created.</p> <p>In turns of simplicity, the more users there are associated to a ledger entry, the slower the decay becomes.</p> <p>At the base line, for example, 1 AEN Coin will last for c. 3.2 years</p> |
| Smart Contract Module:         | Supported  |
| Text Messaging:                | Supported; whisper node mechanism  |
| Message Encryption:            | Supported; uses a private key signing to enable messaging to be securely delivered and untampered.   |
| Value Transfer:                | Supported; To all direct transfer from wallet to wallet of the bases currency.   |
| Multi-signature:               | Supported  |
| Smart Wallet:                  | Supported  |
| Side Chain/Business Shards:    | Supported  |
| Mining Tier:                   | Master-nodes (1,000,000 AEN, permissioned), Gold (500,000 AEN, permissioned), Silver (50,000 AEN, public), Bronze (10,000 AEN, public) and Green (10 AEN, public)  |
| Mining Criteria:               | Proof of "iii" + Permission or Public (subject to tiers)   |
| Stake Leasing to remote nodes: | Supported  |
| Accounts:                      | <p>Elliptic Curve Cryptography</p> <p>Private + Public Ed25519 key pair</p> <p>Accounts identified by Aenco addresses derived from ED25519 public keys</p>   |
| Addresses:                     | <p>Base-32<sup>3</sup> encoded triplet:</p> <p>Network byte, 160-bit hash of the account's public key, 4 byte checksum</p>   |
| Transactions:                  | Only confirmed transactions are included in a mined block and updates the ledger account state. Transaction fees can be increased to raise priority of a specific transaction.   |
| Blocks:                        | <p>Linked blocks with up to 120 tx per block, and as the blocks are stored as a permanent record with implied decay with a birth block. Each block contains the following:</p> <ul style="list-style-type: none"> <li>• Block Version</li> <li>• Block timestamp</li> <li>• Public key of the creator (Mining node)</li> <li>• Block data signature</li> </ul>         |





|                             |  |
|-----------------------------|--|
| Smart Wallet (AEN Connect): | <p>The communication and operation of the end user will always be through the Smart Wallet called AEN Connect (constantly evolving), this will interact directly through an Aenco Blockchain node and present all Aenco chain services and interactions.</p> <p>AEN Connect will be available in the following platforms</p> <ul style="list-style-type: none"> <li>• Web based system available at <a href="https://aencoin.com">https://aencoin.com</a></li> <li>• Mobile Application</li> </ul> <p>Code will be based on 2 layers:</p> <ul style="list-style-type: none"> <li>• User interface Facing layer (Mobile/HTML)</li> <li>• API for back end interaction including blockchain interaction</li> </ul> |
| Blockchain Core:            | <p>Proof of “iii” ledger + decay principles + validation of a trusted node</p> <p>Block securing mechanism by Merkel Tree approach, with a state root mechanism.</p>   |
| KYC/KYB Integration:        | <p>As part of the ecosystem, KYC signatures will be validated and available for 3rd party approval</p>   |



## 5. Aenco Blockchain Roadmap

Below is a one year roadmap in relation to the underlying development of the Aenco Blockchain, in parallel to that of the Aenco Financial Solutions Platform described in our paper. As the blockchain develops, further announcements will be made on our website and communication channels, where we will also invite feedback from the community during the testing phase with a generous bounty scheme to follow!

