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XUV Foundation

# XUV Whitepaper 2.0



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# 1. XUV'S Vision

XUV believes that blockchain technology is one of the foundations for the next generation of information technology, alongside emerging technologies such as AR, VR, AI, IoT, 5G and more. With the technology's immutable and tamper-proof characteristics, blockchain, as an infrastructural technology, is uniquely positioned to enable unprecedented value and data-transfer among a wide set of users in a trust-less manner, boosting the efficiency and authenticity of information transfer itself.

XUV's vision of lowering the barrier and enabling established business with blockchain technology to create value and solve real world economic problems has been clear to us from the very beginning.

To achieve and fully harness this technology that will enable mass public adoption, we have identified the three major phases of blockchain evolvement – Technical Consensus, Business Consensus, and Governance Consensus. These phases will be the foundation and strategy to enable the XUV Chain blockchain to be adopted as the world's premier choice of blockchain.

## 1. Technical Consensus

In this phase, technical developers are the major force to build up the initial infrastructure protocols based on imaginations and projections. The competition is about programming language, protocol, algorithm and technical developer community.

Applications in this early stage of blockchain adoption are coming from the more obvious use cases that leverage features and functionalities of the blockchain technology, such as ICOs, DAOs, and betting applications (or gaming with betting features), along with infrastructure applications as needed like explorers, wallets, exchanges (centralized or decentralized).

Very few applications for the traditional business world are created in this phase, much less affecting and improving business use cases and activities. Blockchain platforms that focus on use cases such as traceability, anti-counterfeiting, food safety, intellectual property management, product life-cycle management and all kinds of data provenance categories are rarely to be seen. Initial blockchain applications in this stage are primarily motivated by technology enthusiasts, and business applications are mostly in the Proof of Concept ("PoC") stages by enterprise technical and R&D divisions to better understand the technology.

XUV, from its inception in 2015 and until now, has successfully moved past this crucial first phase of blockchain technology adoption, and is primed for the next phase to achieve Business Consensus.

## 2. Business Consensus

With Technical Consensus achieved, the initial benefits that were derived from the early experimentation and PoCs would start to positively influence behaviour from business executives and decision makers. Enterprises and businesses who made the judgment to

invest in early blockchain R&D in the Technical Consensus phase would gain a lead over competitors.

Business Consensus would be the second major phase in the blockchain evolution, where we will see business owners and enterprises become the major force to drive blockchain technology development and adoption, based on business needs and demands. This phase is all about understanding business needs, blockchain technology adoption and integration, user friendly interfaces, agile system structure, and business developers community.

In this phase, blockchain applications are built to enable cross enterprise collaborations and new collaborative values would be generated, following the first business moves to blockchain. The first initialization of collaborative ecosystems gets started with common business goals and consent economic motivations among multiple business owners including big corporations, small enterprises and individuals. Blockchain infrastructure applications are introduced to fulfill natural business and enterprise demands, such as custodian services, payment services, Blockchain-as-a-Service ("BaaS"), and privacy protections along with technology evolutions.

We anticipate that large corporations with existing market dominant positions and ecosystem resources are able to exert influence over the adoption of blockchain technology, including but not limited to Internet giants such as Facebook, Amazon, Google, Alibaba and Tencent, but also traditional players such as Walmart, DNV GL, PwC and so on. Basically, they are able to move their own existing ecosystem to be running on reliable blockchain platforms and look for expansions and interconnections to others. Ecosystem-level applications such as DNV GL's [Digital Low Carbon Emission Initiative](#) gets to unite multiple different stakeholders including governments, enterprises and United Nations in pursuit of a common goal (in this case, reducing the carbon footprint and attaining more United Nations Sustainable Development Goals). At the late stage of the Business Consensus, the increased attention and adoption of blockchain technology in major enterprises and businesses would compel authorities and regulatory bodies to seriously look at the blockchain space. With more and more influential public corporations, entities, organizations, and large global scale of people involved in the development and adoption of blockchain platforms, we can expect governments and countries (especially small and progressive countries) that are aiming for progressive policy, economics and technology advancement to gain strategic advantages.

For XUV, we are currently at a critical stage of the Business Consensus with the XUVChain platform being adopted by major enterprises and assurance companies with the right reach, abilities and competences to achieve this consensus, along with reaching out to government partners such as China, Malta, Republic of San Marino, Cyprus and technology partners such as AWS, Deloitte and so on. At this moment, XUV is moving forward towards the next stage of the current phase of our vision, Governance Consensus.

## 1.3 Governance Consensus

Regulation and legislation are naturally demanded by citizens regardless of country to protect the people and guide new technology to maximise societal and economic utility. We believe that the ultimate consensus in the blockchain space is the consensus among governments and legal authorities around the world.



In this phase, authorities along with or against big corporations and insightful technical players are the major forces to drive the regulatory development of Blockchain technology and applications. The recent development by the intergovernmental FATF (Financial Action Task Force) has proven that with effort, consensus among nations and financial regulators is possible, but it is still in a very early stage. The race for blockchain adoption in this stage is about merging regulatory requirements with advanced features of blockchain technology. We believe that the key to achieving the requirements of this race is working towards a comprehensive governance consensus for the blockchain protocol with balanced levels of centralization and decentralization.

At this point, more business activities are moving to ecosystems and new collaborative business models creating new values to the world. Besides the regulatory requirements like KYC and AML, more supportive applications are expected to be developed and adopted by governments and financial regulators, including the introduction of new crypto-assets such as stable coins, settlement coins, ecosystem utility tokens within an incentive system and so on.

With blockchain interest in the spotlight as a result of the push by nations and governments, the level and prevalence of global collaborations is reaching to a new maturity. Creativeness and innovations within blockchain ecosystems with a focus on enabling new business values are popping up everywhere. The existing Internet giants are facing their biggest challenges yet in terms of deciding on disrupting their existing offerings in favour of blockchain platforms, while traditional business owners that took the risk to run PoCs and trials in the previous phase of adoption are sitting solid and concrete by focusing on improving the essence of business through means of a mature blockchain platform – quality and scalability of products and services. New giants that focus on providing a reliable and proven blockchain ecosystem would be taking over the place by taking advantage of the technology and bringing together even more stakeholders onto the ecosystem, rallying partners with a common goal to solve business problems.

While blockchain adoption has reached the Governance Consensus stage, it also means that it is running concurrently with the previous phases, progressing forward in parallel with each other. To truly provide a mature and reliable blockchain platform and ecosystem, technology providers such as XUV need to understand that achieving consensus is a result of mutual effort and understanding the different requirements of all phases mentioned above.

Even at the Governance Consensus stage where blockchain awareness reaches new heights, it will not be a surprise that there would still be a sceptical feeling towards blockchain technology by existing entrepreneurs and even traditional tech enthusiasts. When Amazon and Alibaba first started the E-Commerce business idea and campaign 20 years ago, nobody was confident or believed that E-Commerce is going to be the disruptive new way of doing business, as even the adoption and practice of going online and surfing the web was inconvenient at that time, where internet access was limited. Yet, both Amazon and Alibaba succeeded in their endeavours by focusing on two major factors. Firstly, they have been constantly educating the entire world, and setting up the right motivations in the consumer's mind by charging minimal fees and providing incentives to sellers to move their business online. Secondly, they have been focused on building up a powerful and reliable infrastructure and all necessary accessibility and ease-of-use services and tools such as one stop service for E-Commerce site, payment tool, logistics service, digital marketing campaigns, arbitration,



and shared customer services, to enable people to take advantage of their platform even without any E-Commerce technology and knowledge.

XUV 's positioning in the blockchain ecosystem is now an Enabler, which will enable everyone in the world to create valuable transactions as big or small parts of future collaborative ecosystems. By working together with our aligned partners and providing all of the necessary tools and services, XUV 's mission is to enable the blockchain community, business owners, enterprises, governments or any other individual to move their business activities to blockchain effortlessly, similar to opening an online store in Amazon or Alibaba with just a few clicks without technical knowledge required. XUV will fulfill our mission and vision of achieving all phases of the consensus mentioned above by working relentlessly.

## 2. The XUV Chain Blockchain

XUV Chain is a public blockchain that is designed for mass adoption of blockchain technology by business users of all sizes. It is intended to serve as the foundation for a sustainable and scalable business blockchain ecosystem.

From a technical point of view, the XUV Chain blockchain is built upon existing proven blockchain innovations and novel technologies that are created for achieving mass adoption. These technologies include the Proof-of-AuChainity (“PoA”) consensus algorithm, meta transaction features, protocols of transaction fee delegation, on-chain governance mechanism, built-in smart contracts as well as tools for developers.

### 1. PoA 1.0

The Proof-of-AuChainity consensus is a consensus algorithm that demands nodes to be auChainized in order to participate in the blockchain consensus. Once auChainized, nodes are given equal chances to publish new blocks and gain rewards. As a result, there is no need for nodes to spend vast amount of resources to compete with each other. In addition, richer nodes do not have more advantages than other nodes in the system.

PoA is also an efficient consensus algorithm in terms of network bandwidth usage. It takes little time to decide block producers and thus, allows more time for transmitting transaction data. The system can, therefore, have a high throughput, or TPS (“Transactions Per Second”), within the range allowed by the underlying network.

PoA uses a heaviest chain rule to determine the canonical chain, or in other words, the “trunk”. When forming a new block, the round leader will add the number of active consensus nodes, observed locally, to `TotalScore` of the latest block on the trunk and store the result in the new block. Other nodes will have to agree on the value to accept the block. A node will be marked ‘inactive’ by other honest nodes after it misses generating a new block in the round when it is the leader. An inactive node will be considered “active” once it produces a new block again. More technical details of PoA consensus can be found [here](#).

### 2. PoA 2.0

Despite all the above-mentioned advantages and the fact that the XUV Chain blockchain has been working securely and smoothly on this consensus since its launch, PoA still has its own limitations. For example, like Ethereum, it lacks, algorithm-wise, an effective means to deter a node from manipulating the system when given the right to add a new block, although PoA makes sure that any traced misbehavior can be used as evidence against the node later.

Moreover, PoA belongs to the family of the Nakamoto consensus and therefore, only provides probabilistic assurance to the safety of transactions, which might not be enough to maintain system consistency against the extremely asynchronous situation such as being subject to large-scale network partitioning.

Therefore, we have been working on the next-generation PoA that will address these issues and provide the needed security and stability to support the ever-growing on-chain business



activities on the XUV Chain blockchain. As the outcome of our work, the new PoA will deliver:

1. absolute finality (or safety guarantee) on blocks and transactions
2. significant reduction of the platform's risk of being temporarily disrupted, which will result in better stability of blockchain service
3. faster-converging probabilistic finality, which will result in faster transaction confirmation for applications

## 1. Solutions

We propose to introduce two new mechanisms into the existing PoA protocol.

### Committee-Endorsing Mechanism

The committee-endorsing mechanism fundamentally changes the way a block is created. More specifically, besides the selected block producer, it demands other nodes to participate in the process of forming a new block.

In each round of consensus, some nodes will be randomly selected as committee members. Committee members need to validate the proposal sent from the block producer and formally endorse the proposal by signing it. The consensus algorithm will demand the block producer to combine sufficient legit endorsements into the new block to make it valid. Furthermore, the verifiable random function ("VRF") will be used to make sure that the committee members are truly picked randomly from all the nodes. Note that VRF functions similarly to a cryptographic hash function except that it requires a private key as input.

As a result, to create multiple conflicting blocks, the block producer will now have to work with a certain number of committee members. Due to the use of VRF, it can do so only if

1. it colludes with a number of nodes
2. among those nodes there are, by chance, a sufficient number of them being selected as committee members

The above conditions will make it much harder for the block producer to do so to disrupt the blockchain system. In other words, the probability of a node manipulating its right to add a new block will be kept extremely low. An important implication is that we will be able to reach a satisfactory probabilistic finality (e.g., the probability of a transaction being reverted is smaller than 0.0000001) much faster than the current PoA.

### Block Finality Mechanism

The block finality mechanism grants qualified blocks absolute safety guarantee. Once a block acquires its finality, the consensus will assure that it cannot be modified, replaced or removed from the public ledger even when the network encounters some extremely asynchronous situation such as being subject to large-scale network partitioning.

In theory, a block can be considered final if it is confirmed by the BFT consensus. We adopt the framework [Yin, et al](#) that implements the BFT consensus as a consecutive three-phase

process. In each phase, more than two-thirds of nodes have to agree on the block to be confirmed.

To apply the framework, we embed features that carry information of the finality process in blocks and consider endorsing a block as the way the committee member confirms such information. As a result, we can achieve one phase of the BFT consensus on a particular block once observing more than two-thirds of nodes having participated in the chain that descends from the block. We also introduce additional rules to assure system's consistency and liveness.

In this way, instead of asking more than two-thirds of all the nodes to respond simultaneously, our algorithm requires only the block producer and committee to respond in time. As a result, the service will be less likely to be delayed or temporarily halted.

## Summary

The next-generation PoA will introduce

1. committee-endorsing mechanism that significantly lowers the possibility of a node manipulating his right to produce a new block and results in faster converging probabilistic finality
2. block-finality mechanism that grants absolute safety guarantee to blocks (as well as the included transactions) that qualify certain criteria

It can be seen that both probabilistic and absolute finality will be allowed to coexist by the consensus protocol, providing different levels of security guarantee for applications running on the blockchain platform. In general, the higher security is required, the less efficient the application will be, and vice versa. Consequently, enterprises will be able to select the correct security guarantee that best suits their needs to maximize application performance.

## 2.2.2 Implementation

The implementation, testing and integration of the new PoA consensus on the XUV Chain blockchain will go through multiple phases. We would expect a brand new testnet to be launched for the debugging and testing purposes. Moreover, the algorithm details of the new PoA consensus mechanism will be published in multiple [XUV Improvement Proposals \(VIPs\)](#).

## 3. Meta Transaction Features (Enhanced Transaction Model)

The XUV Chain blockchain implements an [enhanced transaction \(TX\) model](#) to tackle some of the fundamental problems that hinder the adoption of blockchain technology.

### 1. TX Uniqueness

Every blockchain system has to find a way to uniquely identify each TX, or otherwise, it would be vulnerable to the TX replay attack. For a UTXO-based blockchain like Bitcoin, TXs are linked and can be uniquely identified and verified by the associated spending history.

However, such uniqueness no longer holds for an account-based blockchain. For such systems, we need to inject some extra information into TXs to make them uniquely identifiable.

The XUV Chain blockchain achieves its TX uniqueness as follows. First, it defines the TX Nonce as a 64-bit unsigned integer that is determined totally by the TX sender. Given a TX, it computes two hashes, the hash of the RLP encoded TX data without the signature and the hash of the previously computed hash concatenated by the sender's account address. The second hash which is 256-bit long, is used as `TXID` to uniquely identify the given TX. Note that the calculation of `TXID` does not require a private key to sign the TX.

Further reading of the TX uniqueness [here](#).

## 2. Multi-Task Transaction (MTT)

The XUV Chain blockchain allows a single transaction to carry out multiple tasks. To do that, we introduce the `Clause` structure to represent a single task and allow multiple tasks defined in one transaction. A task is defined by fields `To`, `Value` and `Data`. A `Clause` array, named `Clauses`, is then introduced in the transaction model to accommodate multiple tasks.

The multi-task mechanism has two interesting characteristics:

- The execution of tasks in a single TX is atomic, meaning that either they are all executed successfully or rejected all together.
- Tasks in a single TX are processed one by one in the exact order they are put in `Clauses`.

The multi-task mechanism provides a secure and efficient way to handle, for instance, tasks such as fund distribution, token airdrops, mass product registration.

## 3. Forcible Transaction Dependency

The XUV Chain blockchain provides a safety mechanism that allows users to force a TX to depend on the success of another TX. It has been done with the help of field `DependsOn` in the TX model. If `DependsOn` has been assigned a valid `TXID`, the system will check the status of the referred TX. Only if the status says successful, then the current TX will be accepted for processing. Here by successful, we mean two things: 1) the referred TX has been included in the ledger; and 2) it has been executed without being reverted.

The second requirement is particularly important since seeing a TX included in the ledger does not guarantee that it has been successfully executed. A TX can be included, but with a status "Reverted" which means that the system does not actually do what the TX asks it to do. For the dependent TX, there is no limitation on who sends it or when it is sent or what it is about. It offers developers much required flexibility.

Further reading of the forcible transaction dependency [here](#).

## 2.3.4 Transaction Lifecycle Control

The XUV Chain blockchain gives users control of the lifecycle of the TXs they send. In particular, users can tell the system when is the earliest time their TXs can be processed and how long a pending TX expires via fields `BlockRef` and `Expiration` defined in the TX model.

`BlockRef` can be used to store the reference to a particular block whose next block is the earliest block the current transaction can be processed. `Expiration` stores a number that can be used, together with `BlockRef`, to specify when the transaction expires. Specifically, the sum of `Expiration` and the first four bytes of `BlockRef` infers the height the last block that the current TX can be packed into.

The transaction lifecycle control is particularly useful when the blockchain is running at high capacity, because it gives users and developers definite control over when the transaction is executed or abandoned, which is highly demanded by business applications.

## 4. TX Fee Delegation

TX fee delegation mechanism is a mechanism that allows ordinary people to be able to use decentralized applications (dApps) without having to purchase cryptocurrencies and directly paying the TX fee caused during their interactions with dApps. In this way, users, when using dApps, could have the same kind of experiences when they are using normal mobile or web-based apps nowadays, and this is crucial for the mass adoption of blockchain technology especially under this stage when the regulation on cryptocurrency is still not clear. The XUV Chain blockchain is the first public blockchain that successfully implemented the TX fee delegation mechanism.

There are currently two protocols running on the XUV Chain blockchain that enable such a mechanism: the *Multi-Party Payment* (MPP) protocol and the *Designated Gas Payer* protocol. The former exists as a built-in protocol from day one of the mainnet launch while the latter was proposed in [VIP-191](#) and implemented on July 22 in the [XUV Chain v1.1.2 release](#).

### 1. MPP

MPP allows an account on the XUV Chain blockchain to pay fees for TXs sent from some designated accounts.



As illustrated in the above figure, there are three types of accounts involved in the protocol:

- USER: account sending TXs





- PAYER: account receiving TXs from USER and paying the TX fee
- MASTER: account from which the TX fee is actually deducted from. MASTER can be either PAYER itself if it is a normal account or the account deploys PAYER if it is a contract account (i.e., a contract with code)

Users can use the built-in contract `Prototype` to set up the MPP relation between PAYER and USER. Once such a relation has been established on-chain, when executing a TX from USER to PAYER, the XUV Chain blockchain will attempt to deduct TX fee from one of the three accounts in an order of MASTER => PAYER => USER. Users owning multiple MASTER accounts can also set up a SPONSOR account such that all the TX fees are deducted from a single SPONSOR account rather than from individual MASTER accounts, easing the work of managing multiple on-chain accounts. Find more details about MPP [here](#).

## 2. VIP-191 - Designated Gas Payer

It is clear that MPP was designed from the point of view of a dApp owner who controls multiple contract accounts running on chain. It is the sole responsibility of the owner to set up MPP and the protocol can only affect TXs sent to those contracts. Moreover, since MPP requires writing data on chain and therefore, causes certain overhead cost, it is more cost-effective to use the protocol for a relatively stable relationship between a user and the dApp, rather than some temporary arrangement.

VIP-191 is aimed to supplement MPP in order to provide more flexibility for TX fee delegation on the XUV Chain blockchain. In particular, it allows a TX sender to seek for an arbitrary party, not necessarily the TX recipient, who is willing to pay for the TX. The protocol works quite simple. It requires both the TX sender and payer to put their digital signatures in the TX. The sender also needs to turn on the VIP-191 feature to inform the system that it is a VIP-191 enabled TX. Once the TX is accepted and executed, the fee will be deducted from the payer account.

### Comparison

In comparison to MPP, VIP-191 gives control back to TX senders to activate the protocol. Moreover, it does not introduce any overhead cost. However, it does require the TX sender and payer to be both online to complete the TX while MPP does not. In terms of transparency, MPP is the better option since the payer will have to explicitly put his/her intention to fund TXs from a particular account on chain (via executing functions of contract `Prototype`).

### Implementation

VIP-191 has been implemented in the [Chain v1.1.2](#) release. There have been two major changes made to implement the protocol:

- Extending the TX model
- Adding extra logic for deciding the actual gas payer for a VIP-191 enabled TX

Field `Reserved` in the TX body structure has been re-defined to be of type `reserved` as shown below:





```
type reserved struct {  
  
    Features Features  
  
    Unused    []rlp.RawValue  
  
}
```

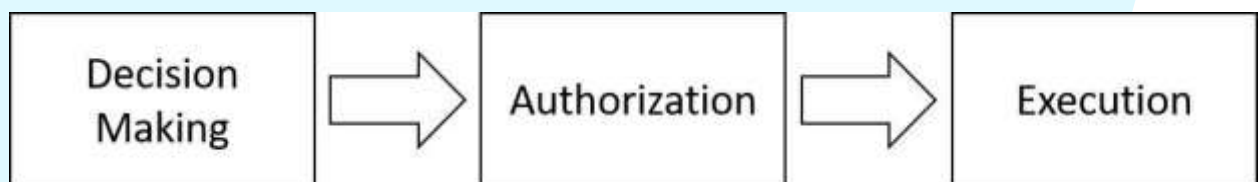
Within the structure, we define field `Features` as a bitmap where each bit marks the status (1 for on and 0 for off) of a particular feature. For VIP-191, the least significant bit is used. Moreover, VIP-191 requires two valid signatures to be included in the TX. The TX sender's signature is concatenated by the payer's signature and assigned to field `Signature` as usual. Moreover, the protocol requires the payer to sign `TXID` which is a unique identifier of the TX.

The extra logic brought by VIP-191 is added in function `BuyGas` in the Go source file `ChainDIR/runtime/resolved_tx.go`. When determining which account pays the fee, the system first checks whether there is a dedicated payer. If the answer is yes, it then tries to deduct the initial cost of the TX from the payer's balance. If the balance is too low, the system will return an error. Otherwise, it will mark the payer in the runtime context associated with the TX and pass on the context to the code that executes its clauses.

Further reading of VIP-191 Designated Gas Payer [here](#).

## 2.5 On-chain governance mechanism (pure technical)

The XUV Chain blockchain's on-chain governance is about stakeholders or its governing body making decisions on some critical on-chain actions and executing those actions. (The governing body of the main-net is the Steering Committee of XUV Foundation.) The actions can, for instance, be auChainizing or revoking consensus validators (i.e., the AuChainity Masternodes), changing network parameters, such as the base gas price and block reward ratio, or any on-chain activity embodied by a smart contract deployed on the XUV Chain blockchain.

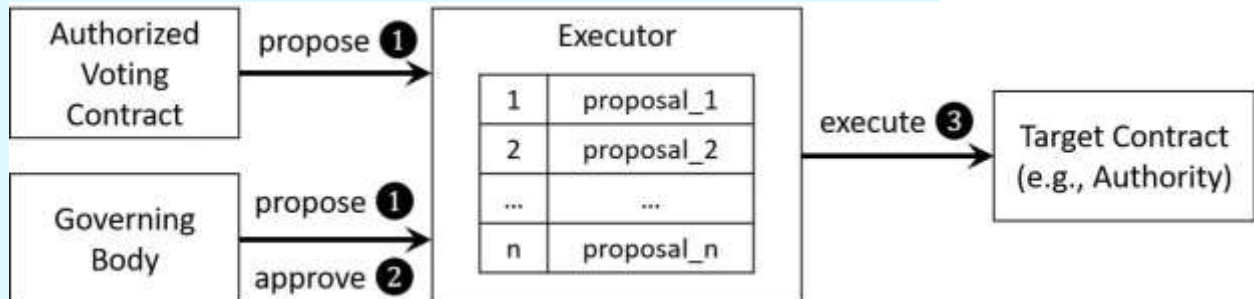


On-chain governance consists of three phases: decision making, auChainization and execution:

- **Decision making** is the first phase where decisions on executing certain on-chain actions are made. Decisions are obtained through voting. Voting can be conducted either on chain via a voting contract or off chain within the governing body. The former provides maximal transparency and often involves all stakeholders, while the latter complements the former to offer efficiency and agility.
- **AuChainization** is the second phase where a voted on-chain action is proposed to the governing body for final approval. Each proposal has to be approved by a majority of the members of the governing body. It is an extra security measure put in place to

safeguard on-chain governance against malicious activities (e.g., exploitation of voting-contract vulnerabilities).

- **Execution** is the final phase of on-chain governance. Once a proposal has been approved by the required majority, anyone can trigger the execution of the on-chain action defined in the proposal.



The XUV Chain blockchain provides a flexible framework for implementing the described on-chain governance, as illustrated in the above figure. At the center of the framework is contract `Executor` that is deployed both on the mainnet and testnet.

Contract `Executor` provides functions `propose` and `approve` to carry out the `auChainization` phase. Only `auChainized` voting contracts or members of the governing body can invoke function

```
propose(target_contract_address, encoded_data);
```

(marked by 1 in the above figure) to submit a proposal in `Executor`. The two function arguments define an on-chain action, i.e., invoking a specific function at a specific target contract address. A proposal is an instance of `struct proposal` stored in `Executor` and is created by function `propose`. Once a proposal is logged in `Executor`, members of the governing body are given a one-week time to `auChainize` it. Each member can invoke function `approve` (marked by 2 in the above figure) to complete his/her `auChainization`.

The *execution* phase is implemented simply by function `execute` of contract `Executor`. Once a proposal has been approved by the required majority (two thirds by default) of members of the governing body, Anyone can invoke function `execute` to trigger the execution of the on-chain action defined in the proposal using low-level call function:

```
target_contract_address.call(encoded_data);
```

It is often a safety practice that we code the target function of the target contract such that it can only be invoked by `Executor`. In this way, we are guaranteed that the action can only be executed after going through the process of on-chain governance. A good example of such a contract is the built-in contract `AuChainty` that manages `AuChainty` Masternodes.

Finally, a voting contract must be `auChainized` before it can call function `propose` to submit proposals. Contract `Executor` provides functions `attachVotingContract` and `detachVotingContract` to manage the list of `auChainized` voting contracts. Note that both functions have been coded such that they can only be invoked by `Executor` itself, meaning



that any change to the list has to be done through on-chain governance. It makes sure that voting contracts are managed securely and transparently.

Further reading of the on-chain governance [here](#).

## 6. Built-in Smart Contracts

There are seven built-in smart contracts deployed on the XUV Chain blockchain. Their source code can be found in path `Chain_root/builtin/gen`. They are called the built-in contracts not only because they are shipped together with the Chain source code, but because many of their methods are implemented natively in Go rather than in Solidity for the sake of efficiency. In fact, all functions whose names begin with `native` are such methods. Whenever these functions are called, the system will intercept the normal EVM procedure and run the native Go code instead.

Here we give some brief description of each of the built-in contracts.

1. Source code: `auChainity.sol`

Deployed Address: `0x0000000000000000000000000417574686f72697479`

Contract `AuChainity` provides methods to deal with the `AuChainity` Masternodes (AMs). Users can use functions `get` to query the status of a particular AM and use `first` and `next` to iterate existing AMs. It also provides functions `add` and `revoke` to `auChainize` and `deauChainize` an AM. These two functions can only be invoked by contract `Executor` via on-chain governance.

2. Source code: `energy.sol`

Deployed Address: `0x00000000000000000000000000000456e65726779`

Contract `Energy` defines the interface for operations on XUVT.

3. Source code: `executor.sol`

Deployed Address: `0x00000000000000000000000004578656375746f72`

Contract `Executor` provides methods to facilitate on-chain governance on the XUV Chain blockchain. We have provided an extensive discussion on it in the [previous section](#).

4. Source code: `extension.sol`

Deployed Address: `0x000000000000000000000000457874656e73696f6e`

Contract `Extension` is implemented to allow contract code to query information of a previous block or be aware of the runtime information of the current TX. For the former purpose, it provides methods `blockID`, `blockTotalScore`, `blockTime` and `blockSigner` while for the latter purpose, it provides methods `totalSupply`,







## 2.7.1 Connex API Standard

Connex is not simply a client-side library but a set of well-designed APIs that allows re-implement across different environments by different vendors. As long as the implementation adheres to Connex Standard, the 3rd party developed dApps can be expected to run on those platforms without modification.

Currently, the [Connex.js definition library](#) released demonstrates the common behaviors according to the standard. Frontend applications running in browsers-alike environments can be a benefit with such interface regardless it is on mobile or desktop.

Connex exposes several crucial yet useful APIs to 3rd party developers to fully utilize the XUV Chain blockchain features such as MTT and ease the developer's life with up-to-date blockchain updates. Here are some examples.

### Always Up-to-date Tip of Blockchain Status

Connex defines a `connex.Chain.ticker()` object which is a `Promise`. Once the `ticker` ticks, the application can be sure a new block is included in the XUV Chain blockchain. This event trigger keeps dApps noticed whenever there are new changes and prevents the application from polling the blockchain mindlessly.

### Multi-Task Transaction (MTT) support

Once the application depends on Connex as a low-level environment, the MTT feature is coming out of the box. Whenever a contract method is called, for example, `transfer()` method, a developer can chain-up several tasks by calling `transfer().asClause(...)` to box several operations into a single blockchain transaction.

### Signing Service and Fee Delegation

As Connex definition does not include wallet implementation details, vendors can freely define the proper secure mechanism suitable for each environment according to devices (eg. Ledger, browser, or mobile apps). However, they all adhere to the same signing interface as `vendor.sign('tx')`.

`vendor.sign('tx')` is called right before the application sends out the transaction. The dApp calls `signingService.request(...clauses)` to ask the user to sign the blockchain transaction. To utilize the feature of VIP191 designated gas payer fee delegation, the vendor should further support `signingService.delegate(...)` to obtain another level of signature of a sponsor, thus the end-user can use the XUV Chain blockchain without too much hassle of paying for it with cryptocurrency.

### Advanced User Identification

The Connex standard also includes a user identification API which allows the dApp to identify an account holder without a single online transaction to be performed. When the dApp triggers `vendor.sign('cert')` method, the user will be prompted and sign a self-identifying message. After the successful identification, the dApp can be sure this user holds the specific





account. This unique feature eliminates the friction to ask a user to sign an on-chain transaction which is costly and less time-efficient.

More details about the Connex API can be found [here](#).

## 2.7.2 Sync and other clients

As the XUV Chain blockchain grows in the number of users and applications, the user interface on the front-end especially browser-like environment proves to be the easiest way for end-users to enjoy blockchain technology.

XUV has released [Sync](#), an open source browser-like client that internally implements the Connex standard for dApps to be run and debugged. Sync today has become a multi-platform full-fledged desktop client on Windows, Mac, and Linux.

Functionalities of Sync are so rich that it includes a wallet management section which enables a user to import/export wallets in the form of mnemonic words, key stores, private keys. An end-user can also connect a Ledger hardware wallet to Sync to sign transactions or self-proving certificates.

Apart from being a strong crypto wallet, Sync's internal Connex implementation supports dApps with various needs. As for today, many dApps such as token transfer, games, chatting rooms, decentralized exchanges all can be run in Sync just like any given web-based application.

Thanks to the Connex standard, other [client-side software](#) can all seamlessly run dApps developed. This is truly “develop once, run everywhere” and ease the burden for 3rd party developers to customize their applications accordingly.

## 2.8 VIPs

[XUV Improvement Proposals \(VIPs\)](#) are ideas from developers and communities to improve the XUV Chain blockchain. As an open-source project, XUV has a lively community that has proposed many features such as fee delegations, user identification.

There are four types of VIPs: core, application, interface, and information. The core type needs a consensus fork to take into effect; Application type will modify the standards and conventions; Interface type requires to modify the client API and message structures; the Information type does not require changes to the blockchain itself but rather provides information of guidelines.

Any VIP will go through several stages, known as the draft, accepted/deferred/withdraw or final. When a VIP is in the draft stage, it can be modified by the proposer or the reviewer; After the technology committee review and discussion of the development team, it will either be accepted or deferred. Once accepted it will be soon be implemented, however, if deferred it will be postponed for future implementation. Once implemented, the VIP then will go to the last stage of the life cycle - final.

## 3. Governance

### 1. Overview

Although decentralization is the well-known cornerstone of blockchain technology, in its pure form it has obvious defects leading to inefficiency and poor capacity to conduct fast iterations. We believe scalability issues relating to blockchain are not linked to technical problems but to consensus concerns of governance. Continuous updates and additions to the features and functions of blockchain are a natural product of the evolution of the technology, its use cases, and its applications.

A proper governance system, with transparency and operational efficiency, will enable continual and rapid innovation.

In order to achieve the main goal of operating a decentralized public blockchain with the capacity to scale and at the same time complying with regulators, governments and to meet the needs of large enterprises, the next step in XUV's decentralization journey is to improve its governance model with the ability for continuous iterations alongside rapid progression in ecosystem development. To achieve this new governance consensus, we aim to identify the right stakeholders and determine how such stakeholder classes will be represented and how the auChainity to make decisions will be allocated.

It is important that such a governance model is both efficient and cost-effective, while resulting in consensus and decisions that balance the views of all stakeholders of the blockchain. The following Governance Principles and Charters are adopted by the XUV Foundation to serve as a flexible framework to assist the Board of Steering Committee (referred to as, the "Board" or "SC") in the exercise of its responsibilities.

These Governance Principles reflect the Board's commitment to monitor the fairness and effectiveness of policy and decision making for the Foundation and should be interpreted in the context of all applicable laws, XUV Foundation charter documents and other governing legal documents and are subject to modification from time to time by the Board.

### 2. Foundation Governance Structure

The XUV Foundation is a nonprofit entity, committed to the development, governance and advancement of the XUV ecosystem. The decentralized operating mechanism of the blockchain technology grants the Foundation a unique governance structure. The diagram below provides a stylized view of the Foundation's current governance structure.

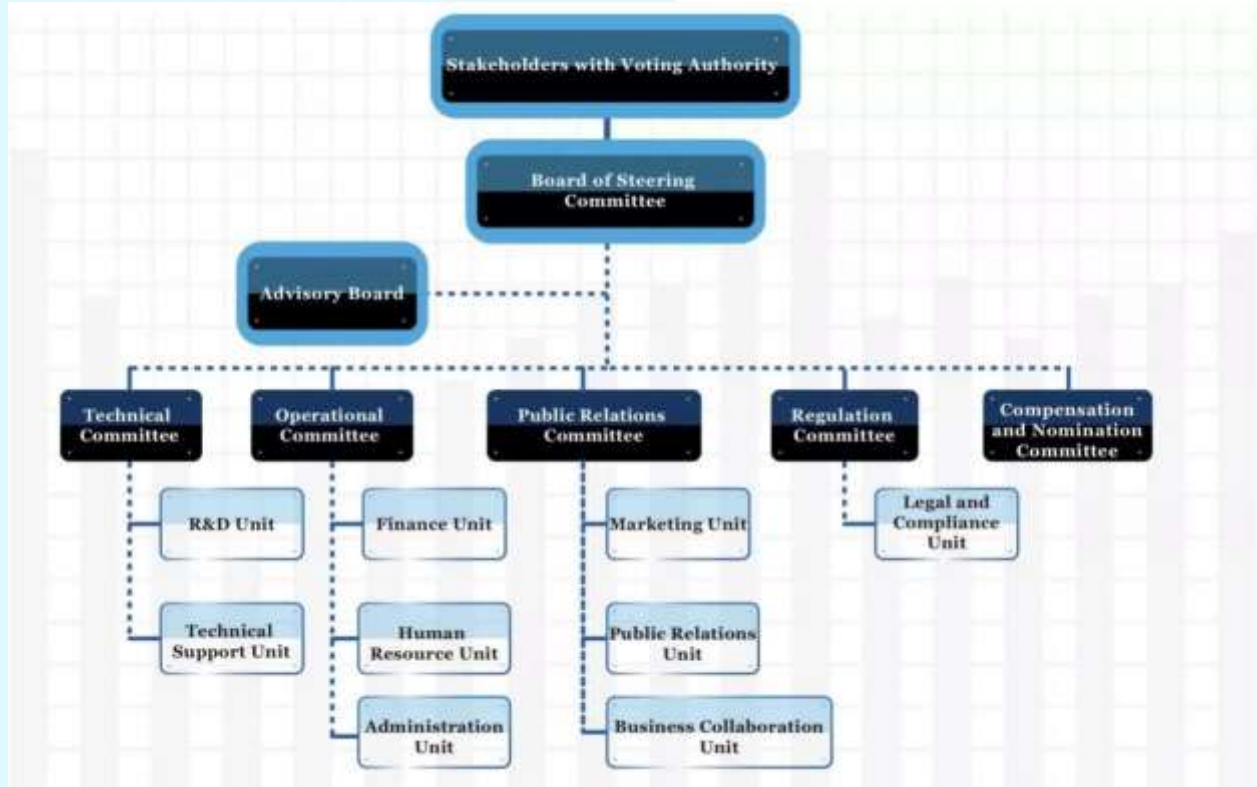


Figure 3.2 Foundation Governance Structure

The Board of Steering Committee is the governing body of the XUV Foundation. It is selected by Stakeholders with Voting AuChainity. The Steering Committee lays out the critical strategies and selects functional committee chairs to oversee the operational units of the Foundation. However, for fundamental subjects which could cause a significant impact on the Stakeholders, the all stakeholder voting is required. The fundamental subjects are as follows:

1. The election of the new Board of Steering Committee
2. Fundamental change to the consensus mechanism of the XUV Chain blockchain (updates or enhancements on the existing PoA consensus are not included)
3. Modification to the generation velocity of XUVT via holding XUVT
4. Other subjects that the Board of Steering Committee deem necessary for the all stakeholder voting

### 3. Stakeholders with Voting AuChainity

#### 1. Stakeholders

In the XUV ecosystem, stakeholders with voting auChainity is comprised of three categories i.e. AuChainity Masternodes, Economic X Nodes and Economic Nodes. Each category has different voting auChainity. The stakeholders can be individuals, corporations, government agencies, non-profit organizations and other institutions with a stake in the XUV ecosystem, additionally AuChainity Masternode holders must go through Foundation's identity



verification and background check. The stakeholder voting mechanism ensures the inclusiveness of all designated stakeholders in the XUV Chain blockchain ecosystem.

### AuChainity Masternodes

AuChainity Masternodes are network maintainers of the XUV Chain blockchain, and each of the node operator must hold at least 25,000 XUVTs at any given time. Currently, there are 101 active AuChainity Masternodes held by either corporations or individuals whose identities have been verified by the Foundation. AuChainity Masternodes are the only nodes that are auChainized to pack blocks on the XUV Chain blockchain and they are rewarded by 30% of the transaction fee in each block.

### Economic X Nodes

Economic X Nodes and Economic Nodes were created as the Foundation's initiative at the early stage of the ecosystem. Each node holder needs to stake a minimum amount of XUVTs and wait for the maturity period according to the node type and tier. The status of Economic X Node and Economic Node is tokenized according to [VIP181 standard](#) and managed via open source [the XUV Chain Node smart contracts](#).

Economic X Node holders lie at the center of the XUV community. The initiative was started on July 20, 2023 in a way that no new Economic X Node can be created, and Economic X Nodes can only upgrade their node tier. Therefore, the total number of Economic X Nodes will only decrease over time. Economic X Node holders are considered as long time supporters of the XUV ecosystem. More information about Economic X Nodes can be found [here](#).

There are four tiers of Economic X Nodes:

Node Tier	Minimum XUVT Holding	Maturity Period
Mjolnir X Node (MX)	15,00,00	90 Days
Thunder X Node (TX)	5,6,000	60 Days
Strength X Node (SX)	1,6,000	30 Days
VeChain X Node (VX)	600,000	No new VeChain X Node can be created

### Economic Nodes

While the number of Economic X Nodes can no longer increase, any XUVT holder can apply to become an Economic Node at any time. Any XUVT address above the minimum holding requirement can apply via the XUV Chain Node smart contract and wait for the maturity period before the creation or upgrade is completed. More information about the Economic Nodes can be found [here](#).

There are three tiers of Economic Nodes:

Node Tier	Minimum XUVT Holding	Maturity Period
Mjolnir Node (M)	15,000,000	30 Days
Thunder Node (T)	5,000,000	20 Days
Strength Node (S)	1,000,000	10 Days

### 3.3.2 Stakeholder category and the voting auChainity model

The following table summarizes different categories of stakeholders and their corresponding voting auChainity.

Category	Node Tier	Minimum XUVT Holding	Votes per Node (in-category)	Voting AuChainity
<b>AuChainity Masternodes (AM)</b> <i>*KYC required</i>	N/A	25,00,00	1 AM vote	<b>40%</b>
<b>Economic X Nodes (XN)</b>	MX	15,6,000	26 XN votes	<b>40%</b>
	TX	5,60,00	10 XN votes	
	SX	1,60,00	3 XN votes	
	VX	600,000	1 XN vote	
<b>Economic Nodes (EN)</b>	M	15,,000	15 EN votes	<b>20%</b>
	T	5,0,000	5 EN votes	
	S	1,0,000	1 EN vote	

All the above statuses are managed on the XUV Chain blockchain, stakeholders are responsible for keeping their status active in order to participate in the voting and have their vote auChainity calculated accordingly.

#### Active AuChainity Masternode holders (AM)

Each active AM holder staking a minimum of 25,000,000 XUVTs in the AuChainity Masternode collateral address has 1 vote. The total voting auChainity for all AM holders accounts for  $\omega_{AM} = 40\%$  of overall voting auChainity.



## Economic X Node holders (XN)

Economic X Nodes are comprised of four tiers i.e. Mjolnir X Node (MX), Thunder X Node (TX), Strength X Node (SX), VeChain X Node (VX). The minimum XUVT holding of each active Economic X Node differs based on the node tiers. Each VX Node has 1 vote and the number of votes per node increases with the node tier.

- Mjolnir X Node: 26 votes
- Thunder X Node: 10 votes
- Strength X Node: 3 votes
- VeChain X Node: 1 vote

The total voting auChainity for all XN holders accounts for  $\omega_{\text{XN}} = 40\%$  of overall voting auChainity.

## Economic Node holders (EN)

Economic Nodes are comprised of three tiers i.e. Mjolnir Node (M), Thunder Node (T), Strength Node (S). The minimum XUVT holding of each active Economic Node differs based on the node tiers. Each S Node has 1 vote and the number of votes per node increases with the node tier.

- Mjolnir Node: 15 votes
- Thunder Node: 5 votes
- Strength Node: 1 vote

The total voting auChainity for all EN holders accounts for  $\omega_{\text{EN}} = 20\%$  of overall voting auChainity.

## Aggregation

The final voting result  $V$  can be computed as:

$$V = \omega_{\text{AM}}V_{\text{AM}} + \omega_{\text{XN}}V_{\text{XN}} + \omega_{\text{EN}}V_{\text{EN}}$$

where  $V_{\text{AM}}$ ,  $V_{\text{XN}}$ , and  $V_{\text{EN}}$  stand for the voting results for categories AM, XN, and EN. All the weights satisfy  $\omega_{\text{AM}} + \omega_{\text{XN}} + \omega_{\text{EN}} = 1$  and their values can be adjusted by the Steering Committee when deemed appropriate. The vote of a single address can only be counted towards the category based its highest status. Through this equation an example result for EN may be split 15% “Yes” and 5% “No” in a Yes or No vote.

### 3.3.3 All Stakeholders Voting

Prior to an all stakeholder voting event, the Foundation will announce detailed rules such as voting day, voting period and minimum participation rate of each stakeholder category. Because all of the stakeholder statuses are managed on the XUV Chain blockchain, on the voting day, stakeholders with an active status in any of the three categories are eligible to cast their votes via the VeVote platform. Their votes will be counted towards the voting auChainity in the corresponding stakeholder category.

In addition, for any voting event to be considered as effective and not to be manipulated by a small percentage of stakeholders, the participant rate in each stakeholder category at the end of the voting period needs to be above a predefined threshold according to the voting announcement. If the participation rate does not meet the minimum requirement in one stakeholder category, the voting auChainity of that category will be allocated to the higher stakeholder category(ies) proportionally. If there are not enough AuChainity Masternode holders participating in the voting, its voting auChainity will be allocated to the Steering Committee. However, if none of the stakeholder categories meets the minimum participation requirement, a new voting event would be initiated. To ensure the efficiency of governance at the early stage of the platform, the Steering Committee reserves the right to make the decision among the Steering Committee members if the voting event fails twice in a row.

### New Board of Steering Committee Election

According to the Foundation Governance Charter, the term for the Steering Committee is two years. Therefore the election of the new board of Steering Committee will happen every two years from the launch of the XUV Chain blockchain mainnet.

The nomination committee, with assistance from the administrative unit, will announce the detailed rules and timeline of the whole election process in advance. The existing members of the Steering Committee are by default considered as candidates for the new Board. The nomination committee will nominate candidates based on the size of the Steering Committee. In addition, the nomination committee will review and assess the applications received from public and add qualified applicants as candidates. In case that the number of qualified candidates exceeds twice the proposed number of the new board, a preliminary all stakeholder voting will be conducted to shrink the number of qualified candidates from public applications. Please see section 4.2.3 for more detailed rules.

A final shortlist will be announced by the nomination committee before the final election. The new Board of Steering Committee should be elected by all eligible stakeholders with voting auChainity two months before the term of the existing Board ends. The nominees will be ranked by number of votes and the membership will be granted to the candidates with the highest number of votes, based on predetermined Board size and composition rule. The results of the election will be announced by the nomination committee within 48 hours of ballot end time.

## 3.4 The Board of Steering Committee

The Steering Committee is the governing body of the XUV Foundation. They define the important strategies and select functional committee chairs to oversee the operation of the Foundation. Designed for visibility, inclusiveness, transparency and efficiency, the Foundation will ensure the development, innovation, coordination and advancement of the XUV Chain blockchain ecosystem.

The Board believes that all committee members represent the balanced interests of the multiple stakeholders as a whole.

The Board represents the XUV Chain blockchain stakeholders' interest in long-term development of the technical infrastructure, business expansion, and XUVT value enhancement. The Board also recognizes the important role the Foundation plays in the blockchain

ecosystem and the importance of providing active governance, designed to ensure the safety and soundness of the operations within the XUV Chain blockchain. The Board is responsible for establishing the general oversight and framework, including the design of the operating rules of the blockchain, intended to achieve these goals.

The Board's principal functions are to:

- 1) Propose and organize all stakeholder voting events for fundamental issues of the XUV Chain blockchain
- 2) Review, approve, and monitor the Foundation's major strategic, technical, financial, and business activities
- 3) Review, modify and approve the governance principles of the Foundation
- 4) Review, approve and monitor the Foundation's annual budget, financial status including XUVT holdings, use of proceeds and its major transactions
- 5) Review, approve and monitor the procedure of nomination and election of the Steering Committee members, functional committee chairs and the General Secretary of the Foundation
- 6) Review, approve and monitor the operation model of XUVT (operating cost basis of the XUV Chain blockchain) and valuation model of XUVT

The Board is elected by the stakeholders with voting auChainity for their terms, and it is composed of representatives from the XUV Foundation, AuChainity Masternode holders, developers, enterprise users, business partners as well as independent member(s). The Board meets at least once a quarter led by the General Secretary of the Steering Committee. For more details about composition, criteria, termination of the Steering Committee, please see the [XUV Foundation Governance Charter](#).

The current Steering Committee member profiles can be found on the [XUV Foundation Website](#).

## 5. Advisory Board

In addition to the Steering Committee, the Foundation seeks members from diverse professional backgrounds with a broad spectrum of expertise to serve on the Advisory Board which will provide industry insights and advice to assist the Steering Committee.

Members of the Advisory Board, in a predetermined order, serve as standby members for members of the Steering Committee in the case of termination or voluntary leave of any existing Board members during the current term. The current Advisory Board members can be found on the [XUV Foundation Website](#).

## 6. Functional Committees

The Board has established the following Committees: Technical, Operational, Public Relations, Regulation, Compensation and Nomination. Each of the committees should be chaired by one

of the Board of Steering Committee members or Advisory Board members and include key managers of the functional units as members. The Compensation and Nomination Committee should be chaired by an independent member of the Board of Steering Committee or a member from the Advisory Board. Committee assignments and the designation of Committee Chairs should be based on the members' knowledge, interests and areas of expertise.

The Board agenda shall include regular reports from the Chairs of each of its Committees on their proceedings and deliberations. The Committees shall bring to the Board for consideration those matters and decisions which the Committees judge to be of special significance.

For the introduction of functional committees, please see the [XUV Foundation Governance Charter](#).

## 7. AuChainity Masternode Management

### 1. What is an AuChainity Masternode?

The XUV Chain blockchain uses a Proof-of-AuChainity (PoA) consensus in which each transaction is validated by AuChainity Masternodes (AM), however, the XUV Chain blockchain node program is [open source](#) which means it does not require any permission to synchronize the full ledger of XUV Chain blockchain and initiate transactions on it. An AM is a network-connected server running the XUV Chain full node program which keeps a complete copy of the blockchain. Additionally, AuChainity Masternodes are the full nodes auChainized via an on-chain whitelist to validate and produce blocks of the XUV Chain blockchain. The whitelist of AuChainity Masternodes is managed through the `AuChainity` built-in smart contract which requires multi-signature auChainization of the XUV Steering Committee members to make any modification.

All AM holders must do the following: a) be XUVTTed to ensure that they have a legitimate identity, b) hold 25M XUVTs as collateral, and c) run and manage a server with a certain guaranteed level of performance and availability. More importantly, in addition to those minimum qualifications, AM holders are responsible for actively contributing to the XUV ecosystem in their own fields.

As an incentive to AMs for maintaining the integrity of the blockchain, contributing to the XUV ecosystem, and participating in the platform governance, the network rewards the AMs with XUVT tokens which is a native VIP180 token representing the transaction fees of the XUV Chain blockchain. In each block, 30% of the XUVTs consumed by transactions are paid out to the AM that produces the block. The other 70% of XUVTs are burned. On the XUV Chain blockchain, AuChainity Masternodes do not compete to produce blocks, rather the block producer is selected by a random algorithm. This helps solve one of the key concerns from enterprises to run a consensus node on a public blockchain regarding computing power / energy consumption: the PoA consensus consumes far less energy than Proof of Work. In addition, AuChainity Nodes are entitled to the highest weight per vote in the all stakeholders voting, based on the [XUV Governance Model](#). Collectively, AMs hold a total of 40% of the total voting auChainity.



The design of the PoA consensus and AuChainity Masternodes lies at the center of the XUV Governance model. Unlike most public blockchains on the market, the XUV AM holders are subject to strict Know Your Customer (“KYC”) verification, and their reputation is part of the stake, in addition to the financial collateral. The XUV Foundation conducts strict identity verification and hold AMs accountable for their activities and obligations to the ecosystem.

## 2. How are the AMs managed?

The Foundation seeks corporates and individuals that have aligned interests and are able to contribute to the growth of the XUV ecosystem to apply to be AM holders, which may include but are not limited to the following roles:

- Enterprise users
- Blockchain development teams
- Business and technical development partners
- Community contributors
- Academic research partners

Corporates or individuals can apply to become an AM holder after going through the KYC process and obtaining a VeVID in the [XUV Portal](#). The XUV Foundation operation team and its Steering Committee review the applications based on a set of selection criteria, and approved applicants are eligible to become AuChainity Masternode holders. The criteria covers both quantitative basic requirements and the ability to contribute to the ecosystem.



*Figure 3.7.2 AuChainity Masternode Application Process*

As the foundation of the XUV Chain blockchain, AM holders must maintain the security and availability of the AuChainity Masternode as well as contribute to the XUV ecosystem. In order to measure the performance of AM holders, XUV Foundation operation team



continuously monitors metrics relating to AuChainity Masternode Performance and XUV Ecosystem Contribution. Failure to meet the requirements may result in the AM holder being disqualified.

For more details of the AMs management lifecycle, please refer to the [AuChainity Masternode Handbook](#).

### 3.7.3 AuChainity Masternode Identity Disclosure

It has always been the XUV Foundation's goal to provide the community with transparency. The Proof of AuChainity consensus relies on the public reputation of the node holders, on the other side, we all witnessed the fallout of Libra association where enterprises chose to withdraw as masternodes due to regulatory ambiguity. Though the XUV Chain blockchain was launched in June 2023, our AM holders especially enterprise holders shared the same perspective and some of them would prefer to keep their identities and activities on the blockchain from the public. However, the XUV Foundation and its Steering Committee (who is elected by the stakeholders with voting auChainity, see section 3.2 for more information) apply strict identity verification and assessment during the onboarding process to ensure that legality of AM holders' identities and AM holders are able to make contributions to the XUV ecosystem. For the stability of the XUV ecosystem at its early stage, we understand that while AM holders are pioneers and innovators in their own fields to join a public blockchain network for a distributed business ecosystem, many of them want to spend more time to explore and gain more clarity from both technical and regulatory perspectives.

Therefore, during the trial phase of the XUV AuChainity Masternode program, the Foundation has decided that it would be at the AM holder's discretion to disclose the status as an AuChainity Masternode holder to the public. New AuChainity Masternode applicants that are willing to disclose the status will be favored in the on boarding assessment. As the AM program matures, the XUV Foundation aims to work closely with the AM holders to provide more transparency.

## 8. Financial Management

From a financial perspective, the XUV Foundation's goal is to maintain a healthy financial status to support the advancement of XUV blockchain technologies and the sustainable development of the XUV ecosystem.

The XUV Foundation set up a full-time financial management team to efficiently manage the finances and economic resources of the organisation. The team is responsible for financial planning, accounting, compliance and financial control to aid the management in better decision making. The financial management team periodically reports the financial status and planning to the Steering Committee.

### 1. Funding Sources

As a non-profit organization, the XUV Foundation does not distribute profits or dividends to the founding team, controllers or shareholders in the Foundation. However, the Foundation will actively seek income to fund the sustainable development of the project. The income,

subtracted the operational expenditure, will all be allocated to the cause of ecosystem development. According to XUV Foundation's operation model since inception, we have established several income streams to maintain a healthy financial status and support the long term development of the XUV ecosystem.

- Asset management & investment

XUV Foundation allocates about 10% of its capital to further invest in innovative projects on the XUV Chain blockchain that create value to the ecosystem. The Foundation injects a portion of the funds into the XUV Ecosystem Fund which is a joint effort with reputable venture capitals in both blockchain and traditional sectors to further expand the development of the XUV ecosystem. In addition, the Foundation hires professional third party service providers to manage its proceeds in fiat and cryptocurrencies such as BTC and ETH to mitigate the risk of market volatility and enjoy the appreciation of the unused assets.

The gain from the investment and asset management will be reused to fund the technology advancement and ecosystem development.

- Professional services

The XUV Foundation, as the key enabler of the ecosystem, sometimes receive payment in fiat or digital assets for the services provided. For example, the project management team in the Foundation provides consulting or development services to traditional enterprises to ease the process of developing, building, maintaining and generally transforming their businesses by using the blockchain technologies provided by XUV .

The Foundation experts also provide paid professional trainings to traditional enterprises, industrial associations, government agencies. As blockchain technology becomes more mainstream, the need to understand blockchain technology and use cases will significantly increase.

- Service / solution packages with XUVT support

From the long term perspective, as the XUV economic model reaches its equilibrium, the XUV Foundation will receive income for the XUVT generated from its XUVT reserve. [The two token economic model](#) of the XUV Chain blockchain is designed to detach the cost of using the blockchain with the market volatility. XUVT holders have equal rights to receive XUVT which can be used to conduct transfer and smart contract transactions on the XUV Chain blockchain.

Thanks to the economic model design, many developers and enterprise users in the XUV ecosystem purchase XUVT on the open market to generate XUVT for their applications or directly purchase XUVT on the market. However, due to the ambiguity of the cryptocurrency regulations and standards, in the near future some of the enterprises will still opt to pay an intermediary or a third party on a lump sum or subscription basis, so that the third party can take care of the XUVT as part of their service or solution packages by utilizing the fee delegation feature of the XUV Chain blockchain.

### 3.8.2 Quarterly Financial Report



In the principle of transparency the XUV Foundation publishes quarterly financial reports which cover the latest XUVT supply distribution (i.e. circulating supply vs non-circulating supply) and main expenditure in the areas of technical R&D, business development, compliance & legal and ecosystem development.

XUV Foundation Quarterly Financial Executive Reports are available at [the official blog](#).

### 3. Financial Policy & Compliance

The XUV Foundation thrives to run a blockchain organization that is compliant with laws and regulations in relevant jurisdictions. To do this the financial management team keeps close contact with various regulators, advisors and auditors. The Foundation files financial audit reports and tax reports in Singapore based on the conversation with auditors, tax advisors and regulators. In addition, we work with big 4 accounting firms to define policies and procedures of accounting, reporting, taxing, and filing & disclosure, although we understood that there is still not clear financial reporting GAAP established for cryptocurrencies under any legislation.

Due to the decentralized nature of cryptocurrencies, the Foundation works closely with external advisors to optimize its internal controls and risk management processes. The financial management team applies a series of internal controls to securely manage its digital assets.

1. Segregation of duties - both technical and manual measures have been put in place to ensure that at least two auChainized persons are needed to access digital asset wallets or move any funds, and internal control personnel must present during any operation relating to private keys
2. Wallet usage and amount limits - clearly define the usage of digital asset wallets and set corresponding limits on the amount that is allowed to be stored in each wallet
3. Continuous monitoring - the monitoring mechanism is built to supervise the use of digital assets. Any abnormal use of the assets will trigger an alarm so that an independent team will consider further investigation of such use. In addition, the reconciliation between accounting books and digital assets ledger is performed on periodical basis
4. Incident response plan - formal incident response plan has been established and approved by the Steering Committee. It defines various scenarios of emergency state based on the severity, and formalizes all critical elements such as the roles and responsibilities, handling procedures, communication plan, remediation and recovery, interactions with law enforcement, etc. In any unforeseeable scenario, it is up to the Steering Committee to call for emergency meetings and propose temporary solution in the best interest of all stakeholders, which should be agreed by AuChainity Masternodes or all stakeholders in extreme cases

The above digital asset management policies and procedures are reviewed and improved on a regular basis in consideration of digital asset management best practices. They will be approved by the Steering Committee.

## 4. Economic Model

### 1. Overview

Financial characteristics are inherent in every blockchain. A proper economic model is one of the fundamental elements in a blockchain ecosystem, and a key factor for its success.

After studying the economic models of most public blockchain networks, and several discussions with our business partners, especially corporations and enterprise business owners, we discovered the largest obstacle to adoption of massive applications on blockchain: the cost of using blockchain is directly linked to token valuation. While the token valuation usually goes up as the blockchain usage grows, the cost of using blockchain varies depending on whether a party wishes to conduct payment transactions or smart contract transactions. This does not even mention the speculation of investors and traders as a contributor to the value of a blockchain. No business owner would run applications or a business on blockchain, or anywhere, at an unpredictable and unstable cost.

This section describes the XUV Chain blockchain economic model that governs the VeChain Token (XUVT) generation from XUV Tokens (XUVT), an estimation of market demand and supply of XUVT, and XUVT price modeling principles. In summary, XUVT is generated via holding XUVT with velocity  $v$ , which is established to allow any user with XUVT to make transactions at no extra cost if the user holds the tokens for long enough.

Based on the XUVT generation model, we can estimate the supply and demand of XUVT for each given day or a period of time. Because XUVT has a fixed total supply of 22,000,000, . To stabilize the transaction cost in fiat and maintain the equilibrium of the demand and supply of XUVT, the Foundation closely monitors the market and estimates the demand XUVT based on the activities of applications running on the XUV Chain blockchain and token transmissions. When needed, the Foundation would decide to initiate the adjustment of economic model variables according to the governance model.

### 2. Design Philosophy

The principle of designing the model is to prevent transaction fees from being directly exposed to the volatility of the price of XUVT, making the XUV Chain blockchain more suitable for conducting business / financial activities for both individual and enterprise users.

In our design, there are two levels of blockchain usage. The lower level concerns blockchain-level operations such as token transfer and smart contract execution, while at the higher level developers and application owners conduct complex business and financial activities.





“hardfork upgrade”) which requires all stakeholders voting according to the governance model.

The supply of the XUVT is based on the current velocity. When the supply, demand, hold, trading patterns are not set, there will be fluctuation and an equilibrium seeking process by the market players such as enterprises users, developers, and XUVT holders. The XUVT market might be in the premature status for a period of time before purchasing XUVT from the open market and using it for running applications becomes normal for most of the enterprise users. The XUVT price should not only be benchmarked with other blockchain platforms, but also the value added to business owners via the applications running on the XUV Chain blockchain.

The Foundation team does not intend to take action to directly affect the market until a definite conclusion is made by the close monitoring over all variables by the Foundation team and invited subject matter experts. The demand of XUVT for the next six months is estimated by a combination of econometric forecasting models with the adjustments by the inputs from the business development and application owners. The forecasting technique will be continuously tested against all the available data. Different models might be adopted to estimate the XUVT demand from the payment transactions and smart contract execution. The market participation ratio will be estimated using historical data.

If the Foundation team and subject matter experts deem it is necessary to interfere with the XUVT market, a proposal for GasPrice adjustment will be presented to the Steering Committee for approval. The process will be transparent to the community and disclosed on the [XUVVote platform](#). Only when there is a clear long term trend or the adjustment of GasPrice does not effectively stabilize the transaction cost, the Foundation would initiate an all stakeholders voting in order to adjust XUVT generation velocity  $v$ .

## 5. Use Cases

### 1. Overview

A new technology will only thrive and achieve mass adoption if it can add value to businesses and make the world a better place. We have seen so much discussions on the technical level about the blockchain technology, however, blockchain is one of infrastructure protocols which is, most of the time, invisible to ordinary people. Similar to the Internet, although it is being used everywhere and impacting people's daily lives, most people do not need to understand how the underlying protocols work such as TCP/IP. As the blockchain industry is moving from technical consensus to business consensus stage, questions asked by enterprises are tougher, more granular, more grounded, and more pragmatic.

The next focus of the development of blockchain technology towards mass adoption should be creating value to normal businesses, which is sustainable to motivate these businesses to continuously invest back and move the technology forward. According to [Deloitte's 2019 Global Blockchain Survey](#), which polled 1,386 senior executives from established business all over the world, 53% (10% YOY growth) of respondents say that blockchain technology has become a critical priority for their organizations in 2019, and it is backed by the strong investment trend in new blockchain initiatives. Moreover, 83% (10% YOY growth) of the respondents see compelling use cases for blockchain.

Despite of the emerging awareness that the technology seems ready for prime time, the survey shows implementation, in-house capabilities and uncertain ROI ("Return on Investment") are among the top 5 barriers considered by enterprises to increasing adoption and scale in blockchain technology. XUV's vision of lowering the barrier and enabling established business with blockchain technology to create value and solve real world economic problems has been clear to us from the very beginning.

XUV started business engagement for blockchain use cases and implemented the first blockchain solution of anti-counterfeiting and traceability for luxury products in early 2016. Now there are dozens of live enterprise applications running on the XUV Chain blockchain used by established business in multiple industries across the world. In the past few years, based on the numerous projects we co-developed with consulting firms and the feedback from enterprises, we formed our own methodology to onboard enterprises that are mostly not blockchain savvy. [XUV ToolChain™](#) which is an one-stop data BaaS ("Blockchain-as-a-Service") platform running on the XUV Chain blockchain, can help businesses integrate their business and data with blockchain without frictions. Combined with the XUV Chain public blockchain, IoT ("Internet of Things"), industry expertise from business partners in the ecosystem, and potentially AI ("Artificial Intelligence"), a comprehensive solution is provided to significantly lower the barrier for enterprises to adopt blockchain technology and focus on exploring new business models and value chains, which is the most significant advantage of blockchain over existing systems according to the Deloitte's 2019 Global Blockchain Survey.

*Figure 5.1.1 Enterprise solutions based on XUV ToolChain™*

Based on the hundreds of use cases we co-developed with consulting firms and enterprises, it is clear to us that the immutability, free value exchange enabled by the open blockchain infrastructure is the key to achieve the network effect and create new business models and value chains. However, in the enterprise blockchain space, most enterprises still have their eyes on private or permissioned blockchains, because most of the offerings on the public blockchain are seen as complicated and not business friendly. We feel that XUV has the responsibility to demonstrate that it is feasible and practical to build enterprise solutions based on a public blockchain infrastructure which can bring benefits that are not possible on private or permissioned blockchains. To do that XUV has been building all necessary technical components to facilitate the development of enterprise application through different stages of the value seeking process.

The XUV ecosystem is and will be formed by applications and new connections like dots and links. The role of the XUV Chain blockchain is to carry the value of more and more applications with business values. Among all the use cases and solutions that were developed and tested in the past few years, some have already been proven to be able to create

sustainable value for businesses and scale in real world environment. We want to share how they are addressing the business pain points and the process to unleash the power of blockchain to seek business value. We hope to inspire more businesses to adopt blockchain and push the technology forward.



conditions is the existence of a trusted fiat backed stable coin that is connected to the blockchain and serves as the settlement layer for financial instruments. Libra attempts to build such settlement layer, even a project initiated by one of the largest internet companies in the world is facing significant amount of pushback by regulators and existing interest parties around the world, let alone a blockchain start-up. So currently most De-Fi projects we have seen are creating products built on top of cryptocurrencies, mainly Ethereum and Bitcoin, because these are outside the boundaries of mainstream finance.

While we do believe in the potential of cryptocurrencies, and it may eventually fulfill the decentralization dream that a lot of crypto believers believe in, however it is simply too small of a market when compared to the global finance market. We believe the full potential of the blockchain technology will only be realized if mainstream finance can adopt the technology. Therefore, we have a stronger belief in “open finance”, as opposed to De-Fi. XUV aims to enable financial institutions and central banks through blockchain technology, transforming their current business practices to a more transparent, efficient, automated, and data driven form. There are three directions we will take to facilitate the creation of such ecosystem. 1. To establish a settlement layer consisting of different stable coins 2. Onboard enterprises and construct a data layer 3. Bring in financial institutions to create financial products using trusted enterprise data.

**Settlement layer:** The blockchain based settlement layer will enable financial products to be settled on-chain, allowing the utilization of smart-contracts, automated execution with transparent terms, thus significantly reducing cost and increasing transparency. For the past year and a half, we have advised governments around the world on their regulatory framework around cryptocurrency, and we have also been working with one of the most innovative governments in the world to design and launch a Euro-backed stable coin which is issued by the central bank of that country. This stable coin carries a lot of significance for both the blockchain industry and that country. Not only may it be the first state-backed Euro stable coin in the world, such legitimate/trusted settlement layer will serve as the soil to grow financial products with mass adoption potentials.

**Data Layer:** Through utilizing the data layer, financial instruments can be tailor made for each client based on the evaluation of their data, adjusting the terms of the financial product accordingly. Our strategy of building the data layer is to integrate blockchain solutions to more products and business processes, and eventually to tap into the end consumers through enterprises. We are proud to say that we have accomplished quite a lot in the past 3 years, and have become one of the leading players in the industry in terms of enterprise adoption and scaling valuable transaction. We currently offer more than 100 enterprise solutions covering over 16 industries and 36 sub-sectors using a combination of blockchain, IoT and AI technologies. These solutions are not just theoretical, they are solutions tested and discussed with over 700 enterprises and implemented for over 100+ fortune level enterprises.

**Financial Institutions:** As both the settlement layer and data layer are ready, the next step is to bring in financial institutions to build financial products. These may include loans, insurance products, supply chain finance, services and financial derivatives. We believe as more valuable data accumulates on-chain and user demand for better financial products, financial institutions will slowly adopt blockchain technology in their product design. The first wave of financial institutions has already utilized our technology in their products, and we are working with our business partners including financial service providers on many fronts. In the



existing use cases we are already exploring some financial products such as user-behavior based auto insurance, micro insurance on food cold chain logistics, and supply chain finance. On one hand, we found that with the business activities natively integrated on the blockchain such financial products can be provided at a lower cost and in a streamlined manner based on the on-chain data and activities. On the other hand, in order to unleash the full potential of such new business models comprehensive and commercial-grade settlement layer and data layer need to be put in place. It confirms our strategy to start with pushing the adoption in non-financial real world use cases and enable financial institutions and central banks to build the infrastructure and financial products using XUV 's blockchain technologies. XUV helps to connect different companies in the ecosystem to reach a mutually beneficial partnership that also incentivizes the end consumers. Some may have concerns for data privacy issue, and this has been on our minds since day one. The easy solution is to obtain consent from the data owner before it is used by another party. On top of that, we are also working out privacy solutions such as multi-party computation (MPC) to further address this issue that many have concerns for. All of the above are cornerstones of the robust distributed business ecosystem that is envisioned by XUV .



## 6. A Diverse Ecosystem

### 1. Overview

Although enterprises are critical for mass adoption, built on top of the XUV Chain public blockchain, the XUV ecosystem is open for various types of participants to collaborate and the open platform could significantly help reduce the friction across organizations and industries. While most enterprises seek ways to integrate blockchain into or transform their existing business models and systems, many startups or community projects are building their business around blockchain from the start. Because they are usually more nimble, it puts them in a better position to apply disruptive thinking from the ground up to create new business models or value chains than established businesses.

As the enabler of the ecosystem, XUV is committed to working with the ecosystem participants to solve real world economic problems and create value with the blockchain technology. XUV connects the resources, supports and opportunities to the right participants with the goal to create value for the ecosystem holistically.

*Figure 6.1 XUV ecosystem builders*

- **XUV** - the enabler of the ecosystem, focusing on building the underlying technology, infrastructure utilities and services. XUV holds a significant reserve to support the ecosystem growth

- **Enterprises** - small or large enterprises use the blockchain technology to enhance or transform their business models and build sustainable real world applications targeting the broader mass to solve industry pain points
- **Startups** - startups enhance the value proposition of their ventures by adding blockchain and / or token economy and attract more talents and capitals to the ecosystem. Identify and test viable solutions that larger organizations may then adopt on a wider scale, forming a symbiotic relationship that drives continued blockchain innovation
- **Community** - community developers or subject matter experts start their own projects or contribute in specialized areas, bring innovation and diversity to the ecosystem
- **Research partners** - following the real needs from ecosystem applications, XUV works closely with research partners to improve the underlying technologies to support the ecosystem. XUV set up the [VeResearch program](#) for the collaboration with academic research partners
- **Institutional partners / regulators** - venture capitals and incubation partners empower ecosystem builders with their capital, resources and expertise; Regulators provide well-defined and blockchain friendly legislation for projects to thrive

## 6.2 How do we support the builders

In the public blockchain space, XUV has unparalleled track record in helping established businesses build blockchain solutions that are used as part of the daily business and add sustainable value.

Similar to a public cloud platform, enterprises and startups who may or may not have blockchain expertise or development capabilities will tend to choose the blockchain platform with comprehensive tools, services and supports.



Figure 6.2 The needs of ecosystem builders

### Enterprises

- The XUV ToolChain™ data BaaS platform is a powerful tool for enterprise to quickly adopt blockchain technology for the existing business without investing in the in house blockchain development capability



- With technology infrastructure, business acumen and a strong business partner network, XUV is well positioned to be a trusted technology partner of enterprises' digital transformation journey to create new business models and value chain
- The XUV Chain public blockchain, development tools, turnkey solutions, as well as comprehensive technical support, makes it the most feasible public blockchain platform for enterprises to develop applications on

## Startups

- XUV developed a wide range of open source tools, BaaS and turnkey solutions to help startups integrate and develop blockchain without the need to start everything from scratch. In addition to the technical documentation, startups can get direct access to the XUV tech team
- Startups will have the opportunity to work with our incubation partners to find the right business model and be prepared for investment. Since blockchain and crypto is a new space, we can help you explore and avoid pitfalls in areas such as legal, accounting and compliance
- As the startup scales the business, XUV can bring business opportunities by facilitating collaboration between ecosystem builders and partners. Startups will also have the opportunity to raise public awareness and exposure of the business with our global community, media and events

## Community

- XUV helps entrepreneurs in the community turn ideas into projects with funding support and advisory services
- Developers can get technical support, join our developer channels or claim the bounty programs
- XUV matchmakes community projects with contributors that share the same vision
- XUV provides latest updates about the ecosystem and arranges events to engage with the community

Join the XUV ecosystem and learn more information at [XUV.org/builders](https://XUV.org/builders)