

# TURN NETWORK



# Table of Contents

## 1. Introduction

- 1.1 History of Blockchain Technology
- 1.2 TURN Network's Innovation in the Blockchain Sector

## 2. Market Analysis

- 2.1 Challenges Faced by Existing Blockchain Networks Within Fully On-Chain Gaming Sector
- 2.2 Solutions by TURN Network

## 3. The Vision and Mission of TURN Network

- 3.1 The Long-Term Vision of the TURN Network
- 3.2 The mission of the TURN Network and the challenges it aims to address

## 4. Technical Architecture

- 4.1 Innovation and Implementation of the TURN Network Technological Framework
- 4.2 TURN Network: The Hierarchical Structure and Functions of L1 and L2
- 4.3 Comprehensive Deepening of TURN Network's Core Technology
- 4.4 TURN Network: The Core Component of the Application Ecosystem

## 5. Core Features and Innovation

- 5.1 Key Features of the TURN Network
- 5.2 Micro-node Applications
- 5.3 Dynamic Gas Fee System
- 5.4 Temporary Private Key Technology
- 5.5 Mobile Mining

## 6. \$TURN Token Economics

- 6.1 \$TURN Reward Mechanism
- 6.2 \$TURN Consumption Channels and Burn Mechanism

## 7. TURN Network Governance Structure

## 8. TURN Network Roadmap and Future Planning

- Q4 2023 - Initial Stage
- Q2 2024 - Expansion Phase
- Q4 2024 - Q3 2025 - Maturity Stage

# 1 Introduction

## History of Blockchain Technology

As the world embraces digitalization, blockchain technology, a revolutionary innovation, has attracted global attention. From the advent of Bitcoin to the innovation of Ethereum's smart contracts, the technology has evolved, demonstrating its vast potential and diverse applications. The fundamental principle of blockchain is decentralization, providing a new kind of data storage that's transparent, secure, and immutable.

However, as the market matures and user demands increase, current blockchain architectures face significant performance limitations, scalability issues, and user experience challenges. This situation has led the blockchain community to urgently seek new solutions to fulfill the rapidly growing market needs.

# 1 Introduction

## TURN Network's Innovation in the Blockchain Sector

Currently, as blockchain technology continues to seek advancements, TURN Network has emerged with a groundbreaking vision, marking a new era in this field. TURN Network, a leading blockchain platform, is committed to tackling the unsolved challenges of the existing blockchain. It has unveiled a revolutionary dual-layer architecture design, made up of an L1 primary layer and L2 sharding sub-layers (Bubble Network). This design maintains the fundamental principles of decentralization and enhanced security, while significantly boosting the network's processing efficiency and scalability through the integration of highly efficient micro-nodes and dynamic sharding technology. TURN Network's innovations have not only surmounted the constraints of existing technologies but also laid the foundation for blockchain applications across various sectors, including gaming and finance.

TURN Network marks a significant leap forward in blockchain technology, moving towards a more efficient, secure, and open digital future. Its core innovations extend beyond technology, encompassing improvements to the economic model, governance structure, and application ecosystem. To tackle common issues like high latency and complicated operations in blockchain-based gaming, TURN Network has introduced a unique "temporary verification" mechanism. This mechanism uses temporary private keys in Layer 2 gaming, enhancing the gaming experience by making it smoother and more immersive. This method not only simplifies the transaction signing process but also maintains security. This is because the temporary private keys are automatically deleted at the end of the game's lifecycle.

In response to the many public blockchain infrastructures that impose various restrictions on mobile mining, TURN Network has introduced a method of mobile mining with its innovative Bubble Chain. This Bubble Chain features a low-cost network of micro-nodes from both mobile and PC platforms, allowing ordinary mobile device users to participate in network maintenance and earn rewards. This has not only increased the appeal of blockchain mining, but also significantly boosted engagement within the network. Through these innovative measures, TURN Network has improved the user experience and laid a strong foundation for its own growth and expansion.

The launch of the TURN Network represents a major progression in blockchain technology. Its innovation isn't limited to technical aspects, but includes extensive optimization of the economic model, governance structure, and application ecosystem. Combining advanced technology with a user-friendly design, the TURN Network breathes new life into the blockchain sector, paving the way for a future that's more efficient, secure, and transparent.

## 2 Market Analysis

### Challenges Faced by Existing Blockchain Networks Within Fully On-Chain Gaming Sector

Blockchain technology is gradually infiltrating the gaming industry with the rise of fully on-chain games — as known as DeGames (Decentralized Games). This sector is quickly becoming one of the most active sector in blockchain applications.

However, several challenges hinder its development:

#### Performance Limitations

Performance limitations significantly affect the development of blockchain gaming. For instance, Ethereum, a mainstream blockchain network, has an average transaction throughput (TPS) of only 15-45 transactions per second.

This capacity is insufficient for large-scale online gaming, especially when thousands of players interact simultaneously. These limitations not only affect game immediacy but also restrict game design complexity and potential player expansion.

#### Bad User Experience

Due to blockchain technical limitations, existing blockchain games often fall short compared to mainstream games in terms of playability and overall gaming experience.

Surveys show that over 60% of blockchain game players are dissatisfied with complicated game mechanics and transaction confirmation times, highlighting the need for user experience optimization.

## Scalability Issues

Scalability is a major hurdle for blockchains. While striving to maintain decentralization and security, current blockchain structure and technology finds it difficult to efficiently increase network capacity.

## Cost Issues

Cost is a significant concern in blockchain gaming. Ethereum, the most extensively used smart contract platform, has experienced network congestion, leading to skyrocketing Gas fees. This cost has become a significant burden for both developers and players.

In 2021, the average Gas fee on Ethereum exceeded \$50 per transaction during peak network times, raising the operational costs for developers and the direct cost for players. For small-scale developers and newcomers, these high fees pose a substantial entry barrier.

## Lack of Interoperability

The absence of interoperability is another major obstacle impeding blockchain ecosystem development. In the current blockchain gaming environment, transferring assets and data between different blockchain platforms is difficult.

This limitation hampers players' freedom to move between games and platforms and limits developers' ability to innovate and broaden the gaming ecosystem. Transferring a game asset from Ethereum to other chains like Polkadot or Solana requires complex cross-chain operations, which are often cumbersome and have a low success rate.

## 2 Market Analysis

### Solutions by TURN Network

As a pioneer in the development of blockchain technology, TURN Network is dedicated to addressing the challenges through the following innovative solutions:

#### High-Efficiency Transaction Processing Capability

TURN Network, with its innovative dual-layer architecture, has significantly enhanced the network's transaction processing speed. Particularly at the L2 layer, a block can be generated every 0.5 seconds, and a transaction can be confirmed with every three blocks, achieving an impressive transaction per second (TPS) rate in the tens of millions.

This exceptional processing capability ensures TURN Network can support the online interaction demands of a large user base, providing a smooth and instantaneous experience whether in decentralized finance (DeFi), gaming, or other high-frequency transaction scenarios. Moreover, the TURN Network's technical team has deeply optimized data storage and transmission mechanisms, not only further accelerating response times but also ensuring stable network operation under high loads. This creates an efficient and reliable blockchain network for users and developers alike.

#### Optimized User Experience

By introducing a temporary signature mechanism, TURN Network has enabled the elimination of the need for signatures in subsequent game operations after a one-time signing interaction, greatly simplifying the transaction process and enhancing the gaming experience. Coupled with a user-friendly interface design and an instant feedback system, TURN Network has significantly accelerated the speed of transaction confirmations, improving the interactivity and responsiveness of the games.

Furthermore, to lower the barrier to entry for new players and to increase overall game participation, TURN Network provides comprehensive user guides and efficient customer support services, ensuring that players can easily master the operations of blockchain games, thereby greatly optimizing the user experience. These innovative measures have not only successfully reduced the learning curve for players but have also set new service standards in the blockchain gaming sector, demonstrating TURN Network's deep commitment to and innovative spirit in enhancing user experience.

## Breakthrough Scalability

To break through the limitations of scalability, TURN Network has introduced an innovative sharding technology that divides the network into multiple smaller segments, or shards, each capable of independently processing transactions and storing data. This design significantly enhances the overall capacity and efficiency of the network, enabling TURN Network to achieve horizontal scaling. As a result, TURN Network can effortlessly expand to support a growing number of games and players. At the same time, this sharding mechanism maintains the decentralized nature and security of the blockchain, offering game developers and players a gaming platform that is both scalable and secure.

## Cost Reduction

The TURN Network has significantly reduced transaction costs for users by adopting cutting-edge consensus mechanisms and optimizing smart contracts. Notably, the L2 layer of the TURN Network inherently reduces the consumption of network resources for each transaction. This allows users to conduct transactions on the L2 layer with zero Gas fees, completely eliminating the economic burden of transaction costs found in traditional blockchain networks. Additionally, TURN Network's dynamic Gas fee adjustment mechanism automatically adjusts Gas prices on the L1 layer based on network load, effectively preventing cost spikes due to network congestion. With such cost-effective innovations, TURN Network provides users with a more effortable and efficient environment for blockchain gaming and applications, paving the way for new possibilities in the application of blockchain technology.

## Promoting Interoperability

To address the challenges of interoperability between blockchains, TURN Network has adopted an embedded cross-chain technology protocol. This protocol is built directly into the core infrastructure of the TURN Network, eliminating the need for external cross-chain bridges, thereby significantly enhancing the efficiency and security of cross-chain transactions. This innovative cross-chain solution not only provides seamless connectivity for the flow of assets and data between TURN Network and other mainstream blockchain platforms but also reserves compatibility space for potential future blockchain technologies. Through this groundbreaking design, TURN Network has greatly expanded the creative possibilities for game developers, while also offering players a wider range of gaming options and a smoother asset transfer experience.

### 3 The Vision and Mission of TURN Network

#### The Long-Term Vision of the TURN Network

TURN Network has a long-term vision to revolutionize the use of blockchain technology within the global digital ecosystem, particularly in gaming and decentralized applications (DApps). We aim to create a blockchain ecosystem that is scalable, secure, and user-friendly. This ecosystem will support complex, interactive games and applications while delivering exceptional performance and user experience. Our goal is to foster technological innovation, promoting widespread blockchain adoption and recognition, and ultimately facilitating a more open, interconnected, and decentralized digital future.

TURN Network is committed to being a leader in blockchain technology innovation. We plan to address industry challenges and bring a safer, more efficient, and interactive digital experience to the world. We believe that as the TURN Network grows, blockchain technology will surpass its current role in cryptocurrencies and foundational applications, becoming a crucial tool in building complex digital ecosystems and economic structures. Our commitment is to develop the TURN Network into a globally leading blockchain platform, providing unparalleled value and opportunities for users, developers, and businesses.

## 3 The Vision and Mission of TURN Network

### The mission of the TURN Network and the challenges it aims to address

The mission of TURN Network is to employ innovative blockchain architecture to tackle existing challenges. The specific goals include:



#### Enhancing Blockchain Performance and Scalability

TURN Network aims to overcome traditional blockchain network limitations in processing speed and capacity. By adopting dynamic blockchain architecture and sharding technology, the network can handle large-scale of concurrent transactions.



#### Enhancing Safety and Transparency

TURN Network enhances the platform's safety by executing innovative security measures and conducting rigorous smart contract reviews. This strategy ensures the fairness and transparency of all transactions and activities.



#### Establishing a Comprehensive Blockchain Ecosystem

The TURN Network is more than a technological platform builder. It's an ecosystem creator that encourages the wide participation of developers, content creators, and users. This approach promotes the overall growth and maturity of the blockchain industry.



#### Optimizing User Experience

TURN Network strives to offer blockchain game users a seamless experience. The goal is to match the ease of traditional online games and applications, while preserving blockchain's core advantages like immutability and decentralization. This approach seeks to eradicate the operational complexity and user-unfriendly interfaces that plague existing blockchain platforms.

## 4 Technical Architecture

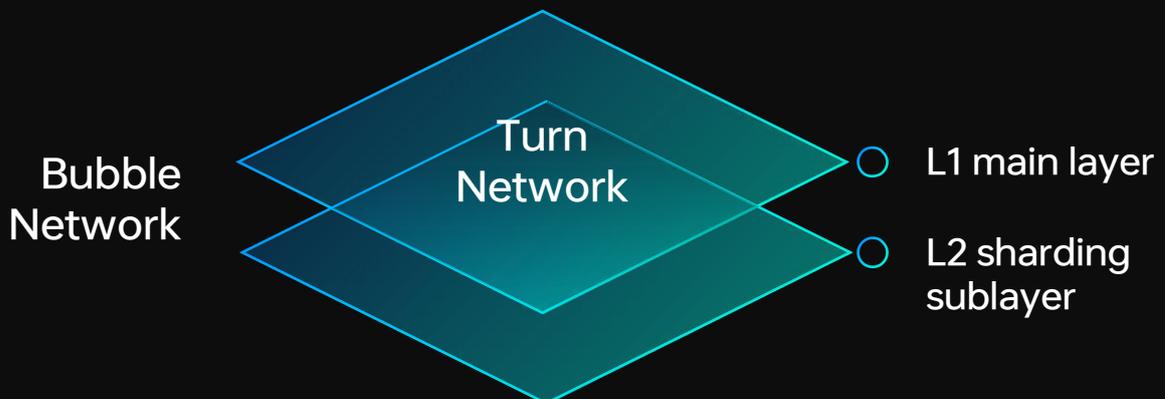
### Innovation and Implementation of the TURN Network Technological Framework

TURN Network has unveiled a revolutionary dual-layer L1-L2 blockchain architecture, significantly improving cross-chain interaction capabilities through the integration of the EVM ecosystem. This innovation enhances not only the circulation of assets and data within the TURN Network but also strengthens the interoperability between networks.

Furthermore, TURN Network's adaptive sharding technology—the Bubble Network—adds unprecedented flexibility and scalability to the system. This unique solution ensures efficient handling of various scale transactions while maintaining fast processing speed and low latency, marking a significant advancement in blockchain technology.

Importantly, TURN Network's architecture offers a stable and efficient public blockchain infrastructure for various ecosystem applications, from decentralized finance (DeFi) and gaming to art collectibles and other blockchain applications. These applications provide continuous momentum for the growth and expansion of TURN Network, creating a virtuous cycle within the ecosystem.

By leveraging integrated technological strengths and an ecological strategy, TURN Network aims to be at the forefront of the next generation of blockchain technology, offering developers and users worldwide a broader range of possibilities and signaling a new era in blockchain application.



## ❑ Innovative of a Dual-Layer Blockchain Structure

TURN Network's core is its innovative dual-layer architecture, consisting of two synergistic network levels: the main network (L1) and the Bubble networks (L2).

This structure strengthens the network's decentralization and security foundation and ensures efficient handling of a massive number of concurrent transactions with high throughput.



## ❑ Highly optimized sharding technology

TURN Network has introduced innovative sharding technology, distributing the computational and storage workload across the network and significantly enhancing transaction processing speed and overall scalability. This strategy not only allows the network to handle the demands of large-scale applications but also provides limitless possibilities for future ecosystem expansion.

## ❑ Flexible Smart Contract Platform

TURN Network's smart contract platform is flexible and compatible, supporting the Ethereum Virtual Machine (EVM) and allowing for seamless migration of approximately 90% of existing decentralized applications (DApps) and smart contracts to the TURN Network.

It offers powerful customization capabilities for developers to create complex and varied DApps, ensuring the efficient and secure operation of applications. With TURN Network, developers can develop and deploy DApps in a secure and efficient environment, providing users with a reliable and smooth experience.





## Layer 2: Subnetwork (Bubble Network)

The Layer 2 focuses on enhancing the network's processing capabilities and response speed, efficiently handling various types of transactions and applications.

Support for micro-node operations has significantly expanded the network's participation and coverage, while also enhancing the network's flexibility and accessibility.

Revolutionary infrastructure for fully on-chain gaming with cross-network interactive capabilities.

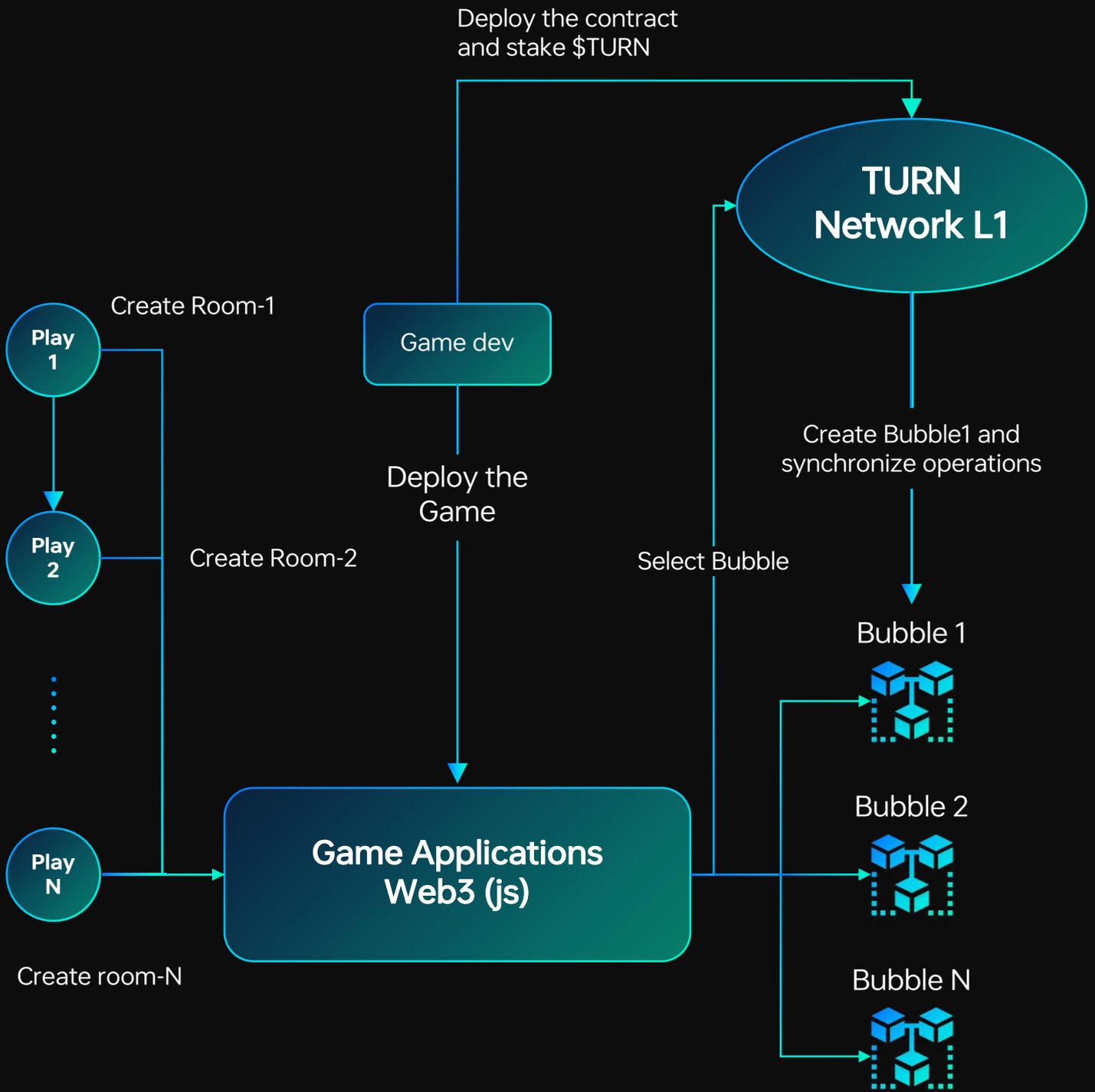
TURN Network, with its innovative technological framework, has revolutionized the infrastructure for fully on-chain gaming. Traditional cloud platforms and microservice architectures have already allowed application developers to deploy their apps with more flexibility and lower costs.

As virtualization technology has advanced, transitioning from hardware server virtualization to cloud hosting, and then to container technologies like Docker, TURN Network empowers fully on-chain game developers. It allows them to automatically create Bubble sharding sub-chains on its PoS+BFT L1 public blockchain, facilitating the quick deployment and operation of full-stack games.

The network management and allocation mechanism of the TURN Network simplifies the complexity of the dual-layer network, focusing on usability. DApp developers don't need to manage the creation and release of the Bubble Chain, enabling them to concentrate entirely on their contracts' business implementation.

For cross-network interactions, TURN Network natively supports functionalities within Solidity, including remote contract deployment and remote method invocation. This substantially reduces the complexity related to cross-network interactions.

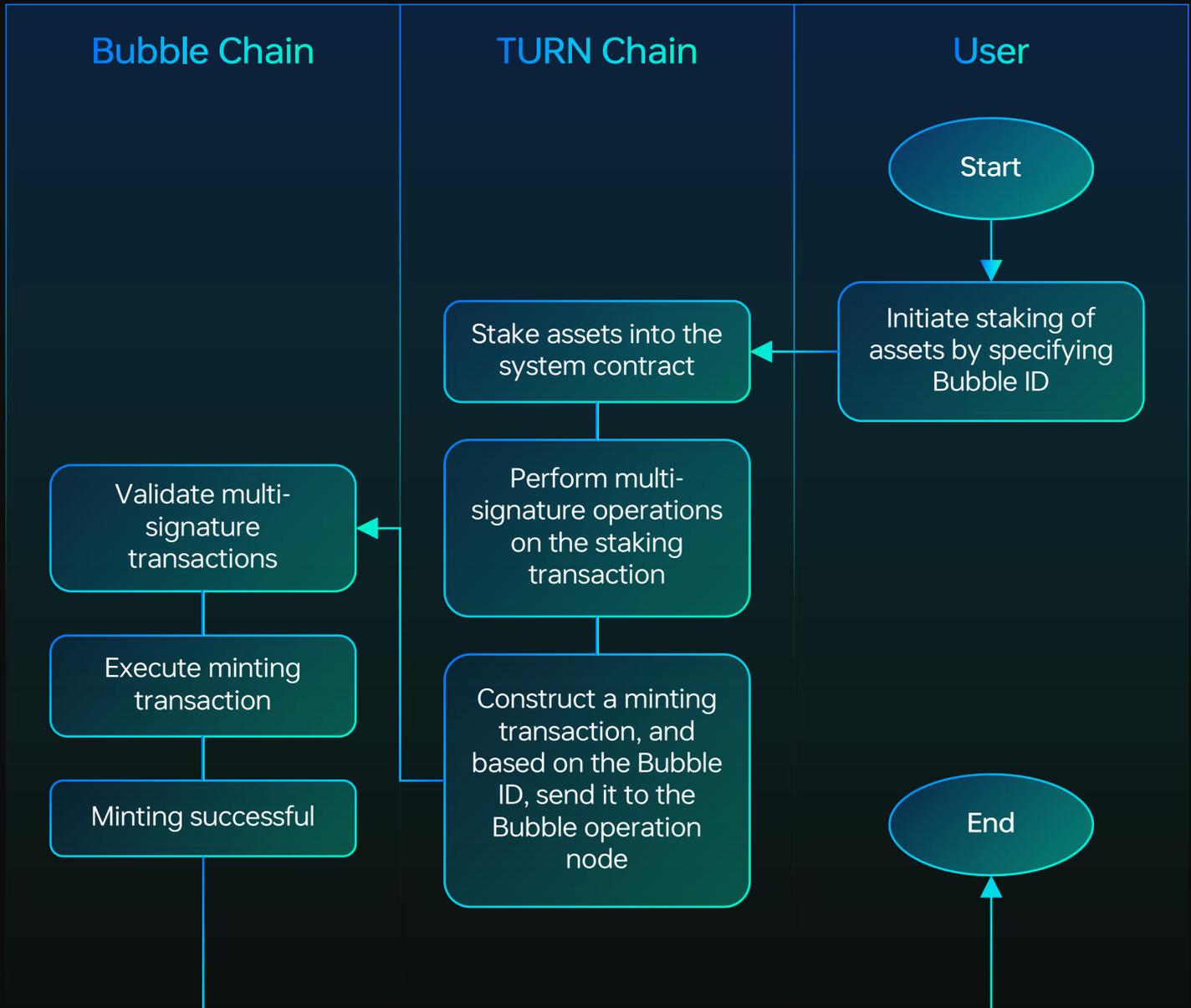
TURN Network offers game developers throughout the blockchain the ability for quick development and deployment. By deploying smart contracts, it automatically creates or assigns Bubble shard sub-chains, supporting the dynamic expansion and flexible operation of the business.



## 4 Technical Architecture

### Comprehensive Deepening of TURN Network's Core Technology

TURN Network has led a revolution in the blockchain field with its groundbreaking technological framework. This provides decentralized applications with an unmatched level of performance, security, and flexibility.



## Innovative Practices in Consensus Mechanisms

TURN Network has adopted the PoS+BFT consensus mechanism, marking a significant progression in blockchain consensus. By integrating the low energy consumption of Proof of Stake (PoS) with the high fault tolerance of Byzantine Fault Tolerance (BFT), this mechanism ensures efficient and secure transaction verification.

In this mechanism, network nodes must stake tokens to gain block creation rights, enhancing network decentralization and strengthening resistance to malicious attacks through the BFT algorithm. This balanced design ensures the TURN Network not only processes transactions efficiently but also maintains the highest security standards.

## Flexible Deployment of Smart Contracts

TURN Network's smart contract platform offers robust support for developing decentralized applications. It allows the deployment of smart contracts on both L1 main networks and L2 sharded subnetworks (Bubble networks), boosting the execution efficiency of smart contracts and giving developers more choices and flexibility.

Developers can choose the best deployment location based on the application's requirements and the network's current state, achieving optimal efficiency and cost-effectiveness. Additionally, TURN Network guarantees the secure execution and efficient management of smart contracts across different Bubble Chains through a standardized contract development protocol, providing a solid technical foundation for complex decentralized applications.

## Strategic Deployment of Cross-Chain Technology

TURN Network has embraced a progressive technical strategy in cross-chain interoperability. By implementing a built-in dual-layer adaptive sharding blockchain infrastructure, the TURN Network can achieve efficient cross-chain interoperability without external cross-chain bridges. This built-in mechanism enhances system efficiency and responsiveness, reduces dependence on external systems, and ensures a more secure and stable cross-chain transaction experience.

This distinctive approach to cross-chain technology differentiates TURN Network in the blockchain field, offering users and developers a more independent and efficient cross-chain operational environment, and advancing the development and innovation of the entire blockchain ecosystem.

## 4 Technical Architecture

### TURN Network: The Core Component of the Ecosystem

TURN Network provides a suite of optimized and user-friendly development tools, significantly lowering the entry barrier for blockchain application development. This facilitates rapid development and deployment. The tools offer seamless integration with mainstream gaming engines, a multifunctional blockchain explorer, and an exclusive TURN Wallet, all contributing to a diverse blockchain application ecosystem.

#### Contract Tools

The TURN Network offers a suite of contract tools that support the ERC20 and ERC721 standards, simplifying and expediting the creation of tokens and non-fungible tokens (NFTs). With these tools, developers can easily achieve automatic generation of contract code and one-click deployment, accelerating the launch process of applications.



#### Game Engine Integration

TURN Network's design is compatible with EVM, providing robust support for game engines that use the Solidity language and ECS (Entity Component System) model, such as MUDs. This enables developers to use their existing game development skills to create diverse blockchain games on TURN Network.

#### Block Explorer

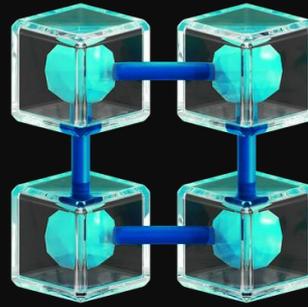
TURN Network's official block explorer enhances transparency and simplifies transaction tracking and data analysis. Users can instantly view network status, transaction details, and smart contract executions.





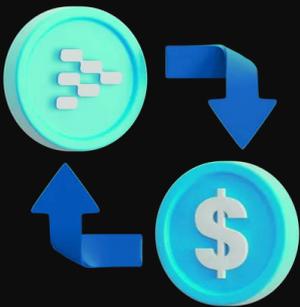
## TURN Wallet

As a core component of the TURN ecosystem, TURN Wallet supports asset management and transaction signing. It also offers advanced features like micro-node mining, a portal for autonomous applications, and services such as proxy signing and fee delegation, enhancing user interaction and engagement.



## Node Tools

To maintain network health and efficiency, TURN Network provides a suite of node tools. These assist node operators with daily management and transaction processing.



## Cross-Chain Bridge Services

TURN Network's cross-chain bridge services play a crucial role in achieving asset diversity and enhancing user experience. These services facilitate asset movement across different blockchains and open new opportunities for TURN ecosystem integration and expansion.

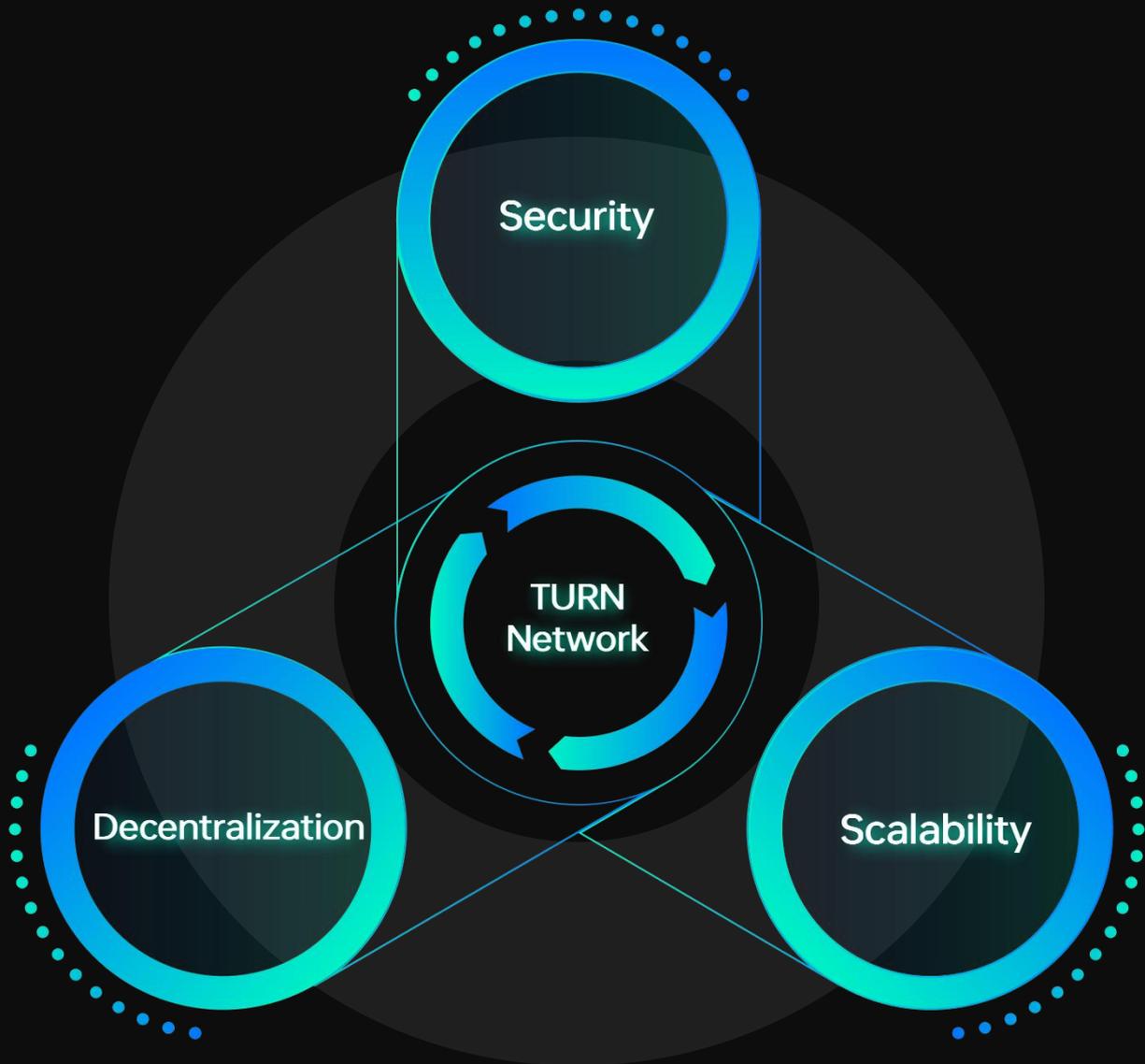


## VRF Services

To ensure fairness and transparency in games and applications, TURN Network provides Verifiable Random Function (VRF) services. These services generate unpredictable, verifiable random numbers, providing a strong security basis for various applications.

## 5 Core Features and Innovations

### Key Features of the TURN Network



These technological features enable TURN Network to tackle the challenges of security, decentralization, and scalability inherent in traditional blockchain networks, offering users and developers an efficient, secure, and accessible blockchain platform.

## ① Security

TURN Network's security mechanism is based on a hybrid consensus algorithm which combines Proof of Stake (PoS) and Byzantine Fault Tolerance (BFT). This algorithm enhances resistance to cyber attacks while preserving the network's decentralized nature. Furthermore, TURN Network bolsters its security with a thorough node verification process and an automated audit system for smart contracts. All transactions and smart contract executions occur within an encrypted environment, safeguarding data integrity and privacy.

## ② Decentralization

TURN Network achieves true decentralization with a distributed network architecture and a micro-node participation mechanism. Unlike traditional centralized systems, anyone can join the network as a node using personal computing devices like smartphones or home computers.

This accessibility increases the network's fault tolerance and resistance to censorship while boosting its level of decentralization.

## ③ Scalability

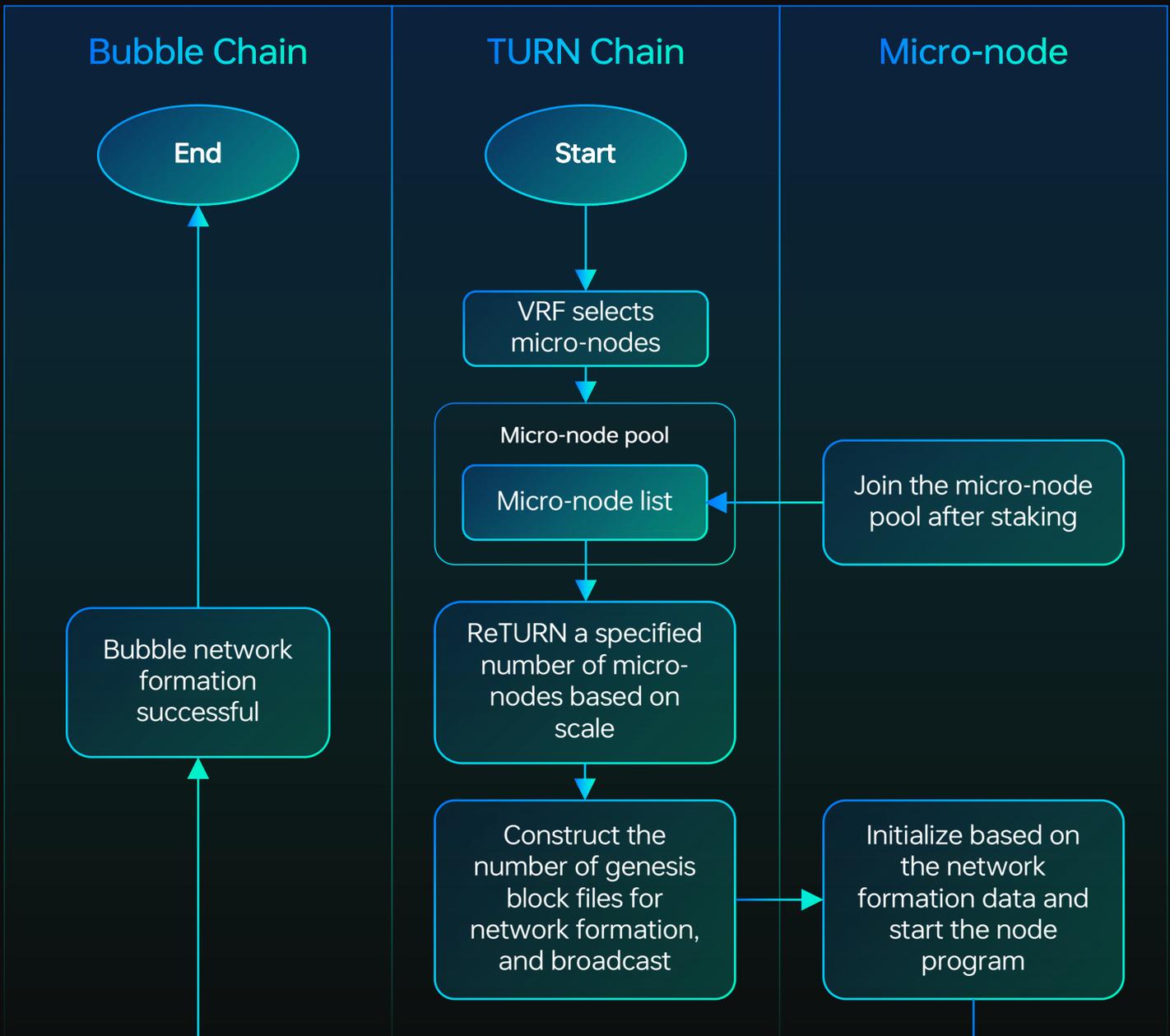
TURN Network's scalability is realized through an innovative L1 and L2 hierarchical structure. The L1 layer, acting as the main chain, is responsible for global consensus and network security. The L2 layer uses dynamic sharding technology, adjusting the number and size of shards based on network load.

In this layer, sharding mechanism enhances the network's processing capabilities and adapts flexibly to different application scenarios and load changes. Moreover, TURN Network incorporates cross-chain technology for seamless interoperability with other blockchain networks, broadening its usability and application range.

## 5 Core Features and Innovations

### Micro-node Applications

The micro-nodes and consensus mechanism form the core of TURN Network ecosystem. These critical technologies enable decentralization, security, and scalability.



## I. The Role of Micro-Nodes and the Staking Process

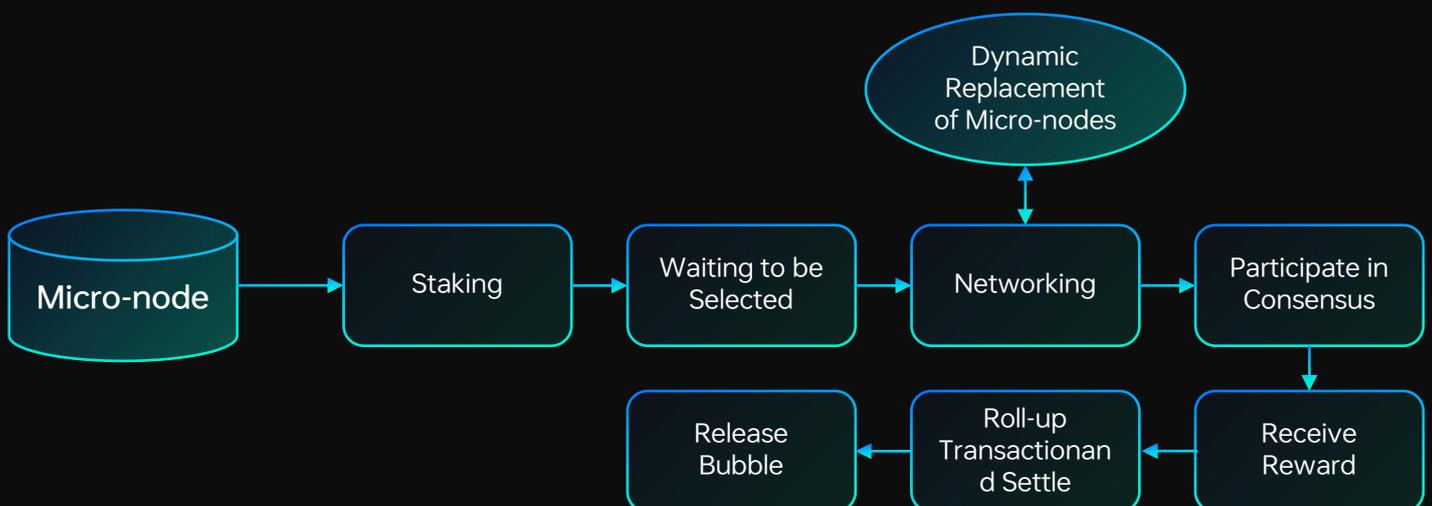
In TURN Network, micro-nodes are crucial element of Bubble Network. Users become micro-nodes by operating a node on their mobile device or PC and staking a specific amount of token. This process ensures the network's decentralization and diversity.

Staking serves not only as a prerequisite for participating in the network's consensus but also as a safeguard for the network's security. Users are eligible to participate in the block production and consensus process of the Bubble sub-chains only after they become a micro-node.

## II. Election of Micro-Nodes and Network Formation

Once users become micro-nodes, they wait for the main chain to broadcast networking details. Through a secure randomization process, users are selected to join the Bubble Chain. This process ensures the network's randomness and fairness.

The chosen micro-nodes form a distributed network through P2P communication. This design enhances global availability of services and the network's resistance to attacks and data security.



### III. Consensus Process and Reward Mechanism

After forming a network, micro-nodes validate and record transaction data in the consensus process. The consensus mechanism in TURN Network is designed for efficiency and security.

Micro-nodes participating in the consensus and block generation receive token as rewards, incentivizing active participation and contribution to the network. The reward system aims to maintain network vitality and long-term stability.

### IV. The Maintenance and Development of the Internet

After processing transactions, micro-nodes compress and aggregate transaction data, which is then submitted to the main chain for final verification and settlement. This process optimizes network resource usage and reduces transaction costs.

Subsequently, the Bubble Chain resources are released, and micro-nodes can choose to leave or continue participating in the creation of new sub-chains, maintaining the network's adaptability and ongoing development.

### V. Contributions to Web3.0

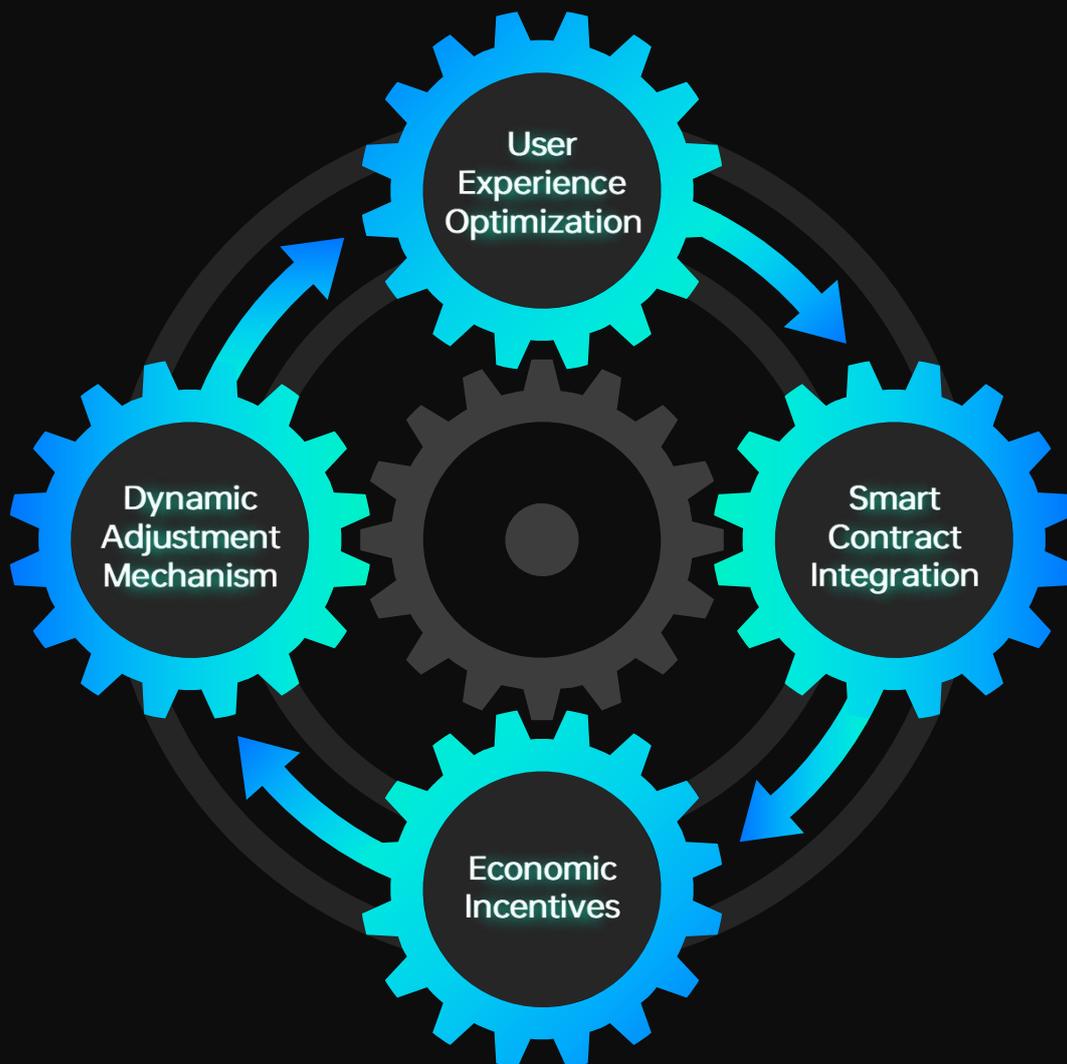
TURN Network's mechanism offers users the opportunity to participate in the blockchain network, earn rewards, and promotes the development of Web3.0 technology.

By encouraging more users to run micro-nodes, TURN Network provides the necessary computational resources and data storage, enhancing user trust and engagement with Web3.0. This underlines the potential of a decentralized, secure, and efficient blockchain ecosystem.

## 5 Core Features and Innovations

### Dynamic Gas Fee System

The Dynamic Gas Fee system is integral to the TURN Network. Its goal is to optimize network efficiency and costs using a flexible fee structure. This system not only solves the overpayment problem associated with fixed Gas fees but also prevents transaction delays during periods of network congestion.



### **A. Dynamic Adjustment Mechanism**

The primary strength of the system is its ability to dynamically adjust gas fees based on real-time network congestion and transaction demand.

When network traffic nears its processing limit, the system increases Gas fees. This discourages non-urgent transactions and prioritizes those willing to pay higher fees.

Conversely, the system lowers gas fees when the network is less active, incentivizing transactions when costs are lower.

### **C. Smart Contract Integration**

The dynamic gas fee system integrates seamlessly with TURN Network's smart contracts. Developers can access current gas fee information within their contracts, allowing them to adjust contract logic to network changes optimally.

This integration facilitates the development of complex decentralized applications (DApps) by offering greater flexibility and efficiency.

### **B. User Experience Optimization**

This system's design prioritizes user experience by dynamically adjusting gas fees.

This approach mitigates the user experience impact of network congestion under a fixed fee model.

Users can optimize their transaction timing based on their needs and cost sensitivity, achieving a balanced trade-off between cost and speed.

### **D. Economic Incentives**

TURN Network's dynamic gas fee system includes an economic incentive mechanism. This encourages users and developers to contribute to the network's maintenance and optimization.

For instance, during less active periods, low-cost transactions can stimulate network activity.

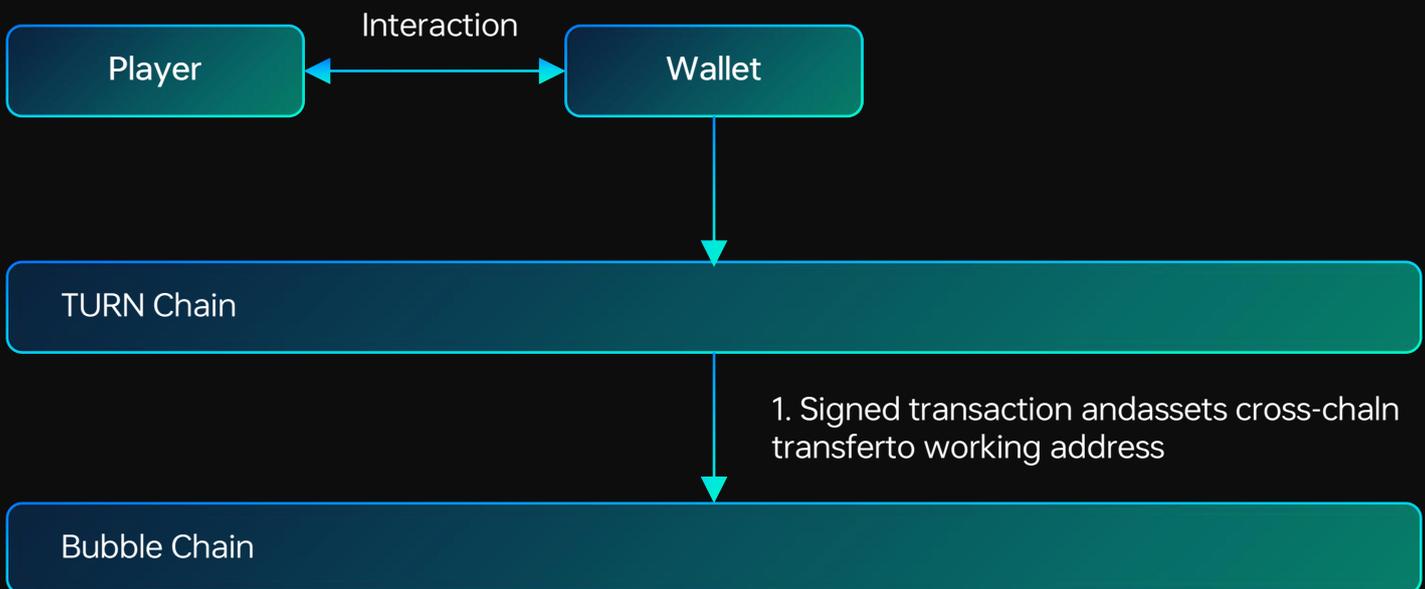
Conversely, during peak times, higher gas fees incentivize validating nodes to invest more resources, enhancing the network's processing capacity.

By introducing an innovative dynamic gas fee system, TURN Network aims to establish a more equitable, cost-effective, and efficient blockchain network. This system is designed to cater to the needs of both users and developers maximally, thereby fostering broader adoption and development of blockchain technology.

## 5 Core Features and Innovations

### Temporary Private Key Technology

TURN Network's temporary private key technology has greatly improved the gaming experience and transaction security for players. In the realm of full on-chain gaming, this technology enables gamers to enjoy a smoother, more convenient gameplay process without sacrificing security.



2. Bind temporary private key to working address
3. Auto-sign transaction with temporary private key
4. Destroy temporary private key after working session ended

The use of temporary private key technology in the operational mechanisms of blockchain-based games.

**1) Asset Exchange and Private Key Generation:** When players transfer their game assets from Layer 1 to Layer 2, a temporary private key is automatically generated and linked to the transaction session. This key is utilized to sign transactions throughout the gaming process, streamlining the player's operations.

**2) Use of Temporary Private Key in Games:** During gaming, all transactions requiring approval are signed using this temporary private key. This eliminates the need for players to frequently input their main private key, enhancing transaction security, and improving the game's fluidity and immersion.

**3) Secure Destruction of Private Keys:** At the end of a gaming session, the TURN Network automatically deletes the temporary private keys. This ensures their one-time use and substantially lowers the risk of private key exposure.

### ● Optimizing Player Experience

The use of temporary private key technology in full on-chain gaming offers a secure and seamless gaming experience. This allows players to focus on the game itself without concerns about transaction security or complex operational procedures.

### ● Automated Trading and Payment Mechanisms Support

Temporary private keys also facilitate the automation of in-game transactions and payment mechanisms. This enables players to automatically complete transactions based on preset conditions.

For instance, players can purchase in-game items or services without interrupting their gameplay. This not only enhances game coherence and player immersion but also provides game developers with new opportunities to design economic models.

### ● Technological Challenges and the Realization of Innovation

TURN Network, tailored to the specific needs of blockchain-based gaming, has implemented efficient key management and encryption communication technologies. These ensure the secure creation, use, and deletion of temporary private keys.

By partnering with game publishers, the network has introduced a proxy payment mechanism for in-game transactions, significantly lowering the entry barrier for players.

The implementation of temporary private key technology has significantly improved the user experience for blockchain users and full on-chain game players. It has enhanced the transaction convenience on the blockchain and improved the security and user-friendliness of on-chain games. Additionally, it has opened new avenues for the development of blockchain games, demonstrating TURN Network's leadership in promoting innovation and widespread adoption of blockchain technology.

## 5 Core Features and Innovations

### Mobile Mining

In the modern Web3 blockchain environment, nodes often rely on servers with public network addresses and high resources. Although this infrastructure is stable and reliable, it restricts the involvement of mobile and PC users, leading to underutilized resources and decreased user engagement. Mobile and PC platforms host a diverse user base, including various age groups and professional backgrounds. These users play an essential role in the Web3 era. TURN Network acknowledges this and has used technological innovation to provide these users with superior, convenient services while bolstering the security and credibility of its products.

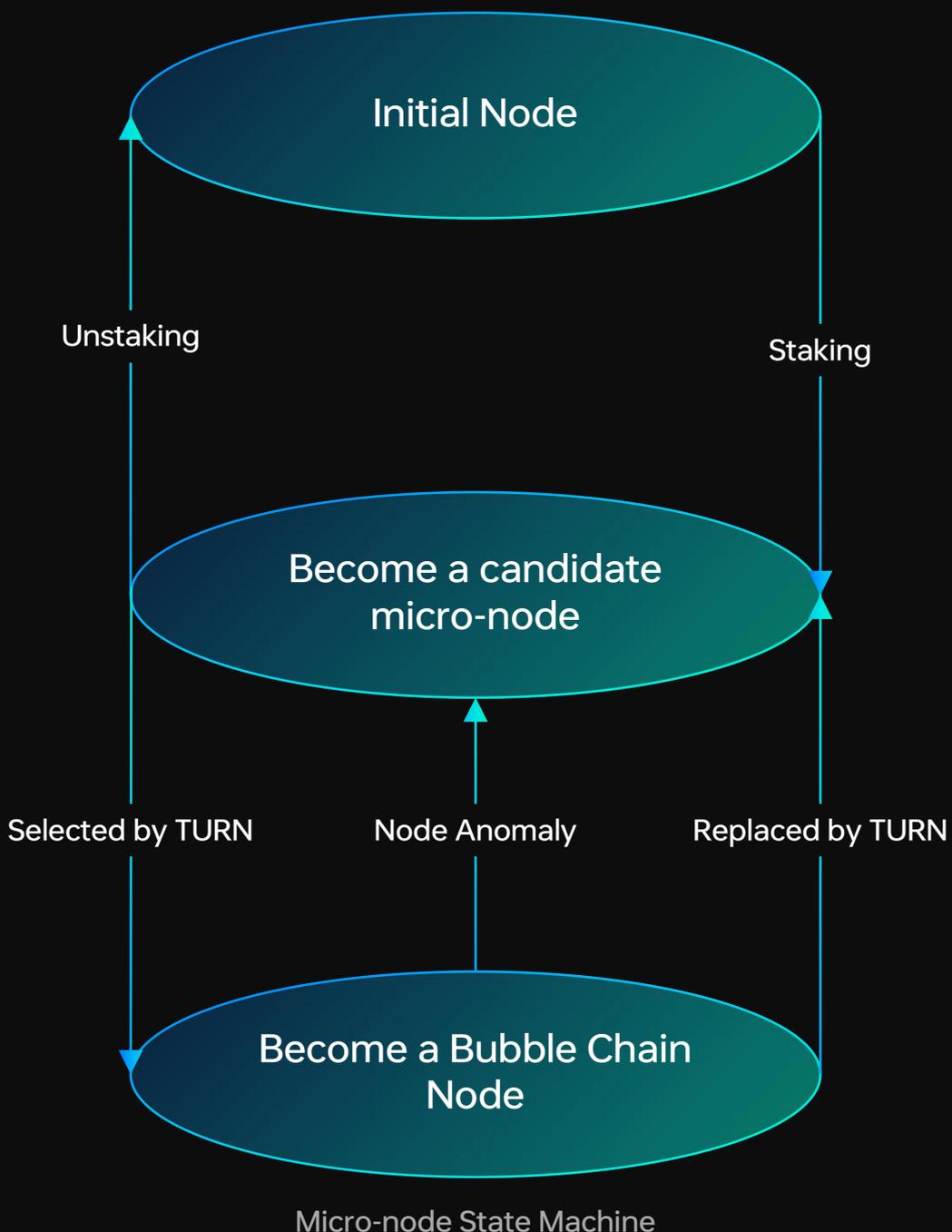
TURN Network's Bubble Chain technology represents a significant step forward in mobile and PC platform mining. Via a network of low-cost micro-nodes, users can operate a node and engage in mining by simply installing an app or software. This approach not only allows more users to join the blockchain network but also offers them greater autonomy over their data and identity. Micro-nodes use P2P communication to create a decentralized blockchain network, which enables efficient mining participation for mobile and PC platform users.

#### The Role and Working Mechanism of Micro-Nodes

- 1. Definition and Role of Micro-nodes:** Micro-nodes are the essential units within TURN Network. They can be deployed on any mobile device or PC. Together, these nodes maintain the operation of the Bubble Chain by participating in the verification and generation of blocks.
- 2. Staking and Node Selection:** Users can initiate micro-nodes by staking a certain amount of token. TURN Network uses a Verifiable Random Function (VRF) mechanism to select nodes from the micro-node pool to participate in the Bubble Network. This ensures the selection process is random and fair.
- 3. Network Setup and Maintenance:** When the genesis block instructions from the main chain are received, the selected micro-nodes start constructing the sub-chain network. This process includes initializing the genesis block, setting up RPC proxy services, and establishing P2P connections.

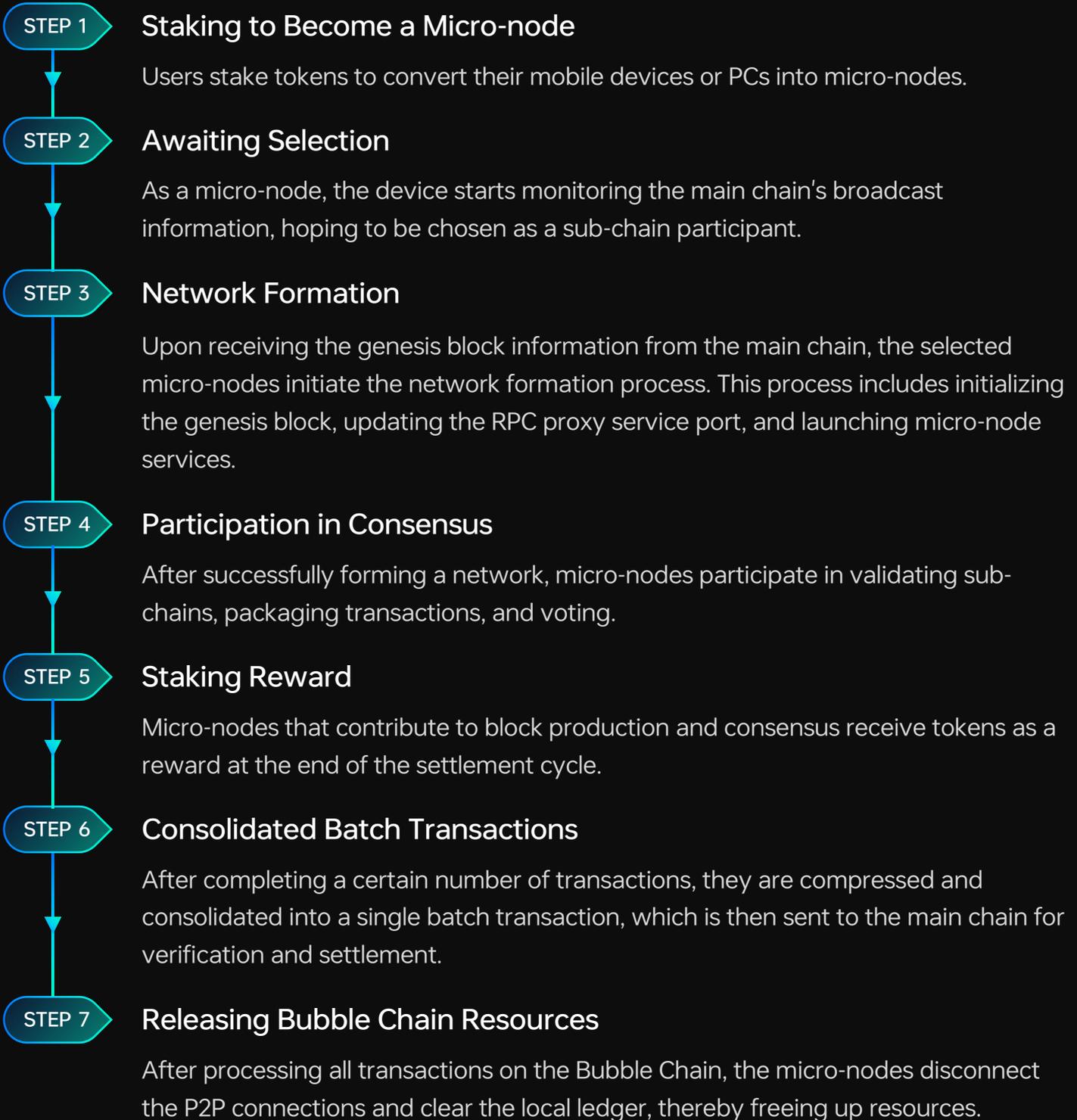
## ▲ Node Resource Management

- Bubble Chain Resource Release:** When the Bubble Chain completes its task, the micro-nodes are notified to release resources. They disconnect P2P connections and clear local blockchain data, freeing up storage and computational resources.
- Micro-node Flexibility:** After resource release, micro-nodes can choose to either withdraw or wait to be selected for a new Bubble Chain. This flexibility allows users to determine their participation level based on their individual circumstances and preferences.



## ▲ Micro-Node Participation Process

The micro-node participation process involves several key steps:



## 6 \$TURN Token Economics

### \$TURN

The exploration and understanding of blockchain technology started with Bitcoin. Initially, it was perceived only as a digital currency. However, with the advent of second-generation blockchain ecosystems like Ethereum and advancements in third-generation blockchain technologies, the public's understanding of blockchain has deepened. Among various forms of blockchain, public chains, often referred to as "public blockchains," are notably significant.

The primary appeal of public chains extends beyond their distributed technology. They engage the interests of participants through economic mechanisms, encouraging individuals to pursue their maximum benefits while collectively maintaining and contributing to the network's stability and security. This creates a mutually beneficial situation. This capacity for self-regulation, autonomous operation, and steady development is key to their long-term survival.

Consequently, the economic model design is crucial for any public blockchain project. TURN Network, in building its economic model, aims for a mutually beneficial situation for all participants by prioritizing their interests and motivations. This foundational philosophy ensures the network's vitality and stability and lays the groundwork for TURN Network's healthy development, showcasing its thoughtful approach to building a sustainable and efficient blockchain network.

The TURN Network's economic model is seamlessly integrated with the advanced concepts of the PoS (Proof of Stake) mechanism and the core strengths of PoW (Proof of Work). Its purpose is to create a blockchain ecosystem that is both secure and efficient. The model is carefully designed to ensure the network's decentralization and incentivize all participants to actively contribute resources and maintain the network.



## 6 \$TURN Token Economics

### \$TURN Reward Mechanism

#### Economic Model Parameters and Reward Distribution

Through a carefully designed token issuance and distribution strategy, TURN Network aims to achieve a fair distribution of tokens. This prevents market manipulation and excessive concentration of token power. This strategy is not only intended to create an equal playing field for all network participants, but it also serves as a foundation for supporting widespread network adoption and healthy growth.

#### Here are the characteristics of the Economic Model Parameters and Reward Distribution Mechanism of TURN Network

- \$ Annual Inflation and Deflation Mechanisms:** TURN Network has set an annual inflation rate of 2.5% to reward network participants. Also, by adjusting deflationary mechanism parameters, such as adapting gas fees based on actual network usage, the network's long-term sustainability is ensured.
- \$ Reward Release Strategy:** To promote long-term participation and decentralization, TURN Network has a strategy that releases rewards proportionally based on the total amount mined. As the network grows, the proportion of rewards released to contributors will gradually decrease, encouraging users to continually engage in network development.

#### Validation Node and Micro Node Staking Rewards

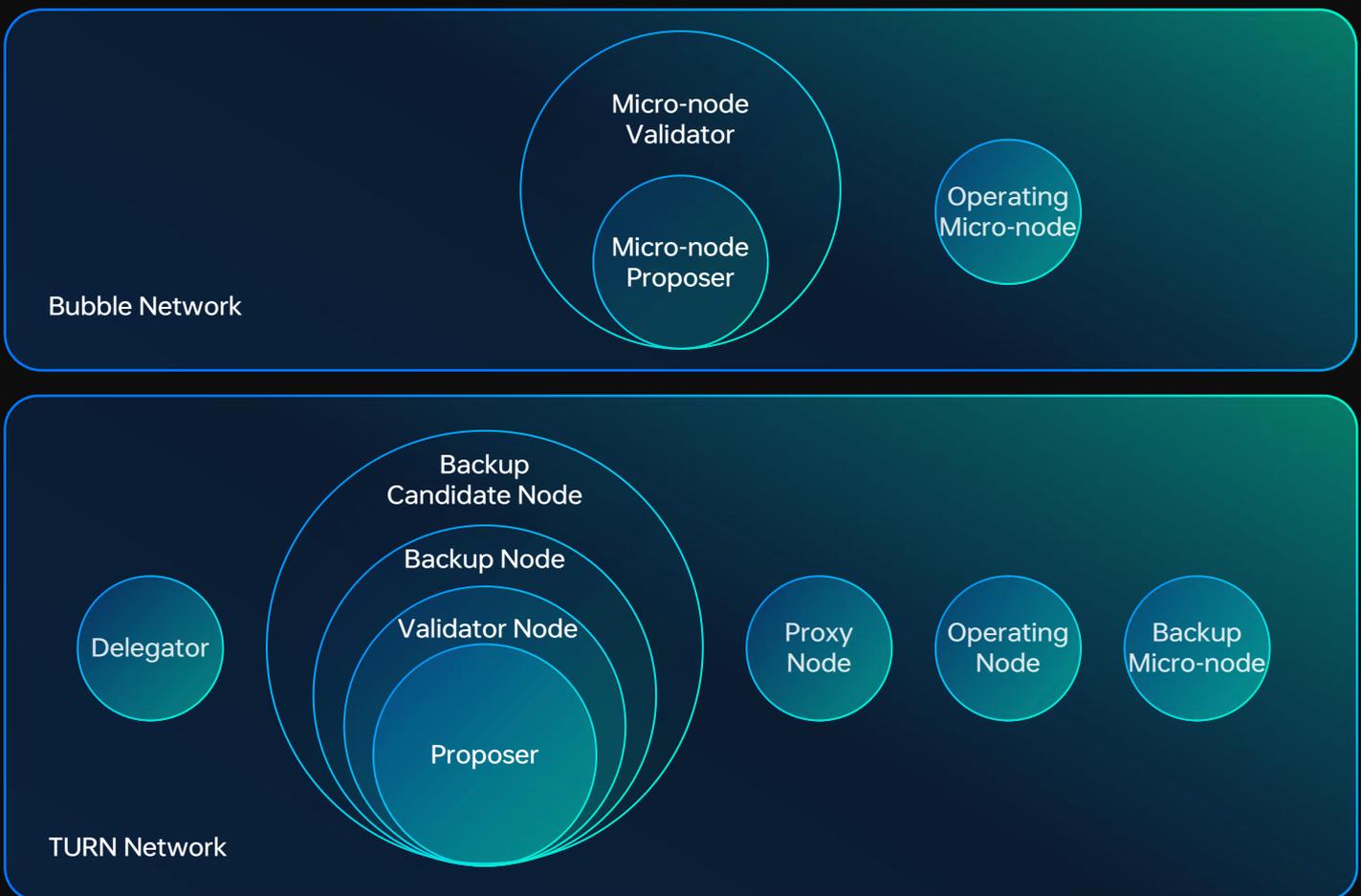
TURN Network, validator nodes and micro-nodes contribute to the network's consensus mechanism by staking \$TURN.

- \$ Collateral Requirements:** To become a verification node on the L1 layer, a minimum collateral of 10,000 \$TURN is needed. The threshold for participating in micro-node mining on the L2 layer is 200 \$TURN, lowering the entry barrier and encouraging more users to contribute to network maintenance.
- \$ Reward Calculation:** The rewards for validation nodes depend on their contribution to network security and their activity level in the consensus process. A total of 500 nodes with the highest staking rankings are selected to enter the candidate pool for the validation phase. In each consensus cycle, the system uses a VRF (Verifiable Random Function) to randomly select 43 validation nodes to take turns acting as proposers. Each successful block produced is rewarded with 4.5835 \$TURN. Meanwhile, micro-nodes on Layer 2 receive block rewards of 18.334 \$TURN, a higher rate compared to Layer 1. However, this block reward may be dynamically adjusted by the system and is also a governable option.

# Mobile Mining Technology Mechanism

TURN Network supports mining participation on mobile devices and PCs through dedicated client software. This low-cost network architecture uses P2P technology, allowing devices to communicate directly without relying on traditional centralized servers. This not only lowers the mining entry barrier but also ensures network decentralization and security through a dynamic election mechanism.

- Dynamic Election:** After staking \$TURN, micro-nodes wait for random selection to become part of a Bubble Chain. A Verifiable Random Function (VRF) ensures the fairness and unpredictability of this process.
- Consensus Mechanism:** The selected micro-nodes participate in the consensus process of the Bubble Chain, using a Proof of Stake (PoS) mechanism to ensure the network's security and stability. During the consensus process, micro-nodes validate and package new transactions through P2P communication.



## 6 \$TURN Token Economics

### \$TURN Consumption Channels and Burn Mechanism

#### I. Transaction Costs

##### I. Dynamic Gas Fees

TURN Network uses a dynamic gas fee mechanism that adjusts transaction fees based on network congestion. This aims to optimize network resource use and prevent excessive congestion.

Transaction fees are deducted directly from user transactions, and a part of these is used to reward nodes that maintain network security and efficiency.

#### III. Regular Burning Mechanism

##### III. Deflationary Policy

TURN Network implements a deflationary policy to regulate token supply and enhance scarcity, involving periodic token burns.

The number of tokens to be burned and the intervals are determined by network governance votes, allowing adjustments according to the network's evolution and the token's economic model requirements.

#### II. Smart Contract Execution

##### II. Contract Deployment and Execution Costs

Deploying and executing smart contracts on TURN Network requires the use of \$TURN.

These costs reward nodes processing transactions and contracts, incentivizing them to provide computational resources.

#### IV. Transaction fees for unsuccessful trades have been destroyed.

##### Transaction Failure Burning

If transactions fail due to reasons like insufficient Gas fees, the paid Gas fees are not refunded.

Instead, they are considered consumed and enter the burned pool, reducing the total supply.

## The automatic destruction mechanism of smart contracts

**Contract with Built-in Self-Destruct Feature:** Some smart contracts may include an automatic self-destruct mechanism. Upon meeting predefined conditions, this mechanism automatically destroys the \$TURN within the contract to achieve specific economic or governance objectives.

TURN Network's token consumption and burn mechanism incorporates advanced blockchain technologies and algorithms. For example, it uses a dynamic gas fee system that adjusts fees based on real-time network load, optimizing network performance and reducing ineffective or malicious transactions. Additionally, the network's smart contract platform allows developers to implement complex token economic models, including an automatic burn function, enhancing network flexibility and customizability.

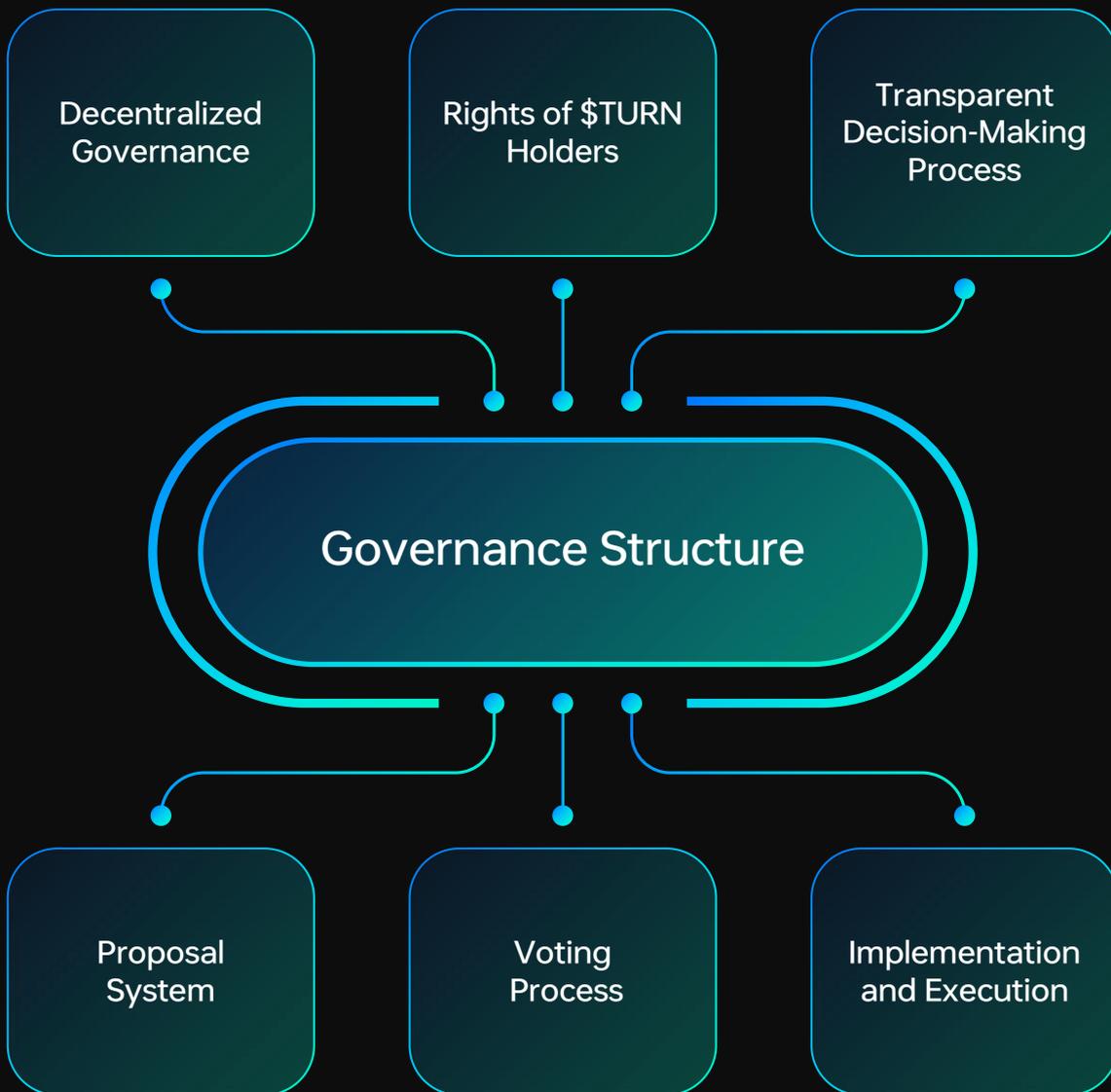
The decisions to establish a regular token burn policy and create a burn pool were made after careful calculations and extensive community discussions. The goal is to achieve long-term deflation and enhance the token's value. The amount and frequency of token burns will be adjusted based on network growth, token circulation, and community governance votes, ensuring the network's economy's healthy development.

These mechanisms enable TURN Network to effectively manage token supply, incentivize participants, and maintain the network's security, efficiency, and scalability.

# 7 TURN Network Governance Structure

## Governance Structure

The design of TURN Network's governance mechanism aims to enhance the network's transparency, participation, and decentralization. This mechanism ensures that all crucial decisions reflect the will and best interests of the entire community.



### a. Decentralized Governance

TURN Network uses a decentralized governance model. This model ensures that no single entity can control the entire network. The governance structure allows stakeholders, including \$TURN holders, developers, and node operators, to participate in decision-making.

### b. Rights of \$TURN Holders

\$TURN holders play a significant role in the network's governance. They can vote on key issues, such as agreement updates, fee structure adjustments, and other governance proposals.

### c. Transparent Decision-Making Process

All governance proposals and voting processes are transparent. This transparency ensures community members fully understand each proposal's details, fostering trust and participation within the community.

## Community Engagement and Decision-Making Processes

### d. Proposal System

Community members can submit proposals to improve the network. These proposals may involve technical updates, new features, or policy changes. After an initial review, the proposal is then submitted to all \$TURN holders for consideration.

### f. Voting Process

Community voting decides all governance proposals. Voting power is proportional to the number of \$TURN tokens an individual or entity holds.

## 8 Route Map and Future Planning

### \$TURN diverse roles

TURN Network project intends to introduce a series of innovative features and expansions in the upcoming quarters. These enhancements aim to continually optimize network performance, improve user experience, and strengthen network security.

#### 2023 Q4 - Initial Stage

- ◆ **Alpha Test:** We will conduct preliminary Alpha testing to verify the network's basic functionality and performance. This test will also allow us to collect feedback from early users, providing data support for future improvements.
- ◆ **PC Mining Launch:** We're thrilled to launch our PC mining feature. This feature allows users to contribute to the maintenance of the TURN Network using their personal computers. By dedicating computing power, users can help ensure the network's security and smooth operation.
- ◆ **TURN Gaming Wallet Launch:** We are introducing the TURN Wallet, a tool specifically designed for gamers. It supports the storage and trading of gaming assets, and seamlessly integrates with games within the TURN Network.
- ◆ **Demo Game Launching:** We're rolling out a demo game to demonstrate the potential applications of the TURN Network in the gaming industry. Developers and players will have the opportunity to experience the unique features of the TURN Network firsthand.

#### 2024 Q2 - Expansion Phase

- ◆ **Testnet Launching:** We're launching the testnet for extensive network testing to ensure stability and security. Our goal is to attract more developers to participate.
- ◆ **Mobile Mining Launching:** We're enabling mobile mining, allowing users to mine using their smartphones. This expands the participant base within the network.
- ◆ **Security and Tokenomic:** We're focusing on strengthening security measures and optimizing the token economic model for the network's healthy economic development.

- ◆ **Mini Game Tournament:** We're hosting a mini-game competition to inspire developers to produce high-quality games, and to boost user engagement and community activity.
- ◆ **Mining Tournament:** We're organizing a mining competition to encourage user participation in network maintenance, and to increase interest and engagement in mining through competition.

## 2024 Q4 - 2025 Q3 - Maturity Stage

- ◆ **Testnet Launching:** The official rollout of the mainnet signifies that the TURN Network has formally entered its operational phase, offering users comprehensive network services.
- ◆ **Staking:** We are excited to introduce our staking feature, which allows users to participate in network governance by staking their \$TURN token. By doing so, users can earn corresponding rewards, thereby enhancing the network's security and stability.
- ◆ **Vesting:** Implementing a token lock-up program that gradually releases tokens according to a predetermined plan, ensuring the long-term stability of the network economy.
- ◆ **Ecosystem Tools:** We are excited to introduce a suite of ecosystem tools, including developer tools, user interface enhancement utilities, and more. These are designed to provide users with a richer online experience and to foster the growth of the ecosystem.

# TURN NETWORK

