Encryptech Tokenomics Whitepaper

Privacy-Preserving Machine Learning at Scale

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Abstract

Encryptech is a decentralized platform offering privacy-preserving machine learning (ML) solutions. Leveraging blockchain technology and advanced cryptographic techniques like Diffrential Privacy ,Trusted Execution Environments (TEE), and Split Learning, Encryptech ensures data privacy and security throughout the ML lifecycle. This whitepaper details the tokenomics structure that underpins the Encryptech ecosystem, focusing on resource allocation, miner incentives, and centralized governance. The native token, **ENC**, serves as the backbone of the ecosystem, enabling sustainable growth and seamless interactions across stakeholders.

Introduction

Encryptech addresses the growing demand for privacy-preserving machine learning solutions by combining the power of blockchain and cryptography. The platform facilitates secure training and inference of machine learning models on encrypted data, ensuring compliance with stringent privacy regulations such as GDPR and HIPAA.

Data owners, machine learning developers, and compute providers interact directly on the platform. Trusted Execution Environments (TEEs) , Diffrential Privacy , and Split Learning safeguard sensitive information throughout the computational process. By decentralizing ML workflows, Encryptech removes traditional barriers to secure collaboration while fostering innovation.

The Encryptech tokenomics model ensures a robust and sustainable ecosystem. The native token, **ENC**, powers all interactions, from computational payments to miner rewards and ecosystem development. This whitepaper provides a detailed overview of the economic and governance structures that make Encryptech scalable and fair.

Token Functions

The Encryptech token (**ENC**) is the economic foundation of the platform, facilitating resource allocation, payments, and incentives while funding ecosystem growth.

Staking: Stakeholders use ENC to secure their place in the network. Data owners and developers stake ENC to reserve compute resources, while compute providers (miners) stake ENC to signal reliability and commitment.

Payments: ENC is used to pay for computational services, including ML model training and inference. Pricing is determined based on task complexity, model size, and execution duration.

Rewards: Compute providers are rewarded in ENC for delivering reliable and secure computational power. Rewards are tied to performance, availability, and task completion metrics.

Treasury: A portion of transaction fees is funneled into a treasury managed by Encryptech. These funds support network upgrades, ecosystem expansion, and community initiatives.

Resource Allocation

Efficient resource allocation is critical to Encryptech's operations, ensuring fairness and scalability for all participants.

Staking-Based Model: Users secure access to computational resources by staking ENC. The proportion of compute power allocated to a participant is determined by their stake relative to the total

staked ENC:

$$P_u = \frac{s_u}{\sum_{i=1}^{n} s_i} \times P_{\text{total}}$$

where P_u represents the compute power allocated to user u, s_u is the user's stake, and P_{total} is the network's total computational capacity.

Direct Job Matching: Jobs are matched to compute providers using a preference-based algorithm. Users can specify requirements such as security guarantees, performance thresholds, and cost constraints. This dynamic system ensures optimal resource utilization.

Compute Marketplace: Encryptech in the future will operate a decentralized marketplace, allowing users to bid for high-priority compute power. Compute providers can adjust rates dynamically based on demand, fostering a competitive environment.

Miner Incentives

Compute providers, or miners, are the backbone of the Encryptech network. The tokenomics framework incentivizes miners to offer high-quality and secure compute resources.

Performance-Based Rewards: Miners are rewarded based on their contributions to the network, including compute capacity (Q), security level (C), and reliability (R). The reward formula integrates these factors:

$$R_m = f(Q, C, R) + b$$

where b is a bonus multiplier for meeting specific performance benchmarks.

Slashing Mechanism: To maintain the integrity of the network, miners who fail to meet performance standards or engage in malicious behavior are penalized. Slashing reduces the miner's staked ENC, proportional to the severity of the violation.

Reputation System: A miner's performance history influences their reputation score, which affects job allocation preferences and potential earnings. This system encourages long-term reliability.

Governance

The governance framework ensures that Encryptech remains adaptable and sustainable. Centralized governance enables rapid decision-making while maintaining network stability.

Centralized Oversight: The Encryptech team retains control over key decisions, such as adjusting staking requirements, refining slashing rules, and allocating treasury funds.

Strategic Adjustments: Governance mechanisms allow the team to respond to market conditions, implement protocol upgrades, and ensure alignment with community needs.

Token Distribution and Economic Design

The total supply of ENC is capped at 1 billion tokens, distributed as follows:

40% Compute provider rewards
30% Treasury for development and growth
20% Ecosystem incentives
10% Founders and early contributors (vesting over 4 years)

Inflationary Rewards: The network employs inflationary rewards during its initial phases to incentivize adoption and participation. These rewards taper off over time, balancing supply and demand.

Flexible Pricing: Both ENC and fiat payments are supported, with fiat transactions converted via on-chain oracles. This flexibility enhances accessibility while maintaining ENC's role as the network's primary currency.

Conclusion

Encryptech's tokenomics framework supports a robust and privacy-preserving machine learning ecosystem. By aligning incentives, ensuring fair resource allocation, and maintaining centralized governance, Encryptech provides a scalable and sustainable platform for secure ML operations. The ENC token ensures seamless interactions

across stakeholders, driving innovation and trust in privacy-preserving computation.