StakeStone 2.0

stakestone.io

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Abstract

StakeStone 2.0 redefines the architecture of modern banking through a *crypto-native, agent-compatible* design that merges the trustless transparency of blockchain with the intelligence of automated finance. The white paper presents StakeStone's vision of a **Crypto-native Neo Bank**: a decentralized financial infrastructure built to serve humans, AI agents, and machines alike.

1 Inside Traditional Banking and Its Breaking Points

On January 3, 2009, at 18:15:05 UTC, the very first Bitcoin block, known as the Genesis Block (Block #0) was mined. To express his discontent with the banking system, Satoshi Nakamoto embedded a message in this inaugural block:

> "The Times 03/Jan/2009 Chancellor on brink of second bailout for banks."

That moment captured a bold vision for change. Sixteen years later, while banks still dominate, Bitcoin's meteoric rise and the unstoppable momentum of blockchain innovation have pushed the world toward a new financial paradigm—one that's open, programmable, and unstoppable.

As shown in Image 1, the core functions of traditional banks can be grouped into three main areas:

- Custody: Safeguarding users' funds through deposits and settlement services.
- Credit: Lending depositors' money to borrowers through credit operations.
- Payments & Clearing: Facilitating the transfer of funds between different accounts and institutions.

These functions are, by nature, intermediary roles, relying on centralized banks and clearing institutions to operate. Figure 1 illustrates how banks and clearing institutions currently collaborate in cross-border payment systems. However, the legacy system was designed as a patchwork of separate banks, each with limited trust and coordination, it inevitably starts facing inefficiencies that shape many of today's banking challenges.

1.1 An Expensive System by Design

The traditional banking system wasn't built to be lean. Banks shoulder hefty operational expenses across IT infrastructure, compliance, staffing and branch networks, and the complex coordination costs of upstream and downstream industry chains. These costs ripple through the entire system, leading to two main challenges:

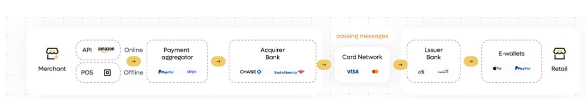

Figure 1: Image 1

1.1.1 The Unbanked and Underbanked

Even in 2024, 21% of adults worldwide have no bank account. Many banks require minimum deposits just to break even on operational costs, effectively shutting out lower-income users. And for those who do have accounts, up to 30-60% are underbanked, unable to access loans, remittances, or investment services without turning to alternative financial services. *(Source: Lucidity Insights)*

1.1.2 Friction Costs: A Hidden Drain on Profits

In today's banking landscape, every financial transaction carries a hidden layer of friction. Because each bank operates as a separate entity with limited mutual trust, funds must often pass through third-party clearinghouses to reach their destination. While this structure helps ensure security, it introduces complex and layered fee mechanisms. Businesses must absorb fixed fees, percentage charges, and intermediary costs, as well as hidden foreign-exchange losses. This is especially pronounced in cross-border payments, where currency conversion fees, bank processing charges, and card network fees stack on top of each other. The result is an opaque and unpredictable cost structure that makes accurate forecasting difficult and gradually eats into corporate margins, becoming a significant barrier to global business growth.

1.2 Efficiency Bottlenecks

Today's banking infrastructure remains deeply tied to manual workflows and legacy operations, making speed and efficiency hard to achieve at scale. Take international remittances as an example: Transfers usually take 1 to 5 business days to clear. But with added compliance steps, multiple intermediary banks, or complex routing, that timeline can stretch to 1–2 weeks. A closer examination below illustrates what drives these delays reveals a complex web of structural constraints:

Factor A: Initiation Time/Bank Cut-Off Times

Effects A: Transfers submitted after the bank's daily cut-off time are rolled over to the next business day.

Factor B: Number of Intermediary/Correspondent Banks

Effect B: If there is no direct channel between the sending and receiving banks, the transfer must pass through multiple intermediary banks, and each step introduces additional delays.

Factor C: Currency Conversion & Forex

Effect C: When currency conversion is involved, settlement often depends on FX market hours, which can postpone the final settlement.

Factor D: Compliance & AML

Effect D: Large or higher-risk transfers are more likely to trigger manual reviews, significantly increasing processing times.

Factor E: Receiving Bank Processing Speed

Effect E: Even after funds reach the receiving bank, internal clearing and crediting checks can further delay the time until the funds are available.

Factor F: Public Holidays/Weekends/Differences in Working Days Across Countries

Effect F: Cross-border transfers are especially vulnerable to differences in weekends and public holidays across countries; one non-working day can halt the entire chain.

Factor G: Banking Infrastructure and Legal Frameworks of Sending/Receiving Bank

Effect G: Mature financial systems process transactions more quickly, while stricter or less mature infrastructures tend to cause slower settlements. All of this points to one conclusion: the inefficiencies built into today's banking system are structural, not accidental. Without system-level upgrades and process overhauls, no amount of fine-tuning will make the system truly faster.

1.3 Disparities in Access to Global Financial Opportunities

Inequality in financial access plays out on two fronts. In financially developed regions, premium investment opportunities are largely reserved for the wealthy. Institutions such as private banks, hedge funds, private equity firms, and family offices typically set high investment thresholds, pricing out ordinary investors. Those with moderate wealth often find themselves locked out of top-tier asset allocation opportunities, deepening the wealth gap over time. Meanwhile, in less developed markets,

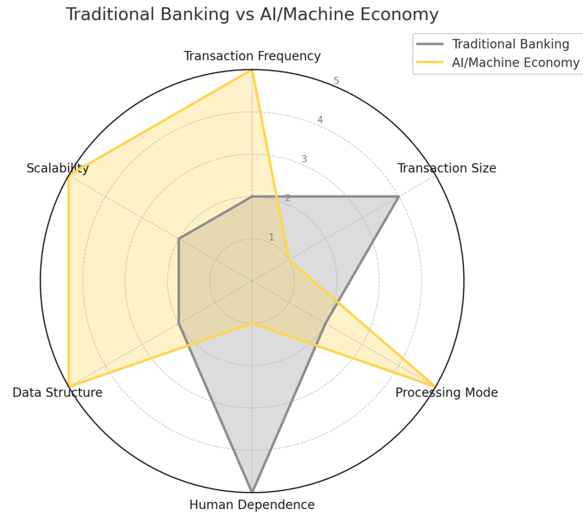

Figure 2: Image 2

weak infrastructure and limited professional capacity results in fewer options for diversified, high-quality investment channels. Many are left to rely solely on basic savings methods or risky alternatives. Incomplete regulatory frameworks and unfavorable market conditions also make it difficult to attract capital and innovative financial products, further deepening the global divide in financial opportunity.

1.4 Why Traditional Banking Wasn't Built for AI

Banking was built for a different era, one of slow, manual processes and overnight reconciliations. The AI and machine economy couldn't be more different.

On the technical side, most banks still run on COBOL-based mainframes and rely on batch processing, a model built for nightly reconciliations, not real-time execution. Bank data is scattered across siloed business lines, inaccessible to AI models that depend on clean, structured, real-time inputs. Scaling centralized infrastructure to meet AI's compute needs requires expensive, slow-to-deploy physical upgrades.

On the operation side, manual processes still dominate in traditional banking. Loan approvals, compliance checks, and risk management all rely heavily on human intervention. Transaction flows are complex and involve third party intermediaries, making them poorly suited for instant M2M payments. Even the way banks are designed—around occasional, high-value transactions—runs counter to the high-frequency, real-time, microtransaction patterns of the IoT economy.

Legacy banking was built for a world of low-frequency, high-value, human-led batch operations. The AI era runs on speed, scale, and automation. This structural mismatch makes it difficult for traditional banking systems to operate efficiently in the age of AI and machine intelligence.

The chart in Image 2 highlights just how different traditional banking is from the AI and computer-driven economy across six dimensions:

- Transaction Frequency: Banks are built for low-frequency usage; machines demand constant, high-frequency interactions.
- Transaction Size: Traditional banking focuses on large, batch transactions, while the AI/machine economy is characterized by small, instant payments.
- Processing Model: Banking still depends on batch cycles; AI requires real-time processing.
- Human Dependence: Legacy workflows lean on manual approvals; the machine economy thrives on automation.
- Data Structure: Banks lock data in silos; AI needs open, connected data environments.

- Scalability: Traditional infrastructure expands slowly; the machine economy expects rapid, on-demand scale.

In short, banking was built for a world of low-frequency, high-value, human-led batch operations. The AI economy runs on the opposite logic — high-frequency, small-value, real-time, automated flows. The design logic of centralized banking is almost the mirror opposite of what the AI era requires.

2 Banking 2.0: The Crypto-Native Upgrade

The Internet once reshaped how we imagine banks. If traditional banks had never existed, how would we design a bank fit for the digital age? This inspired the emergence of neo-banks like Revolut and Monzo, digital platforms that improved traditional banking through better UX and efficiency. However, their core architecture remained tied to the legacy banking system.

Today, blockchain evolution prompts StakeStone to ask the same question: without legacy banks, how would we build a future-ready and decentralized financial system for the blockchain era? StakeStone's answer is the Crypto-native Neo Bank — a blockchain-based financial infrastructure that replaces centralized intermediation with programmable, trustless systems.

- Settlement Layer: High-performance blockchain networks provide native clearing and settlement.
- Identity Layer: Intuitive identity solutions enable fully self-custodied on-chain accounts.
- Interaction Layer: Account Abstraction supports native on-chain smart operations.
- Intelligence Layer: With AP2(Agent Payments Protocol) and x402, StakeStone's system is fully compatible with AI agents and machine payments.

This architecture empowers human and machine agents to transact globally with real-time, low-cost, and secure settlements, forming the cornerstone that we believe as the future of an autonomous and borderless financial era.

2.1 Account and Identity Layer

A key pillar of a Crypto-native Neo Bank is a reimagined Account and Identity infrastructure, the foundation of a new financial paradigm. Built on frontier innovations such as EIP-7702, Social Login, and Gasless infrastructure, it redefines what a financial account can be.

These modules collectively define the architecture of future financial accounts, evolving beyond traditional wallets to support a shared financial account system across both human and AI agents. Our Account & Identity layer ensures compliance and security while delivering a truly frictionless financial experience.

2.1.1 EIP 7702: Smart Functions for Self-Custodies EOAs

EIP-7702 is a key proposal in Ethereum's Account Abstraction roadmap. It allows traditional Externally Owned Accounts (EOAs) to temporarily gain the capabilities of smart contract accounts without changing addresses or migrating assets.

Through EIP-7702, user accounts can dynamically load smart logic within a single transaction, enabling contract-level permissions and automated execution. This evolution transforms accounts from passive asset containers into programmable financial agents capable of policy enforcement and intelligent responses.

Within StakeStone's Crypto-native Neo Bank architecture, EIP-7702 upgrades *static wallet accounts* to *active entities*, enabling:

- Dynamic feature upgrades: enable smart contract functionality in any transaction without asset migration.
- Programmable security: integrates multisig, limits, and freeze policies at the account level.
- Automated asset management: trigger portfolio reallocation based on preset conditions (e.g., yield or FX changes).
- Institutional-grade accounts: enable role-based authorization, risk controls, and compliance.

EIP-7702 thus serves as a cornerstone for the Crypto-native Neo Bank, enabling smart account capabilities and programmable finance without compromising self-custody.

2.1.2 Social Login: Frictionless User Onboarding via Identity Abstraction

Web3 wallets traditionally require users to manage seed phrases and interact with complex transaction flows, posing as a major usability barrier. Social Login solves this by integrating Web2 authentication (Google, Apple ID, X, etc.) with MPC- or smart-contract-based key management, delivering a seamless, self-custodied blockchain experience.

As a core module of StakeStone's Identity Abstraction Layer, Social Login provides:

- Frictionless account creation: one-click onboarding using existing social credentials.
- Private Key fragmentation: private keys are split and stored via distributed cryptography.
- Accounted = Identity: on-chain accounts double as user identities for built-in KYC/AML support.
- Privacy-preserving compliance: zero-knowledge proofs enable verifiable compliance without data exposure.

By abstracting away blockchains technical barriers, Social Login enables true mass adoption, bridging the simplicity of Web2 with the autonomy of on-chain finance.

2.1.3 Gasless: Frictionless Transactions

Conventional blockchains require users to hold native tokens for gas fees, a requirement that not only raises the entry barrier but also limits mainstream usability. Gasless transactions solve this by using relayers or protocol-level gas sponsorship, enabling users to interact on-chain without needing to handle network fees.

Within the StakeStone architecture, Gasless transactions integrate deeply with EIP-7702 and Social Login, forming a complete *Identity–Account–Transaction* loop:

- Account-level gas abstraction: smart accounts automatically sponsor or manage gas on behalf of the user, enabling zero-friction interactions.
- Multi-token fee abstraction: users can pay fees using any stablecoin or other cryptocurrencies, not just the native token of a given chain.
- Optimized for institutions & IoT: ideal for high-frequency, low-value transactions such as retail micro-payments and machine-to-machine settlements.
- Seamless UX: users onboard, transact, and manage assets with zero exposure to blockchain internals.

By abstracting away gas fees while maintaining transparency and composability, Gasless transactions bring Web2-grade usability to Web3-native finance.

2.2 Yield Layer

Within StakeStone's Crypto-native Neo Bank, the Yield Layer serves as the central bridge connecting onchain assets with underlying yield sources.

Our Yield Layer supports two implementation paths based on asset type:

- For non-yield-bearing assets such as BTC and stablecoins, StakeStone employs a combination of smart contracts, custodial infrastructure, and multi-exchange strategies to convert deposits into onchain, verifiable yield-bearing tokens: STONEBTC and STONEUSD. Automated mechanisms manage yield distribution, NAV updates, and synchronized settlement across various execution layers (L2s, centralized exchanges, and custodial venues).
- For natively yield-bearing assets such as ETH, StakeStone utilizes staking and restaking protocols through smart contracts to generate native onchain yield. Returns are represented and settled via STONE (StakeStone Ether), a yield-bearing token.

2.2.1 STONEUSD/STONEBTC

Deposit & Mint After completing on-chain KYC/KYB verification, users can deposit stablecoins (e.g., USDC, USDT) or wrapped BTC (e.g., BTCB) into their yield-bearing accounts.

All deposit transactions are routed through the StakeStone Router Contract, which aggregates incoming funds and allocates them to the corresponding Custody Wallet and Strategy Pools based on the system's yield optimization logic.

Once the deposit is confirmed, the smart contract executes the minting process:

- Based on the current Exchange Rate (denoted as R), the contract mints a corresponding amount of LP tokens (STONEUSD or STONEBTC) serving as yield-bearing certificates.
- The user's holdings of STONEUSD or STONEBTC represent their share of the total yield pool, redeemable at any time.
- The Exchange Rate updates periodically based on realized yields from custody and execution layers, forming a transparent and traceable on-chain yield record.

Delegation & Strategy Execution Once funds enter the custodial layer, the system automatically allocates them across multiple yield sources according to predefined strategies:

- Ceffu Custody Accounts: Serve as the primary liquidity pool, receiving and redistributing funds from multiple users.
- Exchange Accounts (Binance, OKX, Bybit, etc.):
  - Funds are mirrored automatically from custody to exchange sub-accounts (e.g., A-1, A-2, A-3, B-1, B-2, B-3...).
  - Each sub-account may correspond to a distinct strategy execution unit, presently dedicated to neutral arbitrage strategies.
- Yield Distribution Logic:
  - Arbitrage partners or exchanges periodically update performance metrics, including PnL, interest, and fees.
  - Smart contracts perform scheduled on-chain settlements to distribute yields proportionally and transparently.

Following each settlement period, the system issues an Exchange Rate Update, updating new data to the main contract, ensuring STONEUSD / STONEBTC values are accurately reflected in the next cycle.

Withdrawal & Settlement When a user initiates a withdrawal, the system redeems assets based on the latest Exchange Rate and coordinates onchain settlement by recalling funds from custody and exchange accounts.

- Withdrawal Request & Verification: Users submit withdrawal transactions via smart contract. The system verifies their KYC status, the STONEUSD / STONEBTC balance and compliance limits, and generates a unique Request ID for the redemption order.
- Exchange Rate Calculation & On-chain Snapshot: The contract determines the redemption amount using the current Exchange Rate and performs an onchain snapshot to ensure consistency between the redemption value and the current accounting cycle.
- Custody Undelegation & Fund Return: The backend server calls custodial platform's (e.g., Ceffu) APIs to execute undelegation of funds. Exchange sub-accounts (Binance, OKX, etc.) automatically close market-neutral arbitrage positions, after which funds are transferred back to the main custodial wallet.

- Settlement & Distribution: Custodians send back yield and fund settlement data to the system, which then issues an Exchange Rate Update. The smart contract burns the corresponding STONEUSD / STONEBTC and releases the equivalent underlying assets to the user's wallet.
- Settlement Archival & Risk Synchronization: The backend records a settlement snapshot for the current cycle, while the risk management module updates liquidity pool and liquidity coverage ratio, completing the redemption feedback loop.

Cross-layer Coordination & Safeguards The Yield Layer within StakeStone's Crypto-native Neo Bank is a multi-layered, multi-strategy execution network designed for both efficiency and transparency.

- L1: STONE token issuance, Exchange Rate and Settlement;
- L2/ App Chains: Distribution of yield bearing tokens through liquidity pools;
- Custodial & Exchanges: Yield generation and asset security;
- AI Risk Engine: Continuously monitors fund movements and yield volatility within custody accounts.

This design allows StakeStone to operate a multi-layered yield generation network with transparency on-chain, efficiency off-chain, and seamlessly coordinated across all layers.

2.2.2 STONE: StakeStone Ether

Within StakeStone's Crypto-native Neo Bank architecture, STONE (StakeStone Ether) serves as the yield-bearing token for Ethereum-native assets (ETH).

Unlike STONEUSD and STONEBTC, which depend on custodial infrastructure and cross-layer settlement, STONE's yield is generated onchain from staking and restaking protocols within the DeFi ecosystem. The entire process, from yield generation and distribution to Exchange Rate synchronization, is executed onchain through smart contracts.

Deposit & Mint Users deposit ETH directly into the StakeStone smart contract, where the StakeStone Vault acts as a liquidity buffer, temporarily receiving deposited ETH to optimize capital utilization and operational efficiency.

Upon deposit, the protocol automatically executes the minting of STONE, while the deposited ETH remains in the Vault. Once the aggregated deposits meet the deployment threshold, StakeStone Vault allocates and deploys funds to various Strategy Pools:

- The number of STONE (StakeStone Ether) tokens minted is determined by the current Exchange Rate (R-value);
- STONE represents the user's share of the ETH yield pool and remains redeemable at any time;
- The Exchange Rate updates periodically to reflect underlying staking and restaking yield rate changes, maintaining an on-chain yield record.

This architecture guarantees that deposits begin earning yield upon deposit while preserving transparency and smart contract security.

Delegation & Strategy Execution Once assets are deployed to the Yield Layer, the system distributes funds among multiple Strategy Pools based on pre-determined allocation logic set by the on-chain governance module OPAP, balancing yield generation and security:

- Base Staking Layer: ETH is delegated to leading Ethereum staking pools or validator operators to earn native PoS rewards and transaction fees.
- Restaking Layer: By integrating restaking protocols such as EigenLayer and Symbiotic, ETH is restaked into distributed security networks to obtain additional yield.

- Yield Settlement & Distribution: Yield data from each Strategy Pool is automatically consolidated and reported to the main contract, which performs unified settlement and produces an Exchange Rate Update.
- OPAP Strategy Mechanism: The underlying yield strategy of STONE is managed entirely by the On-chain Proposal Allocation Protocol (OPAP) to ensure transparency and decentralized governance. Any modification to base strategies requires approval through a vote by STONE holders before implementation.

Withdrawal & Settlement When a user requests to redeem STONE, the protocol calculates the amount of ETH to be withdrawn based on the current Exchange Rate and proceeds through the settlement logic:

1. The contract determines the redeemable asset value according to the Exchange Rate. If the Buffer Pool balance is sufficient, the user can use the "Instant Withdrawal" option to withdraw ETH immediately from the buffer pool.
2. If the Buffer Pool balance is insufficient, the user can initiate a "Request Withdrawal". The withdrawal request becomes claimable after the protocol completes unstaking operations, secures sufficient redeemable liquidity, and finalizes the next settlement cycle. The user can then claim their withdrawal.
3. Whether "Instant Withdrawal" or "Request Withdrawal", the contract burns the corresponding STONE and releases an equivalent amount of ETH, including both principal and accrued yield.
4. All settlement actions and records are executed fully on-chain, remaining traceable, verifiable, and auditable.

2.3 AI and Machine Payment Layer

As AI and IoT technologies become ubiquitous, future economic activities will no longer be driven solely by humans but increasingly by Intelligent Agents that can execute and settle transactions automatically.

The AI & Machine Payment Layer of StakeStone's Crypto-native Neo Bank is designed precisely for this purpose: it enables every AI, device, or algorithm to possess a verifiable identity, a funding account, and payment capabilities, allowing them to function as Autonomous Economic Actors within the financial system.

This layer integrates next-generation machine payment protocols such as Google's AP2 (Agents-to-Payments Protocol) and Coinbase's x402, forming a fully automated loop from Agent Decision to On-chain Settlement, and establishing the foundational layer of true MachineFi (machine finance).

In StakeStone's Crypto-native Neo Bank architecture, the system supports:

- **AP2 (Agents-to-Payments Protocol):** Defines how intelligent agents generate, transmit, and sign payment intents.
- **x402 (HTTP-based Payment Protocol):** Provides a standardized payment authorization and verification channel, enabling onchain settlement and micropayments without relying on traditional centralized account infrastructures.

Core Applications:

1. **Agent Identity Layer**
   (a) Each AI or IoT device is assigned an onchain account (e.g., EOA) that registers a unique identity, which can become a smart account through EIP-7702.
   (b) This identity is bound to the device's StakeStone bank account, permission policies, and onchain compliance modules (ZK-KYC / AML), forming an Identified Machine Account (IMA) with verifiable credentials and programmable access control.
2. **Payment Intent via AP2**

(a) The Identified Machine Account (IMA) can create an Intent Mandate via the AP2 protocol, authorizing automated payment actions under predefined conditions.

(b) Based on triggering pre-authorization conditions or merchant-side quotations, the AP2 framework generates a Cart Mandate.

(c) After two-way verification within the StakeStone system, the data is packaged into a standardized Payment Intent, which includes amount, recipient, execution conditions, contextual data, and execution logic.

3. **Execution & x402**

(a) A Payment Intent can be executed either directly by an authorized StakeStone smart contract or sent to an x402 facilitator for offchain or hybrid settlement.

(b) The x402 facilitator verifies the signatures and authorization, executes the payment settlement (or forwards the transaction to onchain execution), and returns an HTTP 200 response to confirm payment completion and service accessibility.

4. **Compliance Feedback Loop**

(a) Every payment automatically triggers onchain compliance verification through ZK-KYC / AML RuleSets, ensuring audit visibility for all machine-to-machine transactions.

(b) Transaction and settlement states are synchronized in real time with StakeStone's Risk Control System and Regulatory Interfaces, achieving Compliance-as-Code through protocol-level enforcement.

Through the combination of AP2 and x402, StakeStone's machine accounts can not only perform settlements within its own system but also interoperate with mainstream enterprise-grade payment networks, achieving a Unified Flow between human and machine accounts.

2.4 Fee and Settlement Layer

2.4.1 Payment Abstraction: Multi-Asset Settlement and Fee Neutrality

While Gasless transactions address the user-side fee barrier, Payment Abstraction redefines how fees are sourced and settled within the system.

Legacy blockchains restrict gas payments to native tokens (e.g., ETH), creating friction in cross-chain and multi-asset ecosystems and forcing users and institutions to constantly perform token swaps and top-ups, creating liquidity fragmentation and a discontinuous user experience.

In StakeStone's Fee Layer, Payment Abstraction—built atop Account Abstraction and relayer infrastructure—makes the fee source programmable. Any verified asset can act as gas, enabling a unified multi-asset payment system under a single account.

Key Components:

- Multi-Asset Gas Payments: Users can pay network fees using stablecoins (USDC, DAI, CUSD) or CBDCs, instead of being restricted to native tokens.
- Intelligent Exchange Routing: An embedded router uses oracle-based FX rates for real-time conversions and accurate settlement.
- Sponsored Fee & Incentive Mechanisms: Institutions, protocols, or merchants can sponsor gas fees, thereby supporting B2C and B2B incentive models.
- Cross-chain Account Interoperability: One account can execute payments and transfers across multiple chains without switching mainnets or asset types.

This abstraction framework brings cross-chain neutrality and asset-agnostic settlement to StakeStone's neo-bank architecture, transforming transaction fees into a programmable parameter that adapts to any asset, network, or participant.

2.4.2 Settlement Layer: Layered Settlement Architecture

The settlement layer of StakeStone's Crypto-native Neo Bank is designed to support diverse capital flow scenarios, including:

- Account transfers and balance management between user accounts;
- DeFi/yield product Exchange Rate updates;
- Cross-chain and multi-asset liquidity transfers;
- Automated micropayments between AI agents.

Unlike traditional banks, the asset structure of a crypto-native bank is multi-sourced and contains complex liquidity routes. A single, uniform settlement logic cannot cover all asset types and transaction models. StakeStone therefore implements a layered settlement model based on asset characteristics and transaction scenarios.

2.4.3 Balance Settlement Layer

Handles transactions such as real-time transfers between accounts, payments, and settlements. Depending on transaction size, two blockchain settlement environments are required:

1. High-value, low-frequency transactions: settled directly on Ethereum L1.
2. Low-value, high-frequency transactions: processed in high-performance execution environments (e.g. L2 rollups/appchains) to achieve:
   (a) Real time usability for frequent payments, P2P payments, merchant settlements, and machine-to-machine micropayments;
   (b) Cost efficiency: reduced transaction costs through L2/app-chain gas efficiency, Gasless fee abstraction, and batch processing mechanisms.

2.4.4 Yield and NAV Settlement Layer

Unlike the Balance Settlement Layer, this component of StakeStone's Crypto-native Neo Bank focuses on how yield-bearing tokens maintain accurate NAV updates on L2 or high-performance appchains.

To achieve this, the settlement of yield certificates adopts an L1–L2 / appchain dual-layer coordination model:

- L1 — Sole source of settlement and pricing
  - The pricing of yield tokens are calculated and updated exclusively on Ethereum L1, serving as the single authoritative source for price formation.
  - For large-value transactions, users can directly invest or redeem yield-bearing tokens based on native L1 pricing, with yield settlement completed on L1.
- L2 / Appchains — Retail distribution through swap
  - Yield-bearing tokens bridged to L2/appchains are swapped by retail users via DEXs.
  - The purchase and redemption prices of these tokens are determined either by DEX liquidity or directly quoted by RFQ (Request for Quotation) providers.
  - The low transaction costs and high execution efficiency of L2/appchains allow yield-bearing tokens to reach a broader retail market, supporting smaller investors.

2.5 Compliance and Security Layer: Embedded Regulation and Transparancy

In StakeStone's Crypto-native Neo Bank, the Compliance & Security Layer elevates onchain finance from self-governing automation to a state of being regulatable, auditable, and verifiable.

By embedding compliance logic, risk controls, and audit modules directly into the protocol core, this layer implements regulation by design—where oversight and innovation coexist at the technical level.

Our goal is to establish a globally compliant yet transparently decentralized financial infrastructure, maintaining both regulatory alignment and crypto-native self-sovereignty.

2.5.1 Onchain KYC/AML Module: Compliance Proof with Privacy

Traditional financial systems rely on manual processes or centralized databases for identity verification and anti–money laundering monitoring. StakeStone replaces this model with an On-chain Compliance Identity Layer that uses zero-knowledge proofs to enable privacy-preserving compliance verification.

- ZKP-based Identity Verification: Certified KYC providers validate user identity and risk profiles, issuing a ZK Compliance Credential. When interacting on-chain, users only present a proof, without revealing any plaintext personal information.
- Multi-level Compliance Mapping: Each account carries a dynamic compliance status indicator (Compliant / Restricted / Pending), written directly into the account layer. This integrates seamlessly with EIP-7702's flexible authorization system, enabling transaction-level permission control.
- Cross-chain / Cross-jurisdiction Interoperability: KYC/AML credentials can interoperate across multiple networks through bridges and cryptographic signatures, allowing StakeStone to maintain compliance across different countries and regulatory bodies.

This approach establishes a neo-bank version of "Know Your Wallet (KYW)", ensuring that every account possesses a verifiable compliance identity without compromising user privacy

2.5.2 Programmable Regulatory Interface: From Manual Reporting to Automated Compliance Execution

StakeStone's Crypto-native Neo Bank implements a Regulatory API Layer, enabling regulation compliance to be embedded directly into the banking system as executable code, rather than relying on reports or manual verification.

- API-level Regulatory Integration: Regulatory authorities or compliance nodes can define rules via smart contract APIs, such as cross-border transfer limits, restricted address lists, and reporting intervals. Enabling the system to automatically validate compliance prior to transaction execution, ensuring preemptive enforcement.
- Automated Compliance Data Reporting: Transaction and account data are encrypted and synchr to designated regulatory endpoints, guaranteeing real-time availability and tamper-proof compliance records.
- Compliance-as-Code: Regulatory logic is parameterized and upgradeable, forming an evolving compliance framework where authorities from different jurisdictions can deploy their own rule templates on a shared protocol foundation.

This mechanism transforms regulation from an external oversight function into an intrinsic system capability—

Regulation becomes protocol; compliance becomes automatic.

3 Governance and Tokenomics

STO is the native governance and utility token of the StakeStone ecosystem. Its design leverages the value-measurement function of token to involve and attract a global community to participate in co-building an open, decentralized, and transparent crypto-native banking network.

In StakeStone's banking framework, STO fulfills three core functions:

- Decentralized Governance: Locking STO generates veSTO, granting holders voting rights and participation in protocol decisions.
- Enhanced Liquidity Stability : Users who lock veSTO and provide liquidity receive enhanced yield multipliers.
- Value Accrual: The protocol captures revenue via STO burn mechanisms and redistributes value by enhancing liquidity yields, protocol fee utility, and tokenholder alignment.

3.1 Governance Model: STO and veSTO conversion

Users engage in governance and earn rewards by converting STO tokens into veSTO.

- 1 STO = 1 veSTO upon conversion, effective immediately.
- When reverting from veSTO to STO, a mandatory lock-up period (e.g., 30 days) applies to maintain governance stability.

3.2 veSTO Use Cases

- **Governance:** veSTO holders can vote on key protocol parameters such as fee ratios, token emission schedules, and ecosystem reward allocations, as well as determine the overall direction of protocol development.
- **Deposit (Liquidity Provision) Incentives:** Liquidity providers who lock veSTO receive a yield boost on the liquidity they supply, increasing their overall returns within the Yield Layer.
- **Fee Rebates:** Depending on their veSTO holding tier, users are eligible for rebates on platform fees, including transfer fees and on/off-ramp fees.

3.2.1 Swap and Burn

Through diversified sources of protocol revenue, StakeStone's Crypto-native Neo Bank continuously builds a Public Treasury made up of blue-chip crypto assets.

As the StakeStone ecosystem expands, the Treasury's scale and composition will continue to grow and diversify—forming the long-term value foundation for the STO token.

STO holders gain a value-backed swapping route through the Swap & Burn mechanism:

Holders can exchange their STO tokens for a proportional share of the Treasury's diversified assets. Upon exchange, the STO is permanently burned, simultaneously reducing circulating supply and strengthening its intrinsic value.

This mechanism creates a closed-loop value capture cycle for StakeStone's governance token:

Protocol Growth → Treasury Expansion → Swap & Burn + STO Supply Reduction → Increased Token Value.

4 Conclusion and Outlook

Traditional banking systems are built upon centralized trust and multi-layered intermediaries, resulting in high costs, inefficiency, imbalance, and an overall inability to adapt to the era of intelligent automation.

Over the past decade, the rapid evolution of blockchain technology has prompted a fundamental question: *if the banks of the past had never existed, how would we rebuild them for the future using today's most advanced blockchain technologies?*

StakeStone 2.0—our Crypto-native Neo Bank—was designed as a systematic answer to that question, reimagining the foundations of banking for the decentralized, machine-integrated economy of tomorrow.

4.1 Addressing High Costs: From "Human Trust" to "Code Trust"

The high operating costs of traditional banks stem from their dependence on manual processes, compliance overhead, IT infrastructure, physical branches, and multi-layered settlement structures.

StakeStone 2.0 replaces these inefficiencies with **Account Abstraction (EIP-7702)**, **Gasless transactions**, and **Social Login**, enabling **self-custodied accounts with automated trust through smart contracts and zero-friction onboarding**.

- **Account-as-the-Bank:** Users hold their own onchain accounts—funds no longer require third-party custody.

- **Gasless Transactions:** Fees are abstracted away, creating a Web2-level user experience.
- **Smart Account Logic:** Multi-signature, spending limits, automated yield management, and risk controls are all executed by code instead of manual approval.

For the first time, the cost of trust in banking transforms from human to computational, turning users from recipients of service into autonomous financial actors.

4.2 Addressing Inefficiency: From "Batch Settlement" to "Real-time Settlement"

Traditional banks rely on multi-tiered clearing processes and manual reconciliation for interbank and cross-border transactions, making T+N settlements the norm. These legacy systems depend on end-of-day batch processing, which introduces latency and operational friction.

StakeStone 2.0 replaces this with a **layered settlement architecture** that defines differentiated settlement logic based on asset type and transaction scenario. In this model, each transaction achieves settlement instantaneously, and each settlement equals final confirmation, achieving true real-time settlement.

As a result, cross-border payments, peer-to-peer transfers, and machine-to-machine micropayments can now be executed with near-zero latency, redefining financial efficiency for the onchain era.

4.3 Addresing Inequality of Opportunity: From "Closed Access" to "Open Inclusion"

Traditional banks divide the world into those who are served and those who are excluded, constrained by account requirements, regional barriers, and capital thresholds.

StakeStone 2.0, through our onchain Yield Layer, enables anyone to participate in the global yield network with minimal entry barriers. Because the marginal cost of providing global financial services through code is near zero, the Crypto-native Neo Bank model makes universal financial inclusion possible for the first time.

Regardless of geography or economic condition, every individual and institution can now participate equally within the same yield ecosystem, accessing opportunities once limited to a privileged few.

4.4 Addressing Data Silos and AI Incompatibility: From "Human Decision" to "Intelligent Collaboration"

Traditional banking architectures are closed, fragmented, and lack real-time processing or open interfaces, making them ill-equipped to support emerging financial scenarios such as AI-driven autonomous decision-making and machine-to-machine (M2M) settlement.

Legacy operational logic still assumes that *"customers occasionally perform transactions"* rather than *"intelligent agents continuously interact and transact,"* leaving them fundamentally misaligned with the machine economy.

StakeStone bridges this gap through the integration of AP2 (Agents-to-Payments Protocol) and x402, building an AI & Machine Payment Layer that enables every AI, IoT device, or algorithm to possess an independent identity and programmable payment capability.

- **AP2 defines payment intent:** AI agents automatically generate Payment Intents based on task objectives and resource requirements.
- **x402 provides authorization and secure settlement:** Built on the HTTP 402 status code, x402 offers a standardized payment authorization and validation channel. It receives and verifies Payment Requests from AP2, then executes onchain settlements or calls Custody APIs for fund transfers through designated facilitators.
- **Gasless + Compliance Module:** Relay services sponsor transaction fees, enabling fully automated and auditable agent transactions with integrated regulatory traceability.

AP2 manages payment intent and authorization logic, while x402 oversees verification and settlement. Together, they embed autonomous intelligence into StakeStone accounts, enabling them to make independent decisions and execute transactions, where AI and human accounts collaborate seamlessly within the same financial stack, fully aligning with the machine economy.

4.5 Addressing Regulatory Complexity and Opacity: From "Manual Reporting" to "Compliance-as-Code"

StakeStone 2.0's **Compliance & Security Layer** embeds regulatory logic directly into the protocol layer through its **ZK-KYC/AML module** and **Programmable Regulatory API Layer**, ensuring that compliance and innovation coexist without conflict.

- **Zero-Knowledge Compliance:** Identity legitimacy is verified without exposing private information.
- **Embedded Regulatory APIs:** Compliance rules are executed directly as code, automatically intercepting non-compliant transactions.
- **Cross-Jurisdiction Recognition:** Encrypted credentials and transaction records are portable across networks, enabling multi-national regulatory interoperability.

Compliance is no longer an external burden but a native attribute of the system itself. StakeStone makes "Regulation as Protocol, Compliance as Execution" an onchain reality.

4.6 Toward the Bank of the Future: A Public Network for Global Value Flow

What StakeStone is building is not a traditional financial intermediary dependent on manual processes and centralized systems, but a **new kind of Crypto-native Neo Bank** — a **financial infrastructure** rooted in **blockchain-based trust**, powered by **intelligent accounts**, and defined by **machine-to-machine interoperability**.

When human and machine accounts share the same economic stack and when yield, settlement, clearing, and governance all take place on a single open ledger, the bank is no longer merely a human-centered service institution — it evolves into a public network for global value flow.

StakeStone's Vision To make finance as open as the Internet,And let value flow as freely as information.This, is StakeStone's answer to the future of banking.

5 Appendix

5.1 R Value Calculation Formula for STONEUSD / STONEBTC

To ensure transparency and consistency in yield distribution, NAV calculation, and locking cycles, the StakeStone Crypto-native Neo Bank adopts the formula shown in Image 3 to calculate the R Value (Exchange Rate Ratio), which measures the periodic NAV change of yield-bearing tokens such as STONEUSD and STONEBTC:

$$R = \frac{user\_deposit - user\_withdraw + user\_profit - lp\_locked\_value}{lp\_amount - lp\_locked} \tag{1}$$

Parameter: user_deposit
Definition: The user's total cumulative deposit amount (gross inflow), retrieved in real time from onchain contract data.

Parameter: user_withdraw
Definition: The user's total cumulative withdrawal amount (gross outflow), retrieved in real time from onchain contract data.

Parameter: user_profit

Definition: The user's accrued yield, calculated by the system based on the results of strategy execution (including PnL, fees, and revenue sharing) and allocated to the user's account.

Parameter: lp_amount

Definition: The total issued supply of STONEUSD (or other yield-bearing tokens), representing the total number of circulating yield tokens currently in the system.

Parameter: lp_locked Definition: The amount of STONEUSD in a locked state during the settlement process. Every Thursday (UTC), when user withdrawal requests are processed, the corresponding tokens are marked as locked.

Parameter: lp_locked_value Definition: The value within the locked pool, calculated as lp_locked $\times$ R (NAV at the time of locking). This value records the conversion ratio between STONEUSD and stablecoin for the given cycle. The system updates this figure every Thursday (UTC) and displays the current exchange rate on the frontend.

5.1.1 Parameter Definition and Framework

- The R Value reflects the **periodic NAV fluctuation** of yield-bearing tokens and serves as the core variable for yield distribution and redemption settlement.
- The calculation logic is executed automatically each settlement cycle (typically once per week), ensuring that all user assets are settled accurately based on the latest exchange rate.
- If a locking operation occurs during a cycle, the corresponding tokens and values are temporarily excluded from the denominator to prevent short-term liquidity fluctuations from distorting NAV.
- All parameters are sourced from onchain verifiable data, ensuring that the entire computation process remains **transparent, auditable, and tamper-proof**.

5.1.2 Snapshot and NAV Update Mechanism

StakeStone performs its Snapshot & Settlement Cycle automatically every Thursday at 00:00 UTC, following this process:

1. Aggregate all user deposit, withdrawal, and yield records for the current cycle;
2. Compute the new R Value;
3. Update the Exchange Rate for yield-bearing tokens such as STONEUSD and STONEBTC;
4. Publish an onchain snapshot and synchronize the results to the user interface.

This mechanism ensures fair yield distribution, transparent NAV confirmation, and cross-layer data consistency within each cycle, while also providing a unified NAV reference across the custody, settlement, and contract layers.

5.2 Swap and Burn

The **Swap & Burn** mechanism is one of the core components of the StakeStone protocol, designed to achieve **STO value capture** and **market equilibrium**.

By allowing users to exchange STO tokens for diversified assets held in the Treasury while burning a proportional amount of STO during each swap, the system establishes a self-regulating value model that provides both intrinsic backing and a market floor for the token.

5.2.1 Operational Mechanism

Holding **STO tokens** represents a potential claim on a proportional share of the Treasury's assets. As the protocol grows and accumulates revenue, the Treasury expands with additional blue-chip crypto assets.

When the implied asset value per STO in the Treasury exceeds the market price of STO, an arbitrage opportunity arises. Users can then restore market equilibrium through the following process:

1. **Buy STO on the open market:** When the STO market price falls below its implied Treasury value, users can purchase STO at a discount in secondary markets.

2. **Execute Swap & Burn:** Users submit their STO to the protocol for a swap. The system calculates their share of Treasury assets (e.g., ETH, BTC, or stablecoins) based on the Treasury's NAV, and **permanently burns** the corresponding amount of STO after the swap.

3. **Realize profit and value convergence:** Users receive Treasury assets, while the STO supply decreases, driving the token's market price back toward its intrinsic value range.

5.2.2 Economic and Market Impact

Within StakeStone's tokenomics, the Swap & Burn mechanism performs three key functions:

- **Deflationary Pressure:** Each treasury swap permanently burns STO, reducing total supply and introducing a built-in deflationary effect.
- **Value Realization:** Users can convert STO into Treasury assets, creating a verifiable asset-backed intrinsic value for STO.
- **Soft Value Floor:** The arbitrage process establishes a natural price floor, as market participants continuously rebalance STO's price relative to Treasury NAV.

5.2.3 Self-Regulation and Sustainability

The Swap & Burn design ensures that arbitrage activity not only benefits participants but also stabilizes STO price. Its key characteristics include:

- **Price Discovery:** Market behavior dynamically corrects token valuation, keeping STO prices anchored near Treasury NAV.
- **Organic Equilibrium:** Swap activity maintains a dynamic balance between Treasury growth and STO circulation.
- **Sustainable Value Support:** As the Treasury continues to accumulate assets, STO's intrinsic value and scarcity strengthen in tandem, reinforcing STO's long-term stability.