

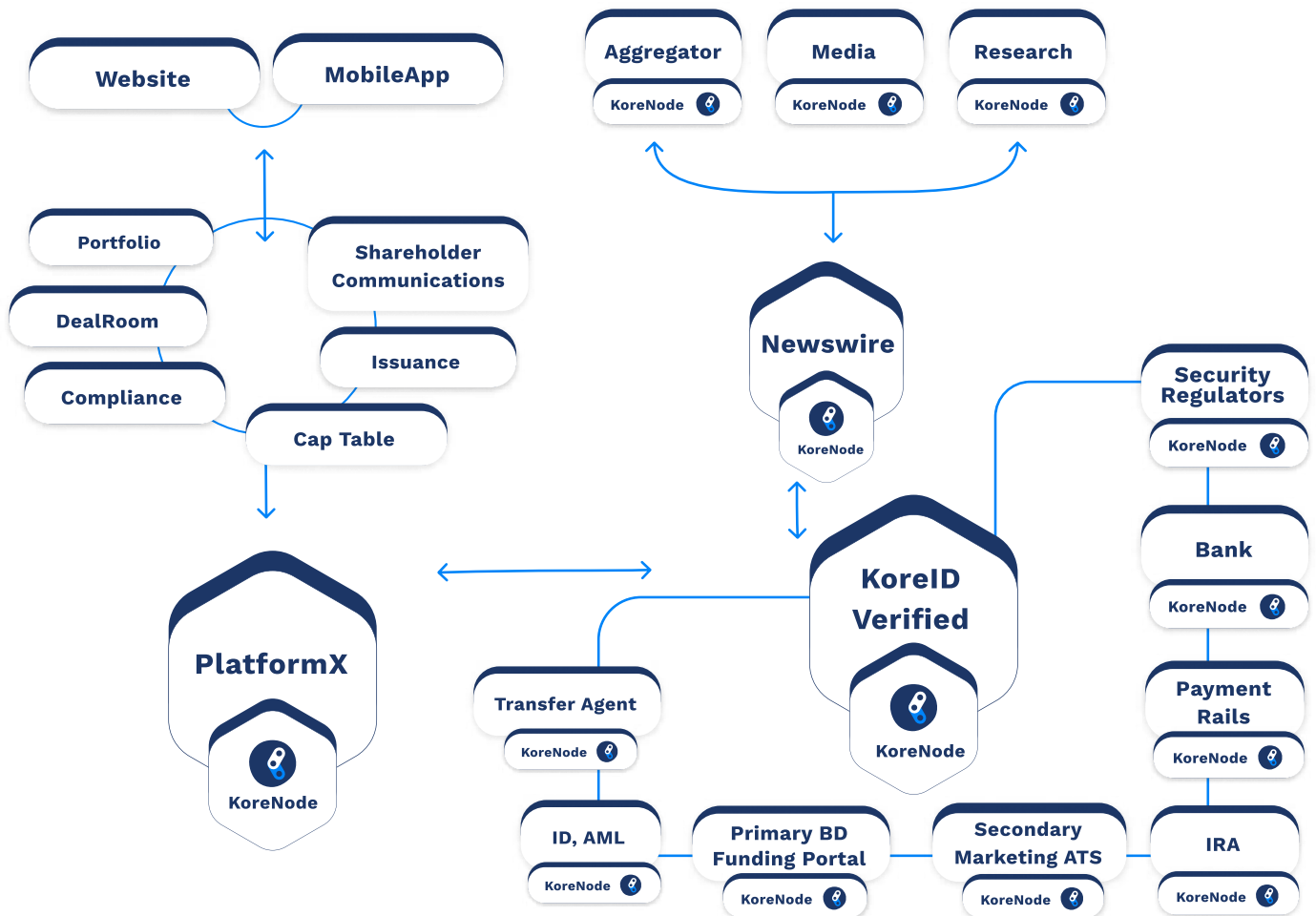


KOREPAPERS

The Infrastructure of Trust for the Private Capital Markets

The Challenge and Solution

The global private capital markets are made up of loosely coupled entities and individuals that conduct capital transactions without strong governance, efficiency, or fluidity. Since these participants are smaller entities, they cannot invest in technical infrastructure, and rarely have technical savvy at the same level as participants in the public markets. While the private markets represent nearly half of the world's GDP, they remain technologically underserved.



KoreChain's Infrastructure of Trust in the global private capital markets remedies this situation by providing a ready-made infrastructure that brings a complete end-to-end delivery of capital market information, ensuring compliance in various jurisdictions, and enabling fluidity in a very cost-efficient manner, all without compromising the freedom and branding of the individual participants.

KoreChain's Infrastructure of Trust is the world's first highly secure and fully permissioned blockchain designed to empower private capital markets. The ecosystem enables fully compliant issuance, trading, clearing, settlement, management, reporting, corporate actions, and auditable records for digital securities worldwide.

Components of the Infrastructure of Trust

The Infrastructure of Trust has the following essential components:

- Regulated Entities
- Compliant Processes that are compliant with securities regulations and company law in multiple jurisdictions
- Technology stack for enabling trust
- Complete lifecycle for the private capital markets
- Chain of Trust

Regulated entities are participants who are subject to legal regulation in one or more jurisdictions. Examples include broker-dealers, secondary market operators, lawyers, auditors, transfer agents, due diligence providers, AML providers, share registries, corporate registries, custodians, regulators etc.

Compliant processes means that all transactions, including primary capital raising through exempt securities offerings, KYC & AML verification, asset transfers, secondary market trading, and corporate actions, are conducted in strict compliance with all relevant legislation.

The **technology stack** of the KoreInfrastructure consists of the primary applications for managing the full end-to-end lifecycle of securities and the trust-enabling KoreChain, which is a permissioned, enterprise-grade blockchain deployed on multiple

KoreNodes operated by independently verified KorePartners. The complaint processes are executed through smart contracts called KoreContracts that ensure business validation and consensus, recording the final results in an immutable, decentralized, and fail-safe distributed, permissioned ledger.

The KoreInfrastructure has the following components and solutions:

- **KoreChannels:** Multiple channels, one for each country, to be used for transactions and data that are required to be located within, and restricted to, single jurisdictions
- **KoreConsortium:** Consortium nodes for each of the major categories of regulated entities (broker-dealers, secondary market operators, transfer agents, etc.)
- **KoreNodes:** Blockchain nodes exclusively owned, controlled, and managed by independent, regulated KorePartners
- **KoreProtocol:** Technical specifications for the creation of various types of KoreContracts that implement and represent various types of digital assets
- **KoreContracts:** Smart contracts that are native to the KoreChain, for issuing and managing digital assets and their transactions
- **KoreSettlement:** A complete settlement engine for the compliant settlement of direct transfers and secondary trades through alternative trading system (ATS) platforms.
- **KoreAPI:** Permissioned API infrastructure for providing access to non-blockchain systems for KorePartners
- **KoreMessaging:** Secure messaging layer for communication between KorePartners
- **KoreBinaries:** Executable binaries that can be created independently by KorePartners for off-chain processing
- **KoreRules:** Rules engine for creating, managing, and executing business rules on the KoreChain
- **KoreStable:** Creation, management, and operations of stablecoins
- **KoreNFT:** Creation, management, and operations of non-fungible token

- **KoreChain Explorer:** Privacy-preserving, web-based explorer of KoreChain transactions.
- **KoreOracles:** Creation, management, and operations of oracular functions for coordinating on-chain and off-chain processing in KoreContracts and KoreTokens
- **KoreBridge:** Interoperability with other blockchains
- **KoreWallet:** Independent mobile app and browser extension for all participants to view and manage their data and conduct transactions

The KoreChain

The Infrastructure of Trust is implemented on the KoreChain, which is a fully permissioned blockchain that has no risk of forking, no mining fees, and no gas fees. The KoreChain is highly secure, with recourse for faulty transactions, and secure custody for all digital assets. All digital assets are non-bearer instruments. This makes it less appealing to crypto-thieves and bad actors. The KoreChain is highly scalable with high throughput and minimal economic waste or environmental impact.

- The KoreChain is a permissioned blockchain built on Hyperledger Fabric.
- It is designed with safety and security as paramount requirements and hosted on IBM's highly secure servers.
- It is completely focused on global private capital markets and especially on tokenized securities.
- All digital assets and tokenized securities are implemented as non-bearer instruments that are fully-compliant with all applicable regulations with owner safeguards built-in,

Why KoreChain?

The market has no blockchain that is designed for the special requirements of securities in private capital markets where safety, security, governance, and risk management are absolutely essential. In addition, securities need to be managed throughout their lifecycle, from issuance to exit, including various types of corporate actions. Securities have custodianship requirements that some entity has to provide, such as the issuing company, broker-dealer, or transfer agent.

The securities environment is very complex and therefore benefits from AI-technology, whether natively to manage the transactions and provide governance, or to support the implementation of complex smart contracts called KoreContracts (which are truly smart and represent enforceable legal contracts). Operationally, the KoreChain platform also uses artificial intelligence to implement validation consensus algorithms

adaptively to suit the needs of the specific transactions and participants.

Since the KoreChain is built on top of an industrial-strength permissioned blockchain (Hyperledger Fabric), it also provides all of the traditional advantages of blockchains such as technical validation, immutable distributed ledgers, and complete traceability.

KoreChain versus a Traditional Blockchain

- The KoreChain is a permissioned distributed ledger
- Governed (and audited)
- Lifecycle management of KoreContracts and KoreTokens
- Event management and subscriptions to events that affect the tradeability or transactions of the security token
- Artificial intelligence for supporting design time guidance, KoreContract execution, data analysis, governance, risk management, and compliance.
- APIs to integrate with functional applications such as KoreConX's All-In-One platform (for portfolio management, cap table management, shareholder management, equity management, issuance management, transfer agent, and capital markets).
- APIs for accessing third-party services
- The KoreChain does not circumvent regulation or disintermediate any of the regulated entities in the private capital markets; instead, it provides a very efficient and fluid infrastructure for protecting the private capital market ecosystem and ensuring compliance with all the appropriate regulations.

The KoreChain Participants

The KoreChain's participants are the stakeholders of the private capital markets. These include the Issuers and their management team, directors, and shareholders (or token holders). Other participants are the investors, broker-dealers, secondary market (ATS) operators, transfer agents, lawyers, bankers, regulators, and third-party service providers.

Advantages of the KoreChain

- It builds on Hyperledger Fabric's modular architecture to provide dynamically adaptable validation and consensus that includes both technical validation and finality as well as legal validation and business finality that is fully compliant.
- It provides security through end-to-end cryptography, separation of transactions through channels, and FIPS 140-2 Level 4 security that includes Hardware Security Modules (the highest level of security specified by the U.S. NIST); Fabric also allows pluggable cryptography to meet the needs of the business.
- It provides audit capabilities on a separate "chain" (implemented as an audit channel) that logs all activity to create digitally-signed and hashed immutable records; the audit chain cannot change the state of any transaction on the operational chain, and no entity or transaction can modify the audit logs.
- It provides the complete infrastructure to support the lifecycle of various types of KoreContracts.
- It allows data, transactions, and business logic to be flexibly stored on-chain or off-chain.

KoreChain Functional Architecture

Functional Layer

Portfolio
Management

CapTable
Management

Minute Book

Investor
Relations

Transfer Agent

Capital
Markets

Compliance

Functional API Layer

Ecosystem Layer

Verification

Validation

Business
Consensus

Legal

Secondary
Market

Third-Party
Providers

KoreTokens, KoreContracts, and Ecosystem Management API

Business Management Layer

Contract
Management

AI
Management

Events
Management

Transaction
Management

Process
Management

Account
Management

AI Expert Base

Business
Consensus

Business
Governance
Rules

Jurisdiction
Rules

Contract
Management

Securities
Business Rules

Lifecycle
Process Rules

Infrastructure Layer

BlockChain
Admin & Ops

Membership

Technical
Consensus

Distributed
Ledger

Account
Management

Security Layer

Technical
Governance

Infrastructure
Security

Security
Monitoring &
Intelligence

KoreAuditChain

Integration & Data Layer

System
Integration

Transformation
& Connectivity

Enterprise
User Directory

Enterprise
Data

KoreNodes

KoreNodes is a mechanism for regulated entities to participate in the KoreChain. Moreover, each KoreNode participates only in those transactions for which the operator is responsible and has regulatory accountability. All transactions are to be fully compliant with securities regulation and company law in various jurisdictions. Participation in a KoreNode ensures there is strong governance over securities transactions.

Deployed on 5 major cloud providers and in 23 countries (and growing), KoreNodes are operated by regulated entities such as broker-dealers, secondary market operators, lawyers, auditors, transfer agents, due diligence providers, AML providers, share registries, corporate registries, custodians, regulators, and more. KoreNodes ensure validation and consensus of transactions so that digital securities are fully compliant with securities regulations, while regulatory oversight of operators ensures they remain trusted participants.

Business view: A KoreNode is an independent node on the KoreChain. A KoreNode allows regulated entities to participate in the KoreChain. Regulated entities are broker-dealers, transfer agents, law firms, auditors, regulators, and ATS platforms.

Technical view: A KoreNode is blockchain software that resides in the cloud. Cloud data centers are operated by major Cloud providers such as Amazon, IBM, Microsoft, Google, Digital Ocean, and many others. These data centers are secure and available 24 x 7 with very little downtime. Data is backed up regularly. Servers are monitored continually. A KoreNode consists of the following technical components:

1. Server machine that resides in a secure data center.
2. Hyperledger Fabric, which is an industrial-strength, permissioned blockchain.
3. The KoreChain (which is built on Hyperledger Fabric).
4. Smart contract software code, also called chaincode, that represents securities transactions.

Why is a KoreNode Important?

A KoreNode contains a copy of all the transactions in which it participates. These records are cryptographically secure, meaning that the data cannot be erased. Such a secure and immutable copy assures KorePartners, clients, investors, auditors, and regulators that all parties in a securities transaction have the same data and that the data cannot be tampered with.

Here are some of the reasons why KoreNodes are important:

- Independent verification and validation of KoreTransactions.
- Originate or process KoreTransactions in the KoreChain (distributed ledger)
- Participate in, and contribute to, the Governance function, vote on enhancements, guide the creation of new financial products, and so on.
- Periodic audit checks - audit code is executed by KoreNode Operator independently at their discretion; this triggers separate audit reports on each of the KoreNodes that are in the jurisdiction and scope of the KoreNode Operator initiating the audit.
- Send and receive secure messages.

Functions of a KoreNode

KoreNodes perform the following functions:

- Endorse transactions, which means the chaincode that runs on the KoreNode checks for the validity of the transactions. The documentation for this code is provided to the KoreNode owner and a number of tests can be run to ensure the the validity of the transactions.
- Maintain a copy of the distributed ledger of transactions on the KoreChain.
- Onboarding New Shareholders
 - Shareholders on the KoreChain platform are onboarded to the ATS platform through the KoreNode in a cryptographically secure way that also provides the ATS Operator the confidence that the data is verified and untampered.

- The KoreNode operator can also onboard counterparties that may not be on the KoreChain, or leverage the information on the KoreChain if the counterparty is already on the KoreChain.
- Ensure Credibility of KYC ID, AML, and Accreditation Verifications
 - First-time investors
 - Recurring investors
 - Re-run KYC on expiry
 - AML for money-based transactions
 - Accreditation of Investor

KoreNode Operators

Every KoreNode is operated by regulated entity. The KoreNode Operator is provided with the software installation of Hyperledger Fabric, KoreChain, and the smart contracts (chaincode) through easily executed deployment scripts.

Alternatively, the KoreChain technology team can do the setup on the KoreNode Operator's behalf after signing a Technology Agreement. This flexibility is there to help Operators who may not have technical knowledge or personnel to perform the technical tasks.

Based on the role of the Operator (for example, broker-dealer), software code called chaincode (aka smart contracts) may be set up on the Operator's server. Such chaincode is typically tailored to validate transactions only in the jurisdiction in which the Operator is licensed to operate by a securities regulatory authority.

The chaincode validates transactions on the Operator's behalf. Such validated transactions are cryptographically sealed using the Operator's signature keys. After such transactions are committed to the shared, distributed ledger, they are immutable. However, reversal transactions are possible in case of errors.

The detailed process is covered in the [KoreNode Onboarding Guide](#).

Benefits to a KoreNode Operator

KoreNode operators benefit in the following ways:

- They are a key part of the Infrastructure of Trust.
- Influence or approve the creation of new digital financial instruments.
- Influence or approve new functionality for the KoreChain.
- Access to transaction data for analytical purposes (without violating confidentiality).
- Access to special insight reports on global trends, by country, by industry, activity type, investment patterns, etc.
- Integrate with KoreNode Operator's internal systems; for example, providing third-party services and data to other participants.
- The first priority in connecting with issuers.
- Special analytical reports.
- Marketing and visibility on all KoreChain websites.

KoreProtocol

The KoreProtocol is a specification for smart contracts on the KoreChain. The KoreProtocol describes the various types of data and methods required for various types of digital securities.

KoreContracts

KoreContracts, written in Golang, are fully-compliant smart contracts that include judicial foundations, Ricardian encoding, and full referenceability of transactions to contract clauses.

KoreSettlement

KoreChain performs complete settlement of direct transfers and secondary trades from alternative trading system (ATS) platforms.

Prior to initiating the trade, the KoreChain places a hold on the number of shares in the seller's account to prevent "double spending". This ensures that all subsequent transactions that may cause double spending are prevented, not just secondary trades (such as, for example, beneficial transfers, private sale requests, and estate transfers).

Once the trade is placed on the ATS, the ATS Operator takes over the process of facilitating the trade. When a valid counterparty (buyer) is found, the ATS Operator onboards the buyer and obtains a KoreID through their ATS KoreNode (unless the buyer already has a KoreID). The KoreChain ensures that only pre-authorized KYC providers and Compliance Officers have verified the buyer.

After the ATS Operator confirms receipt of payments from buyer to seller, the ATS system issues a transfer request to the KoreChain. The request contains the details of the transfer, such as number of shares, date of sale, price, and KoreIDs of buyer and seller, and validating credentials.

The KoreContract on the KoreChain verifies the validity of the transaction and also performs any remaining verifications that may be required based on the KoreContract, such as the approval from the Issuer's board of directors or required completion of provisions for right of first refusal, etc.

Once all the approvals and validations have been completed, the KoreChain gives final approval whereby the cap table of the Issuer is updated and the new buyer receives a welcome email (in case of a new account holder) to register and view their holdings or a notification email (in case of an existing account holder).

KoreAPI

The KoreAPI is a set of permissioned REST APIs for obtaining data and the status of transactions and to post data updates and initiate transactions. The KoreAPI interface is written in Node.js.

KoreMessaging

KoreMessaging is a secure and non-repudiable messaging technology that allows secure communications between the ATS Operator and its partners, which offers the following benefits:

- Eliminates the need for emails
- Eliminates the need for third-party secure communications
- Fully API-driven so that integration with the KorePartners' systems can be done with minimal effort (since the KoreNode provides the actual API service, which means the KorePartners are only API service consumers)
- Logs all messages securely and immutably on the KoreChain (with full audit capability)
- Allows KorePartners to execute transactions on the KoreChain and also send a message to multiple parties with the transaction completion code

KoreBinaries

KorePartner developers can independently create executable binaries for offchain processing or use the KoreBinaries capability to create smart contracts in Golang and register them on the KoreChain, which creates an executable binary that can be stored off-chain and executed by the KorePartners.

KoreRules

The KoreRules technology provides the capability for codeless creation of true contracts which are digitally signed and executed through KoreContracts with real-time interpretation. KoreRules can be created either directly with a normal text-editor or by using a wizard provided by KoreChain.

KoreStable

The KoreStable is a full stablecoin solution that provides the capabilities to create, launch, manage, and operate stablecoins in a fully compliant way.

What is a Stablecoin?

A stablecoin is a digital (crypto) currency that is pegged to a reserve asset that is deemed to be relatively stable. Stablecoins are collateralized with the reserve asset that is held in independent custody. For maximum confidence, stablecoins ideally should be redeemable in the reserve asset for full value at any time and with no questions asked.

Why are they used?

- To bypass the traditional banking system
- To ensure stability to the value of the payment instrument
- To ensure stable storage of funds

- To create fluidity in transactions
- To transact in a cost-efficient way (compared to the traditional payment systems)
- To provide transparency

Technology Capabilities

- POS System Integration
- Multinode blockchain network
- Smart contracts for implementing merchant agreements and compliant usage
- Contract management system
- Mobile App and Wallet

The KoreStable Advantage from KoreChain

KoreChain's KoreStable solution is specifically designed for creating and maintaining stablecoins easily, without code, and with full compliance. The KoreStable solution is built on the KoreChain and includes KoreContracts, KoreRules, KoreMessaing, and KoreAPI.

KoreNFT

Non-Fungible Tokens are used to represent ownership interest in one-of-a-kind digital representation of assets, whether physical or digital. The underlying asset's provenance is established and its custody is secured, both are recorded immutably on the KoreChain after consensus-driven validation.

The process of creating an NFT involves the Originator (original creator of the asset), Asset Digitizer (who creates the digital representation of the asset), Provenance Certifier (who examines and certifies the provenance, as necessary), the KYC/AML Certifier (typically, a FINRA BD), a Custodian (who takes possession of the underlying asset, as necessary), and a Transfer Agent (who ensures a compliant and orderly transfer and recording of the NFTs to primary and secondary investors).

What is a Non-Fungible Token (NFT)?

An NFT is a digital asset that represents another one-of-a-kind asset, whether physical or digital.

Why are NFTs used?

- to represent unique and valuable assets as transactional proxies
- to provide immutable and untamperable proof of ownership, whether in part or full
- to facilitate fluidity in trading and transfers of the underlying asset
- to enable decomposition of an NFT into fractional ownership
- to ensure authenticity of the represented asset during delivery or for audit

Technology Capabilities

- Onboarding of the complete characteristics of the NFT's underlying asset (the issuer of the NFT will be responsible for the mechanism of establishing uniqueness and authenticity)
- Multinode blockchain network of business participants in the ecosystem
- An NFT smart contract
- Mobile App and Wallet for the ecosystem of the asset type

The KoreNFT Advantage from KoreChain

KoreChain's KoreNFT (kNFT) solution is specifically designed for creating and maintaining NFTs easily, without code, and with full compliance. The NFT solution is built on the KoreChain and includes KoreContracts, KoreRules, KoreMessaging, and KoreAPI.

KoreChain Explorer

The Explorer is a permissioned web-based application, similar to Etherscan, for examining and monitoring transactions on the KoreChain.

KoreOracles

Oracles are blockchain artifacts used to provide real-world data to smart contracts in a deterministic way. KoreOracles can be used natively in the KoreChain or created externally in other blockchains, for example in Ethereum using Chainlink or other technology.

KoreBridge

The KoreBridge is a mechanism for interoperability with other blockchains. This enables participants who have applications built on other blockchains but wish to use some of the capabilities of KoreChain or the KorePartners.

KoreWallet

The KoreWallet, implemented as an independent mobile application and as browser extensions, allows participants to view and manage their data and to conduct transactions. The KoreWallet includes multi-party signatures to protect the digital asset owner from losses and theft by implementing recourse, recovery, and reissuance.

Layer2 Architecture

KoreChain Layer2 architecture consists of off-chain processing with all transactions that related to one securities-related transactional processing and compiled into an aggregated transaction that is first cryptographically sealed using the digital signatures of the participants and then made available for recording on any of the public blockchains.

