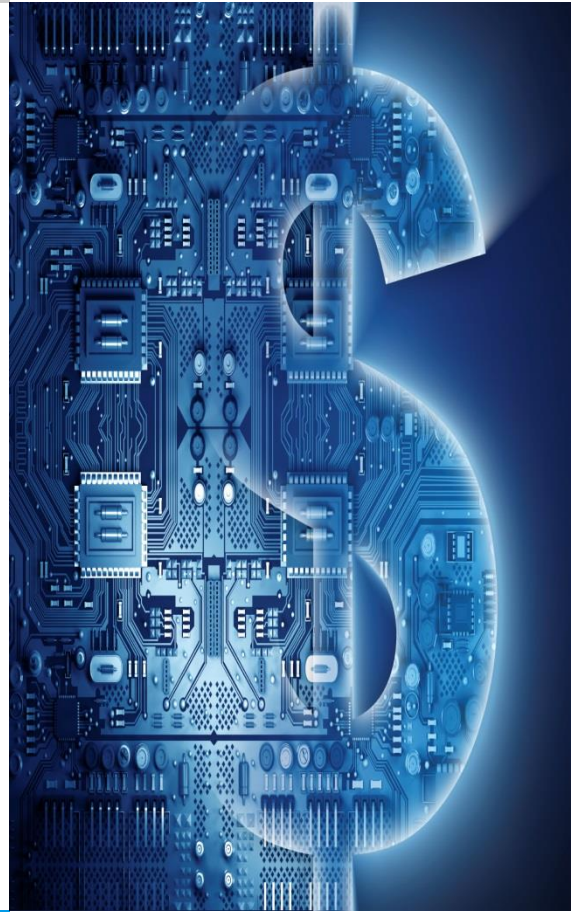


Realize your vision

Samsung SDS Nexledger™

A Blockchain Platform
and Solution



SAMSUNG SDS

Abstract

Blockchain is a trustworthy record or ledger of all transactions that have taken place. It uses the “Consensus Protocol” for validating processes and provides for a secure, verified route for transactions and the storage of values. Utilizing this technology eliminates the reliance on centralized management systems with trusted third-party intermediaries.

The opportunity to substitute trust-verification functions of centralized mediators with decentralized consensus-based systems is a key factor in generating high levels of interest in blockchain with institutions and corporations worldwide. Faster transaction speeds, lower costs, and higher security are some of the major benefits from implementing a blockchain solution. Furthermore, blockchain will act as a catalyst in driving the digital innovation movement toward the integration of the entire global economic structure into one open system.

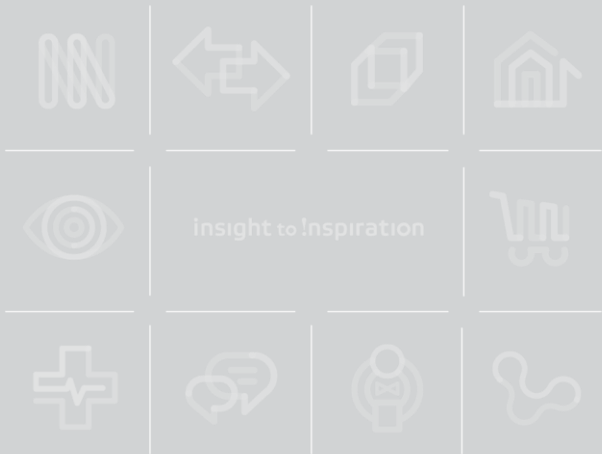
Samsung SDS defines blockchain as a digital vehicle that enables permissioned entities to transfer, exchange, consent and utilize the value and information of digitized assets. Samsung SDS Nexledger platform functions as a digital vehicle that enables corporations and institutions to have access to a wide variety of blockchain-based solutions. Nexledger provides the infrastructure and services required to implement this nascent technology in all industries, including Financial Services, Electronics, Manufacturing, and Logistics.

Details of both the Nexledger platform and available industry solutions are provided within.

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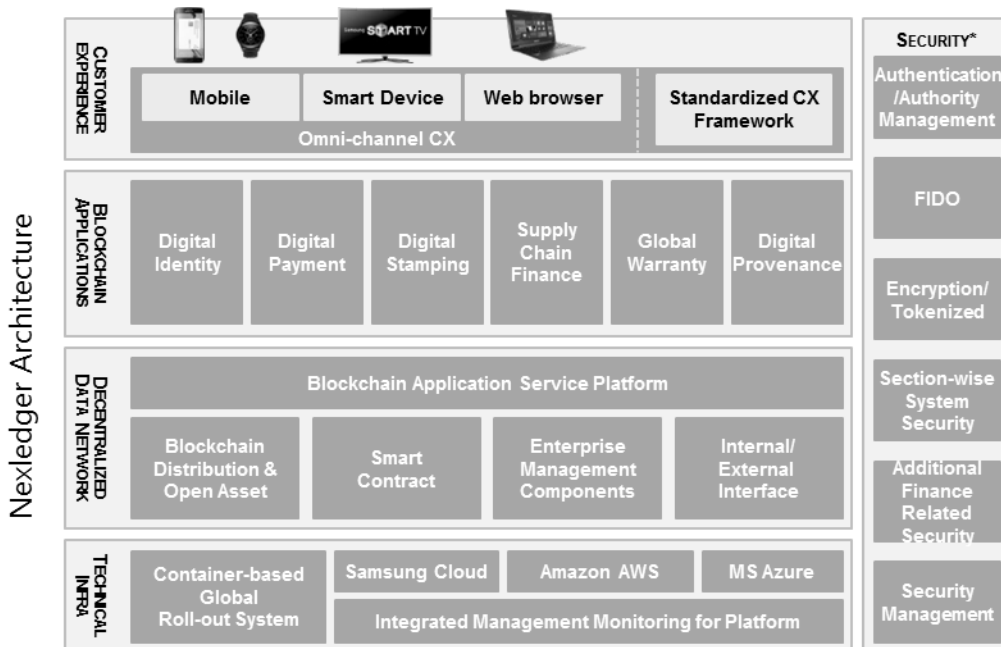
1. Platform Overview



Samsung SDS Nexledger Blockchain Platform

1) Nexledger Overview

Nexledger is a permission-based blockchain model that is composed of trusted participants. The architecture has been designed to block potential access from unspecified nodes whose trust is not guaranteed. Nexledger incorporates Fast Identity Online (FIDO) standards, customer experience (CX), cloud infrastructure, and other technologies to deliver global scalability as well real-time process handling on its shared data network.



* Key core safety features and biometrics provided. Additional security features will be added when required.

Customer Experience

- Enhances omni-channel CX for seamless integration between the platform's core technology
- Delivers API/SDK for agile business application support

Blockchain Applications

- Provides cross-industry enterprise solutions (digital identity, payment and stamping; supply chain finance; global warranty; digital provenance, etc.)
- Supports expansion into various domain solutions (settlement /clearance, logistics, order mgmt., etc.)

Decentralized Data Network

- Enables scalability for business function and data with multi-chain configuration
- Optimizes mining algorithm for efficient block-mining cycle and permissioned mining
- Supports management monitoring of transactions and nodes, asset digitization and automatic transactions through incorporation of smart contracts

Technical Infra

- Supports system operations monitoring with platform-based parameter controls and component settings
- Improves enterprise operation efficiency with blockchain-generated data collection and indexed monitoring
- Enables rapid expansion with global cloud operations made possible through container-based technology

Security

- Strengthens security against transaction forgery and repudiation via FIDO-certified fingerprint and iris verification
- Enhances security and convenience for users by connecting with multiple biometrics for improved authentication

2) Nexledger Key Features

Accounting for the disruptiveness of the nascent blockchain technology, Samsung SDS created Nexledger to be based on a permissioned blockchain system and utilize a consortium to fully take advantage of the proven benefits of blockchain, while eliminating its disadvantages. The Nexledger platform was developed and reviewed to fit the objectives and requirements of enterprise-level standards:

- Bolstered contingent measures with management monitoring of block information
- Reduced lead time with improvements in transaction verification and processing algorithm
- Reduced resource consumption with improvements in confirmation racing algorithm for proof-of-work
- Optimized management for the distributed ledger with multi-chains and partitioned chains
- Enhanced security with FIDO certifications and multiple biometric modalities

“Natural Born” Enterprise-based Platform

Samsung SDS developed and executed the platform ideology, architectural structure, component design, and development process for the Nexledger platform with the intention of serving enterprise-level requirements. Time latency, protocol maturity, technology suitability, and various other components were taken into consideration during the initial development stage of the platform. Nexledger also provides a management monitoring tool for system status observation and real-time verification of transaction validity for all transactions within the blockchain network to satisfy enterprise requirements.

The Next Phase in Blockchain - Expansion Into All Industries

Nexledger provides the infrastructure and services required to implement blockchain technology for all industries, including Financial Services, Electronics, Manufacturing, and Logistics. The Nexledger platform is an agile system that can rapidly launch a variety of blockchain-based services including payment transactions, authentication security, authentication verification, cross-institutional transactions, and IoT solutions. Security and stability of the system is guaranteed with blockchain-based information processing. The foundation for growth is provided with the expansion friendly platform system that is not limited to any specific industry, channel, or location.

3) Nexledger Solutions

The Nexledger platform enables rapid launches of new solutions for corporations. The platform faces no restrictions from scalability, as the application APIs are structured into standardized container units for ease of expansion. More solutions that accommodate a wider range of industries will become available very soon; the solutions available now on the Nexledger platform are listed below:

- Digital Identity: Solution that utilizes blockchain technology to create digital identities for customers
- Digital Payment: Blockchain-integrated solution that can supplement credit and debit cards for customer payments
- Digital Stamping: Blockchain-based solution that can be used for creating secure digitally stamped signatures without the need for a third-party authenticator

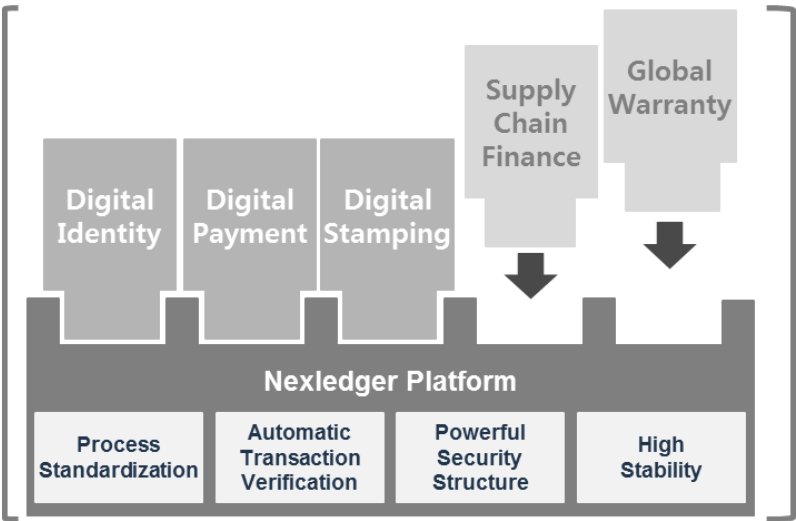
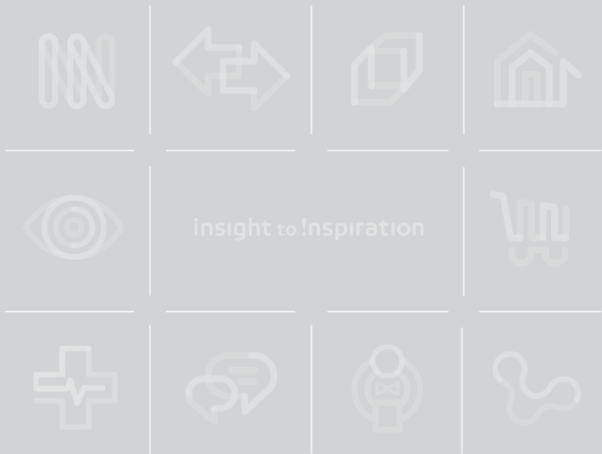


Illustration of Nexledger platform with applicable solutions

2. Solution Overview



1) Digital Identity

Digital Identity digitizes the whole process of defining, creating, utilizing, discarding, and managing of information connected to identities of various entities, individuals, or assets. Implementing a full-fledged digital identity platform is a critical pain point for innovators in all industries. Driving the building and implementation of a digital identity with the highly secure blockchain technology is now made possible with Nexledger. Our platform enables participating entities to share a single distributed ledger containing digital identity data. This allows for various use cases based on an enterprise’s desired goals, such as shared marketing or improved compliance to benefit all participants.

Digital Identity Use Case 1: Affiliate Authentication

The hurdle for customer acquisition is reduced as digital identity can be used for logging into participating affiliate domains or services. Enabling customers to use digital identity for access to participating affiliates is expected to increase customer satisfaction. A blockchain solution is used to manage the authentication and authorization of customer information sharing among affiliates through utilizing the main company’s customer identification information. Dedicated cables, VPN, TLS, etc., will be used to ensure the highest security measures are in place to safeguard digital identity data.

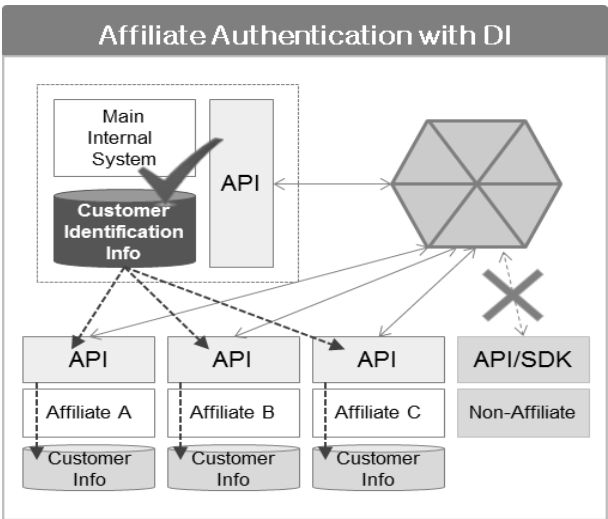


Illustration of Affiliate Authentication use case with Digital Identity

Digital Identity Use Case 2: Financial Institution Authentication

A main company can take the initiative and use customer identification information stored within the blockchain system for managing digital identity. The blockchain system is used to directly oversee management of customer identification information. Synergy is expected to be high with

participating financial institutions as customers can conveniently purchase new financial products from participating financial institutions without having to newly register. The security of the customer info is expected to be bolstered as well.

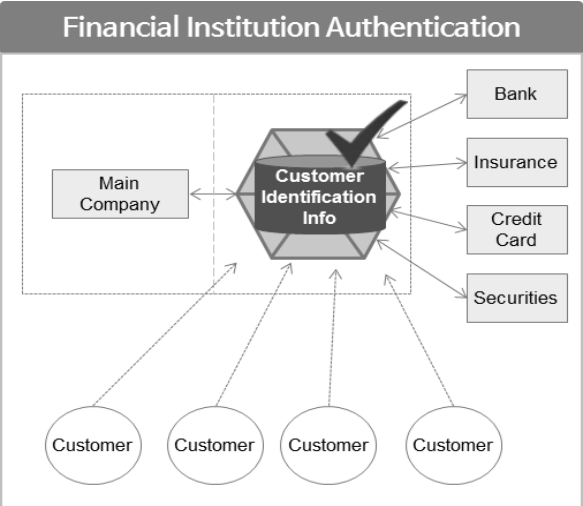


Illustration of Financial Institution Authentication use case with Digital Identity

Digital Identity Use Case 3: Full Digital Economy

The full digital economy does not require a main company to facilitate among participating individuals and entities. All participating companies are treated equally. Customer identification information required for authentication is encrypted within each customer’s device and can be sent to a requesting company on demand. Blockchain facilitates the sharing of customer information among participating parties through encryption and key management services.

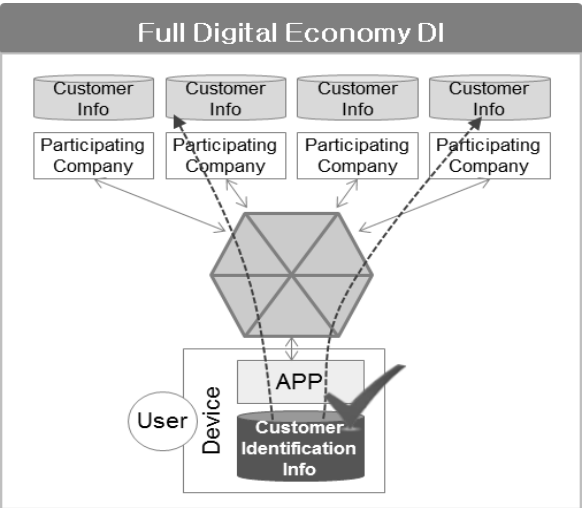


Illustration of Full Digital Economy for Digital Identity

2) Digital Payment

The digital payment platform service is a blockchain-integrated solution that supplements various types of payments. Since all transactions are based on the blockchain platform, participants can benefit from transparent transactions and reduced dependency on mediators. The integrated customer loyalty program enables integration of reward points, mileages, debit cards, credit cards, crypto currencies, etc., on a blockchain platform and can usher in a cashless society through empowering a point-based digital payment supplement. Since the solution uses blockchain-based technology, it guarantees strong security and high efficiency.

Digital Payment Use Case 1: Integrated Customer Loyalty Program

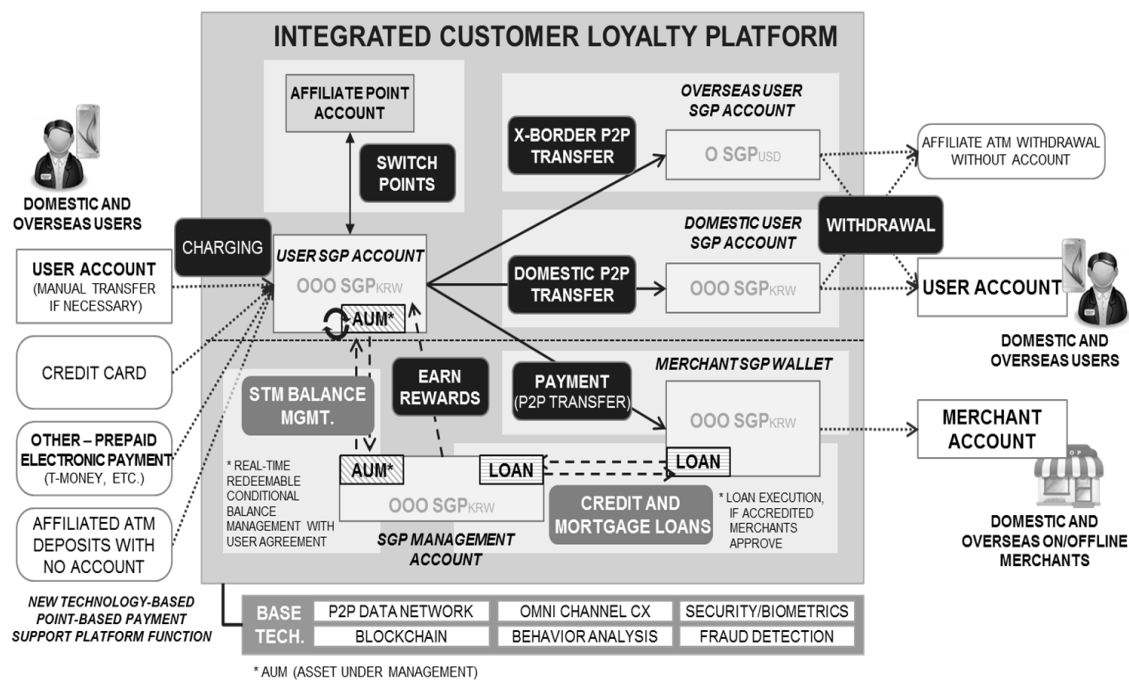


Illustration of Integrated Customer Loyalty Program with Digital Payment

Integration of customer loyalty programs for various participating companies is a digital payment solution on the Nexledger platform. By having an immutable record of transactions, the integrated customer loyalty program enables customers to conduct various activities including charging, redeeming, earning, remittance, payment, withdrawal, transfer, etc. The solution supplements the customer’s payment method, simplifies the overall payment process and lowers costs by reducing dependencies on mediators.

Digital Payment Use Case 2: Direct Payment Service

The direct payment service enables credit card companies and banks to implement a blockchain-based payment module platform to reduce dependencies on mediatory institutions. The flow of payment information will be identical even with the new blockchain system, but the intermediaries will no longer be required. Real-time view of payment-related information will be accessible to all participants. The independent blockchain payment network guarantees reliable transactions without intermediaries and hinders forgery and tampering attempts.

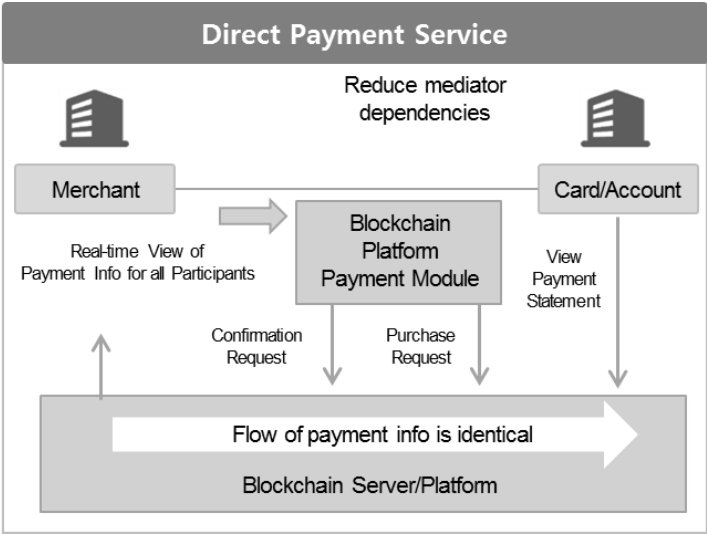


Illustration of Payment Service Provider replacement service with Digital Payment

3) Digital Stamping

The digital stamping feature is a blockchain application that can be used for creating secure digitally-stamped signatures without the need for any third-party authentication system. One of the most promising uses is time-stamping of documents, proof that documents were created at a certain time and not altered afterward. Digitally stamped documents are stored within an immutable ledger and can be used not only for original document authentication, but also for automated transactions using smart contracts.

Digital Stamping: e-Document Original Proof

The e-Document original proof solution is one of the possible use cases with digital stamping. The solution makes saving original customer registration forms possible without certified e-document authorities. Internalizing business processes and reducing dependency on third-party intermediaries enables cost savings and lowers risks from operations. Blockchain can verify time of registration form creation with transactions to create immutable data. Duplication of registration forms or other operational errors are minimized using blockchain technology for time stamping customer registration forms.

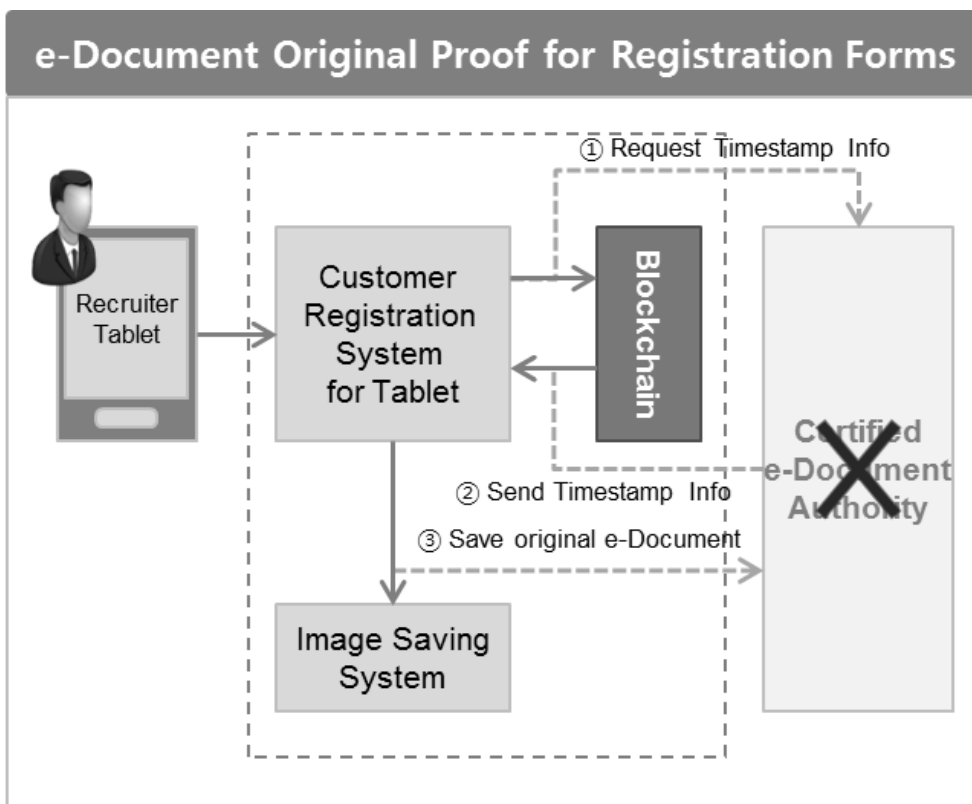
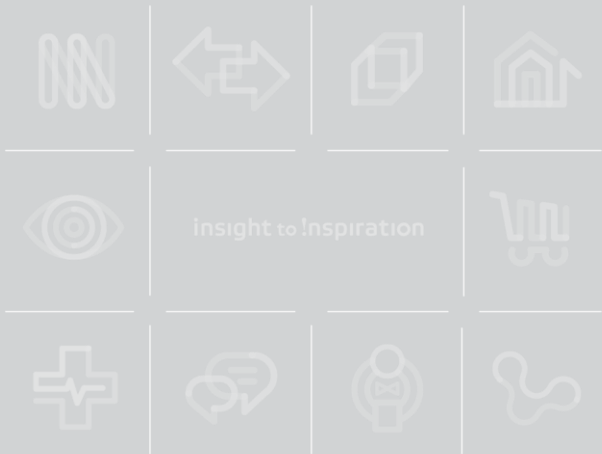


Illustration of e-Document original proof for registration forms with Digital Stamping

3. Offering Overview



1) Blockchain Consulting

Samsung SDS provides consulting services for companies that are interested in implementing distributed ledger technology in their business domains. The service entails a BVA (Blockchain Value Assessment) for discovering opportunities from blockchain applications. Specific use cases will be analyzed for applicability and scalability. After platform applicability is analyzed, an execution roadmap can be clearly defined for implementation.

2) Nexledger Platform

The Nexledger platform can service a spectrum of different blockchain use cases and has been developed to administer custom blockchain applications upon customer request. Customer requested business domains can be analyzed and tailor made by Samsung SDS for implementation into Nexledger. BVA (Blockchain Value Assessment) is conducted to identify the requested blockchain applications meet the goals and scope of the customer. Implementation and launch of the application will benefit from the highly scalable, efficient, and secure Nexledger platform.

3) Nexledger Solutions

Samsung SDS Solutions include a variety of blockchain applications that are accessible on the Nexledger platform. The platform is designed to enable quick launch of services for companies interested in implementing the new technology for replacing their existing or new business models. Available solutions on the Nexledger platform are listed below:

- Digital identity
- Digital payment
- Digital stamping
- Supply chain finance
- Global warranty program
- Digital provenance
- Digital financial concierge service
- Others (customized digital products/services)

4) Samsung SDS Approach

Samsung SDS has developed the Nexledger platform and fully fledged digital identity, digital payment and digital stamping blockchain solutions available for immediate deployment in the form of PaaS or SaaS. Acknowledging that various requirements could exist based on each corporation's unique circumstances, Samsung SDS is fully prepared to accommodate the various business requirements and needs of enterprises by providing flexible customization services on-demand.

Samsung SDS recommends taking a step-by-step approach, like given below, in order to address each corporation's unique circumstances for effective implementation of blockchain.

Samsung SDS conducts a 4-phase process for implementing blockchain technology into businesses domains. Understanding the need for scalability and effectiveness for businesses, Samsung SDS delivers the implementation with predefined goals for each phase of the process.

- **BVA (Blockchain Value Assessment):** The first stage of the application method is focused on identifying the right course of action. Goals, scope, principles, methodology, and various other issues are initially identified to confirm the most appropriate strategy. The use case and expected effects are defined. Platform applicability will be analyzed to verify scalability and efficiency. The execution roadmap is created for effective implementation.
- **Platform-based Prototype:** The next stage of the process is the testing of a prototype. Platform requirements and scope specification are defined for the prototype. Platform configuration and UI definition are finalized. An actual application case is implemented with the prototype and the results are analyzed.
- **Blockchain Application:** The third stage is the full-spectrum application. Platform customization and configuration are finalized. Additional UI requirements or extensions are developed into the platform. Connection and integration testing is conducted for platform development finalization and actual testing on target business domain.
- **Operation:** The last stage is preparations for live launch. The cloud is configured for full operations and the system is prepared for system launch. System deployment is executed at the end of the stage.

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