FCI Lender Services, Inc.
<u>Introducing Servicing Blockchain</u>
"Patents Pending - Application Numbers US63/452,965 & US63/458,098"

In Collaboration with

Technical White Paper
Decentralized Financial Technology Blockchain and IPFS Architecture
www.fci.io
December 2022

Authors:
Alfredo Campana, MBA Computer System Engineering
      FCI Fintech Chief Technology Officer and Chief Operation Officer
Timothy Griffith – FCI Lender Services Director of Technology
Jeffrey Griffith, Ph.D. – FCI Fintech President
Michael Griffith – FCI Lender Services President and CEO

Contents

1. Introduction

2   Benefits Gained Through FCI Fintech's Architecture and Protocol

3   Architecture Functionality and Diagrams

4   Components of a Revolutionary Network of Blockchains

5   Conclusion

1. Introduction

FCI Lender Services, a Fitch-Rated national loan servicing company of both short- and long-term loans, in collaboration with FCI Fintech, has integrated an innovative structure of Blockchain networks and Interplanetary File System (IPFS) technologies with daily servicing and reporting activities for stakeholders. This architecture operates alongside FCI Fintech's existing ecosystem and software suite that has streamlined and revolutionized how FCI assists premier financial institutions in managing their assets. When users interact with FCI Fintech through both private and public networks without a middleman, the nature of this architecture promotes scalability, traceability, security, automatization, decentralization of data, and trust in the financial services sector.

1.1 Proven Success By Revolutionizing the Financial Services Industry

FCI Lender Services has offered high-tech servicing and reporting solutions for over 40 years. FCI Fintech began over a decade ago by providing FCI with systems to make loan servicing more efficient, automated, and scalable. Now, with the integration of API technology, encryption capabilities, Interplanetary File System (IPFS) technologies, and Smart Contracts, FCI Fintech has created the ability to upload and manage transactions and financial loan data into a private, secured Blockchain.

FCI Fintech's Blockchain produces a Forensic Style cataloguing of actions acting as a Zero Knowledge Proof for audit purposes. These entries are both accounted for and memorialized as an undisputed record.

1.2 Current Bottlenecks in the Financial Industry

Most present-day financial technology platforms suffer from several issues such as a lack of transparency, scalability, and compliance reporting, in part because these systems rely on the centralization of infrastructure and data. Further, these platforms often require a Mirror Twin, resulting in multiple areas of friction and delay in uploading, inputting, analyzing, and transferring the necessary data for financial transactions.

2. Benefits Gained Through FCI Fintech's Architecture and Protocol

FCI Fintech provides a singular access point for users to upload, view, share, and transfer information contained in their portfolio or for an individual asset. Among the numerous benefits gained through FCI Fintech's ecosystem and protocols, the innovative merger of Blockchain architecture with Interplanetary File System (IPFS) technology alongside existing fintech capabilities significantly improves how the financial service industry operates through increased security, efficiency, transparency, access, and compliance capacity. By leveraging the benefits of Blockchain and IPFS, financial institutions can better meet the evolving needs of customers and stay competitive in an increasingly digital world.

2.1 Enhanced Security

FCI Fintech's Blockchain technology uses advanced cryptographic algorithms to secure transactions and data by encrypting all of the data uploaded to the Blockchain. It also uses a distributed ledger system that allows for transparent and immutable recording of every transaction recorded on the Blockchain.

2.2 Decentralization of Data

FCI Fintech's users can host a server node which includes an exact copy of the data that FCI Blockchain hosts. These decentralization features make it more difficult for unauthorized users to commit fraud, engage in hacking activities, and prevents the ability to alter the data. This enhanced security builds a trustless environment and provides confidence for users, resulting in an assured reliability regarding the accuracy of the data presented.

2.3 Improved Efficiency

FCI Fintech's integration of Blockchain technology and Smart Contracts automates most of the financial processes such as payment processing, investor disbursements, regulatory reporting, consumer notifications, securitizations, transfer of ownership, and distribution waterfalls. By removing intermediaries and streamlining these processes, FCI Fintech's Blockchain can significantly reduce the time and cost of transactions. This helps to decrease the turnaround time, increase the efficiency of financial services and improve the overall customer experience.

2.4 Increased Transparency

FCI Fintech's Blockchain technology provides a transparent and auditable record of every single transaction ever written on the Blockchain. FCI Fintech has created tools to communicate with the Blockchain. The FCI Fintech Blockchain Explorer allows users to search through each transaction and this process helps audit each transaction, which increases transparency and accountability by helping reduce the risk of errors and fraud. All transactions recorded have a Responsible Party on an immutable ledger and these records can be segmented by businesses, by individual accounts, or by any specific transaction.

2.5 Direct Access

FCI Fintech's combination of Blockchain and Interplanetary File System (IPFS) technology enables peer-to-peer transactions without the need for intermediaries. This helps increase access to financial services, particularly for businesses transacting with other companies, customers, or those seeking to report to government agencies. With the use of IPFS, which is a decentralized peer-to-peer file sharing technology, we enable secure sharing that ensures tamper-proof relaying of large amounts of data or files.

2.6 Expansive Compliance Capabilities

In addition to increased access, the simultaneous use of FCI Fintech's Blockchain and Interplanetary File System (IPFS) technology helps financial institutions comply with regulatory requirements by providing a transparent and auditable record of transactions and documents. This reduces the risk of non-compliance and improves the speed and accuracy in the necessary regulatory reporting.

3. Architecture Functionality and Diagrams

3.1 FCI Fintech Network

The "FCI Fintech Network of Blockchains" diagram illustrates how FCI Fintech's ecosystem spans from Financial Institution users all the way to external users.
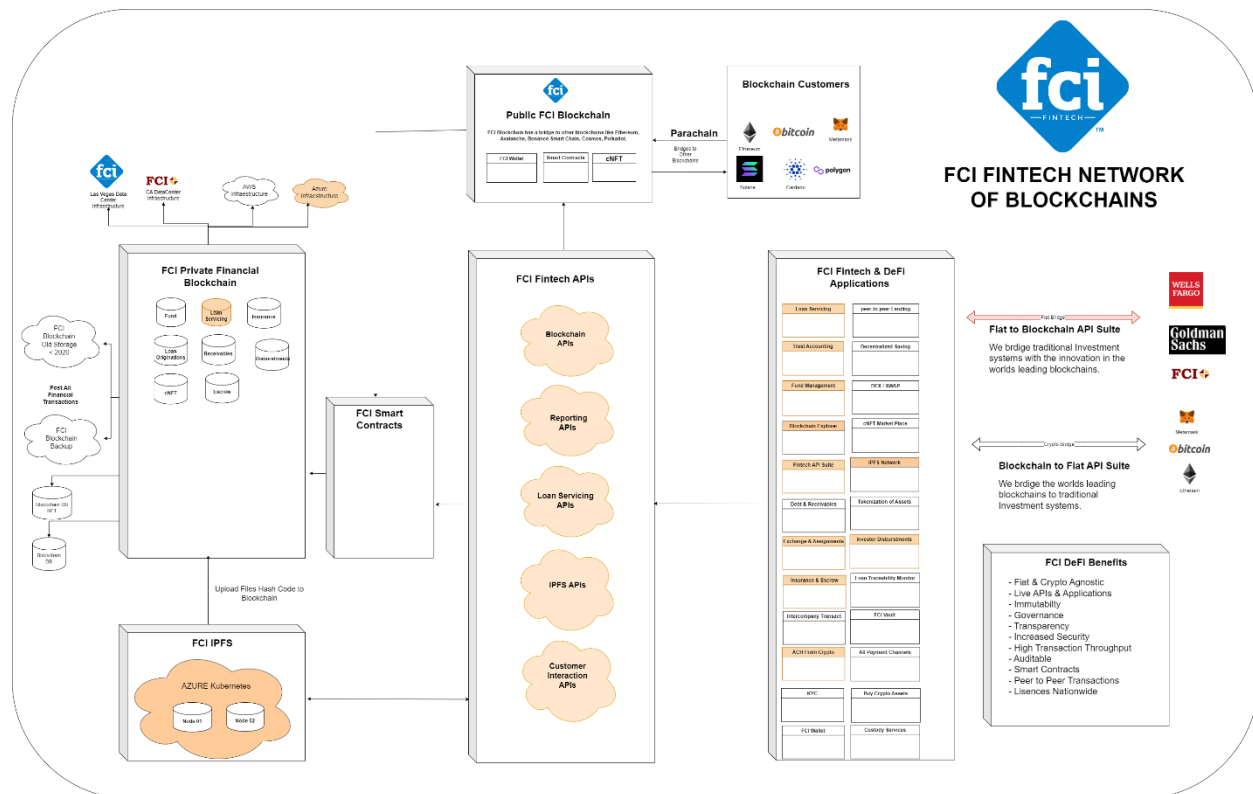
FCI Lender Services provides an example of how a financial institution can fully integrate to the FCI Fintech ecosystem. FCI Lender Services uses FCI Fintech's technology to record all its financial transactions and financial documents inside the innovative ecosystem in two ways. First, FCI can use FCI Fintech's Blockchains and Interplanetary File System (IPFS) as the company's sole source of storage or FCI can post their transactions with direct server readers to the FCI Fintech APIs and then the APIs can post to the FCI Fintech IPFS and Blockchain. Either of these processes allow financial institutions to maintain the use of their own technology and processes.

The following diagram titled "Integration of FCI to The FCI Fintech Network" displays how FCI was able to connect to the FCI Fintech Blockchain Architecture without disrupting its day-to-day processes and while maintaining all of its existing technology:

Integration of FCI Loan Servicing to The FCI Fintech Network
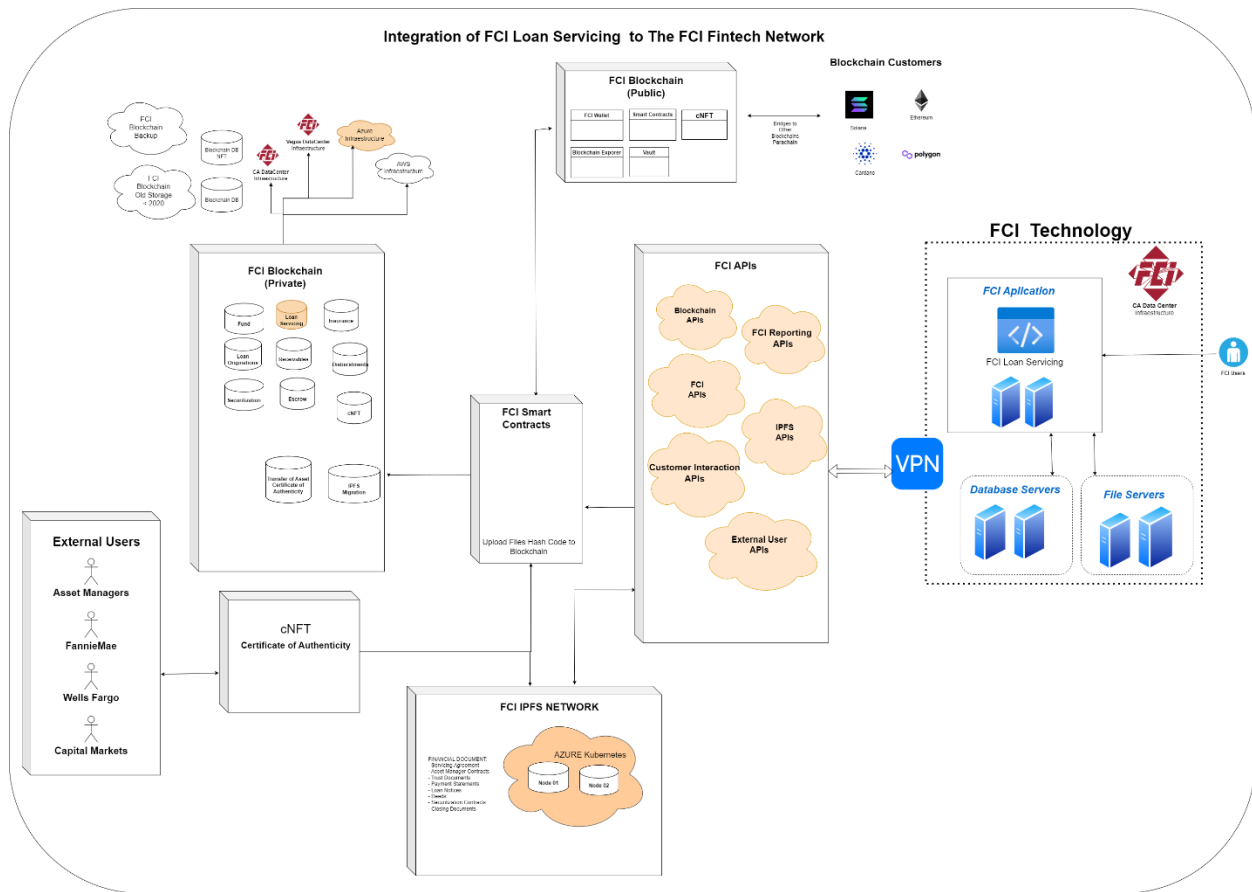
3.2 Financial Transactions

The "Architecture for Financial Transactions" diagram depicted below showcases FCI Fintech's ecosystem for financial transactions and shows how fintech, APIs, Blockchains, Smart Contract, and the Interplanetary File System (IPFS) network work together to register every financial transaction.

This architecture promotes scalability, traceability, security, automatization, decentralization of data, and transparency. FCI Fintech provides flexibility and accessibility for its users. For example, private and public entities can connect through APIs and send financial transactions directly to the FCI Fintech Blockchain.

Additionally, if an institution creates a financial asset like a newly originated loan, it can upload the collateral documentation and additional attachments to the IPFS network. Immediately, the IPFS API uploads to the FCI Smart Contract portal that uses an IPFS hash to record the data in near-real-time to the Private FCI Blockchain.

FCI Fintech's cNFT (Collateralized Non-Fungible Token) summarizes key asset information and acts as a Zero Knowledge Proof that attests to an asset's transactions, ownership, and collateral documentation. If an asset owner decides to sell or transfer one of his assets, he can use the cNFT to publish the asset's information in either the Private or Public FCI Fintech Blockchain to enable the transfer of the cNFT to another FCI Fintech vault holder with a portfolio- or asset-specific key. Additionally, the user can publish the financial asset to an external Blockchain by taking advantage of FCI Fintech's ability to connect to other public Blockchains by utilizing Parachain technology.


Architecture For Financial Transactions
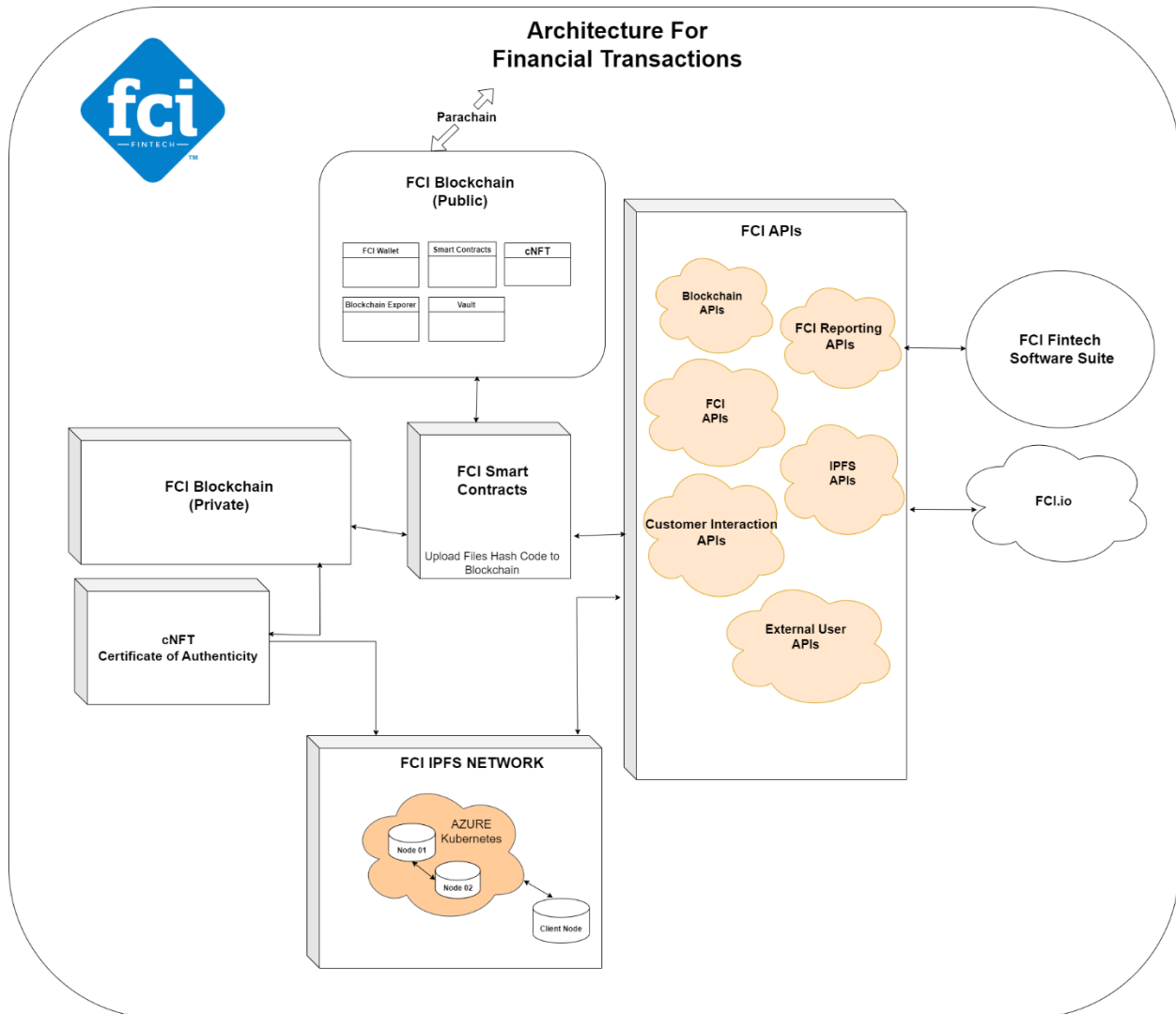
4. Components of a Revolutionary Network of Blockchains

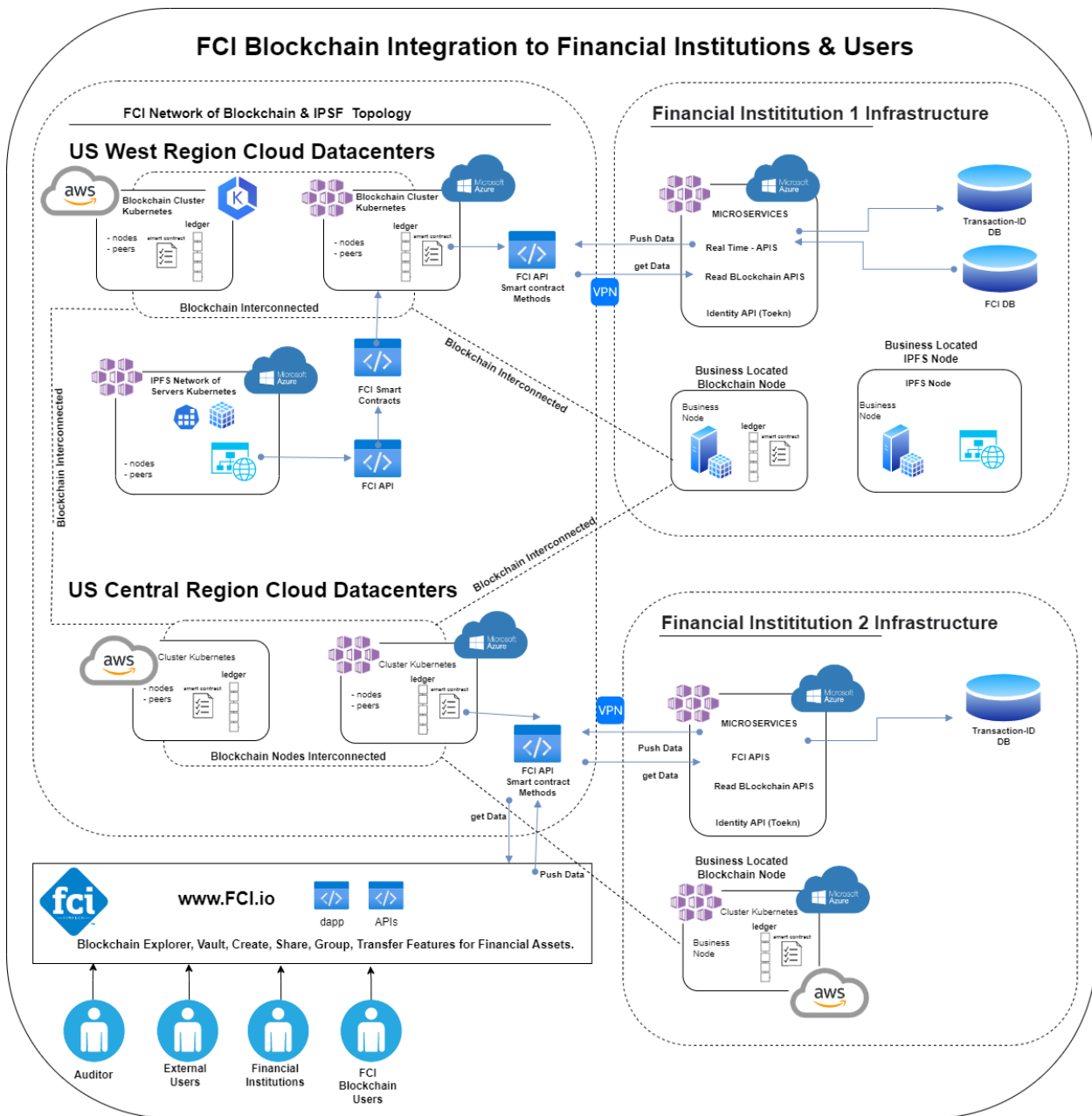## 4.1 FCI Fintech Network of Blockchains

FCI Fintech developed this innovative structure of Blockchain networks after considering the important security, permissions, accessibility, performance, and transparency needs for the financial industry. The architecture operates on multiple private Blockchains. This network of Blockchains emphasize encryption and accessibility so that financial institutions can overcome concerns about the risks of having their financial data hosted on public servers and can instead integrate into FCI Fintech's private network of Blockchains.

FCI Fintech allows institutions to host their own Interplanetary File System (IPFS) and Blockchain nodes in both the private and public Blockchain. Further, the integration of FCI Fintech's Bridge and Smart Contracts allow a company's specific private Blockchain and the public Blockchain to communicate. The Private FCI Blockchain only takes assets to the Public FCI Fintech Blockchain if the asset owner wants to share or transfer the asset from the private system.

The diagram titled "FCI Fintech Network of Blockchains" showcases how the Parachain adds an additional layer of accessibility when used to connect the Public FCI Blockchain to external Blockchain ecosystems. This process permits FCI Fintech's private Blockchain users to access additional nodes that allow for additional flexibility in managing the asset. For example, a fund using the Private FCI Blockchain can trade financial assets with another private Blockchain user or can list those assets for sale in the Public FCI Blockchain, which would provide access to users from all other external Blockchain ecosystems.

FCI Fintech Network of Blockchains
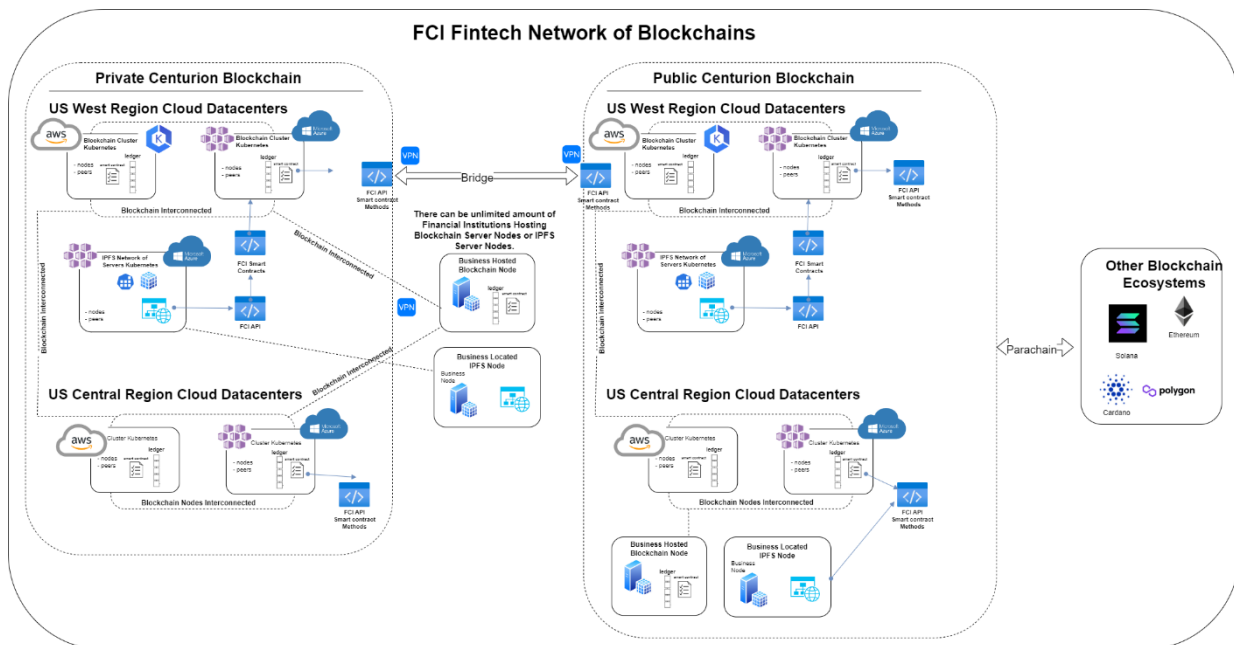
The following diagram, "FCI Blockchain Integration to Financial Institutions & Users," demonstrates how different types of financial institutions can integrate with FCI Fintech's deployed Blockchain environment. Multiple options for this integration are possible: some can use the FCI Fintech Suite which is already integrated to the Blockchain, while others can use their own software and use the FCI APIs to connect to the Blockchain and Interplanetary File System (IPFS) in order to record their financial data.

As detailed in the diagram, Financial Institution 1 uses their existing licensed FCI Fintech applications and instantly has access to the Blockchain node and IPFS node. This data is

already stored in FCI Fintech Blockchain network and IPFS nodes but can also be centrally housed on an internal business server in order to centralize the information. For Financial Institution 1, this approach will greatly benefit their company, as the integration expands and increases the security of the FCI Blockchain ecosystem as a whole.

Financial Institution 2 is not a licensed user of the FCI Fintech software suite as this company relies on their own existing technology. This company can still integrate into FCI Private Blockchain and IPFS Network with their current technology and access the benefits of FCI Fintech's ecosystem through the use of FCI's APIs. By taking this route, a financial institution can still participate in FCI Fintech's ecosystem and host from zero to hundreds of nodes. Even if a financial institution does not host a single FCI node or use any of FCI Fintech's applications, once they are vetted as a licensed financial institution, they may be onboarded and gain access to the benefits of FCI Fintech's ecosystem.

4.2 The FCI Fintech IPFS Network

FCI Fintech's Interplanetary File System (IPFS) is a decentralized peer-to-peer file sharing network of servers hosted in multiple physical and cloud locations including FCI's proprietary datacenter, Azure Cloud, and in internal datacenters of Financial Institutions that are participants in FCI Fintech's ecosystem. The IPFS Network enables the secure and efficient sharing of large amounts of files and data. Additionally, every file that is uploaded to the IPFS server is also recorded in the FCI Blockchain. Some of the benefits for companies using these features are data security, efficient data sharing, traceability of data and files, increased data availability, reduced costs, and improved compliance.

- Data Security: IPFS uses advanced cryptographic algorithms to secure data both while in transit and at rest. This helps to prevent unauthorized access to sensitive financial data, such as customer records, financial statements, and transaction details. Different server nodes store parts of the pieces that make up the complete file, and the file can only be reassembled from these smaller pieces and from different locations when downloaded with an authorized key. This means that files stored on IPFS are distributed across many different nodes, making it difficult for anyone to manipulate or censor the content.

- Efficient Data Sharing: IPFS enables fast and efficient sharing of large amounts of data between financial institutions, customers, and other stakeholders like government agencies. This helps streamline financial processes, such as loan processing, transfer of ownership of securities, and investment management.

- Traceability of Data and Files: When a file is added to the FCI IPFS network, it is broken up into smaller pieces and each piece of the file is given a unique hash that represents its content. These hashes are then used to create a cryptographic link between the smaller pieces, which creates a unique identifier for the entire file. If a change to the

file or data is uploaded, the smaller hashes would not match, thus creating an updated version of the same file and tracing this update in the system.

- Increased Data Availability: As shown in the "FCI Fintech Private IPFS Network" diagram, IPFS stores data in a distributed network of nodes, making it highly available and resilient to network failures. This ensures that critical financial data is always accessible, even in the event of a natural disaster or other electronic disruptions, as FCI Fintech's IPFS technology discovers active nodes within the network to consistently permit users access to their data, ensuring that users have stable and uninterrupted access to their data.
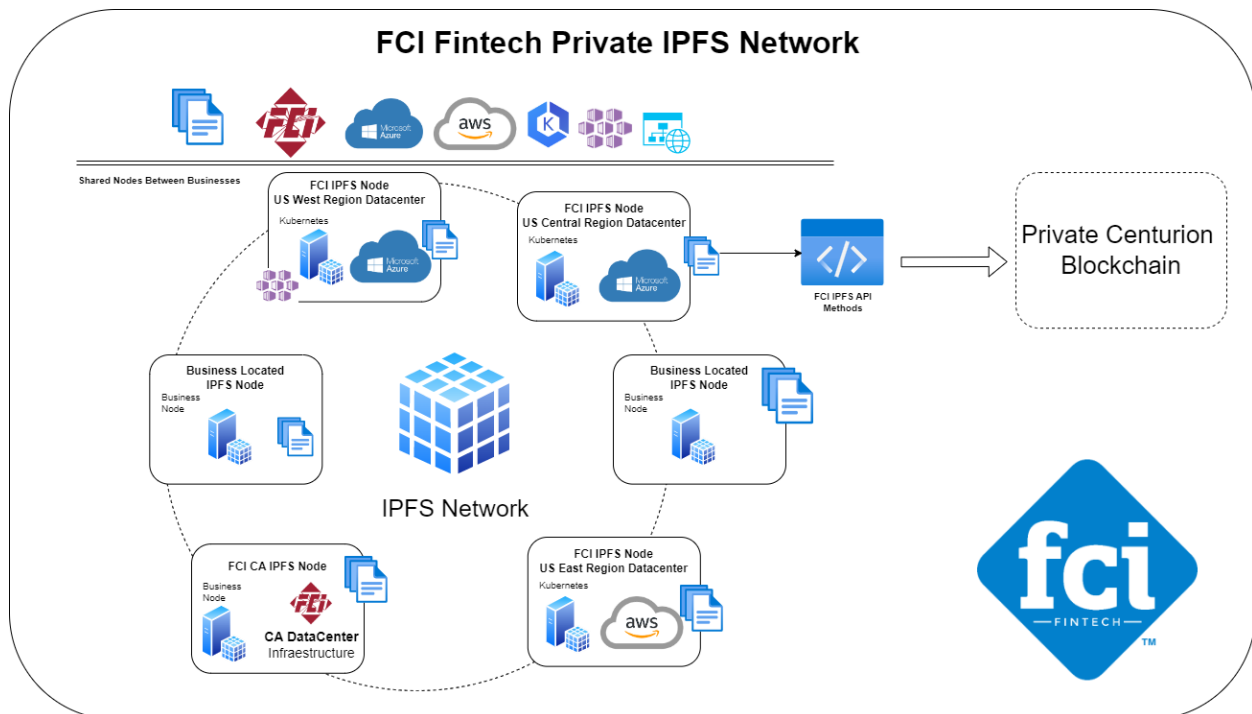
- Reduced Costs: IPFS can help to reduce the cost of data storage and transfer, as it eliminates the need for centralized data storage and expensive network infrastructure and therefore lowers operational costs.

- Improved Compliance: IPFS assists financial institutions comply with data privacy and security regulations, such as GDPR and HIPAA. IPFS helps financial institutions demonstrate compliance with these regulations by providing a secure and auditable record of data access and sharing.

4.3 Smart Contracts

Smart Contracts, which are self-executing contracts with the terms of the agreement written into code, can be used to automate many aspects of financial technology. One such example is using Smart Contracts to automate investor disbursements based on the predetermined waterfall detailed in any agreement.

All parties involved in a Smart Contract first need to agree to the terms of the Smart Contract before it can be executed. Then, the Smart Contract is coded and recorded to the Blockchain; it runs automatically and enforces the rules and conditions of the contract that has been agreed upon by all the parties. Before a Smart Contract can be executed, all parties must first review and agree to the terms of the contract code. Once all parties review and agree to the details of the Smart Contract code, FCI Fintech executes the terms of the agreement.

The Smart Contract then runs automatically, and the outcomes of the contract will be recorded on the Blockchain for all parties to see. This outlined process highlights how FCI Fintech automates payment disbursements to the parties involved, and this technology ensures that each participant in a specific Smart Contract quickly and efficiently receives their share of the income. The automation process removes human error while ensuring that every rule and detail placed in the Smart Contract is followed appropriately.

4.4 FCI Fintech Software Suite

The FCI Fintech software suite is a set of applications designed to help financial institutions manage their day-to-day tasks. These applications include trust accounting, invoicing and billing, loan servicing, fund management, state compliance matrix, collection tracker, CFPB rules, securitization loan servicing, and mortgage pool management.

Overall, FCI Fintech's financial software suite can provide businesses with a comprehensive set of tools for managing their financial operations. By integrating different tools into a single suite, businesses can streamline their financial management processes and improve their overall performance.

4.5 Multi-Currency Bridge

FCI Fintech's Multi-Currency Bridge provides access to exchanges in a convenient way for financial institutions or financial institution clients. As a result, this allows financial transactions to be conducted in a wide range of fiat and cryptocurrency markets.

For example, a borrower can pay his mortgage to US Bank that is denominated in US Dollars, but can make his payment using his crypto wallet. FCI Fintech's ecosystem converts the crypto funds to US Dollars and applies the payment in the correct form of currency. This multi-

currency bridge will open opportunities for new applications in advanced trading features such as margin trading and stop-loss orders.

4.6 APIs

APIs, also known as Application Programming Interfaces, are sets of protocols and tools that allow different software applications to communicate and exchange data with each other. APIs play a critical role in enabling the integration of financial services and data with other software applications, other businesses, and other technologies.

FCI Fintech's software suite already has many types of programmed and live APIs that currently manages millions of requests. Now, FCI Fintech has launched an additional suite of APIs that include Blockchain APIs, Interplanetary File System (IPFS) APIs, and external Blockchain user APIs in order to integrate Blockchain, IPFS, and Smart Contracts into the FCI Fintech Ecosystem.
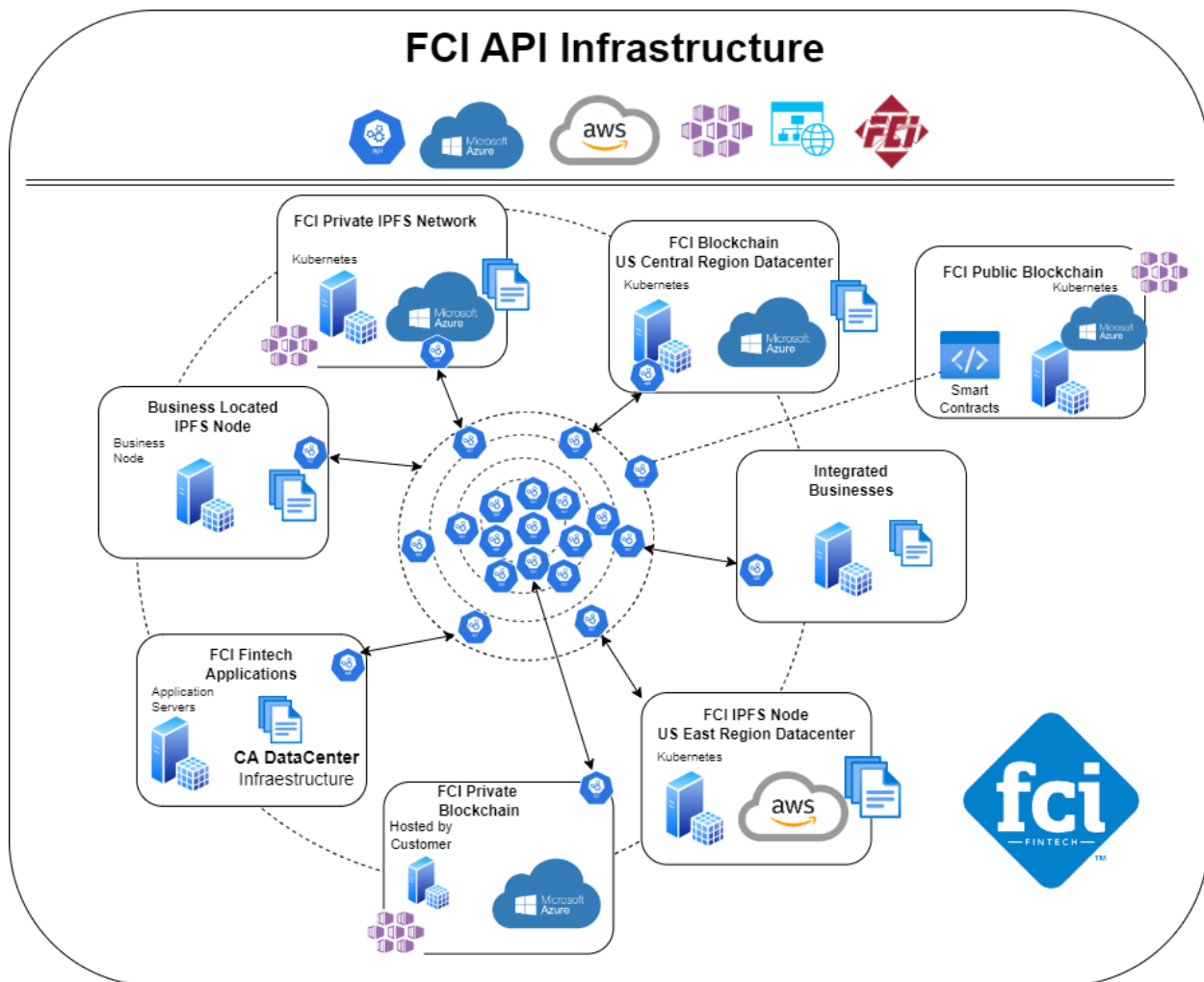
4.7 Parachain

Parachain is a technical mechanism that enables the transfer of financial assets and data between two different Blockchains. A Parachain is a separate Blockchain network that is connected to a multi-chain platform that enables the interoperability between different Blockchains. As shown in the diagram titled "FCI Fintech Blockchain's Implementation of Parachain," the Parachain bridges allow developers to create and deploy decentralized applications (dApps) that are interoperable with other Blockchains, expanding the functionality and potential use cases of the dApps.

FCI Fintech's implementation of Parachain provides a solution for scaling and optimizing the performance of decentralized networks by allowing them to interact with each other without requiring each network to process every transaction. Overall, a Parachain bridge plays a crucial role in facilitating the interoperability between different Blockchain networks, which is an essential feature for the growth and adoption of Blockchain technology.
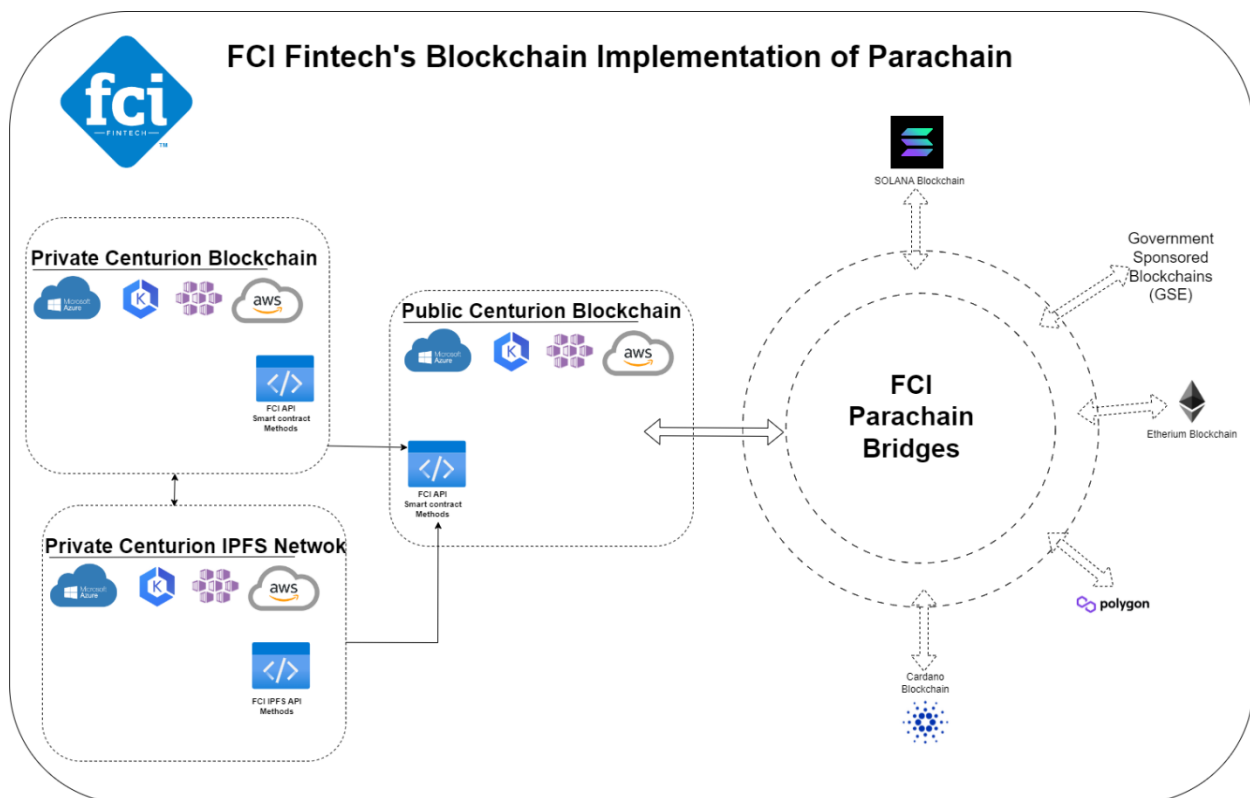
4.8 cNFT and the Certificate of Authenticity

A cNFT, or Collateralized Non-Fungible Token, is a digital asset that represents ownership of a unique financial asset that has real physical collateral.

In the context of collateralized real estate loans, the cNFT is used to represent sole or fractional ownership of a specific mortgage note. The cNFT summarizes asset information such as the original note, mortgage, payment histories, and all documentation that has been uploaded into the Blockchain related to the asset.

The cNFT is a Zero-Knowledge Proof of the defined asset, which for standard single family home loans is represented by the mortgage/deed. The mortgage/deed is the instrument that secures a Promissory Note for real estate, which is backed by the physical property. This defined asset is recorded as security inside the FCI Fintech Network, making cNFT representative of the amount secured. Additionally, cNFT collateral assets are serviced by regulated financial institutions in the United States, making the FCI cNFT a compliant financial asset first introduced as part of FCI Lender Service's efforts to enhance customer's timelines and experiences. This provides assurance to buyers of the asset that they are purchasing a legitimate asset and assures a potential new lender that they have sufficient collateral to secure the loan that collateralizes the cNFT.

The diagram "FCI Fintech's cNFT Cycle" illustrates how FCI Lender Services uses the combination of FCI Fintech's software suite, IPFS, Blockchain, and API technologies to create, manage, and transfer cNFTs. Taken together, FCI Fintech's cNFT technology can change how Capital Markets lend to investors, how Fannie Mae repurchases loans from hedge funds, as well as how any physical asset such as mortgages, bonds, real estate recording, and automobiles can be originated, managed, and transferred.

- Step 1 – an investor services a mortgage loan with FCI Lender Services and the financial asset holder provides all the origination and collateral loan files during the boarding process for processing.
- Step 2 – FCI Lender Services performs its day-to-day onboarding of the loan and in real-time the APIs send recorded servicing history like regular payments to the Blockchain.
- Step 3 – simultaneous to the APIs sending information to the Blockchain, documentation is recorded to the Interplanetary File System (IPFS).
- Step 4 – when the asset and the collateral files are received by the Blockchain and the IPFS, the FCI Smart Contracts create a Private cNFT from the data from the financial asset onboarded by FCI Lender Services.
- Step 5 – if the investor who owns the asset wants to sell or transfer the financial asset outside of the FCI Fintech ecosystem, the Smart Contract will convert the Private cNFT to a Public cNFT and migrate the asset to the Public FCI Blockchain.

- Step 6 – with the cNFT on the Public FCI Blockchain, the cNFT is ready to be transferred through the Parachain technology to a wider market with multiple exit options.
- Step 7 – if applicable, the asset holder can share or transfer ownership of the asset to government entities.
- Step 8 – if selling or transferring privately, Parachain technology can post the asset to other Blockchain markets like Ethereum.
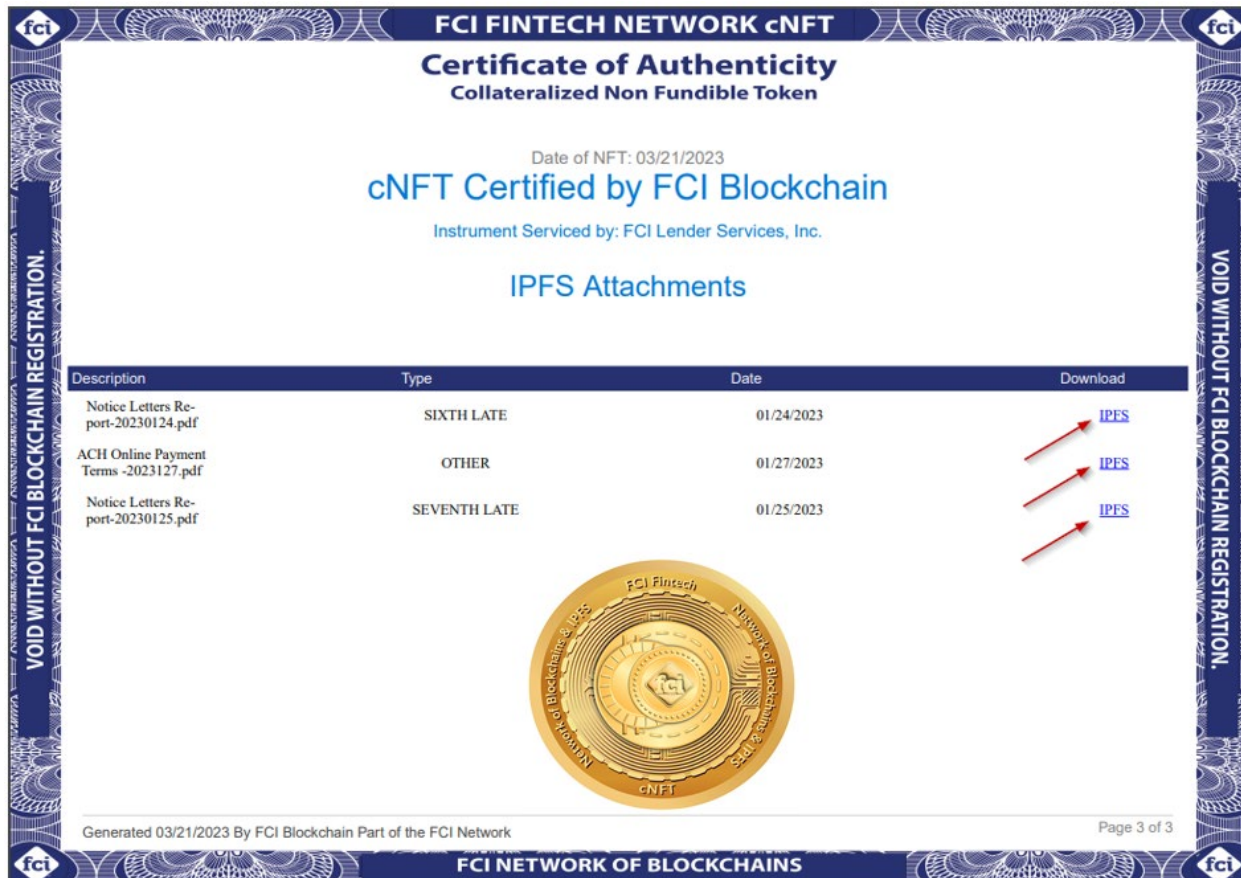

FCI Fintech's cNFT Cycle
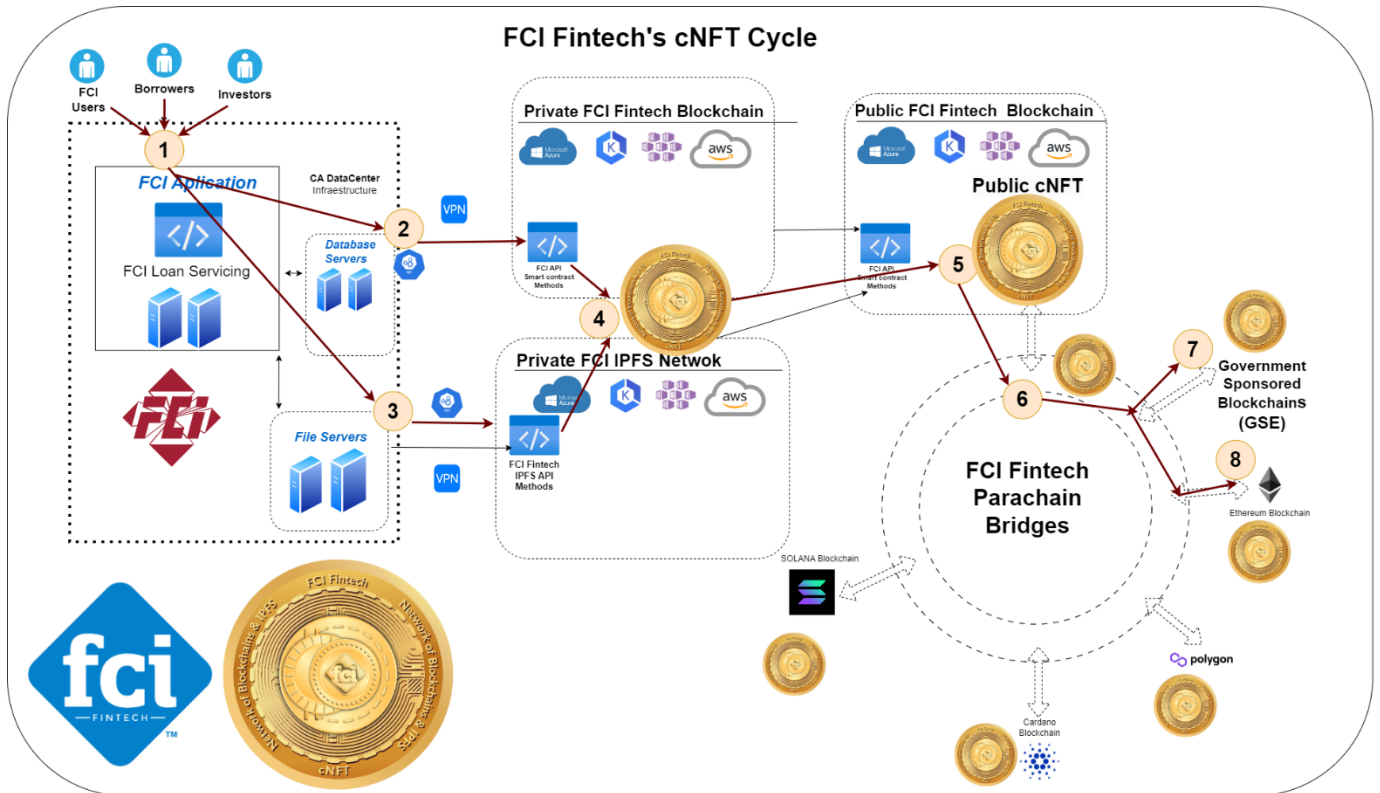
The cNFT Certificate of Authenticity displays a record of the current real-time status of the asset, memorializing the date of the cNFT's reporting, shown by the top arrow on the image below. The use of FCI Fintech's Blockchain Explorer displays up-to-date data for the asset alongside asset values at the time of recording. Additionally, as seen by the second arrow, the cNFT Certificate of Authenticity includes the FCI Blockchain Registration ID in order to validate the data.
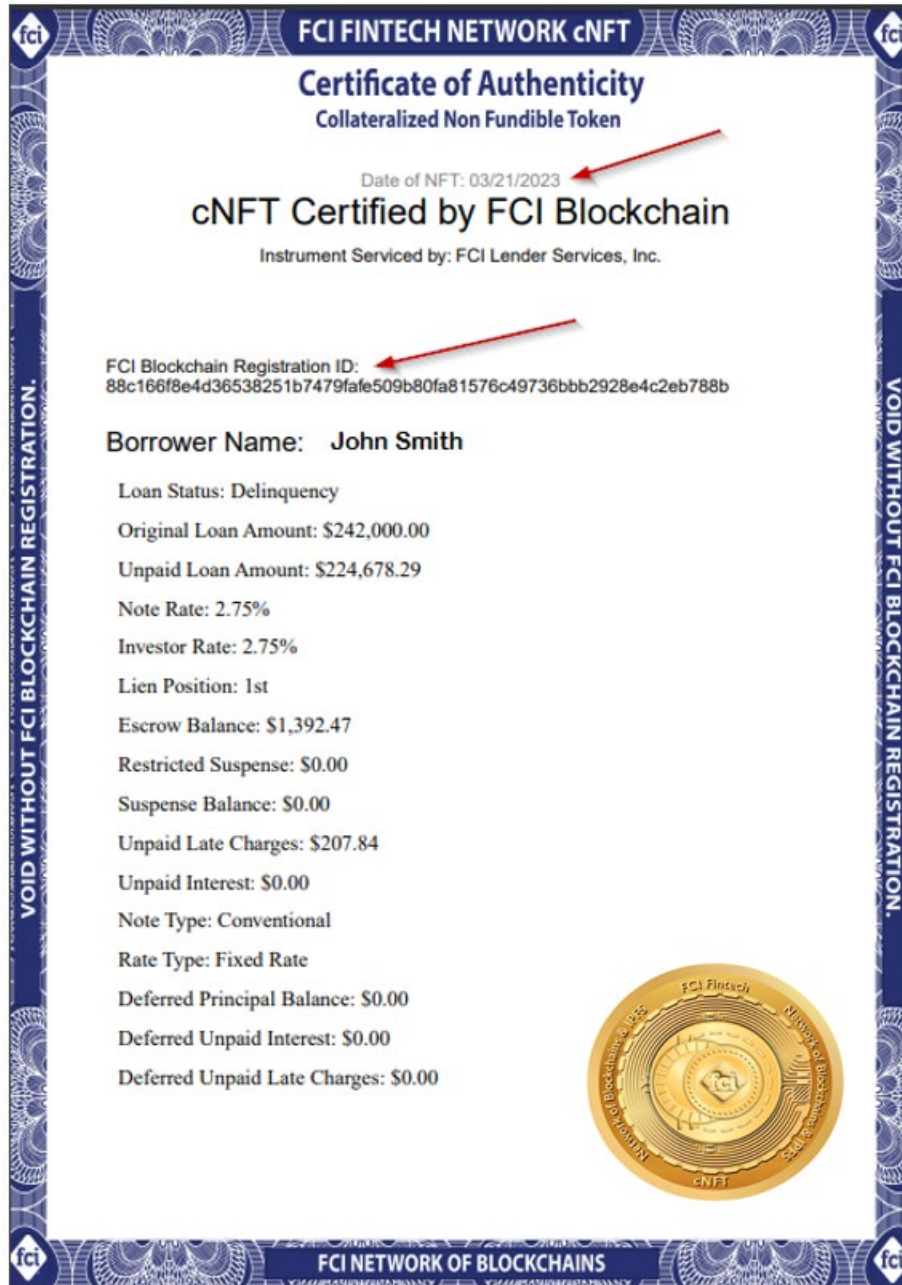
The cNFT Certificate of Authenticity also shows the ownership of the asset and, as seen by the arrows in the screenshot below, has URLs to the IPFS Network for every document

recorded for that asset, which improves transparency for the asset and makes the process more efficient.

`

5. Conclusion

For over a decade, FCI Fintech and FCI Lender Services have collaborated to resolve issues and bottlenecks in the financial industry. Through this partnership, FCI Fintech unites distinct and powerful technologies like Blockchain, Interplanetary File Systems (IPFS), Smart Contracts, APIs, multi-currency bridges, Parachains, and cNFTs alongside the foundational software suite.

FCI Fintech's innovative and revolutionary network of Blockchains provide enhanced security, a decentralization of data, improved efficiency, increased transparency, direct access for users, and expansive compliance capabilities for companies. This inclusive suite of features is the next step in the evolution and integration of technology for empowering companies in the financial industry to better serve their customers and overcomes barriers that currently limit operations, sustainability, and profitability.