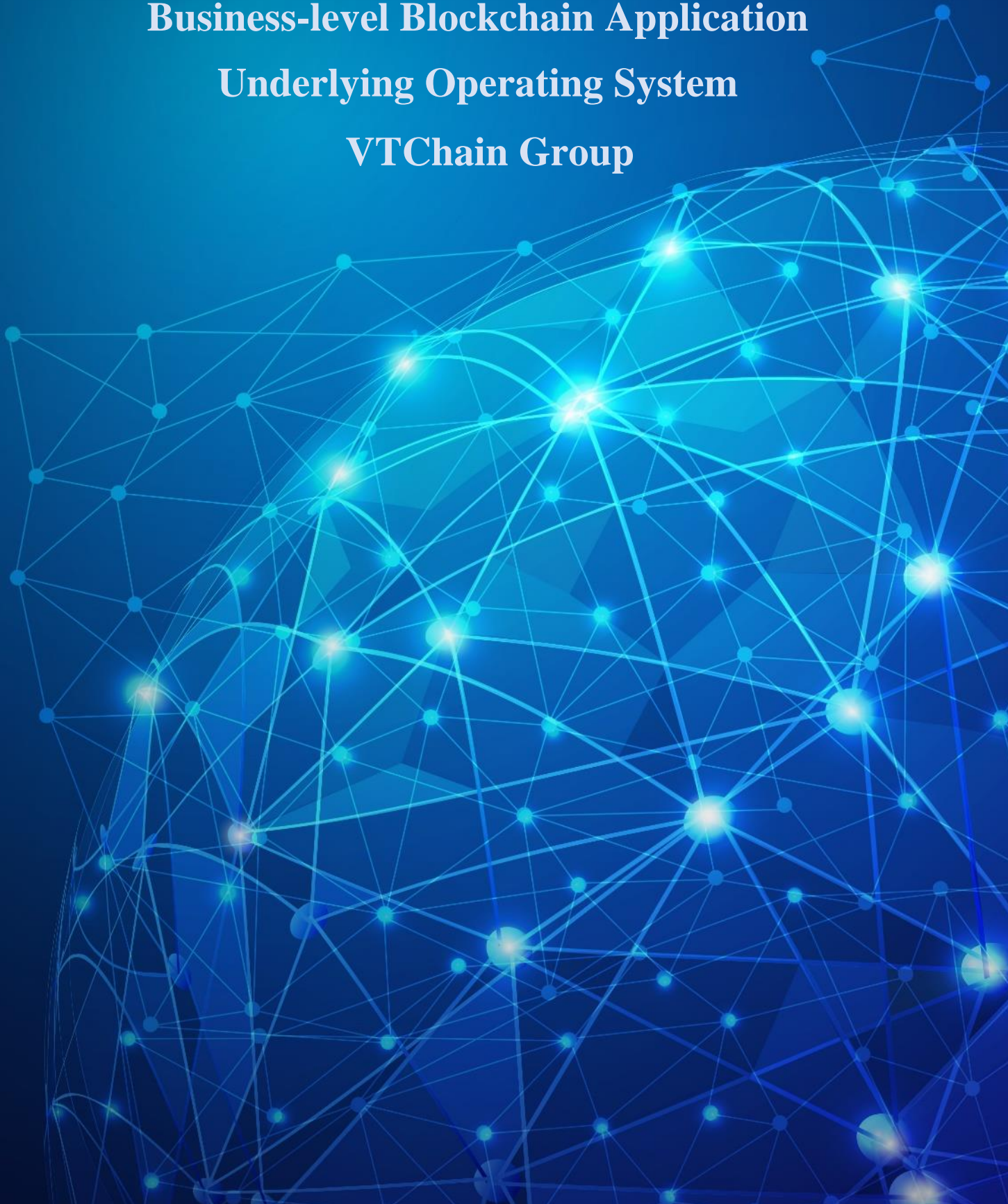# VTChain Technical White Paper

# V3.0

**Business-level Blockchain Application**

**Underlying Operating System**

**VTChain Group**

# Contents

# Version Notice

The VTChain project documentation is provided to all users and institutions concerned with VTChain. During the project development process, we may update the document version from time to time. Please pay attention to VTChain official website (http://www.vtchain.org) and WeChat public number, whichever is the latest version.

This technical white paper defines the VTChain R&D direction and technical solutions. It will be used to guide the VTChain technology research and development.

The VTChain Group thank you for your attention and support!

# Chapter One - An Understanding of the Status of the Blockchain

## 1.1 Blockchain Industry Analysis

2017 is the first year of the blockchain industry's outbreak. Various blockchain projects have emerged in an endless stream, and blockchains have gradually moved into all aspects of physical production and life. From the perspective of industry analysis, each blockchain project has its own uniqueness and creative side. Even though the quality of each blockchain project varies, some high-quality projects indeed standout from the crowd.

Blockchain technology is growing and prospering, making it a vision for developers and organizations around the world. More and more people are paying attention to how blockchains are used in commercial enterprise products to help people solve problems in existing centralized systems, such as the growing cost and the increasingly obvious security issues. From the initial open source community of Bitcoin, Ethereum and other public chain projects, to various types of blockchain start-ups, venture capital funds, financial institutions, IT companies and regulatory agencies, the development of the blockchain ecosystem is gradually developing.

We believe that the prosperity and development of blockchain technology will inevitably bring disruptive changes in many industries. Soon, blockchain technology will land on the application level of the real economy.

## 1.2 Blockchain Application Content

Since its inception, the centralized application has become more and more mature. It has won praises in terms of transaction scale, transaction speed, and ease of maintenance, but increasingly prominent problems still plague users, such as hardware and software R&D investment, system security, maintenance costs, and system upgrades etc.

From the perspective of the application of the existing blockchain technology, the blockchain infrastructure is generally composed of a data layer, a network layer, a consensus layer, an incentive layer, a contract layer, and an application layer. Among them, the data layer encapsulates the underlying data blocks and related data encryption and timestamp technologies; the network layer includes distributed networking mechanisms, data propagation mechanisms, and data verification mechanisms; the consensus layer encapsulates various consensus algorithms for network nodes. The incentive layer integrates economic factors into the blockchain technology system, mainly including the issuance mechanism and distribution mechanism of economic incentives; the contract layer mainly encapsulates various scripts, algorithms, and smart contracts, and is the basis for the programmable features of the blockchain; The application layer encapsulates various applications of

the blockchain. In this model, the blockchain structure based on timestamp, the consensus mechanism of distributed nodes, and the flexible and programmable smart contract are the most innovative technical links of blockchain technology.

The exploration of global blockchain application is very active. Overall, it is still in the stage of small-scale proof-of-concept. The current application of blockchain technology focuses on two aspects:

One is to achieve direct exchange of data in the absence of mutual trust between different institutions or individuals and lack of intermediaries. Blockchain technology originates from Bitcoin and is Bitcoin's underlying data storage technology. Therefore, finance is the hottest area for blockchain applications. As early as 2012, Ripple Corporation of the United States has introduced blockchain technology to provide cross-border transfers, clearing and payment services for several banks. Compared with traditional channels such as SWIFT (Global Interbank Financial Telecommunications Association), it can save one-third of the transaction fees, the operation time of cross-bank reconciliation was compressed from several days to several seconds. The application of blockchain in digital currency, payment settlement, securities trading, and mutual insurance is also highly valued.

The second is for the preservation and reliable storage of important data. Using the characteristics of blockchains that cannot be tampered with, the preservation of important data (e.g., legal documents such as ownership, agreements, bills, etc.) has become a hot spot for application exploration. At present, governments in Estonia, Georgia, and other countries are trying to use blockchain technology to register important assets and carry out registration of important information such as land registration, business registration, and electronic taxation.

## 1.3 Analysis of Difficulties in of Blockchain Application

As of now, there is no large amount of popular trusted blockchain applications. The reason is that many blockchain applications cannot solve the inherent contradictions between the blockchain's own characteristics and commercial applications.

1. The property that the blockchain itself cannot be tampered with is not necessary in certain aspects of commercial applications. The ever-increasing book data makes the blockchain network node bloated, cumbersome and extremely resource intensive.
2. The homogeneity of node types is serious, the execution speed is slow, and the transaction scale and transaction speed are far from the requirements of high concurrency and high response speed of commercial applications.

3. The existing smart contract programming requires high business expression capabilities, and there is no suitable solution for large- and medium-sized business applications.

4. The high transaction fees for all transactions (registration, transfer, application, etc.) of the blockchain limit the development expectation of commercial applications because in high-frequency and large-scale commercial applications, the handling fee is very alarming.

In summary, VTChain believes that to develop commercial applications with the blockchain approach, it is necessary to jump out of the existing framework settings of the blockchain, start with the underlying architecture, and focus on the needs of commercial applications without paying too much attention to existing public ownership. The division of the basic concepts such as the chain and the alliance chain boldly break through innovation and reform and combines the high-quality features of blockchain technology with commercial applications in order to fundamentally solve the problem.

# Chapter Two - VTChain How to define blockchain 3.0

## 2.1 What is VTChain

VTChain is a distributed, production-level open ecosystem for building commercial-level blockchain applications. It is committed to promoting the close correlation between blockchain technology and commercial-grade product applications, making full use of the advantages of blockchain technology and solving application system practices. The increasingly obvious cost and security problems of centralized systems.

The nature of the VTChain project: The project is a public welfare project aimed at promoting the development and improvement of blockchain 3.0 application technologies globally. The VTChain Foundation is a public welfare organization responsible for advancing and managing the development and operation of the VTChain project.

VTChain will plan to open source the project at right time.

VTChain is based on blockchain open source technology frameworks such as Bitcoin, Ethereum, Neo, Hyperledger, etc., and innovatively proposes software as a service (SAAS) blockchain application technology to promote blockchain technology to rapidly build commercial grades application products, fully absorb and draw on the basic components of bitcoin, Ethereum, Neo, and Hyperledger blockchain technologies, making them more suitable for the development and implementation of enterprise-level developers, end users, and especially application-level products in China.

At the same time, borrowing from the technical framework design ideas of Bitcoin, Neo, Ethereum and Hyperledger, VTChain adopts pluggable modular design, which is suitable for the development of commercial-level large-scale application products for junior and senior level developers. Used to build industry applications and platforms that support the business to support a wide variety of business application scenarios.

## 2.2 Design Goals

Since the beginning of the blockchain, "Everyone has participated in the use of blockchain and enjoyed the development results of the blockchain" has become a common vision of the VTChain community. Therefore, the design goal of the VTChain project is to reconstruct the blockchain infrastructure to commercial level. The application architectures are designed for all B2B and B2C applications, and to provide a localized, user-friendly, multi-language IDE development environment.

## 2.3 Innovation Points and Features

VTChain has the main technical features:

### 2.3.1 Combining Production-level Public and Private Chains

VTChain is a production technology platform that truly implements the WYSIWYG technology of blockchain technology. Based on the VTChain series of modules and tools, VTChain can quickly build business application with distributed ledger to serve business cases.

### 2.3.2 Turing's Complete Multilingual Coexistence Ecosystem

VTChain adopts Turing complete computer language and virtual machine, supports multiple development languages such as C#, JAVA, Node.JS, JavaScript, Python, etc. Developers can freely choose suitable language to develop cross-platform blockchain applications, or through smart contract to run in real-time on the VTChain virtual machine.

### 2.3.3 Polymorphic Node and Participant Identity Consensus Mechanism

To avoid network congestion caused by the increase of participants and peer nodes, VTChain divides the blockchain nodes into multiple types: consensus nodes, ordinary nodes, and data nodes. The nodes authorized to apply can be used as consensus nodes or data nodes to store participant identity data. Consensus nodes adopt multiple consensus mechanisms to maintain consistency among all hosts.

VTChain has a CA certificate center. All accessing commercial-grade applications and participants must sign a CA certificate to use this system. Through strict CA certificate authentication, the authority and content of the client (Peer node) can be effectively controlled.

### 2.3.4 Data Segregation and Confidentiality

The "publish-subscribe" mechanism is adopted in the consensus service to support multi-channel message passing, so that the Peer node can subscribe to any number of channels based on the application access control policy; that is, the application designates the channels in the subset of peer nodes. These peers make up the set of related parties submitted to the channel transaction, and only these peers can receive the block containing the relevant transaction, completely isolated from other transactions.

In addition, a subset of Peers submits these private blocks to different ledgers, allowing them to protect these private transactions from the books of other peers' subsets. The application decides to send transactions to one or more channels based on business logic. This is not a built-in limitation. Blockchain networks do not know and assume that there is no relationship between transactions on different channels.

### 2.3.5 Seamless Flow of Digital Assets

To solve the problem of the flow of digital assets held by different participants, VTChain provides a settlement center mechanism that enables participants (including institutions) who hold digital assets such as Bitcoin, Ethereum, and Litecoin to conduct real-time transactions. With dynamic settlement, participants do not need to care about the conversion relationship between digital assets. They only use the asset transactions they own, and the settlement center settles them according to the real-time dynamic "conversion rate".

### 2.3.6 Cross-platform, Localization IDE Development Environment

VTChain uses C# language development and strives to build a cross-platform IDE development environment suitable for developers and companies and provides a Web version of the IDE as well as a desktop version. Localization is not plagiarism and imitation, but comprehensive considerations from system architecture, business logic, usage habits, and development goals, etc., to establish a truly localized blockchain business application program and development kit.

## 2.4 Legal Attributes

VTChain is based on the development of blockchain decentralization ideas, but all design goals are following global laws and maintaining the existing economic order, and on the premise of realizing blockchain enterprise application landing research and development, the existing centralized IT system is prosperous. In an industrial environment, it can be used as an extension or upgrade to gradually expand the decentralized application ecosystem and reduce business costs.

Our legal position is compatible with the existing economic order and the centralized application is harmoniously developed. Through the API agreement and the middleware system, we can achieve mutual compatibility. In the near future, as a new complement and expansion of the real economy, we will solve the problems in the vertical. The subdivision area needs the adaptation of the blockchain technology.

# Chapter Three - Technical Architecture

## 3.1 Overall Architecture

The important feature of VTChain is to support multiple Chain and multi-channel technologies based on its own public chain.

The so-called multi-chain is a logical structure that includes Peer nodes, ledgers, and subscription channels. It isolates participants from data (including chain codes) and satisfies the basics of different people accessing different data under different business scenarios. Claim.

A node exists in the public chain, but also can participate in multiple private chains (through access to multiple channels); as shown below:
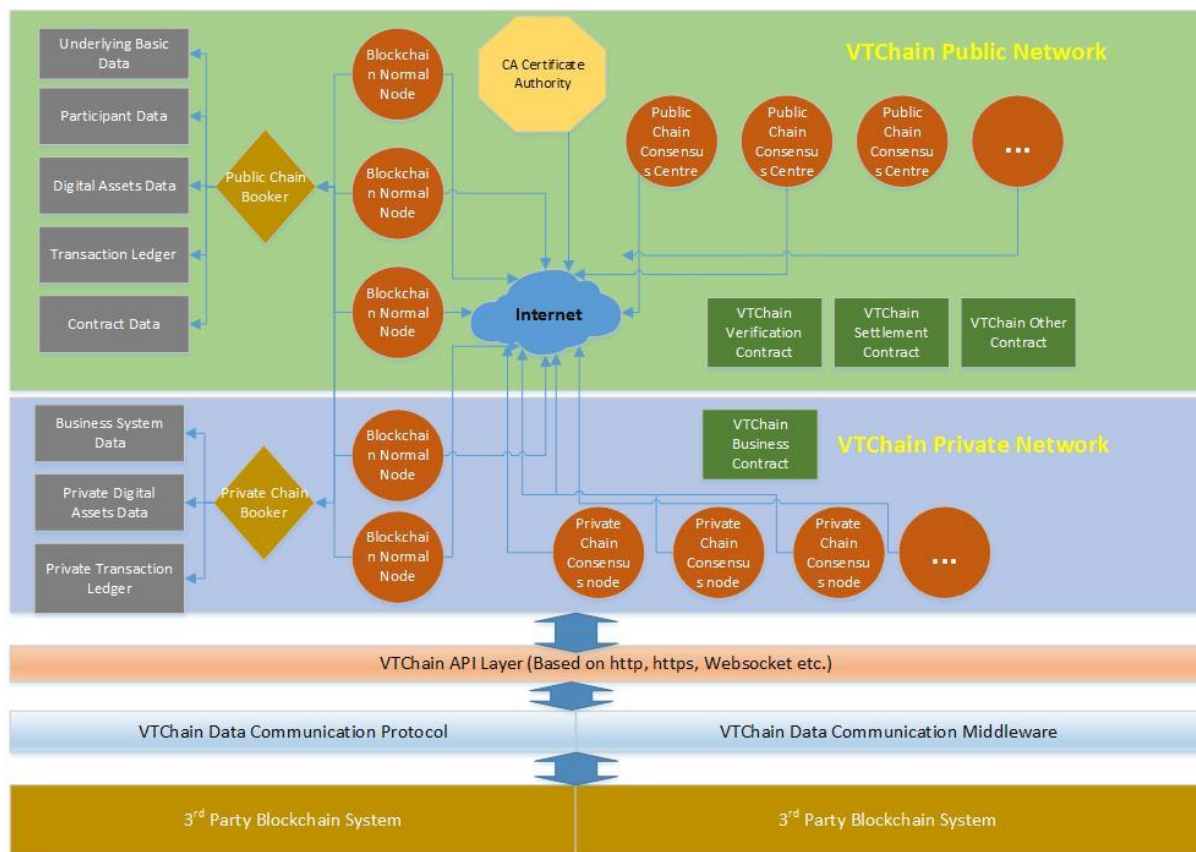


VTChain BlockChain Technology Schematic

**Channel:** The channel is a communication mechanism provided by the consensus service. It is the information pipeline generated by the publish-subscribe design mode. The network transmission of any message and service is based on the channel mechanism. In the VTChain blockchain network, digital assets, transaction books, business contracts, etc. can all communicate via "publish-subscribe" mode. It defines a many-to-many dependency, each node can subscribe to listen to a topic object,

when the topic object changes in its own state, it will notify all the subscribing nodes, so that they can automatically update their own state.

Based on this publish-subscribe relationship, the blockchain nodes and the consensus service are connected to form a confidential communication link (virtual), which realizes the requirement of service isolation. As shown below:



**VTChain Publish-Subscribe Channel**
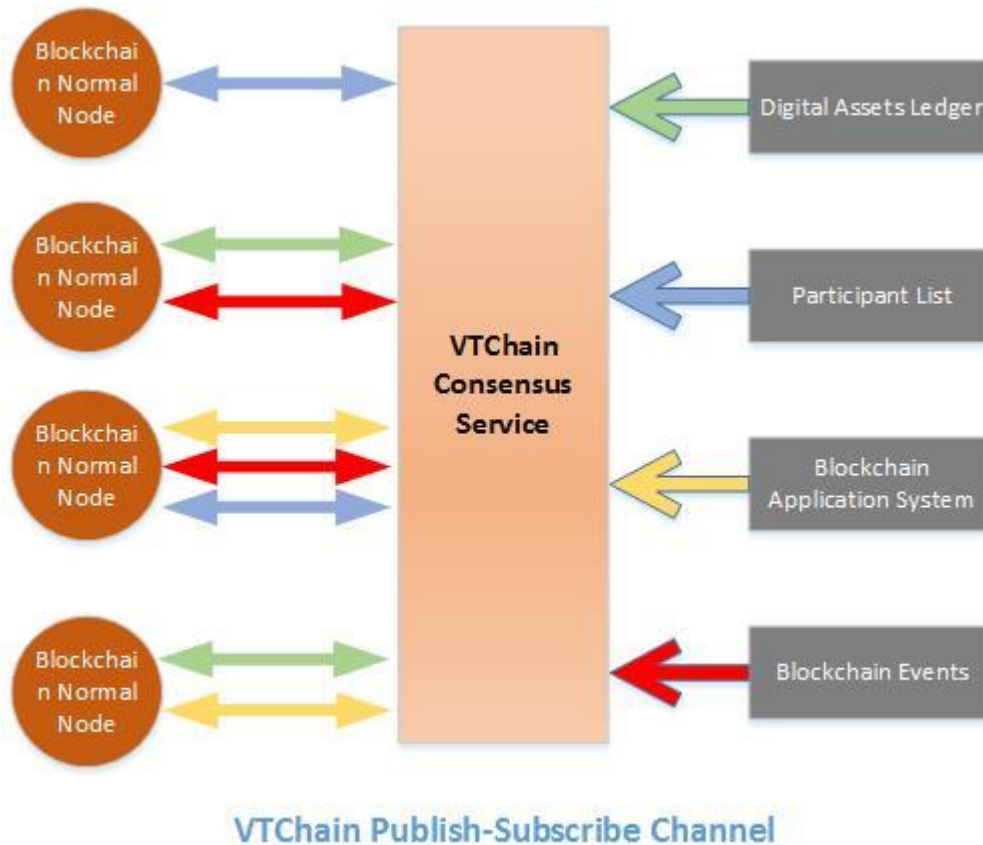
From the above figure, we can see that VTChain's publish-subscribe mode is a decoupled channel mechanism, which makes the objects transmitted by the channel an independent and standardized abstract model. These abstract models include: digital asset books, Participant list, blockchain application system, blockchain events, etc. Each object can depend on each other and can also be independent of each other. The communication channel between the object and the node is the channel. In other words, the channel exists in the abstract theoretical model, and it is not physically present.

The verification, transaction, application and other services between nodes and objects are provided by consensus nodes.

The publish-subscribe channel mechanism can clearly distinguish the public chain and the private chain of different business systems and maintain the logical independence between the

VTChain public chain and various application systems. Through the channel mechanism, participants of the VTChain blockchain application system can effectively focus on its associated participant objects, data, and business systems.

## 3.2 1+N Multi Block Chain

VTChain is a system of decentralized public chain and private chain that runs on the internet and is managed and maintained by many community participants. All participants on the blockchain belong to both the public chain and the private chain.

The public chain book includes all the data of the participating nodes (consensus nodes, data nodes), the digital asset data of the participating users, transaction data, etc. The consensus service automatically maintains the consistency of the entire network without manual intervention. Once the public chain book reaches a consensus, no one has the right to tamper with or delete it.

VTChain is based on the characteristics of blockchain applications, allowing any participant to establish its own private chain application system. Private chains can customize digital assets, participant lists, smart contracts, and application UI templates.

## 3.3 CSL ledger and dynamic storage technology

The irresistible distributed ledger technology of blockchain technology was once the most competitive core technology, but distributed ledger technology still has the following problems:

1. The irreconcilable nature has brought great trouble to the blockchain while winning the cries. A large amount of garbage books and application data flood the chain block, making the block books and related applications such as wallets bloated and cumbersome. It becomes more and more expensive to use system resources (CPU, memory, hard disk, etc.) and it is difficult to use simple application.
2. The general ledger structure makes ordinary users forced to download and store a large amount of garbage books and irrelevant data, increase unnecessary use costs, and make purse and application software synchronization problematic. This obviously does not meet the development needs of commercial applications.

VTChain solves this fundamental problem by adopting classified static ledger + dynamic storage technology, which not only retains the original intention of the blockchain not to be tampered, but also ensures that the ledger data is a valid block and avoids the heavy and difficult application software of the terminal.

**Classified Static Ledger**: Based on the Multi Block Chain multi-chain technology, VTChain divides the chain book into asset book, contract book, application book, and log book. Among them, the asset book refers to the basic elements including user address information, transaction information, and digital asset information. The contract book includes smart contract registration and release information, transaction information, and cancellation. The application account includes the application source code, distribution program, application data, and application log. Etc. The log book refers to the system transaction confirmation log, application release log, and other information.

**Dynamic Storage**: Distributed dynamic storage technology is used for contract books and application books. Contract owners and application owners can dynamically update and upgrade related applications.

## 3.4 Multiple Node Design

The user terminal software of the blockchain business application should be light client software, based on Web or desktop client program, no need to synchronize or download large amount of account data, ready to use. Based on this concept, VTChain classifies the nodes on the chain into ordinary nodes, consensus nodes, and data nodes.

The common node is the user node. This node uses the VTChain unified HTTP protocol or the TCP/IP protocol to connect the VTChain multi-chain network. The common node is provided for the DAPP application user.

The consensus node is a consensus mechanism in a multi-chain network, providing transaction verification, signature verification, and so on.

Data nodes provide services such as data storage, sharing, and application servers.

## 3.5 Universal Consensus and Multiple Consensus Mechanisms

The consensus service of the VTChain blockchain exists in both the public and private chains, and the respective consensus nodes use effective hash algorithms to maintain the consistency and legitimacy of the distributed ledger.

VTChain's main chain uses innovative and unique Universal Consensus (Universal Consensus) algorithm to complete data consistency verification. This algorithm is a commercial-level consensus mechanism based on DPOS, Paxos, IOTA, and other innovative features.

Universal consensus is a consensus mechanism that can truly achieve high-concurrency and large-scale cluster applications. It is intended for medium-sized and large-scale commercial

application development and relies on multi-chain structure and consensus fragmentation algorithm. Node functions are divided into Verifier, Block Collector, and Acceptor. Verifier is used to verify the transaction of account books. Every N nodes form a consensus fragment. A multi-level witness mechanism is used to sign the transaction. The Block Collector verifies the signature of Verifier and is responsible for collecting blocks and asynchronously writing blockchains. Acceptor is responsible for receiving block data.

The Universal consensus mechanism can complete the verification and production of multiple N block transactions at the same time. Compared to existing consensus mechanisms such as POW, POS, DPOS, and IOTA, the Universal consensus mechanism is faster, more decentralized, more reliable and secure, and has better concurrent performance.

The VTChain sub-chain provides a variety of consensus algorithm dynamic switching. Consensus protocols such as PBFT, Raft, POW, POS, DPOS and so on are set by the blockchain consensus node and the DAPP development organization according to the needs of specific business applications.

How the multiple consensus mechanisms coexist will be illustrated in subsequent R&D and white papers.

## 3.6 VTChain Encryption Algorithm

Like most cryptocurrencies, VTChain's account uses a public-private key generation algorithm based on the ECC Elliptic Curve cryptography.

The Elliptic Curve Crypto System (ECC) was proposed by Koblitz N and Miller V in 1985. Its security is based on the difficulty of solving the discrete logarithm problem of elliptic curves, in the case of equal key lengths. The security strength of ECC is much higher than that of RSA systems, because ECC has very important theoretical research value and broad practical application prospects in the field of network information security. On the other hand, in the case of comparable security, ECC uses more keys, which means that the requirements for bandwidth and storage space are relatively minimal, and so far, no sub-exponential time algorithm for elliptic curves has emerged. Therefore, ECC will be the most important mainstream public-private key encryption technology in the future.

The security of elliptic curve cryptography depends on the elliptic curve discrete logarithm problem (ECDLP). The attack on the elliptic curve cryptosystem can also be attributed to the ECDLP attack. The attack on ECDLP is similar to the attack on the discrete logarithm problem on a multiplicative group of finite fields, but the attack method cannot effectively transplant ECDLP.

Attacks on ECDLP are mainly divided into two categories: one is an attack on the discrete logarithm problem of all curves; the other is an attack on a discrete logarithm of a particular curve.

In the VTChain public-private key system, the private key is the only certificate held by the wallet account. The private key can generate the public key, and the public key can generate the wallet address. This process is a one-way, irreversible process. Therefore, external information cannot brute force account information.

## 3.7 Security Sandbox Mechanism

Blockchain is a decentralized system platform. Because the source code is open source, the security and robustness of the system are very important and must be reliable. VTChain completely introduces a real-time running security sandbox model based on blockchain network.

VTChain security sandbox model includes three levels: VTChain virtual machine, dynamic smart contract, VTChain state machine.

VTChain virtual machine is a lightweight runtime environment, its substantive role is the CLR (Common Language Runtime), is responsible for the interpretation and operation of the code in different languages on the chain, and the supported languages include C#, JAVA, JavaScript, GO, Node.JS.

Dynamic smart contract refers to the dynamic execution code of one or more groups of signature verification running on the VTChain virtual machine. Participants can use their preferred language to customize their own application logic and digital asset settlement methods. Dynamic smart contracts are divided into two operating modes: pre-compilation execution and dynamic execution. The conventionally solidified application logic can be published to the blockchain system after pre-compilation to save system overhead and to improve execution efficiency. Dynamically-changing parameter content and real-time application prefabricated logic can be dynamically compiled and executed in real time, such as artificial intelligence, cloud computing, and big data algorithms that may be run on the VTChain blockchain in the future.

The VTChain state machine is a real-time security monitoring mechanism proposed by the VTChain team. It will perform real-time security scanning and monitoring of data and nodes on the VTChain blockchain. The state machine is responsible for the following: Type Checker for smart contracts, code security, Garbage Collector, Exception Manager, and COM Marshaler.

## 3.8 Digital Signature Algorithm

Digital signature refers to the process of signing key information during blockchain transactions, block verification, and block uplink. Digital signature is one of the important means to ensure the identity and security of users.

VTChain's digital signature uses the Schnorr digital signature algorithm.

In 1989, Schnorr proposed a randomized signature scheme that became a Schnorr digital signature scheme for solving ElGamal signatures and discrete logarithm problems.

The Schnorr digital signature algorithm is based on the discrete logarithm problem and can be extended to the Schnorr signature algorithm on the elliptic curve. The main advantage of Schnorr digital signature algorithm is that multiple digital signatures and batch verification can be implemented. That is, signatures of multiple users on the same message can be aggregated into one. And it only needs a single verification process.

Therefore, compared to the ECSDA digital signature method, Schnorr has a shorter signature, stronger security, and faster signature and verification time, so network traffic and storage space requirements will be greatly reduced.

## 3.9 X509 Digital Certificate System

In the blockchain network, since the user identity is anonymized, once the asymmetric encryption algorithm and the public key in the digital signature are replaced and tampered, the consequences will be disastrous. Therefore, to ensure the originality of transactions and digital signatures, there must be adequate protection. VTChain's PKI digital certificates can greatly solve problems such as user digital identity authentication and public and private key protection.

The PKI digital certificate is an important certificate for the VTChain network to prove the user's digital identity. The VTChain Foundation implements the issuance, verification, revocation, invalidation, and the like. In the future, decentralized digital certificates can be issued.

VTChain mainly adopts the mature and reliable X.509 digital V3 certificate system in the industry.

In the VTChain network, the X.509 certificate provides a trusted digital identity mechanism based on the anonymous mechanism. Each user who owns an X.509 certificate considers it to be a relatively trusty node. The light node does not require a certificate.

Digital certificates ensure that the public key of the signature is from the original user, not the fake public key.

The initial users of digital certificates mainly include: consensus nodes, data nodes, coordinator nodes (index service nodes), etc., and may be extended to DAPP nodes, IPFS nodes, etc. in the future.

After the node logs in to the VTChain network, it first verifies the digital certificate, and the node whose digital certificate is missing, invalid, or expired will not be allowed to access the VTChain network.

VTChain's PKI certificate governance system consists of CA (Certification Authority), RA (Registration Authority), and certificate database.

## 3.10 Application System

The VTChain terminal application system is a software tool and application portal provided to end users, who could be digital asset holders, application system users, etc .
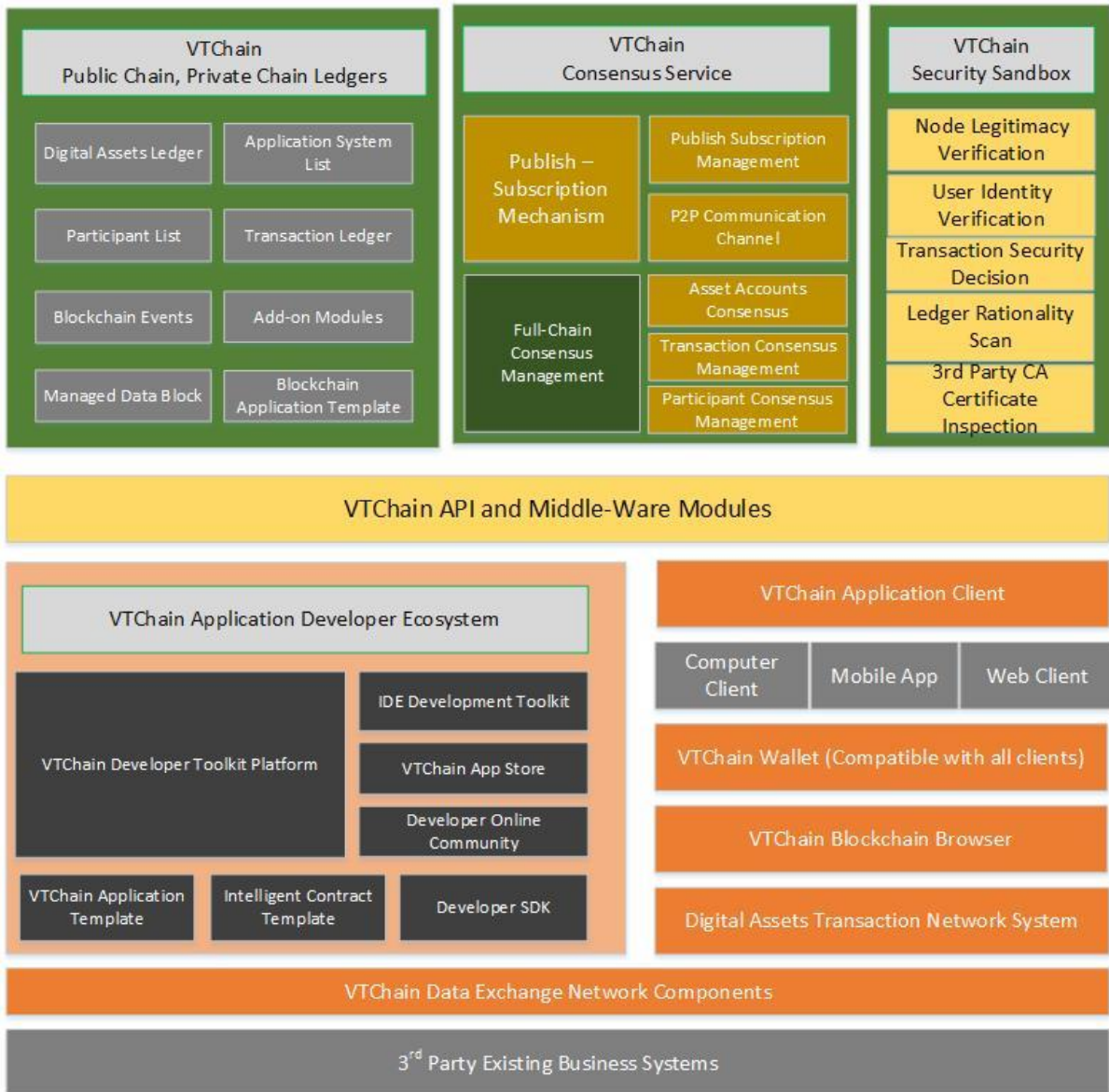
The terminal application system includes: VTChain terminal application client software, VTChain wallet software, VTChain blockchain browser, digital transaction gateway system and so on.

The VTChain terminal application client software is a unified portal for blockchain applications. The terminal users access the VTChain blockchain network through it and run various smart contracts and blockchain applications on it. The mechanism is similar to the primary and secondary dependency relationship in the WeChat-Applet program.

VTChain Wallet software is used to create, manage, and trade users' digital assets. The design of separation of the terminal application client software and the wallet software is to protect the user's digital assets in the chain. At the same time, it provides better user experience to the users who only want to use the wallet but have no interest in the application.

## 3.11 DAPP Ecosystem

The VTChain application developer ecosystem is an ecological environment that applies blockchain technology and is maintained by many community enthusiasts and developers. Its contents comprise VTChain IDE development tools, online Web application store, developer community, VTChain smart contract template, VTChain application template, developer SDK, VTChain API, VTChain data exchange plug-in content.

## VTChain Public Chain, Private Chain Ledgers

| | |
|---|---|
| Digital Assets Ledger | Application System List |
| Participant List | Transaction Ledger |
| Blockchain Events | Add-on Modules |
| Managed Data Block | Blockchain Application Template |

## VTChain Consensus Service

| Publish – Subscription Mechanism | Publish Subscription Management |
|---|---|
| | P2P Communication Channel |
| Full-Chain Consensus Management | Asset Accounts Consensus |
| | Transaction Consensus Management |
| | Participant Consensus Management |

## VTChain Security Sandbox

- Node Legitimacy Verification
- User Identity Verification
- Transaction Security Decision
- Ledger Rationality Scan
- 3rd Party CA Certificate Inspection

## VTChain API and Middle-Ware Modules

## VTChain Application Developer Ecosystem

| VTChain Developer Toolkit Platform | IDE Development Toolkit |
|---|---|
| | VTChain App Store |
| | Developer Online Community |
| VTChain Application Template | Intelligent Contract Template | Developer SDK |

## VTChain Application Client

| Computer Client | Mobile App | Web Client |
|---|---|---|

VTChain Wallet (Compatible with all clients)

VTChain Blockchain Browser

Digital Assets Transaction Network System

## VTChain Data Exchange Network Components

## 3rd Party Existing Business Systems

**VTChain BlockChain Ecological System Famework Diagram**

# Chapter Four - Business Models

## 4.1 Summary of Business Models

The VTChain business model is built around the business model of the system, which not only satisfies the business requirements in system, but also effectively stimulates consensus nodes and data nodes.

## 4.2 Digital Assets Mechanism

The basic digital assets of the VTChain blockchain system include BVC and BVG. Among them, the BVC is a token created by the VTChain system. It has already been generated from the beginning, and the total amount of the distribution no longer increases, and is gradually consumed and reduced along with the transaction process in system. To reduce invalid transactions in the VTChain system, a transaction fee of 0.001%, which could be changed to a dynamic rate in the future, of the transaction amount will be automatically deducted for each transfer operation. It will be automatically imbedded into the black hole address and will be eliminated forever. A maximum of 100 BVC will be deducted for a single transaction.

BVG is the incentive token of VTChain. It does not need to be issued. It is automatically generated by the system as the block is created. It is used to reward system consensus nodes and community contributors.

Token use range: BVC is mainly used for system application transaction settlement and system voting, while BVG will be used for blockchain network creation, accounting and so on. BVG is automatically generated as blocks continue to increase and is rewarded to block makers. It is completed in 25 years and totals 1 billion.

Please pay attention to the VTChain official website for the BVC release plan, and we will release it in due course.

BVC and BVG will implement trades on the VTChain decentralized exchange after the VTChain platform is on-line.

Prior to launch of the VTChain platform, the system used a BVT token based on Ethereum, with attributes equal to BVC.

### 4.3 Cost Design

In this system, digital assets are used as a value-bearing document and are also used to pay for user transactions and use of applications.

Specific costs could happen in below transactions:

1. Digital asset transfer fees.
2. Digital asset registration and issuance costs.
3. Smart contract issuing costs.
4. Application publishing costs, rental fees and so on.
5. Other services necessary costs.

The expenses are mainly rewarded to consensus nodes, data nodes and so on.

### 4.4 Node Incentive Program

To promote the development of the network, VTChain initially implemented reward plans for consensus nodes and data nodes. The specific plan is as follows:

1. The miners receive several BVTs as incentives when they create blocks and complete consensus services.
2. The data node provides data services and several BVT will be awarded each day.
3. Other irregular awards.

The specific implementation content will be determined during system development and internal testing.

### 4.5 DAPP Business Model

DAPP is an important core content of VTChain's enterprise application blockchain system. It designs a certain business model for stakeholders including developers, data node providers, and users of DAPP.

Developers issuing DAPP applications need to pay a certain amount of work.

The data node provider provides application data service, which can charge users usage fee. The specific cost is to be determined by the developer. Data node provider and developer shares the revenue.

# Chapter Five - User Models

## 5.1 Users

Refers to users of VTChain enterprise applications, including government, enterprises, and individual users.

## 5.2 Developers

Refers to the VTChain blockchain network, using the VTChain API protocol and middleware products to develop enterprise application developers, including business organizations or individual developers.

## 5.3 Service Providers

Refers to individuals or organizations that provide basic network and data services for VTChain.

## 5.4 Commercial Unit

Refers to the business organization in the VTChain system, providing upstream and downstream services such as consulting for business applications.

## 5.5 Third-party Agencies

Refers to relevant third-party agencies in the VTChain system, such as CA certification authorities, copyright authorities, and so on.

# Chapter Six – Business Use Cases

## 6.1 P2P Loan Platform Based on VTChain Technology

Judging from the current technology applications and industry status, the commercial value of blockchain technology in the financial field is most clearly visible. We will first talk about how to implement a Block Chain Lending Platform (BCLP), hereinafter referred to as BCLP system, based on the VTChain application platform.

The BCLP system is a digital asset management system such as P2P network loan, credit sharing, information aggregation, and intelligent assessment implemented using blockchain technology and big data technology.

The online loan platform using blockchain technology has the following features:

1. Identity Consensus Mechanism: The BCLP system requires participants to have clear and reliable identity data. Participants include debit users and credit users. Data in this area can be reconstructed from the BCLP data block or pulled from existing application systems. The BCLP system provides a unified API interface and tools to interface with existing applications.

2. Information Aggregation Mechanism: The loan system requires reliable information on the borrower's credit, the lender's loan quota, etc., and has the characteristics of unchangeability. The BCLP system will provide personal credit and lender's loan mechanism, including quotas, Interest rates, etc., are stored in distributed data nodes and are not allowed to be modified without the authorization of the BCLP control list. This is automatically controlled by the consensus mechanism. Therefore, the relevant information of the BCLP system can be considered as reasonable and effective. At the same time, BCLP provides the necessary services for borrowers and borrowers through add-on smart contract logic.

3. Big Data Analysis Strategy: The BCLP system will connect a third party cooperating credit platform to collect a large amount of original data, use a big data analysis strategy and a distributed computing method to intelligently assess the borrower's loan quota, and provide the best loan program through a price comparison mechanism.

How VTChain achieves these goals? The technical framework of BCLP system is as follows:

BCLP Business System based on VTChain
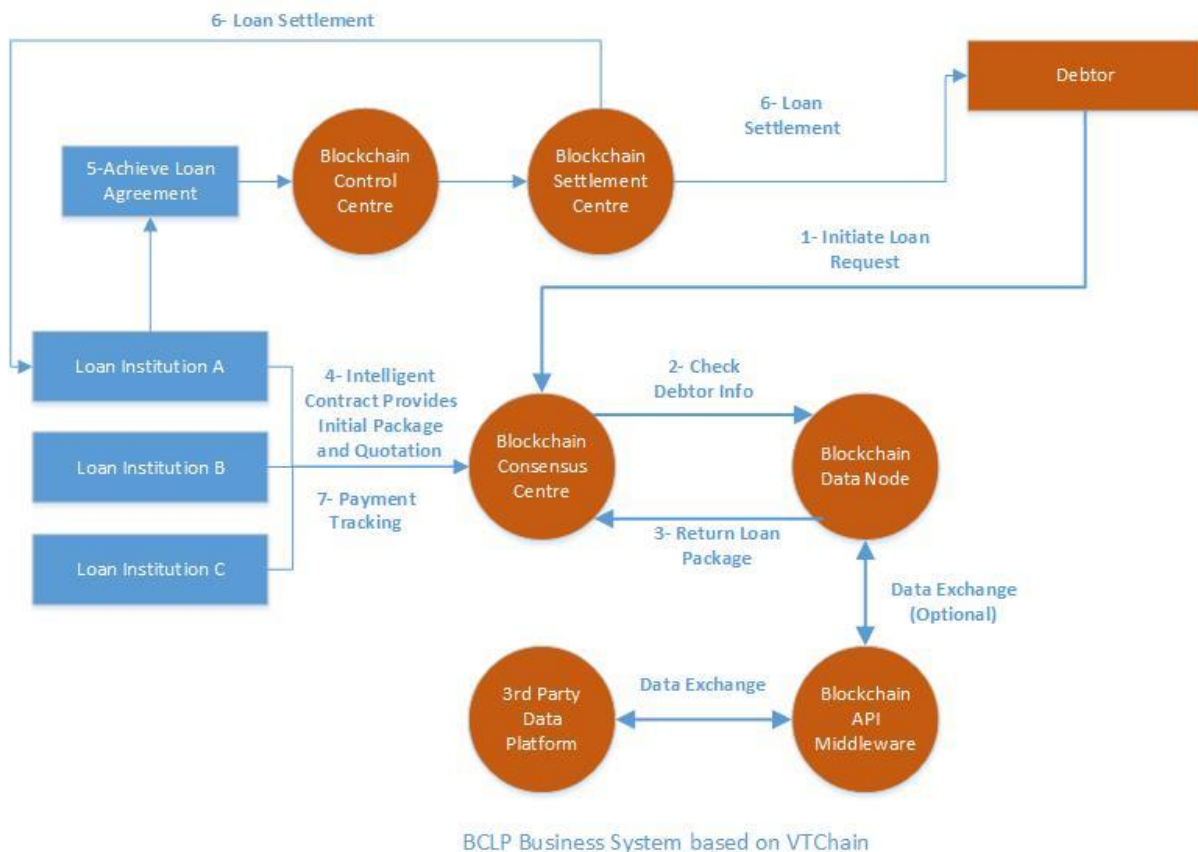
All BCLP system lending services are completed through smart contracts and consensus mechanisms without the need for third party intervention.

All smart contracts require only a few lines of code. We need to first determine the sponsor's identity and reliability, ensure the real name and credit, and the system automatically connects with the relevant financial institutions. If more than one financial institution participates, it will require a competitive quote from the financial institution. The smart contract takes the timestamp of the order instruction as the sorting criteria and preferentially allocates to the loan institution with the top of the time stamp. If the transaction is completed, the settlement centre will automatically settle the digital assets of the loaner and the borrower. The digital assets can be digital currency or legal currency. No one can tamper with or denies.

## 6.2 Automobile Auction Platform Based on VTChain Blockchain Technology

In Hyperlydger's official profile, the blockchain technology-based auto auction platform is a classic application solution, because VTChain also used it as a case for better understanding of VTChain's enterprise-class application features.

In the auto auction platform, it constitutes the three major elements of the transaction: participants, assets and affairs. Participants include all stakeholders in the auction business,

including car holders, buyers, and platform managers. Assets here mainly refer to digitized equivalent objects converted from automobiles. Transactions refer to transaction events such as inquiries, auctions, and management generated by both parties.

The platform management party first registers the participants, assets, and other data in the registration authority and stores them in the data nodes. Blockchain consensus node provides registration services. Through a consensus mechanism, a consistent state is reached in all system clients. This status includes all parties' data, asset data, auction status (in the auction, completed, abandoned, etc.).

After the auction begins, the participants begin to initiate an authentication to the consensus node, obtain their granted authority which is managed by the control center, and obtain the authorized CA certificate. The smart contract collects its bid data and checks whether the auction ends at any time. The auction is terminated when the auction expires, or the first highest bidder is generated. The system will automatically terminate.

In this system, all participants and motor vehicles adopt unique coding methods to obtain unique identification. As a token in the auction system, registration and consensus mechanisms complete the collection and verification.

# Summary

VTChain blockchain has gained wide attention and praise from industry colleagues and related blockchain enthusiasts since its creation. Many community users have put forward good suggestions and ideas for the development of VTChain project. Here, the VTChain team expresses its sincere gratitude and hopes to have many friends along the way in the future.

The VTChain community is an open-minded and open source blockchain project community. Any blockchain talents are always welcome to join our team. We work jointly to help develop and research blockchain technology and promote a new generation of IT solutions with the revolutionary development of the VTChain system.

Time will eventually prove that only blockchain projects that focus on R&D will gain significant development and recognition in the long run.

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