LinkEye

Blockchain-Based Credit Alliance

White Paper

Abstract

LinkEyeis a Hyperledger Fabric based consortium-blockchain solution to facilitate global credit alliance.

Utilizatingblockchain technology and credit economy model enables Linkeye to create a shared list of untrusted profiles within the credit alliance through connecting isolated islands of credit data, creating a comprehensive, reliable credit database. This serves to boost and supplement the credit system of society, eventually achieving the end goal of creating fairness in credit access for all.

Linkeye project has a huge significance at a scientific and technological level to promote the development of a global credit-based society.

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1 Introduction

1.1 Market Capacity

1.1.1 China

In 2016, the market of individual credit loan in China has reached 23 trillion RMB, which recorded a 21.1% increase from 2015. The business is expected to retain an annual growth of over 20% each year and to reach 41 trillion CNY in 2019, which would be quintuple of the market size as in 2010. The size of consumer financing/credit loan market in China is rapidly increasing and it is expected to have huge growth potential.

(Source: Internet)

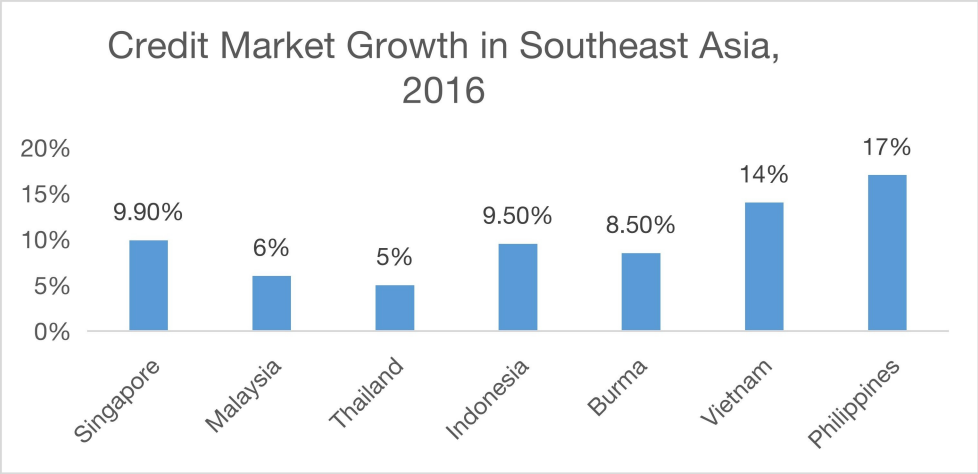
Concurrently, the Chinese credit evaluation market is experiencing a steady growth respectively. However, due to the uncertainty of regulations and difficulties of data acquisition, the market penetration for individual credit remains at about 9%, signifying a huge growth potential.

(Source: Internet)

1.1.2 Southeast Asia

There is a population of 600 million in Southeast Asia, of which only 27% of the local residences have their own bank accounts. Market data shows a surprisingly low number in ownership of credit cards to the population: 6% in Indonesia, 5% in the Philippines and 3% in Vietnam. In comparison, 80% of the US citizens get access and utilize credit services. Exacerbating the problem, there is only very limited amount of the population covered by official credit scoring agency although the awareness of credit loan is relatively strong in these areas. A well-developed credit scoring system will support local institutions to develop consumer-financing businesses, which leads to economic growth. Taking Vietna for example, 40% of the sales of cellphone are finished through installments despite low market penetration of mobile phones-
.thedemand for credit loan is very strong. A developedcredit system will assist the development of the consumer finance industry and boost the domestic economy. The LinkEye project will greatly contribute to the boost of economy in the region by building a credit scoring alliance.

The current size of credit loan market in Southeast Asia is relatively small in relation to its population size. However, with the rapid growth of the market at 10% growth rate year on year, the credit industry is poised for take-off.



(Source: Internet)

1.1.3 Europe

Although Europe has been contributing to the global credit loan market as one of the most important market players, it had stagnated in recent years due to financial crisis in 2008 and debt crisis in 2009. In 2015, the annual credit balance of the 28 European Union countries recorded 1.12 trillion EUR, showing 2.9% increase from 2014, which was the first increase

since 2008. UK (329 billion Euro), Germany (225 billion Euro) and France (153 billion Euro) are the top 3 contributors to the European credit loan market. To conclude, the market capacity is huge for Europe and the recovery is leading to rapid growth.

1.2 Problem

1.2.1 China

- Limited credit coverage and access by the Central Bank

The People's Bank of China did not establish its nationwide unified database of financial credit information until 2006. It is a relatively short period of time for the system to improve. And due to the peculiarities and uniqueness of the Central Bank's system, the credit scoring provided is not well established - shown lack of consistency and unification. At present, there is only 300 million individual credit profiles were recorded in the Central Bank's database. However, the limitation of accessibility to the database makes it more difficult for non-government institutions to inquire and upload credit reports.

- Extensively distributed credit information

Credit data in China is isolated and distributed among various banks, small loan companies and lending platforms. The credit data collected arefragmented, preventing synergy, creating a barrier to common credit application.

- Weak sense of punishment in existing credit system

The current system of disciplinary punishment in credit industry is incomplete which makes the cost of breaching relatively low. Therefore, there have been series of dishonesty happeningsuch as commercial fraud, breach of contract, tax fraud and evasion. AsChina's credit industry started latewith lowsocial awareness of credit, there is a definite need for a comprehensive credit environment.

- The market needs for credit system

As of now, there are more than 1,500 problematic lending platforms reported by government and media. Liquidity crisis are caused largely by bad debts, which eventually lead to the collapse of most of the platforms. In the meanwhile, the market requiresnew credit information platforms

that providereliable, effective, open and transparent data in order to support the development of the credit industry.

1.2.2 Southeast Asia

- The general financial system in Southeast Asia is underdeveloped but rapidly booming, offering great opportunities to the credit business. Take Indonesia for example, there is less than 30% of the entire 300-million population with a bank account of which only 6% uses credit card. In comparison, penetration of bank accounts in China has reached 80% and the figure for Hong Kong and India is 96% and 50% respectively.
- An obstacle exits in the form of fragmented credit data due to Inadequate government credit system and underdeveloped commercial credit bureau

1.2.3 Europe

The financial industry in Europe is dominated by public credit system initiated by the Central Bank. The centralized credit system and database is non-profit and funded by the government, resulting in most of the credit institutions operated by the Central Bank or managed by major national financial institutions. This creates several deficiencies as listed below:

- The fiscal burden of investment in credit system is huge. It takesextensive investment from the government to establish the credit database with high maintenance and operation costs.
- There is less room for market-oriented operation creating a limitation on the range of services to be offered. Public credit is not conducive to various types of credit information integration and penetration, especially inadequate for credit information services and service experience.
- The traditional credit system provides limited support to the local economy. The consumption market in Europe is relatively weak and it will benefit from a more flexible and advanced credit system.

1.3 Solution

Based on the struggles of the credit markets in China, Southeast Asia and Europe, LinkEyehas a clear entry pointinto the industry. By utilizing blockchain technology and credit economy model, Linkeyecan create a shared list of untrusted profiles within the credit alliance by connecting

isolated islands of credit data, and eventually solving the problems of high costs, data discrepancy, accessibility and shortage of talents. With this, Linkeye serves toboosteconomic growth and achieve fairness by forming a comprehensive trustworthy credit system of the entire society.

2 Why LinkEye

2.1 Vision and Mission

LinkEye is an independently developed Hyperledger Fabric based consortium-blockchain solution facilitating global credit alliance. Utilizatingblockchain technology and credit economy model enables Linkeye to create a shared list of untrusted profiles within the credit alliance by connecting isolated islands of credit data. The ultimate goal is to achieve fairnessthrough credit by forming a wide-range trustworthy credit system of the entire society.

Linkeye project has a huge significance at a scientific and technological level to promote the development of a global credit-based society.

LinkEye is committed to build the first blockchain-based Credit Alliance, focusing on completing the platform and the database of fraudulent people by recruiting members for the alliance. The project reinforces honesty to society – fraudulent people won't be able to gain access to financial services while the trusted people enjoy good social resources.

2.2 Current State of Credit Assessment

Information Technology advancement is making data processing more efficient and effective to provide support to an enterprise's operations and decision-making, which leads to immense demand for big data analytics in every industry. With rapid growth of the credit business, huge amount of data is being produced. However, the traditional credit agencies are only able to focus on their niches given the dramatic increase in quantity and depth of the data such as CreditVision for financial institutions and DriverRisk for Insurance companies. A single customer could have different pieces of credit data from various credit data institutions, which makes it impossible to form a comprehensive credit profile. Decisions made from fragmented data may lead to inaccurate risky decisions with unwarranted consequences. Linkeye's mission is to generate comprehensive credit assessment by connect all the isolated islands of credit information. In addition to that, the platform willensure the credit report is accessible and transferable among alliance members.

2.3 Advantages

2.3.1 Blockchain-based

Traditional data center stores data on a central node that is fully controlled by a data center – the data can be modified or deleted. In such case, there are risks that the data could be tampered or deleted, or be sold to other party by the data center for profits. In current model of data union, a number of small data centers will usuallybe attached to a large data center for data exchange. All the data transactionsmade would go through the large data center when usually the small data centers do not trust each other. The larger data center owns all the data eventually by keeping their copies.

Blockchain is a decentralized distributed data storage technology. It isa secure and reliable system that allows data transaction between all kinds of institutions or individuals with the absence ofcentral authority. Powered by techniques of cryptography, decentralized consensus, peer-to-peer network communication,blockchainprevents data frombeing tampered nor deleted. Utilizing such technology allows Linkeye to make sure the data is unable to be modified or deleted once being published on blockchain, building a trusted data system.

2.3.2 Industry insights

LinkEye is operated by a team of financial professionals with years of experience in traditional banking and Fintech. The team had developed its own insights on credit business and IT, which allows them to strategically plan and deliver the project.

2.3.3 SuccessAchievements

The founding team of Linkeye havedeep skillsets in risk management, business development and product development. Worked together for over 3 years, the team has accomplished many milestones including a credit platform with over 1,000 credit financing service providers, operating a payment platform withmonthly transaction amount of RMB 5 billion and a technology-driven micro financing service platform serving millions of users.

2.3.4 Resources:

The key to develop a credit union is to partner with many qualified members. Worked in the credit industry for years, Linkeye team is able

to swiftly kick-start the project generating millions of initial credit data through establishment of strategic partnership with credit loan agencies in China and Malaysia. The accumulation of initial data is expected to exceedtens of millions in the near term.

3 How Does LinkEye Work

The LinkEye team innovatively built a credit alliance based on blockchain technology with a proposed Eight Core Mechanisms, which was generally recognized by the industry to ensure the efficient functionality of the alliance. It is a breakthrough in blockchain in terms of being the first substantive application in the field of credit scoring.

3.1 Blacklist Mechanism

The Blacklist Mechanism enables the publication of fraudulent activities within the credit alliance with consideration of privacy – the data will be desensitized and posted in a masked format. A sample of Linkeye data format will be:

Linkeye ID + Masked ID (such as 220403198011 ******) + credit score + publisher (anonymous) + signature.

The blacklists of untrusted individuals published by members of the alliance contains two parts - public data and detailed info. The public data will be shown and the detailed info (LinkEye template + alliance member customized data) will be stored in blockchain including user ID, full name, time of loan, loan amount, lending platform, overdue time and category. LinkEye requires alliance members to sign an agreement with the borrower prior to the issue of credit loan to inform publication on LinkEye in the event of frauds.

3.2 Membership Mechanism

To ensure integrity and effectiveness of the data, LinkEye will establish a strict standard for reviewing and qualifying the alliance members. The first batch of members has to be reputable brands in the industry. Alliance member uses real name for registration and it has the option to publish dishonest information via real name or anonymous.

3.3 Credit Mechanism

To regulate alliance members and to prevent data fraud, the credit profile of each alliance member will be disclosed in real time. Each member receives an initial credit score of 100 at the assignment. Once there is dishonest behavior founded, 5 points will be deducted from the score and

it will be broadcasted to the alliance. The member will be eliminated from Linkeye Alliance when there is 0 credit score left.

3.4 Arbitration mechanism

When a member holds objections or questions to a piece of data published by another member, it has the right to file arbitration with the LinkEye Foundation. The arbitration will be organized by the foundation. Each of the members holds 1 vote while Linkeye Foundation holds 33.3% of the vote. The arbitration will be made in the event when receiving over 50% of approval vote.

3.5 Information Sharing Mechanism

The user ID is the only match for the member when querying data. The data could only be accessed and exchanged only when the user ID is perfectly matched. Alliance members are allowed to view a detailed version of individual credit reports from other member by exchange via LET. The detailed version shares the same signature with the published version to ensure accuracy of the data.

3.6 Smart Pricing Mechanism

LinkEye executes a smart real-time pricing mechanism that enables all members publish credit data in a slightly lower price than market value to avoid block of data exchange due to price fluctuations of LET.

3.7 Data Security Firewall Mechanism

LinkEye sets up data security firewalls to prevent data from being crawled. Alarm triggers are set up based on application conditions to block abnormal queries. The member will be eliminated in severe cases once triggering the security alarm.

3.8 Open API Mechanism

LinkeyeFoundation provides external query interface open to external parties. Any users can access to the public blacklist by entering the full ID and to the detail report by exchanging via LET.

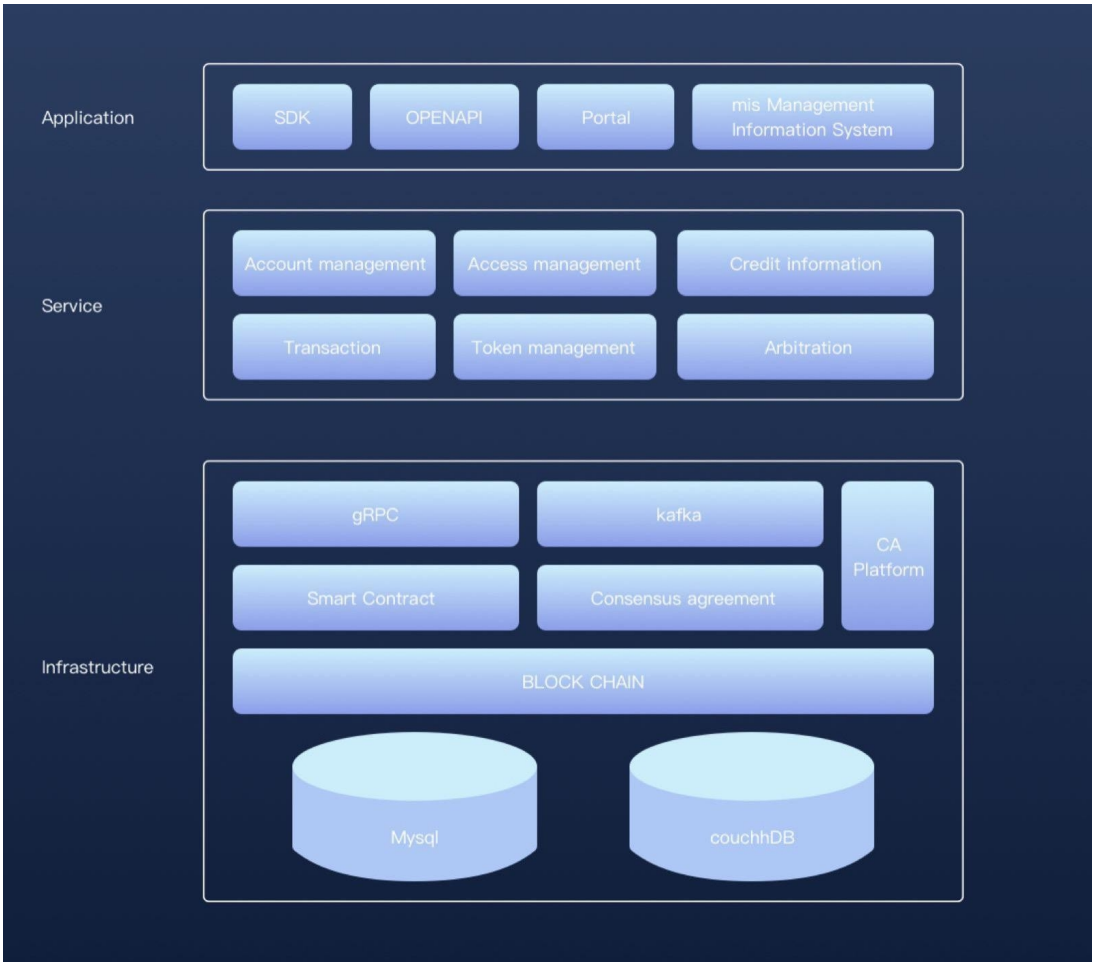
This mechanism increases the punishment to dishonest behavior and makes it nowhere to hide. It serves a groundbreaking role in building a credit-worthy society for all. This serves togreatly increased the exposure of the platform and liquidity of LET.

4 Technical Features

LinkEye is an independently developed HyperledgerFabric based consortium blockchain solution that had optimized and transformed specificallyto the credit industry. Consortium blockchains will be built in different countries and stored credit datas according to their rules and regulations. APIs (Application Programming Interfaces) of credit data will be connected and accessed between different consortium blockchains; and eventually form a global network of credit data union.

Fabric is the first top project onHyperledger. It is firstly submitted to the Union by IBM, DAH, etc., in 2015 and has been continuous improving by many contributors in the Union. In China, Fabric has been successfully applied to the field of financial, supply chain and asset ownership etc. and became the preferred framework for many blockchain solutions.

The Hyperledger Fabric based project is built based on the below architecture:



4.1 Data Security

Linkeye utilizes the combination of symmetric and asymmetric encryption to safeguard the data. In addition, the digital signature mechanism ensures the integrity and authenticity of the information.

4.2 High performance

LinkEye independently realized the PBFT algorithm recommended by IBM, which remarkably improves the writing performance. Using symmetric encryption ensures Linkeye to encrypt data 500-1000 times faster. At meanwhile, the optimization of CIFS increases the data synchronization and transmission between nodes. We had achieve 10,000 tps performance in test environment.

4.3 Scalability

LinkEye takes a modular design to encapsulate consensus algorithms, smart contracts, P2P protocols and blocks to achieve “plug and play”. The smart contracts can be upgraded easily for future extension. At meanwhile, the framework structure supports multi-channels in order to meet the application requirement to control accessibility by authorization. Such flexible design support storage of various category of credit data for future expansion.

4.4 Easy to Access

As the data would be written into the blockchain via API at once by the members of the alliance, Linkeye platform will be automatically complete the data searching and profit allocation. Such mechanism minimizes the cost of additional development to the members by using Linkeye’s SDK.

5 Project Roadmap

Phase One: Completion of the alliance platform to share credit blacklist (2017-2018)

LinkEye is committed to build the first blockchain-based Credit Alliance, focusing on completing the platform and the database of fraudulent people by recruiting members for the alliance. At this stage, the project reinforce honesty to society – fraudulent people won't be able to gain access to financial services.

A soft launch of the platform is planned on February of 2018 to support data access from China, Southeast Asia and Europe. Local teams will be formed to further develop the target markets. By the time when the platform is ready for a public launch in April, the first batch of members will be on board together with blacklists of millions of dishonest borrowers. By end of 2018, the alliance platform will be fully established covering an estimated 70%-80% of the total regional data of blacklist.

Phase Two：Expansion of service scope – launch of "Credit Whitelist"(2018-2019)

The scope of service of Linkeye will be expanded to personal credit evaluation by building individual profile. Building a more effective credit scoring system enable the trusted individual to enjoy better financial services and resources. At this stage, Linkeye aims to provide strong support for the rapid development of the credit industry.Estimated time of completion is Mid-2019.

Phase Three：Establishment of enterprise credit system (2019)

An expansion of service scope from individual profile to enterprise profile would occur. Through involving enterprise as an important participant in the credit financing industry, Linkeye is able to complete the establishment of an efficient credit system of the society.

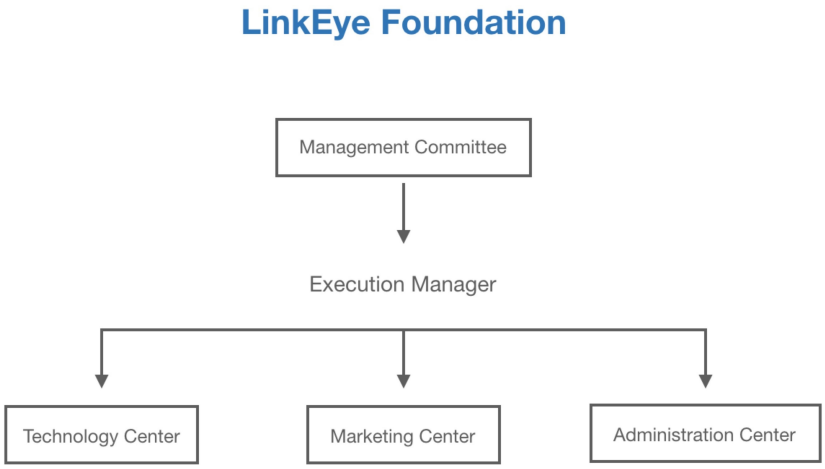
Phase Four: Credit to everything

LinkEye will extend its services from finance industry to other segments of society. All credit related behaviors of individuals and enterprises will be recorded and stored in blockchain. At this stage, Linkeye will realize its ultimate goal - to achieve fairnessby forming a comprehensive trustworthy credit system of the entire society.

6 LinkEye

6.1 Linkeye Foundation

LinkEye Foundation (hereinafter referred to as "Foundation") is set up and operates in Singapore. It is committed to promoting LinkEye's development and its transparency of governance so as to promote the safe, efficient and orderly development of the Alliance. The Foundation will help to manage the general issues and privileges of the alliance by establishing a good governance structure. The design of the structure mainly considers the sustainability of operation, the effectiveness of management and the safety of its funds. The LinkEye Foundation commits to publish monthly progress reports, conductand publish annual audit reports.



ManagementCommittee:

The ManagementCommittee is responsible for the management and decision-making of major agenda of the Foundation, including appointment and demission of the executives. The committee formulates the norms and manages the privileges of the foundation.

Technology Center:

The Linkeye Technology Center is responsible for underlying fundamental technology development, testing, on-line operation, review,

etc. The center communicates with community members and regularly holds technical seminars in the community.

MarketingCenter:

The Linkeye Marketing Center is responsible for research, market strategy, sales and promotion of the alliance and its product.

Administration Center:

LinkeyeAdministration Center manages financial, legal, personnel and administrative affairs. Financial affairs include project fund use and audit; legal affairs include review and formulation of various documents to prevent possible legal risks; personnel and administrative affairs include employment, remuneration and daily administrative work.