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Sentinel Chain

Whitepaper

The World's First Global Marketplace for Financial Inclusion Services

Version 31.1

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Contents

Legal Disclaimer **4 – 11**

1 Abstract **12**

2 Introduction **13**

3 The Team **14 – 17**

3.1 Project Team
3.2 Board of Advisors
3.3 Investment Partners

4 Market Trends and Potential **18 – 20**

4.1 The Hidden Economic Capital of the Unbanked
4.2 The Rising Global Demand for Food

5 The Sentinel Chain Ecosystem **21 – 25**

5.1 Livestock Identification Tag
5.2 CrossPay Mobile Application
5.3 CrossPay Blockchain
5.4 Sentinel Chain
5.5 Sentinel Chain Token (SENC)
5.6 Differences between LCT and SENC
5.7 Sentinel Chain Alliance Partners

6 The Sentinel Chain Token (SENC) Features **26 – 33**

6.1 Insurance
6.2 Loan
6.3 Collateral
6.4 Crowdfunding
6.5 Community Projects
6.6 E-Payments
6.7 Increase in Adoption and Utilisation

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7 The Sentinel Chain Token Sale **34 – 37**

7.1 The Sale Details
7.2 Token Distribution Schedule
7.3 Use of Funds
7.4 Foundation Structure
7.5 InfoCorp AgTech
7.6 InfoCorp Technologies
7.7 Execution and Roadmap

8 Conclusion **38**

9 References **39**

Appendix A – Livestock Identity Tag **40**
Appendix B – CrossPay Mobile App **41**
Appendix C – CrossPay Blockchain **42 – 46**
Appendix D – Sentinel Chain **47 – 50**

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1 Abstract

The ‘poor’ are much richer than they think. What they need is a solution to unlock their economic potential. We bring to them the Sentinel Chain, a blockchain based solution to the problem of ‘dead capital’. The Sentinel Chain is a global B2B marketplace for financial services accepting the use livestock as collateral. The Sentinel Chain addresses two main issues to be solved to allow the asset tokenization of livestock: First, the creation of a process that transforms livestock from ‘dead capital’ to a fungible asset with a transparent and clear defined value. Second, the creation of an open and transparent marketplace that connects the unbanked to the network of global financial providers. This paper introduces the concept and benefits of Sentinel Chain as well as a technical appendix which elaborates on the design and fundamental architectural decisions.

Keywords: Financial inclusion, livestock, collateral, dead capital, blockchain technology, smallholder farmers, unbanked

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2 Introduction

Livestock is an integral part of the greatest enterprise on earth – small-scale agriculture. No other enterprise supports the livelihoods of as many people.

There are more than 570 million farms worldwide, most of which are small and family-operated. These smallholder farmers rely on seasonal agricultural production for their livelihoods. Approximately 70% of the global food production comes from small-scale agriculture.

Smallholders are a driving force in feeding the world.

According to the FAO World Census of Agriculture and UNDESA Rural Population data, smallholders are the largest global segment living on less than US$2 a day and are central to global financial inclusion efforts – but reaching them with financial services is challenging.

Due to the seasonal and volatile nature of agriculture, financial service providers face liquidity management and concentration challenges due to covariant risks – i.e. farmers in the same area generally borrow at the same time and often engage in the same activities, and are therefore exposed to the same risks. One of the primary barriers to private-sector credit to smallholders is the lack of physical collateral – the economic value of their physical asset such as livestock is not recognized as 'capital' in the financial economy. The problem of 'dead capital' leaves the smallholders in an unfortunate position of low financial capability. Without access to formal financial services, they are subjected to higher costs of borrowing as providers often require greater incentives to offer them credit.

'Dead capital' exists because we have forgotten that converting a physical asset such as livestock to generate capital – for example, using the cow to borrow money to manage cash outflows and inflows during times of volatile weather and markets – requires an extremely complex process.

The 'poor' are much richer than they think. What they need is a solution to unlock their economic potential.

There are two main issues to be solved in order to allow asset tokenization of livestock: First, the creation of a process that transforms livestock from 'dead capital' to a fungible asset with a transparent and clear defined value. Second, the creation of an open and transparent marketplace that connects the unbanked to the liquidity pool of global financial players.

We believe that the mutual creation of livestock insurance and the registration of livestock provenance on blockchain provide a new opportunity: the real possibility of accepting livestock as 'collateral' for loans. This innovative model will solve the complex process of converting the physical asset to generate economic capital.

Our solution will revolutionize financial access by unlocking the true economic capital of the unbanked.

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3 The Team

3.1 Project Team

Meet the team behind the Sentinel Chain project.



Roy Lai
Founder/ CEO/ CTO
Singapore

Roy Lai is a natural innovator with more than 20 years of technological experience with expertise in blockchain, investment banking, and inter-bank payments. Roy led the successful implementation of FAST (Fast & Secure Transfers) – a national real-time payment network connecting 14 banks in Singapore. A Research Fellow at the Singapore University of Social Sciences, he teaches courses on Blockchain Programming and smart contracts.
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Chia Hock Lai
Council Member
Singapore

Hock Lai has 20 years of experience in the financial industry, having performed roles in both business and technology. Besides being the founding president of the Singapore FinTech Association, he is also a Fellow of the Singapore University of Social Science, advisor to Startups and mentor to student FinTech projects. He is an alumnus of the National University of Singapore and the Nanyang Technological University.
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Anson Zeall
Council Member
Singapore

Anson Zeall is a seasoned blockchain and fintech entrepreneur. He is the Chairman of ACCESS, Singapore's Cryptocurrency and Blockchain Industry Association, committee member of the Singapore Fintech Association. He is an instructor of the fintech and blockchain workshop for Asian Development Bank and the various central banks in South East Asia. Anson is an alumnus of University of New South Wales and Columbia Business School.
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Zann Kwan
Council Member
Singapore

Zann Kwan brings with her 20 years of professional experience in finance and investments, with the last four years in the crypto-currency space. Her team at Bitcoin Exchange Singapore brought in the first public bitcoin machine in Asia to Singapore. Previously, Ms Kwan was Vice President with GIC, a leading global investment firm. She started her career with Arthur Andersen and KPMG and spent a decade in New York building her investment career. A Chartered Financial Analyst (CFA) Charterholder, Chartered Accountant (CA, Singapore) and a Fellow of Chartered Certified Accountant (FCCA), she also sits on the board of ACCESS and is a frequent speaker and panelist on fintech and blockchain technology.
https://www.linkedin.com/in/zannkwan/

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J.M. Murli Manohar
Project Director
United States

Murli has significant project management, business analysis, software implementation and delivery experience in the midst of challenging enterprise environments. He has a strong ability to articulate instructions from stakeholders, end users and designers into functional requirements for the development teams.

.



Maximilliano Canellas
Lead, Blockchain Development
Argentina

Maxi is an entrepreneur, cryptography enthusiast and blockchain developer. As a cryptologic CTO, he likes to spend huge amounts of time researching blockchain technology, which he believes is the greatest economic & technology revolution of this time.



Anne Riana
Head, PR and Marketing
Singapore

Anne is a PR and marketing professional with expertise and experience in strategy development and brand positioning for early-stage businesses. She is a passionate technology enthusiast with a keen interest in the application of technology to improve lives and enable positive change.



David Nguyen
Vietnam Country Manager
Vietnam

David Nguyen is a lecturer of National University of Vietnam and has also founded a blockchain startup. He has over ten years experience in software development. He was a former project leader of VNG cooperation and project manager of You Net, the second largest internet firm in Vim.



Trung Dinh
Lead (Mobile)
Vietnam

Trung is a member of the founding team of many startups in Vietnam. With more than half a decade of mobile application development, Trung has worked for large companies in Vietnam such as M Service and VNG Corp., and has constantly focused on bringing the newest technologies for mass adoption.



Jamuna Devi
QA Lead
India

Jamuna is a certified Digital Marketing Expert. Project manager of two of InfoCorp's major projects, she handles the QA segments. With 13 years' experience with global clients. Six Sigma Green belt certified, expertise includes logical, analytical reasoning and QA throughout the software development life cycle.



Edwan Chiam
Business Analyst
Singapore

Edwan's personal vision is to bridge communities, re-balance the poverty line and devise solutions to enhance equality. Edwan has an inquisitive mind in all things possible. He embraces both technology and financial expertise to develop use cases for the greater community.



Jackie Tan
Head, Business Development
Singapore

Jackie is the co-founder of FundMyLife - a platform that intelligently connects users with the right financial advisers, based on their financial planning questions. He plays an important role in InfoCorp team to develop business concepts and offshore business capabilities.

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3.2 Board of Advisors



Professor David Lee

Senior Advisor

Professor David Lee is in the fintech and blockchain space in Asia as well as Silicon Valley. In the ASEAN region, Dr. David Lee's mission is to harness technology for an ASEAN Connectivity/ Financial Inclusion via Singapore as a Smart Nation.



Bo Shen

Senior Advisor

Bo Shen is the Founding Partner of Fenbushi and Blockasset. Fenbushi Capital was founded in 2015 and is the first venture capital firm that exclusively invests in Blockchain-enabled companies.



Roland Schwinn

Senior Advisor

Executive Director at Eurex and Shareholder Director of the Board of Directors at Bombay Stock Exchange (BSE). Conducted Research in Digital Disruption in Banking, FinTech and Financial Inclusion, Future of Wealth Management & Cryptocurrencies.



Diego Gutierrez Zaldivar

Blockchain Advisor

CEO & Co-founder at RSK Labs, President & Co-founder at Koibanx, President at Bitcoin Latam and Argentina NGOs. Also, founder of Xinergia, Cero a Cien, Arraiga and Restocoins.



Zeya Thura Mon

Myanmar Advisor

CEO and Group Chairman of RGK + Z&A Group since 1997. Instrumental in the rapid development of Zeya & Associates, the sustained growth of the Royal GK, and the continuing success of Myanmar Central Power. An Alumni of Chicago Booth, Zeya is also a central force in driving financial inclusion projects for the rural development of Myanmar.



Dr. John Vong

Financial Inclusion Advisor

Previously a Senior Resident Advisor of United Nations Development Programme and Adjunct Professor at the National University of Singapore.



Juanita Woodward

Financial Inclusion Advisor

Principal Consultant at CTD Connecting the Dots, with wide experience in fintech, payments and digital financial services, international B2B marketing strategy & project management.



Bernardo Corti

Argentina Advisor

A lawyer in the South America region, with research work related to finance, technology and digital currencies. As Cryptologic CEO, he is currently developing projects related to these sectors.



Ian Myles

Innovation Advisor

Originally from the UK, Ian spent the last 15 years in mobile technology, including running an advanced concept studio for Motorola, and the last five plus years in payments.

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3.3 Investment Partners

Founded in 2015, Fenbushi Capital is the first China-based venture capital firm that exclusively invests in Blockchain-enabled companies. Our mission is to accelerate the inevitable future of Blockchain economy by supporting as may companies as possible. We strongly believe Blockchain technology will play an important role brining much more transparency, efficiency, and robustness into the global economy. With our experienced partners in both traditional finance and the blockchain technology and many startup companies, we hope to bring this vision into fruition.

iGlobe Partners harnesses decades of collective industry and entrepreneurial experience, and have been at the forefront of cultivating Singapore's start-up community. iGlobe Partners have invested in entrepreneurs who are shaping development in these three core areas: Internet of Things (IoT), Internet/Mobile applications, and Health/Biotech — disruptive technologies that are expected to have the greatest impact and influence on consumers and enterprises in the future.

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4 Market Trends and Potential

> "It is a world where the ownership of assets is difficult to trace and validate. It is governed by no legally recognizable set of rules; where the assets' potentially useful economic attributes have not been described or organized; where they cannot be used to obtain surplus value through multiple transactions because their unfixed nature and uncertainty leave too much room for misunderstanding, faulty recollection and reversal of agreement. Where most assets, in short, are dead capital."
>
> HERNANDO DE SOTO, The Mystery of Capital

4.1 The Hidden Economic Capital of the Unbanked

The 'mystery of capital' de Soto writes about refers to the seminal meaning of the word. In medieval Latin, 'capital appears to have denoted some form of livestock, which have always been important sources of wealth beyond the basic meat they provide. Livestock can be counted and measured, but most importantly, additional wealth (or surplus value) in the form of milk, hide, wool, meat and fuel can be obtained from livestock. Livestock also has the useful attribute of the ability to reproduce themselves. According to de Soto, the term 'capital' begins to do two jobs simultaneously, capturing the physical dimension of assets (i.e. livestock) as well as their potential to generate surplus value.

At the moment, the unbanked lack access to the mechanisms that could unlock the economic potential of their livestock so that they could be used to produce, secure, or guarantee greater value in the formal financial economy.

> "…farmers (in Myanmar) have limited access to competitive agricultural loans, so most of them have to rely on costly financing at high interest rates, sometimes of more than 5% per month. High interest rates are an inhibitor of profitability. As in any other businesses, people will not invest if the return is inadequate."
>
> U Thadoe Hein, Managing Director, Myanmar Awba Group
> Oxford Business Group, Interview with U Thadoe Hein
> 23 November 2016

With more than 570 million smallholder farms in the world, there is a need to address the number of traditional pain points in the context of agricultural finance, making it easier for farmers to save, borrow, manage irregular income and insure against loss.

Although the use of digital financial services to expand smallholder access to finance is still in its infancy, the sheer number of pilots is cause for optimism.

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4.2 The Rising Global Demand for Food

Demand for food and other agricultural products is projected to increase by 50% between 2012 an 2050. Smallholders in developing countries produce the bulk of the world's global food supply – which has been showing an increasing trend (See Table 1 and 2 below). However, despite their important contribution, smallholders have suffered benign neglect by policymakers and the international financial community. As a result, smallholders in the developing world continue to account for a large proportion of the poor (See Figure 1 and 2).

Table 1
Production indices (2004–2006=100)

	1990	2000	2014
Livestock	76	92	115
Milk	83	89	114
Meat	74	91	118
Fish	72	92	119

Table 2
Live animal production

	2000	2013
Cattle	1,302,895	1,494,349
Sheep	1,059,082	1,172,833
Goats	751,632	1,005,603
Pigs	856,241	977,021
Buffaloes	164,114	199,784

Isolated from the benefits of the global market economy, smallholders often cannot keep up with the rising demand for food and face limited resources, poor access to markets, affordable technologies, infrastructure and most importantly, credit. The smallholders are also the most vulnerable to price shocks in the global food price volatility.

Agriculture is not just a food-producing machine. It is the backbone of the rural livelihood system, a major source of skilled and remunerative employment and a powerful engine towards larger economic growth. The Sentinel Chain has been designed to fuel this engine and empower the unbanked into economic prosperity.

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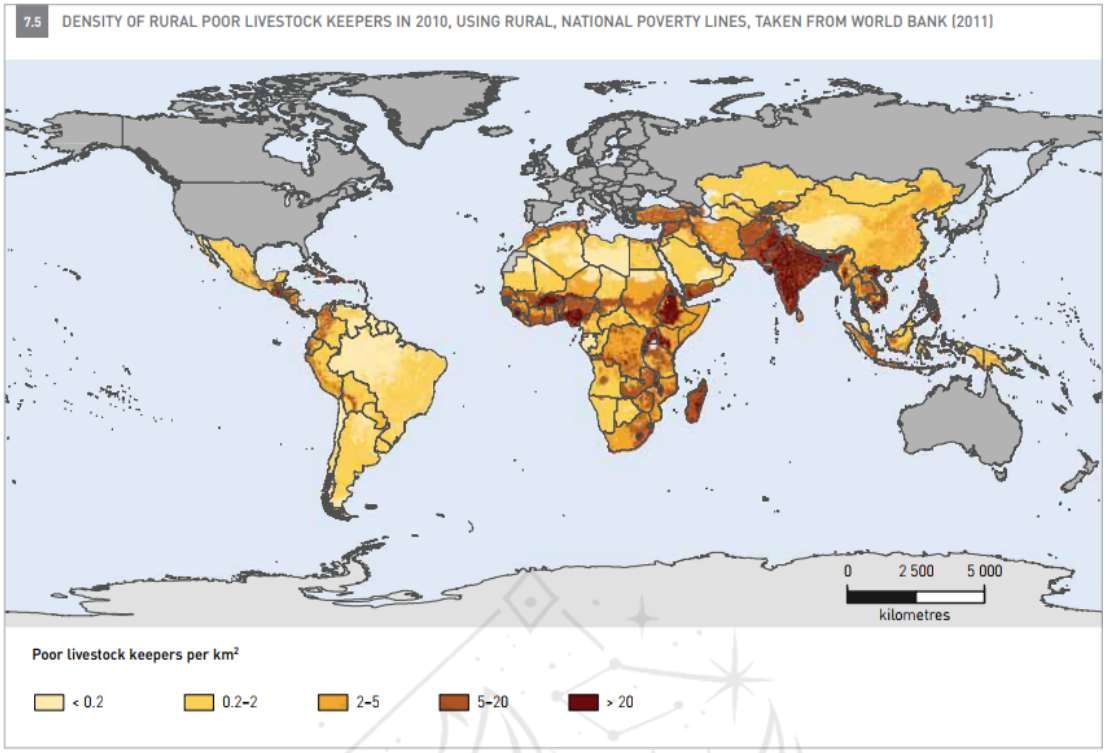


Figure 1: The map above illustrates the geographical density of the rural poor smallholders – i.e. the potential markets which will greatly benefit from the Sentinel Chain project. Source: FAO Statistical Pocketbook World Food and Agriculture, Food and Agriculture Organization of the United Nations, (2015)

TABLE 7.5 ESTIMATES OF RURAL POPULATIONS AND OF RURAL POOR LIVESTOCK KEEPERS (PLKs) IN 2000 AND 2010 (ALL FIGURES ARE IN MILLIONS), USING RURAL, NATIONAL POVERTY LINES, AND THE COMPOUNDED, ANNUALIZED RATE OF CHANGE IN POOR LIVESTOCK KEEPERS FROM 2000 TO 2010

Region	Rural population 2000	Rural population 2010	Rural PLKs 2000	Rural PLKs 2010	Annual change in PLKs, 2000 to 2010
East Asia and Pacific	1 148	1 020	64	52	**-2.05%**
China	*808*	*714*	*15*	*13*	***-1.42%***
Eastern Europe and Central Asia	60	64	9	13	**3.75%**
Latin America and Caribbean	155	115	36	31	**-1.48%**
Middle East and North Africa	96	130	14	22	**4.62%**
South Asia	916	1 100	130	142	**0.89%**
India	*672*	*820*	*95*	*99*	***0.41%***
Sub-Saharan Africa	442	532	123	171	**3.35%**
All regions	**2 817**	**2 961**	**376**	**431**	**1.40%**

Developing regions are based on 2010 World Bank country classification (World Bank, 2010), listed in Appendix A.
Data for China and India also included separately.

Figure 2: Table 7.5 above shows the estimated increase in the number of rural poor livestock keepers in regions such as the Middle East and North Africa, South Asia (India) and Sub-Saharan Africa. Source: FAO Statistical Pocketbook World Food and Agriculture, Food and Agriculture Organization of the United Nations, (2015)

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5 The Sentinel Chain Ecosystem

> "I'm sure all of us here today would agree that financial services are the lifeblood of an economy."
>
> H.M. QUEEN MÁXIMA
> Inclusive Technology for an Inclusive Future
> Speech at the Singapore Fintech Festival, 16 November 2017

The Sentinel Chain is the world's first global B2B marketplace platform for financial inclusion services accepting the use of livestock as collateral.

The ultimate objective of the Sentinel Chain is to unlock the economic potential of the unbanked by bringing together an international community of financial providers looking to participate in facilitating financial inclusion in an open, secure and transparent marketplace. It is specifically designed to provide affordable and secure financial services to those who need it most – the 2 billion unbanked.

According to the Food and Agriculture Organisation of the United Nation's report on World Agriculture, growth in the livestock sector has consistently exceeded that of the crop sector – the total demand for animal products in developing countries is expected to more than double by 2030. With financial inclusion being a priority for developing countries, the Sentinel Chain project seeks to introduce livestock as 'capital' in the formal financial economy, the transformation from 'dead capital' to a financial asset class will increase investment and participation substantially. The basis for such a solution lies in the creation of a physically tamper-proof and digitally-immutable system capable of livestock provenance – the origin of a livestock's existence.

The Sentinel Chain Ecosystem is made up of 5 main components:

- Livestock Identification Tag
- CrossPay Mobile Application
- CrossPay Blockchain
- Sentinel Chain
- Sentinel Chain Token

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5.1 Livestock Identification Tag

The RFID-enabled livestock identity tag (Livestock ID Tag) is tamper-proof and theft-proof on both a material design as well as a data level.

(i) From a material design perspective, the tag has been designed to prevent physical tampering or theft. The tag has been designed for "single-use" and thus cannot be removed without being destroyed.

(ii) From a data perspective, the tag stores the geolocation and time stamp information on to the CrossPay Blockchain. Immutability and non-repudiation ensures the authenticity and secure traceability of certifications, i.e. a digital 'passport' that proves its existence and ownership to an identified entity and origin.

(iii) From both a material design and data perspective, in the event that the tag has been forcibly removed, the information which resides in the tag will be invalidated, thus rendering the tag useless.

5.2 CrossPay Mobile Application

The CrossPay Mobile application (Android) is a mobile financial delivery mechanism for use with the CrossPay Blockchain. It is also designed to be a mobile wallet that provides the unbanked with quick access to their balances and allows for transactions with other users and merchants.

5.3 CrossPay Blockchain

The CrossPay Blockchain is a B2C financial ecosystem specifically designed for the unbanked. Managed and operated within a local geography, it is accessible via the CrossPay Mobile application – a simple mobile interface built for Android. Since blockchains have been fundamentally designed as a decentralized technology for the grassroots level, it is highly suitable for deployment in pockets of local ecosystems to meet the financial inclusion needs of the unbanked.

CrossPay Blockchains consist of 3 components:

(a) Tamper-Proof RFID-enabled Livestock Tag,
(b) CrossPay Mobile application, and
(c) Blockchain technology

These innovative technological solutions will work together to unlock the value of "dead capital" trapped in livestock, thus addressing the last mile problem of financial inclusion. CrossPay Blockchain will use a native cryptocurrency token called "Local CrossPay Token" (or LCT). LCT will be pegged to the value of the country's native currency.

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5.4 Sentinel Chain

The Sentinel Chain is the world's first global B2B marketplace platform for financial inclusion services based on the use of livestock as collaterals. It has been designed with the specific purpose of creating a low-cost cross-border financial infrastructure connecting the isolated unbanked with limited access to formal financial services to a global network of financial providers.

The Sentinel Chain is a consortium blockchain that operates within decentralized governance and is connected to multiple CrossPay Blockchains. In doing so, the Sentinel Chain and the CrossPay Blockchains creates a hub-and-spoke ecosystem specifically designed to provide a low-cost cross-border financial infrastructure. Such an infrastructure will provide liquidity to the local unbanked population via an international network of financial providers. (See Figure 3 below)

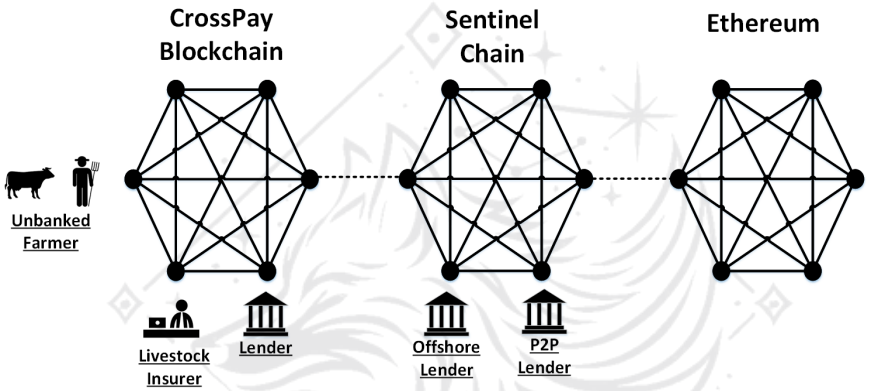


Figure 3: The diagram above shows a high-level design of the Sentinel Chain.

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5.5 Sentinel Chain Token (SENC)

The Sentinel Chain Token (SENC) will be an ERC20-compatible token on the public Ethereum blockchain that allows global financial service providers and cryptocurrency holders to participate in the Sentinel Chain marketplace. Activity on the Sentinel Chain will be performed solely using the Sentinel Token. This will make the Sentinel Token an integral part of the Sentinel Chain platform and the driver of its economy.

5.6 Differences between the LCT and the SENC token

The LCT token will be the local CrossPay Blockchain equivalent of the SENC token. It will be a private token that resides only within each local CrossPay Blockchain. LCT will be used internally by CrossPay Mobile to facilitate the local payments on CrossPay Blockchain Services. The value of LCT is pegged to the country's native currency. Every country will have its own LCT token. LCT token will not exist on any public blockchain and cannot be minted on its own. LCT can only be purchased using SENC.

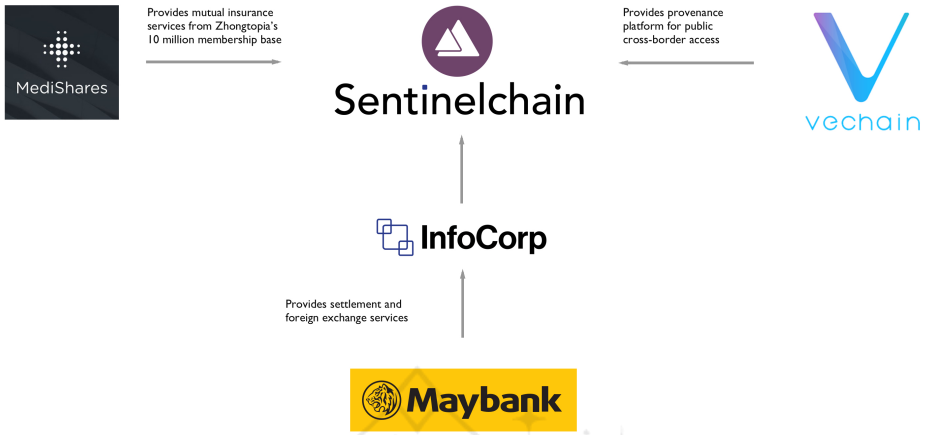
SENC token will only exist on the public Ethereum blockchain. A fixed number of SENC tokens will be issued during an Initial Token Sale. SENC will be required for use with the functions provided by the Sentinel Chain. SENC can be owned by anyone with an ERC-20 compatible wallet. Like all cryptocurrency tokens, SENC may be exposed to market volatility. LCT however will be pegged to the country's native currency value and will not be exposed to the volatility of the cryptocurrency markets.

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5.7 Sentinel Chain Alliance Partners

InfoCorp has formed alliances with various strategic partners to extend the value of the Sentinel Chain.



Maybank is Malaysia's largest bank by both market capitalisation and total assets. It is also one of the largest banks in Southeast Asia, with total assets exceeding US$164 billion and net profit of US$1.63 billion for 2016. As the leading Malaysian banking group with a strong regional presence in South Asia and Southeast Asia, Maybank acts as the main provider of settlement and foreign exchange services to InfoCorp, in facilitating Sentinel Chain's operations. (See Appendix D).

VeChain is renowned for creating a powerful public provenance blockchain that can be used to combat counterfeit luxury goods. As livestock ownership and owners' data remains on the Sentinel Chain, livestock, the provenance of the livestock can reside on a public provenance platform that is integrated to Sentinel Chain, such as VeChain. This can be useful in the case of cross-border livestock trade and food supply chain where proof of origin is required.

MediShares is the world's first global marketplace for mutual aid backed by ZhongTopia, the largest online mutual insurance in China with a membership base of 10 million users. MediShares platform can be integrated to Sentinel Chain as a financial service provider and offer its services to Sentinel Chain's unbanked market.

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6 The Sentinel Chain Token Features (SENC)

We intend to issue the Sentinel Chain Token (SENC), which is primarily used as a medium of exchange for the Local Community Token (LCT) which is then used to make payments for services or participate in projects. These features will be explained in greater detail as follows:

6.1 Insurance



6.2 Loans



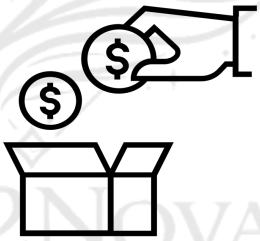
6.3 Collateral



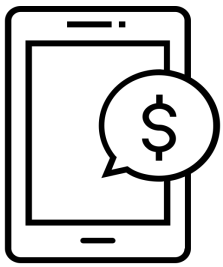
6.4 Crowdfunding



6.5 Community Projects



6.6 E-Payments



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6.1 Facilitating Livestock Insurance

Problem: (1) Fraud is one of the biggest challenges to livestock insurance. A false insurance claim can be filed by swapping out the livestock tag from an insured livestock asset onto an uninsured livestock asset. (2) The second challenge is the lack of accurate livestock time-series data that can be used to determine the livestock insurance premium.

Solution: (1) A physically tamper-proof livestock identity tag when combined with the digitally-immutable property of blockchain as a storage provides the mechanism to prevent such fraud. (2) As the blockchain is inherently a time-series transaction ledger, this creates a storage for analysis of accurate livestock data for insurance premium in future.

Function: SENC can be utilised by livestock insurance companies as a medium of exchange to purchase LCT, which LCT in turn can be used to pay for information storage and publication of a livestock insurance policy on the local CrossPay Blockchain so that such livestock insurance can be associated with the identity of the relevant livestock owner as tracked by the local Crosspay Blockchain and the identity of the relevant livestock tracked by a tamper-proof livestock identification tag (See Figure 4 below).

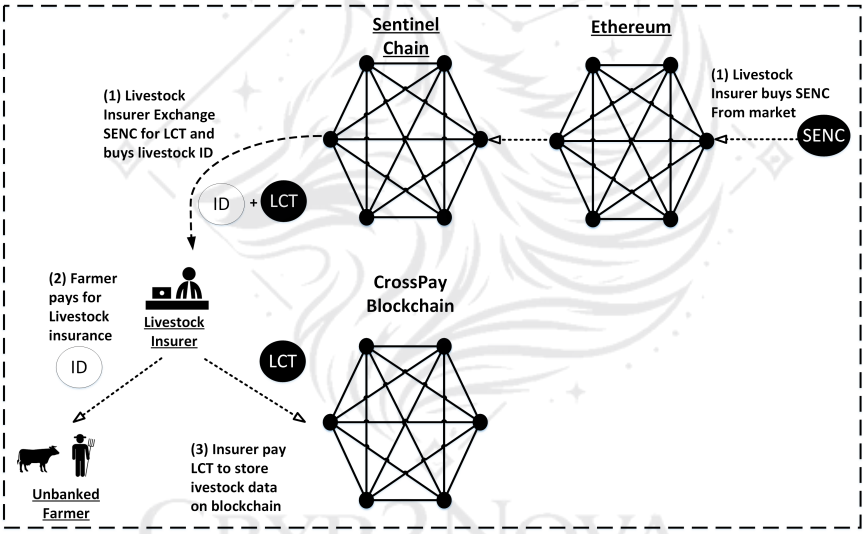


Figure 4: The diagram above shows the issuance of livestock insurance

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6.2 Loans using Livestock as Collateral

Problem: The biggest challenge to getting loans for the unbanked is the lack of credit history and the high interest rates in obtaining an unsecured loan. The second challenge is the difficulty in getting a secured loan using livestock as an asset. Currently, there is no accurate way to provide the proof-of-ownership from an unbanked to a livestock asset, or the proof that it has not been pledged to another lender.

> **High financing cost for unbanked farmers in Myanmar**
> Farm crop prices in Myanmar are much lower than in Vietnam and Thailand. The reason is access to finance. According to Chief Executive of Myanmar Awba Group, "Myanmar farmers have to take loans from loan sharks at an interest of 5-8 percent a month, that translates to 100 percent a year." It is not just farmers but traders in the chain get finance at similar rates. Myanma Awba Group is a market leader in agrochemical fertilizers in Myanmar, connects to 3 million farmers across the country through its vast network of sales centres and dealers.
>
> Interview with Myanma Awba CEO, U Thadoe Hein
> Frontier Myanmar, 4 October 2016

Solution: A livestock insurance policy combined with the use of tamper-proof livestock identity tag and borrower's identity information on the blockchain provides the attestation to the claim of ownership as well as the proof of origin of the livestock asset. The blockchain contains loan agreements that can be used to verify if the livestock is already been pledged. The use of Sentinel Chain's design provides a way to create credit history which can then be verified on the blockchain by future lenders.

Function: SENC can be utilised by local financing companies as a medium of exchange to purchase LCT. The LCT can in turn be used to pay for the publication of livestock-collateralized loan agreements on the local CrossPay Blockchain so that such livestock-collateralized loan agreement can be associated with the identity of the relevant livestock owner tracked by the local Crosspay Blockchain and the identity of the relevant livestock tracked by a tamper-proof livestock identification tag. (See Figure 5 below)

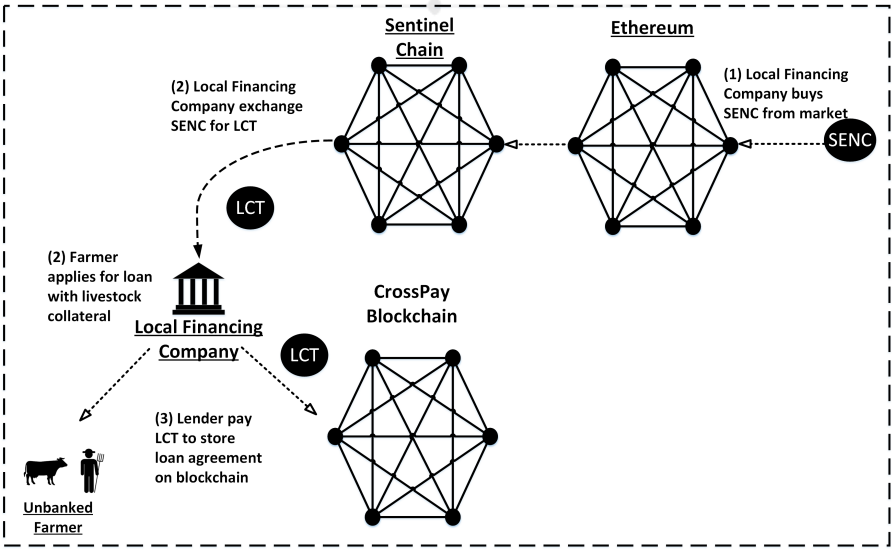


Figure 5: The diagram above shows the issuance of loan agreements

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6.3 Collateral by Third Party Local Financial Providers

Problem: Local financing companies need access to loans from larger or offshore financing companies. This can incur high interest rate to offset the high credit risks associated with unsecured loans.

Solution: Through the creation of livestock collateralised loans, local financing companies are in a better position to manage risks. In addition, local financing companies may use SENC as a collateral for additional leverage. This puts local financing companies in a better position to negotiate for more competitive interest rates and for offshore financing companies to gain access to new and emerging markets.

Function: SENC may be used as collateral by third party local financing companies (as borrowers) to secure against offshore lending from third party offshore financing companies (as lenders) in order to minimise counter-party risk exposure for such offshore financing companies providing such lending. SENC can be held in escrow guaranteed by a contract on the Ethereum blockchain. In the event that the third party local financing company defaults, such escrowed SENC can be released to the third party overseas financing company to be liquidated for funds. (See Figure 6 below)

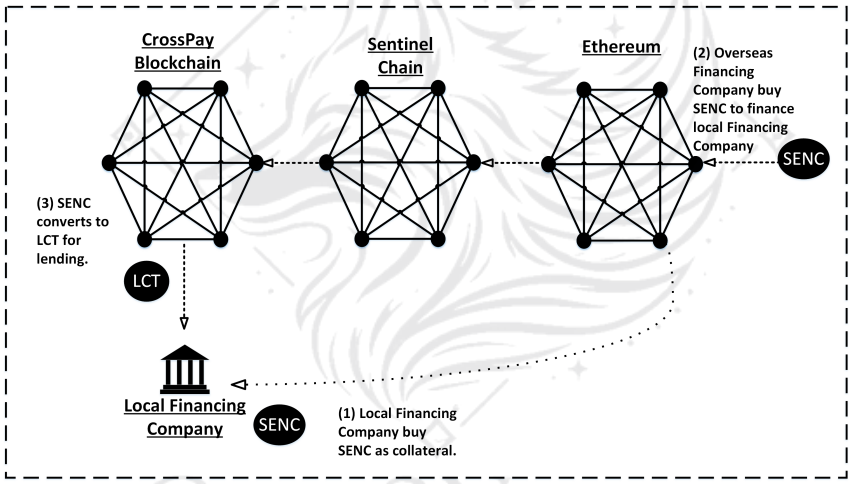


Figure 6: The diagram above shows the cross-border remittance

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6.4 Facilitating Third Party Crowdfunding Projects

Problem: To bring down the cost of financing for the unbanked, the local financing companies must gain access to cheaper source of funding. However, due to the risk premium and limited access of funds, finding a more affordable source of funding for unsecured loans will be challenging.

Solution: The Sentinel Chain will open up a marketplace for Peer-to-peer lending and crowdfunding platforms to integrate with a network of unbanked financing companies. This creates an economy of scale for the overseas lending platform while at the same time providing an alternative and competitive source of funds to local financing companies. Livestock collaterals and SENC collaterals are both credit risk mitigation measures that can be verified on Sentinel Chain – giving the overseas lenders higher transparency and confidence to provide loans to local financing companies.

Function: Third party crowdfunding projects may utilise crowdfunding platforms that are integrated to the Sentinel Chain to undertaking fund-raising in SENC, which can be used to finance the third party local financing companies' business-activities.

In order for third party local financing companies (as borrowers from third parties) to on-lend to the unbanked, the third party local financing companies will need to secure cheaper source of borrowing. The ability to use livestock as collateral allows the third party local financing companies to manage default risk, as well as enabling it to further secure borrowings from third party offshore lending companies or third party offshore crowdfunding platforms using the proof-of-ownership of the relevant livestock collateral. To facilitate access to such proof-of-ownership, the third party offshore crowdfunding platforms' crowdfunding projects can be integrated with the Sentinel Chain to raise SENC, which can be used to finance the local financing companies' business-activities.

By connecting the unbanked to the increased availability of access to the funds offered by the third party offshore financial service providers or third party crowdfunding platforms, Sentinel Chain will be leveraging on the economies of scale, driving down the cost of access to digital financial services.

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6.5 Facilitating Community Projects

Problem: While financial inclusion remains the objective of the Sentinel Chain, the unbanked may be disadvantaged in their access to basic infrastructure such as electricity, road or clean water.

Solution: SENC can be used by local non-for-profit organisations to receive donations from overseas donors and financing aids by integrating their fundraising platforms on to the Sentinel Chain.

Function: SENC can be utilised by third party local not-for-profit organisations as a medium of exchange to purchase LCT that can be used to finance certain social inclusion activities such as building of schools and infrastructure. In times of natural disaster or crisis where financial aid may not be readily available, the Sentinel Chain network may be used for a quick and easy sources of funding by such third party local not-for-profit organisations.

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6.6 E-Payments

Problem: The ability to drive adoption of electronic payments for financial inclusion depends on the ubiquity and network effect of CrossPay Blockchain users.

Solution: By unlocking the value of "dead capital" in unbanked livestock and its usage for livestock insurance and livestock secured loans, the utility value of CrossPay Blockchain can be increased to accelerate adoption of electronic payments via CrossPay Mobile application.

Function: SENC can be utilised by stakeholders as a medium of exchange to purchase LCT that can be used for electronic payments to merchants who accept LCT.

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6.7 Increased Adoption and Utilisation

To revolutionize financial access, the project aims to increase adoption and utilisation of the Sentinel Chain as an international marketplace for cross-border financial services by connecting local community blockchains to offshore financial service providers.

With an increased adoption and utilisation of livestock insurance in conjunction with Crosspay Blockchain, other economic activities utilising the CrossPay Blockchain such as livestock-collateralised loans, are likely to increase as well. This creates a virtuous cycle which increases the network effect of the Sentinel Chain.

The number of active users is expected to grow rapidly in the early years as the Sentinel Chain opens new markets, either by expanding its own operation or via licensing of the software to local entities.

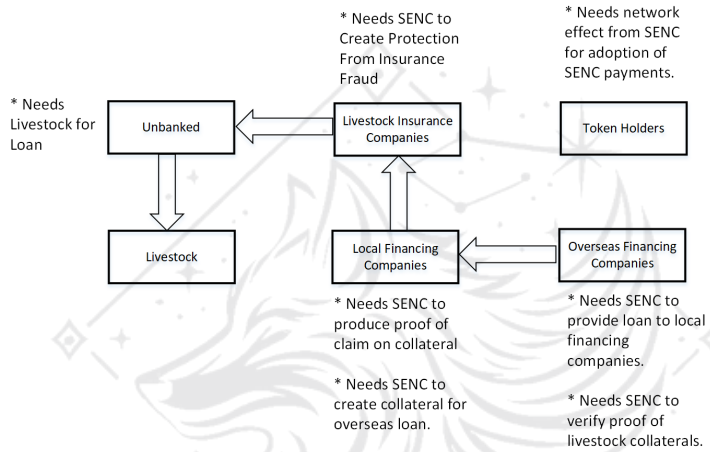


Figure 7: The diagram above shows the incentives motivating the SENC ecosystem

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7. The Sentinel Chain Token Sale

7.1 The Sale Details

Please refer to the Sentinel Chain website for the details and latest updates on the Token Sale details.

7.2 Token Distribution Schedule

Treasury and Reserve Fund	30%
Early supporters	20%
Private Sale	20%
Public Sale	20%
Founding team	10%

7.3 Use of Funds

We currently anticipate that the net proceeds collected in the Public Token Sale will be used as follows:

Liquidity pool	32%
Research & Development	29%
Operations	12%
Contingency	10%
Marketing & Business Development	7%
Sentinel Chain Development	6%
Legal & Finance	4%

Liquidity pool: Up to a 32% of the funds for maintaining the pre-funding liquidity pool of the CrossPay Blockchains and facilitate cross-border remittance on the Sentinel Chain.

Research & Development: Up to 29% of the funds for continued engagement in blockchain application and research to build an integral ecosystem among the local communities.

Operations: Up to 12% of the funds for facilitating alliances and collaboration with strategic partners and launch projects as described in Appendix C below.

Contingency: Up to 10% of the funds will be set aside for any unexpected project overruns.

Marketing & Business Development: Up to 7% of the funds will be used for marketing the Sentinel Chain model in different jurisdictions. This will include online and offline marketing activities, signing partnership relations with various business partners and signing agreements with potential partners from the livestock industry.

Sentinel Chain Development: It is paramount to continue with the development of the current technological infrastructure of Sentinel Chain. Up to 6% of the funds will be used to expand the talent pool of developers to build the various local community blockchains and improve the CrossPay user experience.

Legal & Finance: Dentons, Rodyk & Davidson LLP has been appointed to advise InfoCorp Technologies on legal, regulatory and compliance matters. The

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Token Group will develop a strong in-house legal team to navigate the legal landscape during project development and implementation. Crowe Howarth International has been appointed to advise on tax and audit matters. A robust in-house finance team will be created to manage the treasury and accounting functions in line with the global best practices.

The expected breakdown may be altered based on the outcome of the token sale and project progress.

7.4 Foundation Structure

Infocorp Technologies, InfoCorp Foundation and InfoCorp AgTech have entered into a tripartite agreement to create and distribute 30%, 30% and 40% of the total Sentinel Chain Tokens respectively. All three entities will ensure that the Sentinel Chain Tokens are distributed in accordance to the agreement.

The Foundation will direct the following council and teams with the following functions:

Governance Council

The InfoCorp Foundation council ("**Council**") will:

- Govern and supervise the issuance of the Sentinel Tokens and the use of the treasury fund which contains 30% of the issuance of Sentinel Tokens
- Promote the safety and harmony of the Sentinel ecosystem through the adoption of best practice governance principles
- Direct that the proceeds raised from the distribution of Sentinel Chain Tokens by InfoCorp AgTech be used within the governance guidelines by InfoCorp AgTech (explained further below).
- Oversee the corporate activities that will provide better access of financial products to the underserved and unbanked in the target markets
- Monitor the delivery of the objectives set out in the Token Sale

All council members have an appointment term of 2 years beginning from 27th December 2017.

The Foundation wishes to announce that on 27th December 2017, the council members had given an irrevocable undertaking to the Foundation that consideration for council members will be locked up for 2 years from the date of distribution of the Public Token Sale.

7.5 InfoCorp AgTech

InfoCorp AgTech is a wholly-owned subsidiary of the Foundation and is responsible for the successful development and operation of the Sentinel Chain. InfoCorp AgTech will have the following functions:

SENC Token Issuance in connection with the Private Token Sale and the Public Token Sale

- Direction and supervision of the development and maintenance of Sentinel Chain
- Fund activities that will enable the underserved and unbanked in target markets to have better and more affordable access to financial products

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Management

The management team will be responsible for:

- Legal and financial management.
- Supervision of the grant management process, covering application management, financial tracking and reporting, and operational delivery and reporting.
- Publishing a report on the delivery of the objectives set out in the Token Sale every quarter.
- Providing reports on a regular basis to the Council.

7.6 InfoCorp Technologies

InfoCorp Technologies is the vendor engaged by InfoCorp AgTech to develop and provide the technology, support and maintenance for the development of the Sentinel Chain project. InfoCorp Technologies will share its technology expertise with the Foundation and InfoCorp AgTech to co-issue the Sentinel Tokens at the same time. InfoCorp Technologies has appointed Dentons Rodyk & Davidson LLP to advise on legal, regulatory and compliance matters. InfoCorp Technologies has appointed Crowe Horwath International to be its financial auditor.

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7.7 Execution and Roadmap

The Sentinel Chain project was launched in Q3 2017. The Token Group has already achieved several project milestones, as illustrated in the roadmap below.

In November 2017, the project was announced to the public.

Below we have detailed the milestones that are the building blocks of the Sentinel Chain project.

Q3 2017	Early Supporters Sale
	Signed an MOU with Maybank to collaborate on financial inclusion technology projects in the ASEAN region
Q4 2017	CrossPay Blockchain trial with TS Group for migrant workers dormitory in Singapore
	Signed an MOU for CrossPay partnership with CloudWell Ltd. – the national payment provider to Milk Vita (Bangladesh Milk Producer's Co-Operative Union Ltd)
Q1 2018	January 2018 Pre-Sale begins
	February 2018 Token Sale Whitelist Registration Pre-Sale ends
	March 2018 Public Token Sale
Q2 2018	SENC to be listed and traded on various token exchanges Beta testing of Sentinel Chain
Q4 2018	CrossPay will go live in the first unbanked market
Q1 2019	Sentinel Chain code review and audit Sentinel Chain v1.0 will go live Onboarding of the first financial service provider partner
Q2 2019	Integration of Sentinel Chain to CrossPay Integration of financial service provider to Sentinel Chain
Q3 2019	End-to-end testing of Sentinel Chain
Q4 2019	Sentinel Chain v2.0 will go live

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8. Conclusion

> "The test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have too little."
>
> Franklin D. Roosevelt

We have presented the Sentinel Chain model, which will create the world's first global marketplace for financial inclusion services accepting the use of livestock as collateral. This paper explains the hidden economic potential of the smallholder farmers in which the main problem hindering the recognition of livestock as a financial asset is the very characteristic of livestock - that each individual livestock is unique. Consequently, there is a lack of transparency and liquidity, on the one hand, as livestock change ownership via private cash transactions. On the other hand, there is a multibillion dollar untapped market. Once the Sentinel Chain is implemented, this market will start growing rapidly.

The Sentinel Chain was built with the specific purpose of creating a cross-border financial infrastructure connecting the previously isolated unbanked to a global network of financial providers. Our solution, as described in this paper takes a unique approach to unlocking the economic potential of the unbanked by establishing livestock provenance through the creation of livestock insurance on blockchain. By turning the "dead capital" into a verified asset, this new system could be a unanimous source of connected information, secure and incorruptible, to allow for the integration of the unbanked into the global financial economy.

The Sentinel Chain has not only created a new class of financial inclusion solution but has also set the stage to extend the platform to use cases beyond financial inclusion. Livestock provenance data helps as a quality-control measure for disease control. The same provenance-powered data also enables the traceability of food origin and the verification of the organic food supply source. By unlocking the economic capital of the unbanked, the Sentinel Chain unlocks new opportunities and benefits for the banked – thus empowering the wellbeing of people, animals and communities. Join us today in our mission to redefine inclusive finance.

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Appendix A – Tamper-Proof Livestock Identity Tag

The RFID-enabled livestock identity tag (Livestock ID Tag) is tamper-proof and theft-proof on both a material design as well as a data level.

Livestock Identity Tagging System Components

The livestock identity tags consist of a "Male-Female" tag combination:

- **The Female Tag Component** – The female tag component is a disc embedded with an ISO-14443 compliant NFC chip that can interact with an NFC-enabled smart phone.

- **The Male Tag Component –** The male component, also known as the backing disc, joins the female tag component together through the ear of the livestock. The tag has been designed for "single-use" and cannot be removed without being destroyed. The durable material is made of hardened rubber as compared to the mainstream plastic. In the event that the tag has been forcibly removed, the information which resides in the tag will be invalidated, thus rendering the tag useless.

- **Tag Applicator –** The applicator comprises of a bluetooth smart sensor which houses the repository for the data and authenticity of the livestock.
-
- **Plunger –** The plunger is the manual activation tool that will trigger the transmission once both discs are bound together on the livestock's ear.

Livestock Identity Tagging Process

The 4 stages of tagging the livestock are:

- **Stage 1** – **stock/origin stage**. Raw tags are received from the factory in separate component packages.

- **Stage 2** – **initialization stage.** Data pertaining to the insured livestock are stored into the chip. For example: Tag ID, the name of the insurance company, date of issuance, etc.

- **Stage 3 – application stage.** Both Male and Female discs are tagged unto the ear of the insured livestock using the applicator.

- **Stage 4** – **confirmation stage.** Tags with the stored data are then write-protected with the geolocation and time stamp information on to the CrossPay Blockchain for "Read-Only" traceability.

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Appendix B – Crosspay Mobile

The CrossPay Mobile application (Android) is a mobile financial delivery mechanism for use with the CrossPay Blockchain. It is also designed to be a mobile wallet that provides the unbanked with quick access to their balances and allows for transactions with other users and merchants.

- **Multi-mode authentication**. Its ease of use can be adopted by different unbanked users. An authentication threshold can be set with a pre-determined amount. For example: US$10 as a daily pre-determined allowance

- **Proximity mobile payments** with QR codes and Near Field Communication (NFC) instead of using a traditional credit/debit card

- **Escrow payment mechanism** which can be used to provide electronic cash-on-delivery (COD) payments to replace physical cash payments for the delivery of goods within a local community.

- **Identity validation.** From a data perspective, a livestock identification tag stores the geolocation and time stamp information on the CrossPay Blockchain. Immutability and non-repudiation ensures the authenticity and secure traceability of certifications, i.e. a digital 'passport' that proves its existence and ownership to an identified entity and origin. This forms an important security aspect of the transaction.

- **Asset Tokenization**. By converting the rights to an asset into a digital token on the CrossPay Blockchain, the unbanked is able to turn their Real world asset(s) into a securitized asset. For example, an unbanked may collateralize his livestock by digitalizing the livestock's ownership and value onto the blockchain network, which is multi-signed by interested parties.

- **Document Tracking.** The application is designed to track and validate the authenticity of documents stored on the CrossPay Blockchain.

- **Provenance.** The application enables the creation of unique IDs tagged to the physical assets and tracking them via the private key controlled within the mobile device.

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Appendix C – CrossPay Blockchain Design

An agricultural-financial ecosystem can only be created by bringing together various stakeholders onto a blockchain backend which includes unbanked farmers, livestock insurance companies and micro-financing institutions (MFIs). Blockchain contains unique properties that makes it a desirable technology to be used as a tamper-proof data storage for the tracking of livestock ownership as well as a forgery-proof distributed accounting system for the delivery of unbanked financial services.

- **Immutability.** Immutability refers to the ability to prevent any changes to data that has already been created and is a core feature of most blockchain technologies.
- **Resiliency.** The decentralized nature of blockchain removes the single-point-of-failure risks associated with centralized systems by providing the redundancy and security provided by multiple nodes on the blockchain.
- **Non-Repudiation.** Non-repudiation refers to the guarantee that an action performed on the system can be proven to be performed by, and only by, a certain individual. This is a key aspect to prevent forgery.
- **Auditability.** Because every transaction on the blockchain is tracked since the creation of the system, and given that data is immutable and non-repudiating, therefore information on the blockchain is highly auditable with a high degree of authenticity.
- **Low capital outlay.** All of the above features can be implemented using centralized infrastructure. However, these features will require high upfront investment cost and sophisticated enterprise grade infrastructure and services which makes the provision of low-cost financial inclusion solutions unsustainable in the long run.

A local unbanked community, unlike the general public Internet, operates with an inherent level of trust. Instead of a fully trustless public blockchain model, a semi-trusted blockchain model utilizing a private blockchain platform is compatible and desirable in this scenario for the local community use case. The use of private blockchain can also avoid the volatility risk associated with the public blockchain or uncertainty over transaction fees. As transaction privacy is kept to within the private blockchain, it is also easier for regulatory acceptance.

The CrossPay Blockchain is designed to address lightweight financial applications and extension of the open source MultiChain[1] which is a Bitcoin core fork designed as a low-latency[2], private blockchain platform that supports permission management and native digital asset.

What is blockchain?

The invention of the Bitcoin protocol has brought about new opportunities for inventing new ways in solving the financial inclusion problem. Bitcoin was made famous because of its ability to address the **double-spending** problem in an electronic cash payment system. Unlike physical cash, digital information can be replicated and processed indefinitely, similar to making a copy of an email and sending to multiple parties. The key limitation of digital payment systems, which traditionally use a neutral trusted third party to maintain the record of the payers' and payees' balance and transactions is in a centralized database. The key innovation that has risen from the invention of Bitcoin lies in its ability to prevent the double-spend issue without the need for a centralized trusted third party. This result in a decentralized peer-to-peer global payment system that has proven its resiliency to security breaches for close to a decade. **Blockchain** refers to one of the underlying technologies used in the implementation of Bitcoin.

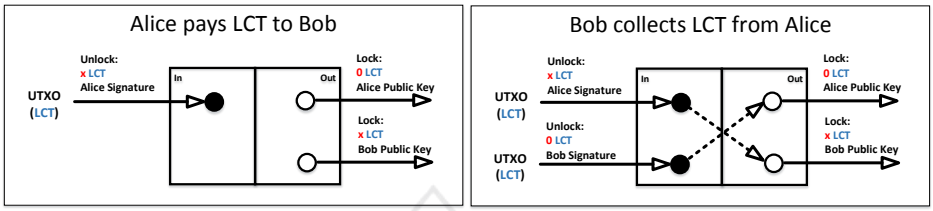
[1] https://www.multichain.com/download/MultiChain-White-Paper.pdf

[2] https://www.multichain.com/blog/2017/06/multichain-1-beta-2-roadmap/

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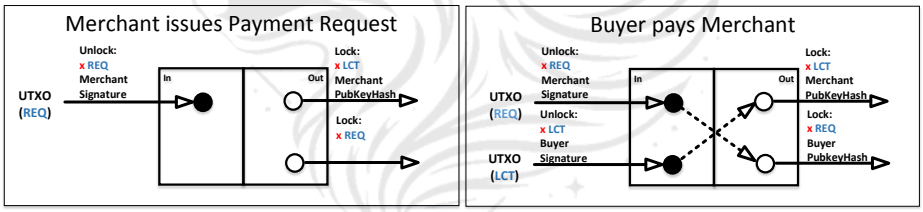
Atomic Asset Exchange

Transactions within a CrossPay Blockchain are commonly facilitated by an atomic asset exchange without the need for a centralized trusted authority. In computer science terminology, atomic basically refers to a group of operations that either succeed or fail in its entirety. This is analogous to delivery-vs-payment, a financial industry term. For instance, Alice can atomically exchange an asset called "ABC" with Bob in return for an Local CrossPay Token called "LCT". As described in the diagrams below, the exchange is constructed as a blockchain transaction by both parties and submitted to the blockchain for confirmation. The success of this exchange depends on the match of asset types and quantities provided by both parties.



Payment Protocol

Payment or collections protocol similar to BIP70[3] can be implemented using the atomic exchange of payment request and LCT. The payment request is implemented with payment details containing the merchant's identity, and contains the PKI certificate and digital signature along with payment receipt information. This information is stored as meta-data on the blockchain and associated with the completed transaction as part of the atomic asset exchange.



Identity Management / Know-Your-Customer (KYC)

The identity information, such as a merchant's identity, is maintained at two levels - a public identity information and private identity information, based on the web-of-trust design.

- Public Identity Information is maintained on Sentinel Chain and is stored as X.509 digital signature certificates with the owner's CrossPay Blockchain address.
- Private Identity Information is maintained on CrossPay Blockchains as a hash to the identity attributes such as date of birth are encrypted and stored along with the verifier's signature such as local financing companies. These attributes are stored off-chain for security purpose.

The identity owner can selectively provide verified identity attribute to third party upon request, such as for KYC purposes.

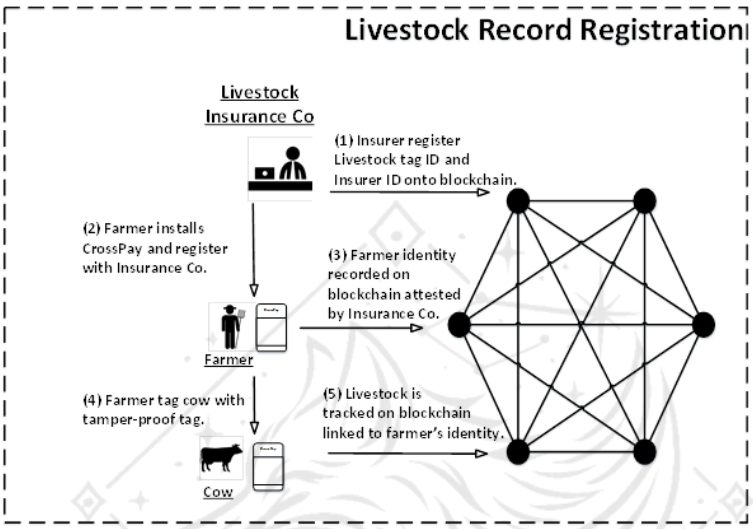
[3] https://github.com/bitcoin/bips/blob/master/bip-0070.mediawiki

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Livestock Insurance Process

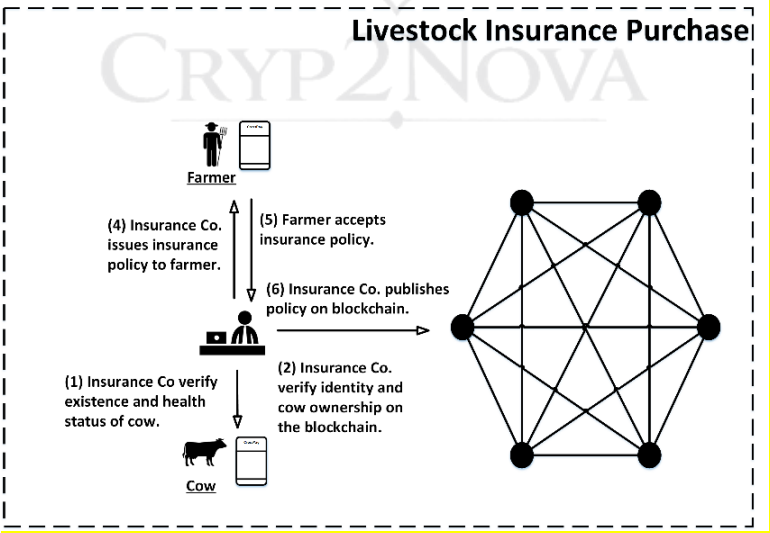
The livestock record registration process includes 3 functions:

- For the livestock insurance company to record its issuance of the livestock ID tag on the blockchain.
- For the livestock insurance company to attest to the identity of the unbanked farmer who registered to use its service.
- For the unbanked farmer to apply the livestock ID tag onto the cow and record the ownership, timestamp and geolocation information onto the blockchain as a proof-of-ownership.



The livestock insurance purchase process serves the following functions:

- For the livestock insurance company to verify the existence and health of the livestock and issue an insurance policy that is tied to the livestock, linked to the livestock ID tag.
- For the unbanked farmer to digitally acknowledge the insurance policy and provide proof of insurance ownership via the blockchain.

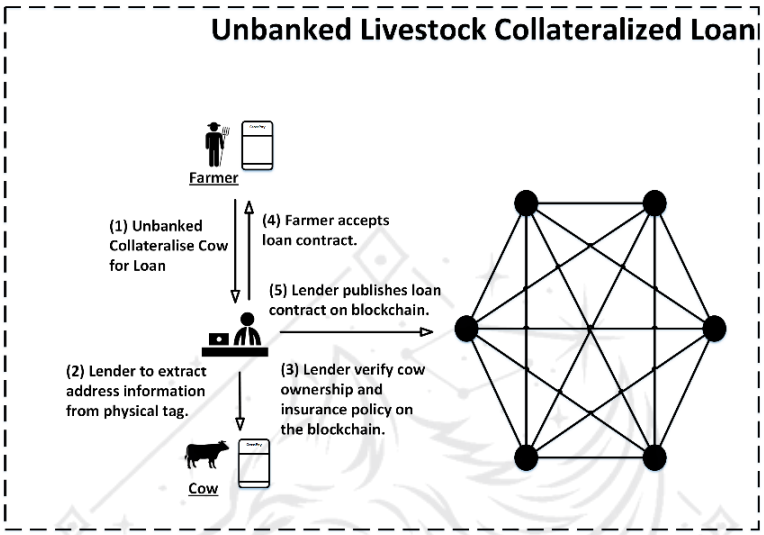


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Livestock Collateralised Loan

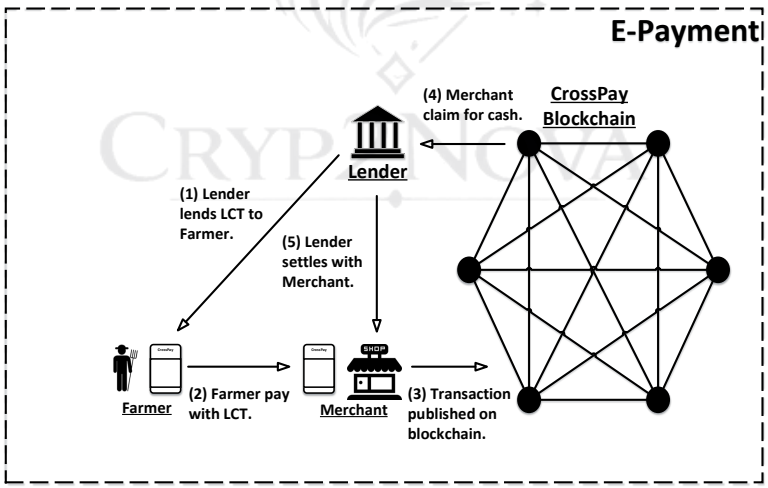
The livestock collateralised loan application process serves the following function:

- For the lender to verify the true ownership and insurance protection belonging to the unbanked livestock.
- For the lender to verify the identity of the borrower that is also attested by the insurance company to prevent loan fraud via forged identity.
- For the unbanked to prove its identity, ownership of the livestock asset as well as ownership of insurance policy from verified livestock insurance company.



E-Payment

The loan agreement can be used by the local lender to offer loans to the unbanked users or in the alternative, offer LCT as a loan to the unbanked to spend within the local ecosystem with merchants who accept LCT as a form of payment.



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Balance of Incentives

The ecosystem is maintained by balancing the incentives between unbanked, insurance company and lender.

The farmer needs to:

- Provide farmer's true identity in order to make a livestock insurance claim.
- Use the livestock insurance as a proof-of-ownership to increase the chance of collateralising the livestock for cheaper loans.

The insurance company needs to:

- Ensure that the livestock is real and is fit to be insured.
- Ensure that the identity of the livestock matches that stated in the insurance policy in the event of an insurance claim.

The lender needs to:

- Ensure that the livestock is real and is fit to be insured.
- Ensure that the farmer is the true owner of the livestock.
- Ensure that the livestock has not been collateralised for other loans.
- Lend at a lower interest rate when the livestock has been authenticated and insured by an insurance company.

As a result, livestock owners has a higher incentive to provide accurate data regarding their identity as well as the ownership of the livestock. The livestock insurance data stored on the blockchain is further protected by a community of lenders that has no incentive to collude with the insurance company to attack the blockchain. There may be an incentive for the unbanked farmer to collude with the livestock insurance agent to defraud the lender. This can happen if the rogue agent were to issue a tag for a non-existence livestock for the unbanked to collateralise it for loan. But since the tag cannot be removed without destroying the chip containing the livestock address, therefore a physical inspection by the lender before approving the loan can be used to verify the claim.

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Appendix D – Sentinel Chain Design

The "Sentinel Chain" is implemented as a consortium blockchain that operates with decentralised governance. Each consortium member is represented by a cluster of nodes on the Sentinel Chain known as the Sentinel Nodes. This decentralized governance model requires that 60% of consortium members' approval are required for the addition of a new consortium member.

Cross-Chain Interoperability

There are generally three types of techniques in chain interoperability[4].

- A centralised, multisignature ("multisig") notary scheme, whereby a group of parties agree to carry out an action on Chain B when some event on chain A takes place. For instance, Interledger[5] follows such a model.
- Sidechains[6], or relays, are able to validate events on an external chain as part of local event validation
- Hash-locking utilizes events on different chains which are unlocked by a single shared value.

However, most of these techniques are often discussed under the context of a public blockchain ecosystem where a fully untrusted environment is involved and no restrictions on permissions and memberships. The use of private blockchains introduces centralization and new complexities. Considerations must be given to the different permissions granted to the connecting nodes on their respective blockchains as well as the type of assets that are allowed to participate in cross-chain transactions.

Cross-Chain Atomic Swap

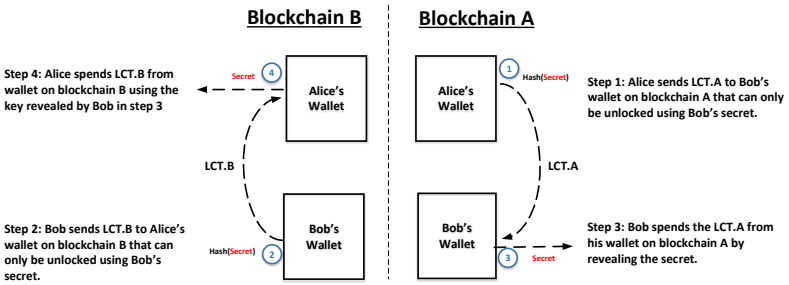
The design of Sentinel Chain Cross-Chain is fundamentally based on the algorithm proposed by Tier Nolan in 2014 to facilitate peer-to-peer trade exchange[7], commonly known as cross-chain atomic swap. This technique has inspired and was adopted by various other blockchain protocols such as Lightning Networks, Raiden and others.

For this to work, the hash function to be used between the two interacting chains must utilize (1) same hashing formula in order for the secret to be shared, (2) multi-signature support. To illustrate how this works conceptually, we assume both Alice and Bob have a wallet on blockchain A and blockchain B and wish to exchange asset LCT.A and LCT.B. Alice wish to swap LCT.A for LCT.B with Bob.

- Alice must broadcast a transaction for sending LCT.A to Bob's wallet address on blockchain A locked with hash of Bob's secret that only Bob will know.
- Bob broadcast a transaction sending LCT.B to Alice on blockchain B (the same hash function) locked with the same hash.
- In order to receive LCT.A on blockchain A, Bob must unlock LCT.A by broadcasting a transaction that contains the secret onto blockchain A; therefore revealing the secret to Alice.
- Alice can therefore unlock the LCT.B being sent to her by using Bob's revealed secret on blockchain B.

[4] Chain Interoperability, Vitalik Buterin, Sep 2016
[5] A Protocol for Interledger Payments, Stefan Thomas & Evan Schwartz
[6] Enabling Blockchain Innovations with Pegged Sidechains
[7] https://en.bitcoin.it/wiki/Atomic_cross-chain_trading

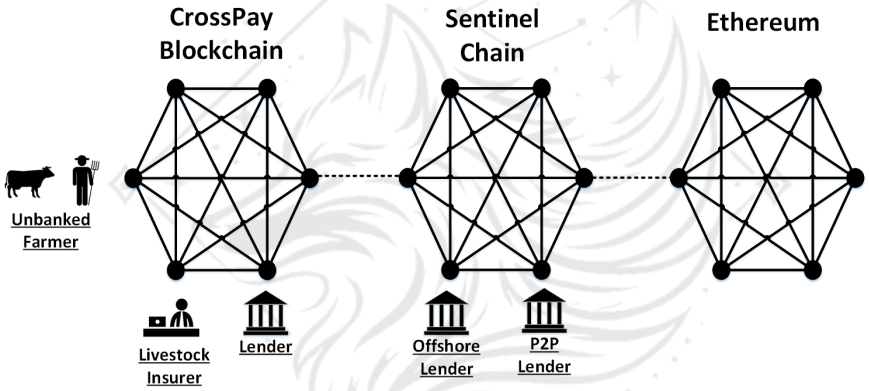
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This approach can be supplemented by additional time-locked transactions that can be broadcasted for refunded to both parties in the event that the exchange does not take place within a limited amount of time.

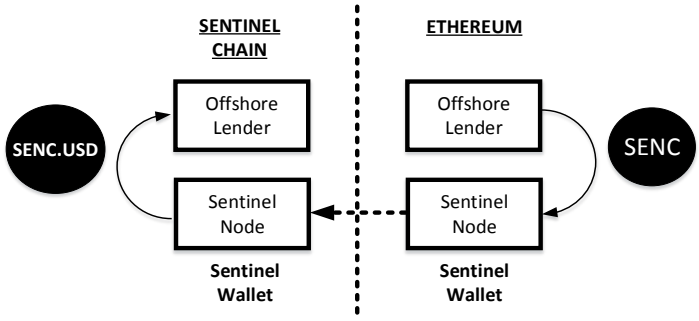
Sentinel Chain Cross-Chain Design

Sentinel Chain adapted this technique for use with permissioned nodes called the Sentinel Node that contains address on both the interacting blockchains. Since the actual implementation of the Sentinel Chain Ecosystem involves 3 types of blockchains at varying levels of trust - CrossPay Blockchains, Sentinel Chain and the public Ethereum network, the design for cross-chain interoperability features must strike a balance between practicality and security.



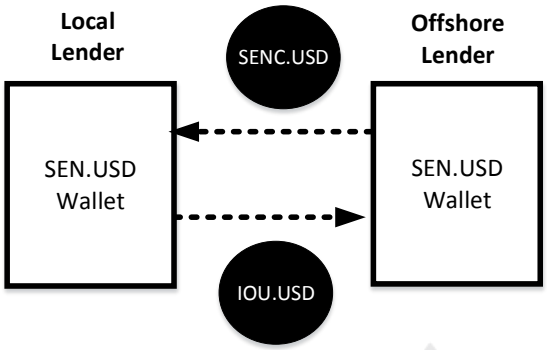
To illustrate how the cross-chain interoperability can be implemented for the Sentinel Chain Ecosystem, the following example assumes an overseas lender on the public Ethereum network transferring SENC tokens to a local financing company to be converted into Local CrossPay Token (LCT) for use in the CrossPay Blockchain.

Step 1: From Ethereum to Sentinel Chain. Offshore lender performs an atomic cross-chain swap using SENC ERC223 tokens from its Ethereum wallet to Sentinel Node's Ethereum wallet. Sentinel Node on Sentinel Chain performs an atomic cross-chain swap using SENC.USD to offshore lender's Sentinel Chain wallet. SENC.USD represents the USD equivalent value of SENC that resides internally within Sentinel Chain only. This assumes the USD to SENC currency exchange rate is known and agreed upon prior to the transfer and that the Sentinel Node has sufficient balance of SENC.USD to complete the swap.

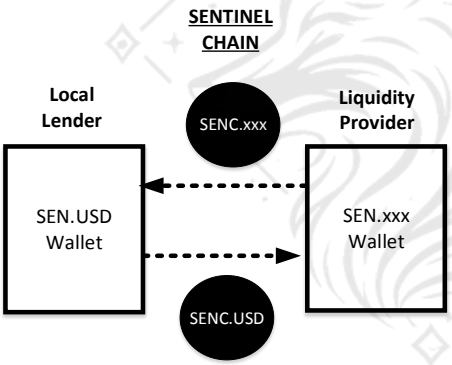


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Step 2: From within Sentinel Chain. Offshore lender performs atomic exchange using SENC.USD for IOU.USD from local lender on the Sentinel Chain. Local lender issues IOU.USD and performs atomic exchange with offshore lender on the Sentinel Chain in return for SENC.USD. This assumes the IOU includes relevant terms related to interest rates and that the offshore lender has sufficient balance in its SENC.USD wallet to complete the exchange.

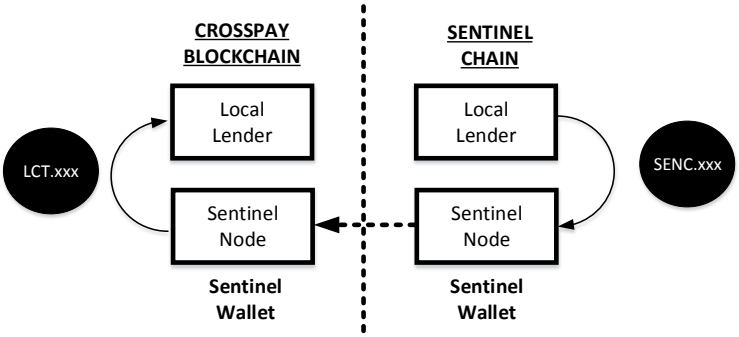


Step 3: From within Sentinel Chain. Local lender performs another atomic exchange between SENC.USD with SENC.XXX (where XXX represents local currency) with a Liquidity Provider residing within Sentinel Chain. The role of Liquidity Provider is currently performed by InfoCorp using a pre-funded liquidity pool of fiat currencies raised via the SENC token sale and held in multicurrency account with InfoCorp's settlement bank.



Step 4: From Sentinel Chain to CrossPay Blockchain.

Local lender performs an atomic cross-chain swap using SENC.XXX from its Sentinel Chain wallet to Sentinel Node's Sentinel Chain wallet. Sentinel Node on Sentinel Chain performs an atomic cross-chain swap using LCT.XXX to local lender's CrossPay Blockchain wallet. SENC.USD represents the USD equivalent value of SENC that resides internally within Sentinel Chain only. This assumes that the Sentinel Node has sufficient balance of LCT.USD to complete the swap.



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