DROPCHAIN

Incentivizing Transparency and Traceability in Global Food Supply through Gamification

White Paper (v 4.0)

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1 ABSTRACT

Blockchain innovations are transforming the world as we know it. Global supply chain and logistics is one area where this technology will have the most profound impact in the years to come.

In this paper, we present a vision for applying Blockchain technology to modernize and drive transparency in supply chains supporting a $1.5T global food trade.[1] The world's population continues to grow, expecting to reach 10 billion by 2050,[2] which will require our food supply chain to evolve and become more efficient, transparent and reliable.

At the same time, consumers have demonstrated an increasing demand for safe and healthy foods. PricewaterhouseCoopers estimates food fraud is a $40 billion global problem.[3] Trust has been lost over the years due to numerous food scandals around the world. That trust with consumers must be rebuilt through a more transparent and accountable food supply network.

Global supply chain solutions already exist but fail to address the human element and the need to align individual incentives along the way. Instead, current Blockchain solutions only focus on distributing tokens to data centers, not those operating within the supply chain. DropChain's technology solves three core problems in foodstuff distribution:

1. Data fragmentation in supply chains, by developing an open-standard, low-cost, and easy to adopt solution for all supply chain stakeholders;
2. Supply chain transparency and data integrity, by creating an innovative gamified cryptoeconomic incentive program rewarding each physical distribution channel for their participation;

[1] WTO International Trade Statistics, 2015
[2] https://foodsafetytech.com/column/blockchain-improves-visibility-food-supply-chain/
[3] https://press.pwc.com/News-releases/fighting–40bn-food-fraud-to-protect-food-supply/s/44fd6210-10f7-46c7-8431-e55983286e22

3. Lack of ground-level consumer data for brands, by providing granular consumer and small business data to brands through a global dashboard, enabling them to track the distribution of their brands down to street level.

To address these problems, DropChain proposes to create a layered Blockchain-based protocol stack servicing food and beverage distribution, called the DropChain Network (DCN). This project is a strategic combination of ground-level partnerships with key brands and distribution partners throughout China and Southeast Asia, with a custom-built ecosystem leveraging the latest in Blockchain, mobile technology, and global supply chain standards.

DropChain's protocol stack is composed of five layers for (1) liquidity, (2) binding, (3) tracking, (4) incentive, and (5) application.

This paper first delivers an introduction on issues that currently surround supply chains in the food and beverage distribution industry, followed by a high-level overview of DropChain's vision and proposed solution. Next, we break down the 5 layers of our protocol stack, followed by an in-depth discussion on ensuring supply chain data integrity and the gamification of token economics. We conclude with the structure of our token offering that will help fund this project and jumpstart DropChain's ecosystem.

DropChain's founders started Foowala, a B2B alcohol and beverage distribution startup. Founded in 2015, we have been deeply involved in the B2B distribution industry with a revenue run-rate of over CNY ¥3M in just our first operating year. We've had the opportunity to work with countless brands, distributors and small businesses across Asia. Years have been spent developing the ground-level relationships and knowledge necessary to get to where we are today. Through our experiences, we've witnessed firsthand many of the problems surrounding the distribution in developing countries.

Blockchain technology has the potential to decentralize supply chains, drive transparency and traceability, and address the food safety issues surrounding the authenticity of what we eat, modernizing a $1.5T industry. DropChain possesses the rare combination of hyper-localized distribution experience along with the technical knowledge of how to address this industry's problems.

2 INTRODUCTION

As supply chains go global the journey of from farm to fork and grape to glass has become increasingly complex. Your meal will have traversed through multiple countries and come in contact with countless parties before ending up on your dinner table. However, as the complexity of supply chains have increased, its transparency and traceability have declined.

Supply chain data has become unevenly distributed amongst key stakeholders across the supply chain, using a multitude of systems and standards, with little reason to share this data with external parties. As a result, stakeholders are stuck within their narrow data siloes and end-buyers have no way of tracing or authenticating the goods which they've purchased.

Furthermore, despite billions of dollars having been spent developing complex global supply chain solutions, none can consistently deliver full transparency and trace a bottle of wine from grape to glass. Technology companies have forgotten that ultimately human beings are involved at every point in a supply chain, and many simply have no incentive to participate in the system.

This system of misaligned incentives and incomplete supply chain data has spawned entire industries dedicated to the counterfeiting of food products, from olive oil and milk to high-end whiskeys and Cognac, with little chance of being caught.

Food fraud is a $40 billion global problem.[4] Brown-Forman, the company behind Jack Daniel's, estimates 30% of all alcohol in China is fake.[5] Clearly, the individuals with the least amount of transparency in the supply chain are at the greatest risk.

[4] https://press.pwc.com/News-releases/fighting-40bn-food-fraud-to-protect-food-supply/s/44fd6210-10f7-46c7-8431-e55983286e22
[5] https://www.theguardian.com/sustainable-business/2015/sep/16/china-fake-alcohol-industry-counterfeit-bathtub-booze-whisky

Food and beverage brands are also at risk as well. Their brand value is at stake if business owners unintentionally sell counterfeit versions to their customers. Using wine as an example, the chances are significant, with an estimated 70% of all wine sold in China being fake.[6]

We've condensed the food and beverage distribution industry's present challenges into three key factors:

1. Data fragmentation. Data siloes exist across the food distribution supply chain. In order to tackle the current challenges that exist with supply chain transparency and product reliability, we must enable stakeholders across the supply chain to collaborate in a simple, transparent way.
2. Misaligned incentives. Humans are still at the heart of supply chains, not technology. Simply spending countless dollars on a technological marvel will yield no favorable results if the real needs of stakeholders are not accounted for in a mutually beneficial manner.
3. No decentralized solution for supply chain data. Although Blockchain provides a decentralized solution to managing data, the technology is inherently difficult to scale up quickly and lacks relational data functionalities that tracking high volume, high transaction-rate goods like foodstuff requires.

2.1 DATA FRAGMENTATION

In its current form, foodstuff distribution data is segregated into silos across the supply chain, with individual database systems, ERP systems, and in-house solutions along the way. The challenge with this current environment is an inability for systems to communicate with one another and to pass off critical product and logistics data. The lack of a common technical language, data exchange standards and the perceived cost of implementing a unified logistics solution has hindered any progress in this area.

These proprietary data silos have created a fragmented eco-system. Typically, only certain parts of global supply chain get audited, with supply chain data only partially collected, resulting in product and logistical data that is never truly complete or reliable.

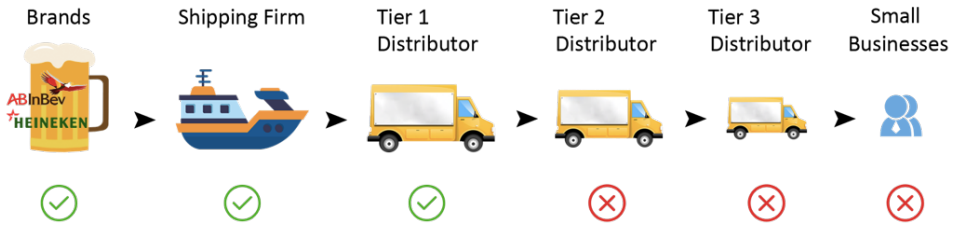
[6] https://cpianalysis.org/2017/01/16/fake-wine-in-china/

2.2 MISALIGNED INCENTIVES

As we reach the end of the supply chain, where products end up in the hands of consumers (the "last mile" of food and beverage distribution) the data is obscure and often non-existent. Typically, once goods enter a country, it is passed off to Tier 1 distributors who own the distribution rights for this particular brand. This product is subsequently sold to Tier 2 distributors who resell it to Tier 3 distributors. Ultimately these goods reach a consumer-facing business intermediary (e.g. restaurants, bar, or grocery store).

The problem with this supply chain is data collection is no longer done beyond Tier 1 distribution, after which its seen as too costly and time consuming for lower-Tier distributors to execute on. Even if data collection is done, product and logistics data is anecdotal at best and fabricated at worst. Without any way to reliably track a product's logistics data from beginning to end, the true origins of a product and whether or not it's counterfeit can never be truly ascertained.

Data and Logistics Transparency of Current Supply Chains



Big brands are increasingly relying on big data to make better decisions on where to focus their marketing dollars and sales efforts. A large part of their strategy demands for a more holistic picture of how their products are disseminated and reach the end consumer. Even for some of the largest food and beverage companies in the world at this moment, decisions still rely heavily on conjecture and guesswork.

2.3 THE FLAWS OF MODERN SOLUTIONS

Blockchain technology presents itself as an opportunity to create a truly decentralized and open eco-system to overcome the data fragmentation challenges mentioned above.

However, the technology in its current form presents certain challenges. Although decentralized, the technology on its own lacks the necessary database functionalities inherent to supply chains. Ethereum, IOTA, Hyperledger Fabric and similar solutions are not designed for such data storage and manipulation. The cost of data storage and operations is also higher than traditional centralized database solutions, making a Blockchain-only solution economically and practically unviable.

Decentralized solutions such as IPFS and Storj can handle the storage of documents, but they cannot adequately address the complexities of handling global interconnected data while delivering advanced database search and operational capabilities found in professional database solutions.

Traditional database solutions deliver on the advanced database functionalities necessary in a global supply chain system, but its centralized data storage does not address the key challenge of data fragmentation and the democratization of supply chain data. Centralized management also allows for the possibility of data tampering and stakeholder collusion, reducing the level of trust in the overall system.

None of the technologies that exist today can independently address the complex supply chain requirements of global food and beverage distribution. Due to the high-volume, frequent-transactional nature of foodstuff distribution, any open and decentralized solution would require high interconnectivity between all stakeholders, while delivering strong database operational performance and data delivery to end-users in a cost-effective manner.

3 VISION

DropChain is the first purpose-built supply chain ecosystem leveraging a tokenized stakeholder incentive structure for the food and beverage industry. It is a complete solution that enables all stakeholders, from the brand owner to lower-tier distributors, to easily leverage Blockchain-supported data tracking in their existing IT infrastructure, driving transparency and reliability throughout the overall supply chain with key emphasis on:

- Aligning incentives for all stakeholders
- Low implementation and operational costs
- Ease of accessibility and applicability
- Empowering brands with big data

The objective is to create a self-sustaining logistics platform that is easy to integrate with while remaining a cost-effective solution. Factoring in a unique tokenized rewards system that incentivizes participation in the DropChain ecosystem, we'll be able to give brands the laser-focused hyper-detailed market data the likes of which they've never seen before. In doing so, we will have tackled key barriers to adoption for stakeholders throughout the entire supply chain.

Efficient, reliable, cost-effective, and fully transparent

3.1 ALIGNING INCENTIVES

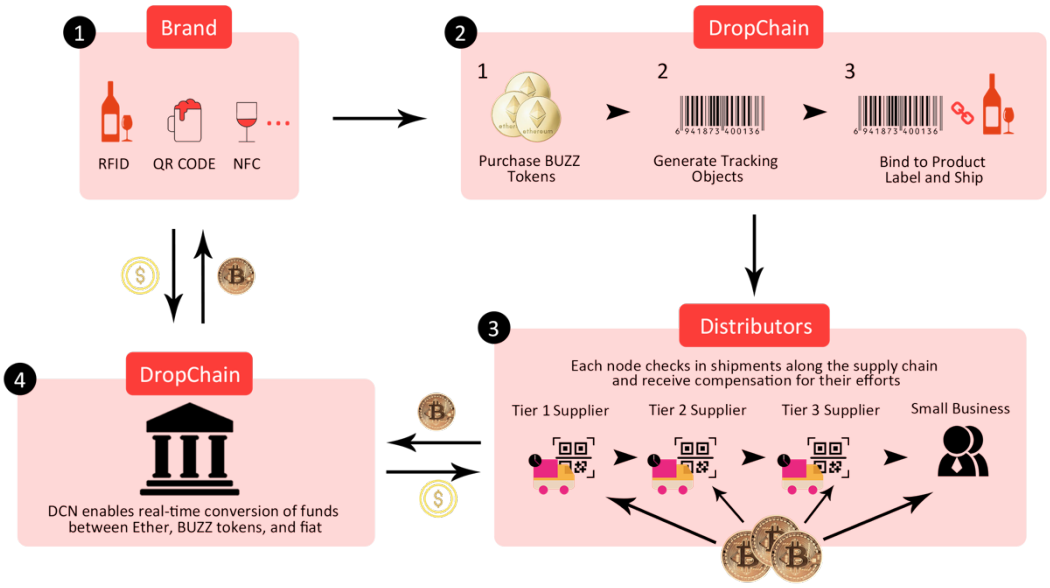
In its current climate, the food distribution supply chain is plagued with misaligned incentives. Brand owners and higher-tier distributors benefit from greater supply chain transparency which allows them to make better decisions regarding which brands to import, the quantity to import, and which channels are most effective distributing these brands. Lower-tier distributors, on the other hand, experience no such benefit from supply chain transparency. Greater transparency only translates into additional workload with no benefit or compensation. Due to this misalignment, brands lack the real data to plan their go-to-market strategy, which results in lower-tier distributors being saddled with excess stock they cannot sell. This in turn prompts questionable sales activities such as parallel (gray market) exports or intra-province distribution, all of which are invisible to the brand owner.

Through a comprehensive incentive alignment strategy, DropChain is able to disrupt and modernize the food distribution industry's supply chain model. Tokenization has enabled us to create clear monetary benefits for all stakeholders along the supply chain, driving participation and further growth of the DropChain ecosystem.

We will accelerate user participation by giving downstream players in the DropChain ecosystem the opportunity to earn tokens as compensation for their time and effort. Lower-tier distributors and even restaurant or store owners who "check-in" shipments of goods into DropChain's digital platform will earn tokens that can be sold directly back to big brands, who require the same tokens to purchase DropChain's supply chain services. This topic is further explored in Section 7 (BUZZ Token Economics).

Tokenization and gamification of the supply chain creates benefits for big brands, top-tier distributors and downstream players, thereby aligning user incentives toward further growth of the DropChain ecosystem.

BUZZ Token Incentive System



3.2 LOWER ADOPTION COSTS

Centralized supply chain solutions are not only complex but expensive to implement. Hence, for big brands and top-tier distributors who already have an existing solution in place, encouraging adoption requires minimizing the entry cost, whether it's executing a full transition into DropChain's ecosystem or a data integration between DropChain and their existing system.

Zero Fees. To encourage adoption, DropChain will charge zero fees for top-tier distributors and all downstream participants to use our platform to:

- Check-in shipments
- Earn and convert tokenized incentives
- Query and track the supply chain for any recorded shipment

Pay to Play. DropChain takes a tiny cost for "gas" (a few cents per transaction), in addition to a nominal commission to help cover server and operational costs related to

the ecosystem. This cost is directly borne by the brand owner and is calculated based on the volume of product the brand is interested in tracking the supply chain of. The cost is fully scalable so brands only track as much data as they want, making our ecosystem financially accessible to brands big and small. Furthermore, once a specific shipment is recorded in DropChain's system, all related downstream activities incur no further commission or fees.

By minimizing or eliminating the entry costs for all parties, we actively promote the adoption of the overall platform across the entire supply chain. As the platform grows and the number of participants increase, our profitability will be derived from the volume of products being tracked via DropChain's ecosystem.

3.3 EASE OF ACCESSIBILITY AND APPLICABILITY

The importance of usability cannot be understated. In order for any eco-system to thrive, it must be inherently easy for participants to access and use. To achieve this, DropChain's system will be largely open with a suite of API's to encourage development and integration. Furthermore, it will be free of mandatory hardware or proprietary labeling requirements that would otherwise deter both brands and supply chain nodes from participating.

API - Friendly. To further reduce development-related adoption costs, a suite of free-to-use, secure API's will be available for existing supply chain solutions to build on. Utilizing XML, a widely adopted file format for data exchange, API's will enable big brands with existing solutions or smaller downstream players to easily and cost-effectively integrate with DropChain's ecosystem. A portion of the ICO funding will go towards:

- Fostering a development community dedicated to building out API plugins and solutions for DropChain's ecosystem
- Building relationships with key industry players in shipping and logistics, assisting with their software development and integration

Whether the supply chain participant is interested in integrating DropChain's supply chain data with their iOS application, corporate intranet, ERP, or even WeChat Mini Program, there will be unified and automatic data interoperability between IT systems of various stakeholders in multi-organization supply chains, with mechanisms for ensuring data integrity.

Label Agnostic. Many higher-end brands already incorporate some form of unique labeling to deter counterfeiting. To encourage all brands to adopt our system, we will not require mandatory use of any special labeling or tracking mechanism. Brands are free to use their existing anti-counterfeiting technology in tandem with DropChain's system. Development funds will be set aside to assist brands initially with hardware integration.

Every unique tracking object generated by DropChain can be bound to a brand's unique labelling system. Brands will need to modify and incorporate a unique DropChain tracking URL onto the label that will allow downstream participants to easily track and scan that item throughout the supply chain. Whether brands already use RFID's, QR codes, or bar codes on their packaging, DropChain's system can integrate seamlessly into their existing system.

Bring Your Own Scanner. DropChain will not require any proprietary scanning hardware. Supply chain participants that already have an existing scanning solution can potentially use it to scan and check-in shipments, pending modifications to how the scanner unit handles the information.

In addition, DropChain will have standalone iOS and Android mobile applications and a WeChat Mini Program ready to launch, enabling lower-tier distributors and small businesses who don't have scanning hardware in place to easily track shipments that come in and earn tokens.

Democratizing hardware requirements and opening up DropChain's ecosystem via a comprehensive API library and standalone mobile applications allows us drive platform adoption by both upstream and downstream supply chain participants. Our aim is to ensure our platform can be accessed anywhere by anyone with almost any hardware.

3.4 EMPOWERING BRANDS WITH BIG DATA

Knowing where a bottle of wine or case of beer ends up is critical for the survival of a brand. Understanding how their products are distributed at the lowest levels gives brands the data they need to make better business decisions such as the volume of goods distributed to a geographic area; whom to target in country-wide marketing campaigns; or, which distribution channels are most effective in a given market.

In the past, big brands would have little visibility at lower-tier distribution channels. We will enable and incentivize these distribution channels to participate in the supply chain process, receiving fair compensation for the work performed.

The Application layer of DropChain's protocol stack will provide the necessary data analytics platform for brands to gather, filter, and analyze the market data generated by each participant in their distribution supply chain, completely free to use.

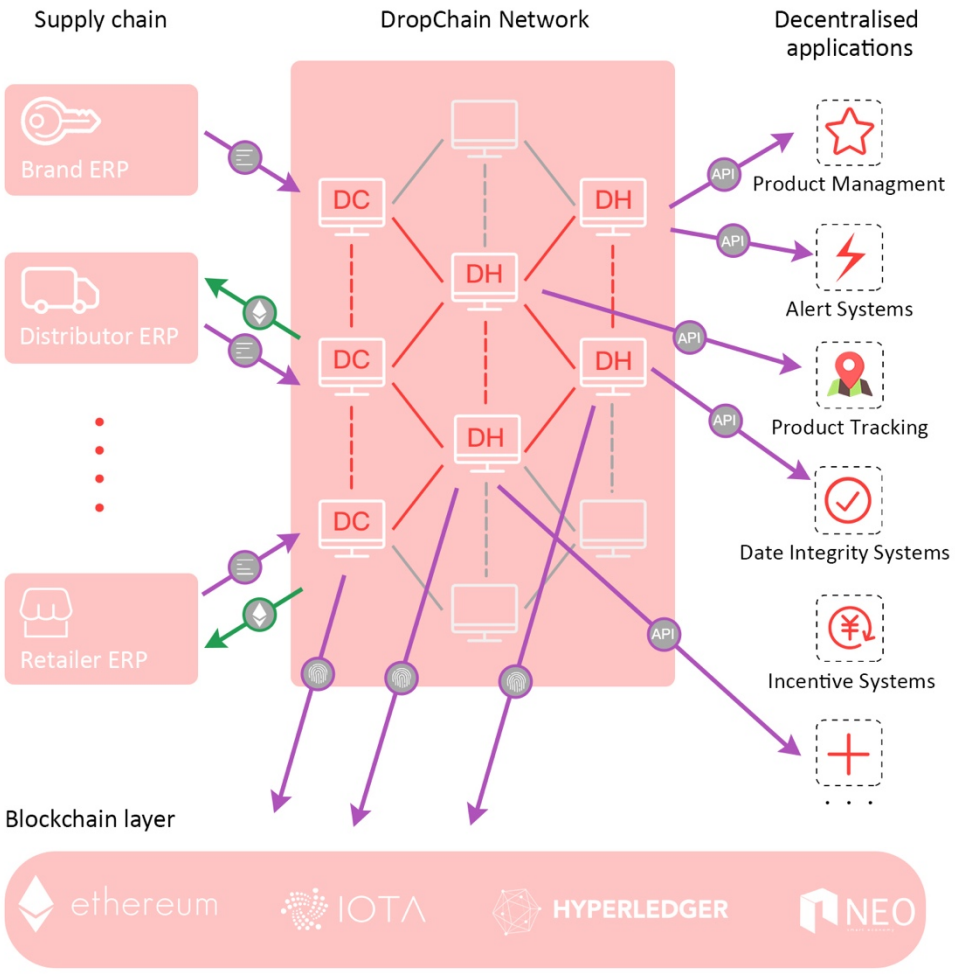
This will enable big brands to have a level of transparency never witnessed before. Not only will brands understand how their goods are dispersed across a specific market, they will also have access to granular market data detailing which city, which district, which street, even which business establishment a specific product ends up at.

Driving transparency and traceability into the food supply chain can only be achieved if a majority of players participate along the supply chain. This requires a gamified system specifically designed to incentivize all participants (via reward tokens); keep adoption costs at a bare minimum; and ensure it's easy to use and access for everybody. Once we are able to reduce these barriers to entry, DropChain will have created a self-sustaining ecosystem whereby:

- Brands can quickly leverage our infrastructure to track their global distribution supply chain through the purchase of our tokens; and
- Supply chain nodes are rewarded for their participation through our currency that can be repatriated back into DropChain's ecosystem and sold directly back to brands themselves

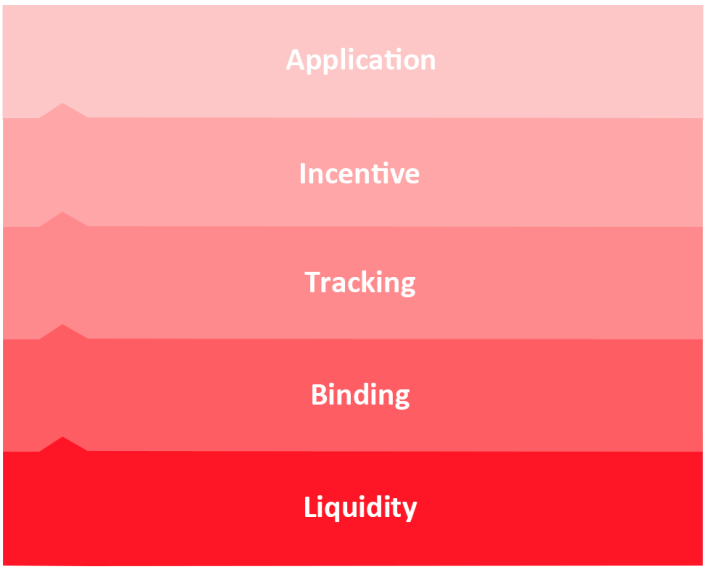
DropChain's protocol stack will preserve the industry's existing distribution structures while using Blockchain-based decentralized networks to create incentivized solutions that address the problems facing food and beverage supply chains and eliminate the core inefficiencies that hold back innovation and true market transparency.

Decentralized Applications and Data Flow



4 PROTOCOL STACK

The following illustration and discussion will present an overview of the DropChain Network (DCN) architecture in the form of a protocol stack.



4.1 LIQUIDITY PROTOCOL

Liquidity of digital currency lives at the base of DropChain's protocol stack, allowing demand-entities to pay for and utilize supply chain tracking and data analytics services, at the same time enabling supply-entities to liquidate digital incentives issued as payment for their participation in the supply chain.

Demand-entities such as brand owners use BUZZ tokens to access the DCN, creating smart contracts between both parties. This contract allows demand-entities to generate unique tracking objects and write data on the DCN. Each instance of a tracking object is allowed unlimited write privileges, facilitating more complex supply chains where numerous supply chain nodes are involved.

Concurrently, supply-entities such as distributors and business owners earn BUZZ tokens in return for their contributions to the supply chain process. Smart contracts initiated keep track of the payment status as well as check-in history for the specific shipment. Once a check-in is authenticated and verified to be genuine, the liquidity protocol will drop the in-progress compensation

Smart contracts enable automated money supply management, implementation of specialized supply chain rules, and a variety of pre-programmed behaviors associated with economic tokens. In DropChain's Liquidity Protocol, token cryptoeconomics incentives all players to drive 100% transparency into the supply chain.

4.2 BINDING PROTOCOL

The demand-side liquidity generated in the base layer of our protocol stack is utilized by its second layer, the Binding Protocol.

The Binding Protocol defines all the ways in which demand-entities can generate unique tracking objects and bind them with a specific volume, measurement or shipment of goods. This is the primary service the DCN provides all brands to track their products across the supply chain. The number of tracking objects that will be generated by the DCN is directly proportionate to the amount of BUZZ tokens deposited by the demand-entity.

DropChain will adopt globally accepted GS1 standards for unique identifiers. GS1 identification standards define unique identification codes (called GS1 identification keys) which will be used within the DCN to reference real-world objects such as crates, unit loads on pallets, or individual cases. GS1 ID keys are globally unique and can be shared between multiple supply-entities, increasing supply chain visibility for participants. By leveraging GS1 standards, we create a common foundation for uniquely identifying products that enter the DCN.

4.3 TRACKING PROTOCOL

The Tracking Protocol is the third layer of DropChain's protocol stack. This layer governs three aspects of the DCN:

- The mechanisms through which information is captured in the supply chain
- The methods used to manage that data within the DCN
- The algorithms for verifying the validity of new supply chain data

Data Capture. DropChain's ecosystem will adopt an open-standards methodology when referring to data capture methods. As stated earlier, a full suite of development API's will be made available, in addition to a fully agnostic approach when it comes to labelling or scanning technology employed to exchange data with the DCN.

However, global standards in data capture will still be followed to ensure all information will be accurately and consistently recorded. DropChain will adhere to GS1 data capture standards, which currently includes definitions for bar code and radio-frequency identification (RFID) data carriers, allowing for GS1 ID Keys and supplementary data to be affixed directly to a physical object. GS1 standards also dictate a consistent interface for readers, printers, and other hardware and software components that connect to the DCN.

Data Management. Supply chains span the globe in today's economy, and the propensity for local standards to be used when sharing data can result in data corruption as it is disseminated across the supply chain. To mitigate this problem, we will leverage global standards for electronic data management to facilitate the automation and ensure the consistency of data occurring across the supply chain.

Standardization of data within our ecosystem is critical for sustainable data integrity. Since XML is better adapted for information exchange using the internet-based technologies, it will be the lingua franca across the DCN. This standard will encompass most areas, including master data, logistical data, and incentive data.

To further strengthen data integrity and to ensure system-wide transparency and readability of supply chain data, the structure and content of the XML data will follow GS1 XML standards, which dictates a clear process flow with checks and balances to ensure the message sent is consistent with the message received.

Data Verification. All data received from supply chain nodes must be authenticated and verified before entering DropChain's data network. Numerous checks will be in place to ensure the integrity and consistency of information.

DropChain's analysis engine will be an integral part in driving supply chain data integrity. The Tracking Protocol will perform this verification in real-time and the backbone of its logic will determine trustworthiness through sophisticated rules-based analysis[7], evaluating the event chains of each individual piece of data that passes through the DCN. Rules-based analysis is dependent on multiple algorithms being applied concurrently:

- Velocity consistency
- Dwell-time consistency
- Lifecycle consistency
- Pair-wise shipping/receiving confirmation

The protocol will model complex trust relationships and will simultaneously generate data used for accounting, risk-management, and preventative analysis. We call our system of fraud and counterfeit detection the Integrity and Continuity Engine (ICE) and its architecture will be discussed in detailed in Section 5 (Data Integrity).

[7] Adapted from the EPCIS-based Supply Chain Visualization Tool by Alexander Ilic, Thomas Andersen, and Florian Michahelles, 2009

4.4 INCENTIVE PROTOCOL

The final layer of DropChain's protocol stack is the Incentive Protocol. It defines and governs the incentive system that sits at the heart of the DropChain's ecosystem. The protocol provides transparency into changes in the financial state of all supply chain node entities and ensures they are dynamically compensated accordingly based on their contribution.

An inherent problem with current supply chain systems (whether or not they leverage Blockchain technology) is their inability to align incentives of key stakeholders. The old adage of "if you build it, they will come" does not play true in the world of distribution.

Although demand-side entities (brands) and top-tier distribution nodes see the value of a fully-efficient and transparent supply chain, nodes further along the supply chain see nothing to benefit from participation. Current solutions focus on rewarding the end-user to extract basic consumer data such as location, date, and brand; however, only having visibility at the beginning and the very end of the supply chain means companies have little knowledge of how that product arrived in the hands of the consumer. The product may have gone through multiple grey channels unknown to brand owners. Perhaps the product was already consumed but the bottle was refilled with fake content and resold to another customer in another city.

Without the prerequisite supply chain transparency, brands find it difficult to optimize distribution channels, root out parallel imports and dissuade illegal activities such as inter-province sales or counterfeiting. Despite leveraging the latest technologies to build something truly transformational, most companies fail to address the simple question of: "what's in it for me?"

Priority and focus is placed on participants who matter most to supply chain transparency: logistics firms and distributors along the product's supply chain. In DropChain's gamified incentive system, participants receive cryptocurrency specific to DropChain's economy as direct payment for their time spent checking in shipments into the DCN.

A Blockchain-based system distinguishes our incentive system through cryptoeconomics. Through automated smart contracts unique to a cryptocurrency economy, there is no ambiguity or reneging on services rendered. Dynamic incentives specific to each stage on the supply chain, governed in real-time based on the transactional velocity and market capitalization of the cryptocurrency, are immutably recorded and immediately transacted once participants complete their contribution. The simple, direct nature of transactions performed via smart contracts is one of the main reasons Blockchain is our technology of choice.

The exact value of the cryptoeconomic incentive differs depending on the stage in the supply chain process. Each value is also dynamic in nature and will fluctuate depending on a multitude of variables such as but not limited to:

- Current valuations of Ether and BUZZ coin
- Volume of BUZZ tokens being transacted by demand-entities
- Volume of BUZZ tokens being earned by supply-entities

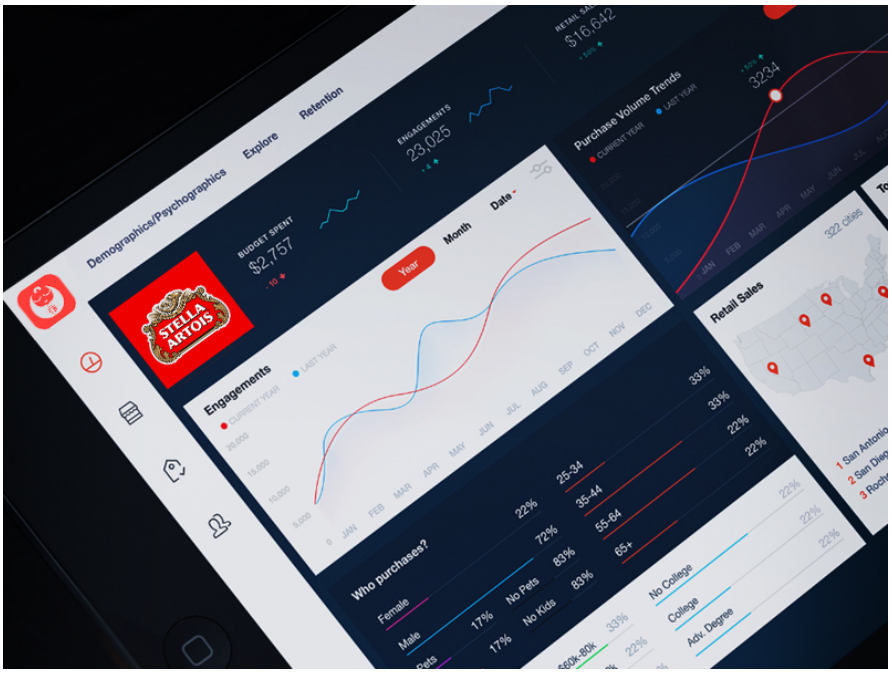
A cryptoeconomic approach removes much of the frictions inherent in traditional service-based relationships whereby one party promises to pay another upon completion of a particular task. Whether one party decides to fulfill their end of the agreement and exchange payment in a reasonable, timely manner is unknown. Smart contracts eliminate these headaches. An action performed welcomes an equal and predefined reaction without any personal considerations.

4.5 APPLICATION PROTOCOL

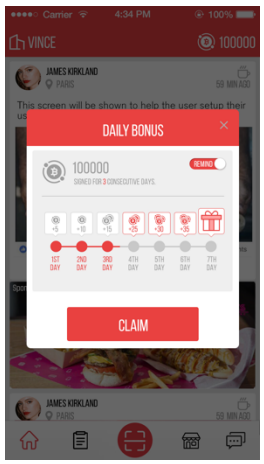
The Application Protocol is the final layer of the DropChain protocol stack. This layer defines the global dashboards, tools, APIs, and data analytics standards which would facilitate both demand and supply-entities accessing DropChain's supply chain network.

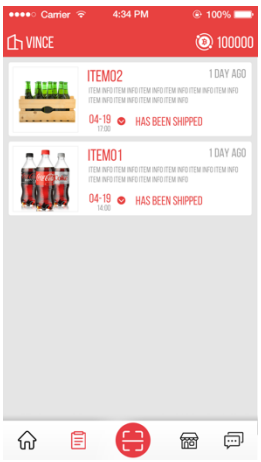
Brands who leverage the DCN will have access to a full range of tools and dashboards allowing them to easily track, aggregate, and analyze their product supply chain. Our mission is to drive full supply chain transparency, enabling brands to make smarter more

targeted business decisions. At the same time, this transparency will improve overall supply chain integrity, allow brands to better manage existing problems surrounding parallel imports and inter-provincial sales.



Furthermore, a fully transparent supply chain will decrease the overall counterfeit rate of a specific product, due to the increased difficulties involved with faking the unique identifiers on a specific case or shipment, ultimately improving food safety overall.





5 DATA INTEGRITY

As supply chain data enters DropChain's data network via distribution nodes, a multitude of checks will be in place to ensure data integrity, both in the authenticity of the data sender, as well as the data itself. Any discrepancies in data or participant will be flagged for review and the unique tracking object (GS1 ID) labelled as potentially compromised.

At the heart of DropChain's data integrity system lies the Integrity and Continuity Engine (ICE), a complex series of algorithms designed to detect any anomalies in data across every product supply chain being stored on the DCN. The Tracking Protocol will perform this verification in real-time through rules-based analysis[8], evaluating the event chains of each individual piece of data. The following are a few of the core logic components that govern each data integrity check.

5.1 VELOCITY CONSISTENCY

Since the DCN handles real-world objects (food and beverages), certain speed constraints apply in the distribution process. Velocity consistency verifies that the velocity (calculated as a function of time and geographic location) is between a minimum velocity v_{min} and maximum velocity v_{max} defined via dynamic distance calculations leveraging readily available mapping API's

The rationale is that goods cannot move faster than the mode of transport allows. For example, if the data is received describing a product was seen at 9 A.M. in Germany and an hour later in Japan, this rule would detect that the maximum threshold v_{max} is exceeded and the corresponding GS1 ID would be flagged as compromised.

[8] Adapted from the EPCIS-based Supply Chain Visualization Tool by Alexander Ilic, Thomas Andersen, and Florian Michahelles, 2009

This inconsistency can be caused e.g. by a counterfeit tag (indicating a fake product). If the transportation method for a specific product is known (e.g. truck, ship, plane, etc.), v_{min} and v_{max} can be configured more accurately to reflect the real-world constraints.

5.2 DWELL-TIME CONSISTENCY

All consumable items have a finite lifespan. In general, the goal is to move goods as quickly as possible across the supply chain to ensure shelf-life is minimized. Dwell-time consistency verifies that the length of time between location e_i and e_{i+1} is below a predefined threshold of t_{max}.

Quality degradation is a major issue for the perishable food. Tracking and predicting the quality of perishable food was a challenging and costly task prior to the introduction of modern sensing technologies, such as RFID tools and humidity-temperature sensors. Nowadays quality prediction models, brands can make a more accurate prediction about the remaining shelf life, which is the and end consumer's main concern.

The quality degradation of perishable food is affected by multiple factors, such as storage time, temperature, and ambient conditions.[9] More specifically, the quality degradation can be expressed by the following equation:

$$(1) \quad \frac{dq}{dt} = -kq^n$$

where q is the quality of a perishable product, k is the rate of degradation, and n is the chemical order of the reaction. In the Equation 1, n could be equal 0 or 1, for the facilitation of two types of different degradation models. When $n = 0$, the quality decays at a constant rate. When $n = 1$, the quality decays exponentially. This setting appears to be more realistic and hence has been used widely in research relevant to perishable food items. For this reason, our research assumes $n = 1$. In Equation (1), k can be expressed as

$$(2) \quad k = k_0 e^{-(E_a/RT_0)}$$

[9] Labuza, T.P. Shelf-Life Dating of Foods; Food and Nutrition Press: Westport, CT, USA, 1982.

where k_0 is a constant, E_a is the activation energy, which can be estimated from empirical data, R is the gas constant, and T_0 is the absolute temperature. According to Equations (1) and (2), the quality of perishable product at time t can be modelled by

$$(3) \quad q(t) = q_0 e^{-k_0 t e^{-(E_a/RT_0)}}$$

where q_0 is the initial quality. In most retailers, the temperature and atmosphere condition are relatively stable. Therefore, we introduce λ as the deterioration rate to simplify the mathematical expression. Let

$$(4) \quad \lambda = k_0 e^{-(E_a/RT_0)}$$

Hence, the quality at time t becomes

$$(5) \quad q(t) = q_0 e^{-\lambda t}$$

Goods that sit idle too long at a specific distribution node would raise concerns within ICE. If the dwell-time is consistently long (or lasts forever) for multiple products passing through the same node, it may suggest the distributor is involved in exporting parallel goods, or they have inefficient stock rotation processes. Either way, the reputation of this distributor would be affected, having a direct impact on their compensation model in the Incentive Protocol.

5.3 LIFECYCLE CONSISTENCY

Every unique tracking object generated on the DCN is represented with an activation date/time. Once the tracking object is judged to have reached its final destination (e.g. a small business), a deactivation date is also recorded. The lifecycle consistency rule ensures that there are no events before the original activation as well as after the deactivation. Any inconsistency would suggest the GS1 ID has been compromised or a counterfeit product has been introduced to the supply chain.

5.4 PAIR-WISE SHIPPING/RECEIVING CONFIRMATION

Traceability is a core requirement to ensure food safety, especially since according to PricewaterhouseCoopers, food fraud is estimated to be a $40 billion a year problem.[10] The logic behind pair-wise shipping/receiving confirmation governs the chain of custody as a product passes through its supply chain. This rule ensures that for every distribution node value of e_{i+1} (receiving) there is a is a corresponding distribution node of e_i (shipping). Duplicate send/receive steps for the same GS1 ID would trigger alarms on inconsistency in the supply chain data, directly impacting the traceability of that shipment.

ICE will model complex trust relationships and will simultaneously generate data used for supply chain node reputation scores. Distributors who consistently raise red flags within DropChain's ecosystem will be penalized with a reduced tokenized compensation. Continued abuse would result in a permanent ban from DropChain's services. At the same time, distributors that routinely demonstrate a commitment to data integrity and supply chain efficiency will be rewarded with additional tokens.

[10] https://press.pwc.com/News-releases/fighting-40bn-food-fraud-to-protect-food-supply/s/44fd6210-10f7-46c7-8431-e55983286e22

6 THE DROPCHAIN NETWORK

Blockchain will create tremendous waves as it modernizes countless industries to come. However, there are still inherent limitations to the Blockchain technology. The technology lacks the necessary database functionalities necessary for tracking multi-layered, data-intensive supply chains. Ethereum, IOTA and similar solutions are not designed for this type of data storage, nor can they provide complex data manipulation functionalities similar to SQL that would be core to a data analytics platform. The cost of data storage and operations is also higher than traditional centralized database solutions, making a Blockchain-only solution economically and practically unviable.

Decentralized solutions such as IPFS and Storj handle document storage but cannot address the complexities of global interconnected data while delivering advanced database search and operational capabilities found in professional database solutions. Traditional database solutions deliver on the advanced database functionalities necessary in a global supply chain system, but its centralized data storage does not address the key challenges of data fragmentation and the decentralization of supply chain data. Centralized management is also inherently more susceptible to data tampering and stakeholder collusion versus a distributed data solution.

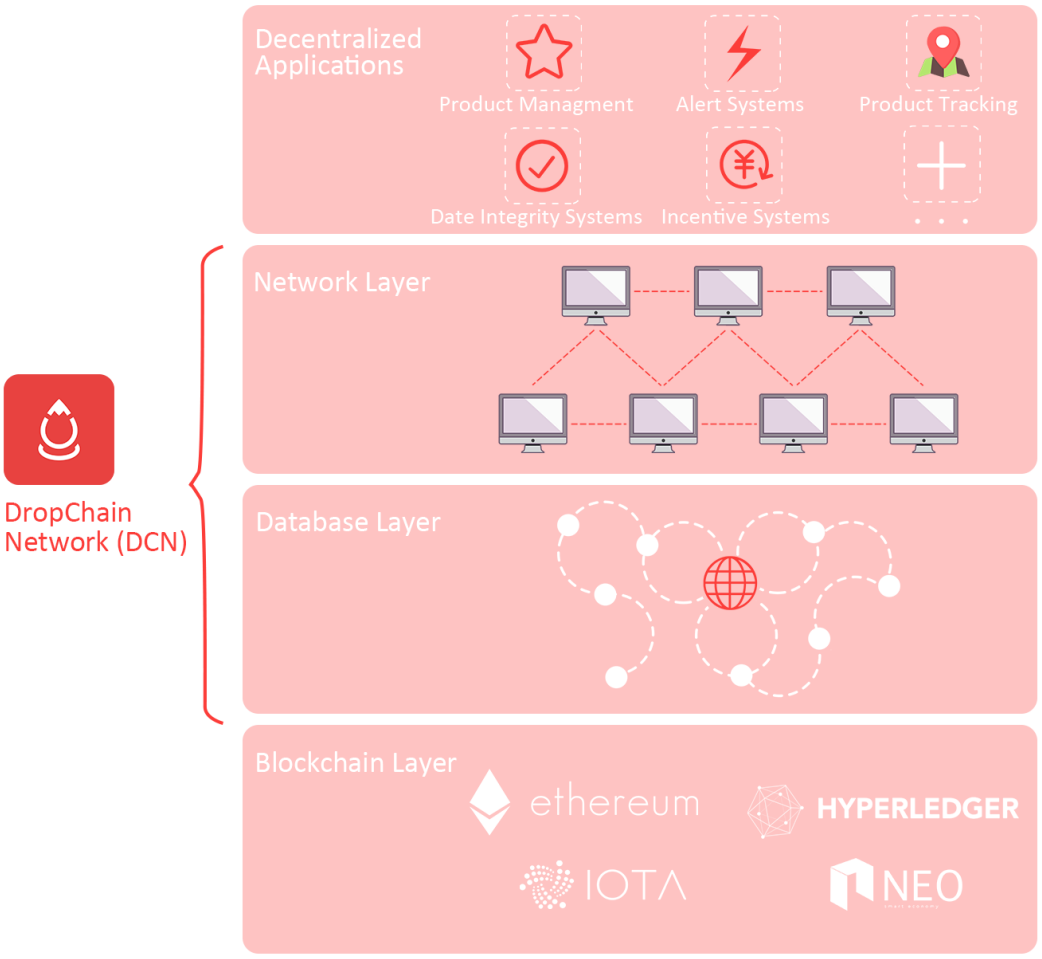
DropChain's ecosystem is high-volume, high-frequency in nature due to the fact we are dealing with food and beverage distribution. The complexities of the industry's global supply chain also require a high level of interconnectivity between all stakeholders. While an open and decentralized solution is our mission, it must also deliver world-class performance in traditional database analytics to deliver quality data to end-users.

The optimal infrastructure for the DropChain Network (DCN) is a multi-layer, multi-tier decentralized network with an off-chain database layer to facilitate data storage and analytics.

The Network Layer would be responsible for demand and supply-entity-facing functionality such as negotiating services, processing and retrieving data, product

tracking, verifying supply chain data integrity and managing incentive allocation. The Database Layer would handle the bulk of the data storage requirements. This will increase overall Blockchain efficiency and lower operational costs.

DropChain Ecosystem



7 GAMIFICATION

DropChain will not only offer the next generation of supply chain tracking and transparency solution, but it will also offer its users a great experience and community. By applying the principles of gamification (Incentivization, Engagement, and Retention) into the various features of the platform, DropChain will create unique mechanics and activity loops that will encourage usage, engagement, participation by its users.

Incentivization (Rewards):

DropChain can only be successful if it's users contribute to the platform. To ensure and encourage participation, DropChain will leverage its token economy and reward the participants with the platform's tokens. Designing features that gives clear steps on how to reach goals is paramount, as well as offering small encouraging feedback along the way, are one of the keys in gamifying the experience. The following are some examples of obtaining these rewards:

- Completion of Milestones (check-ins, delivery completions, shipping efficiency, average stock rotation period, etc...)
- Referrals (earn tokens for referring other similar businesses)
- Registration (platform registration, providing identification, business licenses, storefront address, etc...)

Engagement (Making it fun):

Making the platform easy and fun to use will be a core philosophy around the design of features on the DropChain platform. DropChain wants to have its users participate and contribute not only in the data collection, but also in social community building as well. By offering mechanics and features that allow users to post and share their activities and events, as well as give the community opportunities to provide feedback, we can offer an engaging social system to connect the various user groups with each other. Here are some examples that would help improve engagement:

- Proximity-based connecting (users to other users, locations of interest, etc.)
- Posting / Blogging opportunities (linked to future feature expansion plans)
- Like, Reward, Donation mechanics (feedback can be Likes, Comments, and even rewards)
- Brand Announcements

Retention (Encourage them to come back):

User Retention remains one of the biggest problems in any app. By utilizing proven game designs from the game industry and providing incentives, user retention can be increased and maintained. The more times we can get the users to come back using our app, the more ingrained our ecosystem will be in their daily lives. Here are some ways to increase user retention:

- Daily Login rewards (cumulative login rewards, consecutive login rewards, sponsored reward days, etc.)
- Tiered Gacha rewards (offer random special rewards; tokens, coupons, stickers, prizes, etc.)
- Timed Gacha rewards (open the box in 5 hours, open the box in 12 hours, open box in 24 hours, etc.)
- Task Completion Rewards (opening a marketplace store, placing an item on the marketplace, publishing your first post, referring your first 10 friends, etc.)

Gamifying the food supply network requires intimate knowledge and close relationships with key stakeholders along a given supply chain. Understanding their intrinsic motivations is critical to designing out the gamification pieces necessary to drive adoption and keep all users engaged.

DropChain's sales and business development team has had over 10 years of experience in the food supply chain working with every level of distribution. We have a solid understanding of their needs and how to translate them into real product functionality.

7.1 GAMIFICATION ENGINE AND PARAMETRIC ALGORITHMS

Currently, the gamification engine (GE) is configured so to group gamification objects (actions and milestones) in four broad thematic areas:

- Shipment Scanning: refer to actual number of shipments scanned in as recorded by each distribution point
- Shipment Scanning Insight: refers to understanding how to optimize shipment scanning.
- Engagement: refers to activity in the ecosystem and within the community.
- Profiling: refers to data input about the brand.

Across such areas, there are four major categories of actions:

- Scanning actions: these actions derive from distribution point scanning activities. When the scanning data is received by the DropChain Network (DCN), they are filtered through our data integrity engine (ICE) to monitor data quality and shipment integrity.
- Ecosystem usage actions: these actions are generated as consequences of the user activity by distribution points.
- Gameplay actions: these actions are produced by the GE.
- External actions: these actions are produced by external applications, e.g., the pre-existing ecosystem of each distribution point.

The algorithms for action recognition and token assignment differ according to the source of the action and the synchronicity of the rule engine computation. Scanning actions are evaluated synchronously for all users. The parametric algorithm for weekly scanning activities can be sketched abstractly as follows (the monthly version is similar):

```
For each user U_j in the set of distribution partners DP
If reading frequency >= day
  Compute new weekly average NWA;
  For all active weekly goals WG_k of user U_j
    If NWA-Weeklybaseleine/Weeklybaseleine>= WG_k SatisfiedWeeklyGoals += WG_k;
  End for;

AchievedWeeklyGoal = max (SatisfiedWeeklyGoals);
For all goals G_i in AchievedWeeklyGoals
  Tokens_i = G_i.actionType.score;
  SendGoalNotification(U_j, G_i);
  U_j.profile.tokens+=Tokens_i;
  IncrementTokensInArea(U_j, “scan”, Tokens_i);
  UpdateBadges(U_j);
  UpdateRewards(U_j);
End for;

ResetGoals(U_j);
End for
```

The other categories of actions of the GE that do not depend on the asynchronous processing of scanning data are treated differently. They are triggered by individual users’ events, which are managed by means of asynchronous calls to the GE:

```
Loop:
When Action A_j of User U_i is received at the GE
If (A_j.Active=true AND
  (A_j.repeatable=true OR Count(U_i,A_j)=0) AND
  (A_j.check_time_elapsed=false OR A_j.timestamp-A_j.lasttimestamp > A_j.time_elapsed))
  Tokens = A_j.actionType.score;
  U_j.profile.tokens+=Tokens;
  IncrementTokensInArea(U_i, A_j.area, Tokens);
  UpdateBadges(U_j);
  UpdateRewards(U_j);
End loop.
```

8 BUZZ TOKEN ECONOMICS

The DropChain Network (DCN) is enabled by the tokenization of data tracking and supply chain node contribution activities. There are two primary economic activities that drives our ecosystem:

1. The purchase of BUZZ tokens by brands (demand-entities) to generate unique object trackers on the DCN
2. The conversion of BUZZ tokens into Ether or fiat by supply chain nodes (supply-entities) as compensation for their participation

The BUZZ token serves as a means to access DropChain's services for demand-entities on one end, and as a means of compensation for supply-entities on the other. BUZZ tokens provide the incentive for supply chain nodes such as distributors and even small business owners to participate in the supply chain tracking process.

The ongoing operational costs and maintenance of hardware managed by third-party infrastructure providers on the DCN will also be accounted for and will be dynamically factored into the overall tokenized fee imposed on demand-entities.

The Blockchain layer is also an independent system and will therefore incur a specific transactional cost, dependent on the underlying Blockchain technology being used by DropChain. For example, in the case of Ethereum, a small amount of "gas" (Ether) is also needed to store the necessary hashes on Ethereum for the storage operation. This cost will also be factored into the tokenized fee.

Once demand-entities purchase BUZZ tokens and begin generating unique tracking objects (identified by its GS1 ID), that object is allowed unlimited Write operations on the DCN, as infrastructure providers have already been compensated for the storage

operations of this specific object. Read operations are also unlimited in order to facilitate the quick access of supply chain data at any time without additional cost.

Supply-entities are incentivized to check-in shipments they receive along the supply chain. These tokens are bound directly to their registered DCN account and is non-transferrable. The number of tokens awarded as compensation for participation is a function of supply chain transparency and where a node is located along the supply chain itself. For example, if the Incentive Protocol determines the supply chain for a specific product lacks transparency at later stages, the incentive for lower-tier distributors will be increased to encourage participation. At the same time, if a supply chain is nearly transparent due to participation by multiple distribution nodes, then the Incentive Protocol will decrease the incentive accordingly. This compensation model mirrors those used by O2O logistical startups today, including Uber, Didi, and Grab Taxi. As the number of passengers waiting for rides increases, the compensation for Uber driver increases gradually to encourage them to begin picking up passengers.

Gamifying the compensation experience is central to DropChain's strategy, with elements to encourage repeat usage and long-term product stickiness. A number of strategies currently used in the gaming industry will be leveraged to drive both brand and distributor adoption.

BUZZ tokens generated by the Liquidity Protocol is the native transaction currency for the Incentive Protocol, but it will also accept other means of monetary exchange, such as fiat or cryptocurrencies. DropChain will develop a clearing house platform allowing participants to convert fiat or cryptocurrencies to and from BUZZ tokens.

As brands achieve near-full transparency into their supply chains, gather laser-focused customer data, and fully integrate DropChain into their distribution workflows, the volume of BUZZ token usage will naturally increase. At the same time, distributors will increasingly earn more participating in the supply chain process, dedicating the necessary off-line resources to handle this workload. This will create a self-sustaining ecosystem whereby demand and supply-entities benefit in their own respective ways.

9 THE COMPANY

9.1 THE TEAM

DropChain is a team of 10 and growing. Our primary hiring focus post-ICO will be on top-tier engineers with backgrounds in global supply chain, network security, Blockchain, and networking. Some of our current team members are:

Billy Chan
CEO

Charles Zeng
COO

Vincent Nguyen
Chief of Product

James Wong
Chief of Marketing

Kay Neuenhofen
Blockchain Engineer

Billy Chan – Co-founder, CEO, and Chief Tech Nerd

Billy is a veteran of the IT industry, with over 15 years of software development, consulting, and sales experience in digital technology. Most recently he led the software antipiracy efforts for Microsoft in Eastern China. DropChain represents the culmination of his lifelong interests in technology, supply chain and good food. He has been passionate about Blockchain since 2015 and is excited about leveraging it to reinvent the food and beverage distribution industry.

Charles Zeng – Co-founder and COO

Charles is a restauranteur based in Shanghai. Born in Shanghai, raised in NYC, studied finance, Charles worked for L'Oreal, Shell and Pricewaterhouse Coopers before he decided he wanted to try his hands in entrepreneurship in the "China" that everyone in the finance industry was talking about. Charles currently owns and operates 7 restaurants in Shanghai, fully fluent in both the Chinese and English language, in touch with the 50 shades of grey of how business operates in China, and most importantly, has learned

how to leverage his American roots and heritage to improve the traditional Chinese management ideals to drive better results among his employees.

Vincent Nguyen – Chief of Product

Formerly a Producer at Tencent and Game Designer at Gameloft, Vince founded Faceroll Games Limited, a game development studio based in Shanghai, China.

Having experience in gamification, engineering, game design, platform design, digital arts, audio development, and production management, Vince provides the development teams the vision, focus, management, and execution to ensure high quality output and efficiency during the production process.

Vince led the team in developing Activision's most profitable Call of Duty mobile game, Call of Duty: Heroes to over 50 million downloads, over 2 million 4.5 star reviews avg., $50+ million lifetime revenue, with nearly no UA spending.

James Wong – Chief of Marketing

James has worked over 27 years in product, brand management, supply chain management, and retailing. A hands-on product merchandising, digital marketing and sales professional with successful business track record in licensing brands with Paul Frank, Minions, and adidasSwim sold in China and USA ecommerce platforms, wholesale, retail channels.

Kay Neuenhofen – Blockchain Engineer

Kay has proven experience in system and application development, product deployment and performance tuning. At Sun Microsystems, he contributed to the implementation of the Java Virtual Machine. At Netflix, Kay lead the development of the Netflix iPad app which was ultimately demoed by Steve Jobs at WWDC. Most recently, Kay has implemented parts of the Bitcoin protocol and developed several PlayStation apps for Major League Baseball, including ones for the WWE, MLB, and HBO. These apps are running on 100,000s of devices around the US, and were developed under very tight deadlines.

9.2 ADVISORS

DropChain has put together a team of industry partners and seasoned advisors dedicated to guiding the growth of our business. In additional to technology advisors, we also placed heavy importance on supply chain and industry specialists.

William Bao Bean
General Partner
SOSV

Terence Wang
Managing Partner
AGA Capital

Malcolm Tan
CEO
DXCEL International

Felix Wendlandt
GM
Brander Craft Beers

Allen Fang
Director
Trade & Marketing
Anheuser-Busch InBev

Adrian Lam
ICO Advisor

Alvin Foo
ICO Advisor

9.3 EARLY INVESTORS

DropChain's partner company Foowala raised a seed round of financing from SOSV (Chinaccelerator), AngelVest, and the Shanghai Pudong Government (Shanghai Science and Technology Committee) to jump-start development of our ground-level sales infrastructure and online platform services.

10 STRATEGY, ROADMAP, & TOKEN SALE

10.1 GO-TO-MARKET STRATEGY

DropChain's ecosystem is applicable across many segments of the food and beverage industry. In the initial stages of DropChain's pilot project and MVP rollout, we will leverage our existing industry expertise and supply chain knowledge and focus exclusively on alcohol and beverage distribution.

Why alcohol? Brown-Forman estimates 30% of all alcohol in China is fake,[11] with an estimated 70% of all wine sold being counterfeit as well. The counterfeit of alcohol results in an estimated $1bn annual loss on revenues for the alcohol industry.[12] By narrowing our focus to alcohol distribution, we can leverage what DropChain's founding team already knows and speed up our execution and product development. This systematic, targeted approach better enables us to perfect our tokenized incentive program and cryptoeconomics of DropChain's ecosystem.

Once the DropChain Network goes live in 2020, we will expand into other markets, both local and abroad. We will also begin expanding into foods that are most susceptible to counterfeiting and also suffer from lack of transparency and traceability such as:

- Olive oil (80 percent of Italian olive oil is fake)[13]
- Meat (the horsemeat scandal)[14]
- Milk
- Coffee

[11] https://www.theguardian.com/sustainable-business/2015/sep/16/china-fake-alcohol-industry-counterfeit-bathtub-booze-whisky
[12] http://www.incoproip.com/chinas-fake-booze-market/
[13] https://www.forbes.com/sites/ceciliarodriguez/2016/02/10/the-olive-oil-scam-if-80-is-fake-why-do-you-keep-buying-it/#7ee57b38639d
[14] http://www.thejournal.ie/horsemeat-scandal-explainer-3499580-Jul2017/

10.2 TIMELINE

Below is our anticipated timeline for the development of the DropChain ecosystem, including key partnerships with brands and distribution channels, the DropChain Network, ICE data integrity protocols, and data analytics platform.

Q2– Q3 2018

- Whitepaper release
- Private Pre-Sale Date: April 15 - 29
- Public Pre-Sale Date: May 7 - 27
- Crowdsale ICO Dates: June 17 – July 1
- R&D for system architecture and Blockchain specifications
- Partner with local brands and existing distribution channels on infrastructure development and MVP testing
- Alpha prototype product launch

Q4 2018 – Q1 2019

- MVP Blockchain and logistics infrastructure complete
- GS1 global supply chain standards integration
- ICE data integrity protocols and algorithms complete
- DCN supports incentive payment and payout options in BUZZ tokens only
- MVP launch in East China focusing on craft beers, boutique liquor brands (gins, whisky, etc..), and wine

Q2 – Q3 2019

- Further expansion of partnerships with larger (international) brands and distribution channels to drive DCN ecosystem adoption

- Data analytics platform online, followed by launch of iOS, Android, and WeChat MiniProgram client applications
- Integrate with a third-party currency conversion protocols to enable payment and payout in ETH and all ERC20 Tokens, as well as BTC and fiat
- Partner with startups to test automation of supply-chain tracking

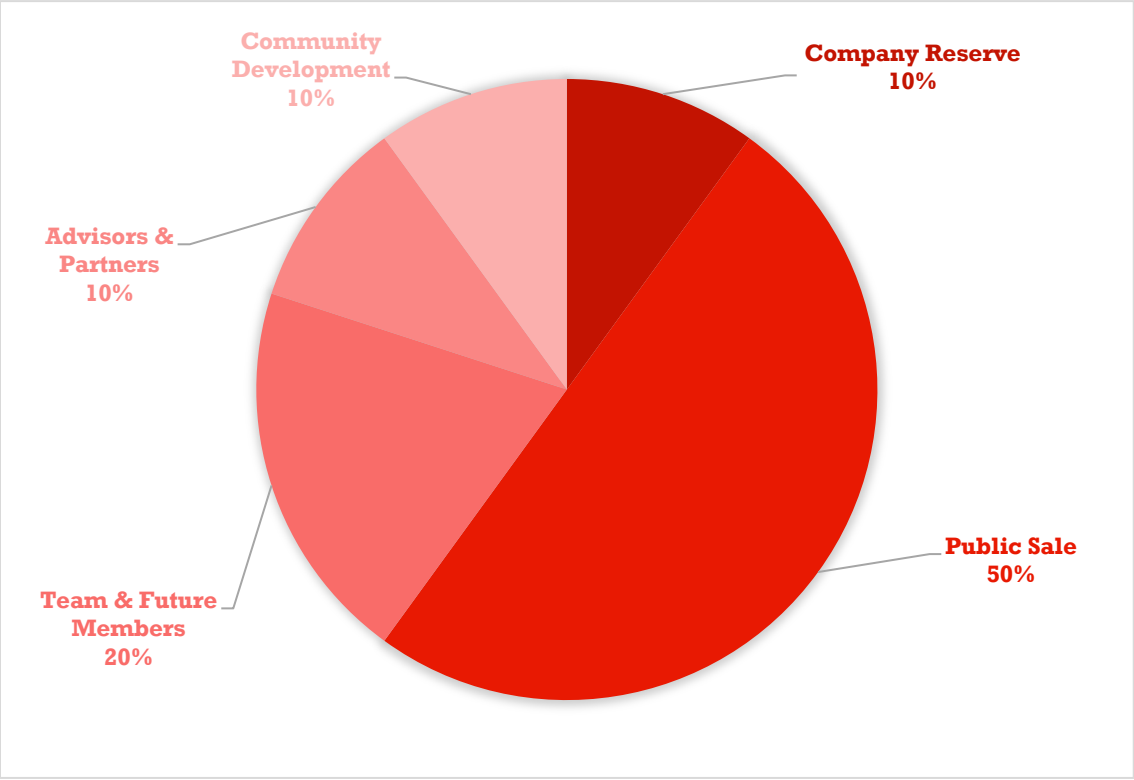
Q4 2019 – Q1 2020

- DropChain Network goes live with full supply chain integration leveraging tokenized incentive system and global data analytics platform
- DropChain begins expansion of supply chain ecosystem into other verticals
- Implement governance model for future protocol improvements
- Promote the growth of the DCN ecosystem and assist brands and distribution partners globally with integrating DropChain into their supply chain

10.3 TOKEN SALE

Main Sale Details	
Hard Cap	USD 20 Million
Dates	17 JUNE 1:00PM UTC to 1 JULY 12:59PM UTC
Accepted Currencies	ETH only
BUZZ to USD Rate	1 BUZZ = US$0.08
Token Supply	Total Token Supply: 500,000,000 BUZZ ICO Token Issuance: 250,000,000 BUZZ
Maximum Contribution	TBD based on number of whitelisted participants

10.4 TOKEN DISTRIBUTION



The BUZZ Token team will be on a 2-year vesting schedule. The team will receive 1/4 of their allocation 6 months after the end of the Public Sale. Every month thereafter, the team will receive 1/24 of their allocation until the 2-year vesting schedule is complete. Cofounders are not exempt from this vesting schedule.

Below is the breakdown of the funds after the token sale.