Jungle Protocol and Consortium

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Executive Summary

Vision

Digitization and Internet technologies are changing how financial systems are built in recent years. A number of traditional building blocks, such as payment and settlement processes, have been advanced, and access to a variety of financial services are now available to people who did not have it previously. This fundamental transformation of how financial systems are built is one of the biggest changes since money was invented. This shift is not only the result of the evolution of technology, but also the fundamental demand that everyone on the planet today is having. When good news about a world-famous company travels across the globe within a few hundred milliseconds over the Internet, people naturally desire to instantly make an investment into the company's future.

Despite the recent progress in technology and huge demands to be exposed to different risk assets in the world, it is still difficult to do so for many people in different countries on the planet, sometimes due to fragile financial systems in the local area, or other times due to incompatible regulations between jurisdictions. Some of the problems in the currency and commodity realm have been tackled by a variety of stablecoins. However, stock markets are still very local and centralized.

We see this is a big problem to solve. The solutions we propose are the Jungle

Protocol and Jungle Consortium. The Jungle Protocol provides a token mechanism representing an equivalent value of different stocks with one-to-one collateral on a blockchain. This protocol implements the process of issuance, redemption, and corporate actions of a token, one-for-one collateralized by stock, when demands exist. The Jungle Consortium provides the framework for transparency and trust of the ecosystem around this protocol.

Jungle Protocol defines the procedures of issuance, redemption, and corporate actions of its on-chain tokens that are backed by fully collateralized underlying assets. The collateral is held by members of the protocol who shape the Jungle Consortium and govern the protocol in a decentralized manner. This framework is designed to work with local stock markets worldwide to provide access to the rest of the world. For example, South African stock traders who are seeking access to Japanese stock markets would be able to buy a fraction of Nintendo stock with Ether. There might be Brazilian crypto providers who would like to provide Indian stock liquidity to local investors as digital assets. It also has never been easy to trade pairs of Tesla and Toyota's stocks simultaneously. The examples are endless. All of these opportunities will be made possible by having digital tokens representing each underlying asset.

Others have attempted to tackle this problem. But Jungle Protocol is an innovative approach that overcomes the obstacles in a regulatory compliant manner. Jungle Protocol will open a new chapter of the global financial system. As another new building block of the DeFi space, Jungle Protocol also expects additional accelerated financial innovations with the adoption of the protocol and applications built thereon by other innovators.

Comparison to Previous Works

On-chain, Trustless Asset

Traditionally, bilateral methods have been utilized to represent stock values of foreign markets. This includes today's Contract-For-Differences (CFDs) including some named Tokenized Stocks. These products are provided by a financial institution that hedges the risk by holding the underlying assets, and the continuity of the product and service is therefore subject to the durability of the service provider. In other words, it is a so-called vendor lock-in situation.

Another similar approach that is used in American stock markets is American Depositary Receipts (ADRs). While ADRs are widely available within American stock markets, they are not available in other countries. Also, it has been pointed out that ADRs don't represent the value exposure of the underlying assets in real-time. As something that is managed by financial institutions, ADRs also cost investors additional fees.

Jungle tokens are smart contracts on public blockchains. They are accessible by anyone in the world and free to transfer to other digital asset services if preferred. Unlike CFDs, investors utilizing Jungle tokens can change the counterparty and are less worried about continuity of service providers so long as they hold assets in their on-chain wallets and the underlying asset is collateralized. Unlike ADRs, the tokens do not incur unnecessary fees by holding them. With the ability to exchange Jungle tokens in multiple venues, price discovery is also highly available.

In addition, due to their bilateral nature, CFDs are not available over weekends, and ADRs are subject to the particular equity exchange's business hours. Crypto trading, on the other hand, is 24/7. This is made possible because of the inherent trustlessness of utilizing cryptographic tokens.

1:1 Collateralized

Some of the previous similar efforts in the DeFi space proposed algorithm-based price discovery methods. According to those proposals, the tokens were collateralized by other digital assets, and the depreciation of the collateralized assets either caused liquidation of the tokens or required more collateral. While this seemed to work for the time being, those tokens did not fundamentally provide the base economic value of the token, as the collateral assets were very volatile against the underlying assets. Thus, the prices of these tokens were often not pegged to the underlying asset.

Jungle tokens are always backed by one-to-one collateral of the underlying assets. If you have one Jungle token, you can always redeem it for the underlying asset, because the underlying assets are custodied by the protocol members for redemption. While algorithm-based assets may be above or below the underlying asset's price due to the lack of publicized intrinsic economic value, Jungle token holders would be hard pressed to believe the value of the token is far from the underlying asset's price when you can redeem it 1:1. The custody services are provided by the members of the protocols, which we will discuss in later sections of this document.

Corporate Actions and Dividends

Equities are not just about trading. Public companies perform reorganizations for many reasons, which is a very important aspect to replicate onto chains. Ever since the very first company, East India Company, was established, dividends have been and will be one of the critical components of the company's equity to its shareholders. From time to time, it also is necessary for a company to change the terms of issued stocks, to update outstanding shares, or issue a new type of shares. These events are part of the stockholder's journey that needs to be propagated to the on-chain tokens, to replicate the same user experiences to the token holders.

None of the previous works, including CFDs, have done this correctly and smoothly, making Jungle Protocol the first that supports corporate actions and dividends seamlessly. This is made possible because of the 1:1 collateralization. When all the economics happen to the underlying collateral, the protocol can transfer the updated attributes and values of the underlying securities to the on-chain token. With the collateral custody's automated interface with smart contract programs, most of the common operations are automatically reflected in the on-chain tokens in a timely manner.

Token holders are eligible to receive equivalent values of digital assets when the company dividends are paid out in the underlying markets.

Use Cases

Individual Investors

Trader Bob is an individual who trades crypto assets on various exchanges and lives on an island floating in the Pacific Ocean. He has been trading BTC and ETH for several years, but he also keeps an eye on macroeconomics in general, and often sees some US stocks showing promising news and good historical returns. Although he was always interested in US stocks, he does not have a brokerage account in the US, and is effectively blocked from US stock trading himself.

Say Jungle Protocol came in. That is, such tokens that represent the underlying US stocks would now be made available to him via the crypto exchange that he already uses. He could continue trading within the same exchange with different exposure opportunities, all without leaving his current venue. He would not need to convert his stablecoin assets into USD to purchase US stocks, since he can directly buy the Jungle tokens with his stablecoins within his choice of exchange.

As Jungle Protocol evolves, say Japan stocks and Indian stocks are also represented by on-chain tokens, Bob would now find an opportunity to trade between Tesla and Toyota with his long-short trading strategy which could be implemented within his crypto exchange.

After Bob purchases tokens that represent the collateralized stocks, he would also go to DeFi platforms that allow him to earn staking interest by providing liquidity utilizing the tokens he holds. This lending protocol would not be a part of Jungle Protocol, but since Jungle tokens are compatible with community standard protocols, other DeFi protocols help Jungle tokens to be used for different purposes as well. Another good example would be decentralized exchanges. Bob could access additional liquidity from decentralized exchanges for Jungle tokens, or stake by providing liquidity using the tokens he bought from a centralized exchange.

Digital Asset Service Providers

Alice Ltd. is a fintech startup company in the Middle East. The company has been providing digital asset services within the country under the local digital asset regulations. While the business started nicely with the sticky users, Alice, the CEO of the startup company, was wondering about the next step for her company's product. A lot of users were talking about additional exposure opportunities to different stock markets. She views Jungle tokens as a potential solution. Since her platform already is capable of handling digital assets, it would be a minimal burden for her team to build the new product line with a new type of on-chain token.

The nature of 24/7 trading would also be a competitive advantage for her local users, since the time difference makes it difficult for her local users to access and react promptly to market movements. As Jungle tokens would be on-chain assets traded on many exchanges across the world, price discovery would be reliable when the underlying stock market is inactive or closed.

Institutional Traders

Charlie runs a small prop trading firm with a few friends. He has been trading various asset classes, including crypto, but also futures, options, currencies, and stocks, for a few years and has witnessed arbitrage strategies in many cycles. Recently he came across Jungle tokens, which piqued his interest. Since he has access to both the underlying stock market as well as the crypto exchanges that list Jungle tokens, he could take advantage of arbitrage opportunities. In theory, the tokens and underlying stocks should be at the same price, but the two different assets being traded in different venues could always create small discrepancies that regular investors would pay no attention to. In fact, the arbitrage opportunities would act as a means for Charlie to provide more liquidity into less liquid crypto trading venues, which would provide intrinsic economic value for the trading community. Accurate price discovery at each venue for a reasonable cost is an important characteristic to allow Jungle tokens to act as a proxy to the stock markets.

Charlie manages his inventory of the token and underlying stocks separately. To the extent he can manage the inventory on each side, he would not need to swap the token and underlying share every single time; instead, he could wait for a bulk issuance or bulk redemption of the tokens, effectively saving some minting costs and time.

Charlie also acts as the translator of the token world demand into the underlying markets. If more buy demand comes into the token exchange market than the underlying market, there would be a momentary price discrepancy. Charlie could now take advantage of the situation by selling the token and purchasing the underlying, effectively announcing the buy demand from the token market to the underlying market. The opposite direction works in the same manner. As a member of the regulated market, Charlie's firm must refrain from operating in a manipulative manner, such as layering and spoofing, so the incentive for Charlie to act with a good faith in the market propagates from the underlying to the token space as well. Jungle Consortium would also autonomously provide a level of guidance and framework to prevent the underlying market from being manipulated by token exchanges.

Values of the Protocol

As you can see in the use case sections, there is substantial value that Jungle protocol holds and provides to a number of stakeholders. We summarize them here:

- Provide stock market access to a global audience that was previously only available locally;
- A high-degree of confidence as the trustless protocol eliminates counterparty risks;
- 24/7 trading liquidity provided by various market venues;
- Instant settlements that are confirmed on chain without days of waiting;
- Flexible payments using various crypto currencies based on need;
- Enhanced liquidity to the underlying markets with arbitrage opportunities;
- Seamless integration with the various DeFi platforms with the standard protocols; and
- The same expectations as underlying assets regarding corporate actions and dividends.

Technology and Implementation

Jungle Protocol is an abstract framework that enables stock market access in the digital asset space. As the crypto assets and surrounding technologies are progressively evolving day by day, particular technologies that are used to implement the protocol also could evolve over time. In fact the first version would be a minimum viable state with many future extensions. In this section, we discuss high-level ideas of design and implementation.

Protocol Design

Stablecoins and crypto-wrapped assets have recently shown valuable insights for implementing digital assets that represent another underlying asset. They have implemented a few different methods to achieve the “stable” aspect, which are categorized largely in two different styles, with one being the collateral approach and the other being the algorithmic approach. The collateral approach offers the intrinsic economic value backed by the reserve, although it deviates from the pure decentralization direction because someone has to provide the underlying asset collateral. The algorithm-based approach can be implemented completely in the software layer that does not require bridging work between the fiat and digital asset space, although there is no strong economic indication that the token is the same value as the underlying.

Jungle Protocol employs the collateral approach, with Proof of Reserve as part of the protocol, which provides intrinsic economic value to the tokens. The Proof of Reserve is provided by the members of the protocol's custodian group, in a transparent manner such that all participants of the community can see the reserve amount and circulating supply of the tokens. The custodian group also serves the issuance and redemption of tokens upon the user's request. As a protocol that brings the underlying stock assets into the digital asset space, Jungle Protocol takes corporate actions seriously, which has been often overlooked in other previous works. Unlike fiat currencies, stock assets have more complexity and benefits, which are important aspects that make stocks attractive to many investors. In Jungle Protocol, when the underlying stocks have a corporate action event such as a dividend or split, the custodian group members unify the event information and trigger the event to the contract, which updates the token's balances as well as provides the payment (e.g. cash dividends) in the event the underlying activity is paid by a fiat currency or another stock that is not the token's underlying.

Below, we discuss the processes in further detail.

Smart Contract

Jungle Protocol's first implementation is a ERC20 smart contract, the industry-standard format that can easily plug into the crypto ecosystem. Each contract would represent a class of underlying stock, each with a different contract address. The ERC20 standard format allows the rest of the Ethereum ecosystem to use these tokens like other stablecoins. One example is Automated Market Makers (AMM) exchanges where the Jungle tokens could be traded without a single authority. ERC20 would also potentially enable lending and borrowing the tokens via other lending protocols. Being on-chain in a permission-less manner is important to be portable in the ecosystem, as well as to be traded in as many venues as possible to achieve high liquidity and help healthy price discovery.

The token implementation isn't bound to ERC20. Like other successful stablecoins, Jungle protocol will be made available on blockchains other than Ethereum mainnet. L2 support and cross-chain availability are two top items for the first ramp up period, although the priorities are ultimately determined by community vote.

Although Jungle Protocol will start with a small number of stocks available in the market, the universe of coverage could be as many as the underlying market itself, which would be thousands of stock symbols in one market, and could go tens of thousands to cover multiple markets from the world. It is predicted that, at this point, scalability and maintainability of ERC20 could be a major issue in the design. The Jungle community continues to explore different formats that could facilitate a large number of tokens efficiently.

Jungle Protocol uses the upgrade proxy contract so as not to change the contract address every time there is a contract upgrade.

Token Issuance and Redemption Process

Jungle tokens are issued and redeemed as requested, and new tokens are minted and burned accordingly. In order for this fully-collateralized token to be issued, a user must provide the underlying asset (stock) first to request a new token. The certified custodian member of the protocol receives this stock, mints a new token out of the pool, and transfers the token to the requester's address in exchange. The token is recorded on-chain, and the user can thereafter take any actions they desire. The token may be sold and transferred to another wallet at another trading venue. The token holder may desire to redeem the token for the underlying stock, and a custodian member will accept this token first, and then return the collateral stock to the user who is requesting the redemption, at which point the token is burned and returned to the pool.

Proof of Reserve

The most important premise of Jungle tokens is that the economic value of the tokens is backed by the underlying assets. That is, if you have a token that represents a share of XYZ stock, then you should be able to exchange this token with a share of XYZ. In that sense, the economic value of XYZ token should be equivalent to the share of XYZ, with a minor risk that the two assets become unavailable to exchange for some reason. Therefore, it is important for any of the token holders to know how many tokens are outstanding against how many shares are actually collateralized. The Protocol's custodian members are important players who would make this information available to the public as well as provide custody of the collateral in the right location. The custodian members update the information periodically and frequently enough to ensure that the report is up to date.

The custodian group members are obviously an important piece of this framework. Jungle Protocol starts with the first custodian member, AlpacaX, although it will eventually shape a more independent governance structure where the custodian group members are chosen by the committee whose members own the defined amount of governance tokens.

Dividends

Jungle Protocol offers dividends. The collateral assets would generate dividends according to each stock's schedule. This total amount is collected by the custodian members and used to fund the payout tokens. Each wallet that holds the Jungle token at 00:00 UTC (or whatever time makes sense from the underlying market's time zone perspective) on the "ex-record" date of the token will be paid for the token dividends in the payout tokens. The date of the holding to be eligible for the token dividends is called "ex-record" date, because the Jungle token transactions settle instantly unlike traditional clearing systems. Therefore, the 12:00 am UTC of the ex date of the underlying asset is effectively the cutoff for the payout. The actual amount is later paid to the wallet address once the underlying dividends are paid out, and the time schedules are announced by the custodian members, who also initiate the transfer of the dividend tokens to the wallet addresses. The smart contract will emit the events once such an event occurs.

Stock Splits and Stock Dividends

Jungle Protocol supports forward splits, reverse splits and stock dividends as far as the event adjusts the holding amount based on the previous holding. The protocol implements “re-balancing” in an efficient way so that the updates occur to all the balance addresses at the same time without incurring the gas fees. If the event involves more complicated operations such as issuing another stock from the transaction, this would not be processed the same way as this case.

Other Corporate Actions

While the two cases above are the most frequent events that Jungle Protocol covers automatically, there are other cases where the transaction is more complicated than the ideal case. Jungle Protocol still handles and mirrors what occurs in the underlying assets with a few primitive operations implemented. That is, 1) as far as the same stock is issued based on the ratio to the previous holding, then the amount is transacted with the same way as splits, and 2) if there are other ways of offering such as a new company’s share is yielded, then the new stocks are evaluated at the market price and the equivalent payout tokens are paid to the address that are eligible for the payment timing.

The primitives of each transaction are pushed by the custodian members to the smart contract, which updates the necessary balances on the chain.

Blockchain

Jungle Protocol will launch on Ethereum Mainnet, where the initial smart contracts will be deployed. Testing of Jungle Protocol smart contracts is on the Goerli network. Although the contract is going to be tested carefully and audited by third parties, it will start with a small capacity.

Once the protocol’s functionality is verified, we will deploy contracts on multiple ethereum Layer two networks (L2), as well as operate L2 gateways that facilitate simple and secure bridging of tokenized stocks between Ethereum networks and shards.

The Jungle L2 gateway services will evolve to integrate with new blockchains as stipulated by the Jungle Consortium. As a generalized framework, Jungle Protocol will be available across multiple blockchains.

Organizations

Jungle Protocol is a community driven protocol that is run by the participants of the protocol, and continues to thrive based on the community feedback. It would not exist without participation and commitment from each role of members. To keep it working for everyone over time, it is important to have the right design of the community. Below we describe the high level community structure. It is also important to note that the protocol will evolve from a small footprint, so what is described here is somewhat the ideal end-goal, while in the early days we may compromise with some middle ground approach, which should be addressed over time as explained later in this document as Roadmap.

Governance

The final goal of the protocol is an autonomous, decentralized governance model, where the protocol is owned by nobody in particular, and the decision making process is collective and transparent. To achieve this goal, Jungle Protocol introduces a governance token, the number of which represents the voting rights of the community. The decisions of the community would include 1) the priority and use of resources for the protocol development, 2) the approval/disapproval of the custody members, and 3) the list of stocks to be supported within the protocol. Each member who holds the governance token can vote for every poll, and based on the holding the decisions are determined. The tokens are other ERC20 tokens that can be distributed in many ways.

Consortium

Jungle Protocol is eventually owned and maintained by the Jungle Consortium. The consortium is a physical legal entity that represents the group of participants of the protocol. It is governed according to the governance model above based on the token model. The concept does not need a legal entity structure, but Jungle takes this approach to be responsible in the fiat world. As it takes some time to have enough members in the governance structure, the shape of the consortium will become more clear as the protocol matures.

Consortium is a neutral umbrella where the protocol continues to be developed, maintained and operated, and provides the guidance for each participant to follow. That being said, the actual operations such as minting, as well as custody service is provided by the members of the consortium, and business models such as fee structures are also delegated to the members.

AlpacaX and Custodian Members

AlpacaX is the founding member of the Jungle Protocol, and acts as a custodian member as well. AlpacaX provides the minting/burning as a service. The custody of the underlying stocks are provided as part of this minting process, and would obey what was discussed in the earlier section.

Legality

Jungle Protocol, as one of such early initiatives in the industry and history, is very careful about not invading the existing legal frameworks in any jurisdictions. If it is deemed illegal to provide the access to the token assets in a jurisdiction, the consortium provides the guidance about the legality and prevents service providers from violating them. As of this announcement, the tokens are likely not legally available in the United States and a few other countries unless the contract is registered in those jurisdictions.

Roadmap

2023

Q1

Initial 20 tokens go live

After a few months of development and testing, the Jungle tokens become available for 20 or so stock names.

Expand to Ethereum L2 chains

While the activities are monitored live, the smart contract will be extended to run on L2 network nodes.

Q2

The governance token JNGL is available to the public

The governance token is issued publicly and distributed to the community members. The decisions from this will be made based on the governance tokens.

Expand the universe to 100 tokens

Once we see the stability in the initial 20 tokens, the universe is extended to 100 or so.

Q3

Second L1 chain support

Aside from the initial Ethereum support, the protocol is implemented in another L1 blockchain.

Q4

Open to the lending DeFi protocols

The Jungle tokens are made available for DeFi for staking once it is consumed in the ecosystem.

2024

Q1

Expand the universe to 1000 tokens

The universe gradually expands as the stability is confirmed in each step. This milestone may be achieved earlier depending on the progress.

Q2

Support the second stock market

By this point, one of the stock markets in the world is added and made available to the rest of the world the same way as other market's token.

2023 - 2024

Welcome the second custodian member, and the protocol shapes Consortium

The timing is highly dependent on the parties who are interested in this protocol, but once we see a success of the protocol mechanism in general, a new custodian member is added to further decentralize the process, and starts the Consortium with the actual legal entity, to be even more compliant.

Jungle

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