Geminon Protocol v2.0

Abstract – **Geminon protocol was created in February 2022 with the aim of developing a deflationary stablecoin pegged to the US CPI, the USDI. During the development of the technology required for this goal, it was discovered that it had the potential to achieve new advances in the field of decentralized finance, improving some of the best-known projects. In this document, we present the new design of the protocol, Geminon v2, which includes important improvements and new features.**

1. INTRODUCTION

When the first version of the Geminon whitepaper was published, back in April 2022, it barely included a deflationary stablecoin, with and algorithmic design and partially collateralized (Geminon, 2022b). The system was inspired by Terra (Kereiakes et al., 2019) and Frax (2021), and provided improvements over both with a design that sought to replicate the advantages of each while reducing their drawbacks.

The collapse of Terra in May 2022 caused us to rethink the design of the protocol, moving to a fully collateralized stablecoin model (Geminon, 2022c). This new design uniquely combined the advantages of fully collateralized and algorithmic systems while reducing their drawbacks. Although the redesign process caused a significant delay of several months in the development of the protocol, it provided a long-term benefit, since it was what drove the research and development of the technologies that would eventually lead to the creation of Geminon v2.

The Geminon stablecoin protocol that was ultimately developed consisted of the use of a fully collateralized elastic supply token (GEX) which was used to algorithmically stabilize the deflationary currency (USDI). The elastic supply of the GEX token allowed it to adapt to changes in the collateral level, reducing its volatility to facilitate the minting of stablecoins, while full collateralization had the mission of avoiding bank run scenarios such as the one that occurred with Terra.

In order to meet the requirements for the security of the collateral and the supply management of the GEX token, it was necessary to create a custom-designed pool called the Genesis Liquidity Pool (GLP). It became clear from the tests that this new type of pool held great potential for a wide variety of applications in decentralized finance (DeFi), especially as a basis for the creation of a decentralized exchange (DEX). This discovery inspired the creation of Geminon v2.

Along with the development of this new pool technology, Geminon developed a new type of price oracle based on adaptive exponential smoothing. The developed technique was used in several different security applications within the Geminon protocol as it was shown in tests to vastly outperform existing algorithms such as TWAP (Geminon, 2023a).

Finally, these technologies developed made it possible to offer a complete set of stablecoins from the world's main Forex markets and to create the fourth great innovation of Geminon: the decentralized Foreign Exchange (ForDEX), which allows swapping any pair of Geminon stablecoins without slippage. This type of swaps has only been made possible by Geminon's state-of-the-art oracles that prevent the price of decentralized Forex pairs from being front-run.

2. IMPROVEMENTS

As with many of the major DeFi projects in existence today, the first developed version of the protocol was not the best possible version of it (see, e.g., Uniswap (Adams, 2018; Adams et al., 2020, 2021) or Aave, 2020a, 2020b). In the case of Geminon, the development requirements of a project of this complexity in a short time led to the adoption of a modular structure in the contracts. Although this methodology was optimal from the perspective of fast deployment, it also had some drawbacks that became apparent during the last phase of project development.

One of the development objectives of the second phase of Geminon is to improve the architecture of the protocol, focusing on the following areas:

- Gas optimization: Optimizing the gas required by transactions is a time-consuming process, as it often involves a trade-off between code readability and efficiency. Since it is only possible to evaluate the gas cost of contract transactions during the final testing phase, such optimization implies an iterative process of code modification, debugging, and new tests. Many new projects cannot afford this time cost, so it is common for second versions of a protocol to be much better gas-optimized.
- Integration: During the final phase of development of Geminon v1 it became clear that the full potential of the protocol could not be achieved without full integration of the smart contracts. Furthermore, as we will see in the next section, the new features that Geminon v2 is going to incorporate, most of which represent a breakthrough in DeFi, are only possible if the different modules are fully integrated.
- Simplicity: The modular design coupled with the interaction needs between the different modules of the protocol introduces additional complexity in the code, with many functions in the contracts created for this sole purpose. An integrated architecture avoids this complexity, which in turn reduces the possibility of bugs in the code and makes it easier to test and audit.
- Security: The complexity of the architecture also has important implications for security, since it increases the attack surface and the need to implement security measures, which in turn results in far greater complexity. For this reason, a simplified architecture results in improved security of the protocol.
- Decentralization: Besides the additional functions and security measures mentioned in the previous points, the modular architecture requires a greater number of parameters to work. All this together means a greater dependence on the interventions of the development team and with it less decentralization of the protocol. One of the main goals of the redesign in Geminon v2 is to reduce the dependence of the project on the team to the minimum possible, achieving greater decentralization.
- Usability: There are some edge use cases, such as swaps inputting the amount to be received instead of the amount to deliver, that were not included in the initial version of the protocol and that we intend to include in this one.
- Standardization: There is a growing effort within the Ethereum community to standardize the APIs of the most used features in DeFi. As an example we could cite EIP-3156, which tries to create a common interface for flash loans. This facilitates interoperability between protocols and the work of arbitrageurs and liquidity providers, which in turn improves the chances of adoption of the Geminon protocol.

These improvements would justify by themselves the development of a new version of the protocol. However, we will find the real cause in the next section, when we see the new features that Geminon v2 will implement.

3. NEW FEATURES

If the initial design of Geminon was focused on stablecoins, Geminon v2 expands this vision to encompass all three DeFi primitives: decentralized exchange, lending and stablecoins, with the aim of bringing innovation to all three fields.

This scope change means two immediate improvements to the initial project:

- The use cases of the GEX token are increasing considerably, and with them the benefits of holding it.
- The collateralization model of stablecoins changes completely.

The drivers of these improvements will be seen in detail when discussing the new features incorporated:

A) Decentralized Exchange (DEX)

One of the greatest breakthroughs of Geminon was the development of GLPs and for this reason it has been decided to create a DEX that benefits from all the advantages that this type of pool offers.

The Geminon DEX departs from the fragmented liquidity model popularized by Uniswap and uses instead the concentrated liquidity model proposed by Bancor (Hertzog et al., 2018; Loesch & Hindman, 2020) and also adopted by ThorChain (2020), as the latter has many advantages over the former:

- One side liquidity: The main feature that differentiates concentrated liquidity systems is that liquidity providers do not need to contribute two different assets to a pool, but only have to provide the asset of their choice.
- Reduced slippage: In a DEX with fragmented liquidity where n assets are traded, it would be necessary to create 2^n pools to be able to perform direct trades between all n assets. In the concentrated liquidity model, all assets are virtually paired with a single connector asset, so it is only necessary to create n pools. As all the liquidity available for each asset is concentrated in a single pool (hence the name of the model), greater depth is obtained and with it less slippage, which greatly benefits traders.
- Reduced impermanent loss: The centralization of all swaps against a single asset in concentrated liquidity DEXs allows for different strategies to compensate liquidity providers (LPs) for impermanent loss. The Bancor protocol, for example, compensates LPs in certain pools for potential losses using the exchange's core token.
- Gas savings. Since in a fragmented liquidity model it is infeasible to create all possible pairs between tokens, swaps between rare tokens that do not have their own pool require several intermediate swaps, which means that swaps have a gas cost proportional to the required number of steps. In the concentrated liquidity model, all swaps always require a single operation, with the consequent savings in gas.
- Fees savings: Similarly to what happens with the cost of gas, the need to carry out several intermediate swaps in different pools for tokens not directly paired causes a fee to be paid to each of the pools involved. A concentrated liquidity DEX charges a constant fee instead.
- Lower deployment cost. Each time a new liquidity pair is added to the Uniswap protocol, a new contract is created, costing almost 3.5 million gas units. On the Ethereum network, with an average gas cost of 100 gwei and Ethereum at $3,000, this meant more than $1,000 of gas cost for each liquidity pair created, with peaks of more than $2,000 at times of greatest network congestion during the bull market. The concentrated liquidity model greatly reduces this cost since only one pool is necessary for each asset. Geminon besides completely eliminates this cost thanks to its integrated architecture.

Given the advanced GEX token supply management capabilities of GLP pools, the choice of concentrated liquidity model using the GEX token as the core connector of the Geminon DEX is elementary.

The new Geminon DEX inherits all the advantages of the concentrated liquidity model and also brings new ones thanks to the advanced capabilities of GLPs:

- Custom liquidity curve: one of the main advantages of GLPs is the ability to parameterize the liquidity curve that they offer. The Geminon DEX AMM will allow to create any type of pool, from constant product curves to stableswaps, along with all possible mixed applications (such as quasi-stable swaps).
- Liquidity bootstrapping: another important feature of GLPs derived from the ability to customize the liquidity curve is that they allow their use as liquidity bootstrapping pools (LBP), that is, as platforms to launch new tokens on the market. This would allow launchpad functionality to be incorporated into the DEX.
- Cross-chain swaps: Leveraging the native multi-chain nature of the protocol and the GEX token, the Geminon DEX will be able to offer swaps between any pair of assets regardless of which chain they are on. This feature represents a qualitative leap in current bridges and takes protocol interoperability to a new level.
- Variable fees: this feature is already present in the current version of GLP, but it will be updated and improved in order to protect liquidity providers from the toxic flow of orders that is believed to cause impermanent loss (Loesch et al., 2021; Crocswap, 2021).
- Flash loans: The possibility of executing flash loans will also be added in this new version of the protocol, although there will be a maximum amount limit to reduce the chances of malicious use of this tool.
- Built-in price oracle: GLPs incorporate an internal oracle that vastly outperforms current alternatives in terms of safety and precision. The Geminon DEX will take advantage of this technology, helping to create a more secure DeFi ecosystem.
- Permissionless pools: the main disadvantage of liquidity-concentrated DEXs versus fragmented ones like Uniswap is that an approval process is needed in order to list assets for security reasons. Geminon solves this problem by using a mixed system, in which any token can be listed without approval by manually supplying the number of GEX tokens needed to create the liquidity pair, such as in a Uniswap-type pool. This solution allows anyone to add their token to the liquidity network without risk while creating a source of demand for the GEX token.

The aforementioned characteristics give the Geminon DEX the potential to set itself in the future as a reference providing both traders and liquidity providers with better service and profitability than current alternatives.

B) Stablecoins

The field of stablecoins is where Geminon v2 will provide the biggest advances. The collateralization system has been completely redesigned with the goal of making Geminon stablecoins the benchmark in decentralization, security, and scalability.

The main features of the new system are:

- Segmented liquidity: there is currently no stablecoin (not even centralized ones like USDT, USDC, and BUSD) capable of riding out a sell-off event without temporarily losing peg or even completely crashing. Geminon v2 solves this problem by directly avoiding the cause: panic among holders. This is accomplished by moving from a shared collateral model to an owned collateral model where each stablecoin holder is assigned their own collateral.

- **Custom collateralization**: A direct advantage of collateral segmentation is that each stablecoin holder can decide which collateral to use as long as their position is fully collateralized. The consequence is that now Geminon v2 becomes a meta-issuer of stablecoin, since now each user is the issuer of decentralized stablecoin.
- **Yield on collateral**: Most collateralized stablecoin projects charge their users interest on the issued currency. Instead, in Geminon v2 users are the ones who receive interest on the stablecoin they issue.
- **Censorship-resistant collateral**: Almost all collateralized stablecoin projects use centralized stablecoins (mainly USDC) as collateral. While this helps to keep the peg stable, it hurts the decentralization of the protocols and exposes them to censorship and government sanctions. To avoid these issues, Geminon v2 uses wrapped assets from the *W-project*[1]. This feature along with the ability to choose any set of (wrapped) stablecoins as collateral allows Geminon to act as a sort of layer 2 solution to centralized stablecoins that provides more security through diversification while remaining decentralized and censorship-free.
- **Multilevel collateralization**: Several additional levels of collateralization are used to achieve greater security. In parallel to segmented collateralization, it is possible to mint and redeem stablecoins through the public collateral pools of the protocol. This mechanism is of special interest to arbitrageurs and loan liquidators. An additional reserve deposit is also created for emergencies and finally it is also possible to redeem stablecoin for GEX tokens. The protocol thus has a total of four guarantee mechanisms for stablecoins.

In addition to all these features, current functionalities such as decentralized Forex exchange along with a full range of stablecoins from all countries and our deflationary currencies will continue to be available.

C) Lending

Unlike DEXs and decentralized stablecoins, whose theoretical underpinnings are complex and relatively recent, providing room for major innovations, the fundamental principles of a loan (principal, collateral, and interest) are well established, so possible innovations in this area are more focused on architecture, efficiency and risk management:

- **Integration**. This would be the main feature that makes it possible to differentiate the Geminon loan protocol from the rest. The lending feature is deeply integrated with the rest of the protocol, enabling unmatched capital efficiency and liquidity as well as new yield generation strategies.
- **Efficient liquidation.** The integration also enables a highly efficient settlement mechanism, increasing the level of potential leverage.
- **Risk management**: Another benefit of the integrated architecture is the ability to execute complex risk management strategies in combination with other protocol functions.
- **Cross-chain loans**: Like the DEX, the lending protocol will take advantage of multi-chain capabilities to allow loans between different blockchains. This feature will also be an alternative way to bridge assets between chains.

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[1] W-Project is a non-profit hyper-infrastructure protocol that extends the concept of wrapped ether (WETH) to centralized stablecoins, creating wrapped tokens out of them. This draws a border between DeFi and TradFi that benefits both stablecoin issuers, as it disconnects them from any liability for the use of their tokens without affecting their income, and protocols and users, who see the risk of censorship disappear on their tokens and projects.

D) Other features

Finally, to the previous features are added those already present in the first version of the protocol, along with others that were initially planned and have not yet been developed:

- The utility token of the protocol (GEX) retains its initial features: elastic supply to reduce volatility and full collateralization.
- The GLP continue to have the mission of controlling the supply of the GEX token and keeping its collateral, although its architecture becomes integrated with that of the rest of the modules.
- ForDEX, our decentralized Forex market that allows trading any pair of our stablecoins without slippage will also be available.
- Governance will be also implemented to improve decentralization of the protocol.
- The multichain bridge will be a key component of this new version, since many features such as cross-chain swaps or cross-chain loans will rely on it.

4. BEYOND V2

The Geminon v2 features shown so far are astonishing, but they are not by themselves the ultimate goal of the new project roadmap, but rather the foundation to build something bigger: a path towards the mass adoption of decentralized finance by individuals, companies and institutions.

The past 3 years have seen the dawn and rise of decentralized finance technology. Said technology has reached a reasonable level of development, and currently there are blockchain solutions that could challenge traditional payment processors in capacity and cost. However, the arrival of crypto winter has shown that most of the volume of operations currently existing in DeFi is still endogenous and/or speculative, so the adoption of the technology in real terms is still quite low.

For this reason, the technology that Geminon is currently developing is envisioned as a means to achieve that real public adoption. If we are successful in creating a full-stack DeFi protocol that is perceived by the public to be reliable and safe, that will allow us to build on top of it an ecosystem of *Fintech* applications for the broad public. These applications could be built around three main axes:

- <u>Decentralized non-custodial banking</u>. Until now most attempts to provide financial services to retailers have simply relied on wallets or centralized custodial services. But a wallet is not the same as a decentralized bank. The use of smart contracts based on the new ERC-4337 standard will allow the creation of authentic decentralized online banking applications that allow instant, private, non-custodial transactions and at almost zero cost.
- <u>Financial services for business</u>: Companies have stricter requirements than retailers in their financial management, especially in the area of compliance. Therefore, it is necessary to provide an application that meets these requirements, while maintaining the principles of decentralization and non-custodial service through the use of smart contracts.
- <u>Supply chain and international trade</u>: One of the fields where blockchain technology has the most potential to add value is in international supply chains, and yet it is one in which there are no highly visible projects. With its ability to become a decentralized Forex settlement platform, using dedicated and custom collateralized stablecoins, Geminon could bring a lot of value to this field. The combination with NFT technology for the settlement of letters of credit in the international transport of goods is another great field to be explored.

At Geminon we firmly believe that in a period of five years digital currencies will have a predominant role in the provision of these services. Our goal: to be one of the first players in the market to offer them at scale by leveraging the account abstraction feature (ERC-4337).

5. CONCLUSION

In this paper we have presented the second version of the Geminon protocol, which greatly expands the scope of the original protocol, encompassing the big 3 DeFi primitives: decentralized exchange, stablecoins, and lending.

For the decentralized exchange, we propose the use of a concentrated liquidity system, which presents significant advantages over the currently prevailing fragmented liquidity systems. This coupled with the use of our GLP technology means that the proposed DEX has the potential to outperform current benchmark protocols, both from a trader and a liquidity provider perspective.

The stablecoin protocol that we have shown involves a complete redesign of the original system, moving to a fully decentralized overcollateralization model where each user becomes a currency issuer that keeps ownership of the collateral, decides its composition and obtains returns on the capital, while the protocol is limited to providing the framework and additional security layers to the system, acting as a central bank in the sense of guarantor of the solvency of the other decentralized banks in the system.

We have also introduced an integrated lending protocol that seeks not only to provide this service, but also to expand and enhance the capabilities of the other primitives, providing better liquidity, capital efficiency and yield generation opportunities.

Finally, we provide an insight into the long-term evolution of the protocol, where we focus on achieving mass adoption by providing an ecosystem of decentralized Fintech applications for individuals, businesses, and institutions by leveraging the account abstraction feature of the new ERC-4337 standard.

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