PANTHER

Abstract

Panther is an interoperable, decentralised custodian and smart contract platform that enables privacy of digital assets on peer blockchains ("peerchains"). At the core of Panther's design are Shadepools, on-demand dark pools for Decentralized Finance (DeFi) which enable institutional and retail users to securely store, obfuscate and transact compliantly on peerchains using Panther Assets ("pAssets"). pAssets are created by issuing 1:1 collateralized, zero knowledge digital tokens on peerchains.

As Panther is built and the ecosystem scales, it is likely we will see pAssets proliferate across peerchains with trading pairs for pAssets of most types. The added value that this obfuscation brings to investors and users will carry a premium. Panther's design objective is to create a liquid decentralized marketplace for privacy as a common good to enable onchain transactional anonymity in a regulatory compliant fashion.

The Problem

Every transaction tells a story, whether we like it or not. That's the problem institutional investors are having with Decentralized Finance (DeFi), a movement that leverages decentralized networks to transform old financial products into trustless and transparent protocols that run without intermediaries (Ong). Despite their growing interest in participating, the ecosystem's lack of core privacy functions makes it difficult to conduct large trades effectively and confidentially.

Today, DeFi applications are predominantly built on the Ethereum (Buterin) protocol (with a market cap of $20.8B USD as of January 2021) (Concourse Open Community). Ethereum transaction history and balances are public by default. This poses a series of challenges for money managing professionals and individuals alike who both value financial privacy. Even though transactions conducted between parties are pseudonymous, the protocol does not offer strong privacy guarantees due to the public decentralized nature of the ledger.

Current trading environments are risky, and the existing solutions for privacy (Béres et al.) are inadequate given the rapid growth of public, permissionless DeFi applications. There is the concern of being front run (Guo et al.) when executing trades and transactions, whereby systematic traders track what is about to happen on the Ethereum blockchain and use that advance information to profit (Daian et al.). Even more damaging for the fungibility of stablecoins (Moin et al.) and utility tokens acting as monetary instruments are the common practices of onchain transaction graph analysis; this renders some tokens tainted and impairs their fungibility and properties as sound money. At the same time, existing privacy-preserving currencies are price volatile, which makes them unsuitable for commerce. This lack of transactional obfuscation puts a limit on the sophistication of trades and transactions that are practical to carry out on Ethereum and poses major trade-offs for all institutions wishing to carry on financial services onchain.

PANTHER

While Bitcoin and Ethereum are popular as stores of value, neither offer privacy or price stability. Zcash offers privacy but is not compatible with DeFi. Stablecoins and other assets may offer price stability, but they also lack privacy and other key features.

Meanwhile, current Ethereum mixers, services that allow individuals to preserve their privacy by mixing their coins with others (Piotrowska et al.), only allow the user to act in a constrained manner. Because denominations are in fixed amounts transactions are cumbersome and do not allow payments of any size. These services are also difficult to operate, easy to make privacy-destroying mistakes with, and have challenging user interfaces.

The Solution

Out of this problem space Panther emerges as a privacy-preserving, 1:1 tokenization layer for Ethereum-based assets, as well as those on other peerchains. Panther tackles a number of privacy issues by anonymizing transactions from the payment's sender and homogeneously standardizing the construction of payments and interactions within DeFi ecosystems. It focuses on five key areas: privacy network effects, increased transaction speeds, correct user behavior, usability, and interoperability:

- Privacy Network Effects - Tokenizing underlying collateral and transacting with pAssets drives powerful liquidity network effects. To reinforce these, Panther promotes minting and discourages burning using fee incentives, e.g. 0.25% mint and 0.1% burn fees, paid in the native XPP token. This leads to a growing pool of pAssets. As the number of pAssets locked and transacted increases, the ability to anonymize transactions grows stronger and the protocol becomes more efficient encouraging widespread adoption.
- Increased Transaction Speeds - As different peerchains compete for transaction speed superiority, pAsset users can move assets from one protocol to another to meet their needs for transaction finality and speeds.
- Correct User Behavior - Utilizing native assets on public peerchains exposes users to a number of deanonymizing threats, such as address reuse, conspicuous transaction fee amounts and human errors. pAssets enforce correct behavior to maximise privacy at a protocol level bringing simple user experience along with high levels of privacy. This in turn encourages transaction volume and enhances privacy network effects.
- Usability - Minting pAssets on peerchains with well adopted standards, such as Ethereum's ERC20 standard, allows users to interact with the growing DeFi ecosystem and network of accepting exchanges, stores and financial institutions using these standards.
- Interoperability - By issuing the native assets of one peerchain on another as pAssets users are able to benefit from the unique advantages of different protocols. Examples of the types of optimizations brought by different protocols are transactions per second, affordability, decentralization, and composability.

PANTHER

Ethereum	Zcash	Panther	Bitcoin	Stablecoins
Efficient	Efficient	Efficient	Efficient	Efficient
Attack and censorship-resistant	Attack and censorship-resistant	Attack and censorship-resistant	Attack and censorship-resistant	Attack and censorship-resistant
Public	Private	Private	Public	Public
DeFi composable	DeFi incompatible	DeFi compatible	DeFi incompatible	DeFi compatible
Price Volatile	Price Volatile	Collateral Dependent	Price Volatile	Price Stable

How It Works
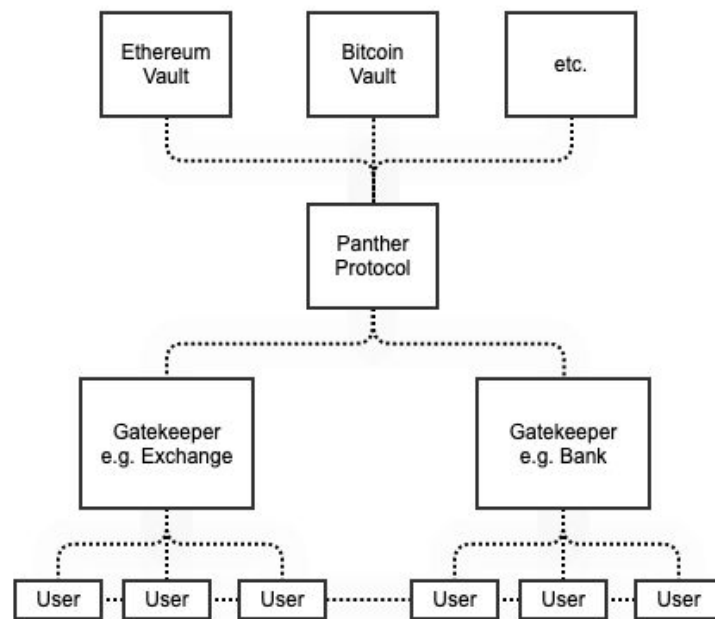
The different stakeholders involved in the Panther ecosystem include:

- Gatekeepers responsible for verifying users and custodying collateral in Panther Vaults. Gatekeepers are the exclusive minters and burners of pAssets and play a key role in the distribution of pAssets;
- Privacy miners who stake pAssets to provide liquidity to the Shadepools and pay relayer node fees;
- Users that hold pAssets and carry out transactions on any peerchain with a Shadepool and Vault;
- The Panther Foundation responsible for steering Panther to full decentralization and encouraging community growth;
- XPP token holders who vote on governance decisions and fund proposals through the Panther DAO; and

- Community members who make proposals to improve the Panther ecosystem and are involved in many ways but are not specifically invested in any single function of Panther.

Minting and Burning

Minting (creating) and burning (destroying) pAssets is a process handled by peerchain self-custodial smart contracts, known as a Panther Vault. The process of doing this however, is initiated by Gatekeepers responsible for providing collateral to Panther Vaults, and who act as the elected custodians. pAssets are minted and burned at a 1:1 ratio to ensure assets are always backed by the same amount of collateral. e.g 1USDT = 1pUSDT.

Verification

Users and enterprises wishing to buy newly minted pAssets, or redeem pAssets bought on secondary markets for the underlying collateral, are required to complete KYC/KYB (Know Your Customer/Business) verification through a Gatekeeper.
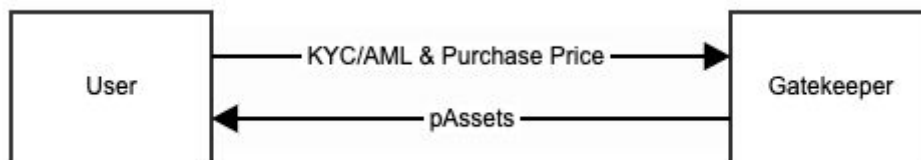
Transacting with pAssets

pAssets minted on a peerchain inherit all of the core properties of that peerchain's native assets and can interact with DeFi ecosystems with the added benefit of onchain privacy.

Phases of Development

When initially launching permissionless protocols, developers should seek to gradually remove themselves as intermediaries. This permits fixing bugs quickly in a production environment. This also facilitates rapid product iteration and evolution. Panther will be launched in incremental stages with increasing functionality being added over time towards full decentralization.

Phase 1 - Ethereum Panther
In the first phase of development, pAssets are minted and burned by Panther Users through an Ethereum based Panther Vault which forms part of Ethereum Panther. Ethereum has been chosen for the first deployment as it is a highly composable and liquid DeFi protocol and is the ideal mechanism for proving protocol robustness, adoption and effectiveness of Shadepools. Initially, the Panther treasury will be managed by the Panther Foundation, however, Phase 1 will see the migration of these funds over to the control of the community governed Panther DAO (Decentralized Autonomous Organization) (Buterin), which will also

be deployed on Ethereum. The Panther DAO will be responsible for setting privacy miner rewards, mint and burn fees, bug bounties, education and software development grants.

Phase 2 - Panther Protocol

In the second phase of development, the Panther Protocol will be built and launched following a public sale of Panther tokens. Envisioned as a decentralized custodian enabling the minting and burning of pAssets across any peerchain, Panther protocol will extend the utility of Panther to multiple blockchains and brings with it a number of advantages:

1. End to end private smart contract execution;
2. Aligned governance incentives from XPP token holders to the Panther Protocol vs. any one Panther peerchain deployments;
3. Solving scaling problems that come with peerchain-to-peerchain direct bridges, enabling seamless, interoperability between peerchains;
4. Optimized blockchain designed for censorship resistance decentralized custody using 51% censorship resistant Ouroboros consensus.

Phase 3 - Panther on Multiple Peerchains

In the third phase of development Panther's decentralized community of developers will be focused on interoperability between chains and the building out of a private DeFi ecosystem, all of which will be governed by XPP token holders and funded through the Panther DAO. With the core Panther Protocol responsible for managing one of the private keys for Panther Vaults on each peerchain, and supporting turing complete, private smart contracts, there will be an emergence of new Panther deployments on other peerchains to enable privacy on and between these growing ecosystems.

Panther Technology

There are seven technology components which make it possible for Panther deployments to provide obfuscation of transactions in peerchain DeFi ecosystems:

1. Shadepools
2. Gatekeepers
3. Vaults
4. Wallets
5. Privacy miners
6. Panther XPP token
7. Panther DAO

1. Shadepools

Shadepools allows users to privately transact on any peerchain through the use of pAssets issued on that peerchain. This is achieved by randomly shuffling pAssets of the sender with other Users and privacy miners to send an equivalent amount to the receiver anonymously. Meanwhile, the underlying 1:1 collateral assets are custodied in Panther Vaults that form part of the peerchain Panther deployment and can be redeemed at any time through Gatekeepers.

In order to provide a practical, scalable, and trustless cryptographic proving system, HALO Zero Trust Step (Bowe et al.) for recursive proofs is used to eliminate reliance on a trusted third party setup.

2. Gatekeepers

Gatekeepers are a federation of globally distributed and independent financial institutions and enterprises responsible for minting and burning pAssets. Additionally, Gatekeepers play the important role verifying and maintaining regulatory compliance for users wishing to buy or sell pAssets. Panther will launch with 13 Gatekeepers at launch.

Due to their capabilities, privacy-preserving blockchain-based projects can find themselves facing scrutiny. It is anticipated that questions regarding the regulatory intricacies of Panther's privacy protocol might arise and are worth addressing at the outset. Panther does not keep lists, maps, registers or documents on Panther users, is unable to ascertain the parties to a transaction, does not impose restriction on users transacting with pAssets, and does not take responsibility for the adherence of Gatekeepers to their local regulations and licensing requirements. The protocol does, however, enable onchain publishing of zero knowledge proofs to IPFS (Benet) that associate a given wallet address with a verified user. That proof directs the querying party to the Gatekeeper responsible for processing the Panther user at the time they bought newly minted pAssets or sold existing pAssets to redeem the underlying collateral.

There will be transparency between Gatekeepers and aggregated statistics provided on the network in a dashboard, these include:

- Names and corporate details of the current Gatekeepers;
- Mint and burn statistics;
- Panther Vault balances; and
- Number of verified users per Gatekeeper.

Given the outsized value that transactional privacy provides to society, we believe that Panther Protocol's approach is both forward-thinking in its approach to regulatory compliance and also in line with the industry's best practices.

3. Panther Vaults

Panther Vault are autonomous, zero knowledge (Goldwasser et al.) self-custodial smart contracts that allow Gatekeepers to act as decentralized custodians for collateral assets created on any single peerchain. As long as a Gatekeeper has membership to the federation they can freely mint and burn pAssets of any type.

Signing of mint and burn transactions are managed by Panther Vaults in a 2-of-2 multisignature scheme consisting of the:

1) Gatekeeper; and
2) Panther Vault.
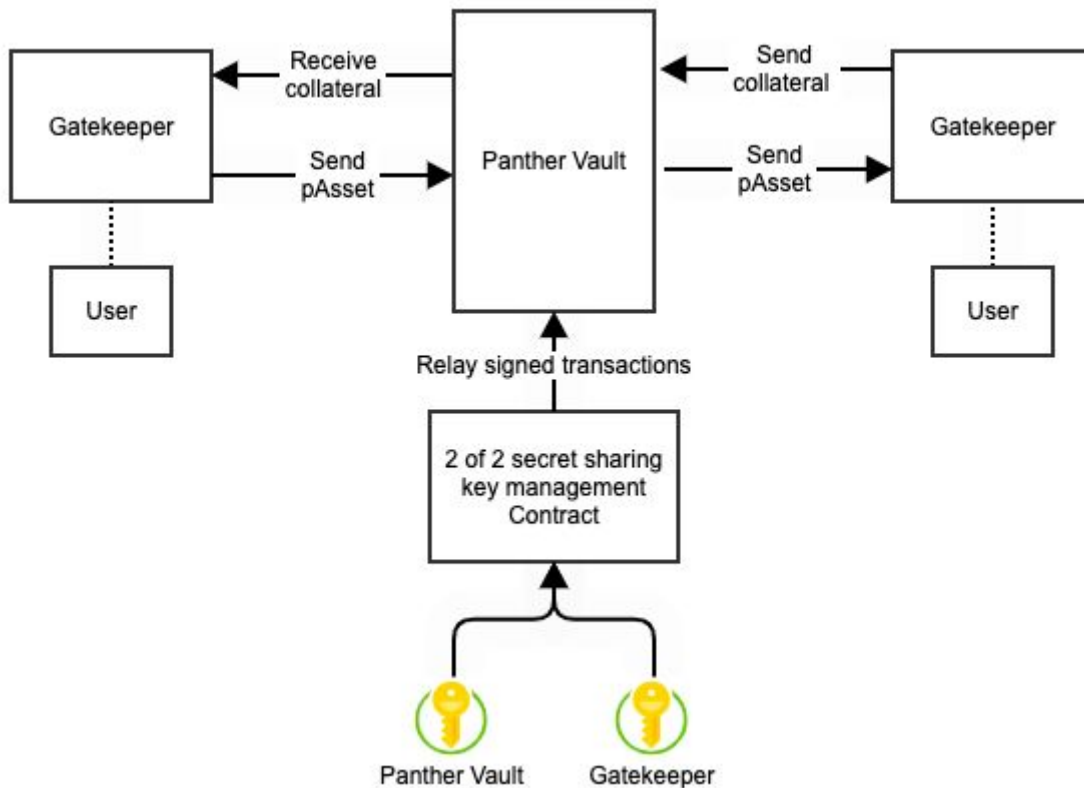
By default, Gatekeepers sign burn/redeem requests with the protocol which will auto-sign provided the Gatekeepers federation membership is valid and they are burning pAssets at a 1:1 ratio for the collateral. In the event a Gatekeeper behaves maliciously and refuses to release collateral assets, XPP token holders can vote to revoke the Gatekeepers membership. At the same time, pAsset holders can burn their assets through another Gatekeeper to access the collateral. In this way, control of onchain collateral always remains with Panther token holders.

4. Panther Wallet

The Panther Wallet is a browser-based self-custodial wallet. Panther Wallets fill a number of key roles within Panther in addition to the traditional role of blockchain based wallets (send, request, store and transaction history):

- Address reuse prevention;
- Private connections to Ethereum DeFi protocols using proxy addresses;
- Voting on governance proposals.

PANTHER

5. <u>Privacy Miners</u>

Privacy miners are nodes running on Panther peerchains which provide pAsset liquidity to Shadepools in exchange for XPP paid in transaction fees and through rewards granted by the Panther DAO. The privacy that Panther brings to each peerchain's DeFi ecosystem is directly proportional with the volume flowing through Shadepools; in other words, the greater the transaction volume from unique addresses, the larger the anonymity set. As the early network is launched the role of privacy miners will be critical to bootstrap liquidity. As the protocol scales organic transaction volume, it is expected that privacy mining rewards will diminish naturally. At the same time, as volume increases the cost of privacy decreases, creating a virtuous cycle.

In Panther there is a lower bound privacy threshold below which transactions will not be sent on the network as they are not sufficiently obfuscated. In order to ensure minimum privacy thresholds are met transaction fees adjust dynamically. When there is not enough pool liquidity, the transaction fees increase to encourage more deposits. The opposite happens when there is excess liquidity in the pool.

In addition to the function of providing liquidity to Shadepools, privacy miners also provide relayer services. Relayer nodes services involve providing the native gas token, such as ETH on the Ethereum peerchain, to newly created proxy addresses to pay for the transaction fees connected with sending pAssets on that chain. This service protects the sender from deanonymization. Privacy miners are chosen by Verifiable Random Function (VRF) (Dodis and Yampolskiy) from all available miners on that peerchain and rewards are paid proportionally to the pAssets locked for mining across the peerchain.

6. <u>Panther Token (XPP):</u>

The Panther Token (XPP) is a finite supply, privacy-preserving gas token used to pay for fees within the Panther ecosystem that also represents a right to vote on governance issues. It is used in several instances to support the function of the protocol and provide incentives for its growth and maintenance. pAssets are designed to improve usability and privacy through enforcement of correct user behavior at the protocol level. The token has the following functions:

<u>Phase 1 Utility</u>
In the first phase, XPP will work in the following ways:

- XPP is used to pay for mint and burn fees associated with pAssets managed by Panther Vaults;
- XPP is used to pay transaction fees for sending pAssets;
- XPP is used to pay incentive fees to privacy miners;
- XPP is used to pay privacy miner's relayer service fees;
- XPP is used to provide rewards to privacy miners from the Panther DAO; and

PANTHER

- XPP is staked and used to vote on governance matters, such as Panther Improvement Proposals (PIPs), Gatekeeper federation membership and requirements, privacy thresholds, community and education grants, and privacy miner rewards.

<u>Phase 2 Utility</u>
When the Panther Protocol is developed, XPP will work in the following additional ways:

- XPP is delegated to or staked directly by Shadenodes responsible for securing the Panther Protocol and processing transactions on the native chain;
- XPP is used to provide rewards to Shadenodes from the Panther DAO;
- XPP is bonded by Shadenodes proportionally to the value locked in Panther Vaults; and
- Vault Maintenance fees are paid by pAsset holders to incentivize honest network behavior.

Token Supply:

The XPP supply will be issued as follows:

- There will only ever be 1,000,000,000 XPP;
- 20% of total supply is being issued to founders, team and advisors of Genblock, the company contracted to build Panther Ethereum and the native Panther Protocol, with a gradual unlocking over 3 years;
- 8% of total supply is being issued to Panther Foundation;
- 15% of total supply is being sold to the public with a gradual unlocking over 1.5 years;
- 5% of the total supply is being to early backers unlocking over 3 years;
- 5% of total supply is being sold to private strategic investors with a gradual unlocking over 3 years;
- 25% of total supply is being reserved for Shadenode staking rewards and emitted using an exponential decay issuance curve over 10 years to incentive early adopters and Shadenode stakers on Panther Protocol.
- 20% of total supply is being reserved by the Panther DAO for Privacy Mining incentives;
- 1.75% of total supply is being reserved by the Panther DAO for Education; and
- 0.25% of total supply is being reserved by the Panther DAO for Bug Bounties.

PANTHER

Token Sale and Distribution	
Stakeholder	% of total supply
Shadenode Staking	25.0000%
Panther DAO - Privacy Miners	20.0000%
Panther Foundation	8.0000%
Early Team and Advisors	20.0000%
Early Backers	5.0000%
Public Sale	15.0000%
Strategic Backers	5.0000%
Panther DAO - Bug Bounties	0.2500%
Panther DAO - Education	1.7500%
Total	**100.0000%**

Governance and the Panther DAO

Governance, being central to the success of the Panther ecosystem, will be initially managed by the independently run Panther Foundation which will be responsible for treasury management. Once the Panther DAO is launched, all XPP held by Panther Foundation will be transferred and XPP token holders will take over treasury management, token economics and funding PIPs by way of a quadratic voting system (Buterin) based on the XPP token holder balances. Voting will be done in a completely transparent way through a public portal.

XPP token holders can vote on specific budgets and projects to be funded, such as new peerchain Panther deployments, and play a critical role in the direction the protocol is going. Functioning like a decentralized crowdfunding platform, the budget can be used for anything that creates value within the ecosystem.

Timeline:

The fundraising and development schedule for Panther will be as follows:
1. In Q1 2021, Panther will begin with a pre-seed raise of $3M USD for the development of the Ethereum based Panther Wallet, Shadepool and Panther DAO.
2. In Q2 2021, Panther testnets on Ethereum will be released for private and then public feedback.
3. In Q3 2021, the Ethereum Panther ecosystem will be released and a public sale will be conducted for the Panther Protocol.
4. In Q4 2021, research and development for Panther Protocol will begin.

PANTHER

Definitions:

- XPP - a finite supply, privacy-preserving gas token used to pay for fees within the Panther ecosystem and represents a right to vote on PIPs.
- PIPs - Panther Improvement Proposals are proposals for modifications to governance, economics, or technology voted on by XPP token holders.
- Peerchains - third party layer 1 blockchains which run Panther Vaults.
- pAssets - 1:1 collateralized, zero knowledge digital tokens that institutional and retail users employ to securely store, obfuscate and transact compliantly.
- DAO - an entity that lives on the internet and exists autonomously, but also heavily relies on hiring individuals to perform certain tasks that the automaton itself cannot do (Buterin), such as Panther DAO.
- Gatekeepers - institutions responsible for verifying users and are the exclusive minters and burners of pAssets.
- Vaults - peerchain self-custodial smart contracts which handle minting (creating) and burning (destroying) pAssets.
- Privacy Miners - nodes in the Panther ecosystem which provide pAsset liquidity to Shadepools in exchange for XPP paid in transaction fees and through rewards granted by the Panther DAO
- Wallets - a browser-based extension self-custodial wallet.

About Us:

Genblock is a Gibraltar-based distributed ledger technology company committed to using peer-to-peer innovations to solve major problems of providing unencumbered access to financial services to the unbanked and underbanked.

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