Cardstack & Card Pay
Protocol Overview

1 INTRODUCTION

Cardstack is building a decentralized application ecosystem that can challenge the Software-as-a-Service offerings from Silicon Valley's tech giants. We do this with a combination of open-source development tools and an easy-to-use environment for end users, backed by smart contract-based protocols.

To enable the creation of a new software economy, Cardstack needed to build a decentralized payment and reward network for fast, easy, and cheap on-chain transactions. This network allows customers to purchase prepaid "credit" to use in our decentralized software ecosystem, while it allows sellers (such as developers) to claim a portion of the revenue, based on what they offer at what price. We call this the Card Pay network.

Card Pay is backed by Decentralized Finance (DeFi) primitives like stablecoins and community tokens. It introduces a type of yield farming, called "spend farming"—which is the earning of reward tokens (similar to loyalty points from credit card companies and airlines) based on spending and earning by customers and merchants. Card Pay is also a network governed by the community, with the Cardstack Token (ERC20: CARD) being the governance token to influence the network's operation and extensions.

While Card Pay was initially designed to support a software marketplace, we see software as just another output from the creator economy. Thus, we believe that Card Pay can also serve as a general-purpose payment network for all kinds of products and services that can be sold on blockchain networks. This includes the exchange of tokens and vouchers for products and services, as well as the issuance or delivery of new types of tokens and vouchers, which will enable a give-and-take gameplay. In this gameplay, participants will be continually exchanging fungible and non-fungible assets, as the relationships between the customers and the creators/merchants deepen. This gameplay loop is not limited by the restrictions of traditional finance and credit card processing networks.

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2 PROBLEMS WITH BLOCKCHAIN PAYMENTS TODAY

Payments between peers—that was the original use case specified in the Bitcoin whitepaper. As Bitcoin transactions became more expensive, that use case has largely been neglected or relegated to other related protocols, like Lightning.

Ethereum gained its footing with the blockchain community via the DeFi movement, which focused on multiple categories—including lending, decentralized exchanges, derivatives, and asset issuance.

On the DeFi Pulse website, which ranks DeFi projects by Total Value Locked (TVL) in its smart contracts, the "Payments" category is by far the smallest when it comes to aggregate TVL. Clearly, the payment use case has not achieved the same market adoption as the other categories. Meanwhile, centralized digital-payment platforms like Venmo, Cash App, Apple Pay, and WeChat Pay have skyrocketed in usage. They continue to grow, substituting older forms of payments, such as credit cards, cash, or bank transfers.

The currently high gas price on Ethereum mainnet makes Ethereum a particularly impractical and uncompetitive payment processing network. Even when purchasing crypto-native assets like non-fungible tokens (NFTs) representing crypto art, buyers and sellers prefer to settle on the cheapest transactional cost, which is ETH, instead of using stablecoins or other ERC20 tokens.

Wallets are hard to set up and use, as most wallets are designed for crypto traders. Even the good ones are modeled after stock trading apps instead of day-to-day payment apps like Venmo or the built-in iOS Wallet app. Only recently have mobile wallets achieved a sizable market share in terms of the Ethereum addresses they control. MetaMask, a chrome browser plugin that most DeFi traders use, is even more challenging to understand and not suitable for day-to-day payments.

Without customer payments as a widespread use case, there is little influx of new cash in crypto networks, including the Ethereum ecosystem. DeFi is therefore quite insular, growing just by counting the TVL that is deposited and re-deposited into different protocols in an ever-growing multiple.

Proponents of scalable payment protocols—like state channels in the Ethereum space and the Lightning Network in the Bitcoin space—promise scalability for simple transfers of value. Yet, these state channels do not allow for full programmability afforded by smart contracts. This is where some exciting experimentation around new business rules and new incentive models is emerging within the DeFi space.

Many of the necessary pieces to create a payment network have been introduced in the blockchain space in the last two years. However, we haven't seen a project that can harness those powerful building blocks to substitute a cash app or something like WeChat Pay.

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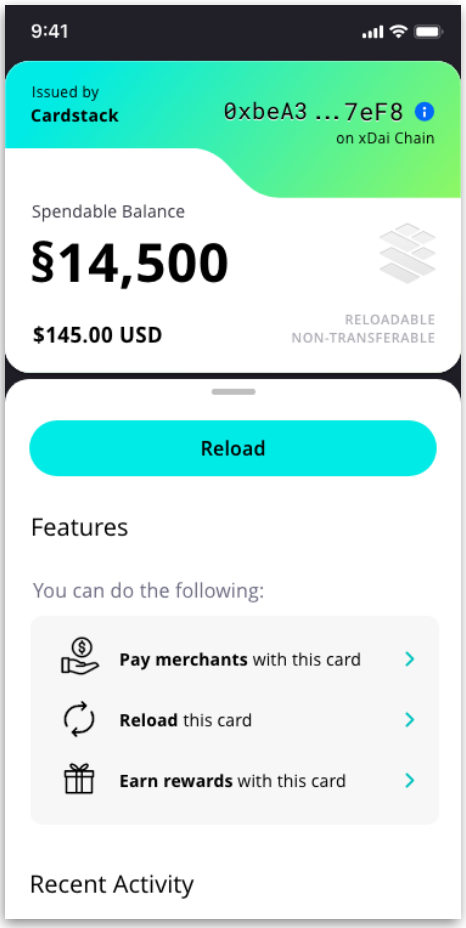
3 CARD PAY: MAKING CRYPTO PAYMENTS PRACTICAL

In order to make crypto payments practical for digital purchases, we need to create a payment protocol, an associated Web-based dApp, and a mobile app that is fast, cheap, and easy to use.

Fast

No need to fund a wallet with ETH and stablecoins:

We have created the concept of a Prepaid Card with a ready-to-use balance. Prepaid Cards can be loaded by customers using Apple Pay or other in-app payment methods. Once they have the Prepaid Card in their wallet, they can spend the balance without any additional setup.



Cheap

Payments with one on-chain transaction:

We use ERC677 instead of ERC20, as it allows for one-tap transfers of stablecoin value. Card Pay can be deployed on layer 2, e.g. on a sidechain like xDAI chain. The gas fee for a transaction on layer 2 is a tiny fraction of what it would cost on mainnet (approx. $40 USD vs $0.03 USD).

Easy

A specially designed mobile app for crypto payments:

The mobile app uses a QR code to connect the wallet to a merchant. It leverages meta transactions, so there is no need for gas. And it performs all currency conversions at the time of the transaction, so that all purchases are priced in simple-to-understand USD.

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4 BUILDING BLOCKS

To accomplish these qualities, we needed to leverage the following technologies aka building blocks in the DeFi ecosystem:

- **Layer 2:** We use the xDAI chain—a popular sidechain that is compatible with the Ethereum Virtual Machine—to store the transactional history and run the business logic of the payment network.
- **Stablecoins:** We support DAI as the main stablecoin that backs USD-value transactions. The protocol can support multiple stablecoins, which are interchangeable from a merchant's point of view, but have their own slightly deviating exchange rates. Those are captured and memorialized when funds are transferred from the customer to the merchant at the point of sale.
- **Smart-Contract Wallet:** We use smart-contract logic written in Solidity to implement automatic stablecoin conversion rates, as well as unique concepts like support for non-transferable cards, and the option to provide loyalty points and membership statuses to returning customers. We use Gnosis Safe as the underlying codebase for the smart-contract wallet on xDAI chain. Additionally, we have begun to extend Gnosis Safe, adding features without compromising the security of the users' funds.
- **NFTs:** We use NFTs to issue vouchers and membership badges, so that customers can redeem their NFTs for other goods and services later on. Thus, merchants can support fiat-backed payments (such as USD-backed stablecoins), volatile tokens (like ETH or community tokens), as well as ERC721 tokens (NFTs) as payment methods—sometimes even in combination for one purchase.
- **Staking:** The economic bandwidth needed to conduct transactions on this layer-2 network is locked in a reserve pool smart contract on Ethereum mainnet. Users who stake their DAI, USDC, or other stablecoins provide this increasing supply, which ensures that customers and merchants can pay each other in the Card Pay network. In turn, they will receive a percentage of the protocol fees charged to merchants, similar to credit card processing fees in open-loop payment networks.
- **Mobile wallet:** We use the WalletConnect standard, which is gaining popularity in the Ethereum space compared to browser plugins like MetaMask. We are basing our mobile wallet on the open-source codebase of Rainbow, which is a very polished and complete Ethereum wallet that can handle DeFi and NFTs. We are extending it to handle smart-contract features like Prepaid Cards and optimizing the usability for day-to-day payment approvals.

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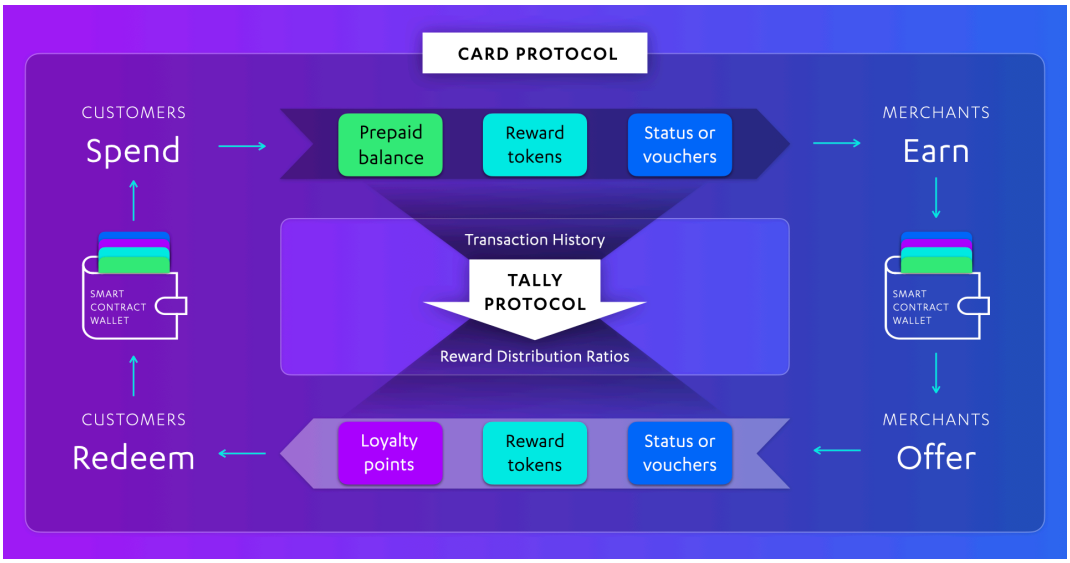
5 CUSTOMER AND MERCHANT WORKFLOW

Card Pay emulates the latest generation of mobile payment apps, such as Apple Pay, as it supports instant checkouts through Touch ID or Face ID for any page that has the "Pay with Card Pay" button enabled. Here is a visualization of the core workflow between customers and merchants:



Step 1: Choose merchant & product

A customer visits a merchant's product page. This can be a page selling NFTs, physical merchandise, or digital subscriptions. The price of the product is displayed in USD, so it is easy to understand. If a customer clicks the "Buy" button (and doesn't have a connected wallet yet), he/she is prompted to download and connect the Cardstack mobile app using a QR code, which is based on the WalletConnect standard that is popular in the DeFi community. This creates a pseudonymous relationship between the customer and the merchant, without asking the customer to register with an email address or a Facebook login.

Step 2: Get customized pricing & place order

The customer may see customized pricing based on the assets in his/her wallet. For example, if the customer has a VIP card that was issued to him/her by the merchant in the past, that customer may receive a discount or bonus for the current purchase. Then, the customer selects the preferred payment method, choosing whether he/she wants to pay with the balance on a Prepaid Card or redeem a voucher. Finally, he/she uses Touch ID or Face ID to sign the on-chain transaction, which will transfer the funds to the merchant.

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Step 3: See earned rewards

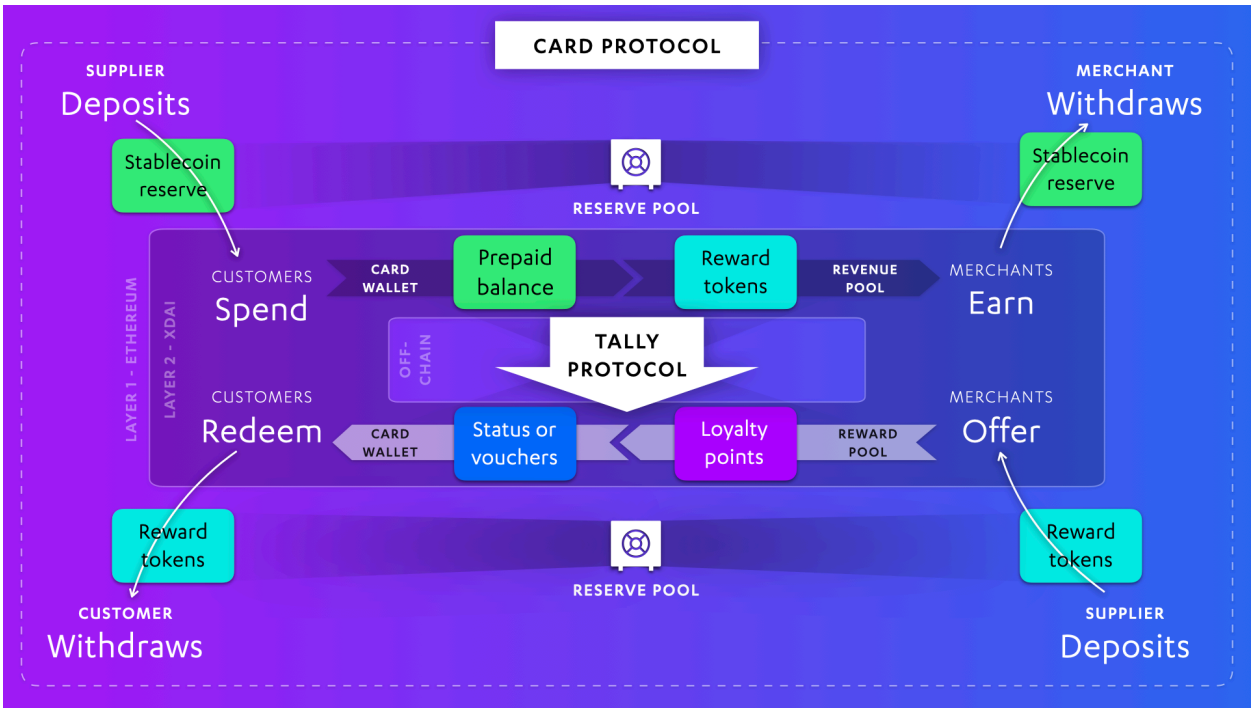
As part of the completed transaction, the customer sees which rewards he/she has earned. Those could be loyalty points issued by the merchant. But they could also be competitive offers from other merchants, who airdrop vouchers to paying customers of their competitors.

Step 4: Claim rewards

The customer can now claim his/her rewards, getting them transferred into his/her wallet. He/she can then use those rewards as a payment method or discount code for future transactions with that particular merchant or the merchant's competitors.

These workflows can be very well integrated into a mobile app, as the composability of DeFi allows us to chain these transactions together and provide dynamic pricing as well as rewards. Since all of this is orchestrated through a mobile app, all the complexity around using MetaMask or dealing with ETH is hidden. Instead, we present an exciting new payment and reward loop that can be played over and over again in rapid succession. For example, by reselling an NFT you just bought as a customer, you can turn yourself into a merchant without doing any additional signup. That is the power of Card Pay as a DeFi payment protocol.

Step 5: Withdraw to mainnet (optional)



Customers and merchants can perform most payment and reward transactions within the fast, cheap, and easy layer-2 network. When they need to trade their earnings to other currencies, they can withdraw their tokens from their wallet in one bulk transaction to the layer-1 Ethereum mainnet.

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6 PAYMENT SCENARIOS

As demonstrated by the previous workflow, the Card Pay network can be thought of as a family of smart contracts that work together to create a next-generation decentralized commerce ecosystem. The building blocks of Card Pay can be mixed and matched by customers and merchants, going beyond the simple workflow highlighted above, so as to create new gameplay that will attract new customers and new creators as sellers. Here are some of the building blocks that are part of Card Pay:

- **Pay with stablecoins:** All prices in the Card Pay network are set in USD, so that it is easy for most customers to understand how much something costs.
- **Pay with non-stablecoin tokens:** Customers can also pay with any ERC20 token, such as wETH, CARD, or even UNI. Card Pay will convert those volatile tokens and provide the USD value based on the current price. Merchants have to opt into each non-stablecoin token they want to accept, so they don't need to take any unintended currency exchange risks.
- **Set a bonus or discount:** Merchants can specify a discount or bonus if the payment is made in a particular currency. For example, a community that issues its own tokens may sell products and services at a 50% discount to customers who pay with the community's own token; this is a way to reward customers who acquire those tokens ahead of time. On the flip side, merchants can demand a premium if the customer pays in a volatile token (e.g. ETH), so as to counteract a potential price drop.
- **Earn reward tokens based on spend:** Merchants who want to offer loyalty points can set up a formula on the smart contract, so that reward tokens are given to customers as a ratio of their spending, e.g. $0.05 USD for every $1 USD spent.
- **Buy and receive vouchers from merchants:** Card Pay supports payments using NFTs. This means that merchants can create a voucher, representing e.g. one free month of usage, and give it to users as a reward. They could even sell those vouchers as a coupon booklet.
- **Redeem vouchers from merchants:** Customers who have those vouchers in their wallet can redeem them for products and services instead of paying with the balance on their Prepaid Card.
- **Claim rewards from other programs:** Reward programs can also be configured in a way that gives tokens or vouchers to customers for any spend visible in the network, even if they spent money on products or services from other merchants.
- **Earn a status from a merchant or network of merchants:** Similarly to airline mileage programs, customers can earn a VIP status if they spend a certain amount of USD or have a certain number of repeat purchases. To that end, merchants can issue membership badges, which are represented by non-fungible ERC721 tokens. Those badges will be prominently displayed in the customer's mobile app. Customers may also be able to buy such badges with a prepaid balance if they want to accelerate their progress towards a particular status.
- **Obtain a discount or special permission based on badges:** Badge holders may unlock special discounts when buying something from a merchant. They can also earn extra reward points because they have a certain status. Badges can also be cross-honored, as affiliated merchants can honor each

other's customer statuses, similarly to how airline alliances recognize travelers from each other's networks. This can all be defined within the pricing/offer management function.

There are many other functions that can be added to the network, but these are the ones that are most commonly used to incentivize customer loyalty and spending in the traditional payment world. We expect them to translate well into the crypto networks.

7 PARTICIPANT ROLES

So far, we have discussed the primary roles of customers as buyers and merchants as sellers. But there are three other groups of participants that are crucial to the operations of the Card Pay network—suppliers, issuers, and reward program administrators. Here is a complete list of participants:

Supplier

Since Card Pay is a layer-2 network, the economic bandwidth denominated in stablecoins and other volatile tokens must be locked in our layer-1 Ethereum mainnet smart contract by a token supplier. The token supplier deposits tokens of various sorts on mainnet and receives an equal number of tokens on the xDAI chain, which can be sold or gifted to customers and merchants as fungible tokens supporting commerce.

Issuer

An issuer takes the supply of layer-2 fungible tokens and packages them into Prepaid Cards. Customers can then buy those Prepaid Cards from the issuer, paying an additional small fee in exchange for these preloaded balances.

There are three types of issuers:

- **Fiat on-ramp issuers** accept fiat payments, such as Apple Pay or debit card transactions, and issue Prepaid Cards against those fiat payments.
- **On-chain issuers** accept deposits on mainnet or another blockchain. They issue Prepaid Cards to the customers once the funds have been received according to the blockchain. This type of payment does not touch any fiat rails.
- **Service providers, such as centralized exchanges,** receive customers' funds, e.g. stablecoins, from within the exchange interface. Then, they issue the Prepaid Cards on the Card Pay network, making it easy for trading customers to spend their stablecoins with very little on-chain orchestration.

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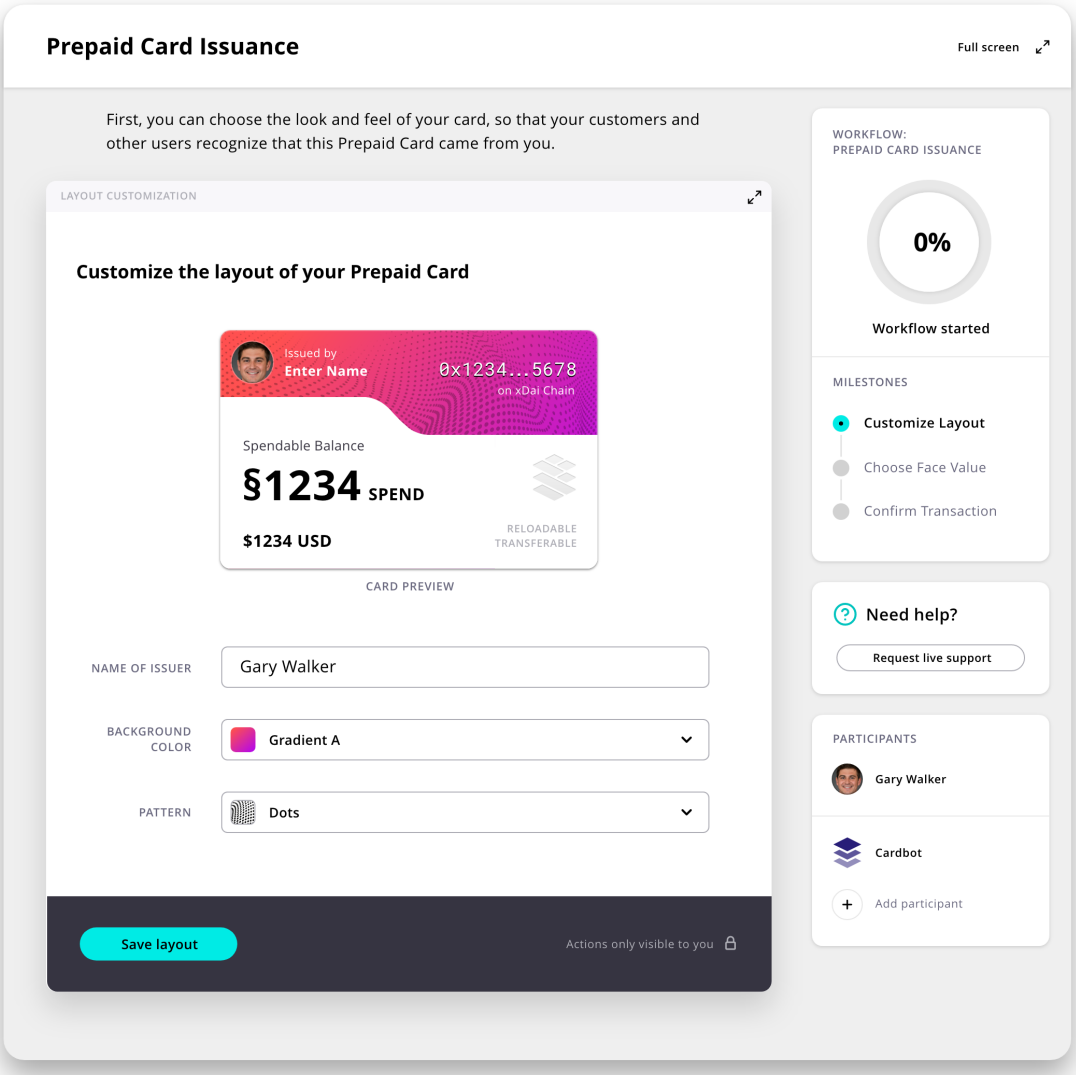


Customer

Customers are not required to do any type of KYC. They just need to have a mobile wallet with an Ethereum address and load it with some funds. Those funds are necessary to not only pay the merchants, but also cover the on-chain transaction fees on the xDAI chain. Customers can create multiple accounts (each with a different address) to segregate their purchases in the different spheres of their digital lives.

Merchant

Anybody can be a merchant, as long as they fill out a merchant profile. Merchants who only accept crypto payments that don't touch any fiat rails do not need to go through KYC. Merchants have to set prices for and list the products (SKUs) that they intend to offer in the network. They can also set discounts and bonuses, so as to incentivize or disincentivize payments in different currencies.

Reward program administrator

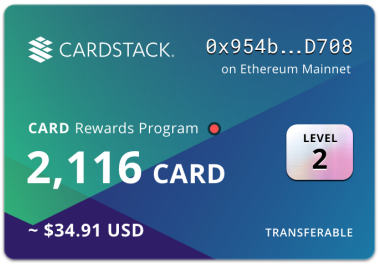
Merchants who have a reward program will also act as reward program administrators. This allows them to set reward ratios for certain categories of spend against certain products, including conditions like timeframes, limits, and qualifications, e.g. offering a reward to VIP badge holders only.

Anybody can establish a reward program, as long as they also act as suppliers who onboard their own reward tokens or vouchers to the network by way of the layer-1 reward pool.

8 INCENTIVES IN THE CARD PAY NETWORK

Card Pay requires participants to actively contribute value and judgement, so that the network can thrive and grow. Therefore, the protocol defines a few interleaved layers of rewards that provide incentives for each of the participants highlighted above.

- **Supplier Reward:** Suppliers who stake stablecoins or other tokens in layer 1 (L1) will receive a percentage of the spending activity in their staked currency, which will be deposited to their layer-2 (L2) wallet.
- **Customer Reward:** Customers who spend money, especially early on in the formation of the network, will receive CARD tokens. The amount will be calculated as a percentage of the USD value of their spend. It will start out as a fairly high percentage, so as to jumpstart the spend mining. Then, it will be gradually reduced in each phase, as the tokens allocated to Batch D of the Cardstack Token Generation Event (TGE) are progressively distributed.



- **Merchant Reward:** Merchants will earn CARD tokens when they successfully sell a product to a customer. Merchants who accept CARD as a payment method will receive even more CARD tokens for those transactions. They can then use those tokens for governance and for getting network services at a discount.
- **Staker Reward:** The Card Pay network has a number of important parameters that define the percentage of protocol fees, the reward distribution schedule, and discount percentages. Stakers who stake CARD tokens and use them for governance purposes will receive staking rewards according to some APR.
- **Reward Program Administrator Reward:** There is a program to airdrop CARD tokens to Card Pay customers and merchants, but we expect that many people will want to distribute their own reward tokens and vouchers to the network. Customers will be paying real money for real goods, so there is incentive for them to be thoughtful about the rewards they distribute. If they spam the network, they could be included in a "deny list", and it will cost them additional staked CARD tokens to remove that negative status.

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9 GOVERNANCE

The Cardstack ecosystem is backed by the Cardstack Token, which is a universal token for performing many activities, including governance and voting. Community members do not vote directly with the Cardstack Token, but they can generate voting vouchers by staking Cardstack Tokens in a voting pool for a period of time. This way, token holders who have staked their tokens for a longer period of time have more influence, as they are more committed to the long-term health of the network. Once token holders receive their voting vouchers, they can control the following parameters and curated lists on-chain:

List of allowed stablecoins

These are the stablecoins that all merchants in the Card Pay network must accept in exchange for their products and services. The merchants take the currency fluctuation risk after they receive each of those stablecoins. Therefore, community voters—who decide which stablecoins the network supports—must find a balance between approving a broad range of stablecoins (to give customers more payment options) and blocking the coins that may be at risk of losing their peg (to reduce the currency fluctuation risk for merchants). We expect this list to grow slowly, but steadily, as the liquidity and reliability of the stablecoin infrastructure on Ethereum matures.

List of default reward tokens

Customers and merchants can redeem reward tokens that they have earned via a sweep. They will receive those reward tokens in their wallet after the sweep. However, this sweep needs to exclude tokens of very low value, e.g. spam tokens. Therefore, the protocol maintains a list of allowed reward tokens, which will be included in all the sweeps. Reward program administrators, who want their own token to be included, will have to participate in the voting process by staking Cardstack Tokens. This creates an economic cost for the reward administrators and improves the quality of the token list.

Percentage of the transaction fee

Transaction fees are deducted from payments in the revenue pool. Parameters that have to be specified are:

- the percentage distributed to suppliers who provide economic bandwidth,
- the percentage distributed to issuers who get the balance into the customers' hands, selling them Prepaid Cards and making it easy for them to reload their balance, and
- the percentage distributed to all Cardstack Token holders.

This is how it works: We take a percentage of the stablecoins from each transaction and buy CARD Tokens in a layer-2 decentralized exchange automatically.

- CARD purchased via AMM can be further distributed as rewards to specific customers and merchants.

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- CARD can be distributed to stakers as staking rewards.
- CARD can be burned to reduce the token supply, which benefits all token holders.

The parameters must be set to be competitive compared to existing credit card and payment loops. Since the gas fees on our layer-2 protocol are very low, even a 1-3% transaction fee (similar to what credit card companies charge merchants) would be much cheaper than the corresponding fee paid in ETH for a mainnet transaction.

We expect these percentages to be adjusted over time through a lively community-driven governance process —so that the Card Pay network can balance the goal of low fees for customers and merchants on the one hand, and the goal of healthy rewards for suppliers and issuers on the other hand, so as to maximize the usability and economic activity of the network.

10 ROLE OF THE CARDSTACK TOKEN (ERC20: CARD)

The Cardstack Token is a multi-purpose token to govern and support all the networks that will be built on the Cardstack Framework. These are some ways in which CARD will be used:

1. **CARD Staking:** This is the entry point for CARD holders who want to participate in the governance process.
2. **CARD Reward:** This is similar to liquidity mining for DEXs. It is a short-term boost, but it helps bootstrap the commercial activity.
3. **CARD Status:** Cardstack Tokens can be used to attain increasing membership levels, which unlock certain capabilities and permissions. Such statuses can be earned by spending on the Card Pay network or purchased at a premium, which is paid in CARD that are burned afterwards.
4. **CARD Swap:** On the layer-2 xDAI chain, the main liquidity pairs will be between community tokens or other types of reward tokens and the Cardstack Token. Reward program administrators will have to ensure that there is enough liquidity between their token and the Cardstack Token, so as to automate the currency exchange process that is part of the payment processing steps.
5. **CARD Boost:** Merchants and issuers who want to highlight their offerings for customers in the Cardstack community can purchase sponsored listings and other types of ad-like instruments. All advertising fees in the Cardstack network are paid using Cardstack Tokens.
6. **CARD Discount:** Network services, including transaction fees, can be paid in CARD. Rates paid in CARD will be discounted compared to rates paid in stablecoins. This discount for Foundation-affiliated hosting services, which encourages CARD holders to pay using CARD, will be deducted based on the USD value after the discount is considered.
7. **CARD Burn:** This is the mechanism to redistribute value to all community members. Here are some examples of situations in which CARD will be burned:

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a) Merchant transaction fees: The CARD purchased by the AMM (DAI>CARD) will be burned after they are acquired.

b) Application fees: These are the fees that are paid to include a token in the list of allowed tokens or promote it to be on top of that list.

c) Membership fees: These are the fees for upgrading to the next level of membership.

11 TECHNOLOGY USED IN THE CARD PAY NETWORK

1. **xDAI:** Cardstack has adopted a lot of xDAI technology, including layer-1 and layer-2 technology called Arbitrary Message Bridge (AMB).

2. **Gnosis Safe:** Cardstack uses many of the Gnosis smart contracts and their supporting infrastructure. For example, all Prepaid Cards are actually Gnosis Safes as multisig wallets, deployed to the xDAI chain. Cardstack uses Gnosis transaction services to index the transaction history within those Prepaid Cards. Cardstack also uses Gnosis relay services to conduct meta transactions, so that customers and merchants do not need xDAI to interact with their wallet. They only need a Prepaid Card balance, backed by stablecoins in our layer-1 reserve pool.

3. **Honeyswap:** Card Pay uses Honeyswap, a deployment of Uniswap V2 on the xDai chain, as the automated market maker (AMM) decentralized exchange (DEX). We will provide CARD as liquidity for the primary pairs of Cardstack Tokens and the reward tokens that are issued and distributed through the reward program within Card Pay. We expect our participants to be major liquidity providers for the pairs as well. We will also ensure that there is enough liquidity between CARD and each of the supported stablecoins. This way, we can use Honeyswap as an exchange rate oracle for many per-transaction exchange rate needs.

4. **WalletConnect:** Card Pay uses the WalletConnect standard, which is already deployed in popular wallets like Rainbow and Argent.

5. **Rainbow:** The Cardstack mobile app is based on the Rainbow Ethereum wallet's open-source codebase; but we have extended it to support the xDAI chain, as well as our concept of Prepaid Cards, and the confirmation workflows that are common in payment applications.

6. **Wyre:** Wyre is a fiat on-ramp for purchasing ETH and DAI that is already integrated with the Rainbow wallet codebase.

12 UPCOMING CARDSTACK PRODUCTS AND SERVICES

While Card Pay is a major part of the development at Cardstack, we are also working on two other products that create the Cardstack ecosystem symbiotically.

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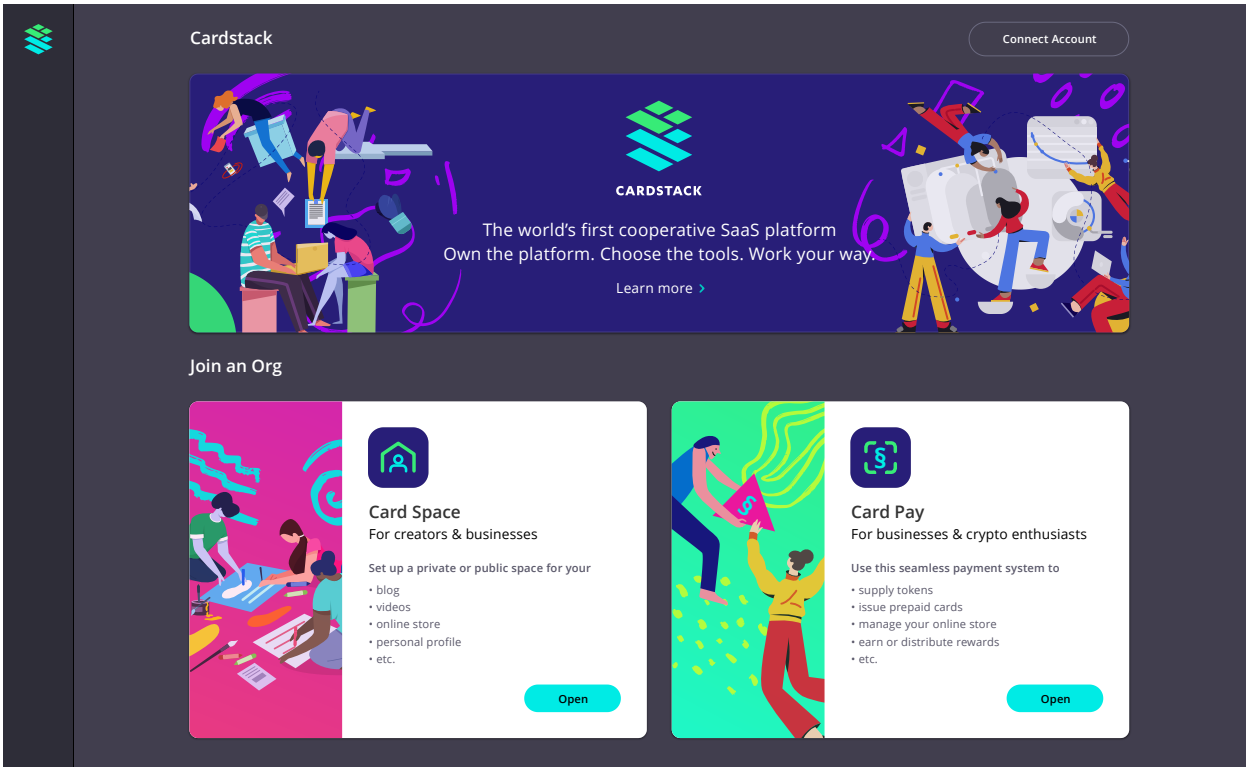
Card Space: dApp hosting for creators and communities



Card Space is a flexible dApp creation tool that allows creators to build customized Web apps, which will enable them to

- author media and publish it on the Web or other protocols, e.g. IPFS,
- conduct workflows with customers and partners to close deals and make money,
- mint and host NFTs that wrap their media, so it can be sold to collectors,
- open storefronts to sell goods and services, and
- manage subscriptions or membership programs to reward loyal customers.

Card Space uses Card Pay as the commerce engine, but provides additional Web 2.0-compatible capabilities, making these economic activities visible to the existing Web that people use every day. As a hosting service, Card Space takes payments from creators via Card Pay, so as to pay for bandwidth, storage, and further product development.

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Card SDK: JavaScript framework for developers to customize and extend Card Space

Card Space is designed as an open-source application platform written in JavaScript. It is designed to be extended by developers who want to build new types of cards that can be added to a space. These cards can be created using the **Card SDK**. The SDK is currently in version 2 form, with version 3 coming soon.

With the Card SDK, developers can create the following new types of media and application experiences:

- **Media cards:** supporting advanced 3D, AR, VR, AI generative art, game assets, etc.
- **Metadata cards:** capture, validate, and store structured data that describes the creative work or data set
- **Offer cards:** commercially oriented cards that provide checkout and payment services to support decentralized marketplaces, new types of order books, as well as centralized cloud services
- **Asset cards:** cards that wrap value—including balances in centralized exchanges or banks (via FinTech hooks), and assets issued on other layer-1 or layer-2 protocols

Card developers who use the SDK do not have to build the Cardstack Environment. Instead, they can focus on adding capabilities and integrations to their preferred decentralized protocols or even centralized services. Once a card is created, it is published in the software catalog. It can be added to a creator's Card Space using simple drag-and-drop features. Customers can interact with the new card with the same ease that the Card Pay app offers them for payments.

Developers who build new cards can leverage our comprehensive Boxel design system, which offers prebuilt UI components to create forms, collections, layouts, action chains, workflow threads, and asset wrappers. At Cardstack, we use Boxel for all our first-party products, including the Card Pay Web and mobile app. We encourage developers to reuse these design system components that have been refined over the last two years, so that new capabilities feel as familiar to customers as something they have been using for years.

We plan to launch the Boxel design system, which comes with a playground for developers, where they can learn about the prebuilt components and experiment with them. This way, they can learn how to quickly create cards using these building blocks.

Card Creator: Cross-chain NFT platform

We expect many creators to be interested in selling NFTs and believe that the low transaction cost on layer 2, combined with the ease of purchase, would bring a lot more casual users to the NFT space. That is why we are building an NFT protocol on layer 2, which will allow artists to mint NFTs at a low cost, while the first buyers can choose to bridge their NFTs from layer 2 to layer 1 for resale.

This NFT minting platform will take advantage of existing design system components for displaying collections, conducting workflows (such as the minting process), as well as payment and reselling processes

(similar to the processes conducted for physical goods by merchants and customers). This may become a template we can offer to other NFT marketplaces or communities, enabling them to build Card Spaces with built-in NFT minting capabilities (among many other capabilities) for their communities.

13 CONCLUSION

We believe that topline revenue from customers, who spend real cash to buy products and services that are valuable to them, is the key to the healthy growth of economic activity and sustainability for crypto networks.

Card Pay is designed to provide easy on-ramps for new customer cash into the network—via fiat, crypto, or service providers. Inviting non-crypto-savvy users to use the Card Pay app for buying digital products they can use, own, resell, or earn from, is the best way to introduce them to the powerful concepts of DeFi. This will lead to an early majority of users who will drive the next phase of growth for crypto networks and the Cardstack ecosystem in particular.

As for the types of products and services people will buy on Card Pay, we believe that we should start with currently existing products like NFTs and community memberships. These will be the main draw for curious users, who follow their favorite creators' first foray into crypto. However, we believe that the protocol we are designing must expand to all kinds of commercial activities, including physical goods in the real world. After all, economic activities in the real world can provide great energy to reshape the value distribution system behind credit card terminals.

Many fiat payment methods are shifting to mobile apps. This makes it easy to substitute a mobile app that is backed by traditional finance and technology with a new mobile app—one that offers the same seamless experience, but is backed by the new possibilities crypto unlocks.

Cardstack is committed to leading the charge of bringing exciting protocols into everyday users' daily routine. We will continue to work on all layers of the stack to provide a seamless, cohesive experience that brings the first billion users into the protocol era.

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