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Unique Network

techpaper

Unique Network Technical Paper 中英对照版

Summary
摘要

Unique Network blockchain in the Polkadot ecosystem can be seen as a foundation for standards and good practices serving for any software that uses or relates to NFT. The core components of Unique blockchain are:

Polkadot 生态系统中的 Unique Network 区块链可以被看作一个标准与良好实践的基础，它为任何使用 NFT 或与 NFT 相关的软件提供服务。Unique Network 的核心组件是：

- NFT Pallet
- NFT Pallet
- Ink! Smart Contracts
- Ink! 智能合约
- EVM/Ethereum Smart Contracts
- EVM / 以太坊智能合约

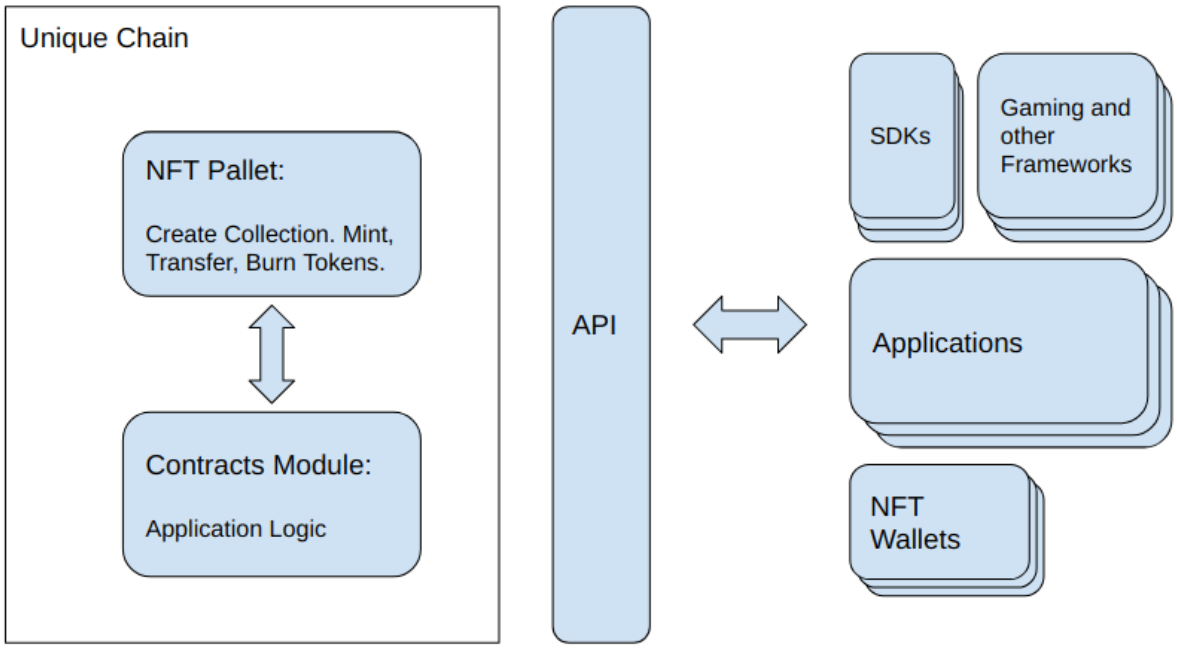
Like ERC-721 Ethereum standard [1] for smart contracts, NFT Pallet provides the base for creating collections of NFTs, minting tokens, managing their ownership, and much more. The smart contracts functionality is included to handle any application logic that is unknown at the time of chain design.

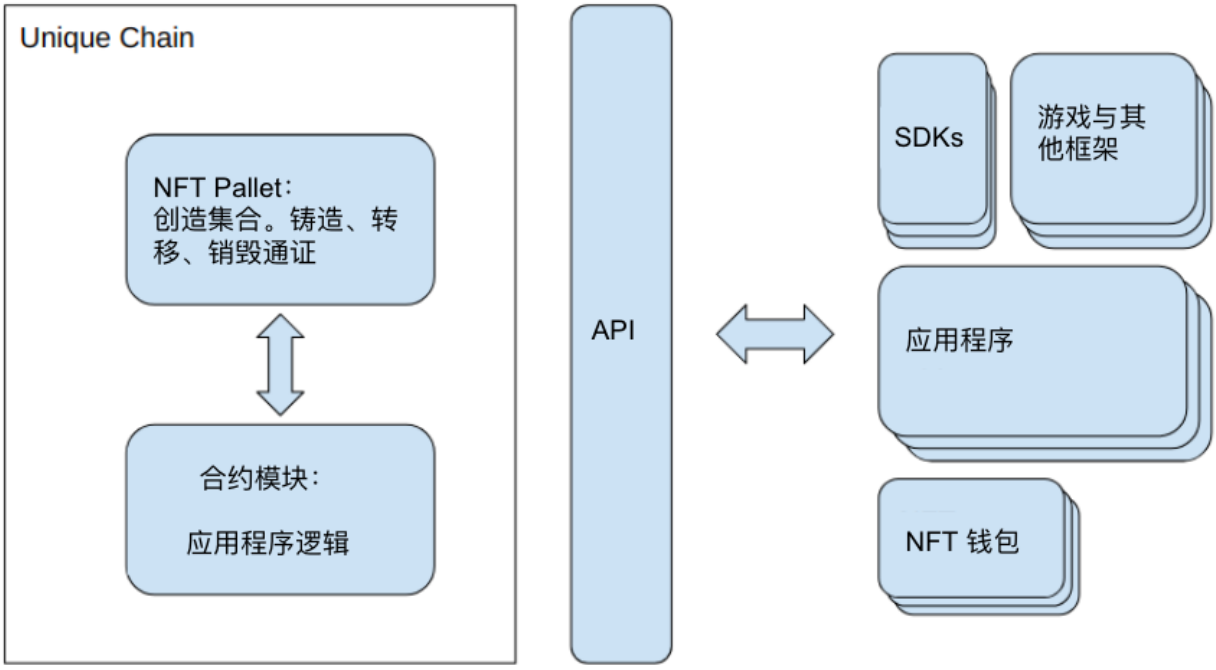
与 ERC-721 以太坊智能合约标准 [1] 一样，NFT Pallet 为创建 NFT 集合、铸造通证以及管理其所有权等诸多功能提供基础。它包含智能合约功能，可以处理在设计链时仍然未知的任何应用程序逻辑。

The Unique Network aims to provide the feature rich and flexible configuration experience to its users. This includes multiple authorization levels, economic models that enable freemium application marketing, miscellaneous administration options, advanced spam protection. The goal is to cover the broad spectrum of NFT applications' development needs and provide maximum flexibility at low to affordable cost.

Unique Network 旨在为其用户提供功能丰富且灵活的配置体验。它包括多个授权级别、支持免费增值的应用程序营销模型、各种管理选项以及先进的 Spam 防护。Unique Network 的目标是满足 NFT 应用程序开发的广泛需求，并以低廉或易承受的成本提供最大的灵活性。

Architecture
架构





It is hard to overestimate the importance of Ownership [2] in human society. Ownership defines the exclusive rights and control over the property. This term originates at the very beginning of our civilization and serves as a basis for many notions such as freedom, money, crime, trading, giving, etc. English philosopher John Locke in his Two Treatises of Government work [3] argues that property even predates the existence of governments, hence it defines “live, liberty and estate”. Thus property, ownership, and rights are one of the most important mankind essentials. It is important for one’s solid realization of the universe to build a correct and precise model of ownership and rights.

所有权在人类社会中的重要性高到难以估量 [2]。所有权定义了对财产的排他性权利和控制权。这个词起源于人类文明初期，是许多概念的基础，如自由、金钱、犯罪、交易、给予等。英国哲学家 John Locke 在他的《政府论》[3] 中认为，财产甚至早于政府的存在，因此它定义了 “生命、自由和物质财富”。因此，财产、所有权和权利是人类最重要的必需品之一。建立一个正确而准确的所有权和权利模型，对于一个人的世界观尤为重要。

Ownership implies a relation between an owned Entity and an Owner, the party that the Entity belongs to. In Blockchain networks the Owner is usually represented by an address: A hash [4] of a public key [5] of a blockchain account, associated with a human identity or not.

所有权是指所拥有的实物与所有者 (该实体所属的一方) 之间的关系。在区块链网络中，所有者通常由一个地址表示，该地址是一个哈希值 [4] 所代表的区块链账户公钥 [5]，无论该账户是否与人类身份相关联。

Defining the owned Entity, as well as rights, presents a more complex problem. In accordance with the ERC-721 standard, the NFT protocol is a very simple and basic description and storage of ownership information. It allows to create a Thing, a unique entity. The protocol allows creating an assignment between the unique Thing and the Owner address, as well as rights to transfer the ownership to another Owner and destroy the owned property.

定义拥有的实体以及权利，是一个更复杂的问题。根据 ERC-721 标准，NFT 协议是对所有权信息进行的简单和基本的描述和存储。利用 NFT 协议可以创造一个物品，一个独一无二的实体。该协议允许在这个独一无二的物品与所有者地址之间创建一个分配关系，同时允许所有者将所有权转移给另一个所有者并拥有销毁所拥有的财产的权利。

This limited set of operations composes the base functionality of the NFT pallet. Purposefully it does not have any knowledge of application logic that may use the NFTs. In order to preserve the decentralized and trustless operation of NFTs, the smart contract functionality is included in the Unique chain so that application developers can implement their custom logic while exercising their user’s ownership rights over NFTs on the same blockchain.

这些有限制性的操作构成了 NFT Pallet 的基本功能。并且不可能触及 NFTs 的应用逻辑。为了保持 NFTs 的去中心化和无需信任的操作，智能合约功能被包含在 Unique 链中，这样应用程序开发人员可以实现他们的自定义逻辑，同时在同一个链上行使他们的用户对 NFTs 的所有权。

In addition, the NFT pallet allows storing the NFT metadata in order to allow more authentic definitions of NFT items, while staying agnostic of this metadata format.

此外，NFT Pallet 支持存储 NFT 元数据，以便更可靠地定义 NFT 项目，且与元数据格式无关。

The Substrate framework [7] provides a robust and flexible WebSocket API allowing connections to the Blockchain to be established by its clients: NFT wallets, Games, Marketplaces, and other applications.

Substrate 框架 [7] 提供了强大且灵活的 WebSocket API，允许其客户端（NFT 钱包、游戏、市场和其他应用程序）建立与区块链的连接。

Feature Highlights
功能亮点

Collection Management
集合管理

The Collection in Unique Network means a set of items united by a common purpose, as well as collection name and description, token prefix, and superior ownership. Generally, a collection would at least originally serve one application (e.g. a game or an art gallery) and possibly more as it evolves. The application developer would create the collection and become its owner. Ownership of collection means the full authority over all of its properties and NFTs, including the capacity to destroy the tokens and the collection or give up this authority by transferring the ownership to an address with an unknown private key. For example, an address of a smart contract (incapable of further transferring or exercising the ownership rights) may be used, since the algorithm of creating smart contract addresses is well known and users don't control the process [6]. Once the authority is given up, the collection properties become locked, which may mean, for instance, that no more NFTs can be minted.

Unique Network 中的集合是指一组出于共同目的而联合在一起的项目，包括集合名称、描述、通证前缀和上级所有权。通常，一个集合最初至少是为一个应用程序（例如游戏或美术馆）提供服务，并且会随着发展而服务更多应用。应用开发者会创建并拥有该集合。集合的所有权意味着对其中所有财产和 NFT 拥有完全的权限，包括销毁通证和集合，或通过将所有权转移到一个具有未知私钥的地址来放弃权限。例如，可以使用智能合约的地址（无法进一步转让或行使所有权），

因为创建智能合约地址的算法是公开的，并且用户无法控制流程 [6]。放弃权限后，集合属性将被锁定，这可能意味着无法再次铸造 NFT。

Another important right that collection ownership gives is administration. An administrator of collection is the account that has elevated privileges over common users, but slightly less than a collection owner. As such, only the collection owner can destroy the collection and add administrators. This permission level was mainly aimed to allow automated operations over collections, such as minting tokens on demand (in a server application in the protected environment). Should the administrator key be compromised, the owner can disable the compromised administrator account. Alternatively, administrator accounts can be used for manual collection management. Also, a smart contract can serve as a collection administrator to allow advanced decentralized application logic such as Claiming free SubstraPunks, for example [8].

集合所有权所赋予的另一项重要权利是管理权。集合管理员是权限高于普通用户但略低于集合所有者的帐户。因此，只有集合所有者才能销毁集合与添加管理员。这个权限级别主要是为了允许对集合进行自动化操作，比如按需生成通证(在受保护环境中的服务器应用程序中)。如果管理员的密钥被泄露，所有者可以禁用泄漏的管理员帐户。也可以使用管理员帐号手动管理集合。此外，智能合约可以充当集合管理员，允许高级的去中心化应用逻辑存在，例如领取免费的 SubstraPunks [8]。

Operating NFTs
NFT 操作

Once the collection is created, its owner can mint tokens that belong to this collection. The minting process is an atomic operation of creating an NFT item, setting this item's immutable metadata and its owner. After the item is created, it becomes an owned truly unique token. The owner of the NFT can transfer it to another address, destroy it, set the mutable token metadata, or, like with collections ownership, give up their authority by transferring to an address with an unknown private key.

创建集合后，所有者可以铸造属于该集合的通证。铸造过程是一个创建 NFT 项的原子操作，会设置该 NFT 项的不可变元数据及其所有者。在项目被创建后，它就变成了一个独一无二的通证。NFT 的所有者可以将其转移到另一个地址、销毁、设置可变的通证元数据，或者像集合所有权一样，将其转移到一个拥有未知私钥的地址来放弃他们的权限。

Collection Properties
集合属性

Metadata Schemas
元数据架构

One important property of a collection is the Off-chain Schema. This schema describes the metadata that is associated with each token and can be accessed by the token ID. It can be an image or a more complex and structured data. For additional protection of token authenticity, the off-chain metadata hash can be recorded in the immutable token metadata.

集合的一个重要属性是链下模式。此架构描述每个通证关联的元数据，并且可以由通证 ID 访问。可以是图像，也可以是更复杂和结构化的数据。为了进一步保护通证的真实性，可以将链下元数据哈希值记录在不可变的通证元数据中。

Besides the off-chain schema, it is possible to set the similar schemas for mutable and immutable NFT metadata that are stored on-chain.

除了链下模式，还可以为存储在链上的可变和不变的 NFT 元数据设置相似的模式。

The main purpose of the off-chain and on-chain schemas is allowing the standardised definition of application specific token data. Even though the Unique blockchain does not utilise this knowledge, 3rd party NFT wallets may do, so the whole NFT ecosystem will benefit from off-chain schema by having a common way to access and display token features.

链下和链上模式的主要目的是允许对应用程序特定通证数据进行标准化定义。即使 Unique 区块链没有利用此逻辑，第三方 NFT 钱包也可以使用，因此，整个 NFT 生态系统将通过具有访问和显示通证功能的通用方法而受益于链下模式。

White Lists
白名单

Depending on the application design and requirements, the collection may be accessible for a wide audience or for a restricted and private group of accounts. In the latter case, a white list access mode may be enabled to restrict capabilities of owning and transferring tokens by only accounts included in the white list.

根据应用程序的设计和要求，该集合可以为广大受众或受限制的私人帐户组访问。在后一种情况中，可以启用白名单访问模式，通过锁定白名单中的帐户来限制拥有和转让通证的能力。

Private and Public Minting
私人和公共铸造

The Collection owner may choose to allow non-privileged users to mint tokens in their collection by enabling the public minting mode. Combined with the White Lists, this could be a powerful tool for applications that require their users to be able to create their own tokens, such as art galleries, some games or applications for collectors.

集合所有者可以选择通过启用公共铸造模式来允许非特权用户铸造其集合中的通证。 结合白名单模式，对于需要用户能够创建自己的通证的应用程序，例如美术馆、某些游戏或收藏家，将是一个强大的工具。

Economic Models
经济模型

As Pedro Armelin (UX Designer) says in his article [9], mass adoption of blockchain technology is largely dependent on UX. An average Internet user would not have any of the following:

正如 Pedro Armelin（UX 设计师）在他的文章 [9] 中所说，区块链技术的大规模采用在很大程度上取决于 UX。普通的网络用户不会参与以下任何一项：

- Knowledge of cryptography or blockchain
- 密码学或区块链知识
- Crypto exchange trading experience or even an account
- 加密货币交易经验，甚至一个交易账户
- Understanding of gas fees
- 了解 Gas Fees

For many gamers owning an NFT does not mean anything more than just seeing an image associated with this NFT in the “My Account” section of the WEB page or in the game application and being able to use it in the game or transfer it to another user.

对于许多游戏玩家而言，拥有 NFT 仅仅意味着在 WEB 页面的 “我的帐户” 部分或游戏应用程序中看到与此 NFT 相关的图像，以及能够在游戏中使用或将其转移给其他用户。

A DMV officer would not need to know anything more than the identity of a person who owns a vehicle with a certain VIN number (represented by an NFT). Any more details will be perceived as extraneous and obstructing the smooth user flow.

一个 DMV 管理者只需要了解拥有带着某个 VIN 序列号（由 NFT 表示）的载具的人的身份。其他细节都被视为无关紧要的，并且会妨碍用户顺畅操作。

This obstruction in the UX presents a large adoption problem and is being tackled by blockchain software engineers in different ways.

UX 中的这种障碍带来了一个很大的采用问题，区块链软件工程师正以多种方式在解决。

Ethereum
以太坊网络

Gas is the “biggest blocker for people starting to use dApps”, says Carsten Munk in his Medium article “Is frictionless Ethereum (and dApps) usage possible” [10]. Every person needs to have a minimum of Ethereum to pay for 21k gas in their wallet before they are able to run any transaction. One way to attack this problem is subsidising the gas cost when the user address is known. Another solution is Gas relay for contract calls, as described in EIP-1077 [11] that requires the user signing a message as a proof of intention to execute the transaction.

Carsten Munk 在他的 Medium 文章《以太坊和其他 dApp 无缝使用体验的可能性（Is frictionless Ethereum (and dApps) usage possible）》 [10] 中说，Gas 是 “人们使用dApp的最大障碍”。在进行交易前，每个人钱包中至少需要存有足以支付 21000 gas 的等值以太坊。解决这个问题的一种方法是在用户地址已知时补贴 gas fee。另一种解决方案是通过合约连接到的 Gas 接力，如 EIP-1077 [11] 中所述，它要求用户签署一个指令以作为执行交易的意向证明。

Either solution requires additional infrastructure to be deployed on top of the Ethereum network, in most cases centralized.

任何一种解决方案都需要在以太坊网络上部署额外的基础设施，这些基础设施在大多数情况下都是中心化的。

EOS
EOS 网络

The EOS system resources [12] are limited, like in any blockchain, but EOS presents an interesting economic model for freemium applications: RAM must be purchased, but it is only purchased one time and remains with the application permanently. In order to execute a transaction, application users would be required to purchase CPU and Network bandwidth, but only if they are willing to use a high amount of these resources in a short period of time, otherwise they are accumulated at some low rates in the user’s account and allow executing free transactions at a small rate limit.

如同其他区块链一样，EOS 系统资源 [12] 是有限的，但 EOS 为免费增值应用程序提供了一个新型的经济模式：必须购买 RAM，但只需购买一次，就永久地与应用程序兼并在一起。为了执行交易，需要用户购买 CPU 和网络带宽，但前提是他们愿意在短时间内消耗大量资源，否则它们将低速累积在用户帐户中，并允许以较低的速率限制执行交易。

While this model is more native to the blockchain (EOS), it has significant limitations. Besides high RAM prices (which are formed on the open public RAM market and cannot be controlled by

EOS miners/stakeholders), it does not provide much flexibility in terms of transaction throughput and complexity. Should the contract owner decide to subsidise a more expensive transaction or more transactions per unit of time than default, they will be driven to fall back to custom solutions similar to what engineers implement in Ethereum.

虽然这种模式更适合于区块链（EOS），但它有很大的局限性。除了 RAM 的高价（这是在开放的公共 RAM 市场上形成的，不能由 EOS 矿工/利益相关者控制）之外，它在交易吞吐量和复杂性方面没有多少灵活度。如果合约所有者决定追加一个更昂贵的交易或在单位时间内进行更多的交易，他们将被迫退回到类似于工程师在以太坊中执行的方案。

Unique Network
Unique Network

Unique Network is going to offer several gas fee models for its users in order to provide as much flexibility as possible to adapt to miscellaneous marketing strategies of application developers and remove UX friction for the newcomers.

Unique Network 将为其用户提供多种 gas 收费模式，以便为应用开发者提供尽可能多的灵活性，以适应应用开发者的各种营销策略，并为新手消除用户体验方面的摩擦。

The gas fee model is configured separately for each Collection or a smart contract. Every Collection and smart contract has a fee model assigned to it, which determines how its transactions are paid, and the developer can choose the fee model that better suits their application. Initially the fee model is configured to a default one and can be updated later at any time and as many times as needed.

Gas fee 模式针对每个集合或智能合约单独配置。每一个集合和智能合约都有一个收费模式，这决定了交易的支付方式，开发者可以选择更适合自己应用的收费模式。最开始时，收费模式被配置为默认模式，后续可以根据需要随时更新。

Currently there are two models implemented: The default “User paid fees” model when the transaction sender pays all gas fees, and the “Pay as you go” model when collection or smart contract owners enable sponsoring for certain transaction types for their users. The spam protection for this model will be explained in the next paragraph.

目前实现了两种模式：当交易发送方支付所有 gas fee 时采用的默认的 “用户付费” 模式，以及收款人或智能合约所有者为用户的某些交易类型提供赞助时采用的 “按需付费” 模型。下一部分将说明此模式的 Spam 防护。

Spam protection
Spam 防护

Network fees are the important security factor that prohibits malicious players from abusing the network resources, as well as protect the network from being overwhelmed by good applications. Changing mechanisms of transaction commissions requires special caution. In case of sponsored fee models the sender and transaction fee payer may be different entities, which may create an attack surface if spam protection was not in place.

网络费用是防止恶意玩家滥用网络资源和保护网络免受应用程序淹没的重要安全因素。改变交易佣金机制需要特别谨慎。在赞助费模式中，发送方和交易费支付方可能是不同的实体，如果没有设置 Spam 防护，可能会产生一个攻击面。

Spam protection prevents uncontrolled depletion of sponsor funds. The Network applies rate limits to sponsored transactions. An NFT token transfer can only be sponsored one time per an interval of time. In the case of a smart contract call, the rate limitation is more challenging because the sender or client identification cannot be easily established: The addresses to send transactions from can be generated as easily as generating a short random sequence of bytes (a private key). The transaction subject (like NFT ID) does not generally exist because smart contracts are aimed to express custom application logic. So the second layer of protection is required: White lists. In order to securely sponsor the smart contract transactions, the application will need to establish a registration procedure, which adds the user's address to the white list.

Spam 防护可以防止不受控制地耗尽赞助资金。该网络对赞助交易实行费率限制。一个 NFT 通证转移只能在一定时间间隔内发起一次。在智能合约调用的情况下，突破交易速度的限制更具挑战性，因为无法轻松建立发送方或客户端标识——可以轻松地生成用于交易的地址，就像生成一个短的随机字节序列（私钥）一样。交易主体（如NFT ID）通常不存在，因为智能合约的目标是表达自定义应用程序逻辑。所以第二层保护——白名单，是必需的。为了智能合约交易安全进行，应用程序将需要建立一个注册程序，将用户的地址添加到白名单中。

Configuring rate limits is one of the upcoming features of the Unique Network that will increase the flexibility of sponsored modes. Also, advanced economic models are included in the roadmap that will allow the collection and contract owners to provide free transactions in exchange for locking funds.

配置速率限制是 Unique Network 即将推出的功能之一，它将增加赞助模式的灵活性。此外，路线图中还包含了先进的经济模型，允许集合和合约所有者进行免费交易，以锁定资金。

Contract Ownership
合约所有权

Like collections and NFTs, smart contracts in Unique Network are also owned. The ownership is atomically assigned at the moment of contract deployment, so the contract is owned by the address that deployed it. Later on the owner can configure fee sponsoring for that contract.

与集合和 NFTs 一样，在 Unique Network 中的智能合约也是被拥有的。所有权在合约部署时进行原子级的分配，因此合约由部署它的地址拥有。随后，所有者可以为该合约配置费用担保。

Fees Payable with ERC-20, Ethereum, or Even Valuable NFTs
使用 ERC-20、以太坊以及有价值的 NFT 支付的费用

One of the coming soon perks of using the flexible economic models is the capability to pay fees directly with the Application's own Fungible (a.k.a. ERC-20) token minted within the Unique Chain. Once the exchange rate between Unique and the application token can be established, the application will be allowed to switch to paying fees with its own token. Combined with Ethereum, Bitcoin, and other bridges, this feature opens the wide range of possibilities to inter-operate between networks, since theoretically any value (not even limited to Fungible tokens, but also Re-Fungible) transferred from over the other networks, can be used for transaction fee payment.

使用灵活的经济模式即将带来的一个好处是，可以直接使用应用程序同质化的（ERC-20）通证支付费用。一旦 Unique 和应用通证之间的汇率建立起来，应用程序将被允许使用自己的通证支付费用。与以太坊、比特币和其他桥相结合，该功能打开了网络间互操作的可能性，因为从理论上讲，从其他网络转移的任何等价物（不限于同质化通证，也可以是重新同质化通证）都可以用于支付交易费。

Re-fungible and Fungible Modes
重新同质化和同质化模式

Re-fungibility is an important step towards building real life models of ownership rights. Often a unique item may be owned by multiple entities in different proportions. The examples of such shared ownership are abundant: Timeshares, co-ownership of art, fractional car ownership, etc. For that purpose Unique Network provides the special mode of Collection: Re-Fungible. The Re-fungible token can be minted and then partially transferred to multiple owners. Read more about the re-fungible standard in Standards and Interoperability section.

重新同质化性是建立真实的所有权模式的重要一步。通常，一个项目可能由不同比例的多个实体组成。这种共享所有权的例子非常多：分时度假、共享艺术品、共享汽车等。为此，Unique Network 提供了特殊的集合方式：重新同质化。重新同质化的通证可以被铸造，然后部分转移给多个所有者。请在标准和互操作性部分阅读关于重新同质化标准的更多信息。

Fungible collection mode is targeted at the same set of use cases as ERC-20 tokens: Any non-unique and divisible resource can be represented as a Fungible token. While these use cases are not the prime focus of Unique Network, many applications need this functionality in parallel to the NFT. The examples include: Non-unique game resources (such as game money), rating points in applications with social networking capabilities, voting tokens, etc.

同质化集合模式的目标是与 ERC-20 通证相同的用例：任何非唯一的、可分割的资源都可以表示为可代替通证。虽然这些用例不是 Unique Network 的主要关注点，但许多应用程序需要与 NFT 并行的这种功能。例如：非唯一的游戏资源（如游戏币）、带有社交网络功能的应用程序的评级点数、投票通证等。

Notes on Standards and Interoperability
标准和互操作性说明

Despite abnormally high transaction fees, at the present moment Ethereum still dominates the NFT space: According to Etherscan.io [14], there are over 7500 NFT smart contracts deployed with a daily number of transactions going over 7000, the number of minted tokens being over 1,000,000 and the number of holders being in the hundreds of thousands unique owner addresses. The most popular NFT standards in Ethereum space are currently ERC-721, and ERC-1155 [13]. Nonetheless, the other blockchains also hosted a few NFT projects. As such, Bitcoin provides the Counterparty protocol [15]. EOS released the recommended standard for NFT smart contract [16], which is similar to ERC-721.

尽管交易费用异常高，但目前以太坊仍然主导着 NFT 领域。Etherscan 显示 [14]，部署了超过 7500 个 NFT 智能合约，每日交易数量超过 7000 笔，铸造的通证数量超过 100 万，持有者的数量有数十万之多。目前，以太坊领域最流行的 NFT 标准是 ERC-721 和 ERC-1155 [13]。尽管如此，其他区块链也托管了一些 NFT 项目。比特币提供了交易对手协议 [15]。EOS 发布了与 ERC-721 类似的 NFT 智能合约标准 [16]。

The Interchain NFT and Metadata Standardization [13] conducted extensive research of NFT token and their Metadata standards. Unique Network aims to comply with this interchain standard and deliver the network protocol that is applicable to and able to describe a wide range of NFT formats known in order to prewire the NFT interoperability for most if not all known NFT standards, which is explained in detail further.

链间 NFT 和元数据标准化 [13] 基于 NFT 通证及其元数据标准进行了广泛的研究。 Unique Network 旨在遵守此链间标准，并提供适用于并能够描述各种已知 NFT 格式的网络协议，以便为大多数已知 NFT 标准预先设置 NFT 交互性。

ERC-721
ERC-721

ERC-721 [1] is the most popular NFT standard that serves as a base for many standards inheriting its properties. It provides capability to mint, burn, and transfer tokens. The methods such as allow and transferFrom enable withdrawing tokens on owner’s behalf. It is also possible

to include random data in the transfer transactions and perform safe transfers that verify that the receiving party (a smart contract) is capable of receiving the NFT token and can handle it by executing a onERC721Received call-back method.

ERC-721 [14] 是最流行的 NFT 标准，许多标准继承了其特性。ERC-721 提供了铸造、刻录和转移通证的功能。诸如 allow 和 transferFrom 之类的方法可以代表所有者撤回通证。 也可以在交易中包含随机数据，并执行安全转移，以验证接收方（智能合约）是否能够接收 NFT 通证并可以通过执行 onERC721Received 回调方法来处理该通证。

All these features are or will be covered by the basic functionality of NFT Pallet, which is in the core of Unique Network.

NFT Pallet 的基本功能将覆盖这些功能，这是 Unique Network 的核心。

Also, the ERC-721 standard describes the ERC721Metadata metadata standard, which includes collection name, token symbol, and token URI. Collection name, description and symbol (token prefix) are the properties of any Unique collection, and token URI can be set as a part of the Off-chain schema.

此外，ERC-721 标准还描述了 ERC721Metadata 元数据标准，其中包括集合名称、通证符号和通证 URI。集合名称、描述和符号（通证前缀）是任何集合均具有的的属性，并且可以将通证 URI 设置为链下模式的一部分。

Token supply as well as BalaceOf parameters also translate one to one to Unique collection parameters: number of created tokens and balance.

通证供应和 BalaceOf 参数也会一一转换为 Unique 的集合参数：创建的通证数量和余额。

ERC-1633
ERC-1633

Refungible standard [20] is covered by Re-Fungible mode in Unique NFT Pallet. See Re-Fungible and Fungible Modes section for more detail.

重新同质化标准 [20] 在 Unique 的 NFT Pallet 中被同质化模式覆盖。请参阅重新同质化模式和同质化模式一节了解更多细节。

ERC-1155
ERC-1155

ERC-1155 standard [17] mainly adds batch operations on top of ERC-721. This functionality is not directly changing the data formats for NFT, but is a convenient way to automate and optimize operations on multiple NFTs. Also, even though the batch minting is not explicitly included in ERC-1155, Unique implements this feature as well, and will implement batch transfer operations.

ERC-1155 标准 [17] 主要在 ERC-721 的基础上增加了批量处理操作。这个功能并不是直接改变NFT的数据格式，而是在多个 NFT 上实现自动化和优化操作的便捷方式。另外，尽管 ERC-1155 中没有包含批处理生成，但 Unique 实现了这个功能，并将实现批量处理传输操作。

ERC-994 and ERC-998
ERC-994 和 ERC-998

Delegated NFT [18] and Composable NFT [19] add the relationship layer, e.g. “NFTs are arranged in a federated, tree-like format”. In order to stay efficient while accommodating this functionality, Unique Blockchain will add a pallet that will allow to create directed labeled interconnections between NFTs. The NFT Relations section explains the relationships between NFTs in more detail.

被委托的 NFT [18] 和可组合的 NFT [19] 添加了关系层，例如 “NFT 以联合的树状格式排列”。为了保持此功能的同时也可以保持效率，Unique 将添加一个 Pallet，该 Pallet 将允许在 NFT 之间创建定向标记的相互联系。 “NFT关联” 部分更详细地介绍了 NFT 之间的关系。

ERC-809 and ERC-1201
ERC-809 和 ERC-1201

Ownership is a capacious term, which serves as an umbrella for many rights that authorize entities for many different actions. Due to this reason, it is important to create the framework capable of providing granular definitions and enforcements for these authorizations.

所有权是一个宽泛的术语，它是授权实体进行许多不同操作权利的概念综合。基于这个原由，创建能够为这些授权提供详细定义和实施框架就变得非常重要。

Renting of NFT described in standards ERC-809 [21] and ERC-1201 [22] are only a small subset of such authorizations, which will be covered under Advanced Ownership Structure, see the corresponding section below.

ERC-809 [21] 和 ERC-1201 [22] 中描述的 NFT 租用只是此类授权的一小部分，细节将在“高级所有权结构” 中进行介绍，请参阅下面的相应部分。

Counterparty
交易对手

Simple yet flexible Counterparty standard [15] adds the capability similar to ERC-721 to Bitcoin protocol, as well as ERC-1633: Fractional Ownership or Re-Fungible.

简单而灵活的交易对手标准 [15] 将类似于 ERC-721 的功能添加到了比特币协议，以及 ERC-1633：部分所有权或再同质化性。

OpenSea Metadata Standard
OpenSea 元数据标准

Opensea is one of the first and most popular NFT trading platforms in Ethereum space that developed the NFT Metadata standard [23] aimed to help describe and visualize all NFT properties that deal with NFT trading and exchange. OpenSea indexers collect on-chain and off-chain data, so that the API can provide the aggregated data about a single NFT token to its clients in one RESTful request.

Opensea 是以太坊领域最早、最受欢迎的 NFT 交易平台之一，它开发了 NFT 元数据标准 [23]，旨在帮助描述和可视化与 NFT 交易相关的 NFT 属性。 OpenSea 索引器收集链上和链下数据，以便 API 可以在一个 RESTful 请求中向其客户端提供有关单个 NFT 通证的聚合数据。

While aggregation is helpful for the purposes of the API, we think it is still important to separate schemas to on-chain and off-chain, since it does not limit schema flexibility, but provides additional structure at low cost. Besides this separation, the Unique metadata schemas are fully compatible with OpenSea standard, since they do not restrict schema format and, in fact, one of the recommended formats for the metadata schema is JSON, which is the same as OpenSea API provides. Additionally, Unique network is capable of storing the mutable metadata on-chain in order to support the decentralized application logic, which is also covered by mutable on-chain metadata schema.

虽然聚合对于 API 很有帮助，但我们认为将模式分为链上和链下仍然很重要，因为这将不会限制模式的灵活性，而是以低成本提供其他可用结构。除了这种分离之外，Unique 元数据模式还与 OpenSea 标准完全兼容，因为它们不限制模式格式，实际上，元数据模式的推荐格式之一是 JSON，与 OpenSea API 提供的相同。 此外，Unique 网络能够在链上存储可变元数据，以支持分散的应用程序逻辑，这也由可变链上元数据模式所涵盖。

Examples of data that is provided by both OpenSea and Unique metadata schemas include, but are not limited to image URLs, token name and description (which we recommend to be stored off-chain in order to preserve system resources and lower application expenses), miscellaneous key-value pairs stored in JSON format.

OpenSea 和 Unique 元数据模式提供的数据示例包括但不限于图像 URL、通证名称和描述（建议将它们存储在链下以节省系统资源和降低应用程序支出）以及其他以 JSON 格式存储的键值对。

Tezos TZIP-16
Tezos TZIP-16

Tezos TZIP-16 [24] standard was created to serve a broader purpose of describing the smart contract metadata, which is not necessarily limited to NFT smart contracts only. It separates schemas into on-chain and off-chain and allows to define each with a JSON string, which is natively supported in Unique chain.

Tezos TZIP-16 [24] 标准的创建是为了服务于描述智能合约元数据，它不限于 NFT 智能合约。它将模式分为链上和链下，并允许使用 JSON 字符串定义每个模式，这在 Unique 链中是被支持的。

Unique Metadata Schemas
Unique 元数据架构

Standardization is important in order to set the grounds for interoperability between multiple chains, but also is flexibility. Unique Network sets the goal to support many standards to stay interoperable and at the same time flexible enough to accommodate new schema standards as they appear. Thus, the Network does not restrict the schema to any format, but allows to select the format out of existing known standards to the moment: ERC-721, OpenSea, or Tezos. The NFT wallets will be able to read the schema version that is stored on-chain and display the NFTs appropriately.

想要为多条链之间的互操作性奠定基础，标准化很重要，灵活性也同样重要。Unique Network 的目标是支持许多标准，以在保证互操作性的同时又具有足够的灵活性，以适应新的架构标准的出现。因此，Unique 不会限制为模式的格式，而是可以从目前已知的标准中选择：ERC-721，OpenSea 或 Tezos。NFT 钱包将能够读取存储在链上的架构版本并显示 NFT。

Consensus and Tokenomics
共识与通证经济学

Consensus
共识

The Unique Network will use PoA consensus until it becomes Kusama and/or Polkadot parachain. After that it will use the Relay chain consensus, as any Polkadot parachain does, and off-chain mechanisms for Collator incentivisation, which is important for decentralization, prevention of censorship attack [26], and improving the user experience due to reducing node latency for client responses.

Unique Network 将使用 PoA 共识，直到成为 Kusama 和/或 Polkadot 平行链。之后，将像任何 Polkadot 平行链一样使用中继链共识，并使用链下机制进行验证人激励，这对于去中心化、防止审查攻击 [26]、 以及通过减少客户回应节点延迟来改善用户体验很重要。

Unique Token
Unique 通证

Unique Token is the Unique Network token that is used for several purposes:
Unique 通证是 Unique Network 通证，有以下几种用途：

- Transaction rate limiting and DDoS protection in form of transaction fees
- 以交易费用的形式限制交易速率和保护 DDoS
- Network Services
- 网络服务
    - Smart contracts storage rent
    - 智能合约存储租金
    - Advanced features of the network
    - 高级网络功能
- In-app payments through payable smart contract methods
- 通过可支付的智能合约方式进行应用内支付
- App promotion program
- App 推广项目
- Paid Rate Limits
- 支付率限制

Inflation
通货膨胀

Inflation in Unique Network is used as a mechanism of development, R&D, marketing, operations, and other on-going expense funding in early stages of the network with decreasing inflation rate over the first 10 years. The initial year will start with inflation rate of 10% annual and will decrease by $\frac{2}{3}$ % every year until it reaches 4% annual in the year 10, at which level it will stay thereafter. As a result of inflation, the Unique tokens will be minted on every block so that the total number of minted tokens during the year will approximately (to the rounding

precision) equal to the inflation rate multiplied by the Unique token total supply at the beginning of the year. The table below shows the inflation rate in detail:

Unique Network 中的通货膨胀被用作网络早期阶段的开发、研发、营销、运营和其他持续费用资金的机制，通胀率在前 10 年内逐渐降低。 第一年将以每年 10% 的通货膨胀率开始，并以每年 $\frac{2}{3}$ % 的速率下降，直到第 10 年达到每年 4%，此后将保持在该水平。 由于通货膨胀，Unique 通证将在每个区块上铸造，这样一年中铸造的通证总数将大约（到舍入精度）等于通货膨胀率乘以那一年年初的 Unique 通证总供应量。 下表详细显示了通货膨胀率：

Year **年度**	**Annual Inflation Rate** **年通胀率**
1	10 %
2	9 $\frac{1}{3}$ %
3	8 $\frac{2}{3}$ %
4	8 %
5	7 $\frac{1}{3}$ %
6	6 $\frac{2}{3}$ %
7	6 %
8	5 $\frac{1}{3}$ %
9	4 $\frac{2}{3}$ %
10+	4 %

Network Services
网络服务

Smart Contract Storage Rent
智能合约存储租金

By Parity design, smart contracts in Contracts Pallet are allowed to store on-chain data (like in any blockchain), but storing requires the contract to pay a certain rent that depends on the

amount of stored data or the contract may be exempt to paying rent if it holds the deposit that is large enough to justify its existence on-chain.

通过 Parity 设计，Contracts Pallet 中的智能合约可以存储链上数据（就像在任何区块链中一样），但是存储需要合约支付一定的租金，这取决于存储的数据量，或者如果它持有足够大的存款以证明其在链上的存在是合理的，则合约可以免于支付租金。

Advanced Network Features
高级网络功能

Unique Chain will be geared with a number of advanced features that will improve the performance of dApps. These include advanced spam protection, off-chain workers that provide indexing or integration with IPFS, import of NFTs from Ethereum Network, register identities and more.

Unique Chain 将配备许多高级功能，这些功能将改善 dApp 的性能。这些功能包括先进的 Spam 防护、提供索引或与 IPFS 整合的链下工作者、从以太坊网络导入 NFT、注册 ID 等。

App Promotion Program
App 推广项目

This program is designed with the goal to motivate the application developers to join the Unique network, and to attract token holders to the newly made applications, which in turn will attract many end users. The application developers who are newly joining the network will be granted a transaction fee stipend that allows them to execute a starting number of free transactions. The range of this number is yet to be determined. This number of free transactions may be significantly increased, if the application is backed by Application Promoters (individual token owners) and their usage will be limited from a 6 to 12 months period of time. Transaction fees during the stipend period will be paid from the Unique Network accounts funded by Unique Network Treasury. After the period expires, the application developers may choose to continue sponsoring their users' transactions or ask their users to pay fees.

该项目旨在激励应用程序开发人员加入 Unique network，并吸引通证持有者加入新制作的应用程序，从而吸引更多用户。新加入网络的应用程序开发人员将获得一笔交易费用津贴，使他们能够执行一定数量的免费交易。补贴额度尚待确定。如果应用程序由发起者（个人通证所有者）支持，免费使用将限制在 6 到 12 个月的时间内，则免费交易的数量可能会大大增加。 补贴期间的交易费用将从 Unique Network 财务部门资助的 Unique Network 账户中支取。 免费使用到期后，应用程序开发人员可以选择继续赞助其用户的交易或要求其用户支付费用。

The program requires certain funds (Unique tokens) to stay in program circulation. The amount of required funds is proportional to the number of joining application developers and the

popularity of their applications. Unique Network will provide funds to be utilized in the program initially, but in order to involve the community, the program also invites Application Promoters who may lock their Unique tokens with the goal of promoting a certain dApp in exchange for incentivisation. Once Promoters' funds are locked to support an application and the promotion begins, the transaction fees of the application start to be paid from these funds and accumulate in the Treasury account. The Promotion continues until funds are depleted or the lock period expires. After the promotion ends, Promoters receive their unlocked funds and a percentage of the accumulated commissions proportionally to their locked funds (as we assume there will be more than one Promoter). Also, promotion has a long term effect for Promoters: They continue receiving a smaller percentage of transaction fees related to this application for the application lifetime (proportionally to their participation in the application promotion). Details of this program are to be defined by the launch of Unique main net.

该项目需要资金（Unique 通证）才能保持运转。所需资金的数量与加入的应用程序开发人员的人数及其应用程序的受欢迎程度成正比。Unique Network 将提供最初在项目中使用的资金，但是为了让社区参与，该项目还会邀请应用程序发起人，他们可以以促进某种 dApp 为目的来锁定 Unique 通证，以换取激励。一旦发起人的资金被锁定以支持某一应用，并且开始 App 推广，应用的交易费用将开始从这些资金中支取并累积在金库账户中。这个过程将持续到资金用完或锁定期满为止。结束后，参与者将收到他们解锁后的资金以及与他们的锁定资金成比例的累计佣金的一定比例（我们假设会有多个参与者）。此外，推广对于发起人具有长期影响：在整个应用程序运行周期中，他们将持续收到与该应用程序相关的交易费用的更小比例的金额（与他们在应用推广中的参与成正比）。该项目的详细信息将具体公布于“Unique Network 主网”的发布信息。

Paid Rate Limits
付速率限制

When clients connect to a public archive node, sometimes it is necessary to read large amounts of on-chain data in a short period of time. Even though reading data is permissionless, the certain rate limits will be normally applied to equalise the opportunity for all clients, but it is always possible to dedicate additional cloud resources to boost the connection performance for applications that require additional bandwidth. Payment for boosting of rate limits can be one of the applications of Unique Token.

当客户端连接到一个公共存档节点时，有时需要在短时间内读取大量链上数据。即使读取数据是无需许可的，也通常会应用特定的速率限制，以均衡所有客户端的机会，但是对于需要额外连接的应用程序，可以专门提供额外的云资源来提高连接性能。为提高速率限制支付费用，可以是 Unique 通证的一个用途。

R&D Roadmap
研发路线图

The research and development in Unique will be a continuous process with a measurable result of miscellaneous PoCs and further implementation in MainNet or ecosystem tools in case if the corresponding research project succeeds.

如果相应的研究项目成功，Unique 的研究和开发将是一个持续的过程，具有各种 PoC 的可衡量结果，并在主网或生态系统工具中进一步实施。

NFT Wallet
NFT 钱包

The R&D roadmap has a production-level NFT Wallet that will enable a non-technical audience to create NFT and ReFungible collections, as well as Fungible tokens and perform major operations on them such as transfers.

研发路线图有一个生产级的 NFT 钱包，它将使非技术受众能够创建 NFT 和重新同质化集合，以及同质化通证并对其执行主要操作，例如转让。

This wallet implementation will be considered a white label reference implementation with an open source code that will be useful for both dApp and wallet developers.

NFT 钱包的实现将被视为带有开放源代码的白名单参考，这对于 dApp 和钱包开发人员都将有用处。

A PoC of the wallet has been operational since August 2020. See SubstraPunks Marketplace section for more details.

钱包的 PoC 自 2020 年 8 月开始运行。有关更多详细信息，请参阅 SubstraPunks 市场部分。

NFT MarketPlace
NFT 市场

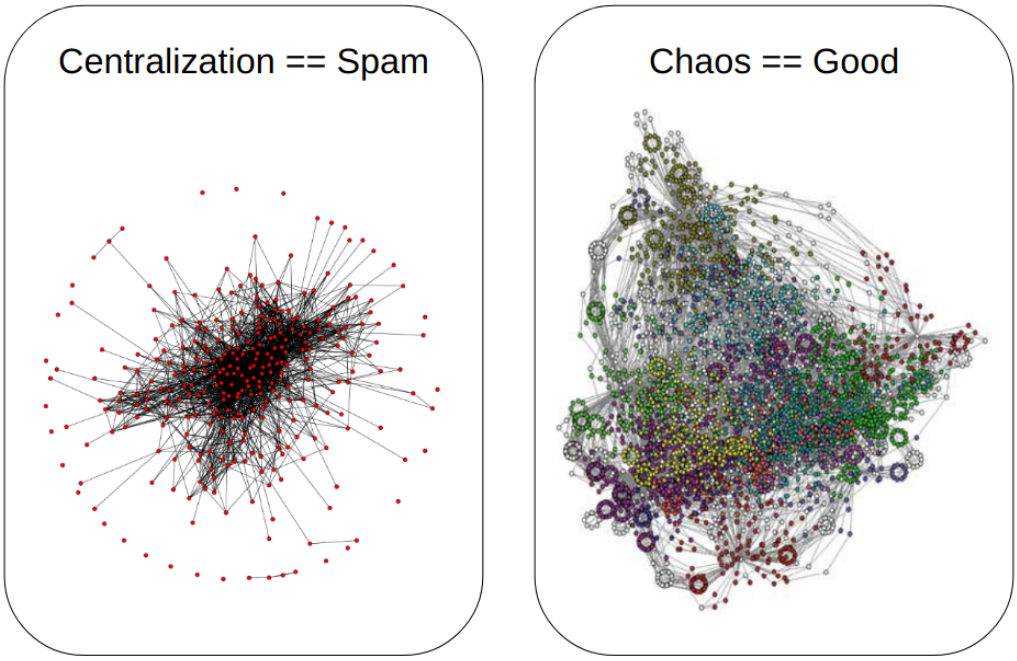
Similarly to a wallet reference implementation, the open source marketplace will be built and shared with the community for similar and better solutions to be built with Unique. The main function of the Marketplace is to allow safe and trustless exchange and trading of non-fungible or re-fungible assets.

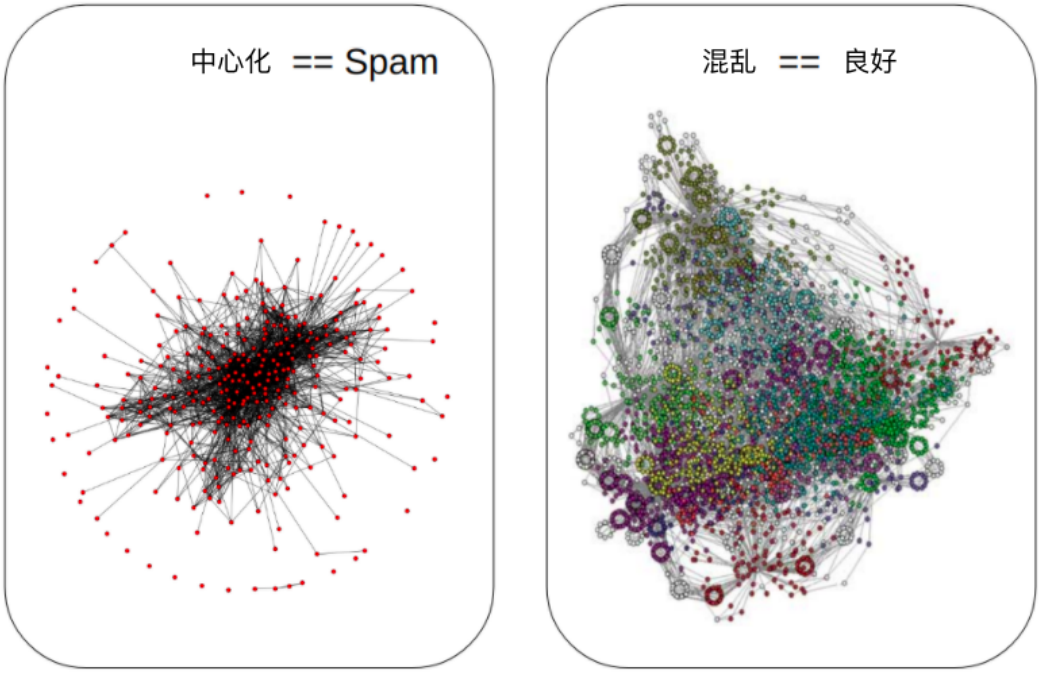
与钱包参考实施类似，开源市场将被构建并与社区共享，以便使用 Unique 构建类似和更好的解决方案。 市场的主要功能是允许不同质化或可重新同质化资产的安全和去信任交换和交易。

The marketplace MVP has been built and is operational since November 2020. See SubstraPunks Marketplace section for more details.

自 2020 年 11 月以来，市场 MVP 已经建成并开始运营。更多细节请参见 SubstraPunks 市场部分。

Advanced Spam Prevention
先进的 Spam 防护





One can build the model of the network of transactors as a directed graph. Ideal graph structure is yet to be identified in further R&D activities, but most likely it is going to be chaotic or some other high-entropy structure rather than ordered because in the ideal decentralized application peers transact with each other randomly (from the macroscopic point of view). Miscellaneous machine learning algorithms may be applied to detect clusters or other types of deviations from high-entropy in this directed graph [25] in order to detect spam or attacks.

可以将交易者网络模型构建为有向图。 在进一步的研发活动中还没有确定理想的图形结构，但很可能它会是混乱的或其他一些高熵结构而不是有序的，因为在理想的去中心化应用程序中，节点彼此随机交易（从宏观角度来看） 。 可以应用各种机器学习算法来检测该有向图中的集群或其他类型的高熵偏差 [25]，以检测 Spam 或攻击。

Bridging To Other Networks
桥接到其他网络

Trustless transfers from other blockchain networks are an important step in mass adoption of the Unique Chain. It is as important to convert existing NFT assets to Unique as attracting new users and minting new collections and tokens. Building dedicated NFT bridges that allow transferring NFT tokens from Ethereum, EOS, Bitcoin, Flow and other networks to (and back from) Unique Chain are an important milestone for the Unique Network. Technically we see the implementation of such bridges similar to bridges designed for transferring fungible values: By locking assets on the parent chain and minting the respective asset on the Unique Chain.

Double spending will be prevented by security of the original chain (e.g. Ethereum smart contract that locks an NFT), and interoperability will be guaranteed by the correct identification of the assets, which, according to Interchain NFT and Metadata Standardization [13], will include ID of the originating chain, ID of the collection, and ID of the token on the originating chain. The process of transferring assets back to the chain of origination may be implemented in reverse: Burning (or locking) of the NFT token in the Unique Chain and releasing of the matching asset in the chain of origination.

来自其他区块链网络的无信任转账是大规模采用 Unique Chain 的重要一步。将现有的 NFT 资产转换为 Unique 与吸引新用户和铸造新的收藏品和通证一样重要。建立专用的 NFT 桥，允许将 NFT 通证从以太坊、EOS、比特币、Flow 和其他网络转移到 Unique 链（或从 Unique 链转移回前面的链），这是 Unique Network 的一个重要里程碑。从技术上讲，我们看到这种桥的实现类似于为转移同质化价值而设计的桥：通过将资产锁定在父链上并在 Unique 链上铸造相应的资产。原始链的安全性（例如锁定 NFT 的以太坊智能合约）将防止双重支付，并且互操作性将通过资产的正确识别来保证，根据 Interchain NFT 和元数据标准化 [13]，这将包括源链 ID、集合 ID、源链通证 ID。将资产转移回起源链的过程可以逆向实现：销毁（或锁定）Unique Chain 中的 NFT 通证并释放源链中的匹配资产。

Unique Chain collators or other incentivised parties may be responsible for operating the NFT bridges under the risk of being slashed in order to guarantee the bridge security.

Unique 链上的验证人或其他受激励方会在被削减的风险下操作 NFT 桥，以保证桥的安全。

The Re-Fungibility is an exciting option that is arised from having NFT bridges: If sharing of the ownership is desired, a previously non-fungible token may be made re-fungible once transferred to Unique Chain through a bridge. As such, a valuable asset (e.g. a CryptoPunk worth $1,200,000) may be split between multiple owners and even traded using a traditional exchange trading model with bid and ask order book for a more accurate price discovery.

重新同质化是一个令人兴奋的功能，它产生于 NFT 桥：如果希望共享所有权，以前非同质化的通证可以通过桥转移到 Unique 链上，使其实现重新同质化。因此，一份资产 (例如价值 120 万美元的 CryptoPunk) 可能会被多个所有者分割，甚至可以使用具有买入价和买价定单的传统交易所交易模型进行交易，以实现更准确的价格发现。

Since the bridge is an important technical component for Unique, a PoC of a bridge has been implemented in the scope of SubstraPunks Marketplace project in order to de-risk the further development.

由于桥是 Unique 的重要技术组件，一个桥的 PoC 已经在 SubstraPunks 市场项目的范围内实施，以降低后续开发等风险。

Interoperability with Ethereum
与以太坊的互操作性

Interoperability with other blockchains does not have to be limited by transferring value through bridges. Unique also aims to become compatible with Ethereum smart contracts by means of including the EVM and Ethereum pallets with Frontier RPC API to enable interaction with the chain using the MetaMask, Truffle, and other Ethereum tools, similarly to other parachains [27]. This is an important feature for applications that will plan to transition from the Ethereum network to Unique chain. Ethereum smart contracts can be deployed in the EVM pallet just like they were deployed on the Ethereum blockchain. Our R&D is working on making the interaction of these smart contracts with NFT Pallet as transparent as possible and minimise any smart contract changes required for such interaction.

与其他区块链的互操作性不必通过桥传递价值而受到限制。Unique 还旨在通过将 EVM 和以太坊 Pallet 包含在 Frontier RPC API 中，使其与以太坊智能合约兼容，从而能够使用 MetaMask、Truffle 和其他以太坊工具（与其他平行链一样）与链进行交互 [28]。对于计划从以太坊网络过渡到 Unique 链的应用程序来说，这是一项重要功能。以太坊智能合约可以部署在 EVMPallet 中，就像它们部署在以太坊区块链上一样。 我们的研发部门正在努力使这些智能合约与 NFT Pallet 的交互尽可能透明，并最大程度地减少此类交互所涉及的的智能合约的更改。

Another important feature for existing Ethereum users will be emulation of ERC-721, ERC-20, and other Ethereum standards through RPC calls. These RPC endpoints will enable transparent use of native Unique Network capabilities in Ethereum tools in the same manner as Frontier, i.e. Metamask, Truffle, Web3 libraries, etc. The dApp developers and publishers will be able to seamlessly convert their user bases to Unique with zero learning curve for their users.

现有以太坊用户的另一个重要特点是通过 RPC 模拟 ERC-721、ERC-20 和其他以太坊标准链。这些 RPC 端点将以与 Frontier 相同的方式在以太坊工具中透明化地使用本 Unique Network 功能，如 Metamask、Truffle、Web3 库等。dApp 的开发者和发布者将能够无缝地将他们的用户基础转化至 Unique。

Enabling NFT Exchanges and Auctions
支持 NFT 交易与拍卖

A number of DEX smart contracts were deployed in Ethereum network many of which completely replicate each other or implement a well known exchange protocols such as 0xcert [28] or HydroProtocol [29]. NFT space has also seen multiple implementations of exchange functionality such as OpenSea [30] or Worldwide Asset Exchange [31]. NFT Collectible games sometimes implement their own auctions, like CryptoKitties [32]. Despite the abundance of protocols, the NFT exchange functionality may be as simple as implementing an escrow and a few types of auctions. Unique Network is planning to include the NFT Exchange pallet that

provides basic yet efficient functionality for decentralized exchanges. This functionality may include acquiring tokens from holders by means of Approve + TransferFrom mechanism (see ERC-721 standard [1]), implementing plain exchange of NFTs between NFT and other assets holders, which may also include exchanging value using the XCMP protocol between parachains, as well as miscellaneous auction types such as bidder-driven, time-driven, etc. Should the marketplace require any more additional functionality, the NFT Exchange pallet will offer the integration with smart contracts pallet, where the marketplace developers will be able to implement all requirements as needed.

在以太坊网络中部署了许多 DEX 智能合约，其中许多彼此完全复制或实现了公认的交换协议，例如 0xcert [29]、HydroProtocol [30]。NFT 可以实现多种交换功能，例如 OpenSea [31] 和 Worldwide Asset Exchange [32]。NFT 收藏游戏有时会进行拍卖，例如 CryptoKitties [33]。尽管协议很多，但 NFT 的交换功能会像实现一个 Pallet 和一个类型的拍卖一样简单。Unique Network 包括 NFT 交换Pallet，该 Pallet 为去中心化交换提供基本而有效的功能。此功能包括通过批准 + TransferFrom 机制（请参阅 ERC-721 标准 [1]）从持有人那里获取通证，在 NFT和 其他资产持有人之间实现 NFT 的普通交换，这还可能包括在平行链之间使用 XCMP 协议交换价值，以及其他拍卖类型，例如竞标者驱动、时间驱动等。如果市场需要更多其他功能，则 NFT 交换 Pallet 将提供与智能合约 Pallet 的聚合，市场开发人员将可以在其中实现所有需求。

NFT Relationships
NFT 关联

Describing entities often implies the interactions or relationships between them. The relationships describe how objects form more complex real world structures. For example, a neighborhood may contain several streets, which contain houses, which contain rooms, etc., all together forming a tree-like structure of real estate objects. Episodes in a series are related to each other in the sense of fixed order in which they come after each other - that is modeled by the linked list.

描述实体通常需要包括它们之间的相互作用或关系。这些关系描述了个体如何形成更复杂的现实结构。例如，一个街道可能包含数条路，路旁有房屋，房屋中有房间，所有这些一起形成了房产的树状结构。一个系列中的每一部分都是按照固定的顺序相互关联的——以链表为模型。

In order to model the real life relationships between objects we looked at the prior art that has already been researched and is proven to work well for most of the software data models: Unified Modeling Language. According to UML.org [33], there are several major types of the relationship: Association, composition, aggregation, generalization (inheritance) and realization. Unique Network NFTs will utilize these types of relationships, as well as additional relationship properties (such as direction and weights, for example) with the goal to enable application developers to create data models to the required complexity.

为了对对象之间的真实关系进行建模，我们考虑一种已经被研究过并被证明适用于大多数软件数据模型的技术：统一建模语言 (Unified Modeling Language)。根据 UML.org [34]，其中有几种主要的关系类型：关联、组合、聚合、概括 (继承) 和实现。 Unique Network NFT 将利用这些类型的关系，以及附加的关系属性 (例如方向和权重)，目的是使应用开发人员能够创建复杂的满足所需的数据模型。

Advanced Ownership Structure
先进的所有权结构

The ownership gives exclusive rights over one's property, but in the blockchain world it is not frequently asked what having these exclusive rights means. Some obvious options are the ability to transfer the ownership to another entity and to destroy the property. But some real world examples demonstrate that more options are needed to describe the use cases that Unique Network may face:

所有权赋予他人财产专有权，但是在区块链世界中，人们并不会经常问到拥有这些专有权意味着什么。部分选择是将所有权转移到另一个实体并销毁。但是，一些现实示例表明，需要更多的选择来描述 Unique Network 可能面临的用例：

- Lending and Borrowing implies the capability to temporarily transfer some property ownership rights to another address
- 借贷意味着将某些财产所有权暂时转移到另一个地址的能力。
- Right to display given to a third party grants the permission to (exclusively or not) use the property for display purposes. For example, to an art gallery to display the art, for the video streaming service to playback videos, or to a Web site to use graphical images
- 将展示权给予第三方，即准许 (专属或不专属) 使用该物品作展示用途。例如，美术馆展出的艺术品、视频网站播放视频或者到 Web 站点来使用图形图像。
- Deed of trust or right to sell or act in some other ways on behalf of the owner is often used in the real estate, personal or business situations
- 委托书或代表业主以其他方式出售或行事的权利经常用于房地产、个人或商业场合。

Many more examples can be given including the highly customized structure of permissions transferred by the owner to miscellaneous third parties. Smart contracts and integration with IPFS for legal document storage may be used to express and enforce the agreements both technically and legally.

可以给出更多示例，包括所有者高度专有的权限结构，这些权限由所有者转移给其他第三方。 智能合约和与 IPFS 集成以存储法律文件可用于在技术上和法律上表达和执行协议。

Off-chain Workers for Indexing
链下的索引编制人员

In Substrate terminology, Off-chain Workers are services running in the background that represent a non-obligatory part of blockchain protocol. The running nodes may voluntarily choose to execute off-chain workers in order to provide additional service to the network and their clients.

在 Substrate 术语中，链下工作者指服务于后台运行，代表了区块链协议的非强制性部分。运行中的节点可以自愿选择执行链外工作程序，以便向网络及其客户端提供额外的服务。

One of the use cases for the off-chain workers is miscellaneous indexing (Chapter 8, Views and Indexes of Database Systems: The Complete Book [35] explains in detail what are database indexes and what they are helpful for). Off-chain indexes improve user experience and at the same time preserve decentralization of the network. Unlike centralized indexers (such as Etherscan [14] or Polkascan [34]), off-chain indexer is a part of the network and can be executed by any node, so the result of their work is duplicatable and verifiable and is protected to certain extent from the censorship.

链下工作人员的用例之一是索引编制（数据库系统的视图和索引，第 8章：详细解释了什么是数据库索引以及它们对数据库索引有什么帮助 [36]）链下索引改善了用户体验，同时保留了网络的去中心化。与中心化索引（例如 Etherscan [14] 或 Polkascan [35]）不同，链下索引是网络的一部分，可以由任何节点执行，因此它们的工作结果从审查的范围上来说是可复制和可验证的，并且在一定程度上可以受到保护。

Another advantage of off-chain indexers is the common RPC API exposed by the public node. This API is well known and integrated by Parity and ecosystem projects with many technological stacks such as JavaScript, Python, C++, C#, etc, which is a major step in mass and enterprise adoption.

链下索引的另一个优点是公共节点通用 RPC API。该 API 因 Parity 和生态系统项目被熟知，并且与许多技术堆栈，如 JavaScript、Python、C++、C# 等集合在一起，这是大规模投入使用的重要一步。

XCMP Application Layer Protocol
XCMP 应用程序层协议

Cross-chain Message Passing [36] in the Kusama and Polkadot ecosystem is an important piece connecting parachains to each other. Two blockchains connected to the relay chain (e.g. Kusama), will be able to exchange arbitrary messages between each other. Nonetheless, application layer protocols are needed in order to implement actual use cases. For example,

one of the generic protocols is being developed at the moment for NFT Bridges [40] in the scope of Web3 Grants Program.

Kusama 和 Polkadot 生态系统中的跨链消息传递 [37] 是将平行链彼此连接的重要组成部分。 连接到中继链的两个区块链（例如 Kusama ）将能够在彼此之间交换任意消息。 尽管如此，仍需要应用层协议才能在现实中实现。例如，目前正在为 Web3 Grants 领域内的 NFT Bridges [41] 开发一种通用协议。

Unique will have more features than a standard bridge provides, which we would like to be usable by other parachains. A custom Unique application layer protocol on top of XCMP will enable other parachains to fully engage with Unique and, if needed, use its rich functionality fully.

Unique 将能比标准桥提供更多的功能，我们希望其他平行链也能使用这些功能。XCMP 的自定义 Unique 应用层协议将使其他平行链能够完全使用 Unique，并在需要时充分使用其丰富的功能。

One of the example applications for XCMP is related to DeFi and consists of bridging NFTs between multiple parachains for trustless borrowing using NFT and ReFungible assets as a collateral. Another example is trustless ReFungibility of other networks' NFTs (e.g. a CryptoKitty) to implement split ownership.

XCMP 的示例应用之一与 DeFi 相关，包括在多个平行链之间桥接 NFT，以使用 NFT 和重新 同质化资产作为抵押进行无信任借款。 另一个例子是其他网络的 NFT（例如 CryptoKitty）的无信任重新同质化以实现所有权分割。

The cooperation with other parachains is not limited to DeFi use cases only. Unique can be used by gaming or government parachains in order to store complex NFT items or bundles or provide NFT or ReFungible tokens to be temporarily displayed in a digital Art Gallery.

与其他平行链的合作不仅限于 DeFi 用例。 游戏或治理平行链可以使用 Unique 来存储复杂的 NFT 项目或捆绑包，或者提供 NFT 或重新同质化通证以临时显示在数字艺术画廊中。

Game Development Frameworks Integrations
游戏开发框架集成

It is important to provide robust tooling for game developers. Integration with Unique Framework [38] and Unreal Engine [39] will enable approximately 90% of game development studios in using Unique blockchain. The major challenges of these integrations consist of understanding the underlying use cases and abstracting the blockchain development from game development making the former fully transparent for the engineers with zero experience in the blockchain domain.

为游戏开发人员提供强大的工具十分重要。整合 Unique 框架 [39] 和虚拟引擎 [40] 将使大约90%的游戏开发工作室能够使用 Unique 区块链。这些集成的主要挑战包括理解底层用例以及从游戏开发中抽象出区块链开发，使区块链开发对区块链领域零经验的工程师来说也可以直观理解。

Application State Storage
应用程序状态存储

Data availability requirements dictate the necessity to store certain most important application data on-chain. The examples may include, but not limited to turn based games state or user account data. The former reflects the particularly interesting use case of decentralizing user accounts, authentication, and authorization. On the one side this use case largely overlaps with Advanced Ownership NFT structure allowing even more flexibility of how NFT and Refungible assets are owned and used, but on the other side, it presents the capability to better manage the application audience: Create it, easily on-board and transition users between applications securely and without a need to register and/or install new tools.

数据可用性要求决定了将某些最重要的应用程序数据存储在链上的必要性。 这些示例可以包括但不限于基于回合的游戏状态或用户帐户数据。 前者反映了分散用户帐户、身份验证和授权的特别有趣的用例。 一方面，此用例在很大程度上与高级所有权 NFT 结构重叠，从而使 NFT 和重新同质化资产的拥有和使用方式更灵活，但另一方面，它提供了更好地管理应用程序受众的能力：轻松创建无需注册和/或安装新工具，即可安全地在应用程序之间加入和转换用户。

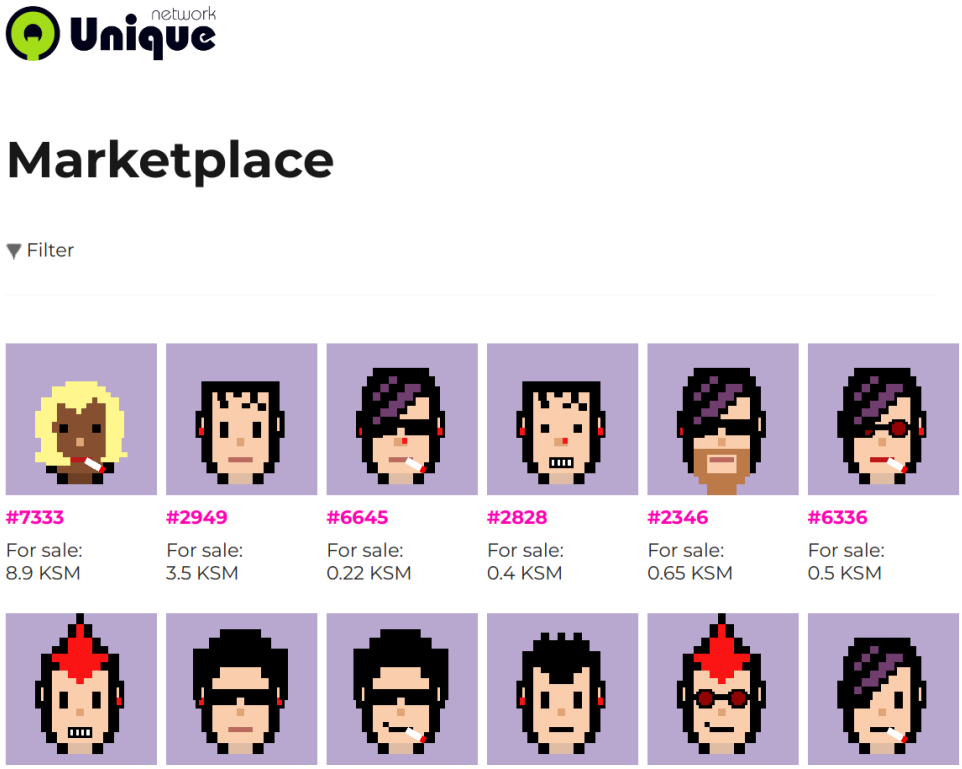
TestNet 1.0
测试网 1.0

As of August 2020, a live TestNet 1.0 is running the early version of Unique Chain. The UI for this chain can be found and exercised at this address: https://uniqueapps.usetech.com/#/nft. The TestNet 1.0 is capable of basic NFT functions such as creating collections, minting, transferring and burning NFT and Re-Fungible tokens. The network also supports smart contracts that integrate with NFT functionality.

截至 2020 年 8 月，测试网 1.0 正在运行 Unique Chain 的早期版本。可以在以下地址找到并使用该链的 UI：https：//uniqueapps.usetech.com/#/nft。测试网 1.0 具备基本的 NFT 功能，例如创建集合、传输、刻录 NFT 和同质化通证等。该网络还支持与NFT功能集成的智能合约。

Showcase: Substrapunks Market
示例：Substrapunks 市场

https://ipfs-gateway.usetech.com/ipns/QmaMtDqE9nhMX9RQLTpaCboqg7bqkb6Gi67iCKMe8NDpCE



Initially designed for Hackusama [37] demonstration purposes, the Substrapunks game was welcomed by the crypto community and received a high level of popularity. The 10,000 NFT characters were all claimed in a few days and shortly after peer-to-peer trading began for valuable assets such as ETH and KSM. After one case of scamming, the quick decision was made to build an on-chain marketplace PoC to facilitate safe trading, explore the possible dApp architectures, experiment with miscellaneous types of loads, and discover and overcome possible problems in a developer-friendly environment.

Substrapunks 游戏最初是为 Hackusama [37] 演示目的而设计的，受到加密社区的欢迎并获得了很高的人气。 这 10,000 个 NFT 字符在几天之内就全部被认领了，在 ETH 和 KSM 等有价值资产的点对点交易开始后不久。 在发生一起诈骗案后，我们迅速决定建立一个链上市场 PoC 以促进安全交易、探索可能的 dApp 架构、试验各种类型的负载，并在开发人员友好的环境中发现和克服可能出现的问题。

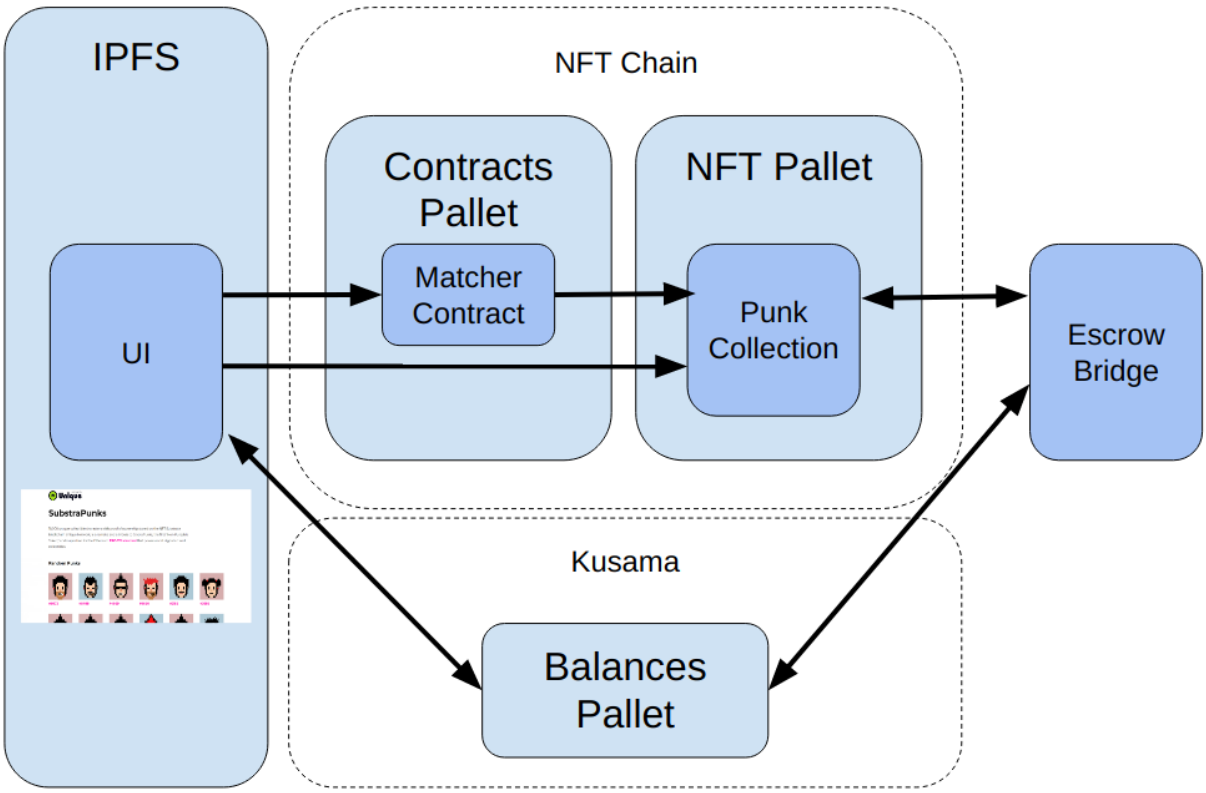
The marketplace has been launched in November 2020 and functions continuously since then. As of March 2021, the total amount of sales reached over 3200 KSM (1,300,000 USD) with the average NFT sales price of approximately 2.22 KSM, and last week average price of 5.09 KSM which calculates to market capitalization of SubstraPunks of roughly 20,000,000 USD.

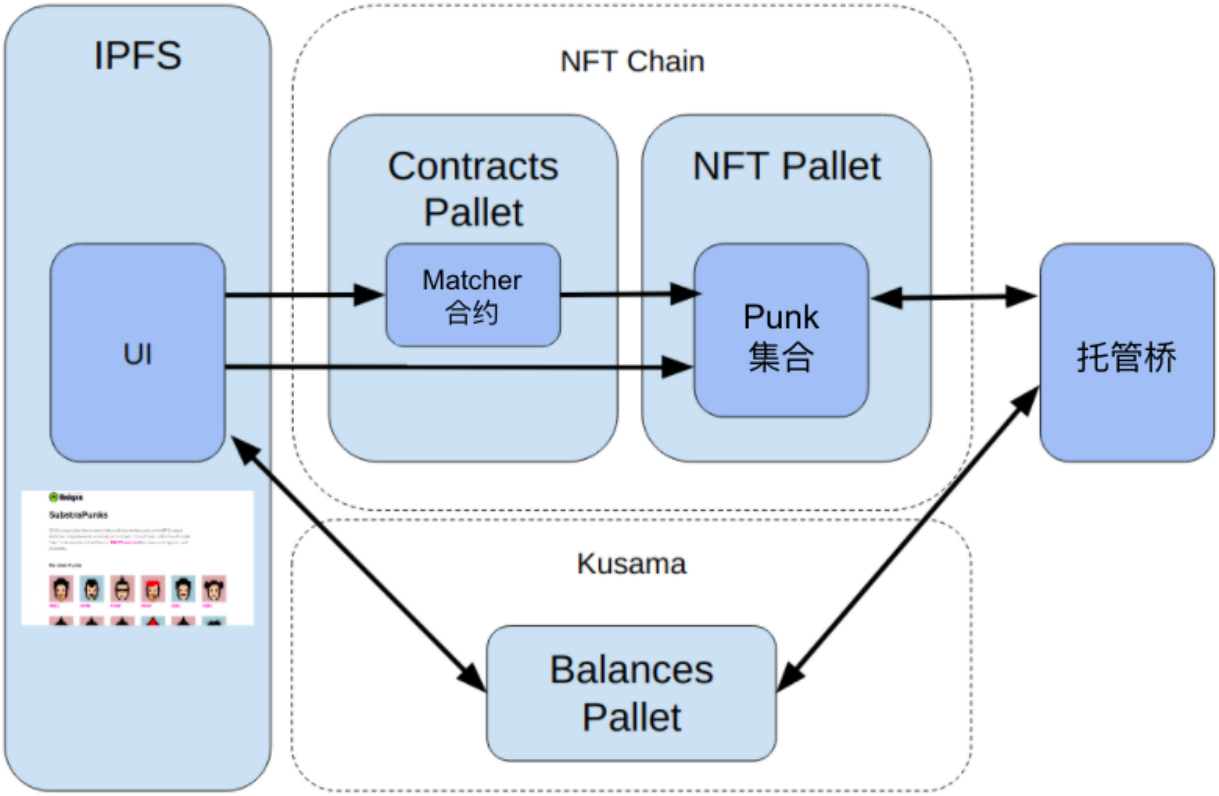
该市场于 2020 年 11 月推出，并从那时起持续运作。截至 2021 年 3 月，总销售额超过 3200 KSM（1,300,000 美元），平均 NFT 销售价格约为 2.22 KSM，上周平均价格为 5.09 KSM，按 SubstraPunks 的市值计算约为 20,000,000 美元。

The following Google Sheet displays up to date Marketplace metrics, which is updated weekly:
下表显示的是最新的市场指标，每周更新:

https://docs.google.com/spreadsheets/d/1Tot5paVRUJr7DLiNsm4yL2TfyyGb3jHSZl4ckAJRbT4/edit?usp=sharing

Marketplace PoC Architecture
市场 PoC 架构





The Marketplace was built as a decentralized application with no backend and a minimal Escrow Bridge server application. It consists of four components:

Marketplace 构建为一个分散的应用程序，没有后端和一个最小的托管桥服务器应用程序。 它由四个部分组成：

1. The frontend UI hosted on IPFS. It consists of several static HTML5 pages powered by JavaScript. The scripts on this page integrate with NFT Chain by means of Polkadot{.js} browser extension and PolkadotJS API.

   前端 UI 托管在 IPFS上。它由几个 JavaScript 驱动的静态 HTML5 页面组成。 此页面上的脚本通过 Polkadot {.js} 浏览器扩展程序和 PolkadotJS API 与 NFT 链集成。

2. SubstraPunks NFT collection created in NFT Pallet with 10,000 minted NFTs. Each NFT has the unique ID and on-chain properties that determine the look of the character.

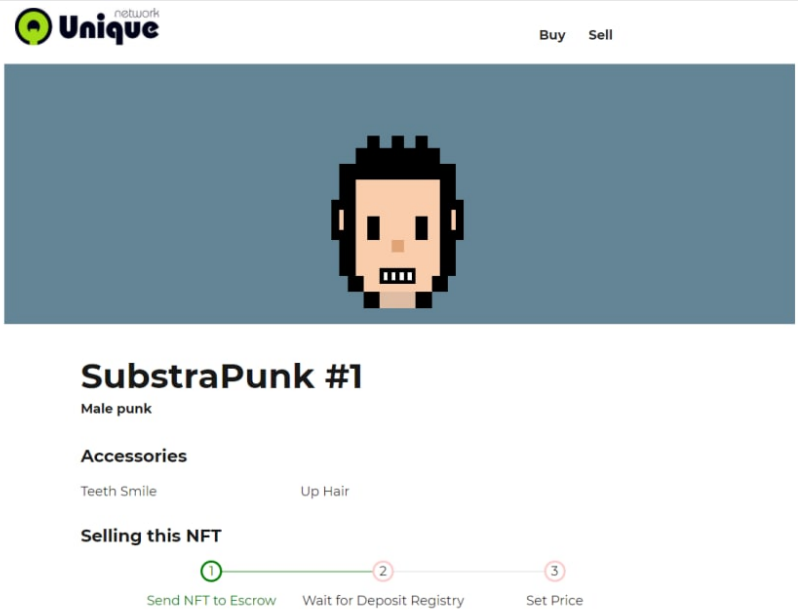
   在 NFT Pallet 中创建的 SubstraPunks NFT 集合，包含 10,000 个铸造的NFT。 每个 NFT 具有确定角色外观、特点 ID 和链上属性。

3. Matcher smart contract that stores current market state and matches incoming bids from the UI against existing ask offers. This contract is written in Ink! 2.1, the extension framework for creating smart contracts with Rust.

   Matcher 智能合约，用于存储当前市场状态，并将来自 UI 的出价与现价进行匹配。这份合约是用 Ink! 2.1 写成，用于使用 Rust 创建智能合约的扩展框架。

4. Escrow Bridge: The trusted account that serves as a mediator between buyers and sellers.

   托管桥：可信任的帐户，充当买卖双方之间的调解人。



This marketplace is one of the first (if not the first) decentralized apps that is also acting as a bridge between multiple networks in the Kusama ecosystem. One of the greatest challenges building it was the design of a multi-blockchain transaction UX workflow. The process of selling an NFT consists of four steps that include two transactions on two different networks, and over 10 major branches of workflow going in an erroneous path, all correctly handled by the UI in a stateless and interruption stable way.

这个市场是最早的（即使不是第一个）去中心化应用程序之一，它也是 Kusama 生态系统中多个网络之间的桥梁。构建它的最大挑战之一是多区块链交易 UX 工作流程的设计。 出售 NFT 过程的四个步骤中，包括两个不同网络上的两个交易，以及错误路径中 10 个以上的主要工作流分支，所有这些均由 UI 以无状态且中断稳定方式正确处理。

References
参考文献

[1] Ethereum EIP-721, https://eips.ethereum.org/EIPS/eip-721
[2] Property and Ownership, https://plato.stanford.edu/entries/property/
[3] John Locke, 1689/90. Two Treatises of Government
[4] Knuth, D. 1973, The Art of Computer Science, Vol. 3, Sorting and Searching, p.527. Addison-Wesley, Reading, MA., United States
[5] Rivest, R.; Shamir, A.; Adleman, L. (February 1978). A Method for Obtaining Digital Signatures and Public-Key Cryptosystems. Communications of the ACM. 21 (2): 120–126.
[6] The Ink! Smart Contracts, https://substrate.dev/docs/en/knowledgebase/smart-contracts/
[7] Substrate, https://substrate.dev/docs/en/
[8] SubstraPunks Game, https://ipfs-gateway.usetech.com/ipns/QmaMtDqE9nhMX9RQLTpaCboqg7bqkb6Gi67iCKMe8NDpCE
[9] Pedro Armelin, UX is key to driving mass adoption, https://uxdesign.cc/ux-is-a-key-to-driving-mass-adoption-of-blockchain-b0f4d40f376c
[10] Carsten Munk, Is frinctionless Ethereum (and dApps) usage possible, https://medium.com/zippie/is-frictionless-ethereum-dapp-usage-possible-a9cd5b01b835
[11] Gas Relay for Contract Calls, https://eips.ethereum.org/EIPS/eip-1077
[12] EOS Core Concepts, https://developers.eos.io/welcome/latest/overview/core_concepts
[13] Interchain NFT and Metadata Standardization, https://internft.org/
[14] Etherscan, https://etherscan.io/tokens-nft
[15] Counterparty, https://counterparty.io/
[16] EOS NFT Standard, https://github.com/unicoeos/eosio.nft
[17] ERC-1155, https://eips.ethereum.org/EIPS/eip-1155
[18] Delegated NFT, https://github.com/ethereum/EIPs/issues/994
[19] Composable NFT, https://github.com/ethereum/EIPs/issues/998
[20] Re-fungible, https://github.com/ethereum/EIPs/pull/1633
[21] ERC-809, https://github.com/ethereum/EIPs/issues/809
[22] ERC-1201, https://github.com/ethereum/EIPs/issues/1201
[23] OpenSea Metadata Standard, https://docs.opensea.io/docs/metadata-standards
[24] Tezos TZIP-16, https://gitlab.com/tzip/tzip/-/blob/master/proposals/tzip-16/tzip-16.md
[25] C.M. Bishop, Pattern Recognition and Machine Learning, Springer – Verlag New York, 2006.
[26] Temporary Censorship Attacks in the Presence of Rational Miners, https://ieeexplore.ieee.org/abstract/document/8802377
[27] Moonbeam Blockchain, https://docs.moonbeam.network/
[28] 0xcert Exchange Protocol, https://0xcert.org/
[29] Hydro Protocol, https://hydroprotocol.io/
[30] OpenSea Exchange, https://opensea.io/

[31] Worldwide Asset Exchange, https://wax.io/
[32] CryptoKitties, https://www.cryptokitties.co/
[33] UML, https://www.uml.org/
[34] Polkascan, https://polkascan.io
[35] Database Systems: The Complete Book. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer D. Widom
[36] XCMP, https://wiki.polkadot.network/docs/en/learn-crosschain
[37] Hackusama, https://hackusama.devpost.com/
[38] Unity Framework, https://unity.com/
[39] Unreal Engine, https://www.unrealengine.com/
[41] NFT Bridge Protocol, https://github.com/w3f/Open-Grants-Program/blob/master/applications/NFT_Bridge_Protocol_for_NFT_Migration_and_Data_Exchange.md