# Open Scaling for Web3

Saito

# Saito: Open Scalling



## The “Infura Problem”

Over the last 5 years, computer scientists have made technical strides scaling blockchain.

Networks like Polkadot now offer fast confirmations, support for parachains and layer-2 networks, enterprise-level reliability, and new features like transaction-finality.

But, as the costs of running these networks have grown, fewer and fewer volunteers are providing the open access nodes needed to keep them decentralized.  Public blockchains are becoming permissioned networks dominated by one or two operators. Infura dominates the Ethereum ecosystem, and monopolies threaten to remake Web3 in the image of Google.

## An Economic Solution

Over the last 5 years, computer scientists have made technical strides scaling blockchain.

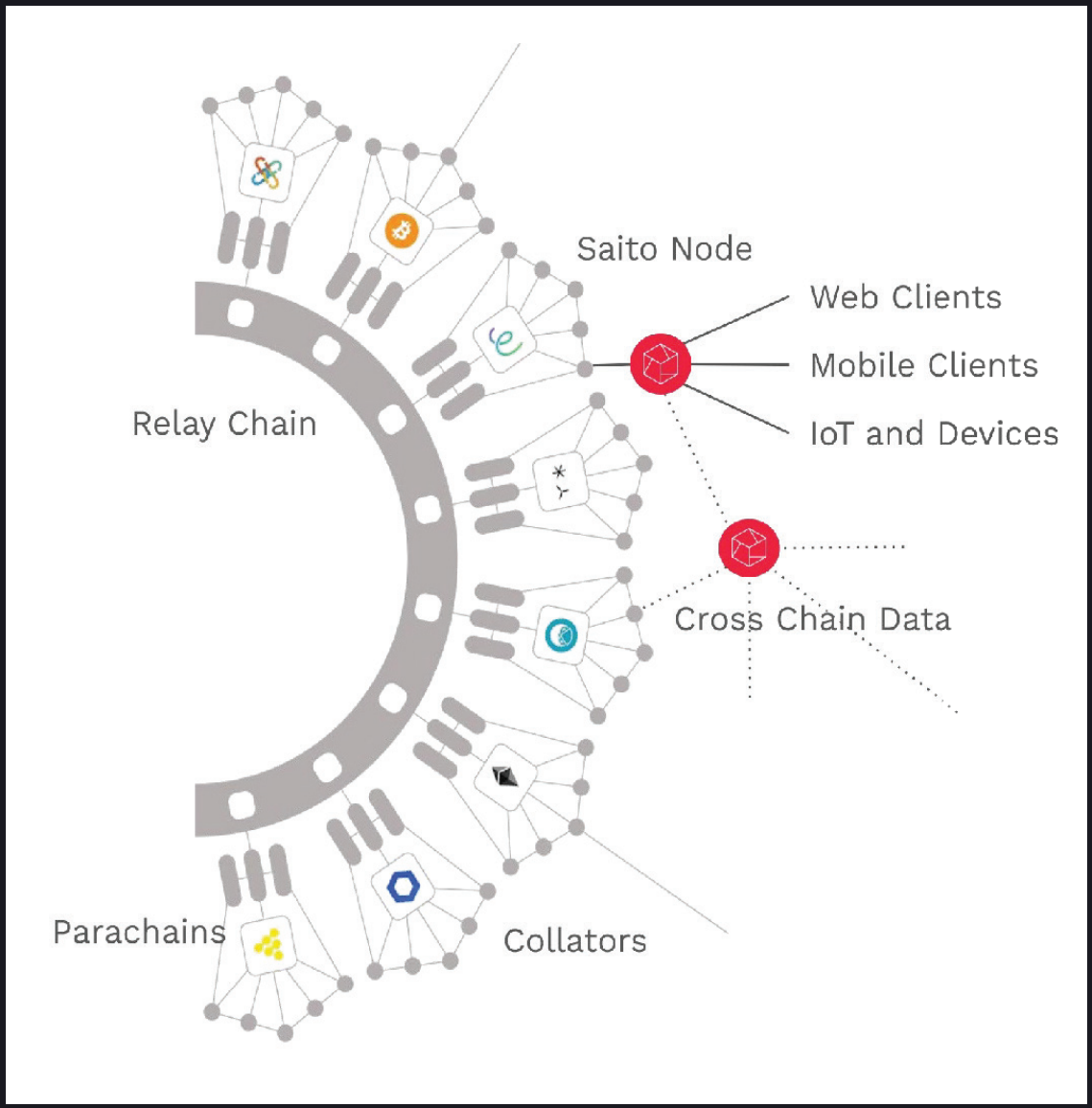
Networks like Polkadot now offer fast confirmations, support for parachains and layer-2 networks, enterprise-level reliability, and new features like transaction-finality.

But, as the costs of running these networks have grown, fewer and fewer volunteers are providing the open access nodes needed to keep them decentralized.  Public blockchains are becoming permissioned networks dominated by one or two operators. Infura dominates the Ethereum ecosystem, and monopolies threaten to remake Web3 in the image of Google.

# Saito as Open Infrastructure



An open, decentralized, Infura and Metamask

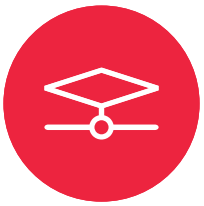



Saito and the Polkadot Ecosystem

**Image source: https://medium.com/polkadot-network/polkadot-parachain-slots-f3f051d41699**

# Highlights





## Open Infrastructure

Saito pays for infrastructure that connects blockchains to users. The more applications run on Saito, the more infrastructure thenetwork deploys.

## Polkadot Ecosystem

Saito pays for infrastructure that connects blockchains to users. The more applications run on Saito, the more infrastructure thenetwork deploys.


## In Browser

Saito pays for infrastructure that connects blockchains to users. The more applications run on Saito, the more infrastructure thenetwork deploys.

## Open Source

Saito is a trust-free and decentralized open-source software stack, powered by an elegant economic design that scales with throughput.

## Anti-Monopolistic

Because access-points make money servicing users and anyone can start a node, there is never a shortage of connection points.

# Open Scaling



While computer scientists have worked on the technical challenges of blockchain scaling, the economic challenge of open scaling remains mostly unaddressed. The problem here is ensuring the non-excludable properties of volunteer networks persist as networks shift to running on commercial infrastructure.

This transition risks monopolization because it requires the free market to provide what economists call a “public good”. That is goods or services with the property of non-excludability, what we often call “open” or “public”. As economists have known since the 1960s, markets do not provide non-excludable services: some form of closure (“privatization”) is necessary to ensure the profits from producing a good flow to those that pay for it.

In the blockchain space we see this as companies that provide user-facing infrastructure take creative steps to capture the benefits of the services they provide. Some sell transactions or refuse to share them with other miners or validators, preferring to collect the fee themselves. Others charge separate fees which defund the consensus layer and make it harder for competitors to stay in business.

The problem is exacerbated by users and developers, who prefer the cheapest and fastest access to the network and view emerging monopolies as helpful rather than as threats. As has happened on Ethereum with Infura, this leads to the emergence of monopolies at the critical choke point where money and transactions flow into the consensus layer.

**Saito is the only known solution to this problem.**

# Roles and Definitions



## Application

Saito applications run in your browser or stand alone applications. If you have been to saito.io your browser formed part of the Saito network. Saito applications can be wallets, or any kind of data driven software.

## Application Server

Application Servers provide applications and anyone on the web with data. These serve custom javaScript for in browser applications, but can also serve API to blockchains.

## Block Producer

Block producers verify transactions and bundle them into blocks, then share these with the network. Block producers also create a puzzle (a golden ticket) that is used to pay routing nodes for their work.

## Security Node

Security nodes compete to solve the puzzles created by Block Producers. The winner gets a reward, and in solving the puzzle creates a random number to pay the routing network in a provably fair way.

## Routing Node

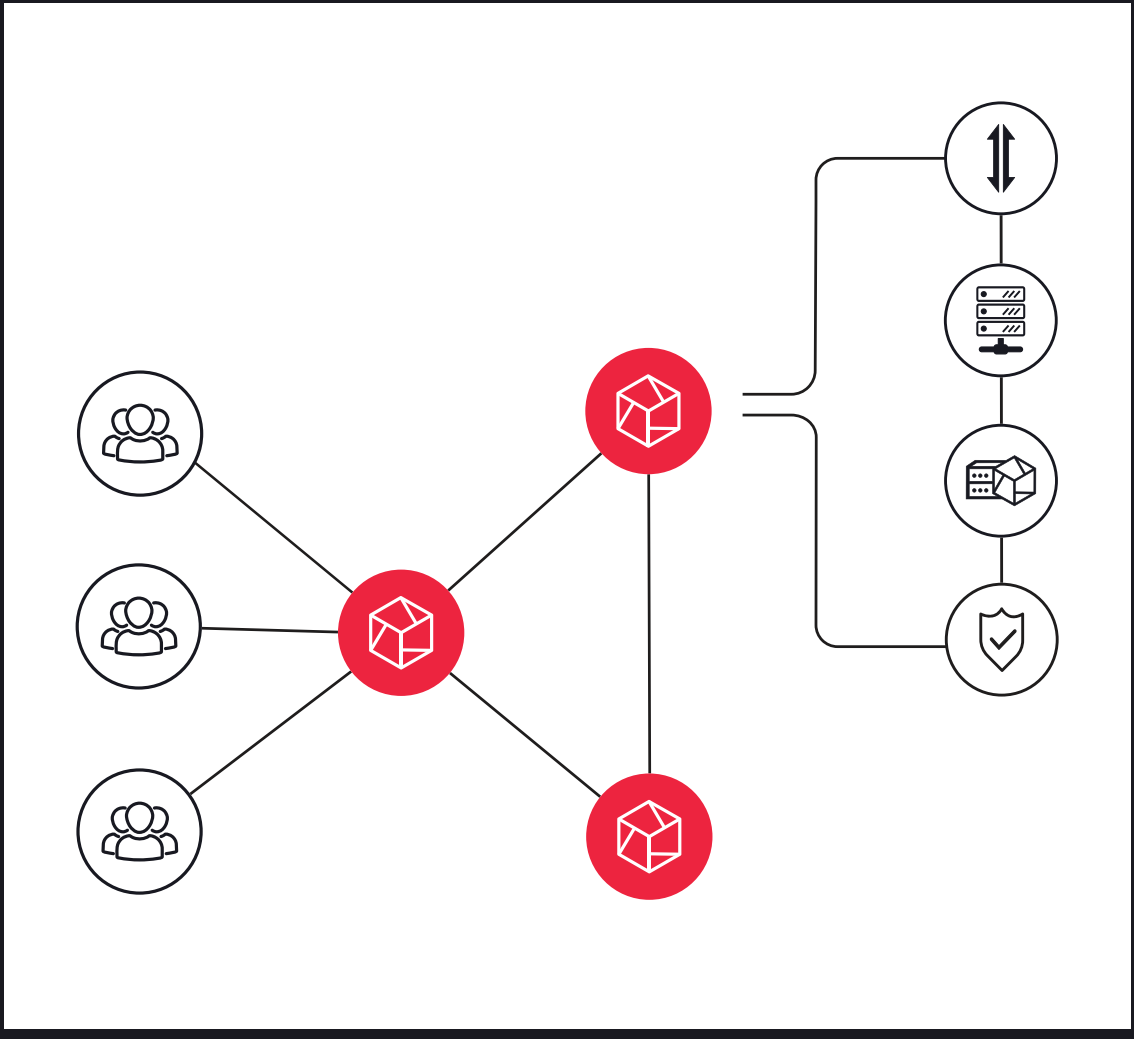
Routing nodes form the backbone of the network. Moving transactions from users to block producers.

# Canary Network



The node.js Saito implementation at github.com/saitotech/saito-lite/ runs a full node providing all of these functions apart from Applications. The Application Server provides a javaScript application to users' browsers. This Lite Client includes any modules the Application Server is configured to supply.

**Future network deployments will likely split some of these functions to dedicated nodes or clusters for effciency.**



# Finding an Economic Solution

The best way to explain Saito's mechanism design is to start with a clear statement of the problem it solves.

Our fundamental problem is paying for open infrastructure. Relying on the private sector to pay for infrastructure causes problems because the market will not fund infrastructure without closing it off to ensure profit. Companies will either defund the consensus layer (i.e. add separate fees) or close access to consensus-layer data (i.e. controlling the distribution of transactions) to create chokepoints they can monetize.

Avoiding this problem requires paying for infrastructure out of consensus. Doing so guarantees that payments are made in an open and competitive fashion and that anyone can join the network and start receiving payments. The critical property of 1-CPU-1-VOTE pioneered by Bitcoin must be protected. Smaller companies should be as profitable as larger companies if they are providing work of equal value to the network. Critically, everyone participating in the network must be paid in proportion to the value of the work they do for the network

The core challenge here is the problem of value-measurement. Networks that are based on "mining" or "staking" cannot solve this problem because their consensus mechanisms declare by fiat that those activities are of value.

Saito by contrast measures "work" (claims for payment) directly from the flow of fees embedded in the transactions and the work that nodes do in routing it into blocks.

The Saito whitepaper covers how this is done and the technical details of how the design protects this mechanism from sybils, fee-recycling and other technical attacks. We encourage technical readers to familiarize themselves with the mechanism, as its security properties are remarkable, including the full eradication of the 51 percent and other economic attacks on the consensus layer

In the next section we offer an overview of why this approach works and how it allow Saito to offer a protective underpinning to other blockchains.

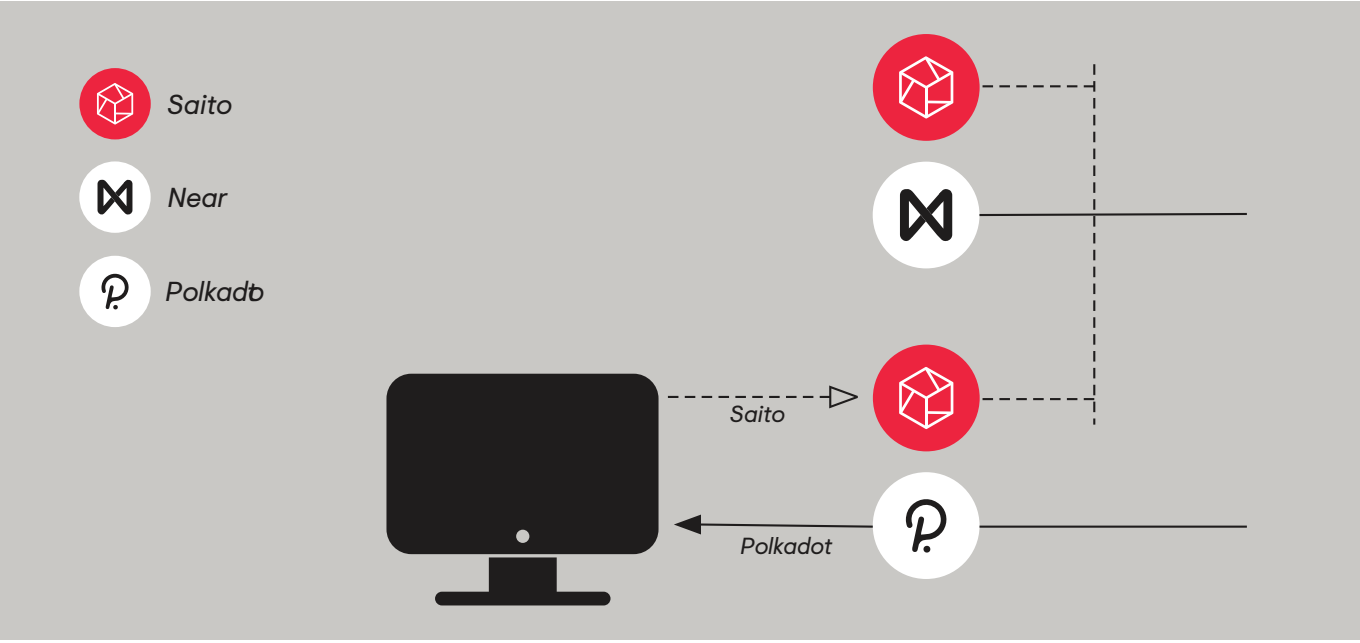
# The solution: Free Routing

Saito pays most to the nodes that run user-facing network Infrastructure. These nodes sit on the network where users connect to them, and also run commercial-grade access points for other blockchains.

To maximize income, nodes compete to attract users providing vanilla routing-services for transaction data or serving that run on the “Saito Stack”, an open source javaScript client that runs applications that can interact with whatever blockchains or parachains users prefer.

Profits to access points depend on the value to users of the infrastructure they provide. The market adjusts the provision o`f infrastructure revenue automatically without the need for programmers to hardcode economic variables.

**This can be seen in Figure 1 below:**




Just as proof-of-work incentivizes mining and proof-of-stake incentivizes staking, Saito incentivizes the running of open network infrastructure. Importantly, the consensus mechanism keeps it honest: companies cannot compete by locking-off access to transactions because nodes that hoard transaction flow make less money than those that share transactions freely with peers. As the Saito Whitepaper explains, nodes do not earn revenue not by adding transactions to the blockchain rather by sharing transactions with peers.

By paying for infrastructure without rewarding cheating (claiming payment for unneeded services) or monopolization, Saito helps web3 blockchains and projects scale to service users and remain true to the goals of web3 design.

# Token Economy

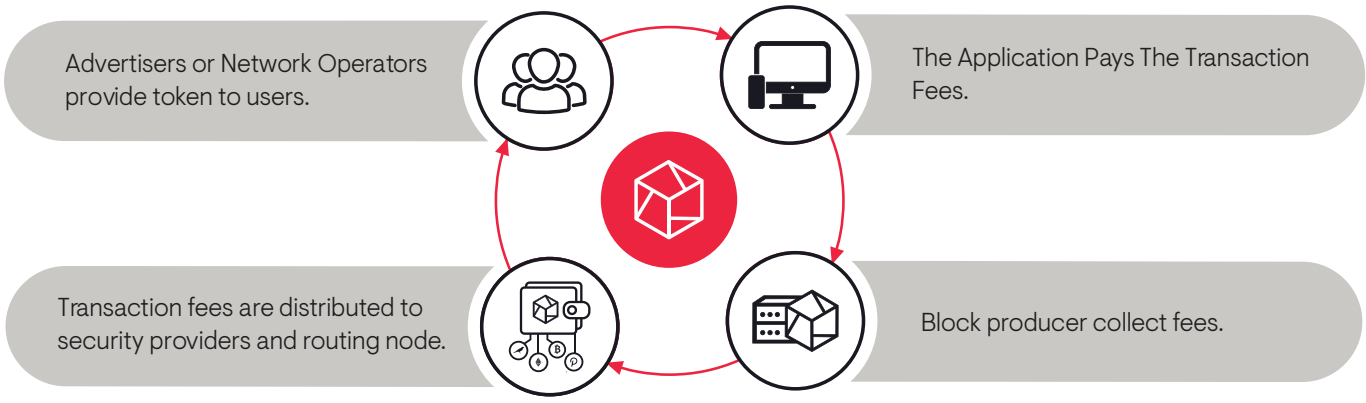
Users need tokens to pay fees to participate in the Saito ecosystem. The sum value of these tiny fees create the economic incentive for nodes to provide infrastructure for other blockchains and parachains.

While some users and companies will purchase Saito tokens to participate in this ecosystem, most users will not need to spend money to use Saito applications in practice. Saito's open-by-design architecture supports user respecting advertising and other business models.

Because Saito applications run directly in the browser, users can receive passive token income by installing applications that provide them with residual token income. An example would be an advertising module which displays advertisements on Saito applications without tracking. Users can be paid directly for ad Impressions, and agree to a price for data they provide, without giving up sovereignty over it.

From an economic perspective, the situation is identical to the current web, except without the ability for companies like Google to create monopolies around the advertising layer.

**The dynamic of token circulation can be seen in the following illustration:**

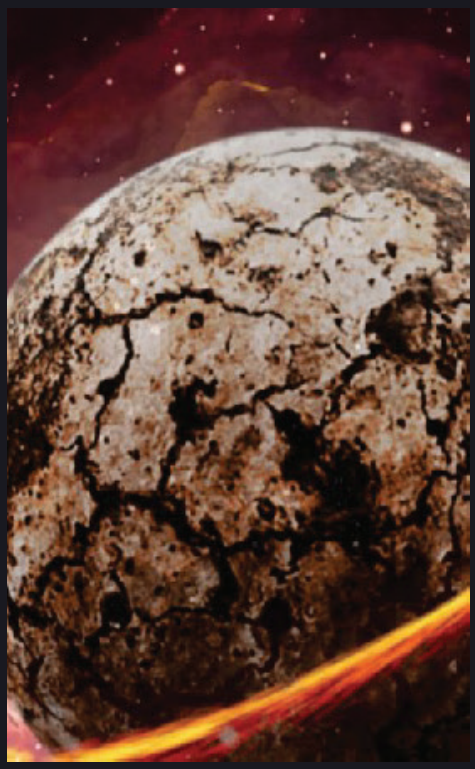


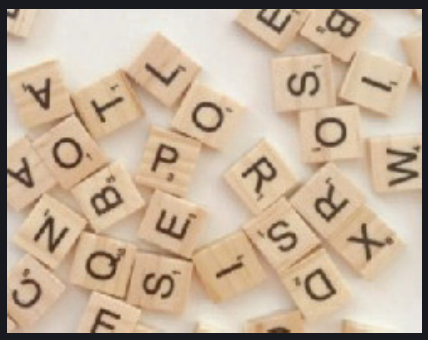

Once understood, this is the obvious approach for eliminating monopolization pressures on the web3 layer. Nodes that provide connectivity cannot prevent users from installing whatever revenue-creating applications they wish. The chokepoint that Google has created in the traditional web vanishes as well.

In the next section we explain what this application stack actually delivers and what sort of applications are already running and gaining usage and popularity in the web3 space.

# Case Study

## The Saito Arcade



The Saito arcade was built to demonstrate the power and flexibility of building applications on Saito. Supporting the complex interactions required for games, and creating a great user experience. It has put the Saito team at the forefront of peer-to-peer web3 application development.

The Saito game engine that drives the arcade contains a number of sophisticated cryptographic tools that allow for trustless bidding and voting, escrow, and randomisation. Users are migrating to the Arcade because the games are fun, open source, and do not require them to use monopolistic companies like Steam or Google Play.

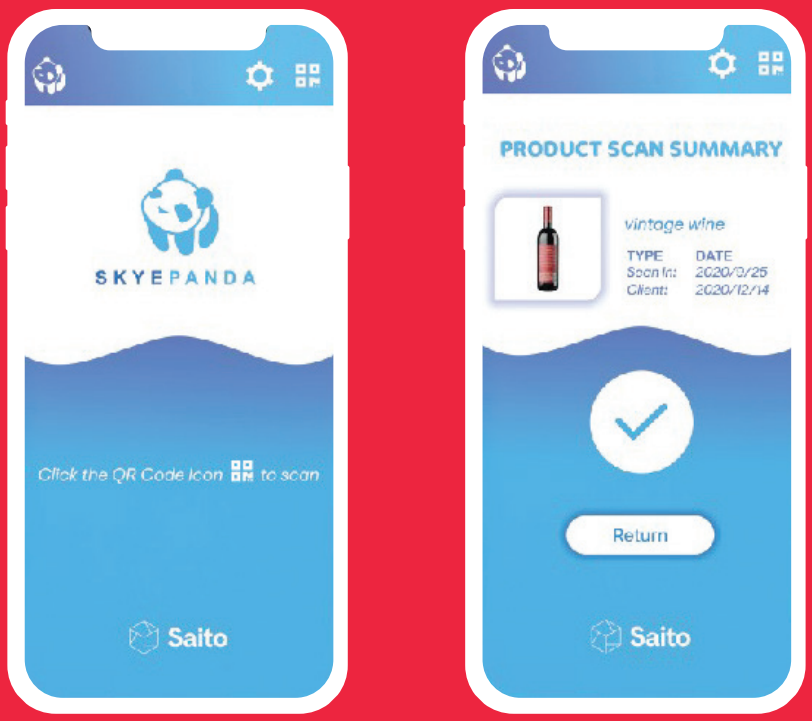
**A web3 foundation grant has been awarded to the Saito team to bring the Saito game engine to the Polkadot community and expand it into an open web3 standard.**

project supported by

**Web3 foundation grants program**

# Case Study

## Skyepanda




Skyepanda is building an open marketplace on Saito that helps small producers connect directly with customers in the China market.

China's ecommerce landscape is dominated by a few massive incumbents that monopolize marketplaces, supply channels and payments.

Saito is working with the Skyepana team to help create an open, trustless platform that includes provenance, reputation and rewards management.

The Skypanda roadmap includes extending to cryptocurrency payments between, producers, KOLs and marketers and consumers.

# Roadmap

Saito is a proven network that has handled nearing 10million transactions. The road ahead is all about partnerships and community building.

## Key focus point

### Web3 Gaming Standard

Expanding the Saito game engine to a general web3 standard.

### Public Network

Attracting communities and infrastructure providers to add nodes to a public network.

### Developer SDK

Improved tooling and even quicker development cycles on Saito.

### Public Sale

Create token value for communities and source of revenue for parachain and other blockchains.

# Contact Us

info@saito.tech

https://github/saitotech/saito-lite

Saito