An *Introduction to ~*

ARCHWAY

Archway Lightpaper

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Proof-of-Stake (PoS) *with* developer *rewards*

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Introduction →

We are on a mission to build a protocol that supports a more equitable blockchain §ecosystem. One that not only rewards network operators and early contributors, but also the developers that build on top of the protocol.

An active and engaged developer community is the single most important determinant of long-term success for any smart contract platform. Developers are the life force of a network, creating decentralized applications (dApps) and services that attract new users and generate millions of dollars in daily network fees.

The rapid rise in valuations of many blockchain networks has largely been driven by these vibrant developer communities. Yet, the individual contributors and builders behind the dApps rarely capture much of the network-level value that they help create. Typically, the lion's share accrues to a small group of entrenched "whales" and well-connected industry insiders.

Visionary dApp developers who executed on building out products and communities may not hold any significant stake in the Layer 1 protocol, and so don't directly share in its success.
As a result, they adopt alternative fundraising techniques and business models to sustain their creations.

The Archway protocol reshapes how value is created and shared across blockchain ecosystems, opening up a completely new kind of developer-centric economy.

Archway~ Overview

Archway is an incentivized smart contract chain for Cosmos, allowing developers to easily deploy high-performance dApps and get rewarded for the value they contribute to the network.

As developers build and launch impactful dApps that generate usage on Archway, they earn a proportional share of network fees and rewards. This shared earning model enables dApps to access recurring rewards and participate in the upside of the underlying protocol. For Archway, it tightly aligns the incentives of developers and their dApp user communities with the overall ecosystem.

Along with more inclusive rewards, Archway's technical design is optimized for a seamless developer experience. The protocol provides a full WebAssembly (Wasm) implementation for cross-language support, a Web3-compatible API, and native bridges that connect to other networks for cross-chain communication and asset transfers.

Built on Cosmos and with native integration of the **Inter-Blockchain Communication protocol (IBC)**, Archway makes it possible to create cross-chain dApps that scale. No need to spin up a new dedicated chain, developers can launch their contracts straight to an established Proof-of-Stake (PoS) network and instantly connect to users, assets, and communities from across the Cosmos ecosystem.

Archway Features

DEVELOPER REWARDS

With Archway, dApps can earn both transaction fees and inflationary rewards in exchange for their contributions to the network. This earning model is similar to how validators are rewarded for operating nodes in a typical Proof-of-Stake chain.

By allocating a portion of network-level rewards to dApps, developers and their communities are directly incentivized and gain a true stake in the protocol.

Archway allows each dApp developer and their community to configure how the Archway allows each dApp developer and their community to configure how the rewards are managed and distributed. When a contract is instantiated, the dApp developer specifies an "owner" address where all fees and rewards are automatically deposited. This target address can be their own, a multisig, or controlled by a separate custom contract. Ownership can then be transferred to a new address as needed, only requiring the signature of the previous owner.

REWARD TYPES

The following sections outline how we expect funding sources could function and how dApps can opt in:

Gass fee • Rebates

Unlike existing smart contract platforms, Archway does not burn gas fees or distribute them entirely to the validators or miners. Instead, the Archway protocol splits the collected gas fees between dApp developers and validators.

At network launch, gas fees are divided evenly with 50% going to dApp developers and 50% to validators. These are configurable parameters and can be adjusted over time through network governance.

From the dApp developer's perspective, a contract receives a 50% rebate on all gas paid. From the validator's perspective, foregoing a portion of rewards in the near-term effectively drives transaction volumes, fees, and value of the underlying network in the future.

It would not be profitable for an attacker to spam transactions on the network as gas rebates recoup only part of the fees paid (50%). As an additional safeguard against potential abuse, uploading new contracts requires higher gas fees than normal transactions to prevent the deployment of spam contracts, but sufficiently low to allow smaller projects to upload contracts.

Gas fee rebates are automatically paid out by the network on a per-block basis.

Inflationary dApp~ *Rewards*

The overall inflation rate on the Archway network follows the **model of the Cosmos Hub**, with total token supply increasing between 7% and 20% annually, depending on the ratio of tokens that are actively staked on the network.

The Archway protocol then shares a portion of these total inflation rewards directly with dApps. At genesis, 25% will go to dApp developers and 75% will go to validators. For example, if the network sees total annual inflation of 8%, then 2% would go to dApps and 6% would go to validators. Again, these distribution values are configurable parameters that can be adjusted by the Archway community through network governance.

The dApp rewards pool (2% in the previous example) is then proportionally distributed based on the relative amount of gas fees that each dApp generates within a given epoch. For example, a dApp that is responsible for 10% of gas consumption would be awarded 10% of the available pool.

To mitigate potential Sybil attacks and ensure spamming transactions is not profitable, each dApp has a max inflation rewards cap. At network launch, there is a hard cap based on the total gas fees paid per dApp. A contract deployed to Archway cannot earn rewards greater than the total gas it generates within an epoch. Implementation of a dynamic rewards cap is being actively researched and can be updated through future governance. Transitioning to a floating cap will provide more flexible distribution and further incentivize developers to continuously improve their dApps.

Any surplus in rewards will be contributed to the Archway community pool where the funds are managed through governance.

Inflationary rewards are paid out by the network on a per-block basis.

Smart contract *fees* →

Smart contract platforms today charge network fees ("gas") based on the amount of computational processing required by on-chain transactions. While this method of measurement works for the underlying economics of a network, it does not support use cases where a developer has to cover additional costs such as distributed storage, access to off-chain processing, external data sources, or other premium features such as audited and insured contracts.

With Archway, developers of dApps can define custom fees for interacting with their smart contracts. Also known as the "take rate," this fee provides developers a flexible option to charge different fee levels that are based on their specific use case and operational needs.

By default, the smart contract fee is set to 0 $ARCH. On initial deployment, the dApp developer can define their fee. The fee is configurable and the dApp owner can adjust it any time, even after the contract has been deployed.

To streamline the user experience, the smart contract fee is embedded directly in the network fee, so end users are simply presented with a single combined fee when signing a transaction.

Since contracts can be integrated into multiple dApps, developers can earn multiple lines of fees across any user base that interacts with their code. They can write and monetize a single contract rather than a fully featured dApp. Since contracts can be integrated across multiple dApps and earn multiple lines of fees from any user base or service that interacts with it. Imagine, for example, the rapid app development that would happen if every NPM package earns fees for computational use.

This fee structure is similar in nature to a built-in licensing model, but can be entirely automated through smart contracts on Archway. These new capabilities and incentives encourage more composability, faster iteration cycles, and greater innovation.

While other developers can fork or copy the smart contract code deployed on Archway and remove such fees, in practice, this has not been a widely successful tactic. Communities show a strong preference for trust in the projects they use and the reputations of the developers behind them and are willing to pay a premium for that reliability.

Example ~ use *cases*

dApps can choose to allocate the funds they accrue in whatever way is most beneficial to their ecosystem. For instance, they can redistribute rewards to their governance token holders, fund core development efforts, cover users' gas fees, seed liquidity pools, contribute to a community DAO, open project bounties, and much more.

Here's a deeper look into these example use cases:

SUBSIDIZE GAS FEES

Gas payments remain one of the critical barriers to delivering a simple, intuitive user experience for dApps. Archway supports **gasless transactions** through the use o pool accounts. A dApp can pull funds from a common pool to sponsor gas payments and completely abstract away that complexity and friction for their end users.

To fund the balance of the pool account, a developer can use the fees and rewards generated by the dApp itself. In effect, the dApp gets a 50% discount on each transaction from gas rebates along with inflation rewards and contract fees that are potentially available as a bonus.

By recycling these funds, dApps have the option to dramatically reduce or eliminate the gas burden for end users, leading to a smoother onboarding process and stronger retention over time.

GOVERNANCE REWARDS

A recent trend has dApps issuing governance tokens to incentivize and bootstrap early communities. Many of these tokens have risen to multi-billion dollar valuations despite not having any clear mechanism for value capture for fees or revenues. Some of these tokens merely grant voting rights, but have still soared in value based on speculation of future utility or potential rights to cash flows.

In the Archway model, dApp developers can go one step further and redistribute their share of network rewards directly to their governance token holders, subject to local securities laws. The Archway model turns standard governance tokens into productive, yield-generating assets.

While individual dApps, such as **SushiSwap** have implemented similar functionality, Archway makes it possible to implement and manage governance rewards at the protocol level itself.

A developer can opt in and automatically redirect funds earned by the dApp, including gas rebates, inflation rewards, and even smart contract fees, straight to governance token holders.

SUPPORT THE CORE DEVELOPMENT TEAM

Rewards offered by Archway could help developers bootstrap new projects without having to dedicate excessive time and focus to fundraising. The process of raising early capital can be difficult for developers of individual dApps.

Development teams often resort to private insider sales that skew early token distribution or are forced to rely on foundation grant programs. Rather than prioritizing the best technology and ecosystem for their dApp, they often choose based on available grants and get locked into a single platform.

Even after a dApp is launched, developers continuing to support the dApp codebase may find it difficult to cover ongoing development costs as the blockchain industry is still nascent and winning business models have yet to materialize.

The model introduced by Archway can counter some of these early financial pressures by allocating dApp rewards directly to core development teams. This funding source could serve as a supplement to help sustain projects and allow the team to focus on what really matters — shipping the best possible product, growing their user base, and supporting the community.

FUND A DECENTRALIZED AUTONOMOUS ORGANIZATION

Rewards generated by a dApp can be contributed to a community-owned DAO that is focused on coordinating and funding critical work for its ecosystem. These rewards can be continuously deposited to the DAO's treasury which allows members to collectively manage and deploy the assets based on specific needs of the project.

Such a DAO could vote to fund core development teams, sponsor events and hackathons, commission code audits, open bug bounties, launch education programs, subsidize third-party integrations, and so on. Anything and everything that could potentially benefit and impact the ecosystem.

The DAO itself can exist and operate as a set of smart contracts on top of Archway, so the entire process is automated and transparent throughout initial rewards collection, voting, grants distribution, and so on.

Giving members collective control over a recurring funding source helps actively engage the dApp's community and contributes toward progressively decentralizing the project itself.

BOOST LIQUIDITY MINING PROGRAMS

DeFi projects could use the funds earned from Archway to boost liquidity mining rewards, a vital strategy for attracting new users and encouraging active participation.

For instance, a decentralized exchange (DEX) can be designed to distribute rewards on top of the fees already paid to their liquidity providers (LPs), while a lending platform can allow users to earn supplemental rewards for depositing and borrowing assets.

Although similar matching and subsidy programs have been run elsewhere as temporary months-long promotions, the steady drip of rewards from the Archway protocol creates unique opportunities to serve as a continual source for boosted incentives.

REDUCE DEX FEES

On networks such as Ethereum, DEX users incur two sets of fees: a network fee and a swap fee. The network fee incentivizes miners to operate nodes and the swap fee incentivizes liquidity providers (LPs) to provide liquidity to the DEX.

By deploying to Archway, DEXs could be constructed to effectively eliminate one of these fees. Instead, the DEX protocol could redistribute the earned gas rebates back to the LPs for providing liquidity to dramatically lower total transaction costs on automatic swaps and improve the user experience.

Access *to*
Cosmos and
beyond →

INTER-BLOCKCHAIN COMMUNICATION PROTOCOL (IBC)

The IBC protocol makes it possible for blockchains to connect to each other. Built on Cosmos, Archway natively integrates IBC so users can frictionlessly exchange assets and data with other Cosmos-enabled chains. dApps deploy straight to Archway and plug directly into IBC without additional development or the need to spin up an independent chain.

This native integration helps expand a developer's addressable market by opening up access to users and liquidity from other chains, while also allowing their token to be ported and utilized elsewhere.

IBC was successfully launched in early 2021 and is now running at scale and growing rapidly. The protocol has been adopted by leading networks such as the Cosmos Hub, IRISnet, Crypto.com, Akash, Persistence, Regen, Sentinel, Starname, Sifchain, Injective, and Osmosis; while Terra, Thorchain, Secret Network, Kava, Althea, Band, Switcheo, Umee and others are lined up to integrate in the coming months.

With each new chain, IBC can unlock more value and its network effect gains momentum.

In a sense, Archway's native IBC integration enables developers to future-proof their dApps. Rather than betting on a single isolated chain or scaling solution and then being locked into that ecosystem, dApps built on the Archway protocol exist across an interconnected network of chains and can be migrated with ease if needed.

BRIDGES TO OTHER MAJOR NETWORKS

Beyond interchain communication between Cosmos-based networks, efforts are underway to connect major chains like Ethereum, Polkadot, Solana, and Celo. Integrating with other major Layer 1 networks helps dApp developers extend their reach even further by connecting with dApps, assets, and users outside of the Cosmos ecosystem.

Other than IBC, the most advanced interchain communication work is around the Gravity Bridge, a bidirectional bridge between Ethereum and other Ethereum Virtual Machine (EVM)-based chains, such as Polygon and Binance Smart Chain.

Archway provides a native Gravity Bridge integration so developers can pull native Ethereum assets such as ERC-20s and ERC-721s into their dApps and bring their own assets to Ethereum.

As a truly decentralized cross-chain bridge, the Gravity Bridge offers a more secure and efficient governance mechanism to manage high-value contracts on EVM-based chains. Many DeFi dApps rely on multisig wallets that are controlled by a small group to manage billions of dollars in value. This reliance poses immense centralization risk as such wallets could be exploited or compromised by internal or external actors.

Through support for cross-chain contract calls, the Gravity Bridge implementation provides a superior alternative. Such contracts on Ethereum could be managed by Archway's decentralized validator set by using the bridge rather than relying on a small and opaque group of individuals who control a centralized multisig.

Gasless* *Transactions*

In Web 3.0, blockchains generally require paying a gas fee in order to execute a transaction. This gas free requirement leads to a poor user experience and causes a major barrier to adoption. With gas fees in place, end users must acquire sufficient network tokens, go through a multi-step payment workflow, and then face unpredictable and steep fees.

To overcome such friction, Archway provides a module for developers to subsidize gas on behalf of their users by funding and pulling from a common account. A pool account (also known as a fee grant) helps efficiently allocate the organization's resources by eliminating the need to continually "top up" many small transactions.

The module is designed to allow one account, the granter, to grant one or more grantee accounts an allowance to spend the granter's network tokens on fees for a subset of transactions, as long as the spending fits within the predefined limits.

Gasless transactions and pool accounts give developers a way to deliver experiences that look and feel like any normal web or mobile application. This familiar paradigm ultimately supports onboarding and retaining more users.

Fast and *Low*~Cost *Transactions*

Archway is powered by Tendermint Core, the most advanced and proven BFT consensus in existence. Considered the gold standard for building Proof-of-Stake (PoS) systems, the Tendermint Core consensus engine has been widely adopted across the industry.

This efficient consensus model makes it possible to process transactions in as little as 6 seconds and at an approximate cost of $0.01 per transaction. Capabilities for fast and low-cost transactions allow developers to create applications and experiences for mainstream users.

An *Energy Efficient* → Blockchain

By nature of its design, Archway is a fast and scalable network with a dramatically smaller environmental impact relative to major Proof-of-Work (PoW) blockchains like Bitcoin and Ethereum. The Archway PoS consensus mechanism utilizes the Tendermint engine to achieve high performance while still maintaining a low carbon footprint.

Compared to traditional Proof-of-Work consensus on other major chains, the Archway network consumes roughly 2M times less energy (less than 1%). See **Why Blockchains Need Cosmos Proof-of-Stake for a Sustainable Environment.**

Our *carbon* footprint

Network *Impact*—

THE VIRTUOUS FEEDBACK LOOP

The opportunity to earn network fees and inflation rewards incentivizes developers to build on Archway. As each new dApp and library is launched atop the network, more users and new assets follow. In turn, this growth attracts more developers who want to leverage those users and assets.

This feedback loop can draw in more developers, more users, more liquidity, and more dApps, creating a flywheel effect that continually drives the utility and value of the underlying protocol.

SUSTAINABLE OPEN SOURCE DEVELOPMENT

Open source software for dApps is very different from traditional open source software. Unlike traditional open source software, smart contracts are immutable, meaning that the code doesn't have to be continuously updated or tightly maintained. One well-deployed, composable financial primitive can generate recurring fees to supplement a developer's income and business model for however long the contracts are utilized.

A key benefit of building on the Archway protocol is the ability for developers to tap directly into protocol funding for their work, without having to rely solely on a business model of their own. Since network fees and rewards are shared with dApp developers, they can earn recurring streams of revenue and use the funds to pay the core team and continuously develop future versions of their dApp.

VALIDATORS POINT OF VIEW

Though validators share fees and rewards with dApps, the network distribution model is designed for sustainable long term growth. In essence, validators forego a portion of rewards in order to attract more builders to the network. More developer activity means more end user adoption and usage, which ultimately drives volume and value to the network and validators themselves over time.

BURNING TOKENS VERSUS REDISTRIBUTING TOKENS

The difference between burning tokens as implemented in Ethereum Improvement Proposal **(EIP) 1559** and distributing rewardsto dApp developers on Archway was evaluated in depth. However, the Archway protocol that continuously redistributes network fees back into the community is a more sustainable approach.

There are merits to EIP-1559's potentially deflationary impact that could increase scarcity and therefore push the price of Ether. However, that benefit might translate to even more expensive gas fees, which risks pricing out developers and further complicating the user experience.

The Archway protocol is designed to support and attract builders by incentivizing and supporting developers through continuous rewards generated directly by the protocol itself.

Network* *Architecture*

The Archway network is being built using the Cosmos SDK, Tendermint, IBC, Starport, and CosmWasm.

ARCHITECTURE OVERVIEW

The network starts with a vanilla Proof-of-Stake (PoS) network, with modified Minting, CosmWasm, Distribution, Staking, Group, and Governance Cosmos modules that manage the Archway inflation and rewards system.

SMART CONTRACTS

The Archway protocol uses CosmWasm, WebAssembly (Wasm), and Rust. Over 40 high-level programming languages support Wasm, including C and C++, Python, Go, Rust, Java, and PHP.

DIFFERENCE BETWEEN SMART CONTRACTS AND COSMOS ZONES

While the ethos of Cosmos is to allow the creation of self-sovereign chains, in many cases, it may make sense for a project to first deploy as a dApp. There is a lot of overhead in launching and maintaining a standalone chain. While the Cosmos SDK simplifies much of the technical effort, a developer still needs to attract and sufficiently incentivize a strong community of validators to run the network, which can be a daunting endeavor for early projects.

Consider the following tradeoffs between building your core logic as a smart contract versus building your logic as an independent Cosmos blockchain.

	Cosmos *Chain*	Smart *Contract*
Speed of development	-	+
Ease of development	-	+
Complexity of Logic	+	+
Maintenance overhead	-	+
Level of customization	+	-
Strict resource control	-	+
Native chain features	+	-
Scalability	+	+

MIGRATING DAPPS TO SELF-SOVEREIGN CHAINS

Some projects may find that starting to build their solution as a dApp rather than a self-sovereign chain better suits their needs. However, the requirements of software projects inevitably evolve over time. Archway is built around the Cosmos vision of self-sovereign chains that provides proven migration support.

Archway provides a simple way to deploy contracts to the Cosmos ecosystem. For many developers, continuing to run those contracts on an established chain like Archway is sufficient. However, for those dApps that hit a certain level of traction and require a network that can be tailored to their specific requirements, it makes sense to run their own dedicated chain.

This migration is straightforward because **CosmWasm** contracts are portable across chains, and the **Starport** toolkit allows developers to spin up and configure their own independent chain in a matter of minutes.

In this sense, Archway can be seen as a launchpad into Cosmos, with the flexibility for developers to easily migrate to a standalone chain if and when a dApp is ready.

Network → *Governance*

Archway governance is the process by which network participants and token holders can influence the future direction of the protocol through proposals and on-chain voting.

DECENTRALIZED GOVERNANCE

In addition to fees and staking, Archway's native token is used for governance. This helps maintain and support Archway's decentralized community while ensuring fair and transparent participation. All holders of the native token can propose changes to the Archway protocol and vote on active proposals. Proposals that reach a consensus threshold are adopted, whether a specific feature or even changing the governance system itself.

Appendix A: *Archway* ® Terminology

CosmWasm
A framework that allows developers to write multi-chain smart contracts using any programming language, including Rust, which compiles to Wasm.

dApp
A decentralized application built on Archway that combines a smart contract and a frontend user interface.

Inter-Blockchain Communication protocol (IBC)
A generalized cross-chain communication protocol for transferring value and data between independent networks.

Pool Account
A common pool Archway dApps can fund and then use to sponsor gas payments for end users.

Starport
An easy-to-use CLI tool for creating sovereign application-specific blockchains using the Cosmos SDK and Tendermint.

Tendermint
A byzantine fault tolerant (BFT) blockchain engine that handles networking and consensus, and a generic application interface (ABCI).

WebAssembly (Wasm)
An open standard developed by a consortium of tech companies that defines a portable binary-code format for executable programs, and a corresponding textual assembly language, as well as interfaces for facilitating interactions between such programs and their host environment.

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