

WHITE PAPER



The World First Cardano Stake Pool with Managed Rewards Distribution

Foreword

Current Cardano staking mechanism doesn't much differ from the original parameters, that were presented with incoming of the Shelly evolution era on the Cardano blockchain. Simple model of rewards delivery is denominated on two main participant groups: **The Delegators** and **The Stake Pool Operators**.

Having in mind that both parties must be motivated and incentivised for their participation in the eco-system, they need to have proper tools to claim their partial ownership of the protocol. Therefore, holdings of Cardano native tokens (ADA) are rewarded in the process called Staking. Compared to Delegators rewards, the Stake Pool Operators receive additional income from Fixed Fees and Margin Fees.

Delegators' rewards are calculated based on multiple factors, like blocks assignments per epoch and their production by the affiliated pools, followed by saturation (or over-saturation) level of impacted Stake Pools, etc. There is, however, always an expected range of rewards coming from the operational pools, proportional to the Delegator's holding of average yearly yield 4.5% - 5.5%.

Founders of the **Dionysus Pool Cluster** address such a traditional system as problematic from the following perspectives:

1. **Big Delegators** aren't motivated to search for best staking opportunity, as yield varies so little and there aren't additional rewards factors for pools competitiveness.
2. **Small Delegators** don't have any chance for booster rewards that would improve their position with Cardano portfolio.
3. **Pools blend** into a small group of profiting units, while dragging over 2/3 of the other stake pools behind, in the non-sustainable shadow.

This White Paper has been briefly crafted with an intention to shift the paradigm of Cardano staking rewards forward and to define new frontiers for the Managed Rewards Distribution.

Where the Dionysus Pool Cluster leads the new path from 12/2021 onwards, others are being proudly invited to read about, assess and join us on the new & fascinating journey in the world of Cardano staking.

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Business Summary

Sustainable model of Managed Rewards Distribution (viz chapter Sustainable Distribution Model) demonstrates a significant impact of our unique rewards management system. Examples of big and small stakes (viz chapter Rewards Examples) help to visualize the possible rewards scenarios.

Pools in Dionysus cluster are selected by our Delegators accordingly to their appetite. Every of our pools provides a chance on receiving attractive Managed Rewards, while keeping desired fraction of the Protocol Rewards available to each Delegator.

Dionysus cluster is the unique place, where Delegators meet to reach their goals, dreams and ambitions. It may be a competitive appreciation of their portfolio or a fair chance of multiplying a smaller stake. Rewards expectations of our Delegators are the cornerstones of the Dionysus Pool Cluster operations.

We are DIONYSUS - We Manage Rewards Distribution!

Happy Staking & Enjoy Your Rewards!

Your Dionysus Pool Team

Stats & Features

Key Stats

Pool Name	DIONYSUS
Pool Tickers	DIO, DIO1, DIO2, DIO3, DIO4
Launch Date	20 th December 2021
Fixed Fee	500 ADA
Margin Fee	3% (internal margin)
Protocol Rewards	50%, 40%, 30%, 20%, 0%
Managed Rewards	50%, 60%, 70%, 80%, 100% (visible as Margin Fee)

What are Pools' Unique Features?

1. **Managed Rewards Distribution** - Fast, Intuitive, Automated. The world first managed rewards distribution service, provided to all Delegators in DIOx pools cluster.
2. **High Rewards** - The **Epoch Delegators** (one delegator per pool) receive rewards of up to 300% of their stake or complete content of the rewards bag (a.k.a. MoonBag).
3. **No tax event Pool spin-off** - We honour delegators who request no-tax events from the Protocol Rewards. Pool DIO4 fulfils such request and is available at stakeholders' service. Tax events happen only if the delegators are selected for Managed Rewards.
4. **Transparency** - Rewards Distribution news are shared on social networks and are also provided with links for the review of protocol events.
5. **Sustainability** - Dionysus Pool Cluster is funded on the unique sustainability model (viz chapter Sustainable Distribution Model).

Rewards Examples

Following 2 examples demonstrate rewards delivery in the Dionysus Pool Cluster.

Ex. 1: Pool size is 5M ADA and Delegator with stake 303 700 ADA has been selected for the Managed Rewards distribution in the pool DIO. What is the difference between normal and managed pool rewards?

Table 1: Rewards projection for Example 1

Pool	Stake	Total Rewards	Delegator's Stake	Protocol Rewards	Managed Rewards	Rewards
Default	5M	4 093	303 700	231.80	0	231.80
DIO1	5M	4 093	303 700	112.40	1 398.70	1 511.10

Result: DIO pool provides more than 6x bigger rewards for selected delegator than Default stake pool. Delegator received very competitive appreciation of their position!

Ex. 2: Pool size is 64.2M ADA and Delegator with stake 213.6 ADA has been selected for the Managed Rewards distribution in the pool DIO. What is the difference between normal and managed pool rewards?

Table 2: Rewards projection for Example 2.

Pool	Stake	Total Rewards	Delegator's Stake	Protocol Rewards	Managed Rewards	Rewards
Default	64.2M	2 1178.46	213.60	0.15	0	0.15
DIO1	64.2M	2 1178.46	213.60	0.08	640.79	640.87

Result: DIO pool provides more than 4 270x bigger rewards for selected delegator than Default stake pool. Delegator's position has been effectively triplicated!

Values

Community

The service of Managed Rewards Distribution has been prepared for every member of the Dionysus community. We don't judge, select nor privilege any Delegator above another.

Pool owners pledge not to be directly involved in staking their assets within Dionysus Pool Cluster (viz FAQs).

Fair Chance for Everyone

The ratio of ADA staked with the Dionysus pools to the total stake amount is proportional to the probability of delegators' selection to the Managed Rewards Distribution. In plain English: Smaller Delegators have chance of game-changing rewards, while Bigger Delegators find Dionysus as a harbour of highly competitive appreciation of their assets. This process repeats every epoch.

Only exception are the stakes from Cardano Foundation (CF) and Input-Output Global (IOG). According to current staking rules, the CF and IOG addresses are removed from the Managed Rewards Distribution process.

Safety

Dionysus Cluster complies with moderated and secure data delivery, high-availability and backup / restore actions on the latest grade technology. We provide multiple layers of the hybrid-security. Our infrastructure combines on-prem and in-cloud virtualized solutions of finest grade. This way, we assure high-requirement standards for the continuous operations and high availability of Dionysus services.

Team

We are a tandem of curious and crazy minds, who are never afraid of going after a challenge. Was it a business trip around the globe? Was it a Google, HP, Credit Suisse or AXA Insurance in need of help? We were there and we worked our experience up and broad to deliver the best and nothing else. Now we are ready to provide our dear Delegators with the unique staking experience, first of its kind.



Igor is a technical mastermind of the Dionysus Pool Cluster. There is no other guy who has a button for replicating pools, other button for restoring a backup and another one ready for boosting a beer fridge! Igor is the infrastructure and DevSecOps professional.



Miro has been a business, marketing and financial brain behind the Dionysus operation. Once there was a 25ADA giveaway for the "winning delegator" on Twitter. He saw it and promised to do better. Miro likes to stand against the mainstream and believes in a better rewards model that could be of a great value for the Cardano community.

Sustainable Distribution Model

The model of sustainable distribution needs to consist of following key elements:

- Shuffle of delegators on the pool level
- Selection of the **Epoch Delegator** who receives Managed Rewards
- Calculation of the Managed Rewards amount

Following subchapters provide more clarity on the key elements of the sustainable distribution model.

Default calculation of Managed Rewards

Simplified model of Managed Rewards distribution should firstly define the environment and its surrounding. Primarily, the relation of expected rewards and their extremes (*max*, *min*) in the stake pool with dependency on components of fees and margins.

Let it be the pool size P_1 that determines the amount of ADA staked in the pool. Both functions of pool maximum and minimum rewards can be projected e.g., with the rewards calculator from the Cardano independent group Adatainment: https://www.adatainment.com/index.php?page=staking_calculator&lang=en.

It will be then a set of 2 functions $pool_{max}$ and $pool_{min}$ which describes an area of expected reward values.

Equation 1: Maximum of Pool Rewards.

$$pool_{max} = (8 \times P_1 - 11) \times 10^{-4}$$

Equation 2: Minimum of Pool Rewards.

$$pool_{min} = (6 \times P_1 + 1) \times 10^{-4}$$

Let the P_1 be an interval between 1M and 65M of staked ADA, called the “Interval of Interest”. Extremes of pool rewards outside this interval gain a non-linear character (protocol penalizations) and would have to be evaluated by another system of equations. Presented scenario, therefore, won't apply for outsides of the Interval of interest.

Equation 1 and *Equation 2* are both linear equations. Their rate of change is a constant on the Interval of Interest. We will then average both equations by their mean. Let the $pool_{rev}$ be the single equation for the pool rewards, n the number of independent measurements and i the iterator over each rewards equation:

Equation 3: Mean of Pool Rewards.

$$pool_{rev} = \frac{1}{n} \sum_{i=1}^n pool_i = \frac{(8 \times P_1 - 11) + (6 \times P_1 + 1)}{2} \times 10^{-4}$$

Let the Fixed Fee be σ and such fee be deducted from the Pool Rewards before applying the Default Rewards Ratio D_r on a set of remaining rewards. Delegator's rewards then must be adjusted by the ratio of the Delegator Stake P_2 to the pool size P_1 . The equation for a single Delegator's Protocol Rewards $Del_{p.rev}$ is then represented by:

Equation 4: Delegator's Protocol Rewards

$$Del_{p.rev} = (pool_{rev} - \sigma) \times D_r \times \frac{P_2}{P_1}$$

The Equation 4 applies for the Pool Stake P_1 in the Interval of Interest. It is mandatory that the Pool Stake can't be empty or smaller than any delegator's stake (positive Reals are understood as including but not defining the complete set for staked ADA). Cases of Fixed Fee larger than Pool Rewards aren't considered, as Fixed Fee remains constant on 500 ADA:

Notation 1: Set limits for Pool Stake and Delegator's Stake

$$P_1, P_2 \ni \mathbb{R}^+ \wedge P_1 \geq P_2$$

The Margin Fee consists of two elements. The Pool Margin m_1 and Managed Rewards Margin m_2 . The Managed Rewards Margin is contributed in by all delegators and is used for pay-outs of Managed Rewards Distribution to the selected delgator.

Activation of the Managed Rewards event is marked as M_{act} . Default value of the activator is 0. If the Delegator is selected for the Managed Rewards, the activator value equals 1. Providing the summary of both Margins and Default Rewards Ratio equals 1, the universal equation for Delegator's Managed Rewards Distribution D_{MRD} is as follows:

Equation 5: Default equation for Delegator's Managed Rewards Distribution

$$D_{MRD} = (pool_{rev} - \sigma) \times \left(M_{act} \times m_2 + D_r \times \frac{P_2}{P_1} \right)$$

Equation 5 has been purposely calculated via Managed Rewards Margin and the component of Default Rewards, to detail the key factors for complete delegator's

rewards. Therefore, the simpler but less descriptive equation variation via the Pool Margin m_1 has been omitted.

Delegators' shuffle mechanism

The aim of delegators shuffling is to comply with following rules:

- Shuffle each member of the pool
- Minimize resources for only necessary instances and auxiliaries (python function **random()**)
- Keep the time complexity in levels **O(n)**, incl. necessary auxiliaries **O(1)**, and support the growth of delegators groups in the Dionysus Cluster

Unbiased and successful shuffling is one of key elements for the fair distribution model. Dionysus pool cluster uses the **Fisher-Yates Shuffle Algorithm** with a modern twist of Durstenfeld's version, utilizing positional swaps over comma assignment operations.

Selected method, thus, allows to minimize demand for resources, while shuffling each delegator within originating instance.

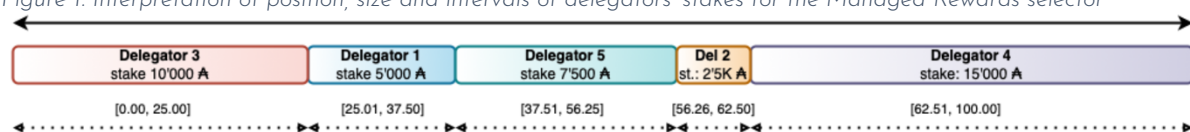
Delegator's selection mechanism

Selection of the **Epoch Delegator** for the Managed Rewards can happen only after the delegator list has been shuffled.

To build a fair and motivating construct, the probability of being selected for Managed Rewards must be proportional, as the ratio of delegator's stake to the overall stake in the pool.

To visualize the influence of delegator's stake on such probability, we use the construct of "One Meter Line", on which we draft delegator's **position** and the **interval**. Delegators' position and size is calculated independently for each epoch.

Figure 1: Interpretation of position, size and intervals of delegators' stakes for the Managed Rewards selector



As demonstrated on the Figure 1, the "One Meter Line" provides a fair chance of becoming an **Epoch Delegator**, based on delegators stake size - still, the probability is the inclining, however not a determining factor.

Triggering a **random.uniform()** function on the body of decimals from 0 to 100 give and independent value for being pinned to the Epoch Delegator's interval. It also serves as a security against splitting stakes to smaller sub-stakes. Not adhering to the Aristotle's life conviction, Dionysus pool is the place where "the whole is as great as a summary of its parts" and doesn't give any bigger chance for Managed rewards; neither to three stakes of 5'000 ADA each nor one stake of 15'000 ADA.