Regular Punks Arena

Whitepaper v0.3.10

Status: In development. We reserve the right to update this document as the game is built and tested.

Abstract

Regular Punks Arena is a tournament game where robot dogs with CryptoPunk heads battle through a single-elimination bracket on Base. Matches are simulated in discrete ticks using onchain entropy, producing results that are unpredictable ahead of time and verifiable after the fact. Spectators can buy tickets that track a dog through the tournament, and dog owners can compete for a team-funded prize pool.

1. Goals

- Credible ownership: the NFT can remain canonical on Ethereum while gameplay runs on Base.
- Low-friction tournaments: bracket progression and match resolution are designed for frequent onchain interaction.
- Deterministic verification: anyone can replay match outcomes given the same inputs and entropy sources.

2. System Overview

Regular Punks Arena consists of tournaments made up of rounds. Dogs opt in as entrants, the bracket is constructed, and each round produces winners that advance until a champion remains.

Roles:

- Dog owner: registers and enters their dog into tournaments and can optionally participate with power moves during fights.
- Spectator: purchases tickets on dogs and follows bracket progression.
- Resolver: submits transactions to create rounds and resolve matches (can be a keeper, community, or automated service).

3. Tournament Format

Tournaments use single-elimination knockout brackets.

3.1 Any number of entrants

A tournament can accept any number of entrants N. The bracket is padded to the next power of two P where P is the smallest power of two and P is greater than or equal to N. The number of byes is P minus N. Entrants are shuffled using a tournament seed and placed into the bracket; empty slots become byes.

3.2 Top 512 owner payouts

The owner prize pool pays out to the top 512 finishers. Operationally, this means every dog that reaches the round of 512 is in the paid set. Bracket padding with byes ensures the tournament cleanly reaches a 512 round as long as total entrants are at least 512.

4. Fighter Attributes

Each fighter has base stats and identity attributes that modify effective combat performance.

4.1 Base stats

Attack (ATK), Defense (DEF), and Agility (AGI) each range from 20 to 100.

- Attack increases damage dealt.
- Defense reduces damage taken.
- Agility increases the chance to strike first each tick and improves dodge.

4.2 Type advantages

Each Regular Punk has a CryptoPunk type. Type provides a focused advantage by boosting exactly one stat.

Type	Effect
Human	No bonus
Zombie	Defense +10%
Ape	Attack +10%
Alien	Agility +10%

4.3 Fighting style

Each fighter has a fighting style. Styles apply percentage modifiers to stats before combat begins.

Style	Attack	Defense	Agility	Special
Aggressive	+10%	-8%	0%	None
Defensive	-8%	+10%	0%	None
Agile	0%	0%	+10%	None
Balanced	+4%	+4%	+4%	None
Explosive	-5%	-5%	-5%	Small chance to land a lethal hit

4.4 Effective stats and HP

Combat uses effective stats computed from base stats, then type modifiers, then style modifiers. Effective stats are clamped to a safe upper bound to prevent runaway stacking.

HP is derived from effective Attack and effective Defense only:

HP = 100 + 2 * (ATK_eff + DEF_eff)

5. Combat Mechanics

Matches are simulated in discrete ticks. Each tick selects a first striker, resolves strikes, and updates HP.

5.1 Match structure

A fight lasts up to 30 ticks. Each tick can contain up to two strikes: one from the first striker and one retaliation from the other fighter if still alive.

5.2 Tick entropy

Each tick uses a blockhash as entropy. With a match start block and a fixed step size, tick i references a target block. Entropy for that tick is the blockhash of the target block.

Matches must be resolved while referenced blockhashes are still available. If a referenced blockhash is unavailable, the protocol may fall back to a VRF-based entropy source.

5.3 Initiative per tick

Initiative is rerolled each tick. Higher agility improves the probability of striking first, but does not guarantee it unless the agility gap is large.

Let delta = AGI_eff_A minus AGI_eff_B. Division on signed values truncates toward zero, matching Solidity behavior. The probability A strikes first is:

chanceAFirst = clamp(50 + (delta / 2), 10, 90)

A deterministic roll derived from the tick entropy selects the first striker for that tick.

5.4 Damage

Each strike computes damage using attacker ATK_eff, defender DEF_eff, and a small random roll from the tick entropy.

baseDamage = ATK_eff + roll - (DEF_eff / 2) where roll is in the range 0 to 9.

Damage is clamped to at least 1 and at most the defender's current HP.

5.5 Dodge

The defender can partially dodge based on agility difference. On a successful dodge, damage is reduced to one third, with a minimum of 1 damage if the defender still has HP remaining.

5.6 Explosive lethal hit

Explosive style fighters have a small chance to land a lethal hit on a strike. A lethal hit reduces the defender's HP to 0 immediately.

The lethal chance is **0.05% per strike**. Lethal cannot trigger on a dodged strike.

5.7 Tick flow

- Determine the first striker for the tick using initiative.
- First striker performs a strike. If the defender reaches 0 HP, the match ends.
- If the defender is still alive, the second fighter retaliates with a strike.
- Proceed to the next tick until a knockout occurs or all 30 ticks have completed.

5.8 Match end and tiebreak

If a knockout occurs, the surviving fighter wins. If no knockout occurs after 30 ticks, the winner is the fighter with higher remaining HP. If HP is tied, a deterministic coin flip breaks the tie using the final tick's entropy.

5.9 Power moves

Power moves are special actions a player can trigger during their fight to incentivize active participation. They are not items and are not traded. Every fighter has access to the same set of power moves.

Available power moves:

- Super Attack: the fighter's next outgoing strike deals 25% more damage.
- Super Defense: the fighter's next incoming strike deals 25% less damage.
- Heal: restore 15% of the fighter's max HP for that match, capped at max HP.

Rules:

- Each fighter can submit at most 2 power moves per match. They can be the same move.
- Power moves cannot be submitted in the last minute of the fight.
- Power moves take effect starting on the tick immediately after the transaction that submits the move is included onchain.

The last minute is defined in ticks: a 30-tick match disables power moves starting at tick 25 (the final 6 ticks).

6. Betting Mechanics

Spectators can buy tickets on dogs. A ticket tracks a specific dog through the tournament. If that dog loses at any point, the ticket becomes inactive.

6.1 Ticket validity and payout

Ticket purchases add ETH to the betting pool. At tournament end, holders of tickets on the champion split the entire betting pool.

6.2 Ticket pricing

The first ticket is priced at a protocol-defined starting price. After the first ticket, the ticket price is determined by the ratio of the betting pool size to the number of active tickets.

ticketPrice = bettingPool / activeTickets

Active tickets are tickets on dogs that are still alive. When a dog is eliminated, all tickets on that dog become inactive. As tickets become inactive, activeTickets decreases and ticket price increases for future purchases.

6.3 Betting windows

Tickets can be purchased for dogs in active fights, but ticket purchases are disabled in the last minute of any fight. Betting is also disabled after the final match starts.

Matches are expected to be resolved immediately after fights. If resolution is delayed, ticket purchases remain disabled after the fight ends until the match is resolved.

7. Owner Prize Pool

The owner prize pool is funded by the team and allocated to dog owners by placement tier. The following allocation targets approximately 15 ETH total and pays through the top 512.

Placement tier	Players	Prize per player (ETH)
1st (Champion)	1	5.0000
2nd	1	1.0000
3rd-4th	2	0.3500
5th-8th	4	0.2000
9th-16th	8	0.1200
17th-32nd	16	0.0700
33rd-64th	32	0.0300
65th-128th	64	0.0180
129th-256th	128	0.0120
257th-512th	256	0.0069

8. Future Sustainability (Exploratory)

Regular Punks Arena is being designed to support games in perpetuity. In addition to team-funded prize pools, we are exploring a future token-driven flywheel that funds tournaments over time.

High-level idea:

- A token may be claimable by NFT holders, with separate allocations for the team and ongoing tournament support.

- A tax on token activity may contribute to funding future games.

- A burn mechanic may allow dog owners to resurrect their dog after a tournament ends, returning the dog from the lock contract so it can be used again in future games.

Any token design is under active development, may change materially, and may be described in a separate document at a later date.

9. Conclusion

Regular Punks Arena combines bracket-based competition, onchain verifiable match simulation, spectator betting, and team-funded owner rewards. Type advantages, fighting styles, and power moves provide variety and active gameplay while keeping rules deterministic and auditable.