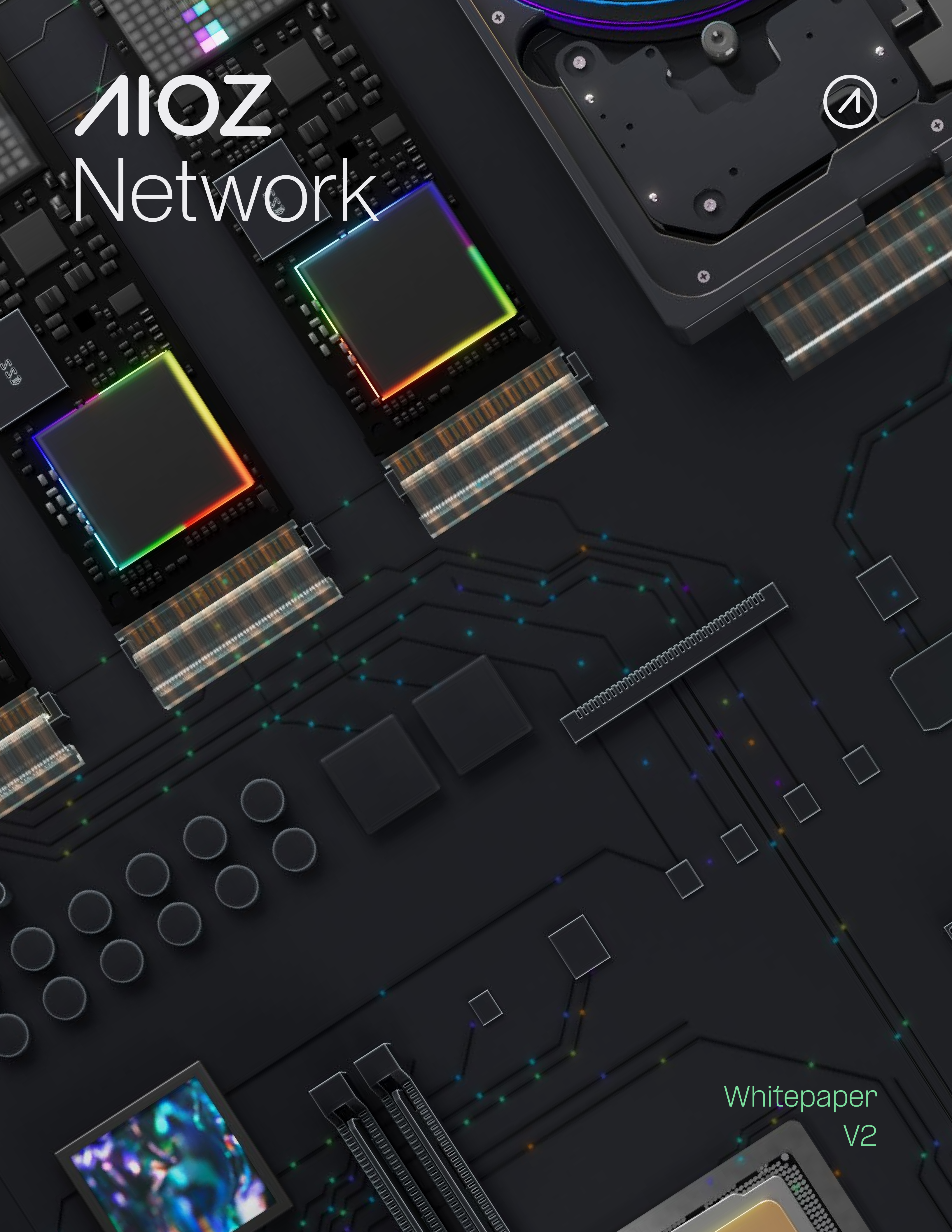
AIOZ Network

Whitepaper V2



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Executive Summary

OVERVIEW

AIOZ Network is a **vertically integrated DePIN Layer-1** that unifies decentralized storage (**AIOZ Storage**), content pinning/caching (**AIOZ Pin**), content delivery & streaming (**AIOZ Stream**), and AI inference orchestration (**AIOZ AI**) into a single, token-metered economy. Built on a **Cosmos-SDK Layer-1** with full EVM compatibility, AIOZ delivers scalable, censorship-resistant services with seamless interoperability between Web3-native and traditional ecosystems. The network is supported by **a global community of DePIN**.

Key Differentiators:

→ End-to-end DePIN stack: **Storage, Pinning, Streaming, and AI—integrated under one token, scheduler, and governance model.**

→ Privacy & verifiability: **client-side encryption and edge-level access controls; federated learning (FL), verification ML, and selective FHE for inference.**

→ Developer enablement: **Unified SDKs, a no-code dApp builder, composable APIs, and event-driven interoperability.**

→ Flexible monetization: **Native SVOD/TVOD/AVOD, tips, watch-to-earn, transparent revenue splits, and cross-dApp bundles.**

Strategic Roadmap:

→ Unified Task Ledger: **Single-contract orchestration across storage, delivery, pinning, and compute with verifiable work receipts.**

→ AI-assisted DevOps: **LLM-driven replication tuning, workload placement, anomaly detection, and auto-remediation.**

→ Data-to-Marketplace convergence: **Tokenized datasets with programmable royalties and consented dataset licensing for AI.**

→ Ecosystem scaling: **Decentralized dApp store, privacy-preserving analytics, and targeted grants to accelerate adoption.**

Impact Potential:

→ Cost efficiency: **Competitive unit economics vs. traditional internet service providers through distributed delivery and marketplace-priced resources.**

→ Resilience: **Geo-distributed redundancy and fault isolation reduce single points of failure; censorship resistance by design.**

→ Value creation: **Diversified revenue for creators, Edge DePIN, and developers via transparent, on-chain splits.**

Vision Statement

AIOZ's mission is to become the **global backbone for decentralized applications and services**—a user-owned, developer-driven, and economically sustainable ecosystem where value flows back to those who create and operate it.

1. Introduction

1.1 BACKGROUND: THE RISE OF DEPINS

Over the past decades, Decentralized Physical Infrastructure Networks (DePINs) have emerged as peer-to-peer systems where individuals contribute real-world resources (storage, bandwidth, compute, sensors, energy) and receive cryptographically verifiable rewards. AIOZ Network (video streaming, AI inference, and object storage) shows how incentives can crowd-source infrastructure that previously required multi-billion-dollar investments by hyperscalers.

Two converging trends accelerate this shift:

I. **Powerful, affordable edge hardware — consumer GPUs, ARM single-board computers, and NVMe SSDs now deliver data-center-class performance at the network edge.**

II. **Mature L1 building blocks — high-throughput, low-fee blockchains provide the programmable trust layer to meter contributions, settle micropayments, and penalize misbehavior.**

1.2 PROBLEM STATEMENT: LIMITATIONS OF CENTRALIZED CLOUDS

Despite their ubiquity, conventional clouds exhibit three structural drawbacks:

Cost inefficiency

As of 2025, Bandwidth is commonly priced at $0.05–$0.12 per GB and object storage at $0.02–$0.036 per GB-month, well above commodity hardware costs. Startups frequently cite egress as their largest operating expense. By contrast, AIOZ targets transparent, low unit economics via a DePIN-backed delivery mesh.

Single points of failure

Incidents at major providers show how misconfigurations or DDoS events can ripple across thousands of services at once.

Data sovereignty & censorship

Control concentrated in a politically sensitive jurisdiction enables geo-blocking, opaque de-platforming, and surveillance risks—counter to the ethos of Web3.

These issues motivate exploring DePIN alternatives that promise lower unit costs, higher fault tolerance, and stronger resistance to censorship.

1.3 RESEARCH OBJECTIVES & QUESTIONS

This study evaluates the thesis above using AIOZ Network's integrated storage, streaming, and AI layers. Each objective includes clear success criteria and baselines.

O1: Compare the **cost–performance envelope** of AIOZ services with web2 cloud providers under matched workloads, using cost per GB, cost per unit of AI work (e.g., per GFLOP or per 1k tokens), and a QoE-adjusted cost per stream.

O2: Analyze how **topology and incentives** affect reliability, latency, and throughput in a permissionless, geo-distributed environment, using real-world uptime and churn data from DePIN.

O3: Build a **proof-of-concept workload**—adaptive video streaming with edge-AI subtitle generation—and assess QoE: stall ratios under one percent, video quality within five VMAF points of baseline, TTFF within two seconds, and live latency near three seconds or less for at least ninety percent of sessions.

O4: Propose **governance and token-economic policies** that keep DePIN returns positive while preserving end-user affordability, validated through simulation and sensitivity analysis.

These objectives lead to the following research questions (RQs) and hypotheses (H):

→ **RQ1: How do DePIN storage and delivery costs scale with the number of participants and their geographic dispersion?**

- → H1: Unit costs decline sublinearly as participation grows due to smarter routing and adaptive redundancy.

→ **RQ2: What replication or erasure-coding settings are needed to achieve "nine-nines" (99.99%) object durability in an untrusted edge mesh?**

→ H2: With average DePIN uptime around 99%, either five replicas or a 10-of-14 erasure-coding scheme should meet the target under observed churn.

→ **RQ3: Which staking, slashing, and reward curves best encourage honest uptime and deter Sybil behavior?**

→ H3: A policy with stronger penalties for repeated faults and tiered reward multipliers for uptime above ninety-eight percent will increase honest throughput by fifteen percent or more in simulation.

1.4 SIGNIFICANCE & SCOPE

Academic relevance. This work contributes empirical evidence for large-scale, incentive-driven resource sharing—a topic often addressed only in simulation. Insights into multi-path routing, verifiable work, and token economics aim to inform future peer-to-peer protocol design.

Industry impact. Cloud spending exceeded $600 B in 2024. Even modest efficiency gains translate into billions in savings for media, AI, and IoT. Demonstrating production-grade DePIN performance could reshape CAPEX/OPEX planning for content platforms and edge-AI providers.

Scope delimitations. We focus on content-addressable storage, video delivery, and AI inference—the three workloads AIOZ currently supports. We do not cover DePIN energy grids or economic modeling beyond a five-year horizon. Regulatory considerations (e.g., GDPR, HIPAA) are discussed only insofar as they affect data locality and incentive design.

2. Literature & Technology Review

2.1 CENTRALIZED VS. DECENTRALIZED NETWORKS

Traditional cloud platforms concentrate storage, compute, and control in a few hyperscale datacentres. This model leads to:

→ **High infrastructure and egress costs**

→ **Single points of failure and outages**

→ **Opaque data monetisation**

→ **Geo-limited quality of service**

By contrast, Decentralized Physical Infrastructure Networks (DePINs) coordinate resources across many independent DePIN.

How DePINs work

→ **Crowd-source spare storage, GPU/CPU cycles, and bandwidth from thousands of DePINs, rewarding contributors with on-chain incentives**

→ **Shard, replicate, and route data and workloads over a peer-to-peer overlay, removing the need for monolithic datacentres and aligning ownership with contributors**

Resulting benefits

→ **Lower marginal cost**

→ **Stronger censorship resilience**

→ **Locality-aware latency that can equal or surpass centralised CDNs**

2.2 POSITIONING OF AIOZ AMONG LAYER–1S, DEPIN & AI COMPUTE NETWORKS

AIOZ Network occupies a unique position by combining Layer-1 blockchain functionality with a fully integrated DePIN service stack, enabling it to serve as a single point of access for multiple infrastructure primitives.

Layer-1 Design. A Cosmos-SDK chain with full EVM compatibility, enabling smart contract composability across both Ethereum-compatible and IBC-enabled ecosystems. This dual compatibility allows AIOZ to interoperate natively with a broad spectrum of DeFi, storage, and compute protocols.

Integrated DePIN Stack. Native runtime modules for Storage (AIOZ Storage), Content Delivery (AIOZ Stream), and AI Compute (AIOZ AI) operate over a global mesh of DePINs already running the AIOZ DePIN Application, consolidating infrastructure provisioning into one ecosystem.

Unified Token Economics. A single AIOZ token meters all core resources—storage- GB·months, transcoding-minutes, inference-GFLOPs, and bandwidth-GB—

while rewarding DePIN in proportion to verifiable work performed. This unified model eliminates the token fragmentation seen in single-service networks such as LPT, HNT, or RNDR.

Developer Experience. REST/gRPC APIs and multi-language SDKs expose the entire stack as "multi-cloud primitives" with built-in micropayments and event-driven integration. This significantly reduces the integration burden. In strategic terms, AIOZ functions as a vertically integrated "Web3 Internet Foundation" — delivering a one-stop, token-aligned infrastructure layer — while most contemporaries provide point solutions that must be manually composed to achieve similar breadth.

2.3 LARGE–SCALE FEDERATED & SWARM LEARNING

On the AI front, AIOZ AI is exploring Decentralized Federated Learning (DFL) techniques in which model updates—not raw data—may circulate between participants. Each DePIN could train locally encrypted gradients and periodically average them via a multigraph topology that aims to maximise throughput while helping to preserve privacy. Gradient aggregation is considered under a Decentralized Periodic Averaging SGD (DPA-SGD) schedule, with adaptive consensus weights that could down-rank unreliable peers. Swarm-style role fluidity is being studied, where any DePIN might switch between storing, routing, or computing depending on network conditions, thereby seeking to balance the "Storage–Delivery–Compute" triangle.

Compared with siloed FL systems, AIOZ's on-chain staking and slashing aim to introduce economic alignment against data poisoning, while homomorphic encryption of feature tensors is intended to help maintain GDPR-grade confidentiality during gradient exchange.

Collectively, these mechanisms suggest the potential that a community-owned network could train and serve state-of-the-art models at the edge without ceding data sovereignty—indicating a possible path toward sovereign, trust-minimised AI services.

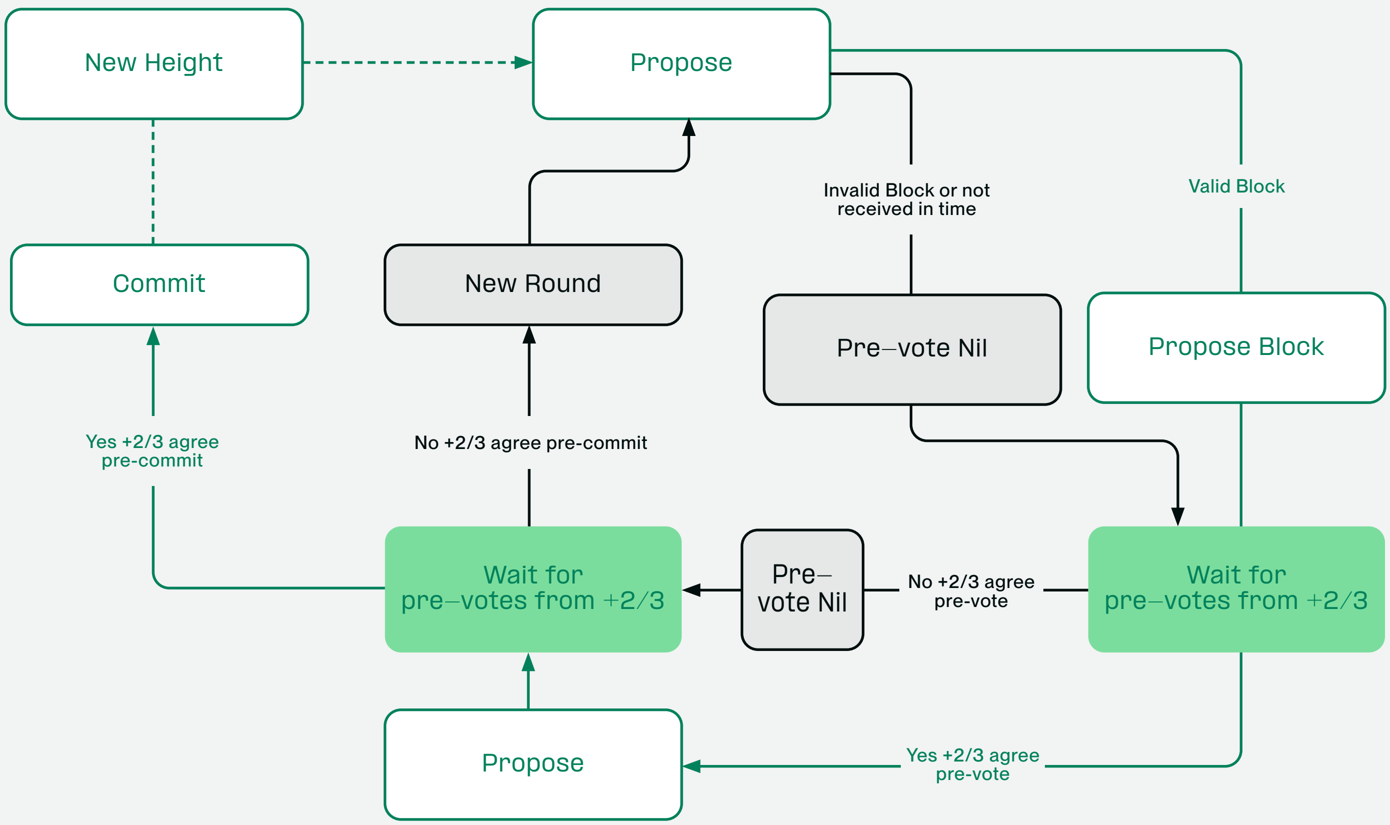
3. AIOZ Network Foundations

3.1 DELEGATED BYZANTINE FAULT TOLERANCE (DBFT)

What BFT means

In open networks some participants can be unreliable or malicious. Byzantine Fault Tolerance (BFT) is the property of still reaching agreement and making progress even when a minority misbehaves. In practice, this means the chain can keep producing correct blocks and avoid conflicting histories.

AIOZ Network dBFT



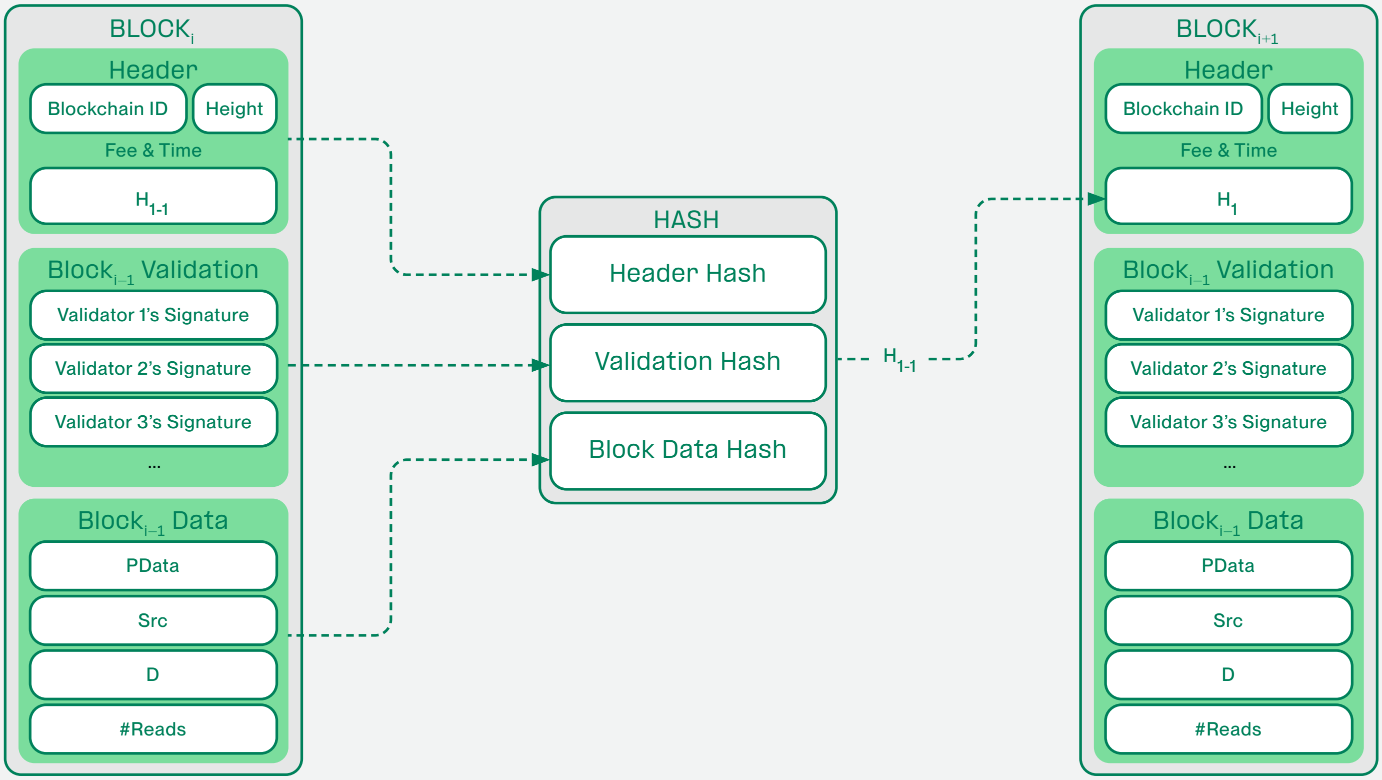
AIOZ uses Delegated BFT (dBFT) on top of CometBFT:

- Validators: propose and vote on blocks.
- Witnesses: relay transactions, replicate state, and serve the network, but do not vote. They can later become validators via delegation/election.

Why dBFT for AIOZ

- Deterministic finality: once a block is committed, it is final (no reorgs).
- Low-latency settlement: suitable for micro-payments and per-request metering (e.g., storage, delivery, inference).
- Light-client friendly: easy verification at edges, gateways, and over IBC.

How a block is decided



Consensus runs in *heights* and *rounds* with short timeouts:

I. Propose: a designated proposer suggests a block.

II. Prevote: validators signal whether the proposal looks valid.

III. Precommit: validators confirm their choice based on prevotes.

IV. Commit: if at least two-thirds of validator voting power signs the same block, it is finalized and the chain moves to the next height.

If a round fails (e.g., the proposer is offline), the next proposer takes over and the process repeats. Safety is preserved throughout.

What's inside a block

→ Header: basic metadata and cryptographic commitments (Merkle roots).

→ Transactions: ordered, verified actions from users and modules.

→ Last commit: validator signatures proving the previous block was finalized.

Rewards, slashing, and governance

→ Rewards: validators unlock rewards funded through fees and budgets when they participate correctly.

→ Slashing: misbehavior (e.g., double-signing) or extended downtime is penalized.

→ Parameters: timeouts, reward splits, and slashing rates are set on-chain and can be changed by governance.

Security in practice

Typical threats include malicious proposers, vote equivocation, network DoS, and key compromise. Mitigations include proposer rotation and timeouts, evidence handling with on-chain slashing, peer scoring and rate limits, and operational practices like unbonding delays.

What to monitor

Validators and witnesses expose metrics for block time, finality latency, and vote participation. Current p50/p95 figures and operational thresholds are summarized in the Appendix

3.2 TOKEN ECONOMICS

The **AIOZ** token aligns incentives across the network. It is the unit you pay with, the unit edges receive rewards, and the stake that secures the chain.

What the token does

→ Pay for services. **Storage, pinning, streaming/delivery, transcoding, and AI inference are paid in AIOZ.**

→ Reward real work. **DePIN contributors are rewarded with AIOZ tokens for verifiable work (e.g., proof of storage, proof of delivery, proof of transcode). The more reliable and higher quality their service, the greater the rewards.**

→ Route fees transparently. **Each payment is split on-chain between creators, edge DePIN, validators, and the protocol treasury. Programmatic burns permanently reduce supply.**

→ Secure the network. **Validators (and any staked coordinators) lock AIOZ to participate. Misbehavior (double-signing, fraud, prolonged downtime) is penalized; good performance is rewarded**

→ Fund growth. **The treasury receives a share of fees to support DePIN incentives, grants, R&D, and risk buffers. All movements are on-chain and auditable.**

Supply and inflation schedule

In blockchain networks, **inflation** refers to the controlled creation of new tokens over time. Inflation is necessary to:

→ Reward **validators and delegators who secure the network and process transactions.**

→ Fund the treasury **for grants, incentives, and ecosystem growth.**

→ Align incentives **so that more participants contribute resources (compute, storage, bandwidth) and keep the network robust.**

Without inflation, validator rewards would rely solely on transaction fees, which may be insufficient in the early stages of the network. Inflation ensures a sustainable economic model until transaction and service revenues are large enough to fully support the ecosystem.

The **initial annual inflation of AIOZ Network was 9%**, starting at mainnet launch. This rate gradually decreases by **1% each year** on December 25, until reaching the **long-term base target of 5% by 2026.** This ensures a balance: rewarding early participants strongly, while moving toward long-term sustainability with reduced inflationary pressure on supply.

AIOZ Inflation Reduction Schedule

Effective date	Annual inflation I_t	Note
Dec 25, 2023	8%	reduced from 9%
Dec 25, 2024	7%	reduced from 1%
Dec 25, 2025	6%	reduced from 1%
Dec 25, 2026	5%	long-term base target

Inflation and Minting Formula

→ M_t : Number of newly minted tokens in period ***t***.

→ $M_t = I_t \cdot S_t$

where:

I_t is the annual inflation rate in period *t*

S_t is the circulating supply at the start of period *t*

→ M_{val} : Validator and Delegator Rewards

$$M_{val} = 0.5 \cdot M_t$$

→ M_{tre} : Treasury Allocation

$$M_{tre} = 0.5 \cdot M_t$$

Programmatic burns

Token burns are tied to network activity:

→ 50 % **of all on-chain transaction fees (base+tips) are burned.**

→ 5 % **of all DePIN rewards are burned.**

→ 5 % **of all infrastructure revenues are burned.**

→ 5 % **of all AIOZ native dApp revenues are burned.**

Let F^{chain} denote total on-chain fees in period *t*, and R^{depin}, R^{infra}, R^{dapp} the respective revenue-bases. The burn amount is

$B_t = 0.50\ F^{chain} + 0.05\ R^{depin} + 0.05\ R^{infra} + 0.05\ R^{dapp}$, and net supply change is $\Delta S_t = M_t - B_t$.

Operator experience

At the end of each period, DePIN receive:

→ a summary of work proved (bytes delivered, tasks completed, uptime),

→ a quality score (e.g., latency/reliability),

→ the resulting payout from the edges' pool.

Why this is sustainable

More usage drives more fees and burns; more rewards attract more (and better) DePINs; better DePINs improve quality and capacity; better service attracts more users. This flywheel benefits creators, viewers, edge DePIN, and developers.

3.3 SECURITY & PRIVACY MODEL

On-chain security. dBFT preserves safety with up to f < 1 Byzantine validators while maintaining liveness under partial synchrony. Each block commits Merkle roots for application state; light clients verify headers and proofs for efficient, trust-minimized reads and IBC relaying.

Transport security. Control-plane and receipt channels use authenticated key exchange (e.g., X25519) to derive per-session keys; content is encrypted at rest and in flight (e.g., AES-GCM). Rate-limit tokens protect API surfaces.

Privacy-preserving compute. Today: client-side encryption, access control (ACL/ABAC), and optional attested execution for sensitive inference. Roadmap: federated learning for on-device training, verification ML, and selective FHE for narrow DePIN where performance permits. All privacy features are opt-in and accompanied by cost/latency disclosures.

Threat model overview. We consider (i) malicious edges (drop/forge data, fake work), (ii) Sybils, (iii) censoring or unstable coordinators, and (iv) network partitions. Mitigations map as: VWRs + slashing (i), staking + reputation decay + admission control (ii), multi-coordinator failover with replayable queues (iii), and adaptive redundancy / erasure coding across fault domains (iv).

3.4 PAYMENTS

Account Model

Each participant interacts through an AIOZ Account that reflects a spendable balance used across Storage, Pin, Stream, and AI services. These balances are maintained within a unified interface for ease of use, and all financial activity — such as credits, debits, settlements, splits, refunds, and token burns — is transparently recorded and enforced on the AIOZ Network.

The system architecture allows balances to be independently verified and reconciled on-chain, aligning operational efficiency with decentralized accountability.

Funding Paths

To minimize onboarding friction while preserving decentralization, the network supports two complementary ways to add funds:

→ **Direct AIOZ Top-Up.** Users who already hold AIOZ on the AIOZ Network can credit their account in a single step.

→ **External On-Ramp Integration.** Users may fund their account through third-party on-ramps that facilitate conversions from fiat currencies or external crypto assets. These services handle the exchange into AIOZ and deposit the resulting tokens onto the AIOZ Network. Users experience a unified top-up flow with transparent quotes and all-in fees.

Note: All fiat-related transactions are handled by regulated third-party providers. AIOZ does not directly process fiat payments or act as a financial intermediary.

Both paths converge on the same outcome: an updated on-chain balance available to pay for services.

User Experience

→ **Frictionless onboarding.** New users can fund without prior token holdings; crypto-native users retain a direct path.

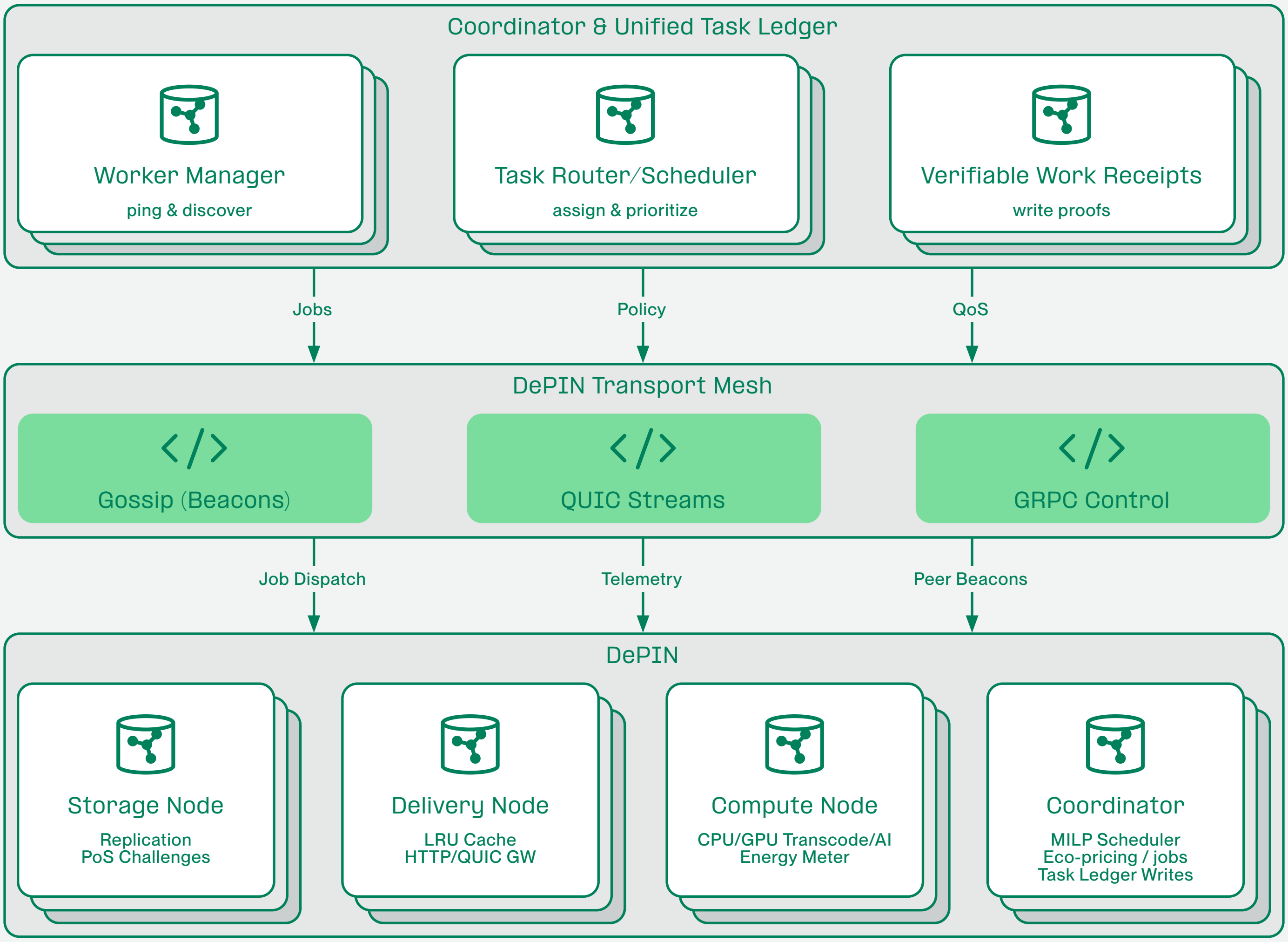
→ **Fee transparency.** Quotes disclose what will be credited and the full cost of conversion and transfer before confirmation.

→ **Receipts that matter.** Each settlement emits on-chain references that users and integrators can reconcile against their own ledgers.

4. AIOZ DePIN Architecture

4.1 ROLES & RESPONSIBILITIES

AIOZ Network DePIN Architecture



DePIN. Individual devices (PCs, laptops, home servers) that contribute spare CPU/GPU cycles, storage, and bandwidth to the network. AIOZ tokens are rewarded proportionally to two factors: their raw resource contribution and their task-completion rate. An Edge can opt into one or more roles—transcoding, storing, or delivering video/AI segments. Persistent non-compliance leads to payment slashing or permanent removal.

Content Owners & Viewers. COs upload assets and fund storage/compute contracts; viewers request segments, sign delivery receipts, and potentially receive watch-to-earn rewards

4.2 PROOF SYSTEMS (PoT, PoS, PoD)

Goals. Soundness (honest work passes), fraud detection (cheating is caught), and liveness (honest DePIN settles on time).

Key knobs.

→ **Challenge rate.** How many random checks we do per period/job; higher for high-value tasks or low reputation.

→ **Samples per segment (PoT).** How many frames we compare.

→ **Receipt window (PoD).** How long a delivery receipt is valid before it's considered stale.

Proof of Transcoding (PoT).

Transcoding converts source video into multiple renditions to match device and network constraints (e.g., H.265/AV1/H.264/VP9). High-efficiency compression reduces storage and egress while maintaining perceptual quality. Because transcoding occurs on untrusted Edges, the network must verify that each output segment faithfully represents the source and conforms to the requested profile.

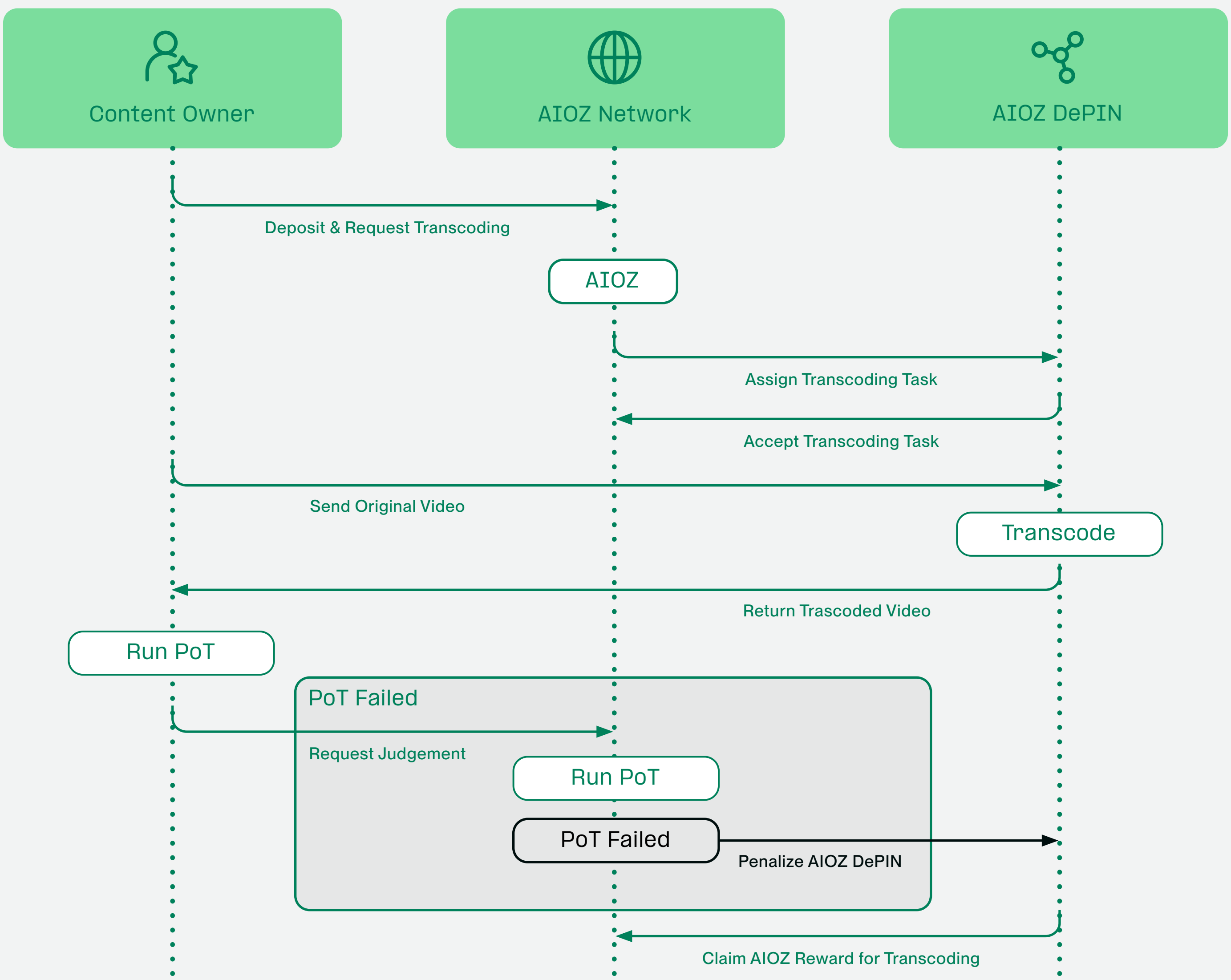
Task assignment & storage lifecycle

I. Request & funding. Content Owners (COs) submit a transcode job and escrow payment to AIOZ Network.

II. Scheduling. The AIOZ Network selects eligible Edge DePIN based on capability and reputation. Edges may accept/decline specific segments.

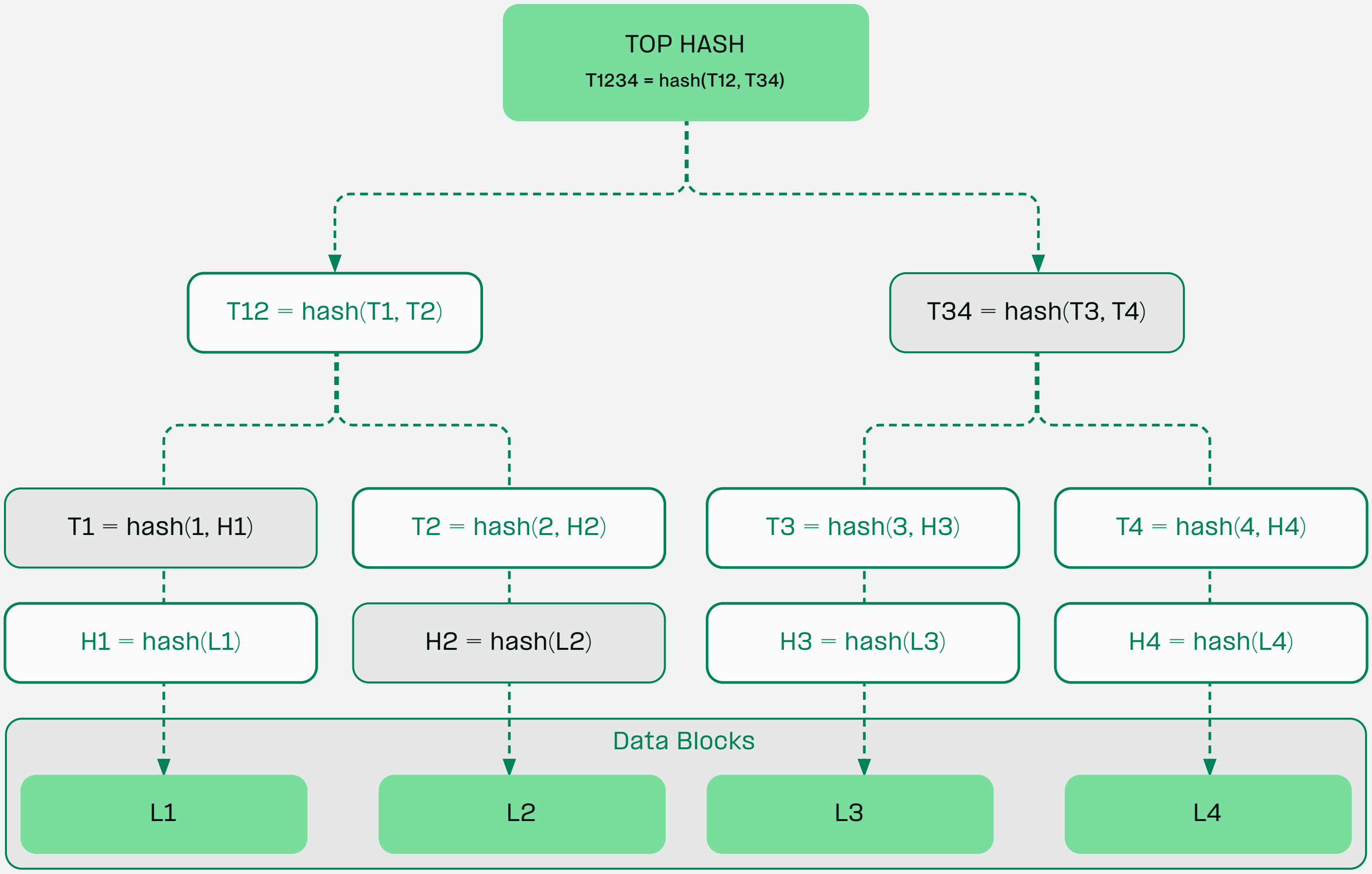
III. Ingest. COs upload segment(s) to the chosen Edge(s).

IV. Output & retention. When verification passes, original and transcoded segments may be stored on Edges under a **time-to-live (TTL)** policy; expired segments are garbage-collected. If verification fails, the job (or failing parts) is reassigned.



Verification protocol

PoT is a lightweight, randomized audit that compares each transcoded segment V2 against its source V1 while checking strict profile compliance.



Proof of Storage (PoS)

Storing data segments on untrusted Edges risks loss, tampering, or corruption. Before any segment is delivered, AIOZ DePIN verify the **entirety and integrity** of the segment using a Merkle-tree scheme that minimizes bandwidth.

Each data segment is partitioned into fixed-size blocks. A Merkle tree is built over these blocks; the **TOP HASH** (Merkle root) uniquely commits to the segment's content. To prevent forgery:

→ The AIOZ Network computes and records the TOP HASH before assigning the storage task (rather than accepting a hash computed by the Edge).

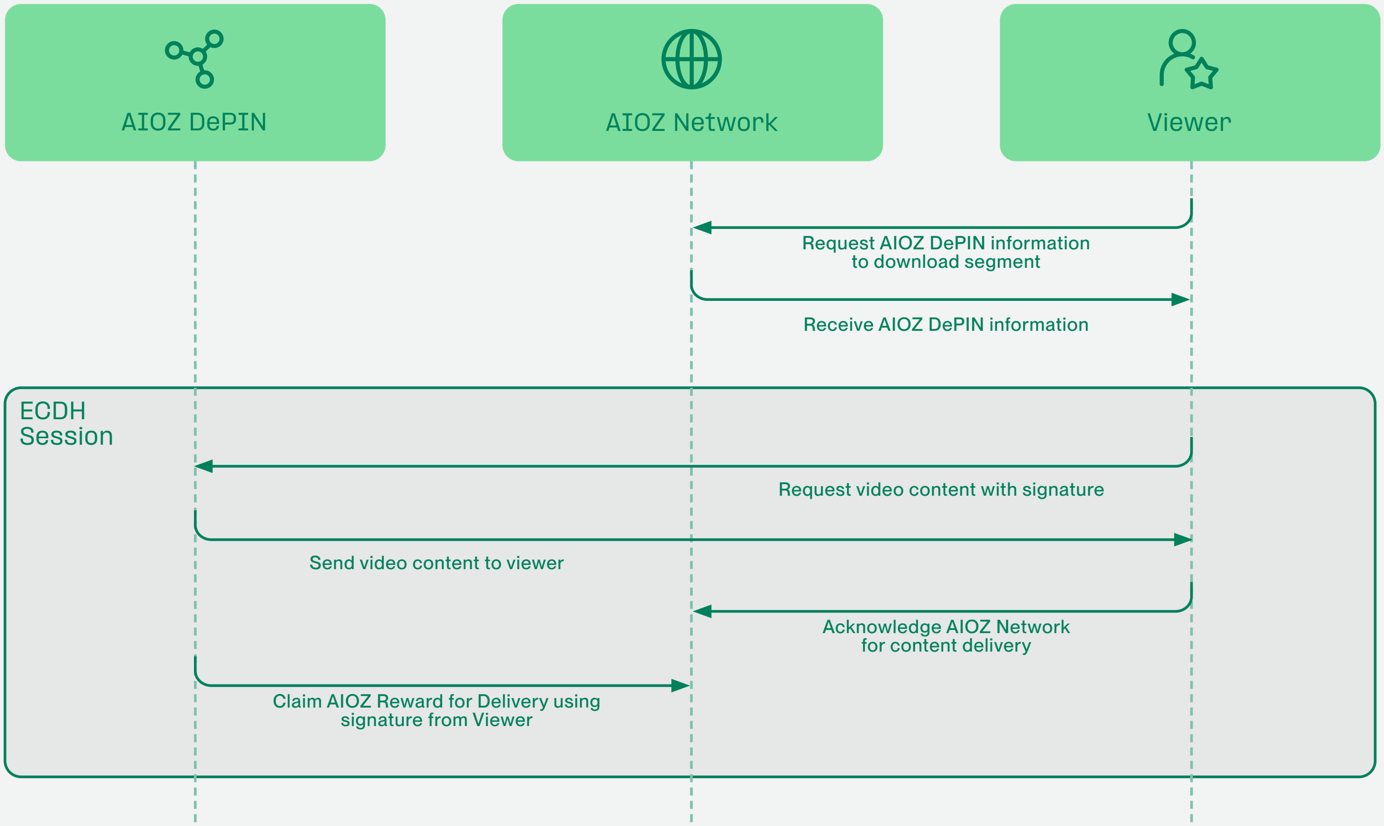
→ During audits, the AIOZ Network issues randomized challenges for hashes (and, when required, data samples) at varying block indices and depths.

→ The Edge must respond within a deadline; late, missing, or invalid responses fail the check.

Why Merkle proofs? Comparing a small set of hashes—rather than entire files—substantially reduces network overhead while retaining strong detection: any modification, reordering, or deletion in the segment changes the TOP HASH.

Proof of Delivery (PoD).

Rewarding delivery requires cryptographic evidence that **a real viewer** requested and received specific segments, while preventing replay and fake-traffic fraud.



Flow.

I. The viewer requests content from AIOZ Network.

II. If approved, the AIOZ Network routes the viewer to an appropriate Edge that stores the segment.

III. The viewer and Edge establish a secure session (ECDH/X25519).

IV. For each delivered segment, the viewer issues a digitally signed receipt bound to: stream/segment IDs, sequence number, timestamp, and a unique nonce.

V. Edges redeem receipts with the AIOZ Network to claim rewards.

Security properties.

Confidentiality & integrity: session keys protect control/data channels; content remains encrypted at rest and in flight.

Anti-replay: nonces and short receipt windows invalidate duplicates and stale claims.

Auditability: receipts are batched; aggregated hashes (e.g., a Merkle root of receipts) are anchored to the Task Ledger for independent verification.

4.3 RESEARCH OBJECTIVES & QUESTIONS

Building on the above mechanisms, this thesis asks:

RQ1: How does the frequency and sample size of PoT/PoS audits affect detection latency versus network overhead?

RQ2: What minimum redundancy factor R yields > 99.999999% object durability under empirical Edge churn models?

RQ3: Can adaptive trust weights (based on real-time reputation scores) raise DePIN throughput by > 15%?

RQ4: Which incentive curve parameters (wRC, wTCR) maximise protocol revenue while keeping Edge ROI positive?

DePIN reputation and task-allocation policies are already earmarked as future R&D priorities, highlighting the practical relevance of these questions

4.4 RESOURCE ECONOMY & REPUTATION

Edge rewards are computed as $R_{NR} = (w_{RC} \cdot RC + w_{TCR} \cdot TCR) \times RR$, where RC is the weighted resource-contribution vector and TCR the task-completion rate. All rewards settle in AIOZ, the same token used by creators and viewers, closing the economic loop.

To maintain service quality, AIOZ Networks maintains a Reputation Score derived from uptime, audit outcomes, and historical SLA breaches; high scores unlock priority tasks and bonus multipliers, whereas repeated infractions lower score and eventually eject the DePIN.

5. AIOZ Infrastructure Layer

5.1 AIOZ STORAGE

AIOZ Storage is a decentralized object store built on the AIOZ Network's DePIN. It provides familiar, S3-compatible buckets and keys so existing tools and SDKs work out of the box. The goal is fast, reliable, and cost-efficient storage for Web3 and AI workloads without relying on a single provider.

What it provides.

→ Decentralized & resilient — Data is split and placed across independent edge DePIN and regions to avoid single points of failure.

→ S3-compatible — Works with standard clients, libraries, and pipelines (upload, list, get, presigned URLs).

→ Cost-efficient — Uses a distributed supply of capacity to lower total cost versus centralized clouds.

→ Scalable on demand — Capacity grows as new DePIN joins; no manual sharding or re-architecting.

→ Privacy & access — Client-side encryption and edge-level access controls.

Typical use cases.

→ Storing models, datasets, and checkpoints for AI/ML pipelines.

→ Powering decentralized marketplaces for models and data.

→ Backing content delivery and media workflows in Web3 dApps.

5.2 AIOZ PIN

AIOZ Pin is a decentralized IPFS pinning and gateway layer focused on cacheability and creator control. It runs on the AIOZ Network's DePIN, keeping content online and tamper-evident via content IDs (CIDs) while serving it over stable HTTPS endpoints.

What it provides.

→ Decentralized pinning — Persist files and folders on IPFS so they remain available even if other peers drop copies.

→ Gateway-as-a-Service — dApps whitelist a dependable HTTPS domain (or custom domain) yet still benefit from P2P redundancy.

→ Media optimization — On-the-fly image optimization (format, resolution, color profile) before propagation for faster loads.

→ Creator controls — Manage pin sets, versions, and access rules; optional allowlists at the gateway.

→ Integrity by design — CIDs make content immutable and tamper-evident.

Typical use cases.

→ NFT assets and metadata that must stay resolvable long-term.

→ Web3 game art, levels, and downloadable content.

→ dApp frontends, static sites, and media libraries served via a stable gateway.

5.3 AIOZ STREAM

→ AIOZ Stream is a live and on-demand video layer built on the AIOZ Network's DePIN. It uses peer-to-peer delivery and an AI-assisted ABR engine to maximize quality per token while keeping latency and costs low for creators, enterprises, and dApps.

What it provides.

→ DePIN + P2P delivery — Viewers are served from nearby DePIN for scale, resilience, and lower egress.

→ AI-driven ABR — Segment-by-segment bitrate selection tuned to device and network conditions.

→ Protocol compatibility — Works with standard HLS and MPEG-DASH pipelines and players.

→ On-chain monetization — Subscription Video on Demand (SVOD), Transactional Video on Demand (TVOD), and Ad-Supported Video on Demand (AVOD) translate into composable on-chain primitives—subscriptions, pay-per-view, and advertising.

→ Revenue sharing — Real-time auctions for AVOD and automatic splits to creators, edge DePIN, and optional viewer incentives.

→ Ecosystem integration — First-class hooks into AIOZ Storage and AIOZ AI for ingest, indexing, and workflow automation.

Typical use cases.

→ Live events, esports, and interactive streams need low latency.

→ Over-The-Top content library and long-form VOD with subscription or pay-per-view.

→ User-Generated-Content dApps that want on-chain monetization and P2P scale.

5.4 AIOZ AI

AIOZ AI is a decentralized AI compute layer on the AIOZ Network's DePIN. It lets developers and creators run inference, host models and datasets, and participate in an on-chain AI marketplace—without relying on a single provider.

What it envisions providing:

→ Routing & task manager — Continuously balances storage, delivery, and compute for cost, latency, and reliability.

→ Decentralized compute — Jobs run on independent edge DePIN; capacity scales as new DePIN participate.

→ Model & dataset marketplace — Publish, discover, and monetize models, datasets, and inference APIs.

→ Privacy & control — Client-side encryption, access control, and optional attestation for sensitive workloads.

→ Token incentives — Pay-per-inference and transparent fee splits; contributors are rewarded for verified work.

→ Ecosystem integration — First-class hooks into AIOZ Storage (assets, embeddings) and AIOZ Stream (video AI).

How it works

→ Publish a model/dataset or select a hosted one from the marketplace.

→ Define runtime and requirements (e.g., GPU/CPU, memory, region).

→ The scheduler assigns DePIN based on latency, cost, and reputation.

→ DePIN execute; receipts are verified; results are returned to your app.

→ Payouts and reputation update automatically on-chain.

Typical use cases.

→ Low-latency inference APIs for LLMs, vision, and speech.

→ RAG pipelines with embeddings stored in AIOZ Storage.

→ Video understanding for AIOZ Stream (captioning, moderation, search).

→ Monetizing proprietary models and curated datasets.

5.5 CROSS–LAYER DESIGN PRINCIPLES

VI. **Edge-first topology: every micro-service executes as close to the end-user as possible, minimising backbone transit and congestion.**

VII. **Programmable economics: a unified staking/reward model secures storage integrity, streaming QoE, and AI task accuracy with a single token.**

VIII. **Composable APIs: developers mix layers (e.g. pin an AI-generated model artefact, then stream inference results) via a common SDK.**

IX. **Self-optimising intelligence: telemetry from the AI router flows back into Storage, Pin and Stream, closing the optimisation loop and raising network efficiency.**

6. AIOZ dApp Layer

The AIOZ dApp Layer is the user-centric frontier of the network. By exposing the underlying DePIN services (Storage, Stream, Pin, AI) through standardized primitives, it enables a composable and economically aligned application ecosystem.

6.1 CROSS–dApp ARCHITECTURE

Unified Identity & Wallet. Every account is anchored by an ECDSA wallet; JWTs signed by the wallet provide SSO, payment authorization, and on-chain permissioning with a single credential.

Vector-First Data Model. All assets (images, video, documents, AI artefacts) can be emitted as embeddings stored in a distributed vector bucket for semantic search, RAG, and cross dApp recommendations.

Event-Driven Protocols. A global on-chain event bus composes workflows from immutable, auditable events (e.g., payment confirmations; rentals emit ad-coupon events).

Shared Token Primitives. Reusable contracts for SVOD/TVOD, micro-payments ensure consistent economic behavior across dApps.

6.2 dApp DEVELOPMENT FRAMEWORK

SDKs, CLI, and Templates. Multi-language SDKs (TypeScript, Python, Go, Rust) and boilerplates abstract chain complexity so builders focus on product logic.

UI/UX Component Library. AIOZ Theme supplies React/Vue components and design tokens for cohesive, accessible interfaces.

Multi-Platform Deployment. Unified APIs target Web, mobile, and desktop; platform shims handle storage, streaming, and wallet interactions.

No-Code Builder. A drag-and-drop studio that leverages the above primitives:

→ **Account integration (cross-chain auth, payments, referrals) out of the box.**

→ **DePIN back-ends (storage, streaming, AI) selectable in one click.**

→ **AI-assisted smart contracts with LLM-generated code and auto-audit suggestions.**

→ **Marketplace modules for tokenized storefronts, subscriptions, and tipping.**

→ **Real-time analytics with privacy-preserving usage, spend, and QoS dashboards.**

6.3 PROGRAMMABLE INTEROPERABILITY

Composable Smart Contracts. Contracts can invoke/extend others (e.g., an NFT mint launches an exclusive live stream by calling a pre-deployed SVOD contract and allocating storage).

On-Chain Event Subscriptions. Third parties subscribe to granular events via smart contracts or off-chain webhooks to enable loyalty rewards, moderation, and analytics.

6.4 MONETIZATION

Native micro-transactions & subscriptions. Deterministic, low-fee payments support one-off purchases, real-time PPV, and flexible recurring plans; payment streams can auto-swap through the on-chain DEX.

Cross-dApp bundles & access passes. Tiered access across services via NFT day passes, season passes, and time-locked SBTs—spanning use cases from enterprise seats to education discounts.

6.5 OPEN API & THIRD–PARTY INTEGRATION

Universal API Gateway. Files, payments, AI inference, and event streams are exposed via REST/gRPC for external SaaS, bots, and enterprise systems.

Programmable Webhooks. Customizable webhooks connect on-chain events to = email/SMS—bridging blockchain logic with traditional workflows.

6.6 ECOSYSTEM GROWTH & APP DISCOVERY

Decentralized dApp Store. A reputation-weighted registry for discovering, rating, and reviewing audited dApps; badges (e.g., featured, high-uptime) improve trust and navigation.

Privacy-Preserving Analytics. Aggregated metrics (growth, retention, volume) inform developer dashboards and protocol governance to guide incentives and upgrades.

7. Risks & Mitigation

While the AIOZ Network is designed for scalability, resilience, and long-term sustainability, several risks must be considered. This section outlines the key categories of risk and the strategies in place to mitigate them.

7.1 TECHNICAL RISKS

→ DePIN Churn and Availability – DePIN may join or leave the network unpredictably, impacting performance and reliability. Mitigation: Implement redundancy in storage and delivery, maintain reputation scoring for DePIN, and prioritise tasks for high-uptime.

→ Security Threats – Risks include Sybil attacks, data tampering, or malicious computation. Mitigation: Use cryptographic proofs for storage, delivery, and compute; enforce staking and slashing penalties; conduct regular security audits, and isolate untrusted workloads in sandboxed containerized environments to reduce blast radius and contain malicious activity.

→ Scalability Bottlenecks – High transaction or workload spikes may affect latency or throughput. Mitigation: Optimise routing, introduce load balancing across DePIN, and expand infrastructure in high-demand regions.

7.2 ECONOMIC RISKS

→ Token Price Volatility – Large fluctuations in the value of AIOZ can affect DePIN incentives and user costs. Mitigation: Enable stablecoin payment options, dynamically adjust reward rates, and diversify treasury holdings.

→ Liquidity Constraints – Low market liquidity could limit onboarding for large-scale partners. Mitigation: Allocate treasury funds for liquidity provisioning and incentivise long-term staking.

7.3 REGULATORY RISKS

→ Compliance Requirements – Data residency laws, KYC/AML rules, and content regulations may vary by jurisdiction. Mitigation: Provide optional region-specific DePIN selection, partner with compliant service providers, and adapt governance to new regulations.

→ Token Classification Changes – Future legal frameworks may alter the classification of AIOZ tokens. Mitigation: Maintain legal reviews in all major operating regions and adjust token mechanics if required.

By identifying and actively addressing these risks, the AIOZ Network aims to remain robust, adaptable, and capable of delivering on its vision even in the face of technical, economic, or regulatory challenges.

8. Conclusion

8.1 VISION AND FUTURE DIRECTION

AIOZ Network represents a bold step toward redefining the future of decentralized infrastructure. By combining storage, pinning, streaming, and AI compute within a unified, token-driven ecosystem, it offers a scalable and resilient alternative to traditional cloud platforms. Its vision is centered on building an open, censorship-resistant, and community-governed environment that places developers, creators, and users at the heart of the value chain.

Through its DePIN architecture, seamless SDKs and APIs, AI-powered optimization, and an AI-assisted no-code development studio, AIOZ Network empowers a new generation of applications and services while enhancing privacy, accessibility, and performance. The platform is built to challenge centralized incumbents while continuously evolving through community feedback, technological advancement, and open governance.

As global demand for scalable, intelligent, and cost-efficient infrastructure grows, AIOZ Network is positioned to lead the transition toward a decentralized and AI-enabled internet, creating long-term value across technical, economic, and societal dimensions.

8.2 CALL–TO–ACTION

The success of AIOZ Network depends on the collective efforts of a vibrant, engaged community. We invite all stakeholders to contribute to the ecosystem's continued growth and innovation:

→ Developers: **Build and integrate the next generation of decentralized applications with access to multi-service infrastructure, AI-driven tools, and no-code development options.**

→ Content Creators: **Embrace ownership and fair monetization, enhanced by AI-powered features such as automated subtitles, translations, and recommendations.**

→ DePIN Contributors: **Support the backbone of AIOZ Network by contributing resources for storage, delivery, transcoding, and AI compute— tokenized rewards for verifiable work.**

→ Validators: **Operate secure, high-uptime validators to propose and vote on blocks, ensure deterministic finality, and safeguard network integrity; receiving rewards and help steer upgrades through on-chain governance.**

→ Stakers/Delegators: **Strengthen security by delegating AIOZ to reputable validators; receive a share of validation rewards, participate in governance, and promote best practices via delegated voting.**

→ Enterprises: **Deploy scalable, compliant, and AI-optimized solutions across media, analytics, IoT, and other data-intensive industries.**

→ Investors and Partners: **Join a transformative mission to reshape digital infrastructure through decentralization, AI integration, transparency, and community ownership.**

Together, we can reshape the future of the internet—toward a decentralized, intelligent, and creator-first ecosystem. The time to build is now.

Appendix

KEY TERMS & DEFINITIONS

AIOZ Network A decentralized infrastructure layer that supports applications such as streaming, AI, storage, and computation, utilizing DePIN resources powered by blockchain.

dBFT (delegated Byzantine Fault Tolerance) BFT consensus with deterministic finality and validator sets selected via delegation; suitable for low-latency micro-payments and metering.

IBC (Inter-Blockchain Communication) An interoperability protocol for trust-minimized packet transfer between Cosmos chains.

Smart Contract A self-executing program on the blockchain that facilitates and enforces agreements without intermediaries.

Tokenomics The economic model governing the use, distribution, and incentives of the AIOZ token within the platform.

DePIN (Decentralized Physical Infrastructure Network) A model in which physical infrastructure services (e.g., bandwidth, compute, storage) are provided by a decentralized network of individual contributors.

AIOZ AI Decentralized AI inference/marketplace and orchestration on DePIN; pay-per-inference with verifiable work and model/dataset hosting.

AIOZ Pin Decentralized IPFS pinning, managed gateways (public/premium), image optimization, and APIs/SDKs.

AIOZ Storage S3-compatible object storage on AIOZ DePIN; distributed placement, client-side encryption, developer-friendly tooling.

AIOZ Stream A decentralized video streaming platform built on the AIOZ Network, designed to deliver low-latency, high-quality content through peer-to-peer architecture.

PoS (Proof of Storage) Periodic chunk challenges to prove custody/availability of objects.

PoD (Proof of Delivery) Aggregated, nonce-bound segment receipts attesting to delivered bytes/segments.

PoT (Proof of Transcoding) Spot-checks of output frames/profiles to verify declared codec/bitrate/compliance.

HLS (HTTP Live Streaming) HTTP-based adaptive bitrate streaming communications protocol.

VMAF(Video Multimethod Assessment Fusion) Perceptual video quality metric used in QoE modeling/monitoring.

ABR (Adaptive Bitrate Streaming) A streaming technique in which the video quality automatically adjusts in real time based on the viewer's device and network conditions.

SDK (Software Development Kit) A toolkit for developers to integrate the functionality of AIOZ Stream into third-party applications and services.

NFT (Non-Fungible Token) A unique digital asset that can represent ownership of video content, licenses, metadata, or other streaming-related rights.

CID (Content Identifier) IPFS hash that makes objects immutable/tamper-evident across gateways.

LLM (Large language model) A language model trained with self-supervised machine learning on a vast amount of text, designed for natural language processing tasks, especially language generation.

Related Resources

For more detailed information and technical implementation guidance, see the following resources.

AIOZ Network Technical Specifications:

https://aioz.network/develop

In-depth guide to AIOZ's blockchain, DePIN stack, SDKs, and wallet integration.

GitHub Repository:

https://github.com/AIOZNetwork

Source code, SDK modules, smart contracts, and contributions.

AIOZ Storage:

https://aiozstorage.network/docs

S3-compatible APIs, usage guides, and SDKs (JS/Go/Python/CLI).

AIOZ Pin:

https://aiozpin.network/docs

Pinning APIs, public/premium gateways, tutorials.

AIOZ Stream:

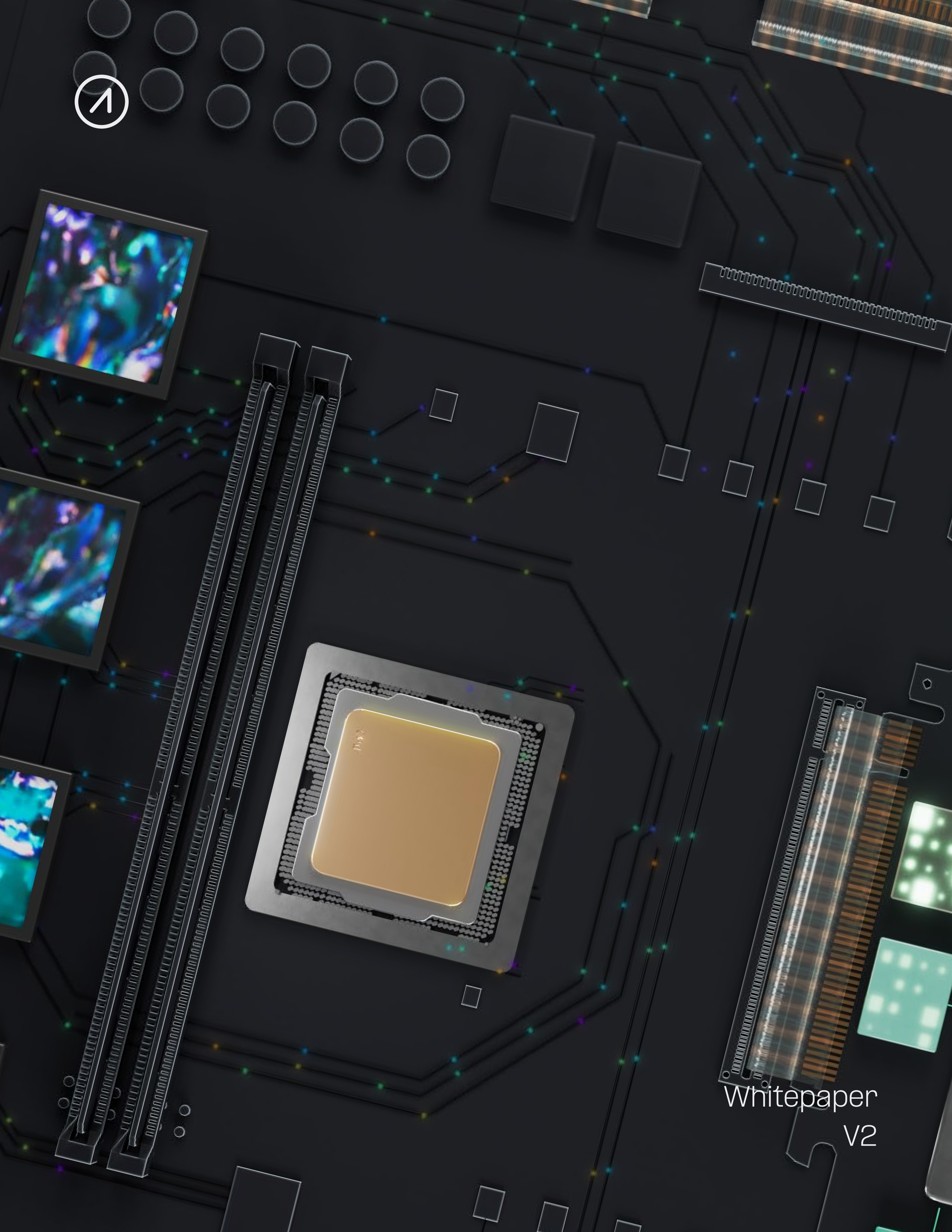
https://aiozstream.network/docs

Streaming APIs, HLS/DASH integration, upload/transcode workflows, monetization primitives

AIOZ AI:

https://aiozai.network/docs

Model/dataset hosting, scheduler & marketplace docs


Whitepaper
V2