

# IPPAN: Immutable Proof & Availability Network

## Whitepaper (Brief Version)

### ■ Abstract

IPPAN (Immutable Proof & Availability Network) is a decentralized, energy-efficient blockchain designed to deliver ultra-high throughput (1–10M TPS), deterministic ordering, and global availability across diverse devices. It introduces HashTimer™, a cryptographically verifiable timestamping mechanism, enabling precise chronological ordering of all transactions and blocks. IPPAN combines BlockDAG scalability with a Fair Byzantine Agreement (FBA) consensus model, ensuring resilience, interoperability, and future-proof integration for machine-to-machine (M2M) and financial applications.

### ■ Key Features

- HashTimer™ Ordering - Deterministic, cryptographically verifiable network time. Orders all blocks, transactions, and rounds with microsecond precision.
- BlockDAG Consensus with FBA - Scales to millions of transactions per second. Finality achieved in 100–250 ms through parallel rounds.
- Lightweight Mining & Rewards - Daily mining limits ensure fairness and energy efficiency. Optional “Mining as a Service” for enterprises.
- Human-Readable Domains & Addresses - Payable addresses in the format @alice.ipn. Domain system with premium TLDs (.ipn, .cyborg, .iot, .m).
- IPPAN Time - Median-based synchronization across nodes. Accurate to 100 ms; embedded in every transaction and block.
- Global Peer Discovery - Robust DHT (libp2p), NAT traversal, and mDNS auto-discovery. Designed to survive extreme disruptions.
- Storage & File Availability - Nodes index both transactions and user files. File hashes anchored by HashTimer™, acting as unique IDs.

### ■ Architecture

- Consensus Layer: BlockDAG + FBA validator scheduling.
- Execution Layer: Deterministic transaction ordering via HashTimer.
- Networking Layer: libp2p with auto-discovery, DHT replication, and micro-cost flood protection.
- Identity Layer: Ed25519 key pairs, Base58i encoding, human-readable domains.
- Incentive Layer: Block reward split — 20% to verifier, 80% distributed among validators.

### ■ Use Cases

- Financial Systems: Real-time settlement with deterministic audit trails.
- IoT & M2M Payments: Microtransactions between devices with minimal energy cost.
- Data Provenance & Compliance: Cryptographically verifiable logs for regulators.
- Global Availability Network: Decentralized DNS-like service with payment capabilities.

### ■ Vision

IPPAN is designed to be the backbone of decentralized availability and verifiable time. With its deterministic HashTimer and scalable BlockDAG, it bridges financial, industrial, and AI-driven ecosystems — enabling a

future where machines, people, and institutions transact securely and instantly at planetary scale.