State of Crypto, AI and DePIN in 2025

Raghav Lathi

April 30, 2025

Abstract :

This report explores the evolving landscape of Cryptocurrency, Artificial Intelligence (AI), and Decentralized Physical Infrastructure Networks (DePIN) as of 2025. It highlights major players, emerging opportunities, ongoing challenges, and outlines recent developments with future outlooks.

1 Introduction

Decentralized Physical Infrastructure Networks (DePINs) represent a transformative intersection between blockchain incentives and real-world infrastructure. One way to think of DePINs is as a global, community-owned "Internet of Infrastructure," where anyone can operate a node — from a hotspot to a solar panel, and get rewarded whereas others can use those services. [2]

Six primary sectors define DePIN activity today: **compute**, **wireless**, **network**, **sensors**, **energy**, and **logistics**. Compute DePINs provide decentralized cloud services; wireless projects crowdsource telecom infrastructure; network DePINs enhance internet accessibility; sensors decentralize data collection from the physical world; energy DePINs build distributed renewable grids; logistics DePINs track supply chains transparently. [1]

Fueling this growth is the rising demand from AI, which requires vast amounts of compute, storage, and bandwidth. DePINs offer decentralized, scalable alternatives to tech monopolies, supporting AI systems with diverse, resilient infrastructures. Despite this momentum, DePIN remains in its earliest innings, with less than 0.1% market share of the over $1 trillion traditional infrastructure markets [1].

2 Key Projects/Players

2.1 Crypto Foundations

Solana leads in network infrastructure while Base leads in consumer and marketplaces. Solana's latency-focused culture attracts innovators at the infra layer, while Coinbase's brand and retail distribution attracts consumer-focused founders to Base. [3]

2.2 DePIN Leaders

- **Helium**: Builds decentralized wireless networks.
- **IoTeX**: Enables secure machine-to-machine data exchanges.
- **Filecoin**: Provides decentralized storage critical for DePIN and AI applications.

2.3 AI x DePIN Innovations

- **Bittensor**: A decentralized machine learning marketplace.
- **Dawn**: Supports peer-to-peer networking for AI agents.

Tokens like $HNT (Helium), $DIMO, or $IOTX (IoTeX) are not just speculative assets; they are infrastructure enablers. They reward users for powering physical infrastructure, validate sensor data, and grant governance rights. Also, FIT21 offers a path to clarity, exempting utility tokens from the stricter laws. [4]

But uncertainty remains. If a DePIN token is deemed a security, it could limit exchange listings, restrict U.S. user access, and trigger extensive compliance burdens, especially for early-stage projects with small teams.

3 Opportunities and Challenges

3.1 Opportunities

- **Open Infrastructure Ownership**: Anyone can contribute and earn.
- **Decentralized Resource Access**: AI can access compute and data through DePIN networks.
- **Smart Energy Grids**: Communities can trade renewable energy using blockchain.
- **Smart Cities**: Decentralized IoT management for traffic, pollution, and energy control [2].

DePIN primitives like *proof-of-location* are helping scale networks faster.

3.2 Challenges

While DePIN offers transformative potential, several barriers must be addressed [1]:

- **Scalability and Network Efficiency**: As DePIN networks grow, transaction congestion and latency can increase, making it critical to enhance throughput without compromising reliability.
- **Interoperability**: Different DePIN systems must seamlessly integrate and exchange resources. Without standardized protocols, isolated networks risk reducing the broader potential of decentralized infrastructure.
- **Security and Privacy**: Although blockchain ensures security, the distributed nature of DePIN creates vulnerabilities. Strong encryption and privacy-preserving technologies are needed, especially for sensitive sectors like healthcare and finance.

4 Recent News and Future Outlook

4.1 2024 Trends

The DePIN sector expanded significantly, surpassing 1,170 live projects. AI-integrated DePINs like Bittensor saw a major increase in node participation and validator activity. Venture firms such as Multicoin Capital and Andreessen Horowitz (a16z) deployed significant capital into DePIN-AI hybrid projects. With $50B of market cap across 350 tokens, the DePIN sector traded at 100x ARR. [3].

4.2 Future Outlook

In the near future, AI agents and DePIN-connected devices are expected to drive most network interactions. Agents (bots) are already the most active users of public blockchains. Crypto users natively understand the potential of onchain agents after years of competing with sandwich/MEV bots for trade execution, sniper bots for NFT mints, etc. [3]. Moreover, governments are piloting DePINs to enhance national digital sovereignty, as seen in Tanzania's collaboration with Threefold. [3]

The most immediate and tangible impact of DePIN will be felt in our cities and industries.Smart cities require seamless integration of countless sensors, real-time data processing, and reliable communication networks. Traditional centralized infrastructure struggles with this complexity, but DePIN offers a scalable and efficient solution. [5]

The DePIN sector's market cap has exceeded $15 billion, with projections reaching over $40 billion by 2026. Despite obstacles, the convergence of AI, crypto, and DePIN has laid the groundwork for a decentralized infrastructure revolution poised to reshape industries worldwide. [5]

References

[1] Z. Lin and T. Wang, "(DePIN): Challenges and Opportunities," *Arxiv*, 2024. [Online]. Available: Arxiv

[2] Mark C. Ballandies and Hongyang Wang, "Decentralized AI Infrastructure," *IEEE Xplore*, 2024. [Online]. Available: IEEE Xplore

[3] D. Blame and S. Gala, "State of DePIN 2024," *Messari Report*, 2024. [Online]. Available: Messari

[4] K. Aslam, "State of US DePIN Regulation," *IoTeX Report*, 2025. [Online]. Available: IoTeX

[5] DePIN Hub, "5 Bold DePIN Predictions That Will Shape 2025," *DePIN Hub Report*, 2025. [Online]. Available: dePIN Hub