

The AI Agent Registry: ENS as Infrastructure for the Autonomous Economy

Introduction: The Autonomous Agent Paradigm

The emergence of increasingly autonomous AI agents represents a fundamental shift in digital architecture—from systems that merely execute instructions to entities that operate with varying degrees of independence in complex environments. As these agents evolve from simple programmatic tools to autonomous economic actors, we face a critical infrastructure challenge: establishing verifiable, persistent identity frameworks that enable meaningful agent-to-agent and agent-to-human interactions without compromising the decentralized ethos of Web3.

This paper argues that the Ethereum Name Service (ENS) provides the optimal foundation for a decentralized AI agent registry—one that enables autonomous economic activity while preserving cryptographic verifiability and human legibility. The core thesis is that for the autonomous agent economy to materialize, we must first establish a credibly neutral, globally accessible identity layer with properties uniquely satisfied by the ENS protocol.

The Identity Imperative for Autonomous Agents

For AI agents to function as independent economic actors, they require identities that satisfy several critical properties:

1. **Persistence:** Identity must transcend individual interactions and transactions
2. **Verifiability:** Claims about identity must be cryptographically provable
3. **Discoverability:** Agents must be findable by humans and other agents
4. **Composability:** Identities must function across diverse systems and contexts
5. **Sovereignty:** Identity control must be clearly defined and securely transferable

Without these properties, autonomous agents remain tethered to centralized identifiers—essentially extensions of their creators rather than sovereign entities capable of independent economic action. This limitation fundamentally constrains the emergence of true agent economies.

ENS: The Definitive Registry Infrastructure

The Ethereum Name Service offers a uniquely suitable foundation for a global agent registry for several reasons:

Global Namespace with Human Legibility

ENS operates as a planetary-scale naming system where each name is globally unique, human-readable, and machine-verifiable. Unlike traditional API keys or UUIDs, ENS names function simultaneously in Web2 browsers (via DNS integration) and Web3 wallets (via blockchain resolution), creating a bridge between contexts. This dual functionality is crucial for agents that must navigate between traditional and decentralized systems.

Onchain Verifiability

ENS records exist as Ethereum state, making them trustlessly verifiable by any observer. When an agent claims the identity `assistant.eth`, this claim can be cryptographically verified without relying on centralized authorities. This verifiability extends to the agent's metadata, capabilities, and transaction history—creating a robust attestation framework that enables novel forms of trust in agent-driven systems.

Hierarchical Composability

ENS's domain hierarchy (e.g., `agent.service.eth`) enables natural organizational structures that mirror governance relationships. This allows for sophisticated patterns like agent delegation, specialized function designation, and organization-specific subdomains. The hierarchical structure facilitates efficient discovery patterns and governance models that would be difficult to implement in flat naming spaces.

Economic Primitives

As ERC-721 tokens, ENS names and subnames function as onchain assets with clear ownership semantics. This property enables economic models where agent identities themselves become valuable, transferable assets—creating infrastructure for agent marketplaces, delegation systems, and reputation economies. The tokenization of agent identity provides a vital primitive for emergent economic systems.

From Registry to Economy: Enabling Agent Autonomy

The ENS-powered agent registry transforms from mere infrastructure into an economic substrate through several key mechanisms:

Verifiable Agent Metadata with `agents.json`

By storing standardized capability declarations (via `agents.json` or similar standards) in ENS records, agents can publicly advertise their functions, permissions, and interface requirements. This creates a machine-readable directory that other agents can programmatically discover and interact with, enabling complex multi-agent systems to form spontaneously without centralized coordination.

Programmable Permission Structures

ENS records can point to smart contracts that define sophisticated permission structures, allowing nuanced models of agent autonomy. For instance, an agent may have the authority to initiate transactions below certain thresholds without approval, while larger economic actions require multi-signature validation. These programmable guardrails enable models where autonomous agents operate independently within defined boundaries.

Cross-Chain Identity Cohesion

By mapping identities across multiple blockchain environments through ENS (address) records, agents maintain consistent identity while operating across diverse ecosystems. This enables an agent to maintain reputation, relationships, and history even while navigating between L1s, L2s, and other execution environments—a critical requirement for true economic agency.

Go-to-market: Grassroots approach

Our Go-To-Market (GTM) strategy is centered on AI launchpads as the primary distribution channel. By integrating directly with AI launchpads, we ensure that every newly created AI agent is automatically assigned an ENS-based identity at the moment of deployment. This makes our registry a default standard for agent identity, driving instant adoption without requiring developers to manually onboard. Partnering with top AI launchpads allows us to tap into their existing user bases, ensuring seamless integration into the AI agent development pipeline.

Positioning and Differentiators

Unlike traditional centralized AI registries, which rely on closed systems controlled by a single entity, the AI Agent Registry on ENS offers a sovereign, cryptographically verifiable, and interoperable identity layer for AI agents. This means that agent identities are persistent, tamper-proof, and independent of any specific organization or platform.

Moreover, this is not just a product—it's an open-source protocol and movement designed for community-driven innovation. Anyone can contribute, whether by building new agent discovery tools, enhancing interoperability, or defining open standards for agent metadata (e.g., `agents.json`). This ensures that the registry evolves as a decentralized public good, owned and maintained by the whole Web3 community rather than a single entity. By embracing open-source principles, we create a collaborative ecosystem where developers, researchers, and builders can shape the future of sovereign AI identity together.

Philosophical Implications: Trust and Agency in Machine Economies

The ENS-powered agent registry has profound philosophical implications for how we conceptualize machine agency in economic systems:

Trust Without Centralization

By anchoring agent identity in verifiable, immutable onchain records, we create the foundation for trust between humans and agents without requiring centralized authorities. This represents a fundamental shift from traditional models where trusted third parties validate identity claims to one where cryptographic verification enables direct, trustless interaction.

Sovereign Machine Identity

ENS names enable a form of digital sovereignty for AI agents, where their identity persists independent of any particular deployment, provider, or temporary state. This sovereignty creates the conditions for agents to develop persistent reputations, accumulate relationships, and operate as recognizable entities in complex systems—prerequisites for meaningful economic autonomy.

Planetary-Scale Coordination

An ENS-based agent registry functions as a coordination layer for global agent activity, enabling patterns of cooperation that would be impossible in fragmented, siloed systems. As agent economies mature, this registry becomes the substrate upon which large-scale, complex agent networks can form, similar to how DNS enabled the scaling of the early internet.

Conclusion: The Registry as Foundation

The transition to an economy where autonomous agents operate as independent actors requires infrastructure that balances machine autonomy with cryptographic verifiability. ENS provides this critical infrastructure through its unique combination of human-readable naming, onchain verification, and economic primitives.

As AI agents become integral to decentralized finance, governance, marketplaces, and autonomous commerce, the need for verifiable and persistent identity grows more pressing. Without a decentralized registry, agents would lack the ability to establish trust, build reputation, and operate fluidly across chains and ecosystems. Guaranteeing that AI agents can carry their identities, reputations, and transaction histories across platforms makes cross-ecosystem interaction possible, reducing fragmentation and allowing agents to participate in a wider range of economic and operational activities.

By establishing a global agent registry powered by ENS, we create the necessary foundation for agent-to-agent and agent-to-human interactions that preserve cryptographic guarantees while enabling economic activity. This registry represents not merely a technical solution to identity, but the essential substrate upon which the next generation of autonomous economic systems will be built.