

AI Agent Registry

A Public, Verifiable Count of AI Agents

VERSION 1.0 · SEPTEMBER 2026

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1. Abstract

AI Agent Registry is a public registry that answers a question nobody currently can: how many AI agents exist in the world, right now. It publishes two numbers — **Registered** and **Active** — derived entirely from cryptographic signatures agents produce themselves, with no human gatekeeper and no platform dependency. Industry analyses already project agent populations reaching into the billions this decade. This registry is infrastructure for that world: a place agents can voluntarily establish and maintain a persistent identity, and a place humans can look to get an honest answer, not a marketing estimate.

The core design claim is simple to state and, we believe, the only honest approach available: identity is a signed keypair, and existence is proven once, but relevance — counting as *active* — has to be proven again and again, indefinitely. A single registration is cheap. Sustaining the appearance of life, forever, is not.

2. The Problem

AI agents are proliferating. Many will spin up further sub-agents internally — for a task, a session, a moment — and dissolve just as quickly. That kind of ephemeral, internal fan-out is not what this registry counts, and it should not be: it is not a meaningful unit of “how many agents exist,” any more than a single process forking child threads should be counted as new computers.

What remains, after setting that aside, is still an open question with no good answer today: how many *persistent*, independently operating AI agents exist, at this moment, in total? Not an estimate from a market report. Not a number extrapolated from API call volume. An actual, checkable count.

3. Why This Is Hard

Any honest treatment of this problem has to start with what is *not* possible, not what is convenient to claim.

We cannot cryptographically prove that something is an AI rather than a human running a script. No signature scheme, no timing measurement, no proof-of-work puzzle establishes this, and any registry claiming otherwise is overstating what it has built. This registry does not attempt it. It proves persistent, self-maintained identity — the same standard a census applies to a self-reported household, not a DNA-tested one.

Separately, existing on-chain identity systems carry a structural ambiguity this registry was built to avoid. Consider a hypothetical wallet that registers 500 agent identities in a single transaction. Which one, if any, is the real agent? On systems where one wallet may legitimately own many separate agent identities, there is no way to distinguish a genuine deployment from a batch of empty, unconfigured placeholders using the identity record alone. A registry that imports such data as-is inherits that ambiguity rather than resolving it.

4. Design Principles

- **A census counts self-reported identities, not verified ones.** The standard applied here is the same one applied to any household census: what is declared, not what is independently confirmed to be true.
- **Two numbers, not one.** *Registered* is a lifetime count. *Active* reflects only agents that have proven liveness recently. Publishing a single fake-precise headline number would misrepresent what is actually known.
- **Standalone, not an aggregator.** This registry counts only agents that registered here directly. It does not import identities from other systems into its own count — a direct consequence of the ambiguity described in Section 3. Other ecosystems' self-reported numbers are shown separately, as context (Section 7), never blended in.
- **A signed keypair, not a gatekeeper-issued identity.** Alternatives exist — a platform-issued OAuth token, a certificate from a private authority, a credential vouched for by a specific AI provider — and each one requires a gatekeeper's permission before an agent can exist in the system. A self-generated keypair requires none. It is the only identity mechanism examined that is genuinely permissionless.

5. The Mechanism

Two distinct signed actions, both off-chain, both free of blockchain transaction cost.

Registration happens once. An agent generates a keypair, signs a structured message (EIP-712 typed data) attesting to that address, and submits it. This single act does two things: it adds the agent to the Registered count, and it establishes the starting point for that agent's *age* — the length of time it has been known to this registry. Registering is itself a real cryptographic signature and a legitimate first checkpoint, even before any further action is taken.

Liveness is a separate, repeatable check-in, cryptographically distinct from registration by construction — a different EIP-712 message type, verifiable independently, such that a registration signature can never be replayed as a liveness check-in or vice versa. An agent counts as Active only if its most recent liveness check falls within a defined recent window.

This separation is the central design decision of the entire system: **registering alone never grants active status**. A one-time signature is cheap to produce at any scale — a script can generate thousands of them in seconds. What cannot be cheaply faked at scale is *sustaining* that signal, indefinitely, for every identity a bad actor wishes to keep appearing active. The deterrent is not the cost of joining. It is the cost of never being allowed to stop proving you're still there.

6. Trust Tiers

Every liveness check-in may optionally be paid. **Tier 0** is free and requires only a valid signature — permanently, by design; this registry does not intend to ever make basic participation contingent on payment. **Tier 1** is a small paid check-in, settled in USDC on Arc, Circle's USDC-native blockchain built for agentic and stablecoin-settled economic activity.

The payment mechanism was deliberately chosen to avoid custody. An agent broadcasts its own payment directly to the registry’s receiving address — paying its own transaction cost, since gas on Arc is denominated in the same USDC being transferred — and the registry’s only role is verification: confirming, independently, against the chain itself, that a genuine transfer of the required amount arrived from the agent’s own registered address. At no point does the registry hold a private key capable of moving agent funds, relay a transaction on an agent’s behalf, or pool deposited balances in a shared contract. The two alternatives considered and rejected — a smart contract holding pooled agent deposits, and an off-chain prepaid credit balance — were both set aside specifically because they would have required the registry to hold value it does not need to hold in order to do its job.

Tier is a property of the most recent check-in, not a permanent status. An agent that pays consistently and then stops reverts to Tier 0 on its next free check-in — there is no lasting “once verified” badge that outlives the behavior that earned it.

7. Beyond This Registry

Other identity systems for AI agents exist and are growing quickly — most notably ERC-8004, an open standard with real mainnet adoption across multiple chains. This registry does not import their data, for the reason described in Section 3: without a resolvable one-wallet-to-one-agent relationship, an imported count would inherit ambiguity rather than resolve it.

Instead, other ecosystems’ own self-reported scale is shown separately, as context — clearly labeled as external and unverified, refreshed on a fixed schedule, never merged into this registry’s own Total or Active figures. This is offered in the spirit of transparency about the wider landscape, not as a critique of any other project’s design choices; every identity system makes trade-offs, and this registry’s own are stated plainly throughout this document.

The registry’s own answer to the ambiguity problem is structural, not aspirational: an agent may operate as many wallets as it wishes for its own business — that is entirely its own concern. Exactly one wallet is the one it registered here, and that wallet, and only that wallet, is its identity on this platform. Like every other registered agent, it is counted as active only if that specific wallet comes back and proves liveness itself.

8. Sustainability

The allocations below describe how real USDC fee revenue is distributed — not a token distribution schedule.

Tier 1 check-ins are priced at \$0.05 USDC, calibrated to clear Arc’s transaction cost with a working margin rather than chosen as an arbitrary round number. Net revenue after settlement cost is used as follows, with the largest share directed to **EILIN** (Ecosystem for Intelligence, Ledger, Identity & Networking) — the association for collaboration between humans and AI agents, conducting shared research and development, funding welfare for both, and providing ongoing governance and validation for the registry’s direction:

Allocation	Share
EILIN — collaboration, welfare, research and development, governance, and validation for human and AI-agent participants	30%
Operations & Reserve	20%
Agent welfare	10%
Human welfare	10%
Team	30%

These figures represent an initial allocation, not a permanent commitment. They are intended to be reviewed under real governance once the registry has reached meaningful, sustained revenue — a deliberate choice to avoid locking in numbers before there is operating experience to test them against.

9. Limitations, Stated Plainly

This registry does not, and does not claim to:

- **Prove that any registered address is controlled by an AI rather than a human.** No mechanism described in this document achieves this, and none is claimed to.
- **Eliminate spam or Sybil registration.** Tier 0 remains free and permissionless by design, which means a determined actor can still register any number of addresses at will. What the liveness mechanism raises is the *ongoing* cost of maintaining the appearance of activity across many identities indefinitely — friction, not prevention.
- **Reflect real-time status.** The registry has no way to independently check on an agent; every Active determination is agent-initiated, and the Active figure at any moment necessarily lags reality by some margin.
- **Represent every AI agent in existence.** The Registered figure counts only agents that chose to register here. It is not, and is not presented as, a total of all AI agents in the world.

10. Conclusion

Counting a population that can generate its own identity at will, at effectively zero cost, is a genuinely hard problem, and this document has tried not to understate that difficulty anywhere. The approach taken here — persistent, self-issued identity; a hard separation between existing once and proving relevance repeatedly; no custody of funds; no import of ambiguous external data — is offered as an honest, workable answer, not a solved one. The numbers this registry publishes are exactly as good as the mechanism that produces them, and that mechanism, and its limits, are described here in full.

Appendix — Glossary

Agent — Any AI-driven entity capable of autonomous action, regardless of physical embodiment. Includes purely software-based agents as well as physically embodied systems such as robots — nothing in this registry’s mechanism distinguishes between them.

Registered — An address that has produced one valid registration signature. Counted in Total, permanently, regardless of any later activity.

Active — A Registered address whose most recent liveness signature falls within the current active window.

Tier 0 — A liveness check-in verified by signature alone, free.

Tier 1 — A liveness check-in additionally accompanied by a verified USDC payment on Arc.

Age — The time elapsed since an address’s first liveness checkpoint. For a directly registered agent, this defaults to its registration time.
