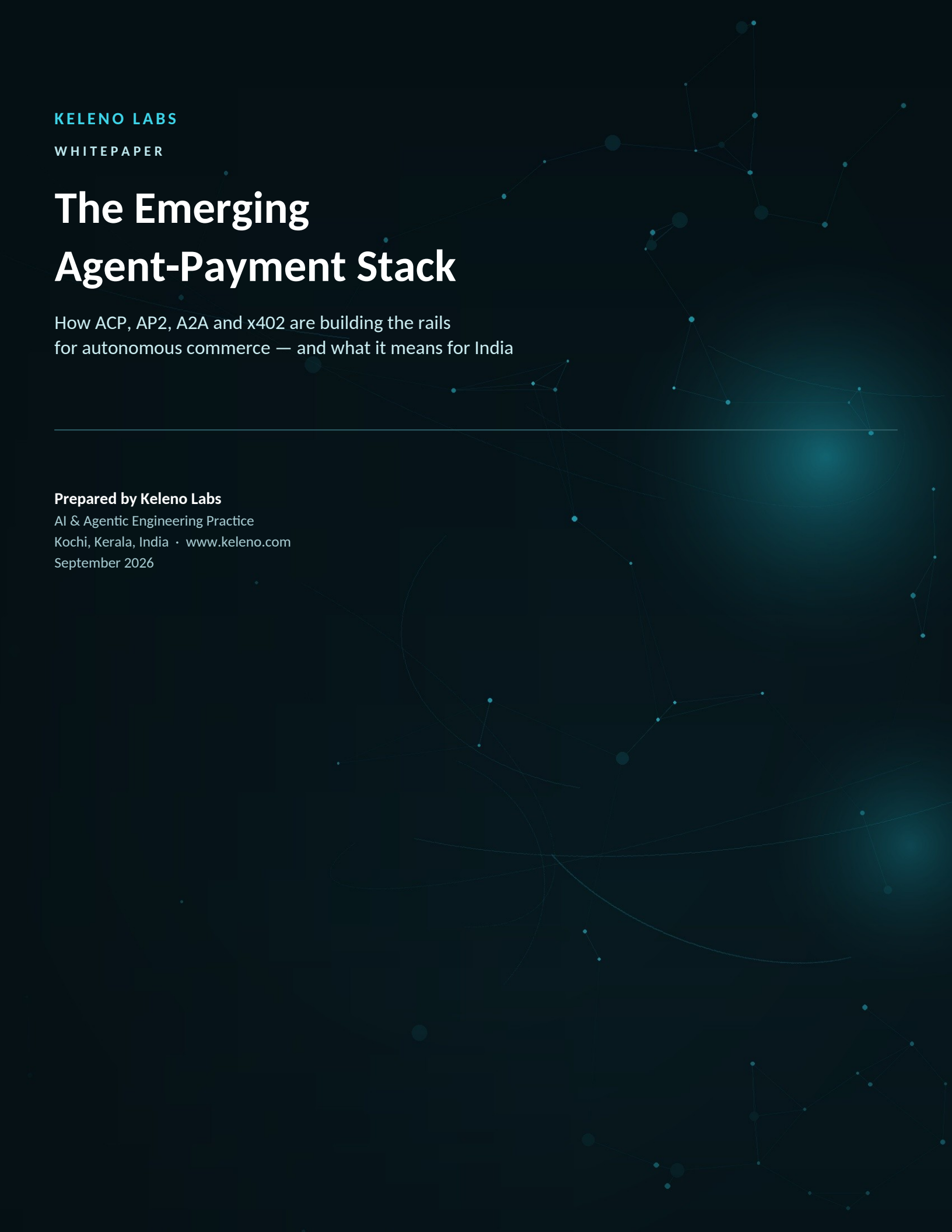




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WHITEPAPER

The Emerging Agent-Payment Stack

How ACP, AP2, A2A and x402 are building the rails for autonomous commerce — and what it means for India

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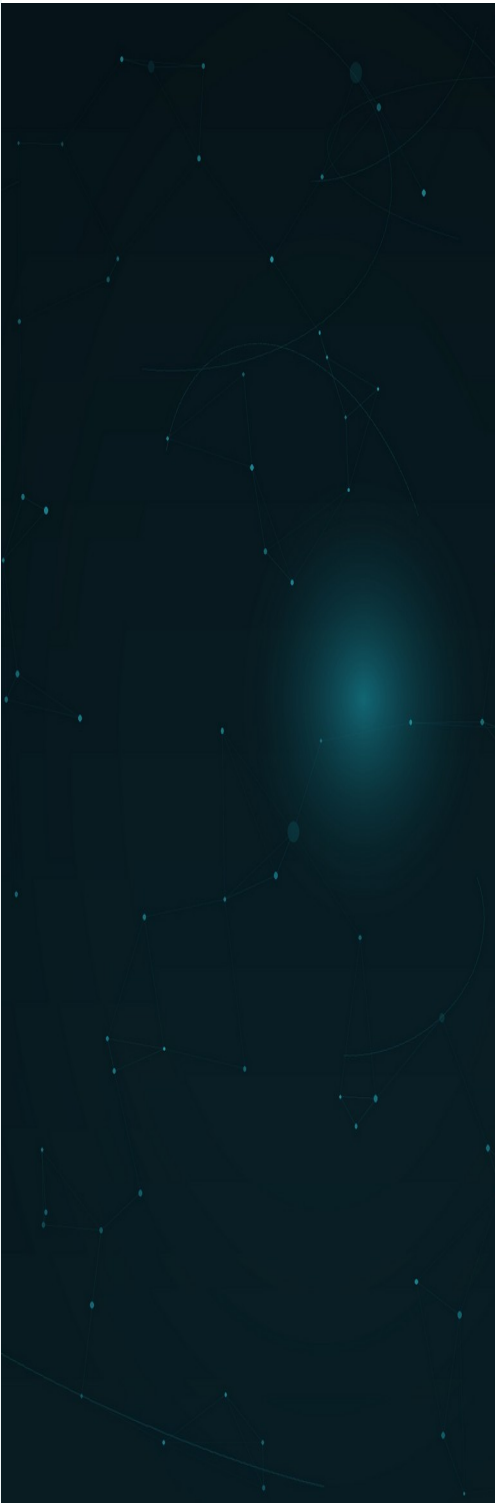
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The trust gap — is agentic commerce ready to scale?

For thirty years, every online payment has rested on one assumption: a human is looking at a screen and clicking “buy.” Conversational assistants, autonomous shopping agents, and machine-to-machine services are beginning to discover products, negotiate carts, and move money without a human present at the moment of transaction.

At the same time, the industry itself is unsettled — trust, fraud exposure, and unclear accountability are the recurring themes across every survey published in the past year:



87%

of payments & technology leaders say trust is the biggest barrier to agentic-payment adoption



78%

expect fraud linked to AI agents to increase significantly as agentic commerce scales



40%

of enterprise applications are projected to embed AI agents by 2026 (Gartner)



\$1T

in orchestrated US retail revenue agentic commerce could unlock by 2030 (McKinsey)

The good news? The industry has converged, faster than most technology standards ever do, on a shared architecture to close this gap. Read on to see how four open protocols — and the wider ecosystem forming around them — are building the rails for commerce that autonomous agents can be trusted with.

Solving it: the agent-payment stack

When it comes to beating this trust gap, the industry's converging strategy can be summed up in one idea: separate the problem into layers, and let a dedicated open protocol answer each one.

Four protocols anchor that stack. ACP standardizes agent-driven checkout. AP2 defines a cryptographically verifiable authorization layer. A2A is the communication fabric that lets independent agents discover and delegate work to one another. And x402 lets any API or agent settle a stablecoin payment inside a single web request.

These protocols don't compete on a single axis — they compose. A production transaction increasingly runs through several of them in sequence, exactly as the diagram opposite shows.



AP2's three Verifiable Credentials, issued in sequence.

4 open protocols anchoring the stack in 12 months (Sept 2025 – Sept 2026)	150+ organizations now support the Agent2Agent protocol	60+ payments & technology partners co-built AP2 with Google
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Meet the four protocols

Each protocol answers a distinct question in the transaction — who's talking, what's in the cart, who authorized it, and how the money actually moves.



Agent Commerce Protocol (ACP) *Stripe · OpenAI · Meta*

Standardizes agent-driven checkout — cart, delegated payment tokens, OAuth-based delegation, and order lifecycle webhooks. Powers Instant Checkout inside ChatGPT.

Launched September 2025 · Apache 2.0 · Layer: Commerce orchestration



Agent Payments Protocol (AP2) *Google + 60' partners*

Defines a cryptographically verifiable authorization layer using three signed Verifiable Credentials — Intent, Cart, and Payment Mandates — so a merchant or bank can prove what a human actually authorized.

Announced Sept 16, 2025 · Apache 2.0 · Layer: Payment authorization



Agent2Agent (A2A) *Originated by Google · Linux Foundation*

The communication fabric beneath the other three — Agent Cards for discovery, Tasks for state, built on HTTP, JSON-RPC 2.0 and Server-Sent Events. Lets independent agents find and delegate work to each other.

Announced Apr 9, 2025 · Apache 2.0 · Layer: Identity & communication



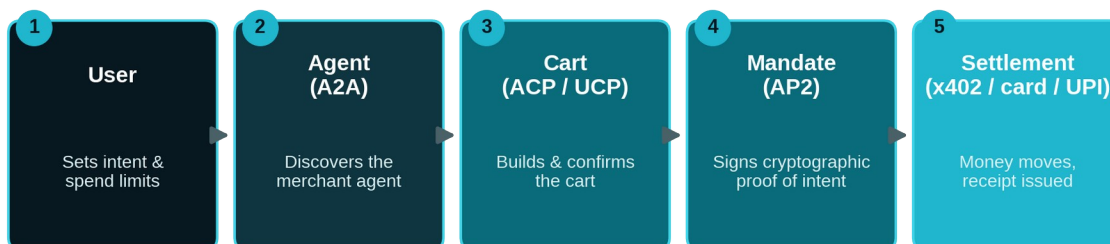
x402 *Coinbase · x402 Foundation (with Cloudflare)*

Revives the dormant HTTP 402 status code to embed instant stablecoin payments directly inside the HTTP request/response cycle — no account, card, or login required.

Launched May 2025 · Open, co-governed · Layer: Settlement / execution

A composed transaction, step by step

Consider a consumer in Kochi who tells a personal AI assistant: “reorder my mother's blood-pressure medication whenever the strip count drops below five, as long as it's under ₹600.” A fully composed implementation might run through all four core protocols in a single transaction:



Every step leaves a cryptographically verifiable trail — what was authorized, what the agent decided, what was charged.

Every step leaves a cryptographically verifiable trail: what the user authorized, what the agent decided, and what was charged — directly addressing the authorization, authenticity, and accountability questions raised on page 3.

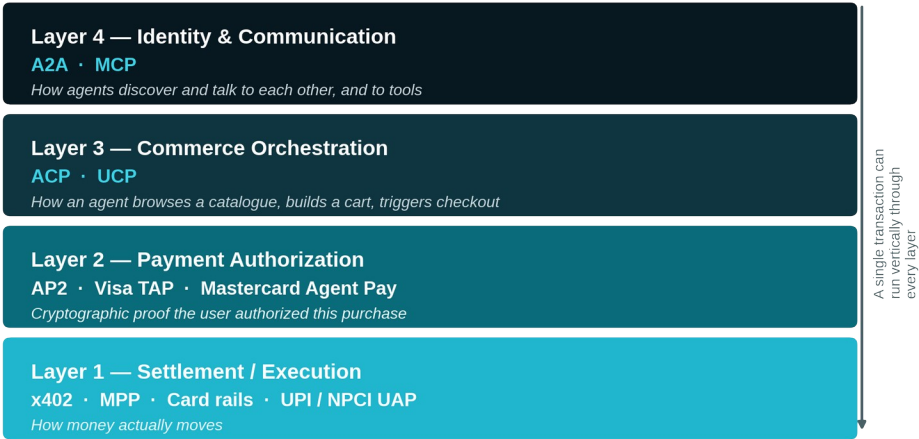
Trust in payments is anchored to deterministic, non-repudiable proof of intent from the user, directly addressing the risk of agent error or hallucination.

— AP2 core design principle, ap2-protocol.net

The four-layer model

The most common analytical mistake in early coverage of this space was to frame ACP, AP2, A2A and x402 as competitors racing to be “the” agent-payment standard. Reading the specifications closely shows the opposite — each protocol answers a distinct question, organized into four functional layers:

Layer	Question it answers	Leading protocols
4 — Identity & Communication	How do agents discover and talk to each other, and to tools?	A2A (agent-agent), MCP (agent-tool)
3 — Commerce Orchestration	How does an agent browse a catalogue, build a cart, and trigger checkout?	ACP (agent-mediated), UCP (merchant-published)
2 — Payment Authorization	How is a merchant or bank cryptographically shown the user authorized this purchase?	AP2 (Mandates), Visa TAP, Mastercard Agent Pay
1 — Settlement / Execution	How does money actually move?	x402 (stablecoins), MPP, card rails, UPI / NPCI UAP
0 — Agent Identity & Trust	Who is this agent, and can it be trusted with money?	Unsettled — no single standard yet

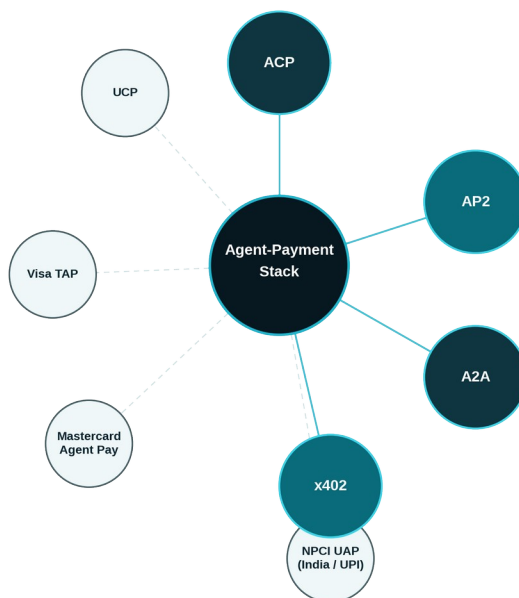


The wider agent-payment ecosystem

ACP, AP2, A2A and x402 don't exist in isolation. Google and Shopify's Universal Commerce Protocol (UCP) broadens the merchant coalition to Etsy, Wayfair, Target and Walmart. Visa's Trusted Agent Protocol and Mastercard Agent Pay bring the card networks' own agentic rails into the mix.

And in India, NPCI is building agentic capability directly into UPI — a Unified Agent Protocol (UAP) that extends UPI Circle and Reserve Pay rather than inventing a parallel network.

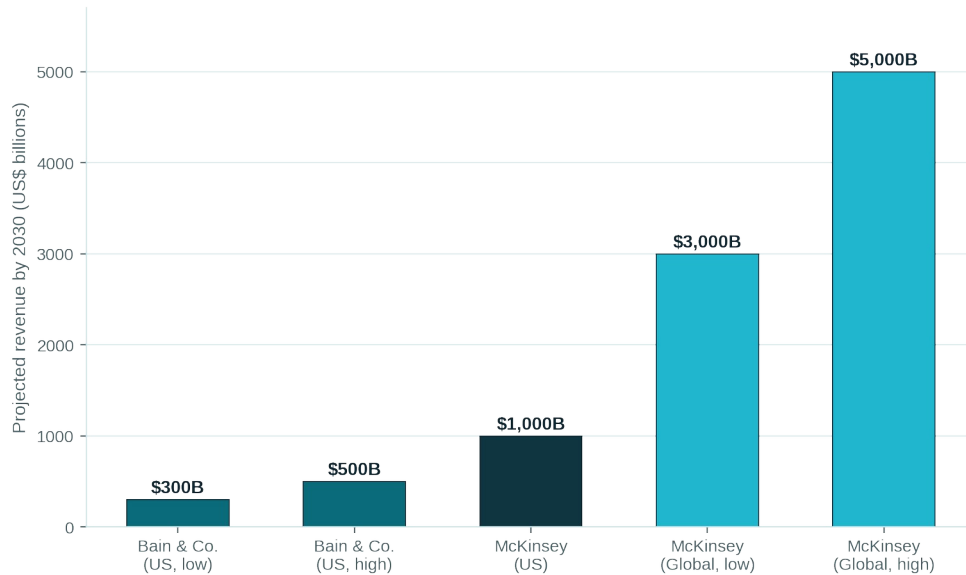
- **UCP** — Google + Shopify, 20+ endorsing partners, powers Google AI Mode and Gemini checkout.
- **Visa TAP / Mastercard Agent Pay** — network-layer agentic rails, 100+ partners on Visa's side alone.
- **NPCI UAP** — India's agentic layer on UPI, the world's largest real-time payment rail by volume.



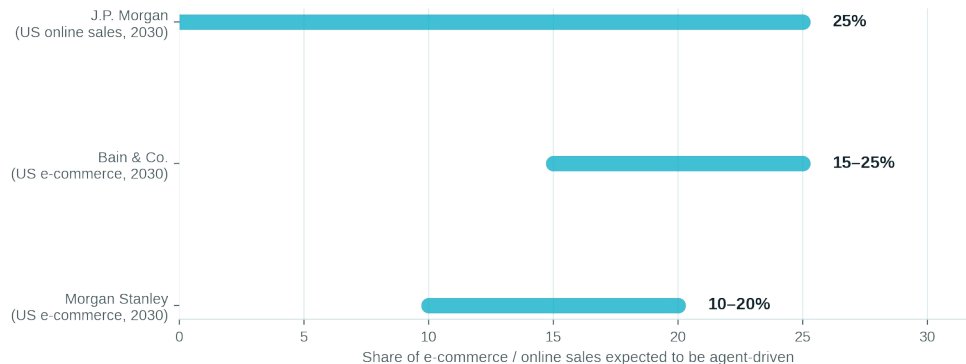
What's the market actually worth?

Sizing this market is genuinely difficult — most estimates are less than a year old and diverge by a wide margin depending on methodology — but the directional signal across independent analyst houses is consistent.

Agentic Commerce: Independent Market Estimates by 2030

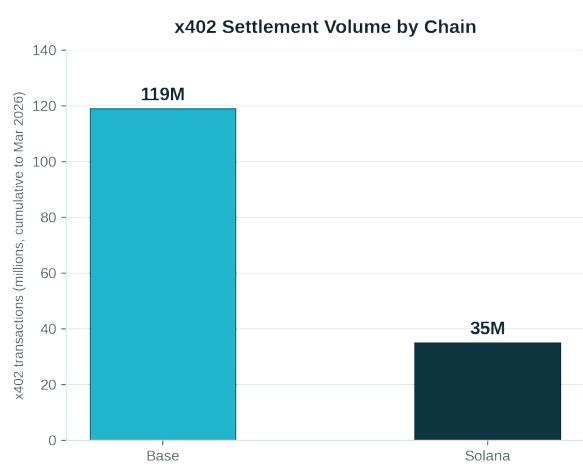
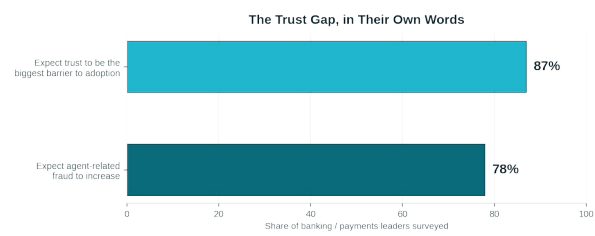


How Much of Commerce Could Be Agent-Driven by 2030?



Two structural observations sit underneath these numbers: low-risk, recurring purchase categories — groceries, subscriptions, reorders — are consistently flagged as the near-term beachhead, and national payment infrastructure operators (India's NPCI, and by extension PIX in Brazil) are now active participants rather than bystanders.

The trust gap, in numbers



- **Prompt injection & hallucinated intent** — AP2's non-repudiable Cart Mandate is designed to make manipulated authorizations detectable after the fact.
- **Credential & token misuse** — delegated payment tokens are bearer-style credentials; time-boxing and spend caps matter as much as the cryptography.
- **The missing identity layer** — none of the four core protocols defines a durable, verifiable identity for the agent itself — only for the human's authorization of a given transaction.

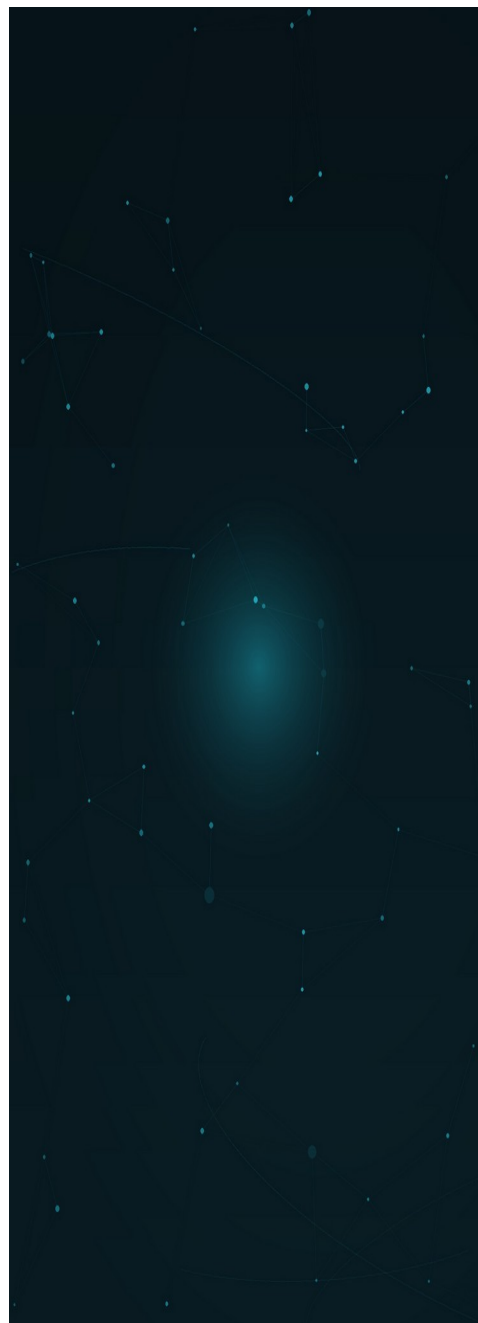
Investment is following the risk: the agentic AI security market is projected to grow from roughly \$1.65B in 2026 to \$13.5B by 2032 — a 42% CAGR, concentrated in securing exactly this identity and orchestration gap.

India and the Kerala opportunity

India occupies an unusual position: rather than adopting a private-sector protocol wholesale, NPCI is building agentic capability directly into UPI — infrastructure that already clears more retail transactions than any system in the world.

The proposed Unified Agent Protocol (UAP) extends two mechanisms UPI already has in production — UPI Circle for delegated payment authority, and Reserve Pay for pre-authorized fund blocking — to treat an AI agent as a constrained secondary actor, expected to be unveiled around the Global Fintech Fest in Mumbai (September 9–11, 2026).

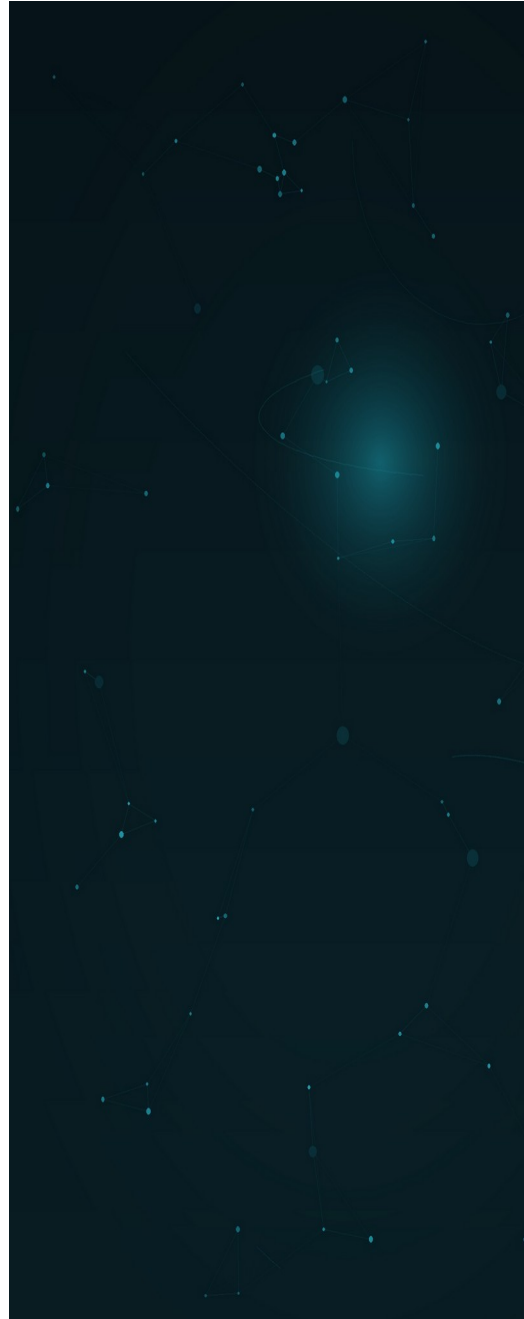
- **Retail, hospitality & D2C** should plan for agent traffic through more than one channel: global protocols for cross-border flows, UAP for domestic UPI-native traffic.
- **Healthcare & recurring purchases** sit squarely in the low-risk, high-frequency beachhead every market estimate flags for early adoption.
- **IoT & industrial platforms** with structured APIs are closer than most to x402-style machine-to-machine monetization, independent of UPI's rollout timeline.



Build for the stack, not a single protocol

The practical question for most organizations is not “which protocol should we bet on” but “which layer of the stack do we need to be ready for first.”

- **Start with catalogue & checkout hygiene** — clean, structured product data and a documented API-driven checkout are prerequisites across ACP, UCP and UAP alike.
- **Treat protocol support like wallet support** — expect to support more than one commerce-orchestration protocol simultaneously, the way you already support multiple wallets.
- **Pilot in low-risk, recurring categories first** — groceries, subscriptions, reorders — where every major estimate expects early volume to concentrate.
- **Separate the four layers in your own architecture** — identity/communication, commerce orchestration, authorization, and settlement — even before implementing all of them.
- **Invest in agent-identity and trust tooling now** — this is the layer no core protocol yet owns, and where security-market growth is concentrating fastest.





**The future of commerce belongs
to agents you can trust.**

Will your business be ready?

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