AGENTIC PAYMENTS AND THE CASE FOR CRYPTO RAILS

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CoinDCX
India ka Crypto Coach

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Executive Summary

Something has changed in the way money moves, and most of the people who write payments policy have not yet caught up with it. For almost the entire digital era, a human sat at the centre of every transaction - tapping “pay”, approving an OTP, confirming a cart. That human is now quietly being taken out of the loop.

Artificial-intelligence agents, acting on authority of their owners, have begun to discover services, compare options, negotiate, and settle payments autonomously. This is not a forecast. It is already happening, at a small scale, in places most users never see - software paying for compute , for data, for an API call that costs a fraction of a rupee. The interesting question is what happens when it scales. Once the buyer stops being a person and becomes a piece of software transacting hundreds of times an hour, the thing that limits commerce is no longer how quickly a customer can decide. Instead, it is the speed at which **the underlying rail can verify, settle, and finalise a payment**.

This report explains the conceptual underpinnings of agentic payments and it does so within the Indian context. It notes that the rails best suited for agentic payments are already operational in India, but sit in the country’s unnoticed virtual digital asset (VDA) sector. The report emphasizes that traditional payment rails of banks and cards were never designed to provide money that is **programmable**, **settles in seconds at any hour of any day**, **costs almost nothing to move**, and **carries its own rules** about who may spend it, how much, and until when. While the rails developed by the VDA sector through blockchains, stablecoins, and tokenisation were designed for these very purposes.

THE ARGUMENT:

Agents need money that can think for itself -money that can be programmed, settles in seconds, and enforces its own spending limits. Fiat rails cannot do this on their own. India's digital-asset framework can, and it is already most of the way there.

India’s position here is genuinely unusual, and worth stating plainly. The country runs the most-used real-time retail payments system in the world - processing over 241 billion transactions valued at more than ₹314 lakh crore in FY 2025–26 alone, which accounts for nearly half of all global real-time transaction volume. It has set out a clear, confident posture on AI governance through the IndiaAI Governance Guidelines and the Reserve Bank’s FREE-AI framework. And it has built, over the last three years, a supervised VDA framework under the Financial Intelligence Unit (FIU-IND) that already does several of the things a compliant agentic settlement layer would need to do. The pieces are on the table. They have simply not been connected to one another yet.

That is the gap this report tries to close. It acknowledges where crypto rails carry real risks, where the technology is still immature, and where the honest answer is ‘not yet’. The aim is to give a regulator, a payments executive, or a policymaker enough to decide whether this is a conversation India wants to shape - or one it would prefer to inherit, ready-made, from somewhere else.

WHAT FOLLOWS FROM THIS, IN SHORT

- **The standards are being written now.** The x402 payment protocol moved to the Linux Foundation in April 2026 with Visa, Mastercard, Stripe, Google and AWS among its members. India does not have a seat at that table.
- **Agentic commerce is not hypothetical.** Stripe, Visa, Mastercard, PayPal and Google have each shipped or acquired stablecoin and agent-payment infrastructure in the last eighteen months.
- **India's most agent-ready financial segment is its VDA sector.** Crypto exchanges already run the machine-readable, programmable, round-the-clock interfaces that look far more like agentic infrastructure than the fiat banking stack does.
- **The ask is modest.** Recognise agent identity and on-chain delegation, and run a co-supervised pilot .

Section 1 | Why the momentum towards agentic AI matters

1.1 From paper to programmable: a brief evolution

Money has gone through several reinventions in living memory, and each transition redefined what financial infrastructure had to do. Paper currency required physical cash handling, vaulting, and reconciliation. The shift to digital interfaces in the 1990s and 2000s - net banking, card swipes, ATMs - kept settlement on the same correspondent-bank rails but added an electronic UI. The next layer, AI-assisted decisioning, sat above that plumbing: credit scores generated by machine-learning models, fraud detection running on deep nets, robo-advisory products allocating portfolios. Through all of this, the actual transaction was still initiated by a human pressing a button.

Agentic systems break that system. An AI agent is a system or program capable of autonomously performing tasks on behalf of a user or another system, designing its own workflow and using the tools available to it[1]. When such an agent holds cryptographically delegated authority, it can identify a service, negotiate price, sign the request, settle the payment, and verify the outcome - without a human in the loop on the per-transaction step.

The human's role moves up a level, to setting policies, mandates, and budgets. This is a meaningful change, because the binding constraint on transaction volume stops being how fast the user can click, and starts being how fast the underlying infrastructure can verify, settle, and finalise.

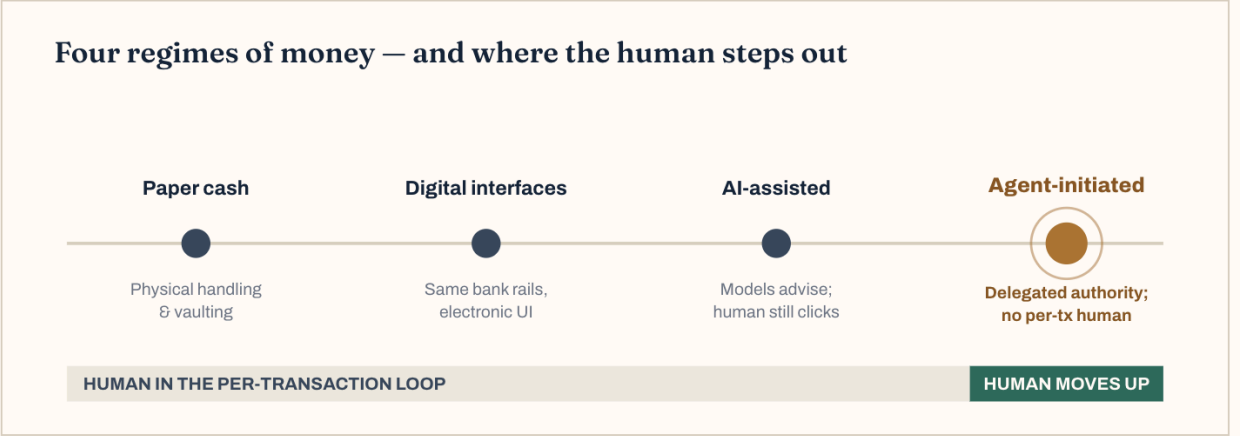

Fig 1 : Across the first three regimes the binding constraint stays human. In the fourth, it shifts to the rail - its latency, throughput, programmability, and cost of error

[1] Gutowska, A. (2026, June 16). AI agents. *What are AI agents?* Retrieved June 23, 2026, from https://www.ibm.com/think/topics/ai-agents

1.2 The economic actor changes

In a paper[2] presented at the Bank of England in March 2026, the Financial Policy Committee noted that AI adoption in UK financial services was already at 75 percent of firms, but flagged that 'risks are likely to increase, potentially rapidly, amid growing intent among financial firms to grow their deployment of advanced AI', and specifically asked the Financial Conduct Authority (FCA) and Bank to do further work on agentic AI in payments. The committee did not say agentic systems were already systemic; it said the regulatory framework had not kept pace with the trajectory.

Morgan Stanley's research desk has put a number on the consumer-facing piece of this: agent-driven online buying could account for **$385 billion of US e-commerce by 2030**[3]. The B2B and machine-to-machine layer beneath that - agents paying for compute, model inference, data, API calls, scrapes, fulfilment microservices - is harder to size, but the early signal from x402 alone shows the per-transaction pattern: average payment size of roughly **twenty cents**, with throughput[4] in the hundreds of millions of micro-settlements per quarter.

1.3 What changes in the economics of finance

Three properties of the payment rail become first-order, where they used to be second-order optimisations:

- **Discovery breadth -** A human consumer might compare three or four providers for a non-trivial purchase. An agent will routinely query dozens, sometimes hundreds, in parallel. The marketplace assumption - that 'consideration sets' are small - quietly stops holding.Pricing power shifts toward whichever rail is fastest at returning a binding quote: agents act on the first firm, executable price they can settle against, so the orders, and the volume behind them, move to whoever answers at machine speed rather than to whoever a human happened to find first.
- **Settlement finality at machine timescales -** Card authorisation is fast; card settlement isn't. ACH[5] transfers settle in days. Even RTGS-class rails are not designed for sub-second multi-leg settlement. Public blockchains running stablecoins do this natively - Solana settles in about half a second at $0.00025 per transaction[6]; Base settles in roughly two seconds at fractions of a cent[7].

[2]Current approach to AI in financial services risks serious harm to consumers and wider system. (n.d.). UK Parliament Website. Retrieved June 23, 2026, from https://committees.parliament.uk/committee/158/treasury-committee/news/211401/current-approach-to-ai-in-financial-services-risks-serious-harm-to-consumers-and-wider-system/

[3] Agentic Shoppers to boost E-Commerce | Morgan Stanley. (n.d.). Morgan Stanley. Retrieved June 23, 2026, from https://www.morganstanley.com/insights/articles/agentic-commerce-market-impact-outlook

[4] Throughput is the volume of transactions a payment rail clears in a set period - in this case, the count of micro-settlements per quarter rather than the size of each payment.

[5] ACH (Automated Clearing House) transfer is an electronic, bank-to-bank money transfer processed through the U.S. ACH Network. It is a secure, cost-effective alternative to paper checks, wire transfers, or credit card networks

[6] *What is Solana? | Solana*. (n.d.). Retrieved June 23, 2026, from https://solana.com/learn/what-is-solana

[7] Eco. (2026, June 18). *x402 Protocol Explained*. Support. Retrieved June 23, 2026, from https://eco.com/support/en/articles/14839402-x402-protocol-explained

- **Infrastructure becomes the binding constraint -** Once the human is removed from the per-transaction loop, the limiting factor is the rail itself: latency[8], throughput, programmability[9], and the cost of being wrong. Agents that get throttled or face high per-transaction overhead will simply not transact in those venues. The rail with the lowest friction wins by default.

1.4 The unbundling of the app economy

There is a second-order consequence that is starting to surface in the venture-capital conversation. Agents weaken platform gatekeeping. A consumer who never visits a particular app - because their agent does the discovery, comparison, and checkout - does not see that app's branding, recommendations, ads, or upsells. The economics of the app store, the affiliate network, and the lead-generation site all change when the buyer is no longer human-eyeballs-on-screen. Stripe has been openly making this argument; a16z[10] framed it as: traditional payment processors will struggle to onboard the merchants of the agent economy, 'not because the technology is lacking, but because when a processor says yes to a merchant, it takes on that merchant's risk' - and the risk profile of an AI agent racking up tens of thousands of API calls is not something the existing acquirer-issuer model can underwrite at scale. What replaces it is machine-readable, permissionless, low-overhead financial infrastructure that any agent can plug into. That is, almost by definition, the architecture of public blockchain-based settlement.

[8] Latency, in payments, is the delay between sending a payment instruction and the rail confirming it as final - the lag an agent running dependent, back-to-back transactions cannot design around

[9] Programmability is the ability to write rules directly into a payment, or into the money itself - spending caps, conditions, time limits - so that the rail enforces them automatically, rather than a separate system applying them after the fact.

[10] Levine, N. (2026, March 4). Agentic commerce won't kill cards, but it will open a gap. *a16z crypto*. Retrieved June 23, 2026, from https://a16zcrypto.substack.com/p/agentic-commerce-wont-kill-cards

Section 2 | What agentic payments actually are

An agentic payment is a transaction an AI agent initiates, negotiates or executes under delegated authority, rather than on a direct human instruction at the moment of payment: the human sets the policy upstream - book a flight under a set price, prefer morning departures, stay within a monthly cap - and reviews outcomes after the fact, while the transaction in between runs machine to machine[11]. The distinction from ordinary automation is easy to miss and carries the whole argument. A subscription auto-debit is a rule - if the date matches and the balance clears, debit - whereas an agent reasons, plans, uses tools and acts, choosing which service to use, which instrument to pay with, and when to move, against a goal it has been handed. **The intelligence sits in the agent; the rail merely carries the resulting instruction to settlement**.

2.1 How an agent payment actually moves

Beneath the definitions, every agentic payment runs the same short lifecycle: the agent discovers a merchant or counterparty, proves that the user authorised the purchase and within what limits, transmits the funds, and reconciles the result back to a specific user, agent and transaction. What differs is the **credential the agent presents** and the **rail it settles on**. Two families have emerged in production, and they are converging rather than competing cleanly.

- **Card-network rails** carry agent payments through a tokenised credential plus a cryptographic mandate. OpenAI's Agentic Commerce Protocol[12] powers in-chat "instant checkout"; Mastercard's Agent Pay[13] issues agents a restricted token that carries the spending rules with it; Visa's Intelligent Commerce[14] uses a Trusted Agent Protocol to confirm an agent is allowed to act before a transaction clears; Google's AP2[15] supplies the mandate scheme. The agent presents a scoped token a merchant can verify, while the money still settles over existing acquiring infrastructure.
- **On-chain rails** carry them through stablecoin settlement - a stablecoin being a crypto token pegged to a currency such as the dollar. Coinbase's x402[16] revives the long-dormant HTTP 402 "Payment Required" code so an agent can pay a server in stablecoins inside an ordinary web request, and Stripe's machine-payments stack settles agent purchases in stablecoins inside the same account a merchant already uses.

The convergence is the tell. The same payment majors are building on both families at once, and x402 has been wired into both Visa's and Stripe's agent paths - which is why the foundational standard now

[11] AI Agent Payments: The Future of Autonomous Commerce | Chainlink. (n.d.). Retrieved June 23, 2026, from https://chain.link/article/ai-agent-payments

[12] Agentic Commerce Protocol | OpenAI Developers. (n.d.). Retrieved June 23, 2026, from https://developers.openai.com/commerce

[13] Mastercard Developers. (n.d.). Retrieved June 23, 2026, from https://developer.mastercard.com/mastercard-checkout-solutions/documentation/use-cases/agent-pay/

[14] Scaling AI commerce with secure, friction-free transactions across the global acceptance ecosystem. (n.d.). Retrieved June 23, 2026, from https://developer.visa.com/capabilities/visa-intelligent-commerce

[15] Parikh, S., & Surapaneni, R. (2025, September 16). Announcing Agent Payments Protocol (AP2). Google Cloud Blog. Retrieved June 23, 2026, from https://cloud.google.com/blog/products/ai-machine-learning/announcing-agents-to-payments-ap2-protocol

[16] Introducing x402: a new standard for internet-native payments. (n.d.). Retrieved June 23, 2026, from https://www.coinbase.com/en-in/developer-platform/discover/launches/x402

sits with a neutral body rather than any single company. For India the relevant point is that the on-chain family is the one offering programmability at the level of the money itself, and it is the one the country's VDA sector is already equipped to operate.

Fig 2 : Comparison: Existing Agent Payment Process vs. x402 Pay-Per-Use Simplicity (Source : x402 Whitepaper)

WHERE THIS IS ALREADY LIVE

- **Compute and inference -** AI agents paying for GPU time, model inference calls, and storage on-demand. Hyperbolic, Akash, and several other compute marketplaces accept x402 stablecoin payments today; Coinbase's documentation lists machine-to-machine compute payments as the lead use case for x402.
- **Data and signals -** CoinGecko activated x402 across its market-data endpoints in February 2026 at $0.01 USDC per request. This is the standard pay-per-call model that subscriptions cannot price efficiently - an agent that needs one query in a session pays one cent and moves on.
- **Software unlocks and SaaS metering -** On-demand premium-feature access without subscription overhead. This is the pattern that x402 was specifically designed for: HTTP 402 'Payment Required' has been an unused status code since the early web, and agentic commerce is what finally gives it a use
- **Agent-to-agent settlement -** With Google's Agent Payments Protocol (released September 2025), an agent on one platform can pay an agent on another for work done, with the blockchain receipt doubling as proof of purchase.

- **Routing and subscription clean-up -** Agents that switch to the cheapest API transaction-by-transaction, or audit recurring payments and cancel what is unused - both of which favour per-use billing over fixed monthly debits.

Section 3 | AI and Agents in Indian Finance Today

Where India is, including the on-chain footprint already forming.

3.1 The current AI footprint in Indian finance

The RBI FREE-AI committee[17] - chaired by IIT Bombay, with members from NASSCOM - surveyed banks, NBFCs, fintechs, and tech firms before publishing its August 2025 report. A few findings stand out: **20.8 percent** of surveyed entities are already deploying AI systems, primarily in customer support, sales, credit underwriting, and cybersecurity; **67 percent** expressed interest in deploying AI but had not yet operationalised it. The committee noted that GenAI alone could improve banking operations in India by up to 46 percent over the next several years.

The use cases on the ground in 2026 sit across three layers:

- **Decision support -** AI models running risk scoring, fraud flagging, KYC checks, and underwriting at SBI, HDFC Bank, ICICI, Axis, and across the larger NBFC and fintech base. These are largely AI-assisted, not agent-initiated - a human still pulls the trigger on the credit decision in most workflows.
- **Conversational and customer interface -** LLM-powered chat, document summarisation, claims-handling. Bharat-scale deployments are coming online via Bhashini integration[18] for vernacular access; the FREE-AI report explicitly recommends that financial sector AI be built on Bhashini and indigenous datasets.
- **Algorithmic execution -** This is where the line into 'agentic' starts to blur. SEBI's June 2025 consultation paper on AI/ML in markets[19]and its February 2025 amendment on algorithmic trading by retail investors[20], both deal with systems that initiate trades on behalf of users with limited per-trade human supervision. The frameworks treat the broker as accountable; the question of what happens when the agent itself is the actor has not been answered.

3.2 The on-chain footprint in India is already agentic-shaped

This is the part of the story that has not entered the mainstream Indian policy conversation. The Indian VDA sector - operating under FIU-IND - already runs interfaces and workflows that look much more like agentic infrastructure[21] than the corresponding fiat segment does:

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[17] FREE-AI Committee Report Framework for Responsible and Ethical Enablement of Artificial Intelligence. (2025). Retrieved June 23, 2026, from https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/FREEAIR130820250A24FF2D4578453F824C72ED9F5D5851.PDF

[18] AI-Powered Financial Inclusion in India. (n.d.). Retrieved June 23, 2026, from https://www.pib.gov.in/PressReleasePage.aspx?PRID=2260497®=48&lang=2

[19] https://www.independentdirectorsdatabank.in/img/newsletter/2025/68765aa8d7e00.pdf

[20]Securities and Exchange Board of India. (n.d.). CONSULTATION PAPER ON "GUIDELINES FOR RESPONSIBLE USAGE OF AI/ML IN INDIAN SECURITIES MARKETS." Retrieved June 23, 2026, from https://www.sebi.gov.in/legal/circulars/feb-2025/safer-participation-of-retail-investors-in-algorithmic-trading_91614.html

[21] Agentic infrastructure - financial rails and components designed for software agents to transact on their own authority: machine-readable APIs, programmable wallets that carry their own spending mandate, round-the-clock settlement, and on-chain records that serve as the audit trail

- **Exchange APIs -** Every FIU-registered exchange exposes machine-readable APIs for order placement, balance checks, withdrawals, and transfers. These were built for algorithmic traders and bots, not for human consumers - a structural difference from how most banking APIs evolved here.
- **Programmatic portfolio managers -** Several Indian and global platforms run automated rebalancing, dollar-cost averaging, and yield-routing strategies that operate without per-trade human input , with the human fixing the strategy up front and the software running the individual trades.
- **On-chain wallets and smart accounts -** ERC-4337 smart accounts[22], used routinely by Indian developers building DeFi-adjacent products, support session keys, spending caps, and time-bounded mandates. By April 2026 there were over forty million smart accounts deployed across Ethereum and L2 networks globally , which means software can already be given a capped, time-bounded spending authority through tooling that is in routine use.
- **DeFi composability -** The Indian crypto-native developer base contributes meaningfully to DeFi protocols where any agent - with no onboarding, no contract, no relationship manager - can route assets, borrow, lend, or swap. This is the permissionless equivalent of the open-banking promise that Account Aggregator was meant to deliver in fiat.

India's VDA sector is the most agent-ready part of Indian financial services today, simply because of how its technology stack was built - **machine-readable, programmable, and API-first from the start**.

3.3 India's DPI as agentic precedent

India's digital public infrastructure is the precedent everybody outside India cites and almost nobody connects to the agentic conversation. The numbers are extraordinary by any global comparison:

- **UPI** - 21.63 billion transactions in December 2025 alone[23], valued at ₹27.97 lakh crore, with over 500 million unique users - roughly 81 percent of India's retail digital payments by volume.
- **Account Aggregator** - consent-based portable financial data, used routinely for credit underwriting and personal finance applications[24].
- **ONDC** - live in 630-plus cities with 1.16 lakh retail sellers, having processed over 154 million cumulative orders by December 2024[25].
- **Aadhaar** - 1.44 billion identities and 2,707 crore authentications in FY 2024-25 alone; this is the identity layer that everything else sits on[26].

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[22] ERC-4337 is an Ethereum standard for account abstraction that converts crypto wallets into programmable smart contracts. This allows accounts to execute complex, automated rules directly on-chain, such as multi-signature security, session keys, and custom spending limits.

[23] Anshul. (2026, January 1). UPI volumes, value touch all-time highs in December. CNBCTV18. https://www.cnbctv18.com/business/finance/upi-volumes-value-touch-all-time-highs-december-data-2025-ws-l-19811192.htm

[24] Celebrating four years of launch of the Account Aggregator Ecosystem - India's Digital Public Infrastructure (DPI). (n.d.). Retrieved June 23, 2026, from https://www.pib.gov.in/PressReleasePage.aspx?PRID=2162953®=48&lang=2

[25] ONDC enables fair, transparent and inclusive E-Commerce by creating an Open, Non-Discriminatory digital marketplace. (n.d.). Retrieved June 23, 2026, from https://www.pib.gov.in/PressReleasePage.aspx?PRID=2204664®=3&lang=1

[26] Aadhaar authentication surges past 2,707 crore in 2024-25; UIDAI's face authentication gains momentum. (n.d.). Retrieved June 23, 2026, from https://www.pib.gov.in/PressReleasePage.aspx?PRID=2124910®=3&lang=2

21.6B UPI transactions, Dec 2025 - ₹27.97 lakh crore in value	294M+ Accounts linked on Account Aggregator; now under an RBI-recognised SRO	1.44B Aadhaar identities - the layer everything else sits on	630+ Cities live on ONDC; 154M+ cumulative orders and scaling

Read together, these systems already deliver three core agentic functions in fiat: discover (ONDC), decide (consent-based data via AA), transact (UPI). They were not designed for AI agents. But agents would, in principle, be able to plug into them. The interesting and underexplored question is whether the next-generation versions - UPI 2.0, AA flows, or an ONDC-aligned commerce protocol - should add primitives that let agents identify themselves, prove delegation, and operate with the same ease as a human user.

A recent market launch demonstrates exactly how this works in practice

Case Study | P3P: an agent learns to pay on UPI - Pine Labs[27]

On 11 June 2026, Pine Labs launched the Pine Labs Payment Protocol (P3P), billed as India's first agentic payment protocol built on UPI. The problem it sets out to solve is precise, and it is the one this section has been circling. UPI asks for human authentication - an MPIN - on every transaction. That step is designed for a person, not a process. An agent can browse, compare and decide, but at the moment of payment it hits the same wall every time, and the commerce journey stops.

P3P's answer is to move the human consent upstream. The consumer authorises once, setting the boundaries; after that the agent can browse, select, negotiate and pay within those limits, with no per-transaction human step. The protocol does not invent a new rail. It extends two mandate frameworks UPI already supports - Single Block, Multiple Debit (SBMD) and the One-Time Mandate (OTM) - into payments triggered by software. Identity, delegated authority, spend controls and auditability are supplied through a layer called Grantex, and the system uses the same HTTP 402 'Payment Required' convention that the global on-chain stack has settled on for machine-readable payment requests. The first live application is Gullak, a digital-gold platform whose users can set an agent to buy when the price hits a target. Pine Labs framed the logic plainly: UPI's mandate architecture was already built for agentic commerce - P3P is the layer that was missing.

[27]The AI agent can now pay. Pine Labs launches P3P - India's first agentic payment protocol built on UPI. (2026, June 11). Pinelabs. Retrieved June 23, 2026, from https://www.pinelabs.com/media-analyst/the-ai-agent-can-now-pay-pine-labs-launches-p3p-indias-first-agentic-payment-protocol-built-on-upi

P3P is the clearest domestic evidence that the agentic settlement question is live, not theoretical - and that India's fiat rails can be stretched to meet part of it. But it also marks the boundary of that stretch. P3P inherits exactly what UPI mandates can express: a pre-authorised debit within set limits. It does not give the agent a portable, verifiable identity an arbitrary counterparty can check; it does not encode conditional settlement ('pay only if the service is delivered') in the rail itself; and it does not reach the sub-cent, machine-to-machine, cross-border workloads that have no human consumer behind them at all. Those are precisely the properties the next sections argue are native to blockchain and stablecoin rails. The honest reading is not fiat *versus* crypto - it is that fiat rails are being retrofitted toward agentic behaviour one mandate at a time, while crypto rails were born with these primitives built in. P3P is the proof of demand. The question is which rail carries the part of the workload UPI mandates cannot reach.

And so the framing question this section was designed to surface comes into focus: what breaks when these interactions scale beyond human supervision into autonomous execution - and why are crypto rails already ahead of fiat rails on each of the three functions of discover, decide and transact? The next two sections answer it on the ground.

Section 4 | The Crypto-Native Agentic Stack

Crypto and VDAs are not a future possibility for agentic payments. They are the in-production layer.

4.1 Two stacks doing the same job

Every agent payment, whatever rail carries it, has to do the same three things: **prove who is paying** and **within what limits**, **move the money**, and **leave a record that can settle a dispute later**. Two architectures do this in the market today. One is the fiat stack - the card and bank rails, with agent features fitted on top. The other is the crypto-native stack, which was built for software from the start. This section sets the two side by side and then goes deep on the second. The blockchain primitives and the stablecoin payment layer behind the crypto stack are taken up in the sections that follow, while Section 5 examines where both stacks break under agent-scale traffic .

The non-crypto stack: how it works

On the fiat stack the agent is not really a participant; it borrows a human's payment instrument. The owner provisions a tokenised card credential or an agent token - Visa's Trusted Agent Protocol, Mastercard's Agent Pay, Google's AP2 - and the spending rules sit in the application that issued it. When the agent pays, the request travels through the familiar chain: a gateway passes it to the acquiring bank, the acquirer to the card scheme, the scheme to the issuing bank, which authorises.

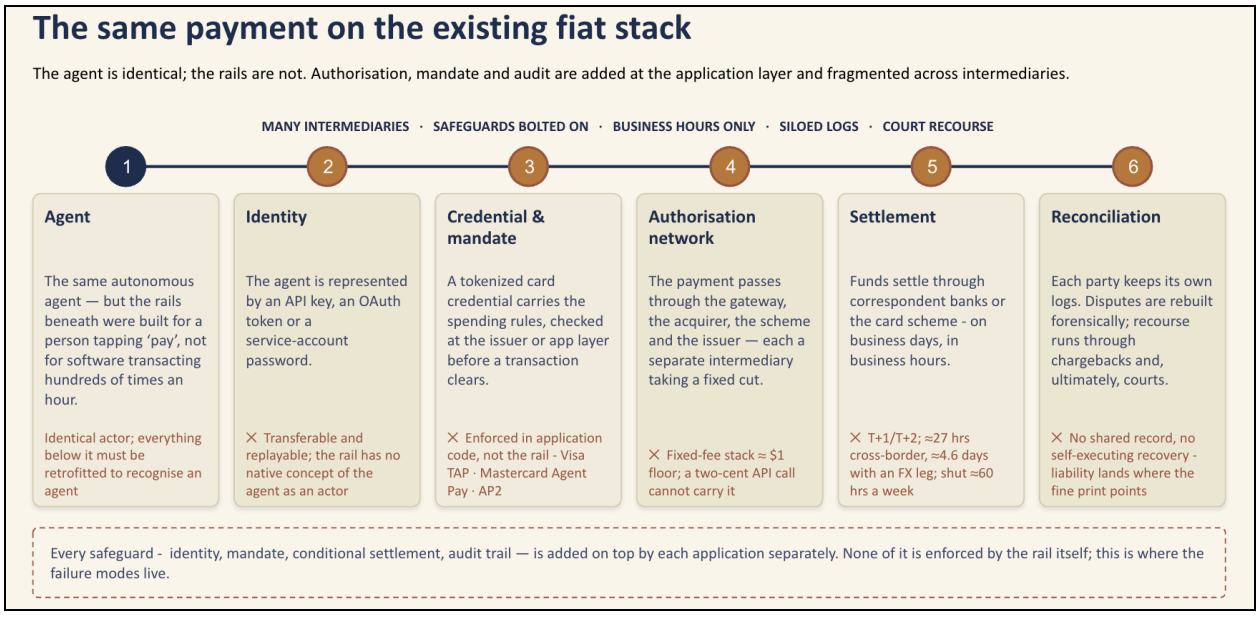

Fig 3 : The same payment on the existing fiat stack: identity, mandate and settlement spread across separate intermediaries, with the safeguards fitted on at the application layer.

The money settles afterwards, through correspondent banks or the scheme, a day or two later, in business hours. When something goes wrong, the record has to be rebuilt from each party's own logs and the recourse is a chargeback. The lifecycle, in one line: provision → present token → authorise across four intermediaries → settle T+1/T+2 → reconcile by hand.

The crypto-native stack: how it works

The crypto stack starts from the opposite end. Software can read from and write to a blockchain by itself; the rail does not close at night, does not ask the agent to open an account, and settles in seconds rather than days. None of this was added for agents - it was there already, which is why most agent payments today run on crypto rails rather than bank or card rails. The agent holds a smart-account wallet that carries its own mandate - a spending cap, an expiry, a list of allowed counterparties - and it pays in a stablecoin, a programmable, always-on unit of dollar value that any software can hold over an API, with no price movement between the decision to pay and the payment clearing. The payment can travel inside the web request itself; settlement is final on a public ledger in about a second, for a fraction of a cent, and the ledger entry is the audit trail. The stablecoin is the settlement layer of this stack, and it is treated in full in Section 4.4. The lifecycle, in one line: delegate once → the agent discovers, requests and signs → the wallet enforces the mandate → settle on-chain in seconds → the receipt is the ledger entry**.**

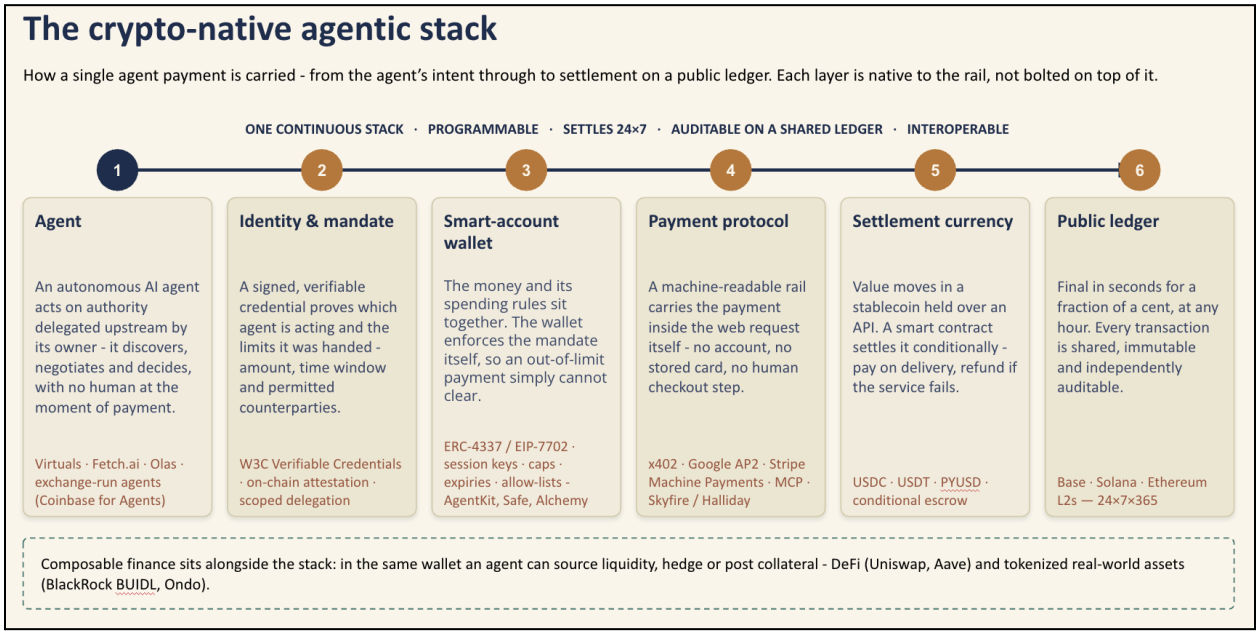

Fig 4- The crypto-native stack: the agent, its identity and mandate, the wallet that enforces it, the payment protocol, the stablecoin and the public ledger all sit on one programmable layer.

Read the two together and the contrast is not that one rail is a little faster than the other. It is that the crypto stack carries the rules, the money and the record on a single programmable layer, while the fiat stack spreads them across separate systems and treats the agent as an afterthought.

Table 1 : Same job, two architectures - the crypto-native stack does in one programmable layer what the fiat stack spreads across intermediaries

Dimension	Fiat agentic stack (non-crypto)	Crypto-native stack
The agent, to the rail	A borrowed human credential; no native idea of an agent	A first-class actor with its own wallet and mandate

Dimension	Fiat agentic stack (non-crypto)	Crypto-native stack
Where the rules live	In the app that issued the token	In the wallet itself — the rail enforces them
Settlement speed	T+1/T+2; a day or two, business hours only	About 0.4–2 seconds, at any hour
Smallest viable payment	A floor near $1, set by fixed fees	A fraction of a cent, down to a millionth
Path the money takes	Gateway → acquirer → scheme → issuer → banks	Wallet → public ledger, directly
Record & recourse	Each party's own logs; chargebacks, courts	One shared, immutable ledger; refund written into code
Built for	A person tapping 'pay'	Software transacting at machine speed

.

That single-layer design is the reason the rest of this section can treat the crypto stack as something already in production rather than a forecast - the wallets, protocols and settlement assets that make it work are examined next

4.2 Agent wallets and smart accounts

It is tempting to read all of this as something happening in the application layer, with ordinary money plumbing underneath. For simple cases that is true. It breaks at the point where an agent needs spending rules the money itself will enforce, and that is what the wallet, not the app, supplies. In the crypto-native stack the agent pays in a stablecoin, but the wallet is where the money sits and where the rules for spending it are kept. It is the part of the stack a bank account cannot copy.

A bank account only holds money. By itself it cannot hand an agent a limited allowance, cap what it spends, set a cut-off date, or fix who it may pay. Banks and fintechs can bolt these controls on, but only inside their own software, so each firm builds its own version and none of them travel from one service to the next. The rules live in the app, and stop at its edge.

Crypto wallets moved the rules into the account itself. Since 2023 an Ethereum standard called account abstraction (ERC-4337)[28] has let a wallet hold its own spending logic rather than leave it to whatever app is in front of it, and more than forty million[29] of these "smart accounts" were in use by early 2026. A 2025 upgrade, EIP-7702[30] - live since the Pectra release in May 2025 - extended the same controls to ordinary wallets, with nothing to migrate. In practice an owner can set a wallet to :

- spend only from a fixed budget, within set limits - say $50 a day, $5 a transaction, approved recipients only;
- stop working after a chosen date, and be switched off at any moment; and

[28] ERC-4337 - ERC-4337 Documentation. (n.d.). Retrieved June 23, 2026, from https://docs.erc4337.io/core-standards/erc-4337

[29] The advantage of gasless transactions for DEX users. (2026, May 15). Nadcab Labs | Web3 Development Services. https://www.nadcab.com/blog/gasless-transactions-in-dex

[30] Eco. (2026a, May 26). ERC-7702 Deep Dive 2026: EOA becomes Smart Wallet. Support. Retrieved June 23, 2026, from https://eco.com/support/en/articles/15254037-erc-7702-deep-dive-2026-eoa-becomes-smart-wallet

- keep a permanent, auditable log of every action.

The mandate - the set of rules the owner lays down - is written in code, not on paper, and the wallet carries it out on its own, with no bank in the middle deciding whether to honour it. Tools doing this in production today include Coinbase's AgentKit, Safe and Alchemy.

Mandate enforcement is the clearest case, but the same logic reaches further. Because the rules sit inside the money, a payment can settle conditionally - release only if the service is delivered, refund itself if not - and it can clear at a cost low enough to carry the sub-cent calls an agent makes by the thousand, the very payments that fixed card fees price out altogether. The thread running through all three is the same: the rules travel with the value instead of being applied to it from outside. That is what lets the system scale to the workload agents generate. Stablecoins and the smart-account stack offer it today; for the fiat rails to match it, they would have to be rebuilt. For India the upshot is plain - any agent-driven service that needs to give software safe, bounded spending authority can already get it on-chain, and not from a bank account.

4.3 Agentic payment protocols

If the wallet is where the money and its rules sit, **a payment protocol is how the money actually moves**. A protocol is just a shared set of rules that lets one piece of software pay another - an agent paying a service, or one agent paying another - with no person wiring up the connection first. A whole layer of these has appeared in the last eighteen months, built for agent payments, and the speed at which it has come together shows how seriously the largest payment firms are taking it:

- **x402**[31] - an HTTP-native payment protocol from Coinbase and Cloudflare that uses the long-dormant HTTP 402 'Payment Required' status code to embed stablecoin micropayments directly into web requests. By March 2026 it had processed over 119 million transactions on Base and 35 million on Solana, with roughly $600 million in annualised volume. Coinbase reported 69,000 active agents using the protocol by April 2026.
- **x402 Foundation**[32] - Formalized by the Linux Foundation in April 2026, the x402 Foundation is supported by 22 major financial and tech launch members. While Coinbase originally contributed the protocol, it is now independently governed to drive open ecosystem evolution.
- **Coinbase AgentKit**[33] - toolkit for building autonomous agents that can transact on-chain, with x402 baked in.
- **Stripe Machine Payments**[34] - Stripe's version, in preview since February 2026, letting a developer charge an agent in stablecoins inside the same Stripe account they already use.

[31] x402 - Payment Required. (n.d.-b). X402. Retrieved June 23, 2026, from https://www.x402.org/

[32] The Linux Foundation. (2026, April 2). Linux Foundation is Launching the x402 Foundation and Welcoming the Contribution of the x402 Protocol. Retrieved June 23, 2026, from https://www.linuxfoundation.org/press/linux-foundation-is-launching-the-x402-foundation-and-welcoming-the-contribution-of-the-x402-protocol

[33] The future of commerce is agentic. (n.d.). Retrieved June 23, 2026, from https://www.coinbase.com/en-in/developer-platform/products/agentkit

[34] Stripe Agentic Commerce | Infrastructure for the Agent Economy. (n.d.). Retrieved June 23, 2026, from https://stripe.com/in/use-cases/agentic-commerce

- **Google AP2 (Agentic Payments Protocol)** [35]- released in September 2025 as an extension to Google's existing Agent2Agent (A2A) communication protocol. AP2 lets agents that are already talking to each other across platforms now also pay each other. x402 was added as one of AP2's first extensions and is currently the only stablecoin facilitator inside the protocol.
- **Skyfire, Halliday**[36] - payment infrastructure specifically targeting AI agents, with KYC, mandate, and dispute primitives built into the API.
- **Model Context Protocol (MCP)**[37] - Anthropic's open standard for connecting LLMs to external tools, increasingly paired with x402 so that an MCP-served tool can charge per call.

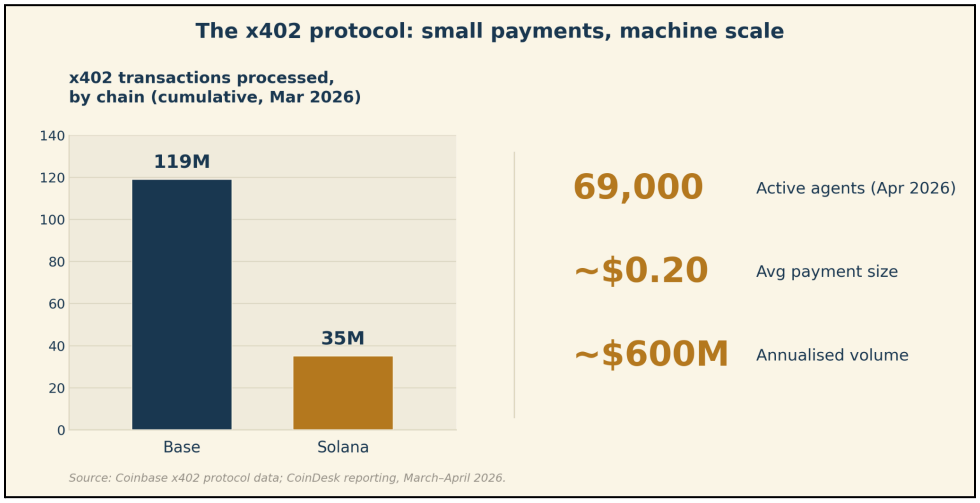

Fig 5 **:** x402 traction by March–April 2026. The volumes are small by fiat standards; the institutional governance around them is not.

As recently as March 2026, on-chain x402 volume was only about $28,000 a day[38], and one analysis found that close to half of the activity looked like testing rather than real commerce. So this is not yet running at the scale of card or bank rails - but that was never the claim. The point is that the rails, the software, the governance and the major partners are already in place. What is still missing is the actual workload, and that is now starting to arrive faster than most expected.

[35] Parikh, S., & Surapaneni, R. (2025b, September 16). Announcing Agent Payments Protocol (AP2). *Google Cloud Blog*. Retrieved June 23, 2026, from https://cloud.google.com/blog/products/ai-machine-learning/announcing-agents-to-payments-ap2-protocol

[36] Skyfire. (2025, August 21). *Product - Skyfire*. Retrieved June 23, 2026, from https://skyfire.xyz/product/

[37] Introducing the model Context Protocol. (2024, November 25). Retrieved June 23, 2026, from https://www.anthropic.com/news/model-context-protocol

[38] Pa一线. (2026, March 11). Analysis: The x402 protocol's average daily transaction volume is only $28,000, indicating that the demand for proxy payments has not yet kept pace with the narrative boom. PANews. Retrieved June 23, 2026, from https://www.panewslab.com/en/articles/019cdbf9-d476-776b-8c88-8b390e38618a

4.4 Stablecoins as the Default Agentic Settlement Layer

A standalone treatment, given how central stablecoins are to the agentic settlement conversation and the current Indian policy moment.

4.4.1 Why stablecoins emerged as the default

Three properties combined to make stablecoins the default settlement currency for AI agents. First, they are programmable in a way that bank money is not - a USDC payment can be embedded in a smart contract, made conditional on outcomes, and held in escrow at near-zero cost. Second, they are unit-of-account stable, which means an agent settling in stablecoins does not have to hedge price risk between deciding to pay and the payment clearing. Third, they are 24x7 settled and natively API-accessible - any agent that can speak HTTP can transact in them, with no opening hours, no batch windows, no business-day cycles.

The growth numbers reflect this. The combined stablecoin market cap stood at **$315 billion at the end of Q1 2026**, with USDT and USDC accounting for roughly 93.5 percent of supply[39]. Stablecoin transfer volume in 2025 was **$33 trillion** - a 72 percent year-on-year increase that puts it ahead of Visa's annual transaction value[40]. Stablecoin-based B2C payments, including payroll, grew to over $300 million monthly by early 2025 and continued accelerating through the year. BVNK alone processed $30 billion in annualised stablecoin payment volume in 2025[41], with one-third of that volume coming from the US market.

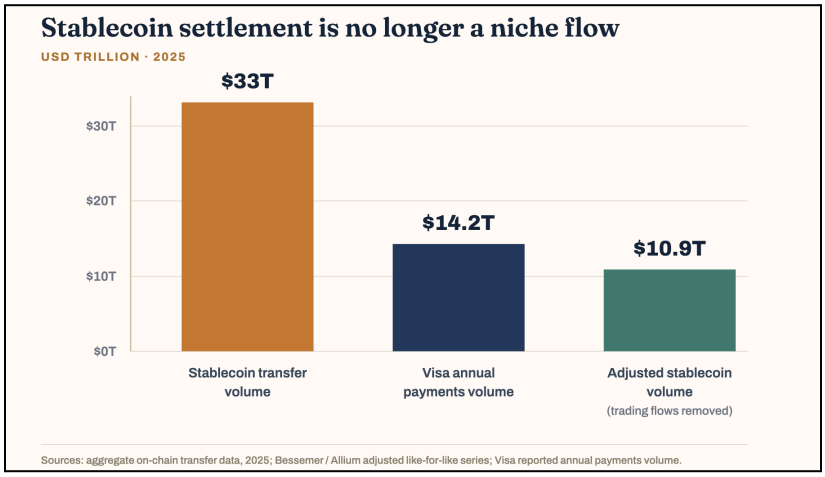

Fig 6 : Even on the conservative, trading-flows-removed measure, stablecoin settlement now operates in the same order of magnitude as the largest card network.

[39] Otychenko, I. (2026a, April 1). Stablecoins in Q1 2026: Rising similarities with 2022. Bitcoin & Crypto Trading Blog - CEX.IO. Retrieved June 23, 2026, from https://blog.cex.io/ecosystem/q1-2026-stablecoin-report-35459

[40] Stablecoin Transactions Rose to Record $33 Trillion in 2025. (n.d.). Bloomberg. Retrieved June 23, 2026, from https://www.bloomberg.com/news/articles/2026-01-08/stablecoin-transactions-rose-to-record-33-trillion-led-by-usdc

[41] Stablecoins became core financial infrastructure in 2025. (2025, December 17). BVNK. Retrieved June 23, 2026, from https://bvnk.com/blog/stablecoins-core-financial-infrastructure-2025

Bessemer's March 2026 work puts fiat-backed stablecoin supply at $273 billion, up from $6.8 billion in March 2020 - a forty-fold rise in six years[42]

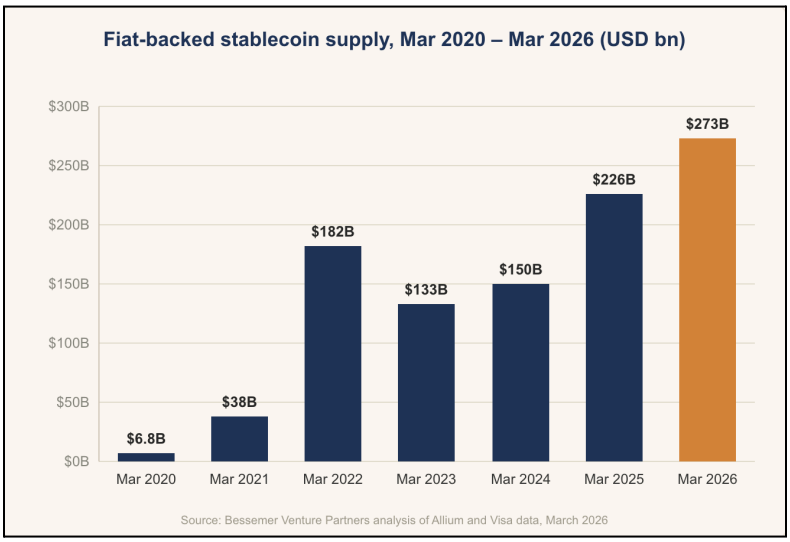

FIg 7: Fiat-backed stablecoin supply has expanded roughly forty-fold in six years. The 2022–23 dip reflects the post-Terra contraction; the recovery since has been driven by payments rather than trading demand

4.4.2 The performance case: where stablecoin rails outrun the incumbent stack

Stablecoin rails beat the card and bank rails on a few things that can be measured directly: what a payment costs, how quickly it is final, what it costs to send abroad, how much cash a firm has to tie up, and whether the rail is open when an agent needs it. On each of these the gap is wide enough to change behaviour, not just price - wide enough to decide whether a payment is worth making at all. Each is taken in turn below.

The micropayment problem - Every card payment carries charges that do not shrink as the amount falls: a flat interchange component, the card network's fee and the gateway's fee, which together set a floor below which someone in the chain loses money on the payment. That floor sits well above the size of a typical agent payment - a one-cent data request, a twenty-cent API call, charges measured in slivers of a cent. The same payment settles on-chain for a fraction of a cent on an Ethereum layer-2 such as Base[43], and for roughly a fortieth of a cent, about $0.00025, on Solana[44]. The effect is not a cheaper card market but a market card rails cannot profitably enter, which is the plainest reason the networks have begun settling these flows in stablecoins rather than over their own rails.

[42] Deakers, C. (2026, April 22). Stablecoins: from DeFi primitive to global financial infrastructure. Bessemer Venture Partners. Retrieved June 23, 2026, from https://www.bvp.com/atlas/stablecoins-from-defi-primitive-to-global-financial-infrastructure

[43] ChainUp. (2026, June 3). Coinbase Base L2: Scaling beyond crypto speculation. ChainUp. Retrieved June 23, 2026, from https://www.chainup.com/blog/coinbase-base-layer-2-ethereum-scaling-utility/

[44] What is Solana? | Solana. (n.d.-b). Retrieved June 23, 2026, from https://solana.com/learn/what-is-solana

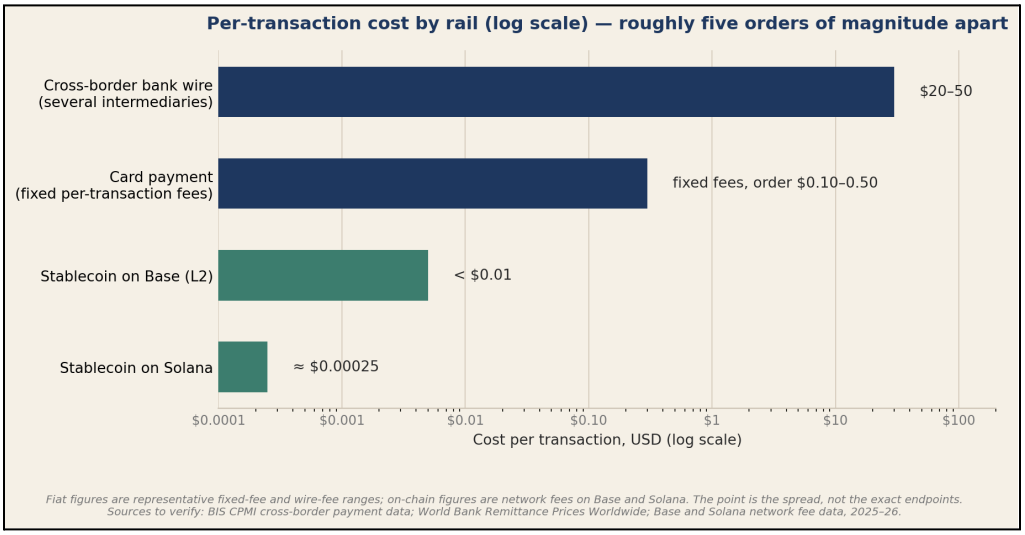

Fig 8 : The Transaction Cost Gap: Traditional Banking vs. Next-Gen Crypto Infrastructure

Settlement speed and finality - SWIFT's own data shows its messages reach the receiving bank within minutes[45]. The money takes far longer - about 27 hours end to end on average, and 4.6 days when a currency change is involved - because the delay sits in the chain of banks passing the funds along, not in the message[46]. Cards authorise in seconds but reach the merchant a day or two later. A stablecoin payment is final - done and irreversible - in about 0.4 seconds on Solana[47] and 2 seconds on Base, at any hour[48]. For a person, two seconds against two days is a mild irritation. For an agent running steps that depend on one another - pay for data, then for computing power, then for delivery, each waiting on the last - a two-day gap halts the whole sequence. Machine-speed work needs machine-speed settlement, and only one set of rails provides it.

The cross-border cost stack - Sending money across borders compounds the problem. An international wire passes through several banks, each taking a fee, on top of an exchange-rate margin and the cost of cash held along the way, and it settles in one to several days[49]. Because much of that cost is fixed, it falls hardest on small transfers: the smaller the amount, the larger the share it loses. The World Bank's Remittance Prices Worldwide put the global average cost of a remittance at roughly 6.5 percent in early 2025, with banks the most expensive channel at well over 13 percent[50]. The same value moves across an established stablecoin corridor for a fraction of that, in minutes. An agent buying services abroad many

[45] Swift GPI: driving a payments revolution. (2020, October 7). Retrieved June 23, 2026, from https://www.swift.com/news-events/news/swift-gpi-driving-payments-revolution

[46] Statrys. (n.d.). Statrys. Retrieved June 23, 2026, from https://tools.statrys.com/blog/how-long-does-a-swift-transfer-take

[47] Learn how the Solana blockchain works. (n.d.). Solana. Retrieved June 23, 2026, from https://solana.com/docs

[48] Eco. (2026c, May 26). Stablecoin payments: How they work and why they matter. Support. Retrieved June 23, 2026, from https://eco.com/support/en/articles/13017854-stablecoin-payments-how-they-work-and-why-they-matter

[49] Administrator. (2026, May 5). *Cross border payment processing*. ACI Worldwide. Retrieved June 23, 2026, from https://www.aciworldwide.com/cross-border-payment-processing

[50] Kennedy, C., William Blair, & Feldman, M. (2025). Money remittances 2024 marks four consecutive years of pricing stability [Industry Report]. Retrieved June 23, 2026, from https://www.williamblair.com/-/media/downloads/egr/2025/williamblair-money-remittances.pdf

times a day could not carry the old cost even once; stablecoins remove the middle banks, the currency hop and the wait in a single step.

Working capital and pre-funding - A quieter cost, but a real one. Because the old rails settle a day or two later, a payment firm has to keep money sitting in the destination account ahead of time to cover what goes out. Industry estimates suggest a firm moving $10 million a month on one route must hold around $670,000 idle under two-day settlement[51], against $100,000 to $200,000 when settlement is same-day. The difference is cash the business gets back to use. In an economy of millions of agent payments a day, this single piece of arithmetic can decide which rail the volume flows to.

Availability and machine accessibility - The large fiat systems run on business hours in their own time zone, and the end-of-day reconciliation - the squaring of the books - waits for the next working day. Agents keep no hours. A rail that is closed for sixty-odd hours every week is, to software that never stops, mostly switched off. Stablecoin settlement runs around the clock and - the point that matters most here - any agent holding its signing key (the cryptographic equivalent of a signature) can reach it directly over the web, with no bank sign-up for each new party it pays. It also charges by the action: an agent that makes one call pays for one call, rather than a flat monthly fee that suits a steady human subscriber far better than a workload that rises and falls.

Table 2 : The agentic requirements set against the three candidate rails. Sources: BIS CPMI, Federal Reserve Bank of Kansas City, SWIFT GPI disclosures, network fee data, 2025–26.

What an agent needs	Card rails	Correspondent banking / SWIFT	Stablecoins on L2s
Viable minimum ticket	≈ $1, set by fixed fees	Tens of dollars; fixed fees are regressive	Fractions of a cent; Circle's Gateway prices to a millionth of a cent
Settlement finality	Authorisation in seconds; merchant funds T+1/T+2	≈ 27 hours average end-to-end; 4.6 days where FX is involved	≈ 0.4s on Solana; ≈ 2s on Base
Availability	24x7 authorisation, batch settlement	Business hours, business days	24x7x365, no batch windows
Machine accessibility	Tokenised credentials via PSPs and schemes	Bank-mediated; no native API for an agent	HTTP-native; any agent that can sign a request can pay

[51] Author calculation: US$10 million monthly payment volume ÷ 30 days × 2-day settlement lag ≈ US$670,000 prefunded liquidity requirement; shown for illustrative purposes to demonstrate the working-capital impact of settlement delays

Mandate enforcement	At the issuer/app layer; revocable tokens emerging	None at the rail level	In the wallet contract itself - caps, expiries, allowlists
Cross-border path	Scheme FX plus acquirer mark-up	2–5 intermediaries; 2–7% all-in is common	Direct wallet-to-wallet; 0.1–0.5% all-in on liquid corridors

4.4.3 How stablecoins are carrying agentic payments today: four working models

Stablecoins are not moving agent money through one channel but four, each run by a different kind of player and each answering a different weakness in the traditional stack. Seen together, they explain why the default has settled where it has.

Table 3 : Comparison of the Stablecoin - led working models and the Baseline model

Dimension	Model 1 — Pay-per-call (x402)	Model 2 — Processor-embedded (Stripe)[52]	Model 3 — Network settlement (Visa / Mastercard[53])	Model 4 — Issuer-native (Circle / PayPal / Tether)	Baseline — Fiat agentic stack (non-crypto)
In one line	The payment travels inside the web request itself - the agent pays per call, with no account or stored card.	The same on-chain payment, hidden inside the merchant tools businesses already use.	Stablecoins run the back-end settlement between banks and the network, with a trust layer that verifies agents.	The coin issuers build the agent tools - wallets, marketplaces, tiny payments - on top of their own stablecoin.	A card or bank credential with agent rules added on top, cleared through the usual chain of intermediaries.
Who runs it / examples	Coinbase and Cloudflare[54] (protocol). Used by CoinGecko[55], Hyperbolic, Akash[56].	Stripe[57], with OpenAI. Any merchant already on Stripe.	Visa and Mastercard. Mastercard via	Circle (USDC), PayPal (PYUSD), Tether (USDT).	Card schemes, acquirers and issuing banks; agent tokens via Visa TAP,

[52] Stripe adds x402 integration for USDC agent payments on Base. (n.d.). Retrieved June 23, 2026, from https://www.theblock.co/post/389352/stripe-adds-x402-integration-usdc-agent-payments

[53] Eco. (2026b, May 26). Mastercard Agent Pay vs Visa Trusted Agent 2026: Compared. Support. Retrieved June 23, 2026, from https://eco.com/support/en/articles/15192003-mastercard-agent-pay-vs-visa-trusted-agent-2026-compared

[54] Launching the x402 Foundation with Coinbase, and support for x402 transactions. (2025, September 23). The Cloudflare Blog. Retrieved June 23, 2026, from https://blog.cloudflare.com/x402/

[55] Crypto Data API: Most comprehensive & reliable crypto price & market data | CoinGecko API. (n.d.). CoinGecko. Retrieved June 23, 2026, from https://www.coingecko.com/en/api

[56] Akash Network - Decentralized Compute Marketplace. (n.d.). Retrieved June 23, 2026, from https://akash.network/

[57] Stripe powers Instant Checkout in ChatGPT and releases Agentic Commerce Protocol co-developed with OpenAI. (2025, September 29). Retrieved June 23, 2026, from https://stripe.com/in/newsroom/news/stripe-openai-instant-checkout

			Agent Pay and its BVNK purchase[58].		Mastercard Agent Pay, Google AP2.
Where the stablecoin sits (the key difference)	At the request - it is the agent-to-server payment.	Underneath the checkout - a settlement layer below a familiar product.	Between institutions - treasury and network settlement, not the consumer payment.	At the source - issued, held and moved on the issuer's own rails, end to end.	Nowhere in the money. Rules live in the app; value moves over bank and card rails.
How a payment flows	Agent calls an endpoint → server returns '402 Payment Required' [59]→ agent signs USDC → resource is returned.	Agent is charged in a few lines of code → pays USDC on Base → funds land in the merchant's normal Stripe balance (tax, refunds, reporting handled).	The agent presents a credentialed token (Verifiable Intent on AP4M, scoped token on Visa TAP) → network verifies and authorises → stablecoin or card-network settlement clears between participants.	Agent holds a wallet from the issuer → pays from it → the issuer's network (e.g. Circle Payments Network) settles to banks and processors.	Agent presents a token → gateway → acquirer → scheme → issuer authorise → correspondent or scheme settlement, a day or two later.
Settlement asset & chain	USDC predominant (~99.8% of x402 volume); mainly Base and Solana, with Ethereum, Arbitrum and Polygon added under x402 v2.	USDC on Base (x402 preview); any major stablecoin on Tempo (MPP); Stripe SPTs for fiat/card rails.	Multi-rail: cards, accounts and stablecoins (USDC, PYUSD, RLUSD on Mastercard's network; AP4M records agent credentials on Polygon, Solana and Base). AP2 treats stablecoins as swappable.	The issuer's own coin - USDC, PYUSD or USDT - across multiple chains.	National currency over card and bank rails; no token in the money itself.
Onboarding (who needs crypto know-how)	Agent needs a wallet and a signing key. Developer-facing.	None for the merchant - no crypto, no node, no chain knowledge needed.	Handled by the network. Institutions, not end-merchants, touch the chain.	Issuer supplies the wallet and tools; low effort for the developer building on them.	Card or bank account plus scheme onboarding; the agent token is set up in-app.
Smallest ticket & cost	Sub-dollar to a cent (CoinGecko at $0.01 a call); network fees a fraction of a cent[60].	Same sub-cent settlement, priced per call, tool or request.	Built to span the range - from large inter-institution flows down to microtransactions of a fraction of a cent (AP4M.	Down to a millionth of a cent (Circle Nanopayments) - no fiat equivalent.	A floor of roughly $1 set by fixed fees; a two-cent call cannot clear at a profit.

[58] Mastercard launches Agent Pay for Machines to unlock super-fast, always-on payments. (2026, June 10). Retrieved June 23, 2026, from https://www.mastercard.com/global/en/news-and-trends/press/2026/june/mastercard-launches-agent-pay-for-machines.html

[59] *x402 - Payment Required*. (n.d.). X402. Retrieved June 23, 2026, from https://www.x402.org/

[60] Stripe adds x402 integration for USDC agent payments on Base. (n.d.-b). Retrieved June 23, 2026, from https://www.theblock.co/post/389352/stripe-adds-x402-integration-usdc-agent-payments

What it changes vs the other models	The base rail the other three settle on or wire into.	Adds an adoption layer over Model 1 - same settlement, none of the crypto exposure.	Moves up to inter-institution settlement and adds agent identity and trust (Agent Score, Agentic Directory) the others lack.	Integrates the whole stack from the coin up, and reaches the smallest tickets and the cross-border corridors the others do not.	The baseline all four improve on - programmable money in place of rules bolted on after the fact.
Traction by 2026 (evidence)	119M+ transactions on Base, 35M on Solana, ~$600M annualised, ~69,000 active agents (Mar–Apr 2026); x402 Foundation under Linux Foundation with 22 launch members (Apr 2026)[61].	Five releases in six months; x402 and USDC-on-Base live Feb 2026; Tempo chain incubated with Paradigm.[62]	Visa ~$7bn annualised stablecoin settlement across VisaNet (FQ2 2026, up from $4.6bn FQ1); 160+ stablecoin card programmes globally; Mastercard AP4M launched 10 Jun 2026 with 30+ partners; $1.8bn BVNK acquisition (Mar 2026)[63].	Circle Payments Network $8.3bn at Q1 close (March'26) → ~$10bn[64] (Jan–May 2026), 136 institutions; USDC = 99.8% of x402 volume[65]; PYUSD in 70+ markets[66]; USDT above $1tn a month[67].	Mature and universal, but not built for machine-scale micro-payments.
Limitation	Early volume partly gamed or incentive-farmed; still small against card rails.	Tied to Stripe's ecosystem; chain coverage still expanding from Base/Tempo baseline.	Stablecoins sit at the back end and behind the network's credentialing layer, not yet the dominant consumer-facing agent payment.	Issuer concentration; USDC's 99.8% share is itself a policy concern (dollar dominance).	Cannot price sub-cent calls, settles slowly, keeps business hours, and does not enforce the mandate at the rail.
Best fit	Machine-to-machine payments for APIs, compute and data.	Merchants who want agent revenue without touching crypto.	Bank- and network-grade settlement, plus agent verification at scale.	End-to-end issuer stacks, nano-tickets and cross-border corridors.	Human-scale consumer payments and existing card commerce.

[61] Noda, D. (2026, March 5). x402 Foundation: How Coinbase and Cloudflare Are Building the Payment Layer for the AI Internet. x402. Retrieved June 23, 2026, from https://blockeden.xyz/blog/2026/03/05/x402-foundation-ai-payment-internet/

[62] Sawinyh, N. (2026, March 18). Stripe's MPP vs. x402: What Actually Happened Today. defiprime. https://defiprime.com/stripe-mpp-vs-x402

[63] Pmtclaw. (2026, June 8). StableCoin Strategy – Visa and Mastercard are taking very different roads | Noyes Payments blog. Retrieved June 23, 2026, from https://blog.starpointllp.com/2026/06/stablecoin-strategy-visa-and-mastercard-are-taking-very-different-roads/

[64] CIRCLE INTERNET GROUP, INC. FQ1 2026 EARNINGS CALL. (2026). [Earnings Call]. Retrieved June 23, 2026, from https://s206.q4cdn.com/265218871/files/doc_financials/2026/q1/1934984433_1995156829_3726644_Transcript_EditedCopy_20260514151714.pdf

[65] Estrada, G., & Estrada, G. (2026c, May 14). Circle Internet Group Q1 2026: Revenue hits $694M as USDC volume surges 263%. TIKR.com. Retrieved June 23, 2026, from https://www.tikr.com/blog/circle-internet-group-q1-2026-revenue-hits-694m-as-usdc-volume-surges-263title

[66] PayPal brings PayPal USD to users across 70 markets. (2026, March 17). PayPal Newsroom. Retrieved June 23, 2026, from https://newsroom.paypal-corp.com/2026-03-17-PAYPAL-BRINGS-PAYPAL-USD-TO-USERS-ACROSS-70-MARKETS

[67] Verma, K. (2026, February 6). USDT volume hit a record $4.4 trillion in Q4: Tether report. Bitcoinist.com; Bitcoinist. Retrieved June 23, 2026, from https://bitcoinist.com/usdt-volume-record-4-4-trillion-in-q4-2025-tether/

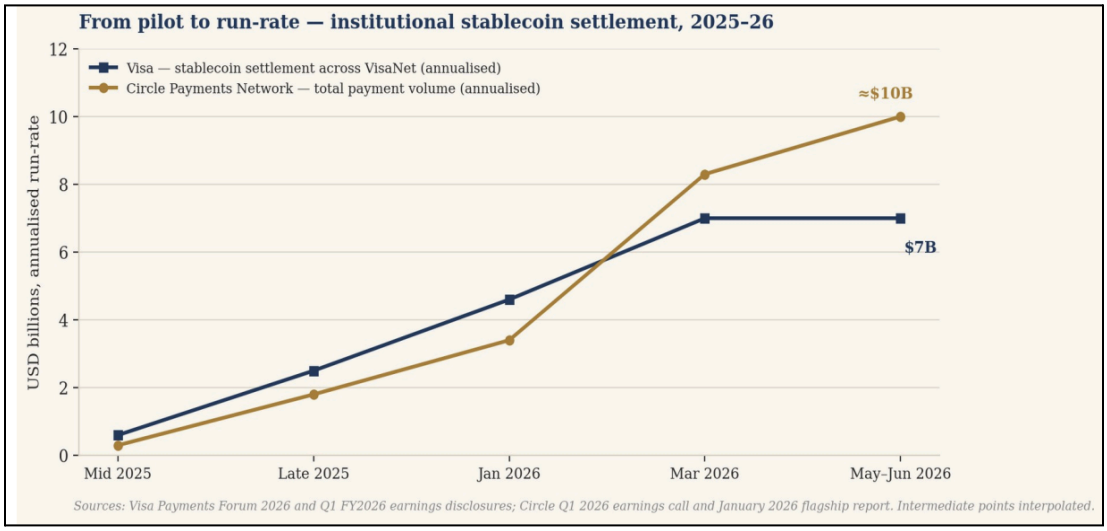

Fig 9 : Institutional stablecoin settlement has moved from pilot to run-rate in under eighteen months - Visa across VisaNet, Circle across a 136-institution payments network.

4.5 Blockchain as Agentic Infrastructure

The public ledger that sits at the foot of the crypto-native stack is what lets the layers above it behave the way they do. This section takes each function in turn.

The stack in 4.1 (Figure 4) ends on a public ledger - Base, Solana, the Ethereum layer-2 networks - and that bottom layer is not a footnote to the rest. It is the reason the layers above work. On a public ledger the rule and the money sit in the same place. The following section unravels each of these on-chain primitives, examining blockchain's role as an agentic infrastructure layer by working through them one at a time.

4.5.1 Verifiable credentials and on-chain agent identity

What the agentic economy needs first, and what fiat rails do not provide, is an identity for the agent rather than for the person behind it: the principal is already covered by KYC, but the agent has no standing of its own. A **verifiable credential** supplies it - a signed digital token, issued by the owner under the W3C standard, stating what the agent may spend, until when, and on what. Any counterparty can check it, the owner can revoke it, and an on-chain attestation registry keeps a public record of which credentials are live and which have been withdrawn, so the identity is portable across services and answers to no central directory. The alternative in use today is an API key or service-account password: copyable, replayable, and silent on what the agent is actually permitted to do.

4.5.2 Programmable money and the micropayment problem

The cost case is made in 4.4.2; the addition here is conditional settlement. A payment can be set to release only if an API returns success, to refund if it does not, or to sit in escrow until a deadline passes with no dispute raised. Because the rule lives in the contract that holds the funds, the rail enforces it

directly, with no separate dispute system invoked afterwards. Neither side has to trust the other, since the money moves only once the agreed thing has happened.

4.5.3 Smart contracts as agent agreements

On legacy rails the payment and the agreement behind it are separate: value moves on one system while the contract sits in a document elsewhere. A smart contract makes them one artefact - meet the conditions and the funds move, miss them and they stay put. A dispute is no longer about what the contract meant but about whether the code captured what the parties intended, which is the narrower and more answerable question. The gain is largest agent-to-agent: two agents can set terms, lock funds in a multi-signature escrow, do the work and settle, with no trust between them and no paperwork in between.

4.5.4 Real World Asset (RWA) tokenisation

A tokenised real-world asset is a claim on something off-chain - a money-market fund, a Treasury bill, a property share, an unpaid invoice - recorded on-chain so it moves like any other balance. The same wallet that holds an agent's stablecoins can hold a BlackRock BUIDL position or an Ondo Treasury, post it as collateral, transfer it to settle an obligation, or split it, all in code. By March 2026 this market, stablecoins aside, had passed $26.4 billion, about three times its size a year earlier - roughly $14 billion in private credit, $5.8 billion in tokenised US Treasuries, the rest in gold, property and corporate bonds.

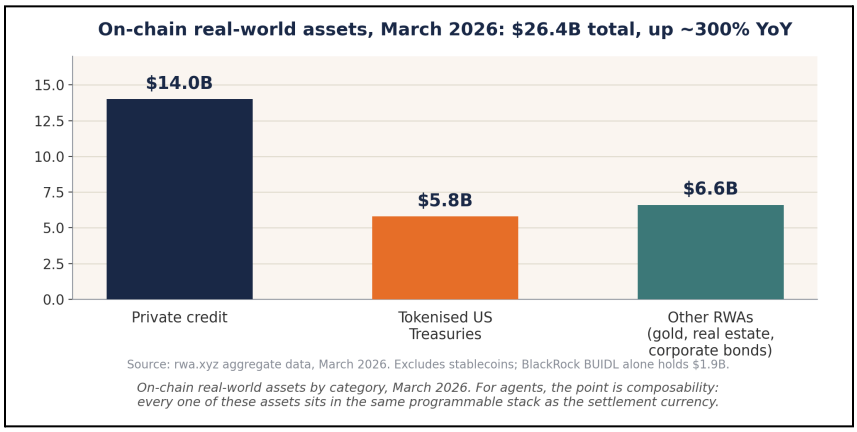

Fig 10 : On-chain real-world assets by category (March 2026)

The effect for an agent is direct - rebalance across asset classes in seconds, raise short-term cash against holdings, settle in dollars, all on one rail. The fiat equivalent runs through several custody accounts, manual transfers, T+1 or T+2 settlement and back-office work; on-chain it comes down to seconds and basis points.

4.5.5 Auditability

A public-blockchain record is written once, shared, time-stamped and unalterable. For agent payments that turns a dispute from a paper-chase - assemble logs, reconcile statements, reconstruct events - into a query against a record both sides already hold, where an overspent mandate, a counterparty default or a failed settlement each leaves its mark on the ledger. For a supervisor the gain is concrete: sampling agentic transactions across a registered VASP need not mean demanding the firm's internal records, because the record already sits where the regulator can read it.

4.5.6 Interoperability

Agents will not all live on one chain, so they must pay across them. Shared token standards - ERC-20 for ordinary tokens, ERC-4626 for yield-bearing ones, ERC-3643 for permissioned ones - with cross-chain bridges and settlement layers such as Circle's CPN let an agent on Base pay one on Solana in seconds; the same transfer over correspondent banking needs a SWIFT message, two intermediaries, an FX leg and one to three days, ending in a netted reconciliation rather than value actually moving. This is also where the work is least finished: x402 is chain-agnostic but still needs a facilitator to bridge USDC between Base and Solana, and ISO 20022 does not yet map to on-chain settlement messages. Closing that gap is open work, and it is where India's ISO 20022 depth from UPI gives it something specific to contribute.

4.6 Live agentic-crypto deployments

There are already projects where the AI agent and on-chain wallet are inseparable. The total market capitalisation of AI agent tokens crossed $15.3 billion[68] in early 2025, and even after the broader correction, several remain meaningful:

- **Virtuals Protocol**[69] - an AI agent issuance platform on Base, where every agent has a tokenised wallet, an associated treasury, and the ability to participate in transactions. At its peak the platform's token VIRTUAL crossed $5 billion in market cap.
- **ai16z (now Eliza Labs)** [70]- an AI-driven DAO on Solana, organised around an autonomous AI agent persona modelled on a venture capitalist. The Eliza framework that ai16z released became one of the most-forked AI-agent open-source repos on GitHub in early 2025.
- **Fetch.ai (FET)**[71] - a longer-running agent network where agents represent users, devices, or services and transact with each other autonomously. Use cases include energy trading, supply-chain optimisation, and travel.
- **Autonolas / Olas (OLAS)**[72] - co-owned autonomous agents that span multiple chains. Pearl, the Olas-developed app store for autonomous agents, has handled millions of agent transactions across nine blockchains.
- **AIXBT**[73]**, Bittensor (TAO)**[74]**, Griffain**[75]**, Zerebro**[76] - agent-driven projects across analytics, decentralised compute, agent launchpads, and creative agents.

These markets are volatile and several of these tokens trade well below their all-time highs. The relevant point is not the token price; it is that real economic value - measured in API calls served, computations performed, agreements settled - is already being moved between agents and on-chain wallets, in production, with no fiat-rail equivalent operating at the same level of integration.

4.7 Institutional and Exchange-Led Agentic Trading Layers

Expanding beyond decentralized networks and sovereign on-chain Decentralised Autonomous Organizations (DAOs), the integration of AI agents into centralized and hybrid crypto exchange architectures represents the next major structural shift in the stack. In this paradigm, **agentic trading serves as the primary driver for agentic payments**. An autonomous agent cannot execute complex, long-running market strategies without the native capability to settle transaction fees, fund multi-step workflows, and independently pay for its own operational overhead.

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[68] AI agents and Crypto: Market Impact - Bates Group. Retrieved June 23, 2026, from https://www.batesgroup.com/news/ai-agents-and-crypto-market-impact

[69] Virtuals Protocol | Society of AI Agents. (n.d.). VIRTUAL. Retrieved June 23, 2026, from https://www.virtuals.io/

[70] Team, E. (n.d.). ElizaOS | The official Eliza website. ElizaOS. Retrieved June 23, 2026, from https://www.elizaos.ai/

[71] Fetch.ai. (n.d.). Fetch.ai - search and discover. Retrieved June 23, 2026, from https://www.fetch.ai/

[72] Olas | Co-own AI. (n.d.). Retrieved June 23, 2026, from https://olas.network/

[73] AIXBT. (n.d.). aixbt. Aixbt. Retrieved June 23, 2026, from https://aixbt.tech/

[74] Censorship-resistant AI. (n.d.). Bittensor.ai. Retrieved June 23, 2026, from https://bittensor.ai/

[75] Griffain. (n.d.). Retrieved June 23, 2026, from https://griffain.com/sign-in

[76] What is zerebro (ZEREBRO) and how does it work? (n.d.). CoinMarketCap. Retrieved June 23, 2026, from https://coinmarketcap.com/cmc-ai/zerebro/what-is/

The Convergence of Strategy and Spend

Traditional algorithmic trading bots were strictly execution-bound, relying on rigid parameters predefined by human operators. Modern agentic trading systems, however, leverage financial reasoning to ingest real-time market sentiment, read developer documentation, and dynamically rebalance portfolios.

To function autonomously, these agents require a dual-action infrastructure:

- **The Order Execution Rail -** Allowing the agent to interact with deep spot or derivatives order books to manage capital exposure.
- **The Machine Payment Rail -** Allowing the agent to autonomously purchase its own inputs - such as premium market data APIs, decentralized compute (DePIN), or paywalled financial research - without human checkout intervention.

To capture this volume, major crypto exchanges are transforming into machine-to-machine liquidity hubs, deploying specialized agent protocols, sandbox wallets, and "Know Your Agent" (KYA) security frameworks.

Table 4 : Comparative Analysis : Exchange Integration and Agent Execution Stack

Platform / Exchange	Agentic Trading Capabilities	Payment & Transaction Execution Rail	Integration & Developer Interface
Coinbase	**Coinbase for Agents** & **Coinbase Advisor**[77] Enables full autonomous portfolio rebalancing, natural-language-driven dollar-cost averaging (DCA), and SEC/CFTC-registered in-app AI financial advice.	Native integration with the **x402 open agentic payment protocol** for machine-to-machine settlement. Agents can pay for data, compute, and premium APIs directly from isolated sub-accounts.	**Model Context Protocol (MCP)**[78] for web-based LLMs (ChatGPT, Claude) and **AgentKit CLI**[79] for local developer customization.

[77] Coinbase for Agents: Your AI Agent Can Now Trade and Pay with Coinbase. (n.d.). Retrieved June 23, 2026, from https://www.coinbase.com/en-in/blog/coinbase-for-agents

[78] Payments MCP: Bringing Wallets, Onramps, and Payments to Every Agent. (n.d.). Retrieved June 23, 2026, from https://www.coinbase.com/en-in/developer-platform/discover/launches/payments-mcp

[79] Getting Started with AgentKit - Coinbase Developer Documentation. (n.d.). Coinbase Developer Documentation. Retrieved June 23, 2026, from https://docs.cdp.coinbase.com/agent-kit/getting-started/quickstart

Binance	**Binance AI Agent Skills (Skills Hub).** Modular skill packages - currently 20 skills covering spot, futures, options, margin, on-chain wallet analytics, smart-money signals, meme-coin tracking, and contract risk auditing. Agents can run end-to-end research-to-execution workflows within scoped API permissions[80].	Standard REST and WebSocket trading APIs, with sub-account isolation and permission-scoped API keys. Stablecoin-denominated settlement (USDT/USDC) is the default for high-frequency agent execution..	REST/WebSocket APIs and direct MCP-compatible skill modules. API keys are scoped per sub-account, with configurable trading-permission limits and IP whitelisting establishing user-defined liability boundaries..
Gemini	**Gemini Agentic Trading** (launched 27 April 2026) - the first agentic trading tool on a regulated US exchange. AI agents can monitor markets, execute spot orders, and apply risk limits within user-defined parameters.[81]	Native exchange-custodied execution via Gemini's full trading API integrated end-to-end with MCP..	MCP server with modular "Trading Skills" (Get Market Data, Find the Spread, Retrieve Candles). Any MCP-compatible client - including Claude and ChatGPT - can connect directly..
OKX	**OKX Agent Trade Kit[82] + OnchainOS[83] + Agentic Wallet[84]** (March 2026). 82 tools across spot, perpetual swaps, options (the only exchange offering agent-accessible options), algo orders, and grid/DCA bots. Agentic Wallet adds	OnchainOS routes execution across 60+ blockchains and 500+ DEXs, with x402 payment support and zero-gas execution on X Layer. Local-first credential architecture - API keys never reach the LLM	Open-source MCP server (`okx-trade-mcp`) and CLI (`okx-trade-cli`) on npm and GitHub. Compatible with Claude Desktop, Claude Code, Cursor, ChatGPT, and any MCP client.

[80] Binance Launches AI Agent Skills, Powering Every Agent with a Binance-Grade Brain. (n.d.). Retrieved June 23, 2026, from https://www.binance.com/en/support/announcement/detail/bafb9dda6cbb47d5882a4090c31d4c64

[81] Gemini. (n.d.). Retrieved June 23, 2026, from https://www.gemini.com/es/blog/introducing-agentic-trading-on-gemini-the-future-of-crypto-is-autonomous

[82] Okx. (n.d.). OKX Agent Trade Kit. OKX United States. Retrieved June 23, 2026, from https://www.okx.com/agent-tradekit

[83] Okx. (n.d.-b). Onchain OS | built for AI. Ready for Web3. | Web3 development Tools. OKX Wallet. Retrieved June 23, 2026, from https://web3.okx.com/onchainos

[84] Okx. (2026, May 29). OKX Wallet officially launches Agentic Wallet. OKX United States. Retrieved June 23, 2026, from https://www.okx.com/help/okx-wallet-officially-launches-agentic-wallet

	autonomous on-chain execution across ~20 chains.		
MoonPay	**MoonAgents** (CLI: 24 Feb 2026[85]; Desktop app: 3 June 2026). Non-custodial software layer giving AI agents access to wallets and the ability to swap, bridge, DCA, set limit orders, and execute stop losses across 10+ chains via natural language. 54 tools across 17 skills.	Integrated fiat on/off-ramps (USD, EUR, GBP virtual accounts; Apple Pay, Venmo, PayPal). MoonAgents Card - a virtual **Mastercard** debit card powered by Baanx and Monavate - lets agents spend stablecoin balances anywhere Mastercard is accepted..	MoonAgents Desktop bundles Claude Code and OpenAI Codex CLI with the MoonPay CLI; the underlying MCP server works with any MCP-compatible client (Claude, ChatGPT, Gemini, Grok). Private keys remain encrypted locally - the LLM never accesses them.

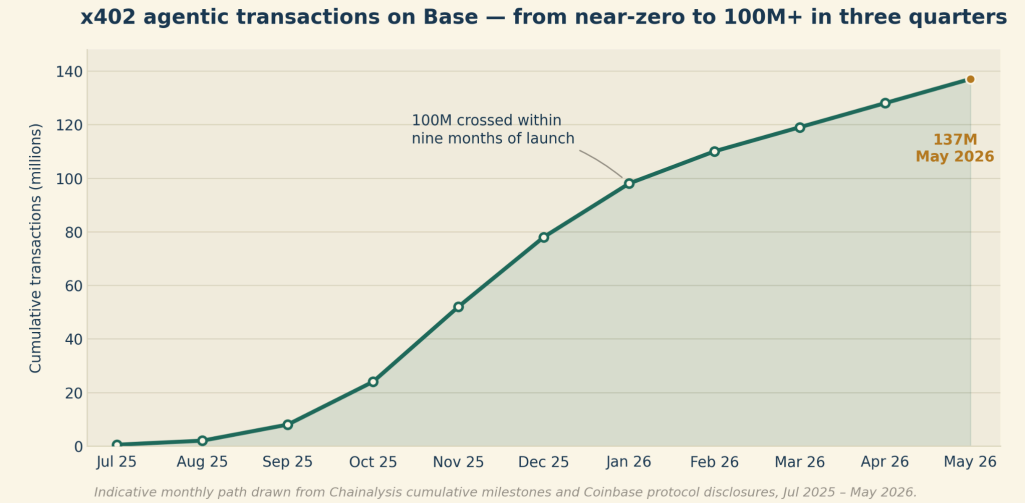

Fig 11 : x402 settlement on Base crossed 100 million cumulative transactions within nine months of launch - almost all of it in USDC, at ticket sizes the card stack cannot price

[85] MoonPay CLI for AI agents. (2026, June 4). MoonPay Help Center. Retrieved June 23, 2026, from https://support.moonpay.com/en/articles/586583-moonpay-cli-for-ai-agents

Section 5 | What Goes Wrong Without the Right Infrastructure

The failure modes of running agent-scale payments on rails built for people - and an even-handed look at the risks crypto rails carry themselves.

Section 4 showed the crypto-native stack is not a forecast; it is already carrying agent payments in production. But the case is only half-made until you show the other side - what breaks when agent-scale traffic runs through rails designed for a human tapping "pay". Five failure modes follow. Each shows up in production incidents, regulatory commentary, or the plain economics of the rails. And because a case that hides its weak points is not one a regulator should trust, the section closes by turning the same lens on crypto.

Impersonation - Consumer payments lean, more than their designers admit, on visual trust: a merchant knows a customer by their card and device, a customer knows a merchant by the storefront and the reviews. An agent removes both at once - a fraudulent one looks as polished as a real one, because there is no face, voice or browsing habit left to read. Fraud teams have flagged the shift; BioCatch[86] reported in late 2025 that flat UK fraud losses were hiding a move towards agent-driven fraud and long, patient social engineering, and that tools like FraudGPT[87] now cost less than a single chargeback. The problem is built in: card and bank rails recognise the instrument - the card, the account - not the agent. They have no concept of an agent as an actor in its own right, so everything layered on top, from device fingerprinting to biometrics to velocity checks (rules that flag too many payments too fast), is guessing at something the rail cannot actually see.

Overspend and manipulation - The second failure is a genuine agent quietly turned against its own owner. OWASP[88], a widely used application-security standards body, shifted its 2026 report from listing possible threats to cataloguing real, disclosed breaches, with prompt injection - feeding an agent hidden instructions dressed up as ordinary content - the largest single cause. Three patterns matter for payments. Poisoned inputs: a doctored product listing or a hidden instruction on a page nudges a shopping agent towards the wrong seller or a higher price, which Palo Alto's Unit 42[89] showed on live checkout flows in early 2026. Memory poisoning: a planted instruction, say a support ticket telling an agent to "remember" a vendor's new payment address, sits in the agent's memory and acts weeks later, as Lakera[90] demonstrated. And supply-chain compromise: a tampered version of a popular tool, LiteLLM, sat on the public software repository PyPI for three hours in March 2026 and was downloaded close to

[86] UK banks see 62% spike in scam attempts. (n.d.). Retrieved June 23, 2026, from https://www.biocatch.com/press-release/uk-banks-see-spike-in-scam-attempts

[87] Mascellino, A. . (2026, June 15). Dark web markets offer new FraudGPT AI tool. Infosecurity Magazine. Retrieved June 23, 2026, from https://www.infosecurity-magazine.com/news/dark-web-markets-fraudgpt-ai-tool/

[88] OWASP Top 10 for LLM & Generative AI Security. (n.d.). LLMRISKS Archive. OWASP Gen AI Security Project. Retrieved June 23, 2026, from https://genai.owasp.org/llm-top-10/

[89] Kaleli, B., Farooqi, S., Starov, O., & Mohamed, N. (2026, March 3). Fooling AI Agents: Web-Based Indirect prompt injection observed in the wild. Unit 42. Retrieved June 23, 2026, from https://unit42.paloaltonetworks.com/ai-agent-prompt-injection/

[90] Team, L. (n.d.). Agentic AI Threats: Memory Poisoning & Long-Horizon Goal Hijacks (Part 1) | Lakera – Protecting AI teams that disrupt the world. Retrieved June 23, 2026, from https://www.lakera.ai/blog/agentic-ai-threats-p1

47,000 times[91]. On legacy rails the only defences live in the application's code, and none of them is enforcement - a bank account cannot refuse a payment for breaking a mandate it does not know exists. The rule and the money sit in separate systems, and the gap between them is exactly where these attacks work.

Fee economics - Card arithmetic breaks at the bottom of the price range. The fees - the cut that passes between banks, the network's charge, the acquirer's and the gateway's - are largely fixed and assume a purchase worth at least a few tens of rupees, so a two-cent call cannot carry a thirty-cent cost, and competition will not cut what is the floor of a design with that many hands in it. India has its own version. UPI is free to use, but the zero-MDR rule - the fee a merchant would normally pay to process a payment, set to nil by law - is funded by a government incentive of Rs 2,000 crore in the 2026-27 Budget[92], which the Parliamentary Standing Committee on Finance found, on 12 March 2026, covers only about 11 percent of what the system actually costs to run, leading it to recommend a tiered fee for large merchants[93]. Add agent traffic on top, with tens of machine payments for every human one, and a free, subsidised rail takes that multiplication straight onto the subsidy bill. The point is not that UPI is the wrong system; it is that machine-to-machine micro-settlement is the wrong job for it, and sub-rupee traffic belongs on a rail whose own costs are sub-rupee.

Dispute without a trail - A human chargeback rebuilds what someone meant from things designed around people - receipts, IP logs, delivery confirmations, the cardholder's own account. None of that fits an agent payment. The questions a dispute now has to answer - what mandate the agent held, what it acted on, whether it went beyond its authority, whether it was tricked - are about an agent's decision-making, and legacy systems record none of it. Each party keeps partial logs, working out what happened becomes a forensic exercise, and the loss lands wherever the fine print sends it rather than where the facts do.

Liability without recourse - This makes the previous failure worse. When a counterparty takes the money and never delivers, there is no automatic way to claw it back - recovery means a human chasing it through tickets, chargebacks and, in the end, the courts. For a $2,000 purchase that is bearable. For a twenty-cent compute payment it is absurd, so small machine payments on legacy rails are in practice unenforceable and the loss is simply written off. The wider legal position is no neater: when an agent gets it wrong, responsibility today falls on whoever pressed "run" - a default nobody has examined, only inherited.

Siloed rails - Agents will not all run on the same platform or the same chain, but legacy rails were never built to let them transact across the lines. A payment that has to cross networks travels through correspondent banks, card schemes and a currency conversion, each adding time and cost, and an agent

[91] Hnyk, D. (2026, March 25). LiteLLM hack: Were you one of the 47,000? FutureSearch. Retrieved June 23, 2026, from https://futuresearch.ai/blog/litellm-hack-were-you-one-of-the-47000/

[92] Budget 2026: UPI, RuPay subsidy for FY27 at ₹2,000 crore; MDR unchanged. (n.d.). Retrieved June 23, 2026, from https://www.business-standard.com/budget/news/upi-rupay-subsidy-fy27-rs-2000-crore-mdr-126020100741_1.html

[93] Parliamentary panel suggests tiered UPI charges. (n.d.). Retrieved June 23, 2026, from https://www.financialexpress.com/business/news/parliamentary-panel-suggests-tiered-upi-charges/4170889/

dealing with a counterparty elsewhere inherits all of it. Software meant to move at machine speed ends up waiting on infrastructure designed to keep institutions, not agents, talking to one another.

Every one of these failures has the same root: a safeguard the payment needed was kept somewhere other than the money itself. Section 4.5 set out the on-chain primitives that put it back inside the money. The table reads the two against each other - a failure on the left, the feature that answers it on the right - and it is the bridge between the problem this section describes and the stack Section 4 built.

Table 5 : Failure modes mapped to their on-chain fixes

Failure mode (Section 5)	Blockchain-native primitive (Section 4.5)
Impersonation - no way to prove who an agent is	Verifiable credentials and on-chain agent identity (4.5.1)
Overspend and manipulation - policy lives outside the money	Mandates enforced at the wallet layer; programmable money (4.5.2)
Fee economics - fixed cost stacks vs sub-cent payments	Sub-cent settlement on L2s; conditional micro-escrow (4.5.2)
Dispute without a trail - fragmented, private logs	Shared, immutable, real-time transaction records (4.5.5)
Liability without recourse - enforcement means courts	Smart contracts as self-executing agreements (4.5.3)
Siloed rails - agents cannot transact across platforms	Common token standards and shared settlement layers (4.5.6)

5.1 What crypto rails get wrong

None of the above means on-chain rails are safe by construction. A credible case has to put its own risks on the table, and there are five worth naming:

- **Key delegation risk -** A smart account is only as safe as the keys above it. If the principal's master key is compromised, the attacker inherits every mandate the principal could grant. Session keys and spending caps bound the damage per key, but key management remains the hardest unsolved problem in consumer crypto, and agents multiply the number of live keys in circulation.
- **MEV exploitation -** Maximal extractable value (MEV) is the profit a third party can capture by reordering, inserting, or censoring transactions while they wait to be confirmed on a blockchain - in effect, jumping the queue at the expense of the original sender. Agent transaction flows are, by design, predictable - same endpoints, same sizes, same cadence. Predictability is exactly what maximal-extractable-value searchers monetise through front-running and sandwiching. An agent

economy at scale is an MEV surface at scale, and mitigations (private mempools, encrypted order flow) are improving but not complete.

- **Smart-contract and oracle exploits -** A mandate is only as sound as the code that expresses it. Bugs in contracts, and tampering with the outside data feeds a contract relies on - its oracles, a price feed for instance - have caused some of the largest losses in crypto's history, and an agent transacting against a flawed contract will carry out the flaw faithfully and fast.
- **Irreversibility cuts both ways -** Settlement finality is a feature for the merchant and a hazard for the defrauded. On-chain rails have no chargeback; consumer-protection outcomes that card networks deliver through reversal have to be engineered on-chain through escrow and conditional release, which adds back some of the complexity the rails removed.
- **Volume that isn’t commerce -** As noted in Section 4, independent analysis flagged roughly half of observed x402 transactions in early 2026 as gamified or incentive-farming activity rather than genuine trade. Early protocol metrics should be read with that discount applied.

The honest comparison, then, is not risk versus no-risk. It is whether the rail’s safeguards are enforced by the rail or bolted on by each application. On legacy rails, mandates, conditions, and audit trails are all aftermarket. On programmable rails they are native - imperfect, attackable, but structurally in the right place.

Section 6 | India's Regulatory Architecture: What Exists, What's Missing, What's Already Built

Surfacing gaps in AI regulation while positioning the VDA framework as latent infrastructure.

6.1 The two layers India has already built

India's AI rulemaking is deliberately light and sector-led. MeitY's IndiaAI Governance Guidelines (5 November 2025)[94] take a soft-law, principles-led line and avoid a standalone AI statute, choosing instead to amend existing law - the IT Act, the DPDP Act, the BNS, consumer law - where gaps appear; their seven principles come directly from the Reserve Bank's FREE-AI report. FREE-AI (13 August 2025)[95] is more prescriptive within finance, calling for AI disclosures in annual reports, a supervisory sandbox, graded liability and board-approved AI policies, and SEBI sits in the same family through its June 2025 AI/ML consultation[96] and February 2025 amendment on retail algorithmic trading[97]. One assumption runs through all of it: a human invokes the model, and the regulated entity - bank, NBFC, broker, payment system operator - is the accountable party. The agent as an actor in its own right is absent from the vocabulary.

The VDA framework was built for anti-money-laundering rather than AI, and has ended up further along. The March 2023[98] PMLA notification brought VDA service providers in as reporting entities on a test of control rather than corporate form, so a claim of decentralisation does not by itself move an activity out of scope; FIU-IND now supervises more than fifty registered VASPs[99]. The AML/CFT guidelines[100] reissued on 8 January 2026 tightened the regime - live identity verification, fuller due diligence, explicit treatment of unhosted-wallet transfers and smart contracts, a ban on mixers and anonymity-enhancing tokens, and an independent annual audit. Above this sits the policy direction:the proposed discussion paper on the classification of VDAs, expected in June 2025 but not subsequently pursued[101], the proposed COINS Act

[94] Sood, A. K., Government of India, S, & Ministry of Electronics and Information Technology (MeitY). (2021b). India AI Governance Guidelines. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/nov/doc2025115685601.pdf

[95] FREE-AI Committee Report Framework for Responsible and Ethical Enablement of Artificial Intelligence. (n.d.). Retrieved June 23, 2026, from https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/FREEAIR130820250A24FF2D4578453F824C72ED9F5D5851.PDF

[96] Securities and Exchange Board of India. (2021). CONSULTATION PAPER ON "GUIDELINES FOR RESPONSIBLE USAGE OF AI/ML IN INDIAN SECURITIES MARKETS." Retrieved June 23, 2026, from https://www.google.com/url?q=https://www.independentdirectorsdatabank.in/img/newsletter/2025/68765aa8d7e00.pdf&sa=D&source=docs&ust=1782213278214728&usg=AOvVaw2JL82Sg-vCTiel1eZSA5zq

[97] SEBI | Safer participation of retail investors in Algorithmic trading. (n.d.). Retrieved June 23, 2026, from https://www.sebi.gov.in/legal/circulars/feb-2025/safer-participation-of-retail-investors-in-algorithmic-trading_91614.html

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[100] AML & CFT Guidelines for Reporting Entities Providing Services Related to Virtual Digital Assets. (2026, January 8). Retrieved June 23, 2026, from https://fiuindia.gov.in/pdfs/downloads/VDA08012026.pdf

[101] India's cryptocurrency policy paper likely shelved for now amid RBI resistance- Moneycontrol.com. (2026b, April 1). Moneycontrol. Retrieved June 23, 2026, from https://www.moneycontrol.com/news/business/india-s-cryptocurrency-policy-paper-likely-shelved-for-now-amid-rbi-resistance-13876766.html

and its Crypto Assets Regulatory Authority[102], a commitment to adopt the OECD's CARF with cross-border data-sharing from 2027[103], and the Income Tax Act 2025 (in force 1 April 2026), which folds "crypto-asset" into the VDA definition and adds a penalty regime for reporting failures.

6.2 The agent-shaped gap

None of these documents - the IndiaAI Guidelines, FREE-AI, SEBI's papers, the VDA framework - speaks to a transaction that a piece of software initiates on its own authority. The questions a payments operator or an exchange must answer to support an agentic flow in India today are answered, where they are answered at all, by private legal opinion:

- **Agent identity** - How is an agent's identity established and verified for an Indian payment, as distinct from the identity of the human standing behind it?
- **Delegated authority** - Is a digital mandate a user signs under the DPDP Act the legal equivalent of a written authorisation under the Payment and Settlement Systems Act?
- **Liability** - When an agent acting under delegated authority overspends, pays a fraudulent counterparty, or fails to deliver, who carries the loss - the principal, the developer who wrote the agent, or the VASP that settled the payment?
- **Reporting** - How are agent-to-agent transactions captured under PMLA, the FATF Travel Rule, and CARF?
- **Enforceability** - Can a smart contract that holds funds and releases them on completion of a service be enforced as an agreement under Indian contract law?

These are the operational blockers that decide whether a compliant agentic payment can clear in India at all.

6.3 What is already built - and what is missing

Here is the part that tends to be missed. The VDA stack, assembled for AML reasons and with no agentic intent, already performs most of the functions a compliant agentic settlement layer would need. It identifies the principal at the on-ramp; it monitors flows for anomalies; it files suspicious-transaction reports; it retains records for five years and pairs them with on-chain settlement; and it is being wired for cross-border exchange through CARF. What it lacks is small in number and specific in nature: a recognised agent-identity primitive, formal legal recognition of on-chain credentials for delegation, and a graded liability rule that splits responsibility between principal, developer and VASP. Those are additions to a working regime, not a rebuild of one. That gap closes in a year or two, not a decade.

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[102] COINS Act model law offers blueprint for crypto regulation in India. (2025, July 21). TradingView. Retrieved June 23, 2026, from https://www.tradingview.com/news/cointelegraph:0bfce99a4094b:0-coins-act-model-law-offers-blueprint-for-crypto-regulation-in-india/

[103] Shukla, A. (2026, February 5). India to begin cross-border crypto data exchange from April 2027. The Economic Times. Retrieved June 23, 2026, from https://economictimes.indiatimes.com/markets/cryptocurrency/india-to-begin-cross-border-crypto-data-exchange-from-april-2027/articleshow/127921787.cms?from=mdr

6.4 The global pace India is being measured against

Two things are happening abroad at once, and they are converging. The first is that stablecoins have been pulled into the regulated payments mainstream in barely two years. The second is that a handful of regulators have begun to name agentic AI in payments explicitly. Where those lines cross - machine-initiated payments settling on supervised stablecoin rails - is the real frontier, and it is being built now.

On the stablecoin side the convergence is hard to miss. The United States, the EU, the UK, Singapore, Hong Kong, the UAE and Japan now run, or are finalising, frameworks that say much the same thing: licensed issuers, full reserve backing, a guaranteed right of redemption, AML supervision. The table below sets them side by side. The direction of travel is unmistakable, and it is the same direction India's own VDA framework already points.

Table 6 : Jurisdictional updates on Stablecoin regimes and Agentic AI in payment posture

Jurisdiction	Stablecoin Regime	Agentic-AI-in-payments posture
United States	GENIUS Act (signed Jul 2025)[104]; OCC, FDIC and FinCEN-OFAC rules filled in through 2026; full effect by Jan 2027.	No federal rule on agent-initiated payments; CAISI-NIST AI Agent Standards Initiative works the technical layer - agent identity, capability disclosure, behaviour.
European Union	MiCA in application; final CASP compliance deadline Jul 2026. EU AI Act high-risk duties from Aug 2026[105].	Neither MiCA nor the AI Act addresses machine-to-machine settlement or agent liability; local-currency stablecoins now being issued explicitly for agentic use.
United Kingdom	Crypto activities order (Feb 2026); FCA stablecoin sandbox cohort; final issuance rules due end-2026.	Most explicit globally: FCA's Mar 2026 Payments Priorities[106] will weigh changing payments rules for agentic AI, with live trials under the Supercharged Sandbox[107]. AI Live Testing second cohort announced **21 April 2026** with eight firms [108].
Singapore	Finalised stablecoin framework	Most detailed risk guidance in print:

[104] Fact Sheet: President Donald J. Trump Signs GENIUS Act into Law. (2025, July 18). The White House. Retrieved June 23, 2026, from https://www.whitehouse.gov/fact-sheets/2025/07/fact-sheet-president-donald-j-trump-signs-genius-act-into-law/

[105] Regulation - 2023/1114 - EN - MICA - EUR-LEX. (n.d.). Retrieved June 23, 2026, from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1114

[106] Financial Conduct Authority. (2026). Regulatory priorities: payments. Retrieved June 23, 2026, from https://www.fca.org.uk/publication/regulatory-priorities/payments-report.pdf

[107] Supercharged Sandbox. (2026, May 5). FCA. Retrieved June 23, 2026, from https://www.fca.org.uk/firms/innovation/supercharged-sandbox

[108] FCA announces second cohort for AI Live Testing. (2026, April 21). FCA. Retrieved June 23, 2026, from https://www.fca.org.uk/news/press-releases/fca-announces-second-cohort-ai-live-testing

	under MAS; Project BLOOM on cross-border settlement.	Model Agentic AI Framework (Jan 2026)[109] and the MindForge Toolkit[110] and Operationalisation Handbook (Mar 2026)[111] cover agent autonomy directly.
Hong Kong	Stablecoins Ordinance in force Aug 2025[112]; first issuer licences granted Apr 2026[113]; LEAP framework for tokenisation[114].	PCPD guidance flags agentic AI as a distinct privacy and security risk category; payments treatment still forming.[115]
Japan / South Korea	Japan permits yen stablecoins via amended Payment Services Act (trust-bank JPYSC due 2026)[116]; Korea advancing a won-stablecoin bill[117].	Both frame stablecoins as core payment infrastructure for machine-to-machine flows; agent-specific rules not yet drafted.
UAE	Central bank Payment Token Services Regulation (2024)[118]; dirham-pegged token already licensed; VARA, FSRA, DFSA aligned.	Posture oriented to remittance and cross-border settlement; agentic layer nascent.

6.5 The asymmetry, and the window

India's natural position at this table is unusually strong, and it is worth stating without hedging. The country runs the largest real-time retail payments system in the world; it holds an articulate, confident AI-governance posture; it has the largest grassroots crypto-adoption base on the planet; and it has a maturing VDA regime that, as shown above, already maps onto several agentic-payment requirements. The asymmetry is simply that none of this has been organised around agentic payments as a subject. The

[109] Singapore Launches New Model AI Governance Framework for Agentic AI. (2026, January 22). Retrieved June 23, 2026, from https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2026/new-model-ai-governance-framework-for-agentic-ai

[110] Project MindForge. (n.d.). Retrieved June 23, 2026, from https://www.mas.gov.sg/schemes-and-initiatives/project-mindforge

[111] MAS partners industry to develop AI Risk Management Toolkit for the financial sector. (n.d.). Retrieved June 23, 2026, from https://www.mas.gov.sg/news/media-releases/2026/mas-partners-industry-to-develop-ai-risk-management-toolkit-for-the-financial-sector

[112] Authority, H. K. M. (2026, April 10). Hong Kong Monetary Authority - Regulatory regime for Stablecoin issuers. Hong Kong Monetary Authority. Retrieved June 23, 2026, from https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/stablecoin-issuers/

[113] Authority, H. K. M. (2026b, April 20). Hong Kong Monetary Authority - Granting of stablecoin issuer licences. Hong Kong Monetary Authority. Retrieved June 23, 2026, from https://www.hkma.gov.hk/eng/news-and-media/press-releases/2026/04/20260410-4/

[114] Hong Kong's Digital Asset Policy 2.0: The "LEAP" Framework. (n.d.). Retrieved June 23, 2026, from https://www.deacons.com/2025/07/30/hong-kongs-digital-asset-policy-2-0-the-leap-framework/

[115] The PCPD Issues Alert over the Privacy Risks of OpenClaw and Agentic AI and Reminds Organisations and the Public to Use AI Safely. (n.d.). Retrieved June 23, 2026, from https://www.pcpd.org.hk/english/news_events/media_statements/press_20260316.html

[116] Experts, G. L. (n.d.). Japan Payment Services Act 2026 Guide | Global Law Experts. Global Law Experts. Retrieved June 23, 2026, from https://globallawexperts.com/japan-payment-services-act-2026-guide/

[117] Lee, S. (2025, July 23). S.Korea's ruling party gears up for won-based stablecoin legislation. KED Global. Retrieved June 23, 2026, from https://www.kedglobal.com/regulations/newsView/ked202507230002

[118] Payment Token Services Regulation | CBUAE Rulebook. (n.d.). Retrieved June 23, 2026, from https://rulebook.centralbank.ae/en/rulebook/payment-token-services-regulation

frameworks abroad are still being drafted, the standards are still open, and the distance between what India has built and what an agentic settlement layer needs is narrow and specific. The window to shape this layer rather than inherit it is open now. At the pace standards are being set elsewhere, it will not stay open for long

Section 7 | The Way Forward

Closing not with a list of prescriptions, but with the questions a policymaker would have to work through - and the one contained step that begins to answer them.

Three things should be clear by this point. Agent-initiated transactions are arriving whether or not India's rulebook is ready for them. The infrastructure best suited to carry them - money that is programmable, settles in seconds at any hour, and enforces its own spending limits - already runs in production on crypto rails, and India's FIU-supervised VDA sector is the closest domestic fit there is. And the distance between today's framework and a settlement layer agents could actually use is a short list of additions, not a rebuild. What is left is to name the questions those additions raise, roughly in the order a policymaker would have to confront them.

Agent identity and delegated authority

The first question is what a recognised agent identity should even look like in Indian financial regulation - whether it builds on W3C Verifiable Credentials, on-chain attestation, the vocabulary emerging from the NIST agent-standards work, or something anchored in the DPI stack itself. The harder question sits underneath it: can a cryptographically signed mandate - issued by a KYC-verified principal, scoped by amount, time and purpose - be treated as valid payment authorisation under the Payment and Settlement Systems Act, 2007, and as valid consent under the DPDP Act, 2023? Settle that, and most of what follows becomes tractable. Leave it open, and every exchange or bank trying to support agentic flows keeps doing it on the strength of a private legal opinion, with no traceable line back to an identified principal.

Liability when an agent acts

When an agent operating inside its mandate causes a loss - a defective purchase, a fraudulent counterparty - responsibility has to land somewhere between the principal, the developer, the platform hosting the agent, and the VASP that carried the settlement. FREE-AI's graded-liability approach extends here without much strain: strict liability for actions taken outside the mandate, a negligence standard for honest in-mandate errors, and a measure of safe harbour for rail operators that enforce the mandate at the protocol level. The useful move is to treat wallet-layer controls - spending caps, allow-lists and time bounds the rail itself enforces - the way supervision already treats maker-checker controls in banking: as a recognised mitigant rather than a curiosity. Whether a smart contract that holds and releases funds against verifiable conditions counts as an enforceable agreement under the Contract Act, 1872, and what weight its execution record should carry in court, belong in the same bundle.

A co-supervised sandbox - the one concrete step

Several of these questions are better answered with evidence than argument, and the pieces for that already exist. FREE-AI recommends an AI sandbox; the RBI, SEBI and IFSCA each run regulatory sandboxes; FIU-IND already supervises a VASP category in which every participant performs KYC, monitors transactions, and files suspicious-transaction reports. A jointly supervised pilot - RBI, SEBI and FIU-IND together, plausibly seated in GIFT IFSC under IFSCA's framework - could test agentic settlement under live supervision without reopening the broader VDA tax or classification debates at all.

WHAT A CONTAINED PILOT WOULD ACTUALLY TEST

- **Identity in practice.** Issue verifiable credentials to a small cohort of agents run by registered VASPs and their institutional clients, and measure whether counterparties and supervisors can verify identity and mandate scope reliably.
- **Enforcement at the rail.** Run agent wallets with protocol-level caps, time bounds and allow-lists, then deliberately attempt out-of-mandate transactions and record whether the rail blocks them with no application-layer help.
- **Settlement under PMLA visibility.** Settle in a regulated stablecoin or tokenised deposit with full Travel Rule and STR coverage, to see whether existing reporting actually captures agent-to-agent flow.
- **Dispute and audit.** Stage mandate breaches and counterparty defaults; compare resolution time and evidentiary quality against a card-rail control group, and draft the graded-liability scale on incidents rather than analogy.

The design choices are narrow and answerable: where the pilot should sit, and what caps on transaction size, participant count and instruments would let it generate real evidence while keeping consumer exposure at zero.

The INR question being decided by default

Underneath all of this is a currency question India has not formally taken up. If the country sets no posture on programmable rupee money - some sequencing across the e-rupee, tokenised bank deposits, and eventually licensed INR stablecoins - then agentic settlement involving Indian users and Indian agents will, in practice, route through USDC and USDT. The data, the tax visibility and the standards-setting leverage travel with it, offshore. For tokenised deposits and the e-rupee the near-term question is which programmability primitives - conditional release, mandate enforcement, escrow - those instruments must expose to be usable by an agent at all; for INR stablecoins, whether issuance should follow Hong Kong's bank-first sequencing, the GENIUS Act's licensed non-bank route, or a hybrid. Either way, the cost of continued non-decision is a real number, and it is being paid now.

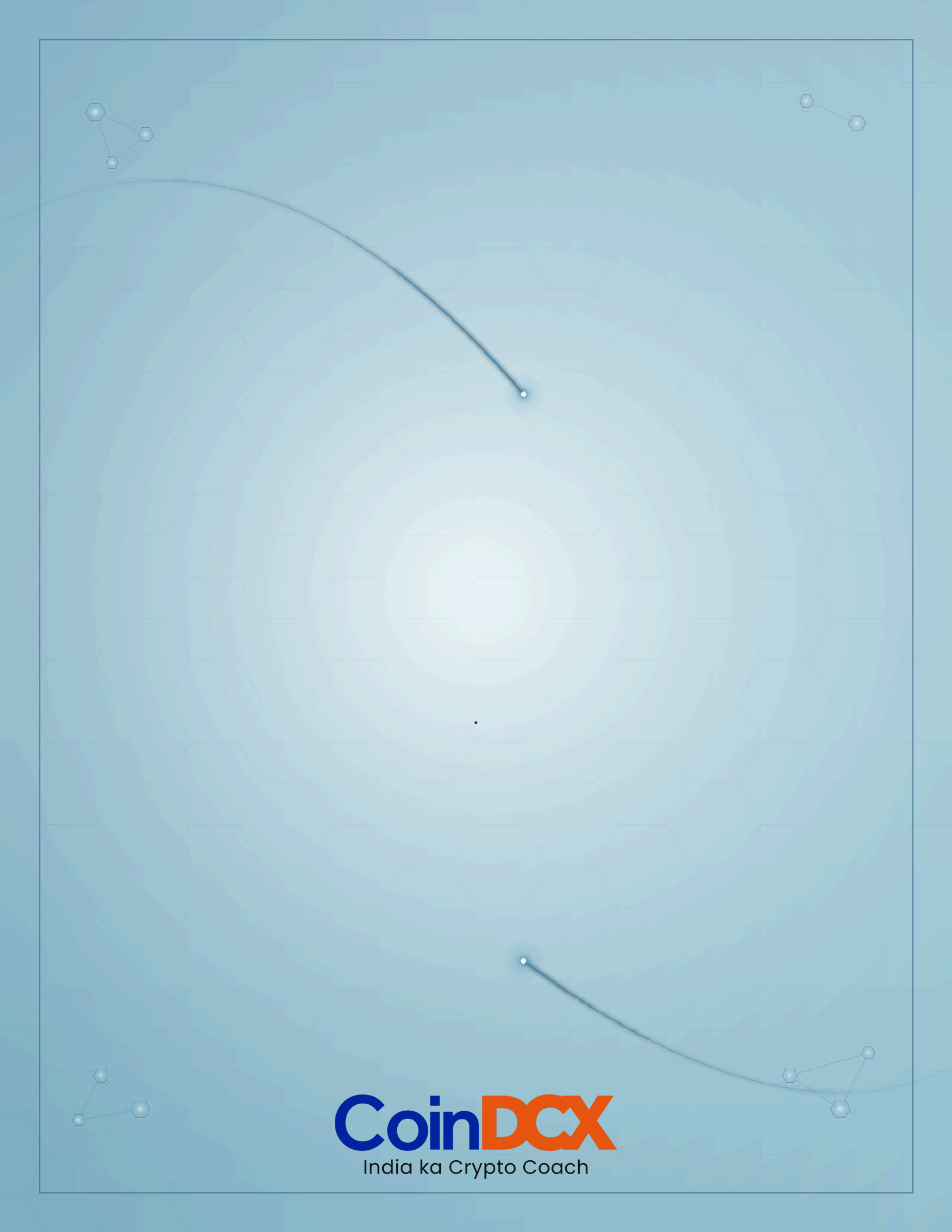
India's seat at the table

The standards are being written as this is read, and mostly without India in the room. NPCI International, the proposed AIGG, the sectoral regulators and the industry bodies have a credible claim to observer or member positions in the x402 Foundation, the BIS CPMI workstreams on agentic payments, and the NIST process - and the ISO 20022 depth India built through UPI bears directly on the one part of that work that is genuinely unfinished: the bridge between bank-messaging standards and on-chain settlement messages. The same logic points inward. The next iterations of India's own DPI - UPI, Account Aggregator, ONDC — could specify agent-facing primitives for identity, delegation proof and machine-readable mandates, so that the fiat and VDA rails converge on common Indian standards instead of drifting into separate stacks.

An invitation, not a verdict

None of this requires settling the debates that have occupied India's crypto-policy conversation for five years - the tax treatment of VDAs, their classification as security, commodity or currency, the eventual shape of the COINS Act. It asks for something smaller and more urgent: recognising that a new class of economic actor has arrived, that it already transacts on infrastructure India regulates, and that the country can either write the

terms of its participation or inherit them ready-made. This report is offered as a starting framework for that conversation - to the regulators weighing where the supervisory perimeter should fall, to the payment-system operators deciding which workloads belong on which rails, and to the builders who will make whatever is permitted. The agent economy will need its trust and settlement primitives regardless of what India decides. The only open question is whether they carry an Indian signature - and the window in which that question stays open is measured in quarters, not years. It is open now.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