The Keystone Foundation: Decentralized Identity in the Web3 Telco Era
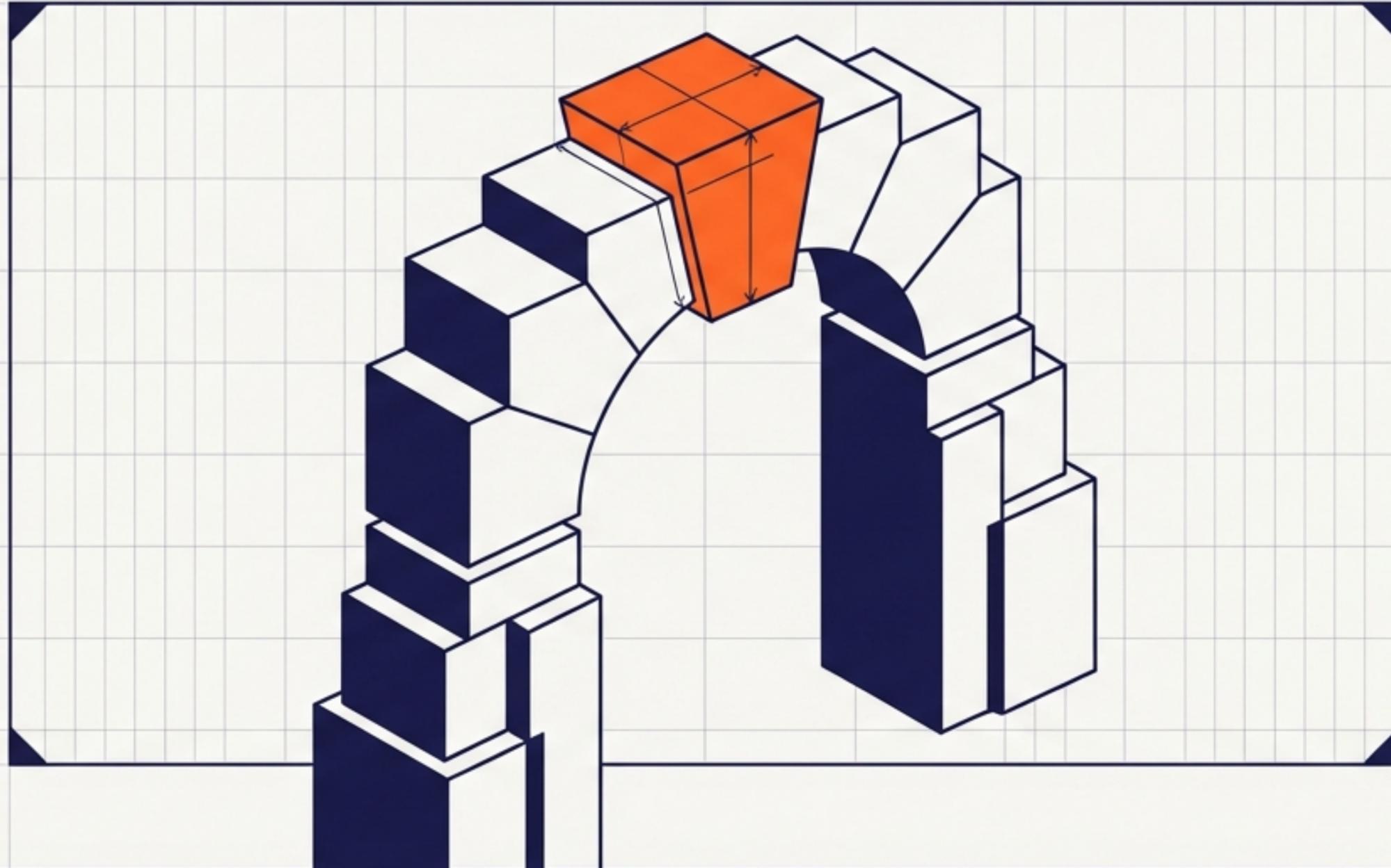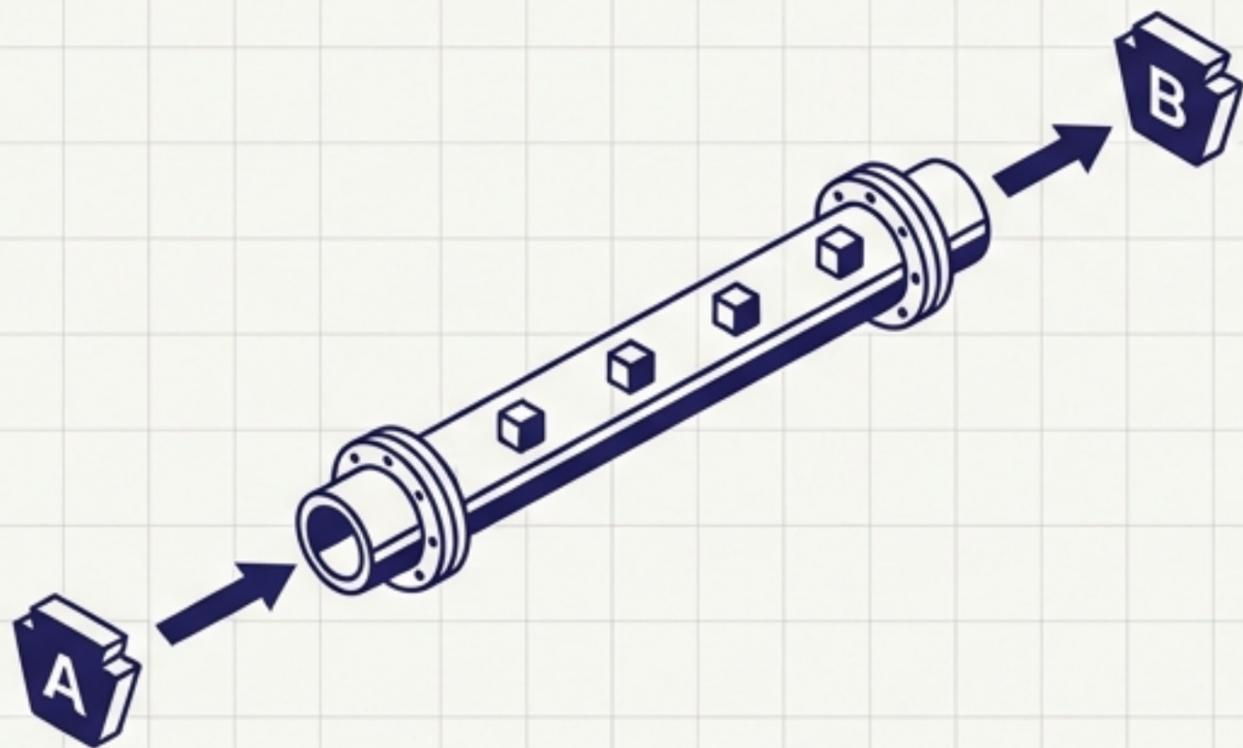
Orchestrating Trust, 5G Standalone, and AI.

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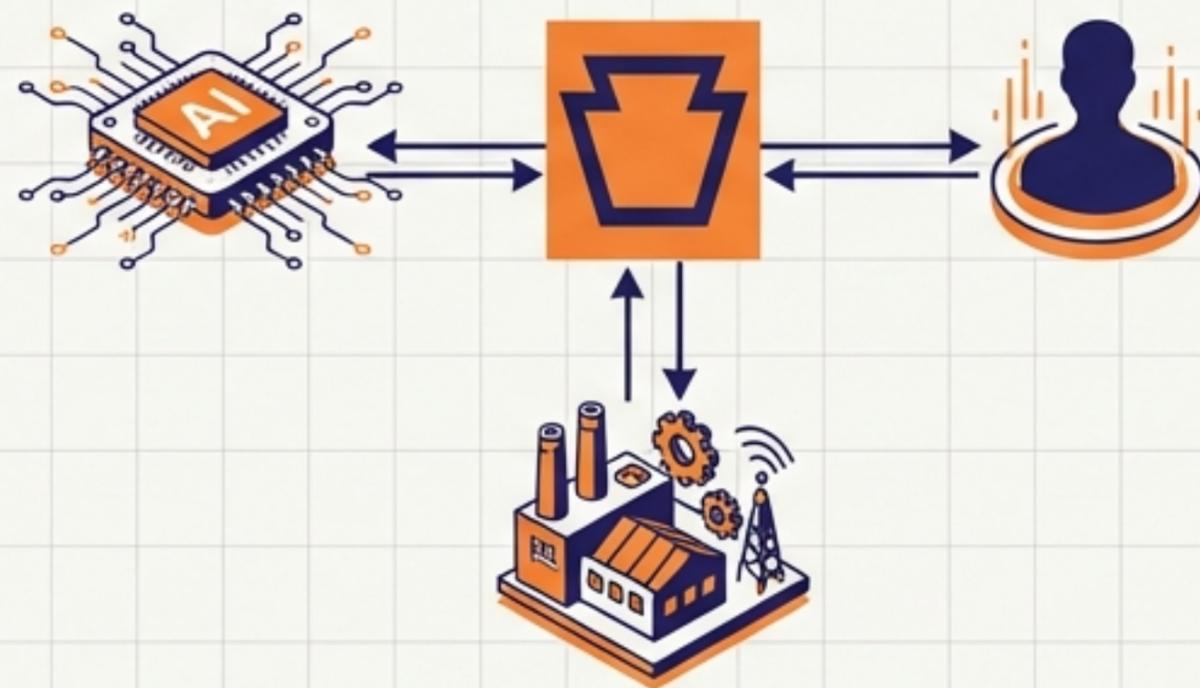# The Paradigm Shift: From Pipe to Platform

Legacy models have reached diminishing returns. MNOs must pivot to a sovereign identity layer to reclaim value.

The Past: Connectivity Gatekeeper

Centralized identity management. Vulnerable databases. Diminishing connectivity revenues.

The Future: Orchestrator of Digital Trust

Decentralized architecture. Trustless Web3 interactions. Monetizable sovereign identity layer.
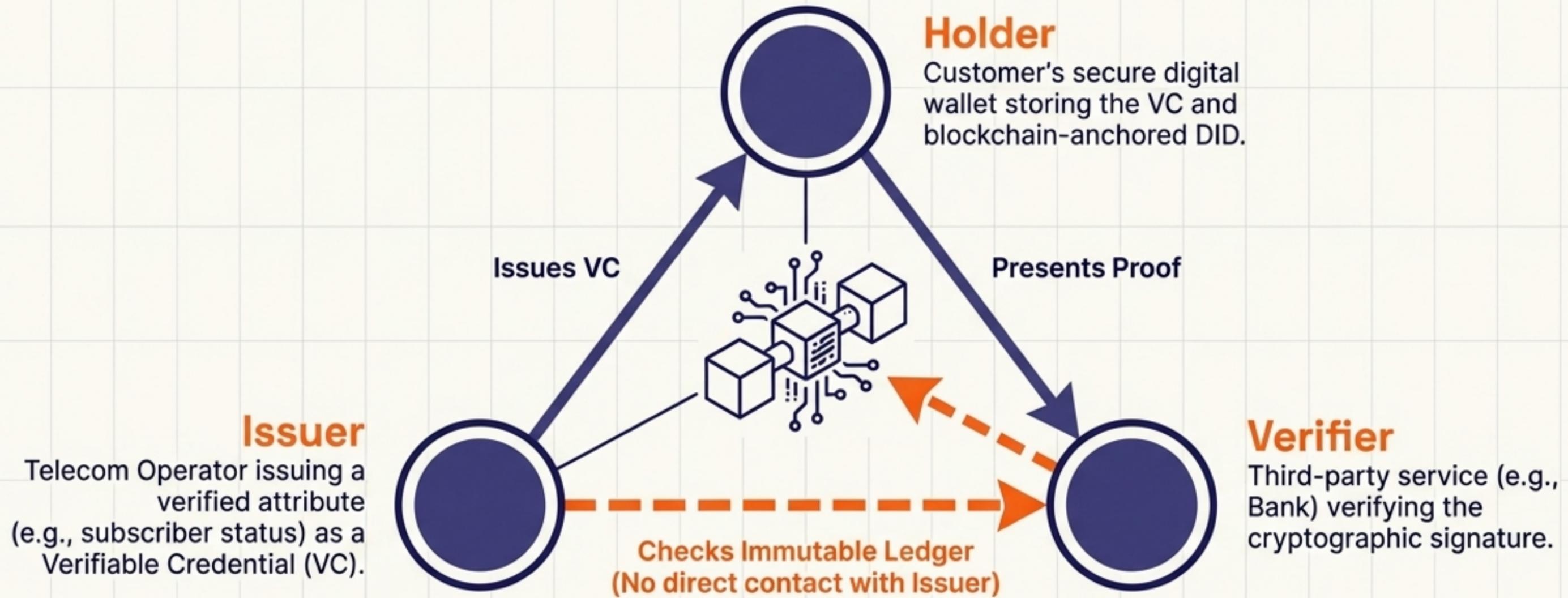
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The Identity Evolution

Shifting from a model that stores user data to a model that cryptographically verifies it.

Dimension	Web2 (Legacy)	Web3 (Decentralized)
Architecture	Centralized & Siloed Databases	Decentralized & Portable Ledgers
Authentication	Passwords & SMS OTPs (Vulnerable Honey Pots)	Cryptographic DIDs & Secure Hardware Wallets
Privacy & Control	Third-party controlled & monetized	User-centric with selective disclosure

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The Mechanics of Trust

Cryptographic verification without contacting the issuer directly preserves privacy and eliminates API bottlenecks.

Holder
Customer's secure digital wallet storing the VC and blockchain-anchored DID.

Issues VC

Presents Proof

Issuer
Telecom Operator issuing a verified attribute (e.g., subscriber status) as a Verifiable Credential (VC).

Verifier
Third-party service (e.g., Bank) verifying the cryptographic signature.

Checks Immutable Ledger (No direct contact with Issuer)

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The Hardware Anchor: TEEs & The Keystone Framework

Software DIDs require hardware anchors. Executing applications in isolated environments drastically reduces the OS-level attack surface.

Application Layer
Wallets / DIDs

Device OS
Android / iOS

Hardware Root of Trust
Trusted Execution Environments (TEEs) & RISC-V

Hardware Anchor

Trusted Execution Environments (TEEs) & RISC-V
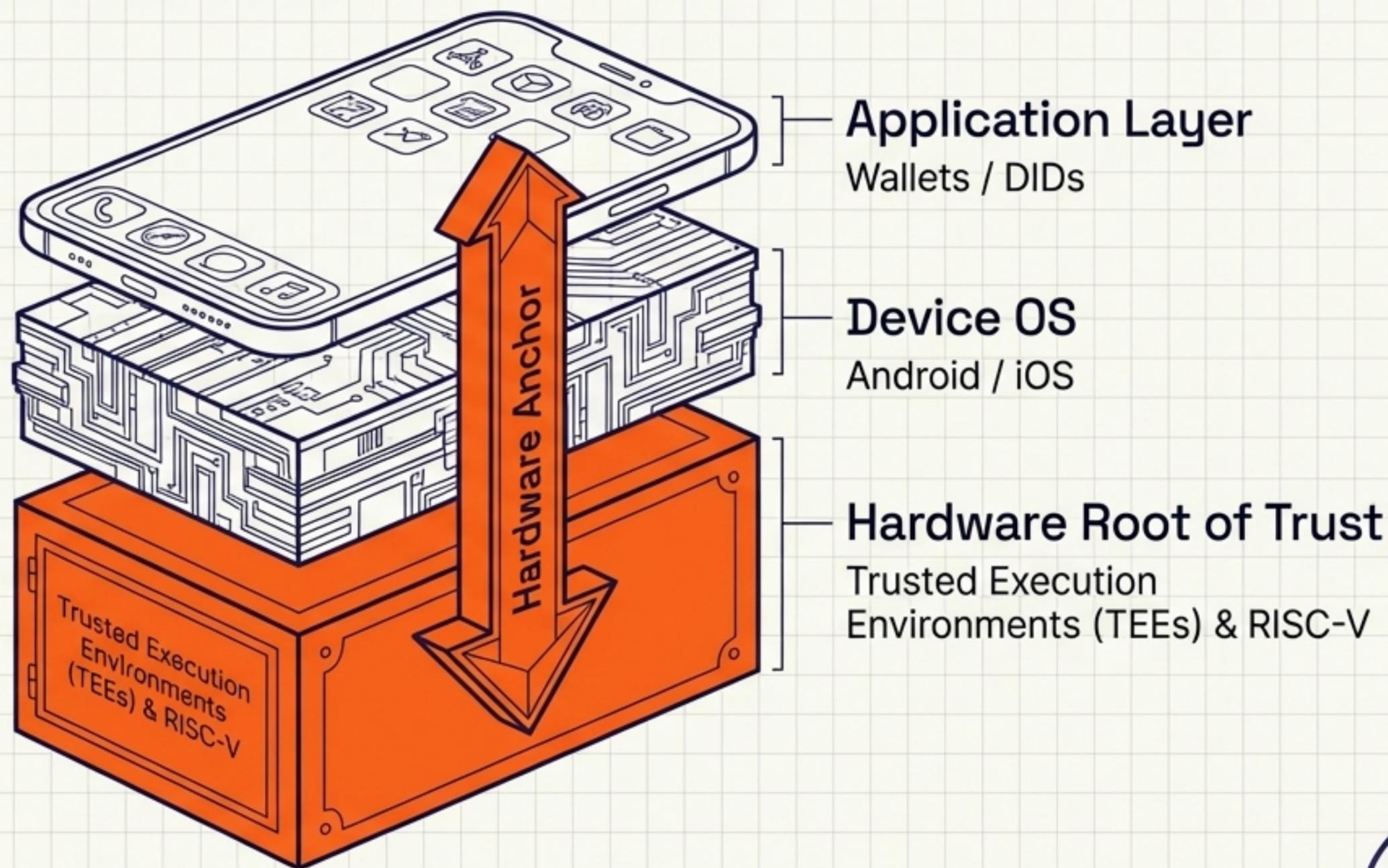
The Catalyst: 5G Standalone & Open APIs

5G SA provides a cloud-native, service-based core. This enables dynamic slicing and real-time identity verification.

Metric	5G Non-Standalone (NSA)	5G Standalone (SA)
Core Network	Legacy 4G Core	Dedicated 5G Core
Architecture	Hybrid	Cloud-Native; Service-Based
API Exposure	Restricted	Extensive (GSMA Open Gateway)

$60 Billion

Projected annual revenue added to the global mobile industry by 2030 through 5G SA premium experiences and network slicing.

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The Telecom Decentralized Identity Network (TDIDN)

By adopting DIDs and distributed ledgers, operators create an immutable, shared truth across borders without a centralized authority.
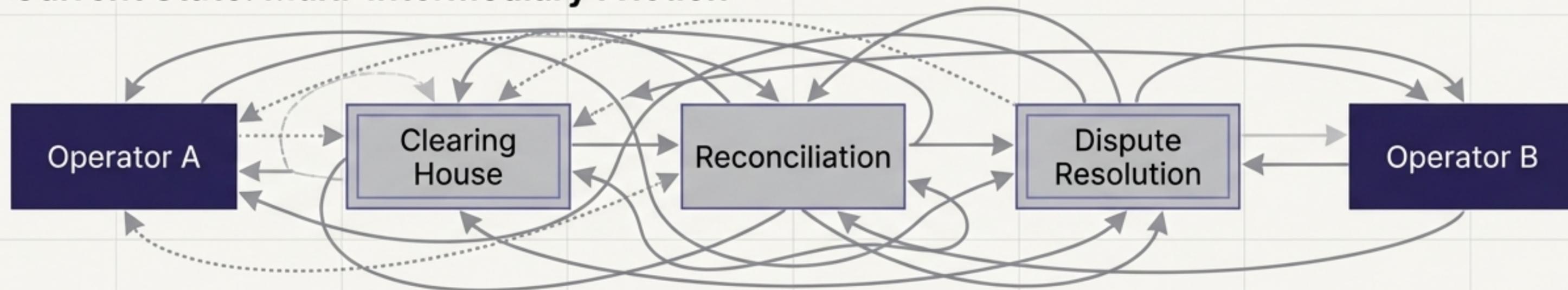

Breaking Down Silos

Hyperledger Indy/Aries protocols replace fragmented databases with a unified, privacy-enhancing trust layer.
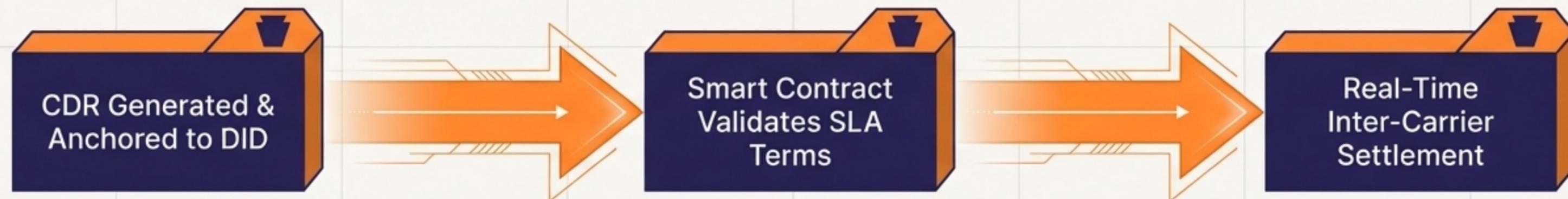
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Operational Transformation: Roaming & Settlements

Call Detail Records tied to DIDs enable smart contracts to automatically validate SLAs, ensuring transparent, real-time clearing.

Current State: Multi-Intermediary Friction

Operator A → Clearing House → Reconciliation → Dispute Resolution → Operator B

TDIDN Future: Automated Smart Contracts

CDR Generated & Anchored to DID → Smart Contract Validates SLA Terms → Real-Time Inter-Carrier Settlement

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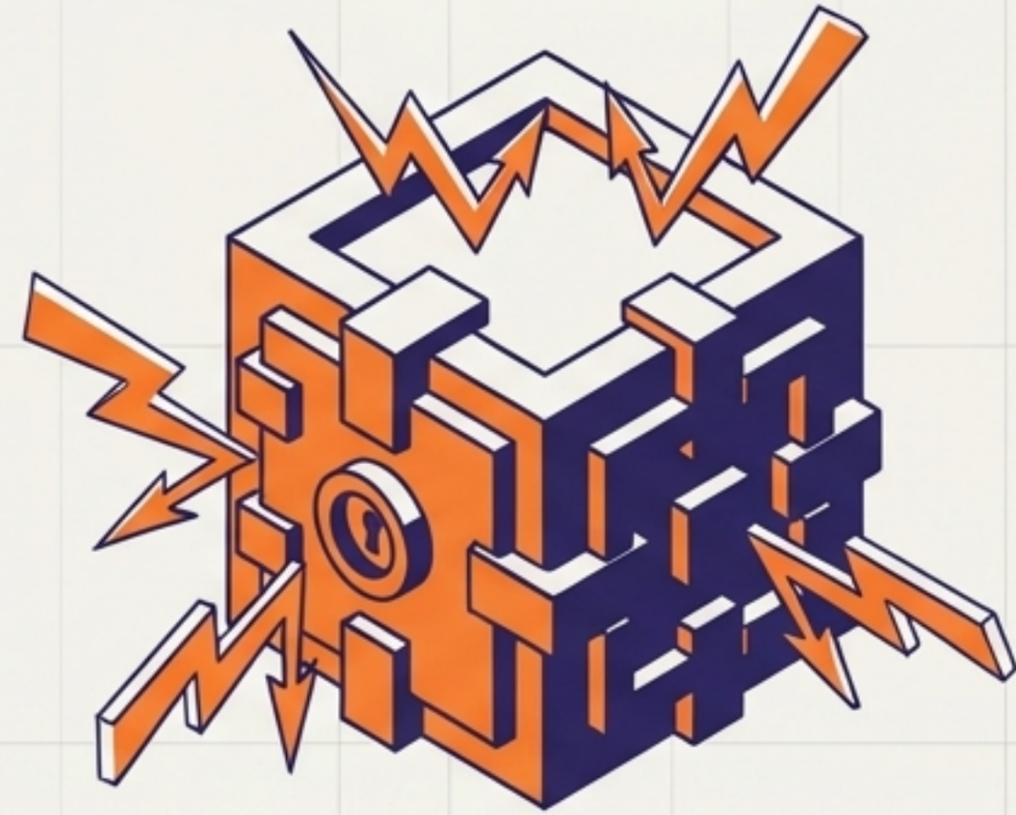
Enhancing Security: Killing the OTP

Replacing vulnerable honey pots with hardware-anchored cryptography.

Legacy Vulnerability
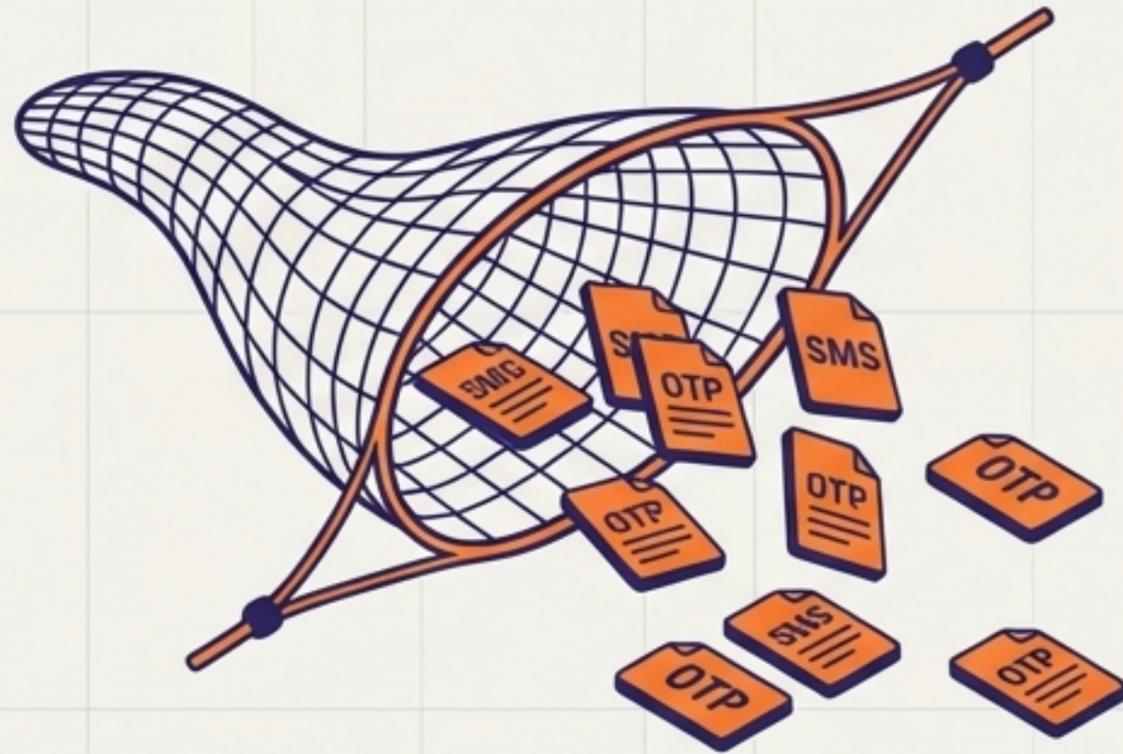
Centralized databases and SMS-based One-Time Passwords are high-value targets, highly susceptible to phishing, spam, and SIM-swap fraud.
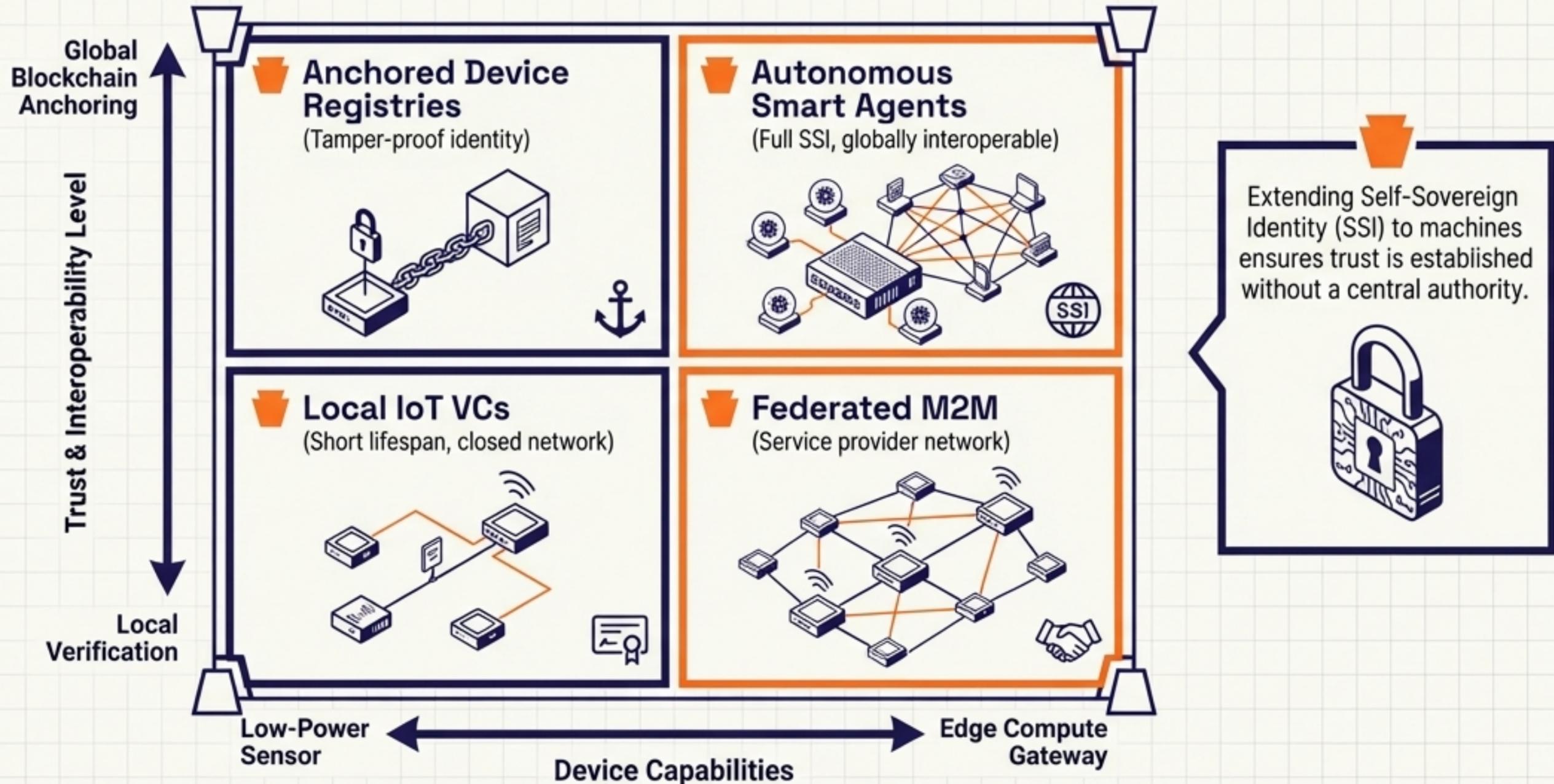
Decentralized Security

Hardware-anchored DIDs eliminate centralized honey pots. Hackers are forced to attempt impossible simultaneous breaches of distributed nodes.

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Scaling to the IoT Ecosystem

Using DIDs to establish secure device registries, eliminating siloed IMEI databases and securing M2M communications at the edge.

Global Blockchain Anchoring

Trust & Interoperability Level

Local Verification

Anchored Device Registries
(Tamper-proof identity)

Autonomous Smart Agents
(Full SSI, globally interoperable)

Local IoT VCs
(Short lifespan, closed network)

Federated M2M
(Service provider network)

Extending Self-Sovereign Identity (SSI) to machines ensures trust is established without a central authority.

Low-Power Sensor

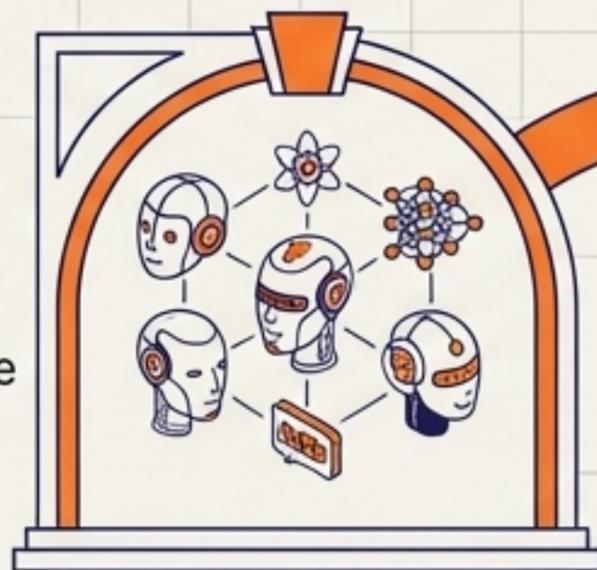**Edge Compute Gateway**

Device Capabilities

The Engine of Transformation: Data & AI

Decentralizing data ownership and offering edge compute positions operators as foundational enablers of the human-centric AI economy.
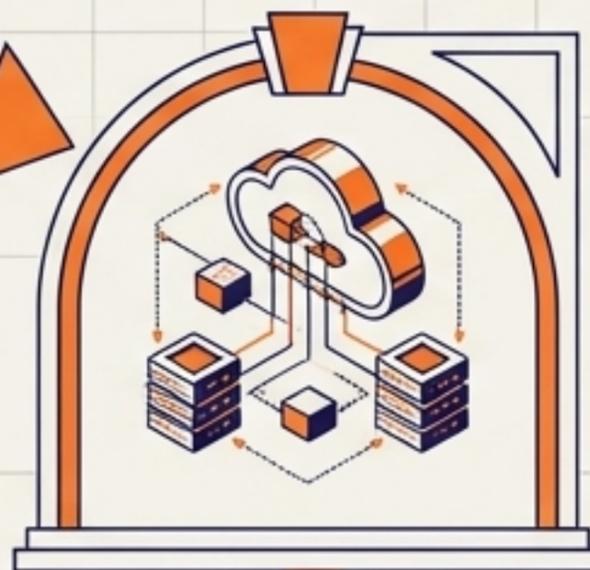
AI Models & Agents

- Agentic AI workflows
- Predictive network maintenance
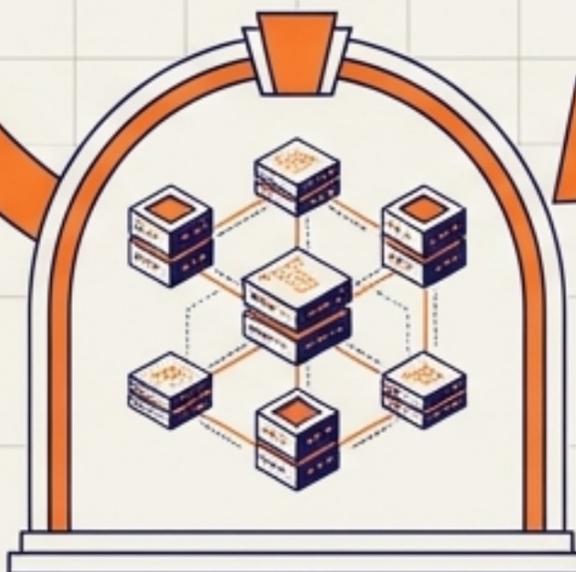- Human-centric interactions

Telco Data

- Real-time network telemetry
- Uniquely rich location insights
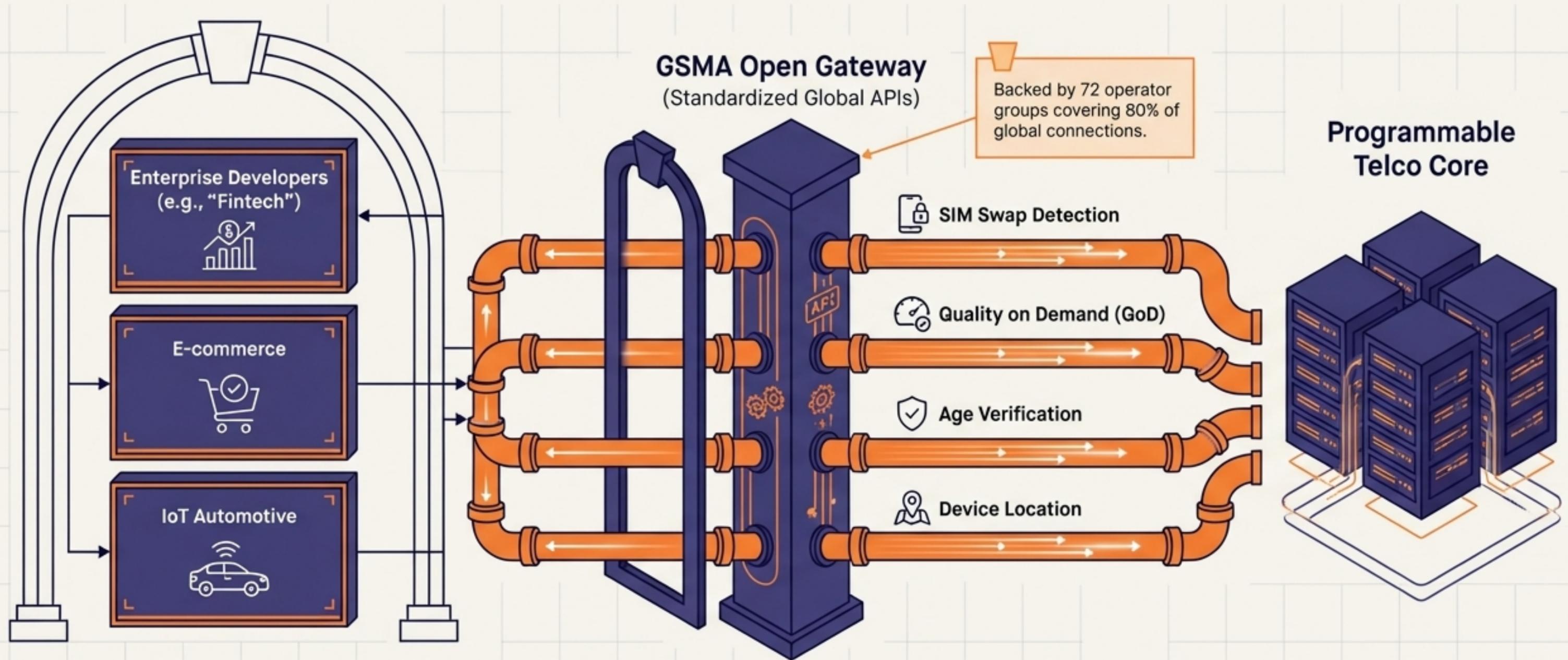- Privacy-preserving Data Mesh

Edge Compute Infrastructure

- Distributed compute power
- Low-latency processing
- Localized AI execution

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Monetizing the Network: GSMA Open Gateway & CAMARA

Transforming the network into a programmable platform. Selling new trust and identity capabilities to developers.

GSMA Open Gateway
(Standardized Global APIs)

Backed by 72 operator groups covering 80% of global connections.

Programmable Telco Core

Enterprise Developers (e.g., "Fintech")

E-commerce

IoT Automotive

SIM Swap Detection

Quality on Demand (QoD)

Age Verification

Device Location

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Building the First Person Trust Graph

Standardizing the Trust Spanning Protocol to connect isolated trust ecosystems into a worldwide digital utility.

Diverse Trust Applications
(Wallets, VCs, Smart Contracts)

Hourglass Model

Trust Spanning Protocol (TSP)

The Trust over IP (ToIP) Framework

Just as TCP/IP connected isolated data networks, TSP allows decentralized trust networks to operate across borders, establishing a global First Person Trust Graph.

Diverse Transport Networks
(5G, TCP/IP, Bluetooth)

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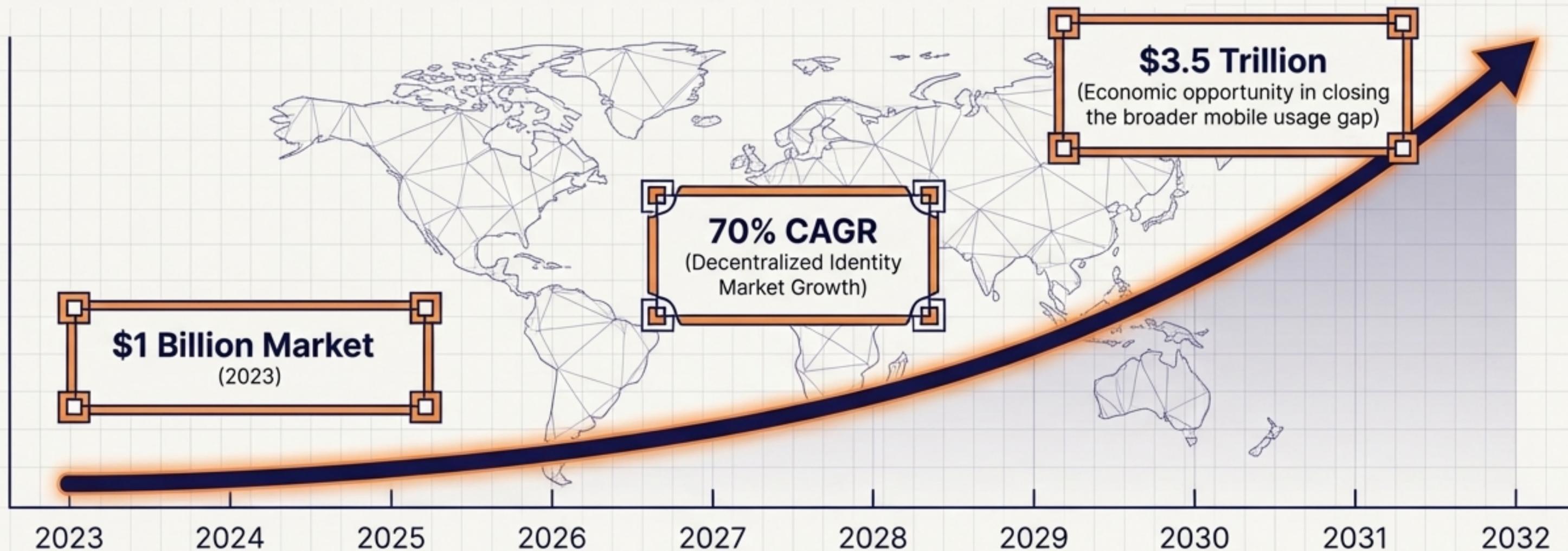# Synthesis: The Complete 5G Web3 Architecture

5G is the integration of standalone core networks, open APIs, and a sovereign identity layer unlocking digital value.

The Orchestration of Digital Trust

- AI, IoT, & Enterprise Applications
- Decentralized Identity (TDIDN & ToIP)
- GSMA Network APIs (CAMARA)
- 5G Standalone (Cloud-native service core)
- Hardware Root of Trust (TEEs, RISC-V)
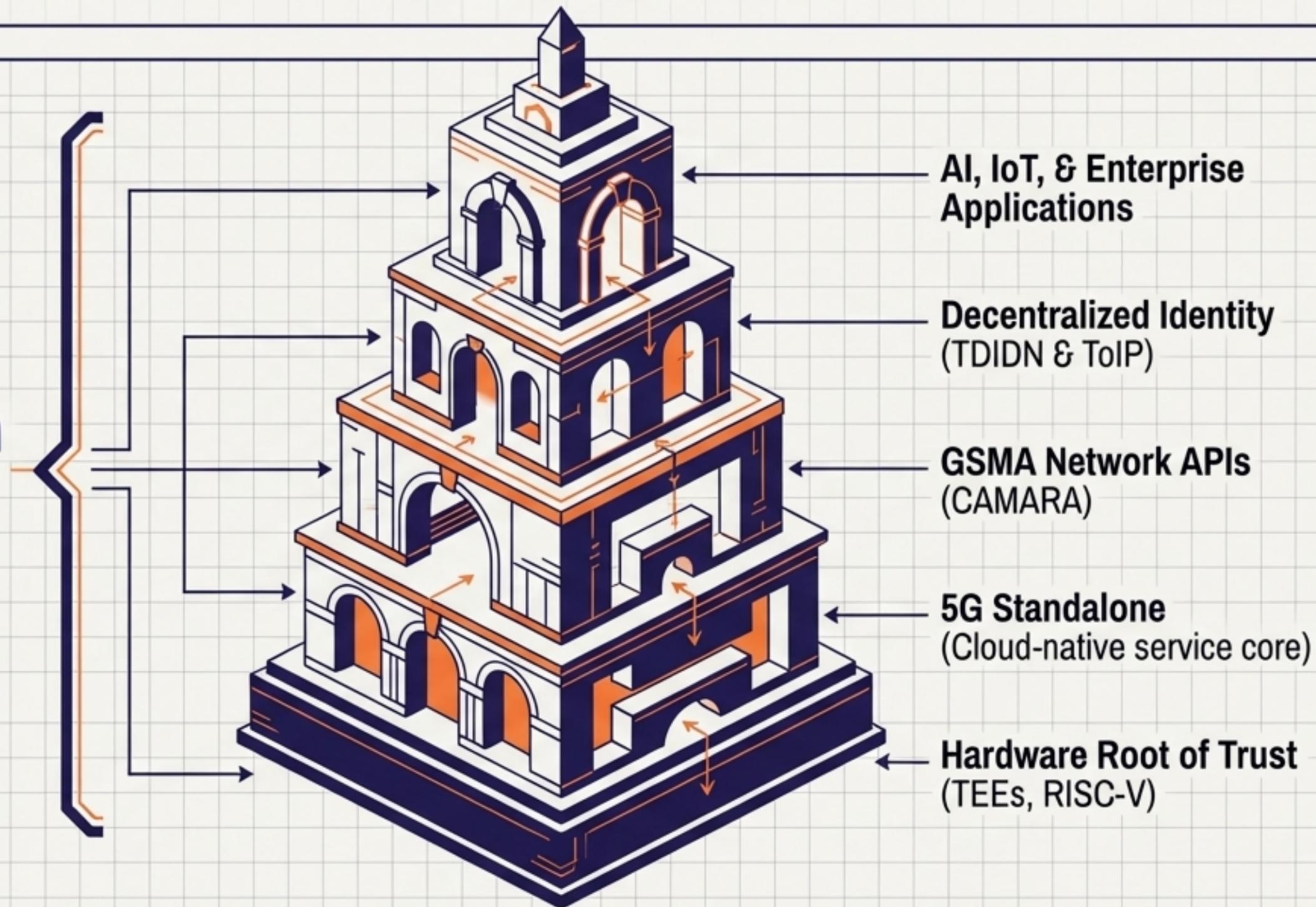
Conclusion & Economic Outlook

Orchestrating the Trust Economy: Telcos must adopt 5G SA and leverage DCI to secure their position in the next revolution.

$3.5 Trillion
(Economic opportunity in closing the broader mobile usage gap)

70% CAGR
(Decentralized Identity Market Growth)

$1 Billion Market
(2023)

2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

The strategic mandate: Embrace open standards (CAMARA, W3C) and transition from connectivity providers to platform players.

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