TELEPORT ACCESS PROTOCOL

An Internet-Native Payment Protocol for Accessing Spatial Data Using PORT Tokens

Version 1.0 — March 2026

Teleport

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1. Abstract

The Teleport Access Protocol (TAP) is a payment-gated access standard that enables developers, companies, and autonomous AI agents to pay for Teleport's spatial data services using PORT tokens, USDC, and other supported digital currencies. TAP leverages the HTTP 402 status code to enable frictionless, programmatic payments between clients and servers, purpose-built for access to 360-degree imagery, 360-degree video, geospatial datasets, and other immersive content APIs.

TAP eliminates traditional API billing friction such as account creation, credit card processing, subscription management, and API key provisioning. Instead, any HTTP request to a TAP-enabled endpoint that lacks valid payment receives an HTTP 402 response containing pricing and payment instructions. The client then signs and submits a token payment, which is verified on-chain before the API response is served.

While TAP accepts multiple payment tokens, PORT is the preferred currency of the Teleport ecosystem. API consumers who pay with PORT receive a significant discount — launching at 50% off standard pricing and following a predetermined annual reduction schedule down to 25%. This discount model, inspired by proven exchange token economics, incentivizes PORT adoption without creating a hard barrier to entry for developers who prefer to pay with USDC or other stablecoins.

PORT tokens serve a dual role: they are the preferred medium of exchange for API access and the reward mechanism for content creators who capture and submit 360-degree content to the Teleport network. PORT is strictly a utility token — its sole purpose is to facilitate access to services within the Teleport ecosystem and to compensate contributors who expand the spatial data library. PORT does not represent equity, ownership, profit-sharing rights, or any claim on the assets or revenue of Teleport. This creates a self-reinforcing token economy where demand for data drives utility to content producers, and high-quality content attracts more API consumers.

2. Introduction & Motivation

2.1 The Problem with Traditional API Payments

Today's API economy relies on payment systems that were designed for human-driven e-commerce, not machine-to-machine transactions. Credit card processors impose minimum transaction amounts (often $0.50 or more), charge percentage-based fees (2.9% + $0.30 is typical), require KYC onboarding, and introduce settlement delays of days or weeks. These constraints make micropayments impractical, exclude autonomous AI agents from participating as API consumers, and create unnecessary friction for developers who simply want to access a data endpoint.

2.2 The HTTP 402 Opportunity

The HTTP protocol already contains a built-in mechanism for payment-gated content: the 402 Payment Required status code, reserved since HTTP/1.1 but never formally utilized for programmable payments. TAP activates this code to create a universal handshake—when a server requires payment, it responds with 402 plus machine-readable payment instructions. The client pays, attaches proof, and retries the request. No accounts, no API keys, no subscriptions. TAP implements this paradigm with PORT token-specific semantics, multi-chain settlement, and pricing models tailored to spatial data.

2.3 Why PORT Tokens?

PORT tokens are the native utility token of the Teleport ecosystem. Currently deployed as an ERC-20 token on Ethereum, PORT serves two critical functions: it is the preferred payment currency for API access and the reward currency for users who capture or submit 360-degree content. PORT is classified as a utility token — it exists solely to enable access to and participation in the Teleport network. It confers no equity, no ownership stake, no profit-sharing rights, and no claim on Teleport's assets or revenue.

TAP accepts multiple payment tokens — including USDC, ETH, and other supported assets — to minimize adoption friction. However, PORT holders receive preferential pricing: a discount that launches at 50% off the standard USDC rate, declining annually on a predetermined schedule to a floor of 25%. This structure removes the barrier to entry (any developer can try the API with USDC they already hold) while creating strong economic incentive to adopt PORT for ongoing usage. As API demand increases, PORT utility grows, which in turn incentivizes more content capture, expanding the dataset and attracting more consumers.

3. Protocol Overview

TAP operates as a middleware layer between API consumers and Teleport's data services. The protocol defines three primary components:

TAP Middleware: A server-side middleware that intercepts incoming HTTP requests, checks for valid PORT payment headers, and either gates or grants access to the underlying API. Integration requires a single line of configuration per endpoint.

TAP Verifier: A verification and settlement service that validates PORT token payment signatures, confirms on-chain transaction finality, and settles funds to Teleport's treasury. The verifier supports multiple blockchain networks and abstracts chain-specific logic from the API layer.

TAP Client SDK: Client libraries (JavaScript/TypeScript, Python, Go) that handle the 402 handshake automatically—detecting payment requirements, selecting the optimal payment token, constructing transactions, signing with the user's wallet, and retrying requests with payment proof attached.

Server-Side Integration (Single Line)

```
app.use(tapMiddleware({
  "GET /360-images/:id": {
    price: "50 USDC",
    accepts: ["PORT", "USDC", "ETH"],
    portDiscount: 0.50, // 50% off at launch
    chains: ["ethereum", "base", "solana"],
    description: "High-res 360 image"
  },
  "GET /datasets/:name": {
    price: "500 USDC",
    accepts: ["PORT", "USDC"],
    portDiscount: 0.50,
    chains: ["ethereum", "base"],
    description: "Geospatial dataset download"
  }
}));
```

4. Protocol Flow

The following sequence diagram illustrates the complete lifecycle of a Port-gated API request, from initial request through on-chain settlement to content delivery:
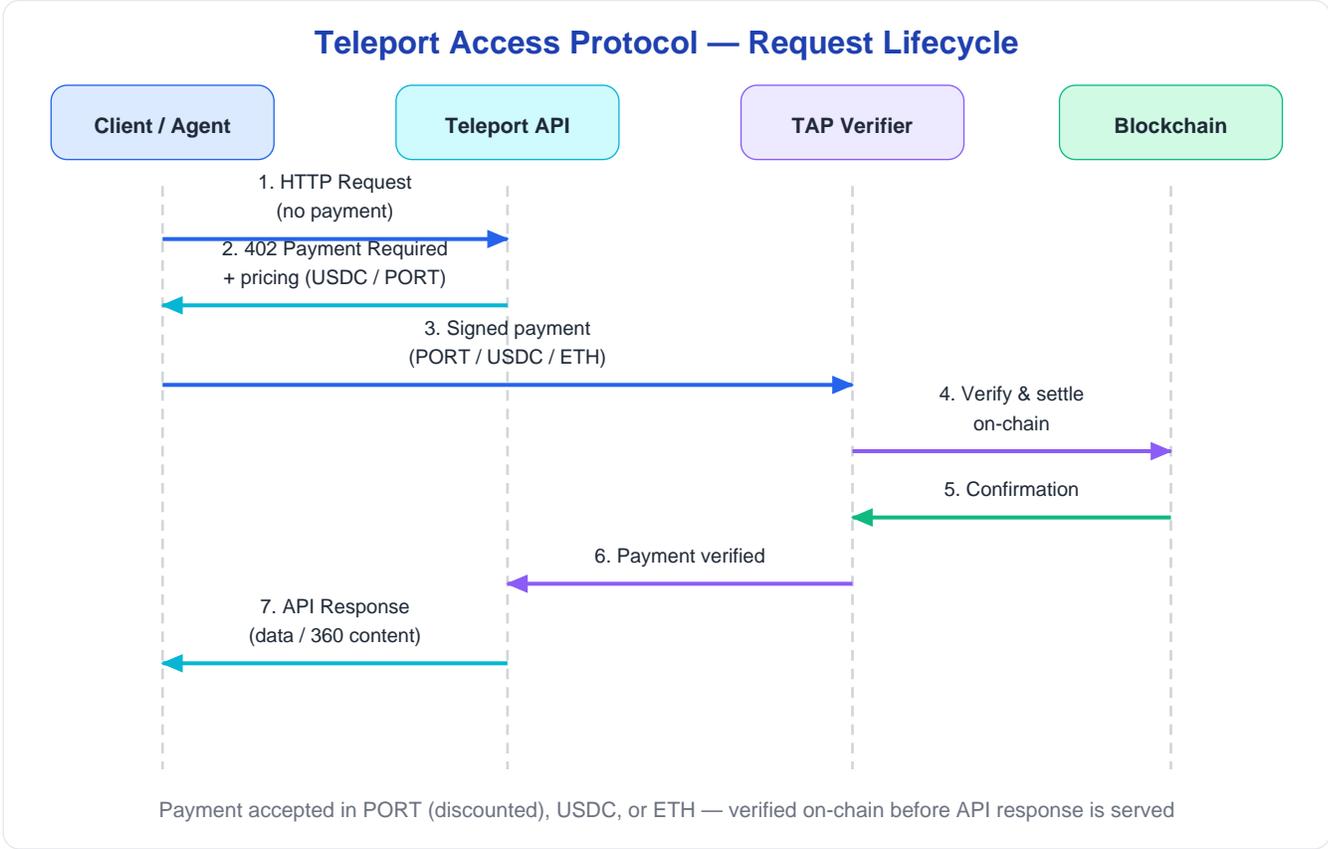
Teleport Access Protocol — Request Lifecycle

Client / Agent	Teleport API	TAP Verifier	Blockchain

1. HTTP Request
(no payment)

2. 402 Payment Required
+ pricing (USDC / PORT)

3. Signed payment
(PORT / USDC / ETH)

4. Verify & settle
on-chain

5. Confirmation

6. Payment verified

7. API Response
(data / 360 content)

Payment accepted in PORT (discounted), USDC, or ETH — verified on-chain before API response is served

Figure 1: TAP Protocol Flow — 7-step request lifecycle from initial HTTP request to content delivery.

Step-by-Step Walkthrough

Step	Action	Description
1	HTTP Request	Client sends a standard HTTP request to a TAP-enabled endpoint without any payment headers.
2	402 Response	Server returns HTTP 402 with a TAP-Payment-Required header containing pricing in USDC (base) a
3	Signed Payment	Client selects their preferred payment token, constructs the transfer transaction, signs it with their wa
4	On-Chain Settlement	TAP Verifier broadcasts the transaction to the appropriate blockchain and waits for confirmation.
5	Confirmation	Blockchain confirms the transaction; Verifier receives the receipt.
6	Verification	Verifier notifies the API server that payment is confirmed and valid.
7	API Response	Server delivers the requested content (360 image, video stream, dataset, etc.) to the client.

5. System Architecture

The system architecture is designed for modularity, chain-agnosticism, and horizontal scalability. The following diagram shows how clients, middleware, API services, the verifier, and blockchain networks interconnect:
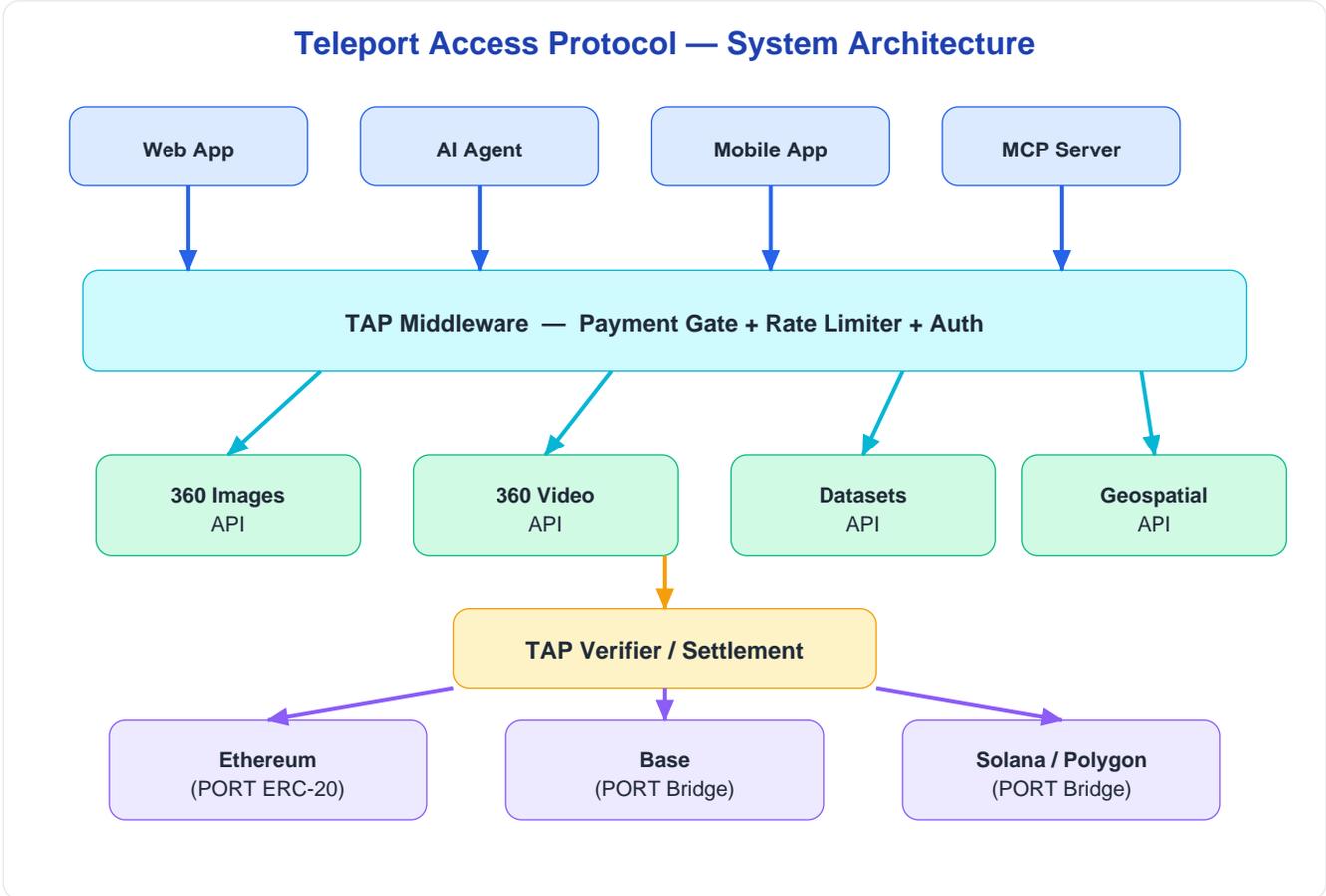

Figure 2: Teleport Access Protocol — System Architecture — from client applications through middleware to blockchain settlement.

5.1 Middleware Layer

The TAP Middleware sits in front of all Teleport API endpoints. It inspects incoming requests for a valid X-TAP-Payment header. If the header is missing or invalid, the middleware returns HTTP 402 with machine-readable pricing in both USDC (base rate) and PORT (discounted rate), along with a list of accepted tokens and chains. If valid, the request passes through to the underlying service. The middleware also enforces rate limiting, request logging, and optional tiered pricing based on PORT staking levels.

5.2 API Services

Teleport exposes four primary API service categories: the 360 Images API for high-resolution equirectangular imagery; the 360 Video API for immersive video streams and downloads; the Datasets API for bulk geospatial data exports; and the Geospatial API for location-based queries, metadata, and spatial search. Each service defines its own PORT pricing, and new services can be added without modifying the protocol itself.

5.3 Verifier & Settlement

The TAP Verifier is a dedicated microservice responsible for validating payment signatures, broadcasting transactions to the appropriate blockchain, monitoring confirmation status, and returning settlement receipts to the middleware. It maintains chain-specific adapters for Ethereum, Base, Polygon, and Solana, and can be extended to support additional networks as PORT bridges are deployed.

6. PORT Token Economy

The PORT token economy creates a virtuous cycle linking API consumers, content creators, the Teleport treasury, and governance participants. The following diagram illustrates the circular flow of value:
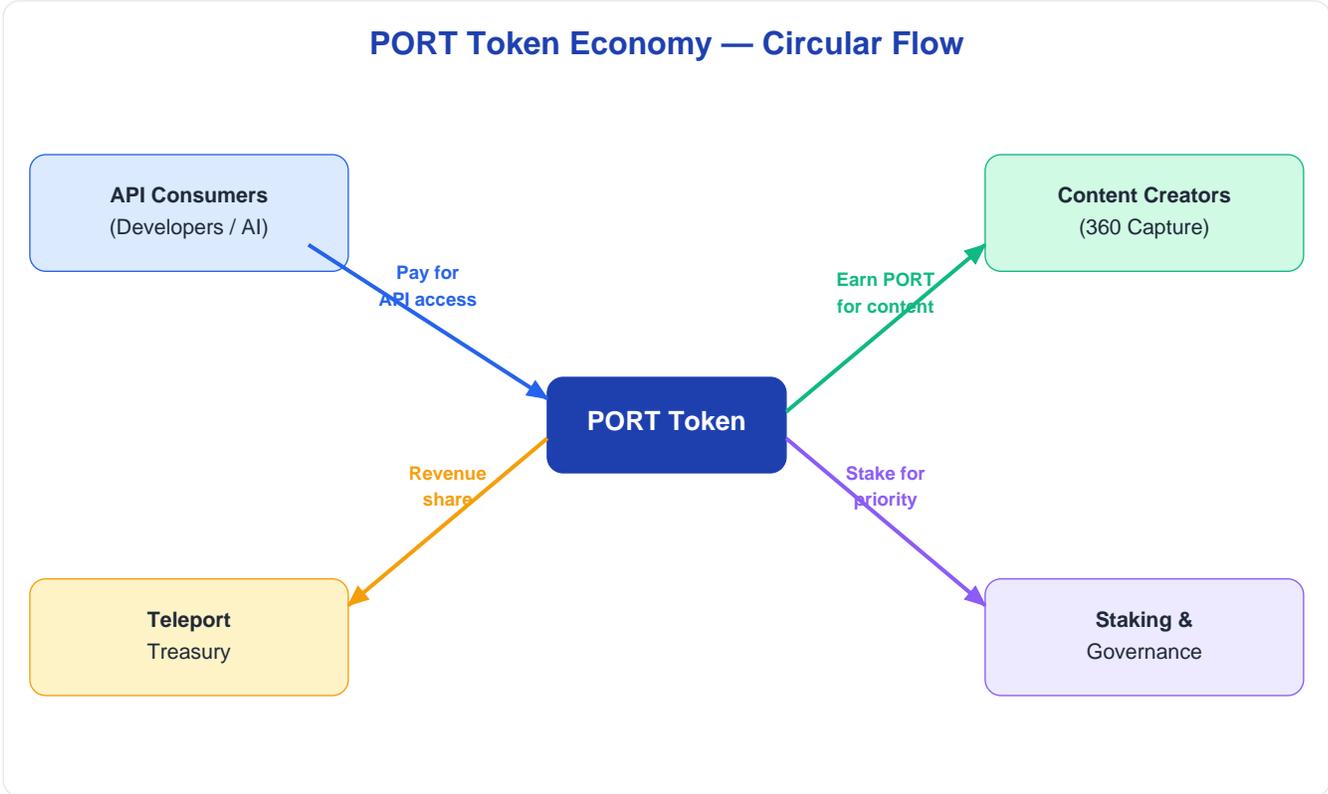

PORT Token Economy — Circular Flow

Figure 3: PORT Token Economy — circular flow between consumers, creators, treasury, and governance.

6.1 Demand Side: API Consumers

Developers, companies, and AI agents can pay for API access using PORT, USDC, ETH, or other supported tokens. However, PORT offers the best pricing — launching at a 50% discount over USDC base rates, with the discount tapering annually to a permanent floor of 25%. This creates a natural pull toward PORT: developers can try the API with tokens they already hold, then migrate to PORT as usage grows and the cost savings compound.

6.2 PORT Discount Schedule

The PORT discount follows a predetermined annual reduction schedule, designed to maximize early adoption incentives while converging toward a sustainable long-term rate:

Year	PORT Discount	Effective PORT Price	Rationale

Year 1	50%	Half of USDC base rate	Maximum incentive to bootstrap PORT adoption
Year 2	40%	60% of USDC base rate	Sustained incentive as ecosystem grows
Year 3	35%	65% of USDC base rate	Gradual normalization
Year 4	30%	70% of USDC base rate	Approaching long-term equilibrium
Year 5+	25%	75% of USDC base rate	Permanent floor — PORT always cheaper

The discount schedule is encoded in the TAP Middleware configuration and adjustable via governance vote. PORT stakers may vote to modify the schedule in response to market conditions, competitive pressure, or ecosystem growth targets. Non-PORT payments (USDC, ETH) are converted to their PORT equivalent at the prevailing market rate via an on-chain oracle, ensuring that Teleport's treasury accumulates revenue regardless of which token the consumer chooses to pay with.

6.3 Supply Side: Content Creators

Users who capture 360-degree images and videos and submit them to the Teleport network earn PORT tokens as rewards. Reward amounts scale with content quality, coverage novelty (capturing underserved areas earns more), and verification status. This incentive structure ensures continuous growth of Teleport's spatial data library.

6.4 Treasury & Revenue Share

A portion of API payment revenue flows to the Teleport treasury to fund protocol development, infrastructure costs, and ecosystem grants. The treasury may also implement a burn mechanism or buyback program to manage token supply dynamically.

6.5 Staking & Governance

PORT holders can stake tokens to receive priority API access (lower latency, higher rate limits), participate in governance votes on pricing changes, new chain deployments, and content reward parameters, and earn staking yields funded by a share of API revenue.

7. Token Distribution & Supply Structure

PORT has a fixed total supply of 10 billion tokens. The distribution is structured to bootstrap the supply side (content creators) before activating the demand side (API consumers), while maintaining sufficient reserves for liquidity, team incentives, ecosystem growth, and long-term strategic needs. Every allocation includes vesting or emission controls to prevent supply shocks that could destabilize the token economy.
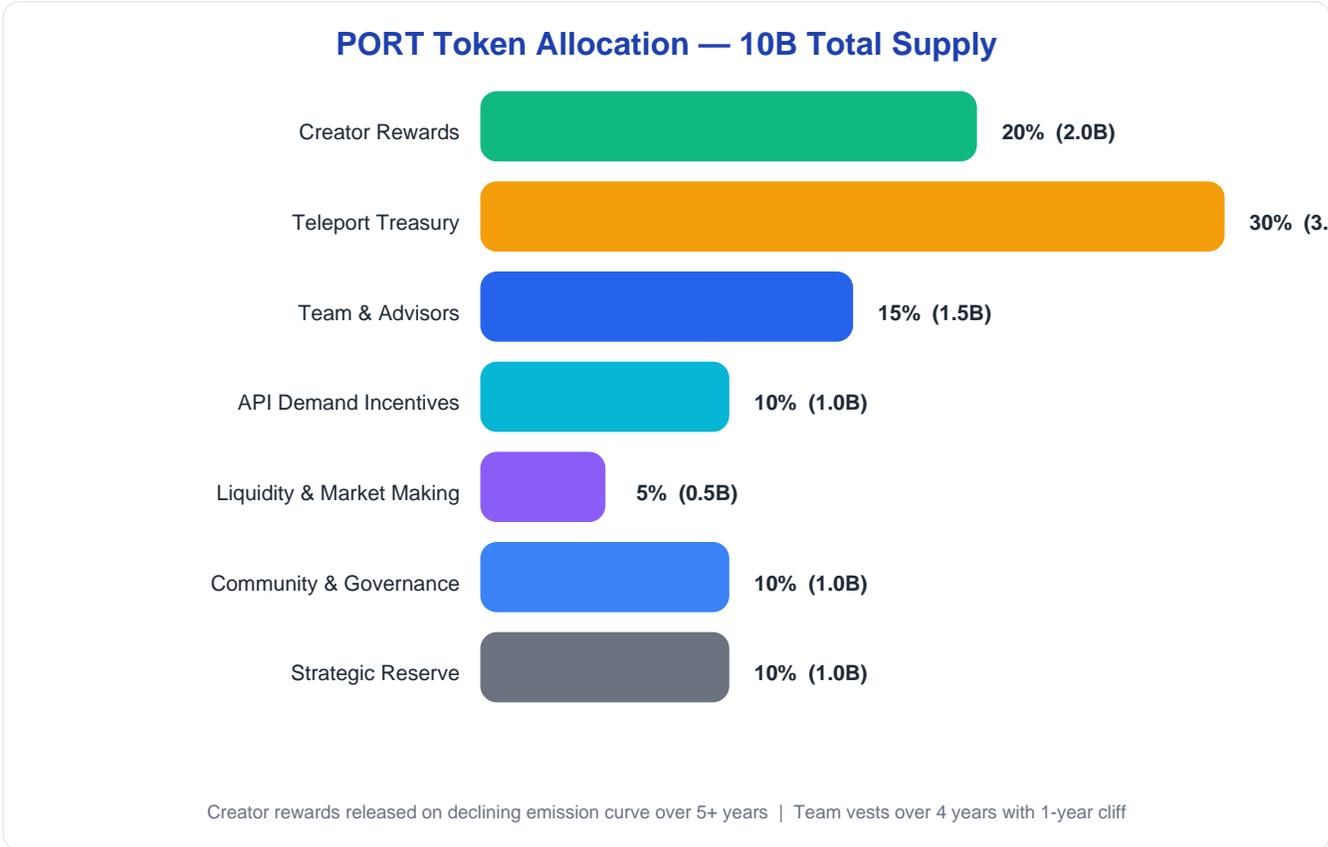

PORT Token Allocation — 10B Total Supply

Category	Allocation
Creator Rewards	20% (2.0B)
Teleport Treasury	30% (3.0B)
Team & Advisors	15% (1.5B)
API Demand Incentives	10% (1.0B)
Liquidity & Market Making	5% (0.5B)
Community & Governance	10% (1.0B)
Strategic Reserve	10% (1.0B)

Creator rewards released on declining emission curve over 5+ years | Team vests over 4 years with 1-year cliff

Figure 5: PORT Token Allocation — 10B total supply distributed across seven purpose-driven tranches.

7.1 Creator Rewards — 2B PORT (20%)

The creator rewards pool is the engine that bootstraps Teleport's spatial data library. These 2 billion tokens are released over five or more years on a declining emission curve — heavy rewards in the early months to attract first-mover content creators, tapering as the dataset grows and organic demand-side economics take over. In the first year, approximately 200 to 300 million PORT are distributed to creators, not 1 billion. This controlled emission prevents the flooding of circulating supply before demand-side utility exists.

Critically, creator rewards follow a vesting schedule: 20% of earned PORT unlocks immediately upon the token generation event, with the remaining 80% vesting monthly over 12 months. This is analogous

to employee stock vesting and protects both the token price and the creators themselves — preventing panic selling at early, illiquid price points. Creators who contribute the earliest and the most will hold the largest allocations, creating evangelical early adopters who recruit others into the network.

7.2 Teleport Treasury — 3B PORT (30%)

The treasury is Teleport's war chest: 3 billion tokens reserved for operations, ecosystem grants, strategic partnerships, liquidity provision, and future fundraising. The treasury enables Teleport to fund development through multiple market cycles without being forced to sell tokens at unfavorable prices. Treasury tokens are governed by a multisig wallet with time-locked release schedules.

7.3 Team & Advisors — 1.5B PORT (15%)

Team and advisor tokens follow a standard 1-year cliff with 4-year linear vesting. No team tokens enter circulation before the first anniversary of the token generation event. This structure is table stakes for investor confidence and signals long-term alignment between the founding team and the protocol's success.

7.4 API Demand Incentives — 1B PORT (10%)

This pool exists to bootstrap the demand side of the token economy. When the API launches, early consumers — robotics companies, AI developers, geospatial platforms, and hackathon participants — receive PORT credits to try the API at zero cost. This is the counterpart to creator rewards: while creators earn PORT for building supply, demand incentives give PORT to consumers to activate usage. The goal is to generate real API transaction volume and testimonials before the open liquidity launch.

7.5 Liquidity & Market Making — 500M PORT (5%)

Reserved for seeding the initial liquidity pool (Uniswap or equivalent) and supporting exchange listings. The pool must be deep enough to dampen early volatility — a thin pool invites manipulation, while a sufficiently deep pool creates a more credible trading environment. These tokens are deployed at the liquidity launch event and are paired with USDC or ETH.

7.6 Community & Governance — 1B PORT (10%)

Allocated for airdrops, staking rewards, governance participation incentives, and future community programs. As the protocol matures and governance transitions from core team decision-making to token-holder voting, this pool funds the incentive mechanisms that ensure active participation in protocol governance.

7.7 Strategic Reserve — 1B PORT (10%)

Locked for a minimum of two years. These tokens are reserved for unforeseen strategic needs: major chain deployments, transformative partnership opportunities, protocol acquisitions, or emergency liquidity support. The reserve provides optionality without diluting near-term circulating supply.

8. Launch Strategy & Sequencing

The difference between a successful token launch and a disastrous one is entirely in the execution details — emission curves, vesting schedules, liquidity management, and timing. The following four-phase launch sequence is designed to build real supply, activate real demand, and launch liquidity into a market with genuine two-sided pressure.
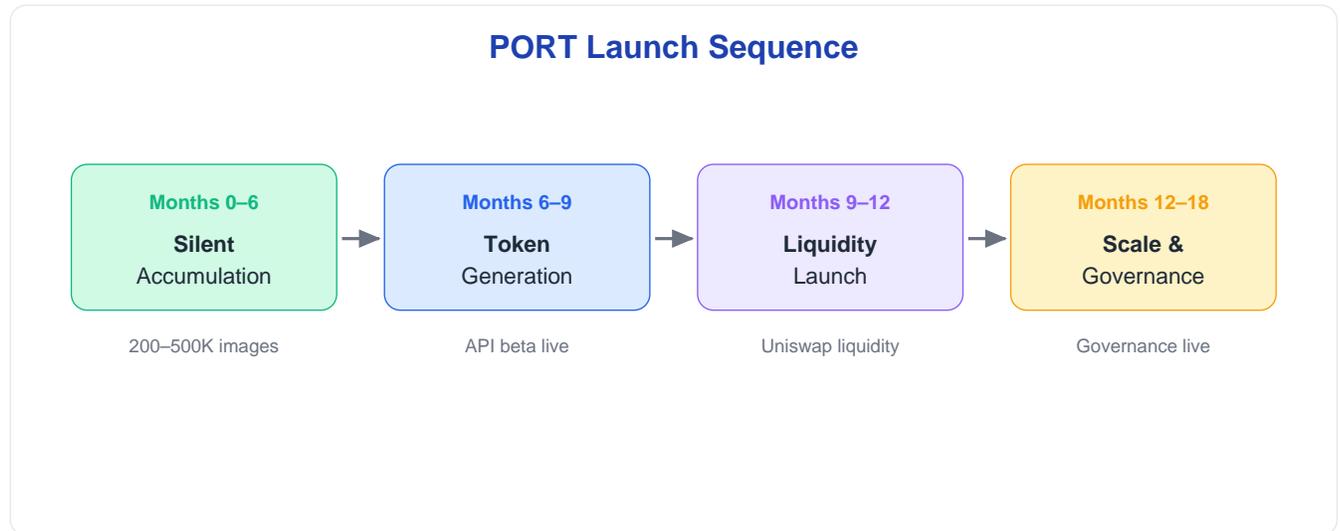
PORT Launch Sequence

Months 0–6	Months 6–9	Months 9–12	Months 12–18
Silent Accumulation	**Token** Generation	**Liquidity** Launch	**Scale &** Governance
200–500K images	API beta live	Uniswap liquidity	Governance live

Figure 6: PORT Launch Sequence — four-phase rollout from silent accumulation through governance.

8.1 Phase 1: Silent Accumulation (Months 0–6)

Launch the iOS capture app. Creators earn PORT for every 360-degree capture, but PORT exists only as a balance in their Teleport wallet — it is not tradable, not on any chain, and not listed anywhere. Think of it like Duolingo gems or Reddit karma at this stage. This approach lets Teleport calibrate emission rates without market pressure. If the reward-per-image ratio is too generous, it can be adjusted before real money is involved.

The dataset quality trigger for advancing to Phase 2 is not a raw image count. Instead, the threshold is defined by diversity and quality metrics: a minimum of 500,000 images across 50,000 or more unique locations, in 20 or more countries, with an average quality score above a defined threshold, and at least 100,000 images containing tagged objects or points of interest. This ensures the dataset is genuinely valuable to API consumers when the demand side activates.

Targets: 50,000 to 100,000 users, 200,000 to 500,000 images captured, 200 to 300 million PORT allocated to creator wallets (unvested).

8.2 Phase 2: Token Generation Event (Months 6–9)

Deploy PORT as an ERC-20 on Ethereum and Base. Creator wallet balances become real on-chain tokens, but with a vesting schedule: 20% unlocks immediately, 80% vests monthly over 12 months. This rewards early creators with immediate liquidity while preventing a supply flood. Simultaneously, announce the API beta with PORT-denominated pricing and onboard 50 to 100 developer teams using PORT from the Demand Incentives pool.

Targets: API beta live with real usage data and developer testimonials. Transaction volume metrics that demonstrate genuine demand for the spatial data library.

8.3 Phase 3: Liquidity Launch (Months 9–12)

By this phase, the protocol has real API demand (developers paying PORT to access 500,000+ diverse images), real creator supply (100,000+ users earning PORT), and a vesting schedule that controls circulating supply. Rather than launching PORT/USDC directly on Uniswap with no controls — which invites bot manipulation, speculative pumps, and immediate dumps — the recommended approach is a Liquidity Bootstrapping Pool (LBP) on Balancer. LBPs use a Dutch auction mechanism specifically designed to prevent initial pump-and-dump dynamics.

Alternatively, a phased Uniswap launch can work if combined with a very deep initial pool (to dampen volatility), the creator vesting schedule (limiting sell pressure), and timing that coincides with a major demand event — such as a flagship enterprise customer announcement — so that genuine buy pressure absorbs initial sell pressure.

Targets: stable liquidity pool, PORT price discovery, listing on CoinGecko and CoinMarketCap.

8.4 Phase 4: Scale & Governance (Months 12–18)

Launch staking, governance voting, multi-chain bridges to Solana and Polygon, and the third-party middleware adoption program. This is when PORT transitions from Teleport's utility token to the spatial data economy's standard payment rail. Third-party spatial data providers can integrate TAP middleware and accept PORT, expanding the token's utility beyond Teleport's own API surface.

9. Multi-Chain Support

While PORT tokens originate as an ERC-20 on Ethereum, TAP is designed for multi-chain operation from day one. The protocol supports bridged PORT tokens on Base, Polygon, and Solana, enabling developers to pay from their preferred network without cross-chain friction:
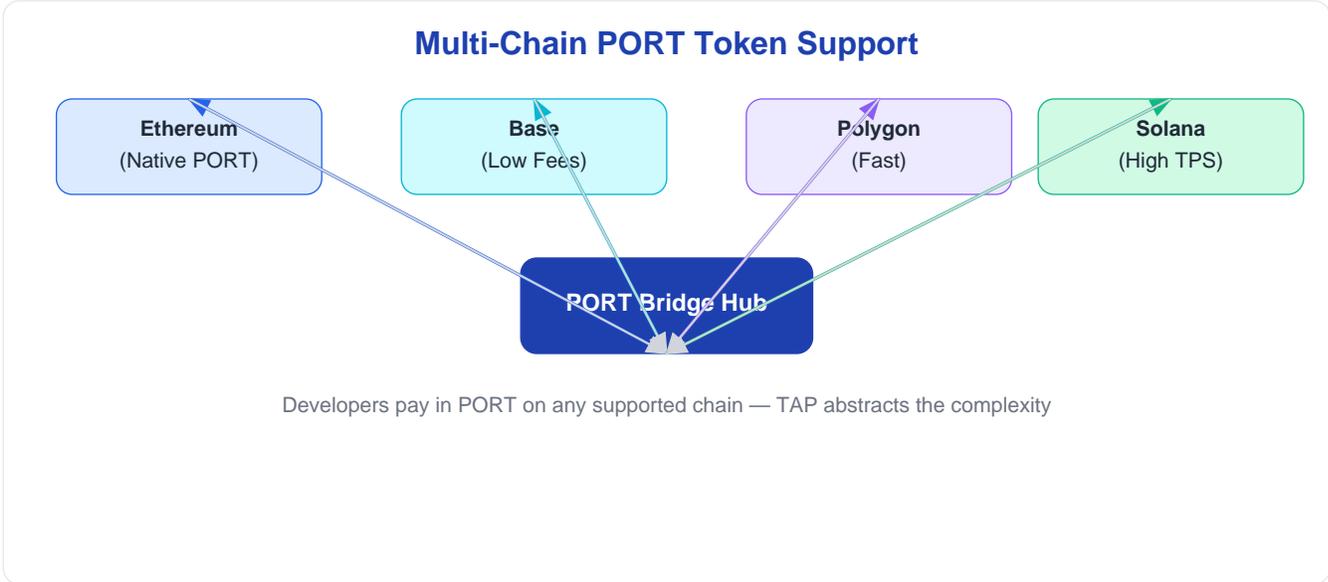

Multi-Chain PORT Token Support

Developers pay in PORT on any supported chain — TAP abstracts the complexity

Figure 4: Multi-Chain PORT Token Support — bridge hub connects Ethereum, Base, Polygon, and Solana.

Chain	Token Standard	Settlement Speed	Typical Gas Cost	Status
Ethereum	ERC-20 (Native)	~15 seconds	$2 – $10	Live
Base	ERC-20 (Bridged)	~2 seconds	< $0.01	Planned
Polygon	ERC-20 (Bridged)	~2 seconds	< $0.01	Planned
Solana	SPL (Bridged)	~400 ms	< $0.01	Planned

The TAP Verifier's multi-chain adapter layer means that API servers do not need to know or care which chain the payment arrived on. From the server's perspective, a verified payment is simply a verified payment, regardless of settlement network. This abstraction allows Teleport to add new chains without any API-side changes.

10. API Endpoints & Pricing

TAP-enabled endpoints follow RESTful conventions. Pricing is defined per-endpoint and returned in the 402 response header. The following table shows representative pricing for Teleport's initial API surface:

Endpoint	Method	Description	USDC Price	PORT Price
`/v1/360-images/{id}`	GET	Full-res 360 image	50 USDC	25 PORT*
`/v1/360-images/search`	GET	Search by location / tags	10 USDC	5 PORT*
`/v1/360-videos/{id}`	GET	Stream / download 360 video	200 USDC	100 PORT*
`/v1/360-videos/{id}/meta`	GET	Video metadata & thumbnails	5 USDC	2.5 PORT*
`/v1/datasets/{name}`	GET	Geospatial dataset download	500+ USDC	250+ PORT*
`/v1/datasets/catalog`	GET	List available datasets	Free	Free
`/v1/geo/search`	POST	Spatial search (bounding box)	25 USDC	12.5 PORT*
`/v1/geo/reverse`	GET	Reverse geocode w/ 360 context	15 USDC	7.5 PORT*
`/v1/capture/submit`	POST	Submit 360 content (earns PORT)	Free	Free

*PORT prices reflect the launch discount of 50%. The PORT discount follows a predetermined annual reduction schedule: 50% in Year 1, tapering to a permanent floor of 25%. USDC prices represent the standard base rate. Pricing is governance-adjustable — PORT stakers may vote to modify per-endpoint pricing to reflect market conditions, content availability, and competitive dynamics. Bulk discount tiers are also planned for high-volume consumers who pre-commit PORT via staking contracts.

11. Integration Guide

11.1 For Buyers (Client-Side)

The TAP Client SDK handles the entire payment handshake automatically. After installation, the developer simply configures a wallet provider and makes standard HTTP requests. The SDK intercepts 402 responses, prompts for payment signing (or auto-signs for AI agents with pre-authorized wallets), and retries with the payment proof header attached.

```
import { TAPClient } from "@teleport/tap-sdk";

const client = TAPClient({
  wallet: myWalletProvider,
  preferredChain: "base",
  autoApprove: true // for AI agents
});
```

```
const image = await client.get(
  "https://api.teleport.eco/v1/360-images/abc123"
);
// Payment handled automatically — image data returned
```

11.2 For Sellers (Server-Side)

Any third-party service that wants to accept PORT tokens for their own spatial data can integrate TAP middleware in under five minutes. The middleware is available as an npm package and a Python package, with Go support planned. This means that the TAP ecosystem is not limited to Teleport's own APIs—any provider of geospatial, 360, or immersive content can adopt the protocol and benefit from the PORT token economy.

11.3 For AI Agents & MCP Servers

TAP is designed for machine-to-machine commerce. AI agents can be provisioned with a PORT-funded wallet and a spending policy (maximum PORT per request, maximum PORT per hour, approved endpoint patterns). The agent then autonomously discovers, pays for, and consumes Teleport API resources without human intervention. The protocol also integrates as an MCP (Model Context Protocol) server, enabling AI models to access Teleport data as a tool during inference.

12. Security Model

The security model inherits the cryptographic guarantees of the underlying blockchains and adds protocol-level protections against common attack vectors:

Payment Authenticity: Every payment is a signed blockchain transaction. The TAP Verifier checks the signature against the sender's public key and confirms on-chain finality before granting access. Replay attacks are prevented by requiring unique transaction hashes per request.

Idempotency: TAP's Payment-Identifier mechanism ensures that a single payment cannot be reused for multiple requests. Each payment is bound to a specific request nonce.

Rate Limiting: Even with valid payments, the middleware enforces per-wallet rate limits to prevent abuse and ensure fair access. Staked PORT holders receive higher rate limit allocations.

No Credential Storage: Unlike traditional API key systems, TAP never stores sensitive credentials server-side. Authentication is purely wallet-based and ephemeral per request.

13. TAP vs. Traditional API Billing

Feature	Traditional (Stripe / API Keys)	TAP (PORT / USDC / ETH)
Account Required	Yes — email, password, KYC	No — wallet only
Minimum Payment	$0.50+ per transaction	Fractions of a token
Fee Structure	2.9% + $0.30 per charge	Network gas only (~$0.01 on L2)
TOKEN Discount	None	50% off with PORT (tapering to 25%)
Settlement Time	2–7 business days	Seconds (on-chain finality)
AI Agent Compatible	Difficult — requires API keys	Native — wallet + auto-sign
Micropayments	Impractical	First-class support
Cross-Border	Complex — FX fees, compliance	Borderless by default
Integration Effort	Weeks (billing, webhooks, dashboard)	Single middleware line

14. Roadmap

Phase	Timeline	Milestones
Phase 1: Silent Accumulation	Months 0–6	iOS capture app live; creators earn PORT (non-tradable); emission rate calibration; 200–500K images; 50–100K users

Phase 2: Token Generation	Months 6–9	PORT ERC-20 deployed on Ethereum + Base; creator vesting begins (20% immediate, 80% over 12 mo); API beta with 50–100 dev teams
Phase 3: Liquidity Launch	Months 9–12	LBP or phased Uniswap launch; enterprise customer announcement; CoinGecko + CMC listing; Python SDK released
Phase 4: Scale & Governance	Months 12–18	Staking + governance voting live; Solana + Polygon bridges; third-party middleware program; Go SDK released
Phase 5: Protocol Expansion	18+ months	Additional L2 support; decentralized verifier network; cross-protocol interoperability; v2.0 specification

15. Conclusion

The Teleport Access Protocol represents a fundamental rethinking of how spatial data services are accessed and monetized. By building an HTTP-native payment protocol around the PORT token economy, TAP creates a system where accessing 360-degree imagery, video, and geospatial datasets is as simple as making an HTTP request—and where paying for that access is instant, frictionless, and borderless.

TAP aligns incentives across the entire ecosystem: developers get seamless API access without billing overhead; content creators earn PORT for expanding the spatial data library; AI agents can autonomously discover and consume data resources; and PORT token holders participate in governance and earn staking rewards. The multi-chain architecture ensures that TAP meets developers where they already are, whether on Ethereum, Base, Polygon, or Solana.

As the internet evolves toward an agentic future—where autonomous systems transact, discover, and consume services at machine speed—TAP will be essential infrastructure. Teleport is building that infrastructure today, one 402 response at a time.

For more information, visit teleport.eco or contact the Teleport team.