InTown Metaverse: A Decentralized Network Powering Global 3d Commerce

The Foundation for Digital Experiences

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Abstract. This paper presents InTown Metaverse protocol, a decentralized network architected to power high-concurrency, digital experiences and commerce. By replacing centralized cloud reliance with a sovereign, IPv6-first global compute pool, the protocol achieves the sub-20ms latency required for real-time, networked interactions. We propose Proof of Transport (PoT), a consensus mechanism that cryptographically verifies packet delivery to reward node operators based on actual data throughput. Finally, we detail a non-custodial bridge mechanism that secures the network's economic floor through staked Ethereum, enabling a self-sustaining utility grid for decentralized event hosting and monetization.

1. The Rise of the Digital Sovereign City

The current digital landscape is fundamentally fractured by its reliance on centralized cloud providers. Modern metaverses and social platforms are built on infrastructure owned by third-party conglomerates such as AWS, Google, and Azure. These intermediaries extract value through rent-seeking, introduce unmanageable latency into real-time environments, and maintain absolute censorship control over the digital experience. The InTown Metaverse protocol rejects this model in favor of a Digital Sovereign City, a decentralized ecosystem designed to host high-concurrency, networked 3D environments without external dependencies.

At its core, the network is a high-performance software suite, delivered via native Mac and Windows applications, built on the A-Frame.js, Networked A-Frame, and Three.js frameworks. This stack allows users to not only experience but also host massive, decentralized events within customizable, persistent 3D worlds. Unlike traditional web-based platforms, these native applications interface directly with the InTown Metaverse protocol, combining a JSON-based ledger for absolute transparency with an AssemblyScript/WASM execution layer for near-native performance. This provides the

foundational infrastructure for a sovereign district where every interaction is a verifiable state transition.

Anchored by the DreamBIG Technology Arena, the network is powered by a global pool of independent node operators who provide the compute and bandwidth necessary for hundreds of millions of users to engage in a lag-free economy. Crucially, the InTown Metaverse architecture enables users to monetize the traffic by hosting a regional event or providing the underlying data transport for another user's experience, among other programmable ways to earn. The protocol is a self-sustaining engine where sovereignty and economic agency are hard coded into the network's heartbeat.

2. Technical Architecture: The Bare-Metal Engine

The InTown Metaverse protocol is engineered on three pillars designed to handle the massive throughput requirements of a global, distributed user base.

2.1 Pillar 1: Deterministic WASM Execution

To ensure that every state transition remains identical across the global compute pool regardless of underlying hardware, InTown Metaverse utilizes a custom virtual machine powered by AssemblyScript. This choice provides a TypeScript-compatible development environment for Experience Architects while compiling to high-performance WebAssembly (WASM). Every contract runs in a strictly sandboxed environment with granular gas metering, which prevents runaway loops and guarantees the 99.9% network uptime required for a professional-grade utility.

2.2 Pillar 2: JSON Ledger Protocol

The second pillar is the JSON Ledger Protocol, which prioritizes transparency as a primary security feature. Unlike opaque binary ledgers, InTown Metaverse's blocks are structured in a human-readable JSON format, allowing any operator or auditor to verify the state of the district using nothing more than a standard text editor. To maintain efficiency during peer-to-peer propagation, these blocks are serialized using Protocol Buffers (Protobuf), ensuring that the user base experiences zero ledger Lag.

2.3 Pillar 3: IPv6-First Networking

Finally, the third pillar is IPv6-First Networking. By mandating native IPv6 support, InTown Metaverse eliminates the traditional "NAT Traversal" bottleneck that plagues home-based node operators. This direct peer-to-peer connectivity allows nodes to

communicate without the overhead of STUN/TURN servers, achieving the sub-20ms latency required for synchronization in high-density environments.

3. Consensus & The Proof of Transport (PoT) Mechanism

The fundamental flaw in traditional consensus models is the disconnect between the protocol's security and the user's experience. Proof of Work secures a network through energy expenditure that does nothing to lower latency for an end-user, while Proof of Stake leads to governance centralization. Proof of Transport (PoT) fixes this by making the act of mining synonymous with utility delivery. In the InTown Metaverse ecosystem, a node's reward is directly proportional to its ability to facilitate the high-speed state synchronization required by the city. The total reward (R) for a node operator is calculated across all successful state transitions (n) by dividing the verified throughput (T_i) by the observed latency (L_i), weighted by the node's individual Integrity Score (S):

$$R = \sum_{i=1}^{n} \left(\frac{T_i}{L_i} \right) \cdot S$$

To prevent ghost traffic, InTown Metaverse utilizes a dual-signed Cryptographic Heartbeat Protocol. Every user connected to the platform acts as a passive verifier. When a node delivers a state update, the user's client signs an ephemeral receipt. These receipts are aggregated into a Merkle Tree within the block header. To ensure integrity, the network employs a security system where nodes are intermittently challenged by their neighbors to prove they are delivering data within the mandated IPv6 latency threshold. This zero-trust environment is further solidified by Deterministic State Verification, ensuring that a node cannot report high throughput if the resulting state root of the JSON ledger does not reflect real economic activity. Any attempt to spoof traffic is met with economic slashing of the ETH setup bond, making the cost of a hack significantly higher than any potential reward from dishonesty.

4. The Bridge & Staking Economy

The InTown Metaverse economy is architected to solve the cold start problem by tethering its value to Ethereum, the world's most liquid smart-contract asset. By utilizing a non-custodial bridge, we eliminate the founder trust requirement. Users lock their ETH into a vault that only they control. When an operator, architect, or developer deposits ETH into the Mainnet bridge, the contract interacts with a liquid staking provider to generate an immediate Infrastructure Yield. This process is fully transparent on-chain, providing the Proof of Reserves needed to back the native ITMV token.

The yield generated by this bridge, estimated at 4-5% annually, serves as the salary for the city. Through yield routing, 70% of these rewards are distributed to the global compute pool via the Proof of Transport mechanism, ensuring they are paid in a hard asset, ETH, regardless of market volatility. The remaining 30% serves as the Protocol's Carry, providing the capital necessary for the ongoing development of the AssemblyScript VM and network optimization. This creates a circular economy where increased participation locks more ETH, which in turn funds more robust hardware to support the expanding user ecosystem.

5. The Land Economy: 50 Plots of Sovereignty

The InTown Metaverse protocol is physically and logically divided into 50 spatial plots, representing multi-tenant state slots within the district. The DreamBIG Technology Arena acts as the anchor tenant on Plot 1, driving the primary economic velocity and traffic demand of the network. Every developer who purchases a plot receives a License to Build, a technical guarantee of a dedicated portion of the global compute pool.

This model ensures that the foot traffic generated by massive events flow directly into the surrounding plots, creating location-based value in a digital environment. As the district matures, the algorithm ensures that plot values escalate according to the aggregate throughput of the network. This culminates in the final auction of Plot 50, which is projected to act as the primary economic hub of the district once the full fan base is active. By owning the land, participating in the compute pool via node hosting, and holding event tickets, the community effectively owns the entire value chain of the city.

The value of a spatial plot (V_p) is defined by the cumulative economic velocity generated by the network's throughput (T) and active user base (F) over time (t):

$$V_p = \int_0^t (T_t \cdot F_t) dt$$

6. The Genesis Roadmap

This roadmap is designed to move the network from a localized state to a globally distributed compute pool backed by at least 100 ETH of staked security.

Phase I: The Hardware Gate

The first phase focuses on Hardware Benchmarking and Operator Recruitment. Potential operators are required to run a proprietary diagnostic script that measures IPv6

throughput, disk IOPS, and WASM execution speed. Only those who meet the desired threshold are permitted to submit a hardware certificate to the Genesis Registry. This ensures that the network's foundation is built on high-performance machines capable of supporting the sub-20ms latency requirements of the network from day one.

Phase II: The Economic Lock

The middle phase activates the Bridge and Sincerity Bond. During this period, verified operators commit their ETH Setup Fee to the protocol escrow. This fee serves dual purposes: it provides the immediate operational runway for the Founding Architect to finalize core optimizations and acts as the initial slashing bond for the Proof of Transport mechanism. Simultaneously, the non-custodial Ethereum bridge opens for the initial deposits. This phase is characterized by radical transparency, with the bridge balance being updated in real-time on the InTown Metaverse registry to build the social proof necessary to hit the milestone.

Phase III: The Protocol Launch

The final phase concludes with the ITMV Minting process. Once the ETH threshold is met, the Genesis Block is finalized, and the first ITMV tokens are minted to the bridge participants. This marks the activation of the global compute pool, where the Digital Sovereign City officially comes online. The License to Build is then issued to the first 10 developers, allowing them to deploy their AssemblyScript based contracts and assets onto the network. By the end of phase III, the InTown Metaverse protocol moves from a development environment to a live, yield-generating infrastructure, ready to host hundreds of millions of users within its sovereign borders.

7. Appendix: Node Hardware Requirements

To maintain the sub20ms latency threshold and ensure the stability of the AssemblyScript VM, all operators must meet the following Bare Metal specifications. These requirements are optimized for high-concurrency 3D state synchronization and real-time IPv6 packet routing.

Node Specification Table

Component	Minimum Requirement	Recommended (Genesis-Grade)
CPU	Quad-Core (2.5GHz+)	Octa-Core (3.2GHz+ / Apple M-Series or Intel i7/i9)
RAM	16 GB DDR4/DDR5	32 GB+ (For multi-tenant plot hosting)
Storage	256 GB NVMe SSD	1 TB NVMe (High IOPS for JSON Ledger indexing)

Network	Native IPv6 (Publicly Routable)	Fiber Optic / 1 Gbps Symmetric
OS	Windows 10 /macOS 12/ Linux	Windows 11 / macOS 14 (Sonoma)/Linux

Technical Compliance Notes

- **The IPv6 Mandate:** Nodes behind a legacy NAT (IPv4 only) will fail the **Cryptographic Heartbeat** challenge. A publicly routable IPv6 address is required to bypass STUN/TURN overhead and participate in the **Proof of Transport** mechanism.
- **The WASM Sandbox:** A minimum of 8 GB of RAM must be dedicated exclusively to the **AssemblyScript execution layer** to prevent memory-related state divergence.
- **The Sincerity Bond:** Upon hardware verification, the ETH Setup Fee must be committed to the non-custodial bridge to activate the node's Integrity Score (S).

Conclusion

The InTown Metaverse protocol is more than a network, it is a collaborative utility grid. By aligning hardware performance with economic incentives through Proof of Transport, we ensure that the digital sovereign city remains fast, transparent, and owned by its operators.

InTown Metaverse provides the permanent foundation for global commerce, ensuring that the next generation of digital experiences is built on a network that is as resilient as it is limitless.

Welcome to the City. What will you build?