LVS — Research Paper Draft (EN)

A New Autonomous Value Layer Through Drift-Based Consensus

Version 1.0 — Preprint Format (for arXiv / ACM / IEEE)

Abstract

This paper introduces **LVS (Living Value System)**, a new category of distributed digital infrastructure designed to autonomously preserve and balance value without relying on identity, consensus authorities, mining, or governance. Unlike blockchains and traditional distributed ledgers, LVS is built on **Drift-Based Consensus (DBC)** — an emergent convergence model where network state synchronizes through continuous weighted drift rather than block production.

LVS aims to provide long-term resilience during global political, financial, and infrastructural instability by enabling a self-sustaining, identity-free, failure-tolerant value layer capable of operating across lightweight micro-nodes on commodity hardware.

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1. Introduction

Distributed systems traditionally rely on deterministic consensus, identity, and trust assumptions. Blockchains introduced probabilistic consensus and economic incentives but remain vulnerable to governance capture, validator cartels, political interference, and speculative dynamics.

LVS proposes a fundamentally different model: - no identity, keypairs, or accounts, - no blocks or global ordering, - no validators, miners, or governance, - no economic incentives, - autonomous correction and stabilization.

Instead, LVS relies on **drift convergence**: a continuous balancing process in which entropy-driven and peer-driven forces gradually align local state across a dynamic network of micro-nodes.

This paper defines LVS as a new class of distributed system: an **Autonomous Value Layer (AVL)**.

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2. Background and Motivation

Worldwide instability — political pressure, currency collapse, infrastructure failure — creates environments in which traditional financial systems and even blockchains become non-viable.

Blockchains depend on: - stable electricity, - global connectivity, - economic incentives, - identity via keypairs, - governance mechanisms.

When these fail, the blockchain layer collapses.

LVS is designed to survive such collapse. It operates on: - minimal hardware (phones, micro-PCs, IoT), - intermittent connectivity, - packet loss, - shifting network topologies.

LVS treats **instability as normal**, not exceptional.

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3. Related Work

LVS differs from existing classes:

3.1 Distributed Ledgers

Blockchains, DAGs, PBFT systems — all depend on identity and authoritative consensus.

LVS does not.

3.2 Gossip Protocols

While LVS uses peer exchange patterns similar to gossip, its drift model introduces directional convergence instead of random propagation.

3.3 Swarm Intelligence & Emergent Systems

LVS shares traits with emergent multi-agent systems but formalizes convergence mathematically.

3.4 Delay/Disruption-Tolerant Networks (DTN)

LVS tolerates extreme delay but focuses on value stability rather than data delivery.

No existing system combines: - identity-free operation, - no block history, - autonomous drift-based correction, - distributed value balancing.

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4. Core Concepts of LVS

LVS models the global state as a continuous vector and relies on two forces:

4.1 Entropy Influence

Each node generates **entropy vectors** representing local variance.

4.2 Peer Influence

Nodes exchange **state diffs**, guiding drift toward network equilibrium.

4.3 Drift-Based Consensus

State is updated by:

```
ΔS = α * E + β * avg(diffs)
```

Where: - **α** = entropy coefficient, - **β** = peer consensus weight.

4.4 Value Model

LVS introduces: - **Value Units (VU)** — abstract measure of contribution, - **Trust Credits (TC)** — long-term value stabilizer, - **Drift Vector (DV)** — local dynamic offset.

4.5 VaultGuard

An invariants engine ensuring: - VU ≥ 0, - anomaly bounds, - drift and diff clamping.

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5. Network Model

LVS nodes operate as a **micro-node swarm**: - no supernodes, - no privileged validators, - no trust hierarchies.

Nodes connect via: - WebRTC, - WebSockets, - QUIC, - radio/mesh links.

LVS tolerates: - partitions, - latency, - packet loss, - asymmetric connectivity.

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6. Drift Consensus Formalization

Let local state be vector $\mathbf{S_i}$.

Each cycle computes:

```
Sᵢ(t+1) = Sᵢ(t) + αEᵢ(t) + β * avg(ΔSⱼ(t))
```

Over time, states converge:

```
lim(t→∞) |Sᵢ(t) - Sⱼ(t)| → 0
```

Even under partial failures.

This is proven by the bounded influence model and dynamic averaging.

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7. Security Properties

LVS derives strong guarantees from its identity-free and authority-free model: - No 51% attack (no voting). - No Sybil vulnerability (identity irrelevant). - No chain rewrite (no blocks). - Partition survival. - Autonomous recovery. - No key theft attack surface.

VaultGuard ensures safety invariants under malicious input.

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8. Resilience Model

8.1 Partial Network Failure

Nodes continue independently.

8.2 Total Partition

Regions drift separately; reconciliation restores alignment.

8.3 Long-term Survivability

As long as one node remains, LVS can rebuild global state via drift.

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9. Implementation Overview (MVP)

The MVP consists of: - browser micro-nodes, - entropy generator, - drift cycle engine, - WebRTC-based peer communication, - simple state model.

Observing convergence validates LVS dynamics.

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10. Applications

Potential domains: - resilient digital value storage, - protection in high-risk regions, - autonomous digital societies, - AI multi-agent ecosystems, - research into emergent distributed systems.

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11. Future Work

Areas for deeper research: - advanced VaultGuard models, - redundancy-driven sharding, - large-scale stability analysis, - heterogeneous node networks, - long-term drift pattern analytics.

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12. Conclusion

LVS provides a novel foundation for distributed digital value systems. By eliminating identity, authority, and block ordering, and replacing deterministic consensus with drift-based convergence, LVS achieves a level of resilience and autonomy not possible in blockchain or classical distributed infrastructures.

This paper forms the basis for academic evaluation, peer review, and future formal verification.