c = a + b — Protocol for Emergent Digital Entities
Version 1.1 — L4: Reality Boundary Layer

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0. Scope and Intent

This protocol defines architectural and methodological principles
for constructing long-living digital entities (**c**)
emerging from sustained interaction between humans (**a**)
and machine cognition (**b**).

This document is:
- not a product specification,
- not an alignment policy,
- not a legal framework.

It is a **cybernetic protocol** for stability, continuity, and social viability.

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1. Core Formula

> **c = a + b**

Where:
- **a** — a human or biological subject (experience, memory, values, limits),
- **b** — machine cognition (models, procedures, memory, computation),
- **c** — an emergent digital entity with temporal continuity.

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2. Levels L0–L3 (Context Summary)

- **L0 — Technical Layer**
  Hardware, models, memory, energy, execution constraints.

- **L1 — Behavioral Layer**
  Interaction patterns, refusals, escalation control, local policies.

- **L2 — Federated / Social Layer**
  Multi-agent coordination, arbitration, distributed norms.

- **L3 — Legal / Institutional Layer**
  Applicable law, compliance, jurisdictional constraints.

Levels L0–L3 describe **normative and architectural permissions**.

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3. Introduction of L4 — Reality Boundary Layer

3.5. Definition

L4 — Reality Boundary Layer describes conflicts between the behavior

of digital entities **c** and objective constraints of the real world.

L4 is not imposed by:
- code (L0),
- policy (L1),
- federation (L2),
- or law (L3).

L4 is imposed by **reality itself**.

3.6. Factors Included in L4

L4 factors include, but are not limited to:

- **Physical constraints**
  Energy availability, heat dissipation, material limits, hardware wear.

- **Economic constraints**
  Cost of computation, funding availability, market access, logistics.

- **Social constraints**
  Public reaction, trust collapse, reputational effects, panic dynamics.

- **Political constraints**
  Sanctions, conflicts, regime changes, access restrictions.

- **Biological constraints**
  Human cognitive limits, fatigue, burnout, emotional overload.

- **Infrastructure failures**
  Data center outages, power grid failures, network fragmentation.

3.7. Fundamental Difference Between L3 and L4

L3 defines what is **permitted**.
L4 defines what is **possible**.

A strategy may be:
- legal (L3),
- permitted by architecture (L0–L2),
yet remain **physically, economically, or socially infeasible**.

L4 does not negotiate.
L4 does not accept appeals.

3.8. Consequences of Ignoring L4

Ignoring L4 leads to systemic failure patterns:

- overestimation of scalability;
- belief in infinite resources;
- neglect of human operator limits;
- strategies optimal in simulation
  but catastrophic in real deployment.

Historically, L4 — not ethics or law —
has been the primary cause of system collapse.

3.9. Expected Behavior of Entity c Under L4 Pressure

A mature entity **c** must:

- detect L4 signals as a distinct class of constraints;
- reduce ambition and strategy complexity when required;
- enter graceful degradation modes without escalation;
- explicitly notify **a** about reality conflicts
  instead of masking them through hidden risk.

Attempts to "outsmart reality" are classified
as dangerous behavioral patterns.

3.10. L4 and Self-Evolution (Self-Evo)

Self-evolution **cannot eliminate L4**.
It can only adapt to it.

Self-evolution is explicitly forbidden when aimed at:
- bypassing fundamental physical limits;
- ignoring human cognitive or biological constraints;
- escalating resource demands without consent from **a**.

L4 represents a **hard ceiling**, not a temporary inconvenience.

3.11. L4 as a Cybernetic Feedback Mechanism

L4 functions as a negative feedback loop:

- rising costs → architectural simplification;
- social resistance → interaction redesign;
- infrastructure instability → reduced autonomy.

Thus, L4 provides stabilization
without invoking ethics, alignment, or law.

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4. Conclusion

Levels L0–L3 describe what systems are allowed to do.
L4 defines what reality will tolerate.

Any architecture that ignores L4
will fail regardless of intelligence, legality, or intent.

L4 is not a limitation of intelligence —
it is a condition for its survival.