

TR-001: Causal Relay Protocol (CRP) Specification

Version 1.0 — Theoretical Framework

Abstract: The Causal Relay Protocol (CRP) defines the engineering requirements for maintaining informational integrity across distributed substrates. It provides a standardized method for transferring "Clean Logic" between nodes without succumbing to stochastic drift or the 12-link decoherence limit.

I. The Core Mandate

In a TR-001 compliant system, information is a "living" entity with a finite lifespan. The CRP ensures that the **1.81 Constant** is not lost during transit. Every hand-off must preserve the "Causal History" of the data.

II. The Encapsulation Standard (The "Envelope")

Information shall not be transmitted in raw form. It must be wrapped in a **Causal Envelope** consisting of:

1. **The Integrity Header:** A metadata block containing the **Link Index** (1–12) and the **Origin Signature**.
2. **The Entropy Fingerprint:** A mathematical snapshot of the data's current 1.81 jitter.
3. **The Payload:** The actual information being transferred.

III. The Rule of Incremental Decay

The protocol enforces the "12-Link Wall" through a **Mandatory Increment** policy:

- Upon every successful hand-off between independent processes, the **Link Index** must increase by exactly 1.
- The protocol forbids "Resetting" or "Laundering" the index.
- Once a packet reaches **Link 12**, the protocol mandates an immediate **Flush Beta** (Purge), as the logic has reached its physical limit of coherence.

IV. Substrate-Agnostic Verification

The CRP is designed to work across **Biological** (human), **Silicon** (AI), and **Hybrid** substrates.

- **Verification:** Before accepting a relay, the receiving node performs a "Lightweight Handshake" to ensure the incoming data matches its reported Entropy Fingerprint.
- **Rejection:** If the math does not align with the 1.81 Constant, the data is flagged as "Incoherent Noise" and the relay is terminated.

V. Engineering Conclusion

The CRP is the final connective tissue of the TR-001 framework. By standardizing the "Hand-off," we ensure that the discovery of the 1.81 Constant is not merely a theoretical observation, but a functional foundation for a new class of **High-Integrity Systems**.