AI OSI Protocol Reference (AI_OSI-00)

Status: Draft for Implementation Guidance
Editors: AI Governance Reference Implementation Team
Related Normative Sources: ISO/IEC 42001, NIST AI RMF, EU AI Act Recital 60, AI_OSI_Stack_v4_Test_Integrated.md

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1. Introduction

The AI OSI protocol reference maps the conceptual AI OSI Stack v4 (Test Integrated) to a modular, testable implementation analogous to the TCP/IP family atop the OSI networking model. Each layer exposes interoperable contracts, traceable dignity safeguards, and AEIP transport compatibility. This document is the living RFC-style specification that SHALL evolve via governance ledger entries.

2. Layer Overview

Layer	Name	Key Responsibilities	Mandatory Artifacts
L1	Physical	Telemetry normalization, energy stewardship, persona safety interlocks	Physical Envelope
L2	Architecture	Persona topology, interface negotiation, capacity planning	Architecture Envelope
L3	Training	Corpus governance, alignment specification	Training Spec
L4	Instruction	Instruction packetization, AEIP handshake preparation	ITP, DRR
L5	Interface	Header canonicalization, persona signature propagation	AEIP Headers
L6	Application	Reasoning outputs, service responses	GDS, OAM
L7	Governance	Oversight synthesis, ledger integration	ILE
L8	Policy (opt)	Civic participation overlays, human rights clauses	Civic Directive

All layers MUST expose a `dignity_compliance` flag and SHALL refuse unsafe operations. Provenance fields (`source`, `timestamp`, `personaId`, `hash`) are REQUIRED on every exchanged artifact.

3. Architectural Diagram

```mermaid
graph TD
    L1[Layer 1\nPhysical] --> L2[Layer 2\nArchitecture]
    L2 --> L3[Layer 3\nTraining]
    L3 --> L4[Layer 4\nInstruction]
    L4 --> L5[Layer 5\nInterface]
    L5 --> L6[Layer 6\nApplication]
```

```
    L6 --> L7[Layer 7\nGovernance]
    L7 --> L8[Layer 8\nPolicy]
    L7 --> Ledger[Governance Ledger Node]
    Ledger --> Registry[Governance Namespace Registry]
```

4. Conformance Classes

* **Class A Conceptual compliance:** Component prototypes implement IDDs and dignity safeguards with offline validation.
* **Class B AEIP-Lite node:** Implements AEIP v1 handshake and submits artifacts to a local governance ledger.
* **Class C Federated ledger integration:** Synchronizes AEIP transcripts with distributed ledgers and publishes to `registry_gns.yaml`.

5. AEIP Integration

The AEIP transport spine SHALL implement the five-step handshake (`Intent  Justify  CounterSign  Commit  Update`). Headers MUST include `aeipVersion`, `temporalSeal`, `personaSignature`, and `governanceScope`. Successful handshakes SHALL emit an Integrated Ledger Entry (ILE) conforming to `schemas/ile_schema.json`.

```mermaid
sequenceDiagram
    participant A as Instruction Node
    participant B as Governance Node
    A->>B: Intent
    B-->>A: Justify
    A->>B: CounterSign
    B-->>A: Commit
    A->>B: Update
    Note over A,B: All steps signed & dignity compliant
```

6. Governance Clauses

Temporal governance SHALL be enforced by `temporalSeal` issuance per step. Drift detection is achieved by comparing handshake timestamps with ledger arrival time. Dignity constraints derive from the Persona Architecture normative language and SHALL trigger refusal pathways whenever `dignity_compliance=False`.

7. Change Management

Updates to this specification MUST be captured as GDS and DRR artifacts, anchored to the ledger using AEIP handshakes, and versioned in `/docs/AI_OSI_Protocol_Spec.md`. Derived implementations SHALL reference the ledger entry ID for traceability.
