The Intent Web: Technical Design Specification (TDS)

1. Purpose

This Technical Design Specification defines the architecture, security guarantees, validation framework, and execution plan for the Intent-to-Interface Protocol (I2I).

It transforms the conceptual model into a concrete, testable, and deterministic system.

The TDS is written for engineers, auditors, and technical stakeholders evaluating feasibility.

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2. Architecture Overview: The I2I Flow

The Intent Web follows a deterministic 5-stage pipeline:

1. **User Intent (Text/Voice)**
2. **Intent Parser Agent → Intent Object**
3. **Schema Generator Agent → I2I UI Schema**
4. **Schema Registry / Persistence Layer**
5. **Renderer Adapter → Executable UI**

Key Properties

- Declarative, not executable.
- Platform-agnostic JSON schema.
- Signed by agents and validated by renderers.
- Enforced against certified components.

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3. Intent-to-Interface Schema (I2I Schema)

3.1. Structure

The I2I Schema is a deterministic JSON structure describing:
- Components
- Layout
- Data bindings
- Events
- Styling tokens
- Schema metadata

3.2. Example (Simplified)

```
{
  "version": "1.0",
  "components": [
    {
      "type": "Chart.Sparkline",
      "data": "wallet.performance7d",
      "style": { "height": 120 }
    }
  ],
  "dataSources": {
    "wallet.performance7d": {
      "source": "onchain://eth/mainnet",
      "method": "fetchPortfolio",
      "params": { "wallets": ["0x123...", "0x456..."] }
    }
  },
  "metadata": {
    "agent": "agent://i2i/core",
    "signature": "0xabcd..."
  }
}
```

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4. Agent Architecture

4.1. Intent Parser Agent

- Converts natural language → structured **Intent Object**.
- Uses grammar-constrained or JSON-mode LLM outputs.
- Validated through Zod or similar schema validator.

4.2. Schema Generator Agent

- Converts Intent Object → I2I Schema.
- Rule-based engine ensures determinism.
- LLM only used for design-style suggestions, never final logic.

4.3. Multi-Agent System

Optional specialization:
- Financial intent agent
- UI layout agent
- Component selection agent
- Data-linking agent

Agents can be:
- Local (fast, free)
- Cloud-based (advanced, paid)
- Third-party marketplace agents

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5. Security Model

5.1. Core Principles

- No executable code in schemas.
- Strict declarative schema format.
- Component allowlists.
- Agent signatures.
- WASM sandboxing for logic.

5.2. Trust Model (3 Tiers)

Tier 1: DAO-Certified Components
- For finance, legal, enterprise.
- Audited, versioned, governed.

Tier 2: Community-Vetted Open-Source
- GitHub repo + commit hash references.
- Automated scanning and sandbox tests.

Tier 3: User-Self-Certified Local Components
- Only render locally.
- Never shared.
- Ideal for experimentation.

5.3. Renderer Trust Policy

User or enterprise defines:

```
{
  "allowedSources": ["dao://", "github://trusted"],
  "block": ["local://*"]
}
```

5.4. Schema Integrity

- Each schema cryptographically signed.
- Renderer verifies signature.
- Mismatched signatures → block.

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6. Performance & Optimization

Strategies

- **Intent caching** (intent hash → schema).
- **Schema caching** (schema hash → rendered template).
- **Local-first lightweight agents** for common intents.
- **Progressive rendering** (skeleton first, hydrate after).
- **Component-level memoization**.

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7. UX Consistency & Templates

Intent Templates

Examples:
- Portfolio-Intent
- Transaction-Intent
- Analytics-Intent

Templates ensure:
- Predictable structure
- Faster parsing
- Easier validation

Constraint Engine

Enterprises can enforce UI policies:

```
{
  "allowedComponents": ["StandardChart", "SendButton"],
  "requiredFields": ["walletAddress"]
}
```

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8. Validation Framework (MVP → Full Protocol)

8.1. MVP Validation Metrics

Component	Goal	Notes
Intent Parser	10 core intents	JSON-mode LLM
Schema Generator	Valid I2I schema	Rule-based engine
Renderer	Render simple dashboards	React adapter
Security	Schema sandbox	WASM isolation

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9. Execution Roadmap (Quantitative)

Phase 1 MVP (Months 1–6)

- I2I Schema v1.0
- React Adapter
- WASM Sandbox
- 10 Certified Components

KPIs:
- 100% successful UI generation for 5 use cases
- < 2s render speed - First public demo

Phase 2 Agent Network & Registry (Months 7–12)

- On-chain registry
- Micropayments
- SDK for third-party agents

KPIs:
- 10+ external agents
- < 500ms avg agent latency
- Security penetration test passed

Phase 3 Governance & Multi-Platform (Months 13–18)

- DAO launch
- 3 major data sources integrated
- Flutter + CLI renderers

KPIs:
- 1,000 daily users
- 50+ certified components
- First DAO vote

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10. Strategic Value

The Intent Web does not replace apps, it replaces the static UI layer underpinning them. Its defensibility comes from:
- Standards
- DAO-certified component library

- Agent marketplace
- Strong network effects

The Intent Web becomes the *interface layer of Web3*, a new internet primitive.

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11. Conclusion

This TDS establishes the technical backbone for a secure, deterministic, and scalable Intent Web ecosystem. It provides clear validation paths, measurable milestones, and a robust architecture that ensures safety, interoperability, and user sovereignty.

The Intent Web — I2I Protocol

TDS v1.0

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Official Repository: https://github.com/masdar80/i2iweb/