# **Technical Design Specification: Symmetrical A2A Protocol**

Version: 6.0

Date: 17 June 2025

Status: Proposed (Based on TRR v22.0)

1. Architectural Overview

This document provides the technical implementation plan for the Symmetrical A2A Communication Protocol enhancement detailed in TRR v22.0. The goal is to modify the Design Agent to produce a machine-readable design\_synthesis.json artifact alongside its human-readable design\_spec.md. This will be achieved by augmenting the existing Design Agent graph.

2. State Management Modifications (agent\_core\_v5.py)

The GraphState TypedDict will be updated with one new key to hold the output of the Design Agent's new JSON artifact.

class GraphState(TypedDict):

# ... (all existing keys: user\_prompt, a2a\_output, design\_spec, etc.)

# --- NEW KEY for v5 implementation (TDS v6.0) ---

design\_synthesis\_json: Optional[Dict] # Will hold the design work order

3. Artifact Specification: design\_synthesis.json

The Design Agent will produce a JSON object with the following schema, designed to be directly consumable by a Coding Agent.

{

"metadata": {

"design\_spec\_version": "<Version of the design spec, e.g., 6.0>",

"generation\_date": "YYYY-MM-DD"

},

"high\_level\_goal": "A one-sentence summary of the feature to be implemented.",

"file\_modifications": [

{

"file\_path": "src/agent\_core\_v5.py",

"changes": [

"ADD\_KEY 'design\_synthesis\_json' to GraphState TypedDict.",

"MODIFY\_FUNCTION 'generate\_design\_spec\_node' to produce a secondary JSON output.",

"ADD\_FUNCTION 'new\_helper\_function(arg1, arg2)' to perform a specific task."

]

},

{

"file\_path": "src/supervisor\_v5.py",

"changes": [

"MODIFY\_FUNCTION 'save\_artifacts' to handle saving the new 'design\_synthesis\_json' artifact."

]

}

],

"new\_files": [

{

"file\_path": "config/new\_config.yaml",

"description": "A new configuration file for the coding agent's tools."

}

]

}

4. Computational Graph Modifications (agent\_core\_v5.py)

The generate\_design\_spec\_node within the build\_design\_agent\_graph will be enhanced. Its responsibilities are now:

1. Generate Markdown TDS (Existing Logic): Generate the human-readable design\_spec.md and store it in state['design\_spec'].
2. Generate Design Synthesis JSON (New Logic): Immediately perform a second LLM call using a new prompt, create\_design\_synthesis\_prompt. This prompt will be formatted with the full text of the just-assembled design\_spec.md. The LLM will be instructed to read the spec and generate a single JSON object conforming to the schema in section 3 of this document.
3. Update State: The node will parse the JSON from the LLM's response and store it in the new state['design\_synthesis\_json'] key.

5. New Prompt Specification (prompts\_v5.yaml)

A new prompt will be added to guide the generation of the design\_synthesis.json.

# --- Prompts for the Design Agent ---

create\_design\_synthesis\_prompt: >

You are an expert software architect. Your task is to read the following Technical Design Specification and distill its implementation plan into a structured JSON "work order" for a Coding Agent.

\*\*CRITICAL:\*\* Your entire output MUST be a single, valid JSON object that conforms to the schema below. Do not add any other text or markdown.

JSON Schema:

{{

"metadata": {{

"design\_spec\_version": "<Version of the design spec>",

"generation\_date": "{current\_date}"

}},

"high\_level\_goal": "<A one-sentence summary of the feature to be implemented.>",

"file\_modifications": [

{{

"file\_path": "<Relative path to the file to be modified>",

"changes": [

"<Use keywords ADD\_CLASS, ADD\_FUNCTION, ADD\_KEY, MODIFY\_CLASS, MODIFY\_FUNCTION, or DELETE\_FUNCTION followed by a brief, precise description of the change.>"

]

}}

],

"new\_files": [

{{

"file\_path": "<Relative path of the new file to create>",

"description": "<A brief description of the new file's purpose.>"

}}

]

}}

### TECHNICAL DESIGN SPECIFICATION TO ANALYZE:

{design\_spec\_md}

6. Supervisor Modifications (supervisor\_v5.py)

The save\_artifacts function will be updated to handle the new potential output from the design phase. It will check for the presence of design\_synthesis\_json in the state and, if valid, save it as a .json file.