**System Test Plan**

**For**

***Ingenion Telemetry Web Server***

Team member:

| Version/Author | Date |
| --- | --- |
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# Introduction

## Purpose

This document is a test plan for Ingenion Telemetry Web Server Testing, produced by the Telemetry Testing team. It outlines the testing strategy and approach the team will adopt to ensure that the telemetry web server aligns with the set business requirements before deployment.

## Objectives

* Adherence to requirements, specifications, and telemetry protocols.
* Facilitates the intended telemetry functions and maintains requisite standards.
* Satisfies the Entrance Criteria for System Deployment.
* Upholds internal security benchmarks.
* Ensures compliance with all relevant data regulations.

# Functional Scope

The Modules in the scope of testing for the Ingenion Telemetry Webserver are detailed in the following documents:

1. Telemetry Requirements Specification document: [System Requirements Specification.docx](https://docs.google.com/document/d/1068auOo8_KrZNU74Gu8HEtnNe4omimwi/edit?usp=sharing&ouid=107022652095637524375&rtpof=true&sd=true)

# Overall Strategy and Approach

## Testing Strategy

Ingenion Telemetry Web Server System Testing will include testing of all functionalities that are in scope (Refer Functional Scope Section) identified. System testing activities will include the testing of new functionalities, modified functionalities, screen level validations, work flows, functionality access, testing of internal & external interfaces.

### Usability Testing

**Test Objective:** Ensure the web server provides an intuitive user experience with clarity, logical navigation, and readability.

**Technique:** Users will navigate the interface, ensuring attributes like access keys, tab order, and font readability align with usability standards.

**Completion Criteria:** All interface elements should be assessed for usability, and any deviations from the standard usability practices should be addressed.

**Special Consideration:** Access to the Ingenion Telemetry Webserver and the corresponding System Requirements Specification document.

### Functional Testing

**Test Objective**: Verify that the system's data entry, retrieval, processing, and command transmission are congruent with the specified requirements in the SRS.

**Technique**: Implement use cases from the use case diagram, where valid data yields the expected outcome, and invalid data results in appropriate warning messages.

**Completion Criteria**: All functional use cases have been executed, and all defects have been rectified.

**Special Consideration**: Emphasis on validating comprehensive logs for communication events, errors, and warnings to facilitate system analysis and debugging.

* + 1. **Hardware and Software Integration Testing**

**Test Objective**: Validate the harmonious integration between the web server software component, FreeRTOS, and the hardware interfaces.

**Technique**: Simulate data processing, transmission, and command actions, checking the system's adherence to the IEEE 802.3 standards and real-time data communication via WebSockets.

**Completion Criteria**: Seamless interaction between the software and hardware components without data loss or communication issues.

## System Testing Entrance Criteria

To commence system testing, the following criteria must be satisfied:

1. Readiness of Test Environment: Ensure that the test environment mirrors the production environment, complete with the necessary hardware and software interfaces.
2. Availability of Test Data: Suitable data sets for telemetry should be available or generated to simulate real-world scenarios.
3. Test Case Preparation: Comprehensive test cases that cover all the functionalities mentioned in the SRS should be ready for execution.
4. Stable Build: A stable build/version of the Ingenion Telemetry Web Server System without critical defects should be available for testing.
5. Documentation: Updated SRS and other relevant documentation must be readily available to the testing team.

## Testing Types

* + 1. **Usability Testing**

The focus here is on the end-user experience, ensuring clarity, readability, and ease of navigation throughout the interactive web server.

**System Requirements Specification, 3.4.1:** "The web server's interface will be checked for intuitive design, emphasizing clarity, readability, and logical navigation."

* + 1. **Hardware and Software Integration Testing**

**Objective:** Validate the harmonious integration between the web server software component, FreeRTOS, and the hardware interfaces.

**Technique:** Simulate data processing, transmission, and command actions, checking the system's adherence to the IEEE 802.3 standards and real-time data communication via WebSockets.

**Completion Criteria:** Seamless interaction between the software and hardware components without data loss or communication issues.

**System Requirements Specification, 3.5.1:** “The system shall rely on FreeRTOS as the operating system running on the MicroBlaze CPU.”

**System Requirements Specification, 3.5.2:** “The system shall use a web server software component to host the interactive web server.”

**System Requirements Specification, 3.5.3:** “The system’s web server software component shall interact with FreeRTOS to retrieve real-time telemetry data.”

**System Requirements Specification, 3.5.4:** “The system shall adhere to IEEE 802.3 standards for Ethernet communication.”

* + 1. **Functional Testing**

The objective of this test is to ensure that each element of the Ingenion telemetry web server component meets the functional requirements as specified in:

* External Interface Requirements
* Business / Functional Requirements
* Any additional functional documents generated during the project, such as issue resolutions, change requests, or feedback.

**System Requirements Specification, 3.1.1:** “The system shall be connected to users via an interactive web server that will have reading and display capabilities of telemetry from peripherals.”

**System Requirements Specification, 3.1.2:** “The system shall be able to send commands to the CPU over Ethernet, sent by the user.”

**System Requirements Specification, 3.1.3:** “The system shall have Ethernet capabilities in order to connect with the user’s computer through an Ethernet interface at 10/100 Mbps.”

**System Requirements Specification, 3.1.4:** “The software product shall interface with the DDR3 memory in the Artix 7 FPGA, supporting read and write operations for data storage.”

## Suspension Criteria and Resumption Requirements

### Suspension Criteria

Testing may be suspended if:

* Critical defects are discovered that halt major functionalities.
* Hardware or network failures that prevent effective system testing.
* Significant discrepancies between the test environment and the production environment that could skew test results.
* Any changes made to the hardware, software, or database during the testing phase.

### Resumption Requirements

Testing can be resumed when:

* Critical defects have been addressed and resolved.
* Hardware or network issues are rectified.
* Test environments are realigned to match the production environment.
* Changes made during the testing halt are validated, and the system is deemed stable for testing.

# Execution Plan

## Execution Plan

The execution plan will detail the test cases to be executed. The Execution plan will be put together to ensure that all the requirements are covered. The execution plan will be designed to accommodate some changes if necessary, if testing is incomplete on any day. All the test cases of the projects under test in this release are arranged in a logical order depending upon their inter dependency.

| Requirement (From SRS) | Test Case # | Input | Expected Behavior | Pass/Fail |
| --- | --- | --- | --- | --- |
| **3.7.1**: The system shall be connected to users via an interactive web server that will have reading and display capabilities of telemetry from peripherals. | 1.1 | User accesses the web server through a browser and requests telemetry data. | The web server displays the telemetry data from peripherals without errors. |  |
| **3.7.2**: The system shall be able to receive commands to the CPU over Ethernet, sent by the user. | 1.2 | User inputs a command via the web interface to be sent to the CPU. | The command is transmitted to the CPU over Ethernet without delay or error, and the CPU acknowledges receipt or action. |  |
| **3.7.3**: The system shall have Ethernet capabilities in order to connect with the user’s computer through an Ethernet interface at 10/100 Mbps. | 1.3 | User connects to the system over an Ethernet connection with a speed test. | The connection speed is determined to be within the 10/100 Mbps range. |  |
| **3.7.4**: The software product shall interface with the DDR3 memory in the Artix 7 FPGA, supporting read and write operations for data storage. | 1.4 | Data write and read commands are executed for the DDR3 memory in the Artix 7 FPGA. | Data is successfully written to and then read from the DDR3 memory. |  |
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# Traceability Matrix & Defect Tracking

## Traceability Matrix

List of requirement, corresponding test cases

## Defect Severity Definitions

| **Critical** | The defect causes a catastrophic or severe error that results in major problems and the functionality rendered is unavailable to the user. A manual procedure cannot be either implemented or a high effort is required to remedy the defect. Examples of a critical defect are as follows:   * System abends * Data cannot flow through a business function/lifecycle * Data is corrupted or cannot post to the database |
| --- | --- |
| **Medium** | The defect does not seriously impair system function can be categorized as a medium Defect. A manual procedure requiring medium effort can be implemented to remedy the defect. Examples of a medium defect are as follows:   * Form navigation is incorrect * Field labels are not consistent with global terminology |
| **Low** | The defect is cosmetic or has little to no impact on system functionality. A manual procedure requiring low effort can be implemented to remedy the defect. Examples of a low defect are as follows:   * Repositioning of fields on screens * Text font on reports is incorrect |

# Environment

## Environment

* The System Testing Environment will be used for System Testing.

# Assumptions

* Define test plan assumptions..

# Risks and Contingencies

Define risks and contingencies.

# Appendices

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