## Subsystem Overview

The User Interface subsystem provides the primary operator touchpoint within the MATS. It delivers feedback through a 7” touchscreen, communicates system status via LED indicators, and provides removable media access through USB and SD ports. The UI runs a lightweight Raspberry Pi OS desktop, auto-launching SatDump at startup. Status LED’s are driven using a Python daemon that subscribes to SatDump telemetry, providing live feedback for RF lock, recording, and power state.

## Subsystem Requirements and Specifications

Table : User Interface Subsystem Specifications

|  |  |
| --- | --- |
| Category | Requirement |
| Display | 7 Inch capacitive touchscreen with Linux driver support. |
| Inputs/outputs | USB-A user port, SD/microSD card reader, power switch, RF & Power status LEDs. |
| Environmental | Operating 0ºC-50ºC, front panel IP-54 splash resistance |
| Electrical | Single 5V DC rail, 2A steady-state draw |
| Software | I2C touch controller, GPIO LEDs |
| Mechanical | Front-panel mounting to aluminum chassis, maximum depth behind panel mm |

## Objectives

The testing objectives for the User Inteface are:

* Verify touchscreen responsiveness and accuracy
* Confirm automatic startup and SatDump launch.
* Validate USB and SD card hot-plug enumeration
* Verify LED indicators function under scripted test
* Confirm LEDs respond correctly to SatDump Telemetry.

These objectives ensure the User Interface provides reliable control and feedback to operators.

## Required Equipment

* UI Hardware
* Test Media: 32 GB microSD card and 128 GB USB Flash drive
* Multimeter
* Python I2C test script (led\_test.py

## Testing Procedure

Table : User Interface Testing

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **Method** | **Expected Result** | **Observed Result** |
| Display Touch Response | Run 10-point accuracy grid or calibration app | Touch deviation < 2 mm |  |
| SatDump Auto-Launch | Boot system and observe startup | Pi logs into desktop and SatDump auto-launches within ~15 s |  |
| USB Enumeration | Hot-plug 128 GB USB drive | Drive mounts automatically in <3 s |  |
| SD Card Enumeration | Hot-plug 32 GB microSD card via panel reader | Card mounts automatically in <3 s |  |
| LED Functionality | Run led\_test.py scripted I²C pattern test | Each LED (Power, RF, Recording) cycles correctly through colors |  |
| LED Telemetry Response | Start/stop SatDump recording session | RF/Recording LEDs toggle in real time with telemetry |  |

## Subsystem Test Results

|  |  |  |
| --- | --- | --- |
| **Test Section** | **Pass/Fail** | **Notes** |
| Touchscreen Accuracy |  |  |
| Auto-Launch of SatDump |  |  |
| USB Enumeration |  |  |
| SD Card Enumeration |  |  |
| LED Functionality |  |  |
| LED Telemetry Response |  |  |