Test Plan Document

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Revision history

Date	By	Description of changes
02/04/2013	gdegeus	Numbered requirements in Trac.
02/18/2013	gdegeus	Filled out first 4 sections, first draft.
02/25/2013	gdegeus	Filled out Traceability Matrix.
03/03/2013	gdegeus	Wrote software Unit tests. Consulted with chathaway on all software tests.
03/07/2013	gdegeus	Wrote software System tests.
03/10/2013	gdegeus	Wrote software Integration tests.
03/10/2013	gdegeus	Wrote all hardware related tests. Consulted with npickett, nquimby, fimmel on all hardware tests.
03/11/2013	gdegeus	Wrote all Acceptance tests, traceability matrix completed.
03/11/2013	gdegeus	Final draft completed.

1 Test Information

1.1 Test type

___ Full Test ___ Regression Test

1.2 System Under Test

System name: _____
Version: _____

Staple the recorder listing of the configuration here

1.3 Test Personnel

Name: _____ Date: _____ Time/h: _____
Name: _____ Date: _____ Time/h: _____
Name: _____ Date: _____ Time/h: _____

2 Test Summary

2.1 Results

Conclusion of the test: **PASS / FAIL**

Identifiers of the observations recorded:

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Total number of cases failed: _____

3 Background

3.1 Purpose and Scope of the Test

The requirements to be tested in this document are the requirements that must be passed or proven true for the system to be declared a working prototype. A working prototype is defined as a system that the team would be proud to present at the end of this course to classmates, professors, and potential employers. This does not include requirements that would have to be met were this system to be sold as a product.
The requirements to be tested include functionality of the hardware and software, and integration between the monitoring hardware, the server, and the display. These requirements do not include aspects such as physical appearance, large scale capability, or more complicated security requirements. The requirements to be tested can be found on the project website at:
http://dunari.cis.vtc.edu:8001/POWER/wiki/Requirements-Index
Each requirement has a Trac ticket associated with it on the page mentioned above, and will be marked as complete as each test associated with that requirement is passed.
A comprehensive list of all requirements can be found in the requirements document, which can be downloaded at:
http://dunari.cis.vtc.edu:8001/POWER/browser/Project%20Repository/Documents/Requirements.odt

3.2 Additional Information

Additional information can be found on the Trac website and in the SVN repository, including source code, tickets and additional documentation.

3.3 Experience required

The tester must be familiar with some python commands and have basic knowledge of the use of the command line to run python commands. The tester must also have basic electrical knowledge and know how to use an ammeter, voltmeter and related safety procedures and precautions. Experience with setting up and running the system suggested.

3.4 Test Items / Equipment Needed

1. Satellite prototype
2. Server (Raspberry Pi)
3. Device to be monitored
4. Independent computer with internet access and a web browser
5. A standard National Electrical Manufacturers Association (NEMA) 5-15 mains electrical outlet

3.5 Estimated test time

The entirety of these tests should take approximately 2-3 hours.

3.6 Reference Documents

Requirements Referenced: http://dunari.cis.vtc.edu:8001/POWER/wiki/Requirements-Index
Requirements Document: http://dunari.cis.vtc.edu:8001/POWER/browser/Project%20Repository/Documents/Requirements.odt

4 Preparing the Test Environment

4.1 Application Setup

The system consists of a Coordinator Satellite, at least one Router Satellite, the Server, hosted on the Raspberry Pi provided, and the Display, a website to be accessed via a web browser on an independent computer.

1. Connect the Server into a power outlet
2. Connect the Coordinator Satellite to the Server via USB
3. Connect any Router Satellites into NEMA power outlets
4. Connect the Server to the network
5. Power on the Server
6. Power on the Satellites
7. Plug the Device into a Router Satellite

4.2 Additional Tools

Addition tools required for some tests include:

- Variac variable auto-transformer
- Voltmeter
- Current meter
- Automated tests files (available in source code)
- Zigbee Mesh test program and accompanying number list
- Serial Monitoring Software
- Voltage Test Software for Satellite
- Current Test Software for Satellite
- An additional tester with no previous experience with the system

Comments: _____

_____

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_____

5 Unit Test Cases

5.1 REST API

Test Case ID	TC_U01
Description	Tests REST API functionality.
Applicable for	
Requirements	
Initial Conditions	Run each test individually.

Name	Input	Expected Result	Success Criteria	Pass / Fail
data_format	Database with at least 2 rows of data	/API/raw/data file outputs an array of hashes in json format.	There is data present in the file	**Pass / Fail**
data_presence	Database with at least 2 rows of data	/API/raw/data file outputs an array of hashes where each has represents one row of data from the input database.	Data present can be parsed by a json parser	**Pass / Fail**
data_consistency	Database with at least 2 rows of data	/API/raw/data file outputs an array of hashes where each has represents one row of data from the input database.	Every hash in the output have identical keys	**Pass / Fail**
data_accuracy	Database with at least 2 rows of data	/API/raw/data file outputs an array of hashes where each has represents one row of data from the input database. The amount of data should correlate to the amount of data in the input database.	Data accurately reflects data in the input database	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.2 Satellite

Test Case ID	TC_U02
Description	Tests REST API functionality.
Applicable for	
Requirements	
Initial Conditions	Run each test individually.

Name	**Input**	**Expected Result**	**Success Criteria**	**Pass / Fail**
data_protocol	Data in “powr:xxxx:xx:xxxx:xxxx” format	Data provided is now in the database.	Data provided is now in the database.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.3 Web UI

Test Case ID	TC_U03
Description	Tests web UI functionality.
Applicable for	
Requirements	
Initial Conditions	Run each test individually.

Name	**Input**	**Expected Result**	**Success Criteria**	**Pass / Fail**
authentication_authorization	User is not logged in	The user is prompted to log in.	The user cannot access the home page.	**Pass / Fail**
html_rendering	Any and all web pages from this site	All web pages render on the site.	A valid HTML document.	**Pass / Fail**
file_presence	Static files	The files can be downloaded.	The user can access all files located under the collected static directory.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.4 Backend

Test Case ID	TC_U04
Description	Tests backend functionality.
Applicable for	
Requirements	
Initial Conditions	Run each test individually.

Name	**Input**	**Expected Result**	**Success Criteria**	**Pass / Fail**
database_functionality	Database	Data can be saved to all tables in the provided database.	Database and all database tables exist.	**Pass / Fail**
orm_layer	Database and data to be saved	Data is saved and can be recalled.	Data is saved and can be recalled.	**Pass / Fail**
modules	POWR module	The URLs created by the provided module load in a browser.	Ability to access URLs created by the provided module.	**Pass / Fail**
permissions_negative	A model resource	No data is available.	The user is not authenticated and no data is available.	**Pass / Fail**
permissions_positive	A model resource	Data is available.	The user is authenticated and data is available.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.5 Unicode and Backend

Test Case ID	TC_U05
Description	Tests uinicode object functionality.
Applicable for	
Requirements	
Initial Conditions	Run each test individually.

Name	**Input**	**Expected Result**	**Success Criteria**	**Pass / Fail**
get_satellite_by_id	Satellite ID in the form of “aaa-bbb-ccc:a”	Satellite object	A Satellite object is returned with the same ID as was the input to the test.	**Pass / Fail**
find_power_cost	Range between 0 and 1000	Power cost applicable to current time stamp	Power cost calculated is within expected limits	**Pass / Fail**
custom_methods	Satellite object	String containing the ID of the given Satellite	The string is given in the form “aaa-bbb-ccc:a”.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.6 Python Automated Tests

Test Case ID	TC_U06
Description	Unit test suite generated by for testing Django
Applicable for	Server software
Requirements	FD_101, FD_102
Initial Conditions	Run “manage.py test” in command line

Name	Input	Expected Results	Success Criteria	Pass / Fail
CheckResource MetaTests		“Resources should inherit the meta options from ModelMeta”	Resources inherit the meta options from ModelMeta	**Pass / Fail**
web_ui_tests.test_login	User is at the log in page	"The user should be logged in after we finish the login test!"	User is logged in to the site	**Pass / Fail**
web_ui_tests.test_logout	User is logged in to the site	"The user should be logged out after we finish the logout test!"	User is on the log in page	**Pass / Fail**
web_ui_tests.test_add_device	“What is it?” = “lamp” “Where is it?” = “the kitchen” “Is it unique in any way?” = “blue shade”	"There should be one device there now"	Device has been created and appears on Device Management page	**Pass / Fail**
web_ui_tests.test_rename_device	Device name = “lamp in the kitchen with the blue shade"	"There should be one device with the name lamp in the kitchen with the blue shade" or "There should be one device there now"	Device name on Device Management page has changed to “lamp in the kitchen with the blue shade”	**Pass / Fail**
web_ui_tests.test_disable_device_single	Device “lamp in the kitchen with the blue shade” is enabled on Device Management page	"There should be one device there now"	Device “lamp in the kitchen with the blue shade” is disabled on Device Management page	**Pass / Fail**
web_ui_tests.test_add_user	“username” = “test” “password” = “password” “Retype password” = “password”	"There should be two users now"	There are 2 users visible on User Management page	**Pass / Fail**
web_ui_tests.test_add_satellite		“There should now be one satellite in the database”	There is a satellite on the Satellite Management page	**Pass / Fail**

web_ui_tests.test_del_user		"There should be one user now"	There is only one user on the User Management page	**Pass / Fail**

Overall: **Pass / Fail**	Date:
Notes:	

5.7 Zigbee Mesh Test

Test Case ID		TC_U02	
Description		Tests whether the Router Satellites can communicate with the Coordinator Satellite and the Server to transmit data to the database.	
Applicable for			
Requirements		FV_105, FS_104	
Initial Conditions		Router Satellite is powered on with the test program loaded, Coordinator Satellite is connected to the Server, serial monitor software is monitoring input from the Coordinator, list of numbers in test program is provided.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Press the button on the Router Satellite to begin the transmission of the test data.	
2		Verify that the numbers shown in the serial monitoring software match the numbers on the list provided.	**Pass / Fail**
3		Verify that the numbers are being received at least once every 60 seconds.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.8 Voltage Circuit

Test Case ID		TC_U03	
Description		Tests the voltage measuring circuit for functionality and accuracy.	
Applicable for			
Requirements		FS_102, FS_301	
Initial Conditions		Router Satellite is plugged into variac, voltmeter plugged into output of Router Satellite, Coordinator Satellite loaded with voltage test software and plugged into Server via USB, serial monitoring software is monitoring input from the Coordinator.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Using the variac, adjust the voltage to a relatively low number.	
2		Verify that the serial monitor is showing the same voltage as the voltmeter with +/- 5% error.	**Pass / Fail**
3		Adjust the voltage to a relatively high number.	
4		Verify that the serial monitor is still showing the same voltage as the voltmeter with +/- 5% error.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

5.9 Current Circuit Test

Test Case ID	TC_U04
Description	Tests the current measuring circuit for functionality and accuracy.
Applicable for	
Requirements	FS_102, FS_301
Initial Conditions	Router Satellite is plugged into a NEMA power outlet, current meter is clamped onto one output wire of the Router Satellite, Coordinator Satellite loaded with current test software and plugged into Server via USB, serial monitoring software is monitoring input from the Coordinator.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Apply a load between 0 and 20 amps to the Router Satellite output.	
2		Verify that the serial monitor is showing the same current as the current meter with +/- 5% error.	**Pass / Fail**
3		Apply a new load between 0 and 20 amps to the Router Satellite output.	**Pass / Fail**
4		Verify that the serial monitor is still showing the same current as the current meter with +/- 5% error.	**Pass / Fail**
5		Apply a new load between 0 and 20 amps to the Router Satellite output.	**Pass / Fail**
6		Verify that the serial monitor is still showing the same current as the current meter with +/- 5% error.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6 System Test Cases

6.1 Log in

Test Case ID		TC_S01	
Description		Tests the Login Screen	
Applicable for		IE7 or newer, Firefox	
Requirements		FV_102	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Open the log in page using the IP address displayed on the LCD screen on the Server.	
2		Verify that the desired site, the Display, is shown at the given IP.	**Pass / Fail**
3		Verify that the log in screen is displayed on both IE6 and Firefox.	**Pass / Fail**
4		Enter Username and Password.	
5	R	Verify that the username can be entered.	**Pass / Fail**
6	R	Verify that the password is masked and can be entered.	**Pass / Fail**
7	R	Verify that the Log in button is displayed.	**Pass / Fail**
8	R	Click the “Log in” button, verify that the page changes to the “Home” page	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.2 Log out

Test Case ID		TC_S02	
Description		Tests the Log out functionality	
Applicable for		IE7 or newer, Firefox	
Requirements			
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is already logged in to the site.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		User is on any page on the site	
2	R	Verify that the log out link is available.	**Pass / Fail**
3		Click on the “Log out” button.	
4	R	Verify that the user has been logged off of the site, the browser displays the log in page.	**Pass / Fail**
5		Verify that the log in screen is displayed on both IE6 and Firefox.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.3 Add Device

Test Case ID	TC_S03
Description	Tests the ability to add a Device
Applicable for	
Requirements	FD_101
Initial Conditions	Equipment is set up as per Preparing the Test Environment section. The user is logged in to the site.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Navigate to the Device Management page.	
2		Click the Add Device button. Verify that there are two Add Device buttons on this page.	**Pass / Fail**
3		Enter relevant data in each of the fields. Verify that it is possible to enter data in each field.	**Pass / Fail**
4		Click Add Device.	**Pass / Fail**
5	R	Select a Satellite to associate to the Device.	**Pass / Fail**
6	R	Verify that the Device is Enabled. Click Save.	**Pass / Fail**
7	R	Verify that the new Device appears on the Device Management page.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.4 Disable Device

Test Case ID	TC_S04
Description	Tests the Disable Device option
Applicable for	
Requirements	FD_101
Initial Conditions	Equipment is set up as per Preparing the Test Environment section. The user is logged in to the site.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Navigate to the Device Management page.	
2		Click the check box next to an existing Device.	
3		Click the Disable selected Devices option in the drop-down menu. Click Go.	
4	R	Verify that there is an “Are you sure?” page. Click “Yes, I'm sure”.	**Pass / Fail**
5	R	Verify that the disabled Device is no longer on the Device Management page.	**Pass / Fail**
6	R	Change the Filter to show all disabled devices by clicking “No”.	**Pass / Fail**
7	R	Verify that the disabled Device is now visible with a red negative sign under the Enabled column.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.5 Add Satellite

Test Case ID		TC_S05	
Description		Tests the add Satellite functionality	
Applicable for			
Requirements		FD_102, FV_103	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is logged in to the site.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Navigate to the Satellite Management page.	
2	R	Click the Add Satellite button. Verify that there are two Add Satellite buttons on this page.	**Pass / Fail**
3		Click Next.	
4	R	Verify that a Satellite serial number is shown, format XXX-XXX-XXX.	**Pass / Fail**
5		Click Next, and then navigate to the Satellite Management page,	
6	R	Verify that the serial number displayed on the previous screen is now displayed in the list of available Satellites.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.6 Remove Satellite

Test Case ID		TC_S06	
Description		Tests that Satellites can be removed.	
Applicable for			
Requirements		FD_102	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is logged in to the site.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Navigate to the Satellite Management page.	
2		Click the check box next to an existing Satellite.	
3		Click the Delete selected Satellites option in the drop-down menu. Click Go.	
4	R	Verify that there is an “Are you sure?” page. Click “Yes, I'm sure”.	**Pass / Fail**
5	R	Verify that the deleted Satellite is no longer on the Satellite Management page.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.7 Add User

Test Case ID		TC_S07	
Description		Tests the Administrator functionality to add users.	
Applicable for			
Requirements			
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is logged in and has Administrator privileges.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Navigate to the User Management page.	
2	R	Click the Add User button. Verify that there are two Add User buttons on this page.	**Pass / Fail**
3		Enter Username and Password, re-type the Password, and click Save.	
4	R	Verify that there is a Change User page, and that the username displayed is the one previously entered.	**Pass / Fail**
5	R	Verify that the additional information fields include: First Name, Last Name, E-mail address, and Permissions.	**Pass / Fail**
6		Click Save.	**Pass / Fail**
7	R	Verify that the new user with the username entered above is now visible on the User Management page.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.8 Remove User

Test Case ID		TC_S08	
Description		Tests the Administrator functionality to remove users.	
Applicable for			
Requirements			
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is logged in and has Administrator privileges.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Navigate to the User Management page.	
2		Click the check box next to an existing User, that is not the currently logged in user.	
3		Click the Delete selected Users option in the drop-down menu. Click Go.	
4	R	Verify that there is an “Are you sure?” page. Click “Yes, I'm sure”.	**Pass / Fail**
5	R	Verify that the deleted User is no longer on the User Management page.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.9 Rename Device

Test Case ID	TC_S09
Description	Tests the ability to rename a Device.
Applicable for	
Requirements	FD_101
Initial Conditions	Equipment is set up as per Preparing the Test Environment section. The user is logged in.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Navigate to the Device Management page.	
2		Click on an existing Device.	
3	R	Verify that there is a Change Device page.	**Pass / Fail**
4	R	Verify that the name of the Device can be edited.	**Pass / Fail**
5		Enter a new name for the Device. Click Save.	**Pass / Fail**
6	R	Verify that the new Device name is displayed on the Device Management page.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

6.10 Reassign Device

Test Case ID	TC_S10
Description	Tests the ability to reassign a Device.
Applicable for	IE6, Firefox
Requirements	FD_101
Initial Conditions	Equipment is set up as per Preparing the Test Environment section. The user is logged in.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Navigate to the Device Management page.	
2		Click on an existing Device.	
3	R	Verify that there is a Change Device page.	**Pass / Fail**
4	R	Click on the drop-down menu next to “Satellite:” and select a different serial number.	**Pass / Fail**
5		Click Save.	
6	R	Verify that the Device modified has the same serial number on the Device Management page as was specified previously.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

7 Integration Test Cases

7.1 Create a Graph

Test Case ID		TC_I01	
Description		Tests whether the site can create graphs with data from the Satellites.	
Applicable for			
Requirements		FD_103, FD_201	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is logged in.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Navigate to the Power Usage page.	
2		Click the option to Create a Graph	
3		Follow the instructions to create a line graph with one existing device, that is normal (not stacked).	
4		Click the Create Graph button.	
5	R	Verify that there is a graph displayed.	**Pass / Fail**
6	R	Verify that the graph is a line chart, includes data from the selected device and only from the selected device, and that there are no stacked lines.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

7.2 View Graphs

Test Case ID		TC_I02	
Description		Tests that graphs previously created can still be viewed.	
Applicable for			
Requirements		FD_103, FD_201	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user is logged in. Test TC_I01 has been run immediately prior.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Navigate to the Power Usage page.	
2		Click the View Graphs page.	
3	R	Verify that there are graphs on this page, including the graph created in the last test.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

7.3 Data Retention Across Satellites

Test Case ID	TC_I03
Description	Tests whether data on a Device is retained when the Device is assigned to a new Satellite.
Applicable for	
Requirements	ND_103
Initial Conditions	Equipment is set up as per Preparing the Test Environment section. The user is logged in to the site, there is at least one Device in the database associated with data.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Navigate to the Device Management page.	
2		Verify that there is an existing Device with associated data.	
3		Create a graph with just the data from the Device specified above.	**Pass / Fail**
4	R	Navigate back to the Device Management page. Edit the settings of the specified Device. Change the Satellite associated with the Device.	**Pass / Fail**
5		Return to the Power Usage page and create a graph identical to step 5.	**Pass / Fail**
6	R	Verify that the graph does not differ from the original graph, verify that the data has not been lost.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

7.4 Zigbee Data Transfer

Test Case ID		TC_I04	
Description		Tests that data from the Satellites are being stored in the database correctly.	
Applicable for			
Requirements			
Initial Conditions		Router Satellite is powered on with the test program loaded, Coordinator Satellite is connected to the Server, list of numbers in test program is provided. The user is logged in.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Press the button on the Router Satellite to begin the transmission of the test data.	
2		Navigate to the Power Usage page.	**Pass / Fail**
3		View the Raw Data.	**Pass / Fail**
4		Verify that the numbers shown in the raw data table match the numbers on the list provided.	**Pass / Fail**
5		Verify that the numbers are being received at least once every 60 seconds.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

7.5 Satellite to Server Protocol

Test Case ID		TC_I05	
Description		Tests whether the Satellites send data as per the defined protocol, and that the Server-side software can parse the data correctly.	
Applicable for			
Requirements			
Initial Conditions		Router Satellite is plugged into variac, voltmeter plugged into output of Router Satellite, Coordinator Satellite loaded with voltage test software and plugged into Server via USB, serial monitoring software is monitoring input from the Coordinator.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Set the variac to a specific voltage.	
2		Verify that the voltmeter reads the specific voltage.	**Pass / Fail**
3		Verify that the data in the serial monitor is in the format “ POWR:xxx:xx:xxx”	**Pass / Fail**
4		Navigate to the View Raw Data page.	**Pass / Fail**
5		Verify that the new data is being added to the table, and that the data is the same as the input voltage.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

8 Acceptance Test Cases

8.1 Ease of Learning

Test Case ID	TC_A01
Description	Tests how easy it is to learn to use the site
Applicable for	
Requirements	ND_101
Initial Conditions	The tester has never used the Display interface before. This test must be timed.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1		Open the log in page using the IP address displayed on the LCD screen on the Server. Begin the timer.	
2		Log in to the site.	**Pass / Fail**
3		Add a Satellite. Verify the Satellite has been added.	**Pass / Fail**
4		Add a Device, be sure to specify the Satellite associated with it. Verify the Device has been added.	**Pass / Fail**
5		Navigate to the Power Usage page.	
6		View a graph representing data from the Device and Satellite just added.	**Pass / Fail**
7		Stop timer. Verify that this test took less than 10 minutes.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

8.2 Examining the Satellite

Test Case ID	TC_A02
Description	Test to confirm that the physical Satellite conforms to requirements about its appearance.
Applicable for	
Requirements	NS_101 , NS_102 , FS_101
Initial Conditions	Equipment is set up as per Preparing the Test Environment section.

Step	Full / Regr	Task & Expected Result	Pass / Fail
1	R	Verify that the Satellite can be plugged into a standard National Electrical Manufacturers Association (NEMA) 5-15 mains electrical outlet.	**Pass / Fail**
2	R	Verify that there is a small LED on the Satellite.	**Pass / Fail**
3	R	Verify that this LED turns on when the Satellite is plugged into the outlet.	**Pass / Fail**
4	R	Verify that the Satellite is small relative to a desktop computer and a laptop computer, and that it is not considerably larger than the outlet.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

8.3 Examining the Server

Test Case ID		TC_A03	
Description		Test to confirm that the physical Server conforms to requirements about its appearance.	
Applicable for			
Requirements		FV_101, FV_104	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Verify that the Server is in the same building as the Coordinator and Router Satellites.	**Pass / Fail**
2		Verify that the Server is connected to the network in the building.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

8.4 Data Loss Error

Test Case ID		TC_A04	
Description		Tests that losing data is considered an error and that a record of the error is available so the problem can be addressed.	
Applicable for			
Requirements		FS_301	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The Coordinator Satellite is informed of the number of Router Satellites on the mesh and the frequency with which the transmissions are being sent.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Remove a Router Satellite from the mesh mid-transmission by restarting it.	
2		View the Error Log found on the Server.	**Pass / Fail**
3		Verify that there are errors in this log.	**Pass / Fail**
4		Verify that these errors are consistent with the missed transmissions.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

8.5 Display Responsiveness

Test Case ID		TC_I05	
Description		Tests the responsiveness of the Display.	
Applicable for			
Requirements		ND_102	
Initial Conditions		Equipment is set up as per Preparing the Test Environment section. The user may or may not be logged in.	
Step	**Full / Regr**	**Task & Expected Result**	**Pass / Fail**
1		Run the Responsiveness automated test from the command line.	
2		Expected result is the site is opened in a browser.	**Pass / Fail**
3		Verify that the test outputs the time it takes to load 3 separate pages.	**Pass / Fail**
4		Verify these numbers are all less than 300 milliseconds.	**Pass / Fail**

Overall: **Pass / Fail**
Notes:

9 Traceability matrix

Requirement ID	Test case ID	Note
FS_101	TC_A02	
FS_102	TC_U03, TC_U04	
FS_301	TC_U03, TC_U04	
FS_103	TC_A04	
FS_104	TC_U02	
FV_101	TC_A03	
FV_102	TC_S01	
FV_103	TC_S05	
FV_104	TC_A03	
FV_105	TC_U02	
FD_101	TC_S03, TC_S04, TC_S09, TC_S10	
FD_102	TC_S05, TC_S06	
FD_103	TC_I01, TC_I02	
FD_201	TC_I01, TC_I02	
NS_101	TC_A02	
NS_102	TC_A02	
ND_101	TC_A01	
ND_102	TC_I05	
ND_103	TC_I03	