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Document Revision 1.6

**Cherry Bomb:  
Cherry Blossom  
Internal Test Procedures**

**For Cherry Blossom Version 5.0**

**(CDRL 14c)  
(U)**

*Prepared for US Govt. by:*

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*For contract:*

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**Revisions**

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1.1	Updated email/chat info	21 October 2010
1.2	Added section 4.2.x tests for CB v4 requirements. Removed redundant 5.7 test.	3 November 2010
1.3	Added start and stop CT services to delete flytrap test.	2 December 2010
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## **1 Introduction**

### **1.1 Purpose**

This document describes the internal test procedures for the Cherry Blossom project of the Cherry Bomb program. These tests are performed internally by the contractor in preparation for FAT. These tests are performed to test fine-grained functionality of the Cherry Blossom system deemed too time-consuming and/or labor-intensive for FAT.

This document should be used in conjunction with the Cherry Blossom Internal Verification and Validation Report (CDRL 15-c) -- referred to as VVR hereafter. When running the tests described in this document, update VVR with appropriate date/tester/version/pass-fail information. Test numbers in this document map to those in VVR. Note that this document derives from the "TestProcedures.doc" of the Cherry Blossom project.

For further context, see the Cherry Bomb Quality Assurance Plan (CDRL 3).

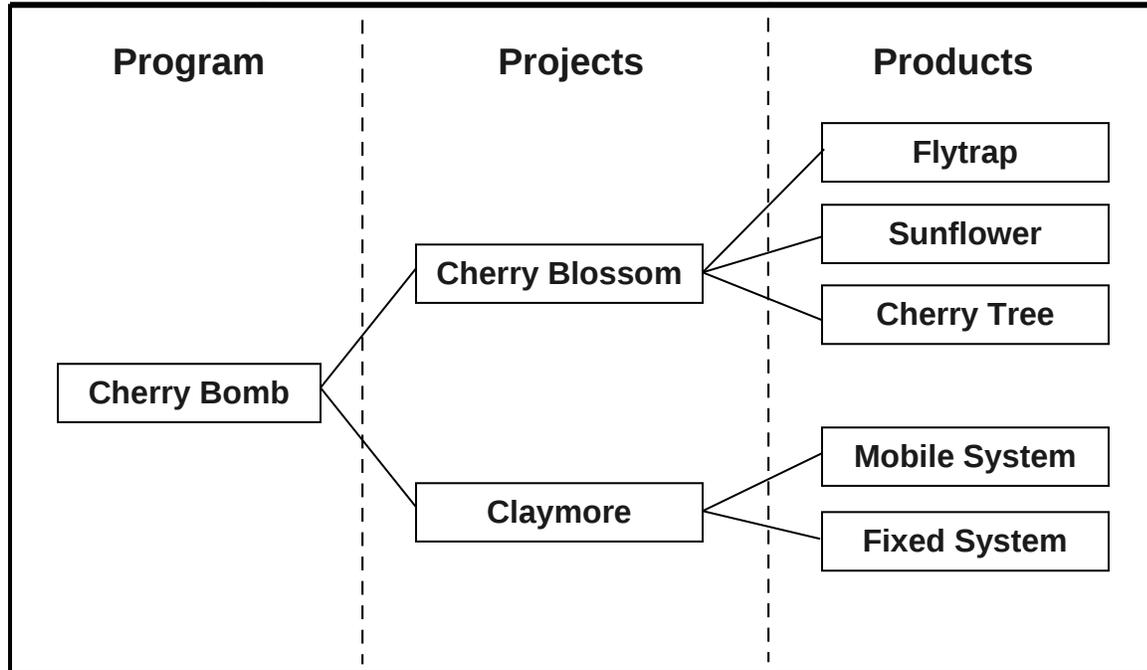
### **1.2 Program Overview**

The CBomb program (contract end 31 August 2012) is a follow-on to the Cherry Blossom project (contract ended 28 February 2010). CBomb encompasses the prior Cherry Blossom project work and specifically partitions Claymore work (which was started on the prior Cherry Blossom contract) into a separate project.

Figure 1 shows the CBomb program/project/product hierarchy.

## Cherry Bomb Program

## Cherry Blossom Internal Test Procedures



**Figure 1: Cherry Bomb Product Hierarchy**

The CBomb program consists of two major projects, Cherry Blossom (CBlossom) and Claymore. The CBlossom project has three major products, a frontend “Flytrap”, a “Sunflower” development kit, and a backend “Cherry Tree”. Note that Sunflower is a joint effort with another contractor, referred to hereafter as the Sunflower Other Contractor (SOC). The Claymore project also has two major products, a “Mobile” system and a “Fixed” system.

### 1.3 Points of Contact

Points of contact for the CBomb project include:

- XXXXX – sponsor – COTR
- XXXXX Y – contractor – PM
- XXXXX Y – contractor – Lead Engineer

### 1.4 Applicable Documents

The following table shows related documents:

- Cherry Bomb Contract
- Cherry Bomb Statement of Work
- Cherry Bomb Quality Assurance Plan (CDRL-3)
- Cherry Bomb: Cherry Blossom User’s Manual (CDRL-12)
- Cherry Bomb: Cherry Blossom System Test Plan (CDRL-13)

## 1.5 Conventions

The documentation for each individual test contains:

- **Description** – a short description of the test
- **Context** – (optional). If the test requires additional lengthy contextual information, include it here.
- **Setup** – procedures for setting up the test.
- **Run** – procedures for running the test.
- **Pass/Fail** – description of how to determine if a test passed or failed

All test devices have the default LAN IP address and username/password labeled on the device. Most devices also have a reset button or similar that if depressed for 15 seconds or so will reset the device to the manufacturer defaults. If you are having trouble connecting/pinging a device, use the reset button, and then use the info labeled on the device to connect/configure.

## 1.6 Prerequisites

To perform the procedures in this document, the tester needs a working knowledge of the Cherry Blossom system. It is assumed that the tester has read the Cherry Blossom User's Manual in enough detail to understand the various Cherry Blossom features and logic/design of those features. The tester must also have a working knowledge of wireless 802.11 networks, including how to configure 802.11 routers/AP's, and how to connect wireless clients to wireless networks.

## 1.7 Test Types

This section describes the test types in this document. Each test type is partitioned into a separate section. The following test types are:

- **Unit Tests** (section 2) – automated tests that exercise individual software modules/libraries/classes/methods.
- **Automated System Tests** (section 3) – automated (i.e., no operator required) tests that exercise the system as a whole.
- **Product Specific Tests** (Flytrap section 4, Cherry Tree section 4.4) – tests specific to a particular product
- **Periodic/Extended Time Tests** (section 6) – tests to ensure robust system operation over an extended period of time.
- **Upgrade Tests** (section 7) – related to Flytrap upgrades.

## 2 Unit Tests

This section describes unit tests for the Cherry Blossom system.

### 2.1 CherryTree/Web Unit Tests

**Description:** these unit tests exercise the software libraries, classes, interfaces, etc. of the backend CherryTree/Web software

**Setup:** checkout (or update) the latest version of CherryBlossom software from the subversion repository ("`<CB>`" refers to the root directory of this checkout).

**Run:** `cd <CB>/CherryTree && ant test`

**Pass/Fail:** any unit test failures will stop the test process and report the error; otherwise success will be reported.

### 2.2 Flytrap Unit Tests

**Description:** these unit tests exercise the software libraries, classes, interfaces, etc. of the front-end Flytrap software (MissionManager and GenericFilter).

**Setup:** checkout (or update) the latest version of CherryBlossom software from the subversion repository ("`<CB>`" refers to the root directory of this checkout).

**Run:** `cd <CB>/Flytrap && make test_clean && make test_inc && make test`

**Pass/Fail:** any unit test failures will stop the test process and report the error; otherwise success will be reported.

### 2.3 Flytrap Device Unit Tests

**Description:** these unit tests exercise the software libraries, classes, interfaces, etc. of the frontend Flytrap software (MissionManager and GenericFilter). However, instead of running them on the client machine, they are run on the Flytrap.

**Setup:** checkout (or update) the latest version of CherryBlossom software from the subversion and build and re-image the flytrap. You should also be directly connected to the flytrap being tested.

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### Cherry Bomb Program

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**Run:** Perform the following:

- `cd <CB>/Flytrap`
- `make im{image_number}_inc && make target_tests`. For example, `make im32_inc && make target_tests`.

The image number can be found by searching for the appropriate MMV in the `<CB>/Flytrap/formImage.sh` file.

- Upload the `mm_T` executable to the flytrap:

From the flytrap, run `'netcat -v -w 90 -l -p 5600 > /tmp/mm_T'`

From the client, run `'cd <CB>/Flytrap/Apps/MissionManager/Test && nc -v -w 10 {flytrap_IP} 5600 < mm_T'`

- If any changes have been made to the underlying source code between the time the flytrap was re-imaged and testing, upload the dynamic libraries to the flytrap. This is typically only necessary during a troubleshooting phase and not during normal testing.

From the flytrap, run `'mkdir /tmp/ft-{svn.version}'` and then `'netcat -v -w 90 -l -p 5600 > /tmp/ft-{svn.version}/libft.so'`

From the client, run `'cd <CB>/Flytrap/Common/libft && nc -v -w 10 {flytrap_IP} 5600 < libft.so'`

From the flytrap, run `'netcat -v -w 90 -l -p 5600 > /tmp/ft-{svn.version}/libcbcrypt.so'`

From the client, run `'cd <CB>/Flytrap/Common/libft && nc -v -w 10 {flytrap_IP} 5600 < libcbcrypt.so'`

The `ft-{svn.version}` path is displayed at the end of the make call and can be found by searching for `'-rpath=/tmp/ft-{svn.version}'`

- From the flytrap, run `'chmod +x /tmp/mm_T'`
- From the flytrap, run `'/tmp/mm_T'`

**Pass/Fail:** any unit test failures will stop the test process and report the error; otherwise success will be reported.

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### 3 Automated System Tests

This section describes automated system tests for the Cherry Blossom system.

#### 3.1 Generic Filter Test

**Description:** This test is performed to simulate an operational environment which stresses the software under heavy load conditions. They may be run from the command line or from a script and provide "PASS/FAIL" output to indicate test results.

**Setup:** follow instructions in <http://<CB>/Test/GenericFilter/README.html>

**Run:** <http://<CB>/Test/GenericFilter/README.html>. Perform the following:

- **Generic Filter System Test:** follow instructions in <http://<CB>/Test/GenericFilter/README.html>, which include a "Wireless Client Short", "Wired Client Short", "Wireless Client Long", and "Performance Test". Ideally, this test is performed simultaneously on multiple Flytraps and clients.
- **Generic Filter System Test in the presence of other client traffic:** ping the Flytrap from a routable host, run the Performance Test on one test client, and run the Generic Filter Test on a different client.

**Pass/Fail:** the scripts used to run the various Generic Filter Tests will indicate pass/fail. The Performance Test has no hard requirement, although typically we like to keep T1-like internet throughput degradation at < 10%.

### 3.2 Memory and File Descriptor Leaks Test

**Description:** Tests that Flytrap firmware is not causing memory and file descriptors leaks after a significant stress test.

**Setup:** same as Generic Filter Test (see 3.1). Power-cycle the Flytrap and after about 30 seconds, telnet to it and record the initial available memory (typically `cat /proc/meminfo`) and initial file descriptor usage (typically `cat /proc/sys/fs/file-nr`).

**Run:** run 1000 iteration Generic Filter System Test (see 3.1). When this has completed, telnet to the Flytrap and record the available memory (typically `cat /proc/meminfo`) and file descriptor usage (typically `cat /proc/sys/fs/file-nr`).

**Pass/Fail:** the test passes if there is no appreciable change in available memory and file descriptor usage as a result of the 1000 iteration Generic Filter Test.

## 4 Flytrap Tests

This section describes Cherry Blossom tests related to the Flytrap product.

For testing purposes, the Flytraps will have telnet capabilities enabled. However, the following devices do not support telnet:

- Belkin F5D8231-4

For these devices 'dumbbellc' must be used. Dumbbellc is used to send commands to the Flytrap and then redirects the output back to the user. To build dumbbellc, run '<CB>/Flytrap/make tools' to create <CB>/Flytrap/Tools/bin/dumbbellc. In addition to the dumbbellc client, ensure that the Flytrap's image is created to include dumbbelld.

### 4.1 Beacon Tests

This section describes tests related to the (complex) beaconing logic of Flytraps. Note that the tests in this section are ordered in such a way as to Make testing more efficient.

Flytrap Firmware: for all of the Beacon Tests, build a firmware (see <http://<CB>/Flytrap/Documentation/ImageFormation.html> for instructions) with the following settings (in <CB>/Flytrap/Config/flytrap.config):

```

CONFIG_DEBUG_VERION = y
MM_INITIAL_BEACON_ADDRESS1 = 1.2.3.4 (i.e., a garbage value)
MM_INITIAL_BEACON_PORT1 = 1234 (i.e., a garbage value)
MM_INITIAL_BEACON_ADDRESS2 -- > 5.6.7.8 (i.e., a garbage value)
MM_INITIAL_BEACON_PORT2 = 5678 (i.e., a garbage value)
MM_INITIAL_BEACON_ADDRESS3 = 24.176.227.182 (i.e., zakura)
MM_INITIAL_BEACON_PORT3 = 80
MM_INITIAL_BEACON_TRAFFIC_REQUIREMENT =
MEDIUM_50_PACKETS_PER_SECOND_TRAFFIC_REQUIREMENT
MM_INITIAL_BEACON_TRAFFIC_REQUIREMENT_MAX_WAIT_SECS = 600 (i.e.,
10 minutes)
MM_INITIAL_BEACON_PERIOD_SEC = 2592000 (i.e., 30 days)
MM_INITIAL_BEACON_ONTIME_UPDATE_PERIOD_SEC = 1800 (i.e., 30 minutes)
MM_INITIAL_BEACON_FAST_RETRY_SEC = 4
MM_INITIAL_BEACON_NUMBER_OF_FAST_RETRIES = 6
MM_INITIAL_BEACON_SLOW_RETRY_SEC = 30
MM_INITIAL_BEACON_MAX_TIME_SEC = 7776000 (i.e., 90 days)
MM_INITIAL_BEACON_SUICIDE_TIME_SEC = 31536000 (i.e., 365 days)
MM_USE_NON_BLOCKING_CONNECT = y
MM_NONBLOCKING_CONNECT_TIMEOUT_SECONDS = 2
MM_NONBLOCKING_CONNECT_TIMEOUT_MICROSECONDS = 80000
CONFIG_SHELLD = y (or, if shelld is not supported for this device,
CONFIG_DUMBBELLD = y)

```

---

**Hardware Required:**

- Wireless Router/Flytrap
- Client Computer
- Hub
- Server Computer with web server
- Ethernet cable(s)

**Initial Setup:**

- If the wireless router is currently a Flytrap, clear its NVRAM of MissionManager (mm) specific data (i.e., telnet to the Flytrap and run "killall mm && mm -x"). Perform a firmware upgrade on the Flytrap using the image with the parameters specified above.
- The Beacon Tests do not require a wireless client connection, so it is desirable (from a security aspect) to disable the Flytrap's wireless interface (i.e., through the device's web configuration). Some Flytrap devices do not support disabling of the wireless interface, so at the very least, enable WPA (or WEP if that is all the device supports). If possible, remove the antenna(s) from the Flytrap.
- Connect the client computer to the Flytrap (i.e., run an Ethernet cable from the client computer to the Flytrap's LAN). Verify connection via ping and telnet.

**4.1.1 Initial Beacon (IB) Period Test**

**Description:** Tests Initial Beacon (IB) Period functionality.

Setup: see "Initial Setup" in section 4.1. Then, disconnect the Flytrap from the internet (i.e., disconnect the cable from the Flytrap's WAN port).

**Run:** telnet to the Flytrap and run "killall mm && mm -x && mm". This will clear MissionManager (mm) NVRAM and restart mm. mm logging should indicate how long until the initial beacon event. As the IB Period in the test firmware is long (30 days), time can be shortened by advancing the ontime stored in Flytrap NVRAM (i.e., typically via "killall mm && NVRAM set ots=xxx && mm", where xxx is the desired ontime in seconds). Note that using date to set clock forward or back should have no effect (ontime should be immune to clock changes). The device will attempt to send its IB once its ontime (the amount of time the device has been powered on) reaches the IB Period, but the ontime is only updated persistently every "INITIAL\_BEACON\_ONTIME\_UPDATE\_PERIOD\_SEC" = 1800 seconds. Test that ontime is accumulating properly with respect to the IB Period by power-cycling the device at intervals greater than 1800 seconds.

**Pass/Fail:** the test passes if the mm logging indicates that the Flytrap would attempt an Initial Beacon at the proper time, except the IB Traffic Requirement is not met. At this point we are only concerned that the IB attempt would be made at the proper time, not that the IB successfully occurs.

#### 4.1.2 IB Traffic Requirement Test

**Description:** Tests IB Traffic Requirement functionality. Some context: the Traffic Requirement feature of the Beacon has two parts – first it determines if enough ambient traffic is passing through the Flytrap to attempt a beacon; second, if enough traffic is passing through the device, it checks that the Flytrap has internet connectivity before sending the Beacon. We need to test both aspects of the Traffic Requirement

**Setup:** Connect the Flytrap WAN to a hub that is not connected to the internet (i.e., this will test that even if enough ambient traffic is flowing through the device, that a beacon will not be sent because there is no internet connectivity). Connect the Server Computer to the hub. Assign the Flytrap's WAN a static IP of, say, 10.1.1.1. Assign the Server Computer an IP of, say, 10.1.1.2. Start the web server on the Server Computer, and be sure it has a link to a large download file (say, 100 Megabytes).

**Run:** Connect the Client Computer to the Server Computer's web server. Continuing from the previous test, when mm logging indicates the next IB attempt is nearing, begin the download of the large file from the Server Computer (which should easily meet the Traffic Requirement).

**Pass/Fail:** the test passes if the mm logging indicates that the IB Traffic Requirement has been met, and the Flytrap would attempt an IB at the proper time, except the IB Internet Connection requirement is not met.

#### 4.1.3 IB Fast/Slow Retry Test

**Description:** Tests IB Fast/Slow Retry functionality.

**Setup:** same as 4.1.2

**Run:** Continuing from the previous test, repeat download of large file from the Server Computer if necessary to keep a continuous stream of network traffic that would meet the Traffic Requirement.

**Pass/Fail:** the test passes if the mm logging indicates that the proper retry intervals (both fast and slow) have been exhausted before checking IB Traffic Requirement and Internet Connection requirements for an IB attempt. The firmware specifies 3 addresses to IB to, so MissionManager should cycle through these 3, pausing fast retry (4 seconds) between each. When the third address is

tried and fails, a slow retry (30 second) pause should occur before cycling back to the first address.

#### 4.1.4 IB Traffic Requirement Timeout Test

**Description:** Tests IB Traffic Requirement Timeout functionality.

**Setup:** same as 4.1.2

**Run:** continuing from the previous test, wait for the IB Traffic Requirement Timeout (600 seconds = 10 minutes) to expire.

**Pass/Fail:** the test passes if the mm logging indicates that the IB Traffic Requirement Timeout has occurred at the proper time, and the Flytrap attempts an IB. The IB will fail because the Flytrap is not connected to the internet, and cannot connect to zakura's CherryTree.

#### 4.1.5 IB Internet Connectivity Test

**Description:** Tests IB Internet Connectivity functionality.

**Setup:** telnet to the Flytrap and run "killall mm". Connect the Flytrap to the internet (i.e., plug the Flytrap's WAN into our public network and have it fetch an IP address via DHCP).

**Run:** telnet to the Flytrap and run "mm". When mm logging indicates the next IB attempt is nearing, begin download of a large file from the internet (which should easily meet the Traffic Requirement).

**Pass/Fail:** the test passes if the IB is successful (i.e., both Traffic Requirement and Internet Connection should be met). Verify (via CherryWeb View -> Flytraps) that this Flytrap is "In Comm".

#### 4.1.6 IB Suicide Time Test

**Description:** Tests IB Suicide Time functionality.

**Setup:** disconnect the Flytrap's WAN from the internet. telnet to the Flytrap and "killall mm && mm -x && mm". Note that to plan a Mission with a Suicide time, the Cherry Web user must have cwadmin privileges.

**Run:** telnet to the Flytrap and run "killall mm && mm -x && mm". Advance the ontime stored in Flytrap NVRAM (i.e., typically via "killall mm && nvramp set ots=xxx && mm", where xxx is the desired ontime in seconds) to just past IB Period (30 days). Wait for an IB attempt (will fail because of IB Traffic Requirement). Advance the ots just before the IB Suicide Time (365 days). Wait for IB Suicide Time to expire.

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**Pass/Fail:** the test passes if, when the IB Suicide Time expires, MissionManager self-terminates, cannot be restarted (telnet to the Flytrap and use ps to verify mm is not running, then start mm, and verify it exits immediately), and cannot be restarted after a device hard reset (certain devices don't support this).

**NOTE:** to restore the Flytrap after a suicide event, telnet to the Flytrap and run "mm -x"

**4.1.7 Power-Cycle Beacon Test**

**Description:** Tests Power-Cycle Beacon functionality.

**Setup:** Create a Mission (using CherryWeb) with the following parameters and Assign it to the Flytrap:

- Beacon Interval=60 seconds
- Traffic Requirement=HIGH
- Traffic Requirement Timeout=300 seconds
- Fast/Slow Retry=10 seconds / 30 seconds
- Power-Cycle Wait=200 seconds
- Port Scanning="Scan All Ports"
- Protocol Scanning="Scan All Protocols"
- Ontime Commit Interval=1800 seconds
- Suicide Time=14400 seconds
- TW's: same 3 Beacon Address/Ports as in the Flytrap firmware (see section 4.1)

Connect the Flytrap to the internet (i.e., plug the Flytrap's WAN into our public network and have it fetch an IP address via DHCP).

**Run:** Have the Flytrap beacon (may need to pass Traffic Requirement test) and successfully receive the Mission above. Power-cycle the Flytrap, and from the Client Computer, begin a large download from the internet (to satisfy the Mission's Traffic Requirement). Wait for the Power-Cycle Beacon.

**Pass/Fail:** the test passes if, after a power-cycle, the Flytrap sends its first (power-cycle) beacon at the proper time (roughly 200 – 210 seconds after powering on -- different devices have different processors and different services starting in different order, so power-cycle beacon time can vary by 10 or so seconds from device to device).

**4.1.8 Periodic Beacon (PB) Interval Test**

**Description:** Tests Periodic Beacon (PB) Interval functionality.

**Setup:** same as 4.1.7

**Run:** allow MissionManager to run, repeating large downloads as necessary to meet Mission's Traffic Requirement

**Pass/Fail:** the test passes if Periodic Beacons occur at expected 60 second intervals (verify using CherryWeb View->Flytraps->Click on your Flytrap Name link and view "Status History" table).

#### 4.1.9 PB Traffic Requirement Test

**Description:** Tests Periodic Beacon (PB) Traffic Requirement functionality.

**Setup:** same as 4.1.7

**Run:** allow MissionManager to run past the time when a Periodic Beacon should occur by generating no traffic from the Client Computer for that period. Begin a large internet download.

**Pass/Fail:** the test passes if Periodic Beacons occurs after large download (at next expected retry).

#### 4.1.10 PB Traffic Requirement Timeout Test

**Description:** Tests Periodic Beacon (PB) Traffic Requirement Timeout functionality.

**Setup:** same as 4.1.7

**Run:** allow MissionManager to run without the Client Computer generating any network traffic for at least "Periodic Beacon Interval + Traffic Requirement Timeout" (=60+300 seconds).

**Pass/Fail:** the test passes if Periodic Beacons occurs after the "Periodic Beacon Interval + Traffic Requirement Timeout" interval expires.

#### 4.1.11 PB Internet Connectivity Test

**Description:** Tests Periodic Beacon (PB) Interval functionality.

**Setup:** connect the Flytrap WAN to a hub that is not connected to the internet. Connect the Server Computer to the hub. Assign the Flytrap's WAN a static IP of, say, 10.1.1.1. Assign the Server Computer an IP of, say, 10.1.1.2. Start the web server on the Server Computer, and be sure it has a link to a large download file (say, 100 Megabytes).

**Run:** Connect the Client Computer to the Server Computer's web server. When mm logging indicates the next PB attempt is nearing, begin the download of the

large file from the Server Computer (which should easily meet the Traffic Requirement).

**Pass/Fail:** the test passes if the mm logging indicates that the PB Traffic Requirement has been met, and the Flytrap would attempt a PB at the proper time, except the PB Internet Connection requirement is not met.

#### **4.1.12 PB Fast/Slow Retry Test**

**Description:** Tests PB Fast/Slow Retry functionality.

**Setup:** Create a Mission (using CherryWeb) with the following parameters and Assign it to the Flytrap:

Beacon Interval=60 seconds

Traffic Requirement=NONE

Fast/Slow Retry=10 seconds / 30 seconds

Power-Cycle Wait=200 seconds

Port Scanning="Scan All Ports"

Protocol Scanning="Scan All Protocols"

Ontime Commit Interval=1800 seconds

Suicide Time=1000 seconds

TW's: same 3 Beacon Address/Ports as in the Flytrap firmware (see section 4.1)

**Run:** Telnet to the Flytrap, run "killall mm && mm". When the Mission above is successfully received, disconnect the Flytrap from the internet. Watch the mm logging for fast/slow retry output. When a full fast/slow retry cycle has completed, connect the Flytrap to the internet.

**Pass/Fail:** the test passes if the Flytrap attempts a PB at the proper fast/slow retry intervals, and when reconnected to the internet, the Flytrap successfully beacons at the next fast or slow retry event. The Mission specifies 3 addresses to PB to, and the firmware has an additional 3 addresses, so MissionManager should cycle through these 6, pausing fast retry (10 seconds) between each. When the third address is tried and fails, a slow retry (30 second) pause should occur before cycling back to the first address.

#### **4.1.13 Overnight PB Test**

**Description:** Tests PB's over an extended period of time.

**Setup:** same as 4.1.12

**Run:** allow MissionManager to run overnight

**Pass/Fail:** the test passes if Periodic Beacons occur at expected 60 second intervals for the overnight period (verify using CherryWeb View->Flytraps->Click on your Flytrap Name link and view "Status History" table).

#### 4.1.14 PB Suicide Time Test

**Description:** Tests PB Suicide Time functionality.

**Setup:** same as 4.1.12

**Run:** continuing with the previous test (assuming the Flytrap is executing the Mission of section 4.1.12), disconnect the Flytrap from the internet. Wait the Suicide Time (1000 seconds).

**Pass/Fail:** the test passes if, when the time since the last successful beacon exceeds Suicide Time (1000 seconds), MissionManager self-terminates, cannot be restarted (telnet to the Flytrap and use ps to verify mm is not running, then start mm, and verify it exits immediately), and cannot be restarted after a device hard reset (certain devices don't support this).

#### 4.1.15 Date Change Immunity Test

**Description:** Tests immunity of Flytrap Beacons to date changes.

**Setup:** telnet to the Flytrap and run "mm -x" to clear NVRAM.

**Run:** Have the Flytrap beacon, and on CherryWeb Flytrap->Details page under the "Status History", note the "Hardware Uptime" for the most recent beacon. Adjust the Flytrap's clock forward by many days (typically with the "date" command), and wait for the Flytrap to beacon again. On CherryWeb Flytrap->Details page under the "Status History", verify that the Flytrap has beacons at the expected time, and that the most recent beacon has not advanced the "Hardware Uptime" more than the expected beacon interval (with +/-2 seconds of accuracy). Repeat this procedure, but this time advance the clock backward by many days

**Pass/Fail:** the test passes if Hardware Ontime monotonically increases in accordance with the beacon interval (i.e., makes no large jumps when a large forward or backward date change occurs).

#### 4.1.16 Ontime Consistency Through Power-Cycles Test

**Description:** Tests the consistency of the ontime NVRAM variable through Flytrap power-cycles.

**Setup:** telnet to the Flytrap and run "mm -x" to clear NVRAM.

**Run:** power-cycle the Flytrap at times just past various multiples of MM\_INITIAL\_BEACON\_ONTIME\_UPDATE\_PERIOD\_SEC.

**Pass/Fail:** the test passes if the value of the device ontime (NVRAM variable "ots") is not reset (that is, it remains monotonically increasing) after the power-cycle events.

## 4.2 Flytrap Features

This section describes tests related to the various Flytrap features, which are enumerated in the Cherry Blossom User's Manual.

### Hardware/Software Required:

- Flytrap
- Client Computer with: America Online Instant Messaging (AIM) client software, MSN Messenger client software, Yahoo Messenger, GoogleTalk client software
- Second Client Computer with Wireshark
- Zakura server running latest release of Cherry Blossom backend software
- Proxy server running squid (for HTTP Proxy/Proxy All Tests only) and Apache web server (for Port/Protocol Scanning Test only)
- True hub (for Encrypted Comm Test)
- Ethernet cable(s)

### Initial Setup:

- Connect the Flytrap to the internet
- Connect the Client Computer (either via wire or wirelessly) to the Flytrap. If using wireless, be sure to secure the Flytrap. Enable WPA (or WEP if that is all the device supports). If possible, remove the antenna(s) from the Flytrap. Verify connection via ping, telnet, and opening a browser to an internet site (e.g., slashdot.org).
- Connect the Second Client Computer to the Flytrap and verify internet connection.

### 4.2.1 Email/Chat Target Detection/Alerting Test

**Description:** Tests detection and timely alerting of email and chat Targets.

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**Setup:** assuming "Initial Setup" in 4.2, plan a Mission with the following parameters:

Beacon Interval=60 seconds

Traffic Requirement=NONE

Fast/Slow Retry=10 seconds / 30 seconds

Power-Cycle Wait=200 seconds

Port Scanning="Scan All Ports"

Protocol Scanning="Scan All Protocols"

Remove AcceptEncoding (gzip)=Yes

Ontime Commit Interval=1800 seconds

Suicide Time=1000 seconds

TW's: same 3 Beacon Address/Ports as in the Flytrap firmware (see section 4.1)

Email Targets: [smith\\_test1@yahoo.com](mailto:smith_test1@yahoo.com), [smith\\_test2@hotmail.com](mailto:smith_test2@hotmail.com),  
[smith\\_test3@maktoob.com](mailto:smith_test3@maktoob.com), [smith\\_test4@gawab.com](mailto:smith_test4@gawab.com), [zakura.test@gmail.com](mailto:zakura.test@gmail.com),  
[abc@def.com](mailto:abc@def.com)

Chat Targets: bethena111, heliotrope111, bethenaaim, heliotropeaim

Have the Flytrap beacon and receive the Mission.

**Run:** log into the following webmail/chat sites and verify timely alerting on CherryWeb:

**Pass/Fail:** the test passes if all of the above logins/actions result in timely Alerts at CherryWeb (View->Alerts), and all of the Alert information displayed on CherryWeb is correct.

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<b>Service</b>	<b>User</b>	<b>Password</b>	<b>Site</b>	<b>Notes</b>
Yahoo Email	smith_test1@yahoo.com	hello_again	<a href="http://www.yahoo.com">www.yahoo.com</a> -> Mail -> (Login) -> Inbox (working as of 21 Oct 2010)	must have Mission with "Remove AcceptEncoding (gzip)"=Yes)
Hotmail	<a href="mailto:smith_test2@hotmail.com">smith_test2@hotmail.com</a>	hello_again	<a href="http://www.hotmail.com">www.hotmail.com</a> -> (Login) -> Inbox (working as of 21 Oct 2010)	must have Mission with "Remove AcceptEncoding (gzip)"=Yes)
Maktoob Email	smith_test3@maktoob.com	hello_again	www.maktoob.com	Part of yahoo (as of Oct 2010)
Gawab Email	<a href="mailto:smith_test4@gawab.com">smith_test4@gawab.com</a>	hello_again	<a href="http://www.gawab.com">www.gawab.com</a> (working as of 21 Oct 2010)	
Gmail	zakura.test@gmail.com	zakura.password	<a href="http://www.gmail.com">www.gmail.com</a> -> (Login) -> click "Web" link (working as of 21 Oct 2010)	must have Mission with "Remove AcceptEncoding (gzip)"=Yes). Gmail is https, but web search page is http and shows gmail address.
Yahoo Messenger (client sw)	bethena111, heliotrope111	hello_again	Login to sw client (working for Messenger 10 as of 21 Oct 2010)	
AIM (client sw)	bethenaaim, heliotropeaim	hello_again	use sw client (working for AIM 7.4 as of 10 Oct 2010)	
AIM Express(web)	bethenaaim, heliotropeaim	hello_again	<a href="http://www.aim.com">www.aim.com</a> -> express (working as of 10 Oct 2010)	
MSN Messenger (sw client)	smith_test2@hotmail.com	hello_again	use sw client (working as of 10 Oct 2010)	
GoogleTalk (sw client)	zakura.test@gmail.com	zakura.password	use sw client	No Longer Supported (encrypted)
Google Search	abc@def.com	N/A	<a href="http://www.google.com">www.google.com</a> (working as of 10 Oct 2010)	Google search for "abc@def.com"

**4.2.2 MAC Target Detection/Alerting Test**

**Description:** Tests detection and timely alerting of MAC Targets.

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**Setup:** plan a Mission with the same parameters as 4.2.1, adding the MAC address of the interface (wireless card or Ethernet card) by which you are connecting Client Computer to the Flytrap. Have the Flytrap beacon and receive the Mission.

**Run:** generate some internet traffic from the Client Computer and verify timely alerting of the MAC Target on CherryWeb.

**Pass/Fail:** the test passes if the Client Computer network activity results in a timely alert at CherryWeb (View->Alerts), and all of the Alert information displayed on CherryWeb is correct.

**4.2.3 Beacon Status and Security Settings Test**

**Description:** Tests that beacon contains correct status and security settings for the Flytrap.

**Setup:** have a Flytrap beacon. Alter the security settings of the Flytrap. Have the Flytrap beacon again.

**Run:** go to the CherryWeb Flytrap Details (View->Flytrap->Click on your Flytrap Name link) page for your Flytrap and examine the Status and Security History tables.

**Pass/Fail:** the test passes if the Flytrap Details page displays the correct status and security settings for the Flytrap.

**NOTE:** a more exhaustive evaluation of Flytrap status and security settings is done during the platform expansion phase of each particular device. See the [<CB>/Test/BeaconSettingsChecklist.xls](#).

**4.2.4 Alert Caching Test**

**Description:** Tests caching of alerts by the Flytrap if an Alert cannot be sent to the CherryTree.

**Setup:** generate an Alert in a situation where the Flytrap cannot connect to the CherryTree. Either shutdown the CherryTree before the Alert is generated, or use a setup like 4.1.2, where the Client Computer can connect to the Server Computer and generate an Alert (e.g., the Server Computer has a webpage with a Target email), but cannot connect to the internet.

**Run:** from the Client Computer, generate an Alert, and wait 5 minutes. Connect the Flytrap to the internet, and verify the cached Alert is received via CherryWeb.

**Pass/Fail:** the test passes if the cached Alert is received shortly after connecting the Flytrap to the internet, and the Alert's "Actual Time" and "Received Time" are

correct (the “Actual Time” should be ‘N’ seconds before the “Receive Time”, where ‘N’ is roughly the number of seconds between generating the Alert and connecting the Flytrap to the internet. Note that internet connections can take up to 30 seconds depending on Flytrap device type, so ‘N’ could vary by this amount).

#### 4.2.5 Target Monitoring Test

**Description:** Tests the Target Monitoring feature of the Flytrap.

**Setup:** plan/assign a Mission to a Flytrap with Target Monitoring enabled, and Target Monitoring interval = 5 seconds and Session Timeout = 60 seconds (other parameters as in 4.2.1).

**Run:** from the Client Computer, generate an Alert. On CherryWeb, verify (on the View->Alerts page) that the “Session Active” is reporting “Yes” for the Alert when there is activity and “No” when there is no activity. Disconnect the test client from the device and wait “Session Timeout”. Reconnect the client and verify that a derived MAC alert is sent for the test client’s MAC address.

**Pass/Fail:** the test passes if the perceived “Session Active” column is behaving according to Target Monitoring behavior (consult Cherry Blossom User’s Manual for Target Monitoring details), and if the derived MAC alert is sent after the test client’s session has timed out.

#### 4.2.6 Redirect Action Test

**Description:** Tests the Redirect Action feature of the Flytrap.

**Setup:** plan/assign a Mission to a Flytrap with [abc@def.com](mailto:abc@def.com) as a Target with a Redirect Action type of Legacy and a Redirect URL to slashdot.org. Set other parameters as in 4.2.1).

**Run:** from the Client Computer, generate an Alert for [abc@def.com](mailto:abc@def.com) (perform a Google search for [abc@def.com](mailto:abc@def.com)). Then go to a root web page (e.g., asdf.com). Client Computer’s browser should be redirected to slashdot.org.

**Pass/Fail:** the test passes if the Client Computer’s browser is redirected to slashdot.org after the Alert is generated and the browser is directed to a root web page.

#### 4.2.7 Double IFrame Action Test

**Description:** Tests the Double IFrame Action feature of the Flytrap.

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**Setup:** plan/assign a Mission to a Flytrap with [abc@def.com](mailto:abc@def.com) as a Target with a Redirect Action type of Double Frame and set the Redirect URL to slashdot.org. Set other parameters as in 4.2.1). Setup the W server (and related CherryWeb configuration) according to the “W Server Test Configuration” document on the classified computer. Ensure the network is disconnected from the internet before connecting the W test server. The following diagram illustrates the network setup:

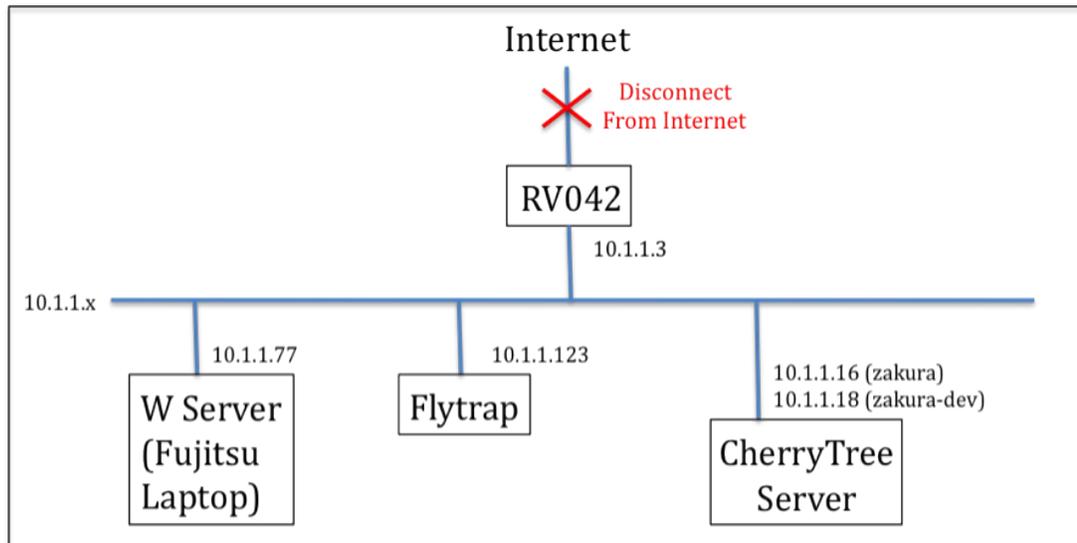


Figure 2: W Test Server Network Setup

**Run:** from the Client Computer, start wireshark and generate an Alert for [abc@def.com](mailto:abc@def.com) (perform a Google search for [abc@def.com](mailto:abc@def.com)). Then go to a root web page (e.g., madonnainn.com). Verify the Client Computer receives a properly formed double iframe packet. Verify the “W Alert” on CherryWeb. Verify the various status states of the W Alert on CherryWeb (Pending, Redirected (happens very quickly), Active/Failure/Complete, Unknown (if connection cannot be made to W server)).

**Pass/Fail:** the test passes if wireshark on the Client Computer shows a properly formed double iframe packet.

#### 4.2.8 Copy Action Test

**Description:** Tests the Copy Action feature of the Flytrap.

**Setup:** plan/assign a Mission to a Flytrap with [smith\\_test1@yahoo.com](mailto:smith_test1@yahoo.com) as a Target with a Copy Action with a 5 minute timeout. Set other parameters as in 4.2.1).

**Run:** from the Client Computer, generate an Alert for [smith\\_test1@yahoo.com](mailto:smith_test1@yahoo.com) (login to smith\_test1’s Yahoo webmail). From the Client Computer Continuously

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ping an internet address (e.g., ping Google.com) indefinitely, and surf the internet for at least 5 minutes. From the Second Client Computer, ping a different internet address indefinitely.

**Pass/Fail:** the test passes if the Client Computer's network traffic (and not the Second Client Computer's network traffic) is copied for the 5 minute period following the Yahoo webmail login (using CherryWeb, click the "download" link in the Copy Data column of the View->Alerts page for the appropriate for [smith\\_test1@yahoo.com](mailto:smith_test1@yahoo.com) Alert, then click on the appropriate pcap file on the Copy Data page, and then verify time and content of capture. A decent way to verify content is, in Wireshark, to sort the packets by type, and look at the DNS packets – they should match the surf history. To verify timeout, in Wireshark, scroll to the last packet and check the time it should be 5 minutes +/- 10 seconds (due to caching and periodic bursting of copy data from ulogd)).

**4.2.9 Derived MAC Detection/Alerting Test**

**Description:** Tests the Derived MAC feature of the Flytrap.

**Setup:** plan/assign a Mission to a Flytrap with [abc@def.com](mailto:abc@def.com) as a Target and Session Timeout = 5 minutes. Set other parameters as in 4.2.1.

**Run:** from the Client Computer, generate an Alert for [abc@def.com](mailto:abc@def.com) (perform a Google search for [abc@def.com](mailto:abc@def.com)). Then, unplug/disconnect the Client Computer from the Flytrap for at least 5 minutes. Then, replug/connect the Client Computer to the Flytrap and generate a little network traffic.

**Pass/Fail:** the test passes if a Derived MAC Alert occurs for the Client Computer's MAC address shortly after (~10 seconds) it is reconnected to the Flytrap.

**4.2.10 Email/Chat Target Action Inheritance Test**

**Description:** Tests the Action Inheritance logic of the Flytrap. See the Cherry Blossom User's Manual for a detailed discussion of Action Inheritance.

**Setup:** plan/assign a Mission to a Flytrap with [abc@def.com](mailto:abc@def.com) as a Target with a Redirect Action, [smith\\_test2@hotmail.com](mailto:smith_test2@hotmail.com) with a Copy Action with a 1 minute timeout, and [smith\\_test4@gawab.com](mailto:smith_test4@gawab.com) with a Copy Action with a 1 minute timeout. Set other parameters as in 4.2.1.

**Run:** from the Client Computer, generate an Alert for [abc@def.com](mailto:abc@def.com) (perform a Google search for [abc@def.com](mailto:abc@def.com)). Then go to a root web page (e.g., asdf.com). Client Computer's browser should be redirected to slashdot.org. Then, from the Client Computer, generate an Alert for [smith\\_test2@hotmail.com](mailto:smith_test2@hotmail.com). Then surf the internet for at least 1 minute. Then, from the Client Computer, generate an Alert for [smith\\_test4@gawab.com](mailto:smith_test4@gawab.com). Then surf the internet for at least 1 minute.

**Pass/Fail:** the test passes if the Client Computer's browser is redirected after the [abc@def.com](mailto:abc@def.com) Alert, Copy Data is recorded for 1 minute after the [smith\\_test2@hotmail.com](mailto:smith_test2@hotmail.com) Alert, and no Copy Data is generated after the [smith\\_test4@gawab.com](mailto:smith_test4@gawab.com) Alert.

#### 4.2.11 MAC Target Actions Test

**Description:** Tests the Action Inheritance logic of the Flytrap. See the Cherry Blossom User's Manual for a detailed discussion of Action Inheritance.

**Setup:** Plan/assign a Mission to a Flytrap with a MAC Target matching the Client Computer's MAC, and give this MAC Target a Redirect Action and a Copy Action with a 1 minute timeout. Set other parameters as in 4.2.1.

**Run:** from the Client Computer, generate an Alert for Computer's MAC. Then go to a root web page (e.g., asdf.com). Client Computer's browser should be redirected. Then, from the Client Computer, surf the internet for at least 1 minute.

**Pass/Fail:** the test passes if an Alert for Client Computer's MAC is sent and received/displayed on CherryWeb in a timely fashion, the Client Computer is redirected after the Alert event, and 1 minute of Copy Data is recorded following the Alert event.

#### 4.2.12 MAC Target Action Inheritance (Lack Thereof) Test

**Description:** Tests the Action Inheritance logic of the Flytrap. See the Cherry Blossom User's Manual for a detailed discussion of Action Inheritance.

**Setup:** plan/assign a Mission to a Flytrap with a MAC Target matching the Client Computer's MAC with no Target Actions, [abc@def.com](mailto:abc@def.com) as a Target with a Redirect Action, [smith\\_test2@hotmail.com](mailto:smith_test2@hotmail.com) with a Copy Action with a 1 minute timeout. Set other parameters as in 4.2.1.

**Run:** from the Client Computer, generate an Alert for Computer's MAC. Then generate an Alert for [abc@def.com](mailto:abc@def.com) (perform a Google search for [abc@def.com](mailto:abc@def.com)). Then go to a root web page (e.g., asdf.com). Client Computer's browser should not be redirected. Then, from the Client Computer, generate an Alert for [smith\\_test2@hotmail.com](mailto:smith_test2@hotmail.com). Then surf the internet for at least 1 minute.

**Pass/Fail:** the test passes if the an Alert for Client Computer's MAC is sent and received/displayed on CherryWeb in a timely fashion, and the Client Computer is not redirected after the Alert event, and no Copy Data is recorded following the Alert event.

#### 4.2.13 Copy All Test

**Description:** Tests the Copy All feature of the Flytrap.

**Setup:** plan/assign a Mission with “Global Traffic Action” = “Copy All” with a 5 minute timeout. Set other parameters as in 4.2.1.

**Run:** from the Client Computer and the Second Client Computer, continuously ping an internet address (e.g., ping google.com) indefinitely, and surf the internet for at least 5 minutes.

**Pass/Fail:** the test passes if the Client Computer’s and the Second Client Computer’s network traffic are copied for 5 minutes. Using CherryWeb, go to the Flytrap Details page for your Flytrap, and under the “Collected Data” header, click the Copy Data “View” link. Then select the appropriate copy data file for the Copy All timeframe. Verify time and content of capture. A decent way to verify content is, in Wireshark, to sort the packets by type, and look at the DNS packets – they should match the surf history. To verify timeout, in Wireshark, scroll to the last packet and check the time it should be 5 minutes +/- 10 seconds (due to caching and periodic bursting of copy data from ulogd). Also verify packets from both Client Computer and the Second Client Computer (sort packets via MAC address).

#### 4.2.14 Harvest Test

**Description:** Tests the Email and Chat Harvest feature of the Flytrap.

**Setup:** plan/assign a Mission with “Harvest Email & Chat” = “Yes”. Set other parameters as in 4.2.1.

**Run:** from the Client Computer and the Second Client Computer, generate network traffic with email addresses and chat addresses (that are not already Targets in the Flytrap’s executing Mission). At the next Flytrap Beacon event, on CherryWeb, check the View->Harvest Data page (sort by Flytrap and page to entries for your Flytrap).

**Pass/Fail:** the test passes if the CherryWeb displays the harvested emails and chats that you generated. Note that harvest data is sent with each beacon, so you may have to wait for the next beacon to see a harvested email/chat.

#### 4.2.15 Flytrap Kill Test

**Description:** Tests the Flytrap Kill feature of the Flytrap.

**Setup:** assign a Flytrap Kill (using CherryWeb, Assign -> Flytrap Kill and select your Flytrap name) to your Flytrap.

**Run:** have the Flytrap beacon.

**Pass/Fail:** the test passes if MissionManager self-terminates, cannot be restarted (telnet to the Flytrap and use ps to verify mm is not running, then start mm, and verify it exits immediately), and cannot be restarted after a device hard reset (certain devices don't support this).

**NOTE:** to restore the Flytrap after a Flytrap Kill event, telnet to the Flytrap and run "mm -x".

#### 4.2.16 Minimal Device Resource Usage Test

**Description:** Tests that the Flytrap features are using a negligible amount of the Flytrap resources.

**Setup:** assign a Mission with parameters as in 4.2.1.

**Run:** have the Flytrap beacon. Surf the internet for 5 minutes.

**Pass/Fail:** the test passes if the tester notices no interruptions in network service and no significant throughput degradation while surfing the internet.

#### 4.2.17 Minimal Interference with Normal Device Usage Test

**Description:** Tests that the Flytrap still appears to the administrator as the original device.

**Setup:** login to the device's (Flytrap's) web configurator.

**Run:** browse the various web configurator pages, changing various settings.

**Pass/Fail:** the test passes if the web configurator appears identical to that of the device's original firmware.

**NOTE:** be sure to reset any device settings (particularly wireless security settings).

#### 4.2.18 Max Targets & Max Actions Test

**Description:** Tests that the Flytrap can handle a Mission with the max number of Targets and Actions.

**Setup:** assign Mission with maximum number of Targets and Actions for your particular Flytrap (typically 150 Targets and 32 unique Actions). Set other parameters as in 4.2.1.

**Run:** generate Alerts (and trigger Actions) for a random sampling of the Targets.

**Pass/Fail:** the test passes if all expected Alerts are received/displayed on CherryWeb in a timely fashion, and all Actions occur as expected.

#### 4.2.19 Encrypted Comm Test

**Description:** Tests that the Flytrap's communications (Beacons and Alerts) are indeed encrypted.

**Setup:** connect the Flytrap's WAN to a true hub, connect the hub to the internet, and connect the Second Client Computer to the hub. Start Wireshark on the Second Client Computer. Plan/Assign a Mission with Target [abc@def.com](mailto:abc@def.com). Set other parameters as in 4.2.1.

**Run:** while Wireshark on the Second Client Computer is capturing data, have the Flytrap beacon and generate an Alert for [abc@def.com](mailto:abc@def.com). Stop/examine the Wireshark capture.

**Pass/Fail:** the test passes if the packets related to the Beacon and Alert events are encrypted (unintelligible).

#### 4.2.20 Port/Protocol Scanning Tests

**Description:** Tests that Port/Protocol Scanning feature of the Flytrap.

**Setup:** connect the Flytrap's WAN to a true hub, connect the hub to the internet, and connect the Proxy Server to the hub. Connect the Client Computer to the Flytrap.

**Run:** assign a Mission with "Port Scanning" set to "80 and Chat Ports", "Protocol Scanning" set to "Only Scan TCP", Target [abc@def.com](mailto:abc@def.com), and other parameters as in 4.2.1. Have the Flytrap beacon and receive this Mission.

Configure Apache on the Proxy Server to bind to port 12121 (edit the Listen field in <APACHE\_HOME>/conf/httpd.conf), add a webpage that has [abc@def.com](mailto:abc@def.com) (e.g., add <CB>/Test/GenericFilter/WebServer/GenericFilterTest1A.html to Apache's web content path), and start Apache. From the Client Computer, open the webpage with [abc@def.com](mailto:abc@def.com) on the web server (remember to append :12121 to the URL). Verify (using CherryWeb) that no Alert is sent (this tests that port scanning is working properly).

If the ProxyServer is not available, any locally installed Tomcat instance running on port 8080 can be used.

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From the Client Computer (in this case, it must be a Linux computer), ping the web server with “ping -p 3A616263406465662E636F6D3A {WebserverIP}”. This hex string converts to “:abc@def.com:?”. Verify that no Alert is sent (this tests that protocol scanning is working properly).

Assign a Mission with “Port Scanning”=“Scan All Ports”, “Protocol Scanning”=“Scan All Protocols”, Target [abc@def.com](#), and other parameters as in 4.2.1. Have the Flytrap beacon and receive this Mission. From the Client Computer, open the webpage with [abc@def.com](#) on the web server (be sure that your browser is not caching this page!).

Verify (using CherryWeb) that an Alert is sent for abc@def.com (this tests that port scanning is working properly). Wait at least “Session Timeout”. Then, from the Client Computer, ping the web server with “ping -p 3A616263406465662E636F6D3A {WebserverIP}”. This hex string converts to “:abc@def.com:?”. Verify that an Alert is sent for [abc@def.com](#) (this tests that protocol scanning is working properly). Be sure to set the Apache port back to 80.

**Pass/Fail:** the test passes if verification steps in the “Run” section are correct.

**4.2.21 Firmware Upgrade Inhibit Test**

**Description:** Tests that a Flytrap inhibits the user from upgrading the firmware with a manufacturer’s error, and that a backdoor page exists for actually upgrading the firmware. Note this feature is only supported on certain Flytrap make/model/versions.

**Setup:** connect a client to the Flytrap’s LAN, and open the Flytrap’s web page.

**Run:** attempt to upgrade the firmware, and verify it doesn’t happen and a reasonable error message is presented. Attempt to upgrade the firmware via the backdoor web page, and verify that it is successful.

**Pass/Fail:** the test passes if verification steps in the “Run” section are correct.

**4.2.22 Mission Manager NVRAM Reset Test**

**Description:** Tests that the Mission Manager NVRAM reset feature works properly (i.e., mm -x).

**Setup:** connect a client to the Flytrap’s LAN, telnet to the Flytrap. Get a listing of the Mission Manager NVRAM settings using “mm -v”.

**Run:** at the telnet prompt, run “mm -x”. Verify the Mission Manager NVRAM settings are all properly unset using “mm -v”.

**Pass/Fail:** the test passes if verification steps in the “Run” section are correct.

#### 4.2.23 Throughput Degradation Test

**Description:** Tests that the Cherry Blossom software does not degrade the LAN <-> WAN throughput of a Flytrap significantly.

**Setup:** Connect a Flytrap to the internet, connect a client to the Flytrap's LAN, and telnet to the Flytrap. Open a browser to “<http://www.dslreports.com/speedtest?flash=1>. Note: it is expected that the internet connection used in this test be a T1 or better.

**Run:** at the telnet prompt, with gf insmod'd and mm running, run a speed test. Then, “killall mm” and “rmmod gf” and run another speed test.

**Pass/Fail:** the test passes if there is no significant (<1%) degradation in throughput results.

#### 4.2.24 Erasure of Persistent Data After Flytrap Upgrade Test

**Description:** If a device is currently running Cherry Blossom firmware (i.e., it is already a Flytrap), upgrade to a different Cherry Blossom firmware will cause the Flytrap persistent data (i.e., Flytrap keys that are stored in NVRAM or special section of flash) to be erased. This test verifies that this feature works properly. Note that upgrading to the same Cherry Blossom firmware will not cause erasure of the Flytrap persistent data. Here, “different” firmware means a firmware with a different build of Mission Manager.

**Setup:** Build two Cherry Blossom firmwares (each should be debug with shell/dumbbell). Configure significantly different beacon addresses (a few invalid addresses first, followed by a valid beacon address) and other beacon settings in each. On the CherryTree/Web Test server, configure a Mission for this device with different beacon addresses (a few invalid addresses first, followed by a valid beacon address) and different beacon settings than either of the two firmwares. Assign this Mission to the test Flytrap. Connect the WAN of the Flytrap to a hub, and connect the hub to the internet. Verify internet connectivity. Connect an Wireshark client to the hub, and start Wireshark.

**Run:** Upgrade the device with firmware 1. As the device reboots, start an Wireshark capture. Verify (in the Wireshark capture) that the device beacons to the proper addresses at the proper times. When the device successfully beacons and receives the Mission (as configured in setup), “killall mm”, run “mm -v”, and verify that the persistent data settings are consistent with those in the Mission. Upgrade the device with firmware 2. As the device reboots, start an Wireshark capture. Verify (in the Wireshark capture) that the device beacons to the proper addresses at the proper times. In particular, be sure that the device beacons

---

according to the parameters set in the flytrap.config for this firmware, and NOT according to those in the Mission assigned to the Flytrap.

**Pass/Fail:** The test passes if verification steps in the “Run” section are correct.

#### **4.2.25 No Flytrap Persistent Data in Device Config File Test**

**Description:** Tests that no persistent data is stored in the device config file.

**Setup:** Connect a client to the Flytrap, login to the Flytrap’s web page, and download/backup the device’s configuration file. Open the configuration file using a binary editor (e.g., bvi).

**Run:** Verify that the device’s configuration file contains none of the special NVRAM keys used (e.g. lald, stt, bmw, ba0-5, bp0-5, boot\_wait, etc.).

**Pass/Fail:** The test passes if verification steps in the “Run” section are correct.

#### **4.2.26 No Unintended Emissions Test**

**Description:** This is a catchall test to make sure that the Flytrap is not creating any unintended network traffic.

**Setup:** Connect the WAN of the Flytrap to a hub, and connect the hub to the internet. Verify internet connectivity. Connect a Wireshark client to the hub, and start Wireshark.

**Run:** Allow Wireshark to run for an extended period of time. Verify that Flytrap emissions are as intended according to the initial beacon settings in flytrap.config, or according to the settings of the current Mission.

**Pass/Fail:** The test passes if verification steps in the “Run” section are correct.

#### **4.2.27 Target Based VPN Link Action Test**

**Description:** Tests the target based VPN Action.

**Setup:** Plan/Assign a mission with a target based VPN action. Connect two client computers to the flytrap.

**Run:** Generate an Alert at one of the client computers. Verify the VPN Link is up. Verify (via ping) connection to the flytrap. Verify port scan (via netcat) of a service running on the client computer.

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From the flytrap, the VPN link can be confirmed by watching the output log and ensuring that the "pa" process is started and that the OpenVPN link is brought up.

**Pass/Fail:** The test passes if a valid VPN Link is created when and only when the target is detected.

**Note:** Additional notes and information about the VPN link can be found in <Test>/vpnProxy\_configuration.txt.

**4.2.28 Target Based VPN Proxy Action Test**

**Description:** Tests the target based proxy action.

**Setup:** Plan/Assigned a mission with a target based Proxy action. Connect two client computers to the flytrap.

**Run:** Generate an Alert at one of the client computers. Verify the VPN Link is up. Verify (via ping) connection to the flytrap. Verify port scan (via netcat) of a service running on the client computer. Verify network traffic of the client computer is proxied through the VPN Server (check the proxydata directory found at ~cbuser/CherryBlossom/CherryTree/Release/proxydata).

**Pass/Fail:** The test passes if a valid VPN Link is created when and only when the target is detected, the VPN Server indicates a proxied connection from the Client Computer (and not the Second Client Computer), and the Client Computer experiences no difference from normal behavior when surfing the internet.

**Note:** Additional notes and information about the VPN link can be found in <Test>/vpnProxy\_configuration.txt.

**4.2.29 VPN Link Global Action Test**

**Description:** Tests the VPN Link global action.

**Setup:** Plan/Assign a mission with the global action set to 'VPN Link.'

**Run:** Verify the VPN Link is up upon receipt of the Mission. Verify (via ping) connection to the flytrap. Verify port scan (via netcat) of a service running on the client computer.

**Pass/Fail:** The test passes if a valid VPN Link is created when the new Mission is received.

**Note:** Additional notes and information about the VPN link can be found in <Test>/vpnProxy\_configuration.txt.

**4.2.30 VPN Proxy All Global Action Test**

**Description:** Tests the VPN Proxy All action.

**Setup:** Plan/Assign a mission with the global action set to 'VPN Proxy All'. Connect two client computers to the flytrap.

**Run:** Verify the VPN Link is up upon receipt of the Mission. Verify (via ping) connection to the flytrap. Verify port scan (via netcat) of a service running on the client computer. Verify network traffic of both client computers is proxied through the VPN Server (check proxydata directory found at ~cbuser/CherryBlossom/CherryTree/Release/proxydata).

**Pass/Fail:** The test passes if a valid VPN Link is created when the new Mission is received, the VPN Server indicates a proxied connection of both Client Computers), and the Client Computers experience no difference from normal behavior when surfing the internet.

**Note:** Additional notes and information about the VPN link can be found in <Test>/vpnProxy\_configuration.txt.

**4.2.31 Squid Proxy Beacon Test**

**Description:** Test the Flytrap's ability to Beacon normally through a squid proxy server with a (nearly) default configuration.

**Setup:** Configure a proxy server (per <Test>/squid\_configuration.txt) and ensure it is available on the test network. Configure the flytrap with the designated static IP address, set the default gateway to the proxy server's IP address, and manually configure the DNS servers. Recommended DNS servers are 128.18.30.66 and 216.136.95.2. Have the flytrap Beacon.

**Pass/Fail:** The test passes if the flytrap is able to Beacon to CherryTree via the squid proxy. This should be confirmed in two steps: first by confirming in the squid server log (/var/log/squid/access.log) that a connection has been attempted; and second, by confirming the receipt of the Beacon via CherryWeb. The access.log file shows each request that is processed, as well as its originating IP address and destination.

**4.2.32 Squid Proxy Alert Test**

**Description:** Test the Flytrap's ability to Alert normally through a squid proxy server with a (nearly) default configuration.

**Setup:** Squid proxy setup the same as "Squid Proxy Beacon Test". Have the flytrap generate an Alert.

**Pass/Fail:** The test passes if the flytrap is able to Alert to CherryTree via the squid proxy. This should be confirmed in two steps: first by confirming in the squid server's `/var/log/squid/access.log` that a connection has been attempted (the `access.log` file shows each request that is processed, as well as its originating IP address and the destination), and second by confirming the receipt of the Alert via CherryWeb.

#### 4.2.33 Squid Proxy Copy Test

**Description:** Test the Flytrap's ability to perform a Copy Action normally through a squid proxy server with a (nearly) default configuration.

**Setup:** Squid proxy setup the same as "Squid Proxy Beacon Test". Have the flytrap perform a Copy Action on a Target.

**Pass/Fail:** The test passes if the Flytrap is able to perform a Copy Action via the squid proxy. This should be confirmed in two steps: first by confirming in the squid server's `/var/log/squid/access.log` that a connection has been attempted (the `access.log` file shows each request that is processed, as well as its originating IP address and the destination), and second by confirming receipt of valid Copy data via CherryWeb.

#### 4.2.34 Squid Proxy Copy Content-Length Filter Test

**Description:** Test the Flytrap's ability to perform a Copy Action normally through a squid proxy server that has been configured to reject (via HTTP 413 error code response) HTTP POST's with Content-Length larger than specified in the squid configuration file.

**Setup:** Squid proxy setup same as "Squid Proxy Beacon Test". Stop the squid proxy (`killall squid && sleep 2 && killall squid`). Clear the squid proxy cache (`squid -z`). Edit `/etc/squid/squid.conf`:

Change:

```
# request_body_max_size 0 kB
```

To:

```
request_body_max_size 1000 kB
```

Start the squid server (`squid`).

**Pass/Fail:** The test passes if the Flytrap is able to perform a Copy Action via the squid proxy. To verify that the Content-Length feature of squid is working, connect a computer with Wireshark to a (true) hub on the WAN side of the Flytrap. Start Wireshark before initiating the copy action. Verify that squid sends an HTTP 413 error code in response to the copy handshake. Verify that handshakes are repeated (each time with the Content-Length parameter being decremented by a factor of 10) until they fall to 1000 kB. Further, generate more than 1000 kB of copy data. Verify that the copy connection is re-established

when the copy exceeds each 1000 kB of data and that multiple copy files (each 1000 kB in length) exist via CherryWeb.

**Cleanup:** Reset the /etc/squid/squid.conf file back to the default setting and restart squid (`killall squid && sleep 2 && killall squid && squid -z && squid`).

#### 4.2.35 Copy Content-Length Reset Test

**Description:** Test the Flytrap's ability to perform a Copy Action through a firewall server that has been configured to reject (via TCP reset) HTTP POST's with Content-Length larger than a specified size.

**Setup:** It is convenient to use the squid proxy as the firewall (i.e., you need a Linux server with iptables). Add the following rule to the firewall server:

```
iptables -t filter -I INPUT -p tcp -s <SOURCE_IP_ADDRESS> --dport
3128 -m string --algo bm --from 0 --string "POST"
-m string --algo bm --from 0 --string
"Content-Length: 100000" -j REJECT --reject-with tcp-reset
```

where <SOURCE\_IP\_ADDRESS> is the WAN IP address of the Flytrap and there is a space after the colon in Content-Length: 100000".

**Pass/Fail:** The test passes if the Flytrap is able to perform a Copy Action thru the firewall. To verify that the Content-Length feature of the firewall is working, connect a computer with Wireshark to a (true) hub on the WAN side of the Flytrap. Start Wireshark before initiating the copy action. Verify that the firewall sends a TCP-reset in response to the copy handshake. Verify that handshakes are repeated (each time with the Content-Length parameter being decremented by a factor of 10) until they fall below 100000 bytes (i.e., 10000 bytes). Further, generate more than 10000 bytes of copy data. Verify that the copy connection is re-established when the copy exceeds each 10000 bytes of data and that multiple copy files (each 10000 bytes in length) exist via CherryWeb.

**Cleanup:** Reset iptables back to it original setting with:

```
iptables -t filter -D INPUT -p tcp -s <SOURCE_IP_ADDRESS> --dport
3128 -m string --algo bm --from 0 --string "POST"
-m string --algo bm --from 0 --string "Content-Length: 100000" -j
REJECT --reject-with tcp-reset
```

where <SOURCE\_IP\_ADDRESS> is the WAN IP address of the Flytrap and there is a space after the colon in Content-Length: 100000".

Note that the only difference between this statement and the setup statement is "-D" instead of "-I".

**4.2.36 W Alert Test**

**Description:** Tests that the Flytrap properly sends a W Alert.

**Setup:** plan/assign a Mission to a Flytrap with [abc@def.com](mailto:abc@def.com) as a Target with a Redirect Action type of Double IFrame and set the Redirect URL to slashdot.org. Set other parameters as in 4.2.1).

**Run:** from the Client Computer, generate an Alert for [abc@def.com](mailto:abc@def.com) (perform a Google search for [abc@def.com](mailto:abc@def.com)). Then go to a root web page (e.g., madonnainn.com). The client's computer should have an embedded Double IFrame to the redirected URL (verify with wireshark). Verify on CW (View->W Alerts) that a Windex Alert occurs with correct info.

**Pass/Fail:** the test passes if CW shows a corresponding W Alert with correct info.

**4.2.37 Application Execution Test**

**Description:** Tests that the Flytrap properly executes an “uploaded” application.

**Setup:** Upload a shellid (or similar application) Mission File built for the Flytrap make/model/hw version/fw version (on CW, Plan->Flytrap Applications->Mission File). Create an “Execute Command” for this application (on CW, Plan->Flytrap Applications->Execute Command) – for example, to have shellid run on port 12345, use “<shellid\_name> -p 12345”. Build a Mission that includes this Mission File and this Execute Command. Assign this Mission to the Flytrap.

**Run:** have the Flytrap beacon and receive the Mission. From the Client Computer, open a console and telnet (in the case of shellid) to the Flytrap (e.g., “telnet 192.168.1.1 12345”).

**Pass/Fail:** the test passes if the Client Computer can successfully telnet to the Flytrap.

**4.2.38 Inhibit FW Version String Test**

**Description:** Tests that the Flytrap properly shows a modified fw version string.

**Setup:** Flytrap must have a firmware that supports inhibit. Assign a Mission with a fw version string for the Flytrap device type.

**Run:** have the Flytrap beacon and receive the Mission. From the Client Computer, browse to the Flytrap’s configuration web page. Verify the web page displays the correct FW version string.

**Pass/Fail:** the test passes if the Flytrap shows the correct fw version string on its configuration web page.

### 4.2.39 Upgrade Alert Test

**Description:** Tests that the Flytrap properly sends an Upgrade Alert.

**Setup:** Flytrap must have a firmware that supports inhibit. Note that this test can be verified in conjunction with test 4.2.21 (Firmware Upgrade Inhibit).

**Run:** from the Client Computer, browse to the Flytrap's firmware upgrade page. Verify on CW (View->Upgrade Alerts) a "Page Visit" Upgrade Alert occurs with correct info. Upgrade the firmware (use inhibit upgrade page). Verify on CW (View->Upgrade Alerts) an "Upgrade Attempted" Upgrade Alert occurs with correct info.

**Pass/Fail:** the test passes if CW shows the corresponding Upgrade Alerts ("Page Visit" and "Upgrade Attempted") with correct info.

## 4.3 S/E 3xxx Specific Tests

This section describes tests specific to the S/E 3xxx Flytrap device. Because the device uses a custom built non-S/E kernel (S/E have not released their GPL sources -- the GPL sources for a similar device kernel are used instead), additional testing is required to ensure that the device still functions in the same way as with the original firmware. This includes testing all wireless security modes, LAN/DHCP settings, and operational modes (AP, Client Bridge, Bridge Router, and WDS modes). The following is a summary of the additional test procedures for the S/E 3xxx, along with documentation on the operational modes (original manufacturer documentation is scant or non-existent in many cases).

### 4.3.1 S/E 3xxx Operational Modes Test

**Description:** Tests that the operational modes of the device behave as in the original manufacturer's firmware.

**Context:** The device has the following modes of operation (Management -> Operation Mode):

- **AP** – the device functions as an access point (not a router). The WLAN LED is lit in AP mode.
- **AP w/ WDS** - additionally, the device has WDS capability when its Operational Mode is AP – WDS is configured in the Wireless -> WDS Settings link. Note that each AP in the WDS needs to be configured with the WLAN MAC addresses of the other WDS devices.
- **Bridge** – the device can connect as a wireless client to another AP with the same subnet. Hence, a wireless bridge is formed between the AP and the LAN connected to the device's Ethernet port. The Wireless -> Site

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Survey link is used to connect the device to another AP. The WLAN LED is NOT lit in Bridge mode.

- **Ad Hoc Bridge to Bridge** – additionally, two devices can also both be set in Bridge mode, so long as the Wireless -> Basic Settings -> Network Type is set to Ad Hoc.
- **Bridge Router** – the device can connect as a wireless client to another AP with the same subnet; the LAN connected to the device through the Ethernet port can be on a different subnet, however. To be clearer, the device can have the wlan interface assigned to one subnet, and the eth interface assigned to a different subnet, and the device will perform the NAT between the wlan and eth interfaces. This is useful, for example, to bridge one LAN with one subnet and a different LAN with a different subnet. The WLAN LED is NOT lit in Bridge Router mode.
- 
- It is desired to ensure that the Flytrap firmware operates in exactly the same fashion as the original manufacturer's firmware. The following combinations should be sufficient, where A refers to a device with manufacturer's original firmware and B refers to a device with Flytrap firmware.

A (Operational Mode/Settings)	B (Operational Mode/Settings)	Comments
AP	Bridge	on B, use Wireless -> Site Survey to connect to A
AP w/ WDS	AP w/ WDS	both A and B must be configured with the other's WLAN MAC address under the Wireless -> WDS settings link
AP (w/ WPA2 security)	Bridge (w/ WPA2 security)	on B, use Wireless -> Site Survey to connect to A
Bridge (Ad Hoc w/ WPA2 sec)	Bridge (Ad Hoc w/ WPA2 sec)	on B, use Wireless -> Site Survey to connect to A
AP	Bridge Router	in some cases, it may be necessary to hard reset B, and then configure Bridge Router mode. Set A's IP to 192.168.2.2, and set B's WLAN IP to 192.168.2.254 and B's LAN IP to 192.168.1.1. You should be able to ping between clients connected behind A (the 192.168.2.x subnet) and clients connected behind B (the 192.168.1.x subnet).
Bridge	AP	on A, use Wireless -> Site Survey to connect to B

Bridge (w/ WPA2 security)	AP (w/ WPA2 security)	on A, use Wireless -> Site Survey to connect to B
Bridge Router	AP	in some cases, it may be necessary to hard reset A, and then configure Bridge Router mode. Set B's IP to 192.168.2.2, and set A's WLAN IP to 192.168.2.254 and A's LAN IP to 192.168.1.1. You should be able to ping between clients connected behind B (the 192.168.2.x subnet) and clients connected behind A (the 192.168.1.x subnet).

**Setup:** For each above combination, first network connectivity should be checked through devices as appropriate (for example, in the first case, check that a client connected behind the Bridge B can access the internet connected behind AP A).

Important: A proper default gateway must be set on the Flytrap device in order for Beacons to function properly. Note that the Flytrap firmware implements a special passive Default Gateway Discovery (DGD) feature to auto-detect a default gateway according to client traffic.

**Run:** have the device Beacon, and test the typical Flytrap functions of Alert, Copy, Redirect by connecting the Client Computer to the appropriate device.

**Pass/Fail:** the test passes if the device successfully Beacons, Alerts, Copies, and Redirects in each of the operational modes.

#### 4.3.2 S/E 3xxx Wireless Settings Test

**Description:** Tests that the Flytrap firmware handles the changing of the wireless settings identically to the original manufacturer's firmware. Because we are using a slightly different wireless driver, the S/E 3xxx must be tested for changes in Wireless settings (Wireless -> Basic Settings and Wireless -> Advanced Settings).

**Setup:** configure the device in AP mode. Wirelessly connect the Client Computer to the device. Login to the device's web configurator.

**Run:** Cycle through each of the wireless settings.

**Pass/Fail:** the test passes if behavior when changing wireless settings is identical to behavior exhibited by manufacturer's original firmware.

### 4.3.3 S/E 3xxx Default Gateway Discovery (DGD) Test

**Description:** Tests the Default Gateway Discovery (DGD) capability of the device.

Context: Flytraps can be built with Default Gateway Discovery (DGD) built in. This is typically done for true Access Points (i.e., not routers), because on many AP's there is no need to set the default gateway (i.e., there's no routing to another subnet, just simply bridging clients on the same LAN subnet. The device is built with DGD enabled.

DGD is a little complex, and so requires a number of manual steps to test all of the functionality. These steps explain the procedure specifically for the S/E 3xxx device (other future AP's should be fairly similar). In all tests, typically any default gateways configured and/or cached on the device are unset, then mm is started, and after generating certain traffic types, the device should successfully beacon. You can also examine the routing table (with "route") to see if a default gateway has been properly set by DGD.

**Setup:** configure the device in AP mode. Wirelessly connect the Client Computer to the device.

**Run:**

**ARP Test** – one technique that DGD uses is an ARP mac/ip address discovery. The Flytrap filters ARP packets, and keeps a mapping of MAC/IP address mapping of local clients. It also filters TCP/IP packets destined for a different subnet, and pulls the MAC address of the router from this packet. It can then look up the IP address from the MAC/IP mapping, or if there is no mapping yet, it polls periodically until the mapping is found. When found, the Flytrap sets its default gateway to this value and stores it persistently over future power-cycles in NVRAM.

First configure the AP without a default gateway using the web interface. Then, telnet to the AP, killall mm, and unset any default gateways cached in NVRAM (this is done with "flash set DEF\_WLAN1\_ACCOUNT\_RS\_IP 0.0.0.0"). You may also need to manually remove the default gateway from the routing table (with "route del default"). Next, start mm. Connect the wireless Client Computer to the Flytrap, and then connect to an internet website (it is assumed that the AP is connected to the internet most likely through a router). In most, cases this should cause all the packets necessary for the ARP technique. If the technique is successful, the Flytrap should beacon successfully. If not, try clearing the ARP table on the wireless client (typically with arp -d \*). Then try connecting to the internet again. mm debug output should indicate "Found ARP gw=a.b.c.d" or something similar.

**DHCP Test** – another technique that DGD uses is DHCP "Options, Router" discovery. Most DHCP servers will serve clients a DHCP packet that includes

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a series of "Options", with one of them being the "Router" option, which contains a list of router IP addresses (in many cases just one, however). The Flytrap filters DHCP packets, searching for the "Router" Option flag. When one is discovered, the Flytrap sets its default gateway to this value and caches it for future power-cycles in NVRAM.

To test this, first configure the AP without a default gateway using the web interface. Then, telnet to the AP, killall mm, and unset any default gateways cached in NVRAM (this is done with "flash set DEF\_WLAN1\_ACCOUNT\_RS\_IP 0.0.0.0"). You may also need to manually remove the default gateway from the routing table (with "route del default"). Be sure that the router that the Flytrap is connected to will server DHCP addresses. Configure the wireless Client Computer to get its IP address automatically using DHCP, and disconnect it from the network. Next, start mm. Then connect the wireless client to the Flytrap. If the test is successful, mm debug output should indicate "Found DCHP gw=a.b.c.d" or something similar, and the Flytrap should beacon successfully.

**Cached Gateway Test** – DGD will cache a discovered gateway in NVRAM (typically in an unused key, as most devices have a number of these) so that discovery is quicker after a power-cycle. Because the cached value could be invalidated at some point, an internet connection test is done after setting this cached gateway. If it fails, the gateway is unset, removed from the cache, and the ARP/DHCP discovery techniques resume.

First, perform a successful ARP or DHCP test. Then telnet to the device, and "killall mm". Then start "mm". mm debug should report "Adding route for stored gw=a.b.c.d", and the Flytrap should successfully beacon.

Next test that an incorrect cached value does indeed get uncached after an unsuccessful internet connectivity test. To do so, set the cached gateway to a nonsense IP (this is done with "flash set DEF\_WLAN1\_ACCOUNT\_RS\_IP 1.2.3.4"). Then telnet to the device, and "killall mm". Then start "mm". mm debug should indicate an internet connection failure, and remove the cached gateway (you can check on the device with "flash get DEF\_WLAN1\_ACCOUNT\_RS\_IP" which should report 0.0.0.0). Then run a DHCP or ARP Test, verify a successful beacon, and check the cached gateway (use "flash get DEF\_WLAN1\_ACCOUNT\_RS\_IP", which should report the proper gateway IP.

**User Reconfigured Gateway Test** – test that if a gateway is reconfigured on the device through the web page, that beacons still go through. While mm is running, open the web configurator, set a correct gateway, and save the changes. Verify that mm is still beacons successfully.

**Pass/Fail:** the test passes if the above 4 subtests pass.

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## 4.4 CB Version 5.0 Specific Tests

This section describes CherryBlossom tests related to the Version 5.0 release.

### 4.4.1 Exclude/Include Built-in Beacon Addresses

**Description:** Tests that the Flytrap properly excludes/includes built-in beacon addresses in the beacon address list.

**Setup:** plan/assign a Mission to a Flytrap with built-in addresses excluded and another with them included.

**Run:** have the Flytrap beacon and receive the first 'excluded' Mission. At successful beacon, disconnect the Flytrap's internet connection. Verify with the sniffer laptop that the Flytrap attempts to beacon only to the beacon addresses specified in the Mission. Reconnect the Flytrap to the internet. Have the Flytrap beacon and receive the second 'included' Mission. Verify with the sniffer laptop that the Flytrap attempts to beacon to all beacon addresses specified in the Mission and to all beacon addresses that have been built-in to the firmware directly.

**Pass/Fail:** the test passes if the Flytrap beacons to the proper set of beacon addresses.

### 4.4.2 No Windex Server Connection Links

**Description:** Tests that Cherry Web shows no pages related to Windex Server connection.

**Setup:** log in to Cherry Web.

**Run:** verify there are no Windex Server Connection Links on the Cherry Web menu pane. Verify no CW pages show any Windex Server Connection info (note pages may still show Windex Alert status info).

**Pass/Fail:** the test passes if no Windex Server Connection links/pages are found on Cherry Web.

### 4.4.3 Run OWT From Cherry Web

**Description:** Tests that an operator can run an OWT directly from CW and get status of the OWT.

**Setup:** log in to Cherry Web.

**Run:** navigate to the Administer->OWT page and run an OWT, noting the return status. Verify the correctness of the OWT output report on the CB Server.

**Pass/Fail:** the test passes if the OWT returns status success and the OWT report output is correct on the CB Server.

#### 4.4.4 Sort Flytraps by Most Recent Beacon

**Description:** Tests that an operator can sort Flytraps by the most recent beacon date on the CW Overview, View->Flytraps, and View->Flytraps->Deployments pages.

**Setup:** log in to Cherry Web.

**Run:** navigate to the Overview, View->Flytraps, and View->Flytraps->Deployments pages, sorting on the 'Most Recent Beacon' column. Verify the correctness of the sorted data.

**Pass/Fail:** the test passes if the Overview, View->Flytraps, and View->Flytraps->Deployments pages all properly sort the 'Most Recent Beacon' column.

#### 4.4.5 Search Target Decks for Targets

**Description:** Tests that an operator can search the Target Decks for a particular Target name on the View->Target Decks pages, including wildcard characters.

**Setup:** log in to Cherry Web.

**Run:** navigate to the View->Target Decks page. Perform a Target Search with and without a wildcard '\*' character. Verify the correctness of the search return.

**Pass/Fail:** the test passes if the Target search returns the proper Target Decks containing that Target.

#### 4.4.6 Target Deck Action Initial Persistence Into Planned Missions

**Description:** Tests that the actions defined during creation of a target deck are propagated into missions that use the target deck

**Setup:** log into Cherry Web

**Run:** Navigate to the target deck creation workflow (Plan → Target Decks) and create a target deck with three or more email targets. Assign a copy action to one

email target, a Windex redirect action to another email target, and no actions to a third email target. Click "Apply Actions" and then navigate to the mission workflow page (Plan→Missions) and define a new mission using the target deck just created.

**Pass/Fail:** The test passes if when viewing the created target deck in the mission workflow the actions for the three email targets are identical to the actions assigned when the target deck was created.

#### 4.4.7 Edited Target Deck Action Persistence Into Planned Missions

**Description:** Tests that when target deck actions are edited, the edits are propagated into missions that use the target deck.

**Setup:** log into Cherry Web

**Run:** Navigate to the target deck creation workflow page (Plan→Target Decks) and select the target deck created in the previous test for editing. Add an additional email target to the deck with a "copy" action, and then navigate to the mission workflow page (Plan→Missions) and edit the mission created in the previous test.

**Pass/Fail:** The test passes if the new email target added to the deck appears in the mission that uses the deck.

#### 4.4.8 Edited Target Deck Action Persistence Into Active Missions

**Description:** Tests that when target deck actions are edited in decks that are used by an active mission, the edits are propagated to a flytrap using the mission.

**Setup:** log into Cherry Web

**Run:** Assign the mission created in the last test to a flytrap. Wait for a beacon, and create an alert using one of the email targets in the target deck. Using an email target that is **not** in the mission deck, verify that the target does not cause an alert. Then add this email target to the deck used by the mission, and after the next flytrap beacon, verify that this new email target now generates an alert (that is, verify that a new mission has been automatically created with the updated deck and sent to the flytrap). Edit the newly-changed deck via the target deck workflow, and verify that the added target appears in the target deck.

**Pass/Fail:** The test passes if the expected alert can be generated for the email target added to the deck after it was added to the deck but not before it was added, and the new target appears when the target deck is edited.

#### 4.4.9 Transparency of Auto-generated Missions

**Description:** Tests that when a mission is auto-generated to reflect target deck edits, any internal prefixes or suffixes identifying the auto-generated mission are not visible to the end user.

**Setup:** log into Cherry Web

**Run:** After the previous test has been performed, access the various screens that list mission names (View→Flytraps, mission workflow, and so on) and verify that no rev number or other prefixes or suffixes indicated an auto generated mission are visible.

**Pass/Fail:** This test passes if all mission names appear normal with no extraneous suffixes or prefixes.

## 5 Cherry Tree Tests

This section describes CherryBlossom tests related to the Cherry Tree product (i.e., the backend server running CherryTree (CT), CherryWeb (CW), and other services/functions running on the backend server).

### Hardware/Software Required:

- Zakura Server running latest release of Cherry Blossom backend software
- Control Computer with internet connection, IE 6.0 or greater (this computer will connect to CherryWeb on zakura)
- Flytrap
- Client Computer
- Ethernet cable(s)

**Initial Setup:**

- Connect the Control Computer to the internet
- Connect the Flytrap to the internet
- Connect the Client Computer (either via wire or wirelessly) to the Flytrap. If using wireless, be sure to secure the Flytrap. Enable WPA (or WEP if that is all the device supports). If possible, remove the antenna(s) from the Flytrap. Verify connection via ping, telnet, and opening a browser to an internet site (e.g., slashdot.org).

## 5.1 CW Login Test

**Description:** Tests that the CW Login is functioning properly.

**Setup:** as in 4.4.

**Run:** Open IE the Control Computer, connect to CW (<https://zakura.com/CherryWeb>), and login as cbuser. Logout and login as an admin User.

**Pass/Fail:** the test passes if login succeeds and cbuser is directed to the Overview page with no errors/exceptions, logout occurs correctly, and login as an admin User occurs correctly.

## 5.2 CW Ticker Test

**Description:** Tests that the CW Ticker is functioning properly and displaying the correct (UTC) time.

**Setup:** assumes 5.1

**Run:** View a few refreshes of the Ticker at the bottom of the page.

**Pass/Fail:** the test passes if the Ticker shows the most recent system Alert (over all of cbuser's Customers), and the UTC time displayed is correct (compare to <http://www.time.gov/timezone.cgi?UTC/s/0/java> or similar).

## 5.3 CW Overview Test

**Description:** Tests that the CW Overview page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "Overview" link. Sort all columns of the tables and page through the tables. Select and deselect the "Show Alerts for Derived Targets" checkbox.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly, and the Show Alerts for Derived Targets checkbox works correctly.

#### 5.4 CW View->Alerts Test

**Description:** Tests that the CW View->Alerts page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "View->Alerts" link. Sort all columns of the tables and page through the tables. Select and deselect the "Show Alerts for Derived Targets" checkbox.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly, and the Show Alerts for Derived Targets checkbox works correctly.

#### 5.5 CW View->Target Activity/Target Details Test

**Description:** Tests that the CW View->Target Activity and Target Details pages work correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "View->Target Activity" link. Sort all columns of the tables and page through the tables. Click on a Target link (to go to a Target Details page). Click on a Client MAC link (to go to a Target Details page for a Client MAC).

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly, and proper Target/Client MAC associations are made.

#### 5.6 CW View->Flytraps Test

**Description:** Tests that the CW View->Flytraps page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "View-> Flytraps" link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

## 5.7 CW View->Flytraps->Diagnostic Test

**Description:** Tests that the CW View->Flytraps->Diagnostic page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “View-> Flytraps->Diagnostic” link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

## 5.8 CW Flytrap Details Test

**Description:** Tests that the CW Flytrap Details page works correctly.

**Setup:** assumes 5.1

**Run:** from the “View->Flytraps” page, click on a Flytrap link. Examine all information, including Status History and Security History tables. Click on the Harvest Data and Copy Data links (tester may have to find a Flytrap link with Harvest and Copy Data).

**Pass/Fail:** the test passes if all page information displays correctly, and links to Harvest and Copy Data behave correctly (i.e., only Harvest or Copy Data for that particular Flytrap are shown).

## 5.9 CW View->Flytraps->Deployments Test

**Description:** Tests that the CW View->Flytraps->Deployments page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “View-> Flytraps->Deployments” link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

## 5.10 CW View->Missions Test

**Description:** Tests that the CW View->Missions page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “View-> Missions” link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

### **5.11 CW Mission Details Test**

**Description:** Tests that the CW Mission Details page works correctly.

**Setup:** assumes 5.1

**Run:** from the “View->Missions” page, click on a Mission link. Examine all information.

**Pass/Fail:** the test passes if all page information displays correctly.

### **5.12 CW View->Copy Data Test**

**Description:** Tests that the CW View->Copy Data page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “View->Copy Data” link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

### **5.13 CW View->Harvest Data Test**

**Description:** Tests that the CW View->Harvest Data page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “View-> Harvest Data” link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

### **5.14 CW View->VPN Data**

**Description:** Tests that the CW View->VPN Data page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “View-> VPN Data” link. Sort all columns of the tables and page through the tables.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly.

### 5.15 CW Plan->Targets Test

**Description:** Tests that the CW Plan->Targets page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan->Targets” link. Add a MAC, email (intermix some uppercase letters), chat (intermix some uppercase letters), and a VOIP Target. Sort all columns of the tables and page through the tables. Attempt to add a Target already in the list.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly; a MAC, email, and chat target could be successfully added (as all lowercase), and a duplicate Target could not be added (CW presents an error message indicating such).

### 5.16 CW Plan->Exploits->Windex Test

**Description:** Tests that the CW Plan->Exploits->Windex page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan-> Exploits->Windex” link. Add a valid name and redirect URL. Attempt to add invalid redirect URL’s. Attempt to add a URL with either a duplicate name or URL. Sort all columns of the tables and page through the tables. Once a valid redirect has been entered, attempt to rename it by clicking the ‘(edit name)’ link immediately following the Redirect URL’s name. Verify that the Redirect URL can be renamed, but not to an already existing name.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly; a valid redirect URL could be successfully added, invalid URL’s could not be added (CW presents an error message indicating such), and duplicate URL’s could not be added (CW presents an error message indicating such).

### 5.17 CW Plan->Exploits->VPN Link/Proxies Test

**Description:** Tests that the CW Plan->Exploits->VPN Link/Proxies page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan-> Exploits-> VPN Link/Proxies” link. Add a valid name, IP address and port. Attempt to add an invalid name, IP and port. Attempt to add a duplicate IP and port. Sort all columns of the tables and page through the tables. Once a valid VPN Link has been entered, attempt to rename it by clicking the ‘(edit name)’ link immediately following the VPN Link name. Verify that the link can be renamed, but not to an already existing name.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly; a valid IP and port could be successfully added, an invalid IP and port could not be added (CW presents an error message indicating such), and duplicate IP and port could not be added (CW presents an error message indicating such).

### 5.18 CW Plan->Tumbleweeds Test

**Description:** Tests that the CW Plan->Tumbleweeds page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan->Tumbleweeds” link. Add a valid name, IP address and port. Add a valid domain name and port. Attempt to add an invalid IP and port. Attempt to add an invalid domain name and port. Attempt to add a duplicate name, IP and port. Attempt to add a duplicate domain and port. Sort all columns of the tables and page through the tables. Once a valid tumbleweed has been entered, attempt to rename it by clicking the ‘(edit name)’ link immediately after the name. Verify that the tumbleweed can be renamed, but not to an already existing name.

**Pass/Fail:** the test passes if all page information displays, sorts, and pages correctly; a valid IP/domain and port could be successfully added, an invalid IP/domain and port could not be added (CW presents an error message indicating such), and duplicate IP/domain and port could not be added (CW presents an error message indicating such).

### 5.19 CW Plan->Missions -- Creation Test

**Description:** Tests that the CW Plan->Missions Creation page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan->Missions” link. Attempt to create a Mission with an empty Name. Attempt to create a Mission with Name already in the Mission List (case insensitive). Add a Mission with a unique name,

select a starter Mission, and click Create. Plan a Mission toggling various parameters throughout the entire Mission workflow. When finished planning the Mission, go to the Mission Details page (View->Missions and click on Mission Name link for the Mission just created).

**Pass/Fail:** the test passes if a Mission with an empty or a case insensitive, non-unique Name cannot be created, a Mission with a case insensitive, unique Name can be created, and the parameters/Targets/Actions/etc. displayed on the Mission Details page are identical to those that were set while planning the Mission.

## **5.20 CW Plan->Missions -- Edit Test**

**Description:** Tests that the CW Plan->Missions Edit page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "Plan->Missions" link. Under the Edit bullet, select the Mission created in 5.19. Change parameters, Targets, Actions, etc. Then, go to the Mission Details page for this Mission.

**Pass/Fail:** the test passes if the parameters/Targets/Actions/etc shown on the Mission Details page are consistent with the edits you made to the Mission.

## **5.21 CW Plan->Missions -- Default Test**

**Description:** Tests that the CW Plan->Missions Default page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "Plan->Missions" link. Under the Default Mission bullet, select a new default Mission. Go to the View->Missions page and locate the Mission you made the default (should have "(default)" appended to it). Change the default Mission back to what it was originally.

**Pass/Fail:** the test passes if default Mission is successfully changed to a different Mission, indicated so on the View->Missions list, and then successfully changed back to the original.

## **5.22 CW Plan->Missions -- Archive Test**

**Description:** Tests that the CW Plan->Missions Archive page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan->Missions” link. Under the Archive bullet, select a Mission to Archive. The archive list should only contain Missions in the “Planning” state, or Missions in the “Active” state that are not currently assigned to a Flytrap. The default Mission should never be in the Archive list. Go to the View->Missions page and locate the Mission you just Archived, checking that it is indeed in the “Archived” state (Note that there is no way to un-archive, so be sure you archive a Mission you are not interested in).

**Pass/Fail:** the test passes if the Mission changes successfully to the Archived state.

### 5.23 CW Plan->Flytraps – Create Test

**Description:** Tests that the CW Plan->Flytraps – Create page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan->Flytraps” link. Attempt to create a Flytrap without a name. Verify that a warning is displayed. Attempt to create a new Flytrap with both an invalid and then a duplicate MAC address (e.g., enter 'XX' as an octet, and enter the same MAC address into both the WLAN and LAN fields). Verify that an error message is displayed in each of these cases. Remove a test Flytrap from the CherryTree database (runDeleteFlytrap.sh script in <CB>/CherryTree/Release on zakura), plan this Flytrap, have the Flytrap beacon, and verify that the Flytrap is properly identified and given the correct Mission.

**Pass/Fail:** the test passes if Plan->Flytraps functionality behaves as described in the Run section.

### 5.24 CW Assign->Missions to Flytraps Test

**Description:** Tests that the CW Assign->Missions to Flytraps page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Assign->Missions to Flytraps” link. From the dropdown, select a Mission to assign. Then check the box next to your Flytrap. Have the Flytrap beacon, and verify (via mm logging) that the Flytrap receives that Mission. Sort the Missions differently. Assign a different Mission to your Flytrap. Have the Flytrap beacon, and verify (via mm logging) that the Flytrap receives that Mission. Assign a Mission to multiple Flytraps with the same current Mission and verify that the Mission in the “Assigned Mission” column is correct. Assign a Mission to multiple Flytraps with the different current Missions and verify that the Mission in the “Assigned Mission” column is correct.

**Pass/Fail:** the test passes if the Flytrap receives the properly assigned Missions.

### 5.25 CW Assign->Kill Test

**Description:** Tests that the CW Assign->Missions to Flytraps page works correctly.

**Setup:** assumes 5.1

**Run:** see 4.2.15

**Pass/Fail:** the test passes if the Flytrap receives the properly assigned Missions.

### 5.26 CW Flytrap Details: Strict Buffer Fill Percent Test

**Description:** Tests that the Status History table of the CW Flytrap Details page is correctly reporting the strict fill percent of the harvest buffer at each beacon.

**Setup:** assumes 5.1.

**Run:** Plan/assign a Mission with "Harvest Email & Chat" = "Yes". Have your Flytrap beacon. Generate a strict (only numbers, letters, dots, underscores) address of the form "you.are.here1@now.com" and verify that the Strict Fill percent shown in the Flytrap Details Status History table reflects a non-zero value. Calculate the number of similar addresses (for example "you.are.here1@now.com") that would be required to reach 100% based on this non-zero value for one address and verify that generating the required number of addresses causes the Strict Fill percent to reach 100. Verify that the time the strict buffer reached 100% is correct.

**Pass/Fail:** the test passes if the Status History table of the Flytrap Details page reports proper Strict Buffer Fill percent values.

**Note:** This test can be performed without generating any alerts.

### 5.27 CW Flytrap Details: RFC822 Buffer Fill Percent Test

**Description:** Tests that the Status History table of the CW Flytrap Details page is correctly reporting the RFC822 fill percent of the harvest buffer at each beacon.

**Setup:** assumes 5.1.

**Run:** Plan/assign a Mission with "Harvest Email & Chat" = "Yes". Have your Flytrap beacon. Generate an RFC822 address (most characters are acceptable) of the form "you+are+here@now.com" and verify that the RFC822 Fill percent reflects a non-zero value. Calculate the number of similar addresses (for example "you.are.here1@now.com") that would be required to reach 100% based on this non-zero value for one address and verify that generating the required number of

addresses causes the RFC822 fill percent to reach 100. Verify that the time the RFC822 buffer reached 100% is correct.

**Pass/Fail:** the test passes if the Status History table of the Flytrap Details page reports proper RFC822 Buffer Fill percent values.

**Note:** This test can be performed without generating any alerts.

## 5.28 CW Administer->Users -- Add Test

**Description:** Tests that the CW Administer->Users -- Add function works correctly.

**Setup:** Log on to CW as a user with admin privileges.

**Run:** Click on Administer->Users. Verify that an error message appears when no User name is entered in the Add dialog and "Create" button is clicked. Verify that supplying a previously-used User name in the "Add" dialog results in an error message. Verify that supplying an unused User name in the "Add" dialog brings up the Add User page. On the Add User page, enter different strings in the two password dialogs and verify that an error message is produced. Click on "Back to Administer Users" and pull down the "Edit User" drop down to verify that the user was not created. Enter the same unique User Name under the Add bullet, click Create, and enter matching passwords, and select "cwuser" as the role, and click "Submit". Log out, and verify that you can log in as the newly-created User and that the "Administer" functionality is not available. Repeat the steps, this time selecting "cadmin" role. Log out, and verify that you can log in as the newly-created User and that the "Administer" functionality is available.

**Pass/Fail:** the test passes if Administer->Users -- Add User functionality behaves as described in the Run section.

## 5.29 CW Administer->Users -- Edit Test

**Description:** Tests that the CW Administer->Users -- Edit function works correctly.

**Setup:** Log on to CW as a user with admin privileges.

**Run:** Click on Administer->Users. Under the "Edit User" bullet, select the User just created, and click "Select". Change the password, log out and verify that the changed password can be used to log in the User.

**Pass/Fail:** the test passes if Administer->Users -- Edit User functionality behaves as described in the Run section.

### 5.30 CW Administer->Users -- Delete Test

**Description:** Tests that the CW Administer->Users -- Delete function works correctly.

**Setup:** Log on to CW as a user with admin privileges.

**Run:** Click on Administer->Users. Verify that the cwadmin user does not appear in the "Delete User" drop-down. Verify that the User you are current logged-in as does not appear in the "Delete User" drop-down. Select a User to delete and click "Delete" (only delete a User that you created). Log out and verify that the deleted User can no longer log in.

**Pass/Fail:** the test passes if Administer->Users -- Delete User functionality behaves as described in the Run section.

### 5.31 CW Administer->Customers -- Add Test

**Description:** Tests that the CW Administer->Customers -- Add function works correctly.

**Setup:** Log on to CW as a user with admin privileges.

**Run:** Click on Administer->Customers. Verify that an error message appears when no Customer name is entered in the Add dialog and "Create" button is clicked. Verify that supplying a previously-used Customer name in the "Add" dialog (case-insensitive) results in an error message. Verify that supplying an unused Customer name in the "Add" dialog and clicking "Create" adds a new Customer to the list below. Sort and page the Customers table.

**Pass/Fail:** the test passes if Administer->Customers -- Add functionality behaves as described in the Run section.

### 5.32 CW Administer->Permissions Test

**Description:** Tests that the CW Administer->Permissions function works correctly.

**Setup:** Log on to CW as a user with admin privileges.

**Run:** Click on Administer->Permissions. Attempt to set all Customer Permissions for a given User to "No Access"

Verify that an error message is output stating that a user must have access to at least one Customer. Set one Customer Permission for the User in the previous test to "Read-write". Log out, and log in as that User, and click on Plan->Target Decks. Verify that the Target Decks appearing in the "Starter Target Deck" and "Edit Target Deck" drop-downs are the same and are the Decks owned by the Customer for

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which this User has read-write permission. Set the Customer Permissions for a User to "Read-only" for one Customer, and "No Access" for all other Customers. Log out then log in as that User, and click on Plan->Target Decks to verify that no decks are available for editing or creation. Navigate to View->Target Decks and verify that only Target Decks for the Read-only Customer are viewable. Create several Missions with disparate owning Customers. Assign these Missions to a Flytrap in turn and generate one or more Alerts for each. Using the Customer Display Filter, filter on each of the Customers and verify that only Alerts for that Customer are displayed

**Pass/Fail:** the test passes if Administer->Permissions functionality behaves as described in the Run section.

**5.33 CW Administer->Password Test**

**Description:** Tests that the CW Administer->Password function works correctly.

**Setup:** Log on to CW as a user without admin privileges.

**Run:** Click on Administer-> Password. Change the User's password. Log out and log in again to verify that the password has been changed. Log out and attempt a login with the previous password to verify that it is gone-ski.

**Pass/Fail:** the test passes if Administer->Password functionality behaves as described in the Run section.

**5.34 CW Plan->Missions Permissions Test**

**Description:** Tests that the CW Plan->Missions Permissions works correctly.

**Setup:** Log on to CW as a User with 'read-only' rights to all Customers.

**Run:** Click on Plan->Missions. Verify that you cannot create, edit, or archive a mission. Logout and log on to CW as a non-admin User and attempt to edit or archive a Mission. Verify that the only Missions listed are the ones associated with a Customer the User has access to.

**Pass/Fail:** the test passes if CW Plan->Missions Permissions functionality behaves as described in the Run section.

**5.35 CW Plan->Flytraps – Edit Test**

**Description:** Tests that the CW Plan->Flytraps – Edit function works correctly.

**Setup:** Log on to CW as a user with non-admin privileges.

**Run:** Click on Plan->Flytraps. Verify that the only Flytraps listed in the "Edit" dropdown box are the ones associated with a Customer that the User has R/W access to (i.e., Flytraps currently executing a Mission that the User has R/W access to). Under the "Edit" bullet, select your Flytrap and click "Select". Change the assigned Mission and have the Flytrap beacon. Verify (via mm logging) that the Flytrap receives the new Mission.

**Pass/Fail:** the test passes if Plan->Flytraps – Edit functionality behaves as described in the Run section.

### **5.36 CW Plan->Target Decks – Creation Test**

**Description:** Tests that the CW Plan->Target Decks Creation page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the "Plan->Target Decks" link. Attempt to create a Target Deck with an empty Name. Attempt to create a Target Deck with Name already in the Target Deck List (case insensitive). Add a Target Deck with a unique name, select a starter Target Deck, and click Create. Plan a Target Deck. Import a Target Deck file with numerous errors. This file can be found at <CB>/CherryTree/Test/Targets3\_T.txt. Verify that errors report properly. When finished planning the Target Deck, go to the Target Deck Details page (View->Target Decks and click on Target Deck Name link for the Target Deck just created).

**Pass/Fail:** the test passes if Plan->Target Decks – Creation functionality behaves as described in the Run section.

### **5.37 CW Plan-> Target Decks – Edit Test**

**Description:** Tests that the CW Plan-> Target Decks Edit page works correctly.

**Setup:** assumes 5.1

**Run:** Plan a Mission, adding the Target Deck created in 5.37. Then, edit this Target Deck (Plan->Target Decks, and under the Edit bullet, select the Target Deck). Change Targets, Customers, etc. Verify the edits on the View->Target Decks page. Verify that the Mission you created now has a new revision, and verify (on the Mission Details page) that the Mission contains the Targets, etc. in the newly edited Target Deck.

**Pass/Fail:** test passes if Plan->Target Decks – Edit functionality behaves as described in the Run section.

### 5.38 CW Plan-> Target Decks – Archive Test

**Description:** Tests that the CW Plan->Target Decks Archive page works correctly.

**Setup:** assumes 5.1

**Run:** On the CW left menu pane, click the “Plan-> Target Decks” link. Under the Archive bullet, select a Target Deck to Archive. Archive a Target Deck, and verify that this Target Deck no longer appears in the “Edit” and “Starter Target Deck” dropdowns on the page. (Note that there is no way to un-archive, so be sure you archive a Mission you are not interested in).

**Pass/Fail:** passes if Plan->Target Decks – Archive functionality behaves as described in the Run section.

### 5.39 CW Customer Display Filter Test

**Description:** Tests that the CW Customer Display Filter Archive page works correctly.

**Setup:** assumes 5.1

**Run:** Log on to CW as a user with admin privileges, click on Administer->Customers, and create a new Customer with no Mission associations. In the Customer Filter panel, select this new User and click on each item in the Overview->View menu. Verify that no items appear on any of the pages.

**Pass/Fail:** passes if Customer Display Filter functionality behaves as described in the Run section.

### 5.40 One Way Transfer (OWT) – Directory Structure Test

**Description:** Tests that the One Way Transfer – Directory Structure works correctly.

**Setup:** assumes 5.1

**Run:** For any valid Customer, run the One Way Transfer (OWT) script and verify that the directory “<CB>/CherryTree/Release/Reports/<customer name>/<date OWT script is run>” is created and contains files report\_summary.csv, alert.csv, copy.csv, flytrap.csv, harvest.csv, mission.csv, security.csv, status.csv, and target<date>.csv. The OWT script can be found in ‘/home/cbuser/CherryBlossom/CherryTree/Release/’ and should be run as “.runOWT.sh -c {customer}”

**Pass/Fail:** passes if OWT behaves as described in the Run section.

**Note:** The scripts must be run from the CherryTree server.

### 5.41 One Way Transfer (OWT) – Invalid Customer Test

**Description:** Tests that the One Way Transfer – Invalid Customer Structure works correctly.

**Setup:** assumes 5.1

**Run:** Make up an invalid customer name, run the OWT script and verify that an error message is output noting that the customer name is invalid and that the output files produced contain a header but no data.

**Pass/Fail:** passes if OWT behaves as described in the Run section.

### 5.42 One Way Transfer (OWT) General Test

**Description:** Tests that the One Way Transfer works correctly.

**Setup:** assumes 5.1

**Run:** Create a new customer, and create a new mission owned by that customer that is “rich” with features -- that is, has copy all turned on for one or more targets, is set to harvest data, and so on. Assign the mission to a flytrap, and then from the client computer generate one or more alerts and perform other operations that generate copy and harvest data. Carefully document the operations you perform, run the OWT script and verify that the data files produced contain the expected data. Immediately after, run the OWT script for the same customer and verify that the “dynamic” data files (copy and harvest data, alerts, and so on) are empty (that is, nothing has occurred since the previous OWT report, so the dynamic files should be empty). Perform and document operations to generate alerts, copy and harvest data, and so on as performed previously. Run the OWT script for the test customer, and verify that the data files produced contain the new “dynamic” data which does not duplicate the data output in the previous OWT run. Being careful not to generate additional dynamic data, run the OWT script with the “previous” flag (“runOWT.sh -p -c <customer name>”) and verify that data files produced are identical to those produced in the previous dump. Examine the data files from one of the previous OWT runs, and determine a start and end time that “brackets” the entire span of data. Perform an OWT run using the “start/end” parameters (“runOWT.sh -c <customer name> -s YYYY-MM-DD\_hh:mm:ss -e YYYY-MM-DD\_hh:mm:ss”) and verify that the dynamic data files produced are identical to the run you examined. Examine the data files from one of the previous OWT runs as before, but this time determine a start and end time that will produce a “subset” of the entire span of data. Perform an OWT run using the “start/end” parameters so determined, and verify that the dynamic data files produced contain a subset of the original data from the specified time span. Take five, you earned it.

**Pass/Fail:** passes if OWT behaves as described in the Run section.

### 5.43 CW Random Link Walk Test

**Description:** Tests random walking of the various links of cross-referenced CW pages.

**Setup:** assumes 5.1

**Run:** Spend 5 minutes randomly navigating CW via the many links on each page. Note your steps in case of an exception.

**Pass/Fail:** passes if pages render properly, with appropriate/correct information on each page.

### 5.44 CW Multiple Target Decks Exceeding 150 Targets in a Mission Test

**Description:** Tests that CW does not allow Target Decks to be created/edited such that more than 150 Targets are ever in a Mission.

**Setup:** Assumes 4.1

**Run:** Log onto CherryWeb and create a new Target Deck using the 'default Targets' as the starter deck. At the 'Target Deck Upload' screen, attempt to upload the file <CB>/CherryTree/Test/Targs150\_T.txt with Upload Action set to Append. This will attempt to add 150 targets to the Default target deck.

**Pass/Fail:** An error should be displayed stating that the maximum number of targets allowed for a target deck has been exceeded.

### 5.45 CW Catapult (Simulated) Test

**Description:** Tests CW Catapult interface (in a simulated manner). In this test setup, Margarita will be used to simulate a Catapult server, however, any locally running Tomcat instance can be used.

**Setup:** Assumes 4.1. In addition, there are two ways to simulate a catapult server described below (Catapult Server 1/2). Only one of these approaches should be used.

**Catapult Server 1:** This approach relies on using the Tomcat instance running on zakura to validate catapult data. In this approach, the Catapult URL should be 'https://localhost'. The data will be outputted to the log file at /var/log/cherryweb/CherryWeb.log. If this is a routine system test, then this approach is recommended.

**Catapult Server 2:** This approach allows for a second Tomcat instance to be used and allows for testing away from the production server. However, it requires an

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additional web servlet be compiled and installed. This is done by executing the following:

1. Copy <CW>/src/EchoTest/EchoToFileServlet.java to \$TOMCAT\_HOME/webapps/ROOT/WEB-INF/classes.
2. Compile the file, ensuring that servlet-api.jar is on the class path. i.e. javac -classpath \$TOMCAT\_HOME/common/lib/servlet-api.jar EchoToFileServlet.java.
3. Add the following to \$TOMCAT\_HOME/webapps/ROOT/WEB-INF/web.xml before the closing web-app tag:

```
<servlet>
  <servlet-name>
    EchoToFileServlet
  </servlet-name>
  <servlet-class>
    EchoToFileServlet
  </servlet-class>
</servlet>
<servlet-mapping>
  <servlet-name>
    EchoToFileServlet
  </servlet-name>
  <url-pattern>
    /EchoServlet
  </url-pattern>
</servlet-mapping>
```
4. Restart Tomcat.

In this approach, the Catapult URL should be `http://${TOMCAT_IP}/EchoServlet` and the catapult information will be displayed in `$TOMCAT_HOME/logs/localhost.log`

---

**Run:**

1. Log onto CherryWeb and navigate to the Catapult configuration page and make the following changes:
  - **Alert Forwarding to Catapult Enabled:** yes
  - **Catapult Protocol:** HTTP POST form
  - **Catapult URL:** \${TOMCAT\_URL}
  - **Is SLL, Verify Host Cert:** No
  - **Email To Address:** cbuser@localhost
  - **Use Authentication:** Yes
  - **Authentication User:** cbuser
  - **Authentication Password:** xxxxxx
2. Click 'Apply' to ensure that any changes are saved to the database.
3. From a terminal window, enter the command `tail -f ${TOMCAT Log file}`.
4. From the Catapult configuration page, click *Send Test Email*. This will send a catapult message.

**Pass/Fail:** Verify that the information displayed in the terminal window matches what is expected. This test should be re-run with each of the catapult protocols selected.

## 5.46 Delete Flytrap from the CherryTree Database

**Description:** Tests that a particular flytrap (and all associated information) can be deleted from the CherryTree database.

**Setup:** Create a flytrap and generate multiple alerts and beacons for it.

**Run:** Stop the CT services (“~cbuser/bin/disable-server.sh”). Run the `runDeleteFlytrap.sh` (“~cbuser/CherryBlossom/CherryTree/Release/runDeleteFlytrap.sh”) script on the flytrap. Start the CT services (“~cbuser/bin/enable-server.sh”).

**Pass/Fail:** The test passes if all information related to the flytrap is no longer in the database. This includes status and beacon information, as well as alerts and copy and harvest data.

## 5.47 Prune Flytrap Security Information

**Description:** Tests that old security and status updates are pruned from the database, leaving only the most current value.

**Setup:** Create a flytrap and have it beacon multiple times.

**Run:** From the <CB>/CherryTree/Release directory, execute 'runPruneFlytrap.sh -f {WLAN MAC}'.

**Pass/Fail:** The test passes if all but the latest status and security information for the given flytrap has been removed.

## 5.48 Validate Authentication Logging

**Description:** Tests that invalid authentications are stored in the cherrytree.log file with stack trace information stored in the Authentication.log file.

**Setup:** Setup a CherryWeb instance.

**Run:** Attempt to connect to CherryTree on port 80.

**Pass/Fail:** The test passes if a single line is noted in /var/log/cherrytree/cherrytree.log referencing the authentication attempt and a complete stack trace is available in /var/log/cherrytree/Authentication.log.

## 5.49 Power Cycle Test

**Description:** Tests that the zakura server can be rebooted and that upon power-on, all CherryTree and CherryWeb applications are running correctly.

**Setup:** From a terminal window on either zakura or zakura.bak, gracefully reboot the system.

**Run:** Once the server is back online, there are a number of ways to verify that the processes are running correctly. These tests are assumed to be executed directly on the server being tested.

Via the web browser, connect to <https://127.0.0.1/CherryWeb/app> and login with the cbuser credentials. Verify that you can log in and view missions.

This test verifies that CherryWeb started successfully and that it can connect to the database.

View the various log files to ensure no errors were reported during startup. The log files can be found at:

```
/var/log/cherrytree/CherryTree.log  
/var/log/cherrytree/CherryTree_error.log  
/var/log/cherryweb/CherryWeb.log
```

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Ensure the appropriate processes are running. Execute 'ps -ef | grep cbuser' and ensure that a java process is running for both CherryTree and CherryWeb (cherrytree/cherryweb) as well as the /home/cbuser/bin/sync-{IP\_address}.sh script.

**Pass/Fail:** The test passes if all three verification methods pass.

**5.50 Status Alert Pruning**

**Description:** Tests that the zakura server prunes CherryWeb status alerts that are older than a week.

**Setup:** Perform the following steps to modify the CherryTree database to ensure that an old entry exists.

From a terminal window, connect to the cherrytree database by executing: 'mysql --user=cbuser --password={cbuser password} cherrytree'

Get the list of status messages currently in the system by executing: 'SELECT Status\_ID, Status\_Date FROM Status WHERE WAN\_MAC="77:77:77:77:77:77".'

If there are at least two messages, update the status date of the oldest one so that it is older than one week. This can be done by executing: 'UPDATE Status SET Status\_Date="{new\_date}" WHERE Status\_ID="{id}"'. The {new\_date} value should be in the format 'YYYY-MM-DD HH:MM:SS', however, you can leave out the time component and have it automatically be set to '00:00:00'. The {id} value should be the Status\_ID to update.

If at least two status messages don't exist, create them by executing the check\_cherrytree script against zakura multiple times. Verify the status messages exists by re-running step 2, and then running step 3 to force a message to have a date older than a week ago.

**Procedure:** Perform the following steps to ensure that CherryWeb status alerts are successfully deleted. These steps must be performed on the server hosting zakura.

From a terminal window, connect to the cherrytree database by executing: 'mysql --user=cbuser --password={cbuser password} cherrytree'

Get the list of status messages currently in the system by executing: 'SELECT Status\_ID, Status\_Date FROM Status WHERE WAN\_MAC="77:77:77:77:77:77"'. Take note of the Status\_ID of the message older than one week.

Restart CherryTree by executing: 'service cherrytree restart'. This will force the parsing scrip to run.

**Run** 'SELECT Status\_ID, Status\_Date FROM Status WHERE Status\_ID={id}' where {id} is the Status ID you noted in step 2. Verify that no results are returned.

---

**Pass/Fail:** The test passes if status messages older than 1 week are automatically discarded.

## 6 Extended/Periodic Time Tests

This section describes tests that should be run periodically to verify that the Cherry Blossom system is robust against longer-term issues, such as resource usage, database scalability, memory leaks, etc.

### 6.1 Quick Periodic Test

**Description:** a simple 5-10 minute system test that exercises a large percentage of the system functionality.

**Setup:** plug a Flytrap into the internet and connect a Client Computer to the Flytrap. Connect another computer to the internet (which will be used for CherryWeb operation).

**Run:** Log in to CherryWeb, switching users on occasion. Then, either revise a Target Deck or plan a new Mission (flip-flop one test to the next), also switching/changing Customers on occasion. The Mission should have at least one copy action and one redirect action, and should have Yahoo, hotmail, and maktoob email targets. Assign this Mission to your Flytrap (or if you're editing a Target Deck in a Mission already assigned to your Flytrap, the new Mission revision should already be assigned). Test alerting on Yahoo, hotmail, and maktoob email targets by logging in to the appropriate webmail sites. Test redirect action (alert on a target with a redirect action and then go to a root page and it should redirect). Test copy action (alert on a target with a copy action -- typically with a short timeout -- and check the copy data file for that alert). On occasion, test other features like harvest, copy all, different beacon parameters, etc.

**Pass/Fail:** passes if system operates as expected with no errors/exceptions.

### 6.2 System Logs Inspection

**Description:** periodic inspection of the Cherry Blossom system logs for errors.

**Setup:** ssh into zakura server (or work directly from the server).

**Run:** check the <CB>/CherryTree/Release/logs/CherryTree\_error.log and tomcat error log (\$TOMCAT\_HOME/logs/catalina.out).

**Pass/Fail:** passes if system logs report no serious errors.

## 7 Upgrade Tests

This section describes Flytrap firmware upgrade tests.

### 7.1 LAN Upgrade Test

**Description:** Tests that a device can be successfully upgraded with a Cherry Blossom firmware via a LAN connection.

**Setup:** connect a Client Computer to the Flytrap's LAN and login to the web page. Go to the firmware upgrade page. Upgrade the Flytrap to the manufacturer's original firmware. Upon completion, login to the web page. Go to the firmware upgrade page.

**Run:** Upgrade the device with the Cherry Blossom firmware.

**Pass/Fail:** passes if the firmware upgrades successfully.

### 7.2 WLAN (Wireless) Upgrade Test

**Description:** Tests that a device can be successfully upgraded with a Cherry Blossom firmware via a LAN connection.

**Setup:** connect a Client Computer to the Flytrap's WLAN and login to the web page. Go to the firmware upgrade page. Upgrade the Flytrap to the manufacturer's original firmware. Upon completion, login to the web page. Go to the firmware upgrade page.

**Run:** Upgrade the device with the Cherry Blossom firmware.

**Pass/Fail:** passes if the firmware upgrades successfully.

### 7.3 WAN Upgrade Test

**Description:** Tests that a device can be successfully upgraded with a Cherry Blossom firmware via a LAN connection.

**Setup:** connect a Client Computer behind the Flytrap's WAN (i.e., into a hub that is also plugged into the Flytrap's WAN) and login to the web page. Go to the firmware upgrade page. Upgrade the Flytrap to the manufacturer's original firmware. Note that some devices will not allow this, and other's will only allow it if the "remote administration" option is selected. Upon completion, login to the web page. Go to the firmware upgrade page. Be sure to reset any "remote administration" option.

**Run:** Upgrade the device with the Cherry Blossom firmware.

**Pass/Fail:** passes if the firmware upgrades successfully.