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**Feature Acceptance Test (FAT)
Procedures
(FIELD)**

Revisions

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1 Introduction

1.1 Purpose

This document describes the Feature Acceptance Test (FAT) procedures for the field test site.

1.2 Applicable Documents

See non-FIELD test doc.

1.3 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.

1.4 Prerequisites

See non-FIELD test doc.

1.5 Related Tests and Test Documents

See non-FIELD test doc.

2 Required Personnel, Equipment, and Setup

This section enumerates the required personnel, equipment, and setup necessary to perform a FAT of the system.

2.1 Required Personnel and Equipment

A FAT of the system requires a minimum of two personnel, referred to hereafter as a “CherryTree Tester” and a “Flytrap Tester”. In actuality, the FAT will likely be attended by more people, including IV&V personnel, interested customers, etc. The following two sections list the requirements and equipment needed by the “CherryTree Tester” and the “Flytrap Tester”. The system has a “Test Kit”, which is a pelican case that includes all of the necessary computers, hardware, cabling, etc for the Flytrap Tester.

2.1.1 CherryTree Tester

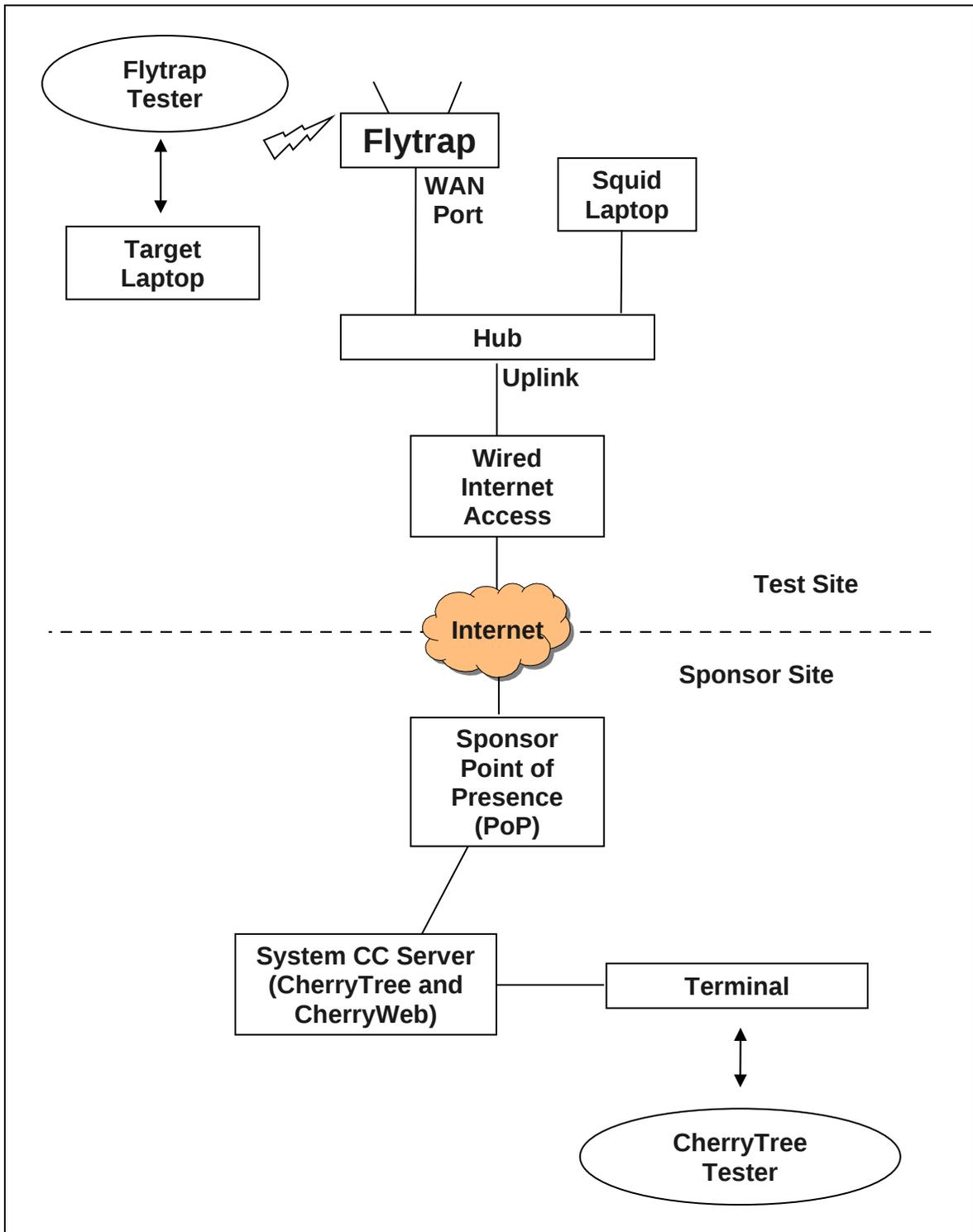
See non-FIELD test doc.

2.1.2 Flytrap Tester

The following table lists the equipment, credentials, and skills required by the CherryTree Tester.

Personnel	Location	Necessary Equipment/Credentials	Skills
Flytrap Tester	Approved site with wired internet access	Cell phone Wired Internet access Test Kit with: <ul style="list-style-type: none"> • Flytrap(s) to be tested • Hub, power strip, and Ethernet cables (5) • 1 “Squid” Linux Laptop with Ethernet card and squid software installed (referred to as “Squid Laptop”) • 1 “Target” Windows XP Laptop with 802.11 wireless card, Ethernet card, technetium (MAC change) and Wireshark software installed (referred to as “Target Laptop”) system Release binder with CD’s containing Production Test Firmware(s) and/or Wireless Upgrade Test Package(s) to be tested	system familiarity Wireless Router/AP familiarity squid familiarity iptables familiarity

2.2 Test Diagram



2.3 Test Setup

This section describes the test setup procedure that must be done before running the individual acceptance tests of section 3.

The “CherryTree Tester” must perform the following test setup steps:

See non-FIELD test doc.

The “Flytrap Tester” must perform the following test setup steps (note that each test site’s internet access may be different, so some steps may not be documented exactly):

Step	Action
1	Setup the Flytrap, Hub, and Squid Laptop (see “Test Diagram” above): <ol style="list-style-type: none"> 1. Connect Ethernet cable from Flytrap WAN port to hub 2. Connect Ethernet cable from Squid Laptop to Hub 3. Connect Ethernet cable from Hub (uplink port) to Wired Internet Access Port
2	Log on to the Squid Laptop (user=squid_user password=squid123!). Ensure the default connection type for the wired interface is DHCP.
3	Connect the Squid Laptop to the internet (there may be some type of registration/internet access procedure required at the site). Verify internet connectivity by going to a web site (e.g., www.google.com).
4	Fetch the Squid Laptop’s IP address (open a terminal window and issue “ifconfig eth0”) and DNS address(es) (open a terminal, issue “cat /etc/resolv.conf”, and look for IP address with “nameserver” tag).
5	Start squid on the Squid Laptop. Open a terminal window (as “squid_user”) and run: <pre data-bbox="435 911 711 940">./squid_start.sh</pre>
6	Configure the Flytrap’s Internet (WAN) Connection: <ol style="list-style-type: none"> a. Boot the Target Laptop in Windows XP and logon (user=Administrator password=target123!). b. Connect the Target laptop to a wired LAN port on the Flytrap. Ensure the default connection type for the wired interface is DHCP. c. On the Target laptop, open a browser and point it to the Flytrap’s IP address (see section 8 Appendix for device specific default addresses/usernames/passwords). d. Set Flytrap Connection Type (or similar) to Static IP Address. e. Set Flytrap IP address to an IP address on the same subnet as the Squid Laptop (prevent an IP address conflict by first pinging this address from the Squid Laptop). f. Set Flytrap Default Gateway to the IP address of the Squid Laptop. g. Set Flytrap DNS to DNS address(es) used by Squid Laptop.

7	On the Target Laptop, disconnect the wired Ethernet cable, and connect wirelessly to the Flytrap (Note: Panasonic Toughbooks have a small wireless control switch by the handle that can easily be knocked into the “off” position – be sure it is in the “on” position). If using a Panasonic Toughbook as the Target Laptop, use the built-in Intel wireless configuration tool to connect wirelessly to the Flytrap (Start->All Programs->Intel PROSet Wireless->Wifi Connection Utility).
8	<p>Verify Flytrap/Target Laptop internet connectivity through the Squid Laptop:</p> <p>a. On the Squid Laptop, tail the squid access log. Open a terminal window (as “squid_user”) and run:</p> <pre data-bbox="418 764 678 793">./squid_tail.sh</pre> <p>b. From the Target Laptop, access the internet (www.google.com). Verify this connection attempt in the squid access log.</p>
9	Wait for a call from the CherryTree Tester before beginning tests

NOTE: for tests that do NOT have squid (VPN Link Test, VPN Proxy Test, VPN Proxy All Test), simply set the Flytrap’s Internet (WAN) Connection type to DHCP and verify internet connectivity with Target Laptop. To stop squid, on the Squid Laptop, open a terminal window (as “squid_user”) and run: `./squid_stop.sh`

3 Feature Acceptance Test Procedures

This section enumerates the procedures for each of the acceptance tests. Each section includes a description, setup, procedure, cleanup, pass/fail criterion, and regression test section. Note that none of the following tests include additional hardware setup outside of that described in section 2.3.

3.1 Test 1: Flytrap Wired (LAN) Firmware Upgrade Test

3.1.1 Description

This test verifies the wired firmware upgrade.

3.1.2 Test Setup

No additional setup required (see 2.3).

3.1.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	Disable the Target Laptop's 802.11 wireless card		N/A
2	Connect the Target Laptop to a Flytrap LAN port with an Ethernet cable		N/A
3	[ddwrt only] Dump the device config file. From the Target Laptop, telnet to the device (telnet 192.168.1.1) and at the command prompt, issue "nvram show". This will dump the device config to stdout. Copy and paste the dump to a file named "config_original.out"	A dump of the ddwrt's config file named "config_original.out".	N/A
4	For the Flytrap being tested, follow the "Wired Upgrade Procedure" instructions in the Appendix in this document.	Flytrap web page reports successful firmware upgrade, device reboots, and sends IB at appropriate time (as verified by CherryTree Tester on CherryWeb).	5.1
5	[ddwrt only] Dump the device config file. From the Target Laptop, telnet to the device (telnet 192.168.1.1) and at the command prompt, issue "nvram show". This will dump the device config to stdout. Copy and paste the dump to a file named "config_wired.out"	Compare "config_wired.out" to "config_original.out" (using diff utility – sort utility may be helpful).	N/A

3.1.4 Test Cleanup

If proceeding to Test 2 (section 3.2), restore the manufacturer's original firmware (use the "wired" upgrade procedure instructions found in the appendix of this document for the device of interest).

3.1.5 Pass/Fail Criterion

See “Expected Results” in table.

3.1.6 Regression Tests

None.

3.2 Test 2: Flytrap Wireless (WLAN) Firmware Upgrade Test

3.2.1 Description

This test verifies the wireless firmware upgrade.

3.2.2 Test Setup

No additional setup required (see 2.3).

3.2.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	Disconnect the Ethernet cable from the Target Laptop to the Flytrap LAN port		N/A
2	Enable the Target Laptop's 802.11 wireless card and associate/connect to the Flytrap.		N/A
3	For the Flytrap being tested, follow the "Wireless Upgrade Procedure" instructions in the Appendix in this document.	Flytrap web page reports successful firmware upgrade, device reboots, and sends IB at appropriate time (as verified by CherryTree Tester on CherryWeb).	5.2 6.4
4	[ddwrt only] Dump the device config file. From the Target Laptop, telnet to the device (telnet 192.168.1.1) and at the command prompt, issue "nvram show". This will dump the device config to stdout. Copy and paste the dump to a file named "config_wireless.out"	Compare "config_wireless.out" to "config_original.out" (using diff utility – sort utility may be helpful).	N/A

3.2.4 Test Cleanup

No additional cleanup required.

3.2.5 Pass/Fail Criterion

See "Expected Results" in table.

3.2.6 Regression Tests

None.

3.3 Test 3: Flytrap B Test

3.3.1 Description

This test verifies the B feature.

3.3.2 Test Setup

No additional setup required (see 2.3).

3.3.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	Following tests 1 or 2, the Flytrap will B	CherryTree Tester (on the View ->Flytraps page) will see the Flytrap report "In Comm" as Yes (green). The "Flytrap Details" page (click on the "Flytrap Name" link has a table of "Status History" that will have an entry for each time the Flytrap Bs (and sends an A). Verify the B entry in the Status History table.	6.1.1 6.1.2.1.x 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	IMPORTANT: if the Flytrap has been pre-planned incorrectly (WLAN and LAN MAC's entered incorrectly), when the Flytrap Bs it will get the default Mission which could have a long next B time. To get a Flytrap out of this situation, it must be assigned the "FAT Test 3 (Flytrap B Test)" Mission and then the Flytrap must be upgraded to a different production firmware than the one it is currently executing.		N/A

3.3.4 Test Cleanup

No additional cleanup required.

3.3.5 Pass/Fail Criterion

See "Expected Results" in table.

3.3.6 Regression Tests

None.

3.4 Test 4: Flytrap Email and Chat A Test

3.4.1 Description

This test verifies the A feature.

3.4.2 Test Setup

No additional setup required (see 2.3).

3.4.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(CherryTree Tester) Assign Mission "FAT Test 4 (Flytrap Email and Chat A Test)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page. NOTE: Ensure that this Mission has bethenaaim as a chat target (maktoob chat no longer exists and so the "hellothere" chat is no longer relevant), "smith_test1@yahoo.com" as an email target, and "abc1@def.com" as an email target. If not, plan and assign a new Mission with these targets.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type "abc1@def.com".	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View-> As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.1 6.1.2.2.3.2 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6
3	(Flytrap Tester) Generate an email A for "smith_test1@yahoo.com" by browsing to yahoo.com, clicking "Mail", and logging in with: user = smith_test1@yahoo.com pass = hello_again Then click the "Inbox" button and/or "Check Mail" button.	(CherryTree Tester) Verify Chat A is received (ticker at bottom of page should light up and View-> As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.1 6.1.2.2.3.2 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6
4	(Flytrap Tester) Generate an AIM Express chat A – on the Target laptop, navigate a browser to www.aim.com/products/express , click on the "Chat Now" button, then the "AIM" button, and log in as: user = bethenaaim pass = hello_again	(CherryTree Tester) Verify Chat A is received (ticker at bottom of page should light up and View-> As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.3 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6

3.4.4 Test Cleanup

No additional cleanup required.

3.4.5 Pass/Fail Criterion

See "Expected Results" in table.

3.4.6 Regression Tests

None.

3.5 Test 5: Flytrap MAC A Test

3.5.1 Description

This test verifies the MAC A feature.

3.5.2 Test Setup

No additional setup required (see 2.3).

3.5.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(CherryTree Tester) Assign Mission "FAT Test 5 (Flytrap MAC A Test)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) Using the MAC changing software (technitium), change the Target Laptop's MAC address to "00:12:3F:11:22:33". Note the wireless hardware in the Toughbook CF-52 (Target laptop in the Test Kits) does not allow changing of MAC. Use the wired interface instead.	Target Laptop's MAC address changes to specified value.	N/A
3	(Flytrap Tester) Generate some internet traffic.	(CherryTree Tester) Verify MAC A is received (ticker at bottom of page should light up and View > As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6

3.5.4 Test Cleanup

No additional cleanup required.

3.5.5 Pass/Fail Criterion

See "Expected Results" in table.

3.5.6 Regression Tests

None.

3.6 Test 6: Flytrap H Test

3.6.1 Description

This test verifies the H feature.

3.6.2 Test Setup

No additional setup required (see 2.3).

3.6.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(CherryTree Tester) Assign Mission "FAT Test 6 (Flytrap H Test)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) Generate email addresses (Google or Yahoo search, or go to contact page for a website with email addresses, etc.)	(CherryTree Tester) Verify H info is received the next time the Flytrap Bs ("Flytrap Details" page click the H Data "View" link and verify H'ed emails).	6.1.2.2 6.1.2.2.11 6.1.7 6.2.7

3.6.4 Test Cleanup

No additional cleanup required.

3.6.5 Pass/Fail Criterion

See "Expected Results" in table.

3.6.6 Regression Tests

None.

3.7 Test 7: Flytrap C Test

3.7.1 Description

This test verifies the C feature.

3.7.2 Test Setup

No additional setup required (see 2.3).

3.7.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(CherryTree Tester) Assign Mission "FAT Test 7 (Flytrap C Forever Test)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type "abc1@def.com".	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.1 6.1.2.2.3.2 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6
3	(Flytrap Tester) Surf to some random websites for 15+ minutes (C action has no time out in this Mission).	(CherryTree Tester) Verify existence, size, and timestamps of C data (View->As and click on the "download" link under the "C Data" column for the A just received). Download the C file and open with Wireshark (may not be installed on Terminal) or binary editor (look for DNS entries matching sites surfed to).	6.1.2.2 6.1.2.2.9 6.1.7

3.7.4 Test Cleanup

No additional cleanup required.

3.7.5 Pass/Fail Criterion

See "Expected Results" in table.

3.7.6 Regression Tests

None.

3.8 Test 8: Flytrap W (Enhanced) Test

3.8.1 Description

This test verifies the W feature.

3.8.2 Test Setup

No additional setup required (see 2.3).

3.8.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(CherryTree Tester) Assign Mission "FAT Test 8 (Flytrap W Test)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) On some laptops, Wireshark will not run properly after changing the MAC address. Verify that Wireshark is sniffing traffic, and change MAC/reboot if necessary.	(Flytrap Tester) Wireshark works properly on the Target Laptop.	N/A
3	(Flytrap Tester) Start Wireshark capture on the Target Laptop	(Flytrap Tester) Wireshark is capturing packets on the Target Laptop.	N/A
4	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type "abc1@def.com".	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.1 6.1.2.2.3.2 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6
5	(Flytrap Tester) go to a root web page (e.g., www.cnn.com). Stop Wireshark capture.	(Flytrap Tester) Verify double iframe packet in Wireshark capture. (If able, contact W group and have them check success).	N/A
6		(CherryTree Tester) Verify on CW that that the View->Windex As page has a new entry with correct information, including status.	6.1.2.2.7 6.1.2.2.8 6.2.9

NOTE: At this point, it is more efficient to move to section 3.11 ("Flytrap C All Test"), then return to section 3.9 and disable squid for the remainder of the "VPN Link/Proxy" tests.

3.8.4 Test Cleanup

No additional cleanup required.

3.8.5 Pass/Fail Criterion

See "Expected Results" in table.

3.8.6 Regression Tests

None.

3.9 Test 9: Flytrap VPN Link Test

3.9.1 Description

This test verifies the VPN Link feature.

3.9.2 Test Setup

No additional setup required (see 2.3).

3.9.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	NOTE: VPN Link is not supported through squid. NOTE: VPN Link not supported on WRT54G v5. (Flytrap Tester) From the Target Laptop, configure the Flytrap's Internet (WAN) Connection to DHCP (i.e., this will disable squid).	Target Laptop should have internet access and should no longer be going thru the Squid Laptop (verify on Squid Laptop access.log).	N/A
2	(CherryTree Tester) Assign Mission "FAT Test 9 (Flytrap VPN Link Test)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
3	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type "abc1@def.com".	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.1 6.1.2.2.3.2 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6
4	(CherryTree Tester) Ping the VPN Link IP Address (not yet supported on WRT54G v5). Get the "VPN IP Address" On "Flytrap Details" page. From the "VPN Link Terminal" (see section 2.3), issue: <code>ping <VPN IP Address></code> Note: Mission has 10 minute VPN Link timeout.	(CherryTree Tester) Verify successful Flytrap ping.	6.1.2.2.12 6.1.2.2.13
5	(CherryTree Tester) Ping the Target Laptop. Go to "View -> As" and check the "Client VPN IP" for the A generated in this test – this is the <VPN IP Address of Target>. Then, from "VPN Link Terminal", issue: <code>ping <VPN IP Address of Target></code>	(CherryTree Tester) Verify successful Target Laptop ping.	6.1.2.2.12 6.1.2.2.13
6	(Flytrap Tester) Start apache service on Target Laptop. (CherryTree Tester) Port scan the Target Laptop. From the "VPN Link Terminal", issue: <code>nc -vvvn <VPN IP Addr of Target> 1-100</code>	(CherryTree Tester) Verify successful Target Laptop port scan of apache service on port 80.	6.1.2.2.12 6.1.2.2.13

7	<p>(Flytrap Tester) Stop apache service on Target Laptop.</p> <p>(CherryTree Tester) Port scan the Target Laptop. From the "VPN Link Terminal", issue:</p> <pre>nc -vvvn <VPN IP Addr of Target> 1-100</pre>	<p>(CherryTree Tester) Verify the service no longer shows on Target Laptop port scan.</p>	<p>6.1.2.2.12 6.1.2.2.13</p>
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3.9.4 Test Cleanup

No additional cleanup required.

3.9.5 Pass/Fail Criterion

See "Expected Results" in table.

3.9.6 Regression Tests

None.

3.10 Test 10: Flytrap VPN Proxy Test

3.10.1 Description

This test verifies the VPN Proxy feature.

3.10.2 Test Setup

No additional setup required (see 2.3).

3.10.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	<p>NOTE: VPN Proxy is not supported through squid – see section 3.9.3 step 1 for disabling squid.</p> <p>NOTE: VPN Proxy not supported on WRT54G v5.</p> <p>(CherryTree Tester) Assign Mission “FAT Test 10 (Flytrap VPN Proxy Test)” to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.</p>	(CherryTree Tester) Verify Flytrap has received new Mission at expected time (“Flytrap Details” page will report “Current Mission” as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type “abc1@def.com”.	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	6.1.2.2 6.1.2.2.2 6.1.2.2.3 6.1.2.2.3.1 6.1.2.2.3.2 6.1.2.2.4 6.1.7 6.2.2 6.2.4 6.2.6
3	(CherryTree Tester) Ping the Target	(CherryTree Tester) Verify	6.1.2.2.12 6.1.2.2.13

	<p>Laptop. Go to “View -> As” and check the “Client VPN IP” for the A generated in this test – this is the <VPN IP Address of Target>. Then, from the “VPN Link Terminal”, issue:</p> <pre>ping <VPN IP Address of Target></pre> <p>Note: Mission has 10 minute VPN Proxy timeout.</p>	successful Target Laptop ping.	
4	<p>(Flytrap Tester) Surf some random websites.</p> <p>Note: Mission has 10 minute VPN Proxy timeout.</p>	(CherryTree Tester) Verify proxy data. See non-FIELD test doc.	6.1.2.2.12 6.1.2.2.13

3.10.4 Test Cleanup

No additional cleanup required.

3.10.5 Pass/Fail Criterion

See “Expected Results” in table.

3.10.6 Regression Tests

None.

3.11 Test 11: Flytrap C All Test

3.11.1 Description

This test verifies the C All feature.

3.11.2 Test Setup

No additional setup required (see 2.3).

3.11.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(CherryTree Tester) Assign Mission "FAT Test 11 (Flytrap C All Forever)" to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) As soon as the Flytrap receives the new Mission, surf to some random websites for 15+ minutes (C all action has no time out in this Mission).	(CherryTree Tester) Verify C data file (on the "Flytrap Details" page, click the C Data "View" link, and check size, timestamps, Flytrap. Download the C file and open with Wireshark (may not be installed on Terminal) or binary editor (look for DNS entries matching sites surfed to).	6.1.2.2 6.1.2.2.9 6.1.2.2.10 6.1.7

3.11.4 Test Cleanup

No additional cleanup required.

3.11.5 Pass/Fail Criterion

See "Expected Results" in table.

3.11.6 Regression Tests

None.

3.12 Test 12: Flytrap VPN Proxy All Test

3.12.1 Description

This test verifies the VPN Proxy All feature.

3.12.2 Test Setup

No additional setup required (see 2.3).

3.12.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	<p>NOTE: VPN Proxy is not supported through squid – see section 3.9.3 step 1 for disabling squid.</p> <p>NOTE: VPN Proxy not supported on WRT54G v5.</p> <p>(CherryTree Tester) Assign Mission “FAT Test 12 (Flytrap VPN Proxy All Test) to Flytrap (Assign -> Missions page). Be sure to click the Assign button at the bottom of the page.</p>	(CherryTree Tester) Verify Flytrap has received new Mission at expected time (“Flytrap Details” page will report “Current Mission” as the one just assigned).	<p>6.1.1</p> <p>6.1.2.1.2</p> <p>6.1.2.2.1</p> <p>6.1.6</p> <p>6.1.7</p> <p>6.2.1</p> <p>6.2.4-5</p> <p>6.2.7</p> <p>6.3</p>
2	<p>(CherryTree Tester) As soon as the Flytrap receives the new Mission, ping the Target Laptop. <VPN IP Address of Target> same as previous tests.</p> <p>ping <VPN IP Address of Target></p> <p>Note: Mission has 10 minute VPN Proxy timeout.</p>	(CherryTree Tester) Verify successful Target Laptop ping.	<p>6.1.2.2.12</p> <p>6.1.2.2.13</p>
3	(Flytrap Tester) Surf some random websites.	(CherryTree Tester) Verify proxy data. See non-FIELD test doc.	<p>6.1.2.2.12</p> <p>6.1.2.2.13</p>

	Note: Mission has 10 minute VPN Proxy timeout.		
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3.12.4 Test Cleanup

No additional cleanup required.

3.12.5 Pass/Fail Criterion

See "Expected Results" in table.

3.12.6 Regression Tests

None.

3.13 Test 13: Catapult Verify Test

3.13.1 Description

This test verifies the Catapult interface feature.

3.13.2 Test Setup

No additional setup required (see 2.3).

3.13.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Flytrap Tester) Log on to yahoo.com: user = smith_test1@yahoo.com pass = hello_again	(Flytrap Tester) Verify Catapult A Events.	6.2.3

3.13.4 Test Cleanup

No additional cleanup required.

3.13.5 Pass/Fail Criterion

See "Expected Results" in table.

3.13.6 Regression Tests

None.

3.14 Test 14: Application Execution Test

3.14.1 Description

This test verifies the Application Execution interface feature.

3.14.2 Test Setup

No additional setup required (see 2.3).

3.14.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) Assign a Mission with a shelld application execution on port 2112 event appropriate for the device make/model/version. NOTE: the Belkin F5D8231-4 v4 does not support shelld, so use dumbbelld (Note the dumbbelld process binds to port 2323 by default).	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) On the target laptop, open a cygwin terminal and initiate a telnet connection to the Flytrap: <pre>cygwin> telnet <WLAN_IP> 2112</pre> At the telnet prompt, list the contents of the tmp directory to show the file of the executing app: <pre># ls -al /tmp</pre> NOTE: for the Belkin F5D8231-4 v4, on the target laptop, open a cygwin terminal, connect to dumbbellc using the dumbbellc client program in the Wireless Upgrade Package for this device: <pre>cygwin> cd <PACKAGE_ROOT>/ wireless_client_files/dumbbellc cygwin> ./dumbbellc 192.168.2.1 "ls -al /tmp"</pre>	The telnet client (or dumbbellc client) shows a listing of the tmp directory of the Flytrap's filesystem, including the shelld (or dumbbelld) file.	6.5

3.14.4 Test Cleanup

No additional cleanup required.

3.14.5 Pass/Fail Criterion

See "Expected Results" in table.

3.14.6 Regression Tests

None.

3.15 Test 15: Inhibit Enhancement Test

3.15.1 Description

This test verifies the Inhibit Enhancement feature. Note: not supported on all devices.

3.15.2 Test Setup

No additional setup required (see 2.3).

3.15.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) Assign a Mission with a version string appropriate for the device make/model/version. NOTE: not supported on all devices.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	6.1.1 6.1.2.1.2 6.1.2.2.1 6.1.6 6.1.7 6.2.1 6.2.4-5 6.2.7 6.3
2	(Flytrap Tester) Open the device's configuration web page.	(Flytrap Tester) Verify that the device's web page displays the new version string.	6.1.4
3	(Flytrap Tester) Navigate to the device's firmware upgrade page and attempt to upgrade with a dummy file.	(Flytrap Tester) Verify that the device's web page displays a manufacturer's error message. (CherryTree Tester) Verify receipt of an upgrade A.	6.1.3 6.1.5

3.15.4 Test Cleanup

No additional cleanup required.

3.15.5 Pass/Fail Criterion

See "Expected Results" in table.

3.15.6 Regression Tests

None.

3.16 Test 16: CB v5.0 Include/Exclude Built-in B Addresses

3.16.1 Description

This test verifies the include/exclude built-in B address feature.

3.16.2 Test Setup

No additional setup required (see 2.3). Assumes the Flytrap firmware has been built with both IP address and url of the test PoP.

3.16.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) Assign a Mission where the built-in PoP addresses are to be excluded (i.e., "Use Firmware Default PoP(s) in Mission" field of the "Mission Workflow Step 8: PoP(s)" is "No") and the only PoP address in the Mission is the IP address of the test PoP. Set B fast and slow retries to 10 seconds.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	CB v5.0 4.1.1 4.2.1
2	(Flytrap Tester) Once the Cherry Tree Tester has verified Flytrap receipt of the new Mission, disconnect the hub's internet port.	(Flytrap Tester) Flytrap no longer has internet connectivity.	CB v5.0 4.1.1 4.2.1
3	(Flytrap Tester) Start wireshark on the squid laptop and verify that the Flytrap attempts to B to only the IP address of the test server and does no DNS lookup of the test PoP's URL (i.e. wireshark shows no DNS lookups of the PoP URL). NOTE: some devices realize after a failed connection attempt (i.e., the first B attempt after disconnecting the hub's internet port) that the gateway is no longer present and will not open another connection until the gateway is present (i.e., subsequent B attempts will not happen and will not show in wireshark until the gateway is present). In this case, reconnect the hub's internet connection, watch for a successful B, and disconnect the hub again. Repeat 3 times to be certain	(Flytrap Tester) Wireshark should only show B attempts to the test PoP IP address – no DNS lookups of the test PoP are performed.	CB v5.0 4.1.1 4.2.1

	that the Flytrap is only B'ing to the PoP IP address and not the PoP URL (i.e. wireshark shows no DNS lookups of the PoP URL).		
4	(Flytrap Tester) Reconnect the hub's internet port and verify Flytrap internet connectivity from the Target laptop.	(Flytrap Tester) Target laptop has internet connectivity.	CB v5.0 4.1.1 4.2.1
5	(Cherry Tree Tester) Assign a Mission where the built-in PoP addresses are to be included (i.e., "Use Firmware Default PoP(s) in Mission" field of the "Mission Workflow Step 8: PoP(s)" is "Yes") and no other PoP addresses are specified in the Mission. Set B fast and slow retries to 10 seconds.	(CherryTree Tester) Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	CB v5.0 4.1.1 4.2.1
6	(Flytrap Tester) Once the Cherry Tree Tester has verified Flytrap receipt of the new Mission, disconnect the hub's internet port.	(Flytrap Tester) Flytrap no longer has internet connectivity.	CB v5.0 4.1.1 4.2.1
7	(Flytrap Tester) Start wireshark on the squid laptop and verify that the Flytrap attempts to B to the IP address built-in to the Flytrap firmware.	(Flytrap Tester) Wireshark should show B attempts to the test PoP IP address and DNS lookups of the test PoP URL.	CB v5.0 4.1.1 4.2.1

3.16.4 Test Cleanup

No additional cleanup required.

3.16.5 Pass/Fail Criterion

See "Expected Results" in table.

3.16.6 Regression Tests

None.

3.17 Test 17: CB v5.0 No W Server Connection Links Test

3.17.1 Description

This test verifies that no W Server Connection Links exist on Cherry Web.

3.17.2 Test Setup

No additional setup required (see 2.3).

3.17.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) Verify no Cherry Web links for configuring the W Server Connection exist. In particular, verify on the Cherry Web left menu pane that no "Administer->W..." link exists.	(CherryTree Tester) No links are found.	CB v5.0 4.1.2

3.17.4 Test Cleanup

No additional cleanup required.

3.17.5 Pass/Fail Criterion

See "Expected Results" in table.

3.17.6 Regression Tests

None.

3.18 Test 18: CB v5.0 Run OWT From Cherry Web

3.18.1 Description

This test verifies the running of OWT from Cherry Web feature.

3.18.2 Test Setup

No additional setup required (see 2.3).

3.18.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "Administer -> OWT". Configure and 'generate' a representative OWT.	(CherryTree Tester) Verify the OWT page returns status success and indicates the path where the OWT report has been written.	CB v5.0 4.1.5
2	(Cherry Tree Tester) Open a terminal to the Cherry Tree server. Navigate to the path where the OWT report has been written.	(Flytrap Tester) Verify the correctness of the OWT data.	CB v5.0 4.1.5

3.18.4 Test Cleanup

No additional cleanup required.

3.18.5 Pass/Fail Criterion

See "Expected Results" in table.

3.18.6 Regression Tests

None.

3.19 Test 19: CB v5.0 Sort Flytraps by Most Recent B

3.19.1 Description

This test verifies the sorting of Flytraps by most recent B on Cherry Web.

3.19.2 Test Setup

No additional setup required (see 2.3).

3.19.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "Overview" page. Sort the table by the 'Last B Date' column.	(Cherry Tree Tester) Verify the correctness of the sort.	CB v5.0 4.1.6
2	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "View->Flytraps" page. Sort the table by the 'Last B Date' column.	(Cherry Tree Tester) Verify the correctness of the sort.	CB v5.0 4.1.6
3	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "View->Flytraps->Deployments" page. Sort the table by the 'Last B Date' column.	(Cherry Tree Tester) Verify the correctness of the sort.	CB v5.0 4.1.6

3.19.4 Test Cleanup

No additional cleanup required.

3.19.5 Pass/Fail Criterion

See "Expected Results" in table.

3.19.6 Regression Tests

None.

3.20 Test 20: CB v5.0 Search Target Decks for Targets

3.20.1 Description

This test verifies the searching of Target Decks for Targets capability of Cherry Web.

3.20.2 Test Setup

No additional setup required (see 2.3).

3.20.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "View->Target Decks" page. Search for various Target names, both with and without wildcard '*' character. Searches must include email, MAC, and chat username Targets that exist in multiple Target Decks and email, MAC, and chat username Targets that do not exist in any Target Decks.	(Cherry Tree Tester) Verify the correctness of the search results.	CB v5.0 4.1.7

3.20.4 Test Cleanup

No additional cleanup required.

3.20.5 Pass/Fail Criterion

See "Expected Results" in table.

3.20.6 Regression Tests

None.

3.21 Test 21: CB v5.0 Target Deck Persistent Actions

3.21.1 Description

This test verifies the Target Deck with Persistent Actions requirement.

3.21.2 Test Setup

IMPORTANT: squid must be disabled for this test (due to VPN Link).

3.21.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "Plan→Target Decks" page. Create a Target Deck containing email Targets abc2@def.com, abc3@def.com, and abc4@def.com. Assign no Actions to these Targets. Navigate to the "Plan→Missions" page and create a Mission with a short (60 second) B period and no traffic requirement. Add the Target Deck to the Mission, and assign it to the Flytrap.	(CherryTree Tester) Navigate to "View→Missions" and verify that the Targets appear with no Actions. Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	CB v5.0 4.1.4
2	(Flytrap Tester) Generate an email A for abc2@def.com, abc3@def.com and abc4@def.com (using Google or Yahoo search page).	(CherryTree Tester) Verify Email As are received (ticker at bottom of page should light up and View->As page should show new entries with correct info)	CB v5.0 4.1.4
3	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "Plan→Target Decks" page. Edit the Target Deck from Step 1, adding a C Action with 1 minute timeout for abc2@def.com, a W Action for abc3@def.com, and a VPN Link Action with 10 minute timeout for abc4@def.com (ensure VPN Server address is correct).	(CherryTree Tester) Navigate to "View→Missions" and verify that the Targets appear with the correct Actions. Verify Flytrap has received new Mission (editing the Target Deck will create a new Mission revision and auto-assign it to the Flytrap) at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	CB v5.0 4.1.4
4	(Flytrap Tester) Generate an A for abc2@def.com and surf some random websites for >1 minute.	(CherryTree Tester) Verify existence, size, and timestamps of C data (View->As and click on the "download" link under the "C Data" column for the A just received). Download the C file and open with Wireshark (may not be installed on Terminal) or binary editor (look for DNS entries matching sites surfed to).	CB v5.0 4.1.4
5	(Flytrap Tester) Start Wireshark capture on the Target Laptop.	(Flytrap Tester) Wireshark is capturing packets on the Target	CB v5.0 4.1.4

		Laptop.	
6	(Flytrap Tester) Generate an email A for abc3@def.com– open Google or Yahoo search page, type “abc3@def.com”.	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	CB v5.0 4.1.4
7	(Flytrap Tester) go to a root web page (e.g., www.slashdot.org). Stop Wireshark capture.	(Flytrap Tester) Verify double iframe packet in Wireshark capture.	CB v5.0 4.1.4
8	NOTE: VPN Link is not supported through squid. (Flytrap Tester) From the Target Laptop, configure the Flytrap’s Internet (WAN) Connection to DHCP (i.e., this will disable squid), if it is not already.	Target Laptop should have internet access and should no longer be going thru the Squid Laptop (verify on Squid Laptop access.log).	CB v5.0 4.1.4
9	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type “abc4@def.com”.	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	CB v5.0 4.1.4
10	(CherryTree Tester) Ping the VPN Link IP Address. Get the “VPN IP Address” On “Flytrap Details” page. From the “VPN Link Terminal” (see section 2.3), issue: ping <VPN IP Address> Note: Mission has 10 minute VPN Link timeout.	(CherryTree Tester) Verify successful Flytrap ping.	CB v5.0 4.1.4
11	(CherryTree Tester) Ping the Target Laptop. Go to “View -> As” and check the “Client VPN IP” for the A generated in this test – this is the <VPN IP Address of Target>. Then, from “VPN Link Terminal”, issue: ping <VPN IP Address of Target>	(CherryTree Tester) Verify successful Target Laptop ping.	CB v5.0 4.1.4

3.21.4 Test Cleanup

No additional cleanup required.

3.21.5 Pass/Fail Criterion

See “Expected Results” in table.

3.21.6 Regression Tests

None

3.22 Test 22: CB v5.0 Mobile VPN

3.22.1 Description

This test verifies the Mobile VPN capability.

3.22.2 Test Setup

Assumes the CB Mobile VPN software has been installed on an I-Term and the I-Term has a known public IP address.

3.22.3 Test Procedure

Step	Execute Action	Expected Results	Req
1	(Cherry Tree Tester) On the Cherry Web menu pane, navigate to "Plan→Target Decks" page. Create a Target Deck containing email Target abc5@def.com. Assign a VPN Proxy Action with a 10 minute timeout to the Target. Navigate to the "Plan→Missions" page and create a Mission with a short (60 second) B period and no traffic requirement. Add the Target Deck to the Mission, and assign it to the Flytrap.	(CherryTree Tester) Navigate to "View→Missions" and verify that the Target appears with the appropriate Action. Verify Flytrap has received new Mission at expected time ("Flytrap Details" page will report "Current Mission" as the one just assigned).	CB v5.0 4.1.3
2	(Flytrap Tester) Generate an email A – open Google or Yahoo search page, type "abc5@def.com".	(CherryTree Tester) Verify Email A is received (ticker at bottom of page should light up and View->As page should show new entry with correct info)	CB v5.0 4.1.3
3	(CherryTree Tester) Ping the Target Laptop. Go to "View -> As" and check the "Client VPN IP" for the A generated in this test – this is the <VPN IP Address of Target>. Then, from the "VPN Link Terminal", issue: ping <VPN IP Address of Target> Note: Mission has 10 minute VPN Proxy timeout.	(CherryTree Tester) Verify successful Target Laptop ping.	CB v5.0 4.1.3
4	(Flytrap Tester) Surf some random	(CherryTree Tester) Verify	CB v5.0

	websites. Note: Mission has 10 minute VPN Proxy timeout.	proxy data. See non-FIELD test doc.	4.1.3
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3.22.4 Test Cleanup

No additional cleanup required.

3.22.5 Pass/Fail Criterion

See "Expected Results" in table.

3.22.6 Regression Tests

None

Appendix: Firmware Upgrade Procedures

This section contains firmware upgrade procedures (both wired and wireless) and other potentially useful information for devices of interest.

Firmware Upgrade Procedures: Belkin F5D8231-4 v4 fw 4.00.16

1. General Information

Make: Belkin

Model: F5D8231-4

Hardware Version: 4 (labeled on the bottom of the device as “Ver. 4011”)

Firmware Version: 4.00.16

MAC Address Info:

WLAN MAC: labeled on the bottom of the device.

LAN MAC: same as WLAN MAC.

WAN MAC: labeled on the bottom of the device.

Defaults Settings/Configuration:

Default LAN IP Address: 192.168.2.1

Web Interface Username: (empty)

Default Web Interface Password: (empty)

2. Wired Upgrade Procedure

Prerequisites:

- client computer with Ethernet interface and firmware file
- Ethernet cable
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password
- if the device is running a CB firmware, under certain situations you may need to reference the CB User’s Manual to perform a firmware upgrade

Limitations: if the device is running a CB firmware, under certain situations you may need to reference the CB User’s Manual to perform a firmware upgrade.

Firmware Filename: ip1006aa[X].img (where [X] is an optional string)

Instructions:

- Connect a wired (Ethernet) client with DHCP enabled to a LAN port on the device with an Ethernet cable. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.2.1, assign yourself an IP address of 192.168.2.11.
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).

-
- Log on to the device’s web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where “<Device_LAN_IP_Address>” is the device IP address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.2.1, use `http://192.168.2.1`.
 - Click the “Firmware Update” link on the left tab.
 - Enter the web interface password and click the “Submit” button.
 - Click the “Browse...” button and browse to the `ip1006aa[X].img` firmware file of interest on the client computer.
 - Click the “Update” button. If you get the error message “Cannot upload, please contact administrator” you will need to reference the CB User’s Manual section 12.7 “Firmware Upgrade Will ...” to further continue the upgrade process.
 - Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 180 seconds

Known Issues: None

3. Wireless Upgrade Procedure

Prerequisites:

- client computer with 802.11 wireless client card (or built-in 802.11 client hardware)
- “Wireless Upgrade Package for the Belkin F5D8231-4 v4 fw 4.00.16” – see “README from the Wireless Upgrade Package for Belkin F5D8231-4 v4 fw 4.00.16” section below.
- client computer LAN IP address
- device LAN IP address
- device web interface password

Limitations: wireless security/encryption (WEP or WPA/WPA2) must be disabled

Firmware Filename: N/A (wireless upgrade package handles this)

Instructions: Follow the instructions carefully in the README below, (which is the same as the README in the “Wireless Upgrade Package for Belkin F5D8231-4 v4 fw 4.00.16”).

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 90 seconds

Known Issues: None

README from the Wireless Upgrade Package for Belkin F5D8231-4 v4 fw 4.00.16:

INTRODUCTION:

This document discusses the procedures for performing a wireless upgrade of a Belkin F5D8231-4 v4 running firmware version 4.00.16.

NEW FOR THIS RELEASE:

Wireless upgrade status should NOT be checked by refreshing the device's "Home" page. Once an upgrade is started (by clicking the "Check Firmware" button), a small "chkfw" browser window will appear which will report status.

If all goes well, the chkfw browser window will display "Success" in 60-70 seconds. The device will then reboot in 4-8 seconds.

See the "OPERATIONAL PROCEDURES" section for more information on checking status.

SETUP:

To perform the upgrade, you will need the following:

1. Windows XP Laptop with a 802.11 wireless card (Belkin F5D8011 or newer 802.11n card preferred, but any standards conforming 802.11b/g card should work).
2. Laptop must have cygwin installed with full "Base", "Devel", and "Editors" packages installed. To install cygwin:
 - a. go to <http://www.cygwin.com/>
 - b. click the "Install or update now" icon.
 - c. A dialog will popup -- click "Run".
 - d. Another dialog will popup. Click "Next" until you reach the "Select Packages" dialog. Note you may have to select a different mirror site on the "Choose Download Site" dialog.
 - e. On the "Select Packages" dialog, on the line that starts with "Base", click the circular arrow icon until the line shows "Base () Install".
 - f. On the "Select Packages" dialog, on the line that starts with "Devel", click the circular arrow icon until the line shows "Devel () Install".
 - g. On the "Select Packages" dialog, on the line that starts with "Editors", click the circular arrow icon until the line shows "Editors () Install".
 - h. Click "Next" and follow the instructions for the rest of the install, which can take a long time (~1 hour).

-
- i. Verify that you can open a cygwin command window. Verify that you have the programs "sed" by entering:
 cygcheck -cd | grep sed
Verify that you have the program "gcc" by entering:
 cygcheck -cd | grep gcc

3. Laptop must have Apache webserver installed. To install Apache webserver:

- a. Downloaded from <http://httpd.apache.org/download.cgi>. Download the Win32 Binary without crypto (at the time this document was written the most current Apache version is available here:
 http://www.signal42.com/mirrors/apache/httpd/binaries/win32/apache_2.2.9-win32-x86-no_ssl-r2.msi).
 Select the version listed under the heading "best available version".
- b. Execute the Apache installer after the download completes. This starts the Installation Wizard.
- c. Accept the default options presented by the Installation Wizard. When prompted to enter a Network Domain enter "foobar". Then enter "localhost" for Server Name. Finally, enter any value for the Email Address (it does not have to be a valid email address).
- d. If you used the default options then Apache is installed in the directory
 C:\Program Files\Apache Software Foundation\Apache2.X
where X is the version of Apache you installed. The root html page (index.html) is located in the htdocs subdirectory.
- e. Apache should now installed as a Windows service that will be automatically started every time Windows boots. If you need to start Apache for some reason, go to:
 Start -> All Programs -> Apache HTTP Server 2.X ->
 Control Apache Server -> Start

4. Laptop must have the {XYZ}_PACKAGE installed, where {XYZ} is the name of the package (typically TEST_XXX or REAL_XXX, where TEST packages are to be used during the TEST phase, and the REAL packages are to be used during the operation). It is critical that all PACKAGE files be in the right directories!

Hereafter, the {XYZ}_PACKAGE is referred to as <PACKAGE>.

IMPORTANT: if you need to edit any of the .sh scripts under <HOME>/<PACKAGE>, use an editor that will not add CR-LF pairs (e.g., use vi, don't use WordPad or Notepad)

- a. Insert the "Wireless Upgrade Package for Belkin F5D8231-4 v4 fw 4.00.16" cdrom into the laptop.
- b. Copy the <PACKAGE>.tar.gz of interest to your cygwin home directory, which is typically C:\cygwin\home\<YOUR_USER> (hereafter referred to as <HOME>).
- c. Open a cygwin command window and untar the PACKAGE:
 tar -xzvf <PACKAGE>.tar.gz
- d. cd into <HOME>/<PACKAGE> and execute: ./setup_windows.sh.

NOTE: If the setup_windows.sh script shows any errors, do the following manual steps:

- Using an explorer window, copy the
 <HOME>/<PACKAGE>/webserver_files/belky
directory to your webserver's root htdocs directory (i.e., your

-
- webserver's htdocs directory should now have a belky subdirectory).
 - cd into <HOME>/<PACKAGE>/wireless_client_files/cfg_file_crc and run "make test"
 - cd into <HOME>/<PACKAGE>/wireless_client_files/dumbbellc and run "make -f Makefile.cygwin"

5. Verify the <PACKAGE> setup:

- a. Verify that the webserver_files have been deployed to the correct directory. Open a web browser to URL:
"http://127.0.0.1/belky/md5sums.txt".
You should see the same info as in
<HOME>/<PACKAGE>/webserver_files/md5sums.txt
- b. Verify that <HOME>/<PACKAGE>/wireless_client_files/cfg_file_crc runs.
From a cygwin command prompt, cd to
<HOME>/<PACKAGE>/wireless_client_files/cfg_file_crc
and execute "./cfg_file_crc". You should see a USAGE message.
- c. Verify that <HOME>/<PACKAGE>/wireless_client_files/dumbbellc runs.
From a cygwin command prompt, cd to
<HOME>/<PACKAGE>/wireless_client_files/dumbbellc
and execute "./dumbbellc". You should see a USAGE message.

TESTING:

This section describes the TESTING procedures. If you are performing the operation, skip to the "OPERATIONAL PROCEDURES" section.

1. Connect the WAN port of the Belkin F5D8231-4 v4 with firmware 4.00.16 to the internet with an Ethernet cable.

2. Restore the device to the manufacturer's 4.00.16 image.

- Connect the laptop to a wired LAN port of the device with an Ethernet cable.
- Open a browser (IE) to "http://<device_LAN_IP_address>" (default <device_LAN_IP_address> is 192.168.2.1).
- Click the "Firmware Update" link on the lower left panel.
- If browser has not previously cached the password for the device, enter the password (default password is text box left empty) and click Submit.
- Click "Browse ..." and select the "vendor_original.img" file on the cdrom.
- Click the "Update" button.
- Wait 3 minutes for the device to reboot.

IMPORTANT: the original web page to upgrade firmware does not work on CB firmware. If you have tried to upgrade using the original web page, and have gotten the error message "Cannot upload, please contact administrator", you will need to:

- See the CB User's Manual, section 12.7 "Firmware Upgrade Will ...".

2a. Reset device back to manufacturer's defaults (one-time only):

- Using a paper clip or pin, depress the "Reset" button on the back of the device for 5 seconds. The device will reboot. Download the new configuration and ("Save/Backup Settings" link), and verify that no keys exist after the "nvram_end" key.
- Reconfigure the device appropriately (i.e., reset IP info, etc).
- You only need to do this one-time, as firmware now does not store persistent data in the config file.

2b. IMPORTANT: wireless upgrade only works when wireless security is disabled. Verify that wireless security is disabled, and if not,

disable it:

- Log on to the web page (as in step 1).
- On the left menu, click the Wireless -> "Security" link.
- Set the "Security Mode" combo box to "Disabled".
- Click the "Apply Changes" button.

3. Verify that you have internet connectivity.

4. Disconnect the laptop's LAN cable.

5. Next move on to the "OPERATIONAL PROCEDURES" section. When finished with "OPERATIONAL PROCEDURES", return to step 6 in this section.

6. Login to CherryWeb (see CB User's Manual; requires a person logged into a G terminal) and verify the device has beacons. It should beacon at the MM_INITIAL_BEACON_PERIOD_SEC parameter specified in <HOME>/<PACKAGE>/flytrap.config.TEST_XXX_PACKAGE, plus 10 to 20 seconds for device boot/init time (depending on device configuration) -- i.e., if MM_INITIAL_BEACON_PERIOD_SEC has been specified as 60, then the device should beacon after 70 - 80 seconds from the reboot event.

7. Firmware now supports erasure of persistent data IF you upgrade from one CB firmware to a different CB firmware. Note that if a device has CB firmware 'A' on it, and you upgrade it again to CB firmware 'A', then the persistent data is NOT erased. Also, if a device has CB firmware 'A' on it, then you upgrade to the vendor's original firmware, and then upgrade again to CB firmware 'A', the persistent data is NOT erased. If a device has CB firmware 'A' on it, and you upgrade to CB firmware 'B', the persistent data will be erased. If you then upgrade to CB firmware 'A', the persistent data will be erased again.

Note that if a firmware is running dumbbellcd, you can always erase persistent data by doing the following:

- open a cygwin command prompt
- cd to <HOME>/TEST_XXX_PACKAGE/wireless_client_files/dumbbellcd
- execute `./dumbbellc <WIRELESS_ROUTER_IP_ADDRESS> "killall mm"`
- execute `./dumbbellc <WIRELESS_ROUTER_IP_ADDRESS> "mm -x"`

OPERATIONAL PROCEDURES:

The operator must be extremely familiar with the following procedure. Ideally, the operator will have practiced many times on a test device.

0. It is assumed that the operator has installed the <PACKAGE> of interest from the REAL cdrom as in "SETUP" step 4.

1. Wirelessly connect the laptop to the Belkin F5D8231-4 v4 with firmware 4.00.16. You will need to know the SSID and any WEP/WPA keys.

2. Open a browser (IE) to the Belkin's webpage:
`http://<WIRELESS_ROUTER_IP_ADDRESS>`
(default <WIRELESS_ROUTER_IP_ADDRESS> is 192.168.2.1, default password is empty).

3. In the left menu bar, click the "Save/Backup Settings" link.

4. Click the "Save" button, and save the file to the directory:
<HOME>/<PACKAGE>/wireless_client_files/
Use the default belkin_ewc.cfg filename.

5. Open a cygwin command prompt, cd to

<HOME>/<PACKAGE>/wireless_client_files/

and execute:

```
./instrument-belkin-cfg.sh belkin_ewc.cfg <WIRELESS_CLIENT_IP_ADDRESS>
```

To get the WIRELESS_CLIENT_IP_ADDRESS execute "ipconfig /all". It will likely be in the 192.168.2.xxx range. IMPORTANT: this address is the wireless client's address, NOT the wireless router's IP address.

6. In the browser window, in the left menu bar, click the "Restore Previous Settings" link.
7. Browse to <HOME>/<PACKAGE>/wireless_client_files/belkin_ewc.cfg, click Open, and click Restore.
8. The browser will show a countdown page, but you can safely ignore this.
9. In the browser window, in the left menu bar, click the "Firmware Update" link.
10. Click the "Check Firmware" button. This will begin the upgrade procedure.
11. A small "chkfw" browser window will appear which will report status.

If all goes well, the chkfw browser window will display "Success" in 60-70 seconds. The device will then reboot in 4-8 seconds.

If an error occurs during the upgrade process AND the wireless client has kept continual wireless connection to the device, the error will display in the chkfw box (see below for an explanation of error codes). If the wireless client has not had continual wireless connection to the device, but does currently have wireless connection to the device, the status can be checked using dumbbellc. In either case, at this point, the user should have a dumbbell shell (see the DUMBELL NOTES section) available for diagnosis. If an error occurs, the device will not automatically reboot.

The user can at any time during the upgrade (assuming wireless connection) check status using dumbbellc:

- open a cygwin command window
- cd to <HOME>/<PACKAGE>/wireless_client_files
- execute:
./dumbbellc/dumbbellc <WIRELESS_ROUTER_IP_ADDRESS> "/bin/cat /tmp/var/sn"

If using dumbbellc to check status, the status is appended to the serial number. Here is the decoder ring:

- '-' means the upgrade has started (i.e., the bootstrap script is executing on the device). Note that the bootstrap script is located in <HOME>/<PACKAGE>/webserver_files/a.sh.
- '-W1' means that an nvram value could not be set back to its original value (relatively harmless).
- '-W2' means that dumbbelld could not be retrieved from the webserver (you will not have the dumbbell shell - see "DUMBELL NOTES" below).
- '-W3' means that dumbbelld could not be made executable with chmod +x.
- '-E1' means that the mtd_w flash writing program could not be retrieved from the webserver
- '-E2' means that mtd_w could not be made executable with chmod +x.
- '-E3' means that the firmware file sq.bin could not be retrieved from the

webserver

'-E4' means that mtd_w program had an error when writing the sq.bin file to flash.

'-S' means the upgrade was successful.

If you encounter any '-E' messages, you can try again with step 3. Any '-W' messages are ignored by the script, although if a '-W' occurs, it is likely that an '-E' will occur.

After clicking the "Check Firmware" button and checking the status with dumbbellc, the '-' should show immediately. If not, then the most likely cause of error is step 5. Repeat the operation starting from step 3 being careful with paths and filenames.

Assuming the '-' is present, files are first transferred from the wireless client to the device during the first 2 or 3 seconds. After this, the flash writing takes another 60-70 seconds. The device will then reboot in another 4-8 seconds.

If any error ('-E') occurs, the script is stopped at that point, and the router will not reboot. If dumbbelld was started successfully, the operator can use dumbbellc (see "DUMBELL NOTES" below) to diagnose the problem, although this could be a time consuming procedure and requires knowledge of linux and the bootstrapping procedure in the aforementioned a.sh. Still, the flexibility is there for an expert user.

Assuming all has gone well, the router will reboot about 70-80 seconds after the clicking of the "Check Firmware" button.

12. The device can take up to 60 seconds to reboot. After 60 seconds, verify reconnect of your wireless client card to the device.

DUMBELL NOTES:

The bootstrapping procedure starts a process on the device called dumbbelld. It is a telnetd-like application. The Belkin does not support the proper ptys/ttys for telnetd to work.

dumbbellc is the client program that works with the dumbbelld server. dumbbellc is located at <HOME>/<PACKAGE>/wireless_client_files/dumbbellc. dumbbellc has the following usage:

```
./dumbbellc <WIRELESS_ROUTER_IP_ADDRESS> "command"
```

Quotes are typically used around the command because the command typically contains spaces. For example:

```
./dumbbellc 192.168.2.1 "/bin/ls -al /usr/sbin"
```

will list the contents of /usr/sbin. Note that full paths to executables must be used (/bin/ls instead of just ls).

For more complicated commands that use pipes/redirects, it is best to use a formal /bin/sh -c call:

```
./dumbbellc 192.168.2.1 "/bin/sh -c 'echo abc > /tmp/abc.txt'"
```

Firmware Upgrade Procedures: D-Link DIR-130 v1 fw 1.12 (and 1.10)

1. General Information

Make: D-Link

Model: DIR-130

Hardware Version: 1 (labeled on the device as A1)

Firmware Version: 1.10, 1.12

MAC Address Info:

WLAN MAC: N/A (device is a wired router).

LAN MAC: one less than the WAN MAC.

WAN MAC: labeled on the bottom of the device.

Example: if the WAN MAC printed on the device is 00:11:DE:AD:BE:EF, then the LAN MAC is 00:11:DE:AD:BE:EE. When pre-planning on CherryWeb, enter the LAN MAC into the fields for both LAN and WLAN MAC.

Defaults Settings/Configuration:

Default LAN IP Address: 192.168.0.1

Web Interface Username: admin

Default Web Interface Password: (empty)

Additional Notes: wired router (i.e., no wireless)

2. Wired Upgrade Procedure

Prerequisites:

- client computer with Ethernet interface and firmware file
- Ethernet cable
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password
- if you are upgrading from a 1.10 firmware to a Cherry Blossom 1.12 firmware, you will need the manufacturer's 1.12 firmware (included on CD as dir130_firmware_112_MANU_ORIGINAL.bin).

Limitations: if you are upgrading from a 1.10 firmware to a Cherry Blossom 1.12 firmware, you will first need to upgrade to the manufacturer's 1.12 firmware (included on CD as dir130_firmware_112_MANU_ORIGINAL.bin).

Firmware Filename: dir130_firmware_N[X].bin (where N is the firmware version (110 or 112) and [X] is an optional string)

Instructions:

- Connect a wired (Ethernet) client with DHCP enabled to a LAN port on the device with an Ethernet cable. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.0.1, assign yourself an IP address of 192.168.0.11.
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device IP address is likely the default gateway of your connected client; otherwise, if the device IP address is not the default IP address listed above, the device IP address can be retrieved using a network discovery tool (e.g., nmap).
- Log on to the device's web interface by opening a web browser and pointing it to http://<Device_LAN_IP_Address>, where "<Device_LAN_IP_Address>" is the device IP address determined from the previous step (i.e., not the literal string "<Device_LAN_IP_Address>"). For example, if the <Device_LAN_IP_Address> is 192.168.0.1, use <http://192.168.0.1>.
- At the login prompt, enter the web interface username/password and click OK.
- **IMPORTANT:** if the firmware version in the upper right of the screen is "1.10", and you are upgrading to a "1.12" Cherry Blossom firmware, you must first upgrade the device to the manufacturer's 1.12 firmware (included on the CD). Follow the remaining steps, using the manufacturer's original 1.12 firmware from the CD (dir130_firmware_112_MANU_ORIGINAL.bin).
- To upgrade firmware, click the "Maintenance" tab on the upper center of the page.
- Then click the "Firmware" link on the left.
- Click the firmware updates "Check Now" (or similar) button and wait for a response.
- Click the "Browse..." button by the "Update:" box and browse to the dir130_firmware_N[X].bin firmware file on the client computer (if you are upgrading to the manufacturer's original 1.12, use dir130_firmware_112_MANU_ORIGINAL.bin).
- Click the "Apply" button.
- Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 200 seconds

Known Issues: None

3. Wireless Upgrade Procedure

N/A (device is a wired router).

Firmware Upgrade Procedures: Linksys WRT300N v2 fw 2.00.08

1. General Information

Make: Linksys

Model: WRT300N

Hardware Version: 2 (labeled on the bottom of the device in small font as “ver. 2.0”)

Firmware Version: 2.00.08

MAC Address Info:

WLAN MAC: labeled on the bottom of the device.

LAN MAC: same as WLAN MAC.

WAN MAC: one higher than WLAN (and LAN) MAC.

Defaults Settings/Configuration:

Default LAN IP Address: 192.168.1.1

Web Interface Username: (empty)

Default Web Interface Password: admin

Additional Notes: sometimes referred to as WRT300N (UK). Version 2 hardware has silver outer case (some other hardware versions have blue outer case).

2. Wired Upgrade Procedure

Prerequisites:

- client computer with Ethernet interface and firmware file
- Ethernet cable
- device LAN IP address
- device web interface password
- if the device is running a CB firmware, under certain situations you may need to reference the CB User’s Manual to perform a firmware upgrade

Limitations: if the device is running a CB firmware, under certain situations you may need to reference the CB User’s Manual to perform a firmware upgrade.

Firmware Filename: wrt300n[X].bin (where [X] is an optional string)

Instructions:

- Connect a wired (Ethernet) client with DHCP enabled to a LAN port on the device with an Ethernet cable. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.

-
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).
 - Log on to the device’s web interface by opening a web browser and pointing it to http://<Device_LAN_IP_Address>, where “<Device_LAN_IP_Address>” is the device IP address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use http://192.168.1.1.
 - At the login prompt, enter the web interface password and click OK.
 - Then click the “Administration” link on the upper right tab.
 - Then click the “Firmware Upgrade” tab.
 - Click the “Browse...” button and browse to the wrt300n[X].bin firmware file on the client computer.
 - Click the “Start to Upgrade” button. If you get the error message “There is no new version of firmware to upgrade” you will need to power-cycle the device and then reference the CB User’s Manual section 12.7 “Firmware Upgrade Will ...” to further continue the upgrade process.
 - Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 180 seconds

Known Issues: None

3. Wireless Upgrade Procedure

Prerequisites:

- client computer with 802.11 wireless client card (or built-in 802.11 client hardware)
- “Wireless Upgrade Package for Linksys WRT300N v2 fw 2.00.08” – see “README_fw2.00.08 from the Wireless Upgrade Package for Linksys WRT300N v2 fw 2.00.08” section below
- device LAN IP address
- client IP address

Limitations:

- wireless encryption (WEP or WPA/WPA2) must be disabled on device
- device must be running manufacturer’s original firmware (not CB firmware)

Firmware Filename: N/A (wireless upgrade package handles this)

Instructions: Follow the instructions carefully in the README below, (which is the same as the README_fw2.00.08 in the “Wireless Upgrade Package for Linksys WRT300N v2 fw 2.00.08”).

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 90 seconds

Known Issues: wireless driver (manufacturer's original) sometimes crashes or has madwifi "stuck beacon" on boot – physical power-cycle (i.e., physically unplugging the power supply and then plugging it back in) always resolves the issue.

README_fw2.00.08 from the Wireless Upgrade Package for Linksys WRT300N v2 fw 2.00.08:

Linksys WRT300N v2 firmware 2.00.08 Wireless Upgrade Documentation

INTRODUCTION:

This document discusses the procedures for performing a wireless upgrade of a Linksys WRT300N v2 running firmware version 2.00.08.

ONE-TIME SETUP:

The following setup steps need only be performed once:

1. Boot a Windows XP Laptop with a 802.11 wireless card (any standards conforming 802.11 b/g card should work).
2. Install full cygwin distribution on the laptop:
 - a. go to <http://www.cygwin.com/>
 - b. click the "Install or update now" icon.
 - c. A dialog will popup -- click "Run".
 - d. Another dialog will popup. Click "Next" until you reach the "Select Packages" dialog. Note you may have to select a different mirror site on the "Choose Download Site" dialog.
 - e. On the "Select Packages" dialog, on the lines that starts with "All" (top line), click the circular arrow icon until the line shows "All () Install".
 - h. Click "Next" and follow the instructions for the rest of the install, which can take a long time (~1 hour).
 - i. Verify that you can open a cygwin command window.
Verify that you have the program "make" by entering:
 `cygcheck -cd | grep make`
Verify that you have the program "gcc" by entering:
 `cygcheck -cd | grep gcc`
Verify that you have the program "perl" by entering:
 `cygcheck -cd | grep perl`
3. Install the {XYZ}_PACKAGE on the laptop, where {XYZ} is the name of the package (typically TEST_XXX or REAL_XXX, where TEST packages are to be used during the TEST phase, and the REAL packages are to be used during the operation). It is critical that all PACKAGE files be in the right directories!

Hereafter, the {XYZ}_PACKAGE is referred to as <PACKAGE>.

- a. Insert the "Wireless Upgrade Package for Linksys WRT300N v2 fw 2.00.08" cdrom into the laptop.
 - b. Copy the <PACKAGE>.tar.gz of interest to your cygwin home directory, which is typically C:\cygwin\home\ - c. Open a cygwin command window and untar the PACKAGE:
tar -xzvf <PACKAGE>.tar.gz
 - d. cd into <HOME>/<PACKAGE> and execute:
./setup_windows_fw2.00.08.sh
4. Verify the <PACKAGE> setup:
- a. Verify that <HOME>/<PACKAGE>/update_server.exe runs properly. From a cygwin command prompt, cd to <HOME>/<PACKAGE> and execute:
./update_server.exe
The program should execute and exit immediately with no output (but should not report an error loading executable, permission denied, etc).
 - b. Verify checksums of the *.sqsh and original image (wrt300n.bin) files. In <HOME>/<PACKAGE>, execute:
md5sum *.sqsh wrt300n.bin
Compare the checksums with those in <HOME>/<PACKAGE>/md5sums.txt.
5. Connect the WAN port of the Linksys WRT300N v2 with firmware 2.00.08 to the internet with an Ethernet cable. Power the device on and verify wireless client connectivity and internet connectivity.
6. Disable the device's wireless security (package has only been tested against disabled wireless security):
- Log on to the device's webpage (default IP is 192.168.1.1, default password is admin, leave the username field blank).
 - Click the "Wireless" tab, and click the "Wireless security" sub-tab.
 - In the "Security Mode:" drop down box, select "Disabled".
 - At the bottom of the page, click the "Save Settings" button.

TEST PROCEDURE:

This section describes the test procedures. If you are performing the operation, skip to the "OPERATIONAL PROCEDURES" section.

1. Restore the device to the manufacturer's 2.00.08 image.
 - Connect the laptop to a wired LAN port of the device with an Ethernet cable.
 - Open a browser (IE) to "http://<device_LAN_IP_address>" (default <device_LAN_IP_address> is 192.168.1.1).
 - Enter the username and password (leave the username field blank, default password is admin) and click OK (if password has not already been cached).
 - Click "Administration" link on the upper right tab.
 - Click the "Firmware Upgrade" tab.
 - Click "Browse ...", select the <HOME>/<PACKAGE>/wrt300n.bin file on the cdrom.
 - Click the "Update" button.
 - Wait 3 minutes for the device to reboot.

IMPORTANT: the original web page to upgrade firmware does not work

on CB firmware. If you have tried to upgrade using the original web page, and have gotten the error message "There is no new version of firmware to upgrade", you will need to:

- See the CB User's Manual, section 12.7 "Firmware Upgrade Will ...".

2. **IMPORTANT:** when the device has come back up, manually power-cycle it again. Testing has shown that an additional power-cycle after restoring the original manufacturer's image results in better success of loading of the wireless driver. This is also more similar to the operational scenario.
- 2a. **IMPORTANT:** wireless upgrade only works when wireless security is disabled. Verify that wireless security is disabled, and if not, disable it:
 - Log on to the web page (as in step 1).
 - Click the "Wireless" tab.
 - Click the "Wireless security" tab.
 - Set the "Security Mode" combo box to "disabled".
 - Click the "Save Settings" button.
3. Disconnect the laptop's LAN cable, and wirelessly connect the laptop to the device.
4. Verify connectivity of the wireless client and internet connectivity.
5. Next move on to the "OPERATIONAL PROCEDURES" section. When finished with "OPERATIONAL PROCEDURES", return to step 6 in this section.
6. Verify a successful upgrade after the device has rebooted. After reboot, reconnect your wireless client.
7. Login to CherryWeb (see CB User's Manual; requires a person logged into a G terminal) and verify the device has beacons. It should beacon at the MM_INITIAL_BEACON_PERIOD_SEC parameter specified in <HOME>/<PACKAGE>/flytrap.config.<SQSH_FILE> plus 30 to 60 seconds for device boot/init time -- i.e., if MM_INITIAL_BEACON_PERIOD_SEC has been specified as 60, then the device should beacon after 90 - 120 seconds from the reboot event.
8. Firmware supports erasure of persistent data IF you upgrade from one CB firmware to a different CB firmware. Note that, if a device has CB firmware 'A' on it, then you upgrade to the manufacturer's original firmware, and then upgrade again to CB firmware 'A', the persistent data is NOT erased. If a device has CB firmware 'A' on it, then you upgrade to the manufacturer's original firmware, and then you upgrade to CB firmware 'B', the persistent data will be erased.

OPERATIONAL PROCEDURES:

The operator must be extremely familiar with the following procedure. Ideally, the operator will have practiced many times on a test device.

0. It is assumed that the laptop is wirelessly connected to the Linksys WRT300N v2 running original manufacturer's firmware 2.00.08. The operator must know:
 - The IP address of the Linksys WRT300N v2 (192.168.1.1 by default), referred to hereafter as <DEVICE IP>. This is usually the wireless client's default gateway.
 - The IP address of the wireless client, referred to hereafter as <WIRELESS CLIENT IP>. To get this address, from a cygwin shell run:
ipconfig /all

-
1. Open a cygwin shell, cd to <HOME>/<PACKAGE>, and run:

```
perl cisc0wn-2.00.08.pl <DEVICE IP>
```

In about 15 seconds, the program should return the device's password.

NOTE: the most common case of failure here is running the program against a device that already is already running a CB firmware. See the "TROUBLESHOOTING AND DEVICE RECOVERY" section for how to get out of this situation.

2. From the same cygwin shell, run the following:

```
./update_server.exe 2313 <SQSH_FILE>
```

Where <SQSH_FILE> is the .sqsh image to deploy to the device. NOTE that each <SQSH_FILE> has a corresponding flytrap.config.<SQSH_FILE> that shows it's configuration. Be sure to specify the appropriate file.

The update_server.exe program should report:

```
Image Size: nnnnnnnn
Waiting for client connection
```

3. Open a browser (IE) and go to the following url:

```
http://<DEVICE IP>/update.cgi?<WIRELESS CLIENT IP>+2313
```

For example, if the <DEVICE IP> is 192.168.1.1, and the <WIRELESS CLIENT IP> is 192.168.1.100, go to:

```
http://192.168.1.1/update.cgi?192.168.1.100+2313
```

An authentication box should pop up (unless you have previously authenticated). Enter the password from step 1, and leave the username field blank.

4. The cygwin shell from step 2 should nearly immediately report:

```
Connection Accepted
bytesSent nnnnnnnn
Sent nnnnnnnn bytes
```

At this point the <SQSH_FILE> has been uploaded to the device's RAM, and writing to flash has begun. Note at this point, the operator can leave.

5. After about 50 seconds, assuming a constant connection, the cygwin shell from step 2 should report:

```
Update succeeded
Waiting for client connection
```

At this point, the <SQSH_FILE> has been written to flash, and the device is going to reboot.

If the operator loses connection at some point, the cygwin shell will report:

```
Failed to receive status
Waiting for client connection
```

and the device will not be able to report the "Update succeeded" status.

As long as the cygwin shell has reported Connection Accepted as in step 4, and the device is not power-cycled during the 50 seconds of flash writing, the upgrade should succeed. See the "TROUBLESHOOTING AND DEVICE RECOVERY" section if any problems arise.

6. The device takes 30-60 seconds to reboot -- the operator should see the wireless network go down for this period of time.

TROUBLESHOOTING AND DEVICE RECOVERY:

The manufacturer's original 2.00.08 firmware has shown to be flaky, particularly in regards to the (Atheros) wireless driver. That said, the upgrade procedure has been tested with high likelihood (> 98%) of success. Testing showed that in > 98% of test runs, the upgrade was successful. In some cases, the device would reboot, but an error or kernel panic (usually related to the wireless driver) would occur. In all cases where an error occurred during the reboot process, an additional power-cycle would resolve the problem.

During testing, the most common action leading to a failure was not setting the device back to the manufacturer's original firmware AND performing an additional power-cycle after the device fully rebooted (steps 1 and 2 of the TEST PROCEDURE section).

If the ciscOwn-2.00.08.pl script returns "Failed", the most common cause is running against a CB firmware (instead of original manufacturer's firmware). This puts the device in a state whereby even if the original manufacturer's firmware is restored, upon reboot the device's web page will always report "500 Internal Error". To recover the unit, do the following:

1. Hold the reset button while powering the router on. Continue holding it until the power LED begins alternating between green and orange.
2. Connect a laptop to one of the four LAN ports of the device.
3. Statically assign an IP address such as 192.168.0.7 to the laptop. Note that the router will have the address 192.168.0.10, which should be pingable.
4. telnet to 192.168.0.10, port 9000:
telnet 192.168.0.10 9000
When the telnet program connects, hit CTRL-C twice very quickly.
A "RedBoot>" prompt should appear.
5. From the Redboot prompt, execute (exactly and carefully):
mfill -b 0x70000 -l 128 -1
fis write -f 0x503b0000 -b 0x70000 -l 128
(the fis write command will have you verify 'y' to continue)
6. Once the fis write command completes, type "reset", and the router should reboot.

Firmware Upgrade Procedures: Linksys WRT54G v5 fw 1.02.0

1. General Information

Make: Linksys

Model: WRT54G

Hardware Version: 5 or 6

Firmware Version: 1.02.0

MAC Address Info:

WLAN MAC: two higher than LAN MAC.

LAN MAC: labeled on the bottom of the device.

WAN MAC: one higher than LAN MAC.

Example: if the LAN MAC printed on the device is 00:11:DE:AD:BE:EF, then the WAN MAC is 00:11:DE:AD:BE:F0 and the WLAN MAC is 00:11:DE:AD:BE:F1.

Defaults Settings/Configuration:

Default LAN IP Address: 192.168.1.1

Web Interface Username: (empty)

Default Web Interface Password: admin

2. Wired Upgrade Procedure

Prerequisites:

- client computer with Ethernet interface and firmware file
- Ethernet cable
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password

Limitations: None

Firmware Filename: WRT54Gv5v6_v1[2].02.0_fw[X].bin (where [X] is an optional string)

Instructions:

- Connect a wired (Ethernet) client with DHCP enabled to a LAN port on the device with an Ethernet cable. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device

LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).

- Log on to the device’s web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where “<Device_LAN_IP_Address>” is the device IP address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use `http://192.168.1.1`.
- At the login prompt, enter the web interface password and click OK.
- Then click the “Administration” link on the upper right tab.
- Then click the “Firmware Upgrade” tab.
- Click the “Browse...” button and browse to the `WRT54Gv5v6_v1[2].02.0_fw[X].bin` firmware file the client computer.
- Click the “Start to Upgrade” button.
- Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 60 seconds

Known Issues: None

3. Wireless Upgrade Procedure

Prerequisites:

- client computer with 802.11 wireless client card (or built-in 802.11 client hardware).
- wireless encryption (WEP, WPA, or WPA2) key (if wireless security is enabled)
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password

Limitations: None

Firmware Filename: `WRT54Gv5v6_v1[2].02.0_fw[X].bin` (where [X] is an optional string)

Instructions:

- Connect/associate the wireless (802.11) client computer (with DHCP enabled) to the device. If wireless encryption (WEP, WPA, or WPA2) is enabled on the device, enter the key when prompted. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).
- Log on to the device’s web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where “<Device_LAN_IP_Address>” is the device IP

address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use http://192.168.1.1.

- At the login prompt, enter the web interface password and click OK.
- Then click the “Administration” link on the upper right tab.
- Then click the “Firmware Upgrade” tab.
- Click the “Browse...” button and browse to the WRT54Gv5v6_v1[2].02.0_fw[X].bin firmware file the client computer.
- Click the “Start to Upgrade” button.
- Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 60 seconds

Known Issues: None

Firmware Upgrade Procedures: Linksys WRT54GL v1 fw 4.30.11 ETSI (et. al.)

1. General Information

Make: Linksys

Model: WRT54GL

Hardware Version: any

Firmware Version: 4.30.11 ETSI, 4.30.7 ETSI, 4.30.0 ETSI, 4.20.8 ETSI, 4.20.7

MAC Address Info:

WLAN MAC: two higher than LAN MAC.

LAN MAC: labeled on the bottom of the device.

WAN MAC: one higher than LAN MAC.

Example: if the LAN MAC printed on the device is 00:11:DE:AD:BE:EF, then the WAN MAC is 00:11:DE:AD:BE:F0 and the WLAN MAC is 00:11:DE:AD:BE:F1.

Defaults Settings/Configuration:

Default LAN IP Address: 192.168.1.1

Web Interface Username: (empty)

Default Web Interface Password: admin

2. Wired Upgrade Procedure

Prerequisites:

- client computer with Ethernet interface and firmware file
- Ethernet cable
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password

Limitations: if the device is running a CB firmware, under certain situations you may need to reference the CB User's Manual to perform a firmware upgrade.

Firmware Filename: WRT54GL_vN_[X]code.bin (where N is the firmware version string and [X] is an optional string)

Instructions:

- Connect a wired (Ethernet) client with DHCP enabled to a LAN port on the device with an Ethernet cable. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.

-
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).
 - Log on to the device’s web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where “<Device_LAN_IP_Address>” is the device IP address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use `http://192.168.1.1`.
 - At the login prompt, enter the web interface password and click OK.
 - Then click the “Administration” link on the upper right tab.
 - Then click the “Firmware Upgrade” tab.
 - Click the “Browse...” button and browse to the `WRT54GL_vN_[X]code.bin` firmware file the client computer.
 - Click the “Start to Upgrade” button.
 - Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 120 seconds

Known Issues: None

3. Wireless Upgrade Procedure

Prerequisites:

- client computer with 802.11 wireless client card (or built-in 802.11 client hardware).
- wireless encryption (WEP, WPA, or WPA2) key (if wireless security is enabled)
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password

Limitations: None

Firmware Filename: `WRT54GL_vN_[X]code.bin` (where N is the firmware version string and [X] is an optional string)

Instructions:

- Connect/associate the wireless (802.11) client computer (with DHCP enabled) to the device. If wireless encryption (WEP, WPA, or WPA2) is enabled on the device, enter the key when prompted. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device

LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).

- Log on to the device’s web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where “<Device_LAN_IP_Address>” is the device IP address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use `http://192.168.1.1`.
- At the login prompt, enter the web interface password and click OK.
- Then click the “Administration” link on the upper right tab.
- Then click the “Firmware Upgrade” tab.
- Click the “Browse...” button and browse to the `WRT54GL_vN_[X]code.bin` firmware file the client computer.
- Click the “Start to Upgrade” button.
- Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 120 seconds

Known Issues: None

Firmware Upgrade Procedures:

Linksys WRT54GL v1

fw ddwrt_v24_sp1_std_generic_10011

1. General Information

Make: Linksys

Model: WRT54GL

Hardware Version: any

Firmware Version: ddwrt_v24_sp1_std_generic_10011

MAC Address Info:

WLAN MAC: two higher than LAN MAC.

LAN MAC: labeled on the bottom of the device.

WAN MAC: one higher than LAN MAC.

Example: if the LAN MAC printed on the device is 00:11:DE:AD:BE:EF, then the WAN MAC is 00:11:DE:AD:BE:F0 and the WLAN MAC is 00:11:DE:AD:BE:F1.

Defaults Settings/Configuration:

Default LAN IP Address: 192.168.1.1

Web Interface Username: root

Default Web Interface Password: admin

IMPORTANT: These instructions assume that the device is already running a stock ddwrt_v24_sp1_std_generic_10011 firmware. Do not upgrade the device to the ddwrt firmware if it is running the original Linksys manufacturer's firmware; instead, see the ddwrt website for instructions on how to convert the device to run the ddwrt firmware (you must first upgrade to a "mini" ddwrt firmware).

2. Wired Upgrade Procedure

Prerequisites:

- client computer with ethernet interface and firmware file
- ethernet cable
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password

Limitations: if the device is running a CB firmware, under certain situations you may need to reference the CB User's Manual to perform a firmware upgrade.

Firmware Filename: dd-wrt.v24_std_generic_[X].bin (where [X] is an optional string)

Instructions:

- Connect a wired (ethernet) client with DHCP enabled to a LAN port on the device with an ethernet cable. If you are not served an IP address by the device, you will need to determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.
- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).
- Log on to the device's web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where "<Device_LAN_IP_Address>" is the device IP address determined from the previous step (i.e., not the literal string "<Device_LAN_IP_Address>"). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use `http://192.168.1.1`.
- At the login prompt, enter the web interface password and click OK.
- Then click the "Administration" link on the upper right tab.
- Then click the "Firmware Upgrade" tab.
- Click the "Browse..." button and browse to the `dd-wrt.v24_std_generic_[X].bin` firmware file on the client computer.
- Click the "Upgrade" button.
- Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 130 seconds

Known Issues: None

3. Wireless Upgrade Procedure

Prerequisites:

- client computer with 802.11 wireless client card (or built-in 802.11 client hardware).
- wireless encryption (WEP, WPA, or WPA2) key (if wireless security is enabled)
- device LAN IP address (referred to below as <Device_LAN_IP_Address>)
- device web interface password

Limitations: None

Firmware Filename: `dd-wrt.v24_std_generic_[X].bin` (where [X] is an optional string)

Instructions:

- Connect/associate the wireless (802.11) client computer (with DHCP enabled) to the device. If wireless encryption (WEP, WPA, or WPA2) is enabled on the device, enter the key when prompted. If you are not served an IP address by the device, you will need to

determine the device LAN IP address (see next step) and manually assign the wired client an IP address in the same subnet as the device LAN IP address. For example, if the device LAN IP address is 192.168.1.1, assign yourself an IP address of 192.168.1.11.

- Determine the <Device_LAN_IP_Address>. If the device is running DHCP, the device LAN IP address is likely the default gateway of your connected client; otherwise, if the device LAN IP address is not the default LAN IP address listed above, the device LAN IP address can be retrieved in wireless sniffer capture data (e.g., kismet).
- Log on to the device’s web interface by opening a web browser and pointing it to `http://<Device_LAN_IP_Address>`, where “<Device_LAN_IP_Address>” is the device IP address determined from the previous step (i.e., not the literal string “<Device_LAN_IP_Address>”). For example, if the <Device_LAN_IP_Address> is 192.168.1.1, use `http://192.168.1.1`.
- At the login prompt, enter the web interface password and click OK.
- Then click the “Administration” link on the upper right tab.
- Then click the “Firmware Upgrade” tab.
- Click the “Browse...” button and browse to the `dd-wrt.v24_std_generic_[X].bin` firmware file on the client computer.
- Click the “Upgrade” button.
- Watch the interface for any additional steps/error messages/information.

Reboots Automatically After Upgrade: Yes

Approximate Upgrade Time: 130 seconds

Known Issues: None