Wireless Accessory Configuration

Product Compliance Test Plan

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Apple

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1 Overview

1.1 Introduction and Scope

The purpose of this test plan is to specify the testing that vendors MUST perform to verify that their products conform to the Wireless Accessory Configuration specification provided by Apple Inc. Section 3.1 describes tests that MUST be run and successfully completed for all Wireless Accessory Configuration enabled products.
Terms and Definitions

Term	Definition
IE	Information Element
AP	Access Point
AU	AirPort Utility
STA	Non-AP 802.11 station
BSSID	Basic Service Set Identifier
SSID	Service Set Identifier
MAC	Media Access Control
BSS	Basic Service Set
ESS	Extended Service Set
DS	Distribution System
DUT	Device Under Test
URL	Uniform Resource Locator
PHY	Physical Layer (802.11a, b, g, n)
OOB	Out of the Box

1.2 Applicability of Tests

Wireless Accessory Configuration enabled DUTs will be tested on any and all wireless network interfaces that allow for Wireless Accessory Configuration.

1.3 Minimum Requirements

The following are minimum requirements to complete the test suites that are included in this test plan.

- MacBook Pro running MacOS 10.9 or greater
- Apple AirPort Extreme 802.11n (5th Generation) Base Station running 7.6.1 or greater
  OR
- Apple AirPort Express 802.11n (3rd Generation) running 7.6.2 or greater
- Apple AirPort Utility 6.3.1 or greater

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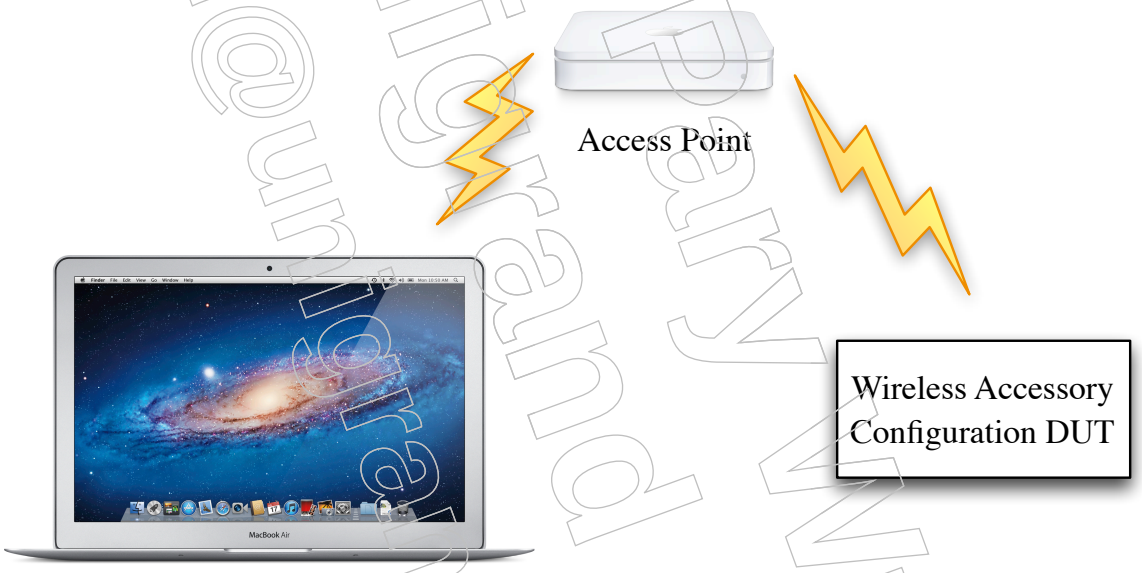
2 Test Tools and Methodology

2.1 Test Environment

The following test beds are designed and specified for each test case in this test plan. The minimum requirement for every test bed is an OSX computer running the latest version of AirPort Utility (Test System) and a simultaneous dual band Apple Base Station, running the latest firmware (Access Point).

2.1.1 Test bed



Test System w/ AirPort Utility

3 Wireless Accessory Configuration Testing

The following test cases must be completed successfully to ensure compliance with the Wireless Accessory Configuration specification and interoperability with Apple Base Station product lines. While it is possible to implement Wireless Accessory Configuration without an Apple Base Station, all tests will be done with an Apple Base Station (AirPort Extreme or Time Capsule) product because certain features of the Base Station are required to complete all of the testing.

3.1 Networking Test Cases

Network connectivity is a requirement for Wireless Accessory Configuration. Each DUT must, at minimum, support 802.11g. All supported PHYs must be tested.

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3.1.1 Association Verification

Wireless Accessory Configuration enabled DUTs have two options of how to be configured based on whether there is an interface that allows for the SSID and security modes to be configured. Only run the test that applies to your DUT.

The following tests assume the device has had no configuration done to the DUT and is still in its factory default state.

3.1.1.1 Wireless Accessory Configuration Mode Automatic Shutoff

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1	Power on the DUT.		
2	Wait for DUT to complete booting.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under "Other Wi-Fi Devices" as a "New Wi-Fi Device" indicating it is an unconfigured accessory or else FAIL.
3	Do not interact with the DUT for at least 30 minutes.		The DUT should come out of WAC mode and stop beaconing the Apple Device IE indicating it is unconfigured. The product mode indicator must show that the device is not in WAC mode or else FAIL. The DUT must not show up in the AirPort Utility as an unconfigured accessory or else FAIL.
4	Power down the DUT.		
5	Power on the DUT.		
6	Wait for DUT to		The DUT should begin beaconing 802.11

	complete booting.		beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.

3.1.1.2 802.11b/g Association Verification

If the DUT supports 802.11b/g the following test must be run.

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select “Manual Setup”.	
2		On the bar across the top of the AirPort Utility, select “Wireless”	
3		Set Base Station to Network Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€.	

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		Under the section that says “Wireless Security:” change it to “None”	
4		Click “Wireless Options”. Check the box that says “5GHz Network Name” and the box should be come editable. Change the name to Soundwave5. Then under the “Radio Mode:” pull down menu select, 802.11a – 802.11b/g. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click “Update” and wait for the Base Station to reboot.	
5	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show

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			that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.
6		Select the DUT in the AirPort Utility.	
7		Set the DUT’s Wi-Fi Network to “Soundwave24€”. Give the DUT the Accessory Name “WAC DUT”. Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
8	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
9		Using the AirPort Utility verify the DUT has joined the network.	In the AirPort Utility, select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name “WAC DUT”. If the DUT is not present or if the MAC address is not present, FAIL.
10	Manually put the DUT into Wireless Accessory Configuration mode according to the device’s instructions.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL.

			The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.

3.1.1.3 802.11n (5GHz) Association Verification

If the DUT supports 802.11n (5GHz) the following test must be run.

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select “Manual Setup”.	
2		On the bar across the top of the AirPort Utility, select “Wireless”	
3		Set Base Station to Network Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€. Under the section that says “Wireless Security:” change it to “None”	
4		Click “Wireless Options”.	

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		Check the box that says “5GHz Network Name” and the box should be come editable. Change the name to Soundwave5. Then under the “Radio Mode:” pull down menu select, 802.11a/n – 802.11b/g/n. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click “Update” and wait for the Base Station to reboot.	
5	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.
6		Select the DUT in the AirPort	

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		Utility.	
7		Set the DUT's Wi-Fi Network to "Soundwave5". Give the DUT the Accessory Name "WAC DUT". Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
8	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
9		Using the AirPort Utility verify the DUT has joined the network.	In the AirPort Utility, select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name "WAC DUT". If the DUT is not present or if the MAC address is not present, FAIL.

3.1.1.4 802.11n (2.4GHz) Association Verification

If the DUT supports 802.11 (2.4GHz) the following test must be run.

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select "Manual Setup".	
2		On the bar across the top of the AirPort Utility, select "Wireless"	
3		Set Base Station to Network Mode	

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		"Create a wireless network". Under the Section that says "Wireless Network Name:" change it to Soundwave24€. Under the section that says "Wireless Security:" change it to "None"	
4		Click "Wireless Options". Check the box that says "5GHz Network Name" and the box should be come editable. Change the name to Soundwave5. Then under the "Radio Mode:" pull down menu select, 802.11a/n – 802.11b/g/n. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click "Update" and wait for the Base Station to reboot.	

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5	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under "Other Wi-Fi Devices" as a "New Wi-Fi Device" indicating it is an unconfigured accessory or else FAIL.
6		Select the DUT in the AirPort Utility.	
7		Set the DUT's Wi-Fi Network to "Soundwave24€". Give the DUT the Accessory Name "WAC DUT". Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
8	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
9		Using the AirPort Utility verify the DUT has joined the network.	In the AirPort Utility, select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name "WAC DUT". If the DUT is not present or if the MAC address is not present, FAIL.

3.1.1.5 802.11 non-broadcast SSID Association Verification

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select “Manual Setup”.	
2		On the bar across the top of the AirPort Utility, select “Wireless”	
3		Set Base Station to Network Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€. Under the section that says “Wireless Security:” change it to “None”	
4		Click “Wireless Options”. Check the box that says “5GHz Network Name” and the box should be come editable. Change the name to Soundwave5. Check the box “Create hidden	

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		network”. Under the “Radio Mode:” pull down menu select, 802.11a – 802.11b/g. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click “Update” and wait for the Base Station to reboot.	
5		Join the hidden network “Soundwave24€” from the Test System.	
6	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.
7		Select the DUT in the AirPort Utility.	

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8		Set the DUT's Wi-Fi Network to "Soundwave24€". Give the DUT the Accessory Name "WAC DUT". Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
9	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
10		Using the AirPort Utility verify the DUT has joined the network.	In the AirPort Utility, select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name "WAC DUT". If the DUT is not present or if the MAC address is not present, FAIL.

3.1.2 Beaconing

3.1.2.1 2.4GHz vs 5GHz Beaconing

If the DUT supports 802.11 2.4GHz but not 5GHz the following test must be run.

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select "Manual Setup".	
2		On the bar across the top of the AirPort Utility, select "Wireless"	
3		Set Base Station to Network	

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		Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€. Under the section that says “Wireless Security:” change it to “None”	
4		Click “Wireless Options”. Check the box that says “5GHz Network Name” and the box should be come editable. Change the name to Soundwave5. Then under the “Radio Mode:” pull down menu select, 802.11a – 802.11b/g. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click “Update” and	

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		wait for the Base Station to reboot.	
5	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under "Other Wi-Fi Devices" as a "New Wi-Fi Device" indicating it is an unconfigured accessory or else FAIL.
6		Select the DUT in the AirPort Utility.	
7		Open the list to set the DUT's Wi-Fi Network.	Verify that "Soundwave24€" is displayed in the list. If not displayed, FAIL. Verify that "Soundwave5" is NOT displayed in the list. If displayed, FAIL.

3.1.3 Security Mode Verification

All Wireless Accessory Configuration enabled DUTs must support no security (None) and WPA2 Personal at minimum. Other security modes are supported by the Apple Base Station and other 3rd party AP products however only those two will be tested.

3.1.3.1 WPA2 Personal

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base	

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		Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select “Manual Setup”.	
2		On the bar across the top of the AirPort Utility, select “Wireless”	
3		Set Base Station to Network Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€.. Under the section that says “Wireless Security:” change it to “WPA/WPA2 Personal”	
4		Click “Wireless Options”. Check the box that says “5GHz Network Name” and the box should be come editable. Change the name to Soundwave5. Then under the “Radio Mode:” pull down menu select, 802.11a/n – 802.11b/g/n. Then click save on	

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		the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click “Update” and wait for the Base Station to reboot.	
5	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.
6		Select the DUT in the AirPort Utility.	
7		Set the DUT’s Wi-Fi Network to “Soundwave24€.”. Give the DUT the Accessory Name “WAC DUT”. Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
8	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
9		Using the AirPort	In the AirPort Utility, select the Base

		Utility verify the DUT has joined the network.	Station. Verify that the DUT is present as a wireless client with the Accessory Name “WAC DUT”. If the DUT is not present or if the MAC address is not present, FAIL.

3.1.4 IP Connectivity

IP connectivity is required for all Wireless Accessory Configuration enabled devices, with a minimum of IPv4 and IPv6 with a DHCP client to be implemented. Both stacks will need to be verified. It is additionally required that Link Local addressing and configuration is allowed on both IPv4 and IPv6 stacks.

3.1.4.1 IPv4 DHCP

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select “Manual Setup”.	
2		On the bar across the top of the AirPort Utility, select “Wireless”	
3		Set Base Station to Network Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€.. Under the section that says “Wireless Security:” change it to “None”	

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4		Click “Wireless Options”. Check the box that says “5GHz Network Name” and the box should be come editable. Change the name to Soundwave5. Then under the “Radio Mode:” pull down menu select, 802.11a/n – 802.11b/g/n. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click “Update” and wait for the Base Station to reboot.	
5	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.
6		Select the DUT in	

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		the AirPort Utility.	
7		Set the DUT's Wi-Fi Network to "Soundwave24€.". Give the DUT the Accessory Name "WAC DUT". Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
8	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
9		Using the AirPort Utility verify the DUT has joined the network.	In the AirPort Utility, select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name "WAC DUT". Take note of the DUT's IP Address. If the DUT is not present or if the MAC address is not present, FAIL.
10		On the Test Machine connected to the Base Station ping the IP address that was collected from Step 9.	If all the pings are successful, then PASS, else FAIL.
11	Reboot the DUT and wait for it to come back up.		Once connected to the network, open the AirPort , select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name "WAC DUT". Take note of the DUT's IP Address. If the DUT is not present or if the MAC address is not present, FAIL.
12		On the Test Machine connected to the Base Station ping	If all the pings are successful, then PASS, else FAIL.

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		the IP address that was collected from Step 11.	

3.1.4.2 IPv4 Link Local

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1		Power on the Base Station and connect to it via the Apple AirPort Utility. In the AirPort Utility select “Manual Setup”.	
2		On the bar across the top of the AirPort Utility, select “Network”. Under the section that says “Router Mode:” change it to “Off (Bridge Mode)” and ensure that there is no Wide Area Network attached to the device.	
3		On the bar across the top of the AirPort Utility, select “Wireless”	
4		Set Base Station to Network Mode “Create a wireless network”. Under the Section that says “Wireless Network Name:” change it to Soundwave24€.	

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		Under the section that says "Wireless Security:" change it to "None"	
5		Click "Wireless Options". Check the box that says "5GHz Network Name" and the box should be come editable. Change the name to Soundwave5. Then under the "Radio Mode:" pull down menu select, 802.11a/n – 802.11b/g/n. Then click save on the AirPort Utility. The AirPort Utility may prompt for various errors and all of them can be ignored. Be sure to click "Update" and wait for the Base Station to reboot.	
6	Power on the DUT. Wait for DUT to complete booting. Note the MAC address of the DUT.		The DUT should begin beaconing 802.11 beacons including the Apple Device IE indicating it is unconfigured and advertising as an 802.11 network with an SSID that is descriptive of the DUT. At minimum the indication of the manufacturer should be present, with no security enabled. The product mode indicator must show that the device is in WAC mode or else FAIL. The DUT must show up in the AirPort

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			Utility under “Other Wi-Fi Devices” as a “New Wi-Fi Device” indicating it is an unconfigured accessory or else FAIL.
7		Select the DUT in the AirPort Utility.	
8		Set the DUT’s Wi-Fi Network to “Soundwave24€.”. Give the DUT the Accessory Name “WAC DUT”. Click next in the AirPort Utility.	Verify that a setup complete message is displayed. If any error messages are displayed, FAIL.
9	Wait for DUT to complete booting and indicate that it has joined a network.		If DUT does not join the network, FAIL.
10		Using the AirPort Utility verify the DUT has joined the network.	In the AirPort Utility, select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name “WAC DUT”. Take note of the DUT’s MAC Address. If the DUT is not present or if the MAC address is not present, FAIL.
11		On the Test Machine connected to the Base Station ping the IP address that was collected from Step 9 using ping6.	If all the pings are successful, then PASS, else FAIL.
11	Reboot the DUT and wait for it to come back up.		Once connected to the network, open the AirPort , select the Base Station. Verify that the DUT is present as a wireless client with the Accessory Name “WAC DUT”. Take note of the DUT’s IP Address. If the DUT is not present or if the MAC address is not present, FAIL.

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12		From a Terminal window of the Test System connected to the Base Station enter: `arp –a –i $INTERFACE` where $INTERFACE is the identifier for your AirPort card	If all the MAC address associated with the DUT is present and the IP address displayed is of the format 169.254.XX.XX, then PASS, else FAIL.

3.1.5 Bonjour TXT Records

3.1.5.1 Bonjour ADD and RMV

Test Environment		[2]	
Step	DUT	Base Station	Expected Behavior
1	Power on the DUT.		
2	Wait for DUT to complete booting.		
3		On the Test System, issue the following command in a Terminal and leave it running. `dns-sd –B _mfi-config`	
4		From a second Terminal window of the Test System enter: `networksetup -setairportnetwork $INTERFACE $SSID` where $INTERFACE is the	A Bonjour record should appear with the following format: Timestamp A/R Flags if Domain Service Type Instance Name The A/R should have "Add" below it, if this is true, PASS. The Service Type should have "_mfi-config._tcp" below it, if this is true, PASS.

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		identifier for your AirPort card and $SSID is the DUT Network name	The Instance should have "$INSTANCENAME" below it, which must be the Friendly Name of the DUT. If this is true, PASS.
5		From the Terminal of the Test System enter: dns-sd –L $INSTANCENAME _mfi-config local where $INSTANCENAME is collected from step 4.	The Bonjour record needs to contain a minimum of the following TXT records (a value is specified that is the requirement for field): deviceid=<MAC address> features=<Feature flag bits> seed=<Configuration seed number> srcvers=1.14 If all of the fields are present then PASS, else FAIL.

4 Certification Procedure

4.1.1 Production Certification Event:

· Product submission must be accompanied by proof of Wi-Fi Certification for the product

· Full product documentation must be provided in both printed and soft copy form (all customer facing documents such as user manuals and quick start guides)

· The submission must be accompanied by a completed "Wireless Accessory Configuration Product Compliance Questionnaire R1"

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