

Using Dashboard for AP Visualization on Floor Plans and Heatmaps

HOW TO GUIDE



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1. Introduction

The purpose of this document is to explain how to configure and to use the Dashboard in WiNG 5 in order to visualize access points on a map and RF heatmaps.

This How-To-Guide has been written using a wireless controller RFS4000 and three access points AP6532, with factory default settings, running a firmware release 5.4.1.0-020R.

However, the features described in this How-To-Guide document are also supported with other wireless controllers and other access points available in the WiNG 5 portfolio.



Note – AP300 does not appear in the WiNG 5 Dashboard.

Configuration steps for management IP address, Wireless LAN, and internal DHCP service are not the objective of this How-To-Guide – Therefore, those configuration steps will not be described. However, the global configuration is available as a text file format at the end of this document.

2. SMART RF

2.1 Step 1-1 – Configuring a SMART-RF policy

1 Basic Configuration

Click Configuration, Wireless, SMART RF Policy, Add and give a name to your new SMART RF policy.

In Basic Configuration, select the Medium Sensitivity, enable SMART RF policy, select Interference Recovery and Neighbor Recovery.

Click OK.

The screenshot shows the WING v5.4 configuration interface. The top navigation bar includes 'Dashboard', 'Configuration', 'Diagnostics', 'Operations', and 'Statistics'. The left sidebar lists various configuration categories, with 'SMART RF Policy' selected. The main content area displays the configuration for 'My_Smart-RF_policy' under the 'Basic Configuration' tab. The 'Basic Settings' section includes radio buttons for Sensitivity (Low, Medium, High, Custom), checkboxes for SMART RF Policy Enable, Interference Recovery, Coverage Hole Recovery, Neighbor Recovery, and Root Recovery. The 'Calibration Assignment' section includes checkboxes for Enable Per Area and Enable Per Floor. The interface also features a search bar, a status bar with event summary indicators, and a footer with 'ZEBRA CONFIDENTIAL: INTERNAL USE ONLY' and 'ZEBRA TECHNOLOGIES'.

2 Channel and Power

Channels 1, 6 and 11 are configured for 2.4GHz band and channels 36, 40, 44, 48 are configured for 5GHz band.

Minimum Power is set to 2dBm and Maximum Power is set to 5dBm for both band of frequency.

Click OK then Commit and Save.

The screenshot displays the WING v5.4 configuration interface for the SMART RF Policy My_Smart-RF_policy. The interface is divided into several sections:

- Power Settings:** This section contains four spinners for power levels. The 5 GHz Minimum Power is set to 2 dBm, 5 GHz Maximum Power is set to 5 dBm, 2.4 GHz Minimum Power is set to 2 dBm, and 2.4 GHz Maximum Power is set to 5 dBm. Each spinner has a range of (1 to 20 dBm).
- Channel Settings:** This section contains two dropdown menus for channel selection. The 5 GHz Channels dropdown is set to 36, 40, and 44. The 2.4 GHz Channels dropdown is set to 1, 6, and 11. Below each dropdown are up and down arrows for navigation.
- Channel Width:** For both 5 GHz and 2.4 GHz, the channel width is set to 20MHz. Radio buttons are provided for 20MHz, 40MHz, and Automatic.
- Area Based Channel Settings:** This section contains a table with columns for Area, Band, and Channel List. The table is currently empty.

The interface also includes a left-hand navigation menu with options like Wireless LANs, WLAN QoS Policy, Radio QoS Policy, AAA Policy, Association ACL, SMART RF Policy, MeshConnex Policy, and Mesh QoS Policy. The top navigation bar includes Dashboard, Configuration, Diagnostics, Operations, and Statistics. The bottom status bar shows an Event Summary with colored indicators and a Find Functional Area search box.

2.2 Step 1-2 – Apply the SMART-RF policy

1 To be effective, the SMART RF Policy must be applied to an RF Domain.

In this example, our access points are located in a single location, so we can use the “default” existing RF Domain.

Click Configuration, RF Domain, select the “default” RF Domain and click on Edit to configure your RF Domain settings.

- Basic Configuration
Select your Time Zone, your Country Code
- SMART RF
Select the SMART RF Policy you have configured

Click OK then Commit and Save.

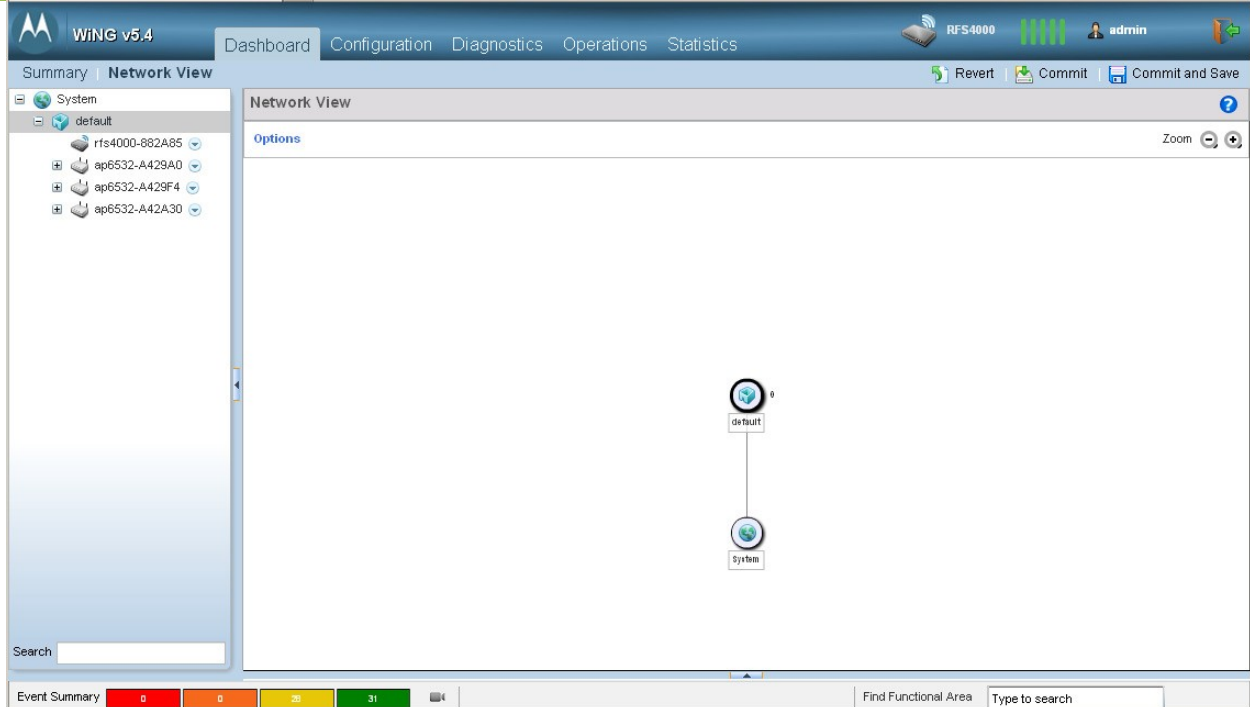
The screenshot displays the WING v5.4 configuration interface. The top navigation bar includes 'Dashboard', 'Configuration', 'Diagnostics', 'Operations', and 'Statistics'. The 'Configuration' tab is active, and the 'RF Domains' section is selected. The left sidebar shows a tree view with 'RF Domain' expanded to 'default'. The main content area is titled 'RF Domain default' and contains several configuration sections:

- Basic Configuration:** Includes fields for Location, Contact, Time Zone (set to GMT+01:00 Europe/Paris), Country (set to France-fr), and VLAN for Control Traffic (set to 1).
- SMART RF:** Includes a dropdown for SMART RF Policy (set to My_Smart-RF_policy), and Override Channel List 2.4 GHz and 5 GHz (both set to Select).
- Smart Scan:** Includes a checkbox for Enable Dynamic Channel (unchecked), and 2.4 GHz Channels (set to 1,2,3,4,...) and 5 GHz Channels (set to 34,36,38,40,...).
- Wireless IPS:** Includes a dropdown for WIPS Policy.
- Statistics:** Includes an OK button, a Reset button, and an Exit button.

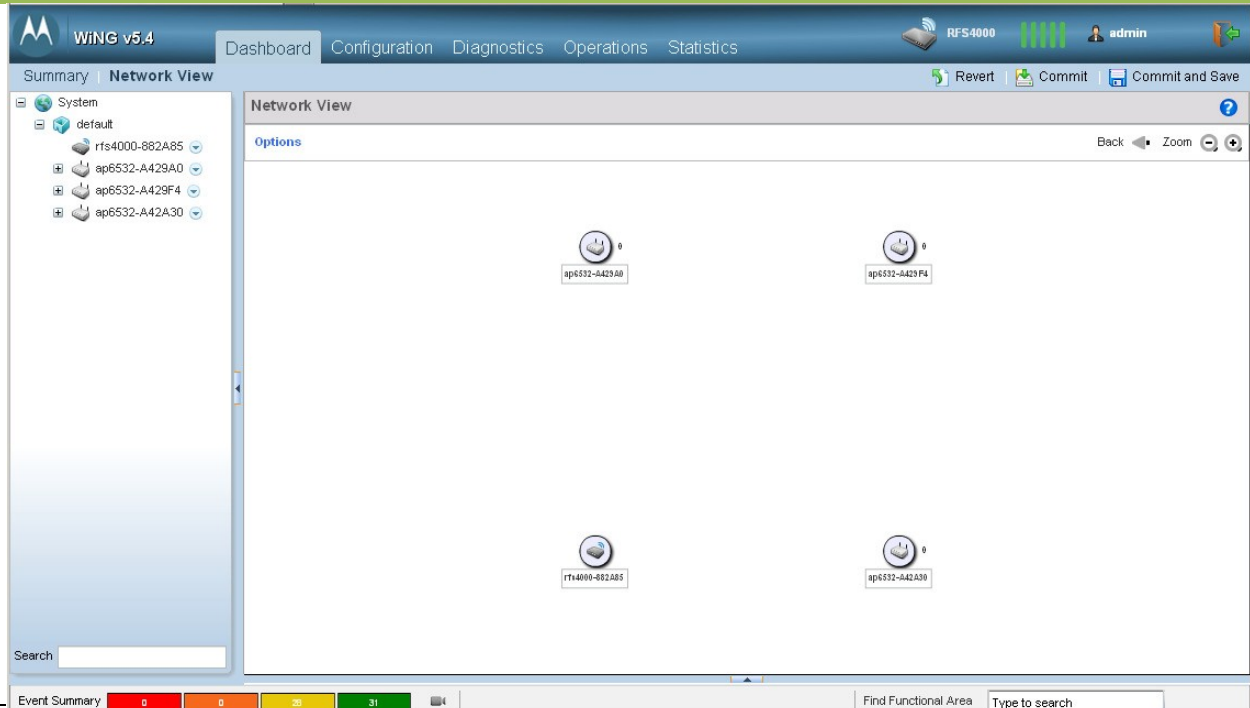
The bottom status bar shows an Event Summary with 0 red, 0 orange, 30 yellow, and 31 green events. A search bar for functional areas is also present.

3. WiNG 5 Dashboard presentation

1 Click Dashboard, Network View and then select the RF-Domain on which the network administrator has to get information (eg. default)



2 Double-click on the RF-Domain default shows the devices that are part of this RF-Domain. 1 RFS4000 and 3 AP 6532 are displayed.



4. Configuring Areas and Floors in a RF-Domain

To help the network administrator to visualize the access points and the connected mobile units on a floor plan, it is necessary first to create an area and a floor. WiNG 5 allows an RF-Domain to be split in several areas and floors.

The following is configured using Command Line Interface (CLI):

1 In the RF Domain default, a new Area is created and named “West-Wing”.

In this Area, a Floor is created and named “FL02”. A floor plan file named “store-floor2-plan.jpg” will be used for AP visualization and for RF heatmaps visualization.

Available units are meters or feet

```
rf4000-882A85>enable
rf4000-882A85#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
rf4000-882A85(config)#rf-domain default
rf4000-882A85(config-rf-domain-default)#layout area West-Wing
rf4000-882A85(config-rf-domain-default)#layout area West-Wing floor
FL02 map-location store-floor2-plan.jpg units feet
rf4000-882A85(config-rf-domain-default)#commit write
[OK]
```

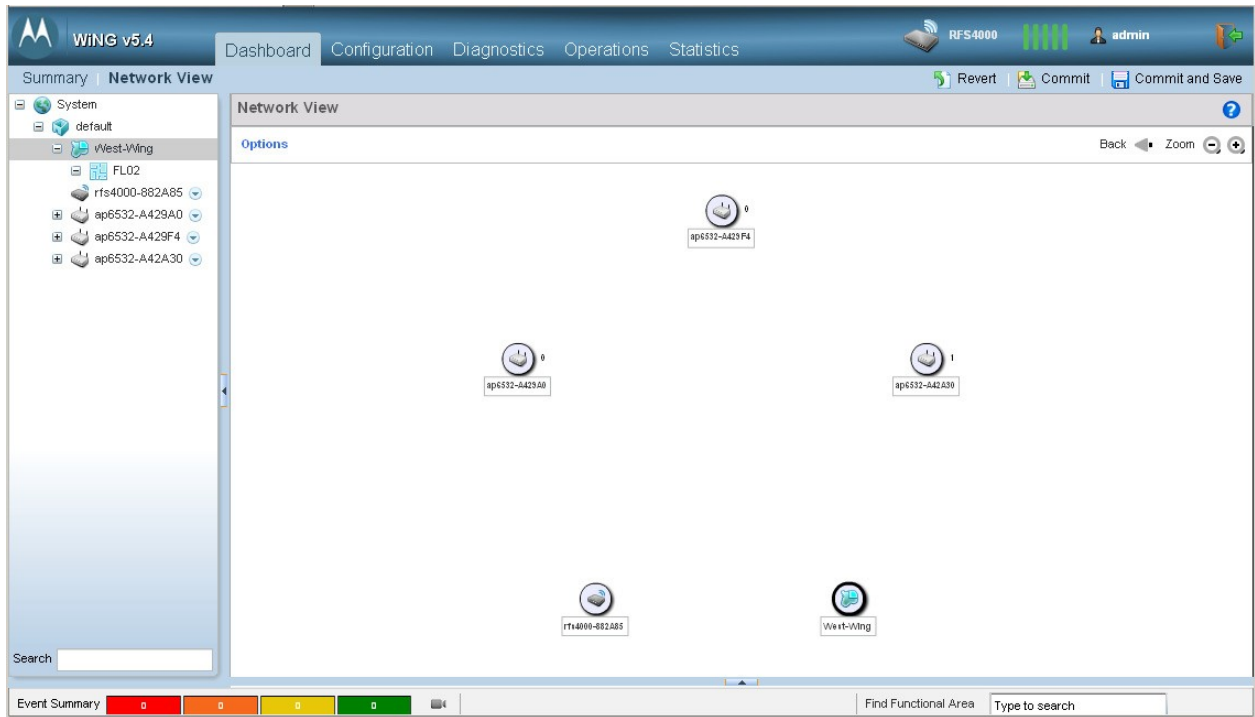


Note – “.JPG”, “.PNG” or “.GIF” files format may be used as a floor plan.

Check the result of the configuration in the Web UI:

2 Log on to the system. Click Dashboard, Network View and then select the RF-Domain default. Open the RF Domain default.

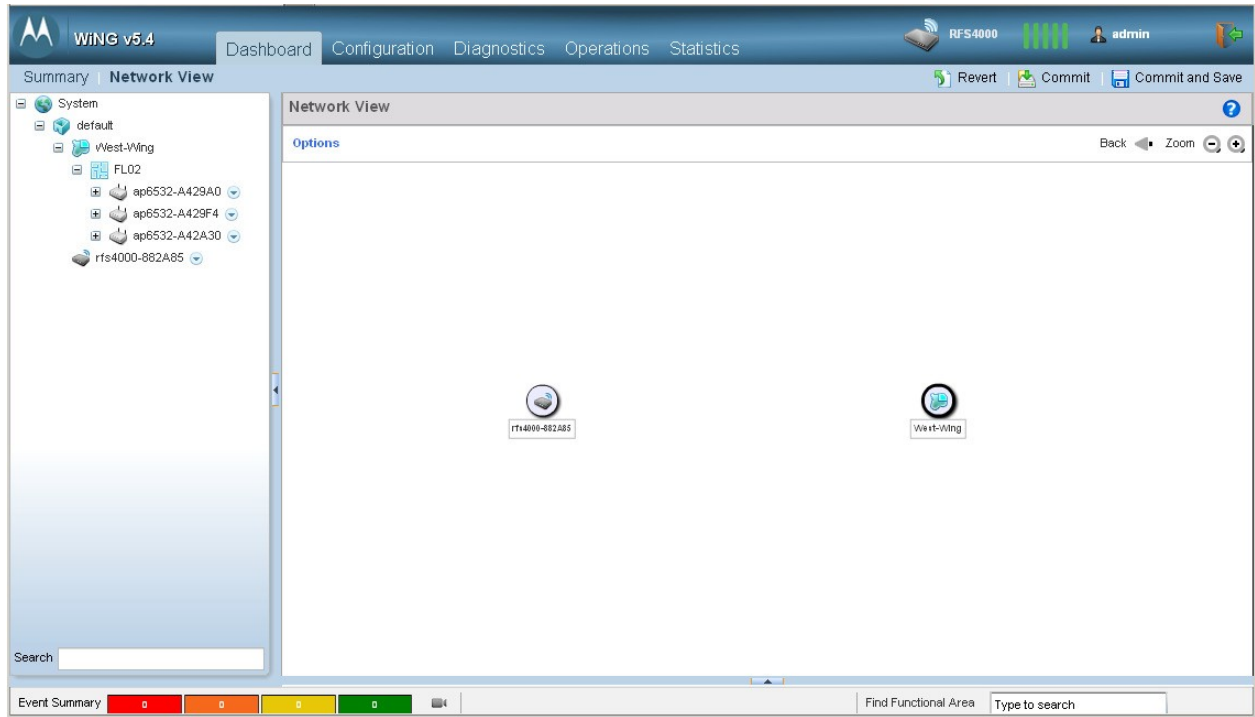
Referring to the hierarchical tree on the left part of the screen, floor “FL02” is now a subset of the Area “West-Wing” in the RF-Domain default.



In the hierarchical tree on the left part of the screen, access points in the RF Domain now can be associated to their respective floor using the Drag-and-Drop feature.

3

After Drag-and-Drop, access points are now part of the floor “FL02” in the area “West-Wing” in RF Domain default.



CD Note – “Drag and Drop” an Access Point into the floor is a Configuration operation. Do not forget to click on the “Commit and Save” button to save your changes.

4

The result of this configuration operation can also be displayed in the Configuration Tab.

Click on Configuration, then Devices

The screenshot displays the WiNG v5.4 Configuration Tab. The interface includes a top navigation bar with 'Dashboard', 'Configuration', 'Diagnostics', 'Operations', and 'Statistics'. Below this, there are tabs for 'Devices', 'Wireless', 'Network', 'Profiles', 'RF Domains', 'Security', 'Services', and 'Management'. The 'Configuration' tab is active, showing a 'Device Configuration' table. The table has columns for System Name, Device, Type, RF Domain Name, Profile Name, Area, Floor, and Overrides. The first three rows of the table are highlighted with a red border, indicating the configuration results. The 'Overrides' column for each row contains a 'Clear' button. The table shows four rows of data, with the first three rows having data and the fourth row being empty. The 'Row Count' is 4. The interface also includes a search bar, a 'Type to search in tables' field, and buttons for 'Add', 'Edit', and 'Delete'. The bottom status bar shows 'Event Summary' with colored indicators and a 'Find Functional Area' search field.

System Name	Device	Type	RF Domain Name	Profile Name	Area	Floor	Overrides
ap6532-A429A0	5C-0E-8B-A4-29-A0	AP6532	default	default-ap6532	West-Wing	FL02	Clear
ap6532-A429F4	5C-0E-8B-A4-29-F4	AP6532	default	default-ap6532	West-Wing	FL02	Clear
ap6532-A42A30	5C-0E-8B-A4-2A-30	AP6532	default	default-ap6532	West-Wing	FL02	Clear
rfs4000-882A85	00-23-68-88-2A-85	RFS4000	default	default-rfs4000			Clear

5. Floor Plan - File Import

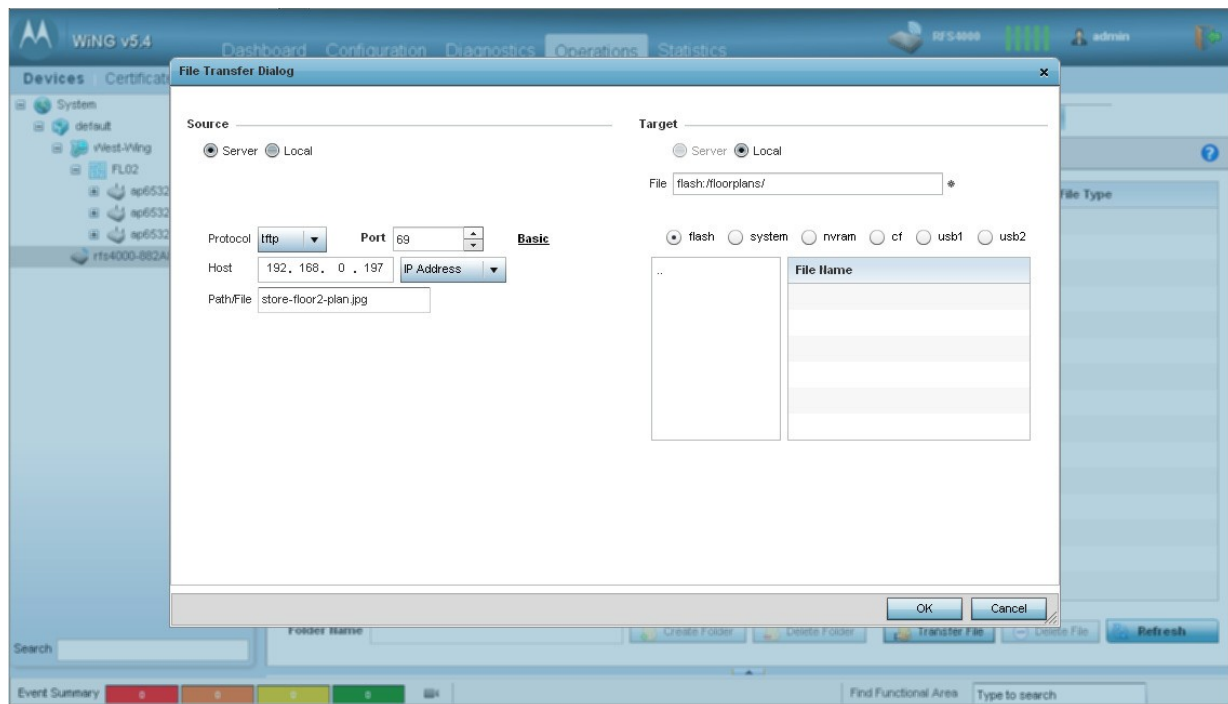
Use the following procedure to import the floor plan file from a TFTP server to the flash memory of the RFS controller:

- 1 Click on Operations, select your RFS Controller and select the File Management tab.
Click on the Transfer File button. The File Transfer Dialog box then appears.

Configure the server settings where the floor plan is located (Source = Server, protocol = tftp, port=69, IP address = 192.168.0.197 and file name = store-floor2-plan.jpg).

Configure then the destination folder where the file will be located (Target = Local, path = flash:/floorplans/).

Click OK to launch the floor plan file transfer.



2

Click on Operations and select File Management.

Browsing the flash Memory then floorplans Directory, it is possible to check if the floor plan file is correctly uploaded (flash:/floorplans/).

The screenshot displays the WING v5.4 web interface. The top navigation bar includes 'Dashboard', 'Configuration', 'Diagnostics', 'Operations', and 'Statistics'. The 'Operations' tab is active, and the 'File Management' sub-tab is selected. On the left, a tree view shows the system hierarchy: System > default > vWest-Wing > FLO2 > rfs4000-882A85. The main area is titled 'File Browser' and shows a directory tree on the left with 'flash:' expanded to 'flash:/floorplans'. A table on the right lists the files in this directory:

File Name	Size (Kb)	Last Modified	File Type
store-floor2-plan.jpg	268396	2013-02-22 13:20:48	binary

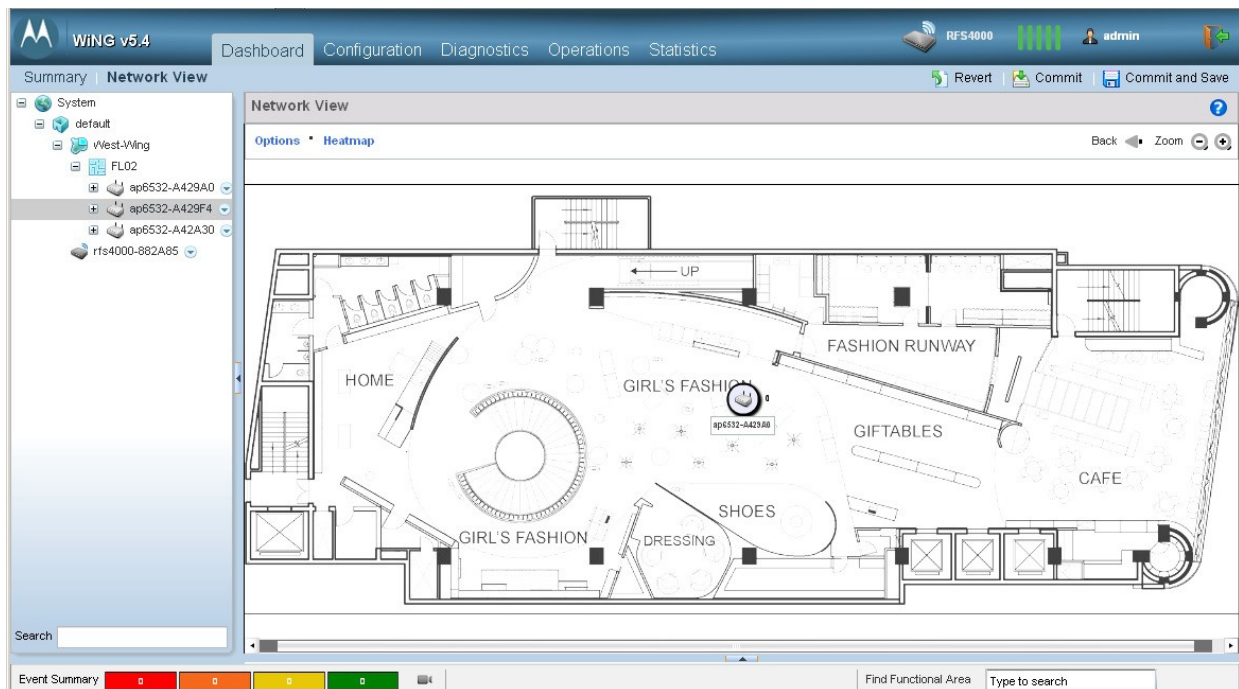
At the bottom of the interface, there is an 'Event Summary' bar with colored indicators and a search box labeled 'Find Functional Area'.

6. AP visualization on floor plan

1 Click on Dashboard and select Network View.

Open the hierarchical tree to display the devices in the RF-Domain. Select the RF-Domain default, and then select any Access Point located on the floor “FL02”.

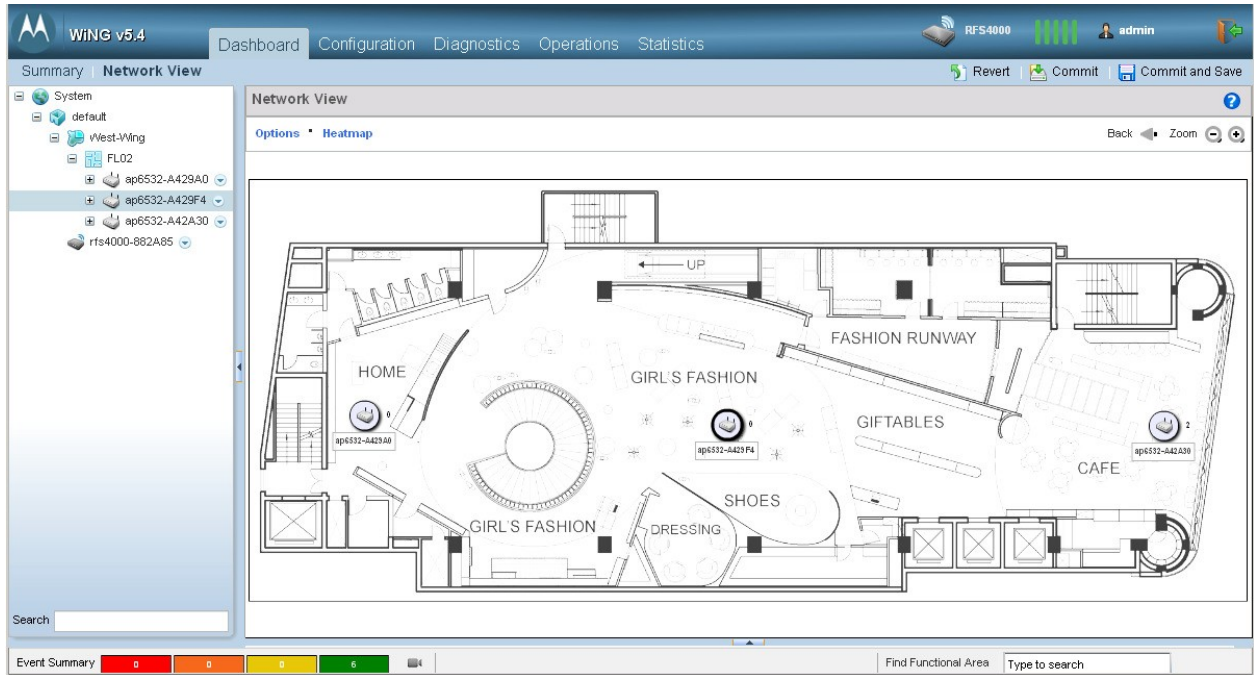
The floor plan now appears with all the Access Point located in the center of the floor plan.



On this Network View, access points on the floor plan now can be moved to their real location in the building using the mouse.

2

After moving access points to their location on the map, the following is now displayed

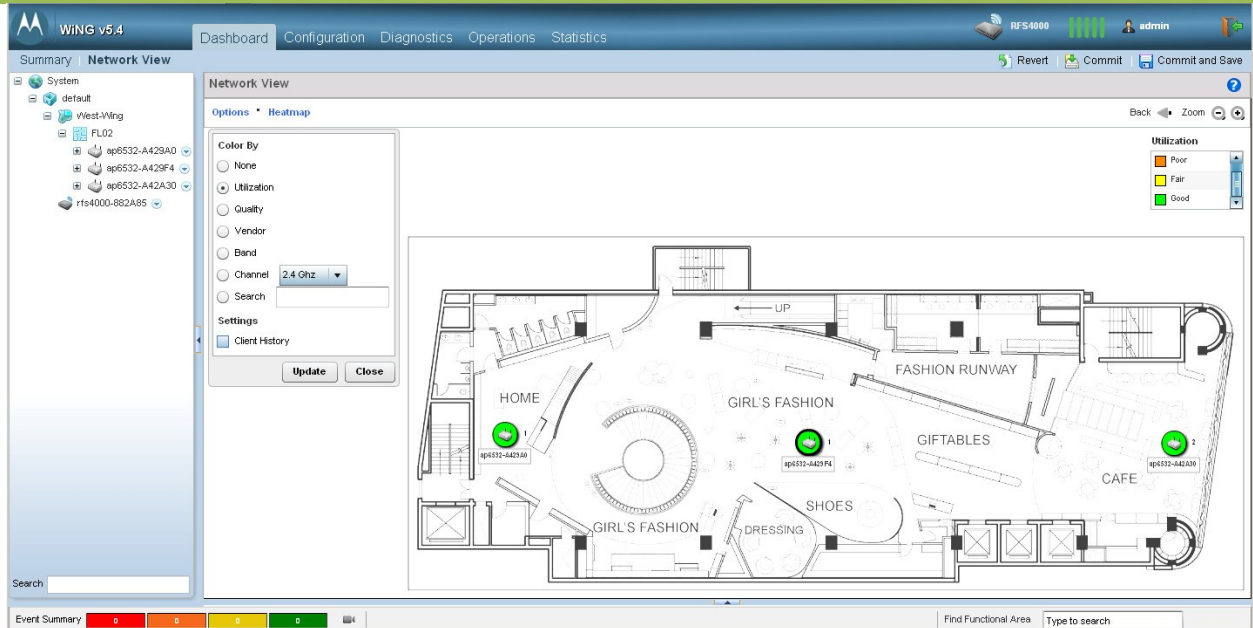


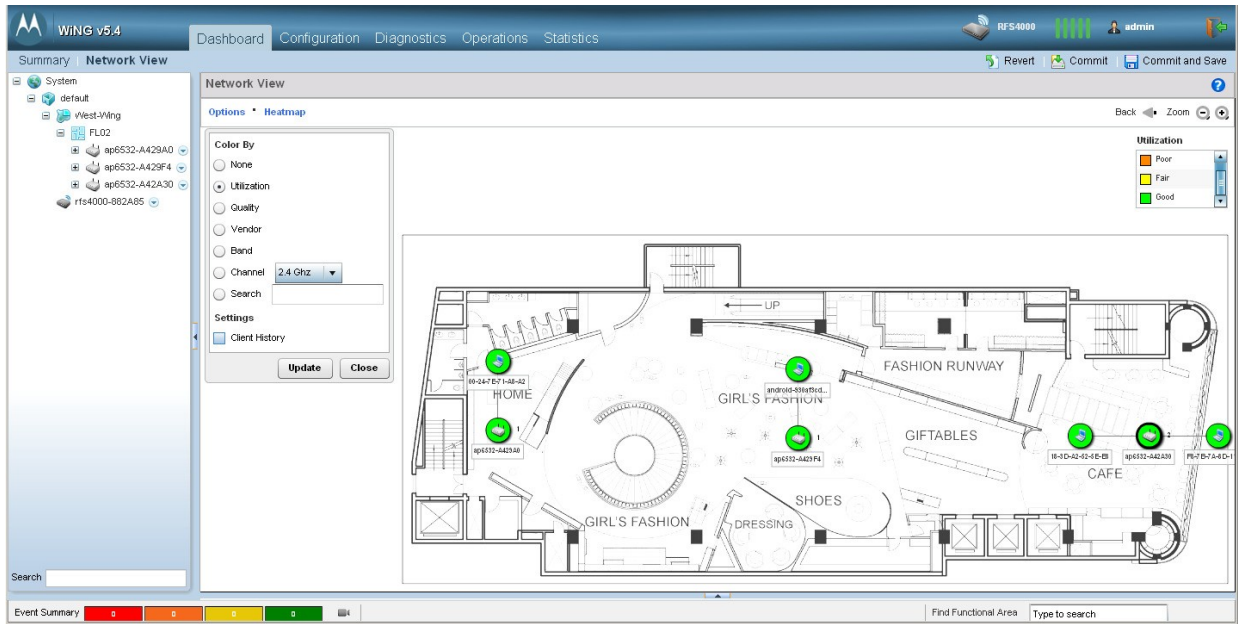
CD

Note – “moving” an Access Point on the Network View is a Configuration operation. Do not forget to click on the “Commit and Save” button to save your changes.

7. Dashboard tools

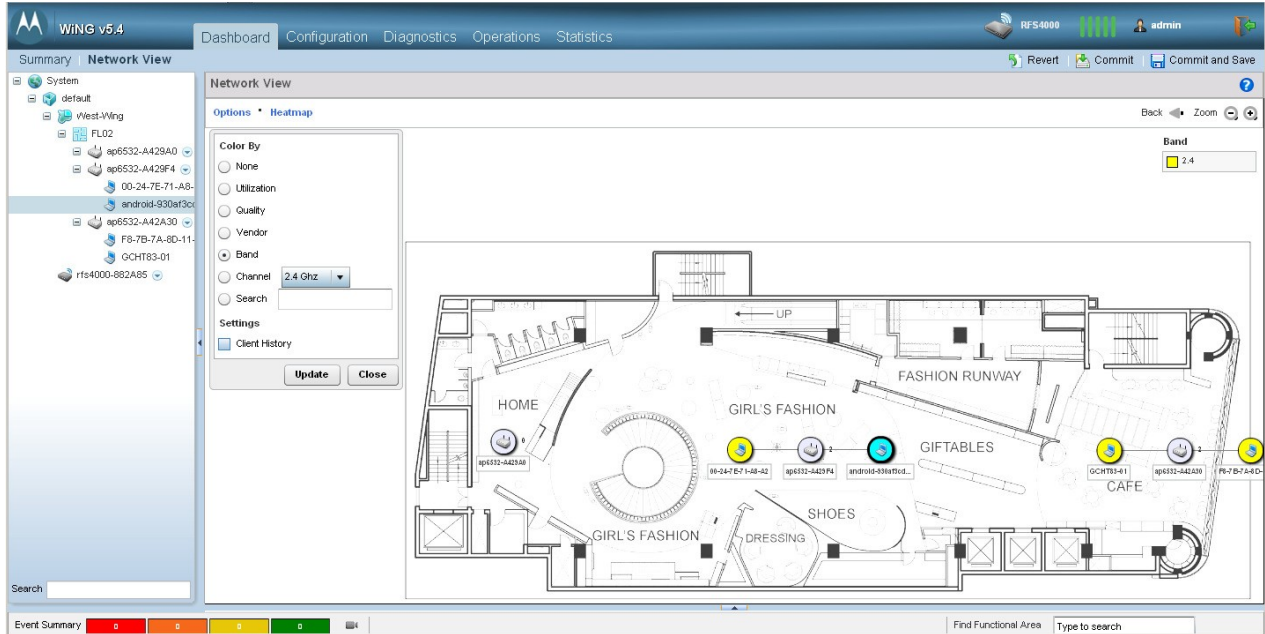
- 1 Click on Dashboard and select Network View. In the Network View window, select Options then Utilization. Click the Update button. The network administrator can easily see if an access point is overloaded. Clicking on each access point displays the current Wi-Fi clients.





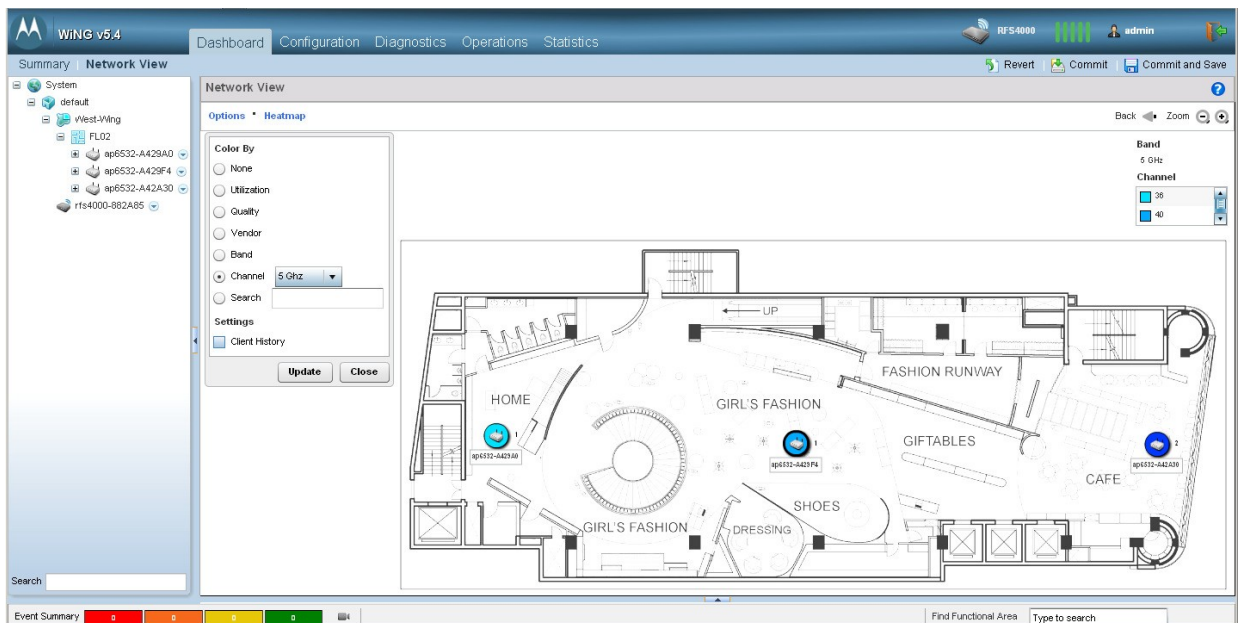
2

Select Band then click the Update button. The network administrator can see if the Wi-Fi clients are connected using the 2.4 GHz band or 5 GHz band. In the following, three mobile units are connected using 2.4 GHz band, one is connected using 5 GHz band.



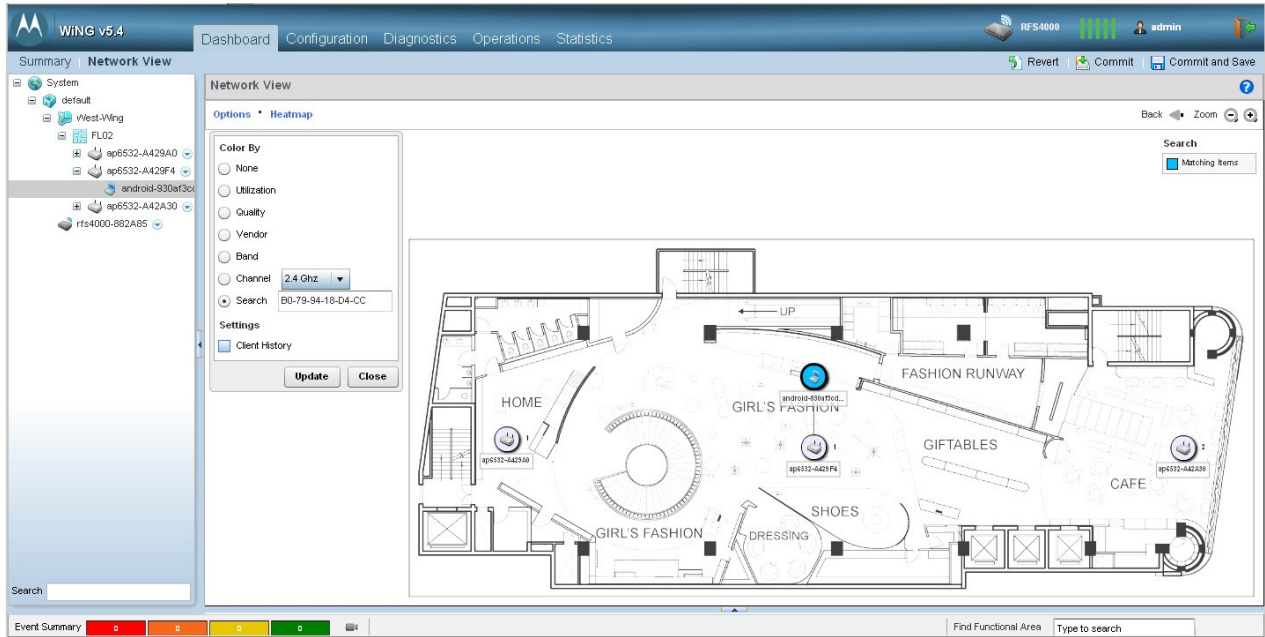
3

Click on Options and Channel, select the band 2.4GHz or 5GHz to display the channel configuration. The following displays channels 36, 40 and 48.



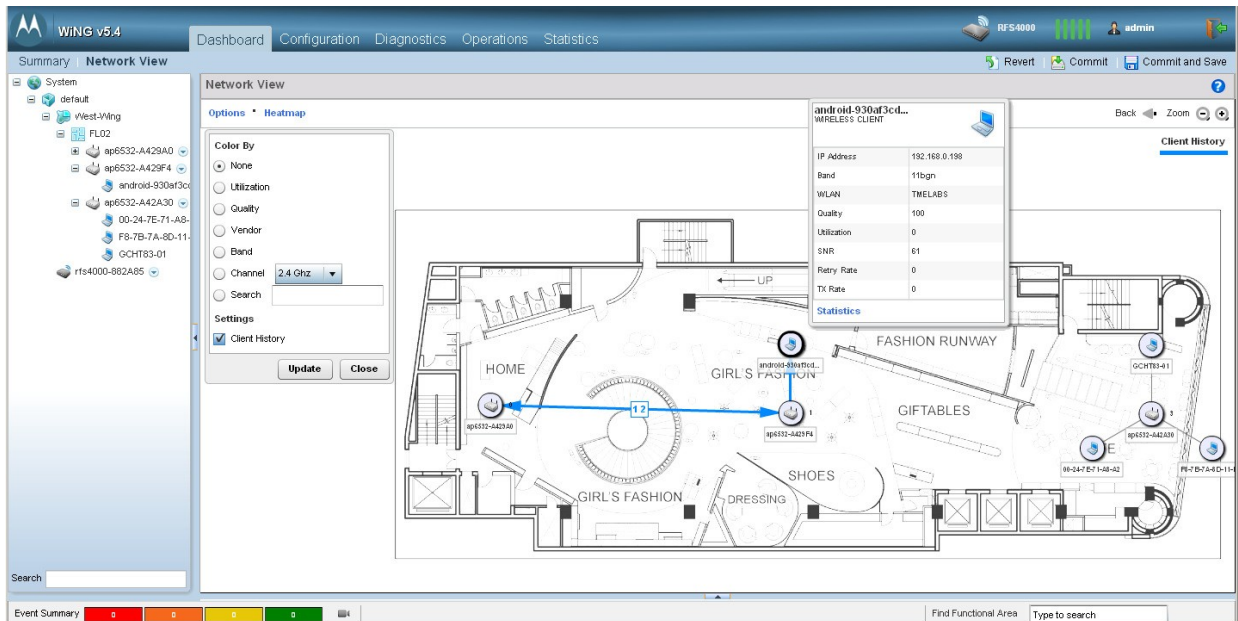
4

Select Search, enter the Hostname / MAC address of a Wi-Fi client and click on the Update button. The matching item is blue colored on the map. Note: This can be used as a basic locating feature.



5

Select Client History and click on a Wi-Fi client to display the association history. In the following example, the Wi-Fi client with IP address 192.168.0.198 has moved from ap6532-A429A0 to ap6532-A429F4.



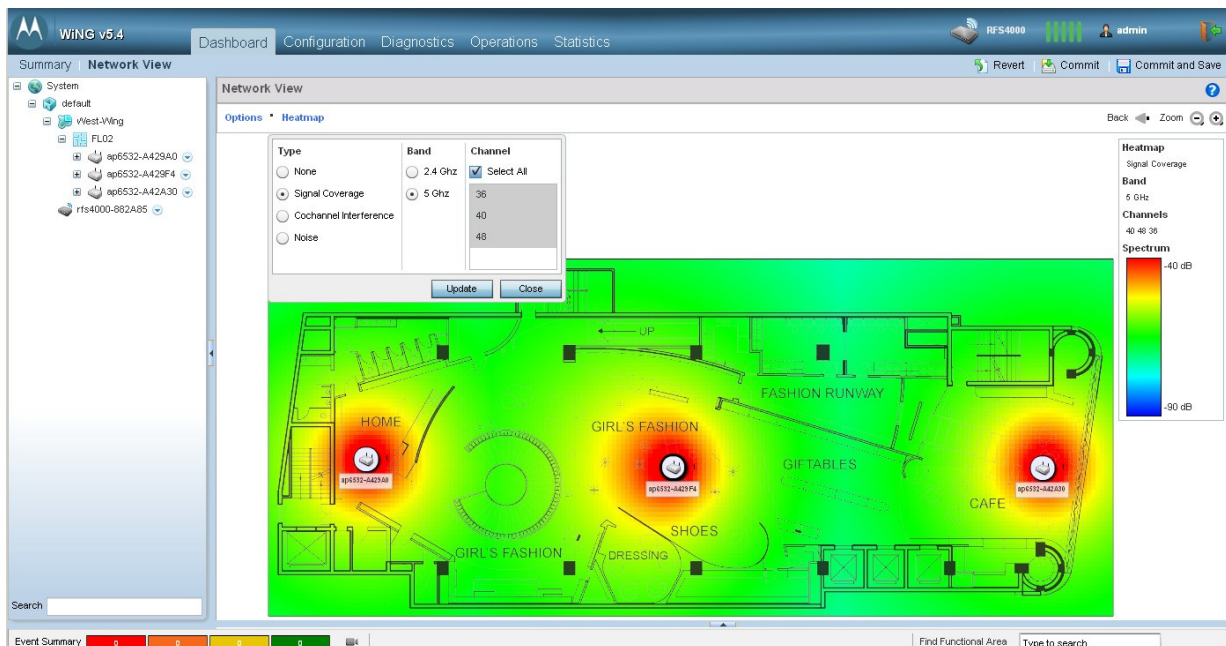
8. Heatmaps

1 Click on Dashboard and select Network View.

In the Network View window, select Heatmap, Signal Coverage and select the Band of frequency 2.4GHz or 5 GHz. All Channels are selected by default. Click the Update button.

The following displays the Heatmap for all channels in 5GHz Band.

Signal is displayed from -40dB (red) to -90dB (blue).



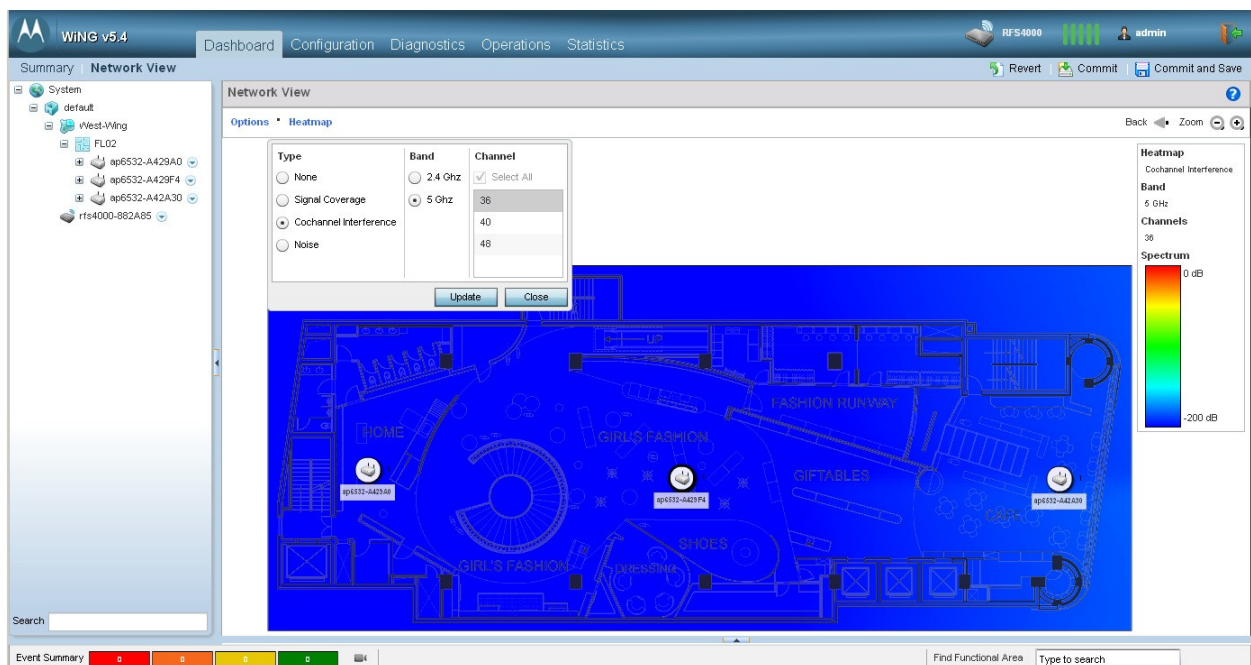
2

Click on Dashboard and select Network View.

In the Network View window, select Heatmap, Cochannel Interference and select the Band of frequency 2.4GHz or 5 GHz. All Channels are selected by default. Click the Update button.

The following displays the cochannel interferences for all channels in 5GHz Band.

The following screenshot shows cochannel interferences are null.

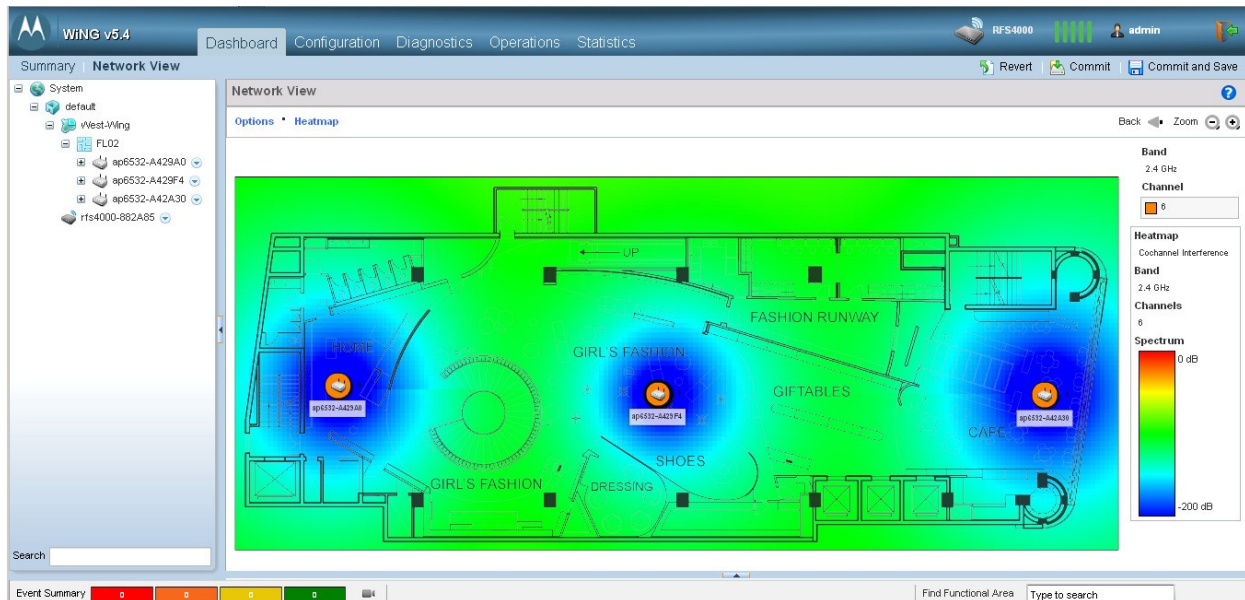


3

The following screenshot displays:

- the Channel Configuration for all three access points in 2.4GHz,
- the Cochannel Interference Heatmap for 2.4GHz Band.

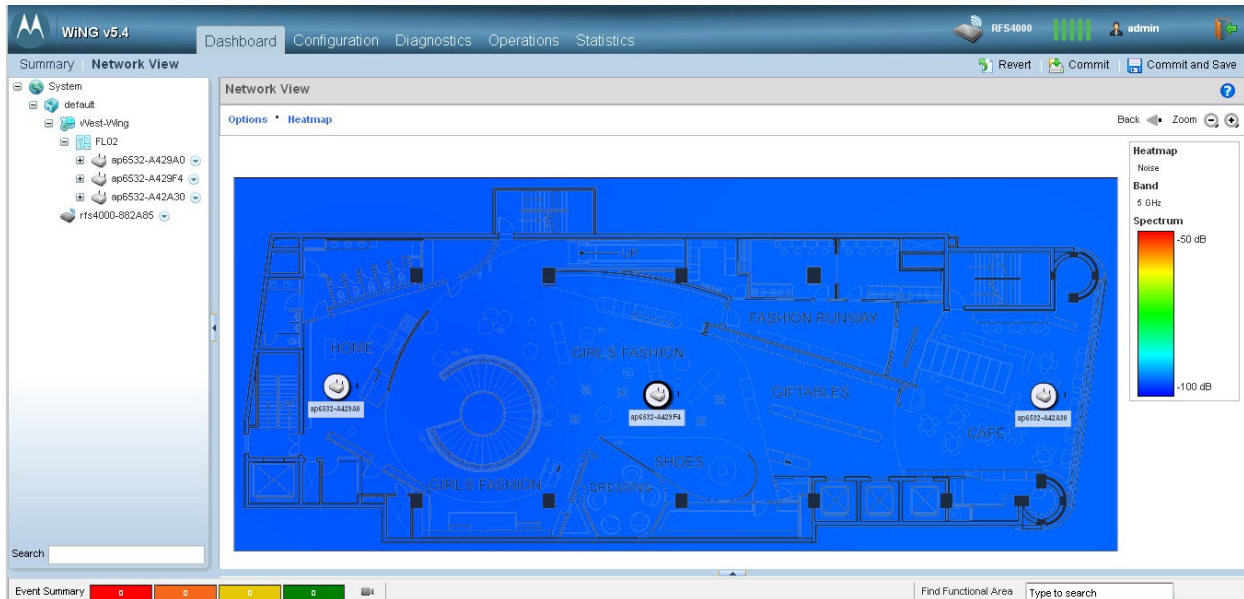
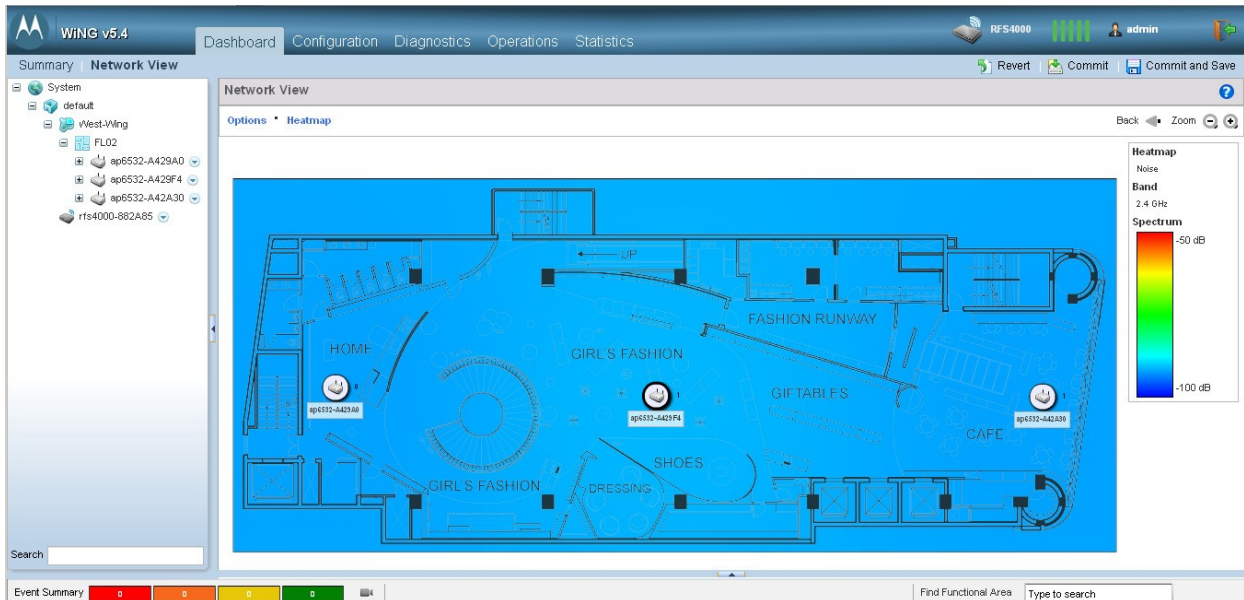
WiNG 5 helps the administrator to visualize interferences. All three access points are using the same channel (6), so cochannel interferences may be considered “High” except very close to each access point where signal is very much stronger than noise.



4

Heatmap feature can display environmental noise. First screenshot displays noise for 2.4GHz band, the second screenshot displays noise for 5GHz band.

The following displays a stronger noise in the 2.4GHz band (clear blue) and no noise (deep blue) in the 5GHz band.



9. Appendix

9.1 Running Configuration

```
!  
! Configuration of RFS4000 version 5.4.1.0-020R  
!  
!  
version 2.1  
!  
!  
ip access-list BROADCAST-MULTICAST-CONTROL  
  permit tcp any any rule-precedence 10 rule-description "permit all TCP  
traffic"  
  permit udp any eq 67 any eq dhcpd rule-precedence 11 rule-description  
"permit DHCP replies"  
  deny udp any range 137 138 any range 137 138 rule-precedence 20 rule-  
description "deny windows netbios"  
  deny ip any 224.0.0.0/4 rule-precedence 21 rule-description "deny IP  
multicast"  
  deny ip any host 255.255.255.255 rule-precedence 22 rule-description "deny  
IP local broadcast"  
  permit ip any any rule-precedence 100 rule-description "permit all IP  
traffic"  
!  
mac access-list PERMIT-ARP-AND-IPv4  
  permit any any type ip rule-precedence 10 rule-description "permit all IPv4  
traffic"  
  permit any any type arp rule-precedence 20 rule-description "permit all ARP  
traffic"  
!  
firewall-policy default  
  no ip dos tcp-sequence-past-window  
!  
!  
mint-policy global-default  
!  
meshpoint-qos-policy default  
!  
wlan-qos-policy default  
  qos trust dscp  
  qos trust wmm  
!  
radio-qos-policy default  
!  
wlan TMELABS  
  ssid TMELABS  
  vlan 1  
  bridging-mode local  
  encryption-type ccmp  
  authentication-type none
```

```
wpa-wpa2 psk 0 hellomoto  
!
```

```
ap300 default-ap300
 interface radio1
 interface radio2
!
smart-rf-policy My_Smart-RF_policy
 assignable-power 5GHz min 2
 assignable-power 5GHz max 5
 assignable-power 2.4GHz min 2
 assignable-power 2.4GHz max 5
 channel-list 5GHz 36,40,44,48
 channel-width 5GHz 20MHz
 no coverage-hole-recovery
!
dhcp-server-policy My_DHCP_Server_Policy
 dhcp-pool Pool_00
  network 192.168.0.0/24
  address range 192.168.0.100 192.168.0.200
  lease 0 2
  default-router 192.168.0.1
!
!
management-policy default
 no http server
 https server
 ssh
 user admin password 1
33563ad48faac048da0319e9a30e05f838f7d0db4f61a823e24d71cce9c864fc role
superuser access all
 no snmp-server manager v2
 snmp-server community 0 public ro
 snmp-server user snmptrap v3 encrypted des auth md5 0 Zebra
 snmp-server user snmpmanager v3 encrypted des auth md5 0 Zebra
!
l2tpv3 policy default
!
profile rfs4000 default-rfs4000
 autoinstall configuration
 autoinstall firmware
 crypto ikev1 policy ikev1-default
  isakmp-proposal default encryption aes-256 group 2 hash sha
 crypto ikev2 policy ikev2-default
  isakmp-proposal default encryption aes-256 group 2 hash sha
 crypto ipsec transform-set default esp-aes-256 esp-sha-hmac
 crypto ikev1 remote-vpn
 crypto ikev2 remote-vpn
 crypto auto-ipsec-secure
 interface radio1
 interface radio2
 interface up1
  ip dhcp trust
  qos trust dscp
  qos trust 802.1p
 interface gel
```

```
ip dhcp trust
qos trust dscp
```

```
    qos trust 802.1p
interface ge2
    ip dhcp trust
    qos trust dscp
    qos trust 802.1p
interface ge3
    ip dhcp trust
    qos trust dscp
    qos trust 802.1p
interface ge4
    ip dhcp trust
    qos trust dscp
    qos trust 802.1p
interface ge5
    ip dhcp trust
    qos trust dscp
    qos trust 802.1p
interface wwan1
interface pppoel
use firewall-policy default
logging on
service pm sys-restart
router ospf
!
profile ap6532 default-ap6532
autoinstall configuration
autoinstall firmware
crypto ikev1 policy ikev1-default
    isakmp-proposal default encryption aes-256 group 2 hash sha
crypto ikev2 policy ikev2-default
    isakmp-proposal default encryption aes-256 group 2 hash sha
crypto ipsec transform-set default esp-aes-256 esp-sha-hmac
crypto ikev1 remote-vpn
crypto ikev2 remote-vpn
crypto auto-ipsec-secure
crypto load-management
interface radiol
    wlan TMELABS bss 1 primary
interface radio2
    wlan TMELABS bss 1 primary
interface gel
    ip dhcp trust
    qos trust dscp
    qos trust 802.1p
interface vlan1
    ip address dhcp
    ip address zeroconf secondary
    ip dhcp client request options all
interface pppoel
use firewall-policy default
logging on
service pm sys-restart
router ospf
!
```

```
rf-domain default
  timezone Europe/Paris
  country-code fr
  use smart-rf-policy My_Smart-RF_policy
  layout area West-Wing
  layout area West-Wing floor FL02 map-location store-floor2-plan.jpg units
feet
!
rfs4000 00-23-68-88-2A-85
  use profile default-rfs4000
  use rf-domain default
  hostname rfs4000-882A85
  license AP DEFAULT-6AP-LICENSE
  license ADSEC DEFAULT-ADV-SEC-LICENSE
  interface vlan1
    ip address 192.168.0.1/24
    no ip dhcp client request options all
  use dhcp-server-policy My_DHCP_Server_Policy
  logging on
  logging console warnings
  logging buffered warnings
!
ap6532 5C-0E-8B-A4-29-A0
  use profile default-ap6532
  use rf-domain default
  hostname ap6532-A429A0
  layout-coordinates -576.7 37.7
  area West-Wing
  floor FL02
!
ap6532 5C-0E-8B-A4-29-F4
  use profile default-ap6532
  use rf-domain default
  hostname ap6532-A429F4
  layout-coordinates -32.2 51.8
  area West-Wing
  floor FL02
!
ap6532 5C-0E-8B-A4-2A-30
  use profile default-ap6532
  use rf-domain default
  hostname ap6532-A42A30
  layout-coordinates 623.3 53.3
  area West-Wing
  floor FL02
!
!
end
```

