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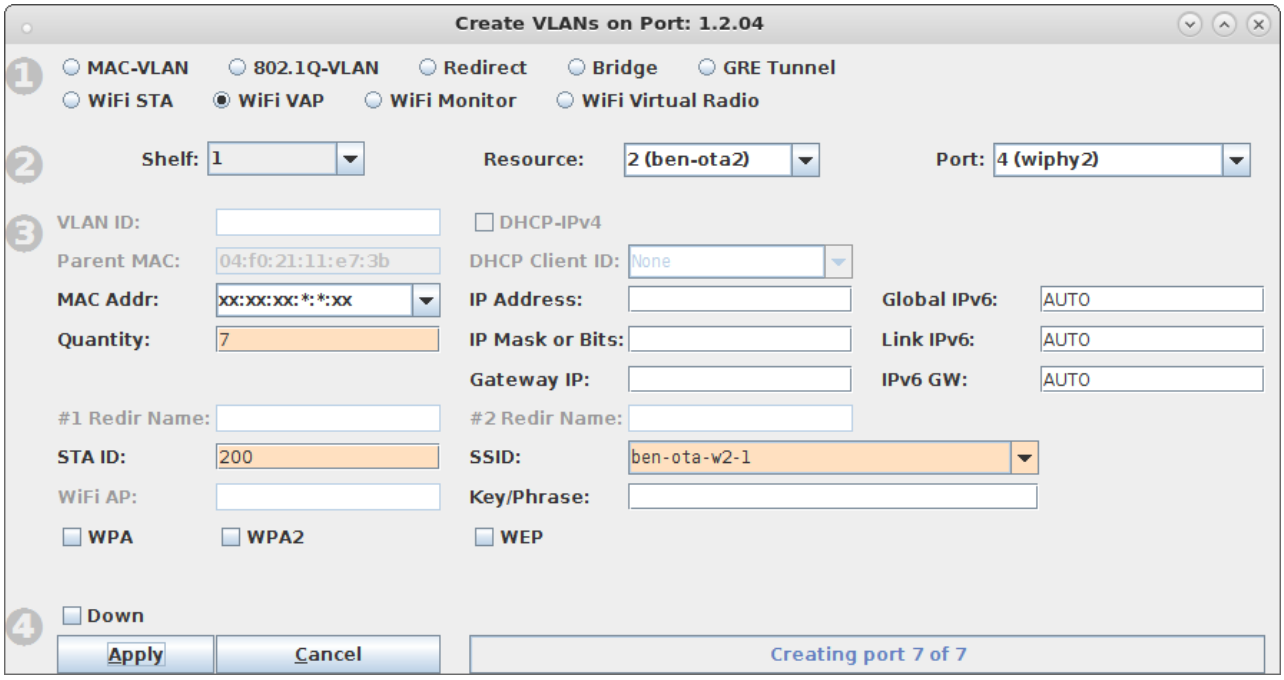
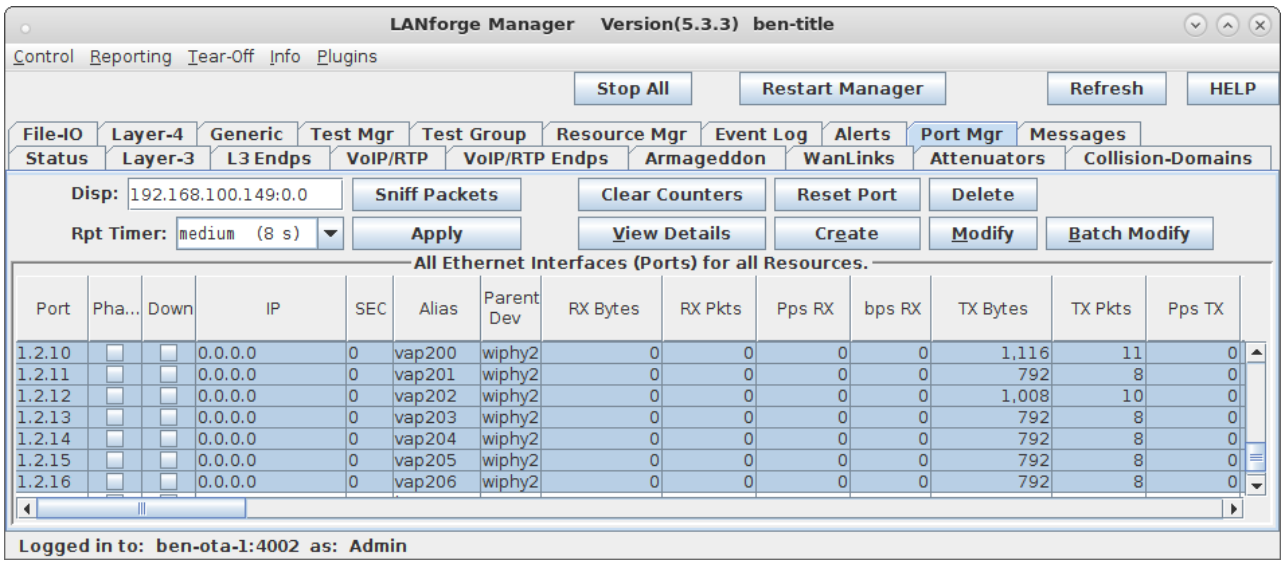
LANforge WiFi Many vAP Testing

Goal: Create 7 vAP on a single a/b/g/n/AC radio to emulate a busy environment and test that station devices associate to the proper AP.
Requires LANforge 5.3.3 or later. Configure 7 vAP, add the vAP to a bridge and set up DHCP. The Device Under Test (DUT) in this case is a mobile handset or other wifi station device. Verify that station can handle many APs and select an appropriate AP from the available scan results. This example uses a LANforge CT523 system but the procedure should work on all CT521, CT522, CT523 and CT525 systems.

1. In the **Ports** tab, select the radio `wiphy2` and click **Create.** Configure the values appropriately and click create.

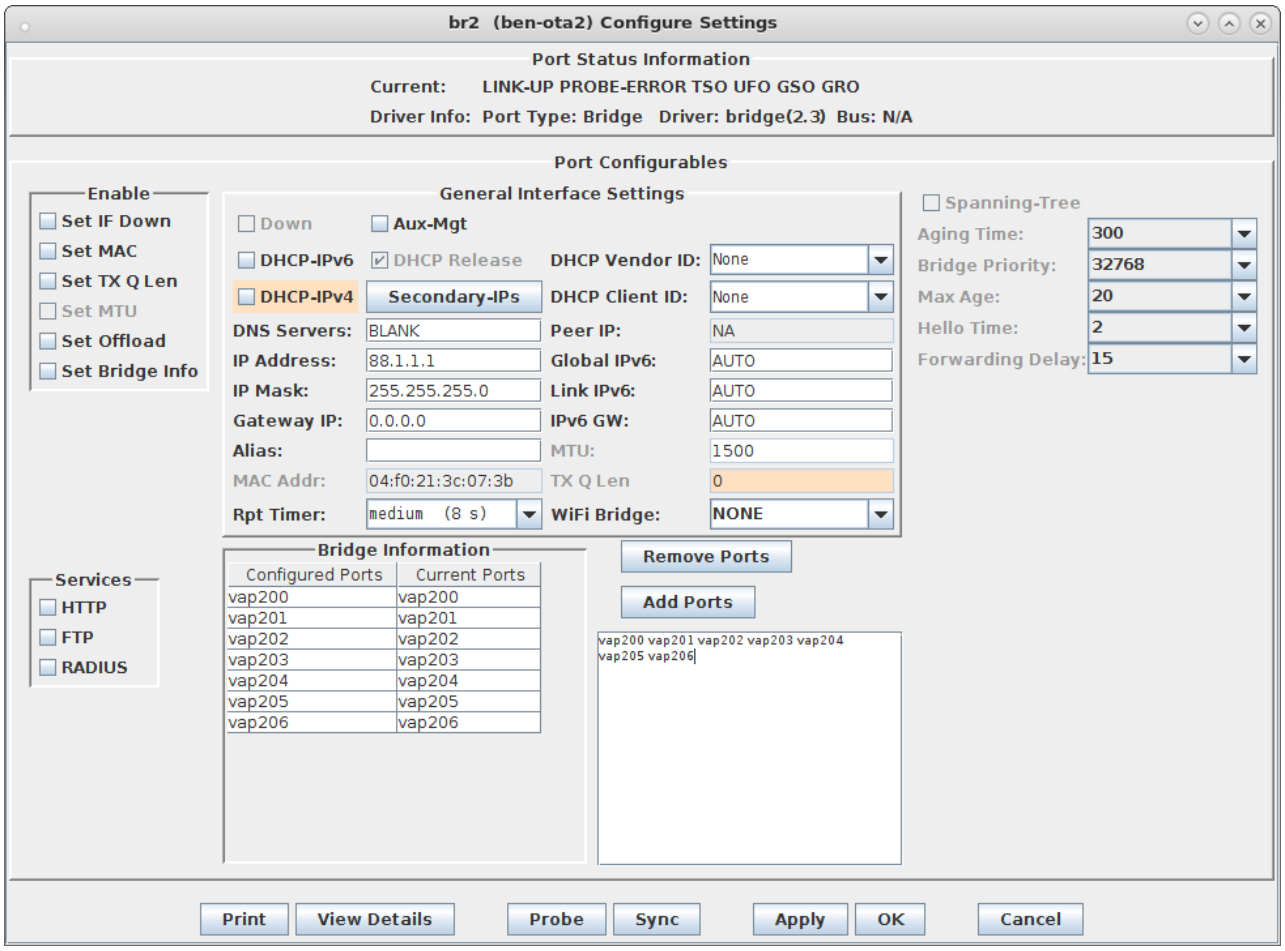


2. In the **Ports** tab you will see the new WiFi vAP:

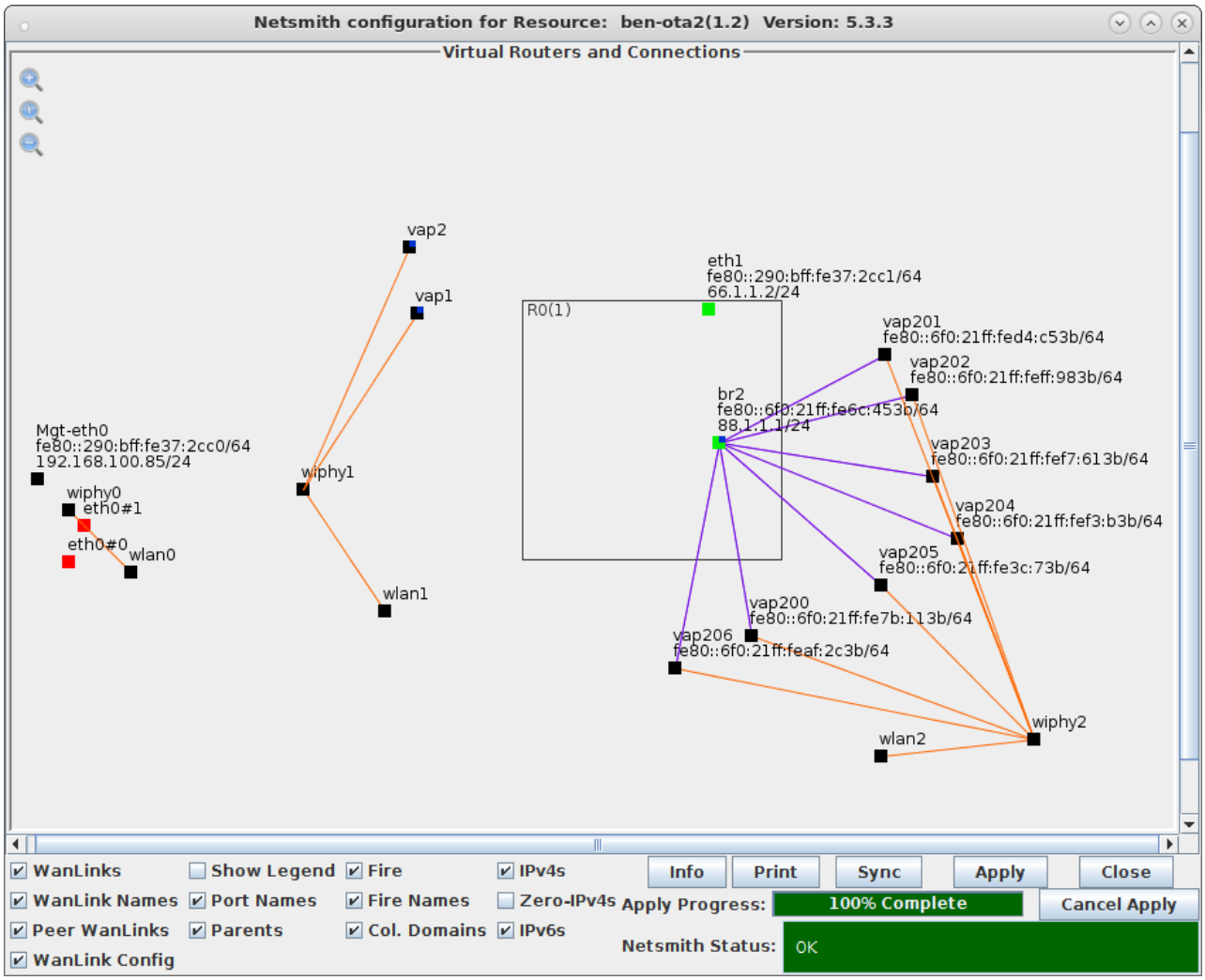


3. Select the **Status** panel in the LANforge GUI, and click the Netsmith button for the appropriate resource. Right-

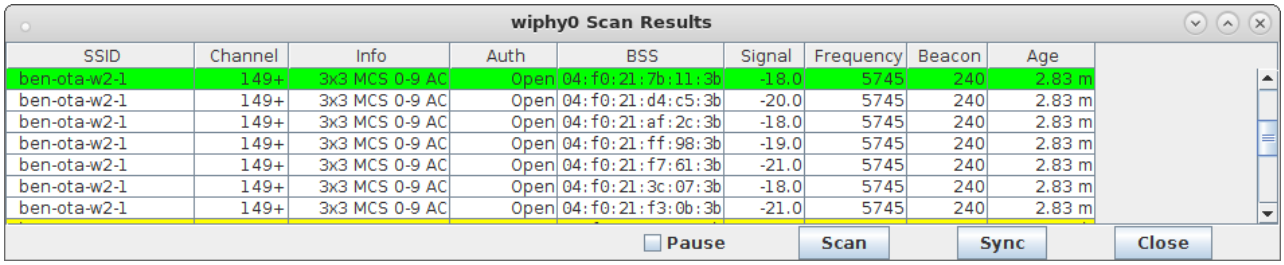
click and select the 'New Bridge' option. In this example, I selected 'br2' as the bridge name. After creating the bridge, click Sync to show the new bridge device. Right-click on it and select Modify Port. Add each of the vAP you just created to the bridge and then apply:



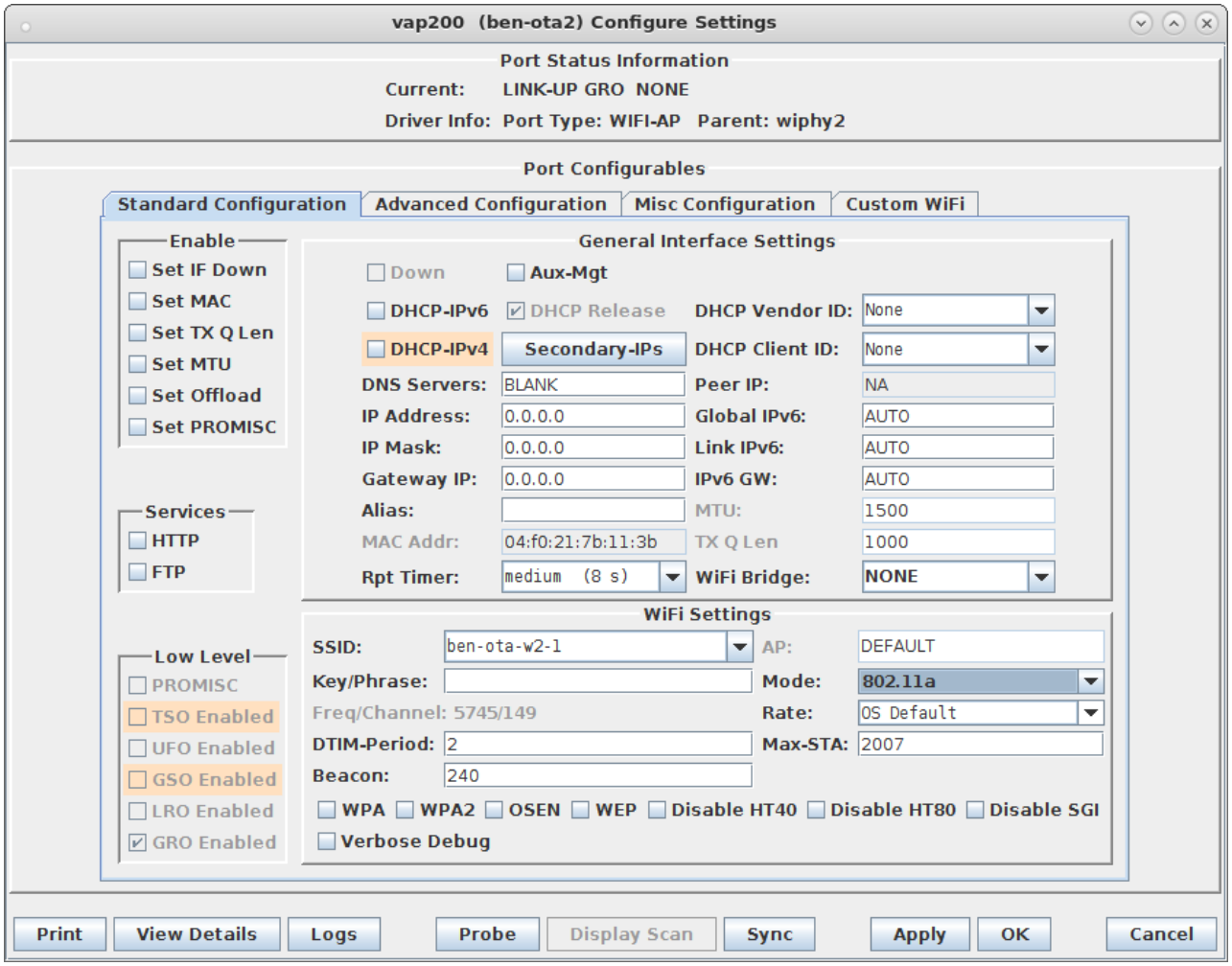
4. Create a virtual router in Netsmith and add br2, and optionally a wired port (eth1) to the router. Double-click the br2 port and configure DHCP to match its IP address. When complete, Netsmith should look something like this:



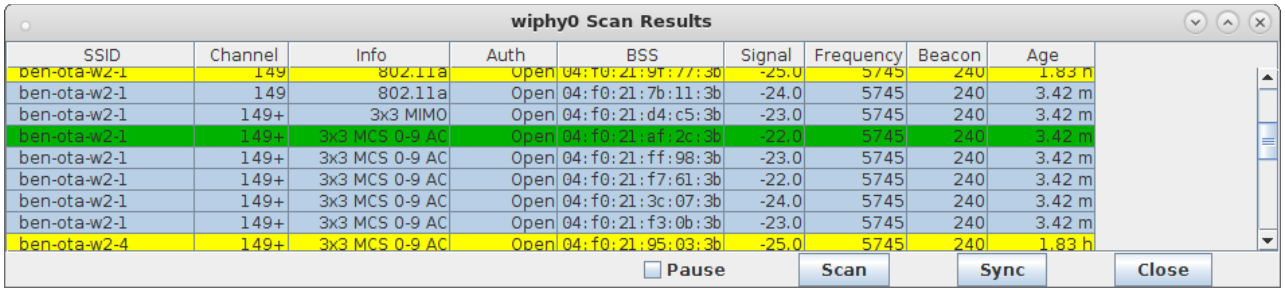
5. Now, we should have 7 vAP able to accept stations and give out DHCP addresses. Depending on the DUT, the user may wish to run iperf on LANforge, or on an upstream device connected to the LANforge eth1 port. For an initial test, make sure the DUT can connect to one of the vAP and get an IP address. The DUT should also see each of the vAP in its listing of available APs. This example will use LANforge WiFi Station on a different radio as the DUT. Here is a listing of the scan results:



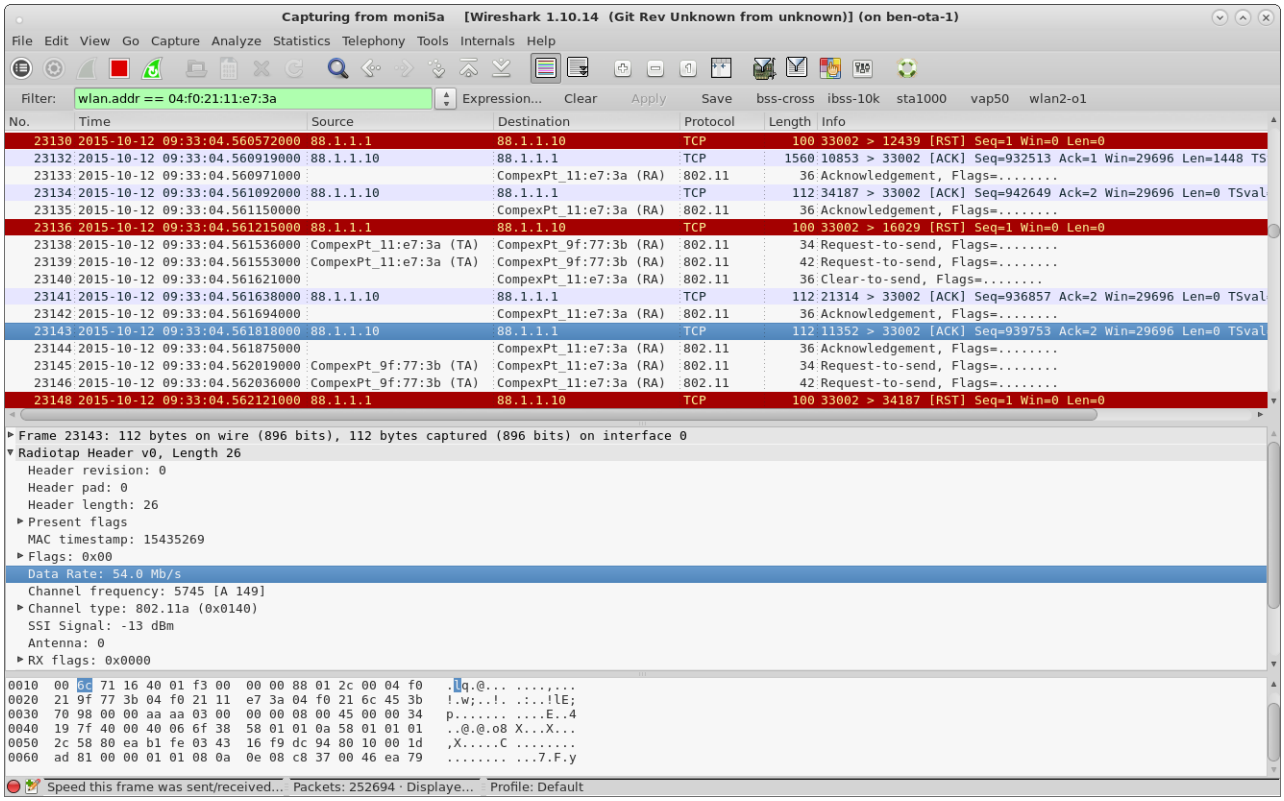
6. To make it a bit more interesting, we will now set the operating modes for one AP to be 802.11a, a second to be 802.11n, and the rest will remain 802.11AC. These APs are running on channel 149, so b and g mode are not available on this radio. To set the mode, double-click the vap200 row and set the Mode to be 802.11a and click OK to apply. Use similar procedure to set vap201's mode to 802.11an:



7. Now, request the DUT to re-scan and re-associate to the network. There should now be one 802.11a, one 802.11n, and 5 802.11AC vAP in the scan results. A well behaved DUT should attempt to connect to the AP with the higest rate that the DUT supports. In this case, the LANforge Station properly selected the 802.11AC vAP:



8. For additional testing, you may wish to use additional LANforge radios to create more vAP, change the SSID and configure DUT to connect to a particular SSID, admin down vAP to make sure DUT will properly connect to a new AP, and much more. You may also run traffic on the different APs to ensure that if a DUT connects to a 802.11a AP, then it does not try to send any 802.11n (HT) encoded traffic. A LANforge radio configured for monitor mode could verify this, as could third-party sniffers.:


Capturing from moni5a [Wireshark 1.10.14 (Git Rev Unknown from unknown)] (on ben-ota-1)
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Filter: wlan.addr == 04:f0:21:11:e7:3a
Expression... Clear Apply Save bss-cross ibss-10k sta1000 vap50 wlan2-o1
No. Time Source Destination Protocol Length Info
23130 2015-10-12 09:33:04.560572000 88.1.1.1 88.1.1.10 TCP 100 33002 > 12439 [RST] Seq=1 Win=0 Len=0
23132 2015-10-12 09:33:04.560919000 88.1.1.10 88.1.1.1 TCP 1560 10853 > 33002 [ACK] Seq=932513 Ack=1 Win=29696 Len=1448 TS
23133 2015-10-12 09:33:04.560971000 CompexPt_11:e7:3a (RA) 802.11 36 Acknowledgement, Flags=........
23134 2015-10-12 09:33:04.561092000 88.1.1.10 88.1.1.1 TCP 112 34187 > 33002 [ACK] Seq=942649 Ack=2 Win=29696 Len=0 TSval
23135 2015-10-12 09:33:04.561150000 CompexPt_11:e7:3a (RA) 802.11 36 Acknowledgement, Flags=........
23136 2015-10-12 09:33:04.561215000 88.1.1.1 88.1.1.10 TCP 100 33002 > 16029 [RST] Seq=1 Win=0 Len=0
23138 2015-10-12 09:33:04.561536000 CompexPt_11:e7:3a (TA) CompexPt_9f:77:3b (RA) 802.11 34 Request-to-send, Flags=........
23139 2015-10-12 09:33:04.561553000 CompexPt_11:e7:3a (TA) CompexPt_9f:77:3b (RA) 802.11 42 Request-to-send, Flags=........
23140 2015-10-12 09:33:04.561621000 CompexPt_11:e7:3a (RA) 802.11 36 Clear-to-send, Flags=........
23141 2015-10-12 09:33:04.561638000 88.1.1.10 88.1.1.1 TCP 112 21314 > 33002 [ACK] Seq=936857 Ack=2 Win=29696 Len=0 TSval
23142 2015-10-12 09:33:04.561694000 CompexPt_11:e7:3a (RA) 802.11 36 Acknowledgement, Flags=........
23143 2015-10-12 09:33:04.561818000 88.1.1.10 88.1.1.1 TCP 112 11352 > 33002 [ACK] Seq=939753 Ack=2 Win=29696 Len=0 TSval
23144 2015-10-12 09:33:04.561875000 CompexPt_11:e7:3a (RA) 802.11 36 Acknowledgement, Flags=........
23145 2015-10-12 09:33:04.562019000 CompexPt_9f:77:3b (TA) CompexPt_11:e7:3a (RA) 802.11 34 Request-to-send, Flags=........
23146 2015-10-12 09:33:04.562036000 CompexPt_9f:77:3b (TA) CompexPt_11:e7:3a (RA) 802.11 42 Request-to-send, Flags=........
23148 2015-10-12 09:33:04.562121000 88.1.1.1 88.1.1.10 TCP 100 33002 > 34187 [RST] Seq=1 Win=0 Len=0
Frame 23143: 112 bytes on wire (896 bits), 112 bytes captured (896 bits) on interface 0
Radiotap Header v0, Length 26
Header revision: 0
Header pad: 0
Header length: 26
Present flags
MAC timestamp: 15435269
Flags: 0x00
Data Rate: 54.0 Mb/s
Channel frequency: 5745 [A 149]
Channel type: 802.11a (0x0140)
SSI Signal: -13 dBm
Antenna: 0
RX flags: 0x0000
0010 00 6c 71 16 40 01 f3 00 00 00 88 01 2c 00 04 f0 .lq.@... ....,...
0020 21 9f 77 3b 04 f0 21 11 e7 3a 04 f0 21 6c 45 3b !.w;..!. .:..!lE;
0030 70 98 00 00 aa aa 03 00 00 00 08 00 45 00 00 34 p....... ....E..4
0040 19 7f 40 00 40 06 6f 38 58 01 01 0a 58 01 01 01 ..@.@.o8 X...X...
0050 2c 58 80 ea b1 fe 03 43 16 f9 dc 94 80 10 00 1d ,X.....C ....
0060 ad 81 00 00 01 01 08 0a 0e 08 c8 37 00 46 ea 79 ....7.F.y
Speed this frame was sent/received... Packets: 252694 · Displaye... Profile: Default