

## LANforge WiFi testing with HotSpot 2.0

**Goal:** Authenticate using HotSpot 2.0, 802.11u, and 802.1x EAP-TTLS.

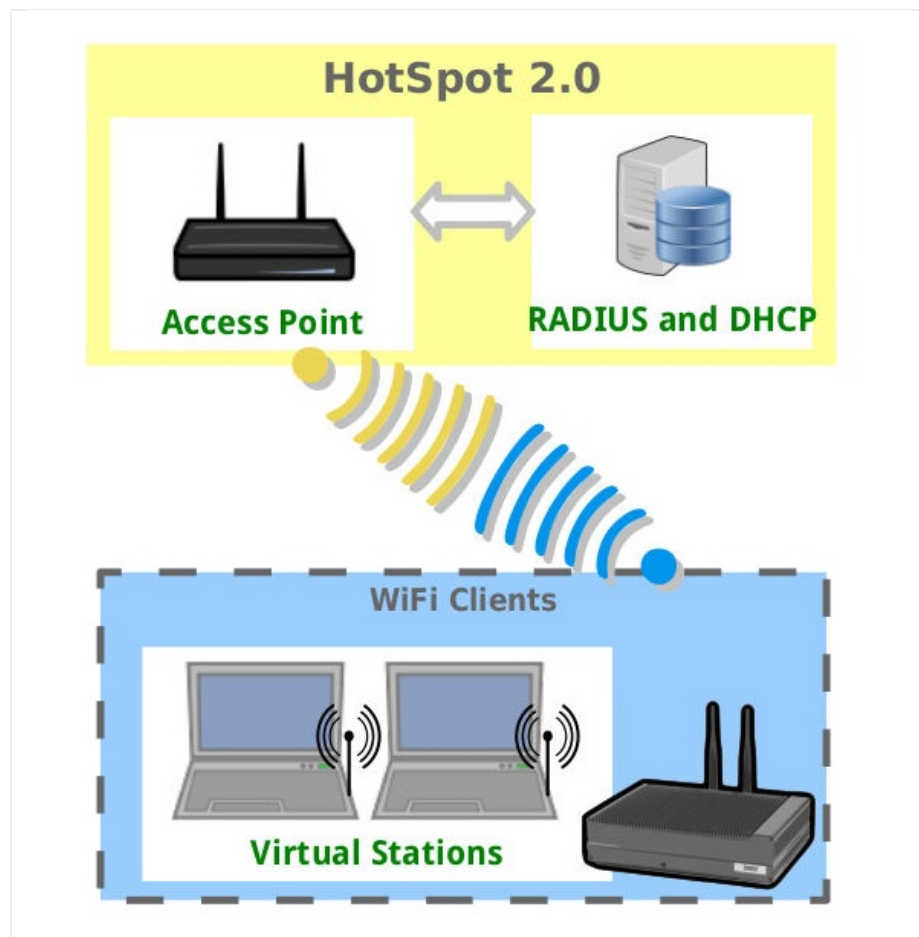
Simplest HotSpot 2.0 example using EAP-TTLS where the client only needs a username and password to authenticate.

There are four main components to setting up this test:

1. One or more Access Points
2. A RADIUS Server
3. A DHCP Server
4. One or more Clients

In this example, one LANforge system will fulfill the roles of APs, RADIUS and DHCP servers while another LANforge system will fulfill the role of Client devices.

Any one of the four main components can be replaced by 3rd party devices as required.



A. Standard Configuration tab:

### vap0 (If0350-6b3c) Configure Settings

Port Status Information  
 Current: LINK-UP GRO NONE  
 Driver Info: Port Type: WIFI-AP Parent: wiphy0 wiphy0...

Port Configurables

Standard Configuration
Advanced Configuration
Misc Configuration
Custom WiFi

**Enable**

Set MAC

Set TX Q Len

Set MTU

Set Offload

Set PROMISC

**Services**

HTTP

FTP

DNS

IPSEC-Client

IPsec-Upstream

**Low Level**

PROMISC

TSO Enabled

UFO Enabled

GSO Enabled

LRO Enabled

GRO Enabled

**General Interface Settings**

Down     Aux-Mgt    DHCP Hostname:

DHCP-IPv6     DHCP Release    DHCP Vendor ID:

DHCP-IPv4    Secondary-IPs    DHCP Client ID:

DNS Servers:     Peer IP:

IP Address:     Global IPv6:

IP Mask:     Link IPv6:

Gateway IP:     IPv6 GW:

Alias:     MTU:

MAC Addr:     TX Q Len:

Rpt Timer:     WiFi Bridge:

IPSec GW:     IPSec Password:

IPSec Local ID.:     IPSec Remote ID.:

**WiFi Settings**

SSID:     AP:

Key/Phrase:     Mode:

Freq/Channel:     Rate:

DTIM-Period:     Max-STA:

Beacon:

WPA     WPA2     WPA3     OSEN     WEP     Verbose Debug

Disable HT40     Disable HT80     Enable VHT160     Disable SGI

Print
Display
Logs
Probe
Display Scan
Sync
Apply
OK
Cancel

B. Advanced Configuration tab:

**vap0 (If0350-6b3c) Configure Settings**

Port Status Information  
Current: LINK-UP GRO NONE  
Driver Info: Port Type: WIFI-AP Parent: wiphy0 [wiphy0...](#)

Port Configurables

Standard Configuration **Advanced Configuration** Misc Configuration Custom WiFi

Advanced WiFi Settings

Select 'WPA2' on the Standard Configuration screen to enable Advanced/802.1x and enable Advanced/802.1x to enable most of these. Enabling 802.11u enables others.

Pairwise Ciphers:	DEFAULT	Group Ciphers:	DEFAULT
Ignore Probes:	zero (0%)	HESSID:	04:f0:21:d1:e7:79
Ignore Auth-Assoc:	zero (0%)	Realm:	0.vap0.localdomain,21[5:7]
Ignore Assoc:	zero (0%)	IMSI:	
Ignore Re-Assoc:	zero (0%)	Milenage:	
Corrupt GTK:	zero (0%)	Domain:	vap0.localdomain
HS20 Capabilities		Consortium:	
HS20 Oper Class		RADIUS IP	127.0.0.1
HS20 WAN Metrics		RADIUS Port	1812
leee80211w:	Disabled (0)	RADIUS Secret	lanforge
Venue Group:	Unspecified (0)	Venue Type:	Unspecified (0)
Network Type:	Private (0)	Address Types:	Not Available (0)
Network Auth:		3GPP Cell Net:	

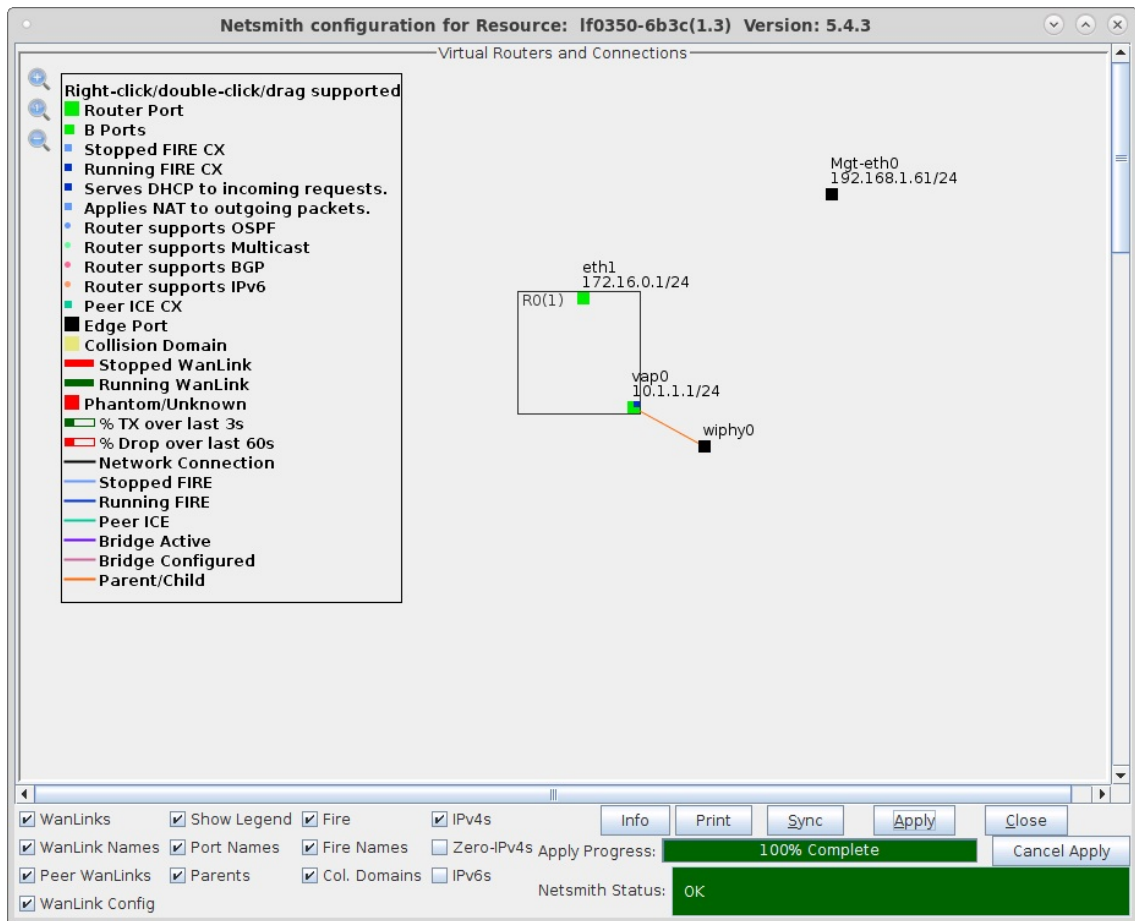
Use 80211d  Use 80211h  BSS-Load  Neighbor Reports  BSS Transition

Advanced/802.1x  Short-Preamble  HotSpot 2.0  Disable DGAF

Enable 802.11u  802.11u Internet  802.11u ASRA  802.11u ESR  802.11u UESA

Print Display Logs Probe Display Scan Sync Apply OK Cancel

C. Create a Virtual-Router for DHCP Service:



For more information see  
[LANforge User's Guide: Ports \(Interfaces\)](#) ,  
[VAP Bridge Mode Cookbook](#) ,  
[Virtual Router with DHCP Cookbook](#)

2. Configure Access Point 2

A. Standard Configuration tab:

### vap1 (If0350-6b3c) Configure Settings

Port Status Information  
 Current: LINK-UP GRO NONE  
 Driver Info: Port Type: WIFI-AP Parent: wiphy1 wiphy1...

Port Configurables

Standard Configuration
Advanced Configuration
Misc Configuration
Custom WiFi

**Enable**

Set MAC

Set TX Q Len

Set MTU

Set Offload

Set PROMISC

**Services**

HTTP

FTP

DNS

IPSEC-Client

IPsec-Upstream

**Low Level**

PROMISC

TSO Enabled

UFO Enabled

GSO Enabled

LRO Enabled

GRO Enabled

**General Interface Settings**

Down     Aux-Mgt    DHCP Hostname:

DHCP-IPv6     DHCP Release    DHCP Vendor ID:

DHCP-IPv4    Secondary-IPs    DHCP Client ID:

DNS Servers:     Peer IP:

IP Address:     Global IPv6:

IP Mask:     Link IPv6:

Gateway IP:     IPv6 GW:

Alias:     MTU:

MAC Addr:     TX Q Len:

Rpt Timer:     WiFi Bridge:

IPSec GW:     IPSec Password:

IPSec Local ID.:     IPSec Remote ID.:

**WiFi Settings**

SSID:     AP:

Key/Phrase:     Mode:

Freq/Channel:     Rate:

DTIM-Period:     Max-STA:

Beacon:

WPA     WPA2     WPA3     OSEN     WEP     Verbose Debug

Disable HT40     Disable HT80     Enable VHT160     Disable SGI

Print
Display
Logs
Probe
Display Scan
Sync
Apply
OK
Cancel

B. Advanced Configuration tab:

**vap1 (If0350-6b3c) Configure Settings**

Port Status Information  
Current: LINK-UP GRO NONE  
Driver Info: Port Type: WIFI-AP Parent: wiphy1 [wiphy1...](#)

Port Configurables

Standard Configuration **Advanced Configuration** Misc Configuration Custom WiFi

Advanced WiFi Settings

Select 'WPA2' on the Standard Configuration screen to enable Advanced/802.1x and enable Advanced/802.1x to enable most of these. Enabling 802.11u enables others.

Pairwise Ciphers:	DEFAULT	Group Ciphers:	DEFAULT
Ignore Probes:	zero (0%)	HESSID:	00:0e:8e:b9:8e:26
Ignore Auth-Assoc:	zero (0%)	Realm:	0.vap1.localdomain,21[5:7]
Ignore Assoc:	zero (0%)	IMSI:	
Ignore Re-Assoc:	zero (0%)	Milenage:	
Corrupt GTK:	zero (0%)	Domain:	vap1.localdomain
HS20 Capabilities		Consortium:	
HS20 Oper Class		RADIUS IP	127.0.0.1
HS20 WAN Metrics		RADIUS Port	1812
leee80211w:	Disabled (0)	RADIUS Secret	lanforge
Venue Group:	Unspecified (0)	Venue Type:	Unspecified (0)
Network Type:	Private (0)	Address Types:	Not Available (0)
Network Auth:		3GPP Cell Net:	

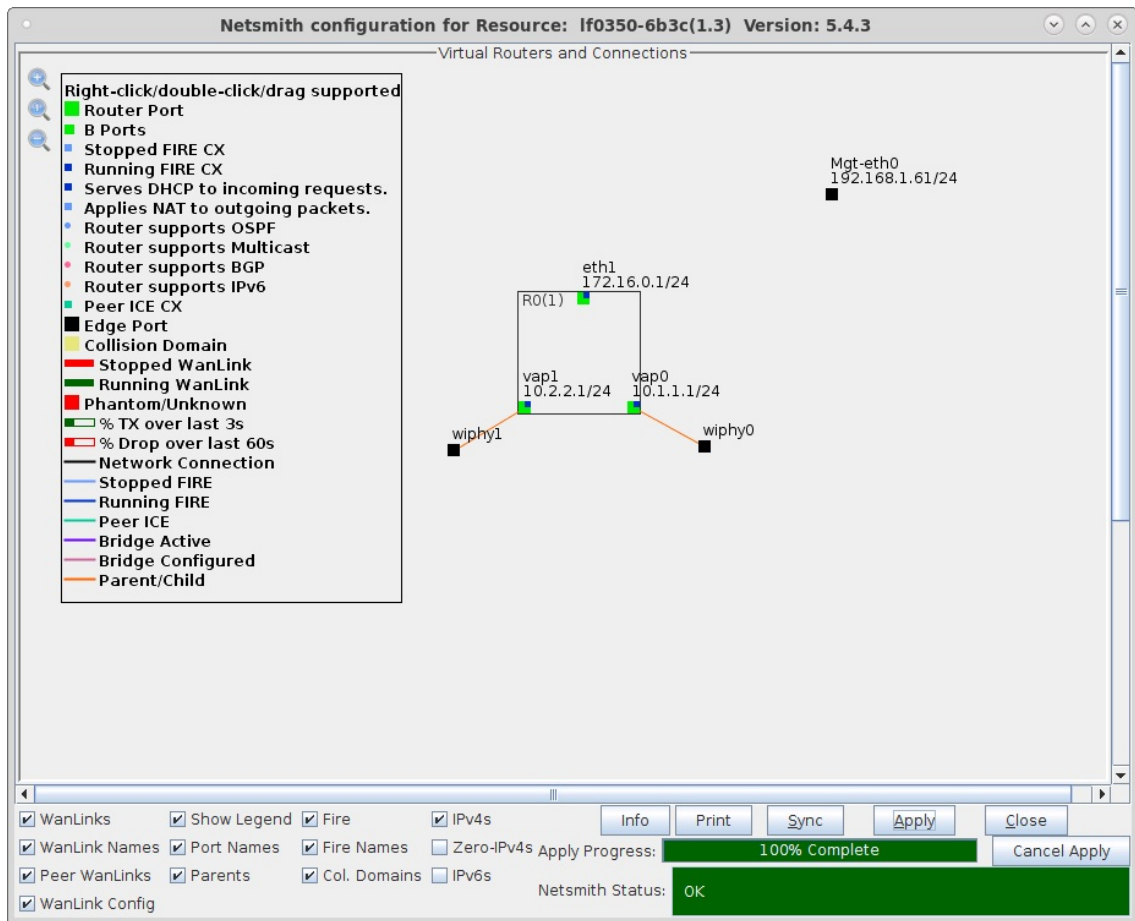
Use 80211d  Use 80211h  BSS-Load  Neighbor Reports  BSS Transition

Advanced/802.1x  Short-Preamble  HotSpot 2.0  Disable DGAF

Enable 802.11u  802.11u Internet  802.11u ASRA  802.11u ESR  802.11u UESA

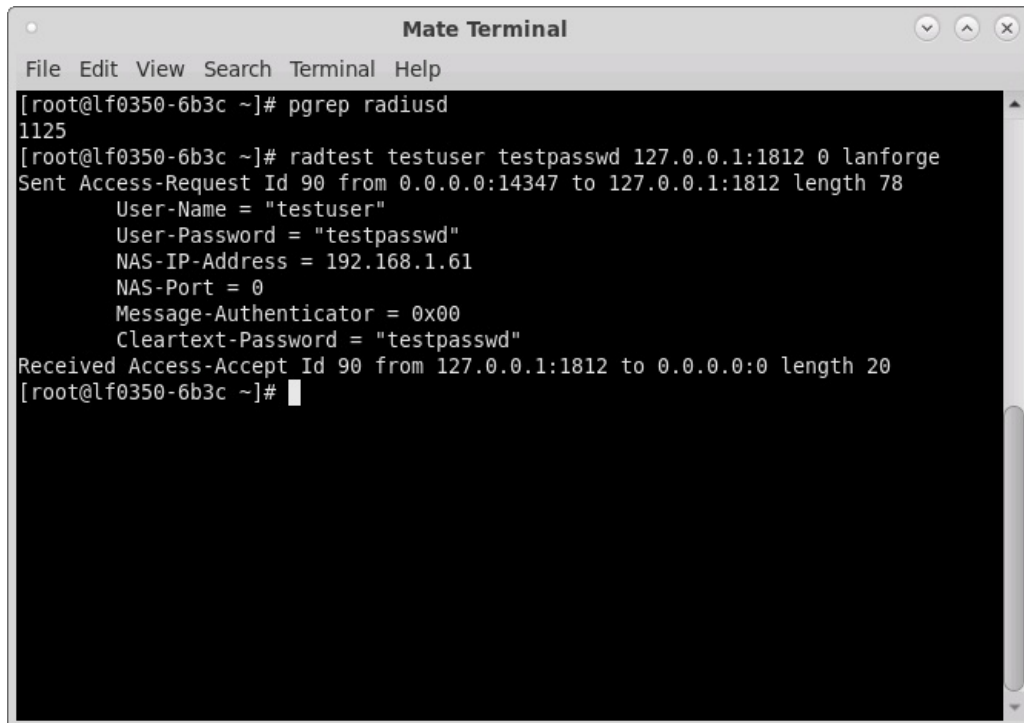
Print Display Logs Probe Display Scan Sync Apply OK Cancel

C. Add DHCP Service for the second AP:

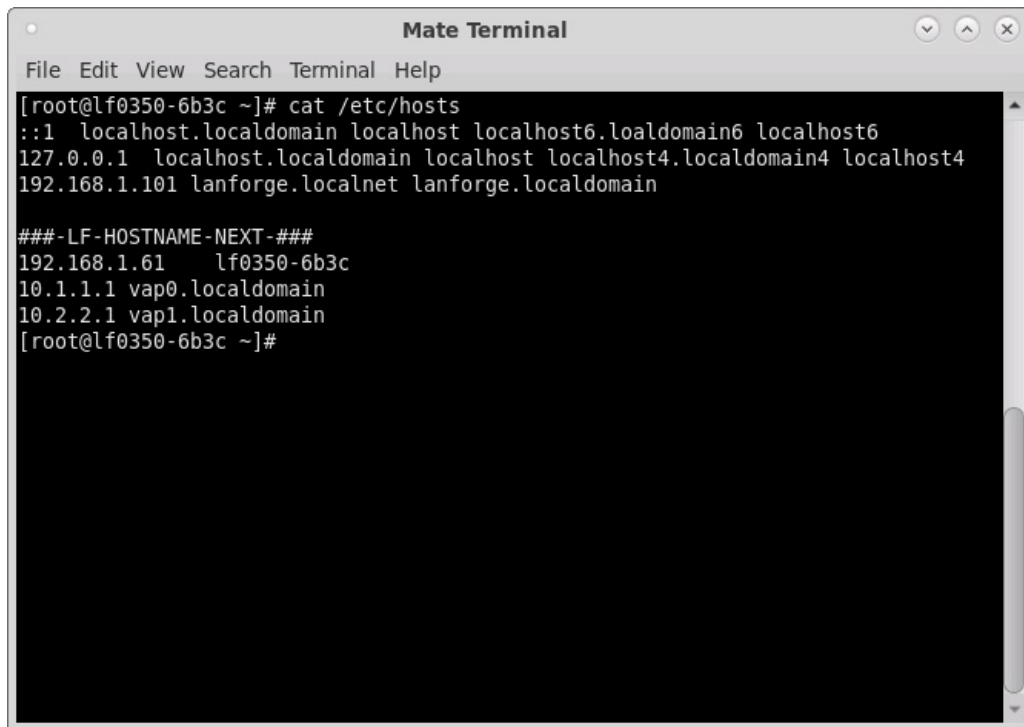


3. Verify FreeRadius is running and setup /etc/hosts file.

A. FreeRadius is installed on the LANforge system by default with the TTLS user/pass credentials **testuser / testpasswd**.

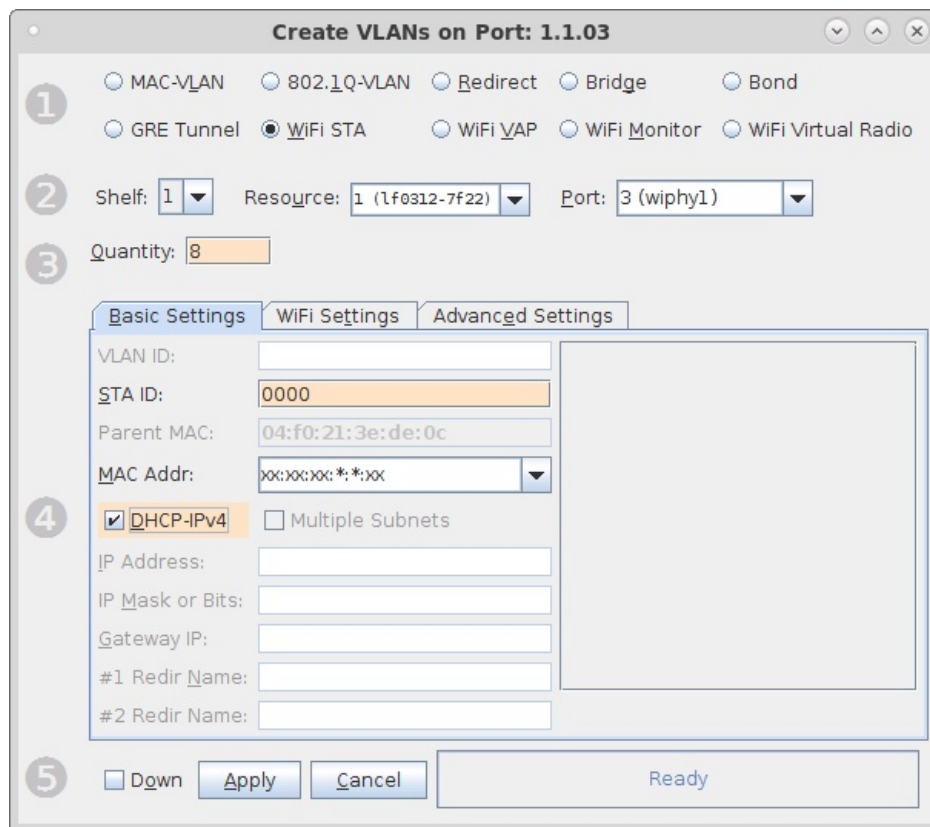


B. Edit /etc/hosts to add local domain names for each AP.



4. Create EAP-TTLS (802.1X username + password authentication) for one or more clients.

A. Create stations.



B. The SSID and Key/Password do not need to be configured when using HotSpot 2.0:

**sta0000 (If0312-7f22) Configure Settings**

Port Status Information  
Current: DOWN LINK-DOWN GRO NONE  
Driver Info: Port Type: WIFI-STA Parent: wiphy1 wiphy1...

Port Configurables

Standard Configuration | Advanced Configuration | Misc Configuration | Corruptions | Custom WiFi

**Enable**

- Set MAC
- Set TX Q Len
- Set MTU
- Set Offload
- Set PROMISC

**Services**

- HTTP
- FTP
- DNS
- RADIUS
- IPSEC-Client
- IPsec-Upstream

**Low Level**

- PROMISC
- TSO Enabled
- UFO Enabled
- GSO Enabled
- LRO Enabled
- GRO Enabled

**General Interface Settings**

- Down  Aux-Mgt
- DHCP-IPv6  DHCP Release
- DHCP-IPv4 **Secondary-IPs**
- DNS Servers: BLANK
- IP Address: 0.0.0.0
- IP Mask: 0.0.0.0
- Gateway IP: 0.0.0.0
- Alias:
- MAC Addr: 04:f0:21:02:17:0c
- Rpt Timer: faster (1 s)
- IPSec GW: 0.0.0.0
- IPSec Local ID.:
- DHCP Hostname: None
- DHCP Vendor ID: None
- DHCP Client ID: None
- Peer IP: NA
- Global IPv6: AUTO
- Link IPv6: AUTO
- IPv6 GW: AUTO
- MTU: 1500
- TX Q Len: 1000
- WiFi Bridge: NONE
- IPSec Password:
- IPSec Remote ID.:

**WiFi Settings**

- SSID: [BLANK] AP: DEFAULT
- Key/Phrase: [?] Mode: 802.11abgn-AC
- Freq/Channel: 0/0 Rate: 0S Default
- WPA  WPA2  WPA3  OSEN  WEP
- Disable HT40  Enable VHT160  Disable SGI

Print | Display | Probe | Display Scan | Sync | Apply | OK | Cancel

- C. Select the **Advanced Configuration** tab in the Port-Modify window and configure the 802.1x, 802.11u, HotSpot 2.0 and other information. The **EAP Identity** and **EAP Password** must match the configuration on your RADIUS server.

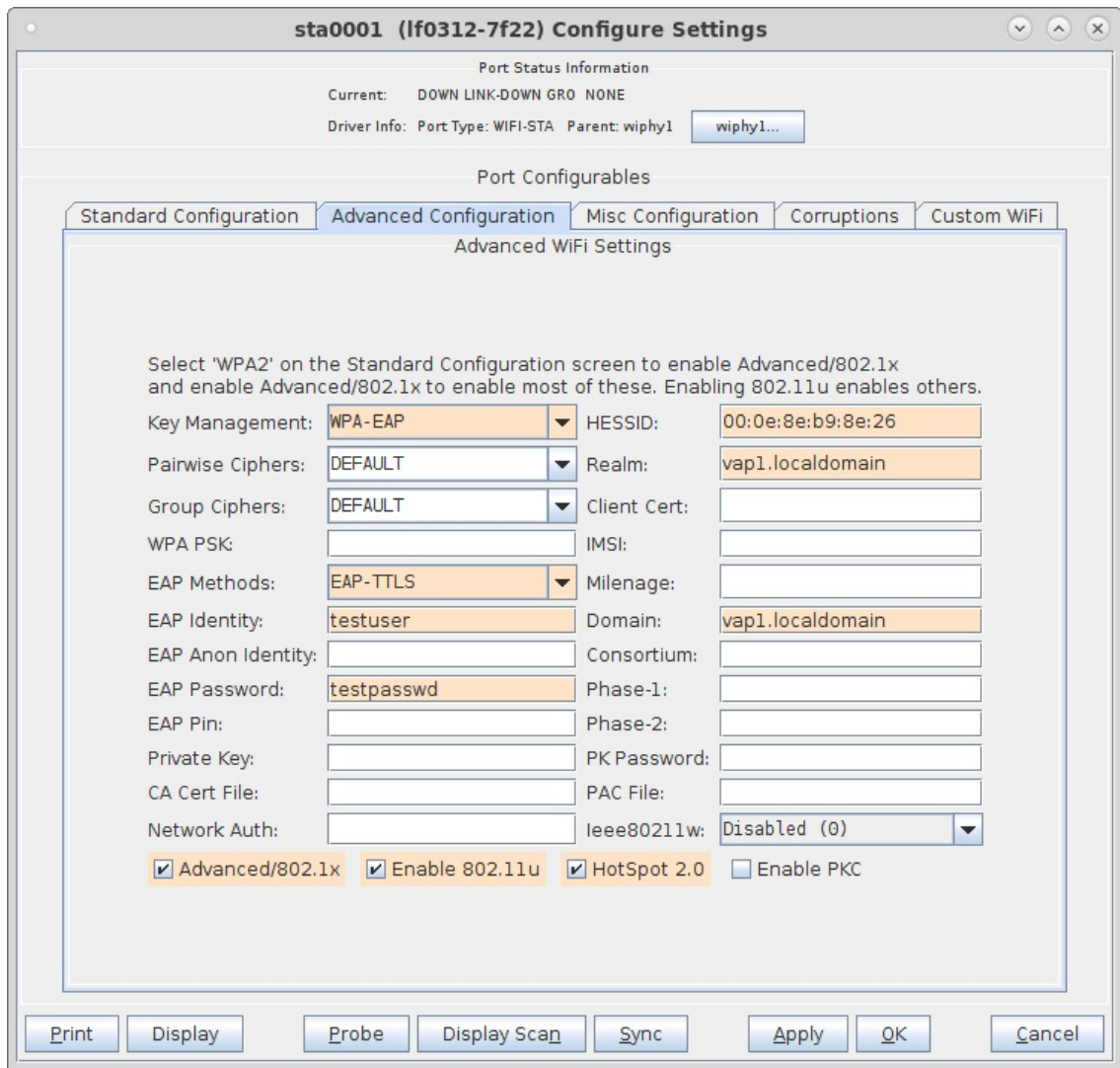
The screenshot shows a window titled "sta0000 (If0312-7f22) Configure Settings". At the top, it displays "Port Status Information" with "Current: DOWN LINK-DOWN GRO NONE" and "Driver Info: Port Type: WIFI-STA Parent: wiphy1" with a "wiphy1..." button. Below this is the "Port Configurables" section, which includes tabs for "Standard Configuration", "Advanced Configuration" (selected), "Misc Configuration", "Corruptions", and "Custom WiFi". The "Advanced WiFi Settings" section contains the following fields:

Select 'WPA2' on the Standard Configuration screen to enable Advanced/802.1x and enable Advanced/802.1x to enable most of these. Enabling 802.11u enables others.

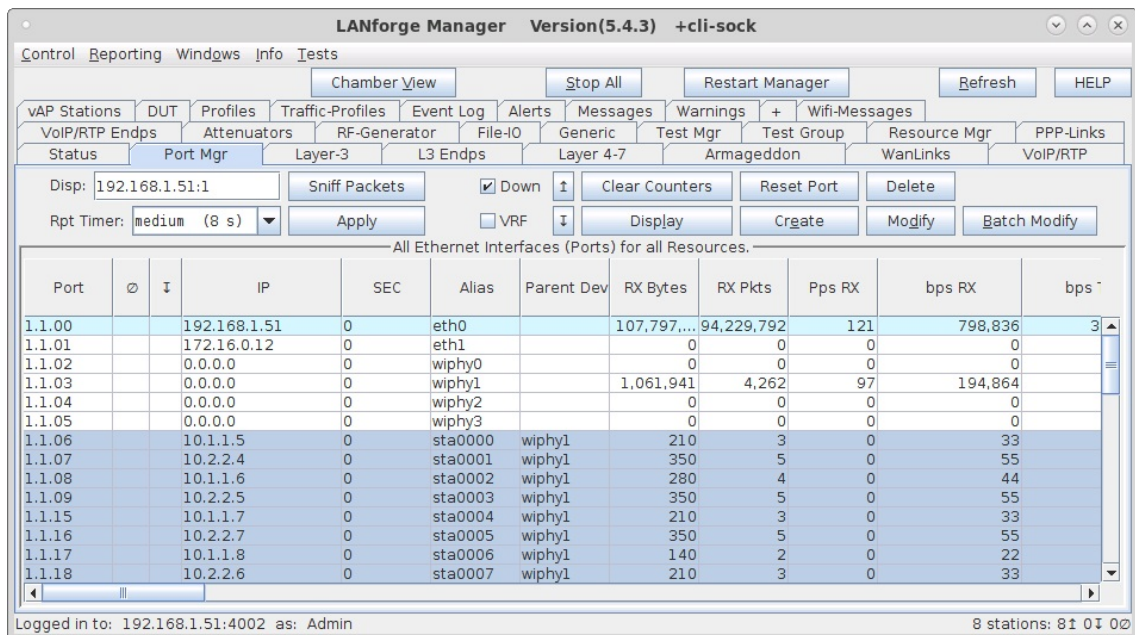
Key Management:	WPA-EAP	HESSID:	04:f0:21:d1:e7:79
Pairwise Ciphers:	DEFAULT	Realm:	vap0.localdomain
Group Ciphers:	DEFAULT	Client Cert:	
WPA PSK:		IMSI:	
EAP Methods:	EAP-TTLS	Milenage:	
EAP Identity:	testuser	Domain:	vap0.localdomain
EAP Anon Identity:		Consortium:	
EAP Password:	testpasswd	Phase-1:	
EAP Pin:		Phase-2:	
Private Key:		PK Password:	
CA Cert File:		PAC File:	
Network Auth:		ieee80211w:	Disabled (0)

At the bottom of the settings area, there are four checkboxes:  Advanced/802.1x,  Enable 802.11u,  HotSpot 2.0, and  Enable PKC. The bottom of the window features buttons for "Print", "Display", "Probe", "Display Scan", "Sync", "Apply", "OK", and "Cancel".

D. The next station is setup with the HESSID and Realm of the second access point.



E. Verify stations connect and obtain DHCP IP address configuration.



For more information see [WiFi Station Cookbook](#)