

LANforge WiFi testing with HotSpot 2.0

Goal: Authenticate using HotSpot 2.0, 802.11u, and 802.1x EAP-TTLS and EAP-TLS. Requires LANforge 5.2.10 or later. Create a Virtual AP configured for HotSpot 2.0 and RADIUS (802.1x) authentication. Create two Station interfaces, one connecting with EAP-TLS and one with EAP-TTLS. This example uses two LANforge CT520 systems but the procedure should work on all CT521, CT522, CT523, CT525 and similar systems.





- 1. Create a virtual AP on wiphy0 of Resource 1. (Skip this if you are using your own AP)
 - A. Go to the Port Manager tab, select wiphy0 on proper resource, click Create, fill out appropriate information and create basic Virtual AP interface.

B. The new VAP should appear in the Port-Mgr table. Double-click to modify. Configure IP Address information, SSID and select WPA2:

| Port Status Information Current: LINK-UP GRO NONE Driver Info: Port Type: WIFI-AP Parent: wiphy0 Port Configurables Standard Configuration Advanced Configuration Misc Configuration Enable General Interface Settings | | | | | | | |
|---|--|--|--|--|--|--|--|
| Current: LINK-OP GRO NONE Driver Info: Port Type: WIFI-AP Parent: wiphy0 Port Configurables Standard Configuration Advanced Configuration Misc Configuration Enable General Interface Settings | | | | | | | |
| Port Configurables Standard Configuration Advanced Configuration Misc Configuration Enable General Interface Settings Set IF Daym | | | | | | | |
| Port Configurables Standard Configuration Advanced Configuration Misc Configuration Enable General Interface Settings | | | | | | | |
| Standard Configuration Advanced Configuration Misc Configuration Enable General Interface Settings | | | | | | | |
| Enable General Interface Settings | | | | | | | |
| | | | | | | | |
| □ DHCP-IPv6 ▷ DHCP Release □ Down □ Aux-Mgt | | | | | | | |
| Set MAC DHCP-IPv4 Secondary-IPs DHCP Client ID: None | | | | | | | |
| DNS Servers: BLANK Peer IP: NA | | | | | | | |
| IP Address: 10.97.1.1 Global IPv6: AUTO | | | | | | | |
| IP Mask: 255.255.0.0 Link IPv6: AUTO | | | | | | | |
| Gateway IP: 0.0.0.0 IPv6 GW: AUTO | | | | | | | |
| Alias: MTU: 1500 | | | | | | | |
| MAC Addr: 00:0e:8e:c3:19:79 TX Q Len 1000 | | | | | | | |
| Rpt Timer: medium (8 s) ViFi Bridge: NONE | | | | | | | |
| WiFi Settings | | | | | | | |
| ABCD-1234 V AP: DEFAULT | | | | | | | |
| PROMISC Key/Phrase: Mode: 802.11abqn | | | | | | | |
| TSO Enabled Freq/Channel: 5745/149 Rate: OS Default | | | | | | | |
| UFO Enabled DTIM-Period: 2 Max-STA: 2007 | | | | | | | |
| GSO Enabled Beacon: 240 | | | | | | | |
| LRO Enabled Use WPA 🛛 Use WPA2 Use WEP Disable HT40 Disable SGI | | | | | | | |
| GRO Enabled Verbose Debug | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Print View Details Logs 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, RADIUS and other information. The RADIUS server can be the LANforge machine when freeradius is installed via If_kinstall.pl --do_radius ... then just copy the client.p12 and ca.pem from the /home/lanforge/ directory on the RADIUS LANforge machine to the Station machine(s) and configure the stations to use those key files. Or, use your own RADIUS server and copy key files as appropriate:

| vap1 (lf0301-1n-f17-32) Configure Settings | | | | | | | |
|--|------------------------|-----|----------------|-------------------------------------|--|--|--|
| Port Status Information | | | | | | | |
| Current: LINK-UP GRO NONE | | | | | | | |
| Driver Info: Port Type: WIFI-AP Parent: wiphy0 | | | | | | | |
| Port Configurables | | | | | | | |
| Standard Configuration Advanced Configuration Misc Configuration | | | | | | | |
| | Advan | ced | 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. | | | | | | | |
| Ignore Probes: | zero (0%) | - | HESSID: | 00:00:00:00:01 | | | |
| Ignore Auth-Assoc: | zero (0%) | - | Realm: | 0,lanforge.com,13[5:6],21[2:4][5:7] | | | |
| Ignore Assoc: | zero (0%) | - | IMSI: | | | | |
| Ignore Re-Assoc: | zero (0%) | - | Milenage: | | | | |
| Corrupt GTK: | zero (0%) | • | Domain: | lanforge.com | | | |
| HS20 Capabilities | | | Consortium: | | | | |
| HS20 Oper Class | 517C | | RADIUS IP | 127.0.0.1 | | | |
| HS20 WAN Metrics | 01:8000:1000:80:240:30 | 00 | RADIUS Port | 1812 | | | |
| leee80211w: | Disabled (0) | - | RADIUS Secret | lanforge | | | |
| Venue Group: | Business (2) | - | Venue Type: | Private Residence (1) | | | |
| Network Type: | Personal (4) | - | Address Types: | Public IPv4 (4) | | | |
| Network Auth: | 00 | | 3GPP Cell Net: | 244,91;310,026;234,56 | | | |
| 🗹 Use 80211d 🔄 Use 80211h 🔄 Short-Preamble | | | | | | | |
| ✓ Advanced/802.1x ✓ HotSpot 2.0 Disable DGAF | | | | | | | |
| 🗹 Enable 802.11u 🗹 802.11u Internet 🗌 802.11u ASRA 🗹 802.11u ESR 🗹 802.11u UESA | | | | | | | |
| Print View Details Logs Probe Display Scan Sync Apply OK Cancel | | | | | | | |
| | | | | | | | |

D. Use Netsmith to create Virtual-Router. Add the vapX interface to the Virtual router, configure the Virtual Router port object to serve DHCP. Optionally, add external Ethernet interface to virtual router so that it can route to upstream networks. You could also set up the VAP in bridge mode and use external DHCP server if preferred.

For more information see LANforge User's Guide: Ports (Interfaces), VAP Bridge Mode Cookbook, Virtual Router with DHCP Cookbook (Skip the WanLink portion)

- 2. Create EAP-TLS (key certificate authentication) Station on wiphy0 of the second LANforge Resource.
 - A. Go to the Port Manager tab, select wiphy0 on proper resource, click Create, fill out appropriate information and create a basic Virtual Station interface.

B. The new Station should appear in the Port-Mgr table. Double-click to modify. Select WPA2. The SSID and Key/Password do not need to be configured when using HotSpot 2.0:

| Port Status Information Current: LINK-UP GRO Authorized Driver Info: Port Type: WIFI-STA Parent: wiphy0 | | | | | | | | |
|---|--|--|---|----------------------------|--|--|--|--|
| Port Configurables | | | | | | | | |
| Standard Configur | ation Advance | ed Configuration | Misc Configuratio | on | | | | |
| Set IF Down | | DHCP Release | DHCP Client ID: | Aux-Mgt | | | | |
| Set TX Q Len Set MTU | DNS Servers: | BLANK | Peer IP: Global IPv6: | | | | | |
| Set Offload | IP Mask: Gateway IP: | 0.0.0.0 | Link IPv6: | | | | | |
| | Alias: MAC Addr: | 00:0e:8e:30:9d:69 | MTU: TX Q Len | 1500 1000 | | | | |
| Low Level | Rpt Timer: | medium (8 s) 🔻 | WiFi Bridge: | NONE | | | | |
| ☐ PROMISC ☐ TSO Enabled ☐ UFO Enabled ☐ GSO Enabled ☐ LRO Enabled ☑ GRO Enabled | SSID: Key/Phrase: Freq/Channel: Use WPA | WiFi: [BLANK] ▼ AP: Mod : 5745/149 Rate V Use WPA2 Use | Settings DEFAULT le: 802.11abqn e: OS Default WEP Disable | ▼ ▼ HT40 Disable SGI | | | | |
| Minu Dataila | Derke | | | | | | | |

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 is required, but it may not matter what value you enter unless your RADIUS server has specific requirements. The LANforge RADIUS server does not care. The Private Key and CA Cert File should come from the /home/lanforge directory on the RADIUS machine if using LANforge for the RADIUS server, or from your own RADIUS server's machine if using your own RADIUS.

| 0 | wlan0 (ct523-3n-f20) Configure Settings | | | | | | | | |
|---|---|------|----------------|----------------|---|--|--|--|--|
| Port Status Information | | | | | | | | | |
| | Current: LINK-UP GRO Authorized | | | | | | | | |
| | Driver Info: Port Type: WIFI-STA Parent: wiphy0 | | | | | | | | |
| | Port Configurables | | | | | | | | |
| Standard Configurat | ion Advanced Confi | gui | ration Misc Co | onfiguration | _ | | | | |
| | Advance | ed 1 | WiFi Settings | | 1 | | | | |
| 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: | 00:00:00:00:00 | | | | | |
| Pairwise Ciphers: | CCMP TKIP | • | Realm: | lanforge.com | | | | | |
| Group Ciphers: | All | - | Client Cert: | | | | | | |
| WPA PSK: | | | IMSI: | | | | | | |
| EAP Methods: | EAP-TLS | - | Milenage: | | | | | | |
| EAP Identity: | lanforge | | Domain: | lanforge.com | | | | | |
| EAP Anon Identity: | | | Consortium: | | | | | | |
| EAP Password: | | | Phase-1: | | | | | | |
| EAP Pin: | | | Phase-2: | | | | | | |
| Private Key: | /home/lanforge/client.p | 12 | PK Password: | lanforge | | | | | |
| CA Cert File: | /home/lanforge/ca.pem | | PAC File: | | | | | | |
| Network Auth: | | | leee80211w: | Disabled (0) 👻 | | | | | |
| ✓ Advanced/802.1x ✓ Enable 802.11u ✓ HotSpot 2.0 🗌 Enable PKC | | | | | | | | | |
| | | | | | | | | | |
| Print View Details Probe Display Scan Sync Apply OK Cancel | | | | | | | | | |

D. Verify Station connects and obtains DHCP IP Address configuration.

For more information see WiFi Station Cookbook

- 3. Create EAP-TTLS (802.1x username + password authentication) Station on wiphy0 of the second LANforge Resource.
 - A. Go to the Port Manager tab, select wiphy0 on proper resource, click Create, fill out appropriate information and create another basic Virtual Station interface.

B. The new Station should appear in the Port-Mgr table. Double-click to modify. Select WPA2. The SSID and Key/Password do not need to be configured when using HotSpot 2.0:

| Port Status Information Current: LINK-UP GRO Authorized Driver Info: Port Type: WIFI-STA Parent: wiphy1 | | | | | | | |
|---|---------------|-------------------|-----------------|--------------------|--|--|--|
| Port Configurables | | | | | | | |
| Standard Configuration Advanced Configuration Misc Configuration | | | | | | | |
| Enable — | | General Inte | erface Settings | | | | |
| Set IF Down | DHCP-IPv6 | ☑ DHCP Release | Down | Aux-Mgt | | | |
| Set MAC | DHCP-IPv4 | Secondary-IPs | DHCP Client ID: | None | | | |
| Set TX Q Len | DNS Servers: | BLANK | Peer IP: | NA | | | |
| Set MTU | IP Address: | 0.0.0.0 | Global IPv6: | AUTO | | | |
| Set Offload | IP Mask: | 0.0.0.0 | Link IPv6: | AUTO | | | |
| Set PROMISC | Gateway IP: | 0.0.0.0 | IPv6 GW: | AUTO | | | |
| Services— | Alias: | | MTU: | 1500 | | | |
| | MAC Addr: | 00:0e:8e:3d:30:e3 | TX Q Len | 1000 | | | |
| | Rpt Timer: | medium (8 s) 🔻 | WiFi Bridge: | NONE | | | |
| | | WIEL | Cattings | | | | |
| TSO Enabled | | VVIET: | settings | | | | |
| UFO Enabled | SSID: | [BLANK] | DEFAULT | | | | |
| GSO Enabled | Key/Phrase: | Mod | le: 802.11abqn | | | | |
| LRO Enabled | Freq/Channel: | 5745/149 Rate | e: OS Default | • | | | |
| GRO Enabled | Use WPA | V Use WPA2 🗌 Use | WEP 🗌 Disable | HT40 🗌 Disable SGI | | | |

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. LANforge RADIUS defaults to: testuser, testpasswd when freeradius is installed via If_kinstall.pl -do_radius. Phase-2 must be configured as shown for EAP-TTLS with MSCHAPV2.

| wlan1 (ct523-3n-f20) Configure Settings | | | | | | | | |
|--|--|-----|-----------------|----------------|--|--|--|--|
| Port Status Information | | | | | | | | |
| Current: LINK-UP GRO Authorized | | | | | | | | |
| | Driver Info: Port Type: WIFI-STA Parent: wiphy1 | | | | | | | |
| Port Configurables | | | | | | | | |
| Standard Configurat | Standard Configuration Advanced Configuration Misc Configuration | | | | | | | |
| | Advar | nce | d WiFi Settings | | | | | |
| Select 'WPA2' on the and enable Advance | 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: | 00:00:00:00:00 | | | | |
| Pairwise Ciphers: | CCMP TKIP | Ŧ | Realm: | lanforge.com | | | | |
| Group Ciphers: | All | • | Client Cert: | | | | | |
| WPA PSK: | | | IMSI: | | | | | |
| EAP Methods: | EAP-TTLS | • | Milenage: | | | | | |
| EAP Identity: | testuser | | Domain: | lanforge.com | | | | |
| EAP Anon Identity: | | | Consortium: | | | | | |
| EAP Password: | testpasswd | | Phase-1: | | | | | |
| EAP Pin: | | | Phase-2: | auth=MSCHAPV2 | | | | |
| Private Key: | | | PK Password: | | | | | |
| CA Cert File: | | | PAC File: | | | | | |
| Network Auth: | | | leee80211w: | Disabled (0) 🗸 | | | | |
| Advanced/802.1x Enable 802.11u HotSpot 2.0 Enable PKC | | | | | | | | |
| | | | | | | | | |
| Print View Details Probe Display Scan Sync Apply OK Cancel | | | | | | | | |

D. Verify Station connects and obtains DHCP IP Address configuration.

For more information see WiFi Station Cookbook

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