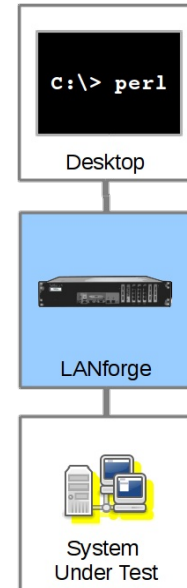


Associating stations with the `lf_associate_ap` script.

Goal: Create, destroy, start and stop virtual stations without needing to use the LANforge GUI.

Automated wireless traffic is possible using the `lf_associate_ap.pl` script. This script can be run within the LANforge server or outside the LANforge Server (on a windows desktop). The output of the script should be redirected to a text file if you want to review the results. Use this file in conjunction with the `lf_fi_remod.pl` script to create traffic. Requires a LANforge CT520 (or better) system and an access point.



Script Capabilities

The `lf_associate_ap.pl` script has many options, but here are the basic actions:

- Create stations and cross connects with them, running traffic for a specified amount of time (action: step1)
- Generate stress on the AP by repeatedly bringing up stations and taking them down (action: step2).

Before you begin

1. We assume you have a separate WiFi access point in routed mode. These examples can be used on a CT523 (or better) system with more than one radio if you want to practice the techniques. You would dedicate a radio to be a virtual AP ([see cookbook](#)).
2. For these examples, our AP will be open with no username or password, and the SSID will be **jedtest**
3. If you want to run scripts from your Windows desktop, you have ActivePerl installed.

Creating a virtual station with traffic

Using `lf_associate_ap` on Windows

1. In the LANforge GUI, we will inspect our `wiphy0` radio.

LANforge Manager Version(5.3.3)

Control Reporting Tear-Off Info Plugins

Stop All Restart Manager Refresh HELP

File-IO Layer-4 Generic Test Mgr Test Group Resource Mgr Event Log Alerts Port Mgr Messages

Status Layer-3 L3 Endps VoIP/RTP VoIP/RTP Endps Armageddon WanLinks Attenuators Collision-Domains

Disp: 192.168.100.178:0.0 Sniff Packets Clear Counters Reset Port Delete

Rpt Timer: medium (8 s) Apply View Details Create Modify Batch Modify

All Ethernet Interfaces (Ports) for all Resources.

Port	Phan...	Down	IP	SEC	Alias	Parent Dev	RX Bytes	RX Pkts	Pps RX	bps RX	TX Bytes
1.2.08	<input type="checkbox"/>	<input type="checkbox"/>	10.26.2.5	0	br2		0	0	0	0	1,006
1.1.0	<input type="checkbox"/>	<input type="checkbox"/>	192.168.100.26	0	eth0		34,000,280	43,610	20	109,478	46,409,344
1.2.00	<input type="checkbox"/>	<input type="checkbox"/>	192.168.100.42	0	eth0		42,404,600	44,639	6	6,116	32,655,592
1.1.1	<input type="checkbox"/>	<input type="checkbox"/>	10.26.1.2	0	eth1		17,427	160	0	0	950
1.2.01	<input type="checkbox"/>	<input type="checkbox"/>	10.26.1.1	0	eth1		17,427	160	0	0	1,494
1.2.09	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	vap0	wiphy0	0	0	0	0	0
1.2.10	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	vap2	wiphy2	0	0	0	0	0
1.1.2	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	wiphy0		0	0	0	0	0
1.2.02	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	wiphy0		1,715	8	0	0	0
1.1.3	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	wiphy1		0	0	0	0	0
1.2.03	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	wiphy1		0	0	0	0	0
1.1.4	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	wiphy2		0	0	0	0	0
1.2.04	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	wiphy2		1,839	7	0	0	0
1.1.5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	wlan0	wiphy0	0	0	0	0	0
1.2.05	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	wlan0	wiphy0	0	0	0	0	0
1.1.6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	wlan1	wiphy1	0	0	0	0	0
1.2.06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	wlan1	wiphy1	0	0	0	0	0
1.1.7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	wlan2	wiphy2	0	0	0	0	0
1.2.07	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.0.0.0	0	wlan2	wiphy2	0	0	0	0	0

Logged in to: 192.168.100.26:4002 as: Admin

And the radio should be set to channel -1 AUTO

wiphy0 (jedtest.candelatech.com) Configure Settings

Port Status Information

Current: LINK-DOWN NONE

Driver Info: Port Type: WIFI-Radio Driver: ath9k() Bus:

Port Configurables

Enable

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

General Interface Settings

Down Aux-Mgt

DHCP-IPv6 DHCP Release DHCP Vendor ID: None

DHCP-IPv4 Secondary-IPs DHCP Client ID: None

DNS Servers: BLANK Peer IP: NA

IP Address: 0.0.0.0 Global IPv6: AUTO

IP Mask: 0.0.0.0 Link IPv6: AUTO

Gateway IP: 0.0.0.0 IPv6 GW: AUTO

Alias: MTU: 1500

MAC Addr: 00:0e:8e:4e:5a:56 TX Q Len: 0

Rpt Timer: medium (8 s) WiFi Bridge: NONE

WiFi Settings

Max-VIFs: 2048 Max-Stations: 2048 Max-APs: 8 Supports: 802.11abgn

Country: United States (840)

Channel/Freq: AUTO (-1 Mhz)

Antenna: All Tx-Power: DEFAULT

RTS: DEFAULT Frag: 2346

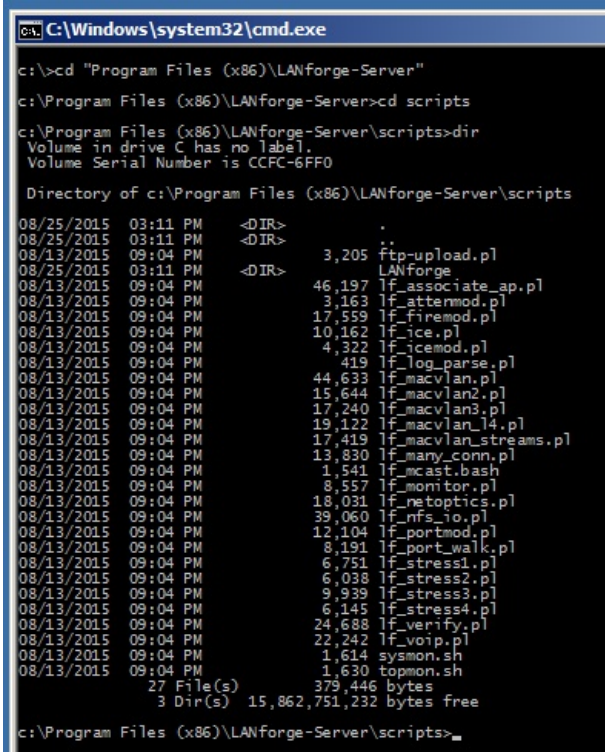
Verbose Debug

Print View Details Logs Probe Sync Apply OK Cancel

i CMD window shortcut: `Win R cmd ↵`

i LANforge Scripts are at `C:\Program Files\LANforge-Server\scripts`

2. `cd C:\Program Files\LANforge-Server\scripts`



```
C:\Windows\system32\cmd.exe
c:\>cd "Program Files (x86)\LANforge-Server"
c:\Program Files (x86)\LANforge-Server>cd scripts
c:\Program Files (x86)\LANforge-Server\scripts>dir
Volume in drive C has no label.
Volume Serial Number is CCFC-6FF0

Directory of c:\Program Files (x86)\LANforge-Server\scripts
08/25/2015  03:11 PM    <DIR>          .
08/25/2015  03:11 PM    <DIR>          ..
08/13/2015  09:04 PM             3,205  ftp-upload.pl
08/25/2015  03:11 PM    <DIR>          LANforge
08/13/2015  09:04 PM          46,197  lf_associate_ap.pl
08/13/2015  09:04 PM           3,163  lf_attemod.pl
08/13/2015  09:04 PM          17,559  lf_firemod.pl
08/13/2015  09:04 PM          10,162  lf_ice.pl
08/13/2015  09:04 PM           4,322  lf_icepod.pl
08/13/2015  09:04 PM           419    lf_log_parse.pl
08/13/2015  09:04 PM          44,633  lf_macvlan.pl
08/13/2015  09:04 PM          15,644  lf_macvlan2.pl
08/13/2015  09:04 PM          17,240  lf_macvlan3.pl
08/13/2015  09:04 PM          19,122  lf_macvlan_14.pl
08/13/2015  09:04 PM          17,419  lf_macvlan_streams.pl
08/13/2015  09:04 PM          13,830  lf_many_conn.pl
08/13/2015  09:04 PM           1,541  lf_mcast_bash
08/13/2015  09:04 PM           8,557  lf_monitor.pl
08/13/2015  09:04 PM          18,031  lf_netoptics.pl
08/13/2015  09:04 PM          39,060  lf_nfs_io.pl
08/13/2015  09:04 PM          12,104  lf_portmod.pl
08/13/2015  09:04 PM           8,191  lf_port_walk.pl
08/13/2015  09:04 PM           6,751  lf_stress1.pl
08/13/2015  09:04 PM           6,038  lf_stress2.pl
08/13/2015  09:04 PM           9,939  lf_stress3.pl
08/13/2015  09:04 PM           6,145  lf_stress4.pl
08/13/2015  09:04 PM          24,688  lf_verify.pl
08/13/2015  09:04 PM          22,242  lf_voip.pl
08/13/2015  09:04 PM           1,614  sysmon.sh
08/13/2015  09:04 PM           1,630  topmon.sh
                27 File(s)          379,446 bytes
                3 Dir(s)    15,862,751,232 bytes free

c:\Program Files (x86)\LANforge-Server\scripts>
```

3. `perl .\lf_associate_ap.pl --help` Will show you the script options.

```

C:\Windows\system32\cmd.exe
c:\Program Files (x86)\LANforge-Server\scripts>perl .\lf_associate_ap.pl --help
Unknown option: help
.\lf_associate_ap.pl [--mgr {host-name | IP}]
  [--mgr_port {ip port}] # use if on non-default management port
  [--resource {resource}] # use if multiple lanforge systems; defaults to 1
  [--quiet {yes | no}] # debug output; -q

## AP selection
[--radio {name}] # e.g. wiphy2
[--ssid {ssid}] # e.g. jedtest
[--security {open|wep|wpa|wpa2}] # station authentication type
[--passphrase {...}] # implies wpa2 if --security not set
[--wifi_mode {a|abg|abgn|abgnAC|an|anAC|b|bg|bgn|g}]

## station configuration
[--num_stations {10}]
[--first_sta {sta100}]
[--first_ip {DHCP |ip address}]
[--netmask {255.255.0.0}]

## connection configuration
[--cxtpe {tcp/tcp6/udp/udp6}] # use a tcp/udp connection, default tcp
[--upstream {name|eth1}]
  # could be AP or could be port on LANforge
  # connected to WAN side of AP
[--bps-min {10000000}] # minimum tx bps
[--bps-max {SAME|bps-value}] # maximum tx bps, use SAME or omit for SAME
[--duration {30}] # connection duration, seconds, default 60
[--poll-time {5}] # nap time between connection displays
[--action {step1,step2}]
  # step1: creates <num_stations> stations and L3 connections
  # step2: does bringup test

[--traffic_type {separate|concurrent}]
  # for step1: separate does download then upload
  # concurrent does upload and download at same time

[--db_preload {scenario name}]
  # load this database before creating stations
  # option intended as a cleanup step

[--db_save {name}]
  # save the state of this test scenario after running the
  # connections, before --db_postload

[--db_postload {scenario name}]
  # load this database after running connections,
  # option intended as a cleanup step

Examples:
## connecting to an open AP, at 2Mbps, for 20 minutes
.\lf_associate_ap.pl --action step1 --radio wiphy0 --ssid ap-test-01 \
  --bps-min 2000000 --duration 1200 --upstream eth1

.\lf_associate_ap.pl --action step2 --sta_names tcp-sta1,tcp-sta2,tcp-sta3 --ssid ap-test-01

## using a second lanforge system to connect to wpa2 AP:
.\lf_associate_ap.pl --mgr 192.168.100.1 --resource 2 --radio wiphy2 \
  --ssid jedtest --passphrase 'asdf1234' \
  --num_stations 10 --first_sta sta400 \
  --first_ip DHCP --upstream eth1 --action step1

## (Windows) using a beginning database and saving the resulting database:
C:\Users\bob> cd 'c:\Program Files (x86)\LANforge-Server\scripts'
C:\Program Files (x86)\LANforge-Server\scripts>perl lf_associate_ap.pl --mgr jedtest \
  --resource 2 --radio wiphy2 --first_ip DHCP \
  --duration 10 --bps-min 10k --bps-max 20M --cxtpe tcp \
  --ssid jedtest --passphrase jedtest1 --security wpa2 \
  --first_sta 300 --db_preload Radio2 --db_save run_results --num_stations 3

## connecting to wpa AP:
.\lf_associate_ap.pl --mgr 192.168.100.1 --radio wiphy0 \
  --ssid jedtest --passphrase 'asdf1234' --security wpa \
  --num_stations 10 --first_sta sta400 \
  --first_ip DHCP --upstream eth1 --action step1

c:\Program Files (x86)\LANforge-Server\scripts>


```

4. We can create a virtual station with this command:

```

perl .\lf_associate_ap.pl --resource 1 --resource 1 --mgr jedtest ^
  --action step1 --radio wiphy0 --ssid jedtest ^
  --first_sta sta100 --num_stations 1 --duration 20 ^
  --first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1

```

 Long DOS commands and be continued on the next line with the  character.


```

c:\Program Files (x86)\LANforge-Server\scripts>perl .\lf_associate_ap.pl --resource 1 --resource 1 --mgr jedtest ^
More? --action step1 --radio wiphy0 --ssid jedtest ^
More? --first_sta sta100 --num_stations 1 --duration 20 ^
More? --first_ip DHCP --upstream ethd --security wpa2 --passphrase jedtest1
Removing old cross-connections, and endpoints ...
cx-100 (ep-A100 - ep-B100)... done.
Deleting ports:... sta100 port sta100 not present, not found, done.
Waiting for 1 stations to be removed... sta100_0ld stations removed
Creating new stations: sta100 Created 1 stations
Waiting for stations to associate... 1/1 seen to associate

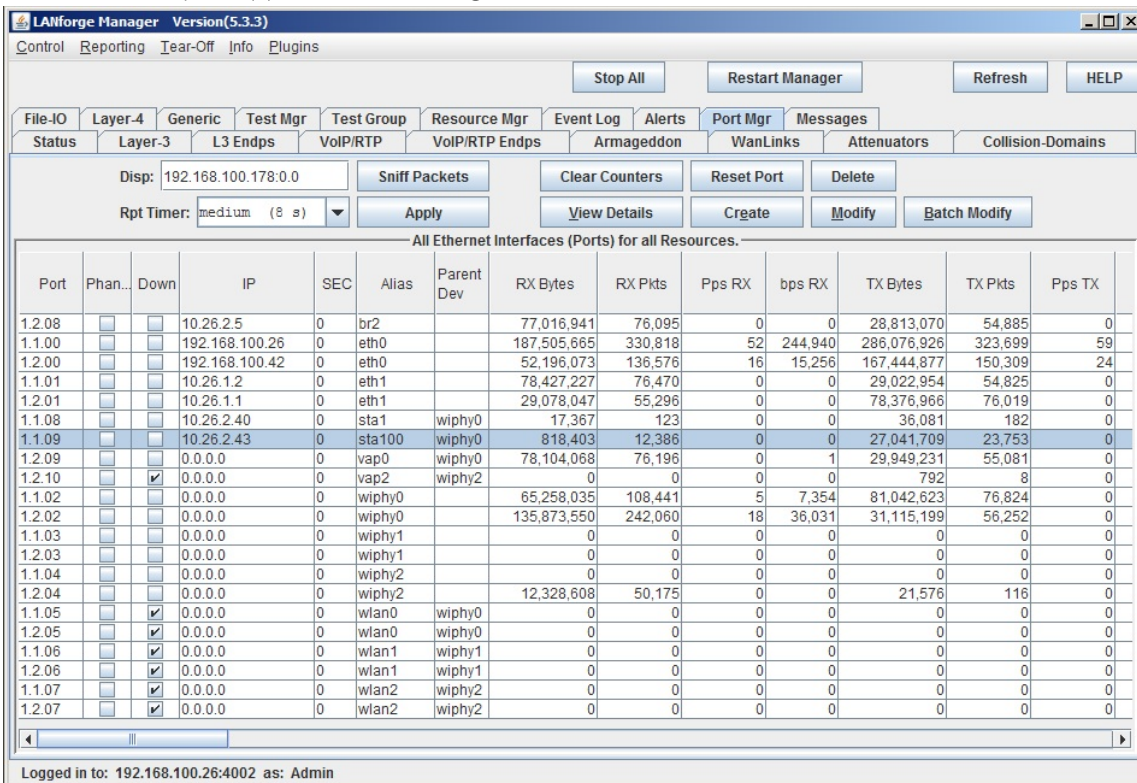
Creating connections: cx-100 (sta100 - ethd), done.
Adjusting cx min/max tx for upload test: cx-100...done.
started uploads.
ep-A100 Rx-bps/Tx-B ep-B100 Rx-bps/Tx-B |
Obps / 6MB 10Mbps / 0B
Obps / 12MB 10Mbps / 0B
Obps / 18MB 10Mbps / 0B
Obps / 24MB 10Mbps / 0B
ep-A100: Tx Bytes: Total: 24998120 Time: 60s Cur: 25000203 416670/s
Rx Bytes: Total: 0 Time: 60s Cur: 0 0/s
ep-B100: Tx Bytes: Total: 0 Time: 60s Cur: 0 0/s
Rx Bytes: Total: 24998120 Time: 60s Cur: 24999369 416656/s
Adjusting tx_rate for download... cx-100...done

Started download...
ep-A100 Rx-bps/Tx-B ep-B100 Rx-bps/Tx-B |
Obps / 0B 0bps / 0B
Obps / 0B 0bps / 0B
Obps / 0B 0bps / 0B
Obps / 0B 0bps / 0B
ep-A100: Tx Bytes: Total: 0 Time: 60s Cur: 0 0/s
Rx Bytes: Total: 0 Time: 60s Cur: 0 0/s
ep-B100: Tx Bytes: Total: 0 Time: 60s Cur: 0 0/s
Rx Bytes: Total: 0 Time: 60s Cur: 0 0/s

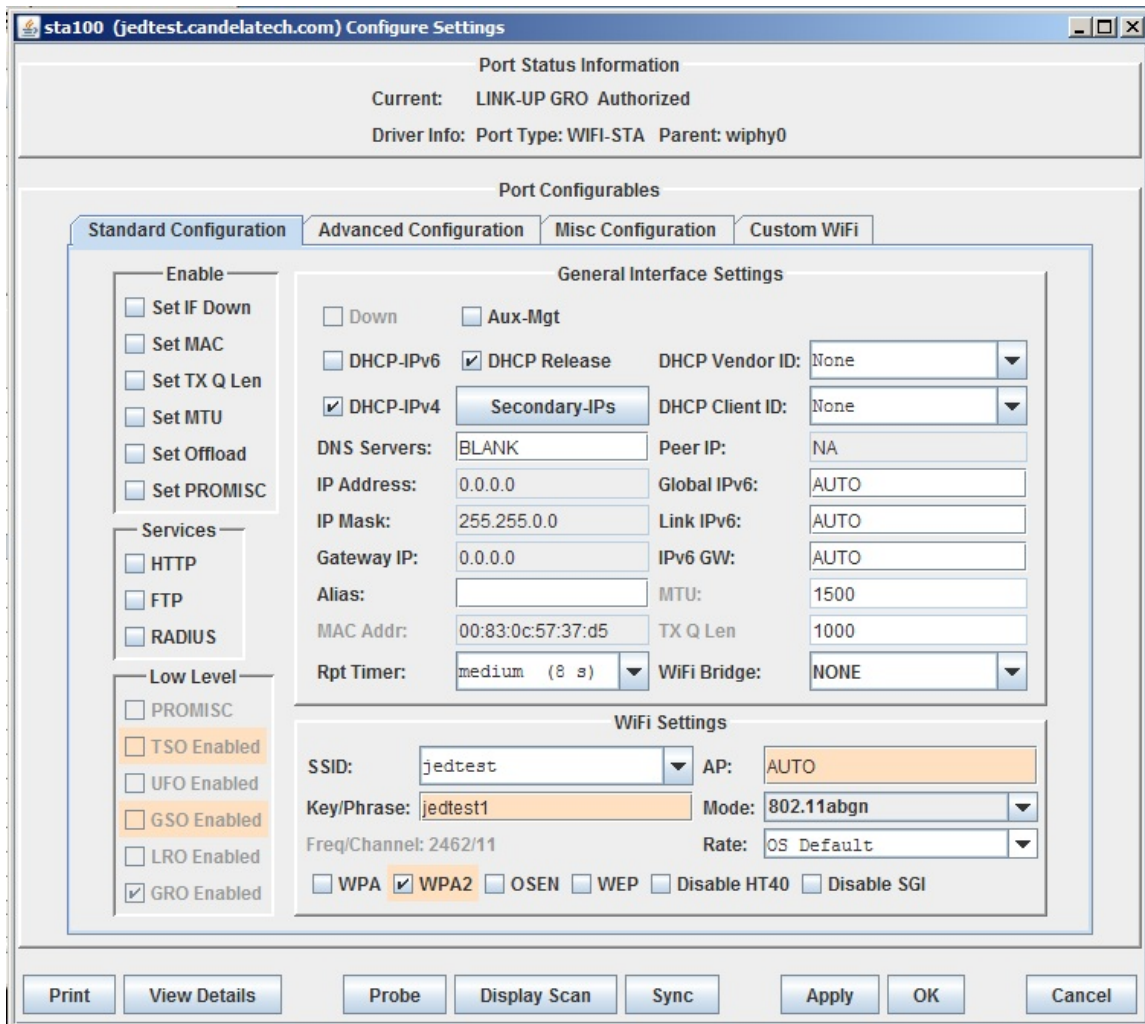
c:\Program Files (x86)\LANforge-Server\scripts>

```

5. We can see the port appear in the LANforge GUI:

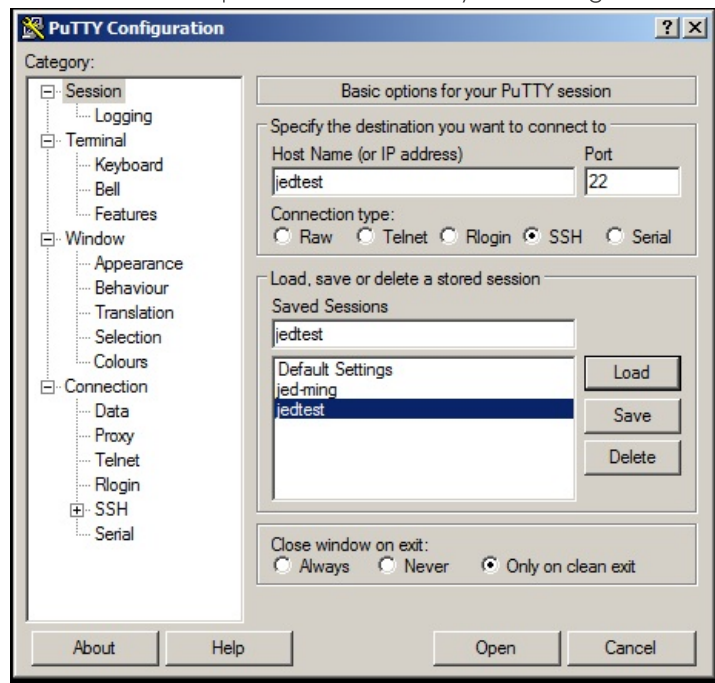


and we can inspect it.



Using `1f_associate_ap` on Linux

1. Double click on your PuTTY icon and open a connection to your LANforge machine.



2. The `1f_associate_ap.pl` script is in the scripts sub directory.

```
lanforge@jedtest:~/scripts
lanforge@jedtest ~
> cd scripts/

lanforge@jedtest ~/scripts
> ls lf_associate_ap.pl
lf_associate_ap.pl

lanforge@jedtest ~/scripts
> ./lf_associate_ap.pl --resource 1 --mgr localhost \
> --action step1 --radio wiphy0 --ssid jedtest \
> --first_sta sta100 --num_stations 1 --duration 20 \
> --first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1
```

3. Our command is basically the same.

i Long shell commands and be continued on the next line with the `\` character.

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 1 --duration 20 \
--first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1
```

4. We will see similar output:

```
lanforge@jedtest ~/scripts
> ./lf_associate_ap.pl --resource 1 --mgr localhost \
> --action step1 --radio wiphy0 --ssid jedtest \
> --first_sta sta100 --num_stations 1 --duration 20 \
> --first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1
Removing old cross-connects, and endpoints ...
cx-100 (ep-A100 - ep-B100)... done.
Deleting ports:...sta100 /9... done.
Waiting for 1 stations to be removed... sta100, Old stations removed
Creating new stations: sta100 Created 1 stations
Waiting for stations to associate... 1/1 seen to associate

Creating connections: cx-100 (sta100 - eth1), done.
Adjusting cx min/max tx for upload test: cx-100...done.
started uploads.
ep-A100 Rx-bps/Tx-B ep-B100 Rx-bps/Tx-B |
0bps / 6MB 10Mbps / 0B |
0bps / 12MB 10Mbps / 0B |
0bps / 18MB 10Mbps / 0B |
0bps / 24MB 10Mbps / 0B |
ep-A100: Tx Bytes: Total: 25190840 Time: 60s Cur: 25244695 420744/s
Rx Bytes: Total: 0 Time: 60s Cur: 0 0/s
ep-B100: Tx Bytes: Total: 0 Time: 60s Cur: 0 0/s
Rx Bytes: Total: 25190840 Time: 60s Cur: 25244273 420737/s
Adjusting tx_rate for download... cx-100...done

Started download...
ep-A100 Rx-bps/Tx-B ep-B100 Rx-bps/Tx-B |
10Mbps / 0B 0bps / 6MB |
10Mbps / 0B 0bps / 12MB |
10Mbps / 0B 0bps / 18MB |
10Mbps / 0B 0bps / 24MB |
ep-A100: Tx Bytes: Total: 0 Time: 60s Cur: 0 0/s
Rx Bytes: Total: 25182080 Time: 60s Cur: 25360022 422667/s
ep-B100: Tx Bytes: Total: 25182080 Time: 60s Cur: 25359597 422659/s
Rx Bytes: Total: 0 Time: 60s Cur: 0 0/s

lanforge@jedtest ~/scripts
>
```

More Traffic Examples

1. Creating Multiple stations that transm

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 20 \
--first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1
```

2. Creating TCP/IP bursty traffic from 30Mbps to 450 Mbps

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 120 \
--first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1 \
--cxttype tcp --bps-min 30Mbps \
--bps-max 450Mbps
```

3. Capturing that report with redirection

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 120 \
--first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1 \
--cxttype tcp --bps-min 30Mbps --bps-max 450Mbps &> report.txt
```

i Both DOS and Linux command output can be saved to a file with the **&>** operator.

i Both DOS and Linux files can be viewed with the **more** command.

4. Creating steady UDP traffic to at 450Mbps

```
$ ./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 120 \
--first_ip DHCP --upstream eth1 --security wpa2 --passphrase jedtest1 \
--cxttype udp --bps-min 450Mbps \
--bps-max SAME &> report.txt
$ more report.txt
```

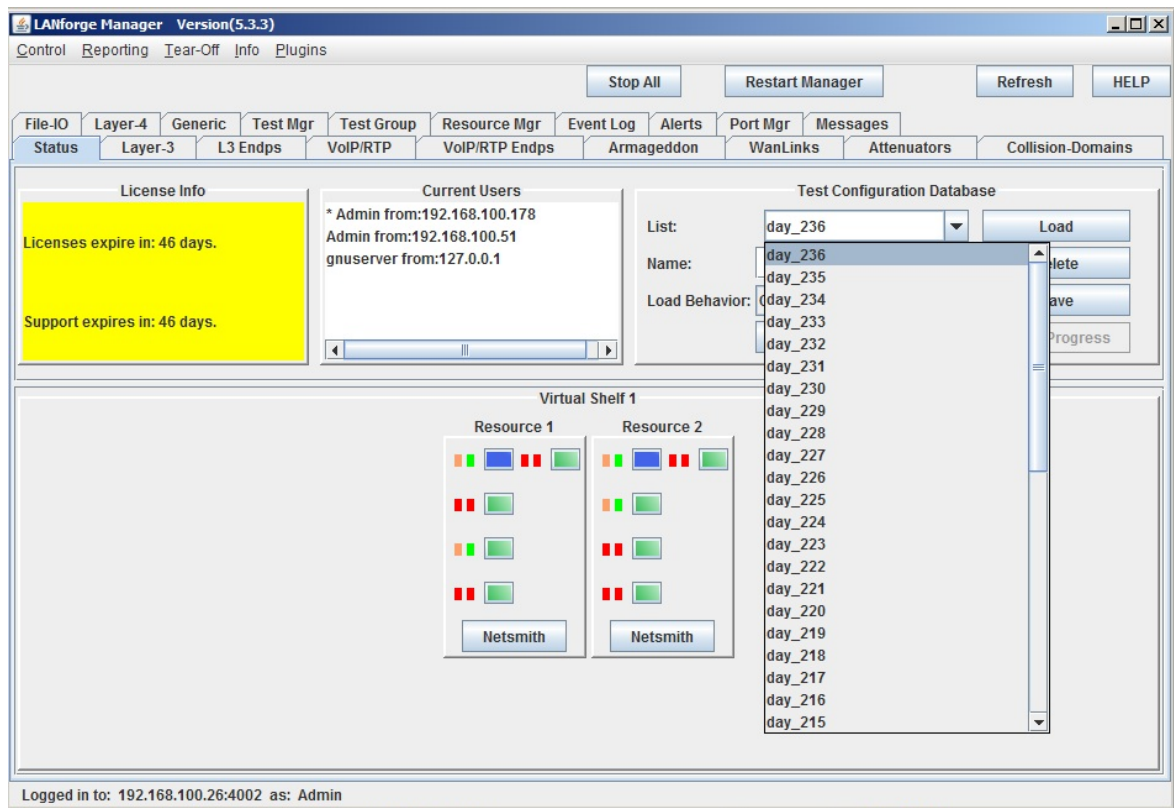
5. Associating to an open AP

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 120 \
--first_ip DHCP --upstream eth1 --security open
```

6. Connecting a station at 802.11/abg speeds

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 120 \
--first_ip DHCP --upstream eth1 --security open \
--wifi_mode abg
```


7. Initializing your test scenario by pre-loading a database. The database is the same name as the dropdown in the GUI Status tab.

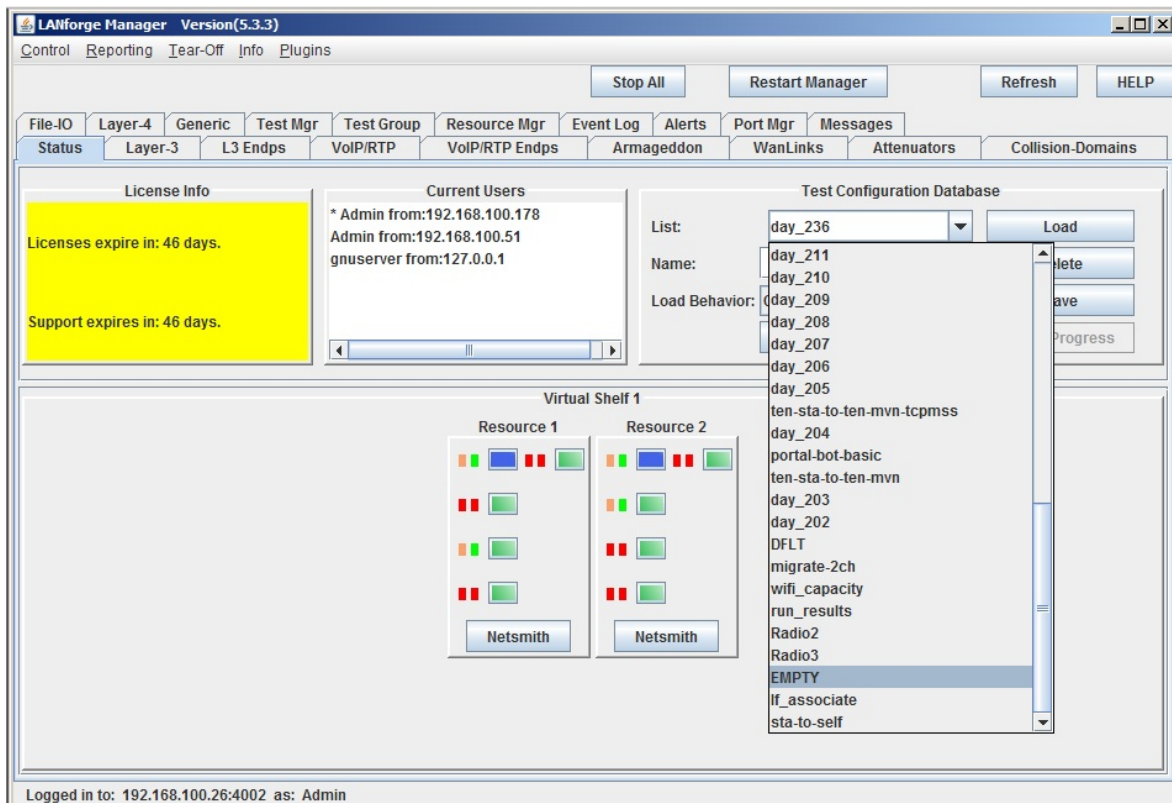


```
./lf_associate_ap.pl --resource 1 --mgr localhost \
  --action step1      --radio wiphy0    --ssid jedtest \
  --first_sta sta100  --num_stations 10 --duration 120 \
  --first_ip DHCP     --upstream eth1  --security open \
  --db_preload day_236
```

8. Saving your test state after completing a traffic run

```
./lf_associate_ap.pl --resource 1 --mgr localhost \
  --action step1      --radio wiphy0    --ssid jedtest \
  --first_sta sta100  --num_stations 10 --duration 120 \
  --first_ip DHCP     --upstream eth1  --security open \
  --db_preload day_236 --db_save station_results
```

9. Cleaning out your scenario settings after completing a traffic run. We can do this by loading the EMPTY database with the `db_postload` switch.



```
./lf_associate_ap.pl --resource 1 --mgr localhost \
--action step1 --radio wiphy0 --ssid jedtest \
--first_sta sta100 --num_stations 10 --duration 120 \
--first_ip DHCP --upstream eth1 --security open \
--db_preload day_236 --db_save station_results --db_postload EMPTY
```

Using lf_associate_ap to stress test an AP

We can have a series of stations associate and unassociate over and over. This can be quite a bit of exercise for an AP. Below is a command that tests five clients connecting.

```
./lf_associate_ap.pl --mgr jedtest --action step2 \
--ssid jedtest --first_sta sta100 --first_ip DHCP \
--num_stations 10 --security wpa2 --passphrase jedtest1
```

This will create set of ten stations bring them up and then take them down.



Script Options

These might have been update since publication, please check --help output for your version of the script.

```

./lf_associate_ap.pl [--mgr {host-name | IP}]
  [--mgr_port {ip port}] # use if on non-default management port
  [--resource {resource}] # use if multiple lanforge systems; defaults to 1
  [--quiet { yes | no }] # debug output; -q

##      AP selection
[--radio {name}] # e.g. wiphy2
[--ssid {ssid}] # e.g. jedtest
[--security {open|wep|wpa|wpa2}] # station authentication type
[--passphrase {...}] # implies wpa2 if --security not set
[--wifi_mode {a|abg|abgn|abgnAC|an|anAC|b|bg|bgn|g}]

##      station configuration
[--num_stations {10}]
[--first_sta {sta100}]
[--first_ip {DHCP |ip address}]
[--netmask {255.255.0.0}]

##      connection configuration
[--cxttype {tcp/tcp6/udp/udp6}] # use a tcp/udp connection, default tcp
[--upstream {name|eth1}]
  # could be AP or could be port on LANforge
  # connected to WAN side of AP
[--bps-min {10000000}] # minimum tx bps
[--bps-max {SAME|bps-value}] # maximum tx bps, use SAME or omit for SAME
[--duration {30}] # connection duration, seconds, default 60
[--poll-time {5}] # nap time between connection displays
[--action {step1,step2}]
  # step1: creates [num_stations] stations and L3 connections
  # step2: does bringup test

[--traffic_type {separate|concurrent}]
  # for step1: separate does download then upload
  # concurrent does upload and download at same time

[--db_preload {scenario name}]
  # load this database before creating stations
  # option intended as a cleanup step

[--db_save {name}]
  # save the state of this test scenario after running the
  # connections, before --db_postload

[--db_postload {scenario name}]
  # load this database after running connections,
  # option intended as a cleanup step

```