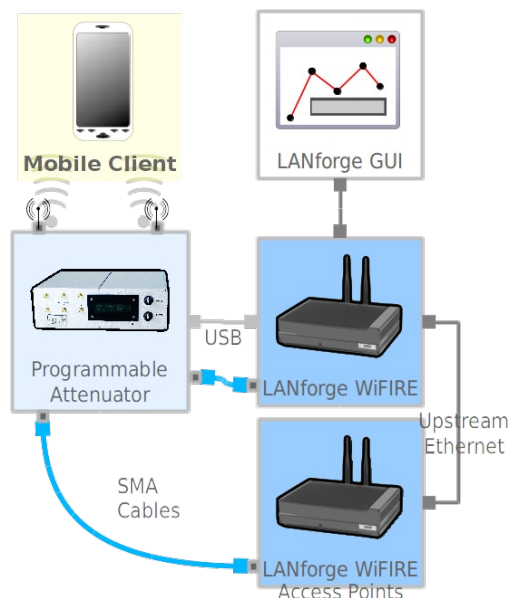


Generating a series of attenuations using data in a CSV file.

Goal: Using the `attenuator_series.pl` script and a specially formatted csv file, you will be able to re-play an arbitrary series of attenuations.

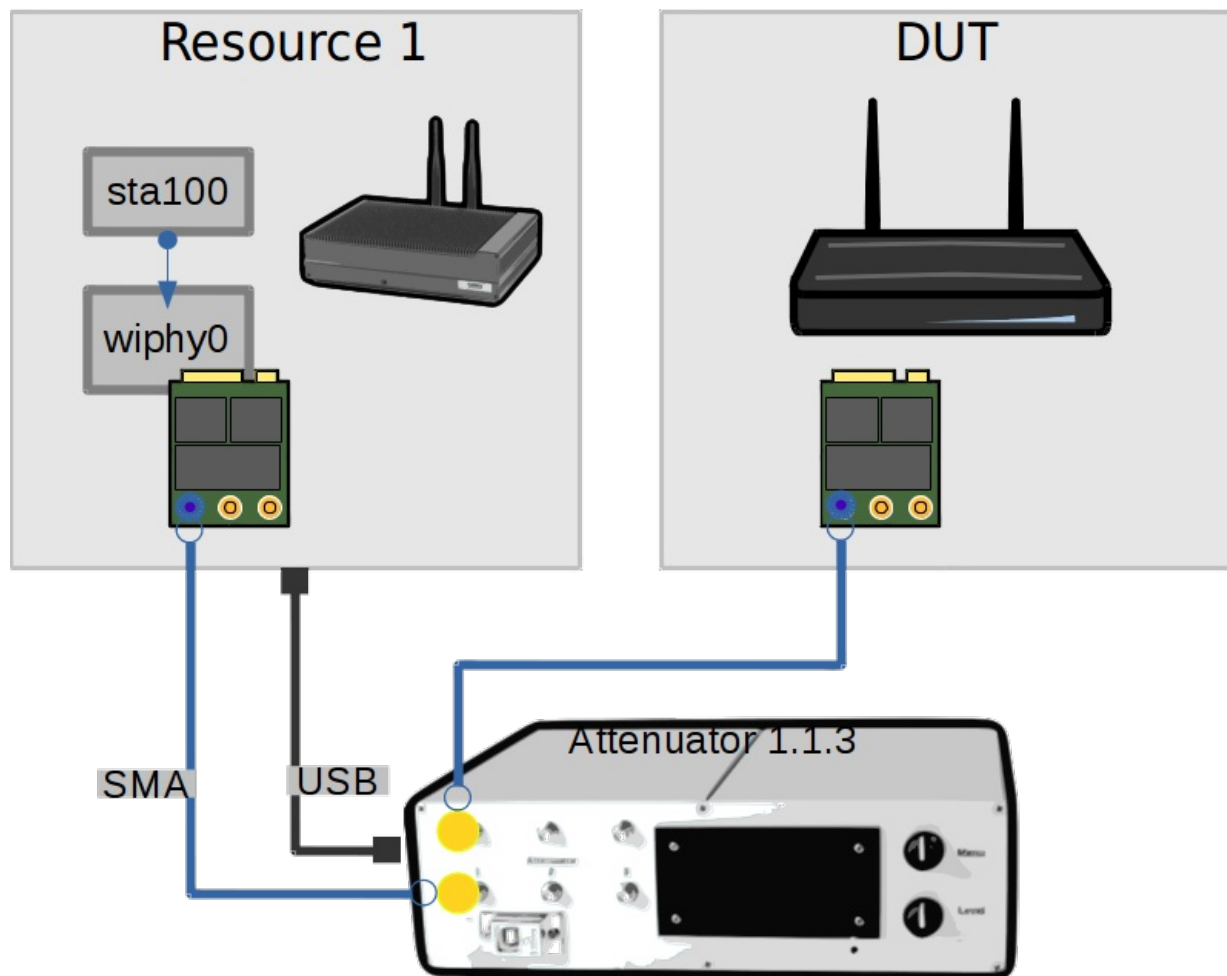
Playing back a series of WiFi attenuation levels using the `attenuator_series.pl` and a CSV file of attenuations make it possible to emulate the motion of a station (or stations) moving among a series APs. Or it could emulate interference in a crowd of moving people. Requires a LANforge CT703 (or better) and a LANforge CT520 (or better) system, and an access point.



Testing 1x1 with one attenuator

Our LANforge manager (resource `1.1`) has an attenuator serial number 3 (resource `1.1.3`) connected to the Device Under Test. The attenuator will be `1.1.1.3`. There will be station `sta100` on LANforge resource 1 and AP `vap0` on LANforge resource 2. Cables connect the radios to the the attenuator. The radios are configured in 1x1 mode. The corresponding channel on the attenuator is `1.1.3.0`

[See [LANforge Entity IDs](#) for more on numbering.]



Let's script it with a simple data file: `/home/lanforge/atten_test1.csv`

```
channels,1.1.3.0
delay,5000
attenuate,250
attenuate,320
attenuate,450
attenuate,520
attenuate,820
```

We run the script in our terminal:

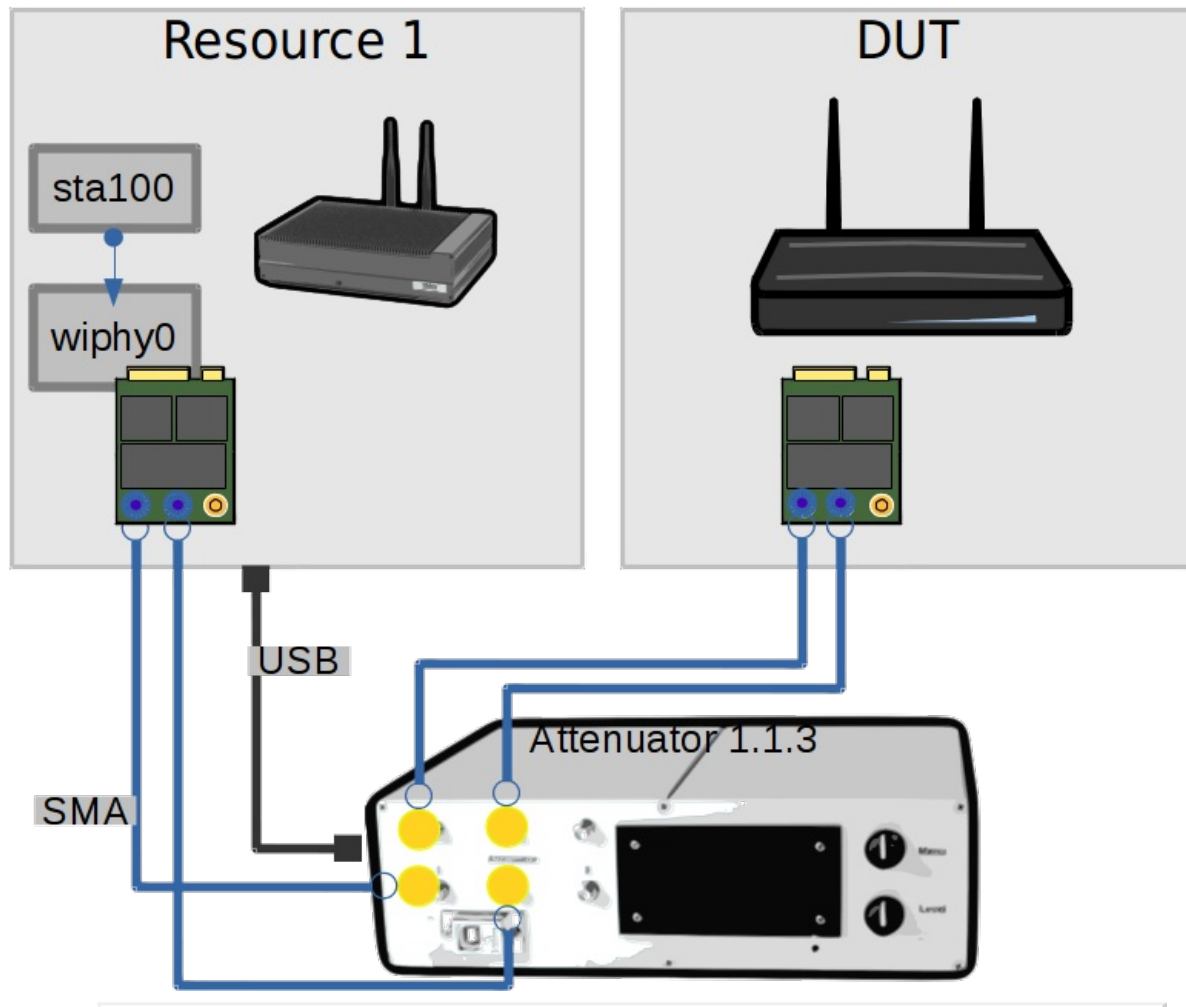
```
$ cd /home/lanforge/scripts
$ ./attenuate_series.pl -f ../atten_test1.csv
```

Watching a Layer-3 connection in the Dynamic Display, we will see a dip, rise and dip at 10 second intervals.



Testing 2x2 with One Attenuator

Next we cable up the second channel (1.1.3.1). We can update the csv test file, by adding a new column for the channel.

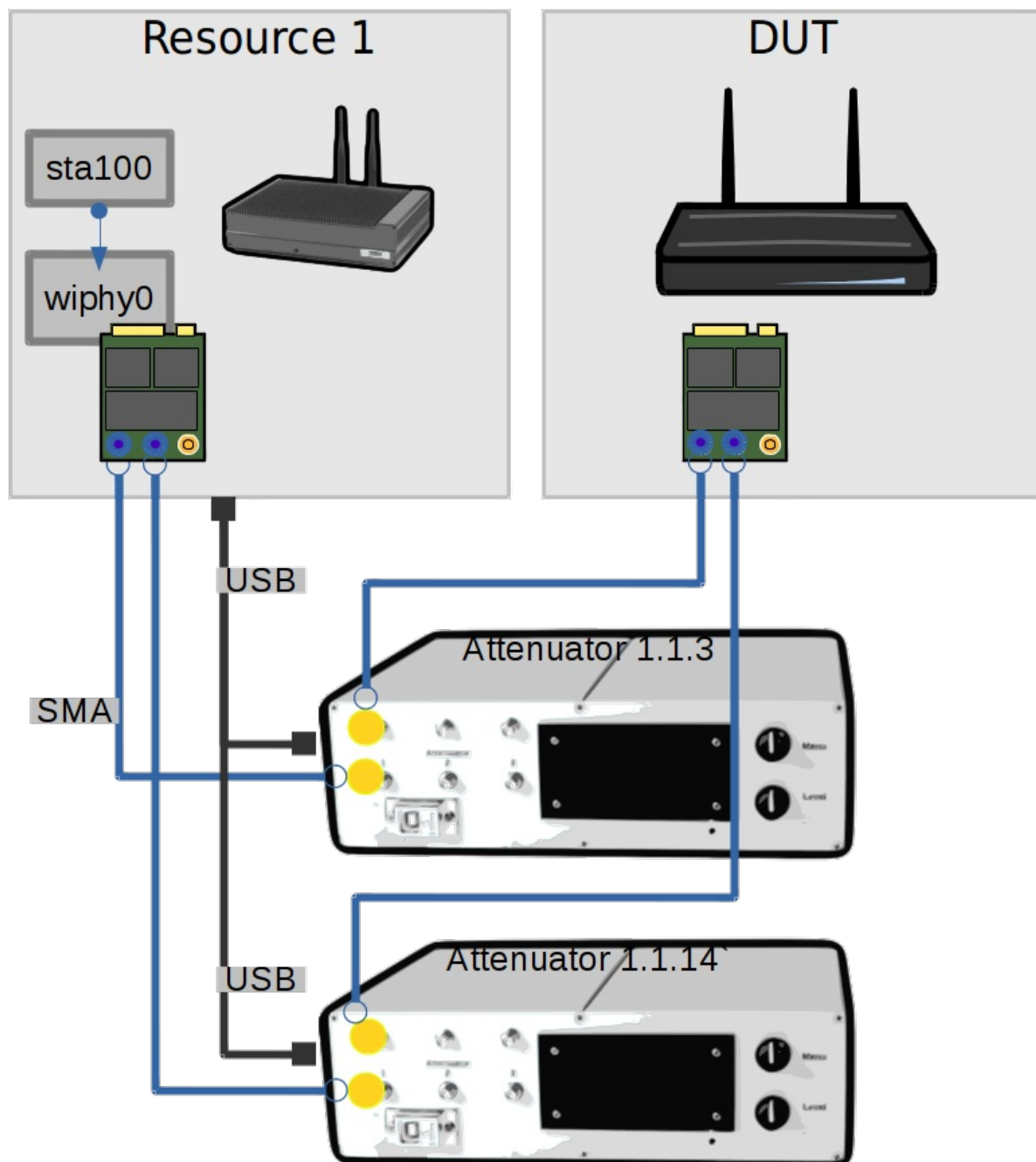


```
channels,1.1.3.0,1.1.3.1
delay,5000
attenuate,250,250
attenuate,320,250
attenuate,450,250
attenuate,520,520
attenuate,820,820
```

We can run the same command and watch the dynamic reports window to see a similar graph.

A 2x2 Example with Two Attenuators

The first radio on each LANforge is connected in 2x2 mode to both attenuators. This example is drawn to illustrate how you design the connection of your channels independently of their radios. Obviously, you don't need two attenuators for this scenario. However, if you had a CT523 with three radios and want to perform 2x2 testing with three client radios, it is possible to do so with only two CT703 attenuators.



We change the data file to specify the first channel on attenuator 14 (1.1.14.0):

/home/lanforge/atten_test3.csv

```
channels,1.1.3.0,1.1.14.0
delay,5000
attenuate,250,250
attenuate,320,320
attenuate,450,450
attenuate,520,520
attenuate,820,820
```

We can run the script once in our terminal:

```
$ cd /home/lanforge/scripts
$ ./attenuate_series.pl -f ../atten_test3.csv
```

Watching the port signal in the dynamic display we will see a rise and dip at 10 second intervals.

Connecting up Multiple Radios

There is no different in attenuator control whether you have one radio in 3x3 or three radios in 1x1 to control. If you are testing multiple radios, you will be monitoring their **RX Signal** in the dynamic report.

File Format

Editing the test data file with a basic spreadsheet program than can save to CSV format is possible. You will want to save with comma format, without double-quoting the cells. These directives are converted to lower-case, so you can type them in UPPER-CASE or Mixed-Case if necessary.

The format of the CSV file allows you to specify many options that might also be specified on the command line.

Directives

comments

Rows that begin with a comment sign (#, ;, !) will be entirely ignored. Cells in column B or beyond will be ignored.

channels

Each cell following this directive specifies an attenuator channel to control.

sleep, nap

The following cell specifies a one-time wait time in milliseconds

delay, naptime

The following cell specifies a standard wait time in milliseconds between each **attenuate** command

attenuate, _ ,

The following cells specify an attenuation value for channels specified by the last **channels** command.

minimum, min

Sets the minimum attenuation permitted. Values below this will be set to the minimum directed.

maximum, max

Sets the maximum attenuation permitted. Values above this will be set to the maximum directed.

Attenuation Values

- **Inherently Positive Values**, like 200 are absolute attenuation values, in deci-decibels. 200 means 20.0dB. The smallest unit of resolution is 0.5dB, so all your values will end in zero or five. E.G. (0, 5, 105, 200, 955). Values range between zero and 955.

- **Explicitly Positive Values**, that begin with `@+`, `++`, `+` are increments with respect to the last value set on the channel.

```
attenuate,250
attenuate,@+50
```

Results in the channel at 30.0dB. Spreadsheets often omit signed values when saving, so `@+` will force a text type cell.

- **Explicitly Negative Values**, that begin with `@-`, `--`, `-` are decrements with respect to the last value set on the channel.

```
attenuate,300
attenuate,@-50
```

Results in the channel at 25.0dB. Spreadsheets often omit signed values when saving, so `@-` will force a text type cell.

- **Basic Cell Math** can be performed, but only against absolute cell values.

```
attenuate,500,400
attenuate,=B1+50,=C1-50,    # results in 550, 350
attenuate,=B2+5,=C2-5,      # fails: B2 and C2 were formulas.
```

This feature is unlikely to be as useful as it sounds, because pasting a column of formulae will be pretty useless, since a spreadsheet processes them recursively. Also, most spreadsheets saved to CSV typically don't save formulae by default, you probably will get the computed values in your CSV file.

- Shortcuts include `_`, `NA`, and `,,`. You can skip a computation on a cell by leaving a blank cell, underscore, or 'NA'. Careful: the value `+0` will likely be truncated to 0, and set the channel to 0.0dB attenuation.

Script Options

The `attenuate_series.pl` script uses these arguments. They support long and short argument switch names:

```
-m
--mgr          LANforge manager host, like localhost or 192.168.101.1

-f
--file         CSV file with attenuation data

-d
--delay        Override of DELAY variable, milliseconds between applying rows

-l
--loop         Repeat indefinitely

-c
--channel       Override of channels variable, eg: 1.2.3.1,2.3.4.3

-i
--min
--minimum      Set minimum attenuation value (not lower than zero)

-x
--max
--maximum      Set maximum attenuation value (not higher than 955)

-n
--dry
--dryrun
--dry_run      Do not apply attenuation, just parse file, ignore nap times
```

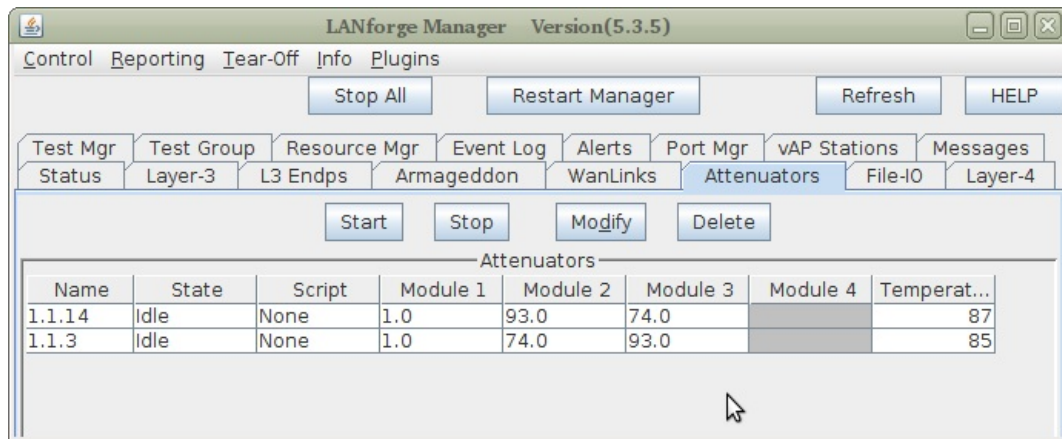
Example CSV File

This CSV shows a working example that gives warnings.

```
1. # example csv
2. channels, 1.1.14.0, 1.1.14.1, 1.1.14.2, 1.1.3.0, 1.1.3.1, 1.1.3.2,
3. DELAY,2000,,,,,,
4. ATTENUATE,950,850,750,950,850,750,
5. attenuate,940,-10,-10,-10,-10,-10,
6. attenuate,930,-10,NA,-10,-10,,
7. attenuate,=B4-10,=C4+10,NA,-15,-15,,
8. attenuate,-15,_, -15,,NA,-15,
9. sleep,1000,,,,,,
10. attenuate,110,115,215,315,415,515,
11. _,=B10-20,=C10+20,=D10+20,=E10+20,=F10+20,=G10-20,
12. _,@+10,@+10,@-10,10,10,10,
13. # eof
```

Attenuators Tab

Here's the Attenuators tab used for the examples:



Opening and Saving CSV

Here are options used for the open dialog in LibreOffice Calc:

Text Import - [series.csv]

Import

Character set: Unicode (UTF-8) ▾

Language: Default - English (USA) ▾

From row: 1 - +

Separator Options

☐ Fixed width ☒ Separated by

☐ Tab ☒ Comma ☐ Semicolon ☐ Space ☐ Other

☐ Merge delimiters Text delimiter: " ▾

Other Options

☐ Quoted field as text ☐ Detect special numbers

Fields

Column type: ▾

	Standard	Standard	Standard	Standard	Standard
1	# test of the attenuator loop				
2	channels	1.1.14.1	1.1.14.2	1.1.14.3	1.1.3.1
3	delay	1000			
4	950	850	750	950	850
5	sleep	1000			
6					
7	-10	-10	-10	-10	-10
8	-10	-10	NA	-10	-10

Help OK Cancel

Here are the options used for the save dialog in LibreOffice Calc:

# test of the attenuator loop						
channels	1.1.14.1	1.1.14.2	1.1.14.3	1.1.3.1	1.1.3.2	1.1.3.3
delay	1000					
attenuate	950	850	750	950	850	750
sleep	1000					
attenuate	940	-10	-10	-10	-10	-10
attenuate	930	-10 NA	-10	-10	-10	-10
attenuate	920	-10 NA	-10	-10	-10	-10
attenuate	-10	-10	-10	-10	-10	-10
attenuate	++10	10	10	10	10	10
attenuate	10	10 NA	10	10 NA	10 NA	10
attenuate	10	10 NA	10	10	10 NA	10
# eof	10	10	10	10	10	10

Export Text File

Field Options

Character set: Unicode (UTF-8) ▾

Field delimiter: , ▾

Text delimiter: " ▾

☒ Save cell content as shown

☒ Save cell fomulas instead of calculated values

☐ Quote all text cells

☐ Fixed column width

Help OK Cancel