

# Various Techniques Cookbooks

The Various Techniques Cookbooks provide miscellaneous examples of how to perform various network configuration tasks. Each is a set of step-by-step instructions intended to help build your familiarity with network configuration in Linux and Windows.

Please contact us at support@candelatech.com if you have any questions.

# All Network Configuration Cookbook Examples

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# Install Script If\_kinstall.pl

# Goal: Install and reconfigure your LANforge server with the If\_kinstall.pl script.

The lf\_kinstall.pl script can configure a majority of Linux OS features that LANforge requires changes to. This includes:

- Disabling SELinux
- Disableing firewall
- Downloading dnf and LANforce updates
- Adding VNC and RDP access
- Adding firmware
- Disabling or reconfiguring NetworkManager
- Enabling serial console
- Modifying kernel options for iommu, pci-aer and kernel memory
- ...and more...

# Contents

# Usage

lf\_kinstall.pl --lfver {lanforge version} --kver {kernel version}
{command}

**Note:** the parameters --do\_kern and --do\_grub requires the --kver option to specify the kernel version. Candelatech Linux kernels end with "+" to denote extra patches. Use --debug|--verbose|-d to enable debugging.

Example: ./lf\_kinstall.pl --kver 3.5.7+ --lfver 5.2.7 --do\_lanforge

Please refer to the Install Guide and the options reference: • Install guide:

http://www.candelatech.com/lfserver\_install.php#webauto

• Reference: <a href="http://www.candelatech.com/cookbook.php">http://www.candelatech.com/cookbook.php</a>?

vol=misc&book=lf kinstall

# **Common Options**

#### --help

This message.

#### --lfver

Specify LANforge version (i.e., 5.2.6)

#### --kver

Specify kernel version, use a + at the end of kernel versions for Candelatech kernels

#### --proxy

Use a proxy for curl, e.g. http://%user:%password@%proxy-ip:%port

#### --do\_all\_ct

Enables all options except: --xrandr, --runlevel

#### --do\_upgrade

Also --do\_update. Upgrades LANforge software, kernel, firmware, packages and OS packages. No system settings altered. Skips cpu-burn.

## --do\_lanforge

Installs LANforge software ONLY, i.e. no kernel installed. No system settings altered.

#### --do\_firmware

Download and install ath10k 802.11AC NIC firmware.

#### --do\_kern

Install the kernel via download or --source\_dir. Enables 'do\_grub' option.

#### --help\_all

Show advanced options

#### --skip\_pip

Avoid doing pip upgrades; might be necessary if you have proxies

#### --skip\_yum\_all

Don't yum update packages, or install new ones.

#### --secureme

reconfigure system to bind to the management port and other security necessities \* bind btserver to management port \* bind\_mgt enables listening on localhost/127.0.0.1 \* indicate to GUI to bind ports to management address Also: -do\_secure --do\_secureme --secure

Please refer to the Install Guide and the options reference: • Install guide:

http://www.candelatech.com/lfserver install.php#webauto

• Reference: http://www.candelatech.com/cookbook.php?

vol=misc&book=lf\_kinstall

# Advanced Options

#### --acknowledge

Also -g. Acknowledge that your licenses are out of date to continue updates

#### --add\_random\_www\_data

creates a series of files in /var/www/html accessable using the url /slug\_list.html

## --bind\_apache\_mgt\_port

configures an /etc/hosts entry lanforge-srv that matches the ip address of the mgt\_dev in /home/lanforge/config.values. Updates the /etc/httpd or /etc/apache2 files to bind to that address. Use this option each time you change the mgt\_dev.

#### --build\_url

Also: --build\_path. This path is appended directly after the --download\_from hostname. The default download path will not be used. The string **\$lfver** will not be inserted. Build paths will not adhere to a directory pattern, use the full path.

#### --bundle\_dest

Also: --bundle\_dir. Specify a directory that the bundle archive should be created in. Use this is to keep bundles from being written to the tmp\_dir or src\_dir

#### --clone\_lvm

[source-drive,dest-drive], or [source-drive,file://file-name] or [source.img.xz,destdrive] Clone the disk with the LVM partitions to the specified disk. == \*Do not use on a running system, use this from a live boot disk.\* ==

1: Boot from F39 Live Install CD and open a terminal and become root. Do not plug in multiple USB drives at once when booting.

2: download ./lf\_kinstall.pl:wget

https://www.candelatech.com/./lf\_kinstall.pl

3: chmod +x./lf\_kinstall.pl

4: use Isusb to check your target drives: Isusb -o name,model,label,partlabel,size 5: [optional] Plug another USB drive into the system if necessary

6: copy the disk image: To copy disk to disk: ././lf\_kinstall.pl --clone\_lvm /dev/sda,/de/sdb To copy disk to file (for backing up a machine image):

././lf\_kinstall.pl --clone\_lvm

/dev/sda,file://run/media/liveuser/usb/lanforge-dev-sda.img To copy compressed disk image to installed drive: /./lf\_kinstall.pl --clone\_lvm /run/media/liveuser/usb/lanforge-dev-sda.img.xz,/dev/sda This command will not compress a disk image; please do that on a workstation.

7: when installing a system, follow with: ././lf\_kinstall.pl --resize\_lvm 8: when installing to a second drive to mirror the disks: ././lf\_kinstall.pl -promote\_lvm\_clone /dev/sdb When applying a new image to a system, when you reboot with the system image and it complains about not successfully loading the system, refer to --regen\_initrd.

# --create\_install\_bundle

Also: --install\_bundle, --create\_bundle, --create\_tarball Create a tarball in tmp\_dir for copying to another LANforge system, will infer --osver, -osveri for current system unless you specify --force\_osver, --force\_osveri, --force\_uname. A complicated example for building a bundle for Adtran: ./lf\_kinstall.pl --create\_bundle --lfver 5.4.8 --kver 6.10.3+ --

# force\_osver "rpi5" \

--force\_osveri 5 --force\_uname adtran-aarch64 --tmp\_dir `pwd` -source dir `pwd` --bundle dest ./bundles/

#### --create\_lanforge\_user

adds user lanforge and directory /home/lanforge create:pypirc: create pypirc file

#### --create\_raid

Also --make\_raid [drive1,drive2...] Turn two or more blank drives into a mirrored LVM filesystem If there have been filesystems installed on these drives before, use --wipe\_raid to remove the filesystems.

Example: ./lf\_kinstall.pl --make\_raid nvme0n1p1,nvme1n1p1

Also --make lvm [drive] Turn one drive into an LVM filesystem image. Use this on a system before installing a LANforge system that you want to develop. This is not intended for image installation. If there have been filesystems on the drive before, please use --wipe raid to remove the old filesystems. Example of developing a system from a blank SSD: 1. Boot from a Live Install CD image 2. Download ./lf\_kinstall.pl:wgethttp://www.candelateh.com/./lf\_kinstall.pl chmod +x./lf kinstall.pl 3. Double check the drives in the system: Isblk -o name,model,label,partlabel,size 4. ./lf kinstall.pl --make lvm /dev/sda This should leave the system ready to install Fedora or another OS onto. Depending on drive and kernel details, you might have to reboot back into the Live Install CD at this point (because of disk partition changes). 5. Install the OS onto the LVM partions. The partions are GPT and are intended for UEFI installation. /dev/sda1 BIOS Boot partition /dev/sda2 EFI data partition /dev/sda3 /boot partition /dev/sda4 LVM physical volume for Volume Group Your LVM Volume Group will be ctvg\_1234 to keep it distinct from any other system volume groups. ctvg\_1234lv\_root for / partition ctvg\_1234-lv\_home for /home partition ctvg\_1234-lv\_swap for swap space, 6, After OS installation, reboot back to OS DO NOT use --resize lym or --promote lvm mirror at this point. 7. touch /home/lanforge/did cpuburn /home/lanforge/did disktest You do not need to both testing the system, those flag files will be erased by --do\_image\_prep 8. Install LANforge, using /var/tmp as --tmp dir: //lf kinstall.pl --lfver 5.4.9 --kver 6.11.11+ -- do all ct -- tmp dir /var/tmp 9. Make sure system reboots to lanforge. 10. If it does not, try rebooting to the Live Install CD and: wget www.candelatech.com/./lf kinstall.pl;chmod +x./lf kinstall.pl ././lf kinstall.pl --regen initrd reboot to LANforge

11: With LANforge booted, log in as root and prepare the system for image capture: ././lf\_kinstall.pl --do\_image\_prep

12: reboot to live install CD

13: save disk image using steps listed in --clone\_lvm feature.

#### --com-speed

Also -- com\_speed. Specify serial com speed (defaults to 115200)

#### --com\_port

Specify the serial com port (defaults to ttySO)

## --create\_webpage

turn this help into HTML text for publication

#### --debug

Also -d, --verbose. Enable extra output.

#### --disable\_audit\_logs

Affects kernel audit messages. Use with --do\_grub and reboot to have this setting take effect.

- 0: enable kernel audit logs (auditd.service not enabled)
- 1: disable kernel audit logs

#### --disable\_resolved

change NetworkManager dns=systemd-resolved to dns=default and disable systemd-resolved.service

#### --do\_all

Enables all options except: --xrandr, --biosdevname, --runlevel, and -serial Skips the CPU burn-in test.

#### --do\_abandoned\_cleanup

create cronjob that erases systemd slices from logged out sessions every hour (might have occurred between F24-F27)

## --do\_biosdevname

Enable biosdevname for interface names (uses terms like enp0s1 instead of eth0).

- Only takes affect when --do\_grub is enabled.
- 0: Disabled
- 1: Enabled
- -1: Use current settings (default)

#### --do\_cma

Configure cma buffer for extra VRF buffer space. Use with --do\_grub, applies on reboot. Use these choices:

-1: do not change

- 0: disable
- 1: apply 64 megabyte value
- >1: apply this value in megabytes

Example: --do\_grub --do\_cma 256 This sets cma=256M in /etc/default/grub From https://www.kernel.org/doc/html/v4.14/admin-guide/kernelparameters.html : Sets the size of kernel global memory area for contiguous memory allocations and optionally the placement constraint by the physical address range of memory allocations. A value of 0 disables CMA altogether.

--do\_cpu\_burn

Attemps the CPU burn task. NOTE: The --skip\_cpu\_burn flag below has precedence.

- 0: Do not attempt it.
- 1: Do it if we have not already run it on this system previously.
- 2: Always run it.
- >10: Run CPU burn test for specified seconds.

#### --do\_ct\_st

Download and install LANforge software and kernel only. Enables 'do\_lanforge do\_kern do\_grub do\_http do\_selinux=0 do\_iommu=0 do\_firmware' No yum update. No system settings altered, except for selinux and iommu.

#### --do\_ct\_swak

Download and install LANforge software but only update grub to point to an already installed kernel. Enables 'do\_lanforge do\_grub do\_http do\_selinux=0 do\_iommu=0 do\_firmware' No system settings altered, except for selinux and iommu.

--do\_cve

Apply mitigations to various CVE vulnerabilities.

#### --do\_cups\_pdf

install cups-pdf package

#### --do\_disk\_test

Also: --disk\_test. Fill and re-read disk to prove read errors?

0: Do not attempt it

1: Do it if /home/lanforge/did\_disktest not found unless --skip\_disk\_test specified

pecilieu

>1: Always run it, ignoring --skip\_disk\_test

#### --do\_elevator

- Add kernel option elevator=noop (i.e. not deadline) for single SSD CFQ optimisation. 0: Disabled
- 1: Enabled
- -1: Use current settings (default) Only takes affect when do grub is enabled.

#### --do\_enable\_archive\_baseurl

Select this option if your mirrors.fedoraproject.org URLs are unable to provide your repository because the content has been moved to archives.fedoraproject.org This option is pretty much opposite of --do\_restore\_metalinks.

#### --do\_enable\_max\_zram

write /etc/sysctl.d/70-lanforge.conf and apply agressive zram configuration (Fedora >= 30) To undo, remove file and reboot.

#### --do\_fedrepos\_default

Select this option to use the fedrepos default command if your yum.repos.d repository URLs have become misconfigured. If fedrepos is not available, consider --do\_restore\_metalinks option.

#### --do\_ff\_homepage

updates Firefox Homepage

--do\_gnome

Tweak gnome settings (enble desktop icons, etc)

--do\_grub

Modify the grub config files to boot the specified kernel.

# --do\_gui\_autostart

Start GUI in VNC server session which starts on boot. Requires LANforgeGUI of specified version to already be installed. 0: disable GUI autostart

1: enable GUI autostart

#### --do\_hs20

Build keys, configure apache ssl and other actions to enable this system to act as an HS20-R2 server. Requires specific LANforge configuration as well before this will actually work. This option must be explicitly enabled: It is not enable as part of any of the other option groupings.

#### --do\_http

Serve LANforge related files at http://localhost

#### --do\_image\_prep

Erase the network settings and dnf cache in preparation for making a disk image for a clone. Expects <code>/root/resize-home.sh</code>

--do\_interop

installs LANforge server, GUI, firmware and required packages on system to sufficient to allow it to be a resource in a LANforge cluster. Right now, this focuses on Ubuntu based systems. This also will configure Networkmanager to ignore ports except the management interface. We cannot necessarily disable NM on interop equipment.

#### --do\_iommu

Configure system to enable/disable intel\_iommu. This kernel feature decreases performance, so LANforge typically wants this disabled for optimal Ethernet performance. This can also be disabled in the BIOS by disabling the VT-d option and IOMMU options.

- 0: Disabled (default for do\_all\_ct, do\_all, do\_ct\_swak, do\_ct\_st)
- 1: Enabled

-1: Use current settings (default) Only takes affect when do\_grub is enabled.

IOMMU is useful in these conditions: \* virtual machine hosting \* MediaTek radios (but not mtk7996 it seems) \* Ath10k radios

## --do\_ios\_tools

Installs iOS tools needed for querying iPhone device data.

## --do\_kmemleak

Configure kernel option for kmemleak. Requires kernel to be compiled with

- appropriate options to actually enable this.
- 0: Disabled
- 1: Enabled
- -1: Use current settings (default) Only takes affect when do\_grub is enabled.

#### --do\_loadmon

Enable the loadmon.pl utility. This logs system load data to journalctl. You can read the output using journalctl --since "5 min ago" -t loadmon |

- ./scripts/parse loadmon.pl
- 0: Disable the service
- 1: Enable the service
- -1: default behavior is to enable the service on 5.4.8, Fedora 30+

#### --do\_loglevel

Configure kernel console logging level. Requires --do\_grub.

- 0: Disabled (removes grub bootline parameter)
- >0: Adds loglevel=[value] bootline parameter)
- -1: Use current settings (DEFAULT) NOTE: This may be overriden by
- /etc/sysrq.d/lanforge.conf kernel.printk sysctl

#### --do\_mgt\_dev

Also --md. Specify the device to dedicate with management network. Use this with --do\_sys\_reconfig.

#### --do\_noaer

Configure system to enable/disable pci error reporting. Requires --do\_grub. 0: Disabled (removes grub bootline parameter)

- 1: Enabled (adds pci=noaer bootline parameter, DEFAULT)
- -1: Use current settings

#### --do\_nomitigations

Configure system to enable/disable spectre and related mitigations. We try to compile out most of these security features since LANforge is not designed to be secure and performance is more important to us. To help make sure all of these mitigations are disabled, we will also pass command-line args to the kernel on bootup to request disabling mitigations. Default is '1'.

- 0: Do not add the mitigations=off option
- 1: Do add the mitigations=off (default)
- -1: Use current settings Only takes affect when do\_grub is enabled.

#### --do\_only\_pkgs

Only install packages (and groups) and exit. Use when creating VMs or if you want to install all distro packages and reboot before proceeding. If you want to download everything needed, install yum packages for development imaging: 1) touch /home/lanforge/did\_cpuburn /home/lanforge/did\_disktest or touch /root/did\_cpuburn /root/did\_disktest (if /home/lanforge does not exist)

2) ./lf\_kinstall.pl --lfver \_\_\_ --kver \_\_\_ --do\_selinux=0 --

skip\_yum\_all

3) ./lf\_kinstall.pl --lfver \_\_\_\_ --kver \_\_\_\_ --skip\_yum\_all --

do\_all\_ct --force\_web  $\$ 

--tmp\_dir /home/lanforge/Downloads --download\_from

- http://ctdownloads/ --download\_only
- 4) reboot

5) ./lf\_kinstall.pl --lfver \_\_\_\_ --kver \_\_\_\_ --do\_only\_pkgs

6) poweroff and make your snapshot

--do\_pkgs

Install packages from Internet needed by LANforge.

#### --do\_print\_label

Use the following two options to print a label with model and mac address information

- 1) print\_host: hostname owning printer
- 2) print\_queue: name of print queue, often 'QL-800' or 'LaserWriter-450'
- 3) serialno: provide the serial number for chassis, or use 'HOSTNAME'

## Example: --do\_print\_label --print\_host 192.168.100.14:8082 -print\_queue QL-800 --serialno HOSTNAME

#### --do\_radius

Install and configure radius server (with default values).

#### --do\_release\_mirror

for downloading install files necessary to host new releases on the system. These files are placed in /var/www/html/downloads and /var/www/html/private/downloads. In the GUI Release Mgr tab, Download

From can list http://192.168.1.101 or whatever the mananagement port IP is.

#### --do\_restore\_metalinks

Select this option if you see errors like below:

- 1) Repository updates-debuginfo has no mirror or baseurl set.
- 2) Repository updates-source has no mirror or baseurl set.
- 3) Repository fedora-debuginfo has no mirror or baseurl set.
- 4) Repository fedora-source has no mirror or baseurl set.
- 5) Error: Failed to synchronize cache for repo 'updates'

6) Your /etc/yum.repos.d repo files have had changes and are unable to reach mirrors.fedoraproject.org

#### --do\_rfgen

removed in 5.4.8, udev rules are now created automatically

## --do\_runlevel

- Configure system to run-level 3 or 5
- 0: Use current settings (do nothing)
- 3: Set to use runlevel 3 (non graphical login)
- 5: Set to use runlevel 5 (graphical login, needed for cinnamon)

#### --do\_save\_yumc

- Specify:
- 1: Yum update then save cache.
- 20: Delete local cache first then update and save.

#### --do\_selinux

- Configure selinux (it conflicts with LANforge.) do\_grub should also be enabled to
- modify the kernel boot commands.
- 0: Disabled (default, if do\_all and related options are selected)
- 1: Enabled
- -1: Use current settings

#### --do\_serial

- Enable serial console configuration in grub.
- 0: Disabled
- 1: Enabled
- -1: Use current settings (default) Only takes affect when do\_grub is enabled.
- --do\_services
  - Enable/Disable services to work well with LANforge.

#### --do\_slub\_debug

Enable/Disable SLUB memory debugging (at least on debugging kernels) Use with -

- -do grub, applies on reboot. Use these choices:
- -1: do not change
- 0: disable
- 1: enable slub debugging

Example: --do\_grub --do\_slub\_debug 1

#### --do\_ssd\_fstab

Modify rw behaviour for SSDs in /etc/fstab.

#### --do\_sys\_reconfig

Attempt to re-configure system config files. Only works on certain platforms (APU2, Jetway, Noah2, Axiomtek)

#### --do\_udev

Create /etc/udev/rules.d/70-persistent-net.rules file if it does not already exist. It may still need hand-editing.

#### --do\_vm\_prep

Erase the network settings and dnf cache in preparation for making a OVA image. Expects /root/resize-home.sh

#### --do\_vm\_reconfig

forces --do\_sys\_reconfig to run, looking for enpX interfaces and no radios

- --do\_vnc Configure VNC for user lanforge. See --do\_secureme
- --do\_webui

installs and configures LANforge WebUI components. Fedora-34 and higher. Requires online access.

#### --do\_xrandr

Add work-around to disable LVDS1 using xrandr. This works around Gnome issues on the Lanner WiFi appliances, and perhaps other systems.

#### --do\_xrdp

should we adjust the xrdp.ini and sesman.ini files: 0: ignore files 1: adjust files

#### --do\_yum\_update

Update OS packages from Internet. Does yum --upgrade or dnf --upgrade or apt-get upgrade.

#### --download\_from

Also: --from, --download\_host. Specify web url to download LANforge packages from. Implies --force web.

#### --download\_only

Download files to tmp-dir, but do not install them or make other changes.

#### --download\_videos

shortcut for downloading Candelatech videos into /var/www/html/videos so that they might be served for video testing. See /usr/local/lanforge/nginx/video.inc for stanza when enabling directory listings when using nginx.

#### --fix\_web\_root

Enable do\_http and reset the /etc/httpd/httpd.conf DocumentRoot and Directory from /home/lanforge/candela\_cdrom to /var/www/html

#### --force\_new\_certs

Re-generate the HotSpot 2.0 R2 (HS20-R2) and/or RADIUS certs, even if we have previously created them.

#### --force\_notes

Force creating Ifnotes.html

#### --force\_osver

Override the detected OS version string with this value. EG: F36

#### --force\_osveri

Override the detected OS version number (integer) with this value. EG: 36

#### --force\_uname

Override the detected value of uname -a. Useful for building bundles on nonmatching hardware. EG: adtran-aarch64

#### --force\_web

Force script to use webserver. Do not use with --source\_dir.

#### --hs20\_server\_ip

IP Address to advertise as HS20 servers. This could be IP address of management port in simple configurations, and for more realistic configurations, perhaps the IP address of something in same network as the HS20 OSEN and .1x APs.

#### --hwver

Specify the hardware string: CT521, CT52x-PR, CT521, CT520, LF0202, CT523, CT523c, CT314, LF0312, LF0313, CT522 Can help with html info page configuration. Leave blank if unsure.

#### --ignore\_err

Ignore any (otherwise fatal) errors. May be useful for offline installs where some functionality is better than none.

#### --install\_large\_file\_cron

Creates a crontab entry that runs

/home/lanforge/scripts/check\_large\_files.bash on a daily basis. If you
want to run that check more frequently, you will have to modify the crontab rules
yourself.

#### --install\_pip\_lanforge\_scripts

removed in 5.4.8, 'lanforge-scripts' package is no longer maintained

#### --install\_selenium

install the selenium package using pip3 (implemented in 5.4.8)

#### --install\_vlc

VLC video player requires RPMFusion repository. This adds the repository and then installs VLC.

#### --lf2100\_8x

Specify adapter board used is the 8x internal splitter/combiner board, for do\_sys\_reconfig

Specify adapter board used is the 8x gen-3 internal splitter/combiner board, for do\_sys\_reconfig

#### --make\_ifcfg\_eth0

Creates /etc/sysconfig/network-scripts/ifcfg-eth0 from the eth0 entry found in /etc/udev/rules.d/70-persistent-net.rules. Fedora only. Edit 70-persistent first.

#### --mgt\_dev

indicate what interface should be configured as the management interface. LANforge works best in cases where there is a dedicated management interface and management network (out of band management). In the case there is only one interface and it has to serve as a traffic port and a management port, that is possible (in band management). Currently this option is only used by the -regen nm conf option. If this option is not specified Specify one of these options:

regen\_nm\_cont option. If this option is not specified specify one of these options:
1) {interface\_name}: name of the interface to set

2) "existing": force the use of the mgt\_dev in /home/lanforge/config.values

## --mgt\_dns

specify IP address to add to [ipv4]mgt\_dev.dns value in mgt\_dev.nmconnection

#### --mgt\_ip

specify either "dhcp" or a "ip/cird/gateway" combination for

- mgt\_dev.nmconnection:
- 1) mgt\_ip=dhcp

2) mgt\_ip=192.168.208.24/20/192.168.208.1

# --no\_fmirror

Uninstall yum-fastest mirror.

#### --nocache

Add fake URL argument to disable any HTTP caching.

#### --ntwk\_mgr\_ok

Enable NetworkManager. Enabled on Fedora 41+, otherwise disabled. Interop on Debian/Ubuntu will leave NetworkManager enabled.

#### --offline

Specify that the system is on an isolated network. Turns off --do\_only\_pkgs -do\_pkgs Enables --skip\_fmirror --skip\_installer\_check --skip\_pip -skip\_yum\_all --skip\_yum\_update

## --print\_host

Use with --print\_label

#### --print\_only

Implies --show\_urls without website check Turns off --do\_only\_pkgs -do\_pkgs Enables --skip\_fmirror --skip\_installer\_check --skip\_pip -skip\_yum\_all --skip\_yum\_update

#### --print\_windows

print out .bat file contents to help with downloading LANforge updates promote\_lvm\_mirror [drive]: Also: --lvm\_mirror. Reformat named drive and attach partitions to the existing LVM as mirror devices. This feature is intended to be used during installation: 1. Boot the system with a live CD distro 2. Download kinstall.pl 3. Use lf\_kinstall.pl --resize\_lvm 4. Use lf\_kinstall.pl -lvm\_mirror [blank drive]

#### --rebuild\_pip

this will uninstall the python pip user environments and build a new one from scripts/requirements.txt; if you see errors, you probably are missing newly required library packages provided by the distro. To make sure your packages are up to date, use:

# Example: ./lf\_kinstall.pl --do\_pkgs

#### --regen\_https\_key

regenerate the /etc/pki/tls/\$hostname.crt and .key files so that they have F33+ 4096 bit keys, not smaller keys.

#### --regen\_initrd

process will mount the LVM root volume and chroot into it, regenerating the Candelatech initrd file so that newly images systems can correctly reboot. \*Use from a Live CD!\* This step is called by --promote\_lvm\_mirror and --resize\_lvm. You might have to recover a system image by running this command from a live USB if the newly applied image has trouble booting.

#### --regen\_nm\_conf

Also -- regen nm config. Backs up

/etc/NetworkManager/NetworkManager.conf and recreates one that specifies that no interfaces except the one with the default route be managed. Enabled by default during do\_interop. NM settings you do not want modified should live in separate conf files in /etc/NetworkManager/conf.d. When this option is used without the --mgt\_dev option, a new management device will be determined. Default value is 1.

0: do not modify NetworkManager.conf

1: update NetworkManager.conf and mgt\_dev.nmconnection

2: update NetworkManager.conf, mgt\_dev.nmconnection, but do not restart NetworkManager

#### --remove\_certain\_pkgs

Uninstall packages that are typically noisy, problematic, or pointless for a LANforge system sold by Candelatech. This is implied by --do\_all\_ct. This is overridden by --skip\_yum\_all, --download\_only, --create\_install\_bundle. Packages presently include: dnfdragora-updater, dnfdragora, openvswitch, spice-vdagent, open-vm-ools, setroubleshoot, virtualbox-guest-additions, thunderbird.

#### --remove\_kern

Uninstall a LANforge kernel from /boot and /etc/grub.d. It will update the /boot/grub2/grub.cfg.

#### --remove\_large\_file\_cron

removes the cronjob created by --install\_large\_file\_cron

#### --remove\_passwords

removes the passwords from accounts root and lanforge and reconfigures sshd to accept empty passwords. Yes...really, it IS crazy, right?

#### --remove\_pipewire

Removes pulseaudio-pipewire packages. 0: do not remove pipewire (default) 1: remove pipewire

#### --reset\_pip

Use when pip3 updates were installed as root and you have system pip3 package conflicts. This will reinstall the python-pip3 package and 'pip3 remove -r requirements.txt' to remove pip3 libraries from system folder. Follow this with --update\_pip to get pip3 libraries into user lanforge folder.

#### --resize\_root

resize the root (/) partition to the extent of the storage device. This is intended for Adtran LF0355\_AT7 and similar AP chassis when booting from USB storage.

#### --save\_gui\_cfg

Use this to restore GUI settings on reboot. Running this a second time copies a changed LANforgeGUI/lfcfg.txt file to \$home to save new changes.

1) backup: copies the LANforgeGUI/lfcfg.txt file to \$home. Disables

lfcustom\_gui.bash if it exists.

2) static: implies backup, creates lfcustom\_gui.bash that replaces lfcfg.txt into LANforgeGUI directory every time LANforgeServer is started.

#### --serialno

use with --do print label, specifies serial number on label

#### --set\_swiotlb

Also: --swiotlb, --do\_swiotlb. Configure IOMMU buffer size. Requires you use IOMMU setting, so use with --do\_grub --do\_iommu=1

#### Example: --do\_grub --do\_iommu=1 --set\_swiotlb=65536

#### --setup\_flatpak

[flatpak URL] Install and create a flatpak 1.6 runtime. Specify the URL of the flatpak to install. Flatpak requires a kernel with SECCOMP enabled to run.

#### --setup\_snapd

[snapd URL] Also --setup\_snap. Install snapd and the Candelatech python virtual environment. Requires F24 or Ubuntu 20.04.

#### --show\_large\_pkgs

Also: --show\_larges\_pkgs, --largest\_pkgs, --large\_pkgs. Show top 20 largest packages. Useful during do\_image\_prep if you want to reduce install footprint.

#### --show\_urls

Show URLS for all files that should be downloaded, and exit.

#### --skip\_cpu\_burn

Don't burn-in CPU.

#### --skip\_disk\_test

avoid do\_disk\_test if /home/lanforge/did\_disktest is missing

#### --skip\_fmirror

Don't alter systems existing use of yum-plugin-fastestmirror.

#### --skip\_grub

Don't do kernel install, even if other options would have selected it.

Don't install LANforge-GUI, even if other options would have selected it.

# --skip\_instller\_check

avoids checking MD5 sum of lf\_kinstall.pl

#### --skip\_ifrename

avoids renaming interfaces and rewriting 70-persistent-net. If OUIs of VMs are detected, the file /home/lanforge/LF\_N0\_IFRENAME is created. If /home/lanforge/LF\_N0\_IFRENAME is found, this option is automatically enabled.

#### --skip\_installer\_check

turn off checking md5sum of ./lf\_kinstall.pl

#### --skip\_kern

Do not install a kernel package, suppresses do\_grub, do\_kern

#### --skip\_radius

Do not attempt to reconfigure radius. Useful when attempting to speed up do\_sys\_reconfig on slow systems.

#### --skip\_resume

Don't try to use HTTP resume when downloading packages.

#### --skip\_xorp

Don't install Xorp virtual-router package, even if other options would have selected it.

#### --skip\_yum\_update

Don't execute dnf/yum --update

#### --source\_dir

Specify location of installation files (must be absolute path). Implied by -use\_bundle. Useful when downloading install packages on an isolated system (typically to /home/lanforge/Downloads). Example: ./lf\_kinstall.pl -lfver 5.4.7 --kver 6.7.5+ --do\_upgrade --source\_dir /home/lanforge/Downloads --offline

#### --tmp\_dir

Specify the script temporary working directory and backups of system files. Typically defaults to /var/tmp .

#### --update\_pip

Also --upgrade\_pip. Upgrades pip3 userland. This calls scripts/pyscripts/update\_dependencies.py. If there are errors from that process, please run that script as user lanforge (not root). If there is a web proxy in your environment, this might be skipped. Some Debian based environments will attempt to create a virtual environment (/home/lanforge/scripts/venv).

#### --use\_install\_bundle

Also --use\_bundle, --bundle [bundle file] Upgrade LANforge using an install bundle file. Bundle files Sets \$source\_dir, \$tmp\_dir to directory containing bundle.tar file. See

http://www.candelatech.com/lfserver\_install.php#offline\_bundle Bundle installations require the system OS matches compiled OS version in the bundle. Confirm your OS version using: "grep Y /etc/os-release". Not intended for --do\_interop. This sets flags: disable\_audit\_logs = 1 do\_cma = cma\_recommendation() if (do\_cma == 1) do\_firmware = 1 do\_grub = 1 do\_http = 1 do\_kern = 1 do\_lanforge = 1 do\_pkgs = 0 do\_upgrade = 1 do\_xrandr = 0 do\_yum\_update = 0 is\_offline = 1 skip\_cpu\_burn = 1 skip\_fmirror = 1 skip\_pip = 1 skip\_xorp = 0 skip\_yum\_all = 1 skip\_yum\_update = 1 source\_dir = tmp\_dir You can specify --force\_osver and --force\_osveri to install a bundle onto a nonmatching OS. For example: --bundle Bundle\_fiver-5.4.7\_kern-6.7.9+\_osver-F36 -force osver 36 --force osveri 36 will install the F36 bundle correctly on F37, F38

#### --use\_yum\_cache

do not erase and rebuild yum cache

#### --wipe\_raid

Also --remove\_raid --remove\_lvm [drive1,drive2...] Remove LVM volumes and signatures from specified disks. Use this before doing --create\_raid the first time on any disk that already has a filesystem.

Example: ./lf\_kinstall.pl --wipe\_raid nvme0n1p1,nvme1n1p1

#### Note:

If you use commands "yum update" or "dnf update", and you need to use a kernel provided by the repository, use grub2-mkconfig to create the boot entry, or consider using --do\_interop Example: grub2-mkconfig -o /boot/grub2/grub.cfg

# Configure Auxiliary Management Interfaces

# Goal: Allow LANforge to create its own wireless management network.

In cases where is is not convenient to use an existing management network, LANforge WiFi systems can be configured to provide their own WiFi management network. This may be especially useful when testing in environments where LANforge needs to be moved around or where you have no good access to existing management LANs. This example assumes that you already know how to create and configure VAP and Stations in LANforge.

- 1. Configure LANforge for Auxiliary Management.
  - A. Connect LANforge systems through the normal management LAN for initial configuration. The resources should be visible in the management tab

	LANforge Manager Ver	sion(5.3.6)		$\odot$ $\bigcirc$ $\bigcirc$
Control Reporting Tear-Off Info	Plugins			
	Stop	All Resta	art Manager	Refresh HELP
Generic Test Mgr Test Group Status Layer-3 L3 Endps	Resource Mgr PPP-Links Event Log VoIP/RTP VoIP/RTP Endps Ar	Alerts Port M mageddon W	gr VAP Stations Mess anLinks Attenuators	ages File-IO Layer-4
License Info	Current Users		Test Configuration Data	base
Licenses expire in: 138 days	* Admin from:192.168.100.149 gnuserver from:127.0.0.1	List:	DFLT	Load
		Name:	aux-mgt-sta5	Delete
		Load Behavior:	Overwrite	Save
Support expires in: 138 days.			Download DB	Show Progress
•	 II			•
	Virtual Shelf	1		
	Resource 1	Resource 2		
		<b></b>		
	Netsmith	Netsmith		
Logged in to: 192.168.100.126:40	02 as: Admin			

B. In this case, we are using wiphy0 for the Aux-Mgt interfaces. On the manager system, configure wiphy0 to be on the desired channel, create a virtual AP on wiphy0, and configure it appropriately. The Aux-Mgt checkbox should be selected, a static IP should be assigned, and an appropriate SSID configured. The AP Aux-Mgt port will automatically serve DHCP and will try to NAT and route packets to the wired Management interface.

		Current: Driver Info	Port Status Inform LINK-UP GRO NON Port Type: WIFI-AP	ation E Parent: wiphv0			
			Dest Configurabl				
Ctopdard Configure	tion Advon	and Configuration	Mice Configurati	es Custom WiF			
Standard Coningura		ced conliguration	Misc conliguiati	torf Catting			
Enable			General In	iterface Settings			
Set IP Down		Down	Aux-Mgt				
Set TX 0 Len		DHCP-IPv6	DHCP Release	DHCP Vendor ID	None	<b>~</b>	
Set MTU		DHCP-IPv4	Secondary-IPs	DHCP Client ID:	None	-	
Set Offload		DNS Servers:	BLANK	Peer IP:	NA		
		IP Address:	99.99.1.1	Global IPv6:	AUTO		
		IP Mask:	255.255.255.0	Link IPv6:	AUTO		
		Gateway IP:	0.0.0.0	IPv6 GW:	AUTO		
Services —		Alias:		MTU:	1500		
HTTP		MAC Addr:	00:0e:8e:75:3d:8d	TX Q Len	1000		
FTP		Rpt Timer:	medium (8 s) 🔻	WiFi Bridge:	NONE	-	
			WiF	i Settings			
Low Level	SSID:	lanforge-mgt		-	AP:	DEFAULT	
	Key/Phrase:				Mode:	(802.11abqn-AC)	-
TSO Enabled	Freq/Channe	el: 2462/11		1	Rate:	OS Default	-
UFO Enabled	DTIM-Period	2			Max-STA:	2007	
GS0 Enabled	Beacon:	240					
LRO Enabled	WPA	WPA2 OSEN	WEP Disable H	T40 🔲 Disable H	180 🔲 Er	nable VHT160 🔲 Dis	able SGI
GR0 Enabled	Verbose	Debug					
,							

C. On the other resources, configure the wlanX interface to connect to the AP on the manager system, and select the **Aux-Mgt** checkbox.

Current: LINK-UP GRO Authorized Driver Info: Port Type: WIFI-STA Parent: wiphy0 Port Configuration Corruptions Custom WIF Enable General Interface Settings Set IF Down Down Aux-Mgt Set MAC DHCP-IPV6 DHCP Release DHCP Vendor ID: None Set MAC DHCP-IPV4 Secondary-IPS DHCP Client ID: None Set MTU DNS Servers: 192.168.100.1 Peer IP: NA Set Offload DNS Servers: 192.168.100.1 Peer IP: NA
Driver Info:       Port Type:       WIFI-STA       Parent:       wiphy0         Port Configurables       Port Configuration       Corruptions       Custom WIF         Enable       General Interface Settings         Set IF Down       Down       PAux-Mgt         Set MAC       DHCP-IPV6       DHCP Release       DHCP Vendor ID:         Set MAC       DHCP-IPV4       Secondary-IPS       DHCP Client ID:         Set MTU       DNS Servers:       192.168.100.1       Peer IP:         NA       DNS Servers:       0.0.0       Global IPV6:
Port Configuration Corruptions Custom WiF Enable General Interface Settings Set IF Down Down Aux-Mgt Set MAC DHCP-IPV6 DHCP Release DHCP Vendor ID: None Set MTU DHCP-IPV4 Secondary-IPS DHCP Client ID: None Set Offload DNS Servers: 192.168.100.1 Peer IP: NA Set Offload DNS Servers: 0.0.0 Global IPV6; AUTO
Standard Configuration       Advanced Configuration       Misc Configuration       Corruptions       Custom WiF         Enable       General Interface Settings         Set IF Down       Down       Aux-Mgt         Set MAC       DHCP-IPV6       DHCP Release       DHCP Vendor ID:       None         Set MTU       DHCP-IPV4       Secondary-IPs       DHCP Client ID:       None       Image: Control of Contr
Enable General Interface Settings Set IF Down Set MAC Set MAC Set TX Q Len Set MTU DNS Servers: 192.168.100.1 Peer IP: NA
Set IF Down         Down         Aux-Mgt           Set MAC         DHCP-IPV6         DHCP Release         DHCP Vendor ID:         None           Set TX Q Len         DHCP-IPV4         Secondary-IPs         DHCP Client ID:         None            Set MTU         DHCP-IPV4         Secondary-IPs         DHCP Client ID:         None            Set offload         DNS Servers:         192.168.100.1         Peer IP:         NA
Set MAC     DHCP-IPv6     DHCP Release     DHCP Vendor ID:     None       Set TX Q Len     DHCP-IPv6     DHCP Release     DHCP Client ID:     None       Set MTU     DHCP-IPv4     Secondary-IPs     DHCP Client ID:     None       Set Offload     DNS Servers:     192.168.100.1     Peer IP:     NA       Set offload     IP Address:     0.0.0     Global IPv6:     AUTO
Set INQ term         Image: DhCP-IPv4         Secondary-IPs         DHCP Client ID:         None           Set MTU         DNS Servers:         192.168.100.1         Peer IP:         NA           Set Offload         DNS Servers:         192.168.100.1         Peer IP:         NA
Set Offload         DNS Servers:         192.168.100.1         Peer IP:         NA           Set peomicic         IP Address:         0.0.0.0         Global IPv6:         AUTO
Set PROMISE IP Address: 0.0.0.0 Global IPV6: AUTO
SELEROMISC
Services IP Mask: 0.0.0.0 Link IPv6: AUTO
HTTP Gateway IP: 0.0.0.0 IPv6 GW: AUTO
FTP Alias: MTU: 1500
RADIUS MAC Addr: 00:0e:8e:4e:5a:95 TX Q Len 1000
Low Level — Rpt Timer: medium (8 s) 🔻 WiFi Bridge: NONE 🖛
PROMISC WiFi Settings
L TSO Enabled SSID: lanforge-mgt ▼ AP: DEFAULT
Key/Phrase: Mode: (802.11abgn-AC)
Freq/Channel: 2462/11 Rate: OS Default
WPA WPA2 OSEN WEP Disable HT40 Enable VHT160 Disable

D. The Port-Mgr tab should look something like this when the Aux-Management interfaces are configured.

					LAN	forge M	lanage	er Ve	rsion(5.3.	6)				$\odot$
ontrol	Repor	ting	Tear-Off Info PI	ugins										
								Stop	All	Restart	Manager		Refresh	HE
Seneric	Ter	st Mar	Test Group	Resou	rce Mar	PPP-l in	ks F	vent Loc	Alerts	Port Mar	VAP Sta	ations Mes	sanes	
Status		aver-3	13 Endos	VolP	/RTP	VolP/RTF	Endn		rmageddor	Wan	Links	Attenuators	File-IO	Laver
orara		lyer a	20 Enapo			1011 )1111			anagoaaoi	- man		Acconductors	111010	Layer
	Disp:	192.3	168.100.149:0.0		Sniff Packe	ts	î	Clear	Counters	Reset	Port	Delete		
	Rpt Ti	mer:	nediun (8 s)	-	Apply		I	View	w Details	Cre	ate	Mo <u>d</u> ify	Batch Modi	iy
					All Et	hernet I	nterfac	es (Por	s) for all Re	esources				
Port	Pha	Dow	n IP	SEC	Alias	Parent Dev	RX B	lytes	RX Pkts	Pps RX	bps RX	TX Bytes	TX Pkts	Pps T
1.0			192.168.100.12	6 0	eth0		190.6	18,480	221,996	10	9,135	169.584.87	9 163.484	
1.1		<b></b>	0.0.0.0	0	eth1			0	0	0	0		0 0	
1.2			0.0.0.0	0	eth2			0	0	0	0		0 0	
1.3			0.0.0.0	0	wiphy0		128,8	22,643	338,150	53	151,268	6,903,32	53,578	
1.4			0.0.0.0	0	wiphyl			0	0	0	0		0 0	
1.5			0.0.0.0	0	wlan0	wiphy0		0	0	0	0		0 0	
1.6		~	0.0.0.0	0	wlan1	wiphyl		0	0	0	0		0 0	
1.7			99.99.1.1	0	vap0	wiphy0	40,9	38,553	37,349	7	62,461	3,953,75	5 35,591	
2.00			192.168.100.10	9 0	eth0		111,6	49,961	88,549	0	0	24,980,36	B 29,494	
2.01			0.0.0.0	0	eth1			0	0	0	0		0 0	
2.02			0.0.0.0	0	eth2			0	0	0	0	100 C	0 0	
2.03			88.1.1.187	0	stal00	wiphyl		20,738	171	0	0	4,07	4 39	
2.04			0.0.0.0	0	wiphyl		17,9	88,948	86,713	19	31,472	59,96	7 1,170	
2.05			88.1.1.193	0	stal01	wiphyl		20,454	163	0	0	4,97	4 47	
2.06			88.1.1.186	0	stal02	wiphyl		20,644	160	0	0	10,80	2 73	
2.07			88.1.1.189	0	stal03	wiphyl		17,368	146	0	0	4,27:	2 44	
2.08			88.1.1.194	0	stal04	wiphyl		20,306	165	0	0	5,42	0 48	
2.09			0.0.0.0	0	wiphy0		16,0	72,057	75,744	11	12,999	43,571,16	3 39,673	
2.10			99.99.1.11	0	wlan0	wiphy0	3,2	28,043	35,474	6	4,820	41,679,77	7 37,345	
2.11			0.0.0.0	0	wian1	wiphy1		0	0	0	0		0	

E. To test that it works properly, you can now remove the wired Manament port connection and wait about 1 minute for the old connection to time out and re-connect to the Auxiliary Management port. Or, just reboot systems with the wired ports unplugged and they should be discovered on the Aux-Mgt ports promptly.

# Windows IP Addresses

# Goal: Find and change network ip addresses on Microsoft Windows.

Here are some techniques for finding and setting IP addresses on Microsoft Windows using the Control Panel and the command line.



- 1. Find the IP Address of the Windows PC. There are two methods you can use:
  - A. Using the Control Panel:
    - A. Click Start, Run, control, [enter]

	Type the name of a program, folder, doo resource, and Windows will open it for y	cument, or Internet ou.
Open:	control	

B. Search and select Network Status and Devices



C. We click on our device, Ethernet 3:



D. Find and/or set the IP address: from Status, click Properites

Connection -		
IPv4 Connec	tivity:	No Internet access
IPv6 Connec	tivity:	No Internet access
Media State:		Enabled
Duration:		00:23:49
Speed:		1.0 Gbps
Details		
Details		
Details	Sent —	Received
Details Activity Bytes:	Sent — 13,339	

E. double click TCP/IPv4

Connect using:	000 MT Network Conn	ection #2
		Configure
🗹 🔺 Microsoft LL	DP Protocol Driver	
✓	opology Discovery Map opology Discovery Res ocol Version 6 (TCP/IP ocol Version 4 (TCP/IP	oper I/O Driver ponder v6) v4) V
✓	opology Discovery Map opology Discovery Res ocol Version 6 (TCP/IP ocol Version 4 (TCP/IP	poper I/O Driver ponder v6) v4)
Link-Layer T     L	opology Discovery Map opology Discovery Res ocol Version 6 (TCP/IP ocol Version 4 (TCP (P Uninstall	pper I/O Driver ponder v6) v4) v Properties

F. you will see and can change the IP address.:

eneral	
You can get IP settings assigned this capability. Otherwise, you ne for the appropriate IP settings.	automatically if your network support eed to ask your network administrator
Obtain an IP address autom	atically
• Use the following IP address	s:
IP address:	10 . 26 . 0 . 10
Subnet mask:	255.255.255.0
Default gateway:	
Obtain DNS server address	automatically
Use the following DNS serve	er addresses:
Preferred DNS server:	
Alternate DNS server:	• • •
Validate settings upon exit	Advanced

- B. Various DOS commands to find the IP addresses on the system:
  - A. ipconfig and ipconfig /all
  - B. netsh interface ipv4 show address
- C. Resetting your DHCP address via command line:
  - A. ipconfig /release
  - B. ipconfig /renew

# Windows MAC Addresses

# Goal: Find MAC Addresses in Microsoft Windows.

Here are some techniques for finding MAC addresses on Microsoft Windows using the Control Panel and the command line.



- 1. Find the MAC Address of the Windows PC. There are two methods you can use:
  - A. Method 1: use the Control Panel
    - A. Click Start, Run, control, [enter]

Type the name of a program, folder, document, or Interneresource, and Windows will open it for you.	<b>.</b>	Run	
Open: control		Type the name of a program, folder, doc resource, and Windows will open it for yo	ument, or Internet ou.
	Open:	control	· · · · · · · · · · · · · · · · · · ·

B. Search and select Network Status and Devices



C. We click on our device, Ethernet 3:



D. Click Details...

Ф.	Ethernet 3	3 Status	
General			
Connection IPv4 Connectivity: IPv6 Connectivity: Media State: Duration: Speed: Details		No Internet access No Internet access Enabled 00:25:29 1.0 Gbps	-
Activity			-
	Sent —	Received	
Bytes:	13,339	15,247	
Properties	😗 Disable	Diagnose	
		Close	

E. Details will show the MAC address (physical address):

Property	Value
Connection-specific DN	
Description	Intel(R) PRO/1000 MT Network Conner
Physical Address	08-00-27-C4-4E-4F
DHCP Enabled	No
IPv4 Address	10.26.0.10
IPv4 Subnet Mask	255.255.255.0
IPv4 Default Gateway	
IPv4 DNS Server	
IPv4 WINS Server	
NetBIOS over Topip En	Yes
Link-local IPv6 Address IPv6 Default Gateway	fe80::99cd:62dc:450d:d8a2%17
IPv6 DNS Servers	fec0:0:0:ffff::1%1
	fec0:0:0:ffff::2%1
	fec0:0:0:ffff::3%1
<	

- F. (Suggested) Set the IP address if you have not already. For more information see Finding Windows IP Address
- B. Method 2: use the DOS command-line. You want to correlate the IP address and MAC address of the Windows ethernet port:
  - A. Click Start, Run, and type cmd, and press [Enter]

	Run	
<u>O</u> pen:	Type the name of a program, folder, document, or Interne resource, and Windows will open it for you. cmd	et V
	OK Cancel Browse	

B. Show interfaces by name with the command: netsh interface ipv4 show addresses

<b>64</b>	C:\Windows\sys	:tem32\cmd.exe – 🗖 🗙
C:\Users\IEUser>netsh inter	face ipv4 show	addresses 🔨
Configuration for interface DHCP enabled: IP Address: Subnet Prefix: InterfaceMetric:	"Ethernet 4"	Yes 169.254.3.216 169.254.0.0/16 (mask 255.255.0.0) 10
Configuration for interface DHCP enabled: IP Address: Subnet Prefix: InterfaceMetric:	"Ethernet 3"	No 10.26.0.10 10.26.0.0/24 (mask 255.255.255.0) 10
Configuration for interface DHCP enabled: IP Address: Subnet Prefix: Default Gateway: Gateway Metric: InterfaceMetric:	"Ethernet 2"	Yes 192.168.100.135 192.168.100.0/24 (mask 255.255.255.0) 192.168.100.1 0 10
Configuration for interface DHCP enabled: IP Address: Subnet Prefix: Default Gateway: Gateway Metric: InterfaceMetric:	"Ethernet"	Yes 10.0.2.15 10.0.2.0/24 (mask 255.255.255.0) 10.0.2.2 0 10
Configuration for interface DHCP enabled: IP Address: Subnet Prefix: InterfaceMetric:	"Loopback Pse	udo-Interface 1" No 127.0.0.1 127.0.0.0/8 (mask 255.0.0.0) 50
C:\Users\IEUser>		~

C. (Optional) if you do not see results, you might need to start the network autodiscovery service: net start dot3svc

<pre>\$ net start dot3svc</pre>			
The Wired AutoConfig	service	is starting.	
The Wired AutoConfig	service	was started	successfully

D. (Optional) Depending on the edition of Windows, the command

netsh lan show interfaces will display mac addresses. § netsh lan show interfaces

ere are 4 interface	s on the system:
Name	: Ethernet 3
Description	: Intel(R) PRO/1000 MT Network Connection #2
GUID	: a3ac1715-8740-4b8f-8022-fec68d9bbd6e
Physical Address	: 08-00-27-C4-4E-4F
State	: Connected. Network does not support authentication.
Name	: Ethernet 2
Description	: Intel(R) PRO/1000 MT Network Connection
GUID	: 6353aef5-ff9f-445c-81db-9bec6c0d477a
Physical Address	: 08-00-27-3A-3C-FB
State	: Connected. Network does not support authentication.
Name	: Ethernet
Description	: Intel(R) PRO/1000 MT Desktop Adapter
GUID	: TocIf25-3499-4d73-88f5-1ff2687633d1
Physical Address	: 08-00-27-12-89-59
State	: Connected. Network does not support authentication.
Name	: Ethernet 4
Description	: Intel(R) PRO/1000 MT Network Connection #3
GUID	: 4ccf6f8e-clee-4taf-b0ef-2dc36c1d8a07
Physical Address	: 08-00-27-4C-4C-4A
State	: Connected. Network does not support authentication.

E. Show mac addresses with: getmac /v /fo csv

(The CSV formatted command of the command ensures that we will see the entire name of the interface which

can be trimmed short in the default output format.)

C81	C:\Windows\system32\cm	d.exe – 🗆 🗙
C:\Users\IEUser>getmag	; ∕v	^
Connection Name Netwo	rk Adapter Physical Address	Transport Name
Ethernet Intel -4D73-88F5-1FF26876331	(R) PRO/10 08-00-27-12-89-E9	\Device\Tcpip_{F0C1F253-3499
Ethernet 2 Intel -445C-81DB-9BEC6C0D47	(R) PRO/10 08-00-27-3A-3C-FB	\Device\Tcpip_{6358AEF5-FF9F
Ethernet 3 Intel -4B8F-8022-FEC68D9BBD0	(R) PRO/10 08-00-27-C4-4E-4F 5E>	\Device\Tcpip_{A3AC1715-8740
Ethernet 4 Intel -44AF-B0EF-2DC36C1D8A	(R> PRO/10 08-00-27-AC-4C-4A 07>	\Device\Tcpip_{4CCF6F8E-C1EE
C:\Users\IEUser>		

F. These commands will make it easier to copy using notepad: netsh interface ipv4 addresses > ifnotes.txt getmac /v /fo csv >>ifnotes.txt notepad ifnotes.txt



G. Now you can easily copy the values:

4	ifnotes - Notepad 🚽 🗖 🗖	
File Edit Format View Help		
Configuration for interface W	244 48	1
Configuration for interface "E	Inernet 4-	
DHCP enabled:	Tes	
IP Address:	169.254.3.216	
Subnet Pretix:	169.254.0.0/16 (mask 255.255.0.0)	
Inter+aceMetric:	10	
Configuration for interface "E	thernet 3"	
DHCP enabled:	Ne	
IP Address:	10.25.0.10	
Subnet Prefix:	10.26.0.0/24 (mask 255.255.25)	
InterfaceMetric:	10	
Configuration for interface "F	thernet 2"	
DHCP enabled:	Vac	
TR Address	102 168 100 125	
Subpat Drafiv:	192.100.100.103	
Subnet Pretix:	192.100.100.0/24 (mask 255.255.25.0)	
Gateway:	192.100.100.1	
Gateway Metric:	0	
interfacemetric:	10	
Configuration for interface "E	thernet"	
DHCP enabled:	Yes	
IP Address:	10.0.2.15	
Subnet Prefix:	10.0.2.0/24 (mask 255.255.25.0)	
Default Gateway:	10.0.2.2	
Gateway Metric:	0	
InterfaceMetric:	10	
Configuration for interface "L	.oopback Pseudo-Interface 1"	
DHCP enabled:	No	
IP Address:	127.0.0.1	
Subnet Prefix:	127.0.0.0/8 (mask 255.0.0.0)	
InterfaceMetric:	50	
"Connection Name", "Network Ada "Ethernet", "Intel(R) PRO/1000 "Ethernet 2", "Intel(R) PRO/100 "Ethernet 3", "Intel(R) PRO/100 "Ethernet 4", "Intel(R) PRO/100	gter","Physical Address","Transport Name" MT Desktop Adapter","08-00-27-12-09-05","Device\Tcpip_(F0C1F233-3499-4D73-80F5-1FF2687633D1)" 04 MT Network Connection "08-02-73A-3C-670","Device\Tcpip_(33584F5-FF9F-445C-81D0-90EC6600477A)" 09 MT Network Connection #2","0 <u>80-02-73A-3C-64-14</u> ","Device\Tcpip_(A342T13-5740-480F-8022-FEC66090B0A7)" 09 MT Network Connection #2","0 <u>80-02-73A-3C-44-44</u> ","Device\Tcpip_(A342T13-5740-480F-8022-FEC66090B0A7)"	
		`
<	>	

# **Customizing DOS Window Settings**

# Goal: Make your DOS windows large and do cut and paste easier.

Here we review DOS window settings that will help you to work faster.



- 1. Customizing DOS Window Settings starts by right clicking the Start Menu
- 2. Type in cmd and hit Enter



3. To get to your DOS window faster, you can pin it to your task bar. Right click the task bar CMD window icon and select **Pin this program to taskbar** 



4. On the DOS window title bar, Right click and select the **Defaults** menu item



5. Select the Quick Edit Mode setting. This allows you to highlight text in the window easily.

Console Windows Properties	×
Console Windows Properties       Options     Font     Layout     Colors       Cursor Size <ul> <li>Small</li> <li>Medium</li> <li>Large</li> </ul> Command History <ul> <li>Buffer Size:</li> <li>So<ul> <li>Mumber of Buffers:</li> <li>Medium</li> <li>Discard Old Duplicates</li> </ul></li></ul>	Edit Options I QuickEdit Mode I Insert Mode I AutoComplete
	OK Cancel

6. In the Font tab, select a slimmer TrueType font, like Consolas or Lucida Console, and set the font size to 10

Console Windows Properties	<u></u>
Options Font Layout Col	ors
Window Preview	Size
	10 8 10 12 14 16 18 20 24
Font Bold fonts	
'한 Consolas '한 Lucida Console Raster Fonts	
Selected Font : Lucida Console C+ WIMOWS> dir S+STEPI - DIR> 11 S+STEPI32 - DIR> 12 S+STEPI32 - DIR> 12 RE-DUE - TXT - 26926 1	- 01 Each character is: - 01 6 screen pixels wide - 01 10 screen pixels high
	OK Cancel

7. In the Layout tab, change the Window Size to 132 columns and 56 rows



8. Click OK to save. The next DOS window you open will appear with your customized settings.

# **Quickly Inspect Your DOS Path**

# Goal: Find if a program or is in your %PATH%

Use this technique to inspect your DOS environment variables for specific strings using **findstr**.



- 1. Follow this example to see if perl is installed and your %PATH% environment variables is updated. First, open up a DOS window: Windows + R cmd Enter
- 2. Type in the DOS Window: echo %PATH% | findstr /i perl Enter
- 3. If perl is installed correctly, you should have it in your path.



4. You can also use this technique to find any environment variable. E.G., find if you have a temporary directory set:



# **Connecting with PuTTY**

# Goal: Using PuTTY on Windows to connect to LANforge Linux servers.

Lots of tasks, like scripting, can be done over SSH from your Windows desktop. Here are a few steps to help you customize your PUTTY terminal to work faster.



- 1. Configuring a PuTTY Session
  - A. When you double click on the PUTTY icon and it launches, you can start customizing your session preferences. We'll name this session jedtest



B. Let's default the window to something large, like 120 columns and 56 rows.

RuTTY Configuration		? ×
Category:		
<ul> <li>Session         <ul> <li>Logging</li> <li>Terminal</li> <li>Keyboard</li> <li>Bell</li> <li>Features</li> </ul> </li> <li>Windowi</li> <li>Appearance</li> <li>Behaviour</li> <li>Translation</li> <li>Selection</li> <li>Colours</li> <li>Connection</li> <li>Data</li> <li>Proxy</li> <li>Teinet</li> <li>Rogin</li> <li>B: SSH</li> <li>Senal</li> </ul>	Options controlling PuTTY's window         Set the size of the window         Columns       Rows         120       56         When window is resized:       Change the number of rows and columns         C Change the size of the font       Change the size of the font         C Trange font size only when maximised       Forbid resizing completely         Control the scrollback in the window       Lines of scrollback         Display scrollbar       Display scrollbar         Display scrollback on display activity       P Reset scrollback on display activity         If Reset scrollback       When scrollback	
About Help	Open Cano	el

C. The Fixed font can be replaced with the Consolas font.



D. Let's turn on TCP Keep-alive and set IPv4 as the default networking protocol.

RuTTY Configuration	?
Category:	
Session     Logging     Terminal     Keyboard     Bell     Features     Window     Appearance     Behaviour     Translation     Selection     Colours     Connection     Data     Proxy     Teinet     Rlogin     SSH     Sertal	Options controlling the connection         Sending of null packets to keep session active         Seconds between keepalives (0 to turn off)         Image: Connection options         Image: Disable Nagle's algorithm (TCP_NODELAY option)         Image: Disable TCP keepalives (SO_KEEPALIVE option)         Image: Disable TCP keepalives (SO_KEEPALIVE option)         Intermet protocol version         C       Auto         C       IPv4         Logical name of remote host         Logical name of remote host (e.g. for SSH key lookup):
About Help	Open Cancel

E. We login to LANforge resources with user lanforge

ategory:	-	
Gession     Goging     Gession     Goging     Gession     Ges	Login details Auto-login usemame When usemame is not sy @ Prompt C Use sy Terminal details Terminal speeds Environment variables Variable Value	Inforge pecified: retern username (ireynolds) xtern 38400,38400 Add Remove

F. Generating a SSH keypair is not difficult. Let's enter the path to our public key file.



G. We have done our PuTTY config. Now back to the top Session screen, and click Save



- 2. Configure Pagent with your public key
  - A. Create your own public ssh key. For more information see WinScp Net
  - B. Start Pagent. Configure it to load on startup.
  - C. In the System Tray you will see the Pagent icon.



D. Right-click the Pagent icon and click Add Key to select your key



E. You will need to provide your pass-phrase to load your key

Pageant Key List	<u>?</u>
Pageant: Enter Passphrase Enter passphrase for ke rsa-key-20131104 • OK Canc	
Add Key	Remove Key

F. We see a loaded key

ssh-rsa 2	048 c4:2f:6b:35:7e	e.ff:26:9a:55:13:5d	fd:c1:69:e6:1f rsa-key-20	131104

G. Here is our key, we will view the .pub file to copy out the public key.

C:\Users\jreynolds\.ssh			_ <b>_ _ _</b> ×
		👻 🛃 Search .ssh	2
Organize 🔻 🙆 Open 🔻 Share with	<ul> <li>Print New folder</li> </ul>		::: 🕶 🛄 🔞
🌗 pub 📃	Name *	Date modified	Type Size
Recent Places	🚊 atlantis-id_rsa.ppk	5/22/2015 3:06 PM	PuTTY Private Key File
mingw-btbits (jed-r20-32)	🗟 atlantis-id_rsa.pub	5/22/2015 3:06 PM	Microsoft Publisher
🥅 Desktop			
📜 Libraries 🛄			
Documents			
Git Git			
J Music			
E Pictures			
Videos			
jreynolds			
.eclipse			
Jimc .jmc			
🍌 .ssh			
AppData 💌	•		Þ
atlantis-id_rsa.pub Da Microsoft Publisher Document	te modified: 5/22/2015 3:06 PM Size: 468 bytes	Date created: 5/22/2015 3:06 PM	

- H. In a putty window you will log into your LANforge server and edit /home/lanforge/.ssh/authorized\_keys
- I. Copy the text and place the "Comment" section at the end when you paste it into your ssh



J. Here is the public key string, with newlines and spaces removed. The Comment text goes at the



L. The next time we load the jedtest PuTTY session we should not be prompted for our password.

# Installing the Arduino Mega Driver on Windows XP

#### Goal: Installing the the Arduino Mega device driver on Windows XP.

The automatic driver install process for Windows XP might automatically install a Microsoft Windows version of the Arduino Mega driver. This is not the driver LANforge expects. These instructions will guide you how through uninstalling an old driver and installing the new driver.

- 1. Follow the link to the Arduino project to download the latest driver :Download Arduino IDE For more information see Installing LANforge Server on Windows
- Download the Arduino IDE zip file to your desktop. Use Right-click→Extract All... to expand the contents to a folder on your desktop.



- 3. Connect USB cable from the Attenuator to the PC
- 4. Click Start -- Control Panel and choose the Add Hardware option.



6. Select the Install the hardware that I manually select option, and click Next



7. Select the Ports (COM & LPT) option, and click Next

From the list below, select the type of hardware you are installing If you do not see the hardware category you want, click Show All Devices. Common hardware types:	
If you do not see the hardware category you want, click Show All Devices.	
If you do not see the hardware category you want, click Show All Devices.	
Common hardware types:	
PCMCIA adapters	
PCMCIA and Flash memory devices	
Ports (CUM & LP1)	
SCSI and RAID controllers	
💇 Sound, video and game controllers	
System devices	
V lape drives	
<pre></pre>	

8. Select (Standard port types) option, then Communications Port and then click Have Disk...



9. Click Browse



10. Navigate to your Desktop\arduino-1.8.9\drivers folder, and click Open

Locate File			? 🛛
Look in: My Docume My Comput My Networ arduino-1.4	Desktop ents ter k Places 8.9	<b>O D</b>	≓ ∰
File name:	".inf	~	Open
Files of type:	Setup Information (*.inf)		Cancel

# 11. Click Next

dd Hardware Wizard	
Select the device driver you	ı want to install for this hardware.
Select the manufacturer at have a disk that contains I	nd model of your hardware device and then click Next. If you he driver you want to install, click Have Disk.
Manufacturer	Model
Adafruit Industries LLC Arduino LLC (www.arduino.cc) Arduino Srl (www.arduino.org) Linino	Adafruit Circuit Playground
This driver is not digitally     Tell me why driver signing is im	signed! Have Disk
	<pre></pre>

# 12. Click Next

Add Hardware Wizard
The wizard is ready to install your hardware
Hardware to install: Adafruit Circuit Playground To start installing your new hardware, click Next.
< Back Next > Cancel

13. Click Continue Anyway



14. Click Finish



- 15. You should not need to reboot your system in order to run the Attenuator
- 16. For LANforge to recognize the new attenuator, restart the LANforge server on the machine that has the attenuator connected. On Windows, close the LANforge server CMD windows and then restart LANforge with using your desktop icon.

# Installing the Arduino Mega Driver on Windows 7

# Goal: Installing the the Arduino Mega device driver on Windows 7.

LANforge CT70x attenuators require recently signed Arduino drivers. The automatic driver install process for Windows 7 might automatically install a Microsoft Windows version of the Arduino Mega driver. This is not the driver LANforge expects. These instructions will guide you how through uninstalling an old driver and installing the new driver from the Arduino website.

<sup>1</sup> If you have recently removed a driver, you might need to reboot your Windows system for it to complete the driver installation process.

1. You want to install the windows version of the LANforge Server beforehand. For more information see Installing LANforge Server on Windows

2. Follow the link to the Arduino project to download the latest driver :Download Arduino IDE



Download the Arduino IDE zip file to your desktop. Use Right-click
 -Extract All... to expand the contents to a folder on your desktop.



- 4. This process requires you to operate the Control Panel as Administrator. Some patch-levels of Windows 7 have secured this. A useful work around for this will be discussed shortly.
- 5. Getting to the Device Manager
  - A. In Control Panel, select Hardware and Sound



B. Select Device Manager



C. In the Device Manager window, right-click on the computer and select Scan for hardware changes

🚔 Device Manager		- • •
File Action Vie	w Help	
⊿ 🚔 jed-w7x64		
Batteries		
Compute	er	
Disk drive	es	
👂 🖳 Display a	dapters	
⊳ 🔮 DVD/CD-	ROM drives	
D - Ca IDE ATA/	ATAPI controllers	
Keyboard	ds	
Mice and	l other pointing devices	
Monitors		
Network	adapters	
d - D Other de	vices	
🐚 U	Scan for hardware changes	
⊳ - Proce	Properties	-
		-
Scan for changed or	new Plug and Play d	

- A. There will be an Other devices→Unkown Device entry. Right-click on it. If the options menu only gives you either Scan for hardware changes or Properties, you might need to restart your control panel as Administrator, that is discussed next.
- B. Using the Run as Administrator option to start the Control Panel in administrator mode.
  - This works best with a CMD window pinned to the task bar. You can do that using Start Menu→ cmd ENTER; and then right-click→ Pin to Task Bar option on the task bar icon for the cmd.exe window.
  - II. Then right-click  $\rightarrow$  Run as Administrator on the CMD taskbar icon



III. Repeat your navigation steps to get to the Device Manager

# 6. Uninstall Old Driver

- If you find a previously installed driver, uninstall it. Especially if this is labeled Windows Arduino Mega
  - A. Right-click  $\rightarrow$  **Uninstall**

	Batteries	
÷-1	Computer	
÷.	Disk drives	
÷	Display adapters	
÷.	DVD/CD-ROM drive	s
÷.	IDE ATA/ATAPI cor	ntrollers
+	Keyboards	
÷.M	Mice and other poir	nting devices
÷	Network adapters	-
<u> </u>	Ports (COM & LPT)	
TI	LANforge Att	Lindate Driver Software
÷	Processors	Disable
÷-1	System devices	Disable
÷ 🖡	Universal Serial B	Uninstal
		Scan for hardware changes
		Properties

B. Select Delete the driver software for this device, and click  $\mathbf{OK}$ 

Keyboards     Wice and other pointing devices     Network adapters     Ports (COM &LPT)     LANforge Attenuator (Arduino Mega 2560 R.3) (COM3)     Porcessors     System devices     Powers Serial Bus controllers	Confirm Device Uninstall
	$\overline{\mathbf{r}}$ Delete the driver software for this device.
	OK Cancel

C. Right-click on the computer, and select Scan for Hardware Changes

D. You might need to un-plug and plug-in your Attenuator.

- E. If the right-click options menu does not allow you to change drivers, reboot your system.
- 7. Install new driver

Select Browse my computer for driver software

A. Browse to Desktop\arduino-1.8.9\drivers and click Next

		Browse For Folder	×
G	Update Driver Software - Universal Serial Bus (USB) Controller	Select the folder that contains drivers for your hardware.	
	Browse for driver software on your computer	Desktop	
	Search for driver software in this location:	Infantes     Infantes     Infantes     Infantes	E
	C:\Program Files (x86)\LANforge-Server  Browse	▷ 🖳 Computer	
	Include subfolders	<ul> <li>W Network</li> <li>arduino-1.8.9-windows</li> <li>arduino-1.8.9</li> <li>arduino-1.8.9</li> <li>arduino-1.8.9</li> <li>arduino-1.8.9</li> <li>arduino-1.8.9</li> </ul>	Ŧ
	➔ Let me pick from a list of device drivers on my computer This lat will show installed driver software compatible with the device, and all driver software in the same category as the device.	Folder: drivers	OK Cancel

B. You will see the Update Driver Software confirmation. Click Close

🖃 🚔 jed-w7x64		
	Update Driver Software - LANforge Attenuator (Arduino Mega 2560 R3) (COM3)	x
E Disk	🚊 Update Driver Software - LANforge Attenuator (Arduino Mega 2560 R3) (COM3)	
Disp		
	Windows has successfully updated your driver software	
E Key		
Hice Not	Windows has finished installing the driver software for this device:	
D Oth		
	LANforge Attenuator (Arduino Mega 2560 R3)	
E Proc	S	
±∎ Univ		
	Ν	
	N	
		Close
		CIUSE

8. You should not need to reboot your system in order to run the Attenuator.

# Installing the Arduino Mega Driver on Windows 10

#### Goal: Installing the the Arduino Mega device driver on Windows 10.

LANforge CT70x attenuators require recently signed Arduino drivers. The automatic driver install process for Windows 10 might automatically install a Microsoft Windows version of the Arduino Mega driver. This is not the driver LANforge expects. These instructions will guide you how through uninstalling an old driver and installing the new driver from the Arduino website.

i If you have recently removed a driver, you might need to reboot your Windows system for it to complete the driver installation process.

<sup>1.</sup> You want to install the windows version of the LANforge Server beforehand. For more information see Installing LANforge Server on Windows

<sup>2.</sup> Follow the link to the Arduino project to download the latest driver :Download Arduino IDE



Download the Arduino IDE zip file to your desktop. Use Right-click
 -Extract All... to expand the contents to a folder on your desktop.



- 4. This process requires you to operate the Control Panel as Administrator.
- 5. Getting to the **Device Manager** 
  - A. Type [Control-F] for Find
  - B. Search for Device



C. Select Device Manager

D. In the Device Manager window, right-click on the computer and select Scan for hardware changes



- 6. If you find a previously installed driver, uninstall it. Especially if this is labeled Windows Arduino Mega
  - A. Right-click  $\rightarrow$  Uninstall



- C. Right-click on the computer, and select Scan for Hardware Changes
- D. You might need to un-plug and plug-in your Attenuator.
- E. If the right-click options menu does not allow you to change drivers, reboot your system.

# 7. Install the Arduino IDE Driver

A. In Device Manager, you want right-click on the Unknown Device and select Update Driver Software...



B. Select Browse my computer for driver software:

Hov	v do you want to search for drivers?
$\rightarrow$	Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.
4	Browse my computer for driver software Locate and install driver software manually.

A. Browse to Desktop\arduino-1.8.9\drivers and click OK

<ul> <li>Update Drivers - USB Senial Device (COM4)</li> <li>Browse for drivers on your computer</li> <li>Search for drivers in this location:</li> <li>ChUsen/jregnold/Documents</li> <li>Include subfolders</li> <li>Let me pick from a list of available drivers on my computer This list will also available drivers.</li> <li>Let me pick from a list of available drivers on my computer This list will also available drivers.</li> <li>Tol USB Drivers</li> <li>Tol USB Drivers</li> <li>Tol USB Drivers</li> </ul>		Browse For Folder		
Browse for drivers on your computer Search for drivers in this location: CWIters/jreynolds/Documents		Select the folder that contains drivers for your hardware.	Update Drivers - USB Serial Device (COM4)	
Search for drivers in this location: CAlterry/reynold/Documents Chalters/reynold/Documents Chalters/reynold/Documents Chalters Chal		Desktop	Browse for drivers on your computer	
CAUservirgenoid/x0ocuments <ul> <li>Provise</li> <li>Provise</li></ul>		> ConeDrive	Search for drivers in this location:	
✓ Include subfolder: → Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device. ✓ Induction 1.8.9 ✓ Bestrop ✓ Bestrop ✓ Bestrop ✓ CP2106,6.7 > CP2106,6.7 > CP2106,6.7 > CP2106,6.7 Ind44 Folder: drivers Ind44 Folder: drivers		> Led Reynolds	C:\Users\jreynolds\Documents	
→ Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device.		> inis PC > inis PC	Include subfolders	
Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device.      CP2106,67      CP2106,67      FT01 US2		Desktop     arduino-1.8.9	$\sim$	
Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device.      CP210x,677       C		V drivers	, i i i i i i i i i i i i i i i i i i i	
→ Let me pick from a list of available drivers on my computer This tisticities available drivers compatible with the device, and all drivers in the same category as the device.  > CP2106,674 Folder:  drivers  drivers		amd64		
same category as the device.		CP210x_6.7	→ Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the	
rolder: dtvers		> FTDI USB Drivers	same category as the device.	
Folder: drivers		ia64		
		Folder: drivers		
Next Ca	Cancel	OK	Next	
Β.	Clie	ck N	ext	
----	------	--------	---	--------
		÷	Update Drivers - USB Serial Device (COM4)	×
			Browse for drivers on your computer	
			Search for drivers in this location:	
			C:\Users\jreynolds\Desktop\arduino-1.8.9\drivers Browse	
			🗹 Include subfolders	
			→ Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device.	
			Next	Cancel
C.	Yo	u will	I see the Update Driver Software confirmation. Click <b>Close</b> .	
				×
		~	Update Drivers - Arduino Mega 2560 (COM4)	
			Windows has successfully updated your drivers	
			Windows has finished installing the drivers for this device:	
			Arduino Mega 2560	
			7	
				Close

C. You should not need to reboot your system in order to run the Attenuator.

# Connect to LANforge using Remote Desktop

# Goal: Operate your LANforge's Linux desktop by accessing it with Windows Remote Desktop utility.

LANforge computers on Intel hardware are typically installed with a full Linux desktop. You can use the LANforge GUI, do traffic sniffing, open terminal windows, and office software to look at report data over remote desktop. LANforge computers are pre-configured with RDP and VNC desktop services.



1. From your Windows Start Menu, type "remote" and **Remote Desktop Connection** should be an option.



2. If you are using the Start→Run menu, type mstsc Enter

Car Kun		
	Type the name of a program, folder, do resource, and Windows will open it for	ocument, or Internet you.
Open:	mstsc	~

- 3. If you want to create a desktop shortcut, explore the folder C:\windows\system32 and right-click mstsc.exe
- 4. Configure your connection:
  - A. Fedora version 24 and 25 have a bug in the vncserver triggered by xrdp. The effective way to use rdesktop on those systems is to select an Xorg session for connecting (not a Xvnc session).
  - B. When connecting to Fedora 14-23 systems:
    - A. User Name: lanforge

General	Display Local Resources	Experience	Advanced	
Lanan	ettinge			
Logon s	Enter the name of the rer	note computer		
200	Computer: 10.23.58	235		~
	User name: lanforge			
	You will be asked for cre	dentials when	you connect.	0
	Allow me to save cred	lentials		
Connec	tion settings			N
	Save the current connect saved connection.	tion settings to	an RDP file	or open a
1	0	Cours As	0	

B. You will not need to fill out the xrdp login screen.

C. When connecting to Fedora 24-25 systems:

A. Do not specify a user name, and select Always ask for credentials.

ieneral	Display Local Resources Experience Advanced
Logon s	ettings
	Enter the name of the remote computer.
2	Computer: cholla=f24-32
	User name:
	You will be asked for credentials when you connect. To use saved credentials, clear the following check box.
	ion settings
Connect	-
Connect	Save the current connection settings to an RDP file or open a saved connection.

B. Select **Xorg** as the session type

Login to cholla-	f24-32
8	Just connecting
Session username password	sesman-Xvnc 💌 sesman-Xvnc Xorg
	OK Cancel

C. Specify username lanforge and password lanforge

Login to cholla-i	24-32
8	Just connecting
Session	Xorg 💌
username	lanforge
password	****
	OK Cancel

D. Local Resources

	Rei Co	note Desk nnectio	n n			
ieneral D	lisplay	Local Resources	Experience	Advanced		
	Conf	igure remote audio Settings	settings.			
Keyboard	Apply	y Windows key cor v when using the fu	nbinations: Il screen		/	
	Exan	nple: ALT+TAB				
Local devi	ices an Choo your	d resources ose the devices and remote session.	d resources that	at you want to	o use in	
	₽ P	rinters More	Clipb	oard		

- A. If your rdesktop session immediately closes, you might have hit the xrdp clipboard bug. If so:
- B. For Windows Remote Desktop (mstsc.exe): unselect Local Devices  $\rightarrow$  Clipboard
- C. For Linux rdesktop, use the command: rdesktop -a16 -r cliboard:off -u lanforge [machine-name]
- E. Disable remote audio settings



F. Disable local printers

둸 Remote	Desktop Connection		-		×
	Remote Des Connectio	ktop <b>DN</b>			
General D	isplay Local Resources	Experience	Advanced		
Remote a	udio Configure remote audio Sett 55	o settings.			
Keyboard	Apply Windows key co	mbinations:			
~	Only when using the f	ull screen	,	~	
	Example: ALT+TAB				
Local dev	ices and resources				
-	Choose the devices ar your remote session.	nd resources that	at you want t	to use in	
	Printers	Clipbe	pard		
	More				

G. Set Server authentication to Connect and do not warn

General Server	Display Local Resources Experience Advanced
9	Server authentication verifies that you are connecting to the intended remote computer. The strength of the verification required to connect is determined by your system security policy.
	If server authentication fails:
	Connect and don't warm me
Connec	st from anywhere
6	Configure settings to connect through Remote Desktop Gateway when I am working remotely.
de	Contract

- H. Connection quality can be 16-bit (millions of colors)
- 5. Click **Connect** to connect to the default desktop, the default password is **lanforge**

E jedtest, candelatech, com:1 (lanforge) - Tight//NC Viewer		
· · · · · · · · · · · · · · · · · · ·		
🚱 Applications Places System 📃 🛄 🧶	S.	😓 EN 🥠 Fri Nov 18, 15:11
Computer		
lanforge's Home		
Trash		
LANforge-FIRE GUI		
LANforge-ICE GUI		
Comfigure LANforge		

6. When you are DONE with your connection, you may close the Remote Desktop window. You will not be logged out. However, if you log in without setting the Username option, you will be logged into a new session alongside your old session. If you see this screen below, you are starting a new desktop session:

Lagis to indust condulatory com	
Just connecting	
Session sesman-Xvnc _ username jireynolds password	
OK Cancel	

- 7. To reconnect to your previous desktop session, make sure you use the Username **lanforge** in your connection settings.
- 8. To logout of the desktop session, select **System**→**Log Out** from the top window of the Linux desktop.



# Connect to LANforge using VNC Viewer

### Goal: Operate your LANforge's Linux desktop by accessing it with the VNC Viewer utility.

LANforge computers on Intel hardware are typically installed with a full Linux desktop. You can use the LANforge GUI, do traffic sniffing, open terminal windows, and office software using a VNC Viewer program. LANforge computers are pre-configured with RDP and VNC desktop services.



<sup>1.</sup> You can download a variety of viewers:

A. Check for viewer packages on your LANforge web page: http://192.168.1.101/

()   jedtest/Index.php
Links to Windows Utilities
<ul> <li>PuTTY (putty.exe)</li> <li>PuTTY is a free SSH, Telnet and serial terminal client for remote access. The main advantage its low-bandwidth requirement. PuTTY can also be used for telnet and serial terminal connections.</li> </ul>
<ul> <li>Remote Desktop</li> <li>LANforge comes installed running xrdp service which you can connect to using Windows Remote Desktop. Because the normal Windows certificates are not present on Linux, you might have to adjust your connection in this ways:</li> </ul>
1. Do no require certificate validation:
Image: A start framework     Start and A starting       Image: A start and a starting     Start and A starting       Image: A start and A starting     Start and A starting       Image: A start and A starting     Start and A starting       Image: A start and A starting     Start and A starting       Image: A start and A start and A start and A start     Start and A start and A start       Image: A start and A start and A start     Start and A start and A start       Image: A start and A start and A start     Start and A start and A start
2. Do not attempt remote audio playback or recording.
Connection
Unit of main independent       International problem
VNC Viewers     Remote desktop access is available on display ':1'.     o <u>TightVNC</u>
• <u>RealVNC</u>

B. or download RealVnc

C. or download TightVnc

2. From your Windows Start Menu, type "vnc" and **VNC viewer** should be an option.



3. If you are using the start menu, it will be under either in All Programs > RealVNC or TightVNC



4. Double click the vnc icon and it will ask you for the IP address. You want to set the Encryption option to **off** because we presume you are connected directly to the LANforge.

V2 VNC Viewer	– 🗆 X
VNC® Viewer	Ve
VNC Server: 192.168.100.26:1	~
Encryption: Prefer off	~
About Options	Connect

5. VNC Viewer might warn you about connecting without encryption. This is a valid warning if you are connecting across public networks.

V2 VNC Viewer	- Encryption	×
	Dinencrypted connection	
The connection	on to this VNC Server will not be encrypted.	
VNC Server:	192.168.100.26::5901	
Your authentic subsequent da susceptible to	ation credentials will be transmitted securely, but all ta exchanged while the connection is in progress may be interception by third parties.	
🗹 Don't warn	me about this again.	
	Continue Cancel	

6. The password is lanforge.

V2 VNC Viewer - A	Authentication X
VNC Server: 192.1	68.100.26::5901
Username:	
Password: •••	•••••
	OK Cancel

7. You will see the LANforge Linux desktop. This is not the same desktop that is actually running on the console if you have a monitor and keyboard connected.



- When you are done with your connection, you may close the VNC viewer window. You will not be logged out. When you connect using VNC viewer again, it show the current state of that desktop, connect you to the last used VNC session.
- 9. To restart the vnc desktop session, select you can issue either of these two commands. You start using ssh (PUTTY et. al.) to connect as **lanforge** to the LANforge machine, and:
  - A. sudo systemctl restart "vncserver@:1.service"
  - B. or
  - C. sudo vncserver -kill :1

# **Display WireShark Using Cygwin**

Goal: We will display the WireShark application on Windows using Cygwin when we press Sniff Packets which actually runs WireShark on the Linux LANforge machine.

The native display protocol for Linux (and Unix) is the X Display Protocol. The Cygwin.org project provides Linux software that runs natively on Windows. You can run an X display server on Windows that accepts connection from LANforge. We will walk through setting up Cygwin and configuring an X display.



2. We will start at Cygwin.org and download the Cygwin installer.

<sup>1.</sup> Installing Cygwin and the X display components



3. Download setup-x86.exe or setup-x86\_64.exe as appropriate. Go to your Downloads folder and double start the program.



4. Next



	E Cygwin Setup	- Choose Installation Directory		-		×
	Select Root In: Select the dir installation pa	stall Directory ectory where you want to install Cygw rameters.	n. Also choose a few	8	1	
	Root Directory					
	C:\cygwin				Browse.	
	Install For	ECOMMENDED) be available to all users of the system. till be available to all users, but Deskt mation are only available to the currer privileges or if you have specific nee	ap Icons, Cygwin Men nt user. Only select thi ds.	u Entries, ar s if you lack	nd importa	nt
6. Next			< Back	lext >	Cano	xel
	E Cygwin Setup	- Select Local Package Directory		<u></u>		×
	Select Local P Select a direct downloads.	ackage Directory tory where you want Setup to store the The directory will be created if it does it	e installation files it not already exist.		1	
	- Local Package I	Directory				
	C:\Users\Jed F	Revnolds\Downloads			Browee	
			< Back N	lext >	Cano	cel
7. Choose a mirror th	nat might be c	lose to you, click Next		_	П	×
	Choose A Dow	nload Site			1	2
	Choose a site	trom this list, or add your own sites to	the list			-
		Available Download Sites: http://cygwin.mirors.constant.com http://cygwin.mirors.hoobly.com http://mirors.koehn.com http://mirors.metapeer.com http://cygwin.skazkaforyou.com http://cygwin.skazkaforyou.com http://mirors.zmission.com http://mirors.				
	User URL:			Add		

8. Now you see a the software selection screen, sorted by category. Some of these entries appear two or more times, because they belong to multiple categores. Try using the search box in upper middle above the software list to search for the packages listed below.

< Back Next > Cancel



- 9. The items you want to search for are
  - openssh
  - xorg-server
  - ∘ xinit
  - ∘ rxvt
  - xlaunch
  - A. Search for openssh and click the Skip property once to change it to the most recent version to set it to install.



B. xorg-server provides the X display system

View Categ	ory V	Search xorg		<u>C</u> lear		
Category	New		Bin?	Src?	Size	Package
🖂 All 🚯 De	fault					
E Debug	Default					
Devel	Default					
E Doc 🖲	Default					
🕀 Utils 🏵	Default					
🗆 X11 🕄	Default					
	Skip		nja	n/a	8k	xorg-scripts: Xorg miscellaneous scripts
	1.19.1-1		$\times$		1,413k	xorg-server: X.Org X servers
	1.19.1-1		$\boxtimes$		26k	xorg-server-common: X.Org X server common data

C. **xinit** helps the X system launch

Category	New	Bin?	Src?	Size	Package
E All 🗘 De	fault				
E Debug	O Default				
E Debug	Default				

D. xlaunch is what you will drag to your task bar to launch your Cygwig X server

View Category V Search xlaur	nch <u>Q</u> lear	
Category New	Bin? Src?	? Size Package
🗆 All 😌 Default		
🗉 Debug 😯 Default		
🗆 X11 📀 Default		
20160530-1	$\boxtimes$ $\Box$	121k xlaunch: GUI tool for configuring and starting the XWin X server

E. **rxvt** and **rxvt-unicode** are more useful terminals than the **minterm** program that Cygwin provides by default.

View Category V Search xvt	Clear	
Category New	Bin? Src? Size	e Package
🗆 All 😌 Default		
🗄 Debug 😯 Default		
Shells I Default		
2.7.10-1	$\boxtimes$	125k rxvt: Lightweight VT102 terminal emulator
9.22-1	$\boxtimes$	690k rxvt-unicode: An improved version of rxvt with Unicode support

10. Click Next and let the installer finish the installation of the Cygwin packages. You will see a Cygwin Terminal icon appear on your desktop and new Cygwin icons in your Start menu.



11. Next we will right-click on the Cygwin Terminal icon and select Open File Location



12. In the Explorer window, scroll to find xlaunch.exe, and drag it to the Task Bar

10							
	0					<u>(</u>	
0	Peoucle Pin					idle 9-win	
([])							
~	CONFIG						
		LIDE-I	Another Texts his			- 0 X	
-							
		File Fiome Share					
-		$\leftarrow \rightarrow \land \checkmark$	his PC > Local Disk (C:) > cygwin > bin	ŭ ⊻		م	
			Name		Туре	Size ^	
		📌 Quick access	🛄 xzless			2 KB	
\$ <sup>2</sup>		🛄 Desktop 🛷	🗋 xzgrep				
		🕹 Downloads 🛛 🖈	🗐 xzfgrep			1 KB	
0/		🗑 Documents 💉	🗟 xzegrep				
	-faither	Pictures &	xzdiff				
E	4		xzdec.exe				
		mingw-btbits *	🗟 xzcmp				
		pub 🖈	🗟 xzcat				
	GINA	J Music	xz.exe			72 KB	
		tank_temp	🔯 xwin-xdg-menu.exe				
$\sim$		Videos	X XWin.exe				
	LANforge	-	📧 xterm.exe				
5	Pin to Taskbar	ConeDrive	xsubpp			6 KB	
		This PC	xrdb.exe				
	SERVER		xorg-backtrace			2 KB	
	a 🧲	Network	T Xorg.exe			1,889 KB	
	Start	•4 Homegroup	📧 xmodmap.exe			31 KB	
	LANforge		📧 xmllint.exe	8/26/2016 12:47 PM		57 KB	
			💽 xmlcatalog.exe	8/26/2016 12:47 PM		18 KB	
			🗙 xlaunch.exe			262 KB	
	1		📑 xkbcomp.exe	1/29/2016 12:49 PM	Application	193 KB	
	Mozilla		iii xinit.exe	9/19/2016 7:20 AM	Application	18 KB	
			📧 xdg-user-dirs-update.exe	11/26/2014 7:11 PM	Application	20 KB	
			🗋 xdg-user-dir	11/26/2014 7:11 PM	File	1 KB	
			xauth.exe	8/10/2014 1:31 PM	Application	36 KB	
1/31/2017			📰 xargs.exe	3/11/2016 1:16 PM	Application	63 KB	
	Cygwin	EEO itemas 1 item 1 it		1/01/0017 0.00 DE4	C		
		Joontems Tritem selecte	201 KB				

13. Click the **x1aunch** icon on the task bar, and click Next



	XLaunch - Session type	×
	Select how to start clients	
	Start no client     This will just start the X server. You will be able to start clients later.	
	Ostart a program This will start a local or remote program which will connect to the X server. You will be able to start clients later too. Remote programs are started using SSH.	
	Open session via XDMCP This will start a remote XDMCP session. Starting local clients later is limited. This option is not available with the "Multiple windows" mode.	
15 Chack Disable Accord	<back next=""> Cancel Help</back>	
15. CHECK DISODIE ACCE	ss Control and add the option Histen itcp. Click Next	

	secungs
	board
Sta	rt the integrated clipboard manager
Nat	ive OpenG
Use	the native windows OpenGL library (WGL). Make sure to export the GL_ALWAYS_INDIRECT environment variable.
🗹 Dis	able access control (Not recommended)
Us	this when you want the X server to accept connections from all clients.
	nal parameters for X server
Additio	

16. Firewall, Click Allow Access

P Windows Sec	urity Alert		×
💮 Windo	ows Firewal	I has blocked some features of this app	
Windows Firewall h	nas blocked som	e features of xwin.exe on all public and private networks.	
X	Name:	xwin.exe	
$\mathbf{X}$	Publisher:	Unknown	
	Path:	C:\cygwin\bin\xwin.exe	
Allow xwin.exe to	communicate on	these networks:	
Private netv	vorks, such as n	iy home or work network	
Public netwo because the	orks, such as the se networks off	ose in airports and coffee shops (not recommended ten have little or no security)	
What are the risks	of allowing an a	ipp through a firewall?	
		PAllow access Cance	el

17. If the LANforge Messages window reports 'No Access', you might need to use **xhost.exe** to grant X11 access.

🕌 LANforge Messages (10.41.0.1:4	002)					-		×
****** Thu Nov 08 14:06:06 PST 2018 Important message from card: Shelf: 1, C specified (wireshark:28704); Gtk-WARNI	ard: 1 -:ERROR: wireshark -i b NG **: cannot open display: 10.	1000 -k -l -S f \$1.1.26:0 :-	ailed with e	rror: 1, output: Au	thorization required,	but no auth	orization	protoco
	Pause	Close		Save File				
A. Open a CMD windov	v							

=	e D 🕀	Filters $\checkmark$
ŵ	Best match	
0	Command Prompt Desktop app	
	Search suggestions	
		>



18. Now your X display service is running. You can check that it's running by clicking into the System Tray and seeing if the icon is there.



19. Launch the LANforge GUI from your desktop. Select a port from the Port Mgr tab. Notice how the Disp field has your laptop's LAN address. This is the display address the remote machine will display the Wireshark window to.

🕌 LANfo	orge Ma	nager	Version(5.3.5)										_	
Control	<u>R</u> eporti	ng <u>T</u> e	ar-Off Info Plugin	s										
								St	op All	Restar	t Manager		Refresh	HELP
Layer-4 Status	Gene	eric Layer-3	Test Mgr Test Gr L3 Endps	oup	Resource N	lgr Ev	/ent Log	Alerts	Port Mgr Arm	vAP Statio	ons Mes Want	ssages Links Att	enuators	File-IO
	Dis	sp: 192	2.168.100.234:0.0		Sniff Pack	tets	î	Clea	r Counters	Reset	Port	Delete		
	Rp	t Timer	medium (8 s)		Apply		Ŧ	Vie	w Details	Crea	te	Mo <u>d</u> ify <u>B</u> a	tch Modify	
	-				All	Ethernet	Interfaces	(Ports	) for all Reso	ources				
Port	Phan	Down	IP	SEC	Alias	Parent Dev	RX By	tes	RX Pkts	Pps RX	bps RX	TX Bytes	TX Pkts	Pps TX
1.1.0			192.168.100.26		eth0		5,441,40	5,190	5,584,160	19	78,436	417,094,300	1,697,238	25
1.1.1			10.26.0.1	0	eth1		12,04	5,067	48,944		70	62,252	829	
1.1.103			0.0.0.0	0	wiphy1		3,18	36,000	14,830	0	0	10,977	70	0
1 1 1 0 4					winhv2									

20. You will see WireShark



21. Resources and other Documentation:

- A. http://unix.stackexchange.com/questions/227889/cygwin-on-windows-cant-open-display
- B. https://www.cs.virginia.edu/~csadmin/wiki/index.php/Using\_Cygwin\_for\_X11\_Forwarding
- C. http://www.arsc.edu/arsc/knowledge-base/ssh-and-x11-forwarding-us/index.xml

# Finding LANforge Report Data

Goal: Properly configured, the LANforge server or the LANforge GUI can collect connection performance information in CSV format.

By default, your LANforge server and your LANforge client do not save the data on connection and port performance. When you configure the save destination for this data, you can use it with any other tool that can read a CSV file.



## Finding LANforge Report Data

### Select your Save Location

You can tell the LANforge server to save data to a directory locally on the management machine, and you can configure your workstation running the the LANforge GUI to save data to a local desktop folder. First, find the Reporting Manager dialog by in the Reporting menu, and select Report Manager the client.

0.		I	ANforge Ma	anager Ve	rsion(5.3.6)		$\odot$ $\sim$ $\times$
Control Rep	orting <u>T</u> ea	ar-Off Info	<u>P</u> lugins				
Prir	nt (Fit to Pa	ge)	Stop	All	Restart Manager	Re	fresh HELP
Prir	nt (Multi Pa	ge)	Deseures	Man K Evant I	an Kalanta K Dant	Man KudD Chatia	ne Managana I
Status Rep	ortin Man	ager		olP/RTP Endp	s Armageddon	Attenuators	File-IO Layer-4
: Timer:	le Report E	Builder	lest Manager	all	Select Al	I Start <u>S</u> top	Quiesce Cle
w 0-5	00		🖵 Go		Disp	lay Cr <u>e</u> ate	Mo <u>d</u> ify Delete
		1		ects for Selec	ted Test Manager-		
Name	Туре	State	Pkt Rx A	Pkt Rx B	Bps Rx A	Bps Rx B	Rx Drop % A Rx Dro
c201	LF/TCP	Run	516,984	258,490	510,125	255,062	0
cx-205	LF/TCP	Stopped	0	0	0	0	0
tcp200	LF/TCP	Run	22,276	22,279	999,993	999,958	0
udp200	LF/UDP	Run	69,913	69,976	1,999,993	1,999,979	0
Logged in to	o: localhos	III	Admin		]		

### GUI Data Collection (Desktop Folder)

Collecting data on your local workstation is very convenient if you can leave the GUI running for the duration of your test scenario. The format of the data here should be similar to the format of the data saved to the server directory. The folders for collecting data are relative to the folder you start your GUI from. If you type in <code>lf\_data</code> that probably means <code>C:\Users\mumble\AppData\Local\LANforge-GUI\lf\_data</code>. You probably want to put in a fully qualified path thats more intuitive, like <code>C:\Users\mumble\Documents\lf\_data</code>.

🕌 Reporting Manager		_		×
Overview Generate Report	Server Data Collection GUI Data Collection			
GUI Data Collection Dir:	C:\Users\Jed Reynolds\Documents\If_data	Choos	e Directory	
Report Data Frequency:	Best Precision			
Collection Status:	NOT saving reporting data.	Save	Stopped	
	Close			

#### **Generate Report**

The Report Generator uses the local data files. In that dialog shows the Report Input Directory field is a local folder where the CSV files collect. The Save Reports to Directory field is where HTMI and PDF files should collect.

Reporting Manager	$\odot$ $\otimes$ $\otimes$
Overview Generate Report Server Data Collection GUI Data Collection	n
Report Input Data Dir: //home/lanforge/lf_data	Choose Directory
Save Reports to Dir: /home/lanforge/lf_reports	Choose Directory
<u>G</u> enerate Report	
Close	

### Server Data Collection (Server Directory)

If your test scenario runs longer than your GUI can be up, you can configure the LANforge server to collect the data. The directory is relative to the */home/lanforge* directory, so if you enter *lf\_data*, you would find the CSV files in */home/lanforge/lf\_data*.

Reporting Manager	$\odot$ $\sim$ $\times$
Overview Generate Report Server Data Collection GUI Data Collection	
Manager Data Dir: If_data	Apply
🗹 Save Endpoint Reports 🛛 Save Port Reports 📝 Save Resource	e Reports
Collection Status: Saving Reporting Data to CSV files.	Saving Stop
Refresh Configuration	
Close	

You can take a look at the data files easily. Here is a server data collection directory:

lanforge@jed	test -	~/1f_(	data				
> r							
total 2628			21465			10.50	
-rw-rr 1	root	root	31465	Mar	1	16:52	wlan2_1.1.7_1488414451.CSV
-rw-rr 1	root	root	31465	Mar	1	16:52	wlan1_1.1.6_1488414451.CSV
-rw-rr 1	root	root	31465	Mar	1	16:52	wian0_1.1.5_1488414451.CSV
-rw-rr 1	root	root	90889	Mar	1	16:52	wipny2_1.1.4_1488414451.Csv
-rw-rr 1	root	root	125299	Mar	1	16:52	w1phy1_1.1.3_1488414451.csv
-rw-rr 1	root	root	101801	Mar	1	16:52	w1phy0_1.1.2_1488414451.csv
-rw-rr 1	root	root	138049	Mar	1	16:52	udp200-B_1488414451.csv
-rw-rr 1	root	root	137626	Mar	1	16:52	udp200-A_1488414451.csv
-rw-rr 1	root	root	160328	Mar	1	16:52	tcp200-B_1488414451.csv
-rw-rr 1	root	root	158351	Mar	1	16:52	tcp200-A_1488414451.csv
-rw-rr 1	root	root	26376	Mar	1	16:52	resource_jedtestcandelatechcom_1.1_1488414451.csv
-rw-rr 1	root	root	114505	Mar	1	16:52	eth1_1.1.1_1488414451.csv
-rw-rr 1	root	root	43937	Mar	1	16:52	eth0_1.1.0_1488414451.csv
-rw-rr 1	root	root	168161	Mar	1	16:52	c201-B_1488414451.csv
-rw-rr 1	root	root	169329	Mar	1	16:52	c201-A_1488414451.csv
-rw-rr 1	root	root	27937	Mar	1	16:52	wlan2_1.2.7_1488414451.csv
-rw-rr 1	root	root	27937	Mar	1	16:52	wlan1_1.2.6_1488414451.csv
-rw-rr 1	root	root	27937	Mar	1	16:52	wlan0_1.2.5_1488414451.csv
-rw-rr 1	root	root	83629	Mar	1	16:52	wiphy2_1.2.4_1488414451.csv
-rw-rr 1	root	root	114613	Mar	1	16:52	wiphy1_1.2.3_1488414451.csv
-rw-rr 1	root	root	100485	Mar	1	16:52	wiphy0_1.2.2_1488414451.csv
-rw-rr 1	root	root	327241	Mar	1	16:52	vap0_1.1.8_1488414451.csv
-rw-rr 1	root	root	40057	Mar	1	16:52	sta205_1.2.10_1488414451.csv
-rw-rr 1	root	root	48097	Mar	1	16:52	sta200_1.2.8_1488414451.csv
-rw-rr 1	root	root	39289	Mar	1	16:52	sta100_1.2.9_1488414451.csv
-rw-rr 1	root	root	21691	Mar	1	16:52	resource_kedtest_1.2_1488414451.csv
-rw-rr 1	root	root	105065	Mar	1	16:52	eth1_1.2.1_1488414451.csv
-rw-rr 1	root	root	40789	Mar	1	16:52	eth0_1.2.0_1488414451.csv

And using a utility like **notepad**, **vi**, **more** or **less** you can look at the file contents:

• Lantorge#jedtest:~/lt_data 🔤 🖽 😸
TimeStamp,Name,EID,CX-Name,IS_RUNNING,tx_rate,bps_tx_rate_3s,rx_rate,bps_rx_rate_3s,rx_drop%x1000,tx_pkts,rx_pkts,tx_bytes,
<pre>rx_bytes,rx_dropped_pkts,rx_dup_pkts,rx_ooo_pkts,rx_wrong_dev,rx_crc_failed,rx_bit_errors,TCP-RTX,conn_timeouts,conn_establ</pre>
ished,tcp_CwND,min_conn_duration_ms,max_conn_duration_ms,min_reconn_pause_ms,max_reconn_pause_ms,pattern,min_pkt_size,max_p
kt_size,min_tx_rate,max_tx_rate,running_for,last_report,destination_addr,source_addr,min_latency,avg_latency,max_latency,bo
$x$ width, lat_0, lat_1, lat_2, lat_3, lat_4, lat_5, lat_6, lat_7, lat_8, lat_9, lat_10, lat_11, lat_12, lat_13, lat_14, lat_15, min_rt_latence_10, lat_14, lat_14, lat_14, lat_15, min_rt_latence_10, lat_14, lat_14, lat_15, min_rt_latence_10, lat_14, la
y,avg_rt_latency,max_rt_latency,rt_box_width,rt_lat_0,rt_lat_1,rt_lat_2,rt_lat_3,rt_lat_4,rt_lat_5,rt_lat_6,rt_lat_7,rt_lat
_8,rt_lat_9,rt_lat_10,rt_lat_11,rt_lat_12,rt_lat_13,rt_lat_14,rt_lat_15,min_drop_amt,avg_drop_amt,max_drop_amt,drop_box_wid
th,drop_amt_0,drop_amt_1,drop_amt_2,drop_amt_3,drop_amt_4,drop_amt_5,drop_amt_6,drop_amt_7,drop_amt_8,drop_amt_9,drop_amt_1
0,drop_amt_11,drop_amt_12,drop_amt_13,drop_amt_14,drop_amt_15,RptTimer,files_played,Avg-Jitter, rx_pkts_11, tx_pkts_11, rx_
bytes_11, tx_bytes_11, cx_dropped_pkts, Rx-First-Pkt-msmin_gap,avg_gap,max_gap,gap_box_width,gap_0,gap_1,gap_2,gap_3,gap_4,
gap_5,gap_6,gap_7,gap_8,gap_9,gap_10,gap_11,gap_12,gap_13,gap_14,gap_15,
1488414454125,c201-A,1.2.8.21.2,c201,1,351397,351397,527098,527098,0,258236,516474,16923754496,33847640064,0,0,0,0,0,0,13,0
7,47,4294967295,0,0,0,1NCREASING,65536,65536,256000,256000,530813,0,10.26.0.2:33028,10.26.2.25:33027,6,7.746,14,1,163669,1
80254,152069,18998,1216,244,21,3,0,0,0,0,0,0,0,14,17,53,26,1,31697,60316,172566,193329,56847,863,647,68,1,0,15,53,71,0,0,
0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
1843,0/3027,328822,2093,397,0,11,2,0,0,433449,83017,0,2,2,0,

## Using Libre Office

Importing the file into a spreadsheet like LibreOffice Calc is simple:

	jreyno	olds Doc	uments    If_	data		
	201 +	1 400 44 4	4E1. cou			
Location: C	201-A	1488414	451.CSV			
Places	Ô	Name			Size	Modified -
Q Search	0	C201-4	_148841445	1.csv	2.1 MB	21:43
Recently .						
If data						
	•	[				
		All file	is.			
						Version:
Read-only						
- neud onty						
					Cancel	Oper
ou only nee	ed to	o separa	ate on cor	mma (,)		
Text Import	- [c20	1-A_1488414	451.csv]	(7)		
mport						
Character set:	Unic	ode (UTF-8	)		1	
Language:	Defa	ault - Englie	h (USA)			
Euriguage.	A	Lingtis	(0.544)		•	
From row:	1	÷				
Separator Optic	ns					
<ul> <li>Eixed widt</li> </ul>	h			Separate	ed by	
		mma 🛛	Semicolon	Space	e 🗌 Oth	er
□ <u>T</u> ab	Co 🖸					
□ <u>T</u> ab □ Merge de	፼ <u>C</u> o elimite	rs			Text del	imiter: "
Tab Merge de	<mark>⊠ ⊆</mark> o elimite	rs			Te <u>x</u> t del	imiter:
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Iab     Merge de     Morge de     Dther Options     Quoted fie	<mark>፼ ⊆</mark> o elimite eld as t	rs ext	C	Detect s	Te <u>x</u> t del pecial <u>n</u> umber:	imiter: "s
Tab Merge du Other Options Quoted fie Fields	<mark>፼ <u>C</u>o elimiter eld as t</mark>	rs ext	C	Detect s	Te <u>x</u> t del pecial <u>n</u> umber:	imiter: "s
Jab     Merge de     Merge de     Morge de     Other Options     Quoted fie  Fields     Column type:	፼ <u>C</u> o elimiter eld as t	ext	C	Detect s	Te <u>x</u> t del	imiter: "
Jab     Merge de     Merge de     Other Options     Quoted fie  Fields Column type:     Standard	፼ <u>c</u> o elimiter eld as t	ext	Standard	Detect s	Te <u>x</u> t del pecial <u>n</u> umber: Standard	imiter: "s
Jab Merge du Other Options Quoted fie Fields Column type: Standard TimeStam 2 d #84144	© <u>C</u> o elimiter eld as t	ext Standard Name C201 - A	Standard EID	Detect s Standard CX-Name	Te <u>x</u> t del pecial <u>n</u> umber: Standard IS_RUNNING	Standard St s Stardard St s S1307 35
Jab Merge du Other Options Quoted fie Fields Column type: Standard 1 TimeStam 2 14884144 3 14884144	elimite eld as t p 54125 59236	ext Standard Name C201-A C201-A	Standard EID 1.2.8.21.2 1.2.8.21.2	Standard CX-Name c201 c201	Text del pecial number: Standard IS_RUNNING 1	imiter: " s S Standard St tx_rate bp 351397 35 3175053 17
Jab Merge du Other Options Quoted fie Fields Column type: Standard T TimeStam 2 14884144 4 14884144	© <u>C</u> o elimiter eld as t 54125 59236 64237	ext Standard Name C201-A C201-A	Standard EID 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2	Standard CX-Name c201 c201	Text del pecial number: Standard IS_RUNNING 1 1	Standard St tx_rate bp 351397 35 175053 17 175581 17
Jab Merge du Other Options Quoted fie Sields Column type: Standard T TimeStam 2 44884144 4 4884144 4 4884144 5 44884144	© <u>C</u> o elimiter eld as t 54125 59236 64237 69238 7424	ext Standard Name C201-A C201-A C201-A C201-A	Standard EID 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2	Standard CX-Name c201 c201 c201 c201	Text del pecial number: Standard IS_RUNNING 1 1 1	Standard St tx_rate bp 351397 35 175053 17 175581 17 352224 35 1760 27
☐ Jab Merge du Dther Options Quoted fie Fields Column type: Standard TimeStam 2 14884144 4 14884144 5 14884144 5 14884144 7 14884144	© <u>C</u> o elimiter eld as t 54125 59236 64237 69238 74244 79286	ext Standard Name 2201-A 2201-A 2201-A 2201-A 2201-A 2201-A 2201-A 2201-A	Standard EID 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2	Detect s Standard CX-Name c201 c201 c201 c201 c201 c201	Text del pecial number: Standard IS_RUNNING 1 1 1 1 1 1	Standard St tx_rate bp 351397 35 175053 17 175581 17 352224 35 176349 17
☐ Jab ☐ Merge di ☐ Quoted fie ☐ Quoted fie ☐ Eleds Column type: ☐ Standard ☐ TimeStam 2 14884144 ☐ 14884144 ☐ 14884144 ☐ 14884144 ☐ 14884144 ☐ 14884144 ☐ 14884144 ☐ 14884144 ☐ 14884144	E Co elimiter eld as t 54125 59236 64237 69238 74244 79286 84287	ext Standard Name c201-A c201-A c201-A c201-A c201-A c201-A c201-A c201-A	Standard EID 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2	Detect s Standard CX-Name c201 c201 c201 c201 c201 c201 c201	Text del pecial number: Standard IS_RUNNING 1 1 1 1 1 1 1 1	Standard St tx_rate bp 351397 35 175053 17 175581 17 35224 3 3176349 17 3522461 35 175053 17
☐ Jab Merge du Merge du Quoted fie Guoted field Guoted field	© <u>C</u> o elimiter eld as t 54125 59236 64237 69238 74244 79286 84287	ext Standard Name c 201-A c 201-A c 201-A c 201-A c 201-A c 201-A c 201-A c 201-A c 201-A	Standard EID 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2	Detect s Standard CX-Name c201 c201 c201 c201 c201 c201 c201 c201	Text del pecial number: Standard IS_RUNNING 1 1 1 1 1 1 1 1	Standard St tx_rate bp 351397 35 175053 17 352224 35 176349 17 3522461 35 175053 17
☐ Jab Merge du Dther Options Quoted fie Fields Column type: Standard 1 TimeStam 2 L4884144 4 L4884144 4 L4884144 6 L4884144 8 L4884144 1 L4884444 1 L4884444 1 L4884444 1 L4884444 1 L4884444 1 L48	© <u>C</u> o elimiter eld as t 54125 59236 64237 69238 74244 79286 84287	ext Standard Name C201-A C	Standard EID 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2 1.2.8.21.2	Detect s Standard CX-Name c201 c201 c201 c201 c201 c201 c201 c201	Tegt del pecial number: Standard IS_RUNNING 1 1 1 1 1 1 1 1 1	Standard St Cx_rate bp 351397 35 175063 17 35224 35 176349 17 352461 35 176349 17 352463 37 352463 37



#### The timestamp column

Libre Office does not have a builtin formula to do this, but it has been discussed here. And the solution is a formula that looks like this:

#### =(A2/86400)+25569

and then you format the column as Date.

### Scripting with Bash

There are a number of ways to collect an dort the data with shell utilities. The first utility to consider is cut, then awk. The first column of the endpoint file we are going to read is the timestamp, the 14th is the rx bytes.

#### Reading the Data and RX Bytes

--Converting Unix Date

```
$ head -n2 c201-A_1488414451.csv | cut -d, -f1
TimeStamp
1488414454125
$ date -d @1488414454125
Mon Dec 23 19:28:45 PST 49135
```

--Using bash

```
$ head -n2 c201-A_1488414451.csv | (while IFS=, read -a L; do echo ${L[13]}; done)
rx_bytes
33847640064
```

--Using cut

```
$ head -n2 c201-A_1488414451.csv | cut -d, -f14
rx_bytes
33847640064
```

--Using awk

### **Scripting with Perl**

It is a lot easier to do math with a perl script than a bash or an awk script. You can pipe things into perl or perl will read the last argument of the -ne switches as an input file.

Not everthing you do in perl is going to be a one-liner. Here's an example of the same script as a more properly formatted perl file:

h

```
#!/usr/bin/perl
my $tt=0;
my @tstamps=();
my @rxb=();
while(<>) {
 @v = split(/,/, $_);
```

```
push(@tstamps, $v[0]);
push(@rxb, $v[13]);
}
$dt = $tstamps[$#tstamps] - $tstamps[1];
$db = $rxb[$#rxb] - $rxb[1];
print "Time: $dt, Total:$db\n";
```

# Writing Disk Images on Windows

# Goal: Copy an installed OS file-system image onto a drive that you will install into a LANforge system that lacks display hardware.

Many LANforge ICE WAN emulator machines are embedded systems that lack display hardware. Installing an OS using only the serial console can be very inconvenient. The easy solution is to perform the installation on similar hardware that does have display hardware, and then move the drive to the embedded device. Here, we learn how to use Etcher on Windows to write a compressed disk image to an mSata drive plugged into a USB3 adapter.



- 1. Here we're using Etcher which handles compressed file system images without any trouble. There are other programs (like Win32 Disk Imagaer or dd for windows) but those are more complex to use.
- 2. Items we'll want:
  - A. 30GB or larger mSATA drive



B. USB3 mSATA drive adapter



- C. The image writing program Etcher
- 3. Download and install Etcher



4. Identify your drive in Control Panel  $\rightarrow$  Hardware and Sound  $\rightarrow$  Hardware and Printers.

💼 Control Panel\Harc	lware and Sound\De	evices and Printers	-	- 🗆	×
$\leftarrow \rightarrow \cdot \cdot \uparrow$	« Hardware and	<ul> <li>Devices and Prin</li> </ul>	ters > v さ	Search De	P
File Edit View To	pols				
Add a device Ad	ld a printer Ren	nove device		-	?
V Devices (4)					
Acer S231HL(Hdmi)	AS2115	ATLANTIS	Natural Ergonomic Keyboard 4000		
> Multimedia Devi	ces (1)				
> Printers (4)					
> Unspecified (1)					
AS211	5 Model: AS21 Category: Stora Status: Conn	15 ge device ected to USB 3.0			

5. Download your image file:



6. Start Etcher

S Etcher	-	□ ×
		• •
+ <b>/</b>		
ETCHER is an open source project by is resin.IO		

7. Select the compressed image:

→ × ↑ 🕂 > This	PC > Downloads		✓ ♂ Search Do	ownloads	٩
Irganize 👻 New folder				■ - □	?
Desktop Documents Downloads	Ctrl2Cap	eldersetups	http%3a%2f%2fc ygwin.mirrors.pai r.com%2f	KeyboardMappin gs	ŕ
<ul> <li>hkwynn (win8-</li> <li>Music</li> <li>Pictures</li> </ul>				۲z	
Videos Local Disk (C:)	New folder	2016-07-01-atlant is-minidumps.zip	apu2-f24.img.bz2	jdk-9-ea+161_lin ux-x64_bin.tar.gz	
🐂 Libraries 💼 Camera Roll	<b>7</b> z	Ζz	Zz	a	
Documents					

8. Select the removable drive



9. You might have to enable unsafe mode if the drive you plugged in has previously been used

A. in Settings, enable Unsafe mode

Etcher	– 🗆 X
	🥹 < Back
Settings	
Anonymously report errors and usage statistics to resin.io	
Z Eject on success	
🗹 Validate write on success	
Include unstable update channel	
Advanced	
☑ Unsafe mode Dangerous	
TCHER is an open source project by 📚 resin.io	

B. Select the removable drive



10. Select the removable drive



11. Write image.



B. It might take 20 minutes to write a 20GB (uncompressed) image.



12. Make coffee.



13. When the image is finished writing, close etcher and use the Safely Eject Thing dialog in the system tray.

A. right click



14. Unplug your drive from the computer, remove the msata drive drive from the USB caddy and then install into your embedded device

# Adding a LANforge Virtual Machine

Goal: Add a virtual machine running LANforge to a LAN with a physical LANforge manager.

We review the configuration steps necessary to add a virtual LANforge resource. The guest instances will be configured to export MAC-VLAN ports to run traffic on their physical management port. The example here uses VirtualBox 5.2.10 and Fedora 27 Server edition, but our current recommendation for virtual machine platforms is actually libvirtd/kvm.



1. Create a new guest instance.

A. When creating the guest, we should use 2 GB of RAM:

9		Create Virtual Machine		
	Name and opera	ating system		
	N <u>a</u> me: 91	34-fedora27s01		
	<u>T</u> ype: Li	nux		0
	Version: Fe	edora (64-bit)		
	Memory size			
				2048 🗘 MB
	4 MB		32768 MB	
	Hard disk			
	O Do not a	add a virtual hard disk		
	Create a	a virtual hard disk now	\$	
	O <u>U</u> se an e	existing virtual hard disk file		
	9118-u	1604-boot.vdi (Normal, 1.25 GB)		
		<u>G</u> uided Mode	< Back Create	Cancel

B. 60 GB of disk:

File location	
9134-fedora27s01	
File <u>s</u> ize	_
4 00 MB	20\00 G
Hard disk file type	Storage on physical bard disk
VDI (VirtualBox Disk Image)	Dynamically allocated
O VHD (Virtual Hard Disk)	<ul> <li>Fixed size</li> </ul>
O VMDK (Virtual Machine Disk)	Split into files of less than 2GB
O HDD (Parallels Hard Disk)	
O QCOW (QEMU Copy-On-Write)	2
O QED (QEMU enhanced disk)	

C. Omit a floppy drive, use a USB table as pointing device:

0			9134-fedora27s01 -	Settings			
	General	System					
	System	Motherboard Proc	essor Acce <u>l</u> eration				
	Display	Base <u>M</u> emory:				2048 MB	÷
$\bigcirc$	Storage		4 MB	1	32768 MB		
	Audio	<u>B</u> oot Order:	✓	*			
₽	Network		Hard Disk	+			
	Serial Ports		Floppy				
Ø	USB	Chipset:					
	Shared Folders	Pointing Device:	USB Tablet	0			
	User Interface	Extended Features:	Enable J/O APIC		$\square$		
			Enable EFI (speci	al OSes only)			
			Hardware Clock i	n <u>U</u> TC Time			
					Cancel	ок	

D. Allocate two or more cores and PAE/NX:

6	)		9134-fedora27s01 - Settings	
		General	System	
		System	Motherboard Processor Acceleration	
		Display	Processor(s):	2
	$\bigcirc$	Storage	1 CPU 8 CPUs	
	Þ	Audio	Execution Cap: [1]	100% 🤤
	₽	Network	Extended Features: 🗹 Enable PAE/NX	
	٨	Serial Ports		
	Ø	USB		
		Shared Folders	\$	
5	:	User Interface		
				ок

E. And the usual virtual processor features:

		9134-fedora27s01 - Settings	
	General	System	
	System	Motherboard Processor Acceleration	
	Display	Paravirtualization Interface: Default	
$\square$	Storage	Hardware Virtualization: 🗹 Enable VT-x/AMD-V	
	Audio	✓ Enable Nested Paging	
-	Network		
	Serial Ports		
Ø	USB		
	Shared Folders	Ν	
	User Interface	h2	
		<u>C</u> ancel <u>O</u> K	:

F. We don't need graphics on these nodes, so use minimum graphics memory:

0		9134-fedora27s01 - Settings	
	General	Display	
	System	Screen Remote Display Video Capture	
	Display	Video Memory: 16 MB	
$\square$	Storage	0 MB 128 MB	
	Audio	Monitor Count:	<u></u>
-	Network	Scale Factor:	
<b>\$</b>	Serial Ports	Acceleration: Enable <u>3D</u> Acceleration	
Ď	USB	Enable 2D Video Acceleration	
	Shared Folders		
	User Interface	3	
		CancelOK	5
	_		

G. Enable RDP access, that is useful. It might be a good habit to allocate separate RDP ports per host, we'll use 9134 for the first guest, 9135 for the second

2	10	9134-fedora27s01 - Settings	
	General	Display	
	System	Screen Remote Display Video Capture	
	Display	✓ Enable Server	
$\bigcirc$	Storage	Server Port: 9134	
	Audio	Authentication Method: Null	•
₽	Network	Authentication Timeout: 5000	
	Serial Ports	Extended Features: 🗹 Allow Multiple Connections	
Ø	USB		
	Shared Folders		
	User Interface		
		Carel OK	

H. Enable Host I/O caching for your SATA device. Specify the Fedora 27 Server ISO image as the DVD:

(	3		9134-fedora27s01 - Setti	ngs		
		General	Storage			
L		System	Storage Devices	Attributes		
		Display	Controller: IDE	<u>N</u> ame:	SATA	
	$\bigcirc$	Storage	<ul> <li>Fedora-Server-netinst-x86_64-27-1</li> <li>Controller: SATA</li> </ul>	<u>T</u> ype:	AHCI	
L		Audio	9134-fedora27s01.vdi	Port Count:		
	₽	Network			Use Host I/O Cache	
		Serial Ports				
	Ø	USB				
		Shared Folders				
5	=	User Interface				
L						
			🕹 🕹 🗟 🗆			
					Cancel	<u>о</u> к

I. Disable Audio

0		9	134-fedora27s01 - Settings		
	General	Audio			
	🚺 System	Enable Audio			
	Display	Host Audio Driver: Pu	lseAudio		0
E E	Storage	Audio <u>C</u> ontroller: ICH	H AC97		0
	Audio	Extended Features: 🗹	Enable Audio <u>O</u> utput		
	Network		Enable Audio Input		
1	Serial Ports				
6	🦻 USB				
	Shared Folders				
	User Interface				
				2	
		]		Cancel OK	

J. Configure the network adapter to:

٢		9134-fedora27s01 - Settings	
	General	Network	
	System	Adapter 1 Adapter 2 Adapter 3 Adapter 4	
	Display	☑ Enable Network Adapter	
$\square$	Storage	Attached to: Bridged Adapter	
	Audio	Name: br0	•
-	Network	♥ A <u>d</u> vanced	
	Serial Ports	Adapter Type: Intel PRO/1000 MT Server (82545EM)	<b></b>
Ø	USB	Promiscuous Mode: Allow All	<b></b>
	Shared Folders	MAC Address: 0800276CA980	3
	User Interface		
		Port Forwarding	
		<u>C</u> ancel	ок

- A. Use the LAN bridged adapter  ${\it br0}$
- B. Use a server adapter driver
- C. Enable Promiscuous Mode to allow sniffing
- K. Start the installation

Fedora 27 Install Fedora 27 Test this media & install Fedora 27 Troubleshooting > Press Tab for full configuration options on menu items.	Fedora 27 Install Fedora 27 Test this media & install Fedora 27 Troubleshooting > Press Tab for full configuration options on menu items.		
Fedora 27 Install Fedora 27 Test this media & install Fedora 27 Troubleshooting > Press Tab for full configuration options on menu items.	Fedora 27 Install Fedora 27 Test this media & install Fedora 27 Troubleshooting > Press Tab for full configuration options on menu items.		
Install Fedora 27 Test this media & install Fedora 27 Troubleshooting > Press Tab for full configuration options on menu items.	Install Fedora 27 Test this media & install Fedora 27 Troubleshooting > Press Tab for full configuration options on menu items.	Fedora 27	
Troubleshooting > Press Tab for full configuration options on menu items.	Troubleshooting > Press Tab for full configuration options on menu items.	Install Fedora 27 Test this media & install Fedora 27	
		Troubleshooting	

L. Under **System->Installation Destination** please manually partitioning is necessary.

	INSTALLATI	ON SUMMARY		FED	ORA 27 INSTA	LLATION
				🖽 u	s	Help!
	LOCALIZA	TION				
edora. SERVER		KEYBOARD English (US)	á	LANGUAGE SUPPO English (United States	RT ;)	
	Θ	TIME & DATE Americas/Los Angeles timezone				
	SOFTWAR	E				
	0	INSTALLATION SOURCE Closest mirror	é	SOFTWARE SELECT Fedora Server Edition	ION	
	SYSTEM					
	?	INSTALLATION DESTINATION Automatic partitioning selected	÷	NETWORK & HOST Wired (enp0s17) coni	NAME nected	
fedora						
				Quit	Begin Ir	istallation
			W	e won't touch your disks ur	ntil you click 'Begii	n Installation'.

### A. Avoid selecting XFS or BTRFS file systems formats.

- B. Create a 1GB partition for /boot, select ext4 filesystem format.
- C. Use the remainder of the drive space for  $\slash$
- D. If you want to separate the / and /home partions select 35GB for / partition.

### M. Set the root password to lanforge. Click Done twice.

ROOT PASSWORD				FEDORA 27 INSTALLATI
Done				🖽 us 🛛 🔛
	The root account is used for	administering the system. Enter a passw	ord for the root user.	
	Root Password:	•••••	۲	
		· · · · · · · · · · · · · · · · · · ·	🛛 🔍 Weak	
	Confirm:	•••••	۲	

	Add User LAINforge:		
	CREATE USER		FEDORA 27 INSTALLATION
	Full name	LANforge	
	User name	Tip: Keep your user name shorter than 32 characters and do not use spaces.	
		Make this user administrator	
	Password	Require a password to use this account	
		Weak	
	Confirm password	·····	
		Advanced	
	The password you have provided is weak: The passwo	rd contains the user name in some form. You will have to press Done twice to	confirm it.
	A. Make user <b>lanforae</b> an Admin	istrator	
	B. Set password to lanforge		
	C. Click <b>Done</b> twice		
0			
0.	when installation tinishes, repoot. The	su will see a login prompt:	
	Fedora 27 (Server Edition) Kernel 4.16.5-200.fc27.x86_64 on an	n x86_64 (tty1)	
	Admin Console: https://192.168.100.	225:9090/ or https://[fe80::77e1:eb75:c3e8:9	62b]:9090/
	localhost login: _		
P	# dnf	update -y -	
	# dnf install -v p	erl 🚛 🌥	
Q.	Install perl:		
	# hostname	ectlstatic set-hostname atlas-f	edora27s01 🚽
R.	Set guest's hostname:		•
S.	Reboot:	v	
	LANforce on the quest instance. Sto	art by logging in as <b>root</b>	
nstall			
nstall			
nstall 'edori lerne	a 27 (Server Edition) 1 4.16.5-200.fc27.x86_64 on an x8	6_64 (tty1)	
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redor kerne damin locall roott roott roott cusr/l kesol connec lengt aving f_kin f_kin (818-1 (000)	a 2? (Server Edition) 1 4.16.5-200.fc27.x86_64 on an x8 Console: https://192.168.100.225 host login: root ord: @localhost ~1# which wget bin/wget @localhost ~1# which curl bin/wget @localhost ~1# which curl bin/wget @localhost ~1# which curl bin/wuu.candelatech.com (www.can wing www.candelatech.com (www.can wing www.candelatech.com (www.can request sent, awaiting response h: 259852 (254K) [text/plain] g to: 'lf_kinstall.txt' nstall.txt 100%[===================================	6_64 (tty1) :9090/ or https://[fe80::?7e1:eb75:c3e8:9 ndelatech.com/lf_kinstall.txt ndelatech.com/lf_kinstall.txt delatech.com) 208.74.158.171 .candelatech.com)1208.74.158.1711:80 c . 200 OK ======>] 253.76K kinstall.txt' saved [259052/259852]	62b1:9090≠ onnected. -KB∕s in 0.00s
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E. You don't need to do a burn in, so turn off the disk check:

F	<pre># touch /home/lanforge/did_cpuburn</pre>
~	
G.	Install LANIOrge:
н	You can disable the VNC Server and Xrdp services on these quests:
	<pre># systemctl stop vncserver@\:1 xrdp.service </pre>
	<pre># systemctl disable vncserver@\:1 xrdp.service</pre>
	# systemctl daemon-reload e
	FrontBlocalhost lanforgel# sustement1 ston uneserverB\:1.service xrdn.service
	<pre>Iroot@localhost lanforgel# systemctl disable vncserver@\:1.service xrdp.service</pre>
	Removed /etc/system/system/multi-user.target.wants/vncserver@:1.service.
	nemoved /etc/systemd/system/oncserver@:1.service. [root@localhost lanforge]# systemctl daemon-reload
	[root@localhost lanforge]#
	# shutdown -r now -
1.	
J.	On next boot, you will see a LANtorge kernel option, it should be automatically selected:
	Fedora (4 16 5-200 fc27 x86 64) 27 (Server Edition)
	Fedora (0-rescue-12ca94f865fa417e835446751160fb0b) 27 (Server Edition)
	Candela Technologies 4.13.15+ COM1 115200 8n1 Candela Technologies 4.16.0+ COM1 115200 8n1
	Use the $\uparrow$ and $\downarrow$ keys to change the selection.
	ress c to cart the scretted rich, or c for a command prompt.

- 3. From your LANforge GUI, configure a MAC-VLAN the on default  $\ensuremath{\mathsf{E}}\xspace$  thermal port.
  - A. In the LANforge GUI, choose the Port Mgr tab, and highlight the new enp0s17 port:

<u>\$</u>						LAN	orge Manager	Versio	in(5.3.8)	N					808
<u>C</u> ontrol	Repor	ting 1	[ear-Off Info Plu	ugins						3					
								Sto	p All	Res	tart	Manager		Refresh	HELP
												-			
Generic Test Mgr Test Group Resource Mgr Event Log Alerts Port Mgr VAP Stations Messages															
Status Layer-3 L3 Endps VolP/RTP VolP/RTP Endps WanLinks Attenuators File-10 Layer-4															
Dien	102	160.1	00 51.0 0	Coiff	Packete	1	+		Cloor Count	ore	- D	anat Bart	Delete	1	
Disp	192	100.1	00.31:0.0	511111	ackets		1		ciear couri	ers		eserron	Delete		
Rpt	Timer:	mediu	um (8 s) 🔻	A	pply		VRF I		View Deta	ils		Create	Modify	Batch M	Modify
						hernet	Interfaces	(Por	ts) for all R	esource	- 20				
				1			lincondeed	1 01	co, ror airre	oboares	1			1	
Port	Pha	Down	IP	SEC	Alias	Parent	BX Byte	29	RX Pkts	Post	8X	bos BX	TX Bytes	TX Pkts	Pps TX
						Dev									
1.2.02			10.41.14.89	0	sta2000	wiphy0	258	851	3,963		3	1,880	11,340	68	0
1.2.03			0.0.0.0	0	wiphy0		5,771	046	35,050		10	12,074	35,343	460	0
1.2.04			10.41.10.228	0	sta2100	wiphyl	258	994	3,963		2	1,808	11,116	68	0
1.2.05			0.0.0.0	0	wiphy1		4,275,	506	30,014		10	12,067	34,783	459	0
1.2.06			10.41.8.151	0	sta2200	wiphy2	258	.093	3,958		3	1,887	11,402	69	0
1.2.07			0.0.0.0	0	wiphy2		8,320	494	44,160		11	15,708	35,295	460	0
1.2.08		2	0.0.0.0	0	wlan0	wiphy0		0	0		0	0	0	0	0
1.2.09		M	0.0.0.0	0	wlanl	wiphy1		0	0		0	0	0	0	0
1.2.10		r	0.0.0.0	0	wlan2	wiphy2		0	0		0	0	0	0	0
1.2.11			10.41.0.21	0	b2000		215	943	4,152		3	1,740	5,180	62	0
1.3.0			192.168.100.29	0	ethl		151.	467	1,489		3	2,485	255,217	552	0
1.3.1			0.0.0.0	0	eth2		74,	244	992		2	1,388	1,732	22	0
1.3.2			0.0.0.0	0	eth3			0	0		0	0	1,732	22	0
1.4.0			192.168.100.225	50	enp0s17		303,	745	4,019		3	2,034	105,508	337	0 -
4	1														•
I a secold		a alt a st	1000 1d					_			-				
Logged	n to:	eates	t:4002 as: Admi	n											

B. Click the **Create** button

C. create one MAC-VLAN port

<u>C (</u>				Create VLANs	on Port: 1.4.0				
	● MA ○ WiF	C-VLAN II STA	○ 802.1Q-VLAN ○ R ○ WIFI VAP ○ WIFI Mo	ledirect 🔾 Bridge nitor 🔾 WiFi Virtu	⊖ Bond Ial Radio	⊖ GRE Tunr	nel		F
6	3	Shelf:	1	Resource: 4	localhost)	-	Port:	) (enp0s17)(MGT)	-
6				DHCP-IPv4					
	Parent	MAC:	08:00:27:6c:a9:80	DHCP Client ID:	None	-			t t
	MAC A	ddr:	X0CXXCX0C*:*:XXX	IP Address:			Global IPv6:	AUTO	
1	<u>Q</u> uanti	ty:	1	IP Mask or Bits:			Link IPv6:	AUTO	
1				Gateway IP:			IPv6 GW:	AUTO	
1	#1 Re	dir <u>N</u> ame:		#2 Redir Name:					
1	STA ID			SID:				-	
1	WiFi AE	2:		Key/Phrase:					-
1	WP	A	WPA2	WEP					
1		wn					2		
		Apply	Cancel			Rea	ady		

- A. Select MAC-VLAN
- B. Quantity: 1
- C. Select DHCP-IPv4
- D. Click Apply
- D. You will see the new port in the GUI:

<u>*</u>	LANforge Man	ger Version(5.3.8)				
Control Reporting Tear-Off Info Plugins						
	Stop All Restart Manager Refresh HELP					
and the second second states in the second second						
Generic   Test Mgr   Test Group   Re	esource Mgr   Event Log   4	lerts Port Mgr VAP Stations	Messages			
Status Layer-3 L3 Endps	VoIP/RTP VoIP/	TP Endps WanLinks	Attenuators File-IO L	ayer-4		
Disp: 192.168.100.51:0.0 S	Sniff Packets	1 Clear Counters Rese	t Port Delete			
Rpt Timer: medium (8 s) 💌	Apply VRF	I View Details Cre	ate Modify Batch Mod	ify		
	All Ethernet Interfa	es (Ports) for all Besources.				
Port Pha Down IP !	SEC Alias Parent Der	RX Bytes RX Pkts Pps F	X bps RX TX Bytes TX Pk	ts F		
1.2.05 0.0.0.0 0	wianz wipnyz		0 0	-		
1.2.10 0.0.0.0 0	0 wlan2 wiphy2	0 0	0 0 0	0		
1.2.11 10.41.0.21 0	0 b2000	223,925 4,319	2 1,115 5,250	63		
1.3.0 192.168.100.29 0	0 eth1	172,013 1,724	3 2,498 318,345 6	519		
1.3.1 0.0.0.0 0	0 eth2	85,564 1,145	2 1,350 1,732	22		
1.3.2 0.0.0.0 0	0 eth3	0 0	0 0 1,732	22		
1.4.0 192.168.100.225 0	0 enp0s17	419,277 4,767	9 11,796 151,772 4	411		
1.4.1 192.168.100.185 0	0 enp0s17#0 enp0s17	3,800 47	2 1,367 1,472	12 -		
	W			•		
Logged in to: jedtest:4002 as: Admin						

# ip -br a show 🗐 📥

E. In the guest VM, you will also see the new port

4. Add a second VM

	#	shutdown	-r	now	e ا
A. Shut down the previous VM:					

- B. clone the VM
  - A. Select the Reinitialize MAC addresses choice, these machine will operate simultaneously.



B. Verify the MAC address of the new guest is set

)	9134-fedora27s02 - Settings	
🧾 General	Network	
📕 System	Adapter 1 Adapter 2 Adapter 3 Adapter 4	
Display	Enable Network Adapter	
Storage	Attached to: Bridged Adapter	
눩 Audio	Name: br0	\$
- Network	▼ A <u>d</u> vanced	
Serial Po	rts Adapter Type: Intel PRO/1000 MT Server (82545EM)	
S USB	Promiscuous Mode: Allow All	0
Shared F	olders MAC Address: 080027DB520D	🥩
User Inte	erface	
	Port Forwarding	

C. Boot the second guest

enp0s17 file.
-tunnel -wireless . ipv6-global ork-functions ork-functions-ipv6

D. If it is listed, change it or remove it.

E. LANforge changes the /etc/udev/rules.d/70-persistent-net.rules file.Edit tht file those as to match the value of your mac address

#	cd /etc/udev/rules.d
4	
#	ip li show enp0s17
#	cat 70-persistent-net.rules

# cd /home/la	force	
+ cu /nome/ia		
· (1.c. c)		
# ./lfconfig		
Your command:	resource 5 🖓 🚔	
4		
Vour command:	config	
iour command:	Config a	
connect_mgr	[host:port]	
gps_dev	[device file]	NONE
max_tx max_send_mmsrc_mem	[1-500]	э 32000
max send mmsg pkts	[1-1000]	500
keepalive	[1000-500000]	30000
wl_probe_timer	[50-2000]	50
wl_probe_timer Other Commands:	[50-2000] help, show_all	50
wl_probe_timer Other Commands: ************************************	[58-2600] help, show_all ***********************************	50 ******* otherwise change .he new value, for example:
wl_probe_timer Other Commands: ************************************	(58-2000) help, show all exerview of the second sec	50 otherwise change che new value, for example:
wl_probe_timer Other Commands: ************************************	(58-2000) help, show all exervices a second	50 otherwise change che new value, for example:
wl_probe_timer Other Commands: ************************************	(58-2000) help, show_all examples of the second of the sec	50 ******* otherwise change he new value, for example:
wl_probe_timer Other Commands: ************************************	<pre>[58-2000] help, show_all ***********************************</pre>	50 ******* otherwise change she new value, for example:
wl_probe_timer Other Commands: ************************************	(58-2000) help, show_all convert, enter 'config', rring the key followed by t burce 5 enp0s17#0 enp0s17 e assignment: f1 enp0s17#0 b dddresses:	50 ****** otherwise change the new value, for example:
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all ecorrect, enter 'config', ering the key followed by t burce 5 enp0s17#0 enp0s17 : assignment: f1 enp0s17#0 : Addresses: Acceptable Walues</pre>	50 otherwise change the new value, for example:
wl_probe_timer Other Commands: ************************************	(50-2000) help, show_all exerned to the sevent sevent sevent ering the key followed by t purce 5 enp0s17#0 enp0s17 e assignment: ef1 enp0s17#0 e: Addresses: Acceptable Values	50 otherwise change the new value, for example: Value
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all examples the sey followed by t purce 5 enp0s17#0 enp0s17 e assignment: f1 enp0s17#0 e hddresses: Acceptable Values examples blues examples blues</pre>	50 www.watue otherwise change the new value, for example: Value Value 7
wl_probe_timer Other Commands: ************************************	<pre>[58-2000] help, show_all example the set of the se</pre>	50 www.www. otherwise change he new value, for example: Value www.www. 7 /home/lanforge
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all extraction to the set of the set of</pre>	50 www.www. otherwise change the new value, for example: Value www.www. 7 /home/lanforge SEL LIST ABOVE
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all ***********************************</pre>	50 vertext otherwise change the new value, for example: Value vertext 7 /home/lanforge SEE LIST ABOUE SEE LIST ABOUE
wl_probe_timer Other Commands: ************************************	<pre>[58-2000] help, show_all ecorrect, enter 'config', rring the key followed by t purce 5 enp0s1740 enp0s17 e assignment: f1 enp0s1740 e Addresses: Acceptable Values conservent servent servent fol=655351 [directory path1] [host:port1] [host:port1] [1-2551]</pre>	50 WWWWWW otherwise change the new value, for example: Value Walue We value, for example: Value See LIST ABOVE SEE LIST ABOVE 26
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all exects enter 'config', rring the key followed by t purce 5 enp0s1700 enp0s17 : assignment: f1 enp0s1700 : ddresses: Acceptable Values exects ent1 [directory path] [host:port1 [host:port1 [1-255] [1-511] [ethermet_device]</pre>	50 WHEN HEN otherwise change the new value, for example: Value Valu
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all ecorrect, enter 'config', ering the key followed by t burce 5 enp0s17#0 enp0s17 : assignment: f1 enp0s17#0 : fdfresses: Acceptable Values comments f1 enp0s17#0 : fdfresses: Acceptable Values comments (B-65535) Idirectory path1 (host:port1 Ihost:port1 It-2551 I1-5111 Terbernet device1 [resource. manager, both]</pre>	50 WHENE otherwise change the new value, for example: Value Walue WHENE SEE LIST ABOUE SEE LIST ABOUE SEE LIST ABOUE 5 emp8s17 resource
wl_probe_timer Other Commands: ************************************	<pre>[58-2000] help, show_all ecorrect, enter 'config', rring the key followed by t purce 5 enp0s17#0 enp0s17 e assignment: f1 enp0s17#0 e Addresses: Acceptable Values conversion [directory path] [host:port] [host:port] [host:port] [t-511] [ethernet device] [resource, manager, both] help, show_all</pre>	50 WWWWWW otherwise change the new value, for example: Ualue Walue Walue Value
wl_probe_timer Other Commands: ************************************	<pre>(58-2000) help, show_all exected and an an</pre>	50 WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW

# shutdown -r now e G. Reboot the second guest:

- H. Start up your first guest (resource 4)
- I. In your LANforge GUI, you should see your two VMs.
- J. Create a MAC-VLAN port for the second guest
- 5. Create a VOIP connection between the two guests.
  - A. In the VOIP tab, click  $\ensuremath{\textbf{Create}}$

4				LANforge Ma	nager Version(5.3.	B)				80	
Control B	eporting ]	[ear-Off Info Plu	gins								
					Stop All	R	estart Mana	ger	Refresh	HELP	,
Generic Status	Test Mgr Layer	Test Group F -3 L3 Endps	esource Mgr E VolP/RTP	vent Log VolP	Alerts Por /RTP Endps	Mgr VAP Want	Stations I inks	Messages Attenuators	File-I0	Layer-4	
	Rpt Timer:	fast (1 s)	Go Test Ma	nager all	-	Selec	t All Star	<u>S</u> top Q	uiesce Clea	r	
	View	0 - 500	•	Go		[	Display Cr	eate Mo <u>d</u> ify	/ Dele <u>t</u> e		
	2		Cros	s Connects	for Selected	Test Manag	er				—
Name	Туре	State	Pkt Tx A → B P	kt Tx A ← B	Bps Rx B	Bps Rx A	Rx Drop % A	Rx Drop % B	Delay A → B D	elay A 🔶 B 🛛	Jit
											Þ
Logged in	to: jedtes	t:4002 as: Admin									
Phone	#	AUTO									

B. You configure:

1) 1)				Create//	Addity Cross Connect					66
				Cross	Connect Information					
	CX Name: r4r5-call100		II100 Rpt Tim	er: fast (1 s)	<ul> <li>Test Manage</li> </ul>	r default_tm	default_tm 💌 CX Typ		SIP 💌	
	Multi-Call	Direct	cted Min Cal	Duration (s) File	▼ Max Ring Time (s	): 20	20  Codec:		-	
	Continuous Call	O Use	Gateway Max Ca	Il Duration (s) File	Min Inter-Call Gap	o (s): 3			Delay: 3	
		Don'	t Send RTP Numbe	r Of Calls INFIN	TE 💌 Max Inter-Call Ga	p (s): 3	- Quiese	e: 45 (45 s	ec) 🔻	
				TX En	dpoint (endpoint A)					
Endp Name:	r4r5-call100-A		UnManaged 🗹 Bind SIP		UDP Port	AUTO		Tx File	media/female_voice_8k	chz.w
Shelf:	1	•	Don't Answer	Record	SIP Port	5060	5060		cion: AUTO	
Resource:	4 (atlas-fedoraf27s01	) 🔻	Bcy Call	Enable PESO	IP ToS:	Best Effort	(0) 🗸		/dev/audio	
Port:	AUTO	-			r Cocket Brierity	0			ALTO.	_
Phone #	AUTO			- Flay to speake	Socket Fridity.		U			
Display Name:				VAD						
Auth User Name:	AUTO Sin		Single Codec	Override SDP VAD Force Send		3000		PESQ Server:	erver: 127.0.0.1:3998	
Reg Expire:	300	-			Jitter Buffer:	8		Quiesce:	45 (45 sec)	
				DV.F						-
				KX EN	apoint (enapoint B)					
Endp Name:	r4r5-call100-B	_	🗌 UnManaged	Bind SIP	UDP Port	AUTO		Tx File	media/female_voice_8k	:hz.w
Sneir: Rocourco:	1 5 (atlas.fedora27s02)	-	Don't Answer	Record	SIP Port	5060		Destination:	AUTO	
Port-	1 (enp0s17#0)		Rcv Call	Enable PESQ	IP ToS:	Best Effort	(0) 👻	Speaker	/dev/audio	
IP Addr:	AUTO	-	No Tunneling	Play to speake	r Socket Priority:	0			AUTO	_
Phone #	AUTO	D.	No East Start			250		Record File		
	AUTO									
Display Name:			Single Codec	Uverride SDP		3000			127.0.0.1:3998	_
Auth User Name:	AUTO									

A. Side-A will be resource 3

B. Side-B will be resource 4

C. Click Apply

C. See the newly created connection:

4				LANforge Mani	ager Version(5.3.8	)				EOX)
Control R	eporting Tea	ar-Off Info <u>P</u> lugin	S							
					Stop All	Re	estart Manage	er	Refresh	HELP
Generic Status	Test Mgr Layer-3	Test Group Res L3 Endps	ource Mgr   Ev VoIP/RTP	ent Log A VolP/	Alerts Port RTP Endps	Mgr VAP : WanLi	Stations Me inks At	essages tenuators	File-I0	Layer-4
	Rpt Timer: f	ast (1s)	Go Test Mar	ager all	-	Selec	t All Start	<u>S</u> top Qu	Jiesce Clear	
6	View 0	- 500		Go		D	isplay Cr <u>e</u> a	ate Mo <u>d</u> ify	Delete	
			Cross	Connects	for Selected	Test Manage	er			
Name	Туре	State	Pkt Tx A → B Pk	t Tx A ← B	Bps Rx B	Bps Rx A	Rx Drop % A F	Rx Drop % B	Delay A → B De	lay A ← B Jit
r4r5-call	SIP/G.711u	Stopped	0	0	0	0	0	0	0	0
										•
Logged in to: jedtest:4002 as: Admin										

#### D. In the VOIP/RPT tab, click **Start**

E. Monitor traffic on the connection with the Modify->View button

<u>*</u>			
<u>Control</u> <u>Reporting</u> <u>Tear</u>	r-Off Info <u>P</u> lugins		
		S	top All Restart Manager Refresh HE
Layer-4 Generic Te	st Mgr   Test Group   Resource	Mgr Event Log Alerts P	ort Mgr VAP Stations Messages
Status Laye	r-3 L3 Endps V	/oIP/RTP VoIP/RTP E	Endps WanLinks Attenuators File-IO
Bot Tin	ner fast (1 s) To Te	st Manager all	Select All Start Stop Oujesce Clear
tipe th		ise manager an	
View	0 - 500	GO	Display Create Modify Delete
		-Cross Connects for Selected	Test Manager
Name Type	State Pkt Tx $A \rightarrow B$ Pkt	t Tx A ← B Bps Rx B Bps R	$A$ Rx Drop % A Rx Drop % B Delay A $\rightarrow$ B Delay A $\leftarrow$ B Jitter A $\rightarrow$ B
r4r5-call SIP/G.711u	Request Start 1,540	1,540 56,887 56	885 0.13 0 0 0 0
\$		Cross Connect: r4r5-call100 Manager:	jedtest 🕞
	Endpoint: r4r5-call100-A		Endpoint: r4r5-call100-B
Port Resource: atlas-fedor Port: enpol17# IP: 192.168.10 bps TX: 28329 Pps TX: 16 bps RX: 29752 Pps RX: 19 Errors: 0 256 pps 16 pps 16 pps	af27 D D D D D D D D D D D D D	Avg:0 01 Packets: 1540 -2215 -1024 Avg:0 08 Packets:	Port         Endpoint         1 7         Avgo           Resource:         attas fedora27         Port:         enp0s17#0         0.0           IP:         192.168.100.108         BX Rate:         524.6         53.0         2.0           bps Tx:         40684         RX Rate:         524.6         53.0         2.0         53.0         2.0           bps Tx:         2.6         TX Pkts:         1540         Type:         V0IP         -2.0         04         04         04         04         04         04         04         04         04         04         04         04         04         04         04         04         0
0 pps 16 pps 16 pps 252 pps 262 144 Mps 8 132 Mps 12 bps 12 bps 12 bps RX-Error-Pkts RX-Dro	22.0 138.0 236.0 104.0 104.0 pped-Pkts Rx Throughput	1538 1538 1538 1538 1538 1538 0 0 0 0 0 0 0 0 0 0 0 0 0	RX-Error-Pkts RX-Oropped-Pkts Rx Throughput
## Configuring Serial Connection to LANforge

#### Goal: Using a serial cable and terminal emulator on Windows to connect to LANforge.

If you experience crashes or system misconfiguration, a network link to LANforge can become unavailable. LANforge machines are shipped with a serial cable for just this possibility. Most LANforge servers come with standard RS232 DB9 pin serial ports, other models have a special RJ45 style connector. You might need a USB to Serial adapter to connect your laptop to the serial cable.



### 1. Connect Serial Cable to LANforge

- A. We will use a CT525 for our example There are two different types of CT525, some have a I/O shield with colors, others do not. Both have DB9 serial ports:
- B. Picture of an unmarked I/O plate:



C. Picture of a colorized I/O plate:



D. Picture of a colorized I/O plate plugged in:



E. Other LANforge chassis models can have either RJ45 or DB9 serial ports.

- 2. Connect Serial Cable to Windows
  - A. Chances are you will be connecting a USB to Serial adapter to your laptop.
  - B. Typically, right after you connect the cable to your USB port, you will see a message from Windows letting you know a new drive has been installed.
  - C. Windows will map this USB adapter to a COM port. Use Device Manager to discover the new COM port:
    - A. Press the Windows key and type device manager

	Apps	Documents	Email	Web	More	•		Feedback	
ය Best	match								
• <b>S</b>	Device I Control p	Manager <sup>Janel</sup>			$\rightarrow$				
Sear	ch suggestio	ons					101		
Q	device ma	nager - See web	results		>		Device Manage Control panel	er	
						📑 Open			
R.									
0									
£									
Q	device ma	nager							

- B. Hit Enter to open the Device Manager
- C. In Device Manager, select Ports



D. In this example, we see that our new USB device was assigned COM3.

3. Configure PuTTY to connect to serial port

A. Press the Windows key and search for putty

	All Apps Documents Ema	il Web More 🕶	Feedback	
ŵ	Best match			^
0	PuTTY Desktop app	$\rightarrow$	, B B	
Þ	Apps			- 1
	2 PuTTYgen	>	PuTTY Desktop app	
	PuTTYgen	>	Desktop app	- 1
	🚯 putty-0.70-installer.msi	>	2	
	Search suggestions	🏦 Run Pac	geant	- 1
	𝒫 putty − See web results	) 🔂 Run Pu	TTYgen	- 1
	Documents (1+)			- 1
Q		Recent Sessi	ons	
/ <del>`</del> +		🖨 fs1		
ŝ		P web.bit	ratchet.com	
		🧬 atlas		
	0	🖉 ied-min	a	$\sim$
	C putty			

B. When you double click on the PuTTY icon and it launches, you can start customizing your session preferences

Pully Configuration		?	>
ategory:	7		
- Session	Basic options for your F	PuTTY session	
Logging	Specify the destination you want	to connect to	
Teminal	Host Name (or IP address)	Port	
Keyboard		22	
Features	Connection type:		erial
Appearance Behaviour Translation Selection	Load, save or delete a stored set Sav <u>e</u> d Sessions	ssion	
Colours	Default Settings	<u>^ L</u> oa	be
Data Proxy	fs1 jed-ming	Say	<u>/</u> e
Telnet	sg sg-proxy	Dele	ete
B⊡- SSH	Close window on exit: O Always O Never I	Only on clean exit	

C. Start by setting your connection type (serial), serial device (com3) and speed (115200). Name your session 'com3'

🕵 PuTTY Configuration	Ν	? ×
PUTTY Configuration Category:  -Session -Logging -Terminal -Keyboard -Bell -Features -Window -Appearance -Appearance -Selection -Colours -Colours -Connection -Data -Proxy -Telnet -Rlogin B-SH	Basic options for your PuTTY ses Specify the destination you want to connec Senal line COM3 Connection type: O Ray O Leinet O Riogin O SSH Load, save or delete a stored session Savgd Sessions Com3 Default Settings atlas com1 com3 fs 1 jed ming sg	? × sion tto Speed 115200 ● Segal Load Saye Delete
Serial	Close window on exit: Always Never Only on cle	an exit
About <u>H</u> elp	<u>O</u> pen	<u>C</u> ancel

D. Select category Serial, specify the Serial Line **COM3**, speed (115200) and set both Parity and Flow Control to **None**.

Category:	Ontions controlling Is	cal earial lines
Logging     Terminal     Keyboard     Pell     Features     Window     Apopearance     Behaviour     Translation     Selection     Connection     Data     Proxy     Teinet     Riogin     SSH     SSH     Ssh	Select a serial line Serial line to connect to Configure the serial line Speed (baud) Data bits Stop bits Parity Flow control	COM3         115200         8           1         1         1           None         V         V
About Help	Op	en Cancel

E. Select the **Session—Logging** category, select Printable Output and name set the Log file name as you prefer. This allows you to collect your commands as notes for later.

🕵 PuTTY Reconfiguration		?	×				
Category:							
E Session	Options controlling session log	ging					
Terminal Keyboard Bell Features	Session logging: O None O All session output Lon file name:						
⊡ · Window	putty.log	Brows	se				
- Appearance Behaviour - Translation - Selection - Colours - Connection - Serial	(Log file name can contain &Y, &M, &D fo time, and &H for host name) What to do if the log file already exists: ○ Always overwrite it ○ Always append to the end of it ◎ Ask the user every time ☑ Flush log file frequently	r date, &T	for				
	4						
	Apply	Cano	cel				

F. Select the  $\ensuremath{\texttt{Session}}$  category, save the  $\ensuremath{\texttt{com3}}$  profile and click  $\ensuremath{\texttt{Save}}$ 

🕵 PuTTY Configuration	N	? ×
Category:	2	
	Basic options for your P	uTTY session
···· Logging ⊡·· Terminal ···· Keyboard ···· Rell	Specify the destination you want t Serial line COM3	o connect to Speed 115200
Features Window Appearance	Connection type:	O <u>S</u> SH
Behaviour	Saved Sessions	
Iranslation	com3	
− Colours     − Connection     − Data     − Proxy     − Telnet     − Rlogin     ⊕ SSH	Default Settings atlas com1 com3 fs 1 jed+ning sg	2 Saye Delete
- Senal	Close window on e <u>x</u> it: Always Never OC	Only on clean exit
About <u>H</u> elp		<u>C</u> ancel

- G. Click the **Open** button. You will see a terminal window appear.
- 4. Use PuTTY to Log In over COM3
  - A. If the screen is blank, hit **Enter** to see a login prompt.

B. Enter username lanforge Enter , password lanforge Enter



5. Collect console output to a logfile





B. step 1



- 6. Common Commands Cheat Sheet: Hit Enter after all commands
  - A. pwd Enter : print current directory
  - B. 1s Enter : list items in directory
  - C. cd Enter : change to your Home Directory
  - D. cd /home/lanforge Enter : go to LANforge home directory
  - E. cd /root Enter : go to root user's home directory
  - F. sudo ./serverctl.bash restart Enter : Restart LANforge service
  - G. sudo reboot Enter : reboot machine
  - H. ip a show Enter : show interface addresses

- I. df -h Enter : show disk usage
- J. mv script.sh.txt /home/lanforge/scripts/script.sh Enter : move file to new name
- K. dos2unix script.sh Enter : Remove DOS/Windows CRLF style line endings
- L. chmod +x script.sh Enter : Turn script executable
- M. ./script.sh Enter : Run script in current directory
- 7. Example of clearing disk space on a LANforge machine
  - A. One common problem with any LANforge machine is cleaning out old kernels. This is an example that shows you how to check disk space and how to remove unused kernels.
  - B. Check disk space with the df -h command

PuTTY COM3 - PuTTY						2	_	×
[lanforge@jedway2 ~]\$ df	-h				~			^
Filesystem	Size	Used	Avail	Use%	Mounted on			
devtmpfs	1.9G		1.9G	0%	/dev			
tmpfs	2.0G		2.0G	0%	/dev/shm			
tmpfs	2.0G	976K	2.0G	1%	/run			
tmpfs	2.0G		2.0G	0%	/sys/fs/cgroup			
/dev/mapper/fedora-root	25G	17G	6.4G	73%				
tmpfs	2.0G	64K	2.0G	1%	/tmp			
/dev/sdal	477M	360M	88M	81%	/boot			
tmpfs	393M		393M	0%	/run/user/1000			
[lanforge@jedway2 ~]\$								
								~

C. Use the dmesg command to see if there are system warning.

Putty	_	×
root@jedway2 boot]‡ dmesg > /tmp/dmesg.log root@jedway2 boot]‡ less <mark>/</mark> /tmp/dmesg.log		^
I		

D. go to the /boot directory. The uname -r command tells you which kernel you are currently running. You may remove old **ct** kernels.

Putty	-		×	
[root@jedway2 ~]# cd /boot			~	
<pre>[root@jedway2 boot]# ls *4.7.* *4.9.* *4.13.*</pre>				
ct4.13.16+.img ct4.9.65+.img initrd-ct4.9.29+.img	System.map	-4.7.10	+	
ct4.7.10+.img initrd-ct4.13.16+.img initrd-ct4.9.65+.img	System.map	-4.9.29	+	
ct4.9.29+.img initrd-ct4.7.10+.img System.map-4.13.16+	System.map	-4.9.65	+	
[root@jedway2 boot]# uname -r				
4.16.18+				
[root@jedway2 boot]# rm -f *4.7.* *4.9.* *4.13.*				
		Ϋ́		
		Ţ		
			~	

E. In addition to removing old kernels, you can remove modules that correspond to those kernels



F. After old kernels and modules have been removed, we re-run **grub2-mkconfig** to regenerate the boot menu:



G. the results will look like this:

PuTTY						_		×
[root@jedway2 ~]# grub2-	mkconf	ig -o	/boot,	/grub	2/grub.cfg			-
Generating grub configur	ation	file						
Found linux image: /boot	/vmlin	uz-4.	11.12-	100.f	c24.x86_64			
Found initrd image: /boo	t/init	ramfs	-4.11.	12-10	0.fc24.x86_64.img			
Found linux image: /boot	/vmlin	uz-4.	10.17-	100.f	c24.x86_64			
Found initrd image: /boo	t/init	ramfs	-4.10.	17-10	0.fc24.x86_64.img			
Found linux image: /boot	/vmlin	uz-4.	5.5-30	D.fc2	4.x86_64			
Found initrd image: /boo	t/init	ramfs-	-4.5.5	-300.	Ec24.x86_64.img			
Found linux image: /boot	/vmlin	uz-0-1	rescue	-529fl	b397cc06430abda0d21	Ec2flf6	9ee	
Found initrd image: /boo	t/init	ramfs	-0-res	cue-5	29fb397cc06430abda(	d2fc2f	lf69ee	.im
g								
done							Υ	
[root@jedway2 ~]# df -h							Ţ	
Filesystem	Size	Used	Avail	Use%	Mounted on			
devtmpfs	1.9G	0	1.9G	0%	/dev			
tmpfs	2.0G		2.0G	0%	/dev/shm			
tmpfs	2.0G	992K	2.0G	1%	/run			
tmpfs	2.0G	0	2.0G	08	/sys/fs/cgroup			
/dev/mapper/fedora-root	25G	14G	9.1G	61%				
tmpfs	2.0G	316K	2.0G	18	/tmp			
/dev/sdal	477M	244M	204M	55%	/boot			
tmpfs	393M	0	393M	08	/run/user/1000			
[root@jedway2 ~]#								
								· ·

## **Connecting SMA Cables to LANforge**

## Goal: Connect the antennas of your device under test to LANforge using SMA cables and a fixed attenuator.

Many WiFi testing scenarios benefit from some amount of WiFi isolation. Connecting the radios of the Device Under Test (DUT) to LANforge's radios using SMA cables can improve connection quality. Using a fixed attenuator can reduce a direct signal so that it is heard by the radios without distortion.



1. The polarities of the cables must match



2. Begin by connecting the SMA Female end of the fixed attenuator to the SMA adapter.

# RP-SMA-Male Adapter on top

3. We see that the exposed end of the sma\_adapter is RP-SMA-Male. RP means Reverse Polarity.



4. Connect the attached attenuator and adapter to the LANforge radio antenna. This exposes the SMA Male end of the attenuator. Your DUT might not have adequate space to mount a fixed attenuator to it, so we suggested connecting it to the LANforge.



5. The polarities of the cable end must match the end of the fixed attenuator. The cable end for this side is SMA-Female.



6. See how the cable connected to the lanforge has both the adapter and the attenuator. It should be safe to use the attenuator and adapter anywhere along a SMA path.



SMA Cable attached to attenuator connected to LANforge

7. Connect the other end of the cable to the Device Under Test (DUT). Your DUT might use different antennas so you might need to use another adapter.



8. We have connected one antenna of our DUT to the one antenna of our LANforge. Repeat this for multiple antennas.



## **Diagnose Problems with GUI on Windows**

#### Goal: Learn how to diagnose problems running LANforge client on Windows.

The LANforge client (GUI) can encounter variety of difficulties depending on the amount of RAM and version of Java running on your desktop. Read this guide to learn steps to take to collect error messages and how to fix out of memory problems.

The LANforge client can be both the GUI running interactively, or in headless HTTP mode.

1.



## Run the client from a CMD window

2. Right click on LANforge GUI icon and select Open File Location

TeamView	Ver	Brother	
13		Open	
		Open file location	
21	-	TortoiseGit X	
btbits		Edit	
Shortc		Print	
	•	Run as administrator	
-		Edit with Notepad++	
PuTT	•	Scan with Windows Defender	
(64-bi		Restore previous versions	
		Send to >	
		Cut	
Git Bas		Сору	
		Create shortcut	
GU		Delete	
		Rename	
LANforge I 5.3.8		Properties	

3. You will see the folder wher the LANforge client is installed

Application Tools	LANforge-GUI_5	.3.8			- 0	×
File Home snare View Manage					0111 5 5 6	~
← → ○ ↑ → Jed Reynolds → AppData → Loc	cal > LANforge-GU	1_5.3.8	~ (	5 Search LANforge		<i>P</i>
	^	Name	Date modified	Туре	Size	^
A Quick access		Ifonf.txt	11/15/2018 10:58	Text Document	2 KB	
🤱 Jed Reynolds		binary_proto.dbg	11/15/2018 10:57	DBG File	0 KB	
.ssh		💿 Ifclient.bat	11/15/2018 10:49	Windows Batch File	5 KB	
3D Objects		📄 precompile.txt	11/15/2018 10:49	Text Document	129 KB	
AppData		📄 gui-eula-ok.txt	8/29/2018 3:03 PM	Text Document	1 KB	
		💿 settings.bat	8/29/2018 3:03 PM	Windows Batch File	1 KB	
Comme		赵 Uninstall.exe	8/29/2018 3:03 PM	Application	173 KB	
Comms		💿 daemon.bat	8/28/2018 6:41 PM	Windows Batch File	2 KB	
ConnectedDevicesPlatform		Ifclient-debug.bat	8/28/2018 6:41 PM	Windows Batch File	1 KB	
D3DSCache		Ifgui-src-5.3.8.tbz2	8/28/2018 6:41 PM	TBZ2 File	3,113 KB	
Diagnostics		README.dos	8/28/2018 6:41 PM	DOS File	1 KB	
ElevatedDiagnostics		🚳 commons-lang3.jar	8/28/2018 6:41 PM	Executable Jar File	376 KB	
lanforge		🖾 glazedlists.jar	8/28/2018 6:41 PM	Executable Jar File	858 KB	
ANforge-GIII 5.3.8		🛃 groovy.jar	8/28/2018 6:41 PM	Executable Jar File	4,454 KB	
		🖾 groovy-swing.jar	8/28/2018 6:41 PM	Executable Jar File	348 KB	
example_scripts		🕌 gson.jar	8/28/2018 6:41 PM	Executable Jar File	235 KB	
intmi		🕌 gson-SNAPSHOT.jar	8/28/2018 6:41 PM	Executable Jar File	235 KB	
📙 images		🛓 jfreechart-fse.jar	8/28/2018 6:41 PM	Executable Jar File	1,521 KB	
🔜 jre	*	🕌 jfreechart-fse-1.0-SNAPSHOT.jar	8/28/2018 6:41 PM	Executable Jar File	1,521 KB	~
48 items 1 item selected 4.19 KB					8	== 🛋

4. Right click on folder area to right of files, and select Run CMD here or Run PowerShell here. This might require that you Shift-Click on anything that might be selected in the directory to un-select it.

I IANforge-GUI_5.3.8					;	×		
→ 👻 🛧 📙 > Jed Reynolds → AppData → Local	> LANforge-GL	JI_5.3.8	~ 1	5 Search LANforge	-GUI_5.3.8 🖌			
	^	Name	Date modified	Туре	Size	^		
Cuick access		🗎 lfenf.txt	11/15/2018 10:58	Text Document	2 KB			
Jed Reynolds		binary_proto.dbg	11/15/2018 10:57	DBG File	0 KB			
ssh .		ifclient.bat	11/15/2018 10:49	Windows Batch File	5 KB			
3D Objects		📄 precompile.txt	11/15/2018 10.49	Text Document	129 KB	10		
AppData		📄 gui-eula-ok.txt	8/29/2018 3:03 PM	Text Document	1 KB	viev	,	
Incal		💿 settings.bat	8/29/2018 3:03 PM	Windows Batch File	1 KB	Sort	by	
Comme		🛍 Uninstall.exe	8/29/2018 3:03 PM	Application	173 KB	Groi	ug by	
		💿 daemon.bat	8/28/2018 6:41 PM	Windows Batch File	2 KB	Ketr	esh	
ConnectedDevicesPlatform		💿 lfclient-debug.bat	8/28/2018 6:41 PM	Windows Batch File	1 KB	Cust	tomize this <u>f</u> older	
D3DSCache		Ifgui-src-5.3.8.tbz2	8/28/2018 6:41 PM	TBZ2 File	3,113 KB	Past	e	
Diagnostics		README.dos	8/28/2018 6:41 PM	DOS File	1 KB	Past	e shortcut	
ElevatedDiagnostics		🔬 commons-lang3.jar	8/28/2018 6:41 PM	Executable Jar File	376 KB	🔥 Git (	SUI Here	
- lanforge		🚔 glazedlists.jar	8/28/2018 6:41 PM	Executable Jar File	858 KB	A Git F	Bash Here	
LANforge-GUI_5.3.8		i groovy.jar	8/28/2018 6:41 PM	Executable Jar File	4,454 KB	One	n PowerShell window he	re
example scripts		groovy-swing.jar	8/28/2018 6:41 PM	Executable Jar File	348 KB		N	
btrol		iii gson.jar	8/28/2018 6:41 PM	Executable Jar File	235 KB	Give	access to	
		gson-SNAPSHOT.jar	8/28/2018 6:41 PM	Executable Jar File	235 KB	🛃 Git	Clone	
images		ifreechart-fse.jar	8/28/2018 6:41 PM	Executable Jar File	1,521 KB	[ Git 0	Create repository here	
jre jre	~	Ifreechart-tse-1.0-SNAPSHOT.jar	8/28/2018 6:41 PM	Executable Jar File	1,521 KB	🦟 Tort	oiseGit	

5. You will see a terminal window open

	2 Windows PowerShell	-	×	- 0	×	
	PS C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>		^		~ (	0
1				e-GUI_5.3.8	,P	
1				Size		^

6. Start the client using the command .\lfclient.bat ENTER

	^	Name	Date modified	Type	Size	^		
Quick access		binary_proto.dbg	1/4/2019 10:00 AM	DBG File		0 KB		
Desktop	<u>_</u>	📄 lfcnf.txt	1/4/2019 9:58 AM	Text Document		2 KB		
	~	🝥 lfclient.bat	11/15/2018 10:49	Windows Batch File		5 KB		
:\Users\Jed	Reynol	lds\AppData\Local\LANforg	e-GUI_5.3.8> .\lfclient.	bat_				

## 7. Be Aware of Quick Edit

quit/exits/leaves.

A. Quick Edit allows you to highlight text quickly with the mouse; it is a feature of both the CMD and PowerShell windows. CMD windows have the distinct drawback of halting execution while text is highlighted.

Press ESC to clear text selection

C. You can change the setting by clicking in the upper left corner, selecting Preferences, then look for Qui,ck Select.



For more information see Windows Server 2016 Features

#### 8.

#### Copy an Error

- 9. Candelatech introduces features into LANforge quickly, and discovering a problem in the LANforge Client occasionally happens--and we want to hear when it does! You can help by copying the terminal output and emailing it to us (at support@candelatech.com). Various kinds of errors leave messages we can find in the terminal like when the LANforge client:
  - A. ...**will not start** after double clicking the icon. This might be caused by a missing or mismatched version of the Java runtime, an error in the start-up script, or a program error.
  - B. ... unexpectedly quits. Probably a program error.
  - C. ...does not respond. Possibly a program error, caused often you will see many exceptions printed to the terminal.
- A Java exception is a rather long list of method calls (a stack trace) that starts with the exception message. Sometimes the exception message is IllegalArgumentException, sometimes it is null (a null pointer exception)
- 11. Scroll the terminal window to see the top of the exception and highlight the exception message and as much of the stack trace as possible. Below is a picture of a condition where the LANforge client script has an error and will not start.



A. Pressing Enter after highlighting the text copies the text into your clipboard.

B. The laptop might not have an email client installed. In that case, open notepad.exe or wordpad.exe from via the Start menu, and paste your stack trace into your text editor.

Initied - Notepad Elle Edit Egmmat View Help			-	D ×
C:\Users\Jed Reynolds\AppData\Local\LWHonge-GUI_5.3.8>echo "INSTALLED_JAVA[C:\Pr "INSTALLED_JAVA[C:\ProgramData\Oracle\Java\javapath\java.exe]"	rogramData\Oracle\Java\javapat	h\java.exe]"		
C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>if not defined INSTALLED_J	JAVA set NO_INSTALLED_JAVA=1			
C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>if "[C:\ProgramData\Oracle	e\Java\javapath\java.exe]" == '	[]" set NO_INSTALLED_JAVA=1		
C:\Users\Jed Keynolds\AppData\Local\LWYGrge-GUI_5.3.8)if [] == [1] ( ser "INSEU_JMAjrekUnjyav.exa" ech "INSEU_DMAN of found, using bundled java" goto_start				
C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>"C:\ProgramData\Oracle\Jav	va\javapath\java.exe" -version	2>"C:\Users\JEDREY~1\AppDat	a\Local\Temp\installed_v"	
C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>for /F "tokens=3" %j in ("	'findstr /b /c:"java version" '	C:\Users\JEDREY~1\AppData\Lc	cal\Temp\installed_v"') do se	t "INST
C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>set INSTALLED_VERSION="=				
C:\Users\Jed Reynolds\AppData\Local\LAWforge-GUI_5.3.8>echo "=>"C:\Users\JEDREY~1 "=>"C:\Users\JEDREY~1\AppData\Local\Temp\inst_vers"	1\AppData\Local\Temp\inst_vers			
C:\Users\Jed Reynolds\AppData\Local\LANforge-GUI_5.3.8>echo "bundled version: 1.8 "bundled version: 1.8.0_144 installed version: "="	3.0_144 installed version: "="			
C:\Users\2ed Reynclds\AppData\Local\LWYGrge-GUI_5.3.8.1fcr /F "tokens=1,2 delims" The system cannot find the file specified. 90 was unappended at this time C:\Users\2ed Reynclds\AppData\Local\LWYGrge-GUI_5.3.8.1f lss 990 ( goto _min_1, PS:C:\Users\2ed Reynclds\AppData\Local\LWYGrge-GUI_5.3.8.0]	" %i in ('type C:\Users\JEDRU _ ) else ( goto _min_2_ )	Y~1\AppData\Local\Temp\inst_	vers') do set "INST_MAJI-%i%j	e <b>.</b>
<	Transition and the	1		>

- C. If your circumstances don't allow highlighting, copying and pasting, you can take a **screen capture**, usually by pressing **Alt** + **PrtScr** shortcut.
- D. When contacting us, please describe the steps you took to reach this error. We need to be able to reproduce the error in order to fix it.

### Out of Memory Conditions

12.

17.

- 13. Candelatech provides a 32-bit and a 64-bit version of the LANforge client. We generally suggest people use the 64-bit client, because most recent laptops are running 64-bit operating systems. This is a common fix for running out of memory. For more information see LANforge Downloads
- 14. When running a WiFi Capacity Test, the generated report consumes significantly more memory than a mere HTML or PDF version of the report does. If you have multiple WiFi Capacity Test reports open, we suggest you save them and close the report windows.
- 15. Running tests for longer periods of time (like days) can also consume significant memory. By default, the LANforge client will only allocate up to two-thirds (2/3s) of the system memory it detects available at start-up. If there are programs like Chrome, Outlook and possibly Electron based applications open, those can be using most of your laptop's memory to begin with. You might need to exit other programs in Windows and restart the LANforge client in order allow it to have more memory.
- 16. You can also edit the start-up script to configure the maximum memory permitted to the Java runtime. That is discussed next.

#### Edit the start-up script

- 18. While it is possible to edit files with notepad.exe, that text editor has few conveniences. Please consider using Notepad++ if you don't already have a text editor available. For more information see Download Notepad++
- 19. Right click on the lfclient.bat startup script, and select Edit with Notepadd++

I     Image     Image     Application Tools     LANforge-GU       File     Home     Share     View     Manage	5.3.8			- 0	× ~ 7
← → ∽ ↑ 📙 → Jed Reynolds → AppData → Local → LANforge-0	JI_5.3.8	~ č	Search LANforge	-GUI_5.3.8	P
🖈 Quick access	Name	Date modified	Type Text Document	Size 2 KB	^
Jed Reynolds	binary_proto.dbg	11/15/2018 10:57	DBG File Windows Batch File	0 KB	
3D Objects	prec Open	10:49	Text Document	129 KB	
AppData	gui-, Edit	:03 PM :03 PM	Text Document Windows Batch File	1 KB 1 KB	
Local Comms	赵 Unin 🎈 Run as administrator	:03 PM	Application	173 KB	
ConnectedDevicesPlatform	Ifclie Scan with Windows Def	ender k41 PM	Windows Batch File Windows Batch File	2 KB 1 KB	
D3DSCache	🗋 lfgui 🛃 Share	k41 PM	TBZ2 File	3,113 KB	
Liagnostics	Give access to	> k41 PM k41 PM	DOS File Executable Jar File	1 KB 376 KB	
lanforge	🔬 glaze 📸 TortoiseGit	> k41 PM	Executable Jar File	858 KB	
LANforge-GUI_5.3.8	groo Restore previous version groo	id1 PM	Executable Jar File Executable Jar File	4,454 KB 348 KB	
example_scripts	son Send to	> k41 PM	Executable Jar File	235 KB	
images	ifree Copy	k41 PM k41 PM	Executable Jar File Executable Jar File	235 KB 1,521 KB	
jre v	🕌 jfree Create shortcut	k41 PM	Executable Jar File	1,521 KB	-
46 items 1 item selected 4.19 KB	Delete Rename				
	Properties				

A. The file opens in the editor at the top. You will want to jump to the end of the file.



amount of memory you want to allow the program. 128 129 "**%CHOSEN JAVA%**" -Xmx**%half%**m^



C. In this example, we've edited the start up script to request 2GB of memory. If you request more than the system will give you, the Java will give you an error and quit.

133	:_start_1_
134	"&CHOSEN_JAVA&" -Xmx2g^
135	<pre>%CommonJavaArgs% %AddModules% ^</pre>
136	<pre>%ExtraJavaArgs% -cp %LFGUI_CP%^</pre>
137	candela.lanforge.lfclient -httpd 8080 8*
138	<b>goto</b> _exit_
139	
140	:_exit_
141	exit /b
142	

For more information see Tuning Java Machines

20. Email support@candelatech.com if you have questions or need help.

## **Recovering Filesystems**

#### Goal: Recover a LANforge system that boots into Emergency Mode

If your LANforge boots into Emergency Mode, your system is experiencing file-system corruption. Follow these instructions to check the filesystems. This process will require a monitor and keyboard or a serial cable connected to the LANforge.

<sup>1</sup> File system corruptions are caused by power-off events without properly shutting down the system



1. The emergency mode prompt looks similar to this:

Give root password for maintenance	
<ul> <li>(or type Control-D to continue):</li> <li>[ 0K ] Reached target NFS client services.</li> <li>[ 0K ] Reached target Remote File Systems (Fre).</li> <li>[ 0K ] Reached target Remote File Systems (Pre).</li> <li>[ 0K ] Reached target Remote File Systems (Pre).</li> <li>[ 0K ] Started Update UTMF about System Runlevel Changes.</li> <li>[ 0K ] Started Update UTMF about System Runlevel Changes.</li> <li>[ 0K ] Started To IP Playmouth To Write Out Runtime Data.</li> <li>[ 0K ] Started To maintenance</li> <li>[ 0r press Control-D to continue]: ath18k pci 0808:04108.05: ath18k pci 08080:04108.05: aread was not certified to opt</li> </ul>	 DANGERT You're overriding EEPROM-defined regulatory domain rate in the domain you chose.
ath18k,pci 88688:34188.8: This might result in a violation : ath18k,pci 8868:34188.8: Do not ever do this unless you rea ath18k,pci 8868:35188.8: DeNGERI You're overriding EEPROH- ath18k,pci 8868:35188.8: from: 8x8 to 8x8 to 5x8 to 5x8 ath18k,pci 8868:35188.8: This might result in a violation o ath18k,pci 8868:35188.8: This might result in a violation o	f your local regulatory rules. 11) know what you are doing f efined regulatory domain rate in the domain you chose. f your local regulatory rules. 11) know what you are doing f

A. The messages beforehand that begin with [ **OK** ] can be ignored.

B. Messages beginning with ath10k\_pci can be ignored.

We assume you'll press the **Enter** (4) key when executing the commands in further examples.

- 3. Provide the root password: lanforge
- 4. The we next need to determine where our filesystems are mounted. You might have filesystems on partitions, or on LVM volumes. Use the command mount | grep ext4 to find your partitions:

```
# mount | grep ext4 
/dev/sda2 on / type ext4 (rw,relatime,nodelalloc)
/dev/sda4 on /home type ext4 (rw,relatime,nodelalloc)
/dev/sda1 on /boot type ext4 (rw,relatime,nodelalloc)
This example shows partitions.
```

<sup>1</sup> Note that inspecting **/etc/fstab** often does not show you device partitions, rather it shows you volume or partition UUIDs.

5. Example of filesystems on volumes:

```
# mount | grep ext4 
/dev/mapper/fedora-root on / type ext4 (rw,relatime,nodelalloc)
/dev/mapper/fedora-home on /home type ext4 (rw,relatime,nodelalloc)
/dev/sdal on /boot type ext4 (rw,relatime,nodelalloc)
Notice that /boot is typically not a LVM volume.
```

#### 6. Issuing the fsck commands

7. For each of those filesystems in the partition example above, you will execute the below commands:



8. For the **volumes** example above, you will execute the below commands:





### 9. Configuring Filesystems Check on Reboot

10. The commands below involve setting the 'mount count' parameter to 1. Every time the filesystem is mounted, it will perform a check. The following examples ensure that full journaling is enabled on the filesystem. This ensures the most amount of recovery. And after that, modern versions of Fedora have metadata checksumming available. Older LANforge systems do not have this.

#### A. Filesystem Check on Every Mount

The filesystems do not need to be unmounted to set this parameter. Only the partition example is shown, the volumes example uses similar commands.



#### B. Tune the Filesystem for Full Journaling

The filesystems do not need to be unmounted to set this parameter. The commands for the volumes version is similar to the partition example below.



C. Note: Inspect /etc/fstab for conflicting mount options. The folling example shows mount options applied in the fstab file:

\$ mount   grep ext4	
/dev/sda2 on / type ext4 (rw,relatime,nodelalloc) /dev/sda4 on /home type ext4 (rw,relatime,nodelalloc) /dev/sda1 on /boot type ext4 (rw,relatime, <b>data=writeback</b> )	
\$ grep data= /etc/fstab +	
UUID=1c1b4732-653f-47dd-a106-ae17cf5b12a9 /boot ext4 data=writeback 1 2	

Notice the fstab entry for **/boot**? It has overridden the data journaling mode. Erase that setting from the fstab mount options.

### D. Enable Metadata Checksumming (optional)

It is only practical to apply metadata checksumming in the below conditions. You will not be able to apply it to the root filesystem / because it cannot be unmounted when you boot the system.

- A. Fedora 27 or more recent
- B. tune2fs 1.43 or more recent
- C. crc32c or libcrc32c modules loaded
- D. you can unmount the filesystem.
- E. To Boot into Emergency Mode, follow these steps:
  - A. Reboot system into Emergency Mode by appending the word emergency at the end of your grub boot option.

Β.	<pre># umount -f /home +</pre>
C.	# umount -f /boot e
D.	# fsck -fD /dev/sda1         (remember that's /boot)
E.	<pre># fsck -fD /dev/mapper/fedora-home +</pre>
F.	<pre># tune2fs -0 metadata_csum /dev/sda1 e </pre>
G.	<pre># tune2fs -0 metadata_csum /dev/mapper/fedora-home .</pre>

#### F. Disable Drive Write Caching (optional)

Drives typically ship with write caching enabled for a performance boost. SSDs have this as well. By turning it off you trade some performance for increased data safety. LANforge systems do not ship with write caching disabled. To make this setting enabled every boot, it needs to be added to /etc/rc.local.LANforge systems have rc-local.service enabled by defualt.

Only disable write caching if your machine powers off without shutdown frequently
# vi /etc/rc.local =
B Add the line /shin/hdnarm -WO /dev/sda

- C. Save the file.
- D. Reboot, or issue the command for this booted session: # /sbin/hdparm -W0 /dev/sda

## **Automatically Start LANforge GUI**

#### Goal: Configure LANforge to automatically start LANforge GUI on boot or login.

Follow these steps to Configure LANforge to automatically start LANforge GUI on boot or login. Requires version 5.4.1 or greater.



#### 1. Quick Start

- A. Open a terminal or connect to your lanforge machine via ssh:
- B. \$ cd /home/lanforge/LANforgeGUI\_5.4.1
   \$ cp LANforge-auto.desktop ~lanforge/.config/autostart
   \$ sudo systemctl restart vncserver@:1.service
- C. If you were connected via VNC, your session will close. When you reconnect via VNC, you will see a LANforge GUI running on the desktop. This will now start again every reboot.

## **Configuring OpenVPN on Ubuntu**

#### Goal: Connect your laptop to a VPN with the provided keys and configuration file.

Connecting to the office network remotely requires you to install the openvpn package and place the config files in the correct places. You can start and stop the VPN using simple commands at a terminal.

1.	Install OpenVPN
2.	Open a terminal and see if you already have openvpn installed:
	\$ which openvpn /usr/sbin/openvpn
	This means you have OpenVPN installed.
3.	Installing openvpn is a simple command:
	<pre>\$ sudo apt install openvpn</pre>
4.	Add your Config Files

5. You should be provided with these files:

- A. your-laptop.key ← This is your private key
- B. your-laptop.crt ← This is your certificate
- C. ca.crt ← This is the VPN server certificate
- D. candelatech.conf ← The config file for the connection

You will place these files in /etc/openvpn. The files should be owned by root, so become root and copy them with this technique:

```
$ sudo -s
[/home/amelia] # cd /etc/openvpn
[/etc/openvpn] # cp ~amelia/Downloads/your-laptop.key .
[/etc/openvpn] # cp ~amelia/Downloads/your-laptop.crt .
[/etc/openvpn] # cp ~amelia/Downloads/ca.crt .
[/etc/openvpn] # cp ~amelia/Downloads/candelatech.conf .
```

#### Starting and Stoping the VPN Connection

7. In a terminal, cd to /etc/openvpn and start the connection as root:

## \$ cd /etc/openvpn

6.

8.

\$ sudo openvpn candeltech.conf

Press Control-C in that window to stop the VPN connection.

### Example Config File

9.	client dev	tunl
	proto	udp
	remote	firewall.candelatech.com 1194
	<pre>#remote</pre>	firewall.candelatech.com 443
	script-security	2
	resolv-retry	infinite
	nobind	
	persist-key	
	persist-tun	
	verb	3
	са	ca.crt
	cert	laptop-dell.2019-08-13.jreynolds.candelatech.com.crt
	key	laptop-dell.2019-08-13.jreynolds.candelatech.com.key
	comp-lzo	
	cipher	AES-256-CBC

## **Configuring OpenVPN on Windows**

#### Goal: Connect your laptop to a VPN with the provided keys and configuration file.

Connecting to the office network remotely requires you to install the openvpn package and place the config files in the correct places. You can start and stop the VPN using simple commands at a terminal.

1.

#### Install OpenVPN

2. Download and install the latest version of OpenVPN GUI on windows.



The list of packages to download is at the bottom of the page:



For more information see Openvpn Community Downloads

3. In your Downloads folder, double click to start the installer.



4. When the installer asks you what components to choose, you just need those necessary for being a client. You do no need to install the EasyRSA script package.

	oose Components hoose which features of OpenVPN 2.4.8-I602-Win10 you wa o install.
Select the components to instal	II/upgrade. Stop any OpenVPN processes or the OpenVPN
service if it is running. All DLLs	are installed locally.
Select components to install	
select components to install.	OpenVPN User-Space Components
	TAP Virtual Ethernet Adapter
	EasyRSA 2 Certificate Management Scripts
	Advanced
	Description
Space required: 12.7MB	Position your mouse over a component to see its description.

### Add your Config Files

 OpenVPN keeps configuration files in C:\Program Files\OpenVPN\config. Open this folder with Windows Explorer.

☐   🖸 📑 ╤   C:\Program Fi File Home Share	les\OpenVPN\config View			- 0	× ~ (
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\square$ $\Rightarrow$ This PC	C → Local Disk (C:) → Program Files →	OpenVPN → config	ڻ v		
> Notepad++	^ Name ^	Date modified	Туре	Size	
✓ 🦲 OpenVPN	README.txt	3/31/2020 9:27 AM	Text Document	1 KB	
config					
🔒 doc 🔒 log 📑 sample-config	v				
1 item					

7. You should be provided with these files:

5.

- A. ca.crt ← This is the VPN server certificate
- B. your-laptop.key ← This is your private key
- C. your-laptop.crt ← This is your certificate

- D. candelatech-udp.conf ← The config file for establishing a UDP connection. This is the faster type of connection.
- E. candelatech-tcp.conf ← The config file for establishing a TCP connection. TCP OpenVPN connections do not perform as well, and are useful if you are in an environment that only allows outbound TCP port 443.

You will place these files in C:\Program Files\OpenVPN\config. you will probably be asked to give your password because the folder is owned by Administrator.

← → • ↑ 🖡 › '	This PC > OS (C:) > Program Files > OpenVPN > config			*	U	
	Name	Date modified	Type	Size		
📌 Quick access	act	29-03-2020 07:06	Security Certificate		2 K	в
💕 Dropbox	a candela-tcp.conf	29-03-2020 09:56	CONF File		1 K	в
OneDrive	a) candela-udp.conf	29-03-2020 09:56	CONF File		1 K	в
	🖙 laptop-2020-02-06.rpadala.candelatech.com.crt	29-03-2020 07:03	Security Certificate		6 K	B
🧦 This PC	laptop-2020-02-06.rpadala.candelatech.com.key	29-03-2020 07:03	KEY File		2 K	.8
3D Objects	README.txt	18-03-2020 14:58	Text Document		1 K	.8

 Double click the OpenVPN GUI icon. If you see a warning message about no configuration files found, we're about to fix that in the next step. Click OK.

OpenVPN GUI	ig files) found. our config files to or "C:\Program
	ОК

9.

## **Configuring OpenVPN**

10. When the OpenVPN software starts, it places an icon in the system tray.

 $\stackrel{{}_{\scriptstyle \perp}}{}$  Click on Taskbar up arrow  $\bigwedge$  to see hidden taskbar items



11. Right click the Screen with Padlock icon to see the menu. Select Settings.



12. You will see the Settings-General tab. Here you can set OpenVPN to start automatically if you desire.

User Interface Language: English	~
Language: English	~
Startup	
Launch on Windows startup	
Preferences	
Append to log	
Show script window	
Silent connection	
Show Balloon	
On connect On connect/reconnect O	) Never

13. Click on the Advanced tab. You will alter these settings:

OpenVPN - Settings		×
General Proxy Advanced At	bout	
Configuration Files Folder: C.\Program File Extension: conf	es\OpenVPN\config	
Log Files Folder: C:\Users\Dell\D	Documents _	
Script Timeout Preconnect script timeout: Connect script timeout: Disconnect script timeout:	10 30 10	
	OK Cancel	

- A. Change the Configuration Files $\rightarrow$ Folder value to where you saved your config files.
- B. Change the Configuration Files  $\rightarrow$  Extension value to **conf**.
- D. Click OK

14.

## Editing your Config File

15. The **candela-udp.conf** configuration file is going to be formatted for a Linux machine. You will need to change the location of the certificates to absolute Windows paths.

inang	0 1110 1000	
i Bad	ckslashes	$\mathbb{N}$ need to be escaped: $\mathbb{N}$
i An	y paths w	/ith spaces need to be " double-quoted " ;.
-	0.03	
🔛 C:\P	rogram Files	OpenVPN\config\candela-udp.conf - Notepad++ [Administrator]
File Ec	it Search V	iew Encoding Language Settings Tools Macro Run Plugins Window ?
	🗄 🖻 🔒 🕻	`````````````````````````````````````
E cano	lela-tcp.conf	Candela-udo conf
1	#	
2	# Candel	
3	# Candell	a openvpn
1	client	
5	dev	†11D
6	proto	
7	remote	Gipewall.candelatech.com 1194
8	keepaliv	- 5 120
9	resolv-r	etry infinite
10	persist-	
11	persist-	tun
12	mute-rep	lav-warnings
13	comp-lzo	
14	nobind	
15	verb	3
16	mute	5
17	ca	"C:\\Program Files\\OpenVPN\\config\\ca.crt"
18	cert	"C:\\Program Files\\OpenVPN\\config\\laptop-2020-02-06.rpadala.candelatech.com.crt"
19	key	"C:\\Program Files\\OpenVPN\\config\\laptop-2020-02-06.rpadala.candelatech.com.key"
20	cipher	AES-256-CBC
21		
22	#	

16. Here is an example file you can highlight and copy:

client	
dev	tun1
proto	udp
remote	firewall.candelatech.com 1194
#remote	firewall.candelatech.com 443
script-security	2
resolv-retry	infinite
nobind	
persist-key	
persist-tun	
verb	3
ca	ca.crt
cert	"C:\\Program Files\\OpenVPN\\config\\laptop-dell.2019-08-13.jreynolds.cande
key	"C:\\Program Files\\OpenVPN\\config\\laptop-dell.2019-08-13.jreynolds.cande
comp-lzo	
cipher	AES-256-CBC
4	Þ

## Starting and Stoping the VPN Connection

18. After saving your config files, return to the taskbar to start an openvpn connection:



- A. Click on Taskbar up arrow  $\Lambda$
- B. Right click on the Computer with Padlock
- C. Select your connection name
- D. Select Connect

## CI/CD Lights-Out Chamber Setup

## Goal: Assemble a LANforge and a device under test (DUT) to operate in an unattended lab setup.

The CI/CD lights-Out chamber is composed of a CT840a chamber, a CT523c LANforge and a test-controller<sup>[1]</sup>, that connects to them via serial and Ethernet. 1) A test controller is a Linux system that can be remotely accessed, and does not need LANforge installed.

Inside the chamber we have:

- a remotely controlled power switch
- a powered USB hub for connecting serial ports of the LANforge and DUT
- a LED lamp
- a USB camera connected to the LANforge machine
- a short table to place above the LANforge for the DUT
- the LANforge machine
- the DUT

Once assembled, this setup can perform a battery of connectivity and traffic tests that do not require a programmable attenuator. Requires LANforge 5.4.2.



#### 1.

## Parts review

Let's review the parts the chamber setup requires:

A. Cables include:



- A. 3 cat5e cables
- B. 2 cat6 cables
- C. 1 USB serial adapter
- D. 1 DB9 female-female cable
- E. Also shown are annenas, with-pin

B. You will also get two small monitor stands and a network power switch. You will be using the legs of both, but discarding one of the stand tops.



- C. You will be getting a LED lamp, a USB camera, 8 port network switch, USB hub, camera clamp, USB A-A cables.
- D. Your chamber will come with a universal power strip, AC power cord, fan AC-DC power adapter, and a printed test report. This assembly guide does not use the universal power strip. You might find a use for it.



E. Your chamber will also come with a brass pipe mounted to a steel plate. This is a fiber tube that you can pass fiber optic cabling through. For this setup, **you can refrain from installing the fiber-pipe**. It is not necessary because we are using copper Ethernet cabling.



2.

First items



A. Place the lamp in the chamber



- B. Place the power distribution unit (PDU) in the chamber on it's side.
- C. Plug the DC barrel connector for the fans into the fan power supply



D. Plug the USB hub USB cable into back of the chamber. The bottom USB port is chamber USB 1 near the top ethernet filter port 3. The top USB port is chamber USB 2.



- A. Port 1: USB Hub
- B. Port 2: Interior Light
- C. Port 5: 5 Chamber Fans
- D. Port 6: LANforge system
- E. Port 7: DUT

4.

F. Others are un-labeled. If you want to add an Ethernet switch in here, we suggest plugging it into one of the **always on** ports on the right side.

### Assemble the USB camera

A. Your camera clamp and USB camera. Your USB camera might be manual-focus.



B. Screw the bolt of the clamp into the tripod mount of the camera



C. Tighten the clamp to the arm of the lamp near the top joint. The USB cable should be plugged into the LANforge when it is added. If you plug it into the USB hub, only the test-controller will be able to use it.



5. Check espresso levels in human system



**Power cables** 



- A. Plug the PDU cable into the rear of the chamber
- B. Plug the USB hub power into port 1
- C. Plug the lamp cable into port 2
- D. Plug the chamber fan AC cable into port 5
- E. Plug the LANforge power-supply into port 6
- F. You will probably plug in your DUT power supply last, into port 7

**Inline Attenuators** 

6.

A. This is an SMA connector chart. Make sure your antennas and in-line attenuators have the correct pins



B. Your 16 LANforge SMA terminals are SMA-Female.



C. Screw 16 SMA-Male/SMA-Female inline attenuators onto your CT523c.



Antennas

8.

A. Check that you have SMA-Male antennas (antennas are with-pin).



B. Screw on your antennas. You will not leave them straight like this.



C. Bend the antennas various ways to ensure they provide diversity. Not providing diverse antenna orientation means your equipment will not reach desired MCS rates.



## Shelf for DUT

A. You are provided two monitor stand kits as to combine into a shelf for the DUT to rest above the LANforge CT523c. You are going to use the legs from the second kit to extend the legs of the first kit.



9.

B. Use a utility knife or a screw driver to separate any feet from legs sections you do not need.



C. Here is a shelf with five segments per leg. Depending on the size of the rubber feet on your CT523c, it might be just tall enough. The other photos show a table with six segments per leg. Looks like Batman likes my work.



D. This table clears the LANforge unit well.



### **Network and Serial Cables**

A. The network ports on the chamber are passive Ethernet RF filters. The do not have activity lights, they do not require power.



A. The top USB3 port is USB 2

- B. The bottom USB3 port is USB 1
- C. The top Ethernet port is 3
- D. The middle Ethernet port is 2
- E. The bottom Ethernet port is 1
- B. Cable the PDU network to chamber Ethernet port  $\boxed{1}$



C. Place the LANforge CT523c in the chamber and attach a CAT5e cable to the management port labeled [MGT]



D. Plug the management port cable into the chamber port  $\boxed{2}$ 


E. Use a CAT6 cable to connect the LANforge [eth3] port to the chamber 3 port. This represents your WAN connection.



F. Connect the DB9 female-female serial cable to the CT523c serial port. It is labeld Serial: 115200 8n1. Connect the USB serial adapter to the other end of the DB9 cable.



G. Plug the USB end of the USB serial adapter into the USB hub. Your test controller will be able to login to the LANforge for network configuration and debugging.



H. Plug in power to the CT523c. It is a green DC connector. Place the table over the CT523c.



You may place the DUT on the table. Use a CAT6 cable to connect the DUT to the LANforge [ eth2 ] port. LANforge will serve DHCP on [ eth2 ] for the DUT and its connected stations, and will NAT and route packets out of [ eth3 ].



J. Plug your DUT power to into PDU port 7



K. Your DUT probably has a serial connector. Cable your DUTs serial cable into the USB hub.



11.

**Controller Setup** 

A. The test controller (aka Jump Host) pictured here is a 1U rack unit.



- A. Your rack KVM will use the left USB2 ports and VGA port of the test-controller.
- B. Connect chamber port USB 1 to a USB3 port on the test-controller.
- C. You might have to use an extra USB3 hub to control more than two CT820a chambers.
- D. Cable chamber ethernet [1] to switch, this is your PDU
- E. Cable chamber ethernet [2] to switch, this is your LANforge management port.
- F. The picture shows chamber ethernet  $\boxed{3}$  connected to the switch. This connection is at your discretion. You might have a different WAN upstream network to attach to chamber ethernet  $\boxed{3}$
- G. The USB ports may be renamed each time the system restarts. To fix this, you can create an /etc/udev/rules.d/81-usb-serial.rules file that defines the USB ports by name using the serial-number of the USB cable if it supports it, or the path (effectively port to which the USB cable is connected).
   #LF on cable with serial number

SUBSYSTEM=="tty", ENV{ID\_SERIAL\_SHORT}=="AK066NLY", SYMLINK+="ttyLF1", MODE="0666"

```
# AP
```

# In case we have something w/out a serial number SUBSYSTEM=="tty", DEVPATH=="1-2.1.4", SYMLINK+="ttyAP1", MODE="0666"

You can find the appropriate information with the  $\ensuremath{\textit{udevadm}}\xspace$  information with the inf

B. In the picture the red cable represents the control network. The yellow cable is your connection to your test controller ETHO



# Changing the logo generated in GUI reports

Goal: Correctly access and change the logo displayed at the top of GUI-generated reports in your local Lanforge GUI.

It is possible to provide your own logo and report header graphics.



1. Open your LANforge GUI, click on Reporting, and Reporting Manager

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VoIP/RT	Print ( <u>M</u> ulti Page) Dynamic Benorts	File-IO	Resource	Mgr D	UT Profiles	Traffic-F	Profiles Alerts	Warnings +		
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Control Control VolP/RT Repo Save Repo	n to: 192.168.92.14:40 n Generate Rep Reporting Windows IP VoIP/RTP Endps tus Port Mo rev Generate Report rt Input Data Dir: Reports to Dir: rt header: rt logo:	002 as: Ort Info Ie File-10 /home /home Report h /home Max report	default Sts Chamb Resource Laver-3 c/dipti/repor c/dipti/repor c/dipti/repor s/report_ba sader image s c/dipti/Docu ort lage size: 2	LANF er View Mgr Di lection T t-data reports anner-100/ zize: 1000 × 2 ments/x64	Orge Manag JT Profiles 1.3 Endos Reportin GUI Data Colle Dx205.jpg 05 px btbits/html/iri	er Versi Stop All Traffic-P g Manage ection	ion (5.4.2) Restart rofiles Alerts Laver 4-7 st ndelaLogo2-90dpl:	Manager Warnings + Armaœeddon 200x90-trans.png	Choose Choose Report B	sh HEL WanLinks Directory Directory rt Logo

3. Find a desired image instead of the default report logo that fits the report logo size (within 200 x 90 px size range) and save the image into the html/images/ path within the bt\_bits directory.

<u>C</u>lose



4. Once the desired image is within the appropriate images folder, scroll over back to the **Reporting Manager** tab, click on **Report Logo** and select the image (and image path) to be placed in the Report logo path. Then select **Report Logo**. Now, once a user generates a report, the new report should print out with a different logo at the top.

		LANforg	e Manager Version(5.4	4.2)	
Control Rep	oorting Wind <u>o</u> ws <u>I</u> nfo <u>T</u>	ests			
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	License Info	Current Use	rs	Saved Test Configu	urations
Licenses exp	ire in: 10 days	* default from:10.253.1.42			
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# <u>Set up an SSH-tunnel on Windows, Linux,</u> <u>or Mac</u>

### Goal: Connect to a LANforge Linux system via a compressed tunnel connection

When connecting to your remote LANforge hardware (presumably accessible over a VPN) you will notice poor response time and lag in your LANforge GUI or your VNC connection. Many VPN connections are based on UDP protocols and packet loss might be affecting your connection quality. Below we explain how to set up SSH tunnels that increase the quality of your connection.



Linux SSH Tunnel Setup

1.

# A. Forwarding a Single Port

A. The ssh option -L is takes an argument **local-port:remote-ip:remote-port**. The remote-ip parameter does not have to match the destination host (but it may). VNC display :1 uses the port 5901. When VNC is in **localhost** mode, it binds to 127.0.0.1:5901. The local-port parameter is the port on the local computer. It probably won't correspond to the remote port.

The resulting command looks like: ssh -L 5900:localhost:5901 user@remotehost. When connecting a VNC browser to localhost:0 (or localhost::5900) it will forward packets to remotehost, and the SSH service on remotehost will forward them to the localhost::5901 port.If you are forwarding multiple LANforge VNC ports to your laptop, you will want to make a plan for what local ports you want to use.

Multiple remote VNC sessions would be forwarded using multiple ssh sessions:



Using the above set of commands, you can connect your VNC viewers multiple X11 display ports on your laptop:

- Iocalhost:1
- localhost:2localhost:3
- localhost:4
- B. Other SSH Parameters

124 alias FreyaTunnel="ssh -CnNv -L 5983:192.168.92.13:5901 -L 4131:192.168.92.13:4001 -L 4132:192.168.92.13:4002 lanforge@192.168.92.13"

- I. -C: Requests compression of data. This is desirable for slower connections. Recommended.
- II. -n: redirects stdin from /dev/null, Required when SSH is running in the background.
- III. -N: do not execute a remote command, useful when forwarding ports.
- IV. -v; Verbose mode. Causes SSH to print debugging messages about its progress.
- V. -L local-ip:local-port:remote-host:remote-port.

Use this flag multiple times to forward multiple ports with one command.

VI. Usually the -L forward uses three parameters, as seen above. Ask support if you need to forward a remote port to only one of your laptop network interfaces.

For more information see Please visit the SSH man page for further flags and switches

#### B. Multiple Forwards to One Host

A. SSH can support multiple port forward per remote host.
 ssh -L localport:ipaddress:remoteport user@remotehost.

Below are ports that you probably want to forward:

- I. 4001 -- perl scripts use this for ascii connection to LANforge server
- II. 4002 -- GUI uses this for binary connection to LANforge server
- III. 5901 -- VNC port for display :1
- IV. 8080 -- REST API port provided by remote GUI
- B. These can be combined into multiple command line arguments. The example below forwards all LANforge ports to your laptop:

\$ ssh -CnNv -L 4001:localhost:4001 \
-L 4002:localhost:4002 \
-L 5900:localhost:5901 \
user@192.168.100.1 e

Notice that in a secure VNC and secured LANforge configuration, this will forward the remote hosts localhost bound ports to your laptop.

#### C. Indirect Host Access

- A. Your laptop might not have direct ssh access to the LANforge machine. Instead, you might have ssh access a gateway or jump host machine that is a firewall between the LANforge and your laptop. This can present itself in two ways:
  - ${f a}$  ) you can ssh to the jump host, but not beyond it
  - ${\bf b}$  ) you cannot ssh to the firewall, but it provides port forwards for LANforge services

### B. You can ssh to a jump host

- I. You still need to know what the remote LANforge IP is.
- II. Your ssh command would look like:
- III. ssh -CnN -L4001:lanforgeip:4001 user@jumphost

#### C. You cannot ssh to the firewall

In this case, ssh will not be useful. You will have to point the GUI or python script on your laptop to the remote port on the firewall.

- I. The firewall forwards port 34002 to lanforge-1:4002
- II. Connect your GUI to firewall:34002
- III. Your firewall administrator will need to share the port forwards on the firewall.

### D. Updating your shell aliases

A. From the computer that you are trying to connect your SSH tunnel from, open the .bashrc file from /home/user/. The .bashrc file can be opened via gedit, vim, or nano. This .bashrc file is where the alias will be setup to properly invoke your ssh.

<pre>ipti@muffin:/home\$</pre>	gedit ~/.bashrc
<pre>ipti@muffin:/home\$</pre>	

- B. Once the .bashrc file is open, type in your alias in any blank spot (that is not within another for-loop or definition).
- C. Further example ssh aliases include:

124 alias FreyaTunnel="ssh -CnNv -L 5903:192.168.92.13:5901 -L 4131:192.168.92.13:4001 -L 4132:192.168.92.13:4002 Lanforge@192.168.92.13"

- I. alias FreyaTunnel="ssh -CnNv -L 5903:192.168.0.6:5901 \
  - -L 4131:192.168.0.6:4001 \ -L 4132:192.168.0.6:4002 \
  - lanforge@192.168.0.6"

II. alias SaltTunnel="ssh -CnN -L 4001:192.168.200.18:4001 salt@10.253.1.6"

D. After editing your .bashrc file, source the file to apply the changes:

bashrc 🛶	
•	
lipti@muffin:~\$ . ~/.bashrc lipti@muffin:~\$	

E. In order for our machine to remember certain passwords and access configurations, some additional edits in the ssh config file. This will be in your ,,~/.ssh/config file (or \$HOME/.ssh/config,,).

### E. SSH Keys

- A. The ssh connection might require an ssh key. This means that one needs to be generated. The private key and public key of the key pair must be saved to the local computer. The public key of the pair should be copied to the remote computer.
- B. Add your SSH key to the device being forwarded. Finally, add your public key that you generated earlier via SSH. This can be done by typing in ssh-copy-id user@ipaddress (see below example).

<pre>dipti@muffin:-\$ ssh-copy-id lanforge@192.168.95.101 /usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed</pre>
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed if you are prompt ed now it is to install the new keys lanforge@192.168.95.101's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'lanforge@192.168.95.101'" and check to make sure that only the key(s) you wanted were added.

C. Once the alias is added to .bashrc file and the ssh key is added to the remote device, open any terminal and simply type in the alias name. This will initiate the tunnel. For example, "FreyaTunnel" in this example would be the alias typed into any terminal. This should incur an instance of your tunnel.

A. There are many ways to set up an SSH tunnel, however, this cookbook will utilize PuTTy.

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Download PuTTY

PuTT's is an GSH and tented telent, developed originally by Simon Tatham for the Windows platform. PuTTY is open source software that is available with source code and is developed and supported by a group of volunteers. You can download PUTT <u>https:</u>

- B. Once PuTTY is downloaded, configure the SSH connection before adding the tunnel. For more information see Connecting with PuTTy.
- C. Once your session is setup, select your session that was just saved from the last cookbook, then on the left-hand panel, select Connection -> SSH -> Tunnels.

Features	^	Optio	ns controlling SSH	port forwar	ding
Window Appearance Behaviour Translation		Port forwarding	iccept connections s do the same (SSI	from other H-2 only)	hosts
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Connection Data Proxy		L5904 192	168.0.14:5901		
Diagin		Add new forward	ded port		
SSH		Source port	5904 ·		Add
Kex		o cance point			Add
Hostkeys		Destination	192.168.0.14:5	901	
Cipher Auth GSSAPI		<ul><li>Local</li><li>Auto</li></ul>	◯ Remote ◯ IPv4		)ynamic Pv6
TTY X11 Tunnels Bugs More bugs					
Coriol	~				

D. After setting up the tunnel, select SSH and enable compression. This will ensure that the tunnel uses data compression.



E. Once all the settings desired are configured, select Session, highlight the session again in Saved Sessions and hit Save for the new session settings. This will make sure that the next time logged in will include all the settings here.

-Session	Basic options for your PuTTY session	
Logging Terminal Keyboard Bell	Specify the destination you want to connect to       Host Name (or IP address)       192.168.92.14	
- Veratives     - Window     - Appearance     - Behaviour     - Translation     - Selection     - Colours     - Connection     - Data     - Proxy     - Telnet     - Rlogin	Connection type: Raw Telnet Rlogin SSH Se Load, save or delete a stored session Saved Sessions GeniaSSH Default Settings GeniaSSH fs1	rial d
About	Close window on exit Always Never Only on clean exit	

F. Now, the session is saved and can be opened by clicking Open

# **Understanding VRF Devices**

### Goal: Understand and inspect private VRF routing tables.

VRF devices are a Linux kernel networking driver that allows private routing tables for individual ports in the system. The examples below show how to find these routes. Requires version 5.3.9 or greater.



1.

### **VRF** Driver

LANforge has been using the Virtual Routing and Forwarding driver since around 2018. This allows private routing tables for each LANforge managed interface. VRF provides specific networking benefits to LANforge:

- A. Virtual stations gain authentic routing as delivered from the AP's DHCP service. IP sockets bound to that station will not send DNS requests out the host's default gateway, for instance. This helps accurately test captive portal and HS2.0 web requests that should never know about the management network.
- Α.
- B. **Multiple identically numbered networks can be modeled in parallel.** Emulating a peer-topeer VPN tunnel between two STA devices that both are on 10.0.0.0/24 networks separated by a WAN.

### 2.

### Disabling VRF

This does make it more difficult to monitor the routes per port.

3. If this feature is undesirable, you can use the following command to disable VRF:

- A. \$ touch /home/lanforge/LF\_NO\_USE\_VRF
- B. \$ sudo reboot

4.

### Finding VRF private routes

To find the routes, you want to use these commands for any particular vrf device:

```
A. Look for the station's master device:
$ ip a show wlan3
wlan3: mtu 1500 qdisc noqueue master _vrf6 state DOWN mode DEFAULT group default qlen 1000
link/ether 00:0e:8e:44:07:a1 brd ff:ff:ff:ff:ff promiscuity 0 minmtu 256 maxmtu 2304
B. When you know the master device you can display that specific routing table:
A. A routing table with a gateway:
```

A. A routing table with a gateway:					
	<pre>\$ ip route show vrf _vrf10</pre>				
	default via 10.40.0.1 dev br0				
	10.40.0.0/20 dev br0 scope link src 10.40.0.21				
Β.	With no default gateway:				
	<pre>\$ \$ ip route show vrf vrf15</pre>				

# Use FireFox with a virtual station to Browse a DUT

### Goal: Use FireFox with a virtual station to Browse a DUT

unreachable default

Access points used as a DUT in a wireless-mesh scenario might not have an ethernet port available to be able to access their management screen. Rather, they require a station to associate to the DUT to access the management console. LANforge virtual stations operate in the context of a VRF (virtual routing) device that protects them from the default routing table of the system. This makes using a browser over a station unintuitive; special commands are required to do this. Requires LANforge 5.3.9 or later.

1.

### Associate a station to your DUT

- A. Create a station as necessary or use the wlan0 device
  - A. if you know the SSID credentials, enter those.
  - B. If you need to discover the SSID, enter anything into the SSID box, like **asdf** so you can start a scan.



For more information see Create stations

B. Scan for your DUT SSID.



C. Configure your station to use the DUT SSID credentials and DHCP.

# Use the vrf\_exec.bash script to start Firefox

The vrf\_exec.bash script changes the networking context for the browser so it can use your station.

A. Open a terminal
\$ sudo -s       B. Become root:
C. Go to the LANforge directory:
\$ ./vrf_exec.bash wlan0 firefox http://10.0.0.1/         D. Start firefox:

**Possible difficulties** 

If you have just rebooted your LANforge system and are jumping to step 2 without starting the LANforge GUI, you might have difficulty getting Firefox to display. By starting the GUI, it runs the **khost** + command and relaxes some basic X11 security settings to let other users display windows on the desktop.

# **Backing Up and Migrating LANforge Data**

# Goal: Learn what directories under /home/lanforge are important to backup and transfer to a new LANforge.

Most of the data that LANforge produces lives in the directory **/home/lanforge**. Not all the files and directories under there are useful to backup or migrate to a new LANforge machine. This guide relates to Linux based LANforge machines. We will assume for this cookbook during a restore situation you have the two LANforge systems connected on the same management network.



 LANforge data lives in various directories under /home/lanforge, and this is a brief explanation of the directories you will want to transfer.

 $\frac{1}{1}$  LANforge scenario data for a realm is saved on the manager (typically resource 1).

- <sup>1</sup> The LANforge client (GUI) can save reports on various machines where it is running. It does not save scenario data.
- 2. Below are listed the important sub-directories from **/home/lanforge**. Each has a note about how important it is to back up. Directories not listed are unlikely to contain LANforge related data.

imes When in doubt backing up the entire /home/lanforge directory is OK

- A. DB/
  - YES this is were all your scenarios are saved
- B. Desktop/ only if you save things here
- C. Documents/ only if you save things here
- D. Downloads/ only if you save things here
- E. html-reports/ yes if you want the reports
- F. **1f\_reports/** yes if you want the data
- G. local/
  - unlikely unless you customize strongswan
- H. report-data/ yes if you want the data

2.

3.

l. scripts/

only if you have modified or custom scripts in here

J. trb\_entities/
 trb\_profiles/

Table Report Builder saved settings only necessary if you use TRB frequently

K. vr\_conf/

only if you save virtual router settings, nginx configs or want to save dhcp lease files

L. wifi/

only if you have customized wpa\_supplicant.conf or hostapd.conf files

### **Archiving Data**

Starting on your old LANforge machine, use the tar command to archive data. Add directories you want to archive to the end of the command.

\$ cd /home/lanforge

\$ tar cjf /home/lanforge-bu.tar.bz2 DB html-reports lf\_reports report-data

i If you run out of space, try using /home/lanforge/check\_large\_files.bash to help clear room.

Copy the Archive

Copy the archive to the new LANforge:

\$ scp /home/lanforge-bu.tar.bz2 lanforge@your-new-machine-ip:/var/tmp

#### 5.

4.

3.

# **Restore the Data**

On the new machine:

- \$ cd /home/lanforge
- \$ tar xvf /var/tmp/lanforge-bu.tar.bz2
- \$ sudo service lanforge restart

# CT714B Stand Assembly

Goal: Fully assemble a stand for CT714B attenuators.

The CT714B attenuator can be assembled in a stack with a base and threaded rods.



1. Insert rods until they stick out a bit through the bottom.



2. Bottom view:



3. Add nuts to all four rods on bottom side of plate. Hand tighten.



4. Full view:



5. Add one spacer to each rod.



6. Full view.



7. Add the first CT714B.



8. Add another set of spacers.



9. Full view.



10. Repeat steps 4 and 5 until all CT714Bs are stacked.



11. Add washers to all rods.



12. Add wing nuts to all rods.



```
13. Full view.
```



14. Add caps to all rods.







16. The nuts on the bottom can easily come loose during assembly. Tighten again as needed.

# Testing the CT840a Turntable

### Goal: Use the If\_chamber.pl script to interact with chamber door sensor, lights and turntable.

The CT840a chamber has a Modbus interface that can provide telemetry about the the door-closed sensor, light control, and turntable control and position. In order to have access to the Modbus protocol, you need a Modbus package installed on your system. The modbus controller in these chambers is simple and does not understand IP routing. You have to be connected on the same network as the modbus system.

1.	Using LANforge on Linux
2.	Test your connection to the chamber with the <b>/home/lanforge/lf_chamber.pl</b> script. This will verify you can reach the modbus controller. Available here: https://www.candelatech.com/downloads/lf_chamber.pl
	A. Source the lanforge.profile script: \$ source /home/lanforge/lanforge.profile
	B. Use the command: \$ ./lf_chamber.pltarg 192.168.100.10status 1 Expect output similar to: Current-Angle: 3599 Door-Open: 0 Table-Moving: 0 Lights: 0 Fan: 1 Jog-Speed: 3 Return-Speed: 3 Absolute-Speed: 3 Jog Angle: 0
3.	Use the <b>chamber-test.sh</b> script to test all the chamber features. Availble here: https://www.candelatech.com/downloads/chamber-test.sh
	A. \$ ./chamber-test.sh 192.168.3.123 The desktop linux is 192.168.3.64, remember to use Alt-F2, 'mate-terminal' to get a shell. Testing chamber at 192.168.3.123 Please close door. Current-Angle: 3599 Door-Open: 0 Table-Moving: 0 Lights: 0 Fan: 1 Jog-Speed: 3 Return-Speed: 3 Absolute-Speed: check output if door is closed: door == 1 Please open door. Current-Angle: 3599 Door-Open: 0 Table-Moving: 0 Lights: 0 Fan: 1 Jog-Speed: 3 Return-Speed: 3 Absolute-Speed: check output if door is closed: door == 0 Toggle lights Did lights turn on? Current clockwise angle: 3599 counter-clockwise-angle: 1 new-angle: 450 Did platform rotate 45 degrees? Did platform rotate another 45? It should be at 90 Current clockwise angle: 2978 counter-clockwise-angle: 622 new-angle: 1 Did platform rotate back to zero? Did fan turn on? Toggle fan

Did fan turn off? Toggle lights Did lights turn off? Current-Angle: 2700 Door-Open: 0 Table-Moving: 0 Lights: 0 Fan: 0 Jog-Speed: 3 Return-Speed: 3 Absolute-Speed: You may close the chamber.

# Using Linux without LANforge

### 5. You will want to download

- A. LANforgeServer that matches your version of Fedora. For example, Fedora 30 would be LANforgeServer-5.4.5\_Linux-F36-x64.tar.gz
- B. The modprobe interface script: If\_chamber.pl
- C. The chamber test script: chamber-test.sh

# 6. Setup

4

: This setup is intended for versions of Fedora that LANforge has been compiled for. The version of mbpoll bundled with the Server archive is specific to the **glibc** version the Fedora distro is built with. You do not have to run the If\_kinstall.pl script or use the install.bash script in the LANforgeServer directory.

- A. Create the following directories: sudo mkdir -p /home/lanforge/local/lib
  sudo mkdir -p /home/lanforge/local/bin
- B. Chown the directories to your current user: sudo chown -R \$USER: /home/lanforge

- C. Expand the LANforgeServer archive in /home/lanforge: tar xf LANforgeServer-5.4.5\_F30-x64.tar.gz
- D. Copy the mbpoll files to the new directories: ,,cp -r LANforgeServer/local/lib/\* /home/lanforge/local/lib,, cp -r LANforgeServer/local/bin/mbpoll /home/lanforge/local/bin

#### 7. Run the scripts

: These scripts require the mbpoll libraries in the LD\_LIBRARY\_PATH. The example below uses the address 192.168.0.3 as the address of the CT840a chamber. Please do not confuse this with the IP of the LANforge that might be in or attached to the chamber.

- A. \$ export LD\_LIBRARY\_PATH='/home/lanforge/local/lib:/usr/lib64'
  - \$ export PATH="/home/lanforge/local/bin:\$PATH"
  - \$ ./lf\_chamber.pl --targ 192.168.0.3 --status 1

# Using Windows without LANforge

9. Not at this time.

8.

# **Remove old Reports and Data**

#### Goal: Find and remove old reports and test data.

Running tests on LANforge for long periods of time can leave a lot of data behind. The **check\_expired\_data.bash** script can find old files to delete. This file is similar to **check\_large\_files.bash** but looks at the age of files. Introduced in LANforge 5.4.5.

1.

2

### Download the script

Download the script if it is not in /home/lanforge/scripts already. If you need to download the script, use the following commands:



### Find the script help

<ul> <li>-d Find data within this directory (required)</li> <li>-t Find data this many days old or older (required)</li> <li>-f Delete files (not a default option)</li> <li>-v Print files</li> <li>See the files you would delete:</li> <li>./check_expired_data.bash -d /home/lanforge/report-data -t 11 -v</li> </ul>	
See the files you would delete: ./check_expired_data.bash -d /home/lanforge/report-data -t 11 -v	
Actually delete the files: ./check_expired_data.bash -d /home/lanforge/report-data -t 11 -f	
You may create a script in /etc/cron.daily like this:	
<pre>#!/bin/bash LF='/home/lanforge' E='/home/lanforge/scripts/check_expired_data.bash' \$E -d \$LF/report-data -t 11 -f \$E -d \$LF/html-reports -t 11 -f</pre>	

#### 3.

### Running the script is likely places

Places we would expect large amounts of files to be saved include:

- A. /home/lanforge/Documents
- B. /home/lanforge/lf\_data
- C. /home/lanforge/report-data

- D. /home/lanforge/html-reports
- E. /home/lanforge/Downloads

### 4. Survey where your data

You can use the df command to get an idea where data is accumulating. Example:

```
$ df -s * | sort -n | tail +
 12736
           interop-5.4.5.apk
 22164
           btserver
 23500
           MonkeyRemote-0.4-shaded.jar
 39500
           gua.64
116536
           local
190444
           LANforgeServer-5.4.4
           LANforgeServer-5.4.5
LANforgeGUI_5.4.4
210004
262628
           backup-lanforge-gui.tar
267344
269196
           LANforgeGUI_5.4.5
```

```
5.
```

# Please Avoid...

Please avoid running the script in the /home/lanforge directory itself. A command like ./check\_expired\_data.bash -d /home/lanforge -t 10 -f would delete your LANforge Server, LANforge GUI and your saved scenarios.

### **Packet Capture Files**

If you are saving PCAP files, please save them in /home/lanforge/Documents or/home/lanforge/reportdata. Please do not save them in /home/lanforge. The check\_expired\_data.bash script should not be run with -d /home/lanforge it is too destructive.

### Also avoid:

- A. /
- B. /boot
- C. /etc
- D. /home
- E. /lib
- F. /opt
- G. /run
- H. /usr
- I. /root
- J. /var/log
- K. /var/cache
- L. /var/spool
- M. /var/www
- N. /var/run

6.

# Creating a cronjob

As the help text indicates, you can copy those lines into a cron job task that can run daily.

A.	\$ sudo -s +
В.	\$ cd /etc/cron.daily
C.	<pre>\$ nano expired_data.bash e</pre>
D.	Copy in your script data and adjust: #!/bin/bash LF='/home/lanforge' E='/home/lanforge/scripts/check_expired_data.bash' \$E -d \$LF/report-data -t 11 -f \$E -d \$LF/html-reports -t 11 -f
E.	<pre>\$ chmod +x expired_data.bash +</pre>
F.	Check for errors by running it by hand:
G.	<pre>\$ ./expired_data.bash e</pre>

# Clustering multiple LANforge systems together

Goal: Cluster multiple LANforge systems together to use while Wifi network testing. Clustering enables multiple LANforges to act as one large LANforge.



- An unclustered LANforge is both 'Manager' and 'Resource'. In a cluster (with multiple LANforges), there is one LANforge that is a 'Manager' and 'Resource' and there are other LANforges that are only 'Resources'. The LANforges that are only a 'Resource' use the first LANforge as their 'Manager'. There are two ways to cluster. One way is via the command line, second is via the User Interface. This cookbook demonstrates how to cluster via the User Interface. First, configure the first LANforge (which is typically both a 'Resource' and 'Manager')
  - A. Open a VNC/RDP window to the LANforge wished to be used as the 'Manager' and 'Resource' of the final cluster. Click on the Configure LANforge icon located on the VNC session desktop.



B. Once the 'LANforge Installation and Configuration (as superuser)' window opens, click on the Basic tab. Set the Setup Mode to Both, Resource ID to 1, and pick a realm 1-254 (example below is realm 2). Realm 255 means the LANforge is un-clustered.



- C. Click on Apply and Exit LANforge Config to save settings.
- Next, configure the following LANforges to cluster to the first LANforge. These LANforges will be only Resources.

A. Open a VNC/RDP window to the LANforge wished to be used as the 'Manager' and 'Resource' of the final cluster. Click on the Configure LANforge icon located on the VNC session desktop.



B. Once the 'LANforge Installation and Configuration (as superuser)' window opens, click on the Basic tab. Set the Setup Mode to Resource, Resource ID to 2 or what the next unused Resource number is, and pick the same realm as the manager LANforge (in our example, realm 2).

Wireshark Network traffic analyzer	ge Installation and Configuration (as superuser)	$\odot$ $\otimes$ $\otimes$
Basic Network cogging clustering	Advanced	Let's configure LANforge Server!
Resource ID	2	Your LANforge system should be configured for a =
Management Interface	2	specific Realm, with a Management Port, and as a Manager, a Resource or Both.
	IP: 192.168.100.33 MAC: 00:0d:b9:53:2d:98	A typical stand-alone LAN forge system will have the following values:
		<ul> <li>Realm 255 (the stand-alone realm)</li> <li>Resource 1 (the only LANforge in the realm)</li> <li>Mode Both (Both a Manager and a Resource)</li> </ul>
	-	For clustered LANforge systems, pick a single realm number between 1-254 for all LANforge systems to be
Reset to	Defaults Restart on Apply Apply Exit LANforge C	onfig

C. Click on the Clustering tab and in the Connect to Manager input box, put in the Manager's IP address followed by a ':4002'

0	LANforge Installation and Configuration (as superuser)	$\odot \odot \otimes$
Basic Network Logging	Clustering Advanced	Let's configure LANforge Server!
Add Cluster Resource	-	Your LANforge system should be configured for a specific Realm, with a Management Port, and as a Manager, a Resource or Both. A typical stand-alone LANforge system will have the following values: • Realm 255 (the stand-alone realm) • Resource 1 (the only LANforge in the realm) • Mode Both (Both a Manager and a Resource) For clustered LANforge systems, pick a single realm number between 1-254 for all LANforge systems to be
	Reset to Defaults Restart on Apply Exit LANforge C	onfig

- D. Click on Apply and Exit LANforge Config to save settings.
- 3. Restart LANforge Manager on all LANforges of cluster. The 'Status' tab of 'the Manager' of the clustered systems should show multiple resources now, as shown in the example below. If systems are not clustering and LANforge version build dates are too far apart between systems in cluster, LANforges may need to be upgraded so build version dates are closer to each other. Please contact support@candelatech.com for assistance.

ontrol Beporting Windgws Info Iests Chamber View Stop All Restart Manager Refresh HEL RF-Generator File-IO Resource Mgr Interop DUT Profiles Traffic-Profiles Alerts Warnings + Wifi-Messages Status Port Mgr Layer-3 L3 Endps Layer 4.7 Armageddon WanLinks VolP/RTP VolP/RTP Endps Licenses expire in: 75 days. Support expires in: 75 days. Status View: Ports by Resource  Ports by Resource		LANforge Ma	nager Ve	ersion(5	.4.6)						
Chamber View Stop All Restart Manager Refresh HEL RF-Generator FileJO Resource Mgr Interop DUT Profiles Trafic-Profiles Alerts Warnings + Wifi-Messages Status Port Mgr Layer-3 L3 Endps Layer 4-7 Armageddon WanLinks VolP/RTP VolP/RTP Endps License Info License Info Current Users Support expires in: 75 days. Status View: Ports by Resource Realm 2 Manager/Resource 10 Resource 11 Netsmith Resource 10 Resource 11 Netsmith	ontrol <u>R</u> eporting Wind <u>o</u> ws <u>I</u> nfo <u>T</u> ests	6									
RF-Generator       File-10       Resource Mgr       Interop       DUT       Profiles       Traffic-Profiles       Alerts       Warnings       +       Wift-Messages         Status       Port Mgr       Layer-3       L3 Endps       Layer 4-7       Armagedon       Warnings       +       Worl/RTP       VolP/RTP       VolP/RTP       Months       VolP/RTP       VolP/RTP       Months       VolP/RTP       VolP/RTP       VolP/RTP       Endps       Layer 4-7       Armagedon       Warnings       +       Worl/RTP       VolP/RTP       Endps         Licenses info       Current Users       Saved Test Configuration:       DFLT        Load         Support expires in: 75 days.       *       Admin from127:00.1       Download DB       Show Progress       Delete         Save       Ports by Resource       *        Overwrite       DUT       Chamber       Save         Realm 2       *       **       **       **       **       **       **       Save       **       **		Chamber ⊻iew	<u>S</u> top A	11	Rest	art Manage	r		Refre	esh	HELP
Status       Port Mgr       Layer-3       L3 Endps       Layer 4.7       Armagedon       WanLinks       VolP/RTP       ColP/RTP       Endps         License info       Current Users       Saved Test Configurations       Saved Test Configurations       Configurations       Delete         Support expires in: 75 days.       * Admin from:127.0.0.1       Download DB       Show Progress       Delete         Save DB Name:       Save       Save       Save       Save       Realm 2         Manager/Resource       Imager/Resource 2       Imager/Resource 2       Imager/Resource 10       Resource 10       Resource 11         Netsmith       Netsmith       Netsmith       Netsmith       Netsmith       Netsmith	RF-Generator File-IO Resource Mgr	Interop DUT Profile	s Traffic-Pr	ofiles	Alerts	Warnings	+	Wifi-Mes	sages	1	
License Info Current Users Saved Test Configurations License expire in: 75 days. TR-398 Support expires in: 75 days. status View: Ports by Resource V Realm 2 Manager/Resource 10 Resource 10 Resource 11 Netsmith	Status Port Mgr Layer-3	L3 Endps   Layer 4-	7 Arm	ageddon	۲ N	WanLinks	Vo	IP/RTP	Vo	IP/RTP	Endps
License expire in: 75 days. TR-398 Support expires in: 75 days. Status Vie <u>y</u> : Ports by Resource ▼ Realm 2 Manager/Resource 1 Resource 10 Resource 11 Netsmith	License Info	Current Users				Saved T	est Co	nfiguratio	ons		
TR-398       Download DB       Show Progress       Delete         Save DB Name:       Save         Ports by Resource       Image://Besource       Image://Besource         Realm 2       Image://Besource       Image://Besource         Manage://Besource       Image://Besource       Image://Besource         Image://Besource       Image://Besource       Image://Besource	Licenses expire in: 75 days.	* Admin from:127.0.0.1 anuserver from:127.0.0.1		Configura	ation:	DFLT				-	Load
Support expires in 75 days. Status View: Ports by Resource   Realm 2  Manager/Resource 1  Resource 10 Resource 11  Netsmith	TR-398	-		Downl	oad DB		Show	Progres	s		Delete
Status View: Ports by Resource Verwrite DUT Chamber Profile          Realm 2         Manager/Resource         Resource 10         Resource 10         Netsmith	Support expires in: 75 days.			Save DB	Name:						Save
Realm 2.	itatus Vie <u>w</u> : Ports by Resource 💌			Verw	/rite 🔲	DUT 🗌 Cha	mber	🗌 Profile	:		
		Netsmith	Netsmith	Resource 10	)Resource	. 11					

# Configure a Remote LANforge

Goal: Configure LANforge to be securely accessed via an Internet accessible gateway.

Follow these guidelines to configure a LANforge server so that it is less abusable if accessible via the Internet. Ideally the only method of access is via SSH. Remember that LANforge systems are designed for isolated environments and convenient usability. Never connect a LANforge system directly to the Internet. It is not secure. Requires version 5.4.6



1.

# Prepare the Gateway

The internet gateway would want the LANforge system management address plugged into it. The following steps assume the gateway is configured to provide DHCP on the LAN and the LANforge management port (eth0) is using DHCP. Use the LANforge Configuration tool or **1fconfig** as necessary.

- A. We do not suggest placing the LANforge in a full DMZ network where all public requests are forwarded to the LANforge. That is not secure.
- B. Just forward the SSH port (22/tcp) to the LANforge
- C. Disable Universal Plug-n-Play (UPnP)
- D. Disable WAN administration ports (those are never secure)

2.

### Prepare the LANforge

We will configure the LANforge server to change the management port and to not manage the default ethernet interface. The server should not accept LANforge protocol commands on every interface, making it much more secure. For this discussion, we will use the **lfconfig** script because that is always easy to access from an SSH connection. Also, we will assume that the LANforge GUI will **NOT run on this machine**.

A. Stop the GUI and disable the autostart GUI feature

А.	<pre>\$ killall lfclient.bash e</pre>	
В.	\$ killall java	
C	<pre>\$ rm -f /home/lanforge/.config/autostart/LANforge-auto.desktop @</pre>	4

B. Configure LANforge server to use loopback as management port

	s anda - a	
A	3 Sudo - S -	
/ \.		
R	# Cd /home/lanforge e	
D.		
~	# ./serverct1.bash stop e	*
C.		
_	# ./lfconfig e	
D.		
	Interfaces: eth0 Resource interface assignment: Resource 1: Specified Resource Addresses: 127.0.0.1:4004 Key Acceptable Values Log_level [0-65535] log_dir [directory path] add resource addr [host:port] rem resource addr [host:port] rem resource addr [host:port] rem resource addr [host:port] realim [1-255] resource [1-511] mgt dev [ethernet device] mode [resource, manager, both] log_file_len [0-26] bind mgt [0-1] shelf [1-8] eth1ethN] first_cliport [1025-4190] connect_mgr [host:port] connect_mgr [host:port] connect_mgr [host:port] max_send.mmsg_mem [1000-500000] max_send.mmsg_mem [1000-500000]	Value 7 /home/Lanforge SEE LIST ABOVE SEE LIST ABOVE 255 1 eth0 both 0 0 1 4001 NONE 5 32000 500
	<pre>max_send_mmsg_pxts[1-1000] keepalive [1000-500000] wl_probe_timer [50-2000] Other Commands: help, show_all If these values are correct, enter "config", the values by entering the key followed by t mode manage.</pre>	500 50 50 contervise change he new value, for example:
F.	Your command: mgt_dev lo	
G.	Your command: <a href="mailto:bind_mgt1">bind_mgt1</a>	
Н.	Your command: dev_ignore eth	D
I.	Your command: show_all	
J.	Key         Acceptable Values           log_level         [0-655335]           log_dir         [directory path]           add_resource_addr [host:port]         realm           resource_it [host:port]         resource           resource_it [host:port]         resource           mid_dev         [encentect device]           mid_dev         [encentect device]           hind mgt         [0-26]           bind mgt         [0-1]           shelf         [1-8]           dev ignore         [th0 eth] ethN]           first_cliport         [1025-4199]           connect mgr         [host:port]           max_send_mmag_mkts         [1-806]           max_send_mmag_mkts         [1-806]           was_send_mmag_mkts         [1-806]           was_send_mmag_mkts         [1-806]           was send_mmag_mkts         [1-806]           was send_mmag_mag_tsts         [1-806]           was send_mmag_mats         [1-806]           was send_mmag_mag_mag_tsts         [1-80	Value 77 //ome/lanforge SEE LIST ABOVE SEE
Κ.	Your command: config	
	# ./serverctl.bash restar	
1		

### 3.

# **Other Security Considerations**

The fewer services listening on all ports on the LANforge the safer it will be.

Check netstat -ntulp to find services listening on address 0.0.0.0

You might want to disable or reconfigure services that could reduce your security posture, such as:

- A. nfs-server.service (only useful for NFS testing)
- B. radiusd.service (used in 802.1x roaming testing)
- C. rpc-bind.service (only useful for NFS testing)
- D. rpc-mountd.service (only useful for NFS testing)
- E. rpc-statd.service (only useful for NFS testing)
- F. vncserver@:1.service (if no local GUI needs to run, should only need ssh)
- G. xrdp.service (because it can be logged in multiple times)

Z	1		
	7		

SSH not only does port forwarding, but it can compress the data stream between a GUI and a LANforge Server.

### A. Using PuTTY

B. See other cookbook

# C. Using OpenSSH

- D. OpenSSH is available on Linux, MAC OS X and Windows
  - A. The SSH -L option specifies [local-port]:[remote-host]:[remote-port]

	Ş	ssh	$-\mathbf{L}$	4002:127.0.0.1:4002	-CnNv	lanforge@gateway-host	el 🚔
Β.							×

C. Leave that connection running.

### E. Using public keys

You can install a public key to your LANforge and use to avoid typing passwords. Those keys usually reside in your **\$HOME/.ssh** directory.

А.	\$ ssh-keygen -t ed25519
Β.	<pre>\$ ssh-copy-id lanforge@gateway-host +</pre>
	$\overset{ imes}{}$ It is possible to specify the ssh key to avoid copying the wrong one
D.	<pre>\$ ssh-copy-id -i \$HOME/.ssh/id_ed25519 lanforge@gateway-host </pre>
E.	\$ ssh -CnNv -i \$HOME/.ssh/ed25519 -L 4002:127.0.0.1:4002 gateway-host

\$ ssh -vnN lanforge-a1

#### F. Using Your .ssh/config File

Edit the hostname and IP configuration for the host

#### 5.

# Connect the LANforge GUI your Forwarded Connection

6. After starting your SSH connection to gateway-host, start your Local GUI and connect to localhost:4002



# **Configure NTP Chronyd on Fedora**

### Goal: configure an NTP time source for a customer Fedora system

Some customer systems are in offline labs that are unable to reach the Internet, and without that connection, NTP will not continue to adjust the system time. Below are examples of how to configure the chrony service to look at the manager system of a LANforge realm to get time updates. The resulting times will be more consistent with respect to the whole realm of machines, but times will still be different than global time sources.

### Background

It is possible to configure chronyd on Fedora to look at specific local servers for time synchronization, and to configure a LANforge to be a NTP time server. For more reference, see https://docs.fedoraproject.org/en-US/fedora/latest/system-administrators-guide/servers/Configuring\_NTP\_Using\_the\_chrony\_Suite/

In the examples below, we will consider two systems:

- manager 192.168.1.101
- resource 192.168.1.102

### Maintenance: Adjusting the time

sudo -s	
chronyc tracking	# display the details about how far off the system is from NTP time
chronyc sources	<pre># display the releationship to the sources</pre>
chronyc makestep	# force a catch-up to the NTP server
chronyc tracking	<pre># to see the resulting time difference.</pre>

### Configure a Server

Use the allow directive to provide access to the NTP protocol from the management network:

rtcsync hwtimestamp \* allow 192.168.1.0/24 local stratum 9

### **Configure a Client**

Edit the /etc/chrony.conf file and add a these lines:

server 192.168.1.101 iburst auto\_offline
local stratum 10
hwtimestamp \*
rtcsync

### **Apply Changes**

Restart the chronyd service to apply:

systemctl restart chronyd.service

Check journalctl for anything wrong.

### All that other stuff in the file

There's plenty of notes in the chrony.conf file. The two network time source directives of interest are:

# pool pool.ntp.org iburst maxsources 4 server 0.pool.ntp.org iburst auto offline

- pool refers to a whole network of time servers that are listed in a DNS group that rotates their definition very quickly. You can use host pool.net.org repeatedly to see what IPs are being provided.
- server points at just one IP

If you are in an offline setting, you might consider commenting out the remote pool/server directives, but the consequence of that is the next time the system is placed on a routable network, it will never try to look for NTP time sources again and hence never attempt to re-set the system hardware clock. It is harmless to leave those directives un-commented.

# Upgrading Offline LANforge Systems

### Goal: upgrade a LANforge system that does not have access to the Internet.

LANforge systems are often in off-line or isolated test environments where the only updates they get can be brought to them on a laptop that can taken to the isolated network manually. Candelatech provides Bundle upgrades that contain all the files necessary for performing the equivalent of a lf\_kinstall.pl -do\_lanforge upgrade action. It is also possible to create a mirror of the software that LANforge systems can query. Offline bundle files were introduced in 5.4.1. Offline upgrade by listing files from lf\_kinstall.pl was introduced in 5.3.3.

### Proxy from Controller Method

Given a network gateway that allows one-way access to LANforge systems, an outside management laptop can be used to upgrade the offline LANforge systems. There is no need to mirror everything, because your LF systems do not span all combinations. **You don't want to mirror everything.** It's over 13GB. Also, If you do not have ssh-keys installed between bizproxy and the LF systems, this technique will prompt you for passwords!

#### **Mirror Packages Proxy option**

If the proxy has a web server URL on the management LAN where LF files can be cached, follow these steps

to update the bundles on the proxy and upgrade the LF systems. This option mirrors the LANforge tar archives and not the bundles. For this example the proxy system will have these properties:

- hostname: bizproxy, 192.168.10.1
- management LAN: 192.168.10.0/24
- required disk space: 10GB
- file system web folder: /var/www/html/lanforge/r5.4.6
- LAN URL: http://192.168.10.1/lanforge/r5.4.6/
- Apache Directory config example:

```
Alias /private/downloads /var/www/html/lanforge
Alias /private/downloads/ /var/www/html/lanforge/
Alias /lanforge /var/www/html/lanforge
Alias /lanforge/ /var/www/html/lanforge/
Oirectory /var/www/html/lanforge>
Require ip 192.168.10.0/24
Options +Indexes +FollowSymLinks
IndexOptions FancyIndexing FoldersFirst NameWidth=*
AllowOverride all
</Directory>
```

• Nginx example:

```
location /lanforge/ {
   root /var/www/html/lanforge;
   autoindex on;
   allow 192.168.10.0/24;
   deny all;
}
```

- On bizproxy, mirror files from www.candelatech.com to bizproxy. Below something close to the commands you would need to put into a shell script.
- 2. Size of the files files you would expect to mirror is about 8GB

```
3. mirror.bash:
```

```
#!/bin/bash
VER="5.4.6"
OSV=F36
CT="https://www.candelatech.com/private/downloads/r${VER}"
cd /var/www/html/lanforge/r$VER
curl -s -o lf kinstall.pl ${CT}/lf_kinstall.pl
curl -s -o list.html ${CT}/
perl -ne '/a href="([^"]+)"/ && print "$1\n";' list.html > list.txt
rm -f list2.txt
perl -ne '/((ath|board|ct[56]|firmware|interop-|LANforge-Server-).*)/ && print "$1\n"' list.txt > list2.txt
perl -ne '/((ath|board|ct[56]|firmware|interop-|LANforge-Server-).*)/ && print "$1\n"' list.txt > list2.txt
grep "[Lx].*[-]${0SV}" list.txt >> list2.txt
for file in "${URLS[@]}"; do echo "${CT}/${file}" ; done > urls.txt
```

4. After running mirror.bash, you now have a copy of the LANforge packages you want on bizproxy.

```
5. From bizproxy, the below script can use the first argument as the IP of the system to upgrade.
web_upgrade.bash:
```

```
#!/bin/bash
LFHOST=${1:-}
if [ -z $LFHOST ]; then echo "Please specify hostname or ip"; exit 1; fi
VER=5.4.6
# specify a kernel version in parameter 2:
KV=${2:=5.19.17+}
BIZ="http://192.168.10.1/"
scp lf kinstall.pl root@${LFHOST}:/root/lf kinstall.pl
ssh root@${LF HOST} "chmod +x /root/lf kinstall.pl
ssh root@${LF HOST} "chmod +x /root/lf kinstall.pl"
ssh root@${LF HOST} "/root/lf_kinstall.pl \
    --lfver $VER --kver $KV \
    --dounload from $BIZ \
    --tmp_dir /home/Lanforge/Downloads"
```

```
Example: ./web_upgrade.bash 192.168.10.2 6.2.4+
```

#### **SSH Copy Packages Option**

If the LANforge cannot reach the proxy controller because of firewall or routing reasons, the proxy controller can copy the files to the LF system and use a local-only install with the If\_kinstall.pl --source\_dir option.

- 1. Use the above mirror script for mirroring the LANforge packages.
- 2. Use a script like the one below to query and copy the correct files to the LF system:

```
#!/bin/bash
cd /var/www/html/lanforge/r5.4.6
LFHOST=${1:-}
if [ -z $LFHOST ]; then echo "Please specify hostname or ip"; exit 1; fi
# specify a kernel version in parameter 2:
```

```
KV=${2:=5.19.17+}
OSV=$(ssh lanforge@$LFHOST "awk -F\= '/VERSION ID/{print \$2}' /etc/os-release")
scp lf kinstall.pl root@${LFHOST}:/root/lf kinstall.pl
ssh root@${LF HOST} "chmod +x /root/lf kinstall.pl"
ssh root@{$LF HOST} "/root/lf kinstall.pl --print_only --show_urls \
     --skip pip --skip yum all --do upgrade \
     --lfver $VER --kver $KV | grep '# http' > /tmp/lf_list.txt"
scp root@${LF HOST}:/tmp/lf list.txt /tmp
mapfile -t urlz < /tmp/lf list.txt</pre>
for url in "${urlz[@]}"; do
    file="${url##*/}
    scp $file root@${LFHOST}:/home/lanforge/Downloads/
done
scp md5.txt root@${LFHOST}:/home/lanforge/Downloads/
ssh root@${LFHOST} "/root/lf kinstall.pl --offline \
    --lfver $VER --kver $KV --do lanforge \
     --source dir /home/lanforge/Downloads \
    --tmp_dir /var/tmp --skip_yum_all --skip_pip"
```

### **SSH Copy Bundles Option**

This option is for mirroring the Bundle files only. This is useful if the default kernel version is acceptable.

 On bizproxy, mirror files from http://www.candelatech.com to bizproxy. Below something close to the commands you would need to put into a shell script. Sizes of the bundle files you would expect to mirror:

```
$ ls Bundle*F{27,30,34,36}* | xargs du -shc
1.76 Bundle lfver-5.4.6 kern-5.19.17+ osver-F27-i-27 x64.tar.xz
1.76 Bundle_lfver-5.4.6 kern-5.19.17+ osver-F30-i-30_x64.tar.xz
1.76 Bundle lfver-5.4.6 kern-5.19.17+ osver-F34-i-34_x64.tar.xz
1.76 Bundle_lfver-5.4.6 kern-5.19.17+ osver-F36-i-36_x64.tar.xz
6.76 total
```

2. We'll call this "bundle\_mirror.bash":

```
#!/bin/bash
VER="5.4.6"
CT="https://www.candelatech.com/private/downloads/r${VER}/"
cd /var/www/html/lanforge/r$VER
curl -s -o lf kinstall.pl ${CT}/lf_kinstall.pl
curl -s -o list.html ${CT}/
perl -ne '/a href="([^"]+)"/ && print "$1\n";' list.html > list.txt
perl -ne '/^(Bundle.*?(F(27|3[046])).*)/&& print "/$1\n"' list.txt > urls.txt
wget -i urls.txt
```

 From bizproxy, the below script can use the first argument as the IP of the system to upgrade. scp bundle upgrade.bash:

```
#!/bin/bash
cd /var/www/html/lanforge/r5.4.6
LFHOST=${1:-}
if [ -z $LFHOST ]; then echo "Please specify hostname or ip"; exit 1; fi
OSV=$(csh lanforge@$LFHOST "awk -F\= '/VERSION ID/{print \$2}' /etc/os-release")
BNAME="Bundle lfver 5.4.6 kern-5.19.17+ osver-F${0SV}-i-${0SV}_x64.tar.xz"
scp $BNAME lanforge@${LFHOST}/home/lanforge/Downloads/
scp lf kinstall.pl root@${LFHOST}:/root/lf kinstall.pl
ssh root@${LF_HOST} ".hmod +x /root/lf_kinstall.pl"
ssh root@${LF_HOST} ".httl.pl -.use_bundle /home/lanforge/Downloads/$BNAME"
```

Example: ./scp\_bundle\_upgrade.bash 192.168.10.2

### **Bundle method**

The bundle upgrade is a standard manner of doing an offline upgrade.

# Interop

### Windows

Offline Windows Ifserver upgrades will require a place to download the windows lanforge update zip from. The existing offline Bundle\_Ifver\_X tar file does not include these files. Rather this requires the LANforge-Server-5.4.6-upgrade.zip file.

- 1. on the Fedora lanforge, configure a test-network port to serve HTTP.
- 2. edit the resulting vr\_conf/nginx\_eth3.conf to add the Downloads directory:

```
3. # Remove the first line '# Autogenerated by ...' and edit the file as
    # desired for a custom config file.
    worker processes 1;
    error_log logs/br1000_error.log;
    pid /home/lanforge/vr_conf/nginx_br1000.pid;
    events {
        worker_connections 1024;
    }
```

```
http {
   include
                /usr/local/lanforge/nginx/conf/mime.types;
   default type application/octet-stream;
   access log logs/br1000_access.log;
   sendfile
                       on;
   keepalive_timeout 65;
   server {
                    10.40.0.1:80 bind dev=br1000;
       listen
       server name localhost;
       access_log logs/br1000_host.access.log;
       location / {
           root html;
           index index.html index.htm;
       error page 500 502 503 504 /50x.html;
       location = /50x.html {
           root html;
       }
       location /Downloads {
                /home/lanforge/;
          root
          autoindex on;
       }
   }
}
```

Notice the:

```
1. location /Downloads {
    root /home/lanforge;
    autoindex on;
}
```

2. and of course: remove the top line of the file

4. reset the port to make the changes take effect

1. first, tail the logfile:

```
[lanforge@ct523-jedway1 logs]$ pwd
/usr/local/lanforge/nginx/logs
[lanforge@ct523-jedway1 logs]$ tail -F br1000_error.log
```

2. next down and up the port. A simple port reset does not restart nginx

5. check on the Windows system to make sure you can browse the url:

		dex of /Downloads/	× +					
$\leftarrow$	С	A Not secure	10.40.0.1/Downloads/	A	rò	5⁄≡	Ē	\$

Index of /Downloads/

<u>/</u>		
LANforge-GUI-5.4.6-Installer.exe	03-May-2023 21:30	163377693
LANforgeDocs-5.4.6.tar.gz	03-May-2023 21:30	61866217
LANforgeGUI 5.4.6-x64-Installer.exe	03-May-2023 21:30	171308948
LANforgeGUI 5.4.6 Linux.tar.bz2	03-May-2023 21:31	168160649

6. Get the correct files into Fedora /home/lanforge/Downloads:

- wget https://www.candelatech.com/private/downloads/r5.4.6/LANforge-Server-5.4.6-upgrade.zip
- 2. check that you did not create LANforge-Server-5.4.6-upgrade.zip.1
- 7. Download on windows, or use posh wget:
  - 1. Using Edge: click on the [...] dots, select Keep, on next card select Extra Options  $\rightarrow$  Keep

Index of /Downloads/	×	+							
← C ▲ Not secure   10.4	0.0.1/	/Downloads/	$\forall_{\mathscr{D}}$	to	לב	Ē	<u>↓</u>	প্	
Index of /Downloa	Do	ownloads					$\Rightarrow$		
	4	▲ LANforge-Server-5.4.6-upgrade.zip isn't commonly downloaded. Make sure you trust LANforge-Server-5.4.6							
/ LANforge-GUI-5.4.6-Installer.exe LANforge-Server-5.4.6-upgrade.zip		03- 10-	May-202 May-202	3 21: 3 20:	30 52		163377 24547	7693 7651	
Administrator: Windows PowerShell						-		×	
<pre>hindows PowerShell Copyright (C) Microsoft Corporation. All rights re Try the new cross-platform PowerShell https://aka. PS C:\Users\Administrator&gt; cd .\Downloads\ PS C:\Users\Administrator\Downloads&gt; wget -o LANfor PS C:\Users\Administrator\Downloads&gt;</pre>	eserve .ms/ps orge-S	d. core6 erver-5.4.6-upgrade	.zip http:	//10.40	ð.ð.1/Downl	Loads/LA	Nforge-:	Serve	

 wget -o LANforge-Server-5.4.6-upgrade.zip http://10.40.0.1/Downloads/LANforge-Server-5.4.6-upgrade.zip

- 8. Stop LANforge on the windows system
- 9. Extract the zip file:
  - cd %env:PROGRAM<TAB><TAB> tab complete to get to cd 'C:\Program Files (x86)\LANforge-Server\'
  - 2. Expand-Archive -Path \$HOME\Downloads\LANforge\*upgrade.zip -Dest .
- 10. run the upgrade\_lfconfig script:
  - 1. .\upgrade\_lfconfig.ps1
  - 2. click OK
  - 3. The server will have started
- 11. Check the LANforge manager system to check it has re-regeistered
  - 1. In the Resources tab, you should see the host-name has returned
  - 2. check the Build Date column to check the version is recent.

# Multiplexed REST Access via Nginx Proxy

# Goal: Configure an NGINX proxy to allow REST traffic to a variety of isolated LANforge machines

It is possible to configure a Nginx proxy in a manner to allow remote REST clients access to multiple isolated LANforge systems. This leverages the proxy\_pass feature in Nginx. There are multiple ways to configure proxy access.

For the example below, we will assume these values:

- public proxy hostname is bizproxy, 10.39.0.44
- bizproxy is running Nginx
- Isolated LAN with LF machines: 192.168.92.0/24
- Example LANforge machines:
  - 192.168.92.10 ct523-jedway1
  - 192.168.92.11 ct522-jedway3
- the LANforge machines need to have GUIs configured to start automatically

### LANforge GUI HTTP Processing

The HTTP library that the LANforge GUI incorporates is very simple. It is not configured to parse Host: headers. There is no need to rewrite the Host header when proxying to port 8080.

Proxying to Apache on LANforge (mgt\_ip, port 80) is different. If you want to proxy requests to a LF Apache instance on port 80, you should incorporate Host header rewriting. (No examples below, sorry.)

# **Proxy Request Rewriting**

Three ways of making proxy requests include:

- Port Rewriting. Works best with our python libraries.
- Hostname Rewriting, more difficult, but still works with python libraries.
- URL (path-name) Rewriting: this does NOT work well with our python libraries.

# **Port Rewriting**

This manner of proxying just translates different server listening ports to the target machines. It is another easy transformation, but it opens up quite a number of high-numbered ports on bizproxy. Nginx config:

```
server {
  listen 1910;
  server name ;
  root /usr/share/nginx/html;
    location / {
      rewrite
                          /(.*) /$1 break;
                          http://192.168.92.10:8080;
      proxy pass
      proxy redirect
                          off;
      proxy set header
                         Host $host;
      proxy set header
                         X-Real-Ip $remote addr;
                         X-Forwarded-For $remote_addr;
       proxy_set_header
    }
}
```

```
server {
  listen 1911;
   server name ;
  root /usr/share/nginx/html;
   location / {
                         /(.*) /$1 break;
      rewrite
                         http://192.168.92.11:8080;
      proxy pass
      proxy redirect
                         off;
      proxy set header Host $host;
                         X-Real-Ip $remote addr;
      proxy set header
      proxy_set_header X-Forwarded-For $remote_addr;
   }
}
```

Use curl to test access:

```
curl -sqv -H 'Accept: application/html' http://bizproxy:1910/port/1/1/list
```

Example script usage:

<pre>./scenario.pymgr bizproxymgr port</pre>	1910 \
load BLANKaction overwrite	

### **Hostname Rewriting**

It is possible to rewrite hostnames and host headers to isolated LF systems. This is **complicated** rewrite because the DNS names need to be present at the developer's workstation. (It is unlikely that the the headers in the HTTP request can be manipulated to add the Host header.) Ideally, the non-isolated LAN DNS can be configured to return the return the IP of bizproxy.corp.me when hostnames like ct523-jedway1.bizproxy.corp.me are requested.

On the developer workstation, this is possible with extra effort on the user side by manipulating the /etc/hosts file on a workstation:

```
# etc/hosts
```

10.39.0.44 ct523-jedway1.bizproxy.corp.me ct523-jedway1

Nginx config:

}

```
server {
   listen 80;
   server name ct523-jedway1;
   root /usr/share/nginx/html;
   location / {
       rewrite
                          /(.*) /$1 break;
       proxy_pass
                          http://192.168.92.10:8080;
                          off;
       proxy redirect
       proxy_set_header Host $host;
       proxy_set_header
                         X-Real-Ip $remote_addr;
       proxy_set_header
                         X-Forwarded-For $remote_addr;
   }
```

Check the URL access using curl:

```
# check by IP:
$ curl -sqv \
	-H 'Host: ct523-jedway1' \
	-H 'Accept: application/json' \
	http://10.39.0.44/port/1/1/list
# check by hostname
$ curl -sqv \
	-H 'Accept: application/json' \
	http://ct523-jedway1.bizproxy.corp.me/port/1/1/list
```

Example script usage:

```
./scenario.py --mgr ct523-jedway1 --mgr_port 80 \
    --load BLANK --action overwrite
```

### Logging HTTP Access

The bizproxy logs should be located in /var/log/nginx. In LF 5.4.6, the GUI can send messages to syslog. Messages from the GUI would look like:

1685573102952: ip[192.168.92.1] sess[] GET url[/port/1/1/list]

# **Appendix**

URL Rewriting is mentioned here so the reader can understand what not to configure.

### **URL Rewriting**

Below is an example permitting REST access to LF hosts by way of a URL prefix. For example, the URL http://bizproxy/92.11/port/1/1/list becomes the URL http://192.168.92.11:8080/port/1/1/list . This is not the best kind of proxy rewriting, but it is the easiest. Using a URL prefix is less ideal because it inherently conflicts with the LANforge python libraries provided. Nginx config:

```
server {
    listen
                 80;
    server name
                 ;
    root
                 /usr/share/nginx/html;
    # Load configuration files for the default server block.
    include /etc/nginx/default.d/*.conf;
    location /92.10 {
                          /92.10/(.*) /$1 break;
       rewrite
                          http://192.168.92.10:8080;
      proxy pass
                          off;
      proxy redirect
                         Host biz lflab5 9210;
      proxy set header
      proxy set header
                          X-Real-Ip $remote addr;
      proxy_set_header
                         X-Forwarded-For $remote_addr;
    location /92.11 {
      rewrite
                          /92.11/(.*) /$1 break;
                          http://192.168.92.11:8080;
      proxy pass
                          off;
      proxy redirect
      proxy set header
                         Host $host;
      proxy set header
                          X-Real-Ip $remote addr;
      proxy_set_header
                         X-Forwarded-For $remote addr;
    }
}
```

Use curl to query the REST endpoint:

\$ curl -sqv -H 'Accept: application/json' http://bizproxy/92.10/port/1/1/list

This is not compatible with the py-scripts library.

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