Install the LANforge Server Components

Overview

Candela Technologies delivers the LANforge system fully installed and configured on tested and approved hardware platforms, such as the 1U rack mounted units. However, a person who has a decent understanding of the Linux operating system should be able to install and configure a functional LANforge system on their hardware platform of choice. LANforge now supports a full install on Windows 2000 and Windows XP as well. **Legal use of the LANforge system is based upon data-generating ports and/or machines. You must own a license for every port or machine configured to generate traffic.**

This document is targetted at people who wish to install the LANforge Demo software on their own hardware, and for people who are re-installing software on hardware furnished by Candela Technologies. **NOTE: Candela Technologies offers support packages!**

1. Hardware Requirements

The LANforge Data-Generators usually require at least one management ethernet port and one data-generating ethernet port. For LANforge-ICE, it is best if you have 3 ethernet ports. The performance of the unit will be directly related to the CPU and memory, as well as the quality of the ethernet hardware and the PCI bus. Candela Technologies suggests at least 128MB of RAM and a 600Mhz processor or better for the Data-Generator boxes. You may be interested to look over the LANforge Hardware Install Guide for more information.

2. Software Requirements

NOTE: LANforge now has limitted support for the Microsoft Windows operating systems. See the Microsoft specific install section for more information.

The LANforge product line is primarily developed and tested on Fedora Core 2 Linux. However, the LANforge processes should work on any distribution based on the 2.4 or higher Linux kernel. To help guarantee success, Candela Technologies recommends that you use Fedora Core 2 or 3 Linux with Candela's custom kernel. If using Fedora Core 4, be sure to disable SELinux. See below for a suggested kernel patches and .config file if you are compiling your own kernel. Specific work-arounds for Suse and other versions of linux are found in the trouble-shooting section at the end of this document.

The installation must include the **/usr/bin/perl** scripting language and the **/sbin/ip** IP configuration tool. You will have hard time finding a distribution that does NOT support these though!

NOTE: For optimum performance, you should use one of the pre-compiled LANforge Linux kernels, or compile your own with the candela patch applied. Pre-compiled LANforge Linux kernels can be found on the Downloads page.

Installing a pre-compiled Linux Kernel

1. Download an appropriate kernel from the downloads page.
2. Install the kernel.

```
cd /
tar -xvzf /home/lanforge/ct2.6.11.p4.tar.gz
/usr/local/bin/kinstall_ct2.6.11.bash
```

3. Update /etc/grub.conf by adding an entry similar to the text below. You may need to change the root option if you are using SCSI disks or a multiple hard drives.

```
title Candela Tech Linux 2.6.11
      root (hd0,0)
      kernel /ct2.6.11.img ro root=LABEL=/ rhgb quiet
      initrd /initrd-ct2.6.11.img
```

4. The kernel installation should now be complete. Reboot and choose the Candela kernel. To make this the default option, edit the default= line in /etc/grub.conf

Compiling your own Linux Kernel

Use of one the kernel configuration found in the LANforge-Extras package as your starting point if you are compiling your own kernel. These configs are known to work (but you may have to tweak slightly for your particular processor type and machine architecture)

Here is some information on compiling the Linux Kernel. Briefly, you will follow steps similar to these:

1. Download and unpack the kernel source.
2. Patch the kernel with the Candela linux kernel patches:

```
cd linux-2.6.XX
patch -p 1 < ../candela_2.6.XX.patch
```

3. `make menuconfig` # Load the correct kernel configuration file from the choices above.
4. `make bzImage modules modules_install`
5. Copy the resulting kernel into place, make the init-ramdisk if needed...
6. Deal with /etc/grub.conf so that it boots your new kernel.
7. Reboot and cross your fingers!

3. Getting your box ready for LANforge

1. **Install the Necessary hardware.**

   Ensure that you have at least two ethernet interfaces installed in your target platform. Ensure you have at least 64MB of RAM installed. LANforge is very flexible, so if you have hardware constraints that do not appear to be supported by LANforge, please contact support@candelatech.com. It is likely we have a solution!

2. **Install and Configure the Linux Operating System**

   Choose a distribution that meets the requirements above, and install it according to it's instructions. If you are using RedHat or Fedora, choose the 'Server' or 'All' package selection, or customize to your specific needs and hope it works! (It probably will.)

   An IP address should be assigned to the management port, and the other ethernet port(s) can be left un-configured at this time. You can use DHCP for the management port.

   It is assumed that the user will be able to correctly configure the Linux Operating system.

   In addition to installing the OS, you may want to install and configure the Network Time Protocol (NTP) tools. You can configure NTP as part of the initial login process on Fedora Core 2 and above.

3. **Install the Ethereal packet sniffer.**

   If you would like to be able to have LANforge automatically bring up the Ethereal packet sniffer, then you must install Ethereal. Which version you can install, and what other packages you have to download depends on your Linux distribution. For Fedora Core 2 and similar distributions, ethereal is included on the install CDROMs, though it is not always installed by default.

   In the end, LANforge will attempt to execute a file called `/usr/sbin/ethereal`. So as long as that file is there, it will work.

   If you choose not to install Ethereal, LANforge will still work fine.

4. **Install Perl Library: Net::Telnet for use with LANforge scripting.**

   If you wish to use LANforge scripting, you will need the Net::Telnet perl library installed. The easiest way to install is to use perl's MCPAN tool:

```
perl -MCPAN -e shell
  ## Choose 'no' when it asks you if you want to manually configure
  ## perl.  The auto-config works just fine.
  # install Net::Telnet
  # quit
```

4. Installing the LANforge traffic-generating software on Linux

Now that you have the Linux Operating System installed on your box, you are ready to install the LANforge components.

1. **Create LANforge accounts**

   You should create a lanforge user, and install the LANforge software in that user's home directory. Use your preferred method, or use mine:

```
adduser lanforge
passwd lanforge
```

2. **Install the LANforge Data-Generator**

   The LANforge Data-Generator software is the same binary as the LANforge Manager, it is just configured slightly different. To install it, copy the LANforgeServer.X.X.X.tar.gz file to some temporary directory and un-tar it with a command like:

```
tar -xvzf LANforgeServer-*_Linux.tar.gz
```

   That command should create a LANforgeServer-X.X.X directory, in which the distribution exists. Change to that directory, and you will find an install.bash file. If you want to use the LANforge SIP VOIP features, make sure that voip_FC2.tar.gz is found at /mnt/cdrom/, ../ or ./ before running the install script.
   Run this script:

```
./install.bash
```

3. **Configure the LANforge Data-Generator**

   NOTE: Make sure all of your interfaces are visible through the **ifconfig -a** command before running **lfconfig**. For example, you may have to load driver modules: **insmod tulip**

Also, the lfconfig tool often scrolls information off the screen, so you may need to scroll back to see useful information. On the console, use **SHIFT-PageUp, SHIFT-PageDown**

NOTE2: Make sure you enter 'config' when done with the lfconfig changes: It is the 'config' option that creates the files needed to run the LANforge applications.

NOTE3: Make sure that each client machine has a unique identifier. This identifier is specified as 'client', and you can find more details below.

NOTE4: If you wish to run the LANforge-ICE WAN Emulator on a machine with only two ethernet ports, the management device (mgt_dev) must be 'lo', the loopback device. This means you will not be able to get network connectivity to this machine when LANforge is running as both of the ICE interfaces must have an IP address of 0.0.0.0

After running the install script, you will want to cd to the /**home/lanforge** directory and run the lfconfig script to configure LANforge:

```
cd /home/lanforge
./lfconfig
```

It is an interactive script that allows you to set certain configuration options and then generate the start/stop scripts to control LANforge. The lfconfig script now hides some of the less-often used options. You can view them with the "show_all" command. However, for most configurations, you will not need to change any of the hidden options.

When you start **lfconfig**, you will see something like this:

```
Interfaces: eth0 eth1 eth2 eth3
Client interface assignment:
  client 0:
Specified Client Addresses:

Key                     Value                   Acceptable Values
************************************************
log_level               7                        [0-65535]
log_dir                 /home/lanforge           [directory path]
add_client_addr         ABOVE                    [host:port]
rem_client_addr         ABOVE                    [host:port]
realm                   1                        [1-255]
client                                           [1-18]
mgt_dev                 eth1                     [ethernet device]
mode                    manager                  [client | manager | both]
Other Commands:  help, show_all
************************************************
If these values are correct, enter 'config', otherwise change
the values by entering the key followed by the new value, for example:
mode manager
Your command:
```

Here are the values you can manipulate, and what they mean:

log_level:
Suggested value is 7, run the btbits binary with the -h option to see what the logging level means.
Example: log_level 7

gps_dev:
The serial device that your GPS system is connected to, probably /dev/ttyS0 or /dev/ttyS1. Use 'NONE' if you have no GPS device connected.
Example: gps_dev /dev/ttyS0

max_tx:
The maximum number of packets to generate per connection per 'loop' through the LANforge main generator code. If you only plan to run a few cross-connects (say, 10 or less), you can increase the max_tx to around 50 and get much better performance. If you want to run large numbers of cross-connects, leave max_tx at 5 to ensure that each cross-connect gets a chance to send some data at regular intervals.
Example: max_tx 50

dev_ignore:
If you don't want to use some of your interfaces for LANforge, then enter them here. Otherwise, lfconfig will attempt to use them all.
Example: dev_ignore eth5 eth6 tr3

add_client_addr:
Add to the list of remote LANforge addresses. These are LANforge entities that will otherwise not be discovered for various reasons. You must have TCP/IP connectivity to them of course! Most configurations do not need to change anything here.
Example: add_client_addr 192.168.5.5:4002

rem_client_addr:
Remove from the list of remote LANforge addresses. These are LANforge entities that will otherwise not be discovered for various reasons.
Example: rem_client_addr 192.168.5.5:4002

shelf:
This is the virtual 'shelf' that this LANforge instance should belong to. Unless you have a large installation, you should enter 1 here. If you have more than 18 LANforge clients, then you will need to put them into a second virtual shelf.
Example: shelf 1

realm:
This is the Realm that this LANforge system should belong to. You can run multiple LANforge managers on the same broadcast

domain by configuring them to be in different realms. As of LANforge release 4.3.4, if set to 255, it will never cluster with other LANforge systems, even if the other system is set to 255 also. Valid range is: 1-255, inclusive.
Example: realm 255

client:
You MUST have a unique client number for every client on a given shelf. So, if this is your first client machine, you want it to be client one, and if this is your 3rd machine, it should be client 3. Example: client 1

first_cli_port:
This is the CLI (command line interface) port. If you have multiple clients configured, then the second will be 2 greater than the first, etc. The binary (GUI) port for a given client will always be one more than the CLI interface port. You can probably leave this at it's default: 4001
Example: first_cli_port 4001

mgt_dev:
This is the ethernet device that the LANforge management traffic is carried over. The management devices for the LANforge manager and LANforge clients must be connected to the same Ethernet broadcast domain (LAN). LANforge data traffic will not normally be carried over the management interfaces.
Example: mgt_dev eth0

mode:
This determines the behavior of the LANforge software. You need exactly one LANforge manager for each realm, and at least 1 LANforge clients. The basic software is the same, and it's behavior is determined by the mode you enter here. If you want to run both the manager and a client on the same machine, use 'both' for the mode.
Example: mode client

Example Configurations

All-in-One LANforge-ICE WAN Emulator & Traffic Generator
This configuration will enable a machine with 3 ports to be a fully functional WAN emulator and/or traffic generator. The LANforge GUI can be installed on the same machine to enable easy management as well.

```
mgt_dev eth0
client 1
realm 22
mode both
config
```

LANforge data generator (or WAN Emulator) machine.
Generally, you will have one system that is both a manager and a traffic generator (see above), and the rest will be only clients. The manager will discover the clients and will be the central point for configuring the entire system. The client machines must have unique identifiers (client must be unique).

```
mgt_dev eth0
client 2
realm 22
mode client
config
```

After running the lfconfig script, you should have a box that is functionally similar to the LF1000 Series units. Now, go to the Hardware Installation Guide and procede to install your new box into the LANforge system.

4. **Start LANforge Servers**

   To start the LANforge servers, use the **serverctl.bash** script:

   ```
   ./serverctl.bash start
   ```

   From now on, the LANforge server will be started when the machine boots.

5. Installing the LANforge traffic-generating software on Microsoft Windows

LANforge now has support for Microsoft Windows operating systems. Currently, only a subset of the LANforge-FIRE traffic generation features are available. Please contact Candela Technologies or your sales representative if you have questions about whether or not a feature you need is supported on Windows. Windows managers can manage Linux data generators, and vice versa.

Currently, only Windows 2000 and Windows XP are actively tested. LANforge may work on other platforms but it has not been verified.

NOTE: If you want to run the LANforge-ICE WAN emulator on a machine with only 2 network interface cards, you can try adding a loopback interface and use that for the management interface.

Install the LANforge server files.

1. Execute the LANforge-Server-Installer.exe program. Be sure to select the option to install WinPcap unless you are certain you do not need to (for instance, you have recently installed this exact same LANforge version). **If the WinPcap install suggests rebooting the system, DO NOT REBOOT UNTILL you have completed the LANforge install!** If you make a mistake and WinPcap does reboot the system, simply re-install LANforge and do not select to install WinPcap the second time. At the end of the LANforge install, you have an option to run the Configure LANforge tool. Please do (re)run this tool and click 'Configure' unless you are certain you do not need to do so.
2. In the configuration tool, select the mode: You will want one machine configured to be 'Both' Master and Client in your realm. The rest of the machines should be configured in client mode only.

3. The text box at the top of the configuration tool shows the LANforge server startup information and the list of interfaces found on the machine. You will need to choose one of the adapters for your management interface. Enter the Device-ID, for example: {20AC6D62-1D4E-49E1-982A-091CD9329CB3} in the Management Network Device field in the configuration tool.

4. The realm number can be any value between 1 and 255. By placing a machine into a certain realm, you ensure that the LANforge software will only communicate with other machines in that same realm. In most cases, the default of 1 is fine.

5. Each LANforge machine must have a unique identifier. This is the 'Machine Id Number', and it corresponds to the Card and Unit number in the LANforge-GUI. Typically, you use 1 for the first system, 2 for the second, and so forth.

6. If your management network is routed, and you are configuring a machine as Master or Both mode, then you will need to specify the IP addresses for the other LANforge client machines. The reason is that while LANforge can automatically discover other LANforge machines on the local subnet, it cannot automatically discover LANforge machines on other subnets. The syntax is: IP1:port1 IP2:port2 ... The default port is 4002 and unless you manually edit the start scripts, it will remain 4002. Example input for the Clients entry box is:
`192.168.2.2:4002 192.168.2.3:4002 120.5.3.2:4002`

7. If you are configured for mode 'Both' or 'Master', then you must install the LANforge license keys sent to you by Candela Technologies or your LANforge reseller. Install these license keys per instructions in the license file. (Typically, copy the keys to a file called license.txt in the LANforge install directory.)

8. Configuration should now be complete. Click on the 'Configure' button to create the LANforge server start scripts. You can then execute the "LANforge Manager" icon and/or "LANforge Data Generator" icons. LANforge will automatically be started when you reboot the machine in the future. You should reboot if a new WinPcap was installed.

9. Optional packages: NTP
If you want to keep the clocks for multiple systems in sync (to better report latencies with LANforge-FIRE, for instance), you should consider installing NTP. Candela suggests this page for more info and downloads:
http://www.meinberg.de/english/sw/ntp.htm

10. Optional packages: Ethereal
The ethereal tool is an excellent packet sniffer and protocol analyzer. You can dowload it from: www.ethereal.com. In order for LANforge to be able to automatically launch ethereal, it must be installed in it's default install directory on the same drive as LANforge is installed. You can also launch ethereal manually of course.

6. LANforge Data-Generator Installation Troubleshooting Guide

Things kind of seem to work, but not really.

Unless you specifically know otherwise, make sure the client indentifiers are unique for every system in your LANforge realm. These numbers correspond to the 'Card Numbers' in the GUI and CLI commands. Also, make sure that all of your LANforge software is of the same version.

I'm using Suse 9.1 and having trouble.

We found that removing the second 'localhost' entry in the /etc/hosts file (the one starting with ::1) made LANforge work. I think that without this change, LANforge may try to use IPv6.

If you have a problem not answered here, please contact Candela Technologies technical support at support@candelatech.com.

Candela Technologies
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