

**Logic Finder Research, Development and Training Lab Environment**

**Draft Document**

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| --- | --- | --- | --- |
| **Version** | **Date** | **Contributor** | **Changes and Additions** |
| 1.0 |  | Wajid | Initial design of the document, Inserted headings |
| 2.0 |  | Omar | FTP Server, Nagios System |
| 2.1 |  | Larry | Internet Connectivity, VPN server and CCIE rack. |
| 2.2 | 9/15/2018 | Larry | Internet Connectivity, WAN connectivity, Switches and purpose, FreeNas and FTP on Omaha, Network Automation. |
| 2.3 | 9/15/2018 | Wajid H. | Updated the following sections  12. FreeNAS Server for Storage and FTP  13. Permanent VMs  14. VMWARE SETUP  20. OpenStack Testbed 1 [ Chicago] |
| 2.4 | 9/15/2018 | Omar | Phoenix Server, Machine Learning Testbed, Austin Server |
| 2.5 | 1/25/19 | Frank Argueta | Updated FreeNAS server section, added PfSense Info and Network Patch Panel info. |
| 2.6 | 5/10/19 | Frank Argueta | Reorganized document. Updated images and info. |
|  |  |  |  |

# **Document History**

# **Purpose of the document**

This document helps explain in detail the lab environment

# **Instructions to the Contributors**

1. Don’t share username or password on this document unless necessary
2. Provide URL / IP information for the required services, doesn’t include switches or VPN Server
3. Please fill out your respective sections
4. Don’t change the format of the document

# **Introduction to the Lab**

Logic Finder Advanced Technologies lab is built in supportive collaboration with Inabia Solution Consulting company and also hosted at Inabia Solution and Consulting office in Redmond, WA.

The lab purpose is to provides Training, Testing, Research and Development environment for the latest technologies. The lab is utilized for our corporate customer training and R&D effort. The lab is also used by interns and training consultants to learn new technologies such as SDN, 5G and NFV.

To support the R&D environment various tools are available in the lab which include Spirent LandSlide and IXIA tools as well as custom SDN machines.

Salient features of the lab are discussed in the next sections.

# **Lab Network Design**

The below picture depicts the various components in the lab and the connectivity. Sine the lab is in active development phase. Depending upon the viewing of this document, some part of the lab may already have been changed. Reach out to lab admin for clarification

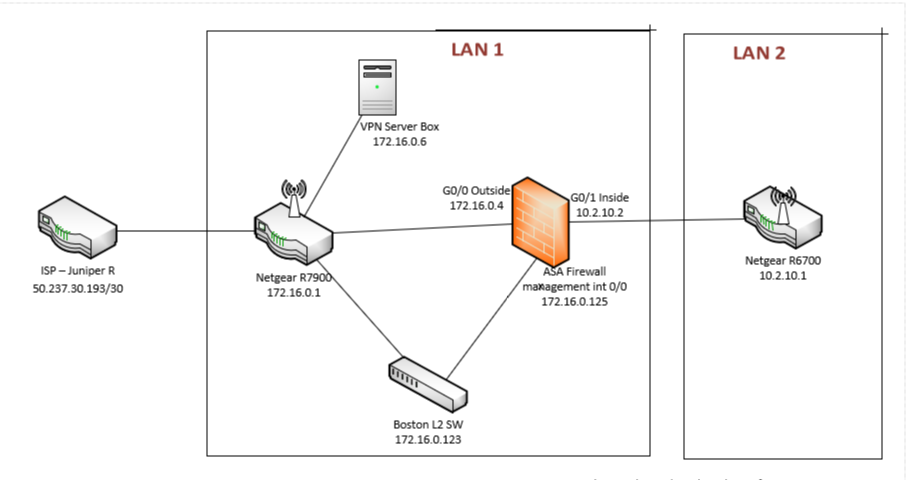


Figure 0 :

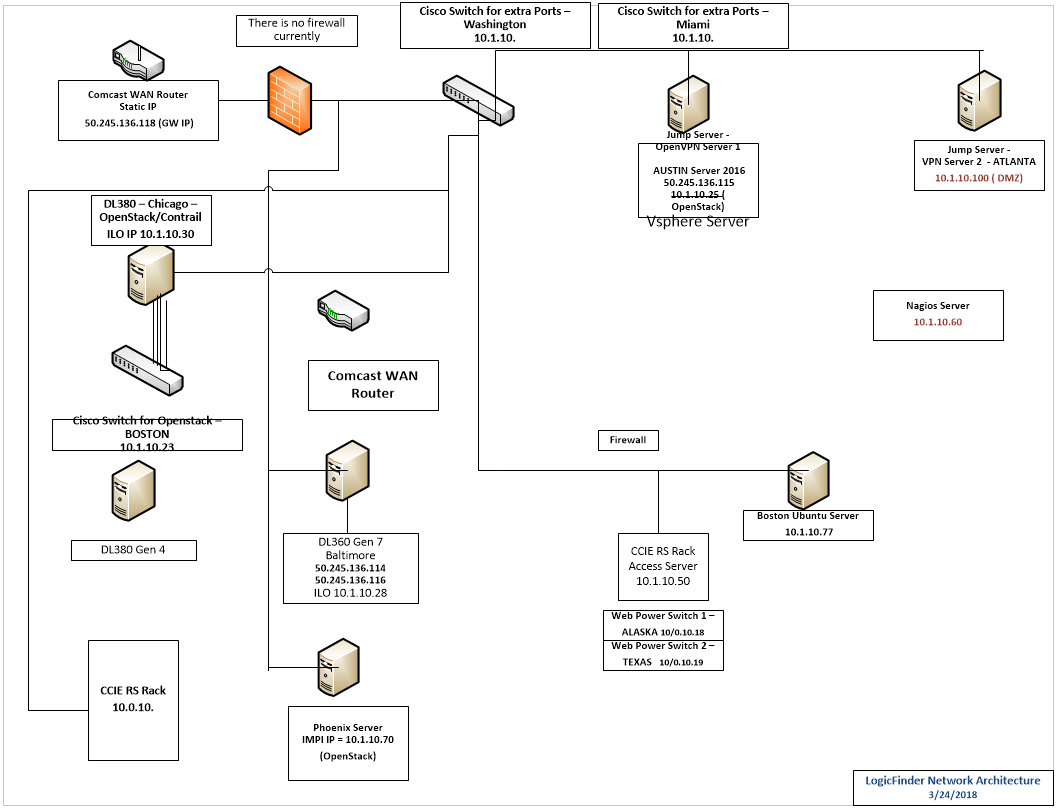


Figure 1: Lab network Diagram

# **Internet Connectivity**

The internet connectivity is provided via Comcast. Currently, we have connected via Fiber speeds or 1000mbps or 1gig speed.

# **WAN Connectivity**

Comcast provides a router and a switch. The link connection is from Comcast provided Juniper switch which has the internet IP of 50.237.30.193. The linksys nighthawk which is the main router has a static of 50.237.30.193. This is also the address we use for all our devices that reaches out to the internet via NAT.

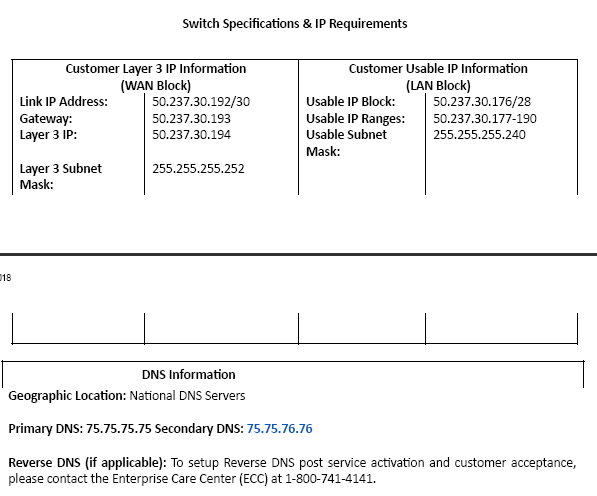


Figure 2 : IP Scheme for

# **LAN Connectivity**

This section explains how each of the three switches are connected. we have 4 switches in the network

The internet connectivity is provided by the Comcast Internet Service Provide as a Metro Ethernet at fiber speed. From the Comcast ISP’s Juniper switch there are two connections. One connection is to a separate router that provides VoIP connection. The second, connects directly into the Linksys Netgear router that then provides a wired connection to all of the connected ports. The Linksys router also provides internet connectivity via Wi-Fi. We have 3 wireless access ports.

**First Wireless Router**

The Linksys Nighthawk itself that has connection to both Inabia 4 and 5 extended. It acts like a chain. All company laptops are connected to our Wi-Fi system.

**Second Wireless Router**

# **Purpose and location of the switches**

We currently have 8 active switches. The switches are Boston, Arlington, Miami, Washington and 4 other switches that belong to the CCIE rack. The Boston switch is directly plugged into our main router (Linksys) to provide available ports for our main networking room. Washington switch also has a long cable connected from the main networking room to the Logic Finder lab. This provides the logic finder rack with connection to the internet. Currently our Miami and Arlington is connected to Washington and it provides us additional ports for access to the network.

# **Wi-Fi connectivity**

There are 6 networks available for Wi-Fi, Inabia 4 and 5, Inabia\_ext4 and Inabia\_Ext5, Inabia8 and Inabia9. The preferred network to use in Satellite office (Lab Room) are Inabia\_EXT4 or Inabia\_EXT5. See the diagram below for details.

|  |  |  |  |
| --- | --- | --- | --- |
| **Network** | **Purpose/ IP Range** | **IP Range** | **Hosted on device** |
| Inabia 4 | This will be deprecated |  | WiFi Router 1 |
| Inabia 5 | This will be deprecated |  | WiFi Router 1 |
| Inabia 8 |  |  | WiFi Router 2 |
| Inabia 10 |  |  | WiFi Router 2 |
| Inabia\_Ext4 | This will be deprecated, Available in the Remote Office Only |  | WiFi Extender |
| Inabia\_Ext5 | This will be deprecated, Available in the Remote Office Only |  | WiFi Extender |
| Inabia\_Ext8 | Available in the Remote Office Only |  | WiFi Extender |
| Inabia\_Ext10 | Available in the Remote Office Only |  | WiFi Extender |

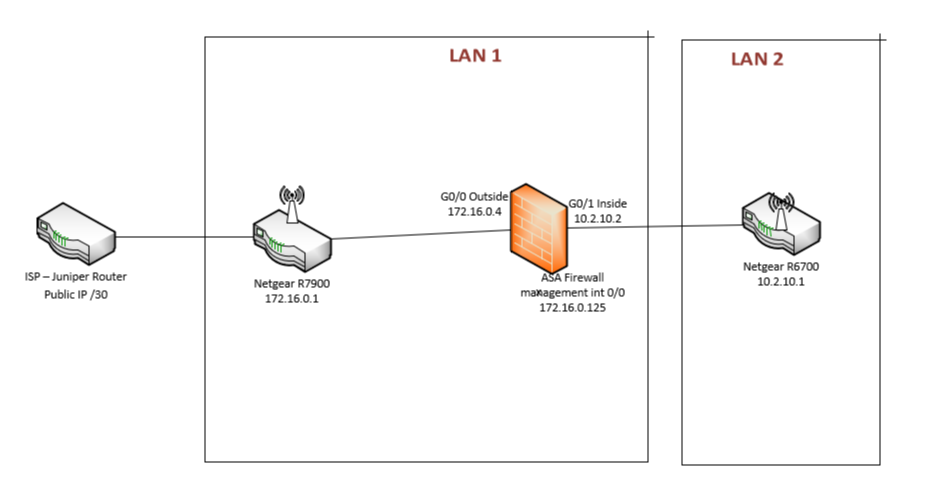


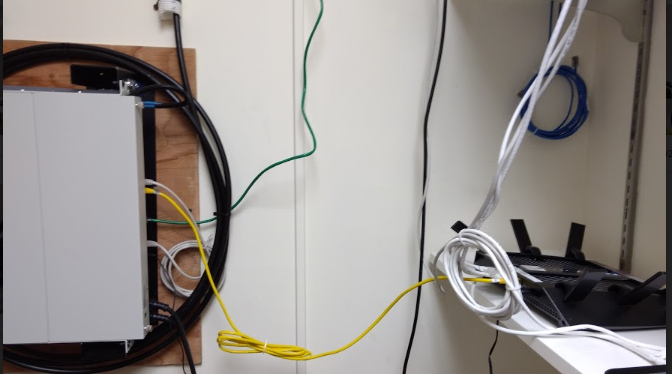
Figure: Wireless Connectivity

## ISP Router – Juniper:



Figure : ISP Router – Juniper:

Yellow CAT5E cable from Juniper to Wireless Router 1. The green cable is connected to a unmanaged Linksys switch for VoIP and printers connectivity.



Ports Connections:



In the Internet Connectivity Room (ICR) we have two consumer-grade WiFi routers that provide internet to two networks. Ports are delegated as shown in the tables:

WiFi Router 1: Network 172.16.0.0/24

|  |  |
| --- | --- |
| Ports | Connectivity |
| Internet Port | To ISP Juniper Router |
| LAN Port 1 | ASA G0/0 outside |
| LAN Port 2 | Hamachi VPN server |
| LAN Port 3 | Boston Switch (IC room) |
| LAN Port 4 | Washington Switch (LogicFinder Lab Room) |

WiFi Router 2: currently functioning as AP. Network 10.2.10.0/24

|  |  |
| --- | --- |
| Ports | Connectivity |
| Internet Port | To ASA G0/1 inside |
| LAN Port 1 | Unused |
| LAN Port 2 | Unused |
| LAN Port 3 | Unused |
| LAN Port 4 | Unused |

Front View of the Internet Connectivity Room (ICR):



# **vCenter on Austin Server**

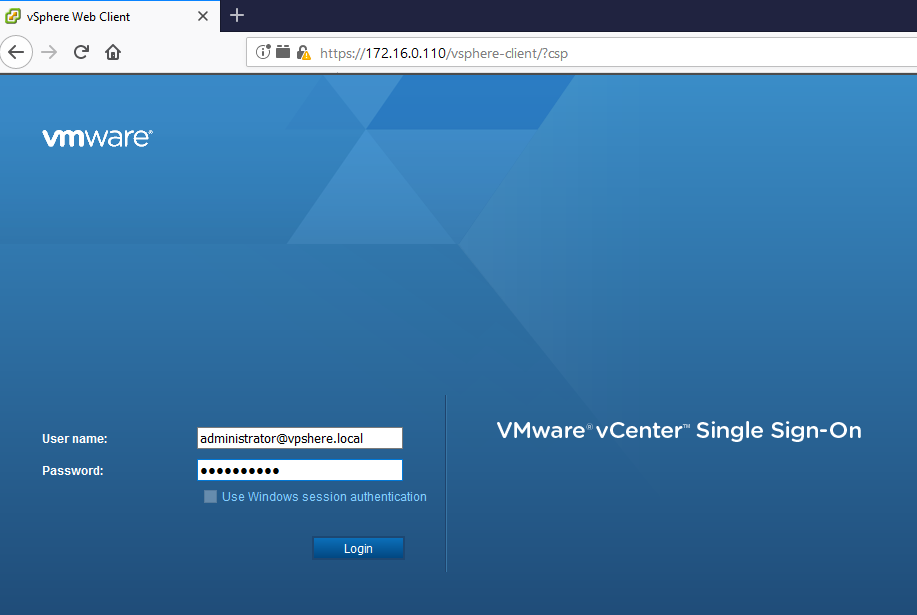
The Austin Server has vCenter installed which is the brand name for VMware’s suite of server virtualization products that includes its ESXi hypervisor and vSphere and vCenter management software. Austin (.110) server provides centralized management for Baltimore (.112) and Omaha (.40) ESxi hypervisors.

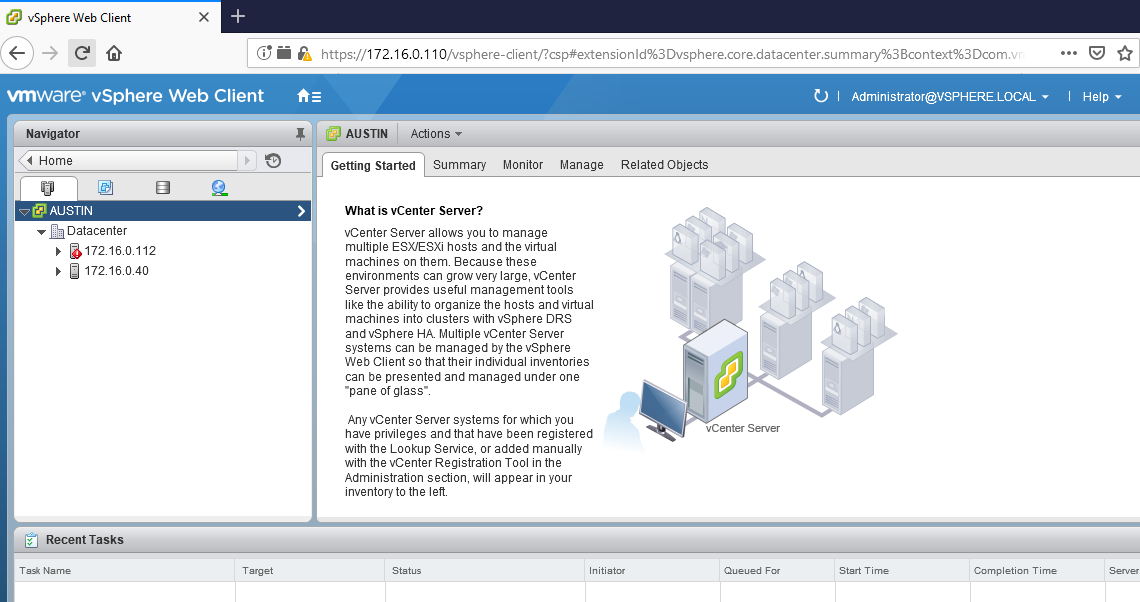
Credentials using VSphere Web Client:

<https://172.16.0.110/vsphere-client/?csp>

username: admnistrator@vsphere.local

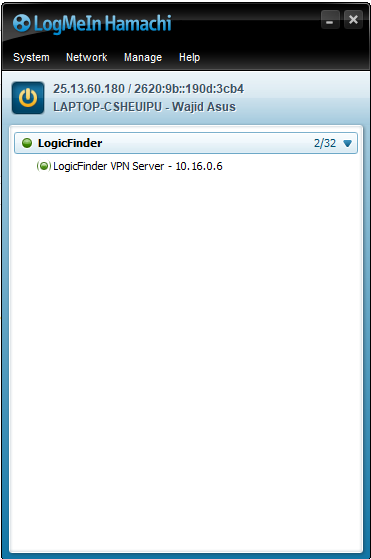
password: Inabia786!





# **VPN Server**

Our VPN server is a Dell PC that has a VPN application installed. The VPN service we are using is called Hamachi LogMeIn and it provides connectivity into the network from the outside. The Hamachi or VPN server in inside the network which provides a secured tunnel to allow access remotely. The link to install Hamachi for connection is provided by the Administrator.



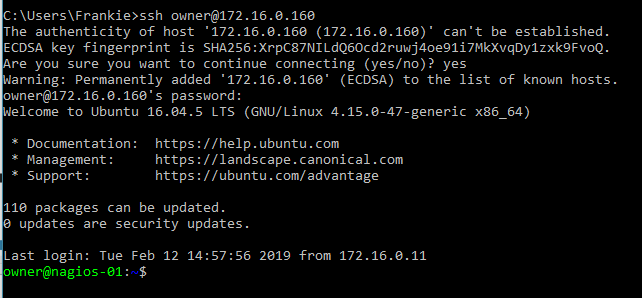
# **Nagios Monitoring System**

Nagios is an open source monitoring system for computers. It was designed to run on the Linux OS and can monitor devices running Linux, Windows and Unix OS. The current machines added to the Nagios server for monitoring are the Phoenix and Austin server, the four switches: Boston, Washington, Miami, Arlington; The VPN Server, the FTP Server, and the .95 virtual machine.

Credentials for the Nagios server via Windows CMD:

ssh [owner@172.16.0.160](mailto:owner@172.16.0.160)

Password: Inabia786!



*Web interface credentials:*

<http://172.16.0.160/nagios/>  
*User: nagiosadmin*

*Pass: Inabia786!*

*A screenshot of a social media post

Description generated with very high confidence*

# **FTP Server**

FTP server is a computer which has file transfer protocol (FTP) address and is dedicated to receiving an FTP connection. The FTP server allows the downloading and uploading files. There could be access restrictions as determined by the FTP server administrator for downloading different files and from different folders residing in the FTP server.

A screenshot of a social media post

Description generated with very high confidence

The FTP Server is built on the Austin Server.

*Credentials:*

ftp://172.16.0.110

Username: Wajid1

Password: Bothell231

# **Network Training and Testing Rack**

The Network Training and Testing Rack is a full CCIE rack. This rack can be used for Network Protocol Testing as well as Training for CCIE Routing and Switching Track.  
  
The rack consists of 4 Cisco switches, 10 Cisco routers, and an access server for better management. Every device is connected to the access server that provides a centralized management. In short, we are able to access all devices with that one IP address.

For remote power on and power off web-based power switches are provided with static ips assigned.

# **VMWare ESXi on Omaha server**

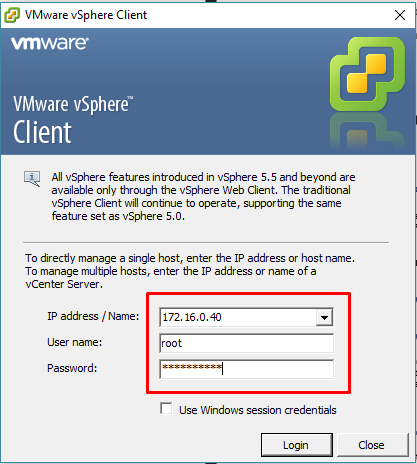
We have ESXi 6.0 installed on our Omaha server with roughly 12 Ubuntu and Windows virtual machines running on it. VMware ESXi is an operating system-independent hypervisor based on the VMkernel operating system. ESXi server GUI can be accsed using Vsphere client as shown below.

*Credentials:*

*172.16.0.40*

*Username: root*

*Password: Inabia786!*



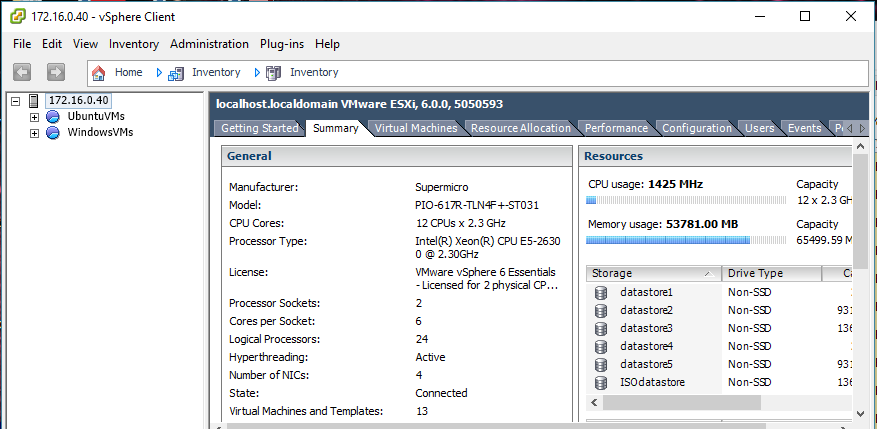


Figure Vsphere client home screen:

While Vsphere client can provide you with many functionalities, it’s still limited when it comes to configuring and making major changes to servers and virtual machines. This is why we use VSphere web client to manage Omaha and Baltimore VMWare ESXSi servers in a more centralized way. Below is its login screen; credentials will be provided by Wajid.

Refer to the VMWare documentation for further details

# **Permanent VMs**

Permanent VM's are running on HP ProLiant DL360 G7 machine, with CPU Intel(R) Xeon(R)

CPU X5670 @ 2.93GHz, 4 NIC cards and 64GB RAM & 3.27TB of storage. It is running

VMware ESXi version 6 where different VM's are provisioned for consultants, partners and students. It has iso's for various flavors of Windows & Linux.

# **VMWARE SETUP**

This is one of the ESXi based VM where we have installed VMware for testing purpose. It is

running the latest version of EXSi 6.7. Another ESXi based VM is running which is used for

vSphere 6.7 setup.

To access the Baltimore server for VMWare management download and install

See the document vmware

# **vSphere for Server and VM Management**

# **CCIE RS Test Environment Virtual VM**

A lab environment has been built on a VM using eve-ng software that has 20 virtual Routers and 10 virtual switches. The goal of this lab environment is to provide a testing environment for test and learn Layer 2 and Layer 3 Network protocols such as STP, MSTP, RIP, OSPF, BGP, MPLS etc.

Refer to the CCIE RS Rack documentation for further details

# **Software Defined Networking (SDN) Testbed [Jahanzeb]**

SDN Testbed is designed to support the training and development work for SDN related technologies.

# **Administration VM**

The Virtual Machine **172.16.0.95** hosted on Baltimore server is set to become an administration VM and has software’s to manage the rest of the lab.

# **Share Folder on Austin Server**

Refer to section 14. Our FTP server resides in Austin server and you can connect to it using FileZilla client and the credentials below:

User: Wajid1

Pass: Bothell231

IP: 172.16.0.110

# **Machine Learning Testbed**

The Machine Learning Testbed is a VM where a ML environment is built to test and try new ML libraries, algorithms, or work on datasets. The environment has Windows 10 as the OS.

Anaconda is the python distribution installed on this VM which comes with its own package manager, conda. The VM has two test environments, on with python 3.5 and one with python 2.7. The other libraries the VM currently holds are TensorFlow, Theano, PySpark.

Keras is also installed

|  |  |  |  |
| --- | --- | --- | --- |
| TensorFlow v1.0 | Theano v1.0 | pySpark 2.3.1 | pyTorch |

*Credentials:*

*By using Remote Desktop Connection:*

*IP: 172.16.0.96*

*username: admin*

*password: Inabia786!*

# **Network Automation Testbed**

Network Automation testbed is located on a Windows 10 VM with the IP of 172.16.0.16. Currently I am working to build a lab with GNS3. The lab will consist of 2 routers 2 switches and 2 nodes with OSPF configured. GNS3 currently has 2 different Cisco IOS's which are c7000 and c2600. The GNS3 needs Junos IOS because we want to test Ansible multivendor use.

# **Chicago OpenStack Testbed 1**

It is ProLiant DL380 Gen9 machine, with 2 x CPU Intel(R) Xeon(R) CPU E5-2640 v4 @

2.40GHz 4 NIC cards and 128GB RAM. We have Ubuntu as main Operating System installed

with KVM as hypervisor on it, KVM then dividing 4 different VM's to provision multi node

environment for OpenStack.

# **Phoneix OpenStack Testbed 2**

The Phoenix server acts as an OpenStack Testbed. OpenStack is a cloud operating system that controls large pools of compute, storage and networking.

The Phoenix server has Ubuntu 18 as its OS. It has multiple network interfaces (I’m not sure of the exact number) which have been bonded together. It has KVM installed which has 4 VM’s, all of them which have Ubuntu 16. Phoenix will have OpenStack Queens installed on it with OpenContrail Kolla, where the Ubuntu 18 will act as a base, and the 4 VM’s will act as nodes.

*Credentials:*

<https://172.16.0.117>

*username: ADMIN*

*password: ADMIN*

# **LTE Testbed**

LTE Testbed will give our associates, consultants and students access to LTE call testing features including VoLTE. LTE Testbed is the design phase.

# **5G Testbed**

5G Testbed will give our associates, consultants and students access to 5G call testing features and will help them understand the architecture of 5G networks. 5G Testbed is the design phase.

# **Linux Containers Testbed**

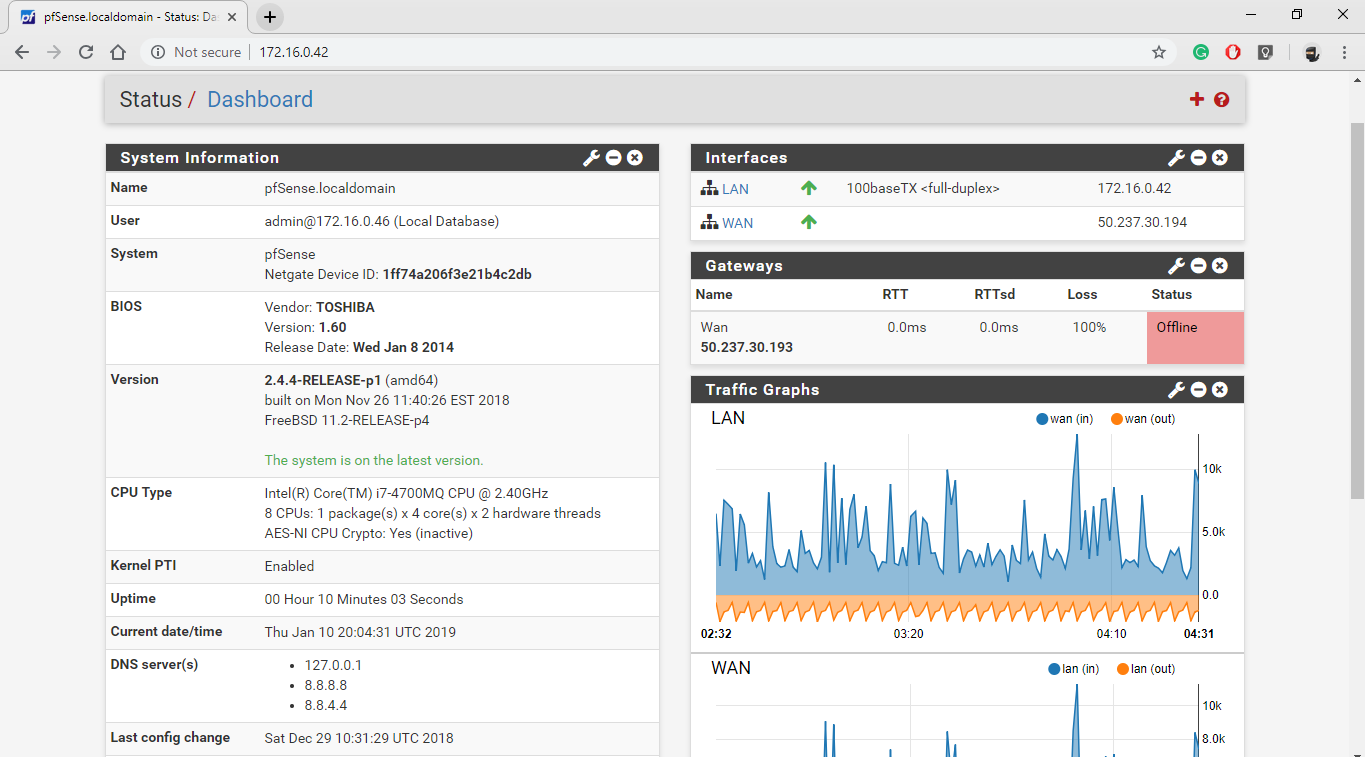
Linux Containers Testbed will give our associates, consultants and students access to Linux Containers, Kubernetes and Docker environment and will help them understand the functioning of the Linux containers and orchestration process. Linux Containers Testbed is in the design phase.

# **ASA Firewall**

[Add info and images here]

# **PfSense**

PfSense is a free and open source network firewall distribution based on FreeBSD OS. Along with free package systems it can have the same functionalities or more of commercial expensive firewalls. It runs on a web interface. Some of the uses of PfSense include LAN/WAN router, VPN router, firewall, DHCP/DNS server, WAP, Port forwarding/NAT. Below is our PfSense web GUI.



*PfSense Login Credentials*

*https://172.16.0.91*

*Default Username: admin*

*Default Password: pfsense*

*Web GUI: 172.16.0.42*

*username : admin*

*password: logic123*

PfSense has been deprecated from the Network

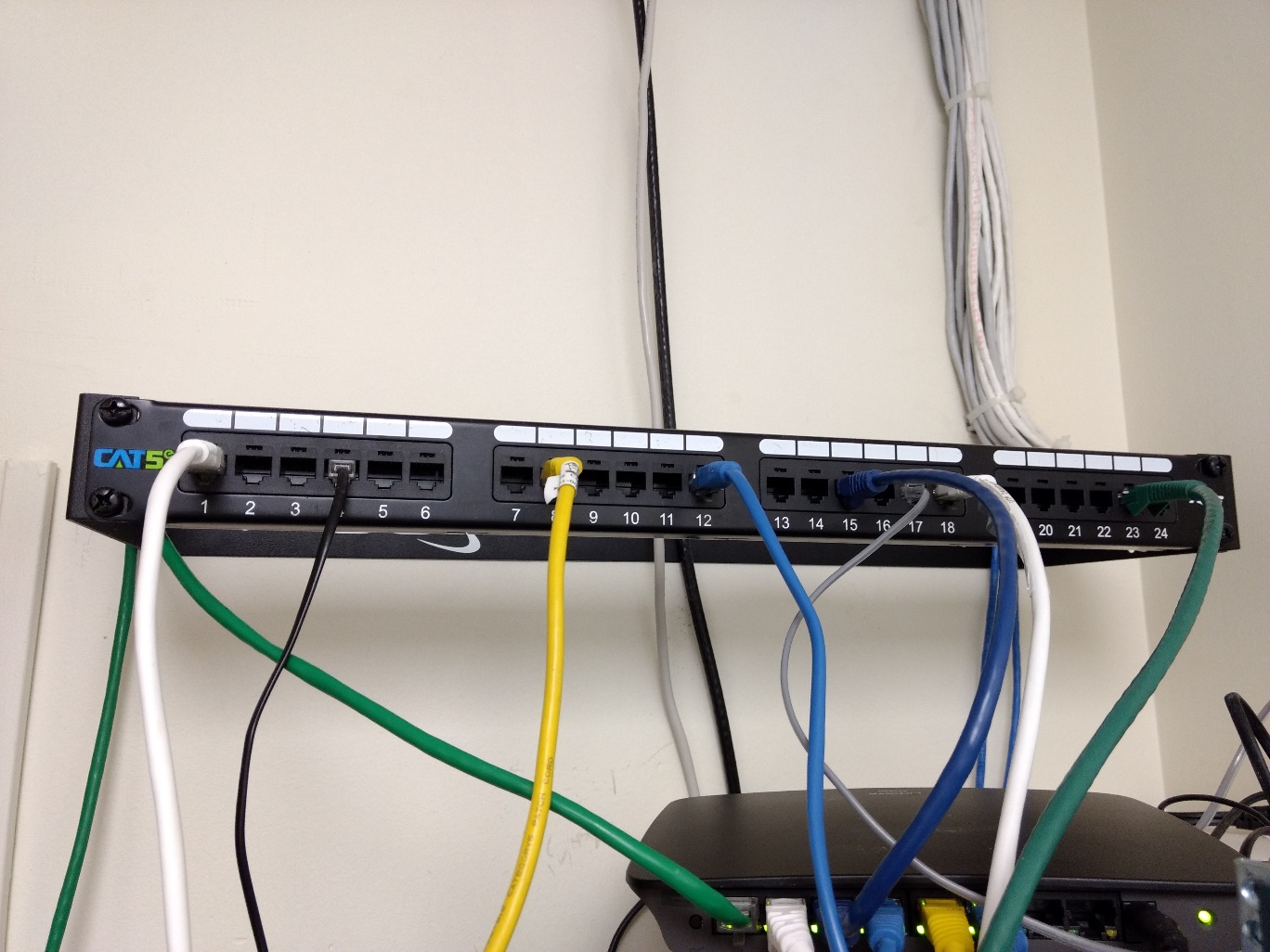
# **Voice Network**

All our VoIP phones are directly connected to an unmanaged Linksys switch located in the Internet Connectivity Room.

[Add picture]

# **Patch Panel Connections**

We have a 24-port patch panel located in the telecommunication closet. This has the incoming and outcoming cables of the LAN/WAN. We plan on replacing the longer cables with smaller patch cables. Below is picture of the patch panel with current cable connections.



# **Questions and Concerns**

For Question and Comments about the lab. Send an email to [lab.admin@logicfinder.net](mailto:lab.admin@logicfinder.net)