



Network Monitoring and Management

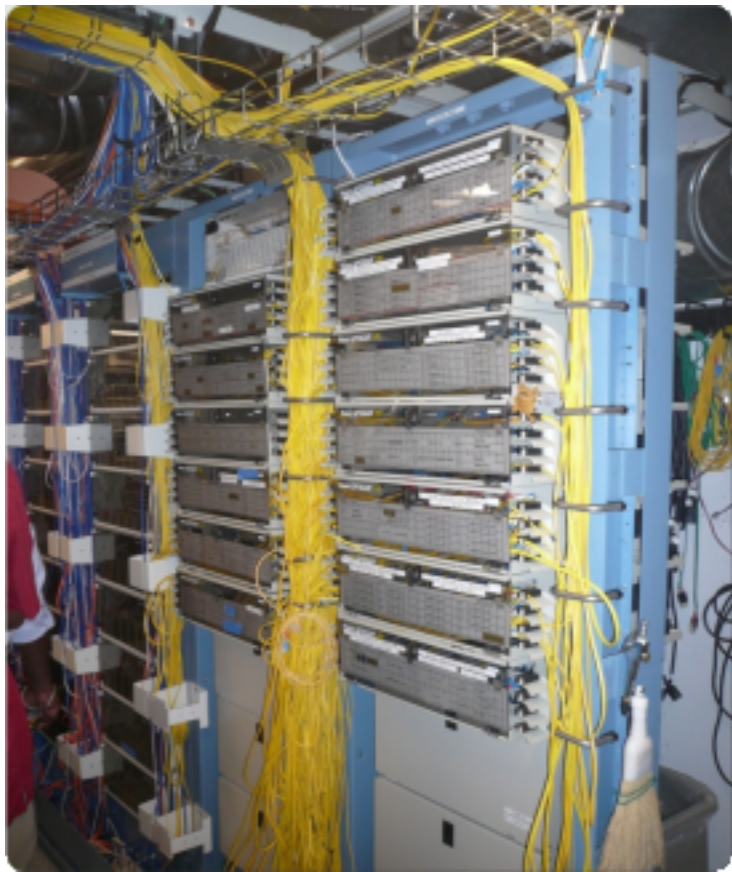
Network Documentation



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Documentation

Maybe you've asked, "*How do you keep track of it all?*" ...



**Document,
document,
document...**

Updated Documentation is essential

- So that you can remember what you did 6 months ago
- So that others in your team can troubleshoot problems quickly
- Think about these questions:
 - What would happen to the network if the main engineer moves to another job?
 - How would your team deal with problems if you were sick? Or on vacation?

Documenting is hard

It's tedious

- “I'm so busy, I don't have time right now”

It's difficult to keep organized

- You need to have an established methodology that everyone can follow
- Otherwise it becomes crazy with time

It becomes outdated very quickly

- Old information is useless and can be even dangerous!

Guidelines

Create a documentation policy

- What's the responsibility of each person?
- What is the process? Order of tasks?
- How to verify completeness/quality?
- Methodologies
 - Consistent naming schemes
 - For devices, cabling, etc.

Guidelines

Label EVERYTHING

- Devices: routers, switches, servers, access points, etc.
- Cabling
- Network jacks
- Racks

Documentation

Basics, such as documenting your switches...

- What is each port connected to?
- Can be simple text file with one line for every port in a switch:
 - health-switch1, port 1, Room 29 – Director's office
 - health-switch1, port 2, Room 43 – Receptionist
 - health-switch1, port 3, Room 100 – Classroom
 - health-switch1, port 4, Room 105 – Professors Office
 -
 - health-switch1, port 25, uplink to health-backbone
- This information might be available to your network staff, help desk staff, via a wiki, software interface, etc.
- Remember to label your ports!

Documentation: Labeling

Nice... 😊



Network Documentation

More automation might be needed. An automated network documentation system is something to consider.

- You can write local scripts to do this.
- You can consider some automated documentation systems.
- You'll probably end up doing both.

NOCs: Network Operation Centers

Where documentation, monitoring and management can all come together:

- Links to monitoring tools
- Ticketing systems
- Documentation systems
 - Diagrams
 - Databases
 - Wikis

The Network Operations Center

NOC = Network Operations Center

- Come in many forms and depend on the size of your organization and your goals.
- “One or more locations from which control is exercised over your network.”
- NOCs can be:
 - Virtual
 - Located at the core of your network
 - With your help desk
 - Built in pieces
 - Etc.

A BIG NOC



There are even bigger NOCs out there...

A small NOC



In the same room there is a desk with a phone, another computer and a monitor. This acted as the group's Help Desk.

Many network problems could be detected and solved on the spot!

Automated Documentation Systems

There are quite a few automated network documentation systems. Each tends to do something different:

- **Netdot:**

<https://github.com/cvcente/Netdot/>

- NetBox:

<https://netbox.readthedocs.io/>

<https://github.com/digitalocean/netbox>

- Netdisco:

<http://netdisco.org/>

- Rack Tables:

<http://www.racktables.org/>

From the web page:

- **IP address management (IPAM)** - IP networks and addresses, VRFs, and VLANs
- **Equipment racks** - Organized by group and site
- **Devices** - Types of devices and where they are installed
- **Connections** - Network, console, and power connections among devices
- **Virtualization** - Virtual machines and clusters
- **Data circuits** - Long-haul communications circuits and providers
- **Secrets** - Encrypted storage of sensitive credentials

Netdisco



Netdisco 2

Locate a machine on the network by MAC or IP and show the switch port it lives at.

Turn off a switch port, or change the VLAN or PoE status of a port. Leave on audit trail. Log why a port was shut down.

Inventory your network hardware by model, vendor, switch-card, firmware, operating system, software, etc.

Report IP address & switch port usage: historical & current.

Pretty pictures of your network.

Netdisco

Demo available at <https://netdisco2-demo.herokuapp.com/>

Details

Ports

Modules

Neighbors

Addresses

router-16.example.com

Show All records. Previous Next

Filter records...

Port	Name	Native VLAN	VLAN Membership	Connected Devices
GigabitEthernet0/1	Link to FW1			router-16 - GigabitEthernet0/1
GigabitEthernet0/2	FW1 Management Interface	968	968	router-17 - GigabitEthernet0/9 00:15:17:44:55:66 server-a.example.com (10.1.3.221) 192.0.5.14
GigabitEthernet0/3	Link to FW2			router-17 - GigabitEthernet0/2
GigabitEthernet0/4	FW2 Management Interface	968	968	00:15:17:11:22:33 192.0.5.15
GigabitEthernet0/5	VPN Server	964	964	
GigabitEthernet0/6	Port With Nothing Connected	1	1	
GigabitEthernet0/7	Gi0/7	1	1	
GigabitEthernet0/8	Gi0/8	1	1	
GigabitEthernet0/9	Gi0/9	1	1	
GigabitEthernet0/10	Gi0/10	1	1	
GigabitEthernet0/11	Gi0/11	1	1	
GigabitEthernet0/12	Gi0/12	1	1	
GigabitEthernet0/13	Gi0/13	1	1	
GigabitEthernet0/14	Gi0/14	1	1	
GigabitEthernet0/15	Gi0/15	1	1	router-17 - GigabitEthernet0/7
GigabitEthernet0/16	Gi0/16	1	1	
GigabitEthernet0/17	Gi0/17	1	1	
GigabitEthernet0/18	Gi0/18	1	1	

Port, Name or VLAN

☐ Partial Match ☐ Not

Legend

Link Up

Link Down

Port Free

Admin Disabled

Blocking

Manual Topology

Neighbor Device

Neighbor Inaccessible

IP Phone

Wireless Client

Archived Data

Link Aggregate

Click "Update View"

Display Columns

Port Controls

☒ Port

☐ Description

☐ Type

☐ Duplex

☐ Last Change

☒ Name

☐ Speed

☐ Port MAC

☐ MTU

☒ Native VLAN

☒ VLAN Membership

☐ PoE

☐ SSID

☒ Connected Nodes

☒ Connected Devices

☐ Spanning Tree

☐ Status

Port Properties

Node Properties

Q Update View

RackTables

Web site: <http://racktables.org/>

“Racktables is a nifty and robust solution for datacenter and server room asset management. It helps document hardware assets, network addresses, space in racks, networks configuration and much much more!”

Demo available at:

<http://demo.racktables.org/>

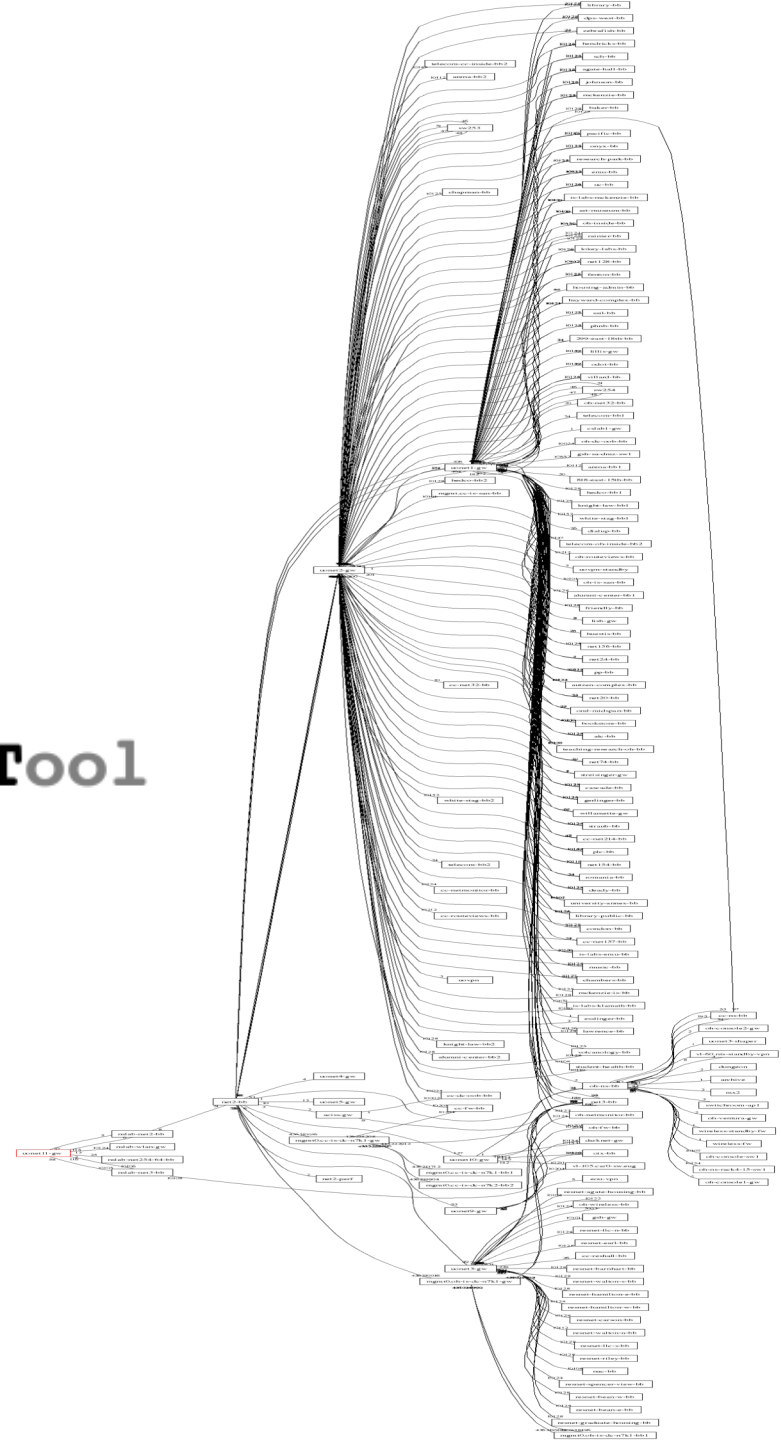




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NETwork DOcumentation Tool





NETwork DOcumentation Tool

It's a very comprehensive tool:

- Device discovery via SNMP
- Layer2 topology discovery and graphing, using:
 - CDP/LLDP
 - Spanning Tree Protocol
 - Switch forwarding tables
 - Router point-to-point subnets
- IPv4 and IPv6 address space management (IPAM)
 - Address space visualization
 - DNS/DHCP config management
 - IP and MAC address tracking

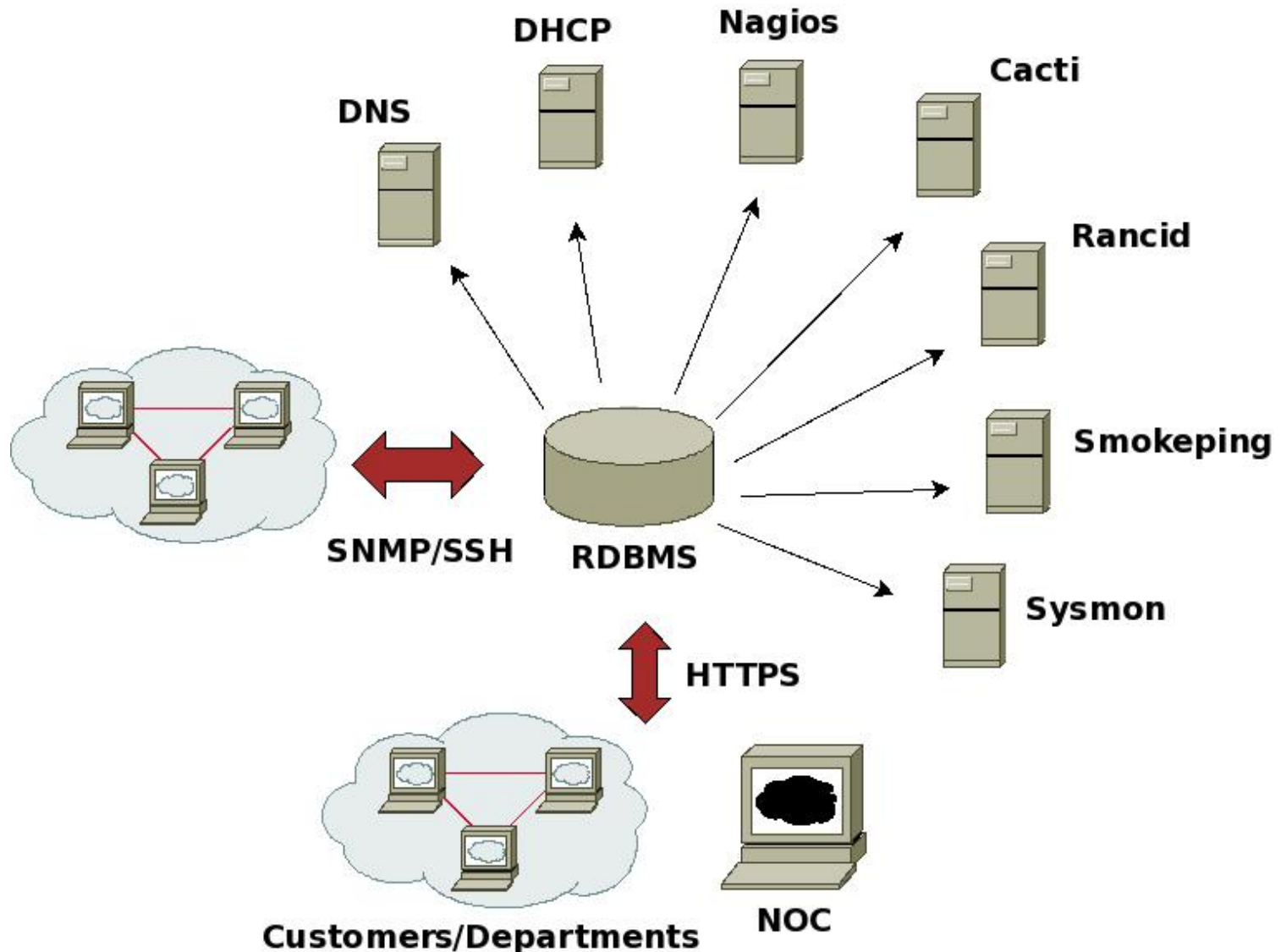
Continued ➔

Functionality continued:

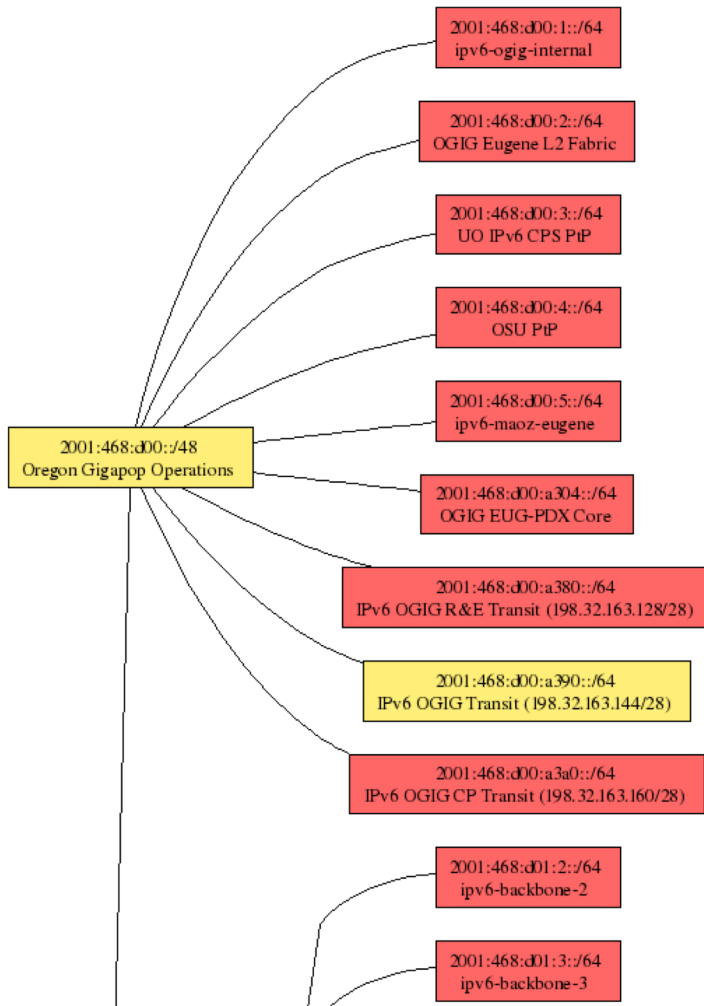
- Cable plant (sites, fiber, copper, closets, circuits...)
- Contacts (departments, providers, vendors, etc.)
- Export scripts for various tools
(Nagios, Sysmon, RANCID, Cacti, etc)
 - I.E., how we could automate node creation in Cacti!
- Multi-level user access: Admin, Operator, User
- It draws pretty pictures of your network

The screenshot displays the Netdot web interface. At the top, there is a navigation bar with tabs: Management, Contacts, Cable Plant, Advanced, Reports, Export, and Help. Below this is a secondary bar with tabs: Devices, VLANs, Address Space, DNS Records, DNS Zones, and DHCP. The main content area is titled 'Device Tasks' and includes a sub-section 'Find Devices'. This section contains a text input field labeled 'Name/IP/MAC:' and a 'search' button. In the top right corner of the 'Device Tasks' section, there are links '[new]' and '[hide]'. At the bottom of the page, a footer indicates the copyright: '© GPL. Netdot: NETwork DOcumentation Tool v.0.9'.

Netdot: NETwork DOcumentation Tool



Netdot Topology example

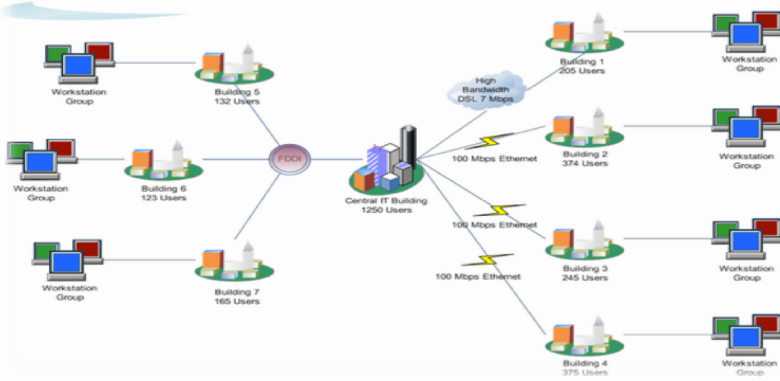


Netdot can draw the topology of a network or a segment of a network dynamically.

Documentation: Diagrams

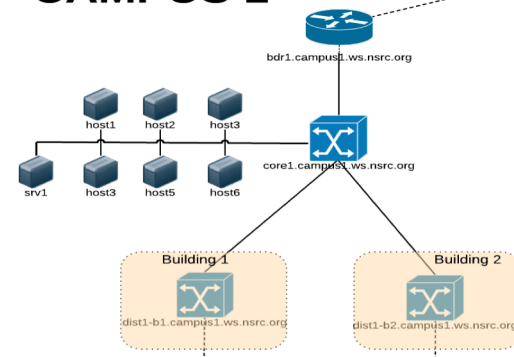
Campus Executive Overview Guideline

Sunday, Jan. 1, 2006

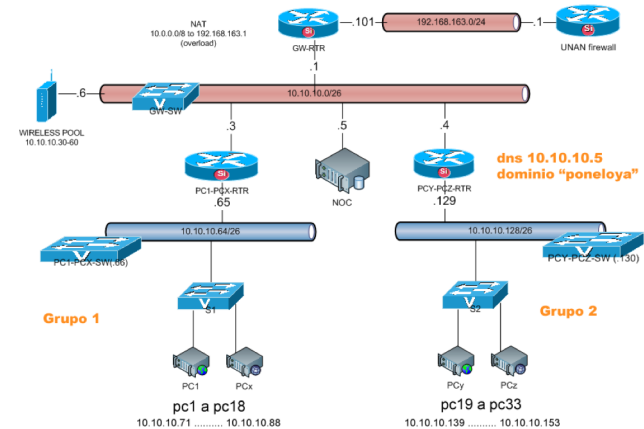
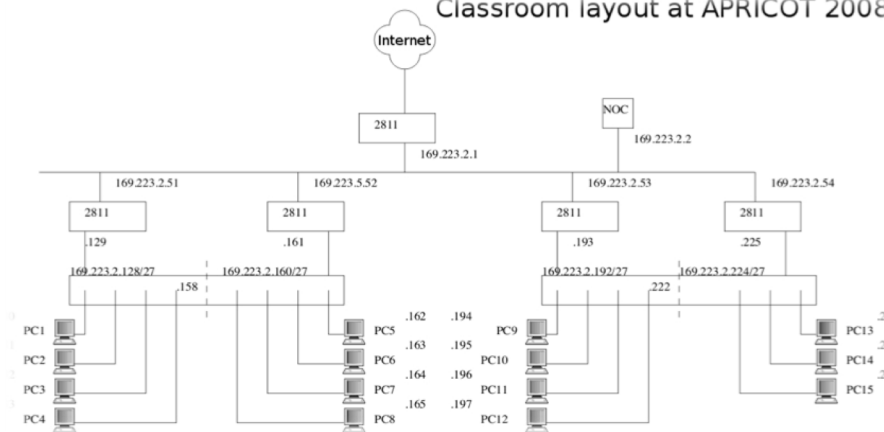


CAMPUS 1

To Transit Provider: transit1.nren.ws.nsrc.org



Classroom layout at APRICOT 2008



Diagramming Software

WINDOWS

Visio: <http://office.microsoft.com/en-us/visio/>

Edraw: <http://www.edrawsoft.com/>

MACINTOSH

Omnigraffle: <https://www.omnigroup.com/omnigraffle>

EazyDraw: <https://www.eazydraw.com/>

OPEN SOURCE

LibreOffice Draw

Pencil: <http://pencil.evolus.vn/>

Dia: <http://live.gnome.org/Dia>

Diagramming Software

WEB BASED

Lucidchart: <https://www.lucidchart.com/>

Google: Google Docs drawings

Gliffy: <https://www.gliffy.com/>

ICONS

Cisco icons:

<https://www.cisco.com/c/en/us/about/brand-center/network-topology-icons.html>

For LibreOffice:

<http://www.vrt.com.au/downloads/vrt-network-equipment>

Nagios Exchange:

<http://www.nagiosexchange.org/>

Netdot Demo

Assuming there is time we will now give a short demonstration of Netdot

Netdot can be found at:

<https://github.com/cvicente/Netdot/>

Questions

