Campus Network Design Workshop

LibreNMS

All in one network graphing and monitoring

UNIVERSITY OF OREGON

Last updated 17th October 2016

NSRC
Network Startup Resource Center

LibreNMS

- SNMP-based auto-discover network monitoring
- Derived from another project (Observium)
- Written in PHP as a web application
- Includes support for a wide range of hardware:
  - Cisco, Linux, FreeBSD, Juniper, Brocade, Foundry, HP and many more
    - See http://docs.librenms.org/Support/Features/
  - Over 100 supported!
  - Routers, Switches, Access Points, Security gateways, Hosts, Printers, …

Available metrics…

- CPU, memory and storage statistics
- Interface traffic, packet and detailed error statistics
- Temperature, fan speed, voltage, amperage, power humidity and frequency sensors
- Users, processes, load average and uptime statistics

Available metrics cont.

- Linux distribution detection
- Real-time interface traffic graphing
- Device inventory collection (useful!)
- Detailed IPv4, IPv6, TCP and UDP stack statistics
- BGP and OSPF information
- MAC <-> IP address lookup
  - Find which port an IP/MAC was last seen on

Features

- Dashboard
- Status Map
- Many extensions, including:
  - Host monitoring well supported using check_mk and support scripts
  - Billing module
- Integration with other tools:
  - Smokeping, collectd, syslog (receive logs from devices)/graylog, Rancid/Oxidized (config management)

Philosophy

- LibreNMS' approach is that the network monitoring shouldn't take long to set up
  - You've already worked hard to build your network and configure it
  - LibreNMS is easier to understand if you understand its philosophy

Philosophy (2)

- Configure equipment correctly
  - community
  - xDP (CDP or LLDP)
  - sysName
  - sysLocation
- ... and LibreNMS will do the rest
  - Auto discovery of devices and resources
  - Optional use of sysServices to map which services (ports) are running on a device

Philosophy (3)

- Concept of enabled vs. ignored
  - By default, LibreNMS will monitor (collect data) all ports/interfaces it finds.
  - If a port is configured to be up, but it's operationnally up, LibreNMS will complain about
  - You can tell LibreNMS to ignore these ports – or better, shut them down if they're not used
  - When they're used, bring them up

SNMP or nothing

- Be aware that for LibreNMS to function, SNMP **must** be enabled
- LibreNMS makes use of CDP/LLDP/OSPF information to detect neighbors and automatically scan for neighboring devices and add them to the monitoring
  - … but this information is fetched using SNMP!
  - If SNMP isn't enabled or available (or wrongly configured), LibreNMS won't function.

Availability

LibreNMS

- Fork of Observium. Open Source, Free and GPL
- https://github.com/librenms/librenms
- https://github.com/librenms/librenms/blob/master/doc/General/Welcome-to-Observium-users.md

Screenshots

These are from LibreNMS. This is the version we will use in class and in our labs.

localhost

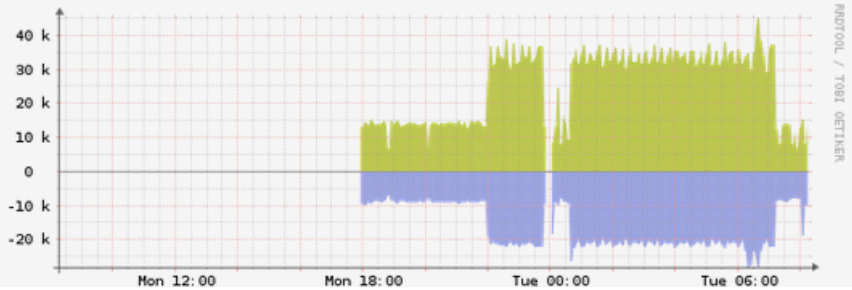
Sitting on the Dock of the Bay

Overview | Graphs | Health | Ports | Map | Inventory | Logs | Alerts | Alert Stats | Performance | Notes

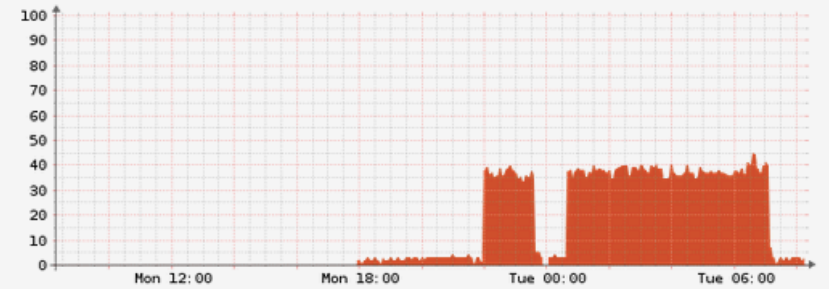
Linux noc.ws.nsrc.org 3.13.0-91-generic #138-Ubuntu SMP Fri Jun 24 15:58:13 UTC 2016 i686

System Name	noc.ws.nsrc.org
Resolved IP	127.0.0.1
Hardware	Generic x86
Operating System	Linux 3.13.0-91-generic
Object ID	enterprises.8072.3.2.10
Contact	Me <me@example.org>
Location	Sitting on the Dock of the Bay
Uptime	1h 6m 28s

Overall Traffic



Processors



QEMU Virtual version 2.0.0 x1

Memory Pools

Physical memory

Virtual memory

Swap space

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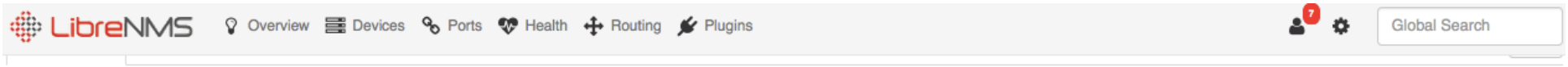


Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 1986-2012 by Cisco Systems, Inc. Compiled Tue 20-Mar-12 22:36 by prod_rel_team

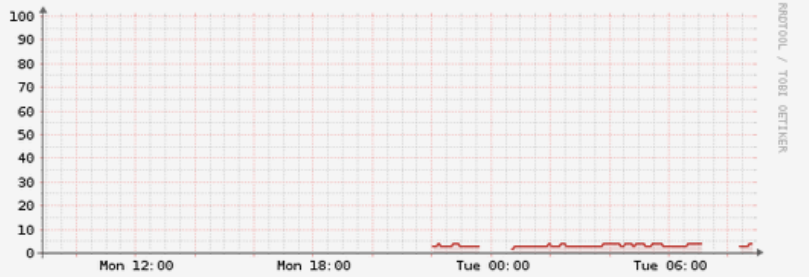
System Name	rtr1
Resolved IP	10.10.0.221
Hardware	cisco7206VXR
Operating System	Cisco IOS 15.1(4)M4 (ADVIPSERVICESK9)
Serial	4279256517
Object ID	enterprises.9.1.222
Uptime	34m 1s

Overall Traffic

3 3 0 0

Fa0/0, Fa0/1, Null0

Processors



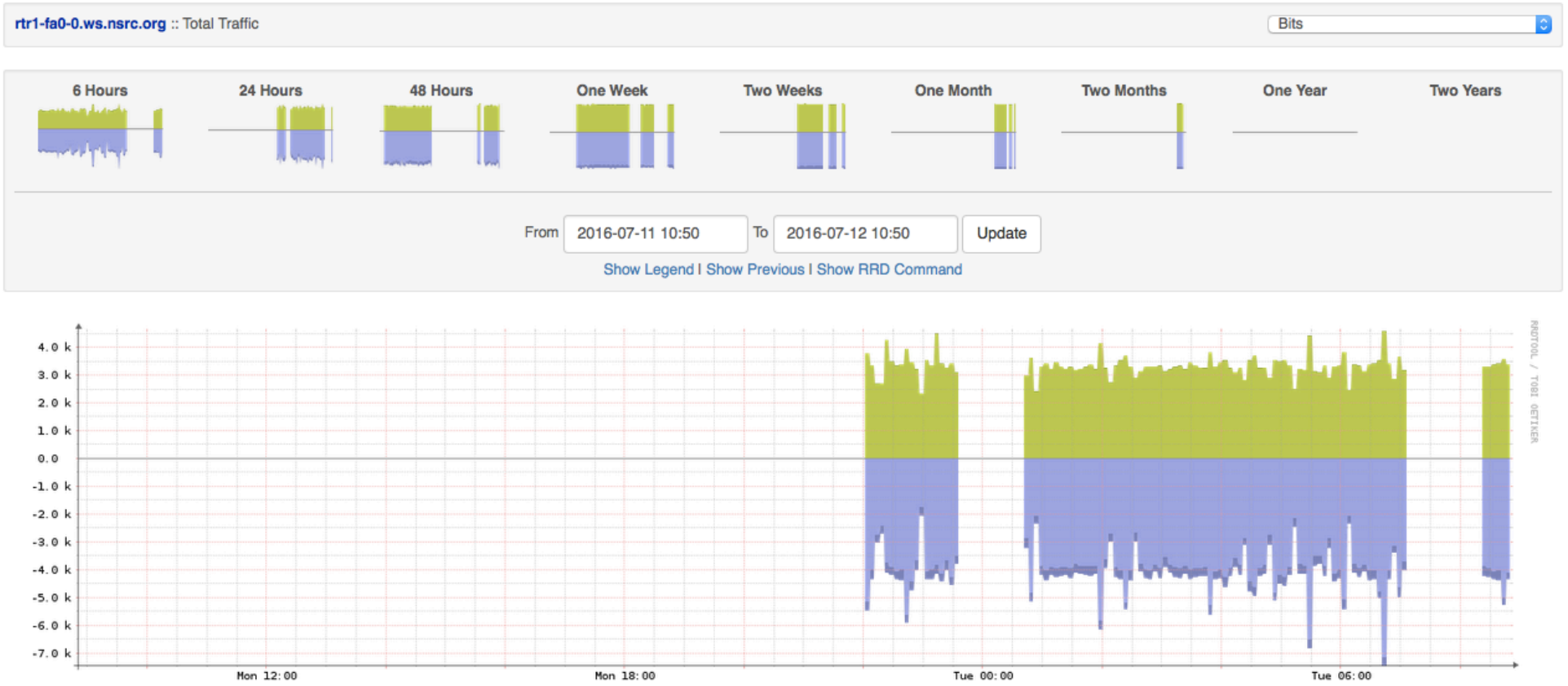
Processor 1	x1	4%

Memory Pools

Processor		76%
I/O		18%

Temperature

I/O Cont Inlet		22°C
I/O Cont Outlet		22°C
NPE Inlet		22°C
NPE Outlet		22°C
I/O Cont Inlet 0		22°C



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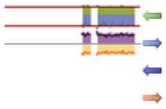
Network Startup Resource Center

- **CISCO7206VXR** (Chassis)
  Cisco 7206VXR, 6-slot chassis
  Serial No. 4279256517
  - **1. I/O and CPU Slot 0**
    I/O and Processor Slot Container
    - **1. NPE-400** (NPE400 0)
      Cisco 7200VXR Network Processing Engine NPE-400
      Serial No. 11111111
    - **2. C7200-I/O-2FE/E** (module 0)
      I/O Dual FastEthernet Controller
      Serial No. 00000000
  - **2. PA Slot 1**
    PA Slot Container
  - **3. PA Slot 2**
    PA Slot Container
  - **4. PA Slot 3**
    PA Slot Container
  - **5. PA Slot 4**
    PA Slot Container
  - **6. PA Slot 5**
    PA Slot Container
  - **7. PA Slot 6**
    PA Slot Container
  - **8. PEM 0**
    Power Supply Container
  - **9. PEM 1**
    Power Supply Container

1. FastEthernet0/0

FastEthernet0/0

10.10.0.221/24



3.22kbps
3.9kbps
3pps
2pps

100Mbps *Ethernet*
fullDuplex -

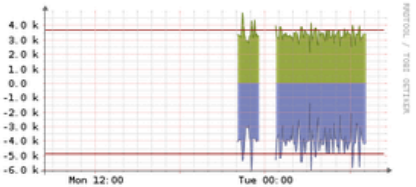
ca:00:64:6b:00:08
MTU 1500

FastEthernet0/0 on rtr8 v4
FastEthernet0/0 on rtr5 v4
FastEthernet0/0 on rtr6 v4
[...]

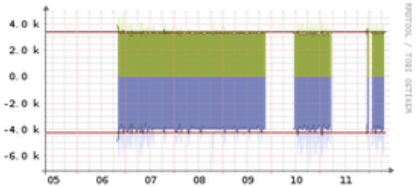
Graphs | Real time | ARP Table | Eventlog | Notes

Create Bill

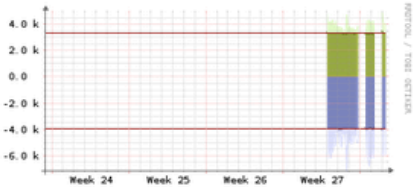
Interface Traffic



bps	Now	Ave	Max	95th %
In	3.22k	3.34k	4.87k	3.68k
Out	3.90k	3.97k	6.06k	4.86k
Total	26.56MB	(In 12.13MB	Out	14.43MB)



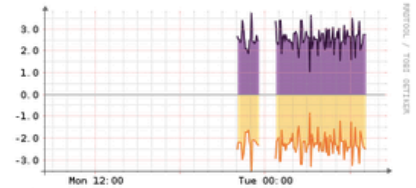
bps	Now	Ave	Max	95th %
In	3.35k	3.31k	4.87k	3.42k
Out	4.06k	3.97k	7.17k	4.27k
Total	327.56MB	(In 148.87MB	Out	178.69MB)



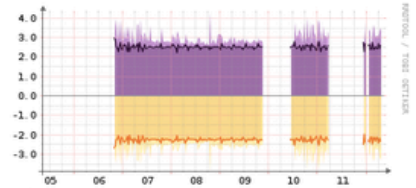
bps	Now	Ave	Max	95th %
In	3.31k	3.30k	4.87k	3.30k
Out	3.98k	3.96k	7.17k	3.98k
Total	353.00MB	(In 160.58MB	Out	192.42MB)

bps	Now	Ave	Max	95th %
In	3.26k	3.29k	4.72k	-nan
Out	3.94k	3.96k	7.17k	-nan
Total	470.01MB	(In 213.48MB	Out	256.54MB)

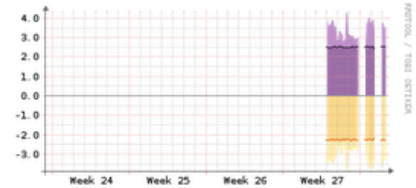
Interface Packets



Packets	Now	Ave	Max
In	2.51	2.53	3.73
Out	2.19	2.26	3.53



Packets	Now	Ave	Max
In	2.57	2.52	4.25
Out	2.30	2.26	3.88



Packets	Now	Ave	Max
In	2.54	2.52	4.25
Out	2.27	2.25	3.88

Packets	Now	Ave	Max
In	2.52	2.52	4.25
Out	2.25	2.25	3.88

Online LibreNMS demo

Is available at:

- https://demo.librenms.org/
- Log on as demo / demo

Workshop installation at:

- http://librenms.ws.nsrc.org/

Questions/Discussion?