

Oregon HamWan

Building a redundant "Internet"

Terms

Internet

- **BGP:** Border Gateway Protocol
- **AS Number:** Autonomous System Number

Services

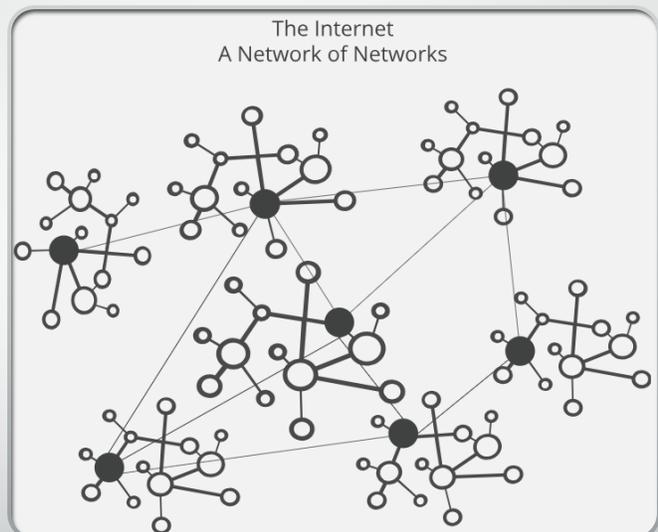
- **DHCP:** Dynamic Host Configuration Protocol
- **DNS:** Dynamic Name Server
- **PiHole:** Traffic limiting / bandwidth shaping
- **NTP:** Network Time Protocol
- **APT-Cache:** File caching server / clients updates
- **IRC:** Internet Relay chat
- **SIP / VoIP:** Session Initiation Protocol / Voice Over Internet Protocol
- **SNMP:** Simple Network Management Protocol
- **ESXi:** Virtualization for server management

What is BGP

- BGP is the postal service of the Internet. When someone drops a letter into a mailbox, the postal service processes that piece of mail and chooses a fast, efficient route to deliver that letter to its recipient. Similarly, when someone submits data across the Internet, BGP is responsible for looking at all of the available paths that data could travel and picking the best route, which usually means hopping between autonomous systems.

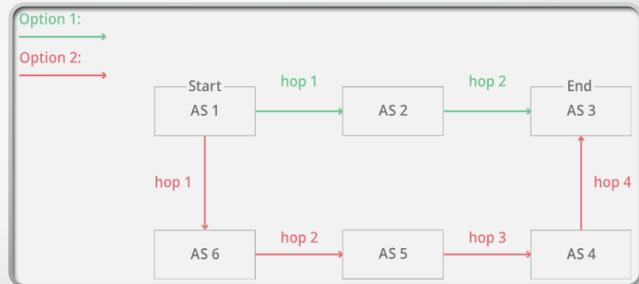
AS Number

- The Internet is a network of networks; it's broken up into hundreds of thousands of smaller networks known as autonomous systems (AS). Each of these networks is essentially a large pool of routers run by a single organization.



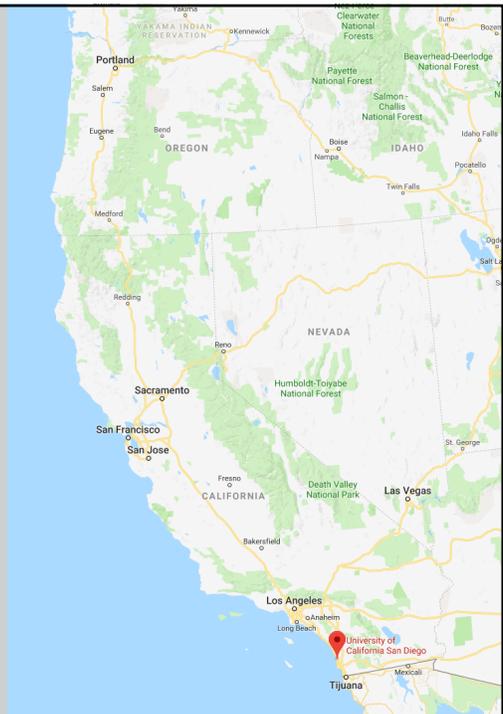
AS Number

- This diagram illustrates a simplified version of BGP. In this version there are only 6 autonomous systems on the Internet. If AS₁ needs to route a packet to AS₃, it has two different options:
- Hopping to AS₂ and then to AS₃:
- AS₂ → AS₃
- Or hopping to AS₆, then to AS₅, AS₄, and finally to AS₃:
- AS₆ → AS₅ → AS₄ → AS₃



University Of California San Diego

- USD is where BGP announcements for the 44.0.0.0 network come from.



BGP Announce table from Hurricane Electric

- Lookup any IP address and BGP AS number
- www.he.com

HURRICANE ELECTRIC INTERNET SERVICES

AS7377 University of California, San Diego

Quick Links: [BGP Toolkit Home](#), [BGP Prefix Report](#), [BGP Peer Report](#), [Exchange Report](#), [Bogon Routes](#), [World Report](#), [Multi Origin Routes](#), [DNS Report](#), [Top Host Report](#), [Internet Statistics](#), [Looking Glass](#), [Network Tools App](#), [Free IPv6 Tunnel](#), [IPv6 Certification](#), [IPv6 Progress](#), [Going Native](#), [Contact Us](#)

Prefix	Description
44.0.0.0/8	Amateur Radio Digital Communications
69.166.11.0/24	RGnet, LLC
69.196.32.0/19	The Regents of the University of California - University of California, San Diego.
69.196.32.0/20	The Regents of the University of California - University of California, San Diego.
128.54.0.0/16	University of California, San Diego
132.239.0.0/16	University of California, San Diego
137.110.0.0/16	University of California, San Diego
169.228.0.0/16	University of California, San Diego
192.135.237.0/24	Marine Physical Lab/UCSD
192.135.238.0/24	Marine Physical Lab/UCSD
192.154.1.0/24	University of California at San Diego
198.134.135.0/24	University of California, San Diego
207.34.0.0/24	RGnet, LLC
216.21.14.0/24	RGnet, LLC
216.151.34.0/24	RGnet, LLC
216.151.38.0/24	RGnet, LLC

Detailed BGP Announcement

HURRICANE ELECTRIC INTERNET SERVICES

44.0.0.0/8

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Network Info | Whois | DNS | IRR

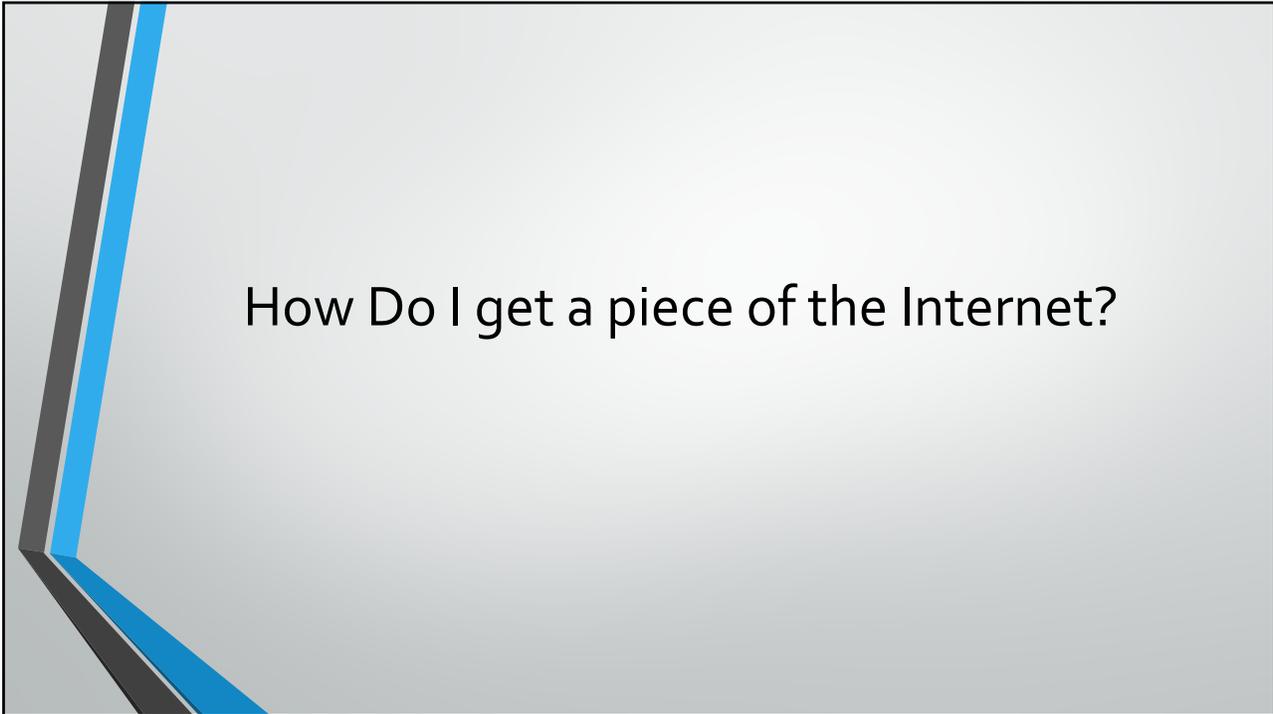
```

NetRange: 44.0.0.0 - 44.255.255.255
CIDR: 44.0.0.0/8
NetName: AMFRNET
NetHandle: NET-44-0-0-1
Parent: ()
NetType: Direct Assignment
OriginAS:
Organization: Amateur Radio Digital Communications (ARDC)
RegDate: 1992-06-30
Updated: 2009-06-19
Ref: https://rdap.arin.net/registry/ip/44.0.0.0

OrgName: Amateur Radio Digital Communications
OrgId: ARDC
Address: 5663 Balboa Ave Suite 432
City: San Diego
StateProv: CA
PostalCode: 92111-2705
Country: US
RegDate: 2014-02-25
Updated:
Ref: https://rdap.arin.net/registry/entity/ARDC

OrgAbuseHandle: BK29-ARIN
OrgAbuseName: Kantor, Brian
OrgAbusePhone: +1-619-693-2246
OrgAbuseEmail: abuse@ampr.org
OrgAbuseRef: https://rdap.arin.net/registry/entity/BK29-ARIN

OrgTechHandle: BK29-ARIN
OrgTechName: Kantor, Brian
OrgTechPhone: +1-619-693-2246
OrgTechEmail: abuse@ampr.org
OrgTechRef: https://rdap.arin.net/registry/entity/BK29-ARIN
                    
```



How Do I get a piece of the Internet?

AMPRNet

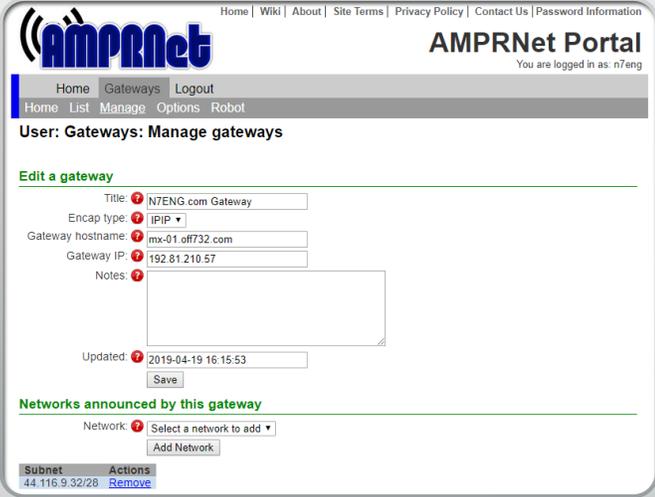
- IP Address allocations for HAMWAN are located here.
- www.portal.ampr.org

Network	Description	Allocated to
44.26.0.160 / 30	WA7V-OR	WA7V
44.26.0.164 / 32	KD8HJE	KD8HJE
44.26.0.165 / 32	AF7SO	AF7SO
44.26.0.168 / 29	OctaNET	K7JDMC
44.26.1.32 / 29	WA7SHI Corvallis	WA7SHI
44.26.1.40 / 29	Independence OR	WA7AR
44.26.1.48 / 28	Curry County Emergency Communications	K7JOW
44.26.1.64 / 28	KD7ISA	KD7ISA
44.26.1.80 / 28	KU0L Radio Asset	KU0L
44.26.1.96 / 27	Eastern Oregon EmComm	KK6GKG
44.26.1.144 / 30	Amity Oregon	K7JL
44.26.1.152 / 29	packet network testbed	KD9XW
44.26.1.192 / 27	KBARA	W0ZY
44.26.1.224 / 28	Lane County EmComm (LCSARO)	KD7GPC
44.26.1.240 / 29	KC7NKP	KC7NKP
44.26.1.248 / 29	AG7EVnet	AG7EV
44.26.102.0 / 24	Portland HamWan	K7ICV
44.26.104.0 / 24	N7GLV Portland Network	N7GLV
44.26.106.0 / 27	KU7PDX	KU7PDX
44.26.108.0 / 24	K7KOC	K7KOC
44.26.128.0 / 22	Central Oregon HAM WAN	K7JLR
44.26.161.0 / 24	N7DOD HamWAN	N7DOD

Network	Type	Description	Actions
44.116.9.32/28	user	Oregon HamWan Services	Edit Release

AMPRNet

- Gateways for AMPRNET
- www.portal.ampr.org



The screenshot shows the AMPRNet Portal interface. At the top, there is a navigation menu with links for Home, Wiki, About, Site Terms, Privacy Policy, Contact Us, and Password Information. The user is logged in as 'n7eng'. The main content area is titled 'User: Gateways: Manage gateways'. Below this, there is a section for 'Edit a gateway' with a form containing the following fields: Title (NZENG.com Gateway), Encap type (IPIP), Gateway hostname (mx-01.off732.com), Gateway IP (192.81.210.57), Notes (empty text area), and Updated (2019-04-19 16:15:53). A 'Save' button is located below the form. Below the form is a section for 'Networks announced by this gateway' with a dropdown menu for 'Network' and an 'Add Network' button. At the bottom, there is a table with columns for 'Subnet' and 'Actions'. The table contains one entry: Subnet 44.116.9.32/28 and Action Remove.

Oregon HamWan Services

What are they, what can they do?

DHCP

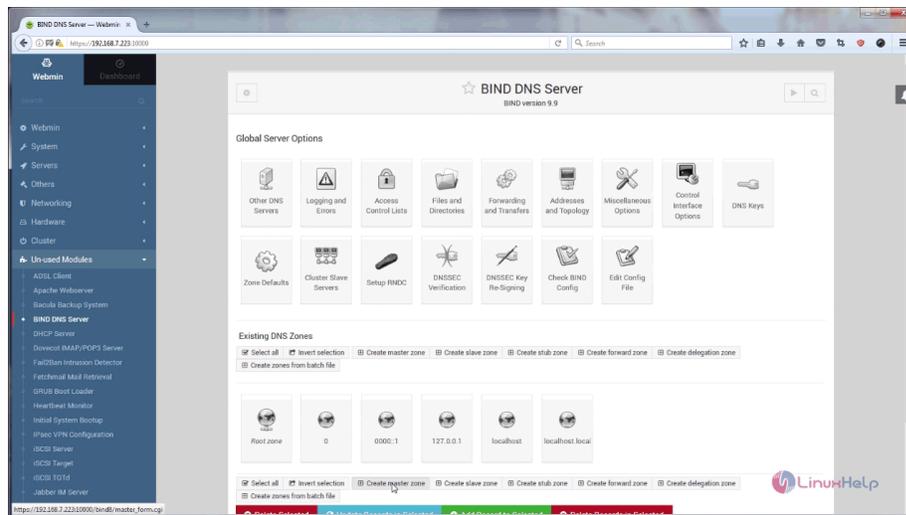
- DHCP (Dynamic Host Configuration Protocol) is a protocol used to provide quick, automatic, and central management for the distribution of IP addresses within a network.
- DHCP is also used to configure the proper subnet mask, default gateway, and DNS server information on the device.
- DHCP will give out IP Addresses assigned to each "Tower"
- Oregon HamWan is currently assigned **44.26.102.X/24**
- The "server" for this function is the router at each tower

DHCP allocations (Potential)

- **Complete Range:** 44.26.102.0/24 (254 Usable)
- **SKYLINE:** 44.26.102.0 – 44.26.102.63 (64 Usable)
- **SALEM:** 44.26.102.64 – 44.26.102.127 (64 Usable)
- **NEWPORT:** 44.26.102.128 – 44.26.102.159 (32 Usable)
- **ASTORIA:** 44.26.102.160 – 44.26.102.191 (32 Usable)
- **DALLES:** 44.26.102.192 – 44.26.102.223 (32 Usable)
- **BEND:** 44.26.102.224 – 44.26.102.255 (32 Usable)

DNS

- The Domain Name Systems (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.
- Through DHCP, we set the DNS IP Address given to end user clients HamWan's DNS servers.
- There would be dual "Redundant" servers at each "Internet Peering Point".
- HamWan can use tools installed in "WebMin" a network wide services server.



PiHole

Network-wide protection

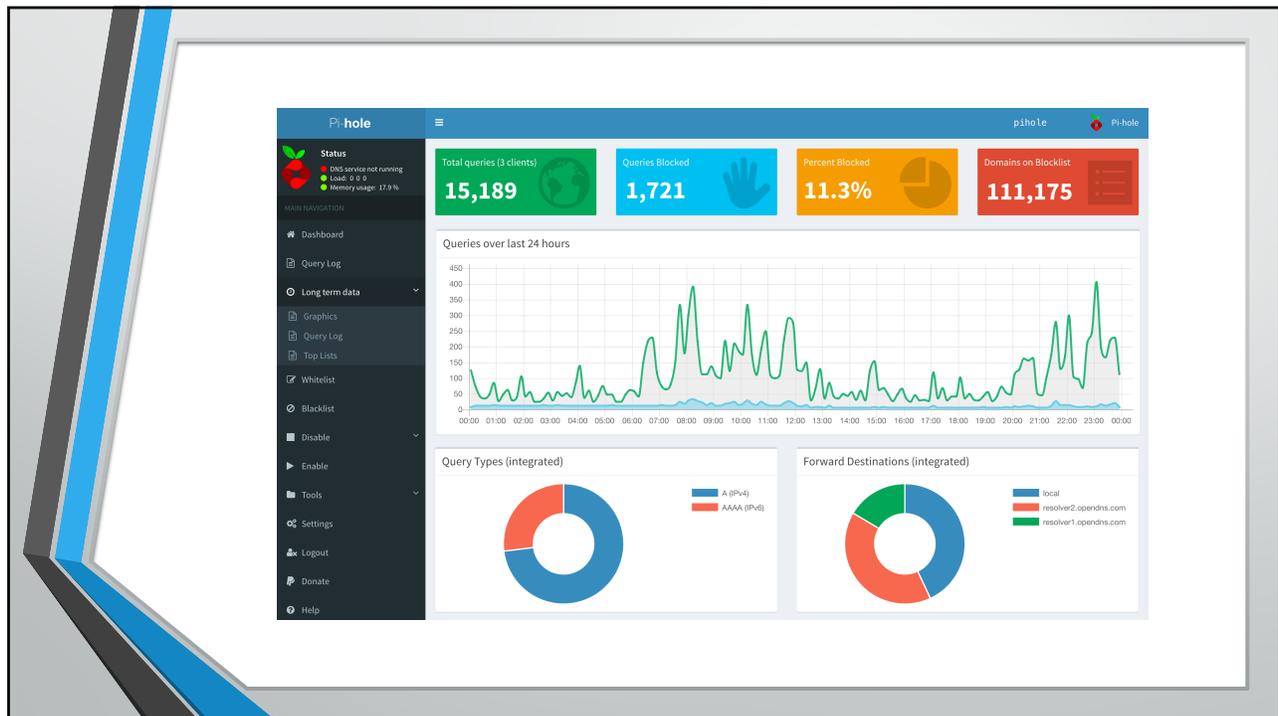
- Instead of browser plugins or other software on each computer, **install Pi-hole in one place** and your entire network is protected.

Improve network performance

- Since **advertisements are blocked before they are downloaded**, network performance is improved and will feel faster.

Monitor statistics

- Our Web interface offers control of your Pi-hole and a central place to view statistics. We also include an API for extending these stats.

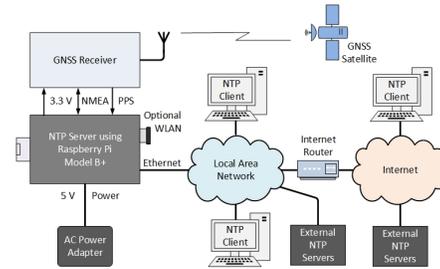


NTP

- NTP stands for *Network Time Protocol*, and it is an *Internet* protocol used to synchronize the clocks of computers to some time reference.
- If you have communicating programs running on different computers, time still should even advance if you switch from one computer to another. Obviously if one system is ahead of the others, the others are behind that particular one. From the perspective of an external observer, switching between these systems would cause time to jump forward and back, a non-desirable effect.
- Ideally this would be a "Stratum 1" server. (*Synced directly to atomic clocks*)
- Oregon Ham Wan server "NTP.OregonHamWan.org"

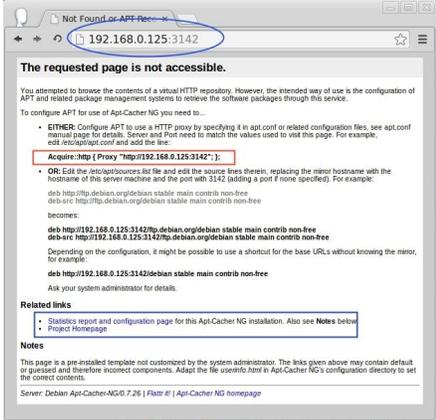






Linux Apt-Cacher

- In a datacenter where you could have hundreds of host instances all needing the same package/kernel/security patch, having a cache of packages inside your network can save a significant amount of network bandwidth and operator time.
- Oregon Ham Wan server "APT.OregonHamWan.org"



Apt-cacher traffic report

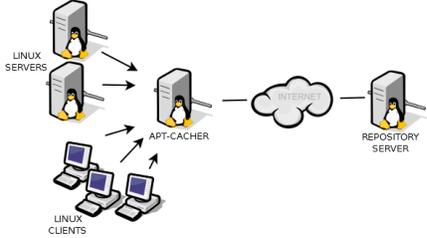
For more information on apt-cacher visit <http://packages.debian.org/apt-cacher>.

summary

Item	Value
Report generated	2008-10-29 06:47:50
Administrator	[REDACTED]
First request	Mon Mar 17 10:59:43 2008
Last request	Tue Oct 28 18:22:09 2008
Total requests	279907
Total traffic	139,909 GB

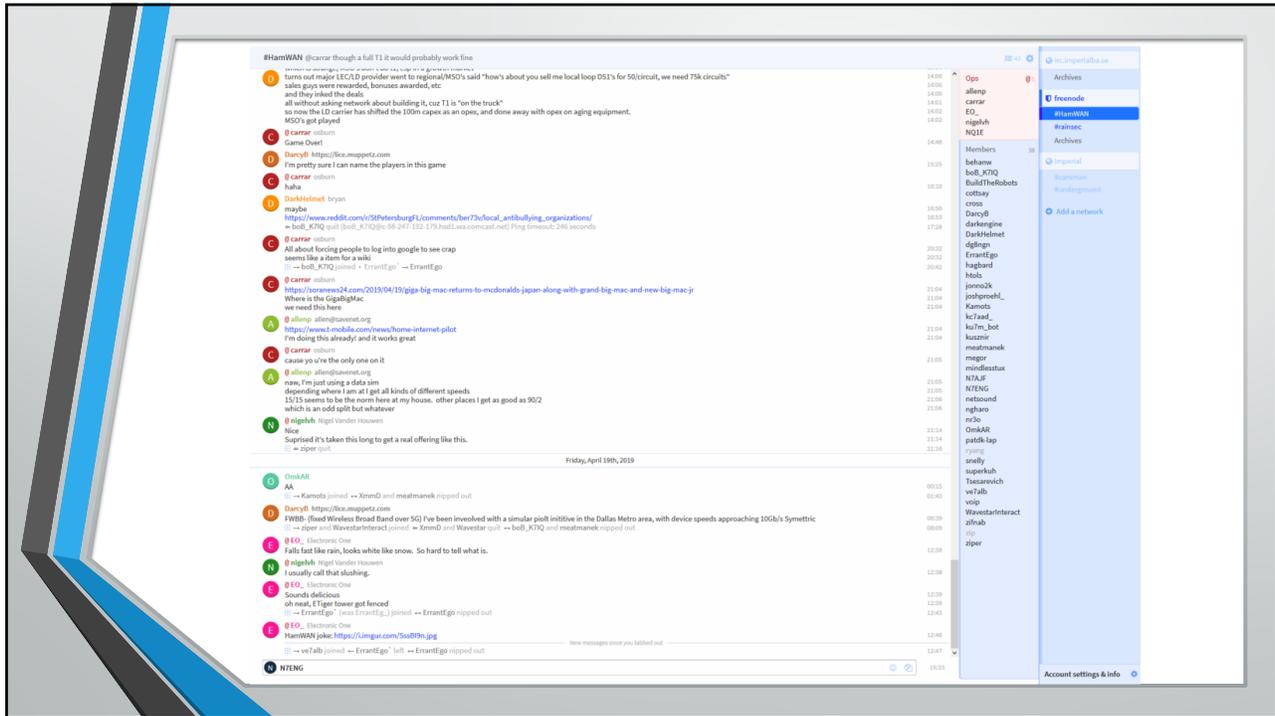
cache efficiency

	Cache hits	Cache misses	Total
Requests	211520 (75.56%)	68387 (24.43%)	279907
Transfers	121,963 GB (87.17%)	17,946 GB (12.82%)	139,909 GB



IRC

- Internet Relay Chat (IRC) is a system for chatting that involves a set of rules and conventions and client/server software.
- Connect to a server "IRC.OregonHamWan.org" and join a "Room"
- #General or #Portland



SIP / VoIP

- SIP is the Session Initiation Protocol. In IP and traditional telephony, network engineers have always made a clear distinction between two different phases of a voice call. The first phase is "call setup," and includes all of the details needed to get two telephones talking. Once the call has been setup, the phones enter a "data transfer" phase of the call using an entirely different family of protocols to actually move the voice packets between the two phones.
- Oregon Ham Wan server **"SIP.OregonHamWan.org"**

FreePBX System Status

FreePBX Notices
No new notifications
[show all](#)

FreePBX Statistics

Total active calls	0
Internal calls	0
External calls	0
Total active channels	0

FreePBX Connections

Uptime

System Uptime: 15 hours, 5 minutes
Asterisk Uptime: 1 hour, 40 minutes
Last Reload: 1 hour, 32 minutes

System Statistics

Processor

Load Average	0.00
CPU	0%

Memory

App Memory	73%
Swap	5%

Disks

Avarhun	4%
Avarlock	0%
Adev	0%
Adevishm	0%

Networks

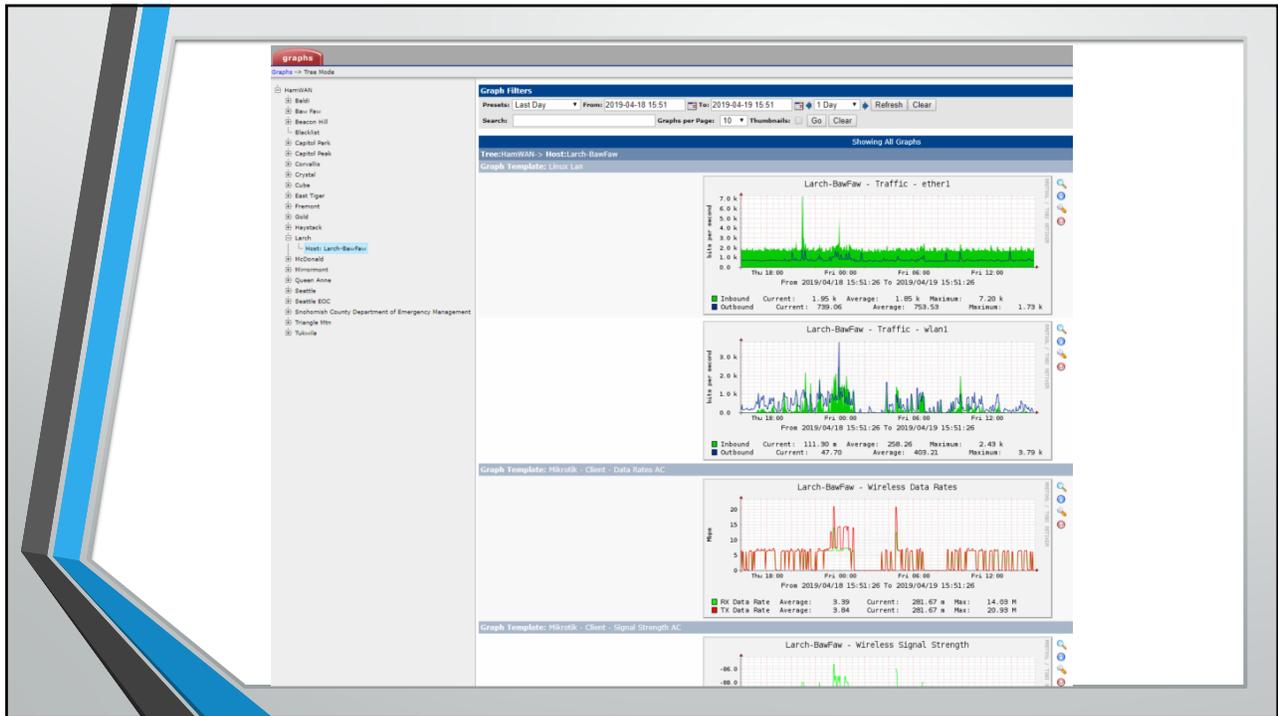
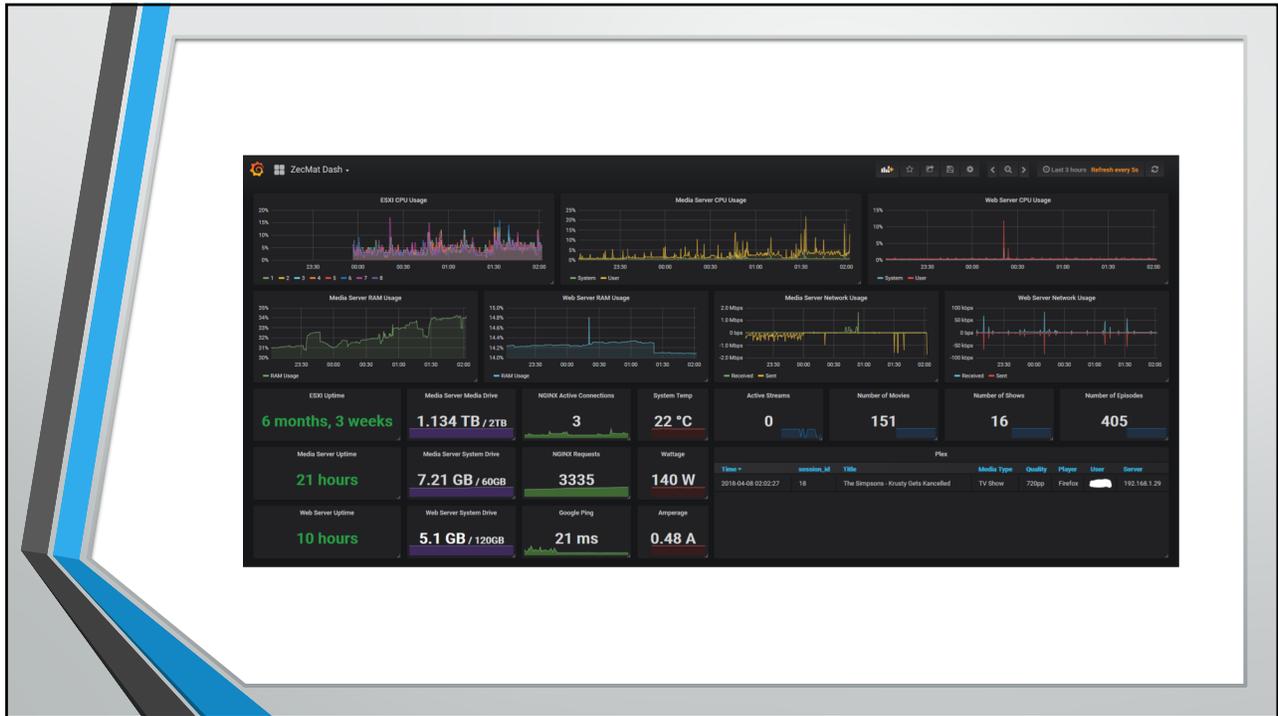
eth0 receive	0.45 KB/s
eth0 transmit	3.67 KB/s

Server Status

Asterisk	OK
Op-Panel	OK
MySQL	OK
Web Server	OK
SSH Server	OK

SNMP

- SNMP stands for Simple Network Management Protocol. It is a standard way of monitoring hardware and software from nearly any manufacturer, from Juniper, to Cisco, to Microsoft, Unix, and everything in between. SNMP requires only a couple of basic components to work: a management station, and an agent.
- Seattle has a monitor program called "Cacti"
<http://monitoring.hamwan.net>
- For pretty graphs we can use "Grafana"



ESXi

- ESXi is a type-1 hypervisor, meaning it runs directly on system hardware without the need for an operating system (OS). Type-1 hypervisors are also referred to as bare-metal hypervisors because they run directly on hardware.
- HamWAN uses “Large” servers to divvy up resources for each server to use.

