


Network Quotas for Individuals – A better answer to the P2P bandwidth problem?

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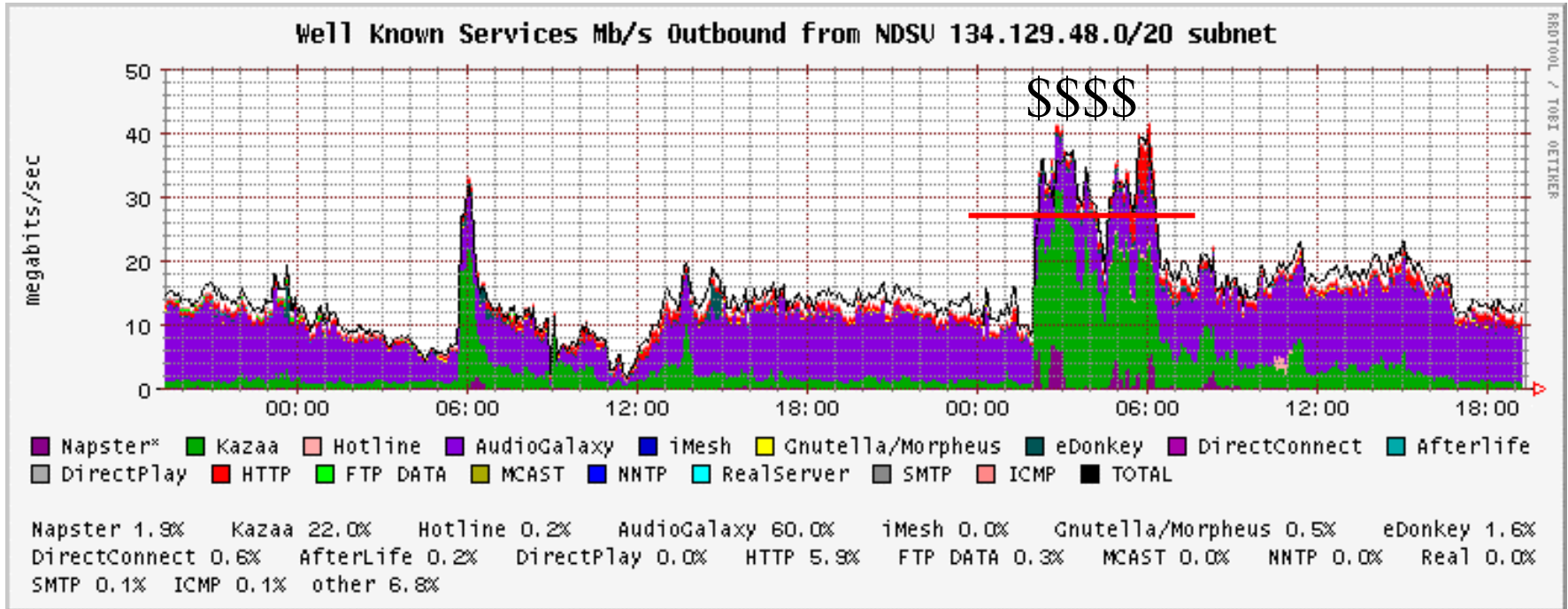
Information Technology Services
NORTH DAKOTA STATE UNIVERSITY Fargo, ND

Personal Accountability: A user's actions should affect them directly, rather than have the pain of network slowness be spread to the whole ResNet community.

ResNet Residence Hall Network Services north dakota state university Fargo, ND	Help Desk 231-8685 help.desk@ndsu.nodak.edu	
Latest News Getting Connected Setup Instructions Software Setup FAQ Bandwidth HECN Policy Static IP	Latest News New ResNet Network Policy 2002-04-01 ITS and Residence Life are working together to help NDSU control its Internet costs. ITS is evaluating a new management method which allocates 600 MB of the network usage to each resident daily, the average ResNet users uses about 100MB a day. This will apply only to traffic going to or coming from the Internet. On campus traffic, like reading you Mail@NDSU e-mail or using Blackboard, will not be counted nor will usage between 2:00 AM and 6:00 AM. The bandwidth usage will be reset daily at 6:00 AM. If a resident exceeds their daily allocation, they will be placed into a shared, limited pool with other users that have exceeded their allocation. They will not be disconnected; they will be sharing 256kbps, which may be very slow for the remainder of the day. This page will give a resident an easy way to check how much traffic has been consumed for the current day. Things to watch out for: If you are using an Internet application that allows you to search for and download files on the Internet, this same application may be allowing others on the Internet to download your files. The files you download and the files that are downloaded from you will be counted against you. If you have a 3MB file and 200 people on the Internet download it, this will require 600MB of network usage.	Links ITS Residence Life Software Downloads Your Usage 134.129.71.120 0 MB % daily: 0% What's this?
Site Manager Last Modified: January 23 2002 13:29:25 Published by North Dakota State University	Prospective students may schedule a visit by calling 1-800-488-NDSU.	 SEARCH PHONEBOOK CAMPUS MAP



Problem – Huge Nightly Outbound Traffic



High outbound usage at night with no limits in effect.

New StageNet (state network) **policy** allots base bandwidth allocation and charges for excess.

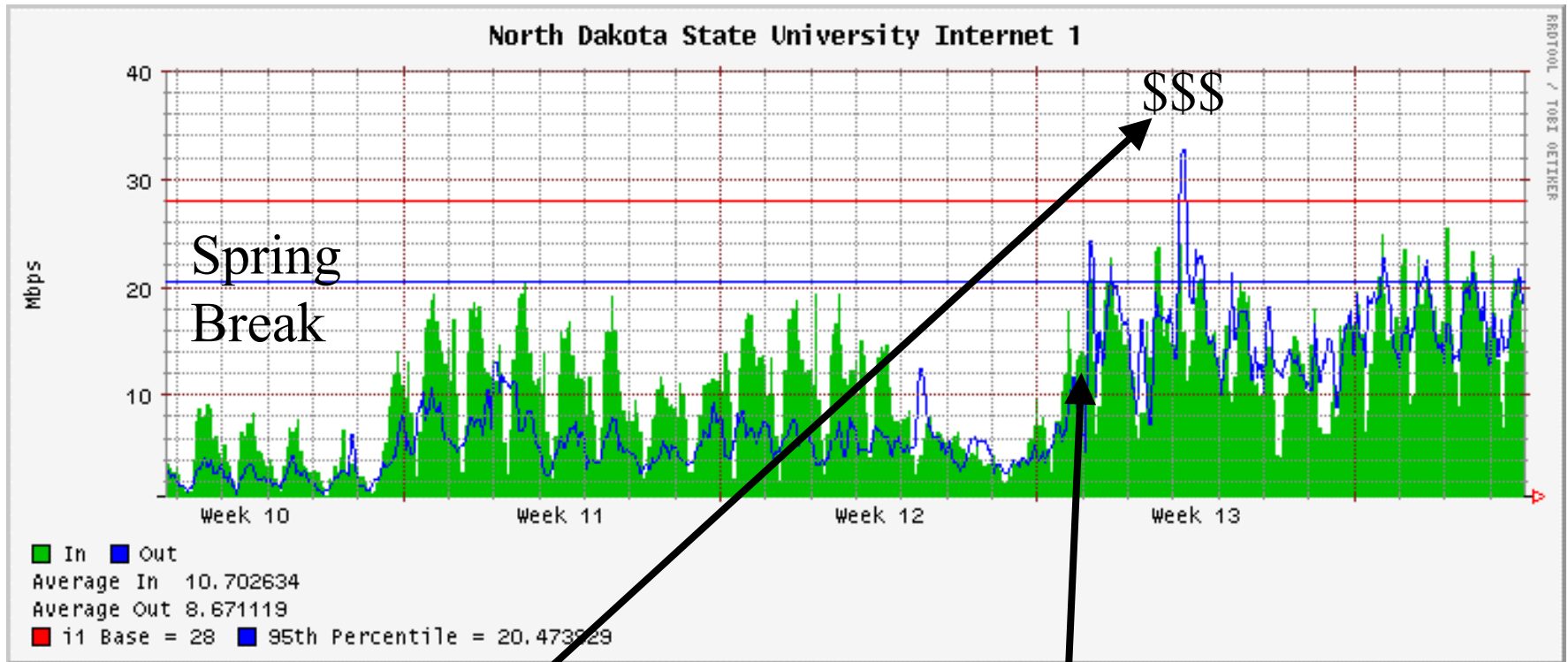
Inbound is bounded by the number of students in the residence halls.

Outbound is bounded by the number of people on the Internet!



End of the story:

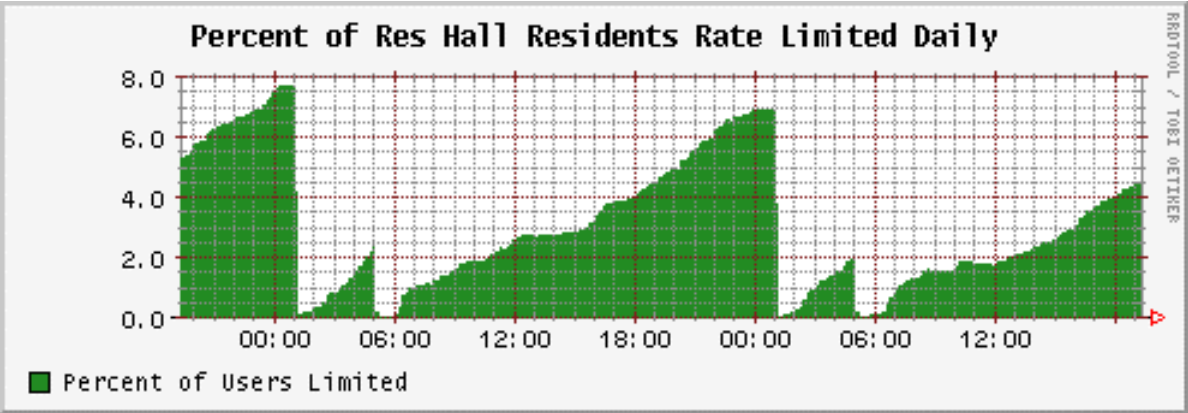
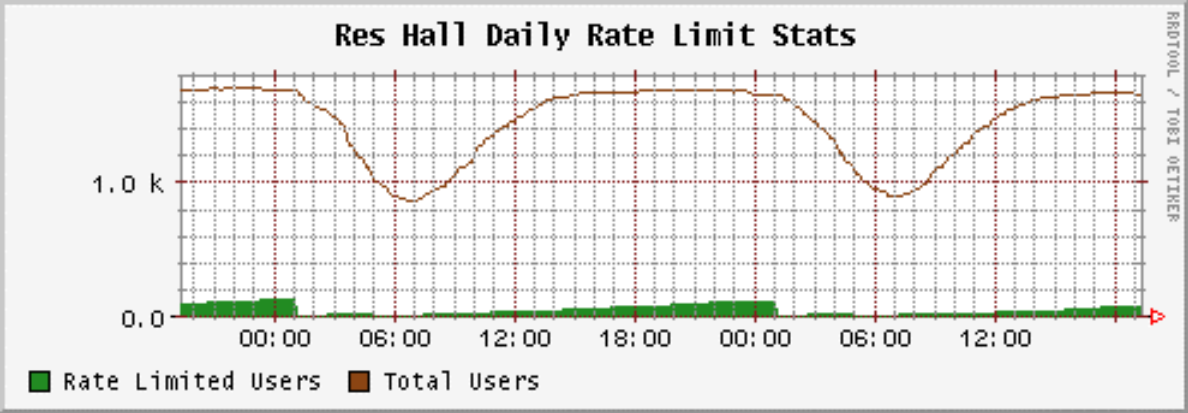
We provided the students more bandwidth, and watched P2P use grow, without additional costs.



Level without any rate limit. New rate limit trial started.



Initial Goal: segregate the top 10% of abusers; meant sacrificing 1.5 Mbps to discourteous users.

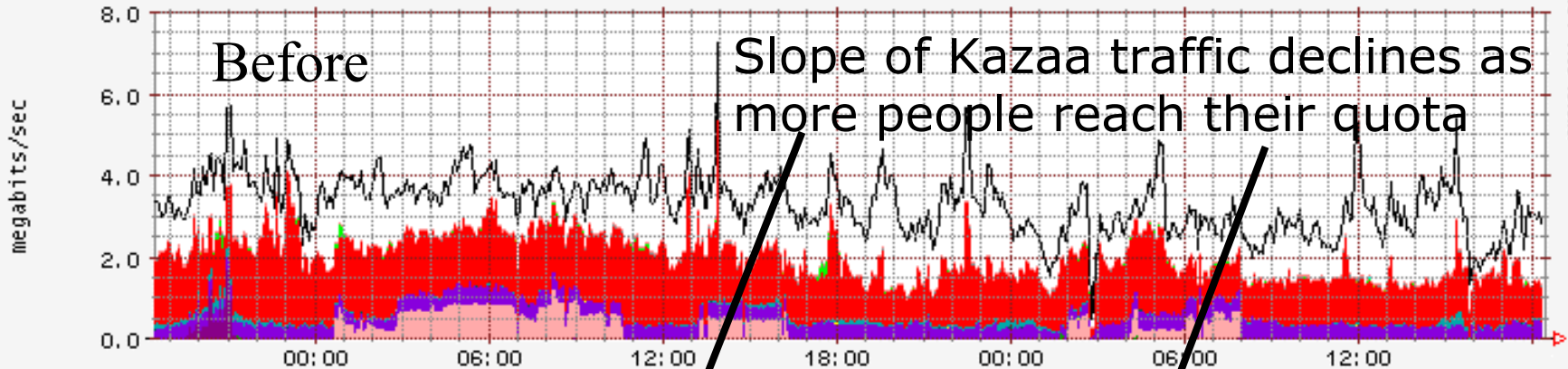


Percentage of resident hall students who reach the quota rises through the day.

Well Known Services Mb/s Outbound from NDSU 134.129.48.0/20 subnet

Before

Slope of Kazaa traffic declines as more people reach their quota

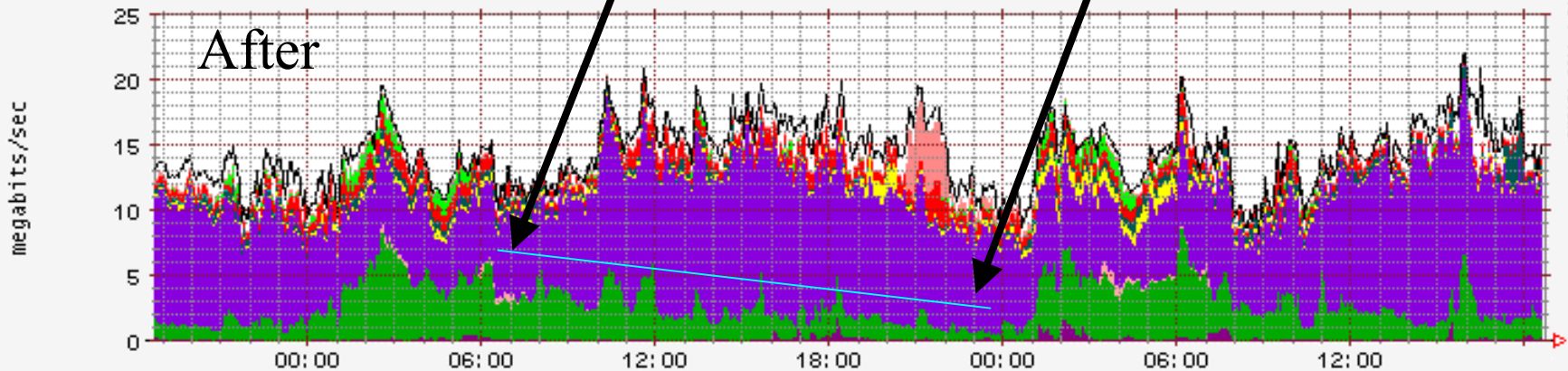


- Napster* ■ Kazaa ■ Hotline ■ AudioGalaxy ■ iMesh ■ Gnutella/Morpheus ■ eDonkey ■ DirectConnect ■ Afterlife
- DirectPlay ■ HTTP ■ FTP DATA ■ MCAST ■ NNTP ■ RealServer ■ SMTP ■ ICMP ■ TOTAL

Napster 0.6%	Kazaa 0.1%	Hotline 5.7%	AudioGalaxy 10.9%	iMesh 0.0%	Gnutella/Morpheus 0.0%	eDonkey 0.0%
DirectConnect 0.0%	AfterLife 1.3%	DirectPlay 0.0%	HTTP 42.6%	FTP DATA 0.3%	MCAST 0.0%	NNTP 0.0%
SMTP 0.2%	ICMP 0.1%	other 38.0%				

Well Known Services Mb/s Outbound from NDSU 134.129.48.0/20 subnet

After

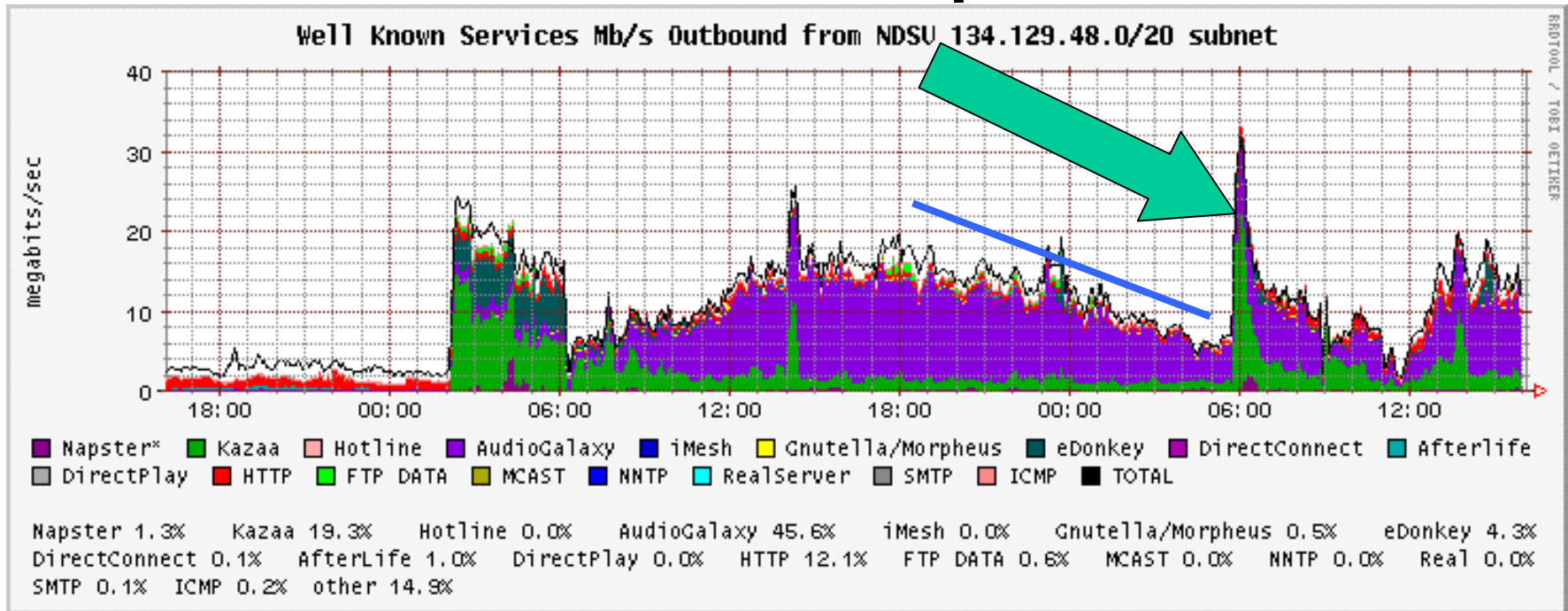


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- DirectPlay ■ HTTP ■ FTP DATA ■ MCAST ■ NNTP ■ RealServer ■ SMTP ■ ICMP ■ TOTAL

Napster 1.3%	Kazaa 19.0%	Hotline 0.4%	AudioGalaxy 58.1%	iMesh 0.0%	Gnutella/Morpheus 2.8%	eDonkey 2.9%
DirectConnect 0.1%	AfterLife 0.1%	DirectPlay 0.0%	HTTP 6.3%	FTP DATA 1.5%	MCAST 0.0%	NNTP 0.0%
SMTP 0.0%	ICMP 1.1%	other 6.4%				



Problem - Spikes



Tested nightly limits. Nice slope down as more people reach quota, but large spikes occurred as quotas are reset to 0 at 6 am.

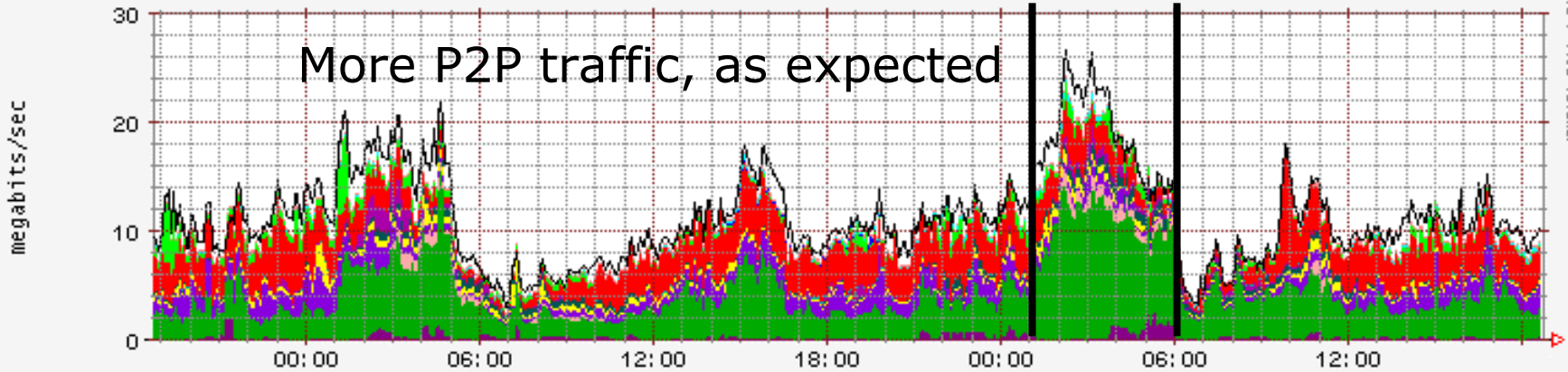


Probation

- Implemented the concept of probation.
- If a student was over their quota ***yesterday***, their traffic will be limited. But the probation rate limits will be 5 times the previous quota rate limits.
- Probation works well and keeps chronic offenders under control which avoids reset spikes.
- But it is complicated to explain to students.

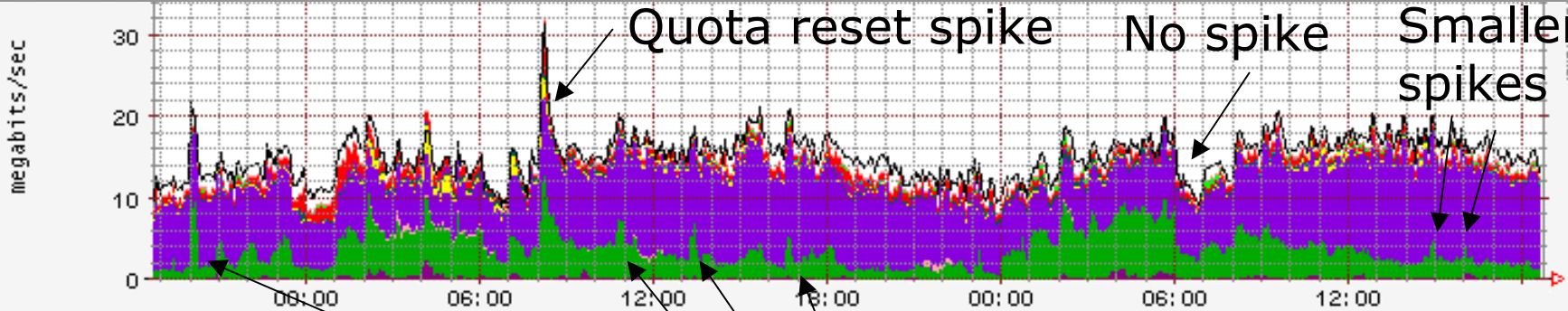
Well Known Services Mb/s Inbound to NDSU 134.129.48.0/20 subnet

More P2P traffic, as expected



■ Napster* ■ Kazaa ■ Hotline ■ AudioGalaxy ■ iMesh ■ Gnutella/Morpheus ■ eDonkey ■ DirectConnect ■ Afterlife
■ DirectPlay ■ HTTP ■ FTP DATA ■ MCAST ■ NNTP ■ RealServer ■ SMTP ■ ICMP ■ TOTAL

Napster 2.9% Kazaa 36.3% Hotline 1.1% AudioGalaxy 10.7% iMesh 0.0% Gnutella/Morpheus 3.9% eDonkey 3.2%
 DirectConnect 1.8% AfterLife 0.3% DirectPlay 0.0% HTTP 26.3% FTP DATA 4.1% MCAST 0.0% NNTP 0.2% Real 0.8%
 SMTP 0.0% ICMP 0.1% other 8.2%



■ Napster* ■ Kazaa ■ Hotline ■ AudioGalaxy ■ iMesh ■ Gnutella/Morpheus ■ eDonkey ■ DirectConnect ■ Afterlife
■ DirectPlay ■ HTTP ■ FTP DATA ■ MCAST ■ NNTP ■ RealServer ■ SMTP ■ ICMP ■ TOTAL

Napster 1.6% Kazaa 23.4% Hotline 0.4% AudioGalaxy 57.2% iMesh 0.0% Gnutella/Morpheus 1.7% eDonkey 1.8%
 DirectConnect 0.7% AfterLife 0.2% DirectPlay 0.0% HTTP 5.2% FTP DATA 0.4% MCAST 0.0% NNTP 0.0% Real 0.0%
 SMTP 0.1% ICMP 0.1% other 7.3%

kazaa spikes on left, not on right

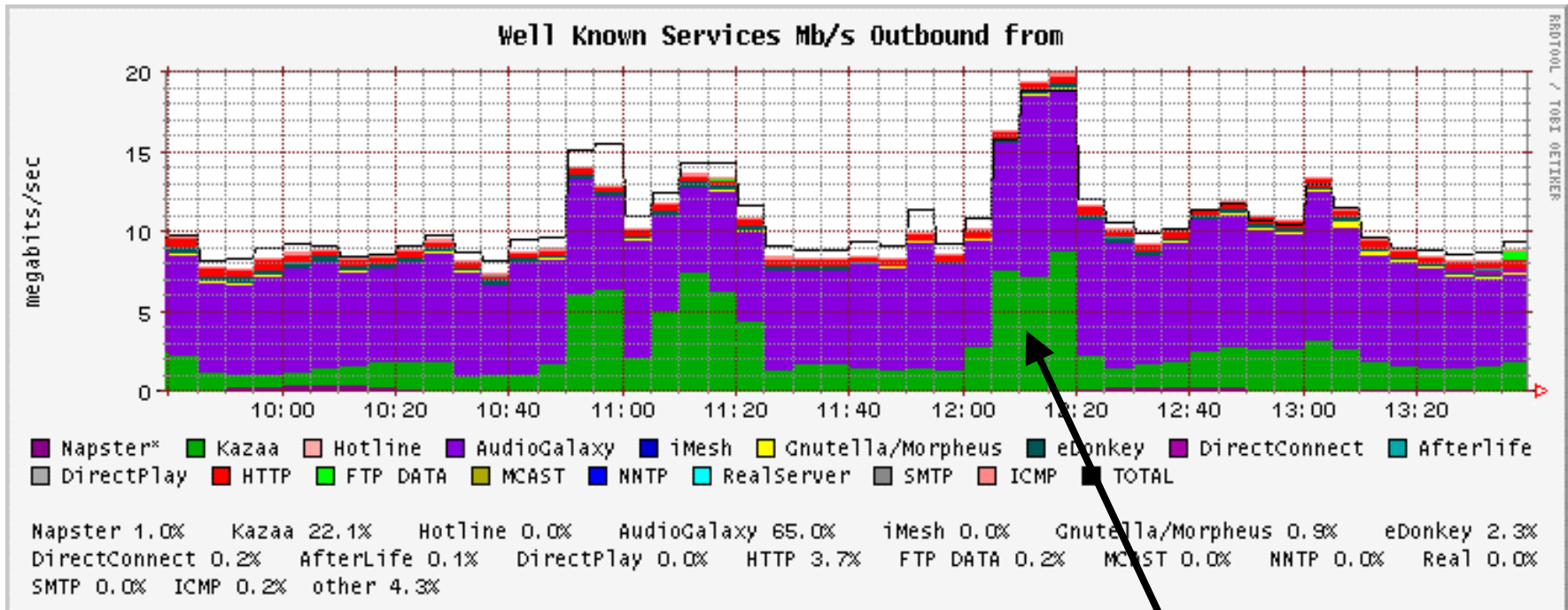


Gains

- User's actions affect them directly, and them alone, rather than affecting the whole ResNet community.
- With this system we don't have to decide which apps are "mis-behaved". Users monitor their own behavior.
- We don't have to keep updating access-lists or wait for vendors to update code to recognize the latest P2P or other app.
- Our system won't be affected when P2P apps start using random ports and/or encryption.



Closeup of Kazaa Spikes



Probation tends to smooth the spikes to be wider and less tall.

Someone reached their quota in 15 mins. -- used 787.5 Mbytes.



Stealth Mode Deployment in Plain Sight

- No announcement to students.
- Provided info to Residence Life and RAs.
- Provided web site with explanation and usage meter.
- No calls to help desk in the first week – few since (2 complains, by friends of friends).
- Do you call the cable company if you are getting free cable?



Links to More Info.

University of Waterloo

- <http://ist.uwaterloo.ca/cn/Residence/history.html>
- <http://ist.uwaterloo.ca/cn/Residence/rn-excess.html>
- <http://ist.uwaterloo.ca/cn/Residence/logic.html>

University of Texas

- <http://resnet.utexas.edu/>

Charley Kline

- http://www.ncne.nlanr.net/training/techs/2001/0128/presentations/200101-kline1_files/frame.htm

Iowa State University

- <http://www.ait.iastate.edu/policy/residence.html>

Bruce Curtis' GPN Presentation

- http://greatplains.net/activities/meetings/meeting-20020418/presentations/BruceCurtis_files/frame.htm