



Product Demonstration Guide

Table of Contents

Overview of Equalizing	2
Equalizing Scenario	2
Key Features of NetEqualizer	3
Setting Up Equalizing	4
Set the Ratio Parameter	4
Set your Network Trunk	4
Keep Default_Rules set to "ON"	4
Setting Connection Limits	5
Setting Hard Limits by IP, Subnet, VLAN, MAC address, or Pool	6
NetEqualizer Reporting	7
Real-time Monitoring.....	7
Historical Reporting & Trend Analysis	8
Where to Install the NetEqualizer	9

Overview of Equalizing

In this guide we will take you through our behavior-based "equalizing" technology, which uses our industry-leading proprietary algorithms to automatically optimize your network bandwidth by relieving congestion and improving the overall user experience, while reducing possibly unwanted traffic from peer-to-peer and other lower priority applications.

Many of you might be familiar with other WAN optimization techniques, such as Compression, Caching, and Layer-7 Application Shaping. "Equalizing" is the term we use to describe our behavior-based method of controlling your bandwidth resources so that users all get their fair share of the network.

If you answer yes to one or more of these questions, Equalizing may be right for you:

- Do you want to improve response times for web browsing, e-mail, chat, SaaS, or other web applications?
- Do you want to reduce the overhead of peer-to-peer (P2P), video streaming, or large ftp downloads?
- Do you want to set rate limits for individual users or subnets?
- Do you want to ensure priority for your VoIP calls?
- Do you want to reduce the threat from rogue applications opening 100's or perhaps 1000's of connections to the Internet?

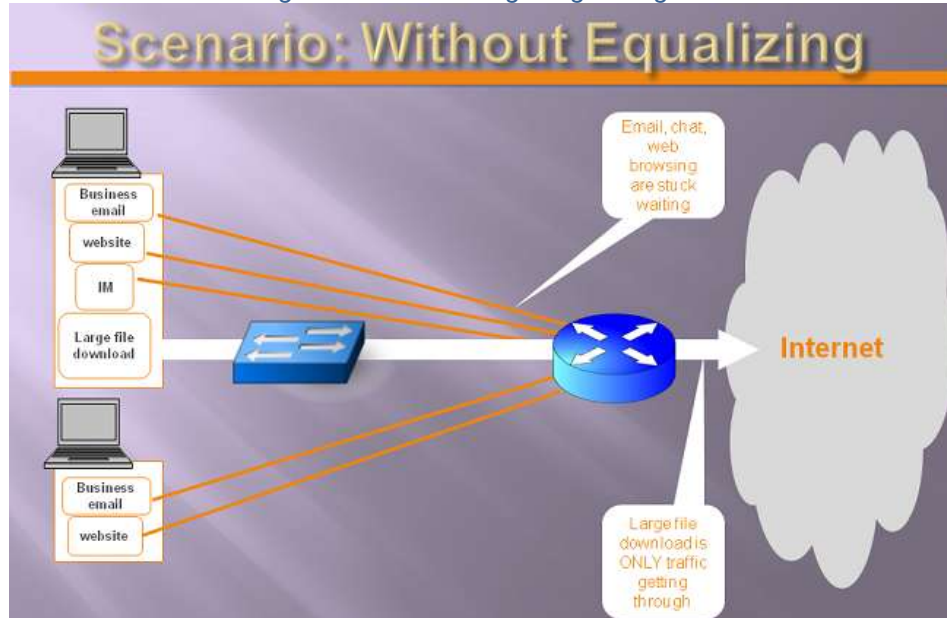
If so, then let's get started...

Equalizing Scenario

We know that you have thousands of users on your network. However, to simplify our example, let's focus in on two (2) of them. Imagine if you will, a situation with two users accessing the Internet at the same time over the same shared link. One person is downloading a large file, sending email, surfing the web, and has a chat session open, while the other is just trying to access e-mail and surf the web. The person emailing would like send a quick business email. But in a typical system, the large file download user will be getting almost all of the bandwidth, bringing the e-mail response time to a crawl. Anyone trying to email or surf the web will just have to sit, and wait.

Figure 1: Without Equalizing

Note that ONLY the large file download is getting through. All other traffic is waiting.



NetEqualizer solves this problem and many other similar bottlenecks automatically! *Equalizing looks at the behavior of the applications and their usage patterns.* By adhering to some simple rules of behavior, the real-time, latency-sensitive applications (such as email) can be differentiated from the heavy non-real-time activities (such as the large file download), and thus be granted priority on the fly, *without needing any specific policies to be set by the network administrator.*

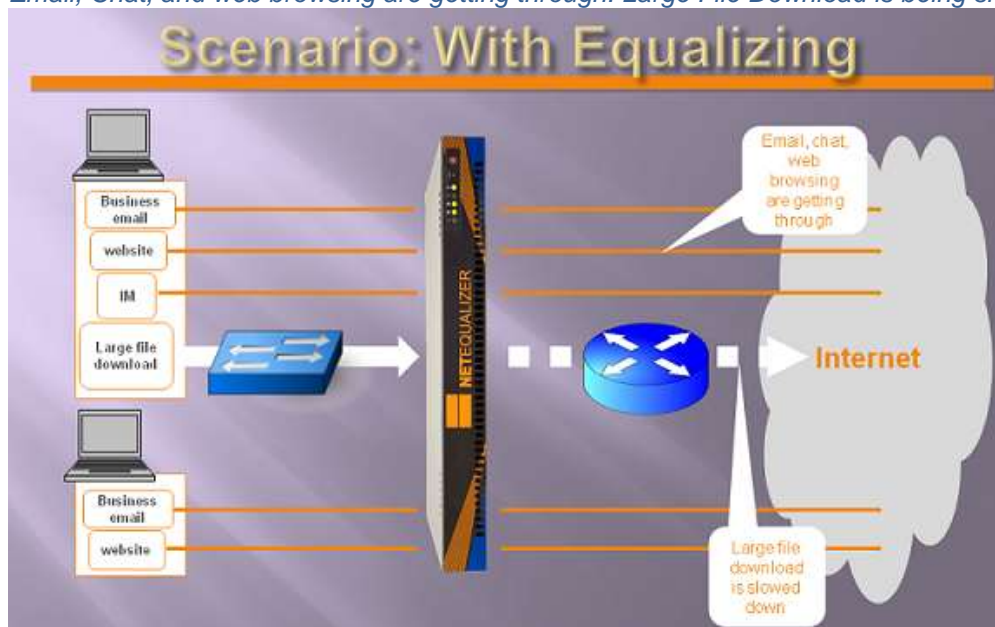
Equalizing is determined from the answers to these questions:

- 1) *How persistent is the flow?*
- 2) *How many active flows are there?*
- 3) *How long has the flow been active?*
- 4) *How congested is the overall network trunk?*
- 5) *How much bandwidth is the flow using, relative to the network trunk size?*

Once these answers are known, then *Equalizing makes adjustments to flows by adding latency to low-priority tasks, so high-priority tasks receive sufficient bandwidth.* As show below, note that with Equalizing, all traffic is getting through, including emails, web surfing, and chat sessions, while the large file download is being slowed down.

Figure 2: With Equalizing

Email, Chat, and web browsing are getting through. Large File Download is being slowed down.



This scenario demonstrates the key concept behind Equalizing; to simply and elegantly minimize network congestion by keeping bandwidth "hogs" from taking more than their fair share of your network.

Key Features of NetEqualizer

Although the NetEqualizer has many advanced features, you can be up & running with our behavior-based shaping (aka "equalizing") in just three (3) simple steps, which will satisfy just about any concern you might have about your network traffic. Setup time from cabling to configuration takes most network administrators one to three (1-3) hours or less.

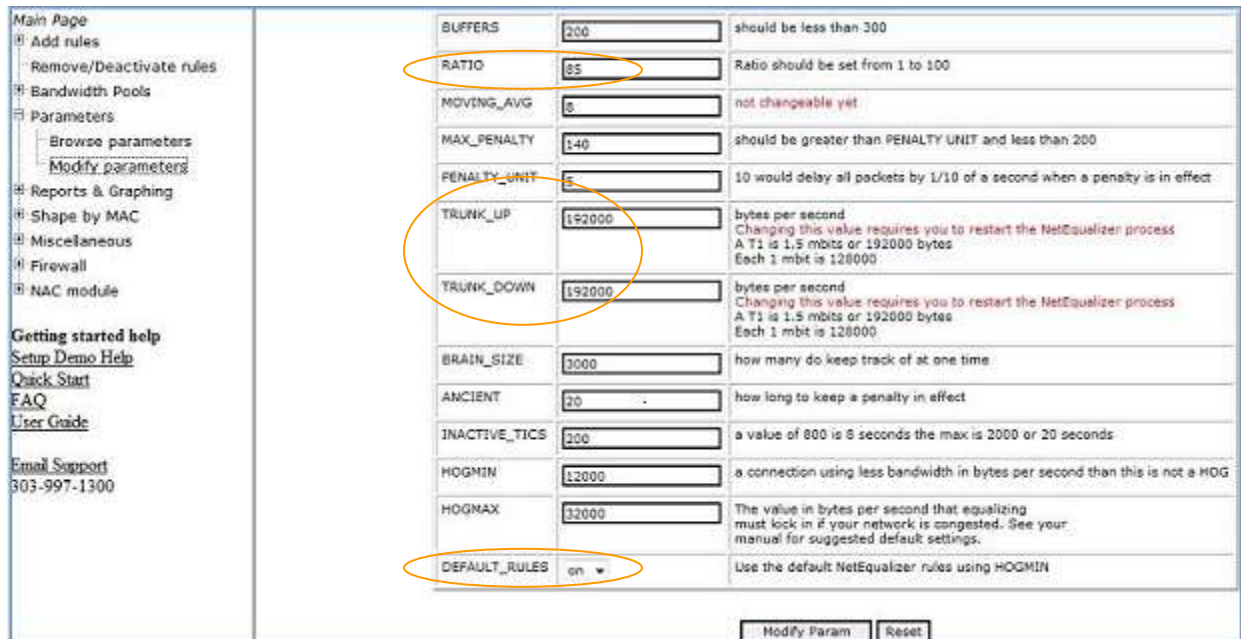
In addition, we offer a complementary review of your installation, once you have completed your configuration, to verify that you have optimized the NetEqualizer setup for your network environment.

Setting Up Equalizing

On the Main Page menu on the left-hand side of the screen,

Click on ->Parameters->Modify Parameters.

Figure 3: Modify Parameters Screen



BUFFERS	200	should be less than 300
RATIO	85	Ratio should be set from 1 to 100
MOVING_AVG	5	not changeable yet
MAX_PENALTY	140	should be greater than PENALTY_UNIT and less than 200
PENALTY_UNIT	5	10 would delay all packets by 1/10 of a second when a penalty is in effect
TRUNK_UP	192000	bytes per second Changing this value requires you to restart the NetEqualizer process A T1 is 1.5 mbits or 192000 bytes Each 1 mbit is 128000
TRUNK_DOWN	192000	bytes per second Changing this value requires you to restart the NetEqualizer process A T1 is 1.5 mbits or 192000 bytes Each 1 mbit is 128000
BRAIN_SIZE	3000	how many do keep track of at one time
ANCIENT	20	how long to keep a penalty in effect
INACTIVE_TICS	200	a value of 800 is 8 seconds the max is 2000 or 20 seconds
HOGMIN	12000	a connection using less bandwidth in bytes per second than this is not a HOG
HOGMAX	32000	The value in bytes per second that equalizing must lock in if your network is congested. See your manual for suggested default settings.
DEFAULT_RULES	on	Use the default NetEqualizer rules using HOGMIN

Set the Ratio Parameter

We first set the Ratio Parameter, which determines when equalizing kicks in. Note that the default ratio is set to “85”. This means that your network is considered congested when your traffic reaches 85%. Our default of 85% works for most networks. To be more aggressive, this can be set to 70-75%. To be less aggressive, raise it to 90%.

Set your Network Trunk

We need to tell the NetEqualizer how big your network trunk is. Equalizing decisions to balance your traffic are all based off of your trunk size. Note that as equalizing is bi-directional, you set both TRUNK_UP and TRUNK_DOWN.

TRUNK_UP = size of your *outbound* network pipe - traffic from the LAN to the WAN (Internet)

TRUNK_DOWN= size of your *inbound* network pipe - traffic from the WAN (Internet) to the LAN

Keep Default_Rules set to “ON”.

Finally, we make sure Default_Rules is set to “ON”. Default_Rules set to "ON" tells equalizing to kick in and shape your traffic. With equalizing turned on, the NetEqualizer monitors your traffic once a second. It remains a completely passive, pass-through device on your network, until your traffic peaks out at RATIO (85% percent utilization), and then Equalizing kicks in like your own personal network administrator, automatically shaping your network traffic.

At 85% saturation, you are at risk of what we call gridlock or brown out. When this happens all usage comes to an agonizing crawl and voice calls drop. The administrator within the NetEqualizer understands this behavior, and at 85% utilization it starts scanning all active connections on your network.

Each row in the table below depicts one active connection pair, that is, one local IP address on your network communicating with a remote IP address on the Internet. Row 2 below shows an actual live chat session between 10.0.0.19 and 192.168.0.34. Notice on row two that the column to the left labeled Wavg shows 70 bytes per second; this is a low bandwidth application. Contrast that with Row 3, this is a download of a large binary file from an Internet

site. Row 3 is using over 17 times the amount of bandwidth that the chat session is using, and is what we call a "bandwidth hog". These inequalities don't go unnoticed by our administrator. The NetEqualizer immediately takes action by creating a temporary policy to slow down the bandwidth hogs (large data users), so that all users get their fair share of the network.

This is equalizing in action. It is time-tested as the most effective way to keep your network operating smoothly.

Figure 4: View of Active Connections Table

SRCP	DSTP	Wavg	Avg	IP1	IP2	Prot
59100	17553	0	0	10.0.0.15	192.168.1.9	TCP 1
6348	59105	70	77	10.0.0.19	192.168.0.34	TCP 2
6348	59125	1252	640	10.0.0.126	192.168.1.218	TCP 2
58168	6348	72	88	10.0.0.110	192.168.0.14	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.3	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.24	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.32	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.51	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.64	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.79	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.84	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.12	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.34	TCP1
58168	6348	72	88	10.0.0.110	192.168.0.234	TCP1
58988	18331	50	62	10.0.0.19	192.168.1.9	TCP1

The NetEqualizer creators, through careful studies of hundreds of customer networks, have discovered a typical user base behavior. Most users consume their network resources diligently, occasionally downloading a file, using a print server or downloading a music file. Brown-out is almost always the result of a small percentage of active users monopolizing large amounts of bandwidth for non-urgent business.

Setting Connection Limits

In addition to equalizing, we also recommend turning on Connection Limits for individual IPs or for a subnet, to reduce peer-to-peer (P2P) traffic. Connection Limits work bi-directionally, limiting both inbound and outbound connections. This will prevent excessive connections from completely overwhelming your routers and access points, not to mention that they could be the major reason all your bandwidth is being consumed.

As you can see in our Active Connection Table above, IP 10.0.0.110 appears more than 10 times. This is indicative of possible P2P use. P2P applications can seek out 100's of remote sites on the Internet, running locally from a client on your network. This can completely overwhelm your routers and access points.

On the Main Page menu on the left-hand side of the screen

Click on ->Add Rules->Connection Limits.

You can set Connection Limits for one IP, or a whole Class B or Class C subnet. With one easy click you can inoculate your network from connection limit abuse.

Figure 5: Setting Connection Limits



Setting Hard Limits by IP, Subnet, VLAN, MAC address, or Pool

The NetEqualizer also enables you to limit bandwidth for particular users or entire groups of users. In addition to our revolutionary automated equalizing features, we provide a full feature set that allows you to set inbound and outbound bandwidth limits by IP address, entire subnets, VLANs, Pools, or user (MAC address).

On the Main Page menu on the left-hand side of the screen

Click on ->Add Rules->Hard Limit by IP.

Select Add Rules/Hard Limit by IP to set inbound and outbound limits by IP address, or Class B or Class C subnets. Note that all IPs in the range EACH get the defined inbound and outbound bandwidth.

Figure 6: Add Rules: Hard Limit by IP

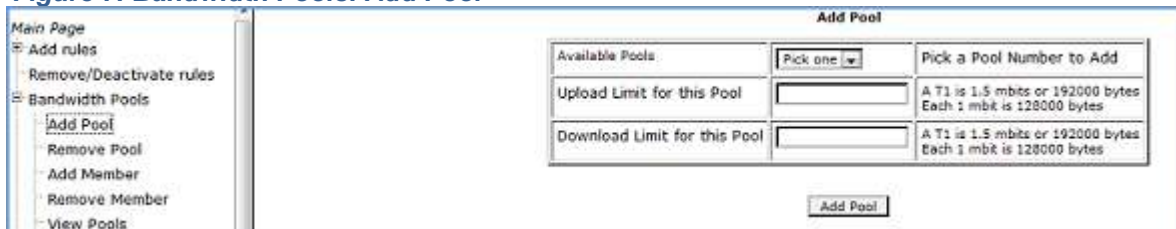


On the Main Page menu on the left-hand side of the screen

Click on ->Bandwidth Rules->Add Pool

Select Bandwidth Pools/Add Pool to set inbound and outbound limits by Pools, which enable all IPs within the Pool to share bandwidth. Note that all IPs in the range SHARE the defined inbound and outbound bandwidth.

Figure 7: Bandwidth Pools: Add Pool

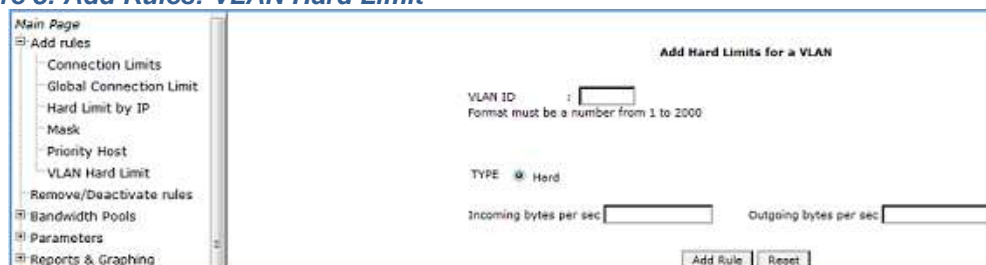


On the Main Page menu on the left-hand side of the screen

Click on ->Add Rules->VLAN Hard Limit

Select Add Rules/VLAN Hard Limit to set inbound and outbound limits by VLAN, which enable all IPs within the VLAN to share bandwidth. Note that all IPs in the range SHARE the defined inbound and outbound bandwidth.

Figure 8: Add Rules: VLAN Hard Limit



On the Main Page menu on the left-hand side of the screen

Click on ->Shape by MAC->Add MAC Limit

Select Shape by MAC/Add MAC Limit if you prefer to set inbound and outbound limits by MAC Address. Note that you can assign a username to each MAC address. Note that MAC addresses EACH get the defined inbound and outbound bandwidth.

Figure 9: Shape by MAC: Add MAC Limit



NetEqualizer Reporting

Reports & Graphing enables you to monitor your network traffic. We offer two types of reporting: 1) real-time monitoring and 2) historical reporting & trend analysis.

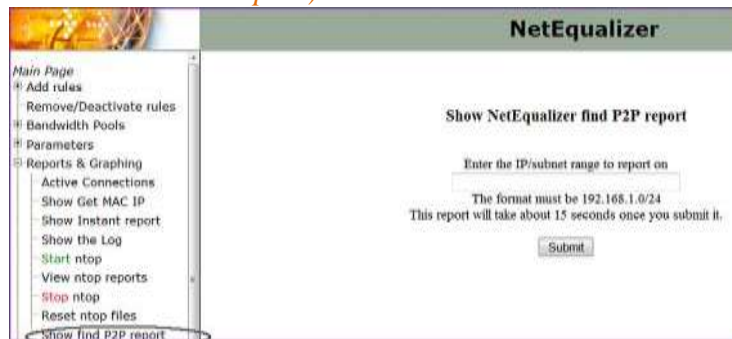
Real-time Monitoring

Our internal reports give you visibility into real-time network traffic and are used to get a sense of "what is going on now" on your network.

- *Active Connections* - See what connections are flowing through in at this moment.
- *The NetEqualizer Log* - See what traffic has been penalized (slowed down).
- *Show find P2P report* - Suspected P2P traffic. Shows IP addresses with a large number of connections.
- *Show Instant Report* - Check instantaneous, real-time bandwidth use for any IP address.

On the Main Page menu on the left-hand side of the screen

Click on ->Reports & Graphing->Show find P2P report (or Show the Log, Active Connections, Show Instant Report)



Historical Reporting & Trend Analysis

We utilize ntop, an open source toolset, for historical reporting and trend analysis. Ntop is configurable and provides you with data in both tabular and graphical formats. If you are not familiar with ntop, and would like to learn more, you can read an overview on their website at <http://www.ntop.org/overview.html>.

Several of the key reports are highlighted here:

- *ntop Summary Hosts Report*
This report shows all IP addresses and the bandwidth that they are consuming. Useful in identifying IP addresses that are your large bandwidth hogs.
- *ntop Summary Traffic Report*
Good report for those that like to see charts depicting network traffic.
- *ntop IP Summary Traffic Report*
Shows traffic by IP in amount of data (KB) and percentage of your overall network used. Quantifies type of traffic (http, ftp, proxy, snmp, Kazaa, Gnutella, etc.)

If you want to store historical data for analyzing trends, or already have a separate reporting server, you can dump data periodically from the NetEqualizer to load your data warehouse/reporting server.

In the example below, you can see our “Show NTOP Host Report”, which enables you to review bandwidth consumption for each IP on your network.

On the Main Page menu on the left-hand side of the screen

Click on ->Reports & Graphing->Show NTOP host report

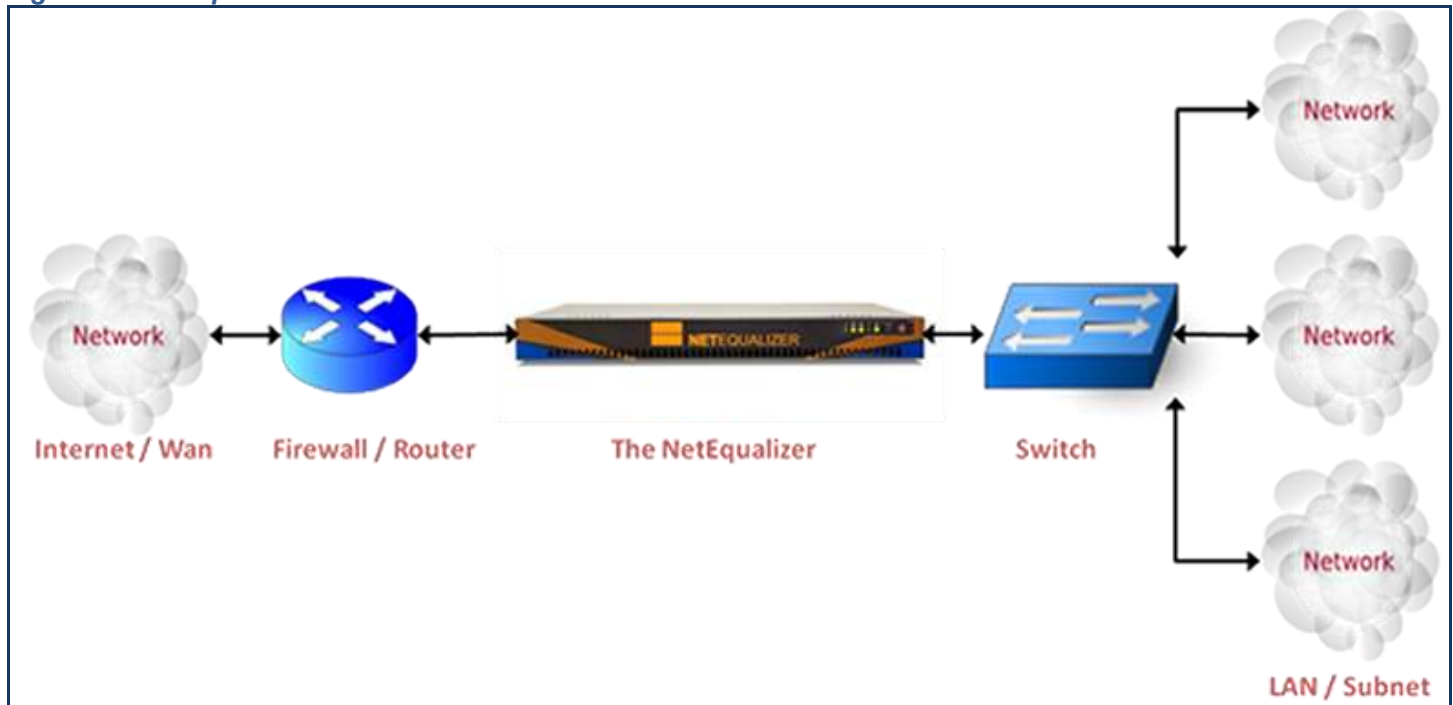
Figure 10: Reports & Graphing: Show NTOP host report



Where to Install the NetEqualizer

The NetEqualizer operates as a Transparent Bridge on your network. There is typically no need to change anything in your network configuration to install the appliance. Simply install the NetEqualizer between your Firewall/Router and Network Switch, or anywhere on your network that you can "see" the individual IP addresses and bandwidth that you want shaped. Once installed, you will use the Factory Default Settings to access it via a web Graphical User Interface.

Figure 11: NetEqualizer Installation



Congratulations!

You made it through the Product Demonstration Guide.

*If you had your own NetEqualizer, it would be up & running now,
automatically solving your network congestion.*