



Quick Start Guide

(Actual Passwords have been xxxxx'd out for this Demo Quick Start Guide)

Author's Note:

Congratulations on your NetEqualizer purchase! You are now on your way to achieving "Faster Networks, With Zero Maintenance, At The Best Prices". In fact, many network administrators find that they can set-up and configure a NetEqualizer on their network in one (1) hour or less.

However, if you have any questions that you need help with during your installation, our Support Team is here to help you. Please call Support at 303.997.1300 x102 or send an email to support@apconnections.net.

After you have completed your installation, if you would like a **complimentary review of your NetEqualizer configuration**, please run **Miscellaneous->Run Live System Diag**, and then email the results to support@apconnections.net. We would be happy to verify that you have optimized the setup for your network.

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Factory Default IP Settings

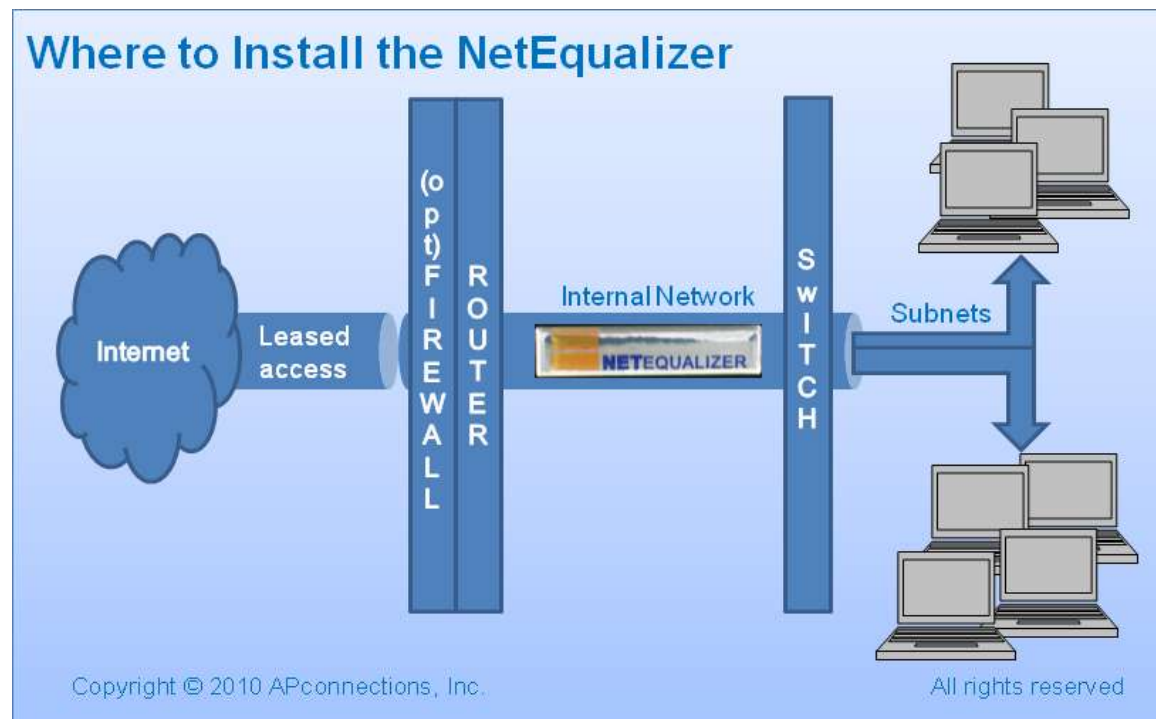
The IP settings to access the NetEqualizer web Graphical User Interface (web GUI) have been set to:

IP Setting	Parameter Name	Factory Default
web GUI IP Address	BRIDGEIP	192.168.1.143
web GUI Netmask	BRIDGENETMASK	255.255.255.0
web GUI Gateway	BRIDGEROUTE	192.168.1.1

Note: The IP address for the NetEqualizer is used to access the web GUI (for management purposes only). All factory default settings can be changed from the web GUI.

Installing 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.



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Step #1: Cabling the NetEqualizer into your Network

All of the NetEqualizer models (series 2000/3000/4000 and POE) have two Ethernet interfaces. They are labeled WAN and LAN on the POE units. For the series 2000/3000/4000, please see the diagram below. If you have requested and received a factory-installed 3rd NIC on your NetEqualizer, the WAN and LAN interfaces may not match the picture below. Please call Support at 303.997.1300 x102 or send an email to support@apconnections.net to get help with your set-up.

First, make sure that you **power on the NetEqualizer**. Do this by pressing the red power button to the right of the LED panel.

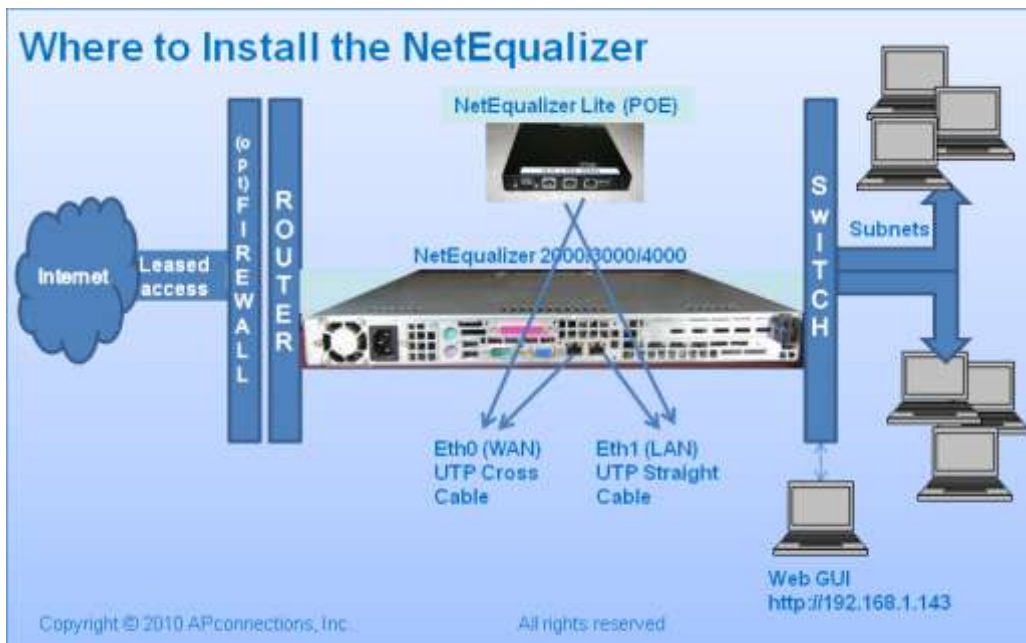
Plug a UTP *cross cable* into the port labeled Eth0 (WAN) on the diagram below (Eth0 is the port closest to the fan on the machine) and connect it to the Firewall/Router. If you have an auto-sensing Firewall/Router, you can use a straight cable or cross cable.



Plug a UTP *straight cable* into the port labeled Eth1 (LAN) on the diagram below (Eth1 is the port furthest from the fan) and connect it to your Network Switch.

Once your machine is on & connected, you should see green lights in the Power LED, Eth0, and Eth1 LEDs.

Note: We recommend that you install your NetEqualizer on a UPS, to protect from power surges and outages.



Step #1A (optional): Access Point Configuration in a Wireless Network

Put your radios in bridging mode and set your Firewall/Router at your head end to do DHCP and NAT, instead of doing DHCP and NAT at your Access Points.

Step #1B (optional): Setting LAN Port Speed and Duplex

Occasionally, customers need to manually set LAN Port Speed and Duplex as some Firewall/Routers do not auto-negotiate correctly with the NetEqualizer. If this is happening in your environment, you will see a large number of collisions and dropped packets as well as reduced network throughput. Although dropped packets are not a good thing, if you are seeing less than 1/10 of a percent (< 0.1%) of the total packets transmitted it will have no adverse effect on your network. If it starts to approach 1 percent (1%), you should see **User Guide Appendix #2** for detailed steps to set this in your environment.

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Step #2: Changing the NetEqualizer Default IP settings & Password

Once the NetEqualizer is powered on and plugged in to your network, you need to access the web GUI to configure it. The web GUI is accessible out-of-the-box via the factory default IP address: <http://192.168.1.143>. You can use any PC that is connected to your internal network to get to the web GUI.

Note: If you are on a VLAN, you will need to set-up an untagged Management Port for administration on a two port system. Please call Support at 303.997.1300 x102 or send an email to support@apconnections.net to get help with setting up a Management Port for a VLAN.

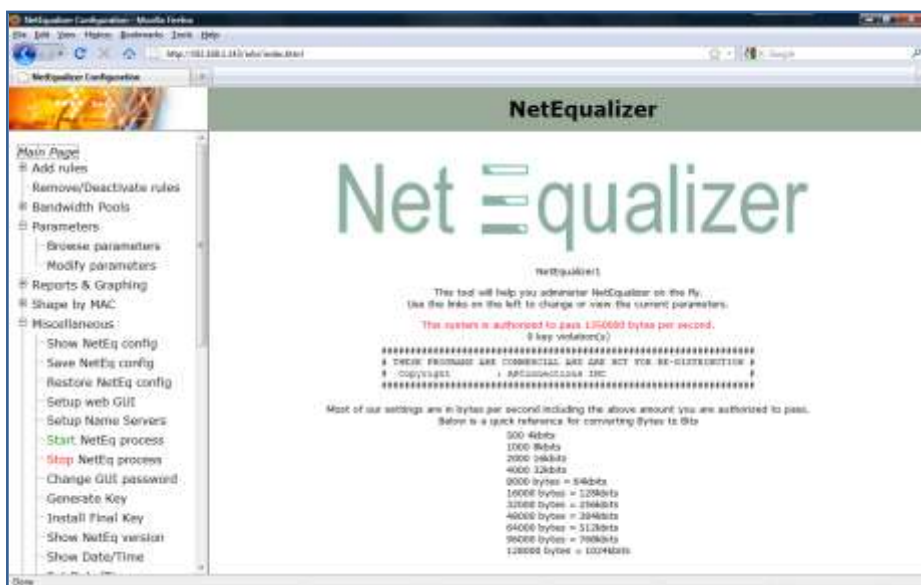
Step #2A (recommended): Changing the Default IP settings

First, login to the NetEqualizer:

Use the factory default IP address:
<http://192.168.1.143>.

Then login using the factory default administrative username and password:
Username = "xxxx" and
Password = "xxxx".

You should now be logged in and see the Main Menu, as shown at right.

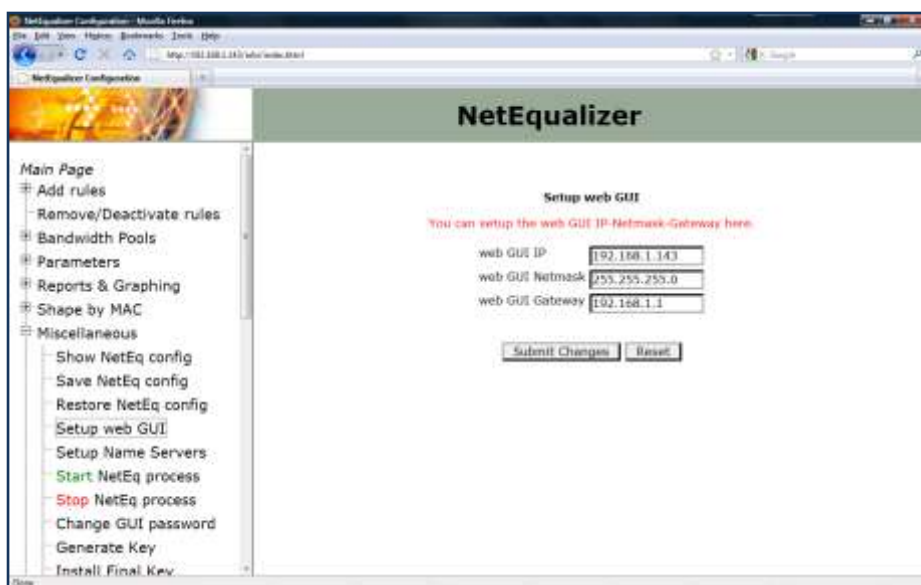


To Change the Default IP settings from the defaults:

Click on **->Miscellaneous->Setup web GUI**. The following screen comes up.

Type in new values to change the web GUI IP address, (*BRIDGEIP) Netmask (*BRIDGENETMASK) Gateway (*BRIDGEROUTE).
(* These are the parameter names shown in the NetEq config file.

To save your changes, Click on **->Submit Changes**, and then to have your changes take effect, Click on **->Miscellaneous->RESTART the Machine**. Once restarted, please wait 1-3 minutes for the NetEq process to reload.
To discard your changes, Click on the **Reset** button.



Note: As the old GUI IP address is no longer valid, you will now need to login from your new GUI IP address.

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Step #2B (recommended): Changing the Default Password

We recommend that you change the Password.

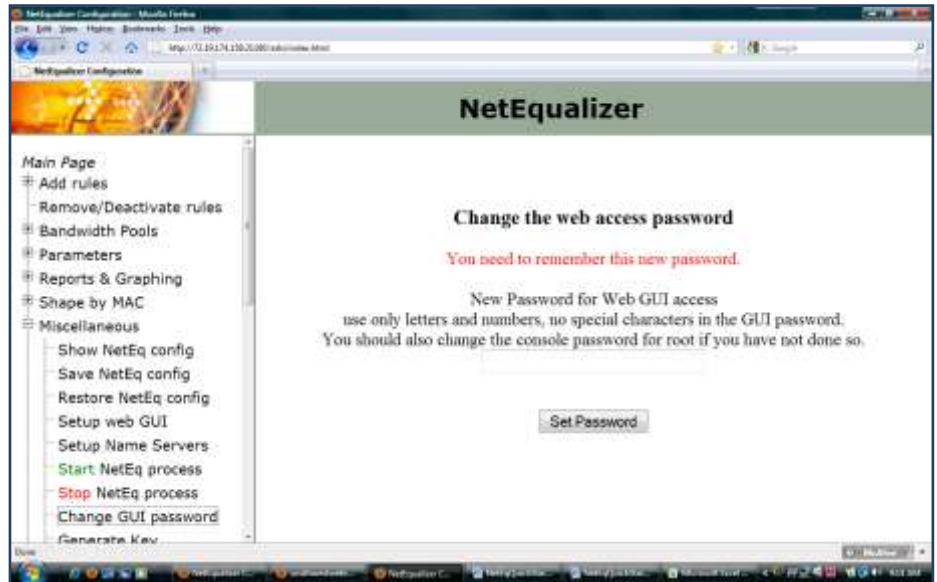
To Change the Default web GUI Administrative Password:

Click on **->Miscellaneous->Change GUI password**. The following screen comes up.

Please note that you can ONLY USE LETTERS AND NUMBERS. Do NOT use Special Characters.

Once you have set the password, Click on **->Set Password button** to save your changes.

If your change was accepted, you should see "Changing password for user neteq. Your request is complete."



Note: If you ever forget your web GUI password, you cannot retrieve it from the NetEqualizer. You will need to email support@apconnections.net or call us at 303.997.1300 x102 with your serial # and we will send you the procedure to reset it.

Step #2C (required): Changing the SSH Password

For security reasons, **we highly recommend that you change your SSH password from the default.** Use an SSH client that supports secure shell version 2, like PuTTY.

Login in as **xxxxx**

The password has been pre-set to **xxxxx**

From the keyboard or SSH type **passwd** to change the password for the Console/SSH access for the user root.

Note: Once you change the root password, you will be prompted to enter your new password before making other changes to your NetEqualizer.

Follow the prompts for the new password change.

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Step #3: Installing Your Final Key

In order to use the NetEqualizer on your network, you need to have an authorized Final Key from APconnections, Inc. Once you have determined that a Final Key is not installed, to create a Final Key is a two step process.

Note: In most cases the NetEqualizer Final Key is NOT INSTALLED upon shipment. You should plan to email a Generated Key and Serial Number to support@apconnections.net and then expect an email in return with your Final Key.

Step #3A (required): Checking if Your Final Key is Installed

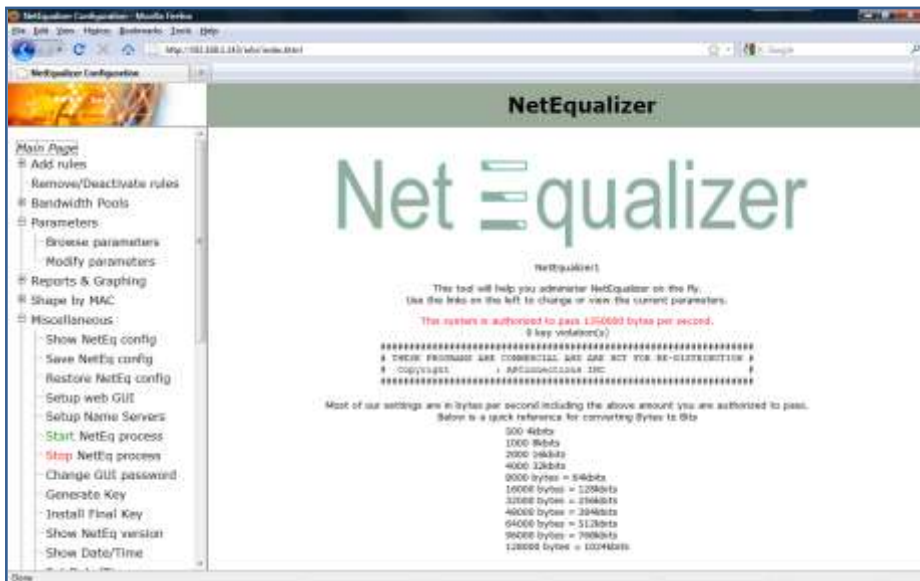
You must install a final key if one is not already installed. You can check this by going to the Main Page of the web GUI and it will say how many bytes per second the unit is authorized for. This should match the license key that you purchased.

If it is still set to the Factory Default, you will see the following...

"YOU DO NOT have a final key installed!"

Otherwise, you should see something like this... This example is for the NE2000-10.

"This system is authorized to pass 1350000 bytes per second." See table below to determine what value you should see, based on your license level.



Note: Factory default setting is 5000. If you see this, your Final Key is either not installed or not valid.

#3A. Main Menu Display of Bytes Per Second for each Model

Model	Licensed Mbps/Gbps	Bytes per Second	Main Menu display shows...
Factory Default	None	5,000	5000
NETEQ-POE	10	1,280,000	>= 1280000
NE2000-4	4	512,000	585000
NE2000-10	10	1,280,000	1350000
NE2000-20	20	2,560,000	2700000
NE2000-50	50	6,400,000	7000000
NE2000-100	100	12,800,000	12800000
NE2000-150	150	19,200,000	20000000
NE3000-100	100	12,800,000	12800000
NE3000-150	150	19,200,000	20000000
NE3000-350	350	43,750,000	46000000
NE3000-1GB	1	125,000,000	>= 125000000
NE4000-5GB	5	625,000,000	>= 625000000

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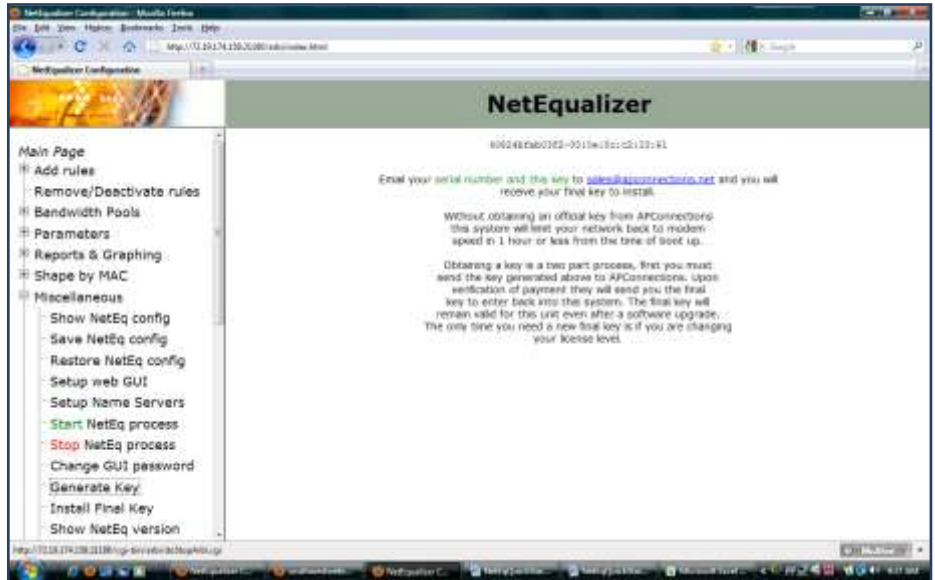
Step #3B (required): Requesting your Final Key

From the Main Page...

Click on ->**Miscellaneous**->**Generate Key**.

The following screen comes up.

Email the Generated Key and your unit's Serial Number (found on the side of the unit) to sales@apconnections.net. Using this information, we will email you a Final Key, usually within one (1) hour during normal Business Hours.



Step #3C (required): Installing your Final Key

Once you have received your Final Key, you must install it on the NetEqualizer.

From the Main Page...

Click on ->**Miscellaneous**->**Install Final Key**. The following screen comes up.

Type in your Final Key and Click on the **Install Key** button.

The screen will now show the # of bytes per second your NetEqualizer is licensed for pass.

You can also check that your Final Key was accepted by going to the Main Page of the web GUI. It should now show bytes per second the unit is authorized for. This should match the license level that you purchased.



Note: If the bytes per second doesn't say something higher than 5000, then your key is not good. Contact sales@apconnections.net to get a new key.

See "Main Menu Display of Bytes/Second for each Model" Table under #3A to help in your validation.

Step #4: Setting Up Equalizing

The next step in setting up your NetEqualizer is to establish the values for **Key Parameters** needed to Equalize on your network. You can also set up Optional Parameters, if appropriate for your configuration. The Key Parameters are used as follows in Equalizing:

1. **RATIO** determines when Equalizing should kick-in.
2. **TRUNK UP** and **TRUNK DOWN** are set to the size of your network pipe. As we equalize bi-directionally, we need both.
3. When **Default Rules = ON** (Equalizing), look at every connection (IP pair) in the BRAIN table (viewable by looking at the Show Active Connections under Reports) and put a PENALTY on those that are over **HOGMIN**.
4. Continue this process until we no longer need to equalize (bandwidth used has dropped below **RATIO**).

Note: Equalizing automatically gives connections < HOGMIN priority, while connections > HOGMIN are slowed down by adding latency.



Step #4A (required): Key Parameters for Equalizing: Setting Trunk Size, Ratio, and Hogmin

In order to start Equalizing, you are required to set up the following parameters. After you change these settings, **Click on ->Modify Param** button to save your changes or **Click on ->Reset** button to discard your changes.

You will also need to stop and then restart the NetEq process once you set TRUNK_UP and TRUNK_DOWN. **Click on ->Miscellaneous->Stop NetEq Process** and then **Click on ->Miscellaneous->Start NetEq Process**.

Once complete, to validate your changes are in place, **Click on ->Browse Parameters**.

Parameter	Unit	Default Value	What you can set to...	Tips
Key Parameters to Set for Equalizing				
RATIO	Percentage	85	1-100	Default of 85% works for most networks. To be more aggressive, use 70 or 75%. To be less aggressive, raise it to 90%.
TRUNK_UP	Bytes per second	192000 (T1)	<i>Size of your outbound network pipe. Traffic from the LAN to the WAN (Internet).</i>	Convert Mbps or Gbps to Bytes per second. Conversion Formulas: = Mbps/8 * 1,024,000 =(Gbps*1,000)/8 * 1,024,000
TRUNK_DOWN	Bytes per second	192000 (T1)	<i>Size of your inbound network pipe. Traffic from the WAN (internet) to the LAN.</i>	Convert Mbps or Gbps to Bytes per second. Conversion Formulas: = Mbps/8 * 1,024,000 =(Gbps*1,000)/8 * 1,024,000
HOGMIN	Bytes per second	12000 (96 kilobits)	<i>For networks of size: <100Mb 12000 ≥100Mb & < 1Gb 20000 ≥1Gb 40000</i>	Default of 12000 (96kbps) is set so that VoIP, email, chat, and web surfing is below HOGMIN.
DEFAULT_RULES	On/Off toggle	On	<i>Leave at Default of "On".</i>	Must be "On" for Equalizing to kick in. Turn off during installation if you want to run throughput tests.

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Step #4B (optional): Additional (Optional) Parameters for Equalizing

You may also need to tune your **PENALTY_UNIT** and **BRAIN_SIZE** to optimize for your network pipe.

After you change these settings, *Click on ->Modify Param button* to save your changes or *Click on ->Reset button* to discard your changes.

Additional (Optional) Parameters				
Parameter	Unit	Default Value	What you can set to...	Tips
MOVING_AVG	Number of Seconds	8	<i>Recommend you do not change from Default value.</i>	
MAX_PENALTY	Hundredths of seconds	140	<i>Rarely changed from Default value.</i>	Should be greater than PENALTY UNIT and less than 200.
PENALTY_UNIT	Hundredths of seconds	5	<i>For networks of size:</i> <i>< 5Mb</i> 5 - 6 <i>>= 5Mb to < 45Mb</i> 2 - 3 <i>>= 45 Mbps</i> 1	The faster the trunk the less radical the PENALTY should be and PENALTY_UNIT will adjust that. For example, 10 would delay all packets by 1/10 of a second when a penalty is in effect.
BRAIN_SIZE	Number of Connections (IP pairs) to track in one (1) second.	10000	<i>For networks of size:</i> <i>< 1Gb</i> 10000 <i>>= 1Gb & < 5Gb</i> 20000 <i>>=5 Gb</i> 30000	How many IP pairs to keep track of at one time during any given second.
ANCIENT	Seconds	20	<i>Rarely changed from Default value.</i>	Should not need to change. How long to keep a penalty in effect.
INACTIVE_TICS	Hundredths of seconds	200	<i>100-800</i>	1 (100) to 8 (800) seconds.

Step #5: Controlling Peer-to-peer Traffic (P2P)

Many customers have an overload of connections on their network due to file sharing applications. To alleviate this problem, we suggest setting Connection Limits, which can be set-up to apply to a single IP or an entire Class B or Class C subnet. We recommend monitoring your installation for several days before setting Connection Limits. That way, you can better understand how many inbound and outbound connections you need to support valid activities on your network. For example, some online games require 60 or more total connections, without being peer-to-peer traffic. If you wish to allow this type of activity, you would need to set your connection limits to 60.

Step #5A (optional): Set Individual Connection Limits Monitoring Connections

You can monitor connections using the following command. In this example, we are looking at users with > 10 connections. You can change this value. **Click ->Miscellaneous->Run a Command type in: /art/count 10**

Set Individual Connection Limits

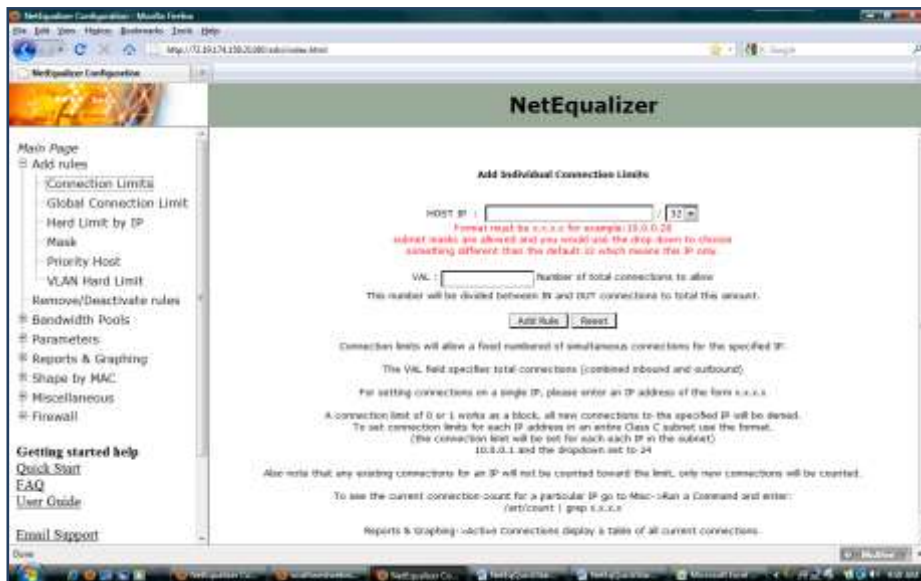
Click->Add Rules->Connection Limits.
The following screen comes up.

Type in your IP address or range.
To set for a Class B subnet, use /16.
To set for a Class C subnet, use /24.

Click on ->Add Rule button to save your changes or **Click on ->Reset button** to discard your changes.

To check that your changes have been applied, **Click->Miscellaneous->Show NetEq config.** You will see one line in your configuration file for each Connection Limit that you have set.

Note: Connection Limits apply to all IP's within the range specified, even those that are set up as a Priority Host - but will NOT apply to MASKED IP addresses.



Step #5B (not recommended): Setting Global Connection Limits

We recommend that you do NOT use Global Connection Limits. We believe that this is better handled through Individual Connection Limits, and plan to demote this function in the future. The reason is that as Global Connection Limits are bi-directional, we found that popular sites (such as yahoo.com, facebook.com) could get limited inadvertently when many users all access the same outbound IP address.

If however you would like to enable Global Connection Limits, you MUST read the following paragraph!

If you have a server or service that requires additional connections (a DNS server for example) above what you want to have for a Global Connection Limit, then set an Individual Connection Limit for this IP first before setting up your Global Connection Limit. Set the value for this Individual Connection Limit to a very high value, like 3000. Global connection limits must be the last connection rule in the configuration file, so if you need to add additional special connection limits for more DNS servers or web servers then you must use **Remove/Deactivate rules->Global Connection Limits** and then add them back after your changes. The configuration file is read top down, so you want the Global Connection Limit to handle all the connections that are not directly specified above it.

Congratulations!

Your NetEqualizer should now be up & running, actively managing your network congestion.

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Step #6: Validating & Backing Up Your Configuration

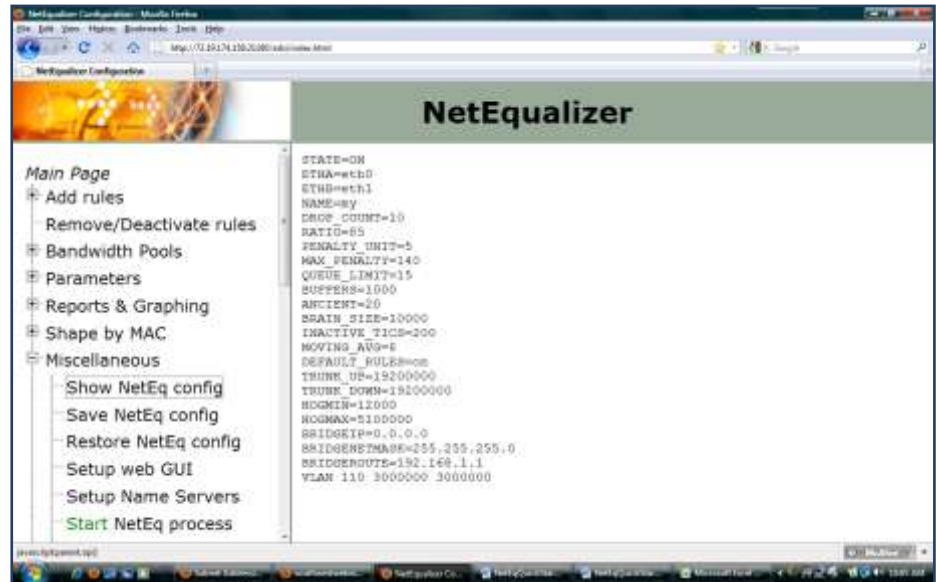
Step #6A (recommended): Validating Your Configuration Settings

From the Main Page...

Click on **->Miscellaneous->Show NetEq config**. The following screen comes up.

Print out your configuration. You can use **Appendix #A2: Validate Your Configuration and Troubleshooting** section to help double check your set-up.

If you would like us to review your configuration, **Click on ->Miscellaneous -> Run Live System Diag** and paste the results into an email with the subject: "Check My Configuration" and mail to support@apconnections.net. We will call or email you to go through your configuration settings.



More Validation Resources

User Guide

<http://www.netequalizer.com/manuals/UserGuide.pdf>

FAQ Guide

<http://www.netequalizer.com/tsfaq.htm>

Support Archives

<http://netequalizernews.com/netequalizer-support-archives/>

Advanced Tips & Tricks

<http://netequalizernews.com/netequalizer-advanced-tips-tricks/>

Step #6B (recommended): Backing Up Your Configuration Settings

Now that you have validated your setup, we recommend that you Backup Your Configuration.

While we include a backup CF card with each NetEqualizer shipped, this does not contain your custom configuration settings.

From the Main Page...

Click on **->Miscellaneous->Save NetEq config**. The following screen comes up.

To back up your configuration, **Click on ->Download Config button**. Save the **NetEq.cfg** file to a backup location.



Appendix A

Appendix #A1: Viewing Traffic

Once the NetEqualizer is inline on your network, you can view what is happening in several ways:

Active Connections

From the Main Page...

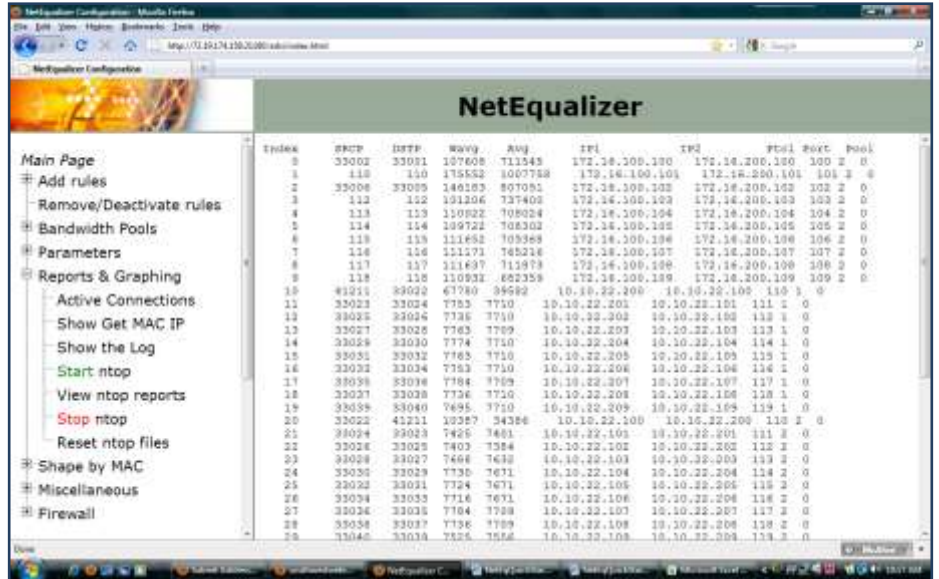
Click on->**Reports & Graphing->Active Connections**. The following screen comes up.

This is a live look at the brain table of the NetEqualizer. This gives you a sense of who are your network "hogs". You can see your network "hogs" by looking for IP pairs with Wavg >12000.

Number of Connections

You can monitor connections using the following command. In this example, we are looking at users with > 10 connections. You can change this value.

Click ->**Miscellaneous->Run a Command type in: /art/count 10**



NetEqualizer Log

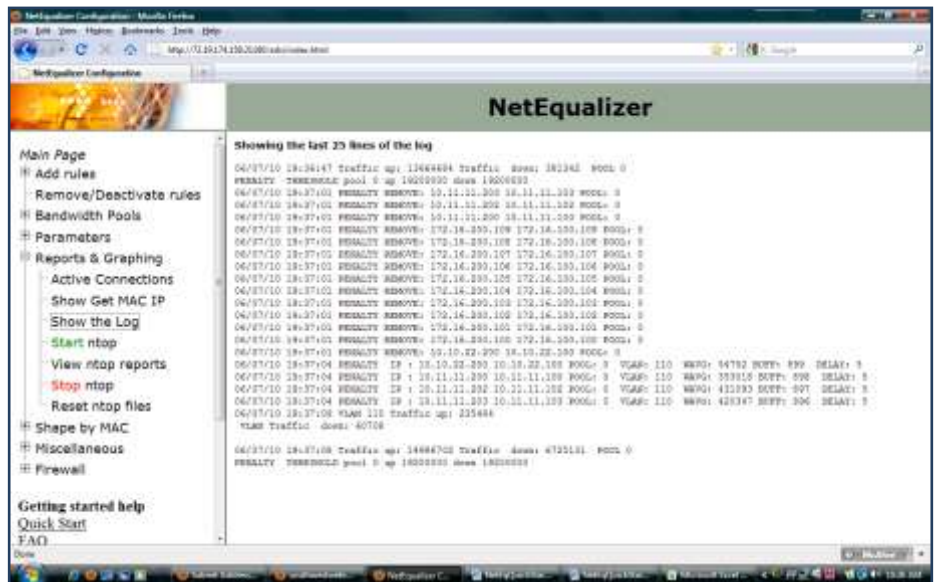
From the Main Page...

Click on ->**Reports & Graphing->>Show the Log**. The following screen comes up.

Here you can see what connections are being made and if anything is currently being given a penalty.

In this example, penalties are being taken off traffic where it says "PENALTY REMOVE". Penalties are being applied where it says "PENALTY".

You may also see "INCREASE PENALTY" and "PENALTY DECREASE" in your log, which both show how penalties are being applied to traffic.



If you are under RATIO on your network, you will not see penalties being applied.

Note: The line with the words PENALTY THRESHOLD is NOT a penalty. It is for informational purposes only.

Appendix #A2: Validate Your Configuration & Troubleshooting

Below are some quick checkpoints that we recommend to validate your configuration, followed by a brief troubleshooting guide.

Validate Your Configuration

1. Make sure TRUNK_UP and TRUNK_DOWN are set correctly for your bandwidth, and are in bytes per second.

Conversion Formulas:

If you have Mbps: Bytes Per Second = Mbps/8 * 1,024,000
If you have Gbps: Bytes Per Second = (Gbps*1,000)/8 * 1,024,000

2. Check that HOGMIN is set to at least 12000 if you want applications like VoIP to flow freely. You can increase the size of HOGMIN, based on your network pipe size. For networks of size:
 - a. < 100Mb 12000
 - b. >= 100Mb & < 1Gb 20000
 - c. >= 1Gb 40000
3. Make sure that your BRAIN_SIZE is set correctly, based on the size of your network. Depending on how many users you have and their activity, you may need to increase this. For networks of size:
 - a. < 1Gb 10000
 - b. >= 1Gb & < 5Gb 20000
 - c. >=5 Gb 30000
4. If you feel you're penalizing too harshly then reduce your PENALTY_UNIT. The faster the trunk the less radical the PENALTY should be and PENALTY_UNIT will adjust that. For example, 10 would delay all packets by 1/10 of a second when a penalty is in effect. For networks of size:
 - a. < 5Mb 5 - 6
 - b. >= 5Mb to < 45Mb 2 - 3
 - c. >= 45 Mbps 1
5. Set Individual Connection Limits for special servers like DNS or Web Servers before using Global Connection Limits. Set to a high value, such as 3000. You can also MASK (see User Guide) off local traffic so that it will not be shaped.
6. Always make sure Global Connection Limits are the last rule set. If necessary, Remove the Global Connection Limit and then add it back in after setting Individual Connection Limits. You can check this by viewing your configuration file in Miscellaneous/Show Config. Your Global Connection Limits will be the two (2) rules with '999999' in them.
7. Key violations occur when you go over your total bandwidth throughput licensed on the NetEqualizer. For example, if you have a 10Mbps license, you are allowed to pass up to 10Mbps in and 10Mbps out. If your NetEqualizer is connected to a switch or router or firewall at more than 10Mbps (such as 100Mbps or 1Gbps connection), it is possible for some local machine on one side to try talking to another one of your local machines on the other side at this higher speed. In order to stay within your license, you have several options: 1) (preferred) you can MASK this local traffic (see User Guide "Masking Off Traffic") or 2) you can lock down your NetEqualizer ports (see User Guide Appendix #2).

Troubleshooting

If you do not see enough traffic flowing through your network...

try #1

If you want to shape less strictly (let larger types of traffic through)...

try #2

If you think that shaping is too severe or too lenient...

try #4

If you have local traffic going through the NetEqualizer....

try #5

If Connection Limits are limiting too much...

try #6

If you are seeing "Key Violations" messages on the Main Screen...

try #7