



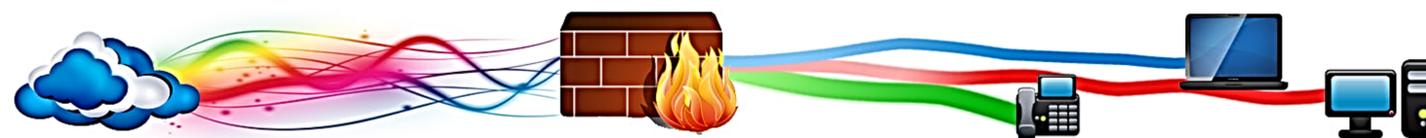
# pfSense Traffic Shaping: Advanced Traffic Management



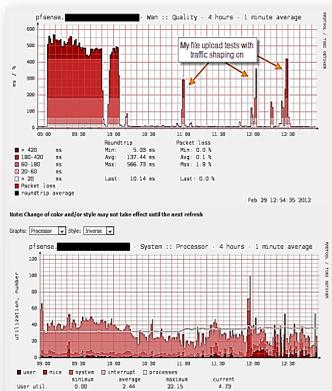
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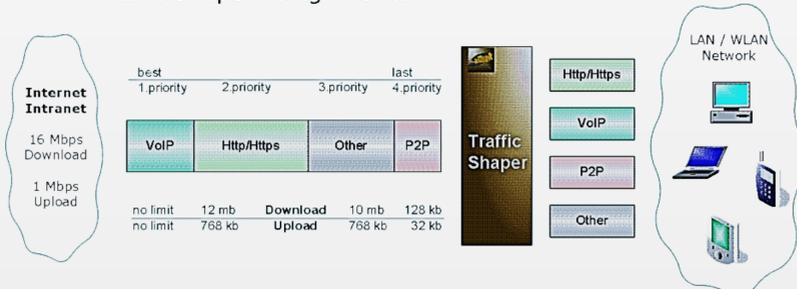
## Introduction



Implementing traffic shaping on your network is like taking all of the traffic in a traffic jam and slamming it to either side of the road so you have free reign to blaze a path at light speed. There are three major variations of traffic shaping.

In our implementation we used Hierarchical Fair Service Curve (HFSC).

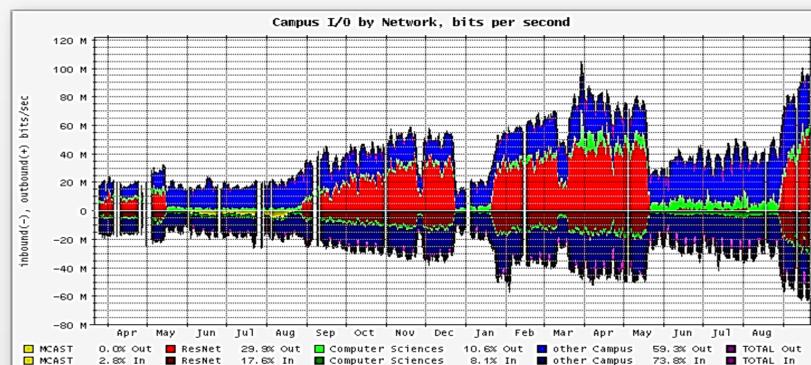
Traffic Shaper using Firewall



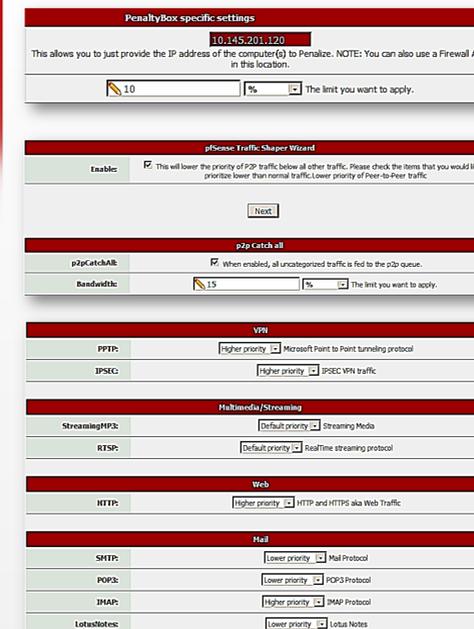
## Class Based Queuing

Class Based Queuing (CBQ) is a queuing algorithm that divides a network connection's bandwidth among multiple queues or classes. Each queue has traffic assigned to it based on source or destination address, port number, protocol, etc.

CBQ queues are arranged in a hierarchical form. At the top of the hierarchy is the root queue which defines the total bandwidth. Child queues are created under the root queue, each are assigned to part of the root queue's bandwidth.



## Implementation



**IP Penalty Box**- Define bandwidth limits based on IP address.

**P2P Catch All**- Allocate bandwidth percentages for P2P traffic, or any unclassified traffic

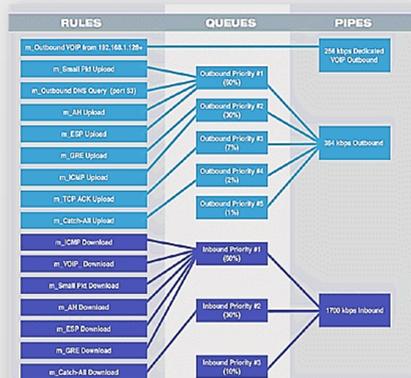
**Service Specific Shaping**: Shape traffic to allow specific protocols (Such as DNS, HTTP, even games) in low, medium, or high queue.

## Hierarchical Fair Service Curve

Normal QoS gives traffic priority on a per session basis. HFSC Packet Shaping takes QoS to the next level by focusing on *guaranteed* real-time, adaptive best-effort, and hierarchical link-sharing last.

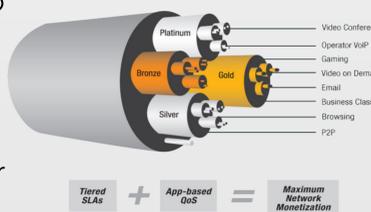
HFSC is based on an algorithm used mostly on Unix operating systems.

HFSC is the first QoS algorithm to support all three of real-time, adaptive best-effort, and link-sharing services.



## Priority Queuing

PRIQ assigns multiple queues to a network interface with each queue being given a priority level. A queue with a higher priority is *always* processed ahead of a queue with a lower priority.

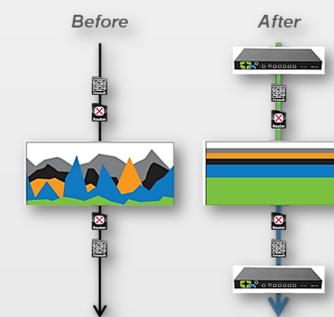


The queuing structure in PRIQ is flat -- you cannot define queues within queues. The root queue is defined, which sets the total amount of bandwidth that is available, and then sub queues are defined under that root.

## Results and Outcome

Without traffic shaping, traffic is capped or carried on a priority basis, causing inconsistencies.

pfSense traffic shaping takes network traffic and reserves amounts of bandwidth for specified services; this makes throughput *much* smoother.



## Sources Cited

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