

Bandwidth Management & Optimization

Opensource Tools & Solutions

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BWM Tools

- Userspace utility, no kernel patches
- XML format configuration file
- Utilizes iptables (nfm Mark value) for traffic classification
- Built-in firewall support
- Logging of traffic stats to file
 - Native & RRDTool format
- Built-in graphing support
- Supports flow bursting & complex flow hierarchies
- Live monitoring of traffic

BWM Tools

- Written in C
- Licensed under GPL v2
- Research began in 2001, public release on freshmeat in 2003Q2
- Threaded design
- Utilizes netlink and the QUEUE target
- Packet “headers” are copied to userspace, inspected, re-ordered and re-queued for acceptance or rejection

BWM Tools

- Configuration file
 - Global section
 - Supports loading of iptables kernel modules
 - Class based traffic matching
 - ACL section (firewalling)
 - NAT section (network address translation)
 - Traffic section (traffic shaping)

BWM Tools

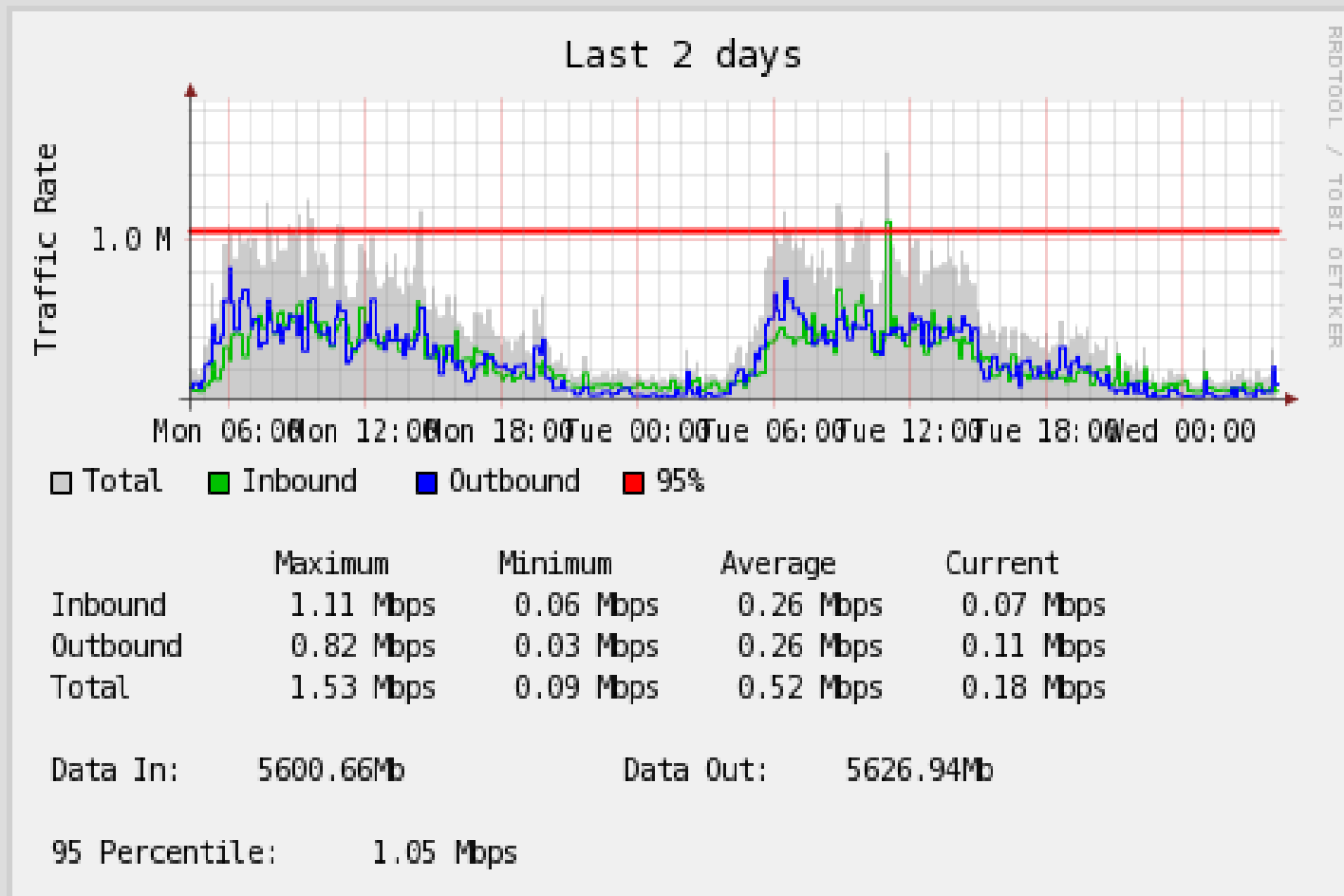
- Configuration file example

BWM Tools

- Logging of the following counters
 - bytes
 - packets
 - bursted packets
 - dropped packets

BWM Tools

- Graphing example using logging to RRD



BWM Tools

- Complex traffic flow specification
 - Bursting
 - Parent flow thresholds
 - Queue size and length control
 - Prioritization of traffic
 - Active queue management (RED like), S. Floyd
 - Grouping of flows for graphing and reporting

BWM Tools

- Flow hierarchy example

```
<flow name="line_in" max-rate="32000">  
  <flow name="p2p_traffic_in" max-rate="8000" burst-ate="24000"  
    nfmak="100">  
    class_p2p_traffic_in  
  </flow>  
  <flow name="vnc_in" max-rate="24000" burst-rate="32000">  
    <queue prio="1" nfmak="101">  
      class_vnc_in  
    </queue>  
  </flow>  
</flow>
```

BWM Tools

- Live monitoring of traffic flows

```
BWM Monitor vdevel - Copyright (c) 2003-2005 Linux Based Systems Design
```

- saix_in
- dst
- dst
- web_dst
- shell_dst
- corp_in
- dst
- mail_pop3_dst
- mail_smtp_dst
- proxy_dst
- webs_dst
- dns_dst
- radius_dst
- farming_in
- dst
- dst
- sandiego_vpn_dst
- saix_out**
- src
- src

Traffic Flow: saix_out

Limits:

Max Rate :	30000	Burst Rate:	-1
Queue Len:	38	Queue Size:	29999

Current:

Rate :	8313	Rate Avg :	9370
Pkt/s :	35	Pkt/s Avg :	28
Queue Len:	0.00%	Queue Size:	0.00%
Bursts :	0	Drops :	0

Press any key to quit...

BWM Tools

- Layer-7 capability using l7-filter
- IPv6 support
- High availability using ha and ct_sync
- Support for IPv6
- Routing using quagga
- Compatible with hipac

BWM Tools

- IBM iseries porting project winner '03
- Actively developed and supported by the opensource community, currently over 8 key contributors
- Fairly complete 203 page manual available
- Currently looking to implement additional active queue management techniques & bandwidth control ideas (ECN, window sizes, TBF, SFQ CBQ)

BWM Tools

Case Studies

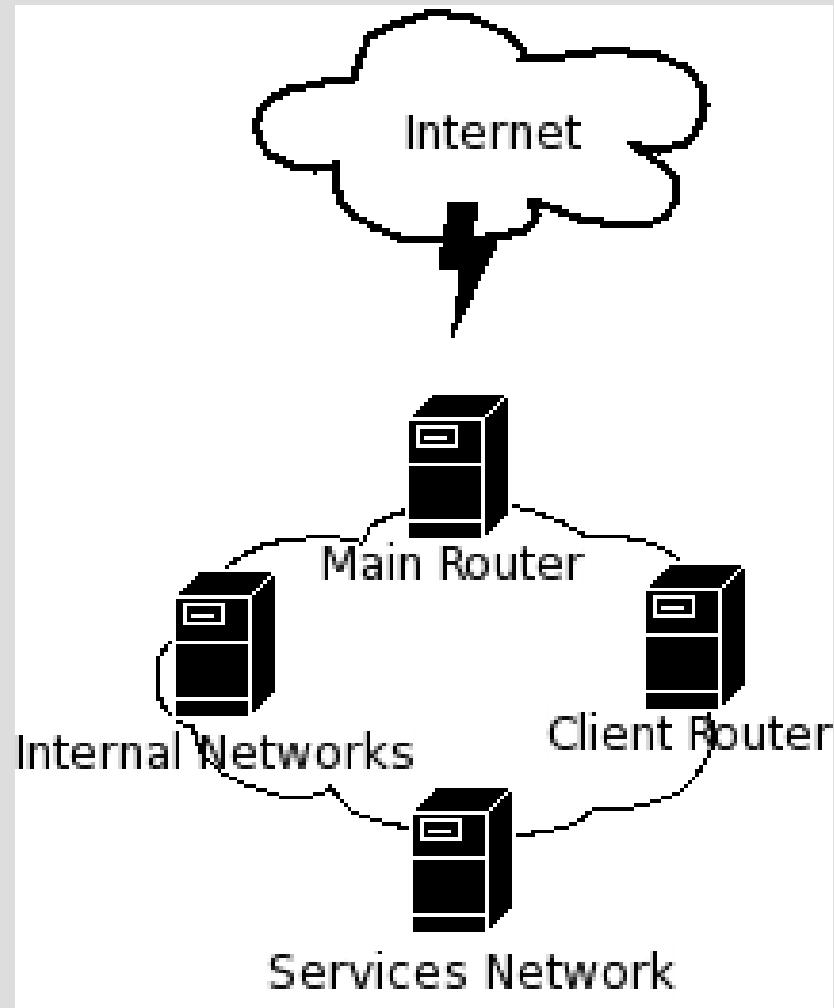
BWM Tools

ISP A

- 8,000 Dialup clients
- 40 Leased lines
- 8 POP's – totaling approx 2,000 clients
- 10 dedicated servers hosted
- Multi-level shaping
- Traffic prioritization

BWM Tools

ISP A



BWM Tools

LinuxRulz

- Gigabit fiber connections
- Opensource mirror hosting
- Prioritization of commercial traffic