Bandwidth Management

Managing high-latency and limited bandwidth satellite connections

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Physical Layout
Latency

- Average of 600ms+ latency to PoP
- Can be up to 1500ms+ depending on path
- Detrimental to VoIP and other real-time services
Latency Mitigation

- There are very few ways to mitigate latency
- Ensure that real-time streaming applications have the highest priority
- For VoIP, we ensure that our providers are no more than 700ms away
- Get the cleanest satellite signal possible
Limited Bandwidth

- Satellite bandwidth is expensive
- Oversubscription is almost a necessity
- Proper management is required for such a finite resource
- Current bandwidth setup is 7.5Mbps inbound and 2.5Mbps outbound
- 300 residential, 100 business, 30 corporate
Management Equipment

- Allot Netenforcer
- Packeteer Packetshaper
- Cacti
Allot Netenforcer

- Bandwidth is categorized as a series of Pipes
- Each pipe can have a number of Virtual Channels (VCs)
- Pipes and VCs operate top-to-bottom (like an ACL)
- Priorities and bandwidth min/max can be set for Pipes and VCs
Pipe and VC Attributes

- Host List
  - IP address ranges, domain names, etc.
- Type of Service
  - TCP/IP ports, All IP
- Quality of Service
  - Bandwidth allocation and priority
Current Configuration

- Top 4 Pipes: Deactivations, Virus, Network-Essential, ICMP
- Corporate customer pipes follow
- General business customer pipes
- Residential customer pipes
# Pipe Layout

<table>
<thead>
<tr>
<th>Category</th>
<th>Action Criteria</th>
<th>Action/Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deactivations, Virus</td>
<td>Match specific TCP Ports and/or IPs</td>
<td>Action: Drop</td>
</tr>
<tr>
<td>Network-Essential (BGP, OSPF, ICMP,VoIP)</td>
<td>Match specific packet signatures</td>
<td>Priority: 10, 512kbps min and max</td>
</tr>
<tr>
<td>Corporate Customers</td>
<td>Match various host lists</td>
<td>Priority: 8, Variable limits</td>
</tr>
<tr>
<td>Business Class</td>
<td>Match various host lists</td>
<td>Priority: 7, Plans: 128, 256, 512</td>
</tr>
<tr>
<td>Residential</td>
<td>Fallback Pipe Match Any</td>
<td>Priority 5, 128 Best Effort</td>
</tr>
</tbody>
</table>
## Example Configuration

<table>
<thead>
<tr>
<th>PIPE</th>
<th>Customer A</th>
<th>512k min/max: Prio8</th>
<th>Hostlist A+B</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>Location 1</td>
<td>256k min: Prio9</td>
<td>Hostlist A</td>
</tr>
<tr>
<td>VC</td>
<td>Location 2</td>
<td>256k min: Prio9</td>
<td>Hostlist B</td>
</tr>
<tr>
<td>VC</td>
<td>Fallback</td>
<td>Normal Priority</td>
<td>Any</td>
</tr>
</tbody>
</table>
# Example Configuration

<table>
<thead>
<tr>
<th>PIPE</th>
<th>Customer C</th>
<th>512k up/dn: Prio8</th>
<th>Hostlist C</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>P2P</td>
<td>64k max: Prio4</td>
<td>Match P2P Packets</td>
</tr>
<tr>
<td>VC</td>
<td>WWW</td>
<td>128k min: Prio 8</td>
<td>Match TCP 80, 443</td>
</tr>
<tr>
<td>VC</td>
<td>Mail</td>
<td>128k min: Prio 8</td>
<td>Match SMTP, POP3</td>
</tr>
<tr>
<td>VC</td>
<td>Fallback</td>
<td>Priority: 7</td>
<td>Match any</td>
</tr>
</tbody>
</table>
Monitoring Cont.

Utilization for NetEnforcer
Inbound: 81% (6518 Kbps)

Min Outbound: 66% (1975 Kbps)

Min: 3:45:57 PM - 3:46:27 PM
Max: 6000

NetEnforcer (Live Conns, New Conns Per Sec)

Live Conns
New Conns Per Sec

NetEnforcer (Packets)

In-Packets
Out-Packets

Most Active Hosts (In-Bandwidth) - Current

Waj In-Bandwidth (Kbps)

3:45:57 PM - 3:46:27 PM

Hosts:
- breakers-canopy211-lbj.bl
- 202.70.117.38
- malama-121-43.bluesky.net
- downloadssecure.memberscanopy120-26.bluesky.net
- ascc-124-98.bluesky.net
- aspa-120-95.bluelink.as (2)
- toolshop-canopy15.bluelink.as (2)
- 168.215.155.64
- pgg-5350-2.id.bluesky.net
- tafuna-canopy120-109.bluesky.net
- 202.70.121.10

Packets (per second)

15:46:05 - 15:46:25
Testing

• Testing from customer premises is done with Speakeasy and Internetfrog
  • [http://www.speakeasy.net/speedtest/](http://www.speakeasy.net/speedtest/)

• Business and Corporate customers are given a Cacti login
Customer Connections
General Usage
Overall Guidelines

• Always limit Peer-to-peer/filesharing
• Managing traffic is always ongoing
• Adjust to the customer’s needs
• For most customers, perception is a key factor