GREAT BANDWIDTH NOT DELIVERING GREAT PERFORMANCE?

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• Challenges in delivering great performance
• Automated tools for pinpointing network weaknesses and improving overall performance
• Keys to ensuring network availability and visibility in a world of
  • Mobile users
  • BYOD
  • Internet of Things
  • Social media and video
• The importance of careful NetFlow planning and monitoring with priorities for specific types of traffic
• Other suggestions
• Q&A
Rise of Content Sharing and Consumption
• Volume of content being shared and consumed is constantly on the rise
• Content is the face of an organization – it celebrates their brand, connects their audience, and informs on their latest news
• People now expect instantaneous access to this content

Bandwidth Availability Within an Organization
• Number of users can constrain bandwidth availability
• Budgets can constrain the ability to provide adequate bandwidth

Network Traffic Mix
• Certain types of network traffic are large consumers of bandwidth

Human Resource Availability
• Administrators traveling site-to-site or building-to-building

Personally-Owned/Unmanaged Devices
• Significantly increase in bandwidth consumption – during March Madness for example
• Represent a potential risk to organization resources and other users
SOLUTION: NETWORK PERFORMANCE MONITORING

- Network performance monitoring provides visibility into where the network is busy
  - Identifies “hot spots” and “under-utilized” links
  - Identify high bandwidth usage times
- Adjust backup schedules and other tasks to “load balance” over time
  - Identify when and where additional bandwidth is needed
- Alert when links become saturated
  - Allows for pro-active fixes before critical outages occur
SOLUTION: NETWORK PERFORMANCE MONITORING

Network Top 10

Top 10 Interfaces by Percent Utilization

<table>
<thead>
<tr>
<th>NODE</th>
<th>INTERFACE</th>
<th>RECEIVE</th>
<th>TRANSMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAB-CLUSTER-01.lab.txt</td>
<td>WAN Minport (STSP) Local Area</td>
<td>94 %</td>
<td>96 %</td>
</tr>
<tr>
<td></td>
<td>Connection*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Router3.lab.local</td>
<td>FastEthernet0/0 - Fail0</td>
<td>94 %</td>
<td>96 %</td>
</tr>
<tr>
<td>NPM_Cisco_FibreChannel</td>
<td>fc1/7</td>
<td>63 %</td>
<td>91 %</td>
</tr>
<tr>
<td>Internet Gateway 3725</td>
<td>Ethernet1 WAN (NetFlow)</td>
<td>85 %</td>
<td>65 %</td>
</tr>
<tr>
<td></td>
<td>fc1/1</td>
<td>62 %</td>
<td>73 %</td>
</tr>
<tr>
<td>Comet 23</td>
<td>Generic Marvell Yukon Chipset based</td>
<td>13 %</td>
<td>87 %</td>
</tr>
<tr>
<td></td>
<td>Gigabit Ethernet Controller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOCoreSwitch</td>
<td>GigabitEthernet/1/01 - WAN Uplink</td>
<td>96 %</td>
<td>1 %</td>
</tr>
</tbody>
</table>

Top 10 Wireless Clients by Traffic

<table>
<thead>
<tr>
<th>IP ADDRESS</th>
<th>SSID</th>
<th>CONNECTED</th>
<th>DATA RATE</th>
<th>TRANSMIT</th>
<th>RECEIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.199.17.43</td>
<td>lab</td>
<td>5/3/2015</td>
<td>2.06.32 PM</td>
<td>84.0 Mbps</td>
<td>4.859 Mbps</td>
</tr>
<tr>
<td>10.199.17.94</td>
<td>lab</td>
<td>4/23/2015</td>
<td>4:30.08 PM</td>
<td>99.0 Mbps</td>
<td>4.443 Mbps</td>
</tr>
<tr>
<td>10.199.17.45</td>
<td>lab</td>
<td>4/29/2015</td>
<td>12:11.47 PM</td>
<td>32.0 Mbps</td>
<td>3.981 Mbps</td>
</tr>
<tr>
<td>172.16.17.120</td>
<td>lab</td>
<td>5/2/2015</td>
<td>10.50.59 PM</td>
<td>63.0 Mbps</td>
<td>4.893 Mbps</td>
</tr>
<tr>
<td>172.16.17.239</td>
<td>lab</td>
<td>4/22/2015</td>
<td>1:03.32 AM</td>
<td>64.0 Mbps</td>
<td>4.845 Mbps</td>
</tr>
<tr>
<td>172.16.17.253</td>
<td>lab</td>
<td>5/9/2015</td>
<td>4:20.04 PM</td>
<td>65.0 Mbps</td>
<td>4.854 Mbps</td>
</tr>
<tr>
<td>172.16.17.49</td>
<td>lab</td>
<td>4/29/2015</td>
<td>8:57.25 PM</td>
<td>21.0 Mbps</td>
<td>4.127 Mbps</td>
</tr>
<tr>
<td>172.16.17.106</td>
<td>lab</td>
<td>5/9/2015</td>
<td>3:49.09 AM</td>
<td>41.0 Mbps</td>
<td>3.545 Mbps</td>
</tr>
</tbody>
</table>
SOLUTION: NETWORK PERFORMANCE MONITORING
SOLUTION: NETWORK TRAFFIC MONITORING

LEVERAGING FLOW DATA FROM NETWORK ROUTERS

- Network performance monitoring identifies where performance hot spots are
- Network traffic monitoring, using NetFlow technology, provides visibility into who and what are consuming the bandwidth on hot spots
  - NetFlow
  - jFlow, rFlow, sFlow®, …
- Reduce the “Mean Time to Innocence”
- Organizational end-users can be educated about how their usage impacts the network as a whole
- Anything that can be monitored, can also be ALERTED on, which provides additional opportunities to be pro-active about fixes before they become critical outages.
SOLUTION: NETWORK TRAFFIC MONITORING

NetFlow can show you when one type of traffic is hogging the pipe....

...Or when it's a user binge-watching their favorite show
SOLUTION: IS IT THE APPLICATION OR THE NETWORK?

- Packet Analysis is the, often cumbersome, process of looking at network traffic between two devices (or a specific type of network traffic such as SQL or HTTP) and measuring the request <> response timing.
- Two of the most helpful metrics that compare timing:
  - TCP Handshake - indicates the network speed
  - Time to first byte - gives the application server response time to data requests
- Packet analysis can now be performed automatically, in real-time.
  - This provides the data in graphs that show the breakdown of protocols, participants, and timing.
  - “Software based probes” are now available rather than hardware only probes.
SOLUTION: IS IT THE APPLICATION OR THE NETWORK?
SOLUTION: QUALITY OF SERVICE

- Quality of Service (QoS) is the process of prioritizing some types of network traffic based on port or protocol.
- Enabling QoS management on the Internet connection ensures that important traffic is not constrained by superficial traffic.
- Low priority or undesirable traffic can be constrained with QoS capabilities.
- BUT... QoS does allow superficial traffic to continue to exist, without negatively impacting the important traffic.
SOLUTION: QUALITY OF SERVICE
SOLUTION: MANAGED DEVICES

- Mobile Device Management (MDM) provides:
  - Security – lost/stolen devices can be wiped/locked preventing the possible disclosure of sensitive student data
  - Monitoring – location services to find lost devices or to alert when devices (read: their owners) are in places they ought not be
  - Management – Deploy, block, remove applications
  - Reporting – including call logs, message traffic, installed/removed apps
  - Alerts – end users can be alerted about events, issues, warnings
SOLUTION: GUEST WIRELESS NETWORK

• Guest wireless will move much of the high volume traffic off of the organization’s network, allowing employees to work more efficiently
• Guest wireless will eliminate much of the security risk to organizational resources introduced by unmanaged devices
• Guest wireless does not have to be building wide; in many cases, outfitting common areas will be sufficient: lobby, cafeteria, meeting rooms, etc..
  • You might even deliberately not implement it in certain areas in which you want to restrict access for non-employees.
• May not even require additional equipment, merely reassigning the existing devices to a separate SSID and partitioning their connectivity on a separate VLAN.
SOLUTION: COMMUNICATION/EDUCATION

• Communicate with users publicly/privately regarding their utilization of network resources
  • Discuss bandwidth consumption of various traffic types
  • Discuss security implications of always-on wireless

• Communicate with organization management
  • Regarding the nature of these challenges
  • The solutions that are immediately available
  • Additional solutions that may require budgetary consideration
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