

Traffic Management Benchmarking Framework

IETF 89 London

draft-constantine-bmwg-traffic-management-03

Barry Constantine

barry.constantine@jdsu.com

Tim Copley

timothy.copley@level3.com

Ram Krishnan

ramk@brocade.com

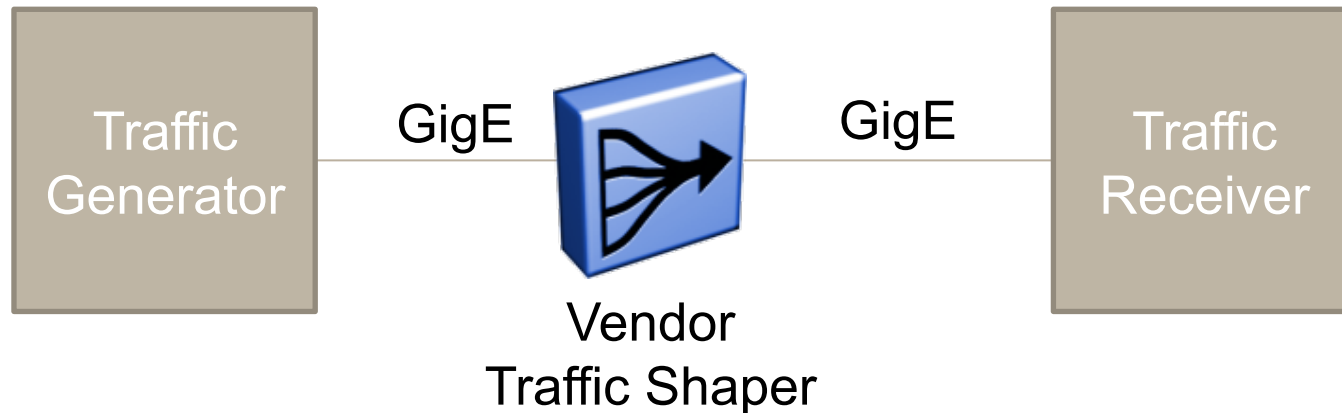
Traffic Management Benchmarking Overview

- Extends RFC 2544 benchmarking into traffic management functionality of network elements:
 - Classification / Prioritization
 - Policing
 - Queuing / Scheduling
 - Shaping

Revisions Incorporated into Draft-03

- Based upon a review with Dean Lee, refined wording to emphasize that scope is to characterize / benchmark traffic management capabilities
 - Using the metrics defined in the draft, re-enforcing that this test method is not a conformance test
- The draft was combed through substantially to clarify content, test flow and metric definitions
- AQM has been removed from the scope of this work, we want to bound the work to the more predominant traffic management functions that are being used by network operators (policing, queuing, shaping)

Traffic Shaper Test (discussed in Vancouver)



- Two (2) vendor's equipment were configured to shape to 40 Mbps CIR with Burst Committed (Bc) and Burst Excess (Be) both equal to 20,000 bytes
 - Each shaper ingress queue configured to handle 256 KB (ensure no ingress drops)
- Traffic generator sent a single 128,000 byte burst (back-back at GigE) while traffic receiver captured packets
- Vendor traffic shapers were compared according to the metrics defined in the traffic management benchmarking draft (results summary next slide)

Traffic Shaper Test Results (discussed in VC)

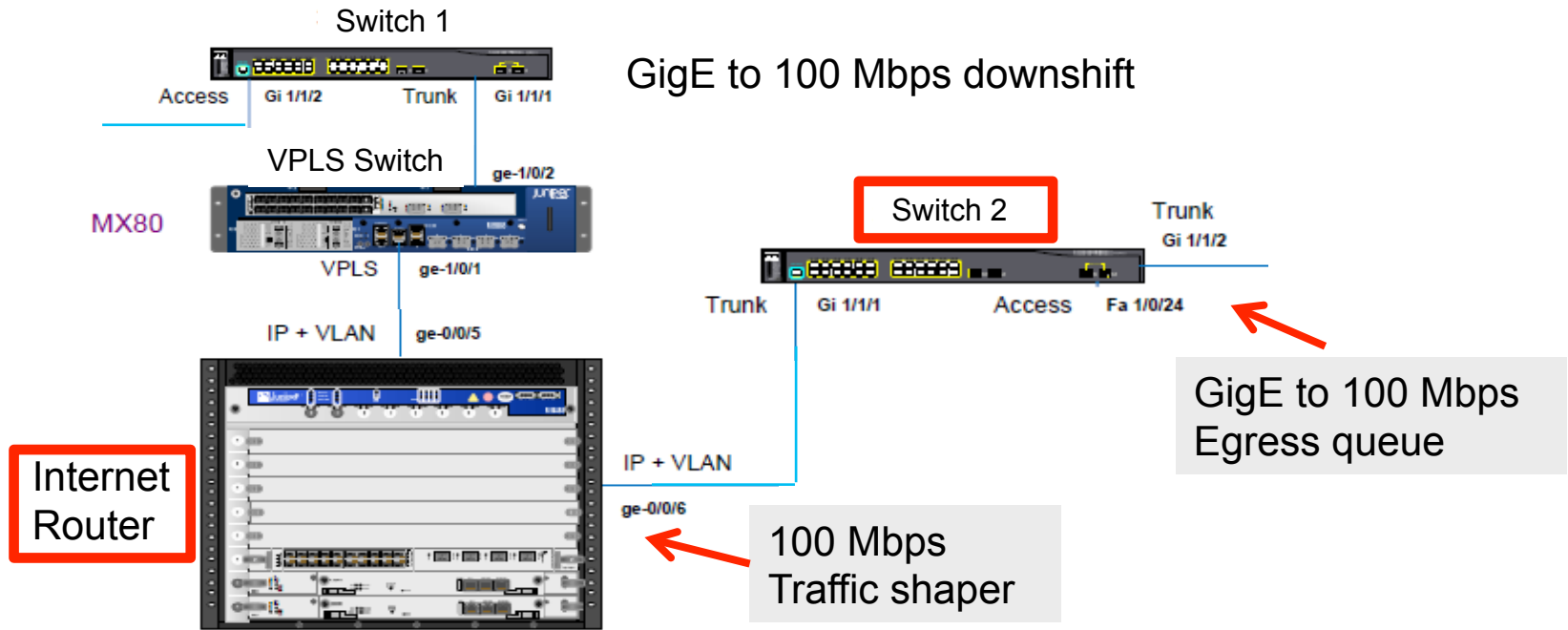
1500 Byte Packets											
VENDOR "A"						VENDOR "B"					
Tc Interval#	Bytes Shaped	Bytes Shaped	Bytes Shaped	Bytes Shaped	Bytes Shaped	Tc Interval#	Bytes Shaped	Bytes Shaped	Bytes Shaped	Bytes Shaped	Bytes Shaped
1	39,468	42,504	39,468	47,058	39,468	1	21,252	21,252	21,252	21,252	21,252
2	19,734	19,734	19,734	19,734	19,734	2	1,518	1,518	1,518	1,518	1,518
3	19,734	19,734	19,734	19,734	19,734	3	1,518	1,518	1,518	1,518	1,518
4	21,252	21,252	21,252	21,252	21,252	.	1,518	1,518	1,518	1,518	1,518
5	19,734	19,734	19,734	19,734	19,734	.	1,518	1,518	1,518	1,518	1,518
6	7,590	4,554	7,590	0	7,590	71	1,518	1,518	1,518	1,518	1,518
Totals	127,512	127,512	127,512	127,512	127,512	Totals	127,512	127,512	127,512	127,512	127,512
Lost packets	"0" for all intervals					Lost packets	"0" for all intervals				
Max Burst Bytes	39,468	42,504	39,468	47,058	39,468	Max Burst Bytes	21,252	21,252	21,252	21,252	21,252
Average Burst Bytes	21,252	21,252	21,252	25,502	21,252	Average Burst Bytes	1,796	1,796	1,796	1,796	1,796
Max Jitter (usecs)	4,339	3,841	4,351	3,839	3,847	Max Jitter (usecs)	295.71	295.71	295.71	295.71	295.71
Ave Jitter (usecs)	206.26	226.79	199.12	180.89	216.83	Ave Jitter (usecs)	243.07	243.06	243.06	243.06	243.07
Ave Burst Interval (usecs)	3,653	4,003	3,534	4,010	3,832	Ave Burst Interval (usecs)	306.2	306.1	306.1	306.1	306.2

- Neither vendor dropped any packets
- Vendor "A" shaped in system time intervals (~4 msec) while vendor "B" shaped according to the CIR transmission rate (~250 usec), see **Max Jitter**
- Also related to timing interval, Vendor A "lumped" bytes (**Average Burst Bytes**) while Vendor B transmitted single frames (mostly*) at CIR rate
 - Vendor A also burst beyond Bc + Be, as high as 47,058 bytes in Trial 4

Additional Testing since Vancouver (1)

- Tested the shaper test method in a major mobile operator lab
 - This operator was comparing the characteristics of several different vendor's equipment for Ethernet backhaul
 - This operator was most interested in the burst size that the shaper would handle without loss at the egress
- All of the draft metrics were deemed useful by the operator
 - Lost Packets, Out of Sequence, Packet Delay Variation, Shaper Rate, Shaper Burst Bytes, and Shaper Burst Interval
- This operator suggested the usefulness of a “burst hunt” mode: the test would automatically derive the maximum burst size achievable in policer, queue, and shaper tests

Additional Testing since Vancouver (2)



- The operator wanted to characterize the shaping function of the **Internet Router** and queue size of **Switch 2**
- Each device was tested independently; (1) characterize the egress behavior of the shaper (2) characterize the burst capability of the egress queue
- Both the stateless burst tests and TCP layer tests were conducted
- Metrics of each test were used to compare different vendors and tweak pre-deployment settings

Next Steps for the Traffic Management Draft

- We seek the BMWG to formally adopt this personal submission as a chartered draft work
- Finalize the Appendix of application test pattern definitions (HTTP, Email, SMB, etc.)
- More review from BMWG members...