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SWITCH POWER CONSUMPTION PERFORMANCE EVALUATION TEST REPORT

BROADCOM INC.

DEVICE AND TEST PLAN INFORMATION			
Device Under Test (DUT)	Tomahawk 5 (details) with 33 1m/2.5m DACs (details)		
Test Plan	Switch Power Consumption Performance Evaluation Plan, Version 1.1, Feb 2026		
Speed Tested	800G	UNH-IOL Test Result ID	41315
This testing provides power measurements for evaluation purposes only. Refer to the referenced test plan.			

CONTACT INFORMATION	
56 Gigabaud Serial Ethernet Test Service	etherlab@iol.unh.edu
Testing Completed by	Nick Farone
Report Reviewed by	Bob Noseworthy

Digitally Signed Below. Learn how to validate the authenticity of this document here.

Digitally signed by UNH-IOL
Date: 2026.03.12 11:16:04 -04'00'

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RESULTS

The following table contains all results from testing.
Detailed test results including observed behaviors can be found in the DETAILED TEST RESULTS.

TEST ID	MIN (W)	MAX (W)	MEAN (W)	AVG TEMP (C)
512-Byte Bidirectional	**786.65**	**792.84**	**788.21**	**22.65**
1024-Byte Bidirectional	**740.96**	**746.16**	**742.39**	**23.02**
1518-Byte Bidirectional	**723.58**	**728.83**	**724.74**	**22.4***
2048-Byte Bidirectional	**709.73**	**716.64**	**710.92**	**22.4***
4096-Byte Bidirectional	**685.12**	**691.1**	**686.29**	**22.4***
9216-Byte Bidirectional	**670.82**	**670.82**	**671.89**	**22.4***
512-Byte Unidirectional	**612.38**	**618**	**613.56**	**22.4***
1024-Byte Unidirectional	**594.07**	**598.93**	**595.18**	**22.4***
1518-Byte Unidirectional	**589.02**	**594.39**	**590.23**	**22.4***
2048-Byte Unidirectional	**585.09**	**590.25**	**586.23**	**22.4***
4096-Byte Unidirectional	**578.29**	**582.45**	**579.43**	**22.4***
9216-Byte Unidirectional	**574.3**	**579.58**	**575.29**	**22.4***
IMIX 1024/2048/4096 7:4:1	**721.02**	**726.22**	**722.54**	**22.59**
IMIX 1024/2048/4096 4:7:1	**714.73**	**721.82**	**716.20**	**22.41**
All Cables, All Admin Up	**538.26**	**544.02**	**539.42**	**22.29**
All Cables, ½ Admin Up	**380.7**	**385.98**	**381.82**	**22.53**
All Cables, All Admin Down	**219.3**	**225.03**	**220.59**	**22.52**
½ Cables, All Admin up	**379.09**	**385.95**	**380.21**	**22.38**
½ Cables, ½ Admin up	**379.34**	**383.73**	**380.40**	**22.89**
½ Cables, All Admin Down	**217.75**	**223.05**	**218.88**	**22.32**
NO Cables, All Admin Up	**196.54**	**201.64**	**197.37**	**22.58**
NO Cables. ½ Admin Up	**196.58**	**200.06**	**197.34**	**22.47**
NO Cables, All Admin Down	**196.53**	**200.67**	**197.49**	**22.52**

(* Temperature readings are over one hour instead of every 30 seconds)

TESTING NOTES

The following table contains any notes on the testing process or on general DUT behavior.

NOTES
All tests were conducted with at least a two-minute settling/soak time, followed by a one-minute measurement time to observe power consumption behavior. Power measurements were taken approximately every second. Temperature was monitored every 30 seconds by thermocouple in a region approximately one foot above the center of the DUT in an open lab setting. Refer to Power Measurement and Temperature Monitor Setup. The DUT was powered and allowed 30 minutes to reach thermal equilibrium before measurements were performed.

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TEST PLAN OVERVIEW

This suite of tests has been developed to help implementers evaluate the performance of the Ethernet device, specifically regarding total power consumption, under varying load conditions in nominal lab temperature conditions. This test plan does not attempt to provide a full evaluation of the switch's performance regarding BER performance, latency, address lookup, or similar network benchmarks (e.g.: RFC 2544, RFC 2889).

These tests are designed to evaluate a product's power consumption under various scenarios to offer a third-party, neutral, evaluation of a device's overall power performance under varying load and test cases. Successful completion of all evaluation tests contained in this suite does not guarantee that the tested device will meet any specific standard, regulatory nor customer requirement, nor does the testing guarantee that worst-case power consumption scenarios have been tested, though the spirit of the testing attempts to achieve this, at least in nominal temperature conditions. These results, combined with satisfactory operation when tested in accordance with related UNH-IOL conformance and interoperability test suites, can provide a reasonable level of confidence that the Device Under Test (DUT) will function well in many Ethernet environments.

REVISION HISTORY

The following table contains a revision history for this report.

REVISION	DATE	AUTHOR	EXPLANATION
1.0	2026-03-12	Nick Farone and Bob Noseworthy	Final Report

DEVICE UNDER TEST INFORMATION

The following table contains the state of the DUT during testing.

COMPONENT	DESCRIPTION
UNH-IOL Equipment ID	32500
Provided to UNH-IOL by	Broadcom Inc.
Speed and Media Type	800G-OSFP
Port Configuration	64 x 800G
ASIC Version	Tomahawk-5
Device Firmware Version	Image: 2.0.0.0
Software Version	SONiC-OS-feat_thor3_12_0_0_daily_251216_0304_37-Enterprise_Advanced
Port Tested	1 through 64
Serial Number	FSJ2546000F

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TEST TOOL INFORMATION

TEST TOOL DETAILS

The following table contains the test tools used during testing.

TOOL	DESCRIPTION
Traffic Generator	Keysight Ares ONE800GER-4P-QDD-OSFP-M+NRZ (944-1412)
Version	26.0.0+2600.14

TOOL	DESCRIPTION
Traffic generation software	IxNetwork
Version	26.0.2601.6

TOOL	DESCRIPTION
Power Meter	Voltech PM1000+
Version	HW:13, FW: 4.26

TOOL	DESCRIPTION
Temperature Monitor	Keysight 34465A with Extech TP875 and K-type thermocouple
Version	A.03.01-03.15-03.01-00.52-05-02

TOOL	DESCRIPTION
Data Collection	Custom UNH-IOL Monitoring, Logging and Plotting Software
Version	1.2

TESTING PARTNERS

The following Test and Measurement Equipment providers have enabled access to their equipment during this testing as a benefit to the UNH-IOL and its Member companies.

COMPANY	EQUIPMENT
KEYSIGHT	Keysight Technologies AresONE
DESCRIPTION	
The Keysight AresONE dual-interface model 800GER-4P-QDD-OSFP-M includes a four-port, reduced-performance chassis with two ports of built-in OSFP800 800GE and two ports of built-in QSFP-DD800 physical interfaces.	
MORE INFORMATION	https://www.keysight.com/us/en/product/944-1412/aresone-800ger-4p-qdd-osfp-m-reduced.html

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TEST SETUP

All tests completed were completed using a two-port traffic generator configuration, with all other ports of the DUT connected in a “snake” configuration to fully utilize each port of the DUT.

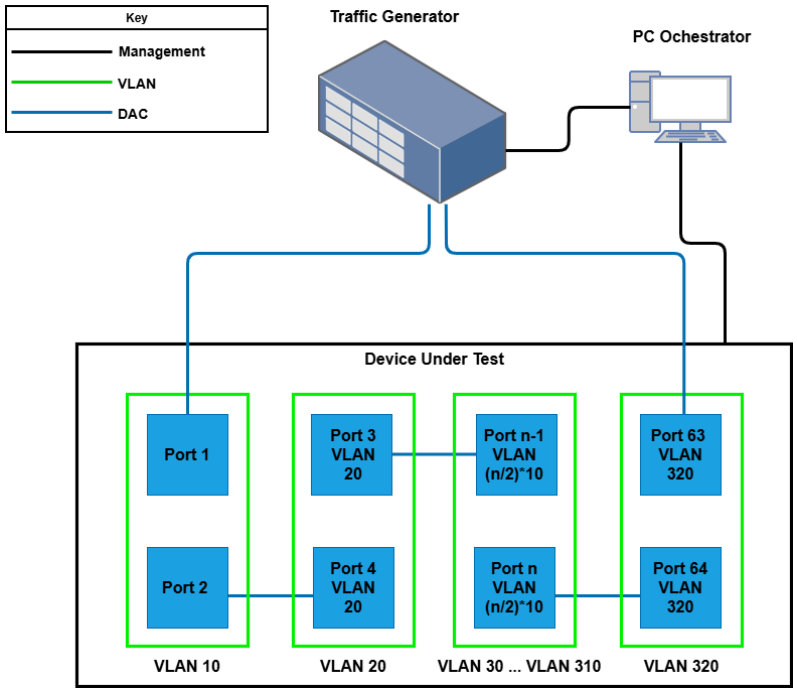


Figure 1 - Test Setup – VLAN snake for VIDs 30 – 310 not shown.

Figure 1 above illustrates the basic “snake” configuration of a 64 port DUT, with 32 VLANs, and 33 cables connecting the ports of the DUT (31 between VLANs, and 2 connecting the traffic generator). Exact port configuration and connections may vary to ease cable connection based on DUT port configuration.

CABLES USED

VENDOR	TYPE	PART #	DESCRIPTION	NOMINAL POWER	QUANT.
TE	DAC	2448078-2	OSFP 112G C/A, 30AWG, 1.0M, GENERIC	N/A	31
Amphenol	Linear Active DAC	AHSP NJMMNK-0008 2517 Rev 2	OSFP Cable Assembly, Linear Active, 30AWG, 2.5M, 112G / Lane, Flex Sleeve	1.1 W	2

Setup with cables connected was confirmed to be at maximum rate (800G) as reported by DUT management and confirmed through reported forwarding rate from the traffic generator. During this validation, the setup was verified to not suffer frame loss nor any reported errors.

POWER MEASUREMENT AND TEMPERATURE MONITOR SETUP

A Voltech PM1000+ was utilized to monitor the power consumption of a single 240V 60Hz AC 20A circuit provided to a single DUT power supply, specifically that on the right of the unit as viewed from the DUT front.
A Keysight 34465A with Extech TP875 and K-type thermocouple were utilized to monitor temperature. Custom data collection software continuously monitored and logged from these devices.

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DETAILED TEST RESULTS

GROUP 1: POWER CONSUMPTION UNDER NO/MINIMAL TRAFFIC CONDITIONS

802.3-Perf.Pwr.1.1 – No Cables Connected

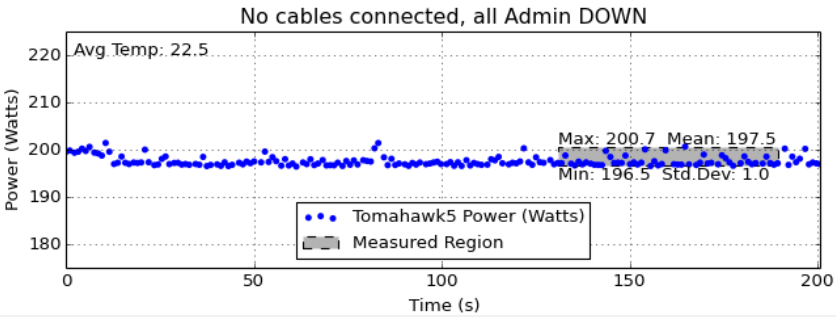
PURPOSE: To Baseline the DUT's power consumption when no cables are connected		**RESULT**
Part A	*DUT Power Consumption with no cables connected with all ports administratively **DOWN**.*	**INFO**
Part B	*DUT Power Consumption with no cables connected with half ports administratively **UP.***	**INFO**
Part B	*DUT Power Consumption with no cables connected with all ports administratively **UP.***	**INFO**

TEST PROCEDURE COMMENTS

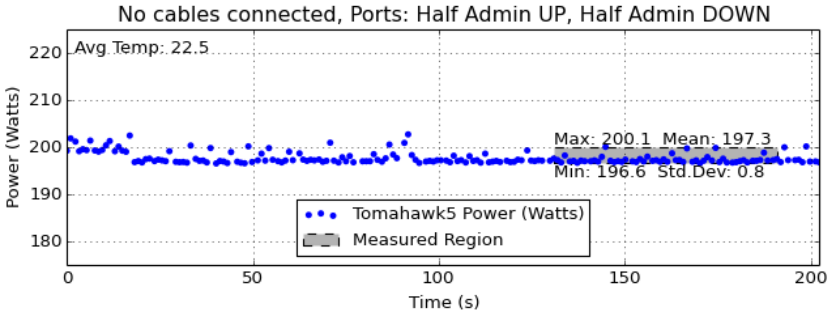
Before measurements, the DUT was powered on for at least 30 min to allow it to reach thermal equilibrium

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS

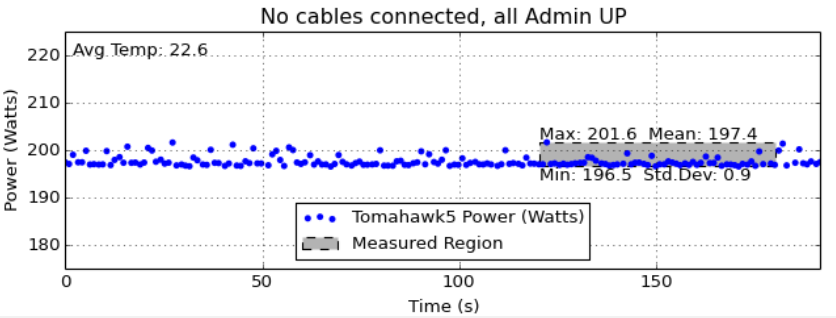
Part A:



Part B:



Part C:



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802.3-Perf.Pwr.1.2 – Half-Ports Connected

PURPOSE: To Baseline the DUT's power consumption when half of the total ports are connected.		**RESULT**
Part A	*DUT Power Consumption with 1/2 cables connected with all ports administratively **DOWN.***	INFO
Part B	*DUT Power Consumption with 1/2 cables connected with 1/2 ports administratively **UP***	INFO
Part C	*DUT Power Consumption with 1/2 cables connected with all ports administratively **UP**.*	INFO

TEST PROCEDURE COMMENTS

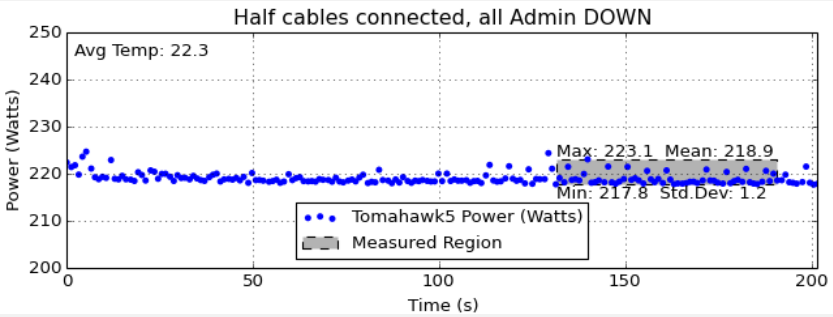
In all parts, a connected cable refers to 1 cable linking 2 VLANs or the DUT to Traffic Generator.

Part B: Connected ports are administratively up.

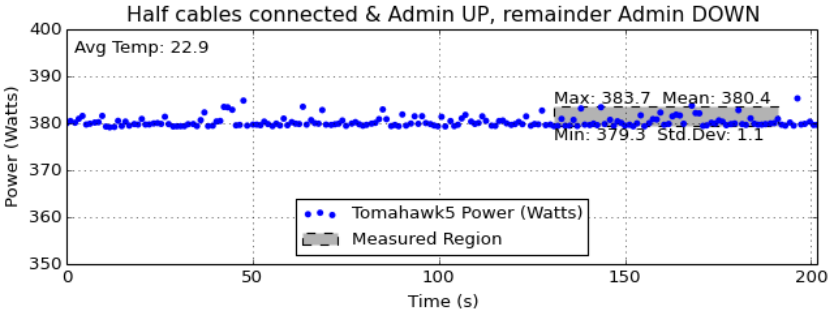
Part C: None.

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS

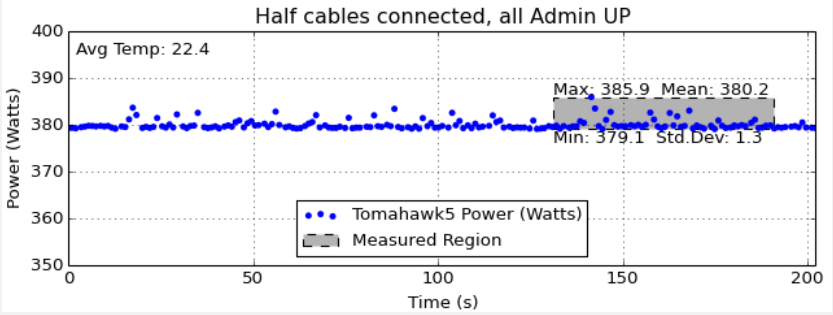
Part A: Connected links are down



Part B: Connected links are up at 800G



Part C: Connected links are up at 800G



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802.3-Perf.Pwr.1.3 – All-Ports Connected

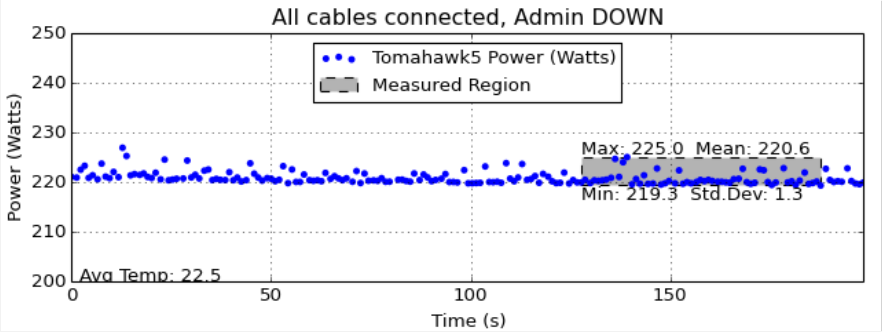
PURPOSE: To Baseline the DUT's power consumption when all of the total ports are connected.		**RESULT**
Part A	*Part A: DUT Power Consumption with all cables connected with all ports administratively **DOWN.***	INFO
Part B	*DUT Power Consumption with all cables connected with 1/2 ports administratively **UP***	INFO
Part C	*DUT Power Consumption with all cables connected with all ports administratively **UP**.*	INFO

TEST PROCEDURE COMMENTS

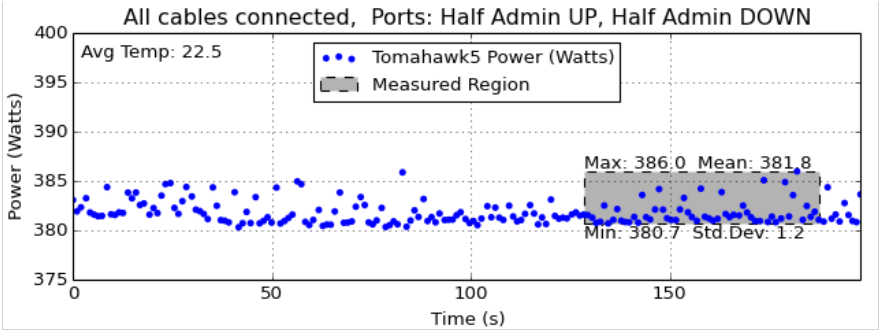
In all parts, a connected cable refers to 1 cable linking 2 VLANs or the DUT to Traffic Generator.

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS

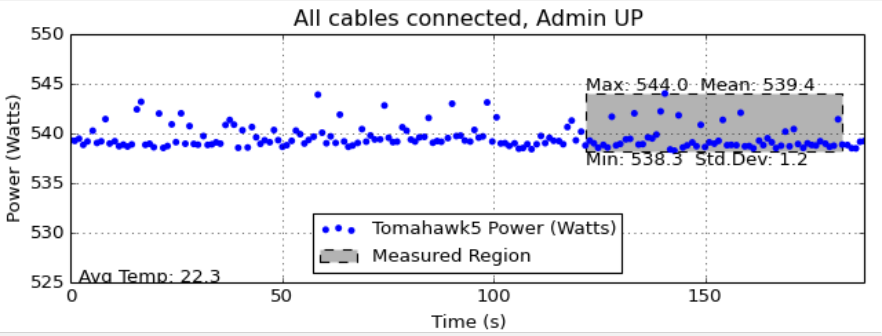
Part A: All links are down



Part B: Enabled and connected links are up at 800G



Part C: All links are up at 800G



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GROUP 2: POWER CONSUMPTION UNDER NO/MINIMAL TRAFFIC CONDITIONS

802.3-Perf.Pwr.2.1 – Line-Rate, fixed traffic-sizes

PURPOSE: To evaluate the DUT's power consumption when all ports are linked, and receiving traffic at line rate, with fixed traffic size.		**RESULT**
Part A	*DUT Power Consumption with line-rate traffic, with **unidirectional** traffic.*	**INFO**
Part B	*DUT Power Consumption with line-rate traffic, with **bidirectional** traffic.*	**INFO**

TEST PROCEDURE COMMENTS

All links were confirmed to be at 800G with no traffic loss and forwarding at the expected rate.

Note:
All measurements were made at line-rate, with no packet loss observed.
The Power measurements were conducted with a total bandwidth of 51.2 Tbps through the DUT.

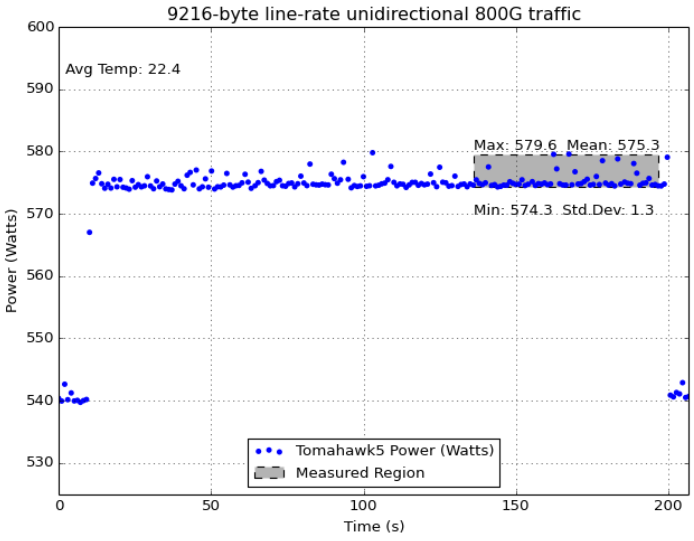
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS

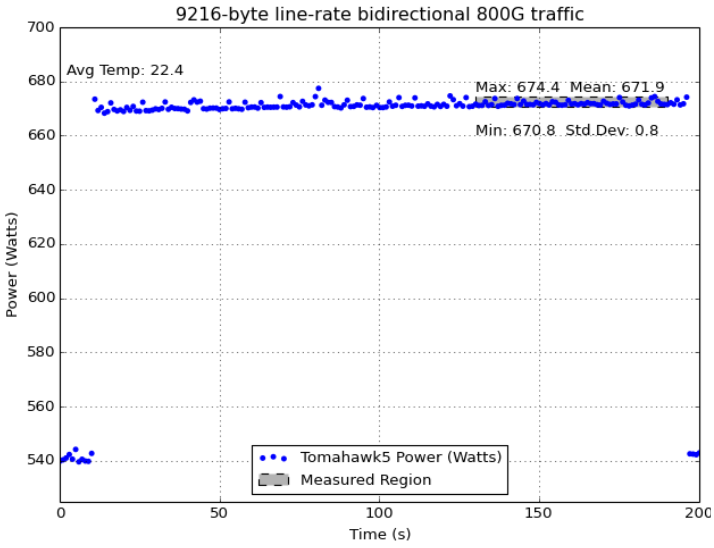
Part A: Refer to the following plots which detail the DUT behavior prior to and during the measurement period.

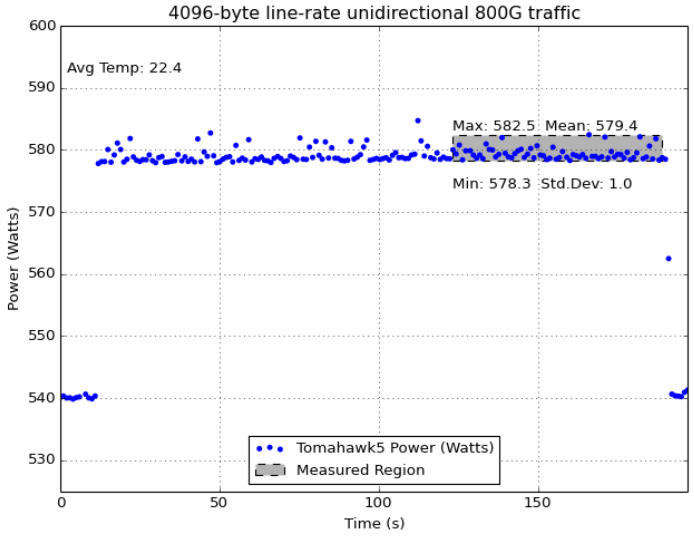
Power	9216	4096	2048	1518	1024	512
Mean / Std.Dev	575.3 / 1.3	579.4 / 1.0	586.2 / 1.2	590.2 / 1.2	595.2 / 1.1	613.6 / 1.3
Min / Max	574.3 / 579.6	578.3 / 582.5	585.1 / 590.2	589.0 / 594.4	598.9 / 594.1	612.4 / 618.0

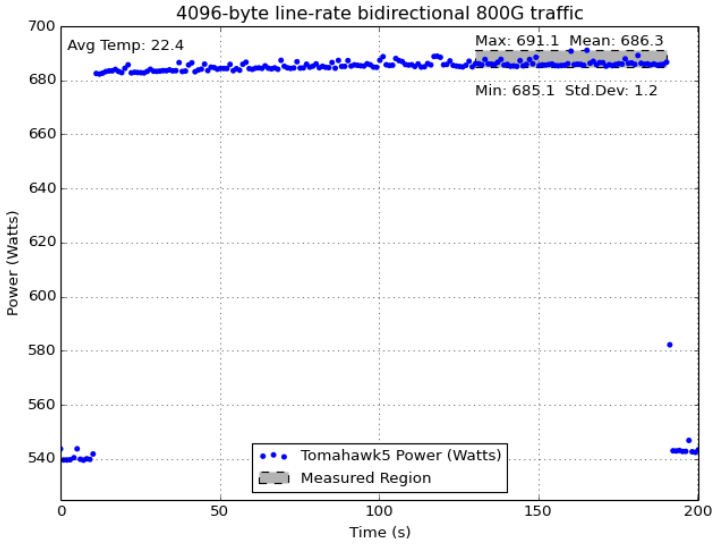
Part B: Refer to the following plots which detail the DUT behavior prior to and during the measurement period.

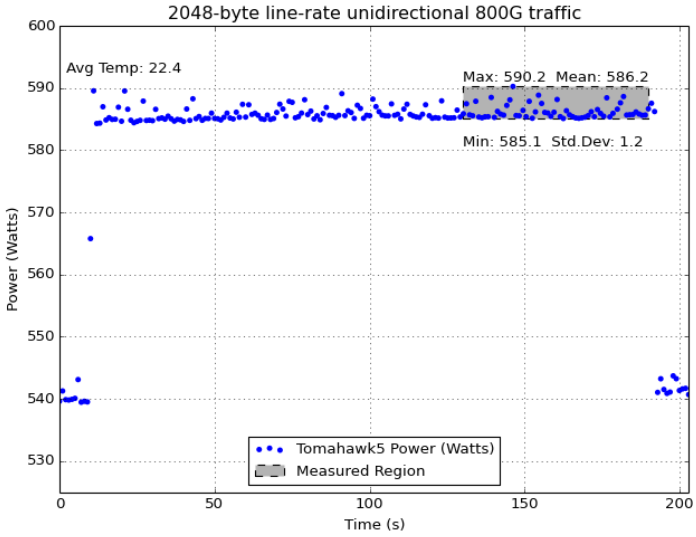
Power	9216	4096	2048	1518	1024	512
Mean / Std.Dev	671.9 / 0.8	686.3 / 1.2	710.9 / 1.2	724.7 / 1.1	742.4 / 1.3	788.2 / 1.3
Min / Max	670.8 / 674.4	685.1 / 691.1	709.7 / 716.6	723.6 / 728.8	741.0 / 746.2	786.6 / 792.8

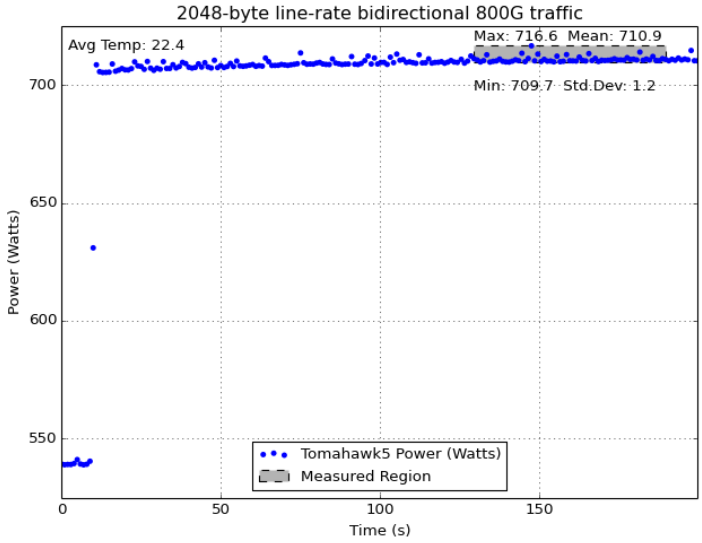


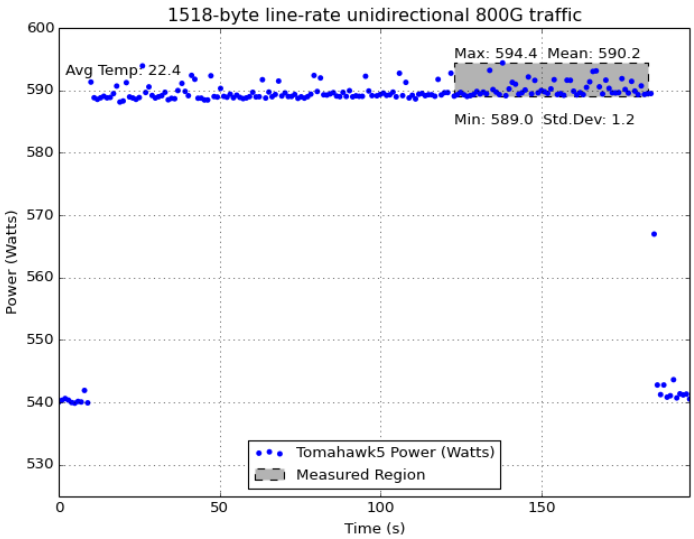


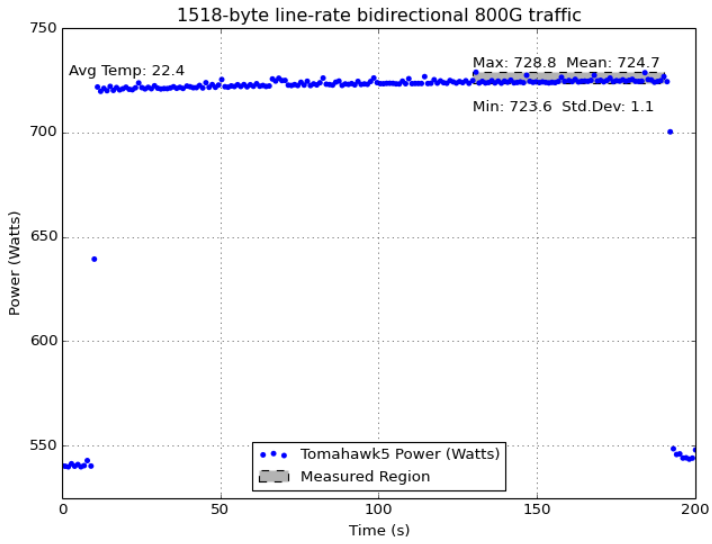




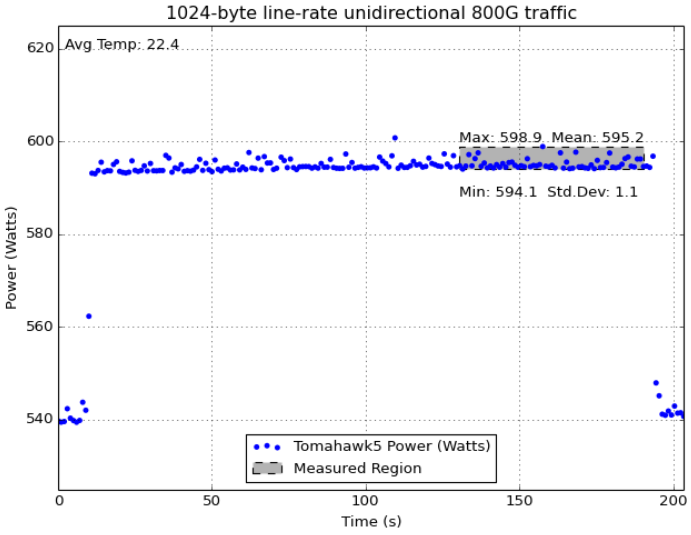


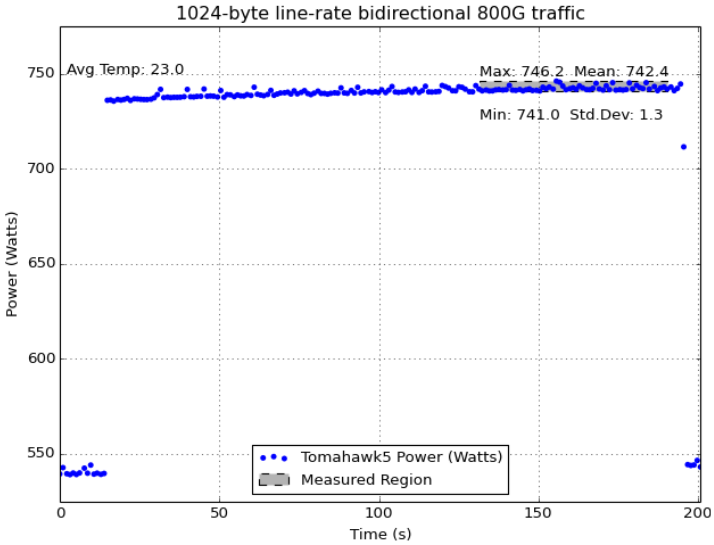


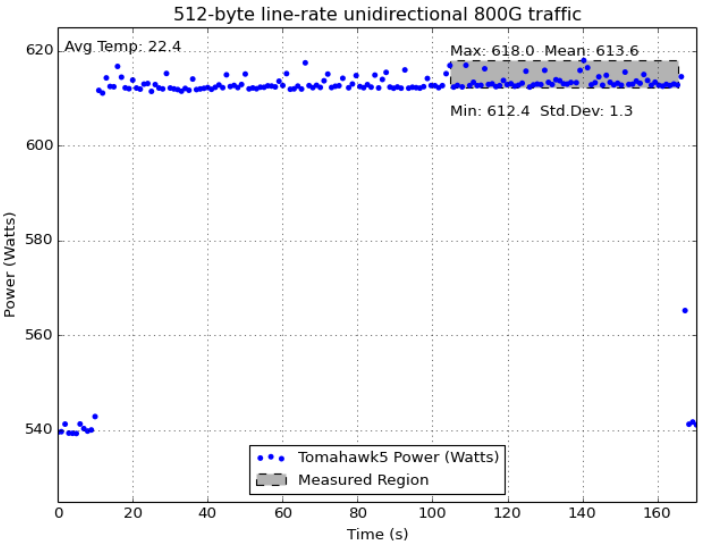


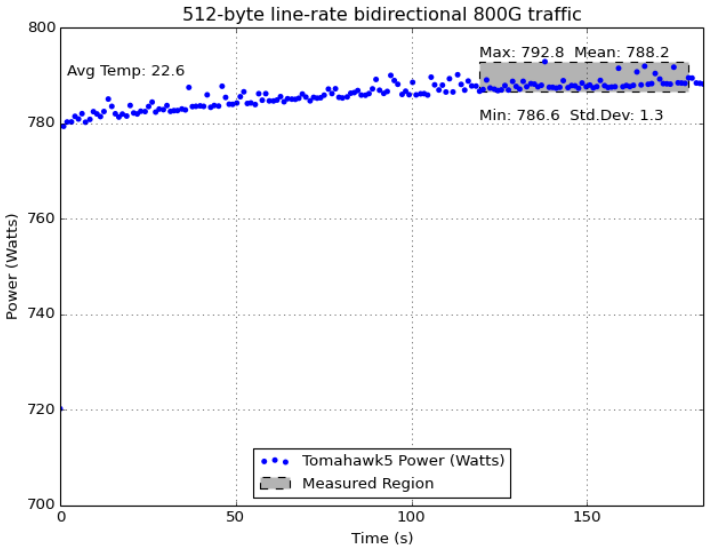


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1024-byte line-rate unidirectional 800G traffic
Avg Temp: 22.4
Max: 598.9 Mean: 595.2
Min: 594.1 Std.Dev: 1.1
Tomahawk5 Power (Watts)
Measured Region
Power (Watts)
Time (s)


1024-byte line-rate bidirectional 800G traffic
Avg Temp: 23.0
Max: 746.2 Mean: 742.4
Min: 741.0 Std.Dev: 1.3
Tomahawk5 Power (Watts)
Measured Region
Power (Watts)
Time (s)


512-byte line-rate unidirectional 800G traffic
Avg Temp: 22.4
Max: 618.0 Mean: 613.6
Min: 612.4 Std.Dev: 1.3
Tomahawk5 Power (Watts)
Measured Region
Power (Watts)
Time (s)


512-byte line-rate bidirectional 800G traffic
Avg Temp: 22.6
Max: 792.8 Mean: 788.2
Min: 786.6 Std.Dev: 1.3
Tomahawk5 Power (Watts)
Measured Region
Power (Watts)
Time (s)

802.3-Perf.Pwr.2.2 – Line-Rate, IMIX traffic sizes 1024/2048/4096

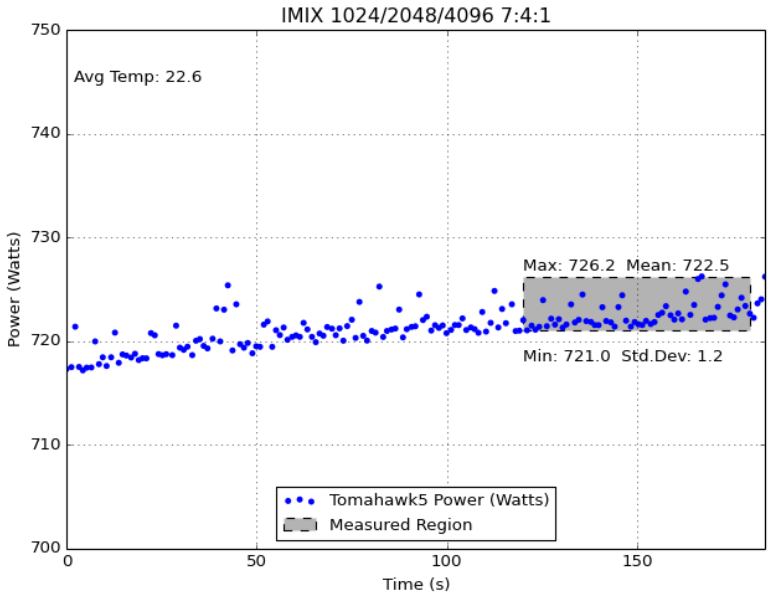
PURPOSE: To evaluate the DUT's power consumption when all ports are linked, and receiving traffic at line rate, with a mix of traffic sizes.		**RESULT**
Part A	*DUT Power Consumption with line-rate, bi-directional traffic with 1024/2048/4096, 7:4:1 weight*	**INFO**
Part B	*Part B: DUT Power Consumption with line-rate, bi-directional traffic with 1024/2048/4096, 4:7:1 weight.*	**INFO**

TEST PROCEDURE COMMENTS

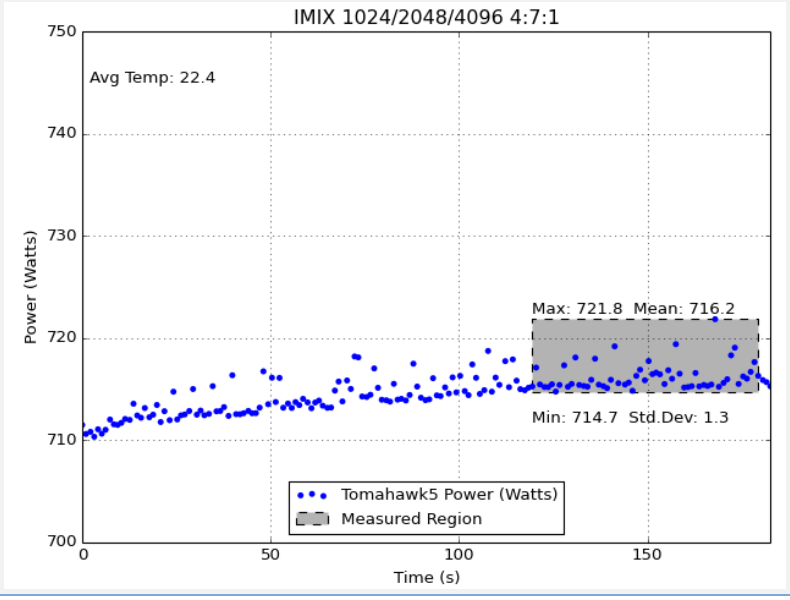
All links were confirmed to be at 800G per port (51.2 Tbps aggregate) with no traffic loss and forwarding at the expected rate. IxNetwork traffic pattern was set to IMIX for 1k, 2k, 4k frame sizes with weighting of 7:4:1 for **Part A**, and 4:7:1 for **Part B**.

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS

Part A:



Part B:



APPENDICES

APPENDIX 1: CONFIGURATION

DUT Configuration file attached

APPENDIX 2: RESULT KEY

The following table contains possible results and their meanings.

RESULT	MEANING	INTERPRETATION
PASS	Pass	The Device Under Test (DUT) was observed to exhibit conformant behavior.
PWC	Pass With Comments	The Device Under Test (DUT) was observed to exhibit conformant behavior, however changes were made to the normal test procedure or the behavior observed requires additional comments.
FAIL	Fail	The Device Under Test (DUT) was observed to exhibit non-conformant behavior.
RTC	Refer to Comments	From the observations, a valid pass or fail was not determined. An additional explanation of the situation is included.
INFO	Informative	Test is designed for informational purposes only. The results may help ensure the interoperability of the DUT, but are not standards requirements.
WARN	Warning	The DUT was observed to exhibit behavior that is not recommended.
N/A	Not Applicable	This test does not apply to the device type or is not applicable to the testing program selected.
N/S	Not Supported	The Device Under Test (DUT) was not observed to support the necessary functionality required to perform these tests or the requirement is optional and not supported by this device.
N/T	Not Tested	This test was not performed and therefore this is not a complete test report. Please see the comments for additional reasons.
UA	Unavailable	The test was not performed due to limitation of the test tool(s) or interoperable systems, or the test methodology is still under development.

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APPENDIX 3: DIGITAL SIGNATURE INFORMATION

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ABOUT UNH-IOL

The University of New Hampshire Interoperability Labs (UNH-IOL) tests networking, storage, and data communications products, develop test plans and test solutions, and contributes to numerous standard organizations, forums and alliances.

Since 1988, the laboratory has fostered multi-vendor interoperability while preparing students for successful careers in the industry. Over the decades, the UNH-IOL has grown into one of **the industry's premier independent proving grounds** for emerging and established technologies.

Explore more about us:

- Our Mission, Vision, and Values
- The History of the UNH-IOL
- Industry-Recognized Test and Reports
- Expertise and Infrastructure
- Training Tomorrow's Engineers

Our efforts take a community.
We extend our thanks to our various members, customers, and Test & Measurement partners for their ongoing support.

Learn how to join our community by contacting us.

University of New Hampshire
Interoperability Labs

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