



University of New Hampshire

Interoperability Labs

Ethernet Testing Services:
56Gbaud Serial, 28GBaudSerial,
10Gbps Serial, 2.5/5/10GBASE-T
and Gigabit Ethernet

Switch Power Consumption Performance Evaluation Plan

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TECHNICAL DOCUMENT

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67 **3 ACKNOWLEDGEMENTS**

68 The UNH InterOperability Laboratory would like to acknowledge the efforts of the following individuals,
69 in alphabetical order, in the development of this test suite.

- | | | |
|----|-------------------|-----------------------------|
| 70 | Surendra Anubolu | Broadcom Corporation |
| 71 | Nick Farone | University of New Hampshire |
| 72 | Bob Noseworthy | University of New Hampshire |
| 73 | Michelle Whisnant | University of New Hampshire |

74 **4 Introduction**

75 **4.1 Overview**

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

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

90 The tests contained in this document are organized in such a manner as to simplify the identification of
 91 information related to a test, and to facilitate the actual testing process. Tests are organized into
 92 groups, primarily to reduce setup time in the lab environment, however the different groups typically
 93 also tend to focus on specific aspects of device functionality. A four-part identification system is used to
 94 organize the tests, where the first ID indicates the subclause of the IEEE 802.3 Standard on which the
 95 test suite is principally based, if applicable. As this is a Performance test plan based on requirements
 96 principally rooted in IEEE 802.3 standards, this label is selected as 802.3-Perf. The second id indicates a
 97 brief identifier for the test plan (Pwr). The third and fourth id indicate the test’s group number and test
 98 number within that group, respectively. This format allows for the addition of future tests to the
 99 appropriate groups without requiring the renumbering of the subsequent tests.

100 **4.2 Normative References**

101 The following documents are referred to in the text in such a way that some or all of their content
 102 constitutes requirements of this document. For dated references, only the edition cited applies. For
 103 undated references, the latest edition of the referenced document (including any amendments) applies.

104 **Table 1 - Normative References**

Short name	Reference (DOI or URL)
IEEE 802.3-2022	DOI: 10.1109/IEEESTD.2022.9844436

105 **4.3 Acronyms, Abbreviations and Definitions**

106 Common acronyms, abbreviations or definitions of terms used throughout this document.

107 **Table 2 - Definition of Terms**

Term	Definition
DUT	Device Under Test
EEE	Energy Efficient Ethernet
IMIX	Internet Mix
TS	Test Station

108 **5 Organization of Tests**

109 The tests contained in this document are organized to simplify the identification of information related
 110 to a test and to facilitate the actual testing process. Each test contains an identification section that
 111 describes the test and provides cross-reference information. The discussion section covers background
 112 information and specifies why the test is to be performed. Tests are grouped by similar functions and
 113 further organized by technology. Each test contains the following information:

114 **5.1 Elementary Test Structure**

115 Each test description follows UNH-IOL’s Ethernet testing format, as defined in the following fields shown
 116 in Table 3.1. A brief description of each field is provided.

117 **Table 3 – Elementary Test Structure**

Purpose	The Purpose is a brief statement outlining what the test attempts to achieve. The test is written at the functional level.										
Device Type, Prerequisites & Classifier	<p>This section notes for each part of the test what the prerequisite conditions are for the given Device Type. Classifier denotes whether the test part, for the identified Device Type meeting the identified pre-requisite conditions, is one of the following:</p> <table border="1"> <thead> <tr> <th>Classifier</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>Mandatory</td> <td>Test part is required if the DUT matches the Device Type</td> </tr> <tr> <td>Conditional Mandatory</td> <td>Test part is required if the pre-requisite condition is true, and the DUT matches the Device Type</td> </tr> <tr> <td>Informative</td> <td>Test part has no pass/fail, but the observations may have value.</td> </tr> <tr> <td>Optional</td> <td>The test part may be elected to be skipped by the requestor.</td> </tr> </tbody> </table>	Classifier	Meaning	Mandatory	Test part is required if the DUT matches the Device Type	Conditional Mandatory	Test part is required if the pre-requisite condition is true, and the DUT matches the Device Type	Informative	Test part has no pass/fail, but the observations may have value.	Optional	The test part may be elected to be skipped by the requestor.
Classifier	Meaning										
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Conditional Mandatory	Test part is required if the pre-requisite condition is true, and the DUT matches the Device Type										
Informative	Test part has no pass/fail, but the observations may have value.										
Optional	The test part may be elected to be skipped by the requestor.										
References	This section specifies source material <i>external</i> to the test plan, including specific subsections pertinent to the test definition, or any other references that might aid in understanding the test methodology and/or test results. External sources are always referenced by number when mentioned in the test description, denoted by square brackets []. References to material internal to the test plan may also be cited, such as references to appendices, such as PICS items mappings to the test case.										
Resource Requirements	This section specifies the test hardware and/or software needed to perform the test. This is expressed in terms of minimum requirements, agnostic of test & measurement tool provider; however, in limited cases specific equipment manufacturer/model information may be provided as an example.										
Modification History	A brief history of significant changes to the test.										
Discussion	The discussion covers the assumptions made in the design or implementation of the test, as well as known limitations. Other items specific to the test are covered here.										
Test Setup	The setup section describes the initial configuration of the test environment referencing the specified default setup. Minor changes in the configuration may be included here or in the test procedure section, below.										
Test Procedure	The procedure section of the test description contains the systematic instructions for carrying out the test. It provides a cookbook approach to testing. Test Procedures may be broken into multiple Parts. Whenever possible, Test Parts should be independent of other parts and insensitive to order of test execution.										

<p>Observable Results</p>	<p>This section lists the specific observables that can be examined by the tester to verify that the DUT is operating properly. When multiple values for an observable are possible, this section provides a brief discussion on how to interpret them. The determination of a pass or fail outcome for a particular test is based on the successful (or unsuccessful) detection of a specific observable.</p> <p>A strong preference is to have any part of a test error on the side of falsely failing a device rather than falsely passing the device. Whether through automation or manual execution, tests ideally have only one of five outcomes:</p> <table border="1"> <thead> <tr> <th>Status</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>PASS</td> <td>Test part meets all PASS criteria, with no FAIL or WARN conditions met.</td> </tr> <tr> <td>FAIL</td> <td>Test part meets at least one FAIL criteria or fails to meet any criteria.</td> </tr> <tr> <td>N/A</td> <td>Test part is Not Applicable to the device type as it is configured.</td> </tr> <tr> <td>WARN</td> <td>Test part does not meet a failing criteria, but behavior is not recommended and is warned against.</td> </tr> <tr> <td>INFO</td> <td>Test part observed specific information that has value to the device manufacturer or industry-at-large and the cited information will be reported in addition to any Pass/Fail determination for the test part.</td> </tr> </tbody> </table> <p>Observable results in this document are presented in a tabular form such as the example below.</p> <ul style="list-style-type: none"> • The first column allows a unique identifier to be associated with each observable in a test, regardless of test part. • The second column references the test part and step (if applicable) that the observable applies to. • The third column is the resulting test status if observed. • The fourth column describes the condition observed for the test status to apply. <p>Example observable result table:</p> <table border="1"> <thead> <tr> <th>Part:Step</th> <th>Status</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a. A</td> <td>N/A</td> <td><This part is Not Applicable if this is true> Example: If the DUT does not support an optional feature.</td> </tr> <tr> <td>b. A:4</td> <td>FAIL</td> <td><This part Fails if this description is true> Example: If any timer observed is below 1.2 μs or above 1.3 μs.</td> </tr> <tr> <td>c. A:5</td> <td>PASS</td> <td><This part Passes if this description is true> Example: All observed values were observed to be within 1.2 μs and 1.3 μs, inclusive.</td> </tr> </tbody> </table>	Status	Meaning	PASS	Test part meets all PASS criteria, with no FAIL or WARN conditions met.	FAIL	Test part meets at least one FAIL criteria or fails to meet any criteria.	N/A	Test part is Not Applicable to the device type as it is configured.	WARN	Test part does not meet a failing criteria, but behavior is not recommended and is warned against.	INFO	Test part observed specific information that has value to the device manufacturer or industry-at-large and the cited information will be reported in addition to any Pass/Fail determination for the test part.	Part:Step	Status	Description	a. A	N/A	<This part is Not Applicable if this is true> Example: If the DUT does not support an optional feature.	b. A:4	FAIL	<This part Fails if this description is true> Example: If any timer observed is below 1.2 μs or above 1.3 μs.	c. A:5	PASS	<This part Passes if this description is true> Example: All observed values were observed to be within 1.2 μs and 1.3 μs, inclusive.
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b. A:4	FAIL	<This part Fails if this description is true> Example: If any timer observed is below 1.2 μs or above 1.3 μs.																							
c. A:5	PASS	<This part Passes if this description is true> Example: All observed values were observed to be within 1.2 μs and 1.3 μs, inclusive.																							
<p>Possible Problems</p>	<p>This section contains a description of known issues with the test procedure, which may affect test results in certain situations. It may also refer the reader to test suite appendices and/or whitepapers that may provide more detail regarding these issues.</p>																								

118 **5.2 Performance Evaluation Test Note**

119 Unless otherwise specified, based on recognized Industry standards, all tests in this test plan are
 120 INFORMATIVE. No judgements are made on the overall fitness of a product based solely on the
 121 measurements made and reported herein. All efforts are made to ensure accuracy in the reported
 122 information, and the reasonable judgement of the UNH-IOL staff on the appropriateness of the
 123 measurements provided within this test plan.

124 **6 Device Under Test (DUT) Requirements**

125 For the purposes of this test suite, the testing focuses on the power consumption of the DUT under
126 various traffic loads.

127 Equipment expected to be provided, if not available at UNH-IOL:

- 128 • A compatible set of cables;
- 129 • At least 2 traffic generator ports compatible with the DUT supporting the maximum supported
130 speed of the DUT.

131 DUT capabilities required:

- 132 • The DUT must support the ability to configure ports into multiple VLANs.

133 The setup for a DUT with a total number of Ports “P”, would set ports N and N+1 into a unique VLAN (eg:
134 VLAN 100 through VLAN 100+(P/2)). Let N = 0 initially and increment N by 2 until all ports are added to
135 VLANs.

136 A compatible cable must be used to connected between each adjacent VLAN (eg: VLAN 100 to VLAN101,
137 a second cable between VLAN101 to VLAN102, etc).

138 The 2 ports of the test station are to be connected to the remaining two ports in the first and last VLANs.

139 **6.1 Multi-speed capable DUTs**

140 If a DUT supports multiple operating speeds, it should be configured for its maximum operation for all
141 tests in this test plan. Upon request, testing at additionally supported slower speeds can be performed.

142 **6.2 Energy-Efficient Ethernet (EEE)**

143 If a DUT supports EEE, methods to enable and disable EEE must be provided if the optional Group 3 and
144 Group 4 testing is desired.

145 **6.3 Per-Test DUT Requirements**

146 Please see the additional requirements listed below:

147 **Table 3 – Test Plan Summary and Per-Test DUT Requirements**

Test # & Name	Title	Prerequisite Conditions	Classifier
Group 1: Power Consumption under no/minimal load			
802.3-Perf.Pwr 1.1	No Cables Connected	None	Informative
Part A	<i>DUT Power Consumption with no cables connected with all ports administratively DOWN</i>		
Part B	<i>DUT Power Consumption with 1/2 cables connected with 1/2 ports administratively UP</i>		
Part C	<i>DUT Power Consumption with no cables connected with all ports administratively UP</i>		
802.3-Perf.Pwr 1.2	Half-Ports Connected	None	Informative
Part A	<i>DUT Power Consumption with 1/2 cables connected with all ports administratively DOWN</i>		
Part B	<i>DUT Power Consumption with 1/2 cables connected with 1/2 ports administratively UP</i>		
Part C	<i>DUT Power Consumption with 1/2 cables connected with all ports administratively UP</i>		
802.3-Perf.Pwr 1.3	All-Ports Connected	None	Informative
Part A	<i>DUT Power Consumption with all cables connected with all ports administratively DOWN</i>		
Part B	<i>DUT Power Consumption with all cables connected with 1/2 ports administratively UP.</i>		
Part C	<i>DUT Power Consumption with all cables connected with all ports administratively UP</i>		
Group 2: Power Consumption under line-rate traffic conditions			
802.3-Perf.Pwr 2.1	Line-Rate, fixed traffic sizes	None	Informative
Part A	<i>DUT Power Consumption with line-rate traffic, with uni-directional traffic</i>		
Part B	<i>DUT Power Consumption with line-rate traffic, with bi-directional traffic</i>		
802.3-Perf.Pwr 2.2	Line-Rate, IMIX traffic sizes	None	Informative
Part A	<i>DUT Power Consumption with line-rate, bi-directional traffic with 1k/2k/4k, 7:4:1 weight</i>		
Part B	<i>DUT Power Consumption with line-rate, bi-directional traffic with 1k/2k/4k, 4:7:1 weight</i>		
Group 3: Power Consumption at less than line-rate without EEE			
802.3-Perf.Pwr 3.1	Less than Line-Rate, no EEE	None	Optional
Part A	<i>DUT Power Consumption with < line-rate bi-directional uniformly spaced traffic & EEE off</i>		
Part B	<i>DUT Power Consumption with less than line-rate bi-directional burst traffic & EEE off</i>		
Group 4: Power Consumption at less than line-rate with EEE Enabled			
802.3-Perf.Pwr 3.1	Less than Line-Rate, with EEE	DUT must support EEE	Optional
Part A	<i>DUT Power Consumption with < line-rate bi-directional uniformly spaced traffic & EEE on</i>		
Part B	<i>DUT Power Consumption with less than line-rate bi-directional burst traffic & EEE on</i>		

148

149

150 **7 Test Cases**

151 The following test cases shall be performed on the Switch device under test.

152

153 **7.1 GROUP 1: Power Consumption under no/minimal traffic conditions**

154

155 **Scope:** The following tests cover the DUT power performance testing under no link, no load and/or
156 minimal load (eg: default management traffic of the DUT) conditions.

157

158 **Purpose:** These tests provide a baseline of the DUT's power consumption to enable evaluation of link
159 and throughput impacts on DUT power consumption.

160

161 **Test 802.3-Perf.Pwr.1.1 – No Cables Connected**

162 **Purpose:** To Baseline the DUT’s power consumption when no cables are connected.

Part	Prerequisite Conditions	Classifier
A-C	None	Informative

163 **References:**

164 [1] TBD

165 **Resource Requirements:**

- 166 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
- 167 precision. The tool must be able to measure max, min and mean power consumption over a set
- 168 interval.

Modification History: 2026-02-20 – Initial Version

169 **Discussion:** This test simply provides a baseline, with ports configured to be down (Part A) and up (Part

170 C) and no cables connected to the DUT.

171 **Test Setup:** No cables should be connected to the DUT. In Part B, select Port 1 through P/2, refer to [Device](#)

172 [Under Test \(DUT\) Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1”

173 refers to the lowest value labeled port on the DUT.

174 **Test Procedure:**

175 *Part A: DUT Power Consumption with no cables connected with all ports administratively **DOWN**.*

176 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.

177 A:2 Ensure all ports are set to administratively be **down**.

178 A:3 Measure the power consumed by the DUT over the period of 1 minute.

179 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air

180 intake or exhaust).

181 b) Note the min, max and mean power consumed over the interval.

182 **Observable results:**

Part:Step	Status	Description
a. A:3(a)	INFO	Report the measured temperature.
b. A:3(b)	INFO	Report the mean, min and max power consumed when no cables are connected and all ports are administratively down.

183 *Part B: DUT Power Consumption with 1/2 cables connected with 1/2 ports administratively **UP**.*

184 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.

185 B:2 Ensure ports 1 through P/2 are set to administratively be **up**.

186 B:3 Measure the power consumed by the DUT over the period of 1 minute.

187 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air

188 intake or exhaust).

189 b) Note the min, max and mean power consumed over the interval.

190 **Observable results:**

Part:Step	Status	Description
c. B:3(a)	INFO	Report the measured temperature.
d. B:3(b)	INFO	Report the mean, min and max power consumed when no cables are connected and all ports are administratively up.

192

- 193 *Part C: DUT Power Consumption with no cables connected with all ports administratively UP.*
 194 C:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 195 C:2 Ensure all ports are set to administratively be **up**.
 196 C:3 Measure the power consumed by the DUT over the period of 1 minute.
 197 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 198 intake or exhaust).
 199 b) Note the min, max and mean power consumed over the interval.

200 **Observable results:**

	Part:Step	Status	Description
e.	C:3(a)	INFO	Report the measured temperature.
f.	C:3(b)	INFO	Report the mean, min and max power consumed when no cables are connected and all ports are administratively up.

- 201
 202
 203 **Possible problems:** None
 204

205 **Test 802.3-Perf.Pwr.1.2 – Half-Ports Connected**

206 **Purpose:** To Baseline the DUT’s power consumption when half of the total ports are connected.

Part	Prerequisite Conditions	Classifier
A-B	None	Informative

207 **References:**

208 [1] TBD

209 **Resource Requirements:**

- 210 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
- 211 precision. The tool must be able to measure max, min and mean power consumption over a set
- 212 interval.

Modification History: 2026-02-20 – Initial Version

213 **Discussion:** This test simply provides a baseline, with the first half of ports connected to cables and ports

214 configured to be administratively down (Part A), 1/2 of the ports administratively up (Part B) and all ports

215 administratively up (Part C).

216 **Test Setup:** Connect Port 1 through P/2 via compatible cables, refer to [Device Under Test \(DUT\)](#)

217 [Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1” refers to the lowest

218 value labeled port on the DUT.

219 **Test Procedure:**

220 *Part A: DUT Power Consumption with 1/2 cables connected with all ports administratively **DOWN**.*

221 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.

222 a) Ensure the Test Setup is in place as noted above.

223 A:2 Ensure all ports are set to administratively be **down**.

224 A:3 Via the DUT’s management, report the administrative state and link status.

225 a) Also note if the DUT has LED indicators and if they show link for the ports with connected

226 cables

227 A:4 Measure the power consumed by the DUT over the period of 1 minute.

228 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air

229 intake or exhaust).

230 b) Note the min, max and mean power consumed over the interval.

231 **Observable results:**

Part:Step	Status	Description
a. A:3	INFO	Report the DUT indicated administrative state and link status
b. A:3(a)	INFO	Report the state of any link LEDs associated with ports with connected cables.
c. A:4(a)	INFO	Report the measured temperature.
d. A:4(b)	INFO	Report the mean, min and max power consumed when half of all ports are connected and all ports are administratively down.

233

- 234 *Part B: DUT Power Consumption with 1/2 cables connected with 1/2 ports administratively UP.*
 235 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 236 a) Ensure the Test Setup is in place as noted above.
 237 B:2 Ensure ports 1 through P/2 are set to administratively be **up**.
 238 B:3 Via the DUT’s management, report the administrative state and link status.
 239 a) Also note if the DUT has LED indicators and if they show link for the ports with connected
 240 cables.
 241 B:4 Measure the power consumed by the DUT over the period of 1 minute.
 242 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 243 intake or exhaust).
 244 b) Note the min, max and mean power consumed over the interval.
 245

246 **Observable results:**

Part:Step	Status	Description
e. B:3	INFO	Report the DUT indicated administrative state and link status
f. B:3(a)	INFO	Report the state of any link LEDs associated with ports with connected cables.
g. B:4(a)	INFO	Report the measured temperature.
h. B:4(b)	INFO	Report the mean, min and max power consumed when half of all ports are connected and all ports are administratively up.

- 247
 248 *Part C: DUT Power Consumption with 1/2 cables connected with all ports administratively UP.*
 249 C:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 250 a) Ensure the Test Setup is in place as noted above.
 251 C:2 Ensure all ports are set to administratively be **up**.
 252 C:3 Via the DUT’s management, report the administrative state and link status.
 253 a) Also note if the DUT has LED indicators and if they show link for the ports with connected
 254 cables.
 255 C:4 Measure the power consumed by the DUT over the period of 1 minute.
 256 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 257 intake or exhaust).
 258 b) Note the min, max and mean power consumed over the interval.
 259

260 **Observable results:**

Part:Step	Status	Description
i. C:3	INFO	Report the DUT indicated administrative state and link status
j. C:3(a)	INFO	Report the state of any link LEDs associated with ports with connected cables.
k. C:4(a)	INFO	Report the measured temperature.
l. C:4(b)	INFO	Report the mean, min and max power consumed when half of all ports are connected and all ports are administratively up.

261
 262 **Possible problems:** None

263 **Test 802.3-Perf.Pwr.1.3 – All-Ports Connected**

264 **Purpose:** To Baseline the DUT’s power consumption when all of the total ports are connected.

Part	Prerequisite Conditions	Classifier
A-B	None	Informative

265 **References:**

266 [1] TBD

267 **Resource Requirements:**

- 268 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
- 269 precision. The tool must be able to measure max, min and mean power consumption over a set
- 270 interval.

Modification History: 2026-02-20 – Initial Version

271 **Discussion:** This test simply provides a baseline, with all ports connected to cables and ports configured

272 to be administratively down (Part A), 1/2 of the ports administratively up (Part B) and all ports

273 administratively up (Part C).

274 **Test Setup:** Connect Port 1 through P via compatible cables, refer to [Device Under Test \(DUT\)](#)

275 [Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1” refers to the lowest

276 value labeled port on the DUT.

277 **Test Procedure:**

278 *Part A: DUT Power Consumption with all cables connected with all ports administratively **DOWN**.*

279 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.

280 a) Ensure the Test Setup is in place as noted above.

281 A:2 Ensure all ports are set to administratively be **down**.

282 A:3 Via the DUT’s management, report the administrative state and link status.

283 a) Also note if the DUT has LED indicators and if they show link for the ports with connected

284 cables

285 A:4 Measure the power consumed by the DUT over the period of 1 minute.

286 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air

287 intake or exhaust).

288 b) Note the min, max and mean power consumed over the interval.

289 **Observable results:**

Part:Step	Status	Description
a. A:3	INFO	Report the DUT indicated administrative state and link status
b. A:3(a)	INFO	Report the state of any link LEDs associated with ports with connected cables.
c. A:4(a)	INFO	Report the measured temperature.
d. A:4(b)	INFO	Report the mean, min and max power consumed when all cables are connected and all ports are administratively down.

291

- 292 *Part B: DUT Power Consumption with all cables connected with 1/2 ports administratively UP.*
 293 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 294 a) Ensure the Test Setup is in place as noted above.
 295 B:2 Ensure ports 1 through P/2 are set to administratively be **up**.
 296 B:3 Via the DUT’s management, report the administrative state and link status.
 297 a) Also note if the DUT has LED indicators and if they show link for the ports with connected
 298 cables.
 299 B:4 Measure the power consumed by the DUT over the period of 1 minute.
 300 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 301 intake or exhaust).
 302 b) Note the min, max and mean power consumed over the interval.
 303

Observable results:

Part:Step	Status	Description
e. B:3	INFO	Report the DUT indicated administrative state and link status
f. B:3(a)	INFO	Report the state of any link LEDs associated with ports with connected cables.
g. B:4(a)	INFO	Report the measured temperature.
h. B:4(b)	INFO	Report the mean, min and max power consumed when all cables are connected and half of all ports are administratively up.

- 305
 306 *Part C: DUT Power Consumption with all cables connected with all ports administratively UP.*
 307 C:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 308 a) Ensure the Test Setup is in place as noted above.
 309 C:2 Ensure all ports are set to administratively be **up**.
 310 C:3 Via the DUT’s management, report the administrative state and link status.
 311 a) Also note if the DUT has LED indicators and if they show link for the ports with connected
 312 cables.
 313 C:4 Measure the power consumed by the DUT over the period of 1 minute.
 314 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 315 intake or exhaust).
 316 b) Note the min, max and mean power consumed over the interval.
 317

Observable results:

Part:Step	Status	Description
i. C:3	INFO	Report the DUT indicated administrative state and link status
j. C:3(a)	INFO	Report the state of any link LEDs associated with ports with connected cables.
k. C:4(a)	INFO	Report the measured temperature.
l. C:4(b)	INFO	Report the mean, min and max power consumed when all cables are connected and all ports are administratively up.

319
 320 **Possible problems:** None

321 **7.2 GROUP 2: Power Consumption under line-rate traffic conditions**

322

323 **Scope:** The following tests cover the DUT power performance testing under maximum link and line-rate
324 traffic conditions. Traffic patterns and sizes may vary in this group.

325

326 **Purpose:** These tests provide data on the DUT's power consumption when all ports are linked and
327 utilized at various maximum line rate conditions.

328

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

330 **Purpose:** To evaluate the DUT’s power consumption when all ports are linked, and receiving traffic at line
 331 rate, with fixed traffic size.

Part	Prerequisite Conditions	Classifier
A-B	None	Informative

332 **References:**

333 [1] TBD

334 **Resource Requirements:**

- 335 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
 336 precision. The tool must be able to measure max, min and mean power consumption over a set
 337 interval.
- 338 • A two-port test station that can generate line-rate traffic at the speeds needed for the DUT. The test
 339 station must be able to send varied traffic, varying size traffic, and record statistics (at least) of the
 340 received traffic rates.

Modification History: 2026-02-20 – Initial Version

341 **Discussion:** This test evaluates the DUT with all ports configured to be up and linked, sending traffic at
 342 line-rate, but only one size tested at a time, in only one direction (Part A) and bi-directionally (Part B).
 343 Except for the uni-directional vs bi-directional nature of the test parts, Part A and Part B are otherwise
 344 identical.

345 **Test Setup:** Connect Port 1 through P via compatible cables, refer to [Device Under Test \(DUT\)](#)
 346 [Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1” refers to the lowest
 347 value labeled port on the DUT.

348 **Test Procedure:** (see next page)

- 349 *Part A: DUT Power Consumption with line-rate traffic, with uni-directional traffic.*
 350 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 351 A:2 From the two-port test station, source traffic at line-rate from one-port to the other. The initial
 352 traffic size tested is 512 Bytes (inclusive of FCS field).
 353 a) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 354 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 355 b) Frame Payloads should not be random but should contain rich transitions eg: alternating
 356 0x55555555 0xAAAAAAAA.
 357 c) Ensure the DUT is configured to support the traffic provided (eg: if Jumbo frames are sent,
 358 ensure Jumbo frame limits are set appropriately).
 359 A:3 Wait 2 minutes.
 360 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 361 b) Ensure traffic rates received match what was sent at the expected rate.
 362 A:4 Measure the power consumed by the DUT over the period of 1 minute.
 363 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 364 intake or exhaust).
 365 b) Note the min, max and mean power consumed over the interval.
 366 A:5 Stop the traffic from the traffic generator and repeat steps A:2 through A:4 varying the frame
 367 size tested through the following byte values: 1024, 1518, 2048, 4096, 9216.
 368

369 **Observable results:**

Part:Step	Status	Description
a. A:4(a)	INFO	For each iteration: Report the size tested and the measured temperature.
b. A:4(b)	INFO	For each iteration: Report the size tested and the mean, min and max power consumed when all ports are up and receiving line rate traffic at a fixed-size.

370

- 371 *Part B: DUT Power Consumption with line-rate traffic, with **bi**-directional traffic.*
 372 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 373 B:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
 374 the second port to the first. The initial traffic size tested is 512 Bytes (inclusive of FCS field).
 375 a) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 376 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 377 b) Frame Payloads should not be random but should contain rich transitions eg: alternating
 378 0x55555555 0xAAAAAAAA.
 379 c) Ensure the DUT is configured to support the traffic provided (eg: if Jumbo frames are sent,
 380 ensure Jumbo frame limits are set appropriately).
 381 B:3 Wait 2 minutes.
 382 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 383 b) Ensure traffic rates received match what was sent at the expected rate.
 384 B:4 Measure the power consumed by the DUT over the period of 1 minute.
 385 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 386 intake or exhaust).
 387 b) Note the min, max and mean power consumed over the interval.
 388 B:5 Repeat steps B:2 through B:4 varying the frame size tested through the following byte values:
 389 1024, 1518, 2048, 4096, 9216.
 390

391 **Observable results:**

Part:Step	Status	Description
c. B:4(a)	INFO	For each iteration: Report the size tested and the measured temperature.
d. B:4(b)	INFO	For each iteration: Report the size tested and the mean, min and max power consumed when all ports are up and receiving line rate traffic at a fixed-size.

392
 393 **Possible problems:** None.
 394

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

396 **Purpose:** To evaluate the DUT’s power consumption when all ports are linked, and receiving traffic at line
 397 rate, with a mix of traffic sizes.

Part	Prerequisite Conditions	Classifier
A-B	None	Informative

398 **References:**

399 [1] TBD

400 **Resource Requirements:**

- 401 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
 402 precision. The tool must be able to measure max, min and mean power consumption over a set
 403 interval.
- 404 • A two-port test station that can generate line-rate traffic at the speeds needed for the DUT. The test
 405 station must be able to send varied traffic, varying size traffic, and record statistics (at least) of the
 406 received traffic rates.

Modification History: 2026-02-20 – Initial Version

407 **Discussion:** This test evaluates the DUT with all ports configured to be up and linked, sending traffic at
 408 line-rate, with a mix of frame sizes sent. Three sizes are selected in this test, 1024 byte, 2048 byte, and
 409 4096 byte. Both parts of this test are performed with bi-directional traffic, however in Part A, the traffic
 410 pattern is weighted 7:4:1 (for every 7 1024 Byte frames, 4 2048 byte frames are sent and 1 4096 byte
 411 frame is sent), whereas in Part B, the pattern weighting is changed to 4:7:1. Except for the traffic
 412 weighting difference, Part A and Part B are otherwise identical.

413 **Test Setup:** Connect Port 1 through P via compatible cables, refer to [Device Under Test \(DUT\)](#)
 414 [Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1” refers to the lowest
 415 value labeled port on the DUT.

416 **Test Procedure:** (see next page)

- 417 *Part A: DUT Power Consumption with line-rate, bi-directional traffic with 1024/2048/4096, 7:4:1 weight.*
 418 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 419 A:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
 420 the second port to the first.
 421 a) The IMIX traffic pattern should be 1024/2048/4096 with a weighting of 7:4:1.
 422 b) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 423 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 424 c) Frame Payloads should not be random but should contain rich transitions eg: alternating
 425 0x55555555 0xAAAAAAAA.
 426 d) Ensure the DUT is configured to support the traffic provided (eg: if Jumbo frames are sent,
 427 ensure Jumbo frame limits are set appropriately).
 428 A:3 Wait 2 minutes.
 429 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 430 b) Ensure traffic rates received match what was sent at the expected rate.
 431 A:4 Measure the power consumed by the DUT over the period of 1 minute.
 432 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 433 intake or exhaust).
 434 b) Note the min, max and mean power consumed over the interval.
 435
 436 **Observable results:**

Part:Step	Status	Description
a. A:4(a)	INFO	Report the size tested and the measured temperature.
b. A:4(b)	INFO	Report the size tested and the mean, min and max power consumed when all ports are up and receiving line rate traffic with an IMIX of 1k/2k/4k weighted by 7:4:1.

437

438 *Part B: DUT Power Consumption with line-rate, bi-directional traffic with 1024/2048/4096, 4:7:1 weight.*

439 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.

440 B:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
441 the second port to the first.

442 a) The IMIX traffic pattern should be 1024/2048/4096 with a weighting of 4:7:1

443 b) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.

444 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.

445 c) Frame Payloads should not be random but should contain rich transitions eg: alternating
446 0x55555555 0xAAAAAAAA.

447 d) Ensure the DUT is configured to support the traffic provided (eg: if Jumbo frames are sent,
448 ensure Jumbo frame limits are set appropriately).

449 B:3 Wait 2 minutes.

450 a) Monitor the traffic received by the test station to ensure traffic is flowing.

451 b) Ensure traffic rates received match what was sent at the expected rate.

452 B:4 Measure the power consumed by the DUT over the period of 1 minute.

453 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
454 intake or exhaust).

455 b) Note the min, max and mean power consumed over the interval.

456

457 **Observable results:**

Part:Step	Status	Description
c. B:4(a)	INFO	Report the measured temperature.
d. B:4(b)	INFO	Report the size tested and the mean, min and max power consumed when all ports are up and receiving line rate traffic with an IMIX of 1k/2k/4k weighted by 4:7:1.

458

459 **Possible problems:** None.

460

461

462 **7.3 GROUP 3: Power Consumption at less than line-rate without EEE enabled**

463

464 **Scope:** The following tests cover the DUT power performance testing under maximum link but less-than
465 line-rate traffic conditions with Energy Efficient Ethernet (EEE) disabled. Traffic patterns and sizes may
466 vary in this group.

467

468 **Purpose:** These tests provide data on the DUT's power consumption when all ports are linked but not
469 driven at line-rate traffic conditions. This can serve as a baseline for performance evaluation if EEE is
470 supported and later enabled.

471

472 **Test 802.3-Perf.Pwr.3.1 – Less than Line-Rate, fixed traffic size, without EEE**

473 **Purpose:** To evaluate the DUT’s power consumption when all ports are linked, and receiving traffic at less
 474 than line rate, with fixed traffic size and Energy Efficient Ethernet (EEE) disabled.

Part	Prerequisite Conditions	Classifier
A-B	None	Optional

475 **References:**

476 [1] TBD

477 **Resource Requirements:**

- 478 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
 479 precision. The tool must be able to measure max, min and mean power consumption over a set
 480 interval.
- 481 • A two-port test station that can generate line-rate traffic at the speeds needed for the DUT. The test
 482 station must be able to send varied traffic, varying size traffic, and record statistics (at least) of the
 483 received traffic rates.

Modification History: 2026-02-20 – Initial Version

484 **Discussion:** This test evaluates the DUT with all ports configured to be up and linked, sending traffic at
 485 less than line-rate, with only one frame size tested, bi-directionally. Part A will examine the case where
 486 the traffic is at a fixed rate with uniform separation (eg: 5% line rate or 1% line rate). In Part B, a burst of
 487 traffic at line rate will be sent, followed by a longer period of silence, equating to 5% (or 1%) line rate over
 488 a window of time (nominally 1 second). Except for the nature of the idle period, the two test parts are
 489 otherwise identical.

490 **Test Setup:** Connect Port 1 through P via compatible cables, refer to [Device Under Test \(DUT\)](#)
 491 [Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1” refers to the lowest
 492 value labeled port on the DUT. Ensure EEE is disabled on all ports.

493 **Test Procedure:** (see next page)

- 494 *Part A: DUT Power Consumption with less than line-rate bi-directional **uniformly spaced** traffic & EEE off.*
 495 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 496 A:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
 497 the second port to the first.
 498 a) Frame size tested will be 1024-byte (including FCS field) at an initial rate of 5% line-rate.
 499 b) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 500 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 501 c) Frame Payloads should not be random but should contain rich transitions eg: alternating
 502 0x55555555 0xAAAAAAAA.
 503 A:3 Wait 2 minutes.
 504 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 505 b) Ensure traffic rates received match what was sent at the expected rate.
 506 A:4 Measure the power consumed by the DUT over the period of 1 minute.
 507 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 508 intake or exhaust).
 509 b) Note the min, max and mean power consumed over the interval.
 510 A:5 Repeat steps A:2 through A:4, changing the traffic rate to 1%.

511 **Observable results:**

Part:Step	Status	Description
a. A	N/A	If the DUT does not support EEE, then baselining the DUT's behavior in this test case may optionally be skipped upon request.
b. A:4(a)	INFO	For each iteration: Report the measured temperature.
c. A:4(b)	INFO	For each iteration: Report the size tested and the mean, min and max power consumed when all links are up and traffic rates are low (uniform spacing).

512

- 513 *Part B: DUT Power Consumption with less than line-rate bi-directional **burst** traffic & EEE off.*
 514 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 515 B:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
 516 the second port to the first.
 517 a) Frame size tested will be 1024-byte (including FCS field).
 518 b) Sufficient frames should be sent at line rate, followed by a period of no frame activity, such
 519 that the overall rate is 5% of line-rate over a 1 second interval.
 520 c) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 521 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 522 d) Frame Payloads should not be random but should contain rich transitions eg: alternating
 523 0x55555555 0xAAAAAAAA.
 524 B:3 Wait 2 minutes.
 525 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 526 b) Ensure traffic rates received match what was sent at the expected rate.
 527 B:4 Measure the power consumed by the DUT over the period of 1 minute.
 528 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 529 intake or exhaust).
 530 b) Note the min, max and mean power consumed over the interval.
 531 B:5 Repeat steps B:2 through B:4, changing the traffic rate to 1% equivalent over a 1 second interval.
 532 a) Note: for 800Gbps, 5% would be 4,788,974 frames at line rate followed by ~0.95s of idle.
 533 b) Note: for 800Gbps, 1% would be 958,191 frames at line rate followed by ~0.99s of idle.
 534

535 **Observable results:**

Part:Step	Status	Description
d. B	N/A	If the DUT does not support EEE, then baselining the DUT's behavior in this test case may optionally be skipped upon request.
e. B:4(a)	INFO	For each iteration: Report the measured temperature.
f. B:4(b)	INFO	For each iteration: Report the size tested and the mean, min and max power consumed when all links are up and traffic rates are low (spaced bursts).

536
 537 **Possible problems:** None.

538 **7.4 GROUP 4: Power Consumption at less than line-rate and EEE enabled**

539

540 **Scope:** The following tests cover the DUT power performance testing under maximum link but less-than
541 line-rate traffic conditions with Energy Efficient Ethernet (EEE) enabled. Traffic patterns and sizes may
542 vary in this group.

543

544 **Purpose:** These tests provide data on the DUT's power consumption when all ports are linked but not
545 driven at line-rate traffic conditions. This can serve as a point of comparison to the results in the
546 previous group, such that the impact of EEE being enabled and disabled can be evaluated.

547

548 **Test 802.3-Perf.Pwr.4.1 – Less than Line-Rate, fixed traffic size, with EEE enabled**

549 **Purpose:** To evaluate the DUT’s power consumption when all ports are linked, and receiving traffic at less
 550 than line rate, with fixed traffic size and Energy Efficient Ethernet (EEE) enabled.

Part	Prerequisite Conditions	Classifier
A-B	DUT must support EEE	Optional

551 **References:**

552 [1] TBD

553 **Resource Requirements:**

- 554 • A tool to measure the power supplied to the DUT with 1% or better accuracy, and, at least, 100mW
 555 precision. The tool must be able to measure max, min and mean power consumption over a set
 556 interval.
- 557 • A two-port test station that can generate line-rate traffic at the speeds needed for the DUT. The test
 558 station must also support EEE at the speeds needed for the DUT. The test station must be able to
 559 send varied traffic, varying size traffic, and record statistics (at least) of the received traffic rates.

Modification History: 2026-02-20 – Initial Version

560 **Discussion:** This test evaluates the DUT with all ports configured to be up and linked, sending traffic at
 561 less than line-rate, with only one frame size tested, bi-directionally with Energy Efficient Ethernet (EEE)
 562 enabled. Part A will examine the case where the traffic is at a fixed rate with uniform separation (eg: 5%
 563 line rate or 1% line rate). In Part B, a burst of traffic at line rate will be sent, followed by a longer period
 564 of silence, equating to 5% (or 1%) line rate over a window of time (nominally 1 second). Except for the
 565 nature of the idle period, the two test parts are otherwise identical.

566 **Test Setup:** Connect Port 1 through P via compatible cables, refer to [Device Under Test \(DUT\)](#)
 567 [Requirements](#) for topology details. “P” is the number of ports on the DUT . “Port 1” refers to the lowest
 568 value labeled port on the DUT. Ensure EEE is enabled on all ports.

569 **Test Procedure:** (see next page)

- 570 *Part A: DUT Power Consumption with less than line-rate bi-directional **uniformly spaced** traffic & EEE on.*
 571 A:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 572 A:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
 573 the second port to the first.
 574 a) Frame size tested will be 1024-byte (including FCS field) at an initial rate of 5% line-rate.
 575 b) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 576 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 577 c) Frame Payloads should not be random but should contain rich transitions eg: alternating
 578 0x55555555 0xAAAAAAAA.
 579 A:3 Wait 2 minutes.
 580 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 581 b) Ensure traffic rates received match what was sent at the expected rate.
 582 A:4 Measure the power consumed by the DUT over the period of 1 minute.
 583 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 584 intake or exhaust).
 585 b) Note the min, max and mean power consumed over the interval.
 586 A:5 Repeat steps A:2 through A:4, changing the traffic rate to 1%.

587 **Observable results:**

Part:Step	Status	Description
a. A	N/A	If the DUT does not support EEE, then this test cannot be performed.
b. A:4(a)	INFO	For each iteration: Report the size tested and the measured temperature.
c. A:4(b)	INFO	For each iteration: Report the size tested and the mean, min and max power consumed when all links are up and traffic rates are low (uniformly spaced).

589

- 590 *Part B: DUT Power Consumption with less than line-rate bi-directional **burst** traffic & EEE on.*
 591 B:1 Power on the DUT if needed. DUT must have been on for 15 minutes to normalize temperature.
 592 B:2 From the two-port test station, source traffic at line-rate from one-port to the second, and from
 593 the second port to the first.
 594 a) Frame size tested will be 1024-byte (including FCS field).
 595 b) Sufficient frames should be sent at line rate, followed by a period of no frame activity, such
 596 that the overall rate is 5% of line-rate over a 1 second interval.
 597 c) If necessary for DUT configuration, frames may be Layer 3 with valid IPv4/IPv6 headers.
 598 Where possible, preference is for well-formed layer-2 VLAN tagged traffic only.
 599 d) Frame Payloads should not be random but should contain rich transitions eg: alternating
 600 0x55555555 0xAAAAAAAA.
 601 B:3 Wait 2 minutes.
 602 a) Monitor the traffic received by the test station to ensure traffic is flowing.
 603 b) Ensure traffic rates received match what was sent at the expected rate.
 604 B:4 Measure the power consumed by the DUT over the period of 1 minute.
 605 a) Note the temperature of the environment adjacent to the DUT (not in-line with any air
 606 intake or exhaust).
 607 b) Note the min, max and mean power consumed over the interval.
 608 B:5 Repeat steps B:2 through B:4, changing the traffic rate to 1% equivalent over a 1 second interval.
 609 a) Note: for 800Gbps, 5% would be 4,788,974 frames at line rate followed by ~0.95s of idle.
 610 b) Note: for 800Gbps, 1% would be 958,191 frames at line rate followed by ~0.99s of idle.

611 **Observable results:**

Part:Step	Status	Description
d. B	N/A	If the DUT does not support EEE, then this test cannot be performed.
e. B:4(a)	INFO	For each iteration: Report the measured temperature.
f. B:4(b)	INFO	For each iteration: Report the size tested and the mean, min and max power consumed when all links are up and traffic rates are low (spaced bursts).

613
 614 **Possible problems:** None.

615

616 **8 TEST PLAN APPENDICES**

617 **8.1 MODIFICATION RECORD**

618 Version 1.0: Date Released: 2026-02-20 -- Initial Release