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5 **Ethernet NIC Diagnostics Profile**

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Foreword

105 The *Ethernet NIC Diagnostics Profile* (DSP1107) was prepared by the Diagnostics Working Group of the
106 DMTF.

107 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
108 management and interoperability. For information about the DMTF, see <http://www.dmtf.org>.

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122

Introduction

123 A *profile* is a collection of Common Information Model (CIM) elements and behavior rules that represents
124 a specific area of management. The purpose of the profile is to ensure interoperability of web-based
125 enterprise management (WBEM) services for a specific subset of the CIM schema — in this case
126 Ethernet NIC diagnostics.

127 Diagnostics is a critical component of systems management. Diagnostic services are used in problem
128 containment to maintain availability, achieve fault isolation for system recovery, establish system integrity
129 during boot, increase system reliability, and perform routine proactive system verification. The goal of the
130 Common Diagnostic Model (CDM) is to define industry-standard building blocks, based on and consistent
131 with the DMTF CIM, which enables seamless integration of vendor-supplied diagnostic services into
132 system and SAN management frameworks.

133 The goal of the *Ethernet NIC Diagnostics Profile* is to define industry-standard building blocks that enable
134 seamless problem determination support for Ethernet NICs. The profile extends the standard diagnostic
135 profile by identifying a base set of Ethernet NIC functions that should be diagnosed by provider
136 implementations. Suppliers can differentiate their diagnostic offering by providing this base set of
137 diagnostics and developing diagnostics to analyze proprietary features of the Ethernet NIC.

138 Document conventions

139 Typographical conventions

140 The following typographical conventions are used in this document:

- 141 • Document titles are marked in *italics*.
- 142 • Important terms that are used for the first time are marked in *italics*.

143 ABNF usage conventions

144 Format definitions in this document are specified using ABNF (see [RFC5234](#)), with the following
145 deviations:

- 146 • Literal strings are to be interpreted as case-sensitive Unicode characters, as opposed to the
147 definition in [RFC5234](#) that interprets literal strings as case-insensitive US-ASCII characters.

148

Ethernet NIC Diagnostics Profile

1 Scope

150 The *Ethernet NIC Diagnostics Profile* specializes the *Diagnostics Profile* by defining the set of classes,
151 properties, methods and default values needed to perform effective problem determination for Ethernet
152 NICs within a management domain.

153 The target audience for this specification includes implementers who are writing CIM-based Ethernet NIC
154 diagnostics or consumers of CIM-based diagnostics for the Ethernet NIC.

2 Normative references

156 The following referenced documents are indispensable for the application of this document. For dated or
157 versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies.
158 For references without a date or version, the latest published edition of the referenced document
159 (including any corrigenda or DMTF update versions) applies.

160 DMTF DSP0004, *CIM Infrastructure Specification 2.6*,
161 http://dmtof.org/sites/default/files/standards/documents/DSP0004_2.6.pdf

162 DMTF DSP0200, *CIM Operations over HTTP 1.3*,
163 http://dmtof.org/sites/default/files/standards/documents/DSP0200_1.3.pdf

164 DMTF DSP1001, *Management Profile Specification Usage Guide 1.0*,
165 http://dmtof.org/sites/default/files/standards/documents/DSP1001_1.0.pdf

166 DMTF DSP1002, *Diagnostics Profile 2.0*,
167 http://dmtof.org/sites/default/files/standards/documents/DSP1002_2.0.pdf

168 DMTF DSP1014, *Ethernet Port Profile 1.0*,
169 http://dmtof.org/sites/default/files/standards/documents/DSP1014_1.0.0.pdf

170 DMTF DSP1033, *Profile Registration Profile 1.0*,
171 http://dmtof.org/sites/default/files/standards/documents/DSP1033_1.0.pdf

172 DMTF DSP1035, *Host LAN Network Port Profile 1.0*,
173 http://www.dmtf.org/sites/default/files/standards/documents/DSP1035_1.0.pdf

174 IETF RFC5234, *ABNF: Augmented BNF for Syntax Specifications, January 2008*,
175 <http://tools.ietf.org/html/rfc5234>

176 ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*,
177 <http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtype>

3 Terms and definitions

179 In this document, some terms have a specific meaning beyond the normal English meaning. Those terms
180 are defined in this clause.

181 The terms "shall" ("required"), "shall not," "should" ("recommended"), "should not" ("not recommended"),
182 "may," "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described

183 in [ISO/IEC Directives, Part 2](#), Annex H. The terms in parenthesis are alternatives for the preceding term,
184 for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that
185 [ISO/IEC Directives, Part 2](#), Annex H specifies additional alternatives. Occurrences of such additional
186 alternatives shall be interpreted in their normal English meaning.

187 The terms "clause," "subclause," "paragraph," and "annex" in this document are to be interpreted as
188 described in [ISO/IEC Directives, Part 2](#), Clause 5.

189 The terms "normative" and "informative" in this document are to be interpreted as described in [ISO/IEC](#)
190 [Directives, Part 2](#), Clause 3. In this document, clauses, subclauses, or annexes labeled "(informative)" do
191 not contain normative content. Notes and examples are always informative elements.

192 The terms defined in [DSP0004](#), [DSP0200](#), and [DSP1001](#) apply to this document.

193 3.1

194 Preboot

195 non-production OS/diagnostic environment running on system hardware

196 4 Symbols and abbreviated terms

197 The following symbols and abbreviations are used in this document.

198 4.1

199 CDM

200 Common Diagnostic Model

201 4.2

202 CIM

203 Common Information Model

204 4.3

205 CIMOM

206 CIM Object Manager

207 4.4

208 CRU

209 Customer Replaceable Unit

210 4.5

211 FRU

212 Field Replaceable Unit

213 4.6

214 IRQ

215 Interrupt Request

216 4.7

217 LED

218 Light Emitting Diode

219 4.8

220 MAC

221 the link layer of the OSI protocol model

222 **4.9**
223 **ME**
224 Managed Element

225 **4.10**
226 **MOF**
227 Managed Object Format

228 **4.11**
229 **NIC**
230 Network Interface Card

231 **4.12**
232 **OS**
233 Operating System

234 **4.13**
235 **PD**
236 Problem Determination

237 **4.14**
238 **PHY**
239 the physical layer of the OSI protocol model

240 **4.15**
241 **PXE**
242 Preboot Execution Environment

243 **4.16**
244 **Rx**
245 received

246 **4.17**
247 **SAN**
248 Storage Area Network

249 **4.18**
250 **TOE**
251 TCP/IP Offload Engine

252 **4.19**
253 **Tx**
254 transmitted

255 **4.20**
256 **WBEM**
257 Web-Based Enterprise Management

258 **5 Synopsis**

259 **Profile Name:** Ethernet NIC Diagnostics

260 **Version:** 1.0.0

261 **Organization:** DMTF

262 **CIM schema version:** 2.31

263 **Central Class:** CIM_EthernetNICDiagnosticTest

264 **Scoping Class:** CIM_ComputerSystem

265 **Specializes:** Diagnostics Profile 2.0.0

266 The *Ethernet NIC Diagnostics Profile* extends the management capability of referenced profiles by adding
267 common methods for determining that the state of managed processors in a system is optimal.

268 CIM_EthernetNICDiagnosticTest shall be the central class of this profile. The instance of
269 CIM_EthernetNICDiagnosticTest shall be the Central Instance of this profile. CIM_ComputerSystem shall
270 be the Scoping Class of this profile. The instance of CIM_ComputerSystem with which the Central
271 Instance is associated through an instance of CIM_HostedService shall be the Scoping Instance of this
272 profile.

273 The CIM_ManagedElement is CIM_EthernetPort or CIM_PortController or a subclass of them.

274 Table 1 identifies profiles on which this profile has a dependency.

275

Table 1 – Referenced profiles

Profile name	Organization	Version	Description
Diagnostics	DMTF	2.0	Specializes
Profile Registration	DMTF	1.0	Mandatory
Ethernet Port	DMTF	1.0	Optional

276 The [Ethernet Port Profile](#) specializes the [Host LAN Network Port Profile](#), which means that the former
277 inherits all of the classes from the latter. The Ethernet NIC Diagnostics Profile requires the use of a
278 subset of the [Ethernet Port Profile](#) and the [Host LAN Network Port Profile](#). Specifically, the
279 CIM_ManagedElement used by this profile may require support of one or more of the following classes:
280 CIM_EthernetPort, CIM_PortController, and their PhysicalElement counterparts (for example, CIM_Card,
281 CIM_Chip, or CIM_PhysicalPackage, depending on the vendor implementation).

282 6 Description

283 Diagnostic programs can be developed to verify that the Ethernet NIC device is behaving properly, to
284 identify its faulty components, or to diagnose the networking subsystem. Such tests are run in two distinct
285 environments:

- 286 • at a vendor facility during development or manufacturing as part of the QA process
- 287 • at an end-user location (In end-user environments, certain diagnostic tests are not practical to
288 run because they might modify or destroy data or they might take too long to run.)

289 Figure 1 represents the class schema for the *Ethernet NIC Diagnostics Profile*. For simplicity, the prefix
290 CIM_ has been removed from the names of the classes.

293 7 Implementation

294 This clause provides additional implementation details for the various diagnostic tests of this profile.

295

296 7.1 Ethernet NIC tests

297 Table 2 provides general information for each test type.

298

Table 2 – Test type information

Test name	Test information	
MAC Register	Coverage Area	This test verifies access to MAC layer registers.
	Coverage Range	Test coverage is limited in an online environment. Full coverage is supported in preboot environments.
	User Control	None
	Execution Time	The test runs on the order of seconds per MAC.
	Built into Device	No
	Details	This test requires a pre-boot environment for full coverage.
Physical Register	Coverage Area	This test verifies the internal traffic path for received (Rx) and transmitted (Tx) data.
	Coverage Range	Full coverage can be supported in an online environment.
	User Control	The user may optionally specify the packet sizes to be used and whether the PHY and MAC layers are tested.
	Execution Time	The test runs on the order of seconds per port.
	Built into Device	No
	Details	Depending on the design of hardware and implementation, some options may not be available.
Internal Loopback	Coverage Area	This test verifies the internal traffic path for received (Rx) and transmitted (Tx) data.
	Coverage Range	Full coverage can be supported in an online environment.
	User Control	The user may optionally specify the packet sizes to be used and whether the PHY and/or MAC layer is tested.
	Execution Time	The test runs on the order of seconds per port.
	Built into Device	No
	Details	Depending on the design of hardware and implementation, some options may not be available.
External Loopback	Coverage Area	This test verifies external traffic path received (Rx) and transmitted (Tx) data.
	Coverage Range	Full coverage can be supported in an online environment.
	User Control	The user may optionally specify the packet sizes and link speeds to be used.
	Execution Time	The test runs on the order of seconds per port.

Test name	Test information	
	Built into Device	No
	Details	Depending on the design of the hardware and the implementation, some options may not be available.
Beacon	Coverage Area	This test verifies the proper operation of the NIC LEDs.
	Coverage Range	Test coverage is limited in an online environment. Full coverage is supported in pre-boot environments.
	User Control	The user may optionally specify the number of times or duration that the LED blinks on and off.
	Execution Time	The test runs on the order of milliseconds per NIC.
	Built into Device	No
	Details	The LED flash pattern is determined by the vendor, but the pattern shall be distinct from that of normal activity. The LEDs to be flashed may be the normal activity/status LEDs or a separate LED provided solely for beaconing.
Self-Test	Coverage Area	This test verifies that the entire NIC is operating properly.
	Coverage Range	Virtual machine diagnostics shall be executed in a pre-boot environment only.
	User Control	None
	Execution Time	The test shall run on the order of seconds (quick tests) or minutes (full tests) per NIC.
	Built into Device	Vendor-specific
	Details	When invoked, the test determines which diagnostics it can run based on the managed element passed in.
Status	Coverage Area	This test verifies the overall status of the NIC.
	Coverage Range	
	User Control	None
	Execution Time	The test shall run on the order of milliseconds or seconds per NIC.
	Built into Device	Vendor-specific
	Details	Tests in a virtual machine environment shall be executed only in a pre-boot environment.
Ping	Coverage Area	This test verifies the data path to the NIC.
	Coverage Range	Full coverage can be supported in an online environment.
	User Control	The user may optionally specify the packet size to be used or the number of iterations to be run.
	Execution Time	The time to run the test depends on the user control parameters.
	Built into Device	No
	Details	
Embedded Processor	Coverage Area	This test verifies that a NIC containing embedded processors is operating properly.
	Coverage Range	This test is limited to a NIC subsystem containing an embedded processor.
	User Control	None

Test name	Test information	
	Execution Time	The test shall run on the order of seconds per NIC.
	Built into Device	No
	Details	High-end NICs can contain an embedded processor that can be used to provide additional capability. For example, some vendors use the processor to implement a TCP Offload Engine (TOE) that offloads processing of the entire TCP/IP stack to the network controller. Some vendors use the processor to implement the Preboot Execution Environment (PXE) capability, which allows the host computer to be booted through the network. In this case, an operating system is downloaded into host memory from a remote system through the NIC instead of using an operating system image stored locally on the system.
IRQ	Coverage Area	This test verifies that the NIC properly raises interrupt signals to the host.
	Coverage Range	This test is limited to the interrupt subsystem of the NIC.
	User Control	None
	Execution Time	The test shall run on the order of milliseconds per NIC.
	Built into Device	No
	Details	

299

300 7.2 CIM_EthernetNICDiagnosticTest

301 One or more instances of the CIM_EthernetNICDiagnosticTest class shall be implemented.

302 The CIM_EthernetNICDiagnosticTest class defines the tests that can be used to diagnose Ethernet NIC
 303 issues. Table 3 and Table 4 define the set of Ethernet NIC tests defined by this profile, the criteria, and
 304 the valid property values for this class. An implementation may extend this class and add vendor-defined
 305 tests using the vendor-defined range of the EthernetNICTestType valuemap.

306

Table 3 – CIM_EthernetNICDiagnosticTest property requirements

Test name	Criteria	ElementName*	EthernetNICTestType	TestType*
MAC Register	Mandatory	Ethernet NIC MAC Register Test	2	(2) Functional
Physical Register	Mandatory	Ethernet NIC Physical Register Test	3	(2) Functional
Internal Loopback	Optional	Ethernet NIC Internal Loopback Test	4	(2) Functional
External Loopback	Mandatory	Ethernet NIC External Loopback Test	5	(5) Access Test
Beacon	Optional	Ethernet NIC Beacon Test	6	(2) Functional
Self-Test	Optional	Ethernet NIC Self-Test	7	(2) Functional
Status	Optional	Ethernet NIC Status Test	8	(4) Health Check
Ping	Optional	Ethernet NIC Ping Test	9	(5) Access Test
Embedded Processor	Optional	Ethernet NIC Embedded Processor Test	10	(2) Functional

Test name	Criteria	ElementName*	EthernetNICTestType	TestType*
IRQ	Mandatory	Ethernet NIC IRQ Test	11	(2) Functional

307 An asterisk (*) indicates that the property is inherited from the parent class CIM_DiagnosticTest.

308 **Table 4 – CIM_EthernetNICDiagnosticTest property requirements**

Test name	Characteristics*	OtherCharacteristicsDescriptions*	Comment
MAC Register			
Physical Register			
Internal Loopback			
External Loopback	10 (Additional Hardware Required)		An external device must be connected to the port that can receive and send back packets.
Beacon			
Self-Test			
Status			
Ping			
Embedded Processor			
IRQ			

309 An asterisk (*) indicates that the property is inherited from the parent class CIM_DiagnosticTest.

310 7.3 CIM_EthernetNICDiagnosticSettingData

311 One or more instances of the CIM_EthernetNICDiagnosticSettingData class may be implemented. They
 312 are associated to CIM_EthernetNICDiagnosticTest using CIM_ElementSettingData. The vendor-defined
 313 default values may be specified and advertised using an instance of
 314 CIM_EthernetNICDiagnosticSettingData that is referenced by the instance of CIM_ElementSettingData
 315 whose property value for IsDefault is 1 (Is Default).

316 A diagnostic test may require parameters to run. Some parameters may affect how the test is run, while
 317 other parameters provide the values to be used by the test.

318 The CIM_DiagnosticSettingData class contains properties that affect how a diagnostic test is run (for
 319 example, LoopControl, QuickMode), how errors are handled (for example, HaltOnError), or how results
 320 are logged (for example, LogOptions). CIM_DiagnosticSettingData is an argument to the
 321 CIM_DiagnosticTest.RunDiagnosticService() extrinsic method. If additional properties are needed that
 322 control the behavior of the diagnostic test, they should be defined in a subclass of
 323 CIM_DiagnosticSettingData.

324 The client may use the vendor-defined default CIM_EthernetNICDiagnosticSettingData instance as an
 325 argument to the CIM_EthernetNICDiagnosticTest.RunDiagnosticService() extrinsic method. Alternatively,
 326 the client may create its own instance of CIM_EthernetNICDiagnosticSettingData and use it instead.

327 The CIM_EthernetNICDiagnosticSettingData class defines the parameters that may be used by some of
 328 the Ethernet NIC tests. Table 5 lists these test parameters and shows which tests might use them. An

329 implementation may extend this class and define additional parameters for any vendor-defined tests that
 330 were added.

331 **Table 5 – CIM_EthernetNICDiagnosticSettingData property requirements**

Test name	ElementName*	PacketSizes	LinkSpeeds	LoopbackLayers*	OtherLoopbackLayers*
MAC Register	Ethernet NIC MAC Register Test				
Physical Register	Ethernet NIC Physical Register Test				
Internal Loopback	Ethernet NIC Internal Loopback Test	Used		Used	
External Loopback	Ethernet NIC External Loopback Test	Used	Used		
Beacon	Ethernet NIC Beacon Test				
Self-Test	Ethernet NIC Self-Test				
Status	Ethernet NIC Status Test				
Ping	Ethernet NIC Ping Test	Used			
Embedded Processor	Ethernet NIC Embedded Processor Test				
IRQ	Ethernet NIC IRQ Test				

332 An asterisk (*) indicates that the property is inherited from the parent class CIM_DiagnosticServiceCapabilities.

333 If any CIM_EthernetNICDiagnosticSettingData property does not have a value when passed as an
 334 argument to the CIM_DiagnosticTest.RunDiagnosticService() extrinsic method, then the default values
 335 for the test arguments shall be used.

336 7.3.1 CIM_EthernetNICDiagnosticSettingData.PacketSizes

337 This array property is used by a client for the tests shown in Table 5 to specify the packet sizes to be
 338 used during the test.

339 The vendor-defined default value is advertised using the default instance of
 340 CIM_EthernetNICDiagnosticSettingData.

341 If no value is specified by the client, the vendor-defined default value will be used.

342 7.3.2 CIM_EthernetNICDiagnosticSettingData.LinkSpeeds

343 This array property is used by a client for the tests shown in Table 5 to specify the link speeds to be used
 344 during the test.

345 The vendor-defined default value is advertised using the default instance of
 346 CIM_EthernetNICDiagnosticSettingData.

347 If no value is specified by the client, the vendor-defined default value will be used.

348 **7.3.3 CIM_EthernetNICDiagnosticSettingData.LoopbackLayers**

349 This array property is used by a client for the Internal Loopback test to specify the layer to test. The
 350 allowed values are shown in Table 6.

351 The vendor-defined default value is advertised using the default instance of
 352 CIM_EthernetNICDiagnosticSettingData.

353 If no value is specified by the client, the vendor-defined default value will be used.

354 **Table 6 – CIM_EthernetNICDiagnosticSettingData.LoopbackLayers property requirements**

LoopbackLayers Value	Criteria	Notes
1 (Other)	Optional	
2 (PHY Layer)	Mandatory	
3 (MAC Layer)	Mandatory	

355 **7.3.4 CIM_EthernetNICDiagnosticSettingData.OtherLoopbackLayers**

356 This array property is used by a client for the Internal Loopback test to specify the layer to test when the
 357 corresponding element in the LoopbackLayers property is set to 1 (Other).

358 **7.4 CIM_EthernetNICDiagnosticServiceCapabilities**

359 The SupportedLoopControl property lists the loop controls that are supported by the Diagnostic Service.
 360 The values are: 0 (Unknown), 1 (Other), 2 (Continuous), 3 (Count), 4 (Timer), 5 (ErrorCount), 0x8000 (No
 361 Loop Control).

362 Table 7 specifies the possible values for each test for CIM_EthernetNICDiagnosticCapabilities.

363 **Table 7 – CIM_EthernetNICDiagnosticServiceCapabilities property requirements**

Test name	SupportedLoop Control*	PacketSize sSupported	LinkSpeeds Supported	LoopbackLayers Supported	OtherLoopbackLayers Supported
MAC Register	0x8000 (No Loop Control)				
Physical Register	0x8000 (No Loop Control)				
Internal Loopback	2 (Continuous) 3 (Count)	Used		Used	Used
External Loopback	2 (Continuous) 3 (Count)	Used	Used		
Beacon	3 (Count) 4 (Timer)				
Self-Test	0x8000 (No Loop)				

Test name	SupportedLoop Control*	PacketSizesSupported	LinkSpeeds Supported	LoopbackLayers Supported	OtherLoopbackLayers Supported
	Control)				
Status	0x8000 (No Loop Control)				
Ping	2 (Continuous) 3 (Count)	Used			
Embedded Processor	0x8000 (No Loop Control)				
IRQ	0x8000 (No Loop Control)				

364 An asterisk (*) indicates that the property is inherited from the parent class CIM_DiagnosticServiceCapabilities.

365 7.4.1 CIM_EthernetNICDiagnosticServiceCapabilities.SupportedLoopControl

366 This array property is used by a provider for the tests shown in Table 7 to specify whether the test
 367 supports loop control. If loop control is not supported, the value of this property is 0x8000 (No Loop
 368 Control). If the test can be run a specified number of iterations, this array property shall contain the value
 369 3 (Count). If the test can be run in a continuous manner, this array property shall contain the value 2
 370 (Continuous).

371 7.4.2 CIM_EthernetNICDiagnosticServiceCapabilities.PacketSizesSupported

372 This array property is used by a provider for the tests shown in Table 7 to specify the list of packet sizes
 373 supported by the test.

374 7.4.3 CIM_EthernetNICDiagnosticServiceCapabilities.LinkSpeedsSupported

375 This array property is used by a provider for the tests shown in Table 7 to specify the list of link speeds
 376 supported by the test.

377 7.4.4 CIM_EthernetNICDiagnosticServiceCapabilities.LoopbackLayersSupported

378 This array property is used by a provider for the tests shown in Table 6 to specify the list of layers (for
 379 example, PHY, MAC, etc.) supported by the test.

380 7.4.5 CIM_EthernetNICDiagnosticServiceCapabilities.OtherLoopbackLayersSupported

381 This array property is used by a provider for the tests shown in Table 6 to specify the list of layers
 382 supported by the test when the value of the LoopbackLayers property is 1 (Other).

383 8 Methods

384 This clause details the requirements for supporting intrinsic operations and extrinsic methods for the CIM
 385 elements defined in this profile. Reference the [Diagnostics Profile](#) for more detail on these methods.

386 8.1 CIM_EthernetNICDiagnosticTest.RunDiagnosticService()

387 The RunDiagnosticService () method shall return one of the return code values defined in [Diagnostics](#)
 388 [Profile](#), Table 2 – RunDiagnosticService () Method: Return Code Values.

389 When failures occur during the execution of a diagnostic test, the failure shall be recorded in the instance
 390 of CIM_DiagnosticServiceRecord associated with the test. The reason for the failure shall be recorded in
 391 CIM_DiagnosticServiceRecord.ErrorCode[], and the corresponding
 392 CIM_DiagnosticServiceRecord.ErrorCount[] shall be incremented. Other occurrences of the same failure
 393 during the same test shall not create additional entries in CIM_DiagnosticServiceRecord.ErrorCode[], but
 394 they shall cause the corresponding CIM_DiagnosticServiceRecord.ErrorCount[] to be incremented.

395 **8.2 Profile conventions for operations**

396 Support for operations for each profile class (including associations) shall be as mandated in [Diagnostics](#)
 397 [Profile](#) version 2.0.0, clauses 8.5 through 8.29.

398 **9 Use cases**

399 **9.1 Overview**

400 This clause contains object diagrams and use cases for the *Ethernet NIC Diagnostics Profile*.

401 Table 8 summarizes the use cases that are described in this clause. The use cases are categorized and
 402 named, and references are provided to the subclause that describes each use case.

403 The CIM_ prefix has been omitted from the class names in the use cases for readability.

404 **Table 8 – Ethernet NIC Diagnostics Profile use cases**

Category	Use case name	Description
Verify NIC Health	Verify Health	Verify the health of a NIC without impacting the host system’s access to the network. See 9.2.1.
	Verify Hardware	Examine a NIC to discover any hardware issues. See 9.2.2.
	Identify NIC	Make a particular NIC easy to physically identify. See 9.2.3.
Troubleshoot Network Connectivity Issues	Verify Device Accessibility	Verify that a particular NIC is accessible. See 9.3.1.
	Stress Test	Create a high volume of traffic to a particular NIC to help uncover issues. See 9.3.2.

405 **9.2 Verifying NIC health**

406 The use cases in this clause describe how the client can use the diagnostic tests to verify the health of
 407 NICs and to locate them. The CIM_ prefix has been omitted from the class names in the use cases for
 408 readability.

409 **9.2.1 Verify health**

410 To substantiate that a NIC is healthy and not developing problems, without disrupting the functioning of
 411 the host system, the client can use Status Test.

412 **9.2.2 Verify hardware**

413 The client can confirm that the NIC hardware is functioning properly with the following procedure:

- 414 1) If available, use Internal Loopback Test to prove that the data path between the host system
 415 and the NIC is functioning properly.
- 416 2) Use Self-Test to verify the functionality of the NIC hardware components.

417 9.2.3 Identify a defective NIC

418 When it has been determined that a particular NIC has to be replaced, the client can use the Beacon Test
 419 to cause the NIC LEDs to flash. This makes it easy to visually identify the defective NIC in a host system
 420 with multiple NICs.

421 9.3 Troubleshooting network connectivity issues

422 The use cases in this clause describe how the client can use the diagnostic tests to isolate problems
 423 affecting network connectivity. The CIM_ prefix has been omitted from the class names in the use cases
 424 for readability.

425 9.3.1 Verify device accessibility

426 The client can use External Loopback to verify that a particular NIC can be physically accessed.

427 9.3.2 Stress test

428 Some problems occur only when high volumes of data pass through the NIC. To help reproduce traffic
 429 problems, clients can use External Loopback or Ping. By using large packet sizes, high link speeds, and
 430 high loop counts, large amounts of traffic can be generated.

431 10 CIM elements

432 Table 9 shows the instances of CIM elements for this profile. Instances of the CIM elements shall be
 433 implemented as described in Table 9. Clause 7 (“Implementation”) and 8 (“Methods”) may impose
 434 additional requirements on these elements.

435 **Table 9 – CIM elements: Ethernet NIC Diagnostics Profile**

Element Name	Requirement	Description
Classes		
CIM_EthernetNICDiagnosticTest	Mandatory	See 10.1.
CIM_EthernetNICDiagnosticSettingData	Optional	See 10.2.
CIM_EthernetNICDiagnosticServiceCapabilities	Optional	See 10.3.
CIM_RegisteredProfile	Mandatory	See 10.4.
CIM_AffectedJobElement	Optional	See 10.5.
CIM_AvailableDiagnosticService	Mandatory	See 10.6.
CIM_ElementCapabilities	Optional	See 10.7.
CIM_ElementSettingData (DiagnosticSettingData)	Optional	See 10.8.
CIM_ElementSettingData (JobSettingData)	Optional	See 10.9.
CIM_ElementSoftwareIdentity	Mandatory	See 10.10.
CIM_HostedService	Mandatory	See 10.11.

Element Name	Requirement	Description
CIM_OwningJobElement	Mandatory	See 10.12.
CIM_RecordAppliesToElement	Optional	See 10.13.
CIM_ServiceAffectsElement	Mandatory	See 10.14.
CIM_ServiceAvailableToElement	Optional	See 10.15.
CIM_ServiceComponent	Optional	See 10.16.
CIM_UseOfLog	Mandatory	See 10.17.
Indications		
None defined in this profile		

436 **10.1 CIM_EthernetNICDiagnosticTest**

437 The CIM_EthernetNICDiagnosticTest class is used to represent the Diagnostic Testing for an Ethernet
 438 NIC. This class specializes CIM_DiagnosticTest as defined in the [Diagnostics Profile](#). The constraints
 439 listed in Table 10 are in addition to those specified in the [Diagnostics Profile](#). See the [Diagnostics Profile](#)
 440 for other mandatory elements that must be implemented.

441 **Table 10 – Class: CIM_EthernetNICDiagnosticTest**

Properties	Requirement	Notes
ElementName	Mandatory	See 7.2.
Characteristics	Mandatory	See 7.2.
OtherCharacteristicsDescriptions	Conditional	If Characteristics has the value of 1 (Other), this property is Mandatory.
EthernetNICTestType	Mandatory	See 7.2.
OtherEthernetNICTestTypeDescription	Conditional	If EthernetNICTestType has a value of 1 (Other), this property is Mandatory.
TestType	Optional	See 7.2.

442 **10.2 CIM_EthernetNICDiagnosticSettingData**

443 The CIM_EthernetNICDiagnosticSettingData class is used to pass in test parameters and to specify other
 444 test control parameters. This class specializes CIM_DiagnosticSettingData as defined in the [Diagnostics](#)
 445 [Profile](#). The constraints listed in Table 11 are in addition to those specified in the [Diagnostics Profile](#). See
 446 the [Diagnostics Profile](#) for other mandatory elements that must be implemented.

447 **Table 11 – Class: CIM_EthernetNICDiagnosticSettingData**

Properties	Requirement	Notes
ElementName	Mandatory	See 7.3.
PacketSizes	Optional	See 7.3.1.
LinkSpeeds	Optional	See 7.3.2.
LoopbackLayers	Optional	See 7.3.3.
OtherLoopbackLayers	Conditional	If LoopbackLayers includes the value of 1 (Other), this property is Mandatory.

448 10.3 CIM_EthernetNICDiagnosticServiceCapabilities

449 The CIM_EthernetNICDiagnosticServiceCapabilities class is used to provide information on the
 450 capabilities for the Ethernet NIC Diagnostic Service. This class specializes
 451 CIM_DiagnosticServiceCapabilities as defined in the [Diagnostics Profile](#). The constraints listed in Table
 452 12 are in addition to those specified in the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other
 453 mandatory elements that must be implemented.

454 **Table 12 – Class: CIM_EthernetNICDiagnosticServiceCapabilities**

Properties	Requirement	Notes
ElementName	Mandatory	See 7.4.
SupportedLoopControl	Optional	See 7.4.1.
PacketSizesSupported	Optional	See 7.4.2.
LinkSpeedsSupported	Optional	See 7.4.3.
LoopbackLayersSupported	Optional	See 7.4.4.
OtherLoopbackLayersSupported	Conditional	If LoopbackLayersSupported includes the value of 1 (Other), this property is Mandatory.

455 10.4 CIM_RegisteredProfile

456 The CIM_RegisteredProfile class is defined by the [Profile Registration Profile](#). The requirements denoted
 457 in Table 13 are in addition to those mandated by the [Profile Registration Profile](#). See the [Profile](#)
 458 [Registration Profile](#) for the other mandatory elements that must be implemented.

459 **Table 13 – Class: CIM_RegisteredProfile**

Properties	Requirement	Notes
RegisteredName	Mandatory	The value of this property shall be "Ethernet NIC Diagnostics".
RegisteredVersion	Mandatory	The value of this property shall be "1.0.0".
RegisteredOrganization	Mandatory	The value of this property shall be 2 (DMTF).

460 10.5 CIM_AffectedJobElement

461 Although defined in the [Diagnostics Profile](#), the CIM_AffectedJobElement class is listed here because the
 462 AffectedElement reference is scoped down to CIM_EthernetPort or CIM_PortController, which is a
 463 subclass of CIM_ManagedElement. The constraints listed in Table 14 are in addition to those specified in
 464 the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 465 CIM_AffectedJobElement that must be implemented.

466 **Table 14 – Class: CIM_AffectedJobElement**

Properties	Requirement	Notes
AffectedElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetPort or CIM_PortController.
AffectingElement	Mandatory	The property shall be a reference to an instance of CIM_ConcreteJob.

467 **10.6 CIM_AvailableDiagnosticService**

468 Although defined in the [Diagnostics Profile](#), the CIM_AvailableDiagnosticService class is listed here
 469 because the ServiceProvided reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a
 470 subclass of CIM_DiagnosticTest, and the UserOfService reference is scoped down to CIM_EthernetPort
 471 or CIM_PortController, which are subclasses of CIM_ManagedElement. The constraints listed in Table 15
 472 are in addition to those specified in the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other
 473 mandatory properties of CIM_AvailableDiagnosticService that must be implemented.

474 **Table 15 – Class: CIM_AvailableDiagnosticService**

Properties	Requirement	Notes
ServiceProvided (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.
UserOfService (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetPort or CIM_PortController.

475 **10.7 CIM_ElementCapabilities**

476 Although defined in the [Diagnostics Profile](#), the CIM_ElementCapabilities class is listed here because the
 477 ManagedElement reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 478 CIM_DiagnosticTest, and the Capabilities reference is scoped down to
 479 CIM_EthernetNICDiagnosticServiceCapabilities, which is a subclass of
 480 CIM_DiagnosticServiceCapabilities. The constraints listed in Table 16 are in addition to those specified in
 481 the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 482 CIM_ElementCapabilities that must be implemented.

483 **Table 16 – Class: CIM_ElementCapabilities**

Properties	Requirement	Notes
ManagedElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.
Capabilities (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticServiceCapabilities.

484 **10.8 CIM_ElementSettingData (DiagnosticSettingData)**

485 Although defined in the [Diagnostics Profile](#), the CIM_ElementSettingData class is listed here because the
 486 ManagedElement reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 487 CIM_DiagnosticTest, and the SettingData reference is scoped down to
 488 CIM_EthernetNICDiagnosticSettingData, which is a subclass of CIM_DiagnosticSettingData. The
 489 constraints listed in Table 17 are in addition to those specified in the [Diagnostics Profile](#). See the
 490 [Diagnostics Profile](#) for other mandatory properties of CIM_ElementSettingData that must be implemented.

491

Table 17 – Class: CIM_ElementSettingData

Properties	Requirement	Notes
ManagedElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.
SettingData (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticSettingData.
IsDefault	Mandatory	If the instance of CIM_EthernetNICDiagnosticSettingData is the default setting, this property shall have the value of TRUE.

492 10.9 CIM_ElementSettingData (JobSettingData)

493 Although defined in the [Diagnostics Profile](#), the CIM_ElementSettingData class is listed here because the
 494 Dependent reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 495 CIM_DiagnosticTest, and the SettingData reference is scoped down to CIM_JobSettingData, which is a
 496 subclass of CIM_SettingData. The constraints listed in Table 18 are in addition to those specified in the
 497 [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 498 CIM_ElementSettingData that must be implemented.

499

Table 18 – Class: CIM_ElementSettingData

Properties	Requirement	Notes
ManagedElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.
SettingData (overridden)	Mandatory	The property shall be a reference to an instance of CIM_JobSettingData.
IsDefault	Mandatory	If the instance of CIM_JobSettingData is the default setting, this property shall have the value of TRUE.

500 10.10 CIM_ElementSoftwareIdentity

501 Although defined in the [Diagnostics Profile](#), the CIM_ElementSoftwareIdentity class is listed here because
 502 the Dependent reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 503 CIM_DiagnosticTest. The constraints listed in Table 19 are in addition to those specified in the
 504 [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 505 CIM_ElementSoftwareIdentity that must be implemented.

506

Table 19 – Class: CIM_ElementSoftwareIdentity

Properties	Requirement	Notes
Antecedent	Mandatory	The property shall be a reference to an instance of CIM_SoftwareIdentity.
Dependent (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

507 10.11 CIM_HostedService

508 Although defined in the [Diagnostics Profile](#), the CIM_HostedService class is listed here because the
 509 Dependent reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 510 CIM_DiagnosticTest. The constraints listed in Table 20 are in addition to those specified in the

511 [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of CIM_HostedService that
 512 must be implemented.

513 **Table 20 – Class: CIM_HostedService**

Properties	Requirement	Notes
Antecedent	Mandatory	The property shall be a reference to an instance of CIM_ComputerSystem.
Dependent (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

514 **10.12 CIM_OwningJobElement**

515 Although defined in the [Diagnostics Profile](#), the CIM_OwningJobElement class is listed here because the
 516 OwningElement reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 517 CIM_DiagnosticTest. The constraints listed in Table 21 are in addition to those specified in the
 518 [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 519 CIM_OwningJobElement that must be implemented.

520 **Table 21 – Class: CIM_OwningJobElement**

Properties	Requirement	Notes
OwningElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.
OwnedElement	Mandatory	The property shall be a reference to an instance of CIM_ConcreteJob.

521 **10.13 CIM_RecordAppliesToElement**

522 Although defined in the [Diagnostics Profile](#), the CIM_RecordAppliesToElement class is listed here
 523 because the Dependent reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a
 524 subclass of CIM_DiagnosticTest. The constraints listed in Table 22 are in addition to those specified in
 525 the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 526 CIM_RecordAppliesToElement that must be implemented.

527 **Table 22 – Class: CIM_RecordAppliesToElement**

Properties	Requirement	Notes
Antecedent	Mandatory	The property shall be a reference to an instance of CIM_RecordForLog.
Dependent (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

528 **10.14 CIM_ServiceAffectsElement**

529 Although defined in the [Diagnostics Profile](#), the CIM_ServiceAffectsElement class is listed here because
 530 the AffectedElement reference is scoped down to CIM_EthernetPort or CIM_PortController, which is a
 531 subclass of CIM_ManagedElement, and the AffectingElement reference is scoped down to
 532 CIM_EthernetNICDiagnosticTest, which is a subclass of CIM_DiagnosticTest. The constraints listed in
 533 Table 23 are in addition to those specified in the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other
 534 mandatory properties of CIM_ServiceAffectsElement that must be implemented.

535

Table 23 – Class: CIM_ServiceAffectsElement

Properties	Requirement	Notes
AffectedElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetPort or CIM_PortController.
AffectingElement (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

536 **10.15 CIM_ServiceAvailableToElement**

537 Although defined in the [Diagnostics Profile](#), the CIM_ServiceAvailableToElement class is listed here
 538 because the UsersOfService reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a
 539 subclass of CIM_DiagnosticTest. The constraints listed in Table 24 are in addition to those specified in
 540 the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of
 541 CIM_ServiceAvailableToElement that must be implemented.

542

Table 24 – Class: CIM_ServiceAvailableToElement

Properties	Requirement	Notes
ServiceProvided	Mandatory	The property shall be a reference to an instance of CIM_HelpService.
UsersOfService (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

543 **10.16 CIM_ServiceComponent**

544 Although defined in the [Diagnostics Profile](#), the CIM_ServiceComponent class is listed here because the
 545 GroupComponent reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 546 CIM_DiagnosticTest, and the PartComponent reference is scoped down to
 547 CIM_EthernetNICDiagnosticTest, which is a subclass of CIM_DiagnosticTest. The constraints listed in
 548 Table 25 are in addition to those specified in the [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other
 549 mandatory properties of CIM_ServiceComponent that must be implemented.

550

Table 25 – Class: CIM_ServiceComponent

Properties	Requirement	Notes
GroupComponent (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.
PartComponent (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

551 **10.17 CIM_UseOfLog**

552 Although defined in the [Diagnostics Profile](#), the CIM_UseOfLog class is listed here because the
 553 Dependent reference is scoped down to CIM_EthernetNICDiagnosticTest, which is a subclass of
 554 CIM_DiagnosticTest. The constraints listed in Table 26 are in addition to those specified in the
 555 [Diagnostics Profile](#). See the [Diagnostics Profile](#) for other mandatory properties of CIM_UseOfLog that
 556 must be implemented.

557

Table 26 – Class: CIM_UseOfLog

Properties	Requirement	Notes
Antecedent	Mandatory	The property shall be a reference to an instance of CIM_DiagnosticLog.
Dependent (overridden)	Mandatory	The property shall be a reference to an instance of CIM_EthernetNICDiagnosticTest.

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ANNEX A (informative)

Change log

Version	Date	Description
1.0.0	2011-12-15	

562