



The Printer Working Group

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PWG Imaging System Power MIB v1.0

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Status: Approved

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Abstract: This document defines the PWG Imaging System Power MIB (for Printers, Copiers, Multifunction Devices, etc.) that extends IETF MIB-II [RFC1213], IETF Host Resources MIB v2 [RFC2790], IETF Printer MIB v2 [RFC3805], IETF Finisher MIB [RFC3806], and PWG Imaging System State and Counter MIB v2 [PWG5106.3].

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This document is a PWG Candidate Standard. For a definition of a "PWG Candidate Standard", see:

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<ftp://ftp.pwg.org/pub/pwg/general/pwg-process-30.pdf>

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This document is available at:

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<ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimspowermib10-20110214-5106.5.pdf>

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The ASN.1 source for this MIB is available at:

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<ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimspowermib10-20110214-5106.5.mib>

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159 **1 Introduction (Informative)**

160
161 This document is the first public standard MIB that addresses power management for Printers and other
162 Imaging Systems.

163
164 The original IETF Printer MIB v1 [RFC1759] was published in March 1995, with major dependencies on the
165 IETF Host Resources MIB v1 [RFC 1514] (for indices, devices, interfaces, storage, and Printer state). The
166 subsequent IETF Printer MIB v2 [RFC3805] was published in June 2004, with major dependencies on the
167 IETF Host Resources MIB v2 [RFC2790]. The IETF Finisher MIB [RFC3806] was also published in June
168 2004, with major dependencies on the IETF Printer MIB v2 [RFC3805] (for common subunits, datatypes,
169 and alerts).

170 **1.1 Imaging System Power MIB Scope**

171
172 This document defines a MIB for Imaging Systems (Printers, Copiers, Multifunction Devices, etc.) that adds
173 power management extensions to IETF MIB-II [RFC1213], IETF Host Resources MIB v2 [RFC2790], IETF
174 Printer MIB v2 [RFC3805], IETF Finisher MIB [RFC3806], and PWG Imaging System State and Counters
175 MIB v2 [PWG5106.3].

176 **1.2 Power Management Elements**

177
178 The abstract power management elements defined in the PWG Power Management Model [PWG5106.4]
179 are mapped essentially one-to-one to the corresponding SNMP objects in the PWG Imaging System Power
180 MIB (see section 4.6 for more details).
181

182 **1.3 Consistency of Power Terminology**

183
184 This document uses power terminology (see section 2.4) that is imported from section 2.4 of the PWG
185 Power Management Model [PWG5106.4] and is technically aligned and consistent with the DMTF CIM
186 Power State Management Profile [DSP1027], IEEE Standard for User Interface Elements in Power Control
187 of Electronic Devices Employed in Office/Consumer Environments [IEEE1621], and Advanced Configuration
188 and Power Interface Specification v4.0 [ACPI].

189 **1.4 Power State Transition Notifications**

190
191 This document specifies the recommended power state transition notification powPowerV2Alert defined in
192 section 5 of this specification and also the recommended printerV2Alert defined in IETF Printer MIB v2
193 [RFC3805].

194 **1.5 Vendor Extension Stable Power States**

195
196 This document specification supports the definition of vendor extension stable power states for any of the
197 base standard DMTF CIM stable power states (see section 2.4. Details are specified in sections 2.4.5 and
198 9.1.1 of the PWG Power Management Model [PWG5106.4], which prohibits the definition of vendor
199 extension power states for special power states (i.e., orderly shutdowns and resets), in order to avoid
200 ambiguity.
201
202
203

204 2 Terminology

205
206 The section defines or imports all of the terms used in the PWG Imaging System Power MIB.

207 2.1 Conformance Terminology

208
209 The uppercase conformance terms **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**,
210 **RECOMMENDED**, **MAY**, and **OPTIONAL** in this document shall be interpreted as defined in [RFC2119].

211 2.2 Printing Terminology

212
213 Normative definitions and semantics of printing terms are imported from IETF Printer MIB v2 [RFC3805],
214 IETF Finisher MIB [RFC3806], and IETF IPP/1.1 [RFC2911].

215
216 This document imports the definitions of **Power Management Client** and **Power Management Server** from
217 section 2.2 of the PWG Power Management Model [PWG5106.4], in order to specify unambiguous
218 conformance requirements.

219 2.3 Datatype Terminology

220
221 This document imports the definitions of the following standard abstract datatypes from section 2.3 of the
222 PWG Power Management Model [PWG5106.4], which in turn imports them from W3C XML Schema Part 2:
223 Datatypes Second Edition [XMLTYPES]. These abstract datatypes are in turn normatively mapped by this
224 document to their corresponding SNMP MIB object syntaxes in the table below.

225
226 **Table 1 – Mapping of Abstract Datatypes to SNMP Syntaxes**

XML Datatype	XML Reference	SNMP Syntax	SNMP Reference	Description
boolean	Section 3.3.2	TruthValue	[RFC2579]	binary true/false
Counter → int	Section 3.4.17	Counter32	[RFC2578]	non-negative 32-bit integer (MUST NOT decrease in value)
dateTime	Section 3.3.8	DateAndTime	[RFC2579]	date/time in ISO 8601 format
Enum → string	Section 3.3.1	INTEGER	[RFC2578]	enumerated positive 32-bit integer
Gauge → int	Section 3.4.17	Gauge32	[RFC2578]	non-negative 32-bit integer (MAY decrease in value)
int	Section 3.4.17	Integer32	[RFC2578]	signed 32-bit integer
string	Section 3.3.1	SnmpAdminString or DisplayString	[RFC3411] [RFC2579]	UTF-8 [RFC3629] - messages US-ASCII [ISO646] – keywords

227

2.4 Power Terminology

228
229
230 This document imports the definitions of the IEEE power mode terms **Off Mode, On Mode, Sleep Mode**
231 [IEEE1621] from section 2.4.1 of the PWG Power Management Model [PWG5106.4].
232

233 This document imports the definitions of the DMTF CIM stable power state terms **Hibernate, OffHard,**
234 **OffSoft, On, Standby, Suspend** [DSP1027] from section 2.4.2 of [PWG5106.4].
235

236 This document imports the definitions of the DMTF CIM special power state terms **OffHardGraceful,**
237 **OffSoftGraceful, ResetHard, ResetHardGraceful, ResetINIT, ResetMBR, ResetMBRGraceful,**
238 **ResetNMI, ResetSoft, ResetSoftGraceful** [DSP1027] from section 2.4.3 of [PWG5106.4].
239

240 This document imports the definitions of the DMTF CIM out-of-band power state terms **NotApplicable,**
241 **NoChange, Other, Unknown** [DSP1027] from section 2.4.4 of [PWG5106.4].
242

243 This document imports the definitions of vendor extension stable power states from section 2.4.5 of
244 [PWG5106.4].
245

246 These power terms are technically aligned and consistent with DMTF CIM Power State Management Profile
247 [DSP1027], IEEE Standard for User Interface Elements in Power Control of Electronic Devices Employed in
248 Office/Consumer Environments [IEEE1621], and Advanced Configuration and Power Interface Specification
249 v4.0 [ACPI]. These power terms are also used in properties defined in the DMTF CIM power classes.

2.5 Operational State Terminology

250
251
252 This document imports the definitions of System operational state terms **Down, Idle, Other, Processing,**
253 **Stopped, Testing, Unknown** and their corresponding valid power states from section 2.5.1 of the PWG
254 Power Management Model [PWG5106.4].
255

256 This document imports the definitions of Subunit operational state terms defined in section 2.2.13.2.2 and
257 the PrtSubUnitStatusTC textual convention in the IETF Printer MIB v2 [RFC3805].
258
259
260
261

262 **3 Requirements**

263
264 Per the PWG Process, this document imports the requirements (rationale, use cases, and design
265 requirements) for the PWG Power Management MIB from section 3 Requirements of the PWG Power
266 Management Model [PWG5106.4].
267

268 **4 Relationship to Other Public Standards**

269
270 This section describes the relationship of the PWG Imaging System Power MIB to other public standards.

271 **4.1 IETF MIB-II – System and Interfaces**

272
273 IETF MIB-II [RFC1213] defines the REQUIRED basic System and Interfaces groups for all managed
274 devices that support any version of SNMP.

275
276 If the pow[Monitor/Log]ComponentType object takes a value of 'interface', then the corresponding
277 [powMonitor/Log]ComponentReferenceId object MUST take a value of ifIndex in IETF MIB-II.
278

279 **4.2 IETF Host Resources MIB v2 – Devices and Storage**

280
281 The IETF Host Resources MIB v2.0 [RFC2790] defines the REQUIRED extended System and Device
282 groups for all managed devices that support any version of SNMP. The IETF Host Resources MIB also
283 defines the OPTIONAL Storage, Software Installed, and Software Running groups.
284

285 If the pow[Monitor/Log]ComponentType object takes a value of 'system' (hrDevicePrinter if IETF Printer MIB
286 v2 [RFC3805] is implemented) or 'processor' (hrDeviceProcessor) or 'faxModem' (hrDeviceModem) or
287 'outputChannel' (hrDeviceNetwork) or 'scanner' or 'scanMediaPath', then the corresponding
288 [powMonitor/Log]ComponentReferenceId object MUST take a value of hrDeviceIndex in IETF Host
289 Resources MIB v2.

290
291 If the pow[Monitor/Log]ComponentType object takes a value of 'storage', then the corresponding
292 [powMonitor/Log]ComponentReferenceId object MUST take a value of hrStorageIndex in IETF Host
293 Resources MIB v2.

294 **4.3 IETF Printer MIB v2 – Alerts and Subunits**

295
296 The IETF Printer MIB v2 [RFC3805] defines the REQUIRED prtAlertTable, an ordered list of the warning
297 and critical alerts on a Printer (or an MFD), which MUST be implemented as persistent across power cycles
298 for conforming implementations of the PWG Imaging System Power MIB. The PrtAlertCodeTC textual
299 convention defined in the IANA Printer MIB [IANA-PRT] defines both 'powerUp' (On) and 'powerDown'
300 (OffSoft or OffHard).

301
302 The additional values 'standby', 'suspend', and 'hibernate' for the IANA Printer MIB are defined in the PWG
303 Power Management Model [PWG5106.4].
304

305 The IETF Printer MIB v2 also defines the printerV2Alert SNMP trap. Clients (SNMP Managers) may register
306 for SNMP notifications.

307
308 Note: The PWG Imaging System Power MIB intentionally does not define separate power notifications, to
309 avoid redundant overlap with the primary IETF Printer MIB v2.

310
311 The IETF Printer MIB v2 also defines the REQUIRED subunits General (i.e., System), Input Tray, Output
312 Tray, Marker, Media Path, Input Channel, Interpreter, and Console.

313
314 If the pow[Monitor/Log]ComponentType object takes a value for one of the Subunits defined in IETF Printer
315 MIB v2, then the corresponding [powMonitor/Log]ComponentReferenceId object MUST take the appropriate
316 prtXxxIndex value in IETF Printer MIB v2.

317 **4.4 IETF Finisher MIB - Finishers**

318
319 The IETF Finisher MIB [RFC3806] defines the REQUIRED finDeviceTable, which MUST be implemented as
320 persistent across power cycles for conforming implementations of this PWG Imaging System Power MIB.
321 The FinDeviceTypeTC textual convention defined in the IANA Finisher MIB [IANA-FIN] defines the specific
322 finisher types used in the finDeviceType object.

323
324 If the pow[Monitor/Log]ComponentType object takes a value of 'finisher', then the corresponding
325 [powMonitor/Log]ComponentReferenceId object MUST take a value of finDeviceIndex in IETF Finisher MIB.
326

327 **4.5 PWG Imaging System State and Counter MIB v2 – Operational States**

328
329 The PWG Imaging System State and Counter (ISC) MIB v2 [PWG5106.3] defines the REQUIRED
330 icKeyTable and icServiceTable and OPTIONAL icSubunitTable, which MUST be implemented as persistent
331 across power cycles for conforming implementations of this PWG Imaging System Power MIB. The PWG
332 ISC MIB also defines the IcServiceTypeTC, IcServiceStateTC, IcSubunitTypeTC, and IcSubunitStatusTC
333 (bit-mask identical to PrtSubUnitStatusTC defined in IETF Printer MIB v2) textual conventions.
334

335
336 If the pow[Monitor/Log]ComponentType object takes a value of 'system', then the corresponding
337 icServiceState object (with icServiceType of 'systemTotals') SHOULD be implemented to report the System
338 operational state (e.g., 'idle' or 'processing'), which directly impacts power consumption.
339

340 If the pow[Monitor/Log]ComponentType object takes a value of any Subunit defined in the IcSubunitType
341 textual convention in the PWG ISC MIB, then the corresponding icSubunitStatus object SHOULD be
342 implemented to report the Subunit operational state (e.g., 'Available and Idle' or 'Available and Active'),
343 which directly impacts power consumption.
344

345 **4.6 Mapping from PWG Power Management Model**

346
347 This PWG Imaging System Power MIB conforms to all best practices for MIBs written in SMIV2 [RFC2578],
348 which required mapping from the abstract power elements defined in the PWG Power Management Model
349 [PWG5106.4] as follows:

- 350
- 351 (1) All PWG Imaging System Power MIB object names are scoped by an unambiguous group (e.g.,
352 'powGeneral') or table (e.g., 'powMonitor') prefix.
 - 353 (2) Some PWG Imaging System Power MIB object names are abbreviated from the corresponding
354 abstract element names in (e.g., 'PowerCalendar.CalendarRunOnce' to
355 'powCalendarRunOnce'), to ensure that no MIB object name is longer than 31 characters (to
356 avoid common portability problems with MIB compilers).

357
358 Several objects are defined in the PWG Imaging System Power MIB that are NOT mapped directly from
359 abstract elements defined in the PWG Power Management Model, as follows:

- 360
- 361 • powGeneralNaturalLanguage (e.g., 'en-US') – for localization of SnmpAdminString values.
 - 362 • powGeneralPolicyMaxAccess (e.g., 'readOnly', 'readWrite', or 'readCreate') – for row status
363 capabilities in the policy tables (powTimeoutTable, powCalendarTable, and powEventTable).
 - 364 • powMonitorIndex – for unique identification of each managed component (System or Subunit) and
365 primary index for other tables in this PWG Imaging System Power MIB.

- 366 • powMonitorComponentType (e.g., 'system' or 'marker') and powMonitorComponentReferenceld
- 367 (e.g., hrDeviceIndex or prtMarkerIndex) – for instance correlation of each managed component
- 368 (System or Subunit).
- 369 • powTimeoutRowStatus (e.g., 'active', 'notInService', or 'createAndWait'), powCalendarRowStatus,
- 370 and powEventRowStatus – for row status management in the policy tables.
- 371
- 372
- 373

Table 2 – Mapping of Abstract Element Groups to SNMP Tables

Abstract Element Group	SNMP Table Name	Comments
Power General	(none)	Scalar objects
Power Monitor	powMonitorTable	Components (System, Subunits)
Power Log	powLogTable	Persistent log (see Usage and Note below)
Power Counter	powCounterTable	Power state transition counters
Power Meter	powMeterTable	Power consumption meters
Power Support	powSupportTable	Power states supported
Power Transition	powTransitionTable	Power transitions supported
Power Request	powRequestTable	Power state change requests
Power Timeout	powTimeoutTable	Power policies
Power Calendar	powCalendarTable	Power policies
Power Event	powEventTable	Power policies

374
375 Usage: Power Management Servers MUST implement the powLogTable group as persistent across power
376 cycles and hardware reconfigurations. Power Management Servers SHOULD only add entries to the
377 powLogTable when a power state transition occurs (i.e., successive powLogTable entries for the same
378 component SHOULD NOT have the same power state). Power Management Servers SHOULD support at
379 least 10 entries in the powLogTable (for reliable fleet management).

380
381 Note: To reduce the hardware cost of support for the PWG Imaging System Power MIB, a resource limited
382 Power Management Server that uses NVRAM as a datastore for its persistent powLogTable could optimize
383 by NOT saving empty or static powLogPowerStateMessage strings to NVRAM.

384

385 4.6.1 Indexing of Imaging System Power MIB

386

387 The General group in the Imaging System Power MIB defines only scalar objects (with instance qualifiers
388 over-the-wire of '.0') and does not define or use explicit index objects.

389

390 The powMonitorTable in the Imaging System Power MIB uses a single index of powMonitorIndex for each
391 row, which includes powMonitorComponentType (e.g., 'system') and powMonitorComponentReferenceld
392 (e.g., value of hrDeviceIndex for the hrDeviceTable row with hrDeviceType equal to 'hrDevicePrinter' in the
393 IETF Host Resources MIB [RFC279]). The powMonitorIndex is the primary or only index of all other tables
394 in the Imaging System Power MIB, with the exception of the powLogTable (see below). This simplifies and
395 clarifies the indexing of the other tables defined in the Imaging System Power MIB.

396

397 The powLogTable in the Imaging System Power MIB uses a single index of powLogIndex for each row,
398 which includes powLogComponentType and powLogComponentReferenceld values, in order to make the
399 powLogTable free-standing when queried by management stations or serialized to a log file.

400

401 The powCounterTable, powMeterTable, and powRequestTable in the Imaging System Power MIB all use a
402 single index of powMonitorIndex for each row, i.e., each component instance.

403

404 The powSupportTable uses a primary index of powMonitorIndex and defines a secondary index of
 405 powSupportPowerState for each row, i.e., each supported stable power state (standard or vendor extension)
 406 for a given component instance.

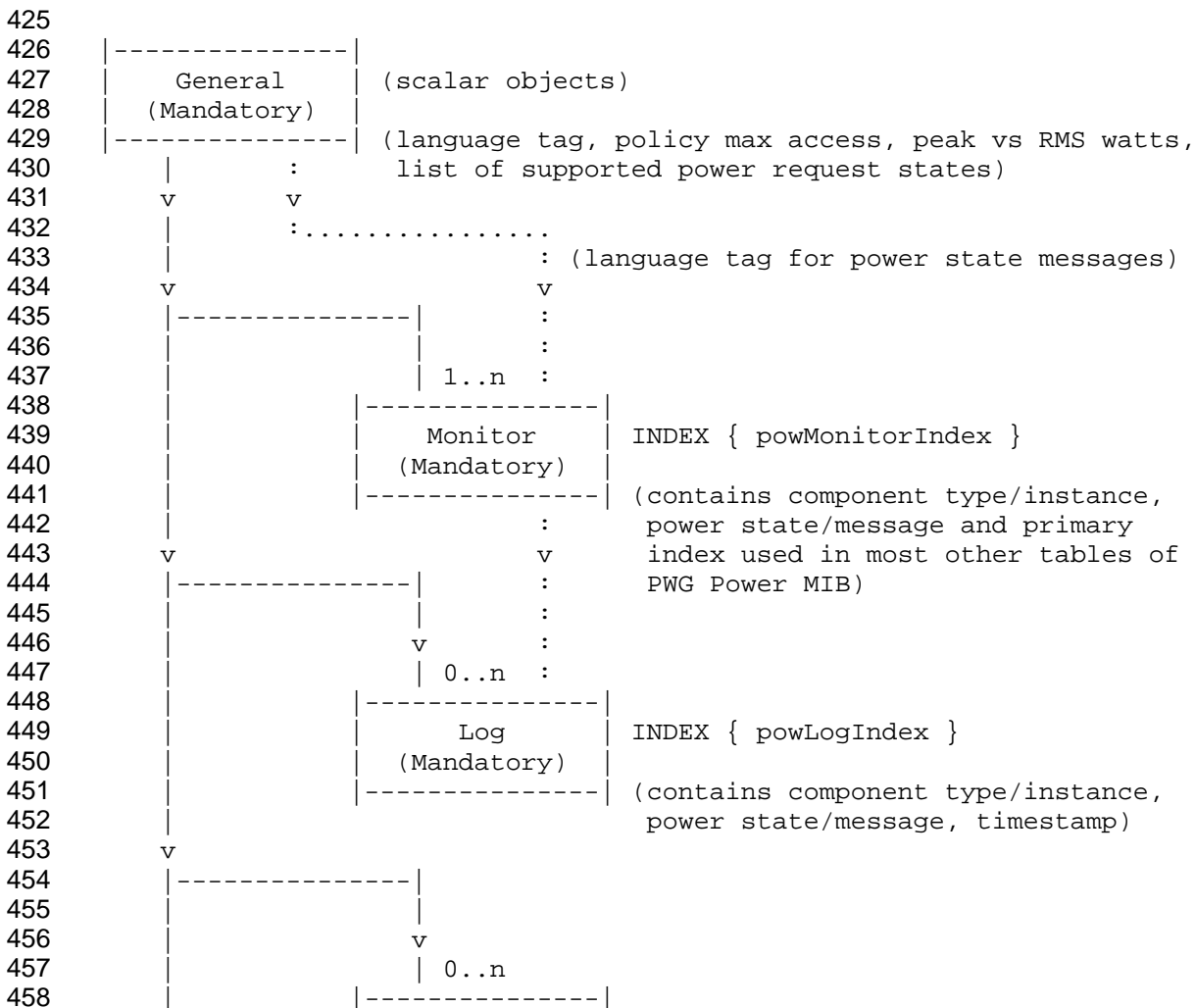
408 The powTransitionTable uses a primary index of powMonitorIndex and defines a secondary index of
 409 powTransitionStartPowerState and a tertiary index of powTransitionEndPowerState for each row, i.e., each
 410 supported transition between stable power states (standard or vendor extension) for a given component
 411 instance.

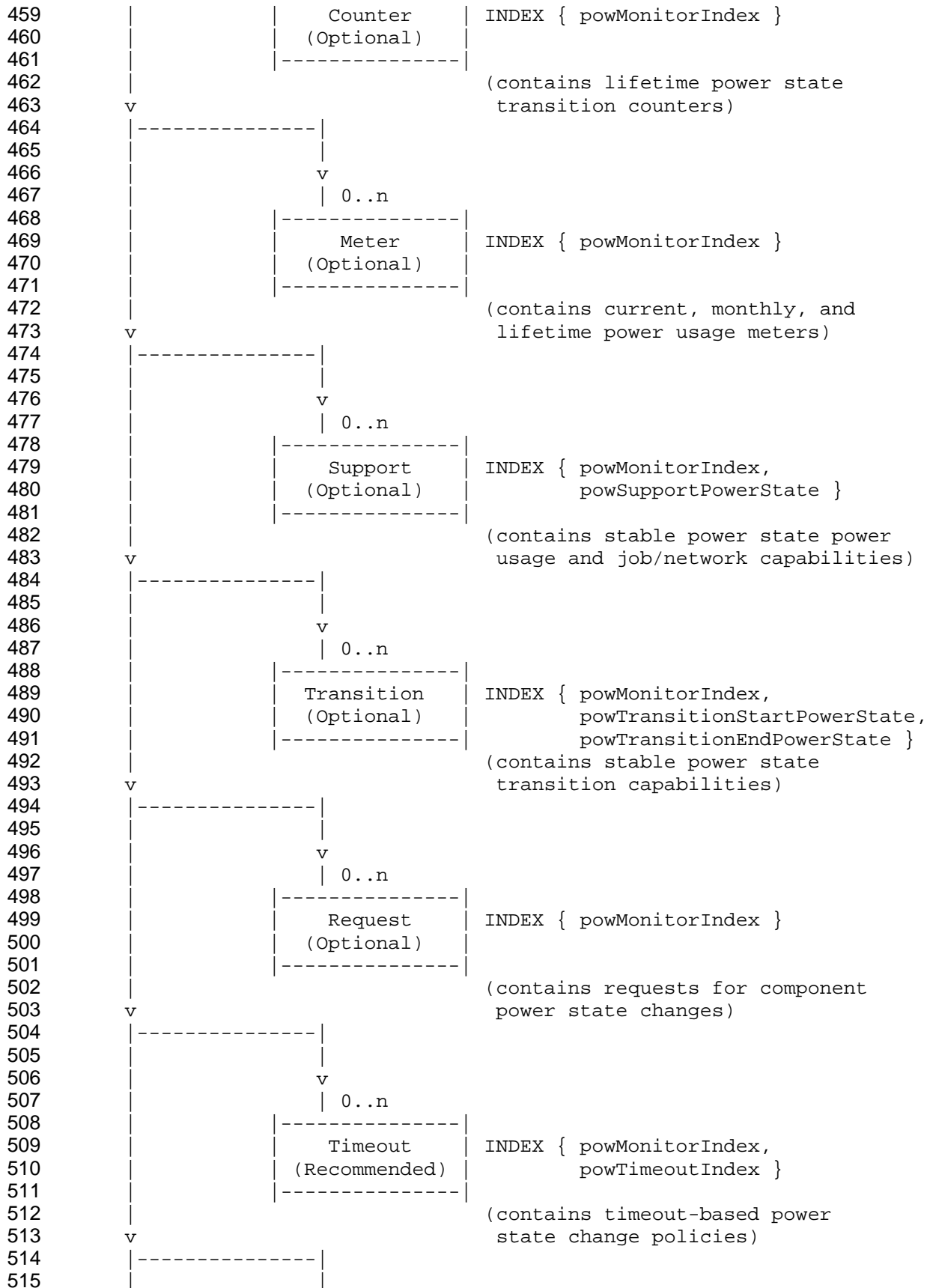
413 The powTimeoutTable uses a primary index of powMonitorIndex and a secondary index of
 414 powTimeoutIndex for each row, i.e., each timeout-based power state change policy for a given component
 415 instance.

417 The powCalendarTable uses a primary index of powMonitorIndex and a secondary index of
 418 powCalendarIndex for each row, i.e., each calendar-based power state change policy for a given component
 419 instance.

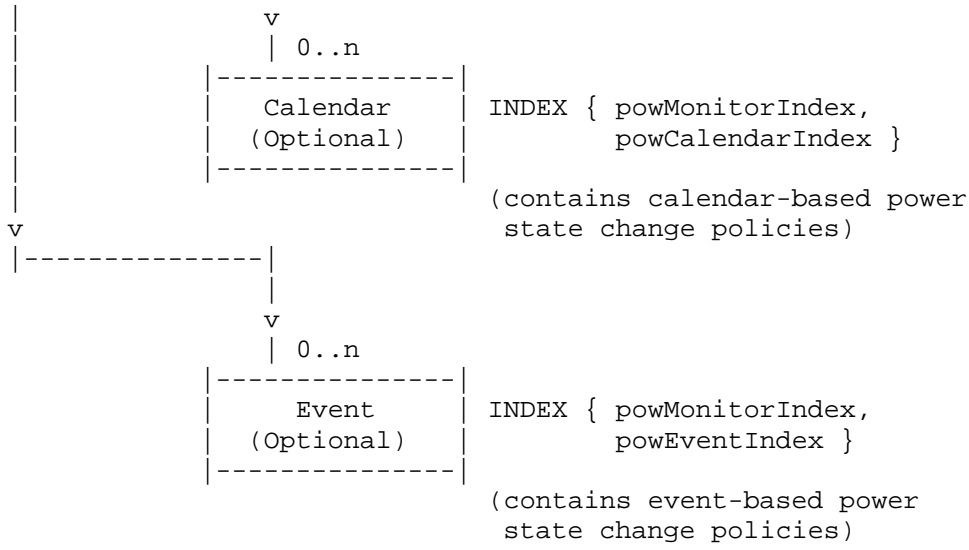
421 The powEventTable uses a primary index of powMonitorIndex and a secondary index of powEventIndex for
 422 each row, i.e., event-based power state change policy for a given component instance.

424 **4.6.2 Diagram of Imaging System Power MIB**





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535 **5 Definition of Imaging System Power MIB**

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537 The ASN.1 source for the PWG Imaging System Power MIB is available at:

538 <ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimspowermib10-20110214-5106.5.mib>

539

540 6 Conformance Requirements

541
542
543

Below are the summary conformance requirements for this specification.

544 6.1 Power Management Server Conformance Requirements

545

546 To claim conformance to this specification, a Power Management Server implementation for a Printer,
547 Multifunction Device, or other Imaging System:

548

- 549 (a) MUST support the REQUIRED Power General, Power Monitor, and Power Log groups defined in
550 section 5 of this specification;
- 551 (b) MUST implement all supported groups as persistent across power cycles, except for major system
552 reconfigurations;
- 553 (c) MUST implement the Power Log group as persistent across power cycles, even in case of major
554 system reconfigurations and SHOULD support at least 10 records in the powLogTable (for reliable
555 fleet management);
- 556 (d) MUST implement all supported power policies (Power Timeout, Power Calendar, and/or Power
557 Event) as persistent across power cycles and hardware reconfigurations;
- 558 (e) SHOULD support the RECOMMENDED Power Timeout group defined in section 5 of this
559 specification;
- 560 (f) MUST conform to the Internationalization Considerations defined in section 8 of this specification;
- 561 (g) MUST conform to the Security Considerations defined in section 9 of this specification;
- 562 (h) MUST support the PWG Power Management Model [PWG5106.4] for the System object;
- 563 (i) SHOULD implement the PWG Imaging System State and Counter MIB v2 [PWG5106.3]
564 (operational states) and the IETF Printer MIB v2 [RFC3805] (alerts) in order to report
565 comprehensive System and Subunit states;
- 566 (j) SHOULD conform to the mapping of valid power states to each operational state defined in section
567 2.5.1 of the PWG Power Management Model [PWG5106.4];
- 568 (k) Only if the icKeyTable, icServiceTable, or icSubunitTable in the PWG Imaging System State and
569 Counter MIB v2 [PWG5106.3] are implemented, MUST also implement those tables as persistent
570 across power cycles as required in section 4.6 of this specification;
- 571 (l) Only if the Scanner and/or Marker components are supported, SHOULD support the PWG Power
572 Management Model [PWG5106.4] for the Scanner and Marker objects; and
- 573 (m) Only if notifications are supported, SHOULD support the power state transition trap
574 powPowerV2Trap in the PowerTrap group.
575

576 6.2 Power Management Client Conformance Requirements

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578 To claim conformance to this specification, a Power Management Client implementation for a Printer,
579 Multifunction Device, or other Imaging System:

580

- 581 (a) MUST support the REQUIRED Power General, Power Monitor, and Power Log groups defined in
582 section 5 of this specification;
- 583 (b) SHOULD support the RECOMMENDED Power Timeout group defined in section 5 of this
584 specification;
- 585 (c) MUST explicitly identify the implemented set of PWG Power Management Model elements defined
586 in section 5 of this specification;
- 587 (d) MUST conform to the Internationalization Considerations defined in section 8 of this specification;

- 588 (e) MUST conform to the Security Considerations defined in section 9 of this specification;
589 (f) MUST support the PWG Power Management Model [PWG5106.4] for the System object;
590 (g) SHOULD implement the PWG Imaging System State and Counter MIB v2 [PWG5106.3]
591 (operational states) and the IETF Printer MIB v2 [RFC3805] (alerts) in order to query
592 comprehensive System and Subunit states;
593 (h) Only if the Scanner and/or Marker components are supported, SHOULD support the PWG Power
594 Management Model [PWG5106.4] for the Scanner and Marker objects; and
595 (i) Only if notifications are supported, SHOULD support the power state transition trap
596 powPowerV2Trap in the PowerTrap group.
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599 **7 IANA and PWG Considerations**

600
601 There are no IANA or PWG registration considerations for this document. The textual conventions used in
602 this PWG Imaging System Power MIB are all defined in the body of the ASN.1 MIB source itself. New
603 registrations require a new version of the MIB.

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605 The power state transition extensions for PrtAlertCodeTC are already defined in section 9.7 of the PWG
606 Power Management Model [PWG5106.4].

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8 Internationalization Considerations

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The IETF Policy on Policy on Character Sets and Languages [RFC2277] requires conforming network protocols to support the UTF-8 [RFC3629] encoding of Unicode [UNICODE] [ISO10646].

To claim conformance to this specification, a Power Management Server or Power Management Client implementation:

- (a) MUST support UTF-8 as defined in [RFC3629]; and
- (b) SHOULD support Network Unicode as defined in [RFC5198], which requires transmission of well-formed UTF-8 strings and recommends transmission of normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

Unicode NFC is defined as the result of performing Canonical Decomposition (into base characters and combining marks) followed by Canonical Composition (into canonical composed characters wherever Unicode has assigned them).

WARNING – Performing normalization on UTF-8 strings received from Power Management Clients and subsequently storing the results (e.g., in System objects) could cause false negatives in Power Management Client searches and failed access.

9 Security Considerations

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633 To claim conformance to this specification, a Power Management Server or Power Management Client that
634 supports secure administrative operations that are privileged (i.e., Operator or Administrator ONLY) MUST
635 implement any supported power state change and power policy create/delete/update protocol requests as
636 secure and privileged administrative operations.
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638 10 References

639 10.1 Normative References

- 640 [ACPI]
641 Advanced Configuration and Power Interface Specification v4.0, June 2009.
642 <http://www.acpi.info/DOWNLOADS/ACPIspec40.pdf>
643
644
- 645 [DSP0004]
646 DMTF Common Information Model (CIM) Infrastructure, DSP0004, May 2009.
647 http://www.dmtf.org/standards/published_documents/DSP0004_2.5.0.pdf
648
649
- 649 [DSP1027]
650 DMTF Power State Management Profile, DSP1027, December 2009.
651 http://www.dmtf.org/standards/published_documents/DSP1027_2.0.0.pdf
652
653
- 653 [IANAPRT]
654 IANA Printer MIB, originally published in RFC3805, June 2004.
655 <ftp://ftp.iana.org/assignments/ianaprinter-mib>
656
657
- 657 [IEEE1621]
658 Standard for User Interface Elements in Power Control of Electronic Devices Employed in
659 Office/Consumer Environments, IEEE 1621, December 2004.
660
661
- 661 [ISO10646]
662 Information Technology - Universal Multiple-octet Coded Character Set (UCS), ISO/IEC Standard
663 10646, 2006.
664
665
- 665 [PWG5105.1]
666 PWG Semantic Model/1.0, PWG Candidate Standard 5105.1-2004, January 2004.
667 <ftp://ftp.pwg.org/pub/pwg/candidates/cs-sm10-20040120-5105.1.pdf>
668
669
- 669 [PWG5106.4]
670 PWG Power Management Model for Imaging Systems v1.0, PWG Candidate Standard 5106.4-2011,
671 February 2011.
672 <ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimspower10-20110214-5106.4.mib>
673
674
- 674 [RFC2119]
675 IETF Key words for use in RFCs to Indicate Requirement Levels, RFC 2119, March 1997.
676 <http://www.ietf.org/rfc/rfc2219.txt>
677
678
- 677 [RFC2277]
678 IETF Policy on Character Sets and Languages, RFC 2277, January 1998.
679 <http://www.ietf.org/rfc/rfc2277.txt>
680
681
- 680 [RFC2790]
681 IETF Host Resources MIB v2, RFC 2790, March 2000.
682 <http://www.ietf.org/rfc/rfc2790.txt>
683
684
- 684 [RFC2911]
685 IETF Internet Printing Protocol/1.1: Model and Semantics, RFC 2911, September 2000.
686 <http://www.ietf.org/rfc/rfc2911.txt>

- 687 [RFC3231]
688 IETF Schedule MIB, RFC 3231, January 2002.
689 <http://www.ietf.org/rfc/rfc3629.txt>
- 690 [RFC3629]
691 IETF UTF-8 Transformation of ISO 10646, RFC 3629, November 2003.
692 <http://www.ietf.org/rfc/rfc3629.txt>
693
- 694 [RFC3805]
695 IETF Printer MIB v2, RFC 3805, June 2004.
696 <http://www.ietf.org/rfc/rfc3805.txt>
697
- 698 [RFC3806]
699 IETF Finisher MIB, RFC 3806, June 2004.
700 <http://www.ietf.org/rfc/rfc3806.txt>
701
- 702 [RFC5198]
703 Unicode Format for Network Interchange, RFC 5198, March, 2008.
704 <http://www.ietf.org/rfc/rfc5198.txt>
- 705 [UAX15]
706 Unicode Normalization Forms, Unicode Standard Annex 15, March 2008.
707 <http://www.unicode.org/reports/tr15/>
- 708 [UNICODE]
709 Unicode Standard v5.1.0, Unicode Standard, April 2008.
710 <http://www.unicode.org/versions/Unicode5.1.0/>
- 711 [ISO646]
712 ISO Information technology -- 7-bit coded character set for information exchange, ISO 646,
713 1991.[XMLTYPES]
714 W3C XML Schema Part 2: Datatypes Second Edition, W3C Recommendation, October 2004.
715 <http://www.w3.org/TR/2004/REC-xmlschema-2-20041028/>
716

717 10.2 Informative References

- 718
719 [PWGSM20]
720 PWG Semantic Model/2.0, work-in-progress, July 2009.
721 <ftp://ftp.pwg.org/pub/pwg/mfd/schemas/PWG-SM2-Latest.zip>
- 722 [RFC1514]
723 IETF Host Resources MIB v1, RFC 1514, September 1993.
724 <http://www.ietf.org/rfc/rfc1514.txt>
725
- 726 [RFC1759]
727 IETF Printer MIB v1, RFC 1759, March 1995.
728 <http://www.ietf.org/rfc/rfc1759.txt>
729
- 730 [ESCOMPUTER]
731 US EPA ENERGY STAR Program Requirements for Computers v5.0.
732 [http://www.energystar.gov/ia/partners/prod_development/revisions/
733 downloads/computer/Version5.0 Computer Spec.pdf](http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/computer/Version5.0%20Computer%20Spec.pdf)
734
- 735 [ESPRINTER]

736 US EPA ENERGY STAR Program Requirements for Imaging Equipment v1.1.
737 http://www.energystar.gov/ia/partners/product_specs/program_reqs/
738 [Imaging%20Equipment%20Specifications.pdf](http://www.energystar.gov/ia/partners/product_specs/program_reqs/Imaging%20Equipment%20Specifications.pdf)
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