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5 **USB Redirection Profile**

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179

Foreword

180 The *USB Redirection Profile* (DSP1077) was prepared by the Server Management Working Group and
181 the Physical Platform Profiles Working Group of the DMTF.

182 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
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195

196

Introduction

197 The information in this specification and referenced specifications is intended to be sufficient for a
198 provider or consumer of this data to identify unambiguously the classes, properties, methods, and values
199 that shall be instantiated and manipulated using the DMTF Common Information Model (CIM) core and
200 common model definitions.

201 The target audience for this specification is implementers who are writing CIM-based providers or
202 consumers of management interfaces that represent the components described in this document.

203

USB Redirection Profile

204 1 Scope

205 The *USB Redirection Profile* extends the management capabilities of referencing profiles and provides
206 the capability to manage USB redirections provided by the system.

207 For keyboard, video, and mouse (KVM) devices, this profile should be used if the devices are to be
208 managed as USB devices. Otherwise, the [KVM Redirection Profile](#) should be used.

209 2 Normative References

210 The following referenced documents are indispensable for the application of this document. For dated
211 references, only the edition cited applies. For undated references, the latest edition of the referenced
212 document (including any amendments) applies.

213 2.1 Approved References

214 DMTF DSP0004, *CIM Infrastructure Specification 2.5*,
215 http://www.dmtf.org/standards/published_documents/DSP0004_2.5.pdf

216 DMTF DSP0200, *CIM Operations over HTTP 1.2*,
217 http://www.dmtf.org/standards/published_documents/DSP0200_1.2.pdf

218 DMTF DSP1001, *Management Profile Specification Usage Guide 1.0*,
219 http://www.dmtf.org/standards/published_documents/DSP1001_1.0.pdf

220 DMTF DSP1004, *Base Server Profile 1.0*,
221 http://www.dmtf.org/standards/published_documents/DSP1004_1.0.pdf

222 DMTF DSP1033, *Profile Registration Profile 1.0*,
223 http://www.dmtf.org/standards/published_documents/DSP1033_1.0.pdf

224 DMTF DSP1076, *KVM Redirection Profile 1.0*,
225 http://www.dmtf.org/standards/published_documents/DSP1076_1.0.pdf

226 IETF RFC 5234, *Augmented BNF for Syntax Specifications: ABNF*, January 2008,
227 <http://www.ietf.org/rfc/rfc5234.txt>

228 2.2 Other References

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

231 3 Terms and Definitions

232 For the purposes of this document, the following terms and definitions apply. For the purposes of this
233 document, the terms and definitions given in [DSP1033](#) and [DSP1001](#) also apply.

234 3.1

235 can

236 used for statements of possibility and capability, whether material, physical, or causal

- 237 **3.2**
238 **cannot**
239 used for statements of possibility and capability, whether material, physical, or causal
- 240 **3.3**
241 **conditional**
242 indicates requirements to be followed strictly to conform to the document when the specified conditions
243 are met
- 244 **3.4**
245 **mandatory**
246 indicates requirements to be followed strictly to conform to the document and from which no deviation is
247 permitted
- 248 **3.5**
249 **may**
250 indicates a course of action permissible within the limits of the document
- 251 **3.6**
252 **need not**
253 indicates a course of action permissible within the limits of the document
- 254 **3.7**
255 **optional**
256 indicates a course of action permissible within the limits of the document
- 257 **3.8**
258 **referencing profile**
259 indicates a profile that owns the definition of this class and can include a reference to this profile in its
260 "Referenced Profiles" table
- 261 **3.9**
262 **shall**
263 indicates requirements to be followed strictly to conform to the document and from which no deviation is
264 permitted
- 265 **3.10**
266 **shall not**
267 indicates requirements to be followed strictly to conform to the document and from which no deviation is
268 permitted
- 269 **3.11**
270 **should**
271 indicates that among several possibilities, one is recommended as particularly suitable, without
272 mentioning or excluding others, or that a certain course of action is preferred but not necessarily required
- 273 **3.12**
274 **should not**
275 indicates that a certain possibility or course of action is deprecated but not prohibited
- 276 **3.13**
277 **unspecified**
278 indicates that this profile does not define any constraints for the referenced CIM element or operation

279 **3.14**280 **Emulated USB Device**

281 the USB device locally emulated on the managed system, which can be redirected to a remote system
282 that contains the physical USB device

283 **3.15**284 **Remote System**

285 the system that contains the physical USB device, to which the managed system can establish a network
286 connection for an Emulated USB Device

287 **3.16**288 **USB Redirection**

289 an arrangement that encompasses an instance of CIM_USBRedirectionService and an instance of
290 CIM_USBRedirectionSAP that are joined by a CIM_ServiceAccessBySAP association

291 **3.17**292 **USB Redirection SAP**

293 the Service Access Point for a USB Redirection Session as modeled by an instance of
294 CIM_USBRedirectionSAP that is part of a USB Redirection

295 **3.18**296 **USB Redirection Service**

297 the instance of CIM_USBRedirectionService that is part of a USB Redirection

298 **3.19**299 **USB Redirection Session**

300 the context and elements of a particular USB Redirection SAP as modeled by an instance of
301 CIM_USBRedirectionSAP

302 **4 Symbols and Abbreviated Terms**

303 The following abbreviation is used in this document.

304 **4.1**305 **HID**

306 Human Interface Device

307 **4.2**308 **MSD**

309 Media Storage Device

310 **4.3**311 **SAP**

312 Service Access Point

313 **4.4**314 **USB**

315 Universal Serial Bus

316 5 Synopsis

317 **Profile Name:** USB Redirection

318 **Version:** 1.0.0

319 **Organization:** DMTF

320 **CIM Schema Version:** 2.22

321 **Central Class:** CIM_USBRedirectionService

322 **Scoping Class:** CIM_ComputerSystem

323 The *USB Redirection Profile* extends the management capability of the referencing profiles by adding the
324 capability to describe information about USB redirections.

325 CIM_USBRedirectionService shall be the Central Class of this profile. The instance of
326 CIM_USBRedirectionService shall be the Central Instance of this profile.

327 CIM_ComputerSystem shall be the Scoping Class of this profile. The instance of CIM_ComputerSystem
328 with which the Central Instance is associated through an instance of CIM_HostedService shall be the
329 Scoping Instance of this profile.

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

331 **Table 1 – Referenced Profiles**

Profile Name	Organization	Version	Relationship	Behavior
Profile Registration	DMTF	1.0	Mandatory	

332 6 Description (Informative)

333 The *USB Redirection Profile* describes the necessary elements needed to provide the capability to
334 manage the redirection of USB devices. The profile could manage the following USB redirection
335 capabilities of typical computer systems:

- 336 • Systems can redirect a locally emulated USB device to a physical USB device or non-USB
337 device present on a remote system through a network session.
- 338 • Each USB Redirection SAP can have multiple locally emulated USB devices or USB composite
339 devices.
- 340 • Systems can support multiple USB Redirection SAPs concurrently.
- 341 • A USB Redirection SAP can initiate the connection to the remote system or listen for a
342 connection request from the remote system.
- 343 • USB Redirection SAPs and emulated USB devices can be added.

344 A USB Redirection is represented by an instance of CIM_USBRedirectionService and an instance of
345 USBRedirectionSAP that are joined by an instance of the CIM_ServiceAccessBySAP association.

346 A USB Redirection can be in an active, inactive, or available state. When the USB Redirection is active,
347 the USB devices are redirected. The state management of the USB Redirection can be performed by
348 managing the state of the USB Redirection SAP (as modeled by CIM_USBRedirectionSAP) and the state
349 of the USB Redirection Service (as modeled by CIM_USBRedirectionService).

350 The capabilities of a USB Redirection are represented by an instance of CIM_USBRedirectionCapabilities
 351 connected to an instance of CIM_USBRedirectionService by a CIM_ElementCapabilities association.
 352 These capabilities include such things as the type and maximum number of devices that can be
 353 redirected and support for the RequestStateChange() method.

354 Each instance of CIM_USBRedirectionService is connected to an instance of CIM_ComputerSystem that
 355 represents the USB Redirection Scoping Class by a CIM_HostedService association and by a
 356 CIM_ServiceAffectsElement association.

357 Each instance of CIM_USBRedirectionSAP is connected to an instance of CIM_ComputerSystem that
 358 represents the USB Redirection Scoping Class by a CIM_SAPAvailableForElement association and by a
 359 CIM_HostedAccessPoint association.

360 Each CIM_USBDevice that is redirected to a USB redirection SAP is connected to the instance of
 361 CIM_USBRedirectionSAP that represents the session by an instance of CIM_SAPAvailableForElement.

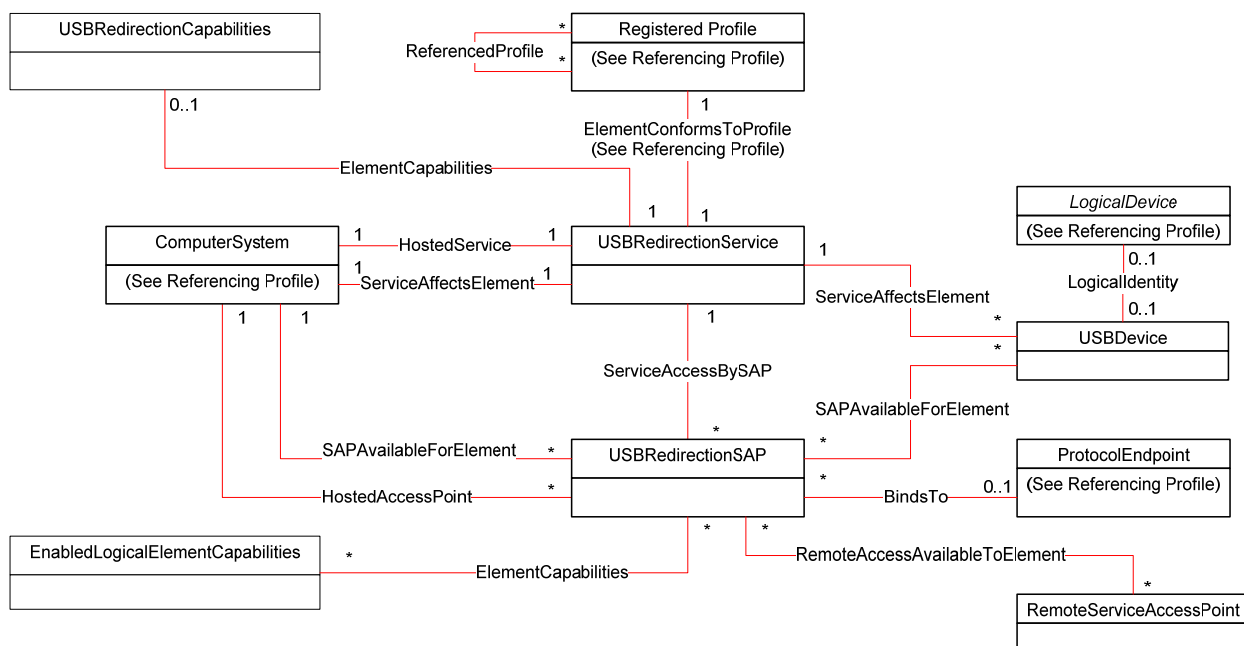
362 If an instance of a concrete subclass of CIM_LogicalDevice exists and provides another representation of
 363 the redirected USB Device, then an instance of CIM_LogicalIdentity is used to associate the instance of a
 364 concrete subclass of CIM_LogicalDevice and the instance of CIM_USBDevice.

365 If an instance of CIM_ProtocolEndpoint exists and represents the endpoint where the USB Redirection
 366 SAP can be accessed, then an instance of CIM_BindsTo is used to associate the instance of
 367 CIM_USBRedirectionSAP to the instance of CIM_ProtocolEndpoint.

368 If an instance of CIM_EnabledLogicalElementCapabilities exists and represents the capabilities of the
 369 USB Redirection SAP, then an instance of CIM_ElementCapabilities is used to associate the instance of
 370 CIM_USBRedirectionSAP to the instance of CIM_EnabledLogicalElementCapabilities.

371 If an instance of CIM_RemoteServiceAccessPoint exists and represents the remote end of the USB
 372 Redirection SAP, then an instance of CIM_RemoteAccessAvailableForElement is used to associate the
 373 instance of CIM_USBRedirectionSAP to the instance of CIM_RemoteServiceAccessPoint.

374 Figure 1 presents the class diagram for the *USB Redirection Profile*. For simplicity, the prefix *CIM_*
 375 has been removed from the names of the classes.



376

377

Figure 1 – USB Redirection Profile: Class Diagram

378 **7 Implementation**

379 This section details the requirements related to the arrangement of instances and their properties for
380 implementations of this profile. Section 7.10.2 describes the class methods required by the profile.

381 **7.1 Representing a USB Redirection**

382 A USB Redirection is represented by an instance of CIM_USBRedirectionService and an instance of
383 CIM_USBRedirectionSAP connected by an instance of the CIM_ServiceAccessBySAP association.

384 The CIM_ServiceAccessBySAP association's Antecedent property shall reference the
385 CIM_USBRedirectionService instance, and its Dependent property shall reference the
386 CIM_USBRedirectionSAP instance.

387 **7.2 Representing a USB Redirection Service**

388 A USB Redirection Service shall be represented by an instance of CIM_USBRedirectionService.

389 **7.2.1 Relationship to the Computer System Hosting the Service**

390 The relationship between the USB Redirection Service and the computer system that hosts the Service
391 shall be modeled with an instance of the CIM_HostedService association. When used in this way, the
392 CIM_HostedService association's Antecedent property shall reference the CIM_ComputerSystem
393 instance, and its Dependent property shall reference the CIM_USBRedirectionService instance.

394 **7.2.2 Relationship to the Computer System with the Emulated USB Devices**

395 The relationship between the USB Redirection Service and the computer system that contains one or
396 more emulated USB Devices shall be modeled with an instance of the CIM_ServiceAffectsElement
397 association. When used in this way, the CIM_ServiceAffectsElement association's AffectingElement
398 property shall reference the CIM_USBRedirectionService instance, and its AffectedElement property shall
399 reference the CIM_ComputerSystem instance.

400 **7.2.3 Relationship to the Capabilities of the Service**

401 The capabilities of a USB Redirection Service may be modeled by an instance of
402 CIM_USBRedirectionCapabilities.

403 When an instance of CIM_USBRedirectionCapabilities exists for this purpose, its relationship to the USB
404 Redirection Service shall be modeled with an instance of CIM_ElementCapabilities. When used in this
405 way, the CIM_ElementCapabilities association's ManagedElement property shall reference the
406 CIM_USBRedirectionService, and its Capabilities property shall reference
407 CIM_USBRedirectionCapabilities.

408 **7.2.4 CIM_USBRedirectionService.RedirectionServiceType**

409 The RedirectionServiceType property shall match the value 4 (USB).

410 **7.2.5 Maximum Number of Concurrently Enabled Redirection SAPs**

411 The USB Redirection Service may support multiple USB Redirection SAPs; however, there may be a
412 limitation to the number of concurrent redirections.

413 The CIM_USBRedirectionService.MaxCurrentEnabledSAPs property shall contain the maximum number
414 of CIM_USBRedirectionSAP instances that have an EnabledState property value of 2 (Enabled) that may
415 be associated to the instance of CIM_USBRedirectionService.

416 **7.2.6 CIM_USBRedirectionService.ElementName**

417 The ElementName property shall be formatted as a free-form string of variable length (pattern “. *”).

418 The ElementName property may support being modified by the ModifyInstance operation (see 8.12.1.1).
419 This behavior is conditional. The following sections describe the CIM elements and behavior required to
420 determine whether an implementation supports client modification of the ElementName property.

421 **7.2.6.1 Modifying ElementName Is Supported — Conditional**

422 This section describes the CIM elements and behavior requirements when an implementation supports
423 client modification of the CIM_USBRedirectionService.ElementName property.

424 An instance of CIM_USBRedirectionCapabilities shall be associated with the
425 CIM_USBRedirectionService instance through an instance of the CIM_ElementCapabilities association.

426 The CIM_USBRedirectionCapabilities.ElementNameEditSupported property shall have a value of TRUE.

427 The CIM_USBRedirectionCapabilities.MaxElementNameLen property shall be implemented.

428 **7.2.6.2 Modifying ElementName Is Not Supported**

429 This section describes the CIM elements and behaviors that shall be implemented when the
430 CIM_USBRedirectionService.ElementName does not support being modified by the ModifyInstance
431 operation.

432 An instance of CIM_USBRedirectionCapabilities may be associated with the CIM_USBRedirectionService
433 instance through an instance of CIM_ElementCapabilities.

434 When an instance of CIM_USBRedirectionCapabilities exists, its ElementNameEditSupported property
435 shall have a value of FALSE.

436 When an instance of CIM_USBRedirectionCapabilities exists, its MaxElementNameLen property may be
437 implemented, but the value of the MaxElementNameLen property is irrelevant in this context.

438 **7.3 Representing the Capabilities of a USB Redirection Service**

439 When the USB Redirection Service does not support creating USB Redirection SAPs, there may be an
440 instance of CIM_USBRedirectionCapabilities that is associated with the instance of
441 CIM_USBRedirectionService through an instance of the CIM_ElementCapabilities association.

442 When the USB Redirection Service does support creating USB Redirection SAPs, there shall be one
443 instance of CIM_USBRedirectionCapabilities that is associated with the instance of
444 CIM_USBRedirectionService through an instance of the CIM_ElementCapabilities association.

445 At most one instance of CIM_USBRedirectionCapabilities shall be associated with the instance of
446 CIM_USBRedirectionService.

447 The USB Redirection Service may constrain the number and type of USB Devices that can be redirected.
448 These constraints are represented by properties in the instance of CIM_USBRedirectionCapabilities that
449 is associated with the instance of CIM_USBRedirectionService.

450 If an instance of CIM_USBRedirectionCapabilities is associated with the instance of
451 CIM_USBRedirectionService and the USB Redirection Service does not support creating USB
452 Redirection SAPs, the properties of CIM_USBRedirectionCapabilities shall reflect the pre-configured USB
453 Redirection SAPs for that service.

454 If an instance of CIM_USBRedirectionCapabilities is associated with the instance of
455 CIM_USBRedirectionService and the USB Redirection Service does support creating USB Redirection
456 SAPs, the properties of CIM_USBRedirectionCapabilities shall reflect the maximum values that can be
457 supported across all the USB Redirection SAPs that are associated with the USB Redirection Service.

458 **7.3.1 Supported Devices**

459 If an instance of CIM_USBRedirectionCapabilities is associated with the instance of
460 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.USBVersionsSupported and
461 CIM_USBRedirectionCapabilities.ClassesSupported arrays shall contain values that identify the devices
462 supported. CIM_USBRedirectionCapabilities.SubClasses may contain additional information identifying
463 the devices supported. Each entry of the USBVersionsSupported array is related to the entry of
464 ClassesSupported, SubClassesSupported, CIM_USBRedirectionCapabilities.MaxDevicesSupported, and
465 CIM_USBRedirectionCapabilitiesMaxDevicesPerSAP arrays that are located at the same index.

466 Instances of CIM_USBRedirectionSAP shall be associated only to instances of CIM_USBDevice that
467 have USBVersion, ClassCode, and SubclassCode properties that match one of the set of values located
468 at the same indexed entry of the USBVersionsSupported, ClassesSupported, and SubClassesSupported
469 properties.

470 **7.3.1.1 USBVersionsSupported**

471 If an instance of CIM_USBRedirectionCapabilities is associated with the instance of
472 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.USBVersionsSupported shall include
473 the USB specification version of the supported USB device corresponding to the USB device class and
474 subclass values in the CIM_USBRedirectionCapabilities.ClassesSupported and
475 CIM_USBRedirectionCapabilities.SubClassesSupported entries at the same index. The USBVersion is
476 specified in Binary-Coded Decimal format, in which a decimal point is implied between the second and
477 third digits. For example, a value of 0x0201 indicates that version 2.01 is supported.

478 **7.3.1.2 ClassesSupported**

479 If an instance of CIM_USBRedirectionCapabilities is associated with the instance of
480 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.ClassesSupported shall include the
481 USB device class code of the supported USB device that corresponds to the USB specification version
482 and subclass code in the CIM_USBRedirectionCapabilities.USBVersionsSupported and
483 CIM_USBRedirectionCapabilities.SubClassesSupported entries at the same index.

484 **7.3.1.3 SubClassesSupported**

485 If an instance of CIM_USBRedirectionCapabilities is associated with the instance of
486 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.SubClassesSupported may include
487 the USB device subclass code of the supported USB device that corresponds to the USB specification
488 version and device class code in the CIM_USBRedirectionCapabilities.USBVersionsSupported and
489 CIM_USBRedirectionCapabilities.ClassesSupported entries at the same index.

490 **7.3.2 MaxDevicesSupported**

491 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
492 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.MaxDevicesSupport array property
493 shall contain the number of devices that are supported for the corresponding device that is specified in
494 the entries of the CIM_USBRedirectionCapabilities.USBVersionsSupported,
495 CIM_USBRedirectionCapabilities.ClassesSupported, and
496 CIM_USBRedirectionCapabilities.SubClassesSupported array properties located at the same index.

497 **7.3.3 SAPCapabilitiesSupported**

498 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
499 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported array
500 property shall contain values that specify whether static pre-configured USB Redirection SAPs exist.

501 The SAPCapabilitiesSupported property can be used by the remote client to determine whether static
502 pre-configured USB Redirection SAPs exist that can be inspected and whose states can be managed or
503 whether the creation of a USB Redirection SAP is required. An implementation may have static pre-
504 configured USB Redirection SAPs and still support the creation of more USB Redirection SAPs.

505 When the SAPCapabilitiesSupported array property contains a value of 2 (Pre-configured SAPs),
506 instances of CIM_USBRedirectionSAP and CIM_USBDevice shall exist and instances of
507 CIM_ProtocolEndpoint and CIM_RemoteServiceAccessPoint may exist.

508 When the SAPCapabilitiesSupported array property contains a value of 3 (Create SAPs), instances of
509 CIM_USBRedirectionSAP, CIM_USBDevice, CIM_ProtocolEndpoint, and
510 CIM_RemoteServiceAccessPoint may exist. In addition, the CreateUSBDevice(),
511 CreateRedirectionSAP() and DeleteRedirectionSAP() methods shall be implemented and shall not
512 return "Not Supported".

513 When the SAPCapabilitiesSupported array property contains a value of 4 (Modify SAP), the properties of
514 instances of CIM_USBRedirectionSAP associated with the instance of CIM_USBRedirectionService may
515 be modified by the ModifyInstance operation.

516 **7.3.4 Requested States Supported for Created SAPs**

517 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
518 CIM_USBRedirectionService, and CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported contains
519 the value 3 (Create SAPs), the
520 CIM_USBRedirectionCapabilities.RequestedStatesSupportedForCreatedSAP shall contain the
521 enumerated values that the USB Redirection Service can support for the RequestedStatesSupported
522 property of the instance CIM_EnabledLogicalElementCapabilities that will be associated with SAPs
523 created by the CIM_USBRedirectionService.CreateRedirectionSAP() method. See 8.3 for details on how
524 the RequestedStatesSupported property is set.

525 **7.3.5 SingleClassPerSAP**

526 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
527 CIM_USBRedirectionService and the CIM_USBRedirectionCapabilities.SingleClassPerSAP has a value
528 of TRUE, only instances of CIM_USBDevice whose ClassCode property have the same value shall be
529 associated with the same instance of CIM_USBRedirectionSAP.

530 **7.3.6 MaxDevicesPerSAP**

531 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
532 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.MaxDevicesPerSAP property shall
533 contain a value specifying the maximum number of devices that are supported by the USB Redirection
534 Service for a single USB Redirection SAP. This value shall not exceed the value of
535 CIM_USBRedirectionCapabilities.MaxDevicesSupported.

536 **7.3.7 ConnectionModesSupported**

537 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
538 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.ConnectionModesSupported array
539 property shall contain values that specify which connection modes the service supports.

540 This property can be used by the remote client to determine whether USB Redirection Service supports
541 initiating connections to a remote application for USB Redirections or waits for a remote application to
542 initiate the connection for USB Redirections.

543 When the ConnectionModesSupported array property contains a value of 2 (Listen), the USB Redirection
544 Service supports waiting for remote applications to initiate network connections for USB Redirections.

545 When the ConnectionModesSupported array property contains a value of 3 (Connect), the USB
546 Redirection Service supports initiating network connections to the remote applications for USB
547 Redirections.

548 **7.3.8 InfoFormatsSupported**

549 The InfoFormatsSupported property may contain an enumeration of the AccessInfo formats available for
550 the USB Redirection SAP. When the ConnectionModesSupported array property contains a value of
551 3 (Connect), this property shall contain an enumeration of the AccessInfo formats available for the USB
552 Redirection SAP to connect to the remote service access point modeled by
553 CIM_RemoteServiceAccessPoint (see 7.7.1.2).

554 **7.3.9 RequestedStatesSupported**

555 When an instance of CIM_USBRedirectionCapabilities is associated with the instance of
556 CIM_USBRedirectionService, the CIM_USBRedirectionCapabilities.RequestedStatesSupported property
557 shall contain zero or more of the following values: 2 (Enabled) or 3 (Disabled) (see 7.10.1.1).

558 **7.4 Representing a USB Redirection SAP**

559 A USB Redirection SAP shall be represented by an instance of CIM_USBRedirectionSAP.

560 **7.4.1 Relationship to the Service**

561 The relationship between the USB Redirection SAP and a USB Redirection Service shall be modeled for
562 each instance of CIM_USBRedirectionSAP that exists.

563 The relationship shall be modeled with an instance of CIM_ServiceAccessBySAP. When used in this way,
564 the CIM_ServiceAccessBySAP association's Antecedent property shall reference the
565 CIM_USBRedirectionService instance, and its Dependent property shall reference the
566 CIM_USBRedirectionSAP instance.

567 **7.4.2 Relationship to the Computer System with the Emulated USB Devices**

568 The relationship between the USB Redirection SAP and the computer system that contains one or more
569 emulated USB Devices may be modeled.

570 The relationship shall be modeled with an instance of the CIM_SAPAvailableForElement association.
571 When used in this way, the CIM_SAPAvailableForElement association's ManagedElement property shall
572 reference the CIM_ComputerSystem instance, and its AvailableSAP property shall reference the
573 CIM_USBRedirectionSAP instance.

574 **7.4.3 Relationship to the Computer System with the SAP**

575 The relationship between the USB Redirection SAP and the computer system that contains the endpoint
576 for the USB Redirection SAP shall be modeled with an instance of CIM_HostedAccessPoint. When used
577 in this way, the CIM_HostedAccessPoint association's Antecedent property shall reference the
578 CIM_ComputerSystem instance, and its Dependent property shall reference the
579 CIM_USBRedirectionSAP instance.

580 **7.4.4 Relationship to the Capabilities of the SAP**

581 The state management capabilities of the USB Redirection SAP may be modeled.

582 The relationship shall be modeled with an instance of CIM_EnabledLogicalElementCapabilities.

583 When an instance of CIM_EnabledLogicalElementCapabilities exists, the relationship between the USB
584 Redirection SAP and the capabilities of that SAP shall be modeled with an instance of
585 CIM_ElementCapabilities. When used in this way, the CIM_EnabledLogicalElementCapabilities
586 association's ManagedElement property shall reference the CIM_USBRedirectionSAP, and its
587 Capabilities property shall reference CIM_EnabledLogicalElementCapabilities.

588 **7.4.5 CIM_USBRedirectionSAP.ElementName**

589 The CIM_USBRedirectionSAP.ElementName property shall be formatted as a free-form string of variable
590 length (pattern “. *”).

591 The ElementName property may support being modified by the ModifyInstance operation (see 8.19.1.1).
592 This behavior is conditional. The following sections describe the CIM elements and behavior required to
593 determine whether an implementation supports client modification of the ElementName property.

594 **7.4.5.1 Modifying ElementName Is Supported — Conditional**

595 This section describes the CIM elements and behavior requirements when an implementation supports
596 client modification of the CIM_USBRedirectionSAP.ElementName property.

597 An instance of CIM_EnabledLogicalElementCapabilities shall be associated with the
598 CIM_USBRedirectionSAP instance through an instance of the CIM_ElementCapabilities association.

599 The CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported property shall have a value of
600 TRUE.

601 The CIM_EnabledLogicalElementCapabilities.MaxElementNameLen property shall be implemented.

602 **7.4.5.2 Modifying ElementName Is Not Supported**

603 This section describes the CIM elements and behaviors that shall be implemented when the
604 CIM_USBRedirectionSAP.ElementName does not support being modified by the ModifyInstance
605 operation.

606 An instance of CIM_EnabledLogicalElementCapabilities may be associated with the
607 CIM_USBRedirectionSAP instance through an instance of CIM_ElementCapabilities.

608 When an instance of CIM_EnabledLogicalElementCapabilities that is associated with
609 CIM_USBRedirectionSAP through an instance of CIM_ElementCapabilities exists, its
610 ElementNameEditSupported property shall have a value of FALSE.

611 When an instance of CIM_EnabledLogicalElementCapabilities that is associated with
612 CIM_USBRedirectionSAP through an instance of CIM_ElementCapabilities exists, its
613 MaxElementNameLen property may be implemented. However, the MaxElementNameLen property is
614 irrelevant in this context.

615 **7.4.6 Session Connection Mode**

616 Two connection modes are defined for USB Redirection SAPs:

- 617 • The USB Redirection SAP waits (listens) for an application on a Remote System to initiate a
618 network connection for USB Redirection.

- 619 • The USB Redirection SAP initiates connecting to the applications on the Remote System for
620 USB Redirection.

621 The connection mode of the USB Redirection SAP shall be represented by the
622 CIM_USBRedirectionSAP.ConnectionMode property. The property shall have a value of 2 (Listen) or
623 3 (Connect), and when an instance of CIM_USBRedirectionCapabilities is associated to the instance of
624 CIM_USBRedirectionService by an instance of CIM_ElementCapabilities, the value of the
625 CIM_USBRedirectionSAP.ConnectionMode property shall be one of the values in the
626 CIM_USBRedirectionCapabilities.ConnectionModesSupported property.

627 **7.4.7 Reset Timeout**

628 The Reset Timeout is the amount of time that the session shall wait after sending a Reset to the Remote
629 System before concluding that the Remote System is not responding in a timely fashion because it may
630 be “hung” or busy. If the Reset Timeout is exceeded, the managed system closes the connection and
631 tries to establish a new connection with the Remote System.

632 The CIM_USBRedirectionSAP.ResetTimeout shall have a value of the Reset Timeout.

633 **7.4.8 Session Timeout**

634 The Session Timeout is the amount of time the USB Redirection SAP will wait for a Remote System to
635 establish a new connection before the USB Device is detached.

636 The CIM_USBRedirectionSAP.SessionTimeout shall have a value of the Session Timeout.

637 **7.5 Representing the Endpoint of a USB Redirection SAP**

638 The instance of CIM_USBRedirectionSAP may be associated through an instance of CIM_BindsTo to
639 one or more instances of CIM_ProtocolEndpoint that represents the endpoints where the redirected USB
640 Redirection SAP is accessed.

641 The CIM_BindsTo association's Antecedent property shall reference the CIM_ProtocolEndpoint instance,
642 and its Dependent property shall reference the CIM_USBRedirectionSAP instance.

643 **7.6 Representing the Locally Emulated USB Device**

644 A locally emulated USB Device shall be represented by an instance of CIM_USBDevice.

645 **7.6.1 Relationship to the USB Redirection Service**

646 The relationship between a locally emulated USB Device and the USB Redirection Service shall be
647 modeled with an instance of the CIM_ServiceAffectsElement association. When used in this way, the
648 CIM_ServiceAffectsElement association's AffectingElement property shall reference the instance of
649 CIM_USBRedirectionService, and its AffectedElement property shall reference the instance of
650 CIM_USBDevice.

651 **7.6.2 Relationship to the USB Redirection SAP**

652 The relationship between a locally emulated USB Device and a USB Redirection SAP may be modeled.

653 The relationship shall be modeled with an instance of the CIM_SAPAvailableForElement association.
654 When used in this way, the CIM_SAPAvailableForElement association's Antecedent property shall
655 reference the CIM_USBDevice instance, and its Dependent property shall reference the
656 CIM_USBRedirectionSAP instance.

657 **7.6.3 Relationship to a Logical Device**

658 The relationship between a locally emulated USB Device and an instance of a concrete subclass of
659 CIM_LogicalDevice may be modeled.

660 The relationship shall be modeled when an instance of a concrete subclass of CIM_LogicalDevice that
661 provides another representation of the locally emulated USB Device exists.

662 The relationship shall be modeled with an instance of the CIM_LogicalIdentity association. When used in
663 this way, the CIM_LogicalIdentity association's SystemElement property shall reference the
664 CIM_USBDevice instance, and its SameElement property shall reference the CIM_LogicalDevice
665 instance.

666 **7.6.4 Representing the USB Device Class**

667 The USB Device class shall be represented by the value of the CIM_USBDevice.ClassCode property.

668 The USB Device version shall be represented by the value of the CIM_USBDevice.USBVersion property.

669 The USB Device subclass may be represented by the value of the CIM_USBDevice.SubClassCode.

670 **7.6.5 Representing the Command Response Timeout**

671 The Command Response Timeout is the amount of time the session shall wait for a response after
672 sending a USB command. If the Command Response Timeout is exceeded, the USB device behaves as
673 if the media were ejected; a Reset message is sent to the Remote System to terminate the previous
674 command.

675 The CIM_USBDevice.CommandTimeout property shall have the value of the Command Response
676 Timeout.

677 **7.7 Representing the Destination of the USB Redirection (Optional)**

678 The remote destination of the USB Redirection may be modeled. When modeled, the requirements
679 specified in the following sections shall be met.

680 **7.7.1 CIM_RemoteServiceAccessPoint Instance**

681 The remote destination of the USB Redirection may be represented by an instance of
682 CIM_RemoteServiceAccessPoint.

683 Every CIM_USBRedirectionSAP instance that has a ConnectionMode property value of 3 (Connect) shall
684 be associated with exactly one instance of CIM_RemoteServiceAccessPoint through an instance of the
685 CIM_RemoteAccessAvailableToElement association.

686 If an instance of CIM_USBRedirectionCapabilities is associated with the CIM_RedirectionService
687 instance and CIM_USBRedirectionCapabilities.ConnectionModesSupported includes both 2 (Listen) and
688 3 (Connect) (see 7.3.7) and CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported includes
689 4 (Modify SAP) (see 7.3.3), static pre-configured instances of CIM_USBRedirectionSAP shall have a
690 CIM_RemoteAccessAvailableToElement association to an instance of CIM_RemoteServiceAccessPoint
691 and a CIM_BindsTo association to an instance of CIM_ProtocolEndpoint.

692 **7.7.1.1 AccessInfo**

693 The CIM_RemoteServiceAccessPoint.AccessInfo property shall have a value that corresponds to the
694 value of the CIM_RemoteServiceAccessPoint.InfoFormat property. The value shall contain the network
695 location for the destination of the USB Redirection.

696 7.7.1.2 InfoFormat

697 The CIM_RemoteServiceAccessPoint.InfoFormat property shall contain the correct valuemap value for
698 the format of the CIM_RemoteServiceAccessPoint.AccessInfo information that designates the network
699 location for the destination of the USB Redirection. When an instance of CIM_USBRedirectionCapabilities
700 is associated with the instance of CIM_USBRedirectionService and
701 CIM_USBRedirectionCapabilities.InfoFormatsSupported is not empty, the value of the InfoFormat
702 property shall be one of the values of CIM_USBRedirectionCapabilities.InfoFormatsSupported.

703 7.7.1.3 OtherInfoFormatDescription

704 If the CIM_RemoteServiceAccessPoint.InfoFormat property is set to 1 (Other), the
705 CIM_RemoteServiceAccessPoint.OtherInfoFormatDescription property describes the format.

706 7.7.1.4 AccessContext

707 The CIM_RemoteServiceAccessPoint.AccessContext property shall have a value of 1 (Other).

708 7.7.1.5 OtherAccessContext

709 The CIM_RemoteServiceAccessPoint.OtherAccessContext property shall have a value of "USB
710 Redirection Destination".

711 7.8 States of a USB Redirection

712 The state of a USB Redirection shall be determined by the states of the CIM_USBRedirectionService and
713 CIM_USBRedirectionSAP instances that are associated through an instance of
714 CIM_ServiceAccessBySAP.

715 The USB Redirection shall have the state *inactive*, *available*, or *active*:

- 716 • The USB Redirection is *active* when the USB Redirection SAP is connected to a Remote SAP.
717 The value of the EnabledState properties in CIM_USBRedirectionService and
718 CIM_USBRedirectionSAP shall be 2 (Enabled) when the USB Redirection is in an active state.
- 719 • The USB Redirection is *available* when the USB Redirection SAP is available for connection at
720 the protocol endpoint. The USB Redirection SAP is either awaiting a connection request (listen
721 mode) or ready to initiate a connection (connect mode). When the USB Redirection SAP is in an
722 available state, the value of the EnabledState property of CIM_USBRedirectionService shall be
723 2 (Enabled) and the value of the EnabledState property of CIM_USBRedirectionSAP shall be
724 6 (Enabled but Offline).
- 725 • The USB Redirection is *inactive* when the USB Redirection is neither active nor available.

726 7.9 State Management of a USB Redirection Service (Optional)

727 The following sections describe the CIM elements and behaviors that allow the client to determine
728 whether state management of the USB Redirection Service is supported.

729 Support for managing the state of a USB Redirection Service is optional behavior. The following sections
730 describe the CIM elements and behaviors that allow the client to determine whether state management of
731 the USB Redirection Service is supported.

732 7.9.1 USB Redirection Service State Management Is Supported — Conditional

733 This section describes the CIM elements and behaviors that shall be implemented when state
734 management of the USB Redirection Service is supported.

735 **7.9.1.1 CIM_USBRedirectionCapabilities**

736 When state management of the USB Redirection Service is supported, exactly one instance of
737 CIM_USBRedirectionCapabilities shall be associated with the instance of CIM_USBRedirectionService
738 through an instance of CIM_ElementCapabilities.

739 The CIM_ElementCapabilities association's ManagedElement property shall reference the
740 CIM_USBRedirectionService instance, and its Capabilities property shall reference the
741 CIM_USBRedirectionCapabilities instance.

742 **7.9.1.1.1 CIM_USBRedirectionCapabilities.RequestedStatesSupported**

743 The RequestedStatesSupported property shall contain one or more of the following values: 2 (Enabled) or
744 3 (Disabled).

745 **7.9.1.2 CIM_USBRedirectionService.RequestedState**

746 When the CIM_USBRedirectionService.RequestStateChange() method is successfully invoked, the value
747 of the RequestedState property shall be the value of the RequestedState parameter. If the method is not
748 successfully invoked, the value of the RequestedState property is indeterminate.

749 The CIM_USBRedirectionService.RequestedState property shall have one of the values specified in the
750 CIM_USBRedirectionCapabilities.RequestedStatesSupported property or a value of 0 (Unknown).

751 **7.9.1.3 CIM_USBRedirectionService.EnabledState**

752 The EnabledState property shall have one of the following values: 2 (Enabled) or 3 (Disabled).

753 When the RequestedState parameter has a value of 2 (Enabled) or 3 (Disabled) and the
754 CIM_USBRedirectionService.RequestStateChange() method completes successfully, the value of the
755 EnabledState property shall equal the value of the CIM_USBRedirectionService.RequestedState
756 property.

757 If the method does not complete successfully, the value of the EnabledState property is indeterminate.

758 **7.9.2 USB Redirection Service State Management Is Not Supported**

759 This section describes the CIM elements and behaviors that shall be implemented when management of
760 the USB Redirection Service state is not supported.

761 **7.9.2.1 CIM_USBRedirectionCapabilities**

762 When state management is not supported, an instance of CIM_USBRedirectionCapabilities may be
763 associated with the CIM_USBRedirectionService instance through an instance of
764 CIM_ElementCapabilities. The existence of the CIM_ElementCapabilities instance is conditional on the
765 existence of the CIM_USBRedirectionCapabilities instance.

766 The CIM_ElementCapabilities association's ManagedElement property shall reference the
767 CIM_USBRedirectionService instance, and its Dependent property shall reference the
768 CIM_USBRedirectionCapabilities instance.

769 **7.9.2.1.1 CIM_USBRedirectionCapabilities.RequestedStatesSupported**

770 The CIM_USBRedirectionCapabilities.RequestedStatesSupported property shall not contain any values.

771 **7.9.2.2 CIM_USBRedirectionService.RequestedState**

772 The RequestedState property shall have the value of 12 (Not Applicable).

773 **7.9.2.3 CIM_USBRedirectionService.EnabledState**

774 The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled), or
775 0 (Unknown). The EnabledState property may have a value of 5 (Not Applicable) when non-CIM
776 instrumentation has manipulated the instance of CIM_USBRedirectionService.

777 **7.10 State Management of a USB Redirection SAP**

778 The following sections describe the CIM elements and behaviors that allow the client to determine
779 whether state management of the USB Redirection SAP is supported.

780 Support for managing the state of a USB Redirection SAP is optional behavior. The following sections
781 describe the CIM elements and behaviors that allow the client to determine whether state management of
782 the USB Redirection SAP is supported.

783 **7.10.1 USB Redirection SAP State Management Is Supported — Conditional**

784 This section describes the CIM elements and behaviors that shall be implemented when state
785 management of the USB Redirection SAP is supported.

786 **7.10.1.1 CIM_EnabledLogicalElementCapabilities**

787 When state management of the USB Redirection SAP is supported, exactly one instance of
788 CIM_EnabledLogicalElementCapabilities shall be associated with the instance of
789 CIM_USBRedirectionSAP through an instance of CIM_ElementCapabilities.

790 The CIM_ElementCapabilities association's ManagedElement property shall reference the
791 CIM_USBRedirectionSAP instance, and its Capabilities property shall reference the
792 CIM_EnabledLogicalElementCapabilities instance.

793 **7.10.1.1.1 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported**

794 The RequestedStatesSupported property shall contain one or more of the following values: 2 (Enabled),
795 3 (Disabled), or 6 (Offline).

796 **7.10.1.2 CIM_USBRedirectionSAP.RequestedState**

797 When the CIM_USBRedirectionSAP.RequestStateChange() method is successfully invoked, the value of
798 the RequestedState property shall be the value of the RequestedState parameter. If the method is not
799 successfully invoked, the value of the RequestedState property is indeterminate.

800 The CIM_USBRedirectionSAP.RequestedState property shall have one of the values specified in the
801 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property or a value of 0 (Unknown).

802 **7.10.1.3 CIM_USBRedirectionSAP.EnabledState**

803 The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled), or
804 6 (Enabled but Offline).

805 When the RequestedState parameter has a value of 2 (Enabled), 3 (Disabled), or 6 (Offline) and the
806 CIM_USBRedirectionSAP.RequestStateChange() method completes successfully, the value of the
807 EnabledState property shall equal the value of the CIM_USBRedirectionSAP.RequestedState property.

808 If the method does not complete successfully, the value of the EnabledState property is indeterminate.

809 **7.10.2 USB Redirection SAP State Management Is Not Supported**

810 This section describes the CIM elements and behaviors that shall be implemented when management of
811 the USB Redirection Session state is not supported.

812 **7.10.2.1 CIM_EnabledLogicalElementCapabilities**

813 When state management is not supported, an instance of CIM_EnabledLogicalElementCapabilities may
 814 be associated with the CIM_USBRedirectionSAP instance through an instance of
 815 CIM_ElementCapabilities. The existence of the CIM_ElementCapabilities instance is conditional on the
 816 existence of the CIM_EnabledLogicalElementCapabilities instance.

817 The CIM_ElementCapabilities association's ManagedElement property shall reference the
 818 CIM_USBRedirectionSAP instance, and its Dependent property shall reference the
 819 CIM_EnabledLogicalElementCapabilities instance.

820 **7.10.2.1.1 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported**

821 The CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property shall not contain any
 822 values.

823 **7.10.2.2 CIM_USBRedirectionSAP.RequestedState**

824 The RequestedState property shall have the value of 12 (Not Applicable).

825 **7.10.2.3 CIM_USBRedirectionSAP.EnabledState**

826 The EnabledState property shall have one of the following values: 2 (Enabled), 3 (Disabled),
 827 0 (Unknown), or 6 (Enabled but Offline). The EnabledState property may have a value of 0 (Unknown)
 828 when non-CIM instrumentation has manipulated the instance of CIM_USBRedirectionSAP.

829 **8 Methods**

830 This section details the requirements for supporting intrinsic operations and extrinsic methods for the CIM
 831 elements defined by this profile.

832 **8.1 CIM_USBRedirectionService.RequestStateChange()**

833 Invocation of the RequestStateChange() method changes the element's state to the value specified in the
 834 RequestedState parameter. The 2 (Enabled) and 3 (Disabled) values of the RequestedState parameter
 835 shall correspond to the enabled and disabled states of the USB Redirection Service, respectively.

836 Whether the method completes successfully if there are active sessions is specific to the implementation.

837 Detailed requirements of the RequestStateChange() method are specified in Table 2 and Table 3.

838 No standard messages are defined.

839 Invoking the RequestStateChange() method multiple times could result in earlier requests being
 840 overwritten or lost.

841 **Table 2 – CIM_USBRedirectionService.RequestStateChange() Method: Return Code Values**

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob

842

Table 3 – CIM_USBRedirectionService.RequestStateChange() Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	RequestedState	uint16	Valid state values: 2 (Enabled) 3 (Disabled)
OUT	Job	CIM_ConcreteJob REF	Returned if job started
IN	TimeoutPeriod	datetime	Client-specified maximum amount of time the transition to a new state is supposed to take: 0 or NULL – No time requirements <interval> – Maximum time allowed

8.1.1 CIM_USBRedirectionService.RequestStateChange() — Conditional Support

844 When an instance of CIM_USBRedirectionCapabilities is associated with the
845 CIM_USBRedirectionService instance and the
846 CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains at least one value, the
847 CIM_USBRedirectionService.RequestStateChange() method shall be implemented and supported. The
848 CIM_USBRedirectionService.RequestStateChange() method shall not return a value of 1 (Not
849 Supported).

8.2 CIM_USBRedirectionService.CreateUSBDevice()

851 This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property
852 array containing a value of 2 (Create SAPs). For more information, see 7.3.3.

853 If an instance of CIM_USBRedirectionCapabilities is not associated with an instance of
854 CIM_USBRedirectionService by a CIM_ServiceAccessBySAP association, then this method shall not be
855 supported.

856 Invocation of the CreateUSBDevice() method performs both of the following actions:

- 857 • creates an instance of CIM_USBDevice
- 858 • creates a CIM_ServiceAffectsElement association between the CIM_USBDevice and the
859 CIM_USBRedirectionService

860 The LogicalDevice parameter may be NULL. When the LogicalDevice parameter is not NULL, the method
861 shall create a CIM_LogicalIdentity association between the CIM_USBDevice and the CIM_LogicalDevice.

862 Instances of CIM_USBDevice that are created by this method may be deleted by using the
863 CIM_USBDevice class Delete intrinsic operation, which will remove the instance of CIM_USBDevice and
864 all the associations that reference it.

865 Detailed requirements of the method are specified in Table 4 and Table 5.

866 No standard messages are defined.

867 **Table 4 – CIM_USBRedirectionService.CreateUSBDevice() Method: Return Code Values**

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

868 **Table 5 – CIM_USBRedirectionService.CreateUSBDevice() Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	NewUSBDevice	string	Encoded String-valued embedded instance of CIM_USBDevice
IN	RedirectedLogical Device	CIM_LogicalDevice REF	Reference to an instance of a concrete subclass of CIM_LogicalDevice
OUT	Job	CIM_ConcreteJob REF	Returned if job started
OUT	USBDevice	CIM_USBDevice REF	Reference to the newly created instance of CIM_USBDevice

869 **8.3 CIM_USBRedirectionService.CreateRedirectionSAP()**

870 This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property
 871 array containing a value of 2 (Creates SAP). For more information, see 7.3.3.

872 If an instance of CIM_USBRedirectionCapabilities is not associated with an instance of
 873 CIM_USBRedirectionService by a CIM_ServiceAccessBySAP association, this method shall not be
 874 supported.

875 Invocation of the CreateRedirectionSAP() method performs the following actions:

- 876 • Creates an instance of CIM_USBRedirectionSAP
- 877 • Creates a CIM_ServiceAccessBySAP association between the new CIM_USBRedirectionSAP
 878 and CIM_USBRedirectionService
- 879 • Creates an CIM_HostedAccessPoint between the new CIM_USBRedirectionSAP and the
 880 CIM_ComputerSystem instance that hosts the USB Redirection Service
- 881 • Creates a CIM_SAPAvailableForElement association between the new
 882 CIM_USBRedirectionSAP and the CIM_ComputerSystem instance that represents the source
 883 of the USB Redirection flow
- 884 • Creates an instance of CIM_EnabledLogicalElementCapabilities and an instance of
 885 CIM_ElementCapabilities, which associates the new instance of CIM_USBRedirectionSAP with
 886 the new instance of CIM_EnabledLogicalElementCapabilities. The properties of the new
 887 instance of CIM_EnabledLogicalElementCapabilities shall have the following values:
 - 888 – ElementNameEditSupported shall be FALSE.
 - 889 – InstanceID shall have a value that consists of the value of the Name property of the newly
 890 created CIM_USBRedirectionSAP instance with “capabilities” appended.
 - 891 – RequestedStatesSupported shall have the values specified in the
 892 NewSAPRequestedStatesSupported parameter, which shall be limited to zero or more of
 893 the values in
 894 CIM_USBRedirectionCapabilities.RequestedStatesSupportedForCreatedSAP.

- 895 • For each instance of CIM_USBDevice that is referenced in the USBDevices input parameter,
896 creates a CIM_ServiceAffectsElement association between the CIM_USBDevice and the
897 CIM_USBRedirectionService
- 898 • For each instance of CIM_USBDevice that is referenced in the USBDevices input parameter,
899 creates an instance of CIM_SAPAvailableForElement associating the CIM_USBDevice and the
900 new instance of CIM_USBRedirectionSAP

901 When the CIM_USBRedirectionSAP is created, its properties shall have the values specified in the string-
902 valued embedded instance of CIM_USBRedirectionSAP that is specified in the CreateRedirectionSAP
903 method's NewUSBRedirectionSAP parameter.

904 When the CreateUSBDevices parameter is TRUE, the CreateRedirectionSAP method shall perform the
905 following actions for each encoded string-valued embedded instance of CIM_USBDevice that is
906 referenced in the NewUSBDevices input parameter:

- 907 • Creates the instance of CIM_USBDevice
- 908 • Creates an instance of CIM_SAPAvailableForElement, which associates the CIM_USBDevice
909 and the new instance of CIM_USBRedirectionSAP
- 910 • Creates an instance of CIM_ServiceAffectsElement, which associates the CIM_USBDevice and
911 the CIM_USBRedirectionService
- 912 • Creates a CIM_LogicalIdentity association between the CIM_USBDevice and the concrete
913 subclass of CIM_LogicalDevice that is referenced in Model Correspondence in the
914 RedirectedLogicalDevices parameter if the CIM_LogicalDevice REF in the
915 RedirectedLogicalDevices parameter is not NULL

916 If the ConnectionMode parameter has a value of 2 (Listen), an instance of CIM_ProtocolEndpoint shall be
917 associated to the CIM_USBRedirectionSAP through an instance of the CIM_BindsTo association. The
918 CIM_ProtocolEndpoint may be created if needed, or an existing CIM_ProtocolEndpoint may be used. The
919 values of the CIM_ProtocolEndpoint properties are determined and set by the redirection service
920 implementation.

921 If the ConnectionMode parameter has a value of 3 (Connect), an instance of
922 CIM_RemoteServiceAccessPoint shall be created based on the string-valued embedded instance
923 encoded in the NewRemoteServiceAccessPoint parameter and associated to the new
924 CIM_USBRedirectionSAP through an instance of the CIM_RemoteAccessAvailableToElement
925 association. The value of the newly created CIM_RemoteServiceAccessPoint.InfoFormat property shall
926 be the same as one of the values specified in CIM_USBRedirectionCapabilities.InfoFormatsSupported.

927 Detailed requirements of the method are specified in Table 6 and Table 7.

928 No standard messages are defined.

929 **Table 6 – CIM_USBRedirectionService.CreateRedirectionSAP() Method: Return Code Values**

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

930

Table 7 – CIM_USBRedirectionService.CreateRedirectionSAP() Method: Parameters

Qualifiers	Name	Type	Description/Values
IN	NewUSBRedirectionSAP	string	Encoded string-valued embedded instance of CIM_USBRedirectionSAP
IN	NewSAPRequestedStatesSupported[]	uint16	Array of RequestedStates to be supported in the capabilities of the new SAP
IN	USBDevices[]	CIM_USBDevice REF	Device to redirect to the SAP
IN	CreateDevices	Boolean	Creates USB Devices
IN	NewUSBDevices[]	Encoded string-valued embedded instances of CIM_USBDevice	New devices to be created and redirected to the SAP
IN	RedirectedLogicalDevices[]	CIM_LogicalDevice REF	Devices to be redirected to SAP through NewUSBDevices
IN	NewRemoteServiceAccessPoint	string	When ConnectionMode = 3, this is the encoded string-valued embedded instance of CIM_RemoteServiceAccessPoint that represents the remote redirection service to which the new SAP should connect.
OUT	SAP	CIM_USBRedirectionSAP REF	
OUT	Job	CIM_ConcreteJob REF	Returned if job started

931 **8.4 CIM_USBRedirectionService.DeleteRedirectionSAP()**

932 This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property
 933 array containing a value of 2 (Creates SAP). For more information, see 7.3.3.

934 If an instance of CIM_USBRedirectionCapabilities is not associated with an instance of
 935 CIM_USBRedirectionService by a CIM_ServiceAccessBySAP association, this method shall not be
 936 supported.

937 Invocation of the DeleteRedirectionSAP() method performs the following actions:

- 938 • Deletes all associations that reference the CIM_USBRedirectionSAP instance that is being
 939 deleted, including:
 - 940 – the CIM_ServiceAccessBySAP association between the CIM_USBRedirectionSAP and
 941 CIM_USBRedirectionService instances
 - 942 – the CIM_SAPAvailableForElement association and the CIM_HostedAccessPoint between
 943 the CIM_USBRedirectionSAP and CIM_ComputerSystem instances
 - 944 – the CIM_SAPAvailableForElement associations between the CIM_USBRedirectionSAP
 945 and CIM_USBDevice instances
 - 946 – any CIM_BindsTo associations between the CIM_USBRedirectionSAP and
 947 CIM_ProtocolEndpoint instances
 - 948 – any CIM_RemoteAccessAvailableToElement association between the
 949 CIM_USBRedirectionSAP and CIM_RemoteServiceAccessPoint instances
- 950 • If the CIM_USBRedirectionSAP was associated to an instance of CIM_ProtocolEndpoint and
 951 the instance of CIM_ProtocolEndpoint was created by
 952 CIM_USBRedirectionService.CreateRedirectionSAP(), deletes the instance of
 953 CIM_ProtocolEndpoint

- 954 • If the CIM_USBRedirectionSAP is associated to an instance of
 955 CIM_RemoteServiceAccessPoint and the instance of CIM_RemoteServiceAccessPoint was
 956 created by the CIM_USBRedirectionService.CreateRedirectionSAP() method, deletes the
 957 instance of CIM_RemoteServiceAccessPoint
- 958 • Deletes the instance of CIM_USBRedirectionSAP

959 When the DeleteUSBDevices parameter is TRUE, the method shall perform the following actions for each
 960 instance of CIM_USBDevice that is created by the CIM_USBRedirectionService.CreateRedirectionSAP
 961 method and associated to the instance of CIM_USBRedirectionSAP referenced by the parameter
 962 RedirectionSAP:

- 963 • Delete the instance of the CIM_ServiceAffectsElement association between the
 964 CIM_USBDevice and CIM_USBRedirectionService instances
- 965 • Delete the instance of USBDevice

966 Detailed requirements of the method are specified in Table 6 and Table 7.

967 No standard messages are defined.

968 **Table 8 – CIM_USBRedirectionService.DeleteRedirectionSAP() Method: Return Code Values**

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

969 **Table 9 – CIM_USBRedirectionService.DeleteRedirectionSAP() Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	RedirectionSAP	CIM_USBRedirectionSAP REF	Redirection SAP to delete
IN	DeleteUSBDevices	Boolean	Deletes USB Devices associated through session
OUT	Job	CIM_ConcreteJob REF	Returned if job started

970 8.5 CIM_USBRedirectionSAP.RequestStateChange()

971 Invocation of the RequestStateChange() method changes the element's state to the value specified in the
 972 RequestedState parameter. The 2 (Enabled), 3 (Disabled), and 6 (Offline) values of the RequestedState
 973 parameter shall correspond to enabled, disabled, and offline requested states for the SAP, respectively.

974 Detailed requirements of the RequestStateChange() method are specified in Table 10 and Table 11.

975 No standard messages are defined.

976 Invoking the RequestStateChange() method multiple times could result in earlier requests being
 977 overwritten or lost.

978 **Table 10 – CIM_USBRedirectionSAP.RequestStateChange() Method: Return Code Values**

Value	Description
0	Request was successfully executed.
1	Method is unsupported.
2	Error occurred.
4096	Job started: REF returned to started CIM_ConcreteJob.

979 **Table 11 – CIM_USBRedirectionSAP.RequestStateChange() Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	RequestedState	uint16	Valid state values: 2 (Enabled) 3 (Disabled) 6 (Offline)
IN	TimeoutPeriod	datetime	Client-specified maximum amount of time the transition to a new state is supposed to take: 0 or NULL – No time requirements <interval> – Maximum time allowed
OUT	Job	CIM_ConcreteJob REF	Returned if job started

980 **8.5.1 CIM_USBRedirectionSAP.RequestStateChange() — Conditional Support**

981 When an instance of CIM_EnabledLogicalElementCapabilities is associated with the
 982 CIM_USBRedirectionSAP instance and the
 983 CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property contains at least one
 984 value, the CIM_USBRedirectionSAP.RequestStateChange() method shall be implemented and
 985 supported. The CIM_USBRedirectionSAP.RequestStateChange() method shall not return a value of
 986 1 (Not Supported).

987 **8.6 Profile Conventions for Operations**

988 For each profile class (including associations), the implementation requirements for operations, including
 989 those in the following default list, are specified in class-specific subclasses of this clause.

990 The default list of operations is as follows:

- 991 • GetInstance
- 992 • Associators
- 993 • AssociatorNames
- 994 • References
- 995 • ReferenceNames
- 996 • EnumerateInstances
- 997 • EnumerateInstanceNames

998 **8.7 CIM_BindsTo**

999 Table 12 lists implementation requirements for operations. If implemented, these operations shall be
 1000 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 12, all operations
 1001 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1002 NOTE: Related profiles may define additional requirements on operations for the profile class.

1003 **Table 12 – Operations: CIM_BindsTo**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1004 **8.8 CIM_ElementCapabilities**

1005 Table 13 lists implementation requirements for operations. If implemented, these operations shall be
 1006 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 13, all operations
 1007 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1008 NOTE: Related profiles may define additional requirements on operations for the profile class.

1009 **Table 13 – Operations: CIM_ElementCapabilities**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1010 **8.9 CIM_EnabledLogicalElementCapabilities**

1011 Table 14 lists implementation requirements for operations. If implemented, these operations shall be
 1012 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 14, all operations
 1013 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1014 NOTE: Related profiles may define additional requirements on operations for the profile class.

1015 **Table 14 – Operations: CIM_EnabledLogicalElementCapabilities**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1016 **8.10 CIM_HostedService**

1017 Table 15 lists implementation requirements for operations. If implemented, these operations shall be
 1018 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 15, all operations
 1019 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1020 NOTE: Related profiles may define additional requirements on operations for the profile class.

1021 **Table 15 – Operations: CIM_HostedService**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1022 **8.11 CIM_HostedAccessPoint**

1023 Table 16 lists implementation requirements for operations. If implemented, these operations shall be
 1024 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 16, all operations
 1025 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1026 NOTE: Related profiles may define additional requirements on operations for the profile class.

1027 **Table 16 – Operations: CIM_HostedAccessPoint**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1028 **8.12 CIM_USBRedirectionService**

1029 Table 17 lists implementation requirements for operations. If implemented, these operations shall be
 1030 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 17, all operations
 1031 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1032 NOTE: Related profiles may define additional requirements on operations for the profile class.

1033 **Table 17 – Operations: CIM_USBRedirectionService**

Operation	Requirement	Messages
ModifyInstance	Optional	See 8.12.1.
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1034 **8.12.1 CIM_USBRedirectionService — ModifyInstance**

1035 This section details the specific requirements for the ModifyInstance operation applied to an instance of
1036 CIM_USBRedirectionService.

1037 **8.12.1.1 CIM_USBRedirectionService.ElementName Property**

1038 When an instance of CIM_USBRedirectionCapabilities is associated with the
1039 CIM_USBRedirectionService instance and the
1040 CIM_USBRedirectionCapabilities.ElementNameEditSupported property has a value of TRUE, the
1041 implementation shall allow the ModifyInstance operation to change the value of the ElementName
1042 property of the CIM_USBRedirectionService instance. The ModifyInstance operation shall enforce the
1043 length restriction specified in the MaxElementNameLen property of the CIM_USBRedirectionCapabilities
1044 instance.

1045 When no instance of CIM_USBRedirectionCapabilities is associated with the
1046 CIM_USBRedirectionService instance or the ElementNameEditSupported property of the
1047 CIM_USBRedirectionCapabilities instance has a value of FALSE, the implementation shall not allow the
1048 ModifyInstance operation to change the value of the ElementName property of the
1049 CIM_USBRedirectionService instance.

1050 **8.13 CIM_RemoteAccessAvailableToElement**

1051 Table 18 lists implementation requirements for operations. If implemented, these operations shall be
1052 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 18, all operations
1053 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1054 NOTE: Related profiles may define additional requirements on operations for the profile class.

1055 **Table 18 – Operations: CIM_RemoteAccessAvailableToElement**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1056 **8.14 CIM_RemoteServiceAccessPoint**

1057 Table 19 lists implementation requirements for operations. If implemented, these operations shall be
1058 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 19, all operations
1059 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1060 NOTE: Related profiles may define additional requirements on operations for the profile class.

1061

Table 19 – Operations: CIM_RemoteServiceAccessPoint

Operation	Requirement	Messages
ModifyInstance	Optional	See 8.14.1.
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1062 **8.14.1 CIM_RemoteServiceAccessPoint — ModifyInstance**

1063 This section details the specific requirements for the ModifyInstance operation applied to an instance of
 1064 CIM_RemoteServiceAccessPoint.

1065 **8.14.1.1 CIM_RemoteServiceAccessPoint.InfoFormat Property**

1066 When an instance of CIM_USBRedirectionCapabilities is associated with the
 1067 CIM_USBRedirectionService instance and the CIM_USBRedirectionCapabilities.InfoFormatsSupported is
 1068 not empty, the implementation shall allow the ModifyInstance operation to change the value of the
 1069 InfoFormat property of the CIM_RemoteServiceAccessPoint instance. The new InfoFormat value shall be
 1070 one of the values in CIM_USBRedirectionCapabilities.InfoFormatsSupported.

1071 **8.14.1.2 CIM_RemoteServiceAccessPoint.AccessInfo Property**

1072 When an instance of CIM_USBRedirectionCapabilities is associated with the
 1073 CIM_USBRedirectionService instance and the CIM_USBRedirectionCapabilities.InfoFormatsSupported is
 1074 not empty, the implementation shall allow the ModifyInstance operation to change the value of the
 1075 AccessInfo property of the CIM_RemoteServiceAccessPoint instance.

1076 **8.14.1.3 CIM_RemoteServiceAccessPoint.OtherInfoFormatDescription Property**

1077 When an instance of CIM_USBRedirectionCapabilities is associated with the
 1078 CIM_USBRedirectionService instance and the CIM_USBRedirectionCapabilities.InfoFormatsSupported
 1079 property has a value of 1 (Other), the implementation shall allow the ModifyInstance operation to change
 1080 the value of the OtherInfoFormatDescription property of the CIM_RemoteServiceAccessPoint instance.

1081 **8.15 CIM_ServiceAffectsElement**

1082 Table 20 lists implementation requirements for operations. If implemented, these operations shall be
 1083 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 20, all operations
 1084 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1085 NOTE: Related profiles may define additional requirements on operations for the profile class.

1086

Table 20 – Operations: CIM_ServiceAffectsElement

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1087 8.16 CIM_ServiceAccessBySAP

1088 Table 21 lists implementation requirements for operations. If implemented, these operations shall be
 1089 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 21, all operations
 1090 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1091 NOTE: Related profiles may define additional requirements on operations for the profile class.

1092 **Table 21 – Operations: CIM_ServiceAccessBySAP**

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1093 8.17 CIM_USBDevice

1094 Table 22 lists implementation requirements for operations. If implemented, these operations shall be
 1095 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 22, all operations
 1096 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1097 NOTE: Related profiles may define additional requirements on operations for the profile class.

1098 **Table 22 – Operations: CIM_USBDevice**

Operation	Requirement	Messages
DeleteInstance	Conditional. See 8.17.1.	None
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1099 8.17.1 CIM_USBDevice — DeleteInstance

1100 This method is conditional on the CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property
 1101 array containing a value of 2 (Creates SAP). For more information, see 7.3.3.

1102 The DeleteInstance operation shall delete all instances of associations that reference the instance of
 1103 CIM_USBDevice and the instance of CIM_USBDevice.

1104 8.18 CIM_USBRedirectionCapabilities

1105 Table 23 lists implementation requirements for operations. If implemented, these operations shall be
 1106 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 23, all operations
 1107 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1108 NOTE: Related profiles may define additional requirements on operations for the profile class.

1109

Table 23 – Operations: CIM_USBRedirectionCapabilities

Operation	Requirement	Messages
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1110

8.19 CIM_USBRedirectionSAP

1111 Table 24 lists implementation requirements for operations. If implemented, these operations shall be
 1112 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 24, all operations
 1113 in the default list in 8.6 shall be implemented as defined in [DSP0200](#).

1114 NOTE: Related profiles may define additional requirements on operations for the profile class.

1115

Table 24 – Operations: CIM_USBRedirectionSAP

Operation	Requirement	Messages
ModifyInstance	Optional	See 8.19.1.
EnumerateInstanceNames	Unspecified	None
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

1116

8.19.1 CIM_USBRedirectionSAP — ModifyInstance

1117 This section details the specific requirements for the ModifyInstance operation applied to an instance of
 1118 CIM_USBRedirectionSAP.

1119

8.19.1.1 CIM_USBRedirectionSAP.ElementName Property

1120 When an instance of CIM_EnabledLogicalElementCapabilities is associated with the
 1121 CIM_USBRedirectionSAP instance and the
 1122 CIM_EnabledLogicalElementCapabilities.ElementNameEditSupported property has a value of TRUE, the
 1123 implementation shall allow the ModifyInstance operation to change the value of the ElementName
 1124 property of the CIM_USBRedirectionSAP instance. The ModifyInstance operation shall enforce the length
 1125 restriction specified in the MaxElementNameLen property of the CIM_EnabledLogicalElementCapabilities
 1126 instance.

1127 When no instance of CIM_EnabledLogicalElementCapabilities is associated with the
 1128 CIM_USBRedirectionSAP instance, or the ElementNameEditSupported property of the
 1129 CIM_EnabledLogicalElementCapabilities instance has a value of FALSE, the implementation shall not
 1130 allow the ModifyInstance operation to change the value of the ElementName property of the
 1131 CIM_USBRedirectionSAP instance.

1132

8.19.1.2 Modifying CIM_USBRedirectionSAP Properties

1133 When an instance of CIM_USBRedirectionCapabilities is associated with the
 1134 CIM_USBRedirectionService instance and the
 1135 CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property has a value of 4 (Modify SAP), the

1136 implementation shall allow the ModifyInstance operation to change the value of the properties of the
 1137 CIM_USBRedirectionSAP instance.

1138 When no instance of CIM_USBRedirectionCapabilities is associated with the
 1139 CIM_USBRedirectionService instance, or the SAPCapabilitiesSupported property of the
 1140 CIM_USBRedirectionCapabilities instance does not have a value of 4 (Modify SAP), the implementation
 1141 shall not allow the ModifyInstance operation to change the value of the properties of the
 1142 CIM_USBRedirectionSAP instance.

1143 **9 Use Cases**

1144 This section contains object diagrams and use cases specific to the *USB Redirection Profile*. The use
 1145 cases are informative and are not intended to define the requirements for conformance.

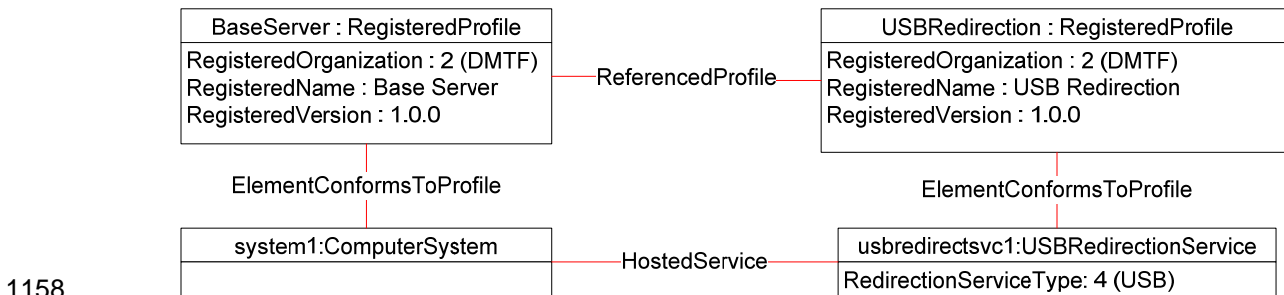
1146 **9.1 Advertising the Profile Conformance**

1147 Figure 2 shows how instances of CIM_RegisteredProfile are used to identify the version of the *USB*
 1148 *Redirection Profile* with which an instance of CIM_USBRedirectionService and its associated instances
 1149 conform.

1150 An instance of CIM_RegisteredProfile exists for each profile that is instrumented in the system. One
 1151 instance of CIM_RegisteredProfile identifies the DMTF [Base Server Profile](#), version 1.0.0. The other
 1152 instance identifies the *USB Redirection Profile*, version 1.0.0. The Central Instance is the
 1153 CIM_USBRedirectionService instance. The Scoping Instance is the CIM_ComputerSystem instance.

1154 This instance of CIM_ComputerSystem conforms to the [Base Server Profile](#) version 1.0.0 as indicated by
 1155 the CIM_ElementConformsToProfile association with the CIM_RegisteredProfile instance.

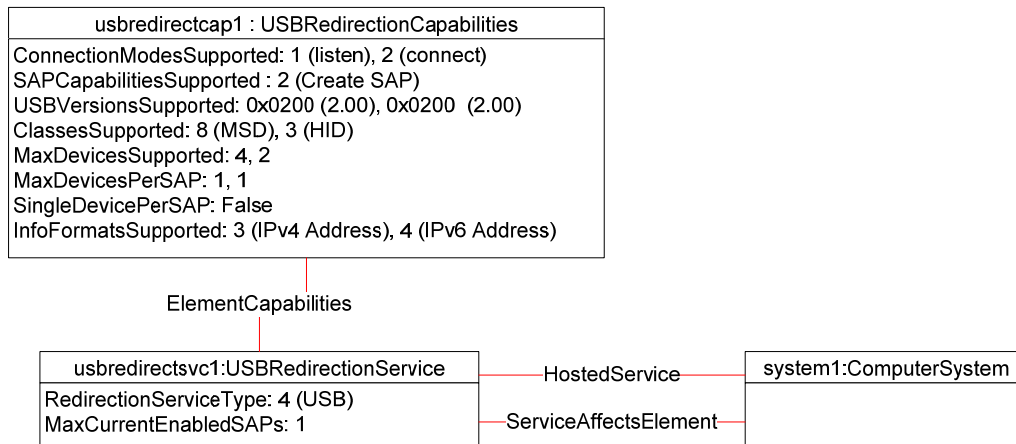
1156 This instance of CIM_USBRedirectionService conforms to the *USB Redirection Profile* version 1.0.0 as
 1157 indicated by the CIM_ElementConformsToProfile association with the CIM_RegisteredProfile instance.



1159 **Figure 2 – Registered Profile**

1160 **9.2 Object Diagram for a Monolithic Server — Create SAPs**

1161 Figure 3 shows a monolithic server, system1, with no pre-configured USB Redirection SAPs. The client is
 1162 expected to create the USB Redirection SAPs.



1163

1164

Figure 3 – Monolithic System — Create SAPs

1165 The USB Redirection Service is represented by usbredirectsvc1. The service (usbredirectsvc1) is hosted
 1166 on system1 as represented by the CIM_HostedService association between system1 and
 1167 usbredirectsvc1.

1168 An instance of CIM_USBRedirectionCapabilities, usbredirectcap1, is associated to usbredirectsvc1
 1169 through an instance of CIM_ElementCapabilities. The
 1170 CIM_USBRedirectionCapabilities.SAPCapabilitiesSupported property has a value of 3 (Create SAPs) that
 1171 specifies that USB Redirection SAPs can be created. The values of the ConnectionModesSupported
 1172 property specify that the created USB Redirection SAPs may be placed in “listen” or “connect” mode.

1173 The values of the USBVersionsSupported property specify that locally emulated USB devices that are
 1174 created must be USB 2.00.

1175 The values of the USBClassesSupported property specify that the locally emulated USB devices that are
 1176 created must be either a Media Storage Device (MSD) or a USB 1.0 or USB 2.0 Human Interface Device
 1177 (HID).

1178 The value of the SingleDevicePerSAP property specifies that MSD and HID devices may be contained in
 1179 the same SAP.

1180 The value of the MaxDevicesSupported property specifies that across all the created USB Redirection
 1181 SAPs, at most four MSDs and two HIDs may be used.

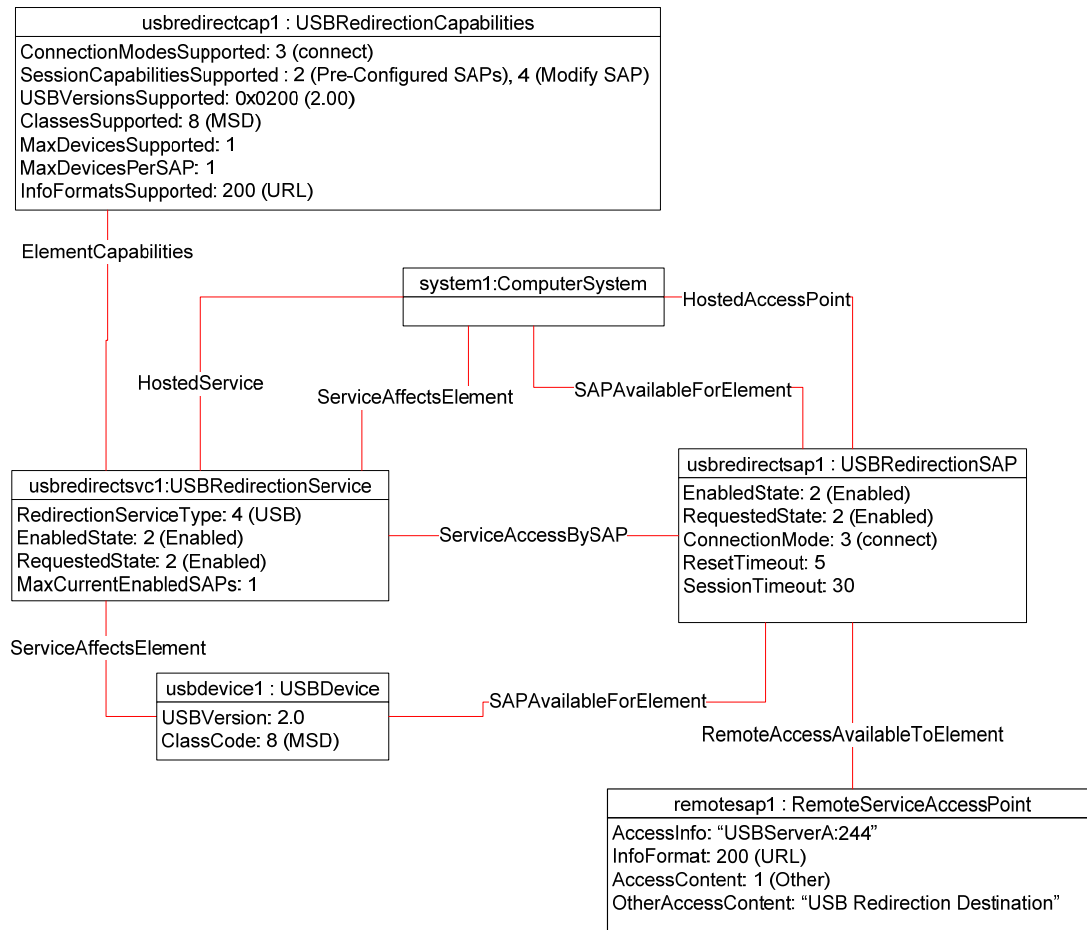
1182 The value of the MaxDevicesPerSAP property specifies that each created USB Redirection SAP can
 1183 contain at most one MSD and one HID.

1184 The value of the InfoFormatsSupported property specifies that when the ConnectionMode is 3 (Connect)
 1185 and a CIM_RemoteServiceAccessPoint is associated with the newly created USB Redirection SAP, the
 1186 Remote Service Access Point AccessInfo property can be set to either 3 (IPv4 Address) or 4 (IPv6
 1187 Address).

1188 The client should conform to these requirements when invoking the CreateRedirectionSAP() method to
 1189 create new SAPs.

1190 **9.3 Object Diagram for a Monolithic Server — Connect Mode for Pre-configured**
 1191 **SAPs**

1192 Figure 4 shows a monolithic server, system1, with a static pre-configured USB Redirection SAP for a USB
 1193 storage device.



1194

1195

Figure 4 – Monolithic System — Connect Mode for Pre-configured SAPs

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The USB Redirection Service is represented by usbredirectsvc1. The USB Redirection SAP is represented by usbredirectsap1.

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The instance of CIM_USBRedirectionCapabilities, usbredirectcap1, describes the capabilities of the USB Redirection Service. The SAPCapabilitiesSupported property value of 2 (Pre-configured SAPs) models that at least one static pre-configured USB RedirectionSAP exists. The absence of the property value 3 (Create SAPs) models that additional SAPs cannot be created. The state of the pre-configured USB Redirection SAPs can be managed, but new USB Redirections cannot be created. The SAPCapabilitiesSupported property value of 4 (Modify SAP) models that the SAP properties can be modified.

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1206
1207

The ConnectionModesSupported property models that the USB Redirection Service supports only the “listen” mode. The USBVersionsSupported and ClassesSupported properties model that the Emulated USB Devices that are being redirected are being emulated as a USB 2.0 MSD (Media Storage Device).

1208
1209

The InfoFormatsSupported property models that the SAP can support URLs to initiate the redirected session connection to the remote SAP.

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1214

The CIM_ServiceAccessBySAP association between usbredirectsvc1 and usbredirectsap1 models that usbredirectsvc1 is available at usbredirectsap1. The USBRedirectionSAP.ConnectionMode property is set to “connect”, which models that the SAP will initiate a session to a remote SAP. The instance of CIM_RemoteServiceAccessPoint, remotesap1, has been configured with the access information needed to initiate a session with the remote SAP.

- 1215 The CIM_HostedService association between system1 and usbredirectsvc1 models that the USB
- 1216 Redirection Service is hosted on system1.
- 1217 The CIM_ServiceAffectsElement association between usbredirectsvc1 and usbdevice1 models that the
- 1218 USB Redirection Service is configured to redirect the session of the locally emulated USB Device. The
- 1219 USBVersion and ClassCode property of usbdevice1 conforms to the constraints of the
- 1220 CIM_USBRedirectionCapabilities.USBVersionsSupported and
- 1221 CIM_USBRedirectionCapabilities.ClassesSupported properties.
- 1222 The CIM_HostedAccessPoint association between usbredirectsap1 and system1 models that
- 1223 usbredirectsap1 is hosted on system1.
- 1224 The CIM_SAPAvailableForElement association between system1 and usbredirectsap1 models that
- 1225 usbredirectsap1 provides a SAP for at least one USB device residing on system1.
- 1226 The USB Redirection is active because the state of the usbredirectsvc1 is 2 (Enabled) and the state of
- 1227 the usbredirectsap1 is 2 (Enabled).

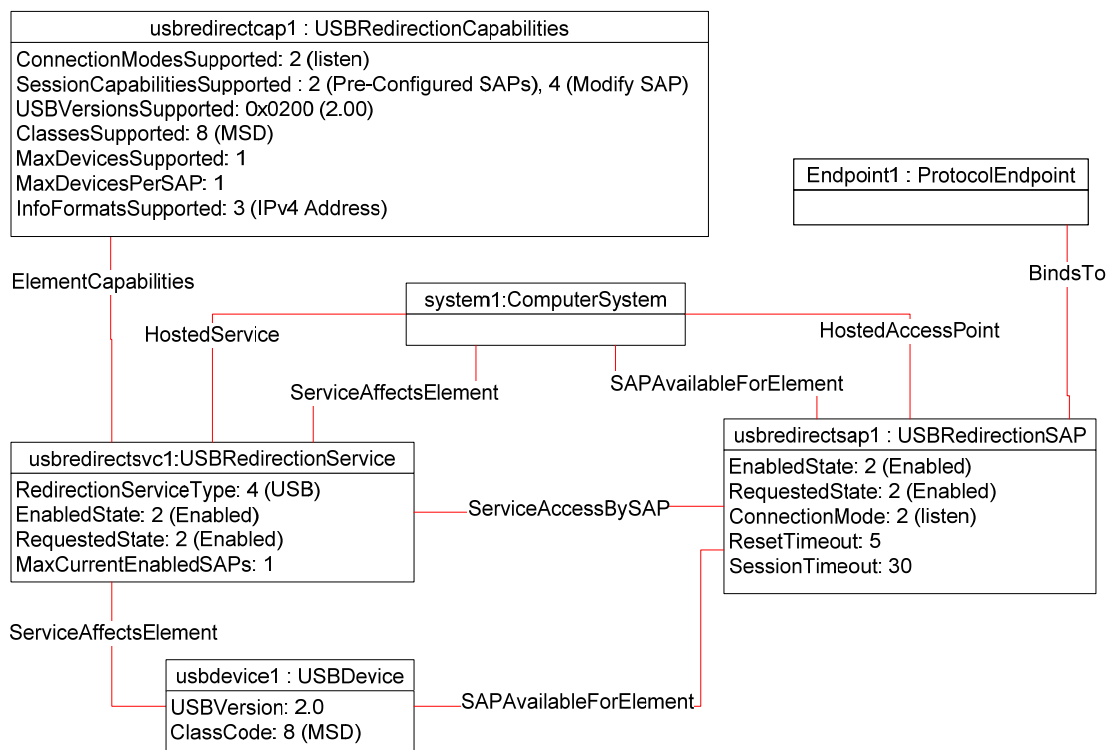
1228 **9.4 Object Diagram for a Monolithic Server — Listen Mode for Pre-configured**

1229 **SAPs**

1230 Figure 5 shows a monolithic server, system1, with a static pre-configured USB Redirection SAP for a USB

1231 storage device, configured for the USB Redirection SAP to listen for a connection request from the

1232 Remote System.



1233

1234 **Figure 5 – Monolithic System — Listen Mode for Pre-configured SAPs**

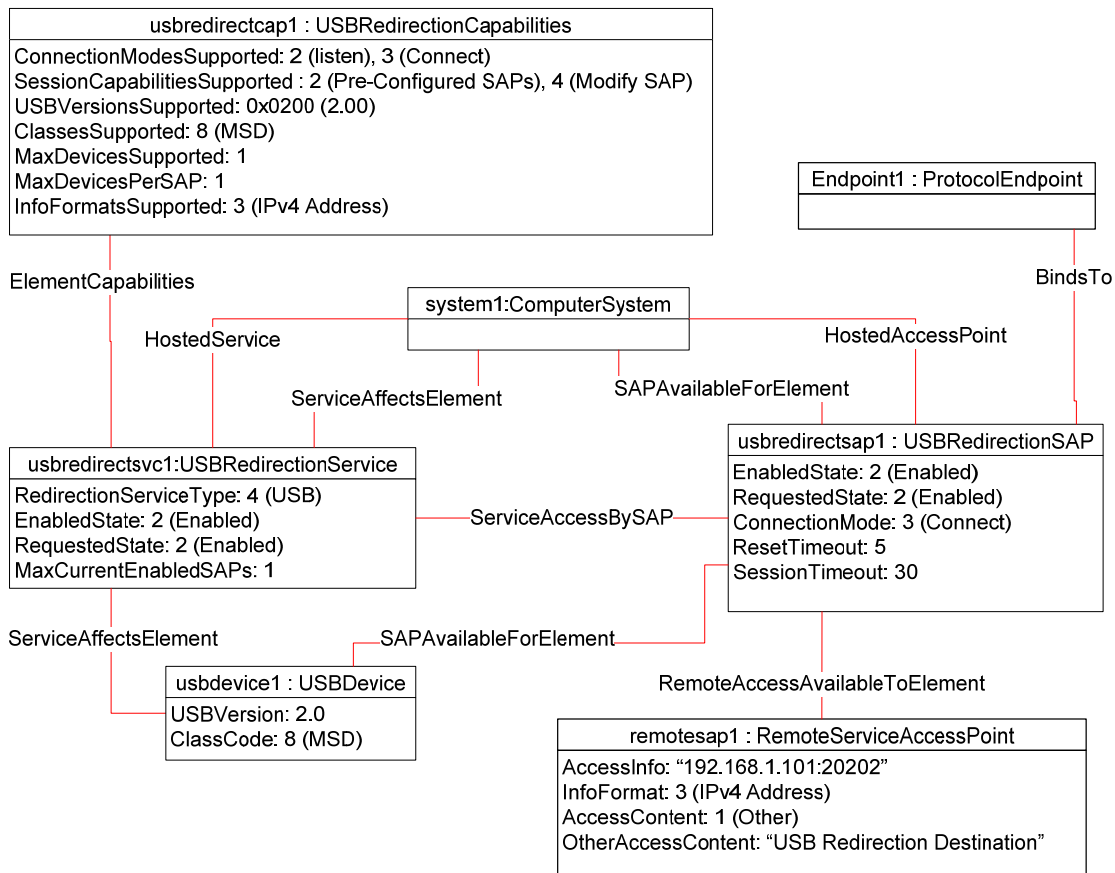
1235 The model shown is similar to the model described in 9.3, with the exceptions noted in the remainder of

1236 this section.

1237 The ConnectionModesSupported property of the instance of CIM_USBRedirectionCapabilities shows that
 1238 the USB Redirection Service only supports the “listen” mode for its SAPs. The CIM_ServiceAccessBySAP
 1239 association between usbredirectsvc1 and usbredirectsap1 models that the usbredirectsvc1 is available at
 1240 usbredirectsap1. The ConnectionMode property of CIM_USBRedirectionSAP is set to “listen”, which
 1241 models that the SAP will wait for the Remote System to initiate a session. The instance of
 1242 CIM_ProtocolEndpoint, Endpoint1, contains the information the Remote System needs to initiate a
 1243 session with the local USB Redirection SAP.

1244 **9.5 Object Diagram for a Monolithic Server — Listen or Connect Mode for Pre-**
 1245 **configured SAPs**

1246 Figure 6 shows a monolithic server, system1, with a static pre-configured USB Redirection SAP for a USB
 1247 storage device.



1248
 1249 **Figure 6 – Monolithic System — Listen or Connect Mode for Pre-configured SAPs**

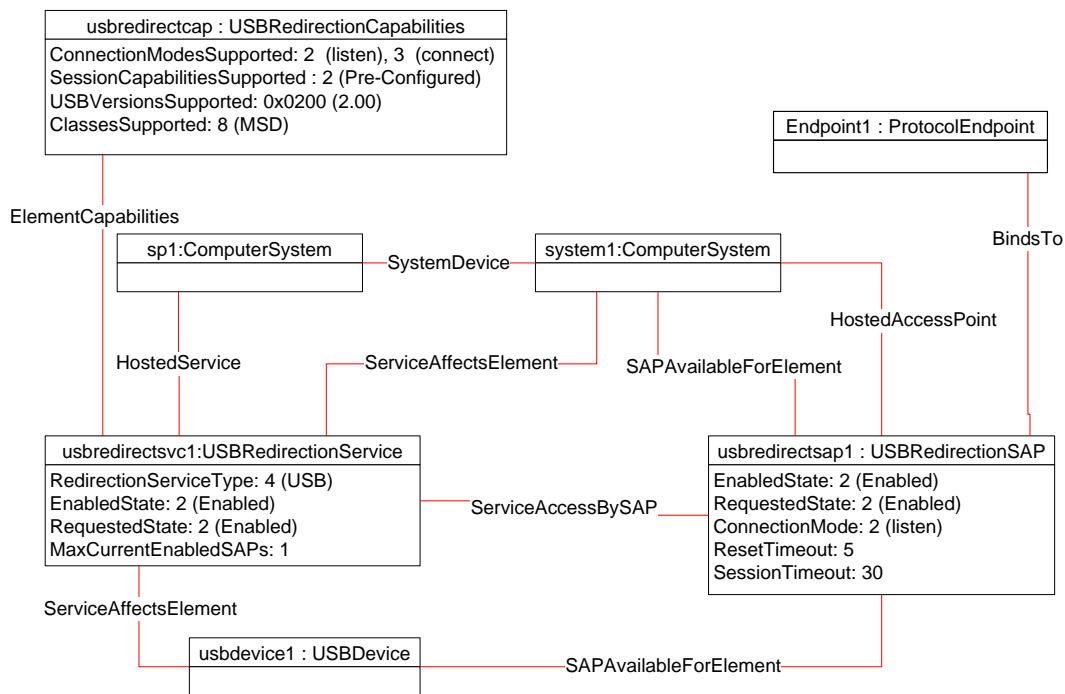
1250 The model shown is similar to the model described in 9.3, with the exceptions noted in the remainder of
 1251 this section.

1252 The ConnectionModesSupported property of the instance of CIM_USBRedirectionCapabilities shows that
 1253 the USB Redirection Service supports both the “listen” and “connect” mode for its SAPs. The
 1254 SAPCapabilitiesSupported property of CIM_USBRedirectionCapabilities shows that the properties of the
 1255 SAP may be modified. Examples of modifications include a change in the timeout properties or a
 1256 reconfiguration of the SAP from “listen” to “connect” mode.

1257 The CIM_ServiceAccessBySAP association between usbredirectsvc1 and usbredirectsap1 models that
 1258 the usbredirectsvc1 is available at usbredirectsap1. Because the SAP may be configured to be in either
 1259 “listen” or “connect” mode, it has both an instance of CIM_ProtocolEndpoint associated to it by
 1260 CIM_BindsTo and an instance of CIM_RemoteServiceAccessPoint associated to it by
 1261 CIM_RemoteAccessAvailableToElement.
 1262 The ConnectionMode property of CIM_USBRedirectionSAP has been set to “connect”, so the instance of
 1263 CIM_RemoteServiceAccessPoint, remotesap1, has been configured with information about how to
 1264 access the remote SAP.

1265 **9.6 Object Diagram for a Monolithic Server with Service Processor**

1266 Figure 7 shows a monolithic server with a service processor. The diagram is similar to Figure 5, but
 1267 Figure 7 contains an instance of CIM_ComputerSystem, sp1, that represents the service processor.



1268

1269

Figure 7 – Monolithic System with Service Processor

1270 **9.7 Determine whether a System Supports USB Redirection**

1271 A client can determine whether a computer system of interest supports USB Redirection as follows:

- 1272 1) Start at the instance of CIM_ComputerSystem that represents the computer system of interest.
- 1273 2) Enumerate the instances of CIM_USBRedirectionService that are associated to the instance of
 1274 CIM_ComputerSystem through an instance of the CIM_ServiceAffectsElement association.
- 1275 3) If such an instance of CIM_USBRedirectionService is not found, the computer system does not
 1276 support USB Redirection. Otherwise, the computer system does support USB Redirection.

1277 **9.8 Determine whether Static Pre-configured USB Redirection SAPs Exist**

1278 A client can determine whether a computer system of interest has static pre-configured USB Redirection
1279 SAPs as follows:

- 1280 1) Start at the instance of CIM_USBRedirectionService that were found using the use case in 9.7.
- 1281 2) Traverse the instance of CIM_ElementCapabilities to find the instance of
1282 CIM_USBRedirectionCapabilities.
- 1283 3) For the instance of CIM_USBRedirectionCapabilities so found, if the SAPCapabilitiesSupported
1284 array contains a value of 1 (Pre-configured SAPs), then at least one pre-configured USB
1285 Redirection SAP exists.

1286 **9.9 Determine whether USB Redirection SAPs Can Be Created**

1287 A client can determine whether USB Redirection SAPs can be created on the computer system of interest
1288 as follows:

- 1289 1) Start at the instances of CIM_USBRedirectionService that were found using the use case in 9.7.
- 1290 2) Traverse the instance of CIM_ElementCapabilities to find the instance of
1291 CIM_USBRedirectionCapabilities.
- 1292 3) For the instance of CIM_USBRedirectionCapabilities so found, if the SAPCapabilitiesSupported
1293 array contains a value of 2 (Create SAPs), then USB Redirection SAPs can be created.

1294 **9.10 Identify Emulated USB Devices that Are Already Available through a USB** 1295 **Redirection SAP**

1296 A client can determine the USB Redirection SAP Destinations managed by a Service as follows:

- 1297 1) Start at the instance of CIM_USBRedirectionService of interest. (The instance can be found
1298 using the use case in 9.7.)
- 1299 2) Enumerate the instances of CIM_USBRedirectionSAP that are associated through an instance
1300 of CIM_ServiceAccessBySAP.
- 1301 3) For each instance of CIM_USBRedirectionSAP, enumerate the instances CIM_USBDevice that
1302 are associated to the CIM_USBRedirectionSAP through an instance of
1303 CIM_SAPAvailableForElement.
- 1304 4) Each instance of CIM_USBDevice represents a locally emulated USB device that is available
1305 through a SAP.

1306 **9.11 Determine If a USB Device Is Redirected**

1307 A client can determine whether an Emulated USB Device of interest is configured to be redirected to a
1308 USB Redirection SAP as follows:

- 1309 1) Start at the instance of CIM_USBDevice that represents the device of interest.
- 1310 2) Find the instance of CIM_USBRedirectionSAP that is associated through an instance of
1311 CIM_SAPAvailableForElement.
- 1312 3) If an instance of CIM_USBRedirectionSAP is not found, the instance of CIM_USBDevice is not
1313 redirected.
- 1314 4) Otherwise, the USB device is redirected and the instance of CIM_USBRedirectionSAP, so
1315 found, represents the SAP.

1316 9.12 Determine How the USB Redirection State Is Managed

1317 A client can determine whether a USB Redirection is managed through the state of the SAP only or
1318 through the states of both the Service and SAP, as follows:

- 1319 1) Start at the instance of CIM_USBRedirectionService of interest using the use case described in
1320 9.7.
- 1321 2) Select the CIM_USBRedirectionSAP that represents the USB Redirection SAP of interest using
1322 the use case described in 9.10.
- 1323 3) From the instance of CIM_USBRedirectionService, find the instance of
1324 CIM_USBRedirectionCapabilities that is associated through an instance of
1325 CIM_ElementCapabilities.

1326 If an instance of CIM_USBRedirectionCapabilities is not found, the USB Redirection cannot be
1327 managed through the state of the USB Redirection Service.

- 1328 4) For the CIM_USBRedirectionCapabilities instance so found, obtain the values of the
1329 RequestedStatesSupported property.

- 1330 5) From the instance of CIM_USBRedirectionSAP, find the
1331 CIM_EnabledLogicalElementCapabilities that is associated through an instance of
1332 CIM_ElementCapabilities.

1333 If an instance of CIM_EnabledLogicalElementCapabilities is not found, the USB Redirection
1334 cannot be managed through the state of the USB Redirection SAP.

- 1335 6) For the CIM_EnabledLogicalElementCapabilities so found, obtain the values of the
1336 RequestedStatesSupported property.

- 1337 7) If the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains no values
1338 and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported contains no
1339 values, then no state management of the USB Redirection is possible.

1340 If the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains no values
1341 and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported contains values,
1342 then state management of the USB Redirection is performed through state management of the
1343 SAP only.

1344 If the CIM_USBRedirectionCapabilities.RequestedStatesSupported property contains values
1345 and the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported contains values,
1346 then state management of the USB Redirection is possible through state management of both
1347 the Service and the SAP.

1348 9.13 Activate a USB Redirection — SAP State Management

1349 When the USB Redirection is managed through the state of the USB Redirection SAP only, a client can
1350 start a USB Redirection as follows:

- 1351 1) Start at the instance of the CIM_USBRedirectionSAP that is a component of the USB
1352 Redirection SAP of interest.
- 1353 2) Invoke the RequestStateChange() method with the RequestedState parameter set to
1354 2 (Enabled).
- 1355 3) Verify that the CIM_USBRedirectionSAP.EnabledState property has a value of 2 (Enabled).

1356 The USB Redirection is now active.

1357 **9.14 Activate a USB Redirection — Service and SAP State Management**

1358 When the USB Redirection is managed through the states of both the USB Redirection Service and USB
1359 Redirection SAP, a client can start a USB Redirection as follows:

- 1360 1) Start at the CIM_USBRedirectionService instance of interest.
- 1361 2) Invoke the RequestStateChange() method with the RequestedState parameter set to
1362 2 (Enabled).
- 1363 3) Verify that the CIM_USBRedirectionService.EnabledState property has a value of 2 (Enabled).
- 1364 4) Invoke the CIM_USBRedirectionSAP.RequestStateChange() method with the RequestedState
1365 parameter set to 2 (Enabled).
- 1366 5) Verify that the CIM_USBRedirectionSAP.EnabledState property has a value of 2 (Enabled).

1367 The USB Redirection is now active.

1368 **9.15 Stop All USB Redirections Associated with the Service — SAP State** 1369 **Management**

1370 In the following use case, it is assumed that the client knows the instance of CIM_USBRedirectionService
1371 of interest.

1372 When the USB Redirection is managed through the state of the USB Redirection SAP only, a client can
1373 stop all USB Redirections as follows:

- 1374 1) Start at the instance of the CIM_USBRedirectionService that represents the USB Redirection
1375 Service of interest.
- 1376 2) Enumerate the instances of CIM_USBRedirectionSAP that are associated with the instance of
1377 CIM_USBRedirectionService through an instance of CIM_ServiceAccessBySAP.
- 1378 3) For each instance of CIM_USBRedirectionSAP found, query the value of the EnabledState
1379 property.
- 1380 4) If the state of each CIM_USBRedirectionSAP is 2 (Enabled), invoke the RequestStateChange()
1381 method with each RequestedState parameter set to 6 (Offline).
- 1382 5) Verify that each CIM_USBRedirectionSAP.EnabledState property has a value of 6 (Enabled but
1383 Offline).

1384 All USB Redirections associated with the CIM_USBRedirectionService instance are now
1385 inactive.

1386 **9.16 Stop All USB Redirections Associated with a Service — Service and SAP** 1387 **State Management**

1388 When the USB Redirection is managed through the states of both the USB Redirection Service and USB
1389 Redirection SAP, a client can stop all USB Redirections associated with the USB Redirection Service as
1390 follows:

- 1391 1) Start at the instance of the CIM_USBRedirectionService that represents the USB Redirection
1392 Service of interest.
- 1393 2) Change the state of the CIM_USBRedirectionService instance by invoking the
1394 RequestStateChange() method with the RequestedState parameter set to 3 (Disabled).

1395 All USB Redirections associated with the CIM_USBRedirectionService instance are now
1396 inactive.

1397 9.17 Find the Number of Active USB Redirection SAPs for a Service

1398 A client can find the number of active USB Redirection SAPs for a USB Redirection Service of interest as
1399 follows:

- 1400 1) Start at the CIM_USBRedirectionService instance of interest.
- 1401 2) Query the value of the EnabledState property.
- 1402 If the EnabledState property is 3 (Disabled), the number of active Redirection SAPs is zero.
- 1403 3) If the EnabledState property is 2 (Enabled), find all instances of CIM_USBRedirectionSAP that
1404 are associated with the CIM_USBRedirectionService through an instance of
1405 CIM_ServiceAccessBySAP.
- 1406 4) For each found CIM_USBRedirectionSAP instance, query the value of the EnabledState
1407 property.
- 1408 5) Count all the CIM_USBRedirectionSAP.EnabledState properties whose value is 2 (Enabled).

1409 9.18 Create a USB Redirection SAP in Connect Mode

1410 A client can create a USB Redirection SAP as follows:

- 1411 1) Start at the CIM_USBRedirectionService instance of interest.
- 1412 2) Inspect the SAPCapabilitiesSupported property for the value 2 (Create SAPs) to confirm that
1413 creating a new SAP is supported.
- 1414 3) Invoke the CreateUSBDevice() method with the USB Class and Device Type to create an
1415 instance of a redirected USB device on the system. This invocation returns a reference to an
1416 instance of CIM_USBDevice (usbdevice1). Multiple invocations of CreateUSBDevice() can be
1417 made.
- 1418 4) Invoke the CreateRedirectionSAP() method with an array of references to the CIM_USBDevice
1419 instances from the USBDevices parameter, along with information to create the SAP. The
1420 NewRemoteServiceAccessPoint parameter must have the access information needed to
1421 determine the remote service access point. The NewSAPRequestedStatesSupported parameter
1422 must have the enumeration of the Requested States that are supported for the SAP, which will
1423 be used to initialize the RequestedStatesSupported property of a new instance of
1424 CIM_EnabledLogicalElementCapabilities that will be associated with the new USB Redirection
1425 SAP by an instance of CIM_ElementCapabilities.
- 1426 5) When the CreateDevices Boolean parameter is TRUE, in addition to the USB device references
1427 in the USBDevices parameter, the CreateRedirectionSAP() method will create new instances of
1428 CIM_USBDevices as specified in the NewUSBDevices parameter and associate them with the
1429 new SAP. Each instance of the concrete subclass of CIM_LogicalDevice that is specified in the
1430 RedirectedLogicalDevices[] parameter that is not NULL will be associated with the new
1431 instance of CIM_USBDevices that was specified in the same entry in the NewUSBDevices
1432 parameter by a CIM_LogicalIdentity association.

1433 The client starts USB Redirection on the managed node by performing state management of the
1434 USB Redirection. When enabled, the managed node will attempt to establish a session with the
1435 remote service access point.

1436 9.19 Create a USB Redirection SAP in Listen Mode

1437 A client can create a USB Redirection SAP as follows:

- 1438 1) Start at the CIM_USBRedirectionService instance of interest.
- 1439 2) Inspect the SAPCapabilitiesSupported property for the value 2 (Create SAPs) to confirm that
1440 creating a new SAP is supported.

- 1441 3) Invoke the CreateUSBDevice() method with the USB Class and Device Type to create an
 1442 instance of a redirected USB device on the system. This invocation returns a reference to an
 1443 instance of CIM_USBDevice (for example, usbdevice1). Multiple invocations of
 1444 CreateUSBDevice() can be made.
- 1445 4) Invoke the CreateRedirectionSAP() method with an array of references to the CIM_USBDevice
 1446 instances, along with information to create the SAP. The NewSAPRequestedStatesSupported
 1447 parameter must have the enumeration of the Requested States that are supported for the SAP,
 1448 which will be used to initialize the RequestedStatesSupported property of a new instance of
 1449 CIM_EnabledLogicalElementCapabilities that will be associated with the new USB Redirection
 1450 SAP by an instance of CIM_ElementCapabilities.
- 1451 5) When the CreateDevices Boolean parameter is TRUE, in addition to the USB device references
 1452 in the USBDevices parameter, the CreateRedirectionSAP() method will create new instances of
 1453 CIM_USBDevices as specified in the NewUSBDevices parameter and associate them with the
 1454 new SAP. Each instance of the concrete subclass of CIM_LogicalDevice that is specified in the
 1455 RedirectedLogicalDevices[] parameter that is not NULL will be associated with the new instance
 1456 of CIM_USBDevices that was specified in the same entry in the NewUSBDevices parameter by
 1457 a CIM_LogicalIdentity association.
- 1458 The client starts USB Redirection on the remote node; the remote node will attempt to establish
 1459 a session with the protocol endpoint of the managed node.

1460 9.20 Delete a USB Redirection SAP and Associated USB Devices

1461 A client can delete a USB Redirection SAP and the instances of CIM_USBDevice that have been created
 1462 as follows:

- 1463 1) Start at the CIM_USBRedirectionService instance of interest.
- 1464 2) Inspect the SAPCapabilitiesSupported property for the value 2 (Create SAPs) to confirm that
 1465 creating a new SAP is supported.
- 1466 3) Invoke the DeleteRedirectionSAP() method, specifying the SAP to be deleted in the SAP
 1467 parameter and specifying TRUE for the DeleteUSBDevices parameter. If the SAP was not pre-
 1468 configured, it will be deleted. The instances of CIM_USBDevice that are associated with the
 1469 SAP that were not pre-configured will be deleted. The associations referencing the deleted SAP
 1470 and deleted USB devices will also be deleted. Pre-configured SAPs and USB devices will not
 1471 be deleted.

1472 9.21 Delete a USB Redirection SAP and Associated USB Devices

1473 A client can delete a USB Redirection SAP that has been created without deleting created instances of
 1474 CIM_USBDevice as follows:

- 1475 1) Start at the CIM_USBRedirectionService instance of interest.
- 1476 2) Inspect the SAPCapabilitiesSupported property for the value 2 (Create SAPs) to confirm that
 1477 creating a new SAP is supported.
- 1478 3) Invoke the DeleteRedirectionSAP() method specifying the SAP to be deleted in the SAP
 1479 parameter. If the SAP was not pre-configured, it will be deleted. The associations that reference
 1480 the deleted SAP will also be deleted. Pre-configured SAPs will not be deleted. Instances of
 1481 CIM_USBDevice that have been created by CreateUSBDevice or CreateRedirectionSAP may
 1482 be deleted later using the CIM_USBDevice Delete intrinsic operation, which deletes the
 1483 previously created instances of CIM_USBDevice and all the associated instances that reference
 1484 the instance being deleted. Pre-configured instances of CIM_USBDevice may not be deleted by
 1485 the Delete intrinsic operation.

1486 **9.22 Determine whether CIM_USBRedirectionService.ElementName Can Be**
 1487 **Modified**

1488 A client can determine whether the ElementName property can be modified as follows:

- 1489 1) Start at the instance of CIM_USBRedirectionService.
- 1490 2) Find the CIM_USBRedirectionCapabilities instance with which it is associated by traversing the
1491 CIM_ElementCapabilities association.
- 1492 3) Query the value of the ElementNameEditSupported property of the
1493 CIM_USBRedirectionCapabilities instance.

1494 If the value is TRUE, the CIM_USBRedirectionService.ElementName property can be modified
 1495 by a client. If no instance of CIM_USBRedirectionCapabilities is associated with the
 1496 CIM_USBRedirectionService instance, modifying the
 1497 CIM_USBRedirectionService.ElementName property is not supported.

1498 **10 CIM Elements**

1499 Table 25 shows the instances of CIM elements for this profile. Instances of the CIM elements shall be
 1500 implemented as described in Table 25. Sections 7 (“Implementation”) and 8 (“Methods”) may impose
 1501 additional requirements on these elements.

1502 **Table 25 – CIM Elements: USB Redirection Profile**

Element Name	Requirement	Description
CIM_RegisteredProfile	Mandatory	See 10.1.
CIM_BindsTo	Conditional	See 10.2.
CIM_ElementCapabilities	Conditional	Referencing CIM_USBRedirectionService. See 10.3.
CIM_ElementCapabilities	Conditional	Referencing CIM_USBRedirectionSAP. See 10.4.
CIM_EnabledLogicalElementCapabilities	Optional	See 10.5.
CIM_HostedAccessPoint	Mandatory	See 10.6.
CIM_HostedService	Mandatory	See 10.7.
CIM_LogicalIdentity	Conditional	See 10.8.
CIM_RemoteAccessAvailableToElement	Conditional	See 10.9.
CIM_RemoteServiceAccessPoint	Conditional	Conditional on the session ConnectionMode. See 7.7.1 and 10.10.
CIM_SAPAvailableForElement	Mandatory	Referencing CIM_ComputerSystem. See 10.11.
CIM_SAPAvailableForElement	Optional	Referencing CIM_USBDevice. See 10.12.
CIM_ServiceAccessBySAP	Mandatory	See 10.13.
CIM_ServiceAffectsElement	Mandatory	Referencing CIM_ComputerSystem. See 10.14.
CIM_ServiceAffectsElement	Optional	Referencing CIM_USBDevice. See 10.15.
CIM_USBDevice	Mandatory	See 10.16.
CIM_USBRedirectionCapabilities	Optional	See 10.17.
CIM_USBRedirectionSAP	Mandatory	See 10.18.
CIM_USBRedirectionService	Mandatory	See 10.19.

1503 10.1 CIM_RegisteredProfile

1504 CIM_RegisteredProfile identifies the *USB Redirection Profile* in order for a client to determine whether an
 1505 instance of CIM_ComputerSystem conforms to this profile. The CIM_RegisteredProfile class is defined by
 1506 the [Profile Registration Profile](#). With the exception of the mandatory values specified for the properties in
 1507 Table 26, the behavior of the CIM_RegisteredProfile instance is in accordance with the [Profile](#)
 1508 [Registration Profile](#).

1509 **Table 26 – Class: CIM_RegisteredProfile**

Elements	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "USB Redirection".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of 2 (DMTF).

1510 10.2 CIM_BindsTo

1511 The CIM_BindsTo association is used to relate the CIM_USBRedirectionSAP instance to the
 1512 CIM_ProtocolEndpoint instance that represents the endpoint where the USB Redirection SAP is
 1513 available. Table 27 contains the requirements for elements of this class.

1514 **Table 27 – Class: CIM_BindsTo**

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_ProtocolEndpoint class. See 7.5. Cardinality is "0..1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.5. Cardinality is "1..*".

1515 10.3 CIM_ElementCapabilities Relating CIM_USBRedirectionService to 1516 CIM_USBRedirectionCapabilities

1517 The CIM_ElementCapabilities association is used to relate an instance of
 1518 CIM_USBRedirectionCapabilities to an instance of CIM_USBRedirectionService. Table 28 contains the
 1519 requirements for elements of this class.

1520 **Table 28 – Class: CIM_ElementCapabilities Referencing CIM_USBRedirectionService**

Elements	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionService class. See 7.2.3. Cardinality is "1..*".
Capabilities	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionCapabilities class. See 7.2.3. Cardinality is "0..1".

1521 **10.4 CIM_ElementCapabilities Relating CIM_USBRedirectionSAP to**
 1522 **CIM_EnabledLogicalElementCapabilities**

1523 The CIM_ElementCapabilities association is used to relate an instance of
 1524 CIM_EnabledLogicalElementCapabilities to an instance of CIM_USBRedirectionSAP. Table 29 contains
 1525 the requirements for elements of this class.

1526 **Table 29 – Class: CIM_ElementCapabilities Referencing CIM_USBRedirectionSAP**

Elements	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.4.4. Cardinality is "1..*".
Capabilities	Mandatory	This property shall be a reference to an instance of the CIM_EnabledLogicalElementCapabilities class. See 7.4.4. Cardinality is "0..1".

1527 **10.5 CIM_EnabledLogicalElementCapabilities**

1528 CIM_EnabledLogicalElementCapabilities represents the capabilities of the USB Redirection SAP.
 1529 Table 30 contains the requirements for elements of this class.

1530 **Table 30 – Class: CIM_EnabledLogicalElementCapabilities**

Elements	Requirement	Notes
InstanceID	Mandatory	Key
RequestedStatesSupported	Mandatory	See 7.10.1.
ElementNameEditSupported	Mandatory	See 7.4.5.
MaxElementNameLen	Conditional	See 7.4.5. Conditional on ElementNameEditSupported

1531 **10.6 CIM_HostedAccessPoint**

1532 The CIM_HostedAccessPoint association is used to relate the CIM_USBRedirectionSAP instance to the
 1533 CIM_ComputerSystem instance to which the USB is redirected. Table 31 contains the requirements for
 1534 elements of this class.

1535 **Table 31 – Class: CIM_HostedAccessPoint**

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem class. See 7.4.3. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.4.3. Cardinality is "**".

1536 **10.7 CIM_HostedService**

1537 The CIM_HostedService association is used to relate the CIM_USBRedirectionService instance to the
 1538 CIM_ComputerSystem instance on which it is hosted. Table 32 contains the requirements for elements of
 1539 this class.

1540 **Table 32 – Class: CIM_HostedService**

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem class. See 7.2.1. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionService class. See 7.2.1. Cardinality is "**".

1541 **10.8 CIM_LogicalIdentity**

1542 The CIM_LogicalIdentity association is used to relate the CIM_USBDevice instance to the instance of a
 1543 concrete subclass of CIM_LogicalDevice which provides another representation. Table 33 contains the
 1544 requirements for elements of this class.

1545 **Table 33 – Class: CIM_LogicalIdentity**

Elements	Requirement	Notes
SystemElement	Mandatory	This property shall be a reference to an instance of the CIM_USBDevice class. See 7.6.3. Cardinality is "1".
SameElement	Mandatory	This property shall be a reference to an instance of a concrete subclass of the CIM_LogicalDevice class. See 7.6.3. Cardinality is "1".

1546 **10.9 CIM_RemoteAccessAvailableToElement**

1547 The CIM_RemoteAccessAvailableToElement association is used to relate the instance of
 1548 CIM_USBRedirectionSAP to the instance of CIM_RemoteServiceAccessPoint. Table 34 contains the
 1549 requirements for elements of this class.

1550 **Table 34 – Class: CIM_RemoteAccessAvailableToElement**

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_RemoteServiceAccessPoint class. See 7.7.1. Cardinality is "**".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.7.1. Cardinality is "1".

1551 **10.10 CIM_RemoteServiceAccessPoint**

1552 The CIM_RemoteServiceAccessPoint class represents the SAP on the remote system. Table 35 contains
 1553 the requirements for elements of this class.

1554 **Table 35 – Class: CIM_RemoteServiceAccessPoint**

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	Key
SystemName	Mandatory	Key
Name	Mandatory	Key
CreationClassName	Mandatory	Key
AccessContext	Mandatory	The property shall match the value 1 (Other).
AccessInfo	Mandatory	See 7.7.1.1.
InfoFormat	Mandatory	See 7.7.1.2.
OtherAccessContext	Mandatory	The property shall match the value "USB Redirection Destination".
OtherInfoFormatDescription	Conditional	Conditional on InfoFormat value. See 7.7.1.3.

1555 **10.11 CIM_SAPAvailableForElement Relating CIM_USBRedirectionSAP to**
 1556 **CIM_ComputerSystem**

1557 The CIM_SAPAvailableForElement association is used to relate the instance of CIM_ComputerSystem on
 1558 which the Emulated USB Devices reside to the instances of CIM_USBRedirectionSAP that are available
 1559 as access points for the redirected USB Devices. Table 36 contains the requirements for elements of this
 1560 class.

1561 **Table 36 – Class: CIM_SAPAvailableForElement Referencing CIM_ComputerSystem**

Elements	Requirement	Notes
AvailableSAP	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.4.2. Cardinality is "*" .
ManagedElement	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem class. See 7.4.2. Cardinality is "1".

1562 **10.12 CIM_SAPAvailableForElement Relating CIM_USBRedirectionSAP to**
 1563 **CIM_USBDevice**

1564 The CIM_SAPAvailableForElement association is used to relate the instance of
 1565 CIM_USBRedirectionSAP to the instance of CIM_USBDevice that represents the Emulated USB Device
 1566 that is accessible through the USB Redirection SAP. Table 37 contains the requirements for elements of
 1567 this class.

1568 **Table 37 – Class: CIM_SAPAvailableForElement Referencing CIM_USBDevice**

Elements	Requirement	Notes
AvailableSAP	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.6.2. Cardinality is "1".
ManagedElement	Mandatory	This property shall be a reference to an instance of the CIM_USBDevice class. See 7.6.2. Cardinality is "0..*".

1569 **10.13 CIM_ServiceAccessBySAP**

1570 The CIM_ServiceAccessBySAP association is used to relate the instance of CIM_USBRedirectionService
 1571 to the instances of CIM_USBRedirectionSAP that are enabled by the service. Table 38 contains the
 1572 requirements for elements of this class.

1573 **Table 38 – Class: CIM_ServiceAccessBySAP**

Elements	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionService class. See 7.4.1. Cardinality is "1".
Dependent	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionSAP class. See 7.4.1. Cardinality is "1..*".

1574 **10.14 CIM_ServiceAffectsElement Relating CIM_USBRedirectionService to**
 1575 **CIM_ComputerSystem**

1576 The CIM_ServiceAffectsElement association is used to relate the instance of
 1577 CIM_USBRedirectionService to the instance of CIM_ComputerSystem that represents the source of the
 1578 USB Redirection Flow. Table 39 contains the requirements for elements of this class.

1579 **Table 39 – Class: CIM_ServiceAffectsElement Referencing CIM_ComputerSystem**

Elements	Requirement	Notes
AffectingElement	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionService class. See 7.2.2. Cardinality is "*" .
AffectedElement	Mandatory	This property shall be a reference to an instance of the CIM_ComputerSystem class. See 7.2.2. Cardinality is "1".

1580 **10.15 CIM_ServiceAffectsElement Relating CIM_USBRedirectionService to**
 1581 **CIM_USBDevice**

1582 The CIM_ServiceAffectsElement association is used to relate the instance of
 1583 CIM_USBRedirectionService to the local emulated USB Device that can be redirected. Table 40 contains
 1584 the requirements for elements of this class.

1585 **Table 40 – Class: CIM_ServiceAffectsElement Referencing CIM_USBDevice**

Elements	Requirement	Notes
AffectingElement	Mandatory	This property shall be a reference to an instance of the CIM_USBRedirectionService class. See 7.6.1. Cardinality is "1".
AffectedElement	Mandatory	This property shall be a reference to an instance of the CIM_USBDevice class. See 7.6.1. Cardinality is "0..1".

1586 **10.16 CIM_USBDevice**

1587 CIM_USBDevice represents the locally emulated USB device that can be redirected to a remote system.
 1588 Table 41 contains the requirements for elements of this class.

1589 **Table 41 – Class: CIM_USBDevice**

Elements	Requirement	Notes
CreationClassName	Mandatory	Key
SystemCreationClassName	Mandatory	Key
SystemName	Mandatory	Key
DeviceID	Mandatory	Key
USBVersion	Optional	See 7.6.4.
ClassCode	Mandatory	See 7.6.4.
SubclassCode	Optional	See 7.6.4.
CommandTimeout	Mandatory	If the command times out, the USB Device emulates a media eject and tries to "Reset" the connection.

1590 **10.17 CIM_USBRedirectionCapabilities**

1591 CIM_USBRedirectionCapabilities represents the capabilities of USB Redirection Service. Table 42
 1592 contains the requirements for elements of this class.

1593 **Table 42 – Class: CIM_USBRedirectionCapabilities**

Elements	Requirement	Notes
InstanceID	Mandatory	Key
RequestedStatesSupported	Mandatory	See 7.3.8, 7.9.1.1, and 7.9.2.1.
ElementNameEditSupported	Mandatory	See 7.2.6.
MaxElementNameLen	Conditional	See 7.2.6. This property is Conditional on ElementNameEditSupported.
USBVersionsSupported[]	Mandatory	See 7.3.1.

Elements	Requirement	Notes
ClassesSupported[]	Mandatory	See 7.3.1.
SubClassesSupported[]	Optional	See 7.3.1.
MaxDevicesSupported[]	Mandatory	See 7.3.2.
SAPCapabilitiesSupported[]	Mandatory	See 7.3.3.
RequestedStatesSupportedForCreatedSAP	Conditional	See 7.3.4. This property is Conditional on the SAPCapabilitiesSupported array property including the value 3 (CreateSAPs).
InfoFormatsSupported	Conditional	See 8.14.1.1. This property is Conditional on the ConnectionModesSupported array property including the value 3 (Connect).
SingleClassPerSAP	Mandatory	See 7.3.5.
MaxDevicesPerSAP	Mandatory	See 7.3.6.
ConnectionModesSupported[]	Mandatory	See 7.3.7.

1594 **10.18 CIM_USBRedirectionSAP**

1595 The CIM_USBRedirectionSAP class represents a USB Redirection SAP. Table 43 contains the
 1596 requirements for elements of this class.

1597 **Table 43 – Class: CIM_USBRedirectionSAP**

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	Key
SystemName	Mandatory	Key
Name	Mandatory	Key
CreationClassName	Mandatory	Key
ElementName	Mandatory	See 7.4.5.
EnabledState	Mandatory	See 7.10.1.3.
RequestedState	Mandatory	See 7.10.1.2.
ConnectionMode	Mandatory	See 7.4.6.
ResetTimeout	Mandatory	See 7.4.7.
SessionTimeout	Mandatory	See 7.4.8.
RequestStateChange()	Mandatory	See 8.5.

1598 **10.19 CIM_USBRedirectionService**

1599 The CIM_USBRedirectionService class represents the ability to manage the USB redirection capabilities
 1600 of a computer system. Table 44 contains the requirements for elements of this class.

1601 **Table 44 – Class: CIM_USBRedirectionService**

Elements	Requirement	Notes
SystemCreationClassName	Mandatory	Key
SystemName	Mandatory	Key
CreationClassName	Mandatory	Key
Name	Mandatory	Key
ElementName	Mandatory	See 7.2.6.
MaxCurrentEnabledSAPs	Mandatory	See 7.2.5.
EnabledState	Mandatory	See 7.9.1.3.
RedirectionServiceType	Mandatory	The property shall match 4 (USB).
RequestedState	Mandatory	See 7.9.1.2.
RequestStateChange()	Mandatory	Conditional on RequestedStatesSupported. See 8.1.
CreateUSBDevice()	Conditional	Conditional on SAPCapabilitiesSupported. See 8.2.
CreateRedirectionSAP()	Conditional	Conditional on SAPCapabilitiesSupported. See 8.3.
DeleteRedirectionSAP()	Conditional	Conditional on SAPCapabilitiesSupported. See 8.4.

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ANNEX A (informative)

Change Log

Version	Date	Description
1.0.0	07-14-2009	DMTF Standard Release

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