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SSH Service Profile

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Foreword

The *SSH Service Profile* (DSP1017) was prepared by the Physical Platform Profiles Working Group and the Server Management Working Group of the DMTF.

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Introduction

The information in this specification should be sufficient for a provider or consumer of this data to identify unambiguously the classes, properties, methods, and values that shall be instantiated and manipulated to represent and manage an SSH service, its associated configuration information, and any active connections.

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

SSH Service Profile

1 Scope

The *SSH Service Profile* extends the management capability of referencing profiles by adding the capability to represent an SSH service and its associated sessions.

2 Normative References

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

2.1 Approved References

DMTF DSP0004, *CIM Infrastructure Specification 2.3*,
http://www.dmtf.org/standards/published_documents/DSP0004V2.3_final.pdf

DMTF DSP0200, *CIM Operations over HTTP 1.2*,
http://www.dmtf.org/standards/published_documents/DSP200.pdf

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

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

DMTF DSP1036, *IP Interface Profile 1.0,*
http://www.dmtf.org/standards/published_documents/DSP1036_1.0.pdf

2.2 Other References

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

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1
can
used for statements of possibility and capability, whether material, physical, or causal

3.2
cannot
used for statements of possibility and capability, whether material, physical, or causal

3.3
conditional
indicates requirements to be followed strictly in order to conform to the document when the specified conditions are met

3.4
mandatory
indicates requirements to be followed strictly in order to conform to the document and from which no deviation is permitted

3.5
may
indicates a course of action permissible within the limits of the document

3.6
need not
indicates a course of action permissible within the limits of the document

3.7
optional
indicates a course of action permissible within the limits of the document

3.8
referencing profile
indicates a profile that owns the definition of this class and can include a reference to this profile in its "Referenced Profiles" table

3.9
shall
indicates requirements to be followed strictly in order to conform to the document and from which no deviation is permitted

3.10
shall not
indicates requirements to be followed strictly in order to conform to the document and from which no deviation is permitted

3.11
should
indicates that among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.12
should not
indicates that a certain possibility or course of action is deprecated but not prohibited

4 Symbols and Abbreviated Terms

The following symbols and abbreviations are used in this document.

4.1
CIM
Common Information Model

4.2
IP
Internet Protocol

4.3
SSH
Secure Shell

4.4
TCP
Transmission Control Protocol

5 Synopsis

Profile Name: SSH Service

Version: 1.0.0

Organization: DMTF

CIM Schema Version: 2.22

Central Class: CIM_ProtocolService

Scoping Class: CIM_ComputerSystem

The *SSH Service Profile* extends the management capability of referencing profiles by adding the capability to represent an SSH service in a managed system. This profile includes a specification of the SSH service, its associated configuration, and any active sessions.

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

Table 1 – Referenced Profiles

Profile Name	Organization	Version	Relationship	Behavior
Profile Registration	DMTF	1.0	Mandatory	
IP Interface	DMTF	1.0	Optional	See section 7.3.

The central class for the *SSH Service Profile* shall be the CIM_ProtocolService class. The central instance of the *SSH Service Profile* shall be an instance of CIM_ProtocolService. The scoping class for the *SSH Service Profile* shall be CIM_ComputerSystem. The scoping instance of the *SSH Service Profile* shall be the instance of CIM_ComputerSystem to which the central instance is associated through an instance of the CIM_HostedService association.

6 Description

The *SSH Service Profile* describes an SSH service, its associated configuration, and active sessions.

Figure 1 represents the class schema for the *SSH Service Profile*.

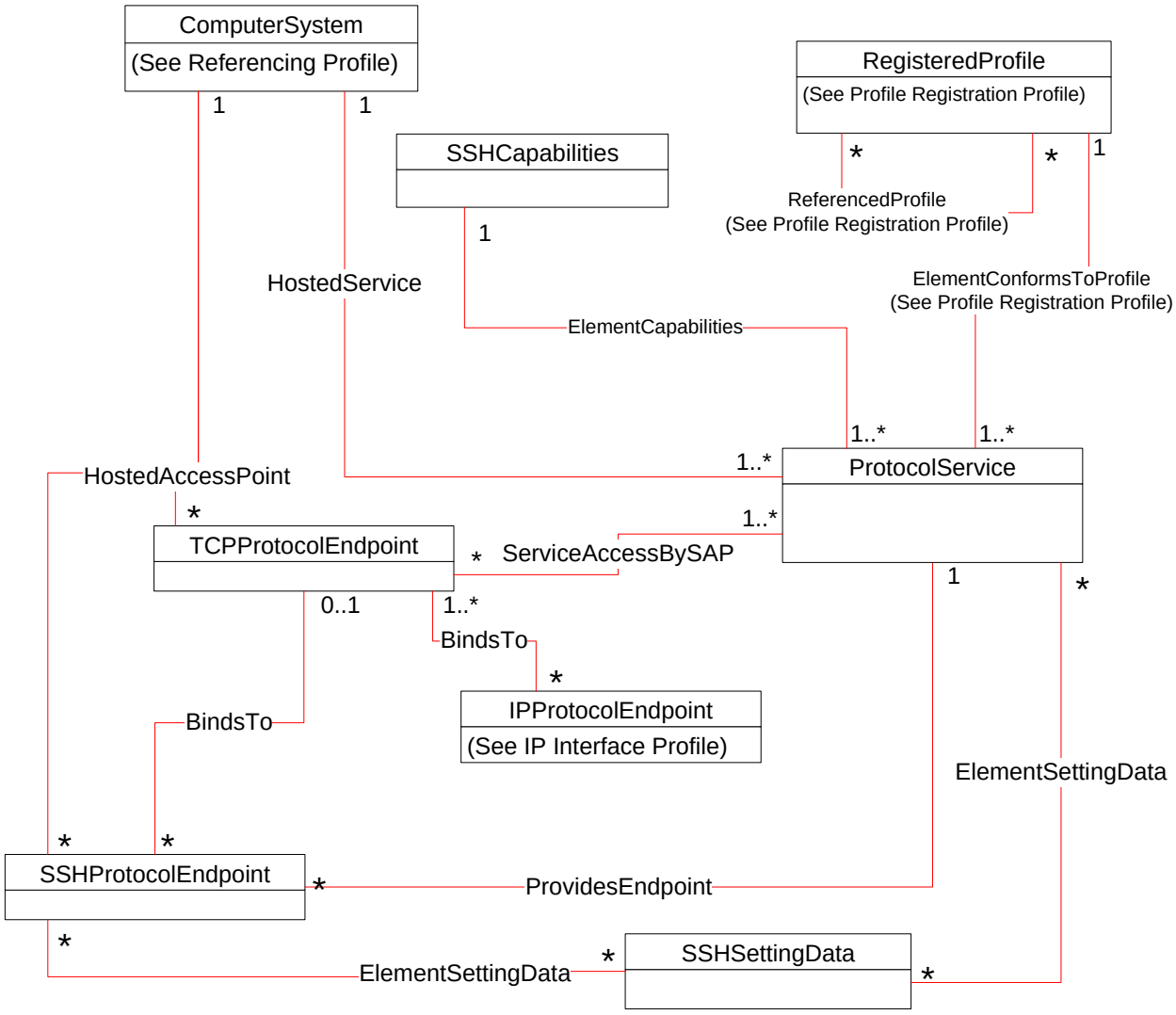


Figure 1 – SSH Service Profile: Class Diagram

The *SSH Service Profile* extends the management capability of referencing profiles by adding the capability to represent an SSH service hosted on a managed system. Functionality within the scope of this profile includes:

- representation of the SSH service
- representation of active SSH sessions at the SSH server
- configuration of the SSH service
- configuration of the SSH sessions from the SSH server

Functionality explicitly excluded from the scope of this profile includes modeling of the SSH session at the SSH client.

This profile represents the capabilities of the SSH service, the current configuration of the SSH service, active sessions, and the default settings when new sessions are activated. The SSH service is represented by an instance of CIM_ProtocolService. The capabilities of the SSH service are represented by an instance of CIM_SSHCapabilities. The current configuration of the SSH service is modeled with the properties from the instance of CIM_ProtocolService. Each active session with the SSH service is represented by an instance of CIM_SSHProtocolEndpoint. The current configuration of an active session is reflected in the values of the properties from the CIM_SSHProtocolEndpoint. CIM_SSHSettingData represents a complete configuration that an SSH session could have. For example, an instance of CIM_SSHSettingData contains the configuration that will be in effect for an SSH session when it is first established. CIM_TCPProtocolEndpoint is an optional endpoint used to model the TCP port(s) over which an SSH service listens or an SSH session is active.

6.1 SSH Session Lifecycle

When an SSH session is established with the SSH service, an instance of CIM_SSHProtocolEndpoint is created. The CIM_SSHProtocolEndpoint instance exists for the duration of the SSH session that it represents. When the SSH session is ended, the CIM_SSHProtocolEndpoint will be removed. When the CIM_SSHProtocolEndpoint is explicitly deleted through an intrinsic DeleteInstance operation, the SSH session is ended.

7 Implementation Requirements

This section details the requirements related to the arrangement of instances and properties of instances for implementations of this profile.

7.1 Representing an SSH Service

An instance of CIM_ProtocolService shall represent the SSH service being modeled.

7.1.1 CIM_ProtocolService.Protocol

The Protocol property of the CIM_ProtocolService instance shall have a value of 2 (SSH).

7.1.2 SSH Service Capabilities

An instance of CIM_SSHCapabilities shall be associated with the CIM_ProtocolService instance through an instance of CIM_ElementCapabilities. This instance of CIM_SSHCapabilities shall represent the capabilities of the SSH service.

7.1.3 Managing the SSH Service's State

This section describes the usage of the RequestedState and EnabledState properties to represent the state of an instance of CIM_ProtocolService.

7.1.3.1 State Management Supported

Exactly one instance of CIM_SSHCapabilities shall be associated with an instance of CIM_ProtocolService, which indicates support for managing the state of the SSH service.

Support for managing the state of the SSH service is conditional behavior. This section describes the CIM elements and behaviors that shall be implemented when this behavior is supported.

7.1.3.2 CIM_ProtocolService.RequestStateChange( ) Supported

When the CIM_SSHCapabilities.RequestedStatesSupported property contains at least one value, the CIM_ProtocolService.RequestStateChange( ) method shall be implemented and supported. The CIM_ProtocolService.RequestStateChange( ) method shall not return a value of 1 (Unspecified).

7.1.3.3 CIM_ProtocolService.RequestedState

When state management is supported, the RequestedState property shall be supported. When state management is Unspecified, the RequestedState property may be supported.

Upon successful invocation of the CIM_ProtocolService.RequestStateChange( ) method, the value of the RequestedState property shall be the value of the RequestedState parameter. If the method is not successfully invoked, the value of the RequestedState property is indeterminate. When the RequestedStatesSupported property of the associated instance of CIM_SSHCapabilities contains one or more values, the RequestedState property shall have one of the values specified or 5 (No Change). When the RequestedStatesProperty of the associated instance of CIM_EnabledLogicalElementCapabilities does not contain any values, the RequestedState property shall have the value of 12 (Not Applicable).

7.1.3.4 EnabledState

When the RequestedState parameter has a value of 2 (Enabled) or 3 (Disabled), upon successful completion of the CIM_ProtocolService.RequestStateChange( ) method, the value of the EnabledState property shall equal the value of the RequestedState property. If the method does not complete successfully, the value of the EnabledState property is indeterminate. The EnabledState property shall have the value 2 (Enabled), 3 (Disabled), or 5 (Not Applicable).

7.1.3.5 Indicating State Management Support with CIM_SSHCapabilities

When state management is supported, the RequestedStatesSupported property of the CIM_SSHCapabilities instance associated with the CIM_ProtocolService instance via an instance of CIM_ElementCapabilities shall contain at least one value. The RequestedStatesSupported property may have zero or more of the following values: 2 (Enabled), 3 (Disabled), or 11 (Reset).

7.1.4 CIM_ProtocolService ElementName Constraints

The ElementName property of CIM_ProtocolService may be modifiable by a client or it may have a fixed value.

7.1.4.1 ElementName Is Not Modifiable

When an implementation does not support modification of the ElementName property by a client, the ElementName property shall be formatted as a free-form string of variable length (pattern ".*").

7.1.4.2 ElementName Is Modifiable

The CIM_ProtocolService.ElementName property may be modified by a client. This is conditional behavior. This section describes the CIM elements and behavioral requirements when an implementation supports client modification of the CIM_ProtocolService.ElementName property.

7.1.4.2.1 CIM_SSHCapabilities.ElementNameEditSupported

This property shall have a value of TRUE when the implementation supports client modification of the CIM_ProtocolService.ElementName property.

7.1.4.2.2 CIM_EnabledLogicalElementCapabilities.MaxElementNameLen

The MaxElementNameLen property shall be implemented when the ElementNameEditSupported property has a value of TRUE. The MaxElementNameLen property shall indicate the maximum length of a string that the implementation will accept as a value for the ElementName property of the associated CIM_ProtocolService instance.

7.1.5 Default Configuration of the Service

The default configuration is the configuration of the service when it was first installed on the managed system. When an implementation exposes the default configuration, the default configuration shall be represented by an instance of CIM_SSHSettingData associated with the CIM_ProtocolService through an instance of CIM_ElementSettingData where the IsDefault property of the CIM_ElementSettingData instance has a value of 1 (Is Default).

7.1.5.1 Listening Port

An SSH service can listen on one or more TCP ports for incoming connection requests. An implementation may model the TCP port(s) to which the SSH service is bound. When the implementation models the TCP ports, the following requirements apply.

7.1.5.1.1 CIM_TCPProtocolEndpoint

For each IP port to which the SSH service is bound there shall be modeled an instance of CIM_TCPProtocolEndpoint in which the PortNumber property of the instance indicates the port number to which the SSH service is listening.

7.1.5.1.2 Relationship to SSH Service

For each CIM_TCPProtocolEndpoint instance, there shall be an instance of CIM_ServiceAccessBySAP that associates the CIM_ProtocolService instance with the CIM_TCPProtocolEndpoint.

7.1.5.2 Managing Listening Ports

The implementation may support managing the ports on which the SSH Service listens. This is an optional behavior. The ListenOnPort( ) method (see section 8.1) of the CIM_ProtocolService can be used to add ports on which the SSH service will listen. Using the DeleteInstance intrinsic operation to delete an instance of CIM_TCPProtocolEndpoint will stop the SSH service from listening on the represented port (see section 8.15.2).

7.2 Representing an SSH Session

Each active session with the SSH service shall be represented with an instance of CIM_SSHProtocolEndpoint.

7.2.1 Relationship with Service

An instance of CIM_ProvidesEndpoint shall associate the CIM_ProtocolService with the CIM_SSHProtocolEndpoint.

7.2.2 Port for Session

An implementation may model the TCP port to which the SSH session is bound. This is optional behavior. When the implementation models the TCP port the following requirements apply.

7.2.2.1 CIM_TCPProtocolEndpoint

When the TCP port to which the SSH session is bound is modeled, the TCP port shall be modeled using an instance of CIM_TCPProtocolEndpoint.

7.2.2.2 Relationship to Session

An instance of CIM_BindsTo shall associate the CIM_SSHProtocolEndpoint instance with the CIM_TCPProtocolEndpoint.

7.2.3 Session Default Configuration

When an SSH session is created, it will have an initial configuration. Implementations can indicate to clients the configuration that will be assigned to a session. An implementation can also indicate to clients the configuration that an active session had when the session was first established.

7.2.3.1 Configuration that Will Be Assigned

An implementation may assign the same initial configuration for all SSH sessions spawned. When the implementation assigns the same initial configuration for all SSH sessions, the configuration that a session will have when it is established shall be represented by an instance of CIM_SSHSettingData associated with the CIM_ProtocolService through an instance of CIM_ElementSettingData where the IsNext property of the CIM_ElementSettingData instance has a value of 1 (Is Next).

7.2.3.2 Initial Configuration of a Session

The initial configuration of a session may be modeled. This is optional behavior. When the configuration that a session had when it was established is modeled, it shall be represented by an instance of CIM_SSHSettingData associated with the CIM_SSHProtocolEndpoint through an instance of CIM_ElementSettingData where the IsCurrent property of the CIM_ElementSettingData instance has a value of 1 (Is Current).

It is not necessary that there be a discrete copy of CIM_SSHSettingData for each active session. It is only necessary that the CIM_SSHSettingData associated with the CIM_SSHProtocolEndpoint accurately reflect the initial configuration of the session.

7.3 Relationship with IP Interfaces (Optional)

When the specific port for an SSH session or service is modeled, the specific IP interface over which the session is active may be modeled. This is optional behavior. When the implementation models the specific interface over which an SSH session is active, there shall be an instance of the CIM_BindsTo association where the value of the Antecedent property shall be a reference to the CIM_IPProtocolEndpoint and the value of the Dependent property shall be a reference to the CIM_TCPProtocolEndpoint.

8 Methods

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

8.1 CIM_ProtocolService.ListenOnPort( ) (Optional)

The CIM_ProtocolService.ListenOnPort() method shall be supported when the ListeningPortManagementProperty of the associated instance of CIM_SSHCapabilities has a value of TRUE. When the value of ListeningPortManagementProperty of the associated instance of CIM_SSHCapabilities has a value of FALSE, the CIM_ProtocolService.ListenOnPort() method shall not be supported.

425 The CIM_ProtocolService.ListenOnPort( ) method is used to configure additional ports on which the
426 ProtocolService will listen. ListenOnPort( ) method's detailed requirements are specified in Table 2 and
427 Table 3.

428 No standard messages are defined.

429 **Table 2 – CIM_ProtocolService.ListenOnPort( ) Method: Return Code Values**

Value	Description
0	Request was successfully executed.
2	Error occurred
0x1000	Job started: REF returned to started CIM_ConcreteJob

430 **Table 3 – CIM_ProtocolService.ListenOnPort( ) Method: Parameters**

Qualifiers	Name	Type	Description/Values
IN	IPEndpoint	CIM_IPProtocolEndpoint REF	Optional reference to specific IPProtocolEndpoint to which the created TCPProtocolEndpoint will be bound
OUT	Job	CIM_TCPProtocolEndpoint REF	TCPProtocolEndpoint created if method is successful
IN, REQ	PortNumber	uint16	Desired port number for the service to listen on

431 When the method completes successfully, the implementation shall create an instance of
432 CIM_TCPProtocoEndpoint. The value of the PortNumber property of the instance of
433 CIM_TCPProtocolEndpoint shall be the value of the PortNumber parameter of the method invocation.
434 The implementation shall create an instance of CIM_ServiceAccessBySAP that references the instance
435 of CIM_TCPProtocolEndpoint and references the instance of CIM_ProtocolService on which the method
436 was invoked.

437 The IPEndpoint parameter for the method is optional. The implementation shall perform the following
438 actions when the IPEndpoint parameter is not specified:

439 • The implementation shall create an instance of CIM_HostedAccessPoint that references the
440 newly created CIM_TCPProtocolEndpoint instance and the instance of CIM_ComputerSystem
441 with which the CIM_ProtocolService instance is associated through an instance of
442 CIM_HostedService (the scoping system).

443 • For each instance of CIM_IPProtocolEndpoint that is associated through the
444 CIM_HostedAccessPoint association with the CIM_ComputerSystem instance with which the
445 instance of CIM_ProtocolService on which this method was invoked is associated through an
446 instance of CIM_HostedService, the implementation shall create an instance of the
447 CIM_BindsTo association where the value of the Antecedent property shall be a reference to
448 the CIM_IPProtocolEndpoint and the value of the Dependent property shall be a reference to
449 the CIM_TCPProtocolEndpoint.

450 The implementation shall perform the following actions when the IPEndpoint parameter is specified:

451 • The implementation shall create an instance of CIM_HostedAccessPoint that references the
452 newly created CIM_TCPProtocolEndpoint instance and the instance of CIM_ComputerSystem
453 with which the CIM_IPProtocolEndpoint instance is associated through an instance of
454 CIM_HostedAccessPoint.

455 • The implementation shall create an instance of the CIM_BindsTo association where the value of
456 the Antecedent property shall be a reference to the CIM_IPProtocolEndpoint and the value of
457 the Dependent property shall be a reference to the CIM_TCPProtocolEndpoint.

8.2 CIM_ProtocolService.RequestStateChange( )

CIM_ProtocolService.RequestStateChange( ) method invocation will change the element's state to the value specified in the RequestedState parameter. The Enabled and Disabled values of the RequestedState parameter correspond to enabling or disabling the functionality represented by the instance of CIM_ProtocolService. A value of 2 (Enabled) shall correspond to a request to enable the functionality. A value of 3 (Disabled) shall correspond to a request to disable the functionality. A value of 11 (Reset) shall initiate a reset of the SSH service.

See section 7.1.3 for information about the effect of this method on the RequestedState property.

The method shall be considered successful if the availability of the functionality upon completion of the method corresponds to the desired availability indicated by the RequestedState parameter. It is not necessary that an actual change in state occur for the method to be considered successful. It is sufficient that the resultant state be equal to the requested state. Upon successful completion of the method, the Return Value shall be zero.

See section 7.1.3.4 for information about the effect of this method on the EnabledState property.

Detailed requirements of the RequestStateChange( ) method are specified in Table 4 and Table 5.

No standard messages are defined.

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

Table 4 – CIM_ProtocolService.RequestStateChange( ) Method: Return Code Values

Value	Description
0	Request was successfully executed.
1	Method is unsupported in the implementation.
2	Error occurred
0x1000	Job started: REF returned to started CIM_ConcreteJob

Table 5 – CIM_ProtocolService.RequestStateChange( ) Method: Parameters

Qualifiers	Name	Type	Description/Values
IN, REQ	RequestedState	uint16	Valid state values : 2 (Enabled) 3 (Disabled) 11 (Reset)
OUT	Job	CIM_ConcreteJob REF	Returned if job started
IN, REQ	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

8.2.1 CIM_ProtocolService.RequestStateChange( ) ConditionalSupport

When the CIM_EnabledLogicalElementCapabilities.RequestedStatesSupported property contains at least one value, the CIM_ProtocolService.RequestStateChange( ) method shall be implemented and supported. The CIM_ProtocolService.RequestStateChange( ) method shall not return a value of 1 (Unspecified).

8.3 Profile Conventions for Operations

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

The default list of operations is as follows:

- GetInstance
- Associators
- AssociatorNames
- References
- ReferenceNames
- EnumerateInstances
- EnumerateInstanceNames

8.4 CIM_BindsTo

Table 6 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 6, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 6 – Operations: CIM_BindsTo

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

8.5 CIM_ElementCapabilities

Table 7 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 7, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 7 – Operations: CIM_ElementCapabilities

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

8.6 CIM_ElementSettingData

Table 8 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 8, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 8 – Operations: CIM_ElementSettingData

Operation	Requirement	Messages
ModifyInstance	Optional	See 8.6.1.
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

8.6.1 CIM_ElementSettingData — ModifyInstance

When an instance of CIM_ElementSettingData associates an instance of CIM_SSHSettingData with an instance of CIM_SSHProtocolEndpoint, the following rules shall govern the behavior of the ModifyInstance operation:

- The ModifyInstance operation shall not allow the IsDefault property to be modified.
- The ModifyInstance operation shall not allow the IsCurrent property to be modified.
- When the ModifyInstance operation is used to modify the IsNext property to have a value of 1 (Is Next), the ModifyInstance operation shall implement the following behavior:
  - The ModifyInstance operation shall find all other instances of CIM_ElementSettingData that associate an CIM_SSHSettingData instance with the CIM_SSHProtocolEndpoint instance referenced by the target instance of CIM_ElementSettingData.
  - For each instance of CIM_ElementSettingData found, the ModifyInstance operation shall modify the value of its IsNext property to have a value of 2 (Is Not Next).

8.7 CIM_HostedAccessPoint

Table 9 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 9, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 9 – Operations: CIM_HostedAccessPoint

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

8.8 CIM_HostedService

Table 10 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 10, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 10 – Operations: CIM_HostedService

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

8.9 CIM_ProtocolService

Table 11 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 11, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 11 – Operations: CIM_ProtocolService

Operation	Requirement	Messages
ModifyInstance	Optional. See 8.9.1.	None

8.9.1 CIM_ProtocolService — ModifyInstance

When the ElementNameEditSupported property of the CIM_SSHCapabilities has a value of TRUE, the ModifyInstance operation shall allow the value of the ElementName property of the CIM_ProtocolService instance to be modified. The ModifyInstance operation shall enforce the length restriction specified in the MaxElementNameLen property of the CIM_SSHCapabilities.

When the ElementNameEditSupported property of the CIM_SSHCapabilities has a value of FALSE, the ModifyInstance operation shall not change the value of the ElementName property of the CIM_ProtocolService instance.

8.10 CIM_ProvidesEndpoint

Table 12 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 12, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

556 **Table 12 – Operations: CIM_ProvidesEndpoint**

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

557 ## 8.11 CIM_ServiceAccessBySAP

558 Table 13 lists implementation requirements for operations. If implemented, these operations shall be
559 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 13, all operations
560 in the default list in 8.3 shall be implemented as defined in DSP0200.

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

562 **Table 13 – Operations: CIM_ServiceAccessBySAP**

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

563 ## 8.12 CIM_SSHCapabilities

564 All operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

566 ## 8.13 CIM_SSHSettingData

567 Table 14 lists implementation requirements for operations. If implemented, these operations shall be
568 implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 14, all operations
569 in the default list in 8.3 shall be implemented as defined in DSP0200.

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

571 **Table 14 – Operations: CIM_SSHSettingData**

Operation	Requirement	Messages
ModifyInstance	Optional. See section 8.13.1.	None

572 ### 8.13.1 CIM_SSHSettingData — ModifyInstance

573 When the CIM_SSHSettingData instance is associated with the CIM_ProtocolService instance through an
574 instance of CIM_ElementSettingData and the value of the IsDefault property of the
575 CIM_ElementSettingData instance that associates the CIM_SSHSettingData with the
576 CIM_ProtocolService has a value of 1 (Is Default), the ModifyInstance operation shall not be supported.

577 When the CIM_SSHSettingData instance is not associated with an instance of CIM_ProtocolService
578 through an instance of CIM_ElementSettingData where the IsDefault property has a value of 1 (Is
579 Default), the ModifyInstance operation may be supported for the CIM_SSHSettingData instance.

8.14 CIM_SSHProtocolEndpoint

Table 15 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 15, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 15 – Operations: CIM_SSHProtocolEndpoint

Operation	Requirement	Messages
ModifyInstance	Optional. See 8.14.1.	None
DeleteInstance	Optional. See 8.14.2.	None

8.14.1 ModifyInstance

The ModifyInstance operation may be supported for an instance of CIM_SSHProtocolEndpoint. When the ModifyInstance operation is supported for a CIM_SSHProtocolEndpoint instance, the ModifyInstance operation shall not modify the following properties:

- NameFormat
- ProtocolIFType
- OtherTypeDescription

8.14.2 DeleteInstance

The DeleteInstance operation may be supported for instances of CIM_SSHProtocolEndpoint. When the DeleteInstance operation is invoked against an instance, the corresponding SSH session shall be terminated prior to deleting the CIM_SSHProtocolEndpoint instance. The implementation shall also remove any association instances that reference the CIM_SSHProtocolEndpoint.

8.15 CIM_TCPProtocolEndpoint

Table 16 lists implementation requirements for operations. If implemented, these operations shall be implemented as defined in DSP0200. In addition, and unless otherwise stated in Table 16, all operations in the default list in 8.3 shall be implemented as defined in DSP0200.

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

Table 16 – Operations: CIM_TCPProtocolEndpoint

Operation	Requirement	Messages
ModifyInstance	Optional	None
DeleteInstance	Optional	See 8.15.1.

8.15.1 ModifyInstance

The ModifyInstance operation may be supported for an instance of CIM_TCPProtocolEndpoint. When the ModifyInstance operation is supported for an CIM_TCPProtocolEndpoint instance, the ModifyInstance operation shall not modify the following properties:

- NameFormat
- ProtocolIFType
- PortNumber

8.15.2 DeleteInstance

When the CIM_ProtocolService.ListenOnPort( ) method is supported for the instance of CIM_ProtocolService with which the CIM_TCPProtocolEndpoint is associated through an instance of CIM_ServiceAccessBySAP, the DeleteInstance operation shall be supported for the instance of CIM_TCPProtocolEndpoint. When the CIM_ProtocolService.ListenOnPort( ) method is not supported, the DeleteInstance operation shall not be supported.

When the DeleteInstance operation is successful for an instance of CIM_TCPProtocolEndpoint, the SSH service shall stop listening on the TCP port indicated by the PortNumber property of the CIM_TCPProtocolEndpoint. The implementation shall also remove any association instances that reference the CIM_TCPProtocolEndpoint.

9 Use Cases

The following sections outline common use cases for client interaction with the *SSH Service Profile*.

9.1 Object Diagrams

The object diagram in Figure 2 shows how instances of CIM_RegisteredProfile are used to identify the version of the *SSH Service Profile* with which an instance of CIM_ProtocolService and its associated instances are conformant. An instance of CIM_RegisteredProfile exists for each profile that is instrumented in the system. One instance of CIM_RegisteredProfile identifies the “DMTF *Base Server Profile* version 1.0.0”. The other instance identifies the “DMTF *SSH Service Profile* version 1.0.0”. The CIM_ProtocolService instance is scoped to an instance of CIM_ComputerSystem. This instance of CIM_ComputerSystem is conformant with the DMTF *Base Server Profile* version 1.0.0, as indicated by the CIM_ElementConformsToProfile association to the CIM_RegisteredProfile instance. The CIM_ProtocolService instance is conformant with this profile as indicated by the CIM_ElementConformsToProfile association between the instance and the instance of CIM_RegisteredProfile that identifies this profile.

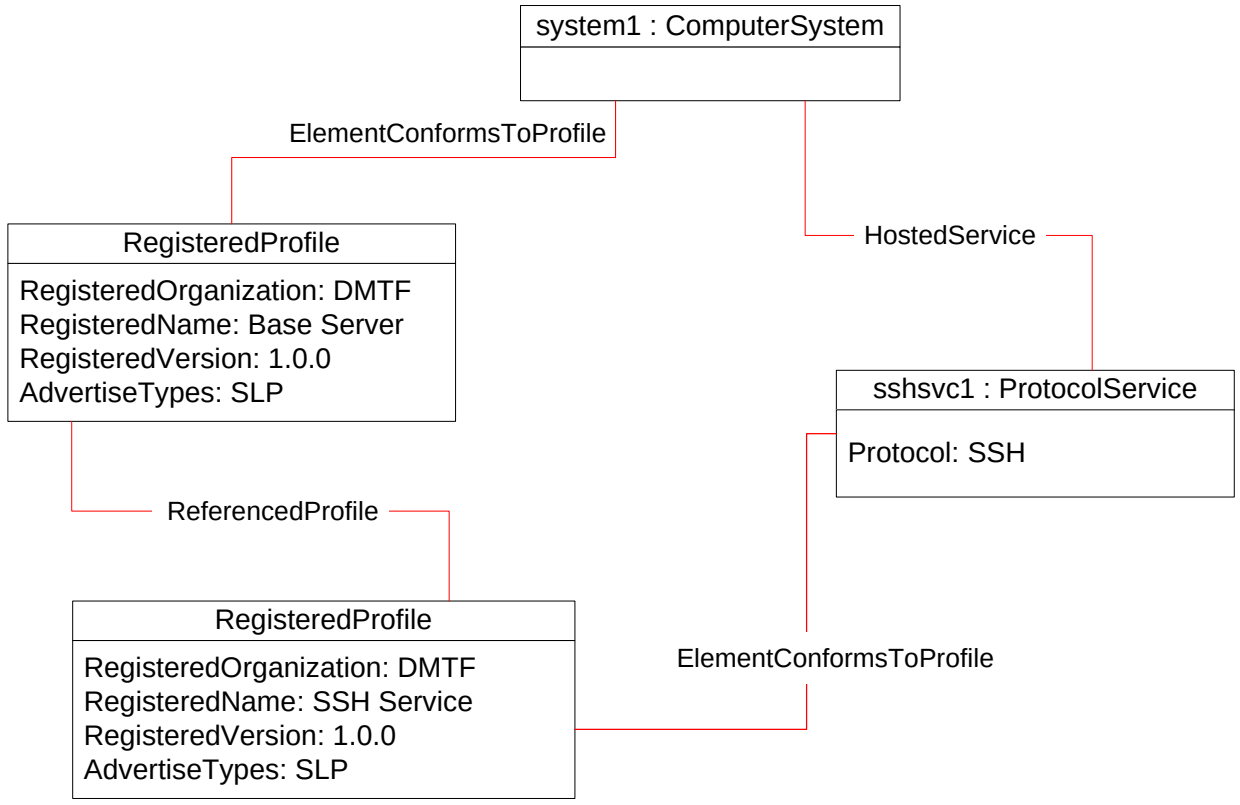
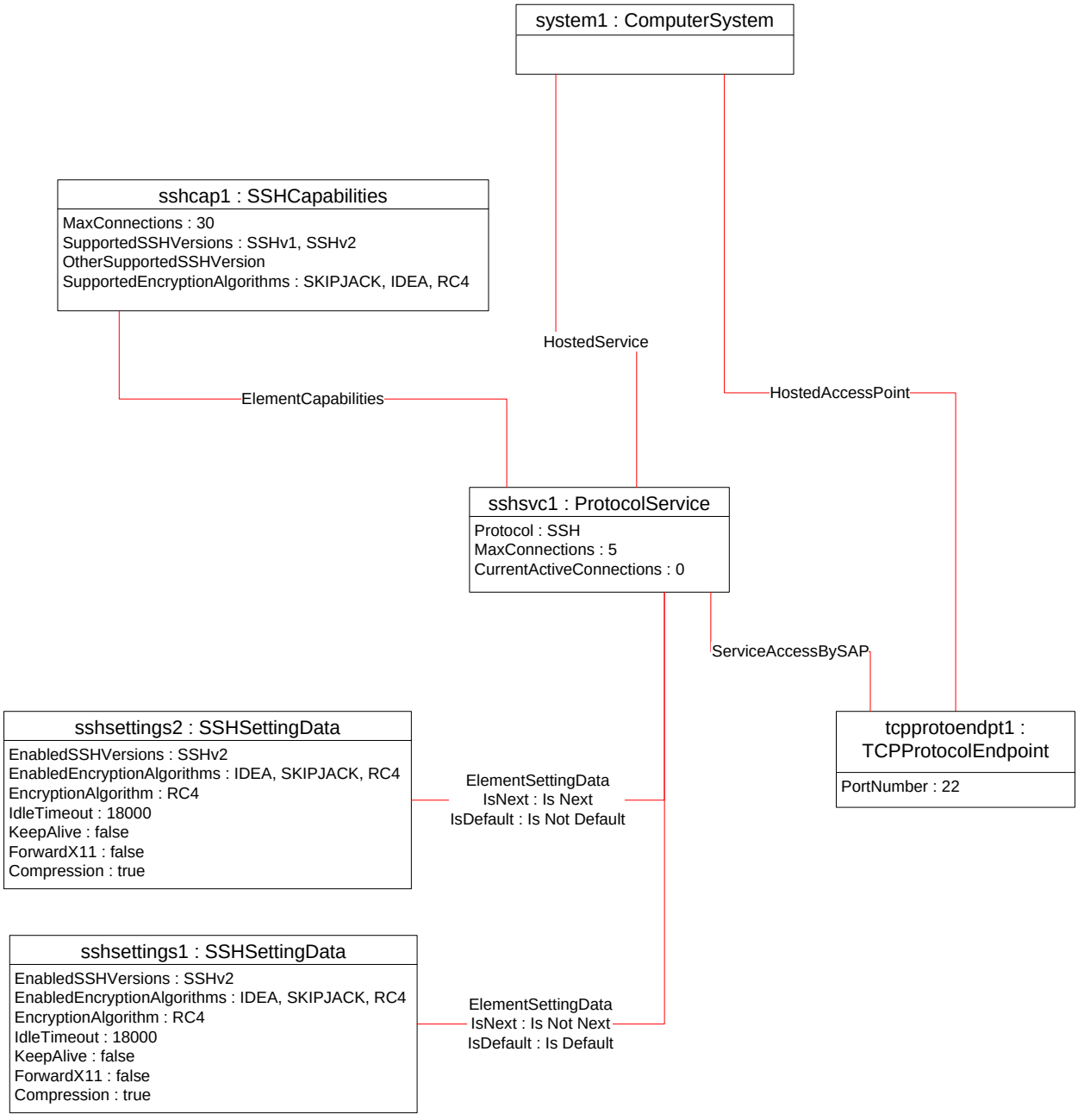


Figure 2 – Registered Profile

Figure 3 through Figure 5 illustrate the sequence of the SSH service listening for connections, an SSH session being established, and the configuration of the SSH session changed from the initial values.

Figure 3 is an object diagram that shows the SSH service enabled and listening for incoming connections. The instance of CIM_SSHSettingData labeled sshsettings2 indicates the settings that will be applied to an SSH session when it is established. The CIM_SSHSettingData labeled sshsettings1 represents the default configuration for a session. The CIM_SSHCapabilities instance indicates the capabilities of the SSH service and its associated sessions. In this example, the SSH service supports SSHv1 and SSHv2, as indicated by the value of the SupportedEncryptionAlgorithms property. However, the administrator has configured the service to enable sessions using only SSHv2. This configuration is indicated by the value of the EnabledSSHVersions property on the associated CIM_SSHSettingData instances.



647

648 **Figure 3 – SSH Service Listening for Connections**

The object diagram in Figure 4 represents the same configuration as Figure 3 with the addition of an instance of CIM_SSHProtocolEndpoint representing a newly established session. Notice that the value of the CurrentActiveConnections property of the CIM_ProtocolService instance (sshsvc1) has been incremented to reflect that a session is active. The values of the properties for the established session (sshprotoendpt1) correspond to the values on the CIM_SSHSettingData where the value of the IsNext property on the CIM_ElementSettingData instance that associated the settings with the service had a value of 1 (Is Next).

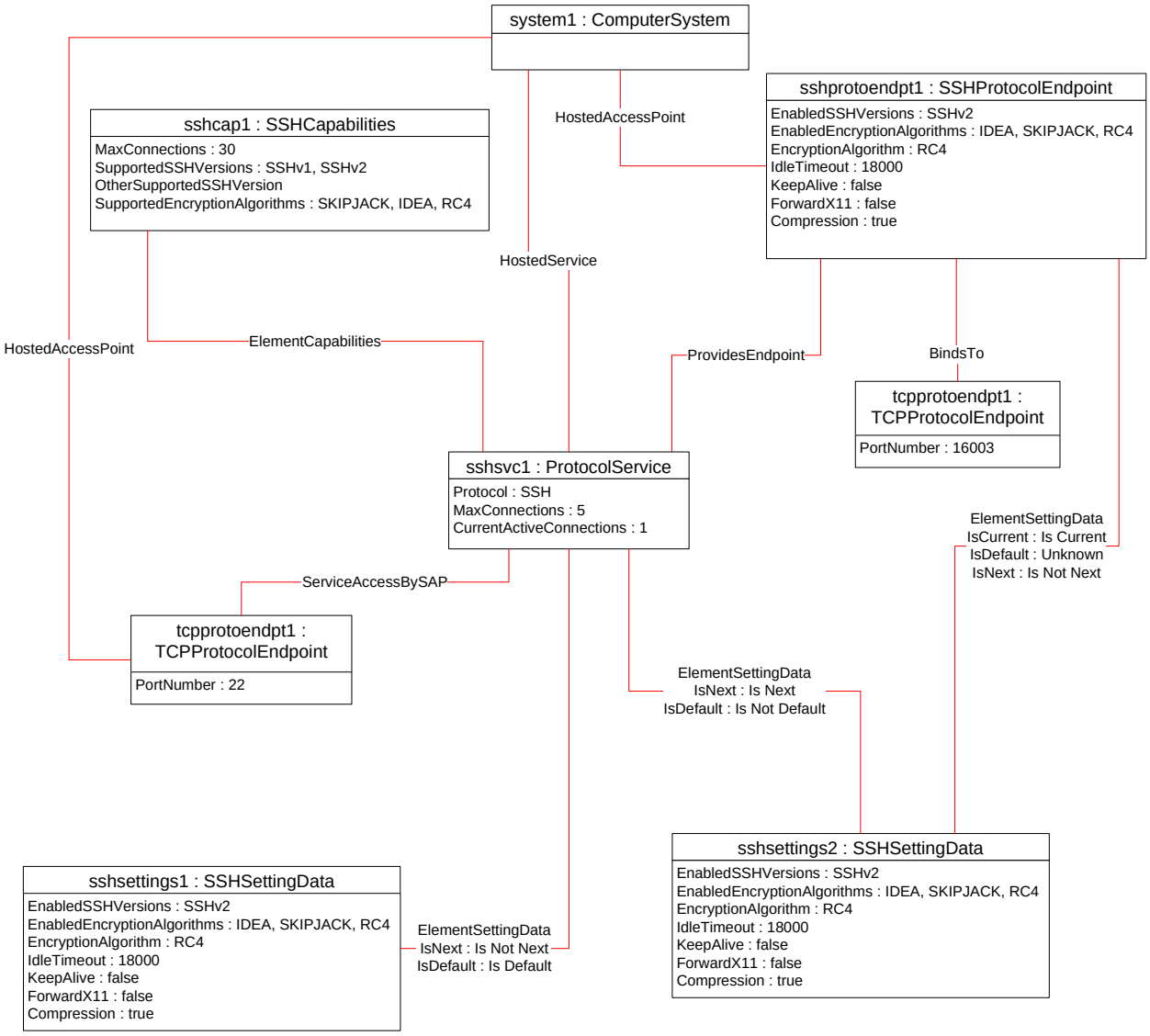
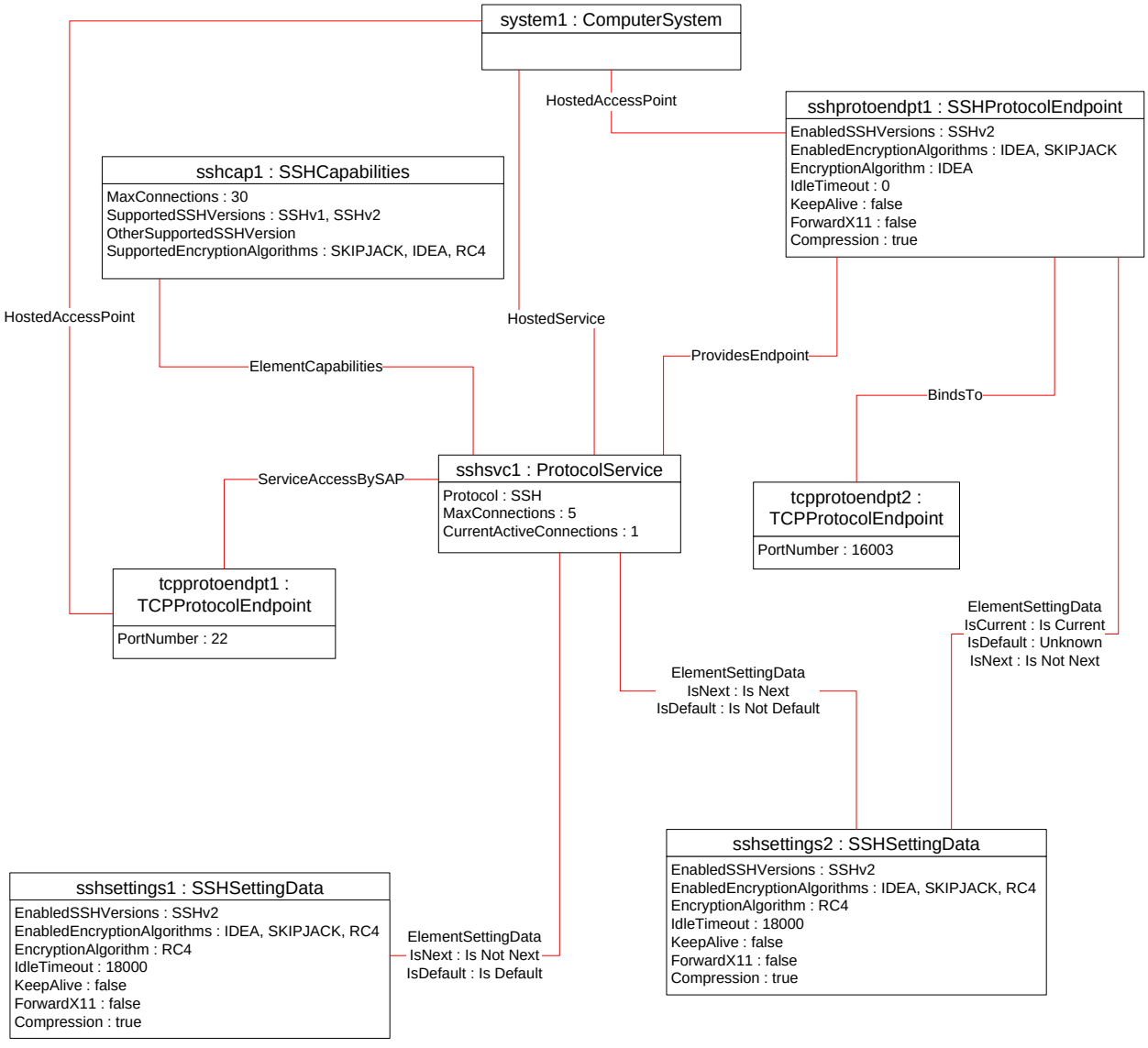


Figure 4 – One Active Session

658 The object diagram in Figure 5 represents the same configuration as in Figure 4 with the exception that
659 the user has changed session parameters from the values in effect when the session was initially
660 established. In the example above, the user has changed the encryption algorithm from RC4 to IDEA.
661 This change is reflected in the value of the EncryptionAlgorithm property of sshprotoendpt1 because the
662 CIM_SSHProtocolEndpoint contains the actual values for the session. Notice that the value of the
663 EncryptionAlgorithm property of sshsettings2 remains unchanged.



664

665 **Figure 5 – Session Changed**

9.2 Configuring Session Default Settings

When an SSH session is established, session settings have default values. A user can change the default values for subsequent sessions' settings as follows:

1) Find the instance of CIM_ElementSettingData that associates an instance of CIM_SSHSettingData with the CIM_ProtocolService where the value of its IsNext property is 1 (Is Next) and the value of the IsDefault property is not 1 (Is Default).
2) Modify the properties of the referenced CIM_SSHSettingData instance.

9.3 Modifying Active Session Settings

A user can find the active sessions for an SSH service and modify their configuration as follows:

1) Find an instance of CIM_SSHProtocolEndpoint associated with the CIM_ProtocolService through an instance of CIM_ProvidesEndpoint.
2) Modify the properties of the CIM_SSHProtocolEndpoint as desired.

9.4 Disabling the SSH Service

If an implementation supports disabling the SSH service, a user can disable the SSH service by invoking the RequestStateChange( ) method on CIM_ProtocolService instance with a value of Disabled for the RequestedState parameter.

9.5 Determining the SSH Service Capabilities

A user can determine the capabilities of the SSH service as follows:

1) Find the instance of CIM_SSHCapabilities associated with the CIM_ProtocolService through an instance of CIM_ElementCapabilities.
2) View the properties of the CIM_SSHCapabilities instance to see the supported function.

9.6 Determining the Listening Port(s) of the SSH Service

An implementation can model the TCP port upon which the SSH service listens for incoming connection requests. When the implementation models the port, a client can determine the ports to which the SSH service is bound as follows:

1) Find all instances of CIM_TCPProtocolEndpoint associated with the CIM_ProtocolService through an instance of CIM_ServiceAccessBySAP.
2) For each instance of CIM_TCPProtocolEndpoint, query the PortNumber property.

Applying this query to Figure 6, the client would find a single instance of CIM_TCPProtocolEndpoint and the value of the PortNumber property would be 22.

Figure 6 is an object diagram for the SSH service listening on TCP port 22 for incoming connection requests across all of the IP interfaces of the host system. This is illustrated by the CIM_BindsTo association instances from the CIM_TCPProtocolEndpoint to the instances of CIM_IPProtocolEndpoint.

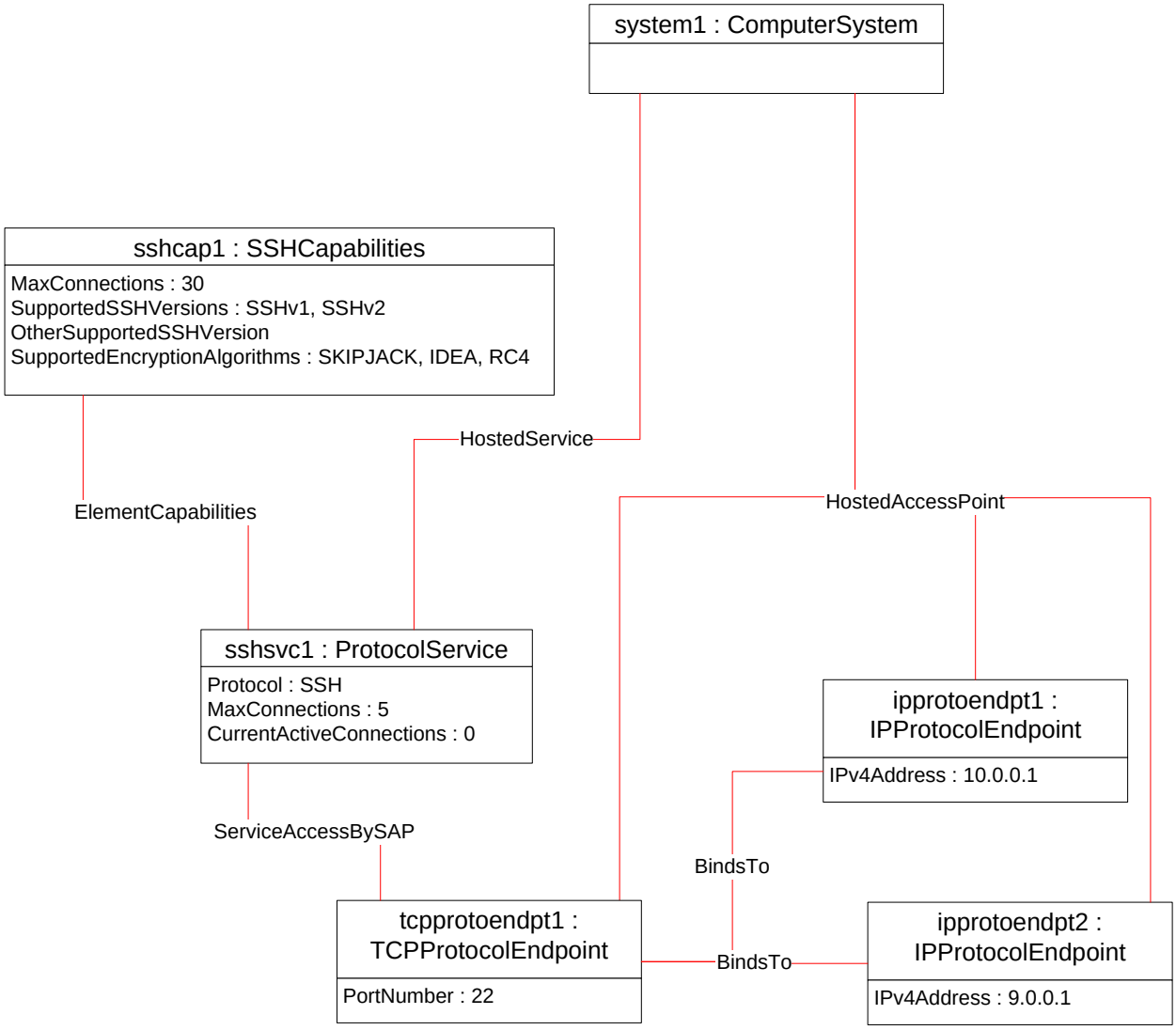


Figure 6 – Listening on a Single Port on All Interfaces

9.7 Adding a Listening Port for the SSH Service

An implementation can support adding and removing bindings between the SSH service and TCP ports. When an implementation supports adding bindings, a client can configure the service to listen on all interfaces or a specific interface.

To have the SSH service listen on a port across all IP interfaces of the system, the client can invoke the ListenOnPort method of the CIM_ProtocolService instance, specifying the desired PortNumber.To have the SSH service listen on a port for a specific interface, the client can invoke the ListenOnPort( ) method of the CIM_ProtocolService instance, specifying a reference to the CIM_IPProtocolEndpoint instance that represents the specific IP interface.

Figure 7 reflects the algorithm above applied to the configuration represented in Figure 6 where the ListenOnPort( ) method was invoked with the IPEndpoint parameter containing a reference to ipprotoendpt2 and a PortNumber parameter of 1700. The instance tcpprotoendpt2 is created and associated with ipprotoendpt2.

9.8 Stopping the SSH Service from Listening on a Specific Port

A client can stop the SSH service from listening on a specific port by invoking the intrinsic DeleteInstance operation against the instance of CIM_TCPProtocolEndpoint that represents the port.

Using the configuration shown in Figure 7 as an example, invoking the DeleteInstance operation against the instance tcpprotoendpt2 would cause the SSH service to no longer listen on port 1700.

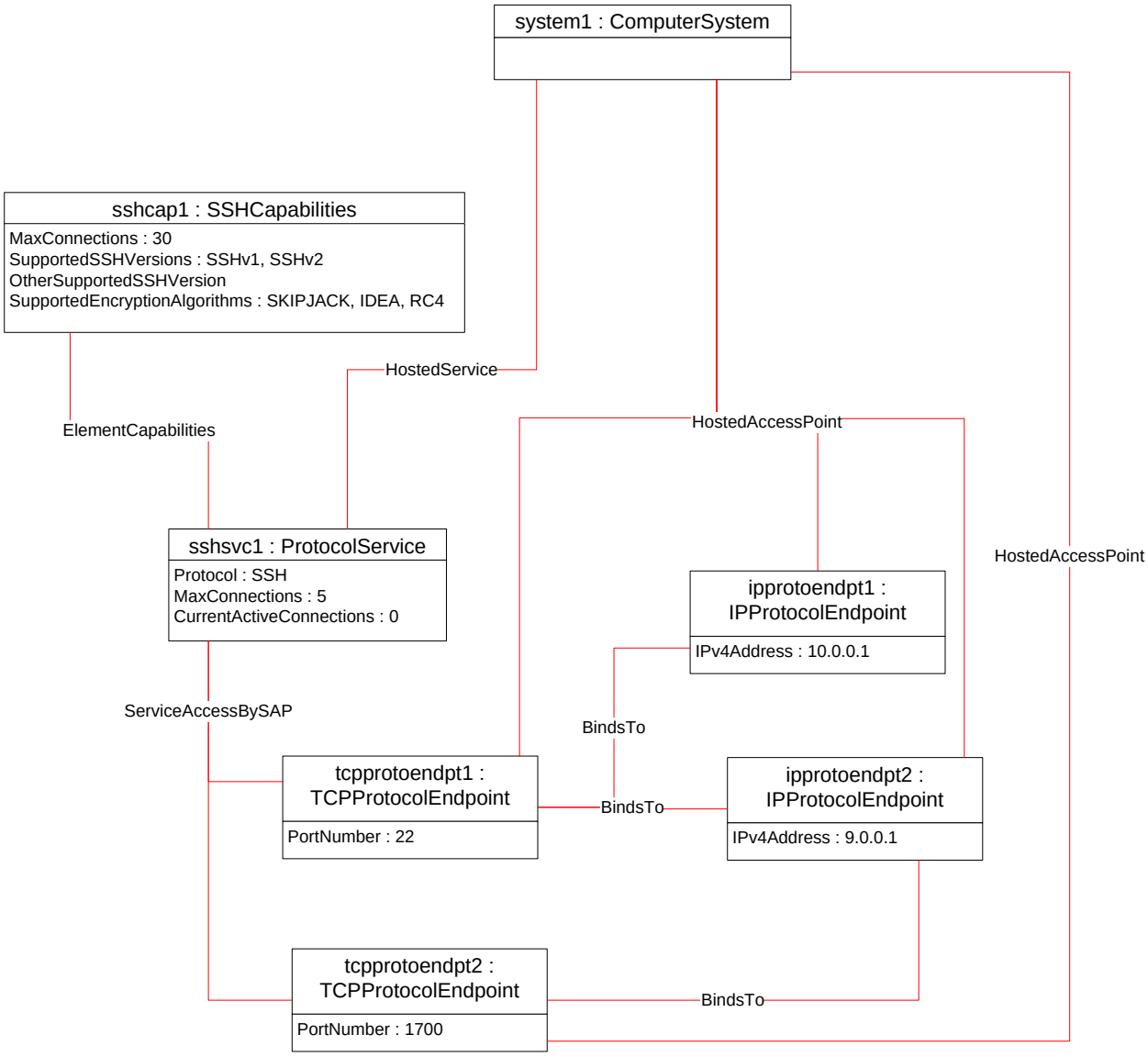


Figure 7 – Port Added Bound to Specific Interface

9.9 Determining If ElementName Can Be Modified

For a given instance of CIM_ProtocolService, a client can determine whether it can modify the ElementName as follows:

1) Find the CIM_SSHCapabilities instance that is associated with the target instance.
   a) Query the value of the ElementNameEditSupported property of the CIM_SSHCapabilities instance. If the value is TRUE, the client can modify the ElementName property of the target instance.

9.10 Determining If State Management Is Supported

For a given instance of CIM_ProtocolService, a client can determine whether state management is supported as follows:

1) Find the CIM_EnabledLogicalElementCapabilities instance that is associated with the CIM_LANEndpoint instance.
   a) Query the value of the RequestedStatesSupported property. If at least one value is specified, state management is supported.

10 CIM Elements

Table 17 shows the instances of CIM Elements for this profile. Instances of these CIM Elements shall be implemented as described in Table 17. Section 7 may impose additional requirements on these elements.

Table 17 – CIM Elements: SSH Service Profile

Element Name	Requirement	Notes
Classes		
CIM_BindsTo	Optional	See 10.1.
CIM_ElementCapabilities	Mandatory	See 10.2.
CIM_ElementSettingData	Optional	See 10.4 and 10.5.
CIM_HostedAccessPoint	Mandatory	See 10.5.
CIM_HostedService	Mandatory	See 10.7.
CIM_ProtocolService	Mandatory	See 10.8.
CIM_ProvidesEndpoint	Mandatory	See 10.9.
CIM_RegisteredProfile	Mandatory	See 10.10
CIM_ServiceAccessBySAP	Conditional	See 10.11
CIM_SSHCapabilities	Mandatory	See 10.12.
CIM_SSHProtocolEndpoint	Mandatory	See 10.13.
CIM_SSHSettingData	Optional	See 10.14.
CIM_TCPProtocolEndpoint	Optional	See 10.15.
Indications		
None defined in this profile		

10.1 CIM_BindsTo — TCPProtocolEndpoint

When an instance of CIM_TCPProtocolEndpoint is instrumented, CIM_BindsTo is used to relate the CIM_SSHProtocolEndpoint instance with the CIM_TCPProtocolEndpoint instance on which it is dependent.

Table 18 – Class: CIM_BindsTo

Properties	Requirement	Notes
Antecedent	Mandatory	The value of this property shall be a reference to an instance of CIM_TCPProtocolEndpoint. Cardinality 0..1
Dependent	Mandatory	The value of this property shall be a reference to an instance of CIM_SSHProtocolEndpoint. Cardinality *

10.2 CIM_BindsTo — IPProtocolEndpoint

When the relationship with an underlying IP interface is modeled according to section 7.3, CIM_BindsTo is used to relate the CIM_TCPProtocolEndpoint instance with the CIM_IPProtocolEndpoint instance on which it is dependent.

Table 19 – Class: CIM_BindsTo

Properties	Requirement	Notes
Antecedent	Mandatory	The value of this property shall be a reference to an instance of CIM_IPProtocolEndpoint. Cardinality *
Dependent	Mandatory	The value of this property shall be a reference to an instance of CIM_TCPProtocolEndpoint. Cardinality 1..*

10.3 CIM_ElementCapabilities

CIM_ElementCapabilities is used to associate an instance of CIM_SSHCapabilities with the CIM_ProtocolService.

Table 20 – Class: CIM_ElementCapabilities

Properties	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to the Central Instance. Cardinality 1..*
Capabilities	Mandatory	This property shall be a reference to the CIM_SSHCapabilities instance. Cardinality 1

10.4 CIM_ElementSettingData — SSH Service

CIM_ElementSettingData is used to associate instances of CIM_SSHSettingData with instances of CIM_ProtocolService.

Table 21 – Class: CIM_ElementSettingData (SSH Service)

Properties	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to the Central Instance. Cardinality *
Setting	Mandatory	This property shall be a reference to an instance of CIM_SSHSettingData. Cardinality *
IsDefault	Mandatory	Matches 1 (Is Default) or 2 (Is Not Default)
IsNext	Mandatory	Matches 1 (Is Current) or 2 (Is Not Current)

10.5 CIM_ElementSettingData — SSH Session

CIM_ElementSettingData is used to associate instances of CIM_SSHSettingData with instances of CIM_SSHProtocolEndpoint.

Table 22 – Class: CIM_ElementSettingData (SSH Session)

Properties	Requirement	Notes
ManagedElement	Mandatory	This property shall be a reference to an instance of CIM_SSHProtocolEndpoint. Cardinality *
Setting	Mandatory	This property shall be a reference to an instance of CIM_SSHSettingData. Cardinality *
IsCurrent	Mandatory	Matches 1 (Is Current) or 2 (Is Not Current)

10.6 CIM_HostedAccessPoint

CIM_HostedAccessPoint is used to relate the CIM_SSHProtocolEndpoint and CIM_TCPProtocolEndpoint instances to their scoping CIM_ComputerSystem instance.

Table 23 – Class: CIM_HostedAccessPoint

Properties	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to an instance of CIM_ComputerSystem. Cardinality 1
Dependent	Mandatory	This property shall be a reference to an instance of CIM_SSHProtocolEndpoint or CIM_TCPProtocolEndpoint. Cardinality *

765 ## 10.7 CIM_HostedService

766 CIM_HostedService is used to relate the CIM_ProtocolService to its scoping CIM_ComputerSystem
767 instance.

768 **Table 24 – Class: CIM_HostedService**

Properties	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to the Scoping Instance. Cardinality 1
Dependent	Mandatory	This property shall be a reference to the Central Instance. Cardinality 1..*

769 ## 10.8 CIM_ProtocolService

770 CIM_ProtocolService represents the SSH service.

771 **Table 25 – Class: CIM_ProtocolService**

Properties	Requirement	Notes
SystemCreationClassName	Mandatory	None
CreationClassName	Mandatory	None
SystemName	Mandatory	None
Name	Mandatory	None
Protocol	Mandatory	See 7.1.1.
MaxConnections	Mandatory	A value of 0 (zero) shall indicate unknown.
RequestedState	Mandatory	See 7.1.3.
EnabledState	Mandatory	See 7.1.3.
ElementName	Mandatory	See 7.1.4.
OperationalStatus	Mandatory	None
HealthState	Mandatory	None
RequestStateChange( )	Mandatory	See 8.2.
ListenOnPort()	Mandatory	See 8.1.

772 ## 10.9 CIM_ProvidesEndpoint

773 CIM_ProvidesEndpoint is used to associate the instance of CIM_ProtocolService with an instance of
774 CIM_SSHProtocolEndpoint representing a session with the service.

775 **Table 26 – Class: CIM_ProvidesEndpoint**

Properties	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to the instance of CIM_ProtocolService. Cardinality 1
Dependent	Mandatory	This property shall be a reference to an instance of CIM_SSHProtocolEndpoint. Cardinality *

10.10 CIM_RegisteredProfile

CIM_RegisteredProfile identifies the *SSH Service Profile*. The CIM_RegisteredProfile class is defined by the *Profile Registration Profile*. With the exception of the mandatory values specified for the properties in Table 27, the behavior of the CIM_RegisteredProfile instance is in accordance with the constraints specified in the *Profile Registration Profile*.

Table 27 – Class: CIM_RegisteredProfile

Properties	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "SSH Service".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of "DMTF".

NOTE: Previous versions of this document included the suffix “Profile” for the RegisteredName value. If implementations querying for the RegisteredName value find the suffix “Profile”, they should ignore the suffix, with any surrounding white spaces, before any comparison is done with the value as specified in this document.

10.11 CIM_ServiceAccessBySAP

CIM_ServiceAccessBySAP is used to associate the instance of CIM_ProtocolService with an instance of CIM_TCPProtocolEndpoint over which a session with the service can be established.

Table 28 – Class: CIM_ServiceAccessBySAP

Properties	Requirement	Notes
Antecedent	Mandatory	This property shall be a reference to the instance of CIM_ProtocolService. Cardinality 1..*
Dependent	Mandatory	This property shall be a reference to an instance of CIM_TCPProtocolEndpoint. Cardinality *

10.12 CIM_SSHCapabilities

CIM_SSHCapabilities represents the capabilities of an SSH service.

Table 29 – Class: CIM_SSHCapabilities

Properties	Requirement	Notes
InstanceID	Mandatory	None
ElementName	Mandatory	pattern ".*"
RequestedStatesSupported	Mandatory	See 7.1.2.
ElementNameEditSupported	Mandatory	See 7.1.2.
MaxElementNameLen	Conditional	See 7.1.2.
MaxConnections	Mandatory	None
SupportedSSHVersions	Mandatory	None
OtherSupportedSSHVersion	Conditional	This property shall have a value when the SupportedSSHVersions property has a value of "Other".
SupportedEncryptionAlgorithms	Mandatory	None

Properties	Requirement	Notes
OtherSupportedEncryptionAlgorithm	Conditional	This property shall have a value when the SupportedEncryptionAlgorithms property has a value of "Other"..
ListeningPortManagementSupported	Mandatory	See 8.1.
MaxListeningPorts	Mandatory	A value of 0 (zero) shall indicate unknown.

10.13 CIM_SSHProtocolEndpoint

CIM_SSHProtocolEndpoint represents a session established with the SSH service.

Table 30 – Class: CIM_SSHProtocolEndpoint

Properties	Requirement	Notes
SystemCreationClassName	Mandatory	None
CreationClassName	Mandatory	None
SystemName	Mandatory	None
Name	Mandatory	None
NameFormat	Mandatory	pattern ".*"
ProtocolIFType	Mandatory	Matches 1 (Other)
OtherTypeDescription	Mandatory	Matches "SSH"
ElementName	Mandatory	pattern ".*"
EnabledSSHVersions	Mandatory	None
OtherEnabledSSHVersion	Conditional	This property shall have a value when the EnabledEncryptionAlgorithms property has a value of "Other".
SSHVersion	Mandatory	None
OtherSSHVersion	Conditional	This property shall have a value when the SSHVersion property has a value of "Other".
EnabledEncryptionAlgorithms	Mandatory	None
OtherEnabledEncryptionAlgorithm	Conditional	This property shall have a value when the EnabledEncryptionAlgorithms property has a value of "Other".
EncryptionAlgorithm	Mandatory	None
OtherEncryptionAlgorithm	Conditional	This property shall have a value when the EncryptionAlgorithm property has a value of "Other".
IdleTimeout	Mandatory	None
KeepAlive	Mandatory	None
ForwardX11	Mandatory	None
Compression	Mandatory	None

10.14 CIM_SSHSettingData

CIM_SSHSettingData represents settings that can be applied to an SSH session.

Table 31 – Class: CIM_SSHSettingData

Properties	Requirement	Notes
InstanceID	Mandatory	None
ElementName	Mandatory	pattern ".*"
EnabledSSHVersions	Mandatory	None
OtherEnabledSSHVersion	Conditional	This property shall have a value when the EnabledEncryptionAlgorithms property has a value of "Other".
SSHVersion	Mandatory	None
OtherSSHVersion	Conditional	This property shall have a value when the SSHVersion property has a value of "Other".
EnabledEncryptionAlgorithms	Mandatory	None
OtherEnabledEncryptionAlgorithm	Conditional	This property shall have a value when the EnabledEncryptionAlgorithms property has a value of "Other".
EncryptionAlgorithm	Mandatory	None
OtherEncryptionAlgorithm	Conditional	This property shall have a value when the EncryptionAlgorithm property has a value of "Other".
IdleTimeout	Mandatory	None
KeepAlive	Mandatory	None
ForwardX11	Mandatory	None
Compression	Mandatory	None

10.15 CIM_TCPProtocolEndpoint

CIM_TCPProtocolEndpoint represents an IP port to which either an SSH session or service can be bound.

Table 32 – Class: CIM_TCPProtocolEndpoint

Properties	Requirement	Notes
SystemCreationClassName	Mandatory	None
CreationClassName	Mandatory	None
SystemName	Mandatory	None
Name	Mandatory	None
NameFormat	Mandatory	pattern ".*"
ProtocolIFType	Mandatory	Matches 4111 ("TCP")
ElementName	Mandatory	pattern ".*"
PortNumber	Mandatory	None

802 # ANNEX A
803 (informative)
804
805 # Change Log

Version	Date	Description
1.0.0	6/16/2009	DMTF Standard Release

806
807