CHAPTER 2

Cisco DCNM SMI-S Server Support

This chapter describes the standard profiles supported by Cisco DCNM SMI-S. The Cisco DCNM SMI-S Server also supports extensions to these profiles to support features in Cisco MDS NX-OS that are not available from the standard profiles.

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- Service Location Protocol, page 2-2
- Server Profile, page 2-2
- Switch Profile, page 2-3
- Fabric Profile, page 2-14

Managing SANs Through SMI-S

SANs are created in a multivendor environment. Hosts, fabric elements (switches, directors), and data storage devices are integrated from different vendors to create an interoperable storage network. Managing these elements from different vendors is problematic to the network administrator. Each element has its own management interface that may be proprietary. A network administrator must work with these disparate management APIs to build a cohesive management application that controls and monitors the SAN.

The SMI-S addresses this management problem by creating a suite of flexible, open management API standards based on the vendor- and technology-independent CIM. Using the SMI-S APIs, collected in *profiles* of common management classes, a network administrator can create a simplified management application CIM client to control and monitor the disparate SAN elements that support SMI-S and CIM. With Cisco DCNM SMI-S Servers either embedded on the SAN elements or supported by a proxy Cisco DCNM SMI-S Server, these elements are accessible to the network administrator's CIM client application.

SMI-S uses the Service Location Protocol version 2 (SLPv2) to discover Cisco DCNM SMI-S Servers. Once the Cisco DCNM SMI-S Servers are identified, the CIM client determines which profiles are supported on Cisco DCNM SMI-S Servers through the Server profile. This profile is mandatory on all Cisco DCNM SMI-S Servers.

Besides the control and monitoring support provided by profiles, the Cisco DCNM SMI-S Server also supports asynchronous delivery of events through CIM *indications*. Indications provide immediate notification of important occurrences such as when an interface goes down.

Service Location Protocol

The first step in managing a network of SAN elements with Cisco DCNM SMI-S Server is discovering the location and support available on Cisco DCNM SMI-S Servers. The SLPv2 provides this discovery mechanism. A CIM client uses SLPv2 to discover Cisco DCNM SMI-S Servers, gathering generic information about what services Cisco DCNM SMI-S Servers provides and the URL where these services are located.

Cisco DCNM SMI-S Server supports SLPv2 as defined in RFC 2608.

Server Profile

Once the CIM client discovers the Cisco DCNM SMI-S Servers within the SAN, the CIM client must determine the level of support each Cisco DCNM SMI-S Server provides. The Server profile defines the capabilities of the Cisco DCNM SMI-S Server. This includes providing the namespace and all profiles and subprofiles supported by Cisco DCNM SMI-S Server.

For each supported profile, the Server profile instantiates the `RegisteredProfile` class. Each instance of this class gives the CIM client the profile name and unique ID that is supported by Cisco DCNM SMI-S Server. Similarly, Cisco DCNM SMI-S Server lists all supported optional subprofiles, using the `RegisteredSubProfile` class and the `SubprofileRequiresProfile` association class to associate the subprofile with the profile.

Switch Profile

The Switch profile models the logical and physical aspects of switches. The Computer System class constitutes the center of the switch model. The switch includes discovery components including ports, port statistics, product information, software, and chassis information. It also includes configuration of the switch including switch and port state change, port speed, switch name, symbolic names, and DomainID. Figure 2-1 shows the switch profile from a communication perspective.

The Switch profile also supports the optional Blade subprofile (see the "Blade Subprofile" section on page 2-7) and the optional Access Point Subprofile (see the "Access Point Subprofile" section on page 2-9). Figure 2-2 shows the switch profile from a communication perspective and switch access point subprofile.

Figure 2-1 Switch Profile in Communication Perspective

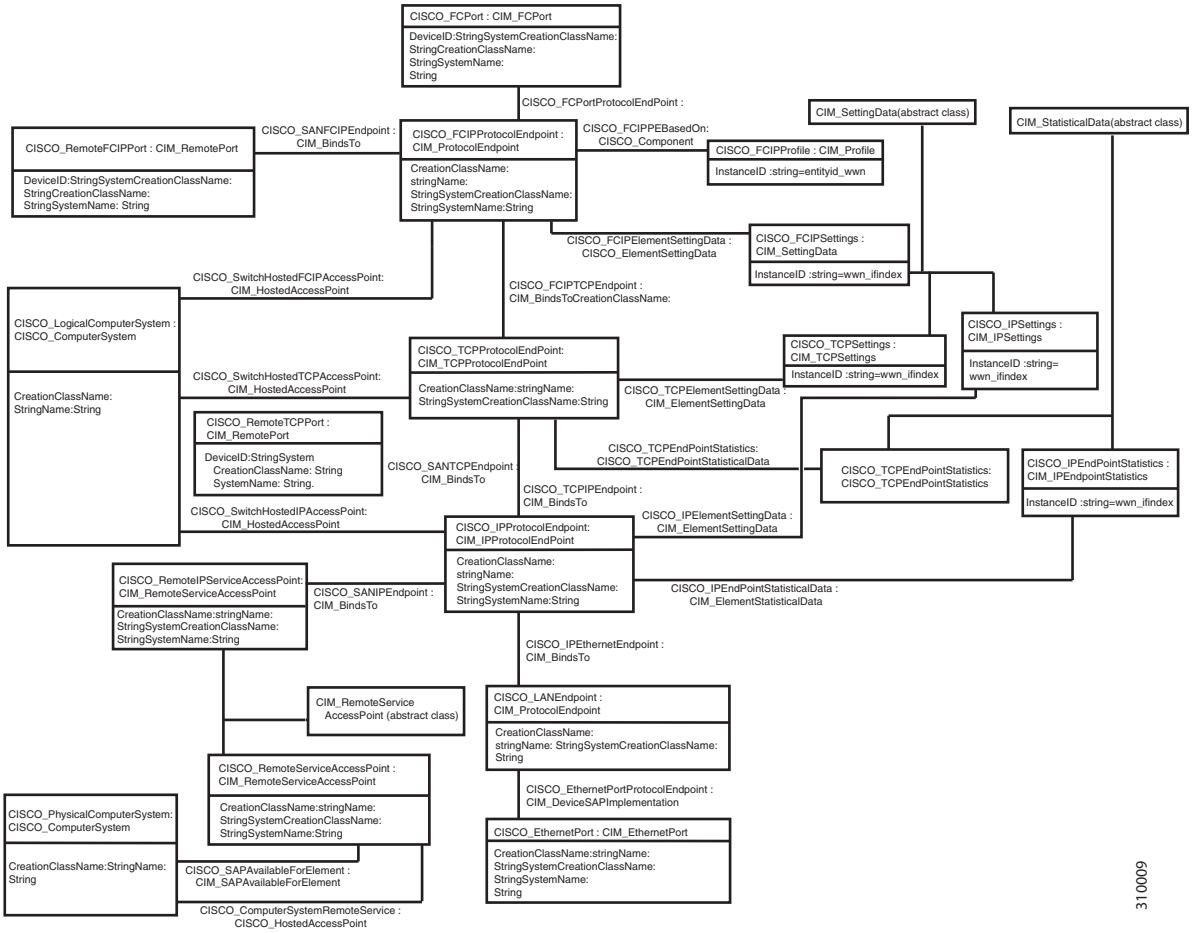


Figure 2-2 Switch Profile in Configuration Perspective and Switch Access Point Subprofile

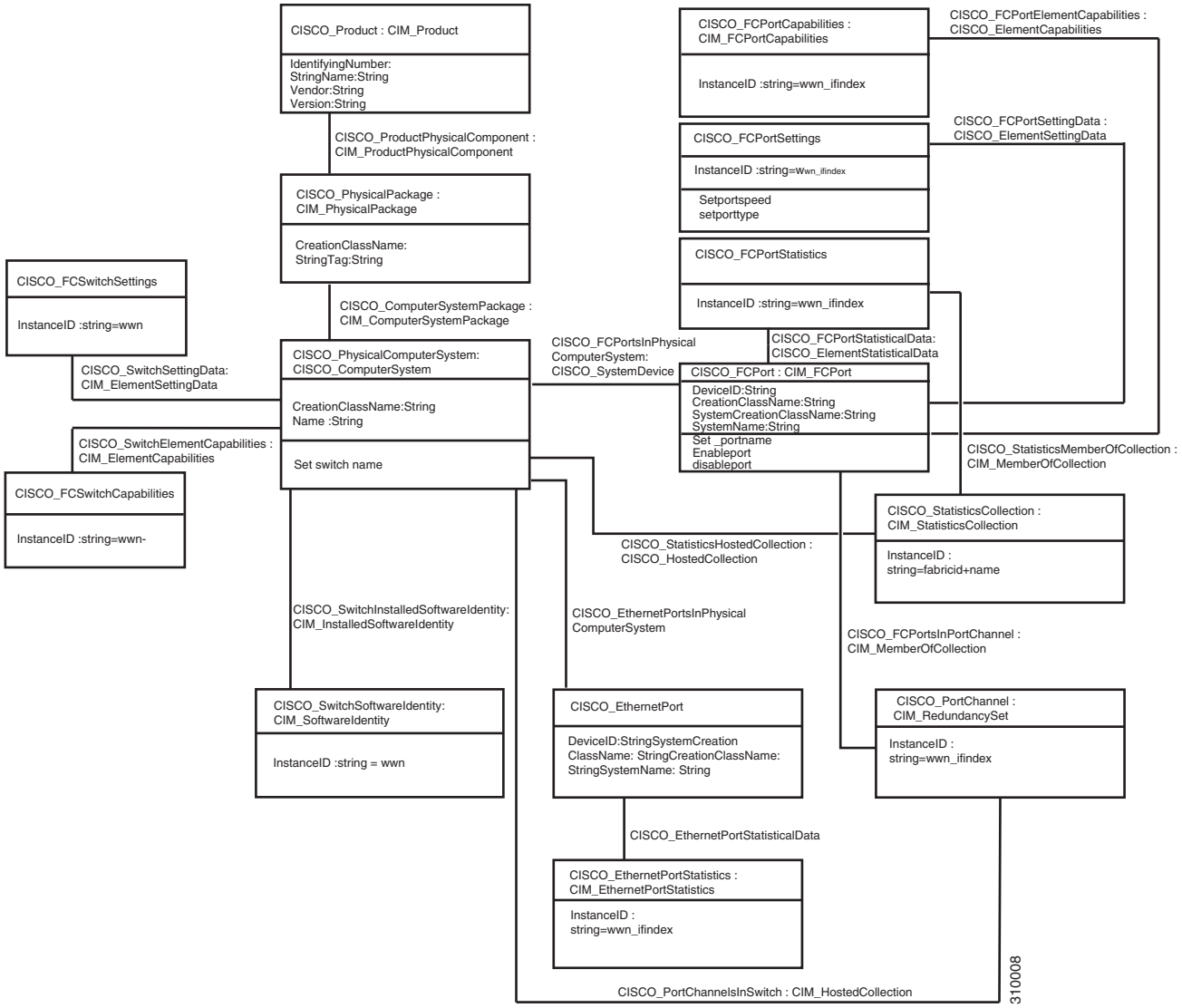


Table 2-1 shows how to use the classes and association classes of Switch profile.

Table 2-1 CIM Elements for Switch Profile

Class	How Used
CISCO_PhysicalComputerSystem:CISCO_ComputerSystem	Identifies the switch, with the Dedicated property set to Switch.
CISCO_ComputerSystemPackage:CIM_ComputerSystemPackage	Associates `PhysicalPackage` to the `ComputerSystem` (Switch).
CISCO_SwitchElementCapabilities:CIM_ElementCapabilities	Associates `FCSwitchCapabilities` to the `ComputerSystem` (Switch).

Table 2-1 CIM Elements for Switch Profile (continued)

Class	How Used
CISCO_SwitchInstalledSoftwareIdentity:CIM_InstalledSoftwareIdentity	Associates the switch and its software identity.
CISCO_SwitchSettingData: CIM_ElementSettingData	Associates `FCSwitchSettings` to `ComputerSystem`.
CISCO_FCPortSettingData: CISCO_ElementSettingData	Associates `FCPortSettings` to `FCPort`.
CISCO_FCPortElementCapabilities:CISCO_ElementCapabilities	Associates the `CISCO_FCPort` and `CISCO_FCPortCapabilities`.
CISCO_FCPortStatisticalData:CISCO_ElementStatisticalData	Associates the `FCPortStatistics` to the `FCPort`.
CISCO_StatisticsMemberOfCollection:CIM_MemberOfCollection	Associates the `NetworkPortStatistics` (fcportstatistics) to the `StatisticsCollection`.
CISCO_TCPProtocolEndPoint:CIM_TCPProtocolEndPoint	A protocol endpoint that is dedicated to running TCP.
CISCO_FCIPTCPEndpoint:CIM_BindsTo	Associates the `CISCO_FCIPProtocolEndpoint` and `CISCO_TCPProtocolEndPoint`.
CISCO_SANTCPEndpoint:CIM_BindsTo	Associates the `CISCO_IPProtocolEndpoint` and `CISCO_TCPProtocolEndPoint`.
CISCO_TCPElementSettingData:CIM_ElementSettingData	Associates the `CISCO_IPProtocolEndpoint` and `CISCO_IPSettings`.
CISCO_FCIPPEBasedOn:CISCO_Component	Associates the membership relationships between a fcipprofile and the fcip protocol endpoints within that switch.
CISCO_FCIPProtocolEndpoint :CIM_ProtocolEndpoint	A protocol endpoint that is dedicated to running fcipport.
CISCO_FCIPElementSettingData:CISCO_ElementSettingData	Associates the `CISCO_FCIPProtocolEndpoint` and `CISCO_FCIPSettings`.
CISCO_FCPortProtocolEndPoint:CIM_DeviceSAPImplementation	Associates the `CISCO_FcPort` with `CISCO_LANEndpoint`.
CISCO_EthernetPortProtocolEndpoint:CIM_DeviceSAPImplementation	Associates `CISCO_EthernetPort` with `CISCO_LANEndpoint`.
CISCO_PortChannel:CIM_RedundancySet	Displays port aggregation for Fibre Channel trunking.
CISCO_PortChannelsInSwitch :CIM_HostedCollection	Aggregates the PortChannels in switch.
CISCO_FCPortsInPortChannel :CIM_MemberOfCollection	Aggregates the `fcports` for port channeling (Trunking).
CISCO_IPProtocolEndpoint: CIM_IPProtocolEndPoint	A protocol end point that is dedicated to running IP.
CISCO_LANEndpoint:CIM_ProtocolEndpoint	A communication endpoint which, when its associated interface device is connected to a LAN, may send and receive data frames. LAN Endpoints include Ethernet, Token Ring and FDDI interfaces.
`CISCO_EthernetPortProtocolEndpoint:CIM_DeviceSAPImplementation`	Associates a `CISCO_EthernetPort` with `CISCO_LANEndpoint`.

Table 2-1 CIM Elements for Switch Profile (continued)

Class	How Used
CISCO_SANFCIPEndpoint:CIM_BindsTo	Associates between CISCO_FCIPProtocolEndpoint and CISCO_ProtocolEndPoint.
CISCO_SANIPEndpoint : CIM_BindsTo	Associates between CISCO_IPProtocolEndpoint and CISCO_RemoteFCIPServiceAccessPoint.
CISCO_IPEthernetEndpoint:CIM_BindsTo	Associates between CISCO_IPProtocollEndpoint and CISCO_LANEndPoint.
CISCO_TCPIPEndpoint:CIM_BindsTo	Associates between CISCO_IPProtocolEndpoint and CISCO_TCPProtocolEndPoint.
CISCO_IPElementSettingData:CIM_ElementSettingData	Associates between CISCO_IPProtocolEndpoint and CISCO_IPSettings.
CISCO_Product:CIM_Product	CISCO_Product is a concrete class that aggregates PhysicalElements, software (SoftwareIdentity and SoftwareFeatures), services and/or other products, and is acquired as a unit.
CISCO_FCPort:CIM_FCPort	Identifies Fibre Channel switch port.
CISCO_logicalfcport:CIM_FCPort	Identifies logical aspects of the port link and the data layers.
CISCO_FCSwitchSettings:CIM_FCSwitchSettings	Identifies Fibre Channel switch settings.
CISCO_FCSwitchCapabilities:CIM_FCSwitchCapabilities	Identifies Fibre Channel switch capabilities.
CISCO_FCPortSettings:CIM_FCPortSettings	Identifies Fibre Channel port settings.
CISCO_FCPortCapabilities:CIM_FCPortCapabilities	Defines configuration options supported by the ports.
CISCO_EthernetPort:CIM_EthernetPort	Identifies Ethernet port.
CISCO_EthernetPortStatistics:CIM_EthernetPortStatistics	Identifies Ethernet port statistics.
CISCO_FCPortStatistics:CIM_FCPortStatistics	Identifies Fibre Channel port statistics.
CISCO_StatisticsCollection :CIM_StatisticsCollection	Collection to aggregate Fibre Channel port statistics to Fibre Channel switch.
CISCO_SwitchSoftwareIdentity:CIM_SoftwareIdentity	Associates switch and its software identity.
CISCO_StatisticsHostedCollection:CISCO_HostedCollection	Associates the statistics collection to the computersystem representing the switch.
CISCO_EndPortsInHostComputerSystem:CISCO_SystemDevice	Identifies end ports in host device.
CISCO_EthernetPortsInPhysicalComputerSystem:CISCO_SystemDevice	Identifies Ethernet port in switch.
CISCO_FCPortsInLogicalComputerSystem:CISCO_SystemDevice	Identifies logical Fibre Channel ports in logical computer system in VSAN.
CISCO_TCPEndPointStatisticalData: CIM_ElementStatisticalData	Aggregates the statistics data for TCP end point.
CISCO_IPEndPointStatisticalData: CIM_ElementStatisticalData	Aggregates the statistics data for IP end point.
CISCO_EthernetPortStatisticalData: CISCO_ElementStatisticalData	Aggregates the statistics data for Ethernet end point.

Table 2-1 CIM Elements for Switch Profile (continued)

Class	How Used
CISCO_TCPSettings:CIM_TCPSettings	Defines TCP transport layer global settings.
CISCO_TCPEndPointStatistics:CIM_TCPEndpointStatistics	Defines the statistics for the TCP end point.
CISCO_IPSettings:CIM_IPSettings	Defines the operational settings for an IP implementation that are configured on a system-wide basis.
CISCO_IPEndPointStatistics:CIM_IPEndpointStatistics	Records the statistics for an CIM_IPProtocolEndpoint.

Table 2-2 shows the services supported by the switch profile.

Table 2-2 Switch Profile Services

Device Name	Description
Enable Fcport	Describes how to enable a port on a Fibre Channel switch.
Disable fcport	Describes how to disable a port on a Fibre Channel switch.
Setportspeed	Describes how to modify the speed of a port on a Fibre Channel switch.
Setporttype	Describes how to modify the port type on a Fibre Channel switch.
Setswitchname	Describes how to modify the name of a Fibre Channel switch.
Setportname	Describes how to modify the name of a port on a Fibre Channel switch.

Blade Subprofile

This subprofile describes how blades in a director class switch can be discovered and managed.

The CIM client uses the optional Blade subprofile to model the physical and logical aspects of a supervisor module, switching module, or services module in a switch. Combining the Blade subprofile with the Switch profile, the CIM client gains a chassis-level view into the switch, associating ports to modules and modules to a switch. Figure 2-3 shows the switch blade subprofile.

Figure 2-3 Switch Blade Subprofile

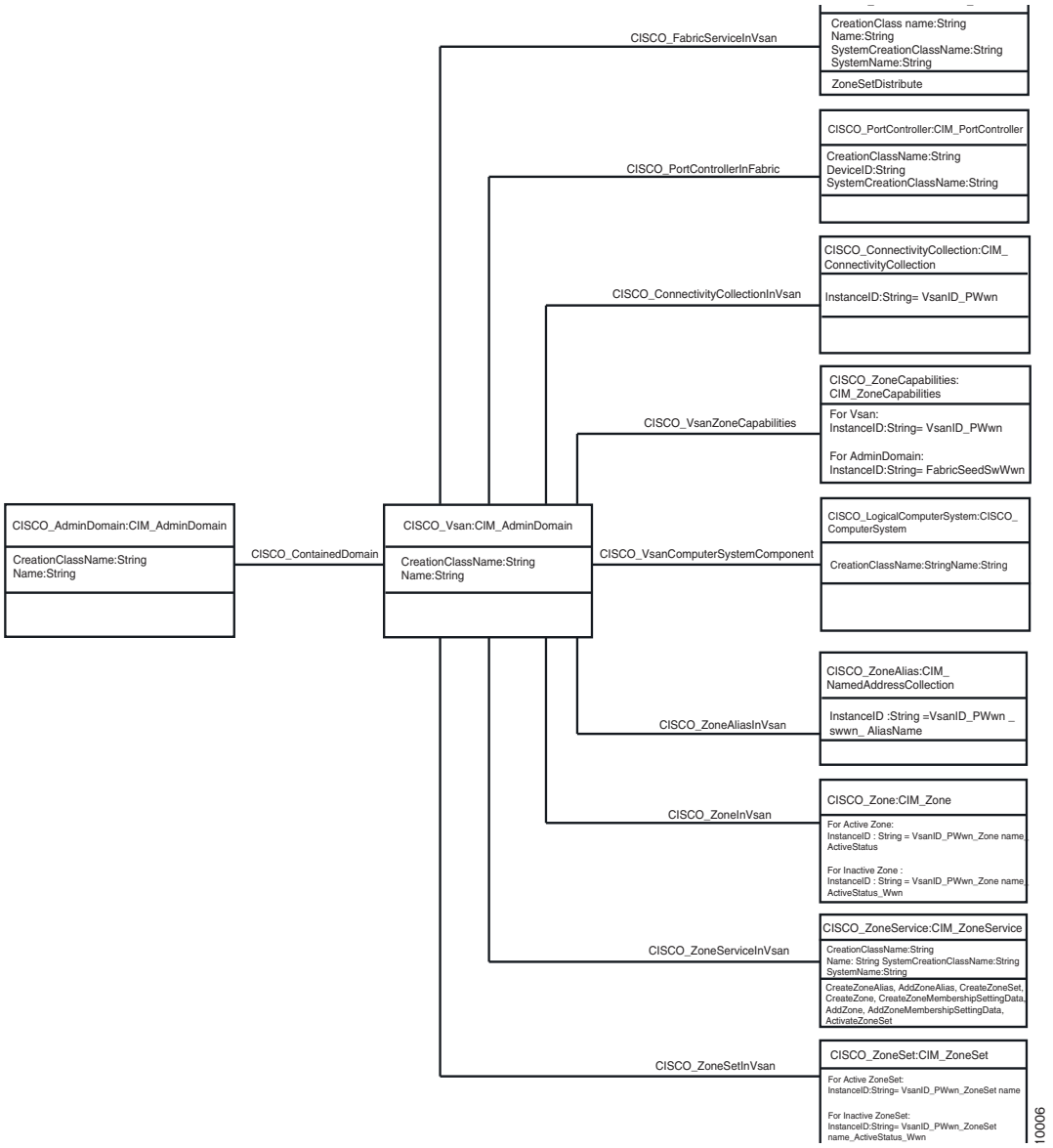


Table 2-3 shows how to use the classes and association classes of Blade subprofile.

Table 2-3 CIM Elements for Blade Subprofile

Class	How Used
`CISCO_LogicalModule:CIM_LogicalModule`	Identifies a blade, supervisor module, switching module, or services module as an aggregation point for the switch ports.
CISCO_ModuleFcPort: CISCO_ModulePort	Associates the logical module to the Fibre Channel port.
CISCO_ModuleEthernet Port:CISCO_ModulePort	Associates the logical module to the Ethernet port.

Table 2-3 CIM Elements for Blade Subprofile (continued)

Class	How Used
CISCO_ProductPhysicalComponent:CIM_ProductPhysicalComponent	Associates the physical element with product.
CISCO_LogicalModulesInPhysicalComputerSystem:CISCO_SystemDevice	Associates `CISCO_PhysicalComputerSystem` and `blade`.
CISCO_PhysicalPackageLogicalModuleRealizes:CISCO_Realizes	Associates `CISCO_PhysicalPackage` and `CISCO_LogicalModule`.
CISCO_PhysicalPackage:CIM_PhysicalPackage	Associates the physical package within which the logical module is stored as rack.
CISCO_LogicalModulesInPhysicalComputerSystem:CISCO_SystemDevice	Associates the logical module to the switch.
CISCO_EthernetPortsInPhysicalComputerSystem:CISCO_SystemDevice	Associates Ethernet ports in `PhysicalComputerSystem`.
CISCO_FCPortsInPhysicalComputerSystem:CISCO_SystemDevice	Associates `fcports` in `PhysicalComputerSystem`.
CISCO_PhysicalElementEthernetPortRealizes:CISCO_Realizes	Associates `Ethernetports` in `PhysicalElement`.
CISCO_PhysicalElementFcPortRealizes:CISCO_Realizes	Associates `Fcports` in `PhysicalElement`.

Access Point Subprofile

The CIM client uses the Access Point subprofile to return the URL to access the switch and install or launch Cisco DCNM-SAN or Device Manager. If Cisco DCNM-SAN or Device Manager have not been installed, then the URL gives the option to install them. If Cisco DCNM-SAN or Device Manager have been installed, then the URL gives the option to launch either of them.

For Access Point subprofile, see Figure 2-2.

Table 2-4 shows how to use the classes and association classes of Access Point subprofile.

Table 2-4 CIM Elements for Access Point Subprofile

Class	How Used
CISCO_RemoteServiceAccessPoint:CIM_RemoteServiceAccessPoint	A ServiceAccessPoint for management tools. Returns the URL for the switch that can be used to install or launch Cisco DCNM-SAN or Device Manager.
CISCO_RemoteIPServiceAccessPoint:CIM_RemoteServiceAccessPoint	A ServiceAccessPoint for management tools. Returns the URL for the switch that can be used to install or launch Cisco DCNM-SAN or Device Manager.
CISCO_SANIPEndpoint:CIM_BindsTo	Associates CISCO_IPProtocolEndpoint and CISCO_RemoteFCIPServiceAccessPoint.
CISCO_ComputerSystemRemoteService:CISCO_HostedAccessPoint	Associates CISCO_PhysicalComputerSystem and CISCO_RemoteServiceAccessPoint.
CISCO_SAPAvailableForElement:CIM_SAPAvailableForElement	Associates between CISCO_PhysicalComputerSystem and CISCO_RemoteServiceAccessPoint. CISCO_SAPAvailableForElement conveys the semantics of a Service Access Point that is available for a ManagedElement.
CISCO_RemoteFCIPPort:CIM_RemotePort	Adds port information to the access data (such as IP address) that is specified in and inherited from RemoteServiceAccessPoint.
CISCO_SANFCIPEndpoint:CIM_BindsTo	Associates between CISCO_FCIPProtocolEndpoint and CISCO_RemoteFCIPPort.
CISCO_RemoteTCPPort:CIM_RemotePort	Adds port information to the access data (such as IP address) that is specified in and inherited from RemoteServiceAccessPoint.

Switch Partitioning Subprofile

The Switch Partitioning subprofile is used when a switch is implemented for multiple instances of a profile. The instances of the profile can be a mix of Switch profile and a different profile or a Switch Profile and a Extender Profile. The switch representing the entire set of systems is called the Partitioning System and the system that it is hosting is called the Partitioned System. For virtual fabrics, ANSI T11 calls the partitioning system the Core Switch and the partitioned system the Virtual Switch. Figure 2-4 shows the switch partitioning subprofile.

Figure 2-4 Switch Partitioning Subprofile

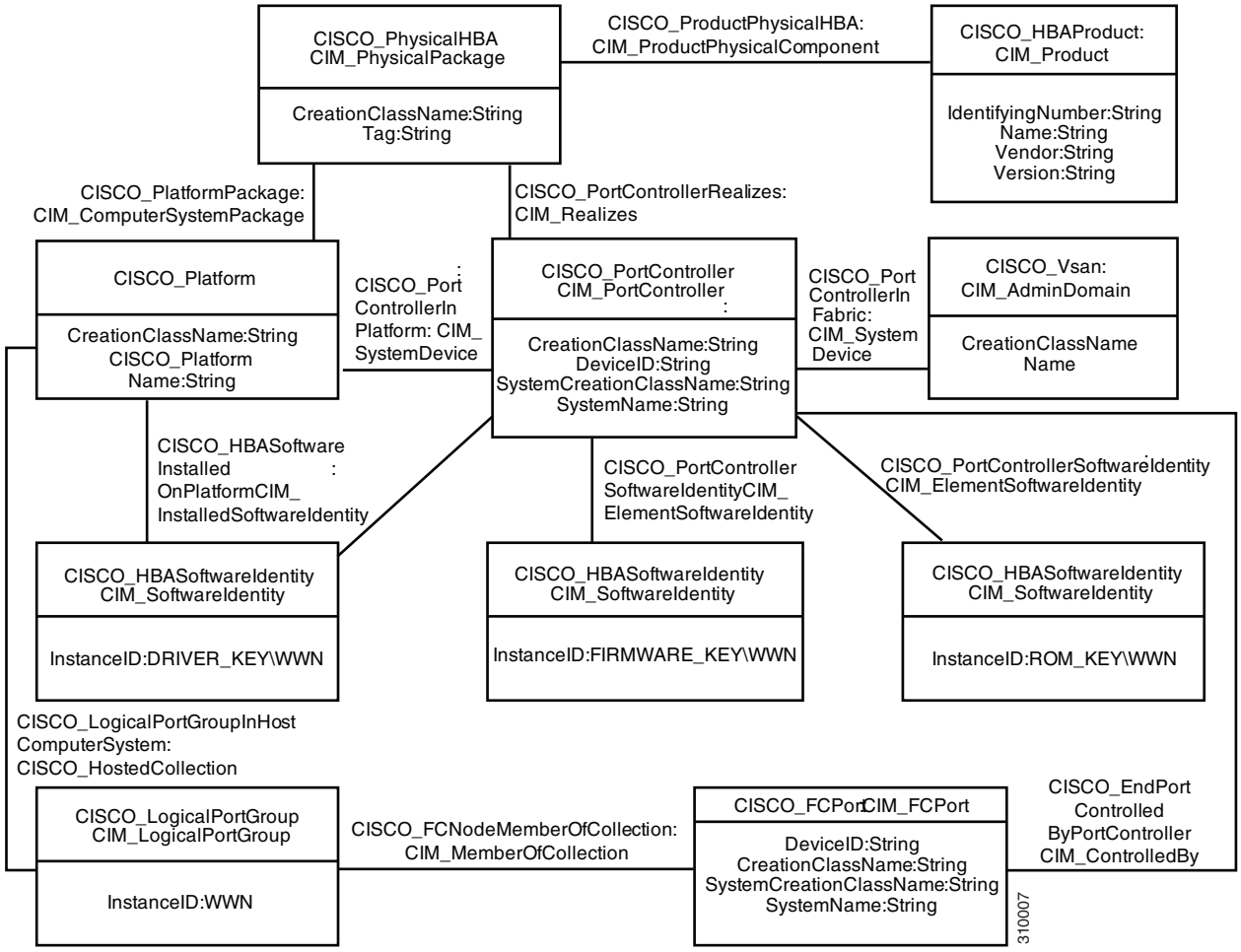


Table 2-5 shows how to use the classes and association classes of Switch Partitioning subprofile.

Table 2-5 CIM Elements for FabricSwitchPartitioning

Class	How Used
CISCO_PhysicalComputerSystem:CISCO_ComputerSystem	The partitioning computer system (core switch).
CISCO_LogicalComputerSystem:CISCO_ComputerSystem	The partitioned computer system that acts like switch (virtual switch).

Table 2-5 CIM Elements for FabricSwitchPartitioning (continued)

Class	How Used
CISCO_LogicalComputerSystemsInAdminDomain:CISCO_Component	Associates `CISCO_AdminDomain` and `CISCO_LogicalComputerSystem`.
CISCO_LogicalForPhysicalComputerSystem:CISCO_HostedDependency	Associates the partitioning computer system and partitioned computer system.
CISCO_LogicalSwitchElementCapabilities:CISCO_ElementCapabilities	Represents the association between managed elements and their capabilities.
CISCO_LogicalSwitchInstalledSoftwareIdentity : CISCO_InstalledSoftwareIdentity	Associates `CISCO_LogicalComputerSystem` and `CISCO_LogicalSwitchSoftwareIdentity`.
CISCO_LogicalSwitchSoftwareIdentity:CISCO_SoftwareIdentity	Software details of the logical switch.
CISCO_LogicalSwitchSettingData:CISCO_ElementSettingData	Associates `CISCO_LogicalComputerSystem` and `CISCO_FCLogicalSwitchSettings`.
CISCO_FCLogicalSwitchSettings:CIM_FCSwitchSettings	Depicts the switch settings class.
CISCO_ProtocolEndPointLogicalComputerSystem	Associates `CISCO_LogicalComputerSystem` and `CISCO_ProtocolEndPoint`.
CISCO_SwitchHostedFCIPAccessPoint:CIM_HostedAccessPoint	Associates `CISCO_LogicalComputerSystem` and `CISCO_FCIPProtocolEndPoint`.
CISCO_SwitchHostedIPAccessPoint: CIM_HostedAccessPoint	Associates `CISCO_LogicalComputerSystem` and `CISCO_IPProtocolEndPoint`.
CISCO_SwitchHostedTCPAccessPoint: CIM_HostedAccessPoint	Associates `CISCO_LogicalComputerSystem` and `CISCO_TCPProtocolEndPoint`.
CISCO_VsanComputerSystemComponent : CISCO_Component	Associates `CISCO_LogicalComputerSystem` and `CISCO_Vsan`.
CISCO_ZoneInLogicalComputerSystem :CISCO_HostedCollection	Associates `CISCO_LogicalComputerSystem` and `CISCO_Zone`.
CISCO_ZoneSetInLogicalComputerSystem : CISCO_HostedCollection	Associates `CISCO_LogicalComputerSystem` and `CISCO_ZoneSet`.
CISCO_FCPortsInLogicalComputerSystem:CISCO_SystemDevice	Associates `CISCO_LogicalComputerSystem` and `CISCO_LogicalFCPort`.
CISCO_HostComputerSystem : CISCO_ComputerSystem	The partitioned computer system which acts like the host (the host computer).
CISCO_EndPortsInHostComputerSystem:CISCO_SystemDevice	Associates `CISCO_HostComputerSystem` and `CISCO_EndPort`.
CISCO_HostComputerSystemsInAdminDomain:CISCO_Component	Associates `CISCO_HostComputerSystem` and `CISCO_admindomain`.
CISCO_LogicalPortGroupInHostComputerSystem:CISCO_HostedCollection	Associates `CISCO_HostComputerSystem` and `CISCO_LogicalPortGroup`.
CISCO_ProtocolEndPointHostComputerSystem:CISCO_HostedAccessPoint	Associates `CISCO_HostComputerSystem` and `CISCO_ProtocolEndPoint`.
CISCO_EndPort:CIM_FCPort	Identifies the switch port that connects to the host.
CISCO_EndPortControlledByPortController:CIM_ControlledBy	This association represents the relationship between an end port and `CIM_PortControllerclass`.

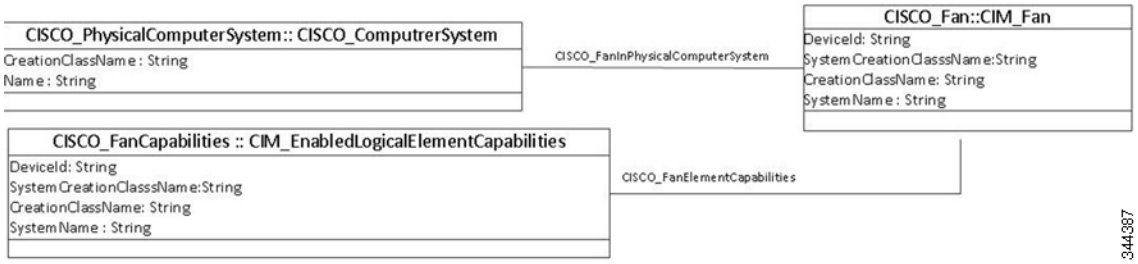
Table 2-5 CIM Elements for FabricSwitchPartitioning (continued)

Class	How Used
CISCO_EndPortSAPImplementation:CISCO_DeviceSAPImplementation	This association represents the relationship between an end port and `CISCO_ProtocolEndPoint`.
CISCO_FCNodeMemberOfCollection:CIM_MemberOfCollection	This association represents the relationship between an end port and `CISCO_LogicalPortGroup`.
CISCO_LogicalFCPort:CIM_FCPort	Fibre Channel port in the logical computer system.
CISCO_FCPortSAPImplementation:CISCO_DeviceSAPImplementation	Associates `Cisco_Logicalfcport` and `CISCO_ProtocolEndPoint`.
CISCO_FCPortsInLogicalComputerSystem:CISCO_SystemDevice	Associates `Cisco_logicalfcport` and `CISCO_LogicalComputerSystem`.
CISCO_LogicalFCPortForFCPort:CISCO_HostedDependency	Associates `Cisco_logicalfcport` and `CISCO_FCPort`.

Fan Profile

The fan profile describes the fan management in the switch.This profile includes classes which model for fan capabilities, fan relationship with switches, and its status. Figure 2-5 displays the fan profile.

Figure 2-5 Fan Profile



Power Supply Profile

The power profile describes the power supply management in the switch.This profile includes classes which model for power supply capabilities, power supply relationship with switches, and its status. Figure 2-6 displays the power supply profile.

Figure 2-6 Power Supply Profile

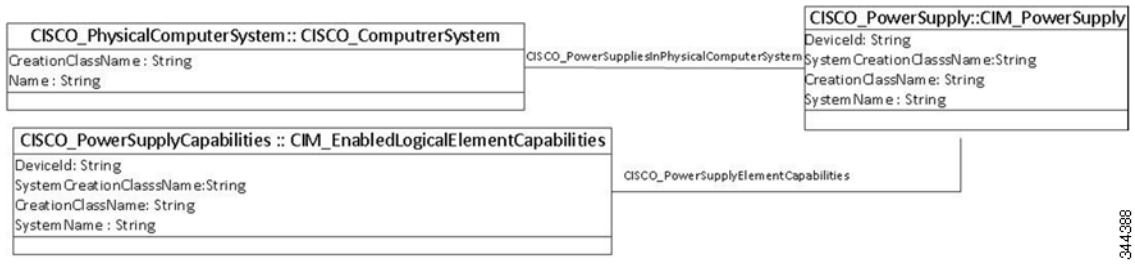


Table 2-6 shows how to use the classes and association classes of the Fan and Power Supply profile.

Table 2-6 CIM Elements for Fan and Power Supply Profile

Class	How Used
CISCO_Fan::CIM_Fan	Represents the fan in the physical switch.
CISCO_FanCapabilities::CIM_Enabled LogicalElementCapabilities	Represents the capabilities of the fan.
CISCO_FanElementCapabilities::CISCO_ElementCapabilties	Associates between the fan and its capabilities.
CISCO_FansInPhysicalComputerSystem::CISCO_SystemDevice	Associates between the fan and PhysicalComputerSystem.
CISCO_PowerSupply::CIM_PowerSupply	Represents the Power Supply in the physical switch.
CISCO_ PowerSupplyCapabilities::CIM_Enabled LogicalElementCapabilities	Represents the capabilities of PowerSupply.
CISCO_ PowerSupplyElementCapabilities:: CISCO_ElementCapabilties	Associates between the PowerSupply and its capabilities.
CISCO_PowerSuppliesInPhysicalComputerSystem::CISCO_SystemDevice	Associates between the PowerSupply andthe PhysicalComputerSystem.

Fabric Profile

A fabric is composed of one or more switches and network elements interconnected in a SAN. The Fabric profile models the physical and logical aspects of the fabric containing the SAN switches listed by the Switch profile.

The SAN and fabrics are represented in CIM by the AdminDomain. SAN contains one or more fabrics, which are modeled as AdminDomains. For Fibre Channel fabrics, the identifier (AdminDomain.Name) is the fabric WWN which is the switch name of the principal switch. The AdminDomain for the Fibre Channel fabric has a NameFormat of WWN. Fabrics can contain one or more virtual SANs (VSANs). Figure 2-7 shows the fabric profile for zone sets. Figure 2-8 shows the fabric profile for the host computer system. Figure 2-9 shows the fabric profile for storage computer system. Figure 2-10 shows the fabric profile for port.

Figure 2-7 Fabric Profile for Zonest

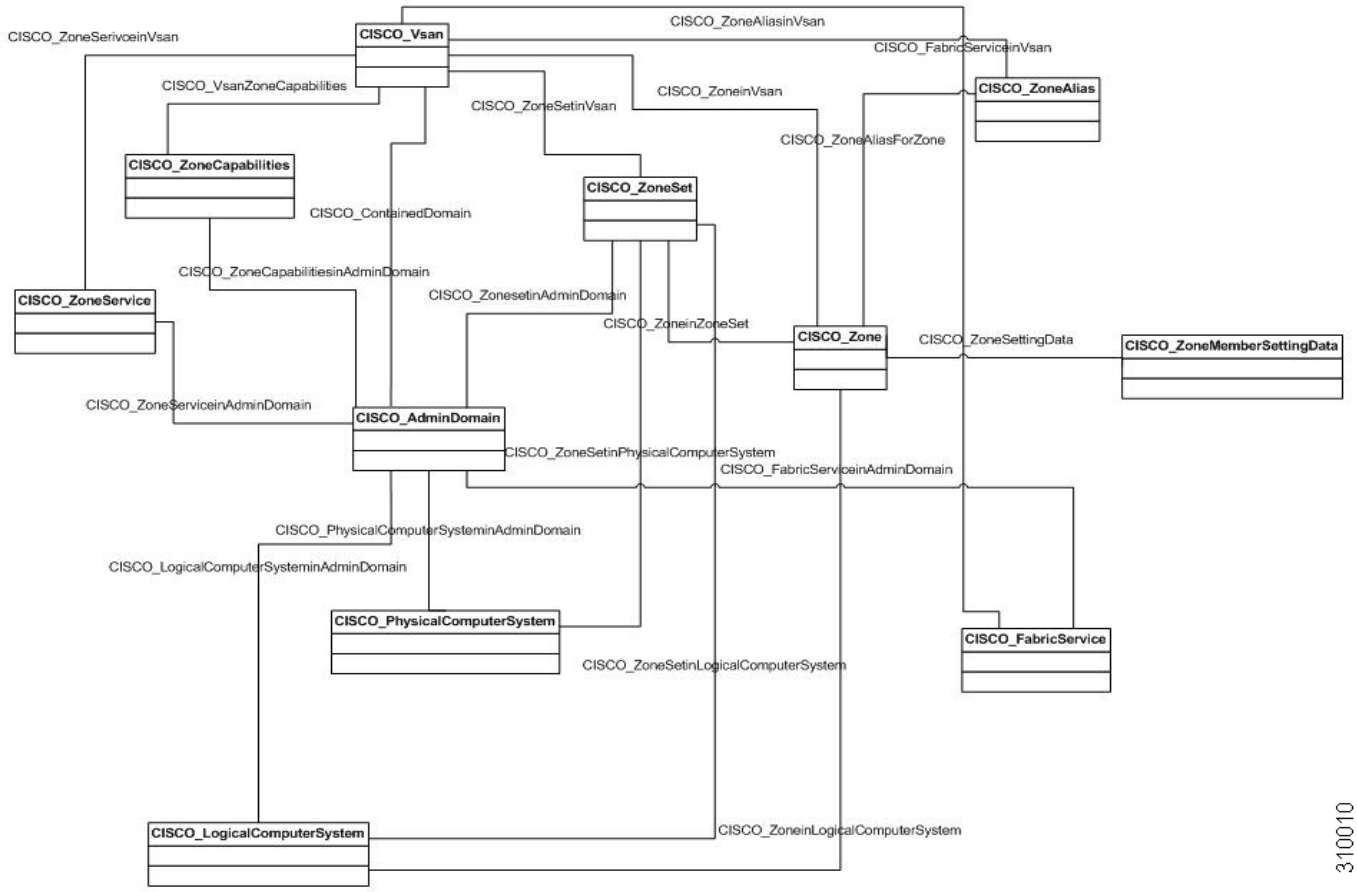


Figure 2-8 Fabric Profile for Host Computer System

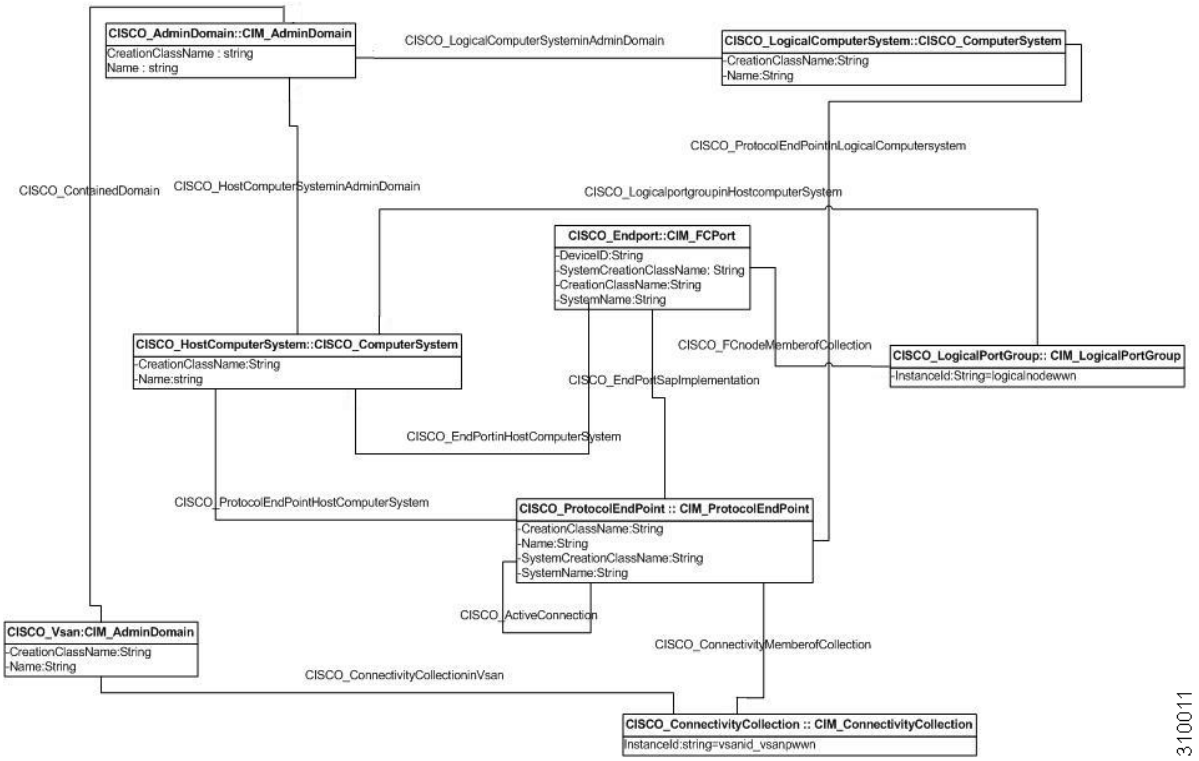


Figure 2-9 Fabric Profile for Storage Computer System

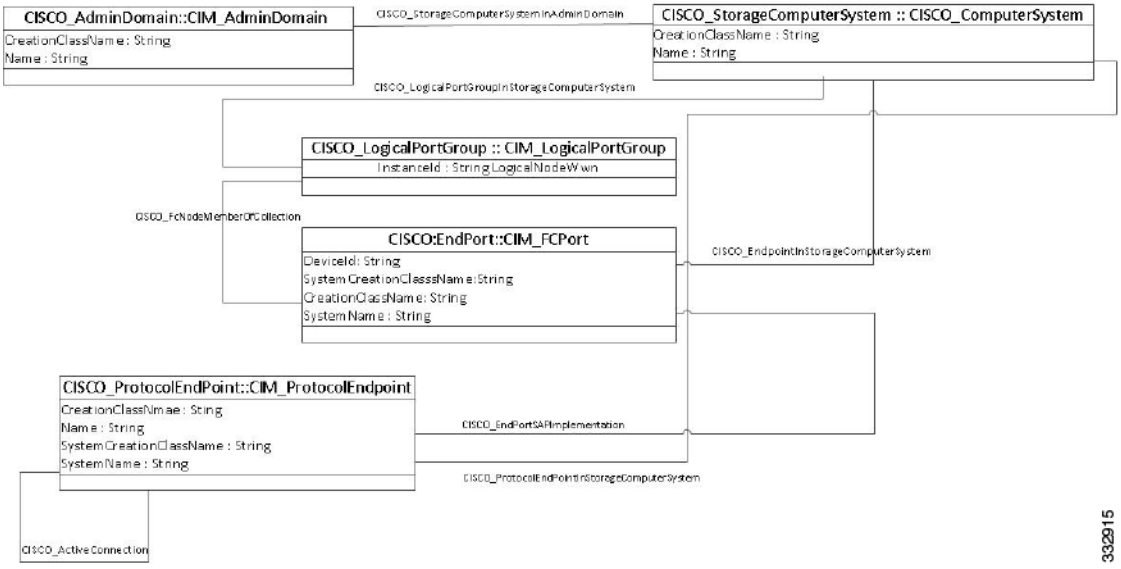


Figure 2-10 Fabric Profile for Port

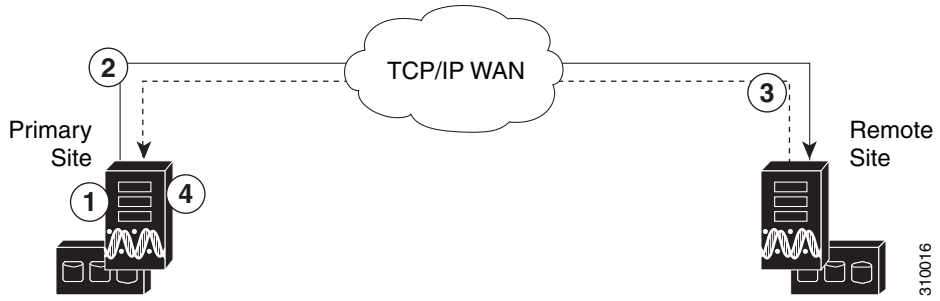


Table 2-7 shows how to use the classes and association classes of the Fabric profile.

Table 2-7 CIM Elements for Fabric

Class	How Used
`CISCO_ActiveConnection :CIM_ActiveConnection`	Associates a connection that is currently communicating or is configured to communicate between two ServiceAccessPoints.
`CISCO_AdminDomain:CIM_AdminDomain`	AdminDomain representing the SAN.
`CISCO_FCIPPEBasedOn:CISCO_Component`	Establishes membership relationships between a FCIP profile and the FCIP protocol end points within a switch.
`CISCO_HostComputerSystemsInAdminDomain:CISCO_Component`	Associates `CISCO_AdminDomain` and `CISCO_HostComputerSystem`.
CISCO_PhysicalComputerSystemsInAdminDomain:CISCO_Component	Associates `CISCO_AdminDomain` and `CISCO_PhysicalComputerSystem`.
CISCO_LogicalComputerSystemsInAdminDomain:CISCO_Component	Associates `Cisco_LogicalComputerSystem` and `Cisco_AdminDomain`.
CISCO_ConnectivityCollection:CIM_ConnectivityCollection	Collects the protocol endpoints of the fabric.
CISCO_ContainedDomain :CIM_ContainedDomain	Associates a fabric (Cisco_Vsan) to a SAN (CISCO_AdminDomain).
CISCO_VsanZoneCapabilities:CISCO_ElementCapabilities	Represents zone capabilities in the VSAN.
CISCO_EthernetPortProtocolEndpoint:CIM_DeviceSAPImplementation	Associates the Ethernet port to the LAN end point.
CISCO_FCPortProtocolEndPoint:CIM_DeviceSAPImplementation	Associates the Fibre Channel port to the FCIP end point.
CISCO_ZoneInPhysicalComputerSystem:CISCO_HostedCollection	Represents active and local zones of the switch. Active zones in all VSAN in which the switch is participating are considered. Local zones in the particular switch is represented.
CISCO_ZoneInLogicalComputerSystem:CISCO_HostedCollection	Associates zone (active and inactive) and `CISCO_logicalcomputersystem`.
CISCO_ZoneAliasInVsan :CISCO_ZoneHostedCollection	Represents the zone alias in the VSAN.
CISCO_ZoneInVsan : CISCO_ZoneHostedCollection	Displays the active zones in VSAN and the local zones in switches.

Table 2-7 CIM Elements for Fabric (continued)

Class	How Used
CISCO_LogicalPortGroup :CIM_LogicalPortGroup	Collection of one or more ports that are logically grouped for administrative and discovery or topology purposes. Logical port groups define port collections for access control or for use in routing policy or other management tasks.
CISCO_FCNodeMemberOfCollection:CIM_MemberOfCollection	Associates `CISCO_LogicalPortGroup` with endport.
CISCO_ZoneAliasForZone :CISCO_ZoneMemberOfCollection	Associates `Cisco_zonealias` and `Cisco_zone`.
CISCO_ZonesInZoneSet:CISCO_ZoneMemberOfCollection	Represents the zones present in the zone set.
CISCO_ZoneSetInPhysicalComputerSystem:CISCO_HostedCollection	Displays the active and local zone sets in all the VSANs in which the switch is participating.
CISCO_ZoneSetInVsan:CISCO_ZoneHostedCollection	Displays the active zone set in the VSAN. Displays the local zone set in all the switches present in the VSAN.
CISCO_ZoneSetInAdminDomain:CISCO_ZoneHostedCollection	Displays the zone set in admin domain which is the zone set present in the default VSAN (vsan 1).
CISCO_ZoneSetInLogicalComputerSystem:CISCO_HostedCollection	Displays the active and local zone sets in the VSAN (logical switch) in which the switch is participating.
CISCO_Zone:CIM_Zone	A zone is a group of ports, end points, nodes, zones, and namedAddressCollections that are managed collectively by the fabric. A zone indicates a set of members that are participating together in the fabric.
CISCO_ZoneSet:CIM_ZoneSet	ZoneSet is a group of zones that are managed collectively by the fabric. The zones are under enforcement by the fabric, only if the zone set is set to active. It displays all the active and local zone sets throughout the fabric. At any time, only one zone set is active in a VSAN.
CISCO_ZoneCapabilities :CIM_ZoneCapabilities	Exposes the capabilities for zoning of an AdminDomain.
CISCO_ZoneMemberSettingData:CIM_ZoneMembershipSettingData	Provides the identification criteria for possible zone and zone alias members. Thirteen different zone members are supported.
CISCO_ZoneSettingData :CISCO_ElementSettingData	Displays the zone member setting data of the selected zone instance, depending on whether it is an active or local instance.
CISCO_FabricServiceInVsan:CISCO_HostedService	Associates `Cisco_FabricService` and `Cisco_VSAN`.
CISCO_FabricService:CIM_Servic	Allows all of the fabric configuration changes.
CISCO_FabricServiceInAdminDomain:CISCO_HostedService	Association between `Cisco_FabricService` and `Cisco_AdminDomain`.
CISCO_StorageComputerSystem:CISCO_ComputerSystem	Represents target in the fabric.
CISCO_EndPort:CIM_FcPort	Identifies the switch port that connects to the host.
CISCO_ProtocolEndPoint:CIMProtocolEndPoint	A communication point from which data can be sent or received. ProtocolEndpoints link system or computer interfaces to LogicalNetworks.

Table 2-7 CIM Elements for Fabric (continued)

Class	How Used
CISCO_StorageComputerSystemsInAdminDomain :CISCO_Component	Associates CISCO_AdminDomain and `CISCO_StorageComputerSystem`.
CISCO_EndPortsInStorageComputerSystem:CISCO_SystemDevice	Associates `CISCO_StorageComputerSystem` and `CISCO_EndPort`.
CISCO_ProtocolEndPointStorageComputerSystem:CISCO_HostedAccessPoint	Associates `CISCO_StorageComputerSystem` and `CISCO_ProtocolEndpoint`.
CISCO_FcNodeMemberOfCollection:CIM_MemberOfCollection	Associates `CISCO_LogicalPortGroup` and `CISCO_EndPort`.
CISCO_EndPortSAPImplementation:CISCO_DeviceSAPImplementation	Asscoiates `CISCO_EndPort` to the protocol end point.

N Port Virtualizer Profile

N port virtualization (NPV) reduces the number of Fibre Channel domain IDs in DCNM-SAN. Switches operating in NPV mode are not part of the fabric and pass traffic between NPV core switch links and end devices and eliminates the domain IDs for these edge switches.

NPV integrates all locally connected N ports into one or more external NP links, which shares the domain ID of the NPV core switch among multiple NPV switches. NPV also allows multiple devices to add to the same port on the NPV core switch, which reduces the need for more ports on the core.

Figure 2-11 N Port Virtualizer Profile

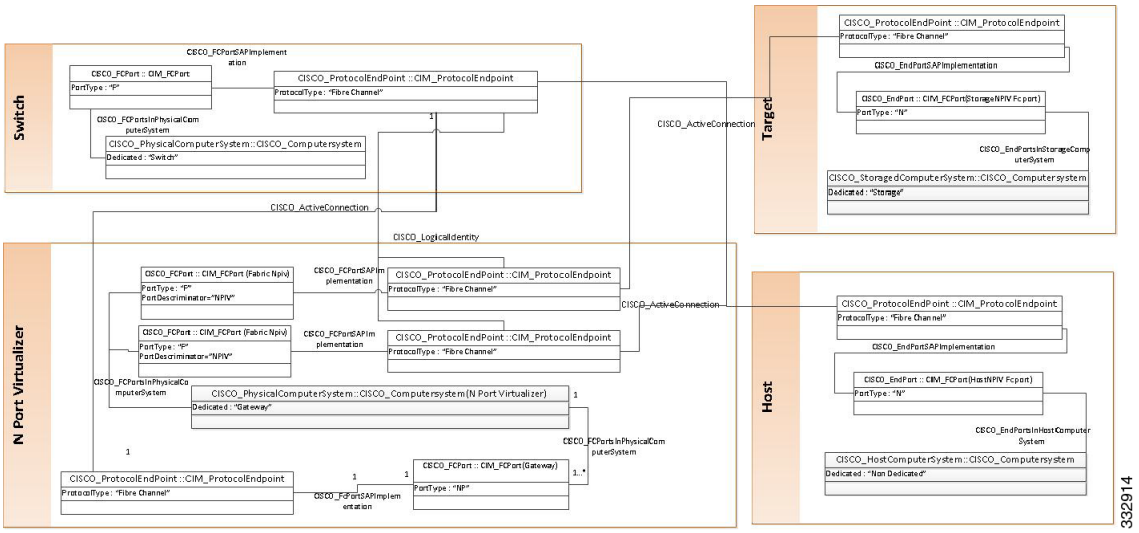


Table 2-8 shows how to use the classes and association classes of the N Port Virtualizer profile.

Table 2-8 CIM Elements for N Port Virtualizer Profile

Class	How Used
CISCO_PhysicalComputerSystemsInAdminDomain : CISCO_Component (N Port Virtualizer to Fabric)	Aggregates N Port Virtualizers in the AdminDomain that represents the fabric.
CISCO_PhysicalComputerSystem:CISCO_ComputerSystem (N PortVirtualizer)	The computer system representing the N Port Virtualizer.
CISCO_PhysicalComputerSystem:CISCO_ComputerSystemPackage (N Port Virtualizer to Physical Package)	This class is required if the Switch profile is implemented. Associates PhysicalPackage to the ComputerSystem (N Port Virtualizer).
CISCO_FCPortSAPImplementation:CISCO_DeviceSAPImplementation (ProtocolEndpoint to Gateway FCPort)	Associates the N Port Virtualizer Gateway FC port to its ProtocolEndpoint.
CISCO_FCPortSAPImplementation:CISCO_DeviceSAPImplementation (ProtocolEndpoint to NPIV FCPort)	Associates the N Port Virtualizer NPIV FC port to its ProtocolEndpoint.
CISCO_ActiveConnection: CIM_ActiveConnection(Gateway)	The association between ProtocolEndpoints representing the links between Fibre Channel switch ports and N Port Virtualizer gateway ports that are used to create active connections between platform and switch ports.
CISCO_ActiveConnection: CIM_ActiveConnection(N Port Virtualiztion)	The association between ProtocolEndpoints representing the links between Fibre Channel platform ports and switch ports that are created through an N Port Virtualizer.
CISCO_FCPort: CIM_FCPort (Fabric NPIV)	NPIV Fibre Channel ports of the N Port Virtualizer.
CISCO_FCPort: CIM_FCPort (Gateway)	A Fibre Channel port of the N Port Virtualizer that is used to connect to the switch.
Class CISCO_ProtocolEndPointLogicalComputerSystem :CISCO_HostedAccessPoint (N Port Virtualizer System to protocolEndpoint)	Associates the ProtocolEndpoint to the N Port Virtualizer ComputerSystem.
CISCO_LogicalIdentity: CIM_LogicalIdentity	Associates ProtocolEndpoints of N Port Virtualizer NPIV FC ports to ProtocolEnpoints of Switch FC ports.
CISCO_ProtocolEndPoint:CIMProtocolEndPoint(N Port Virtualizer)	The endpoint of a link (ActiveConnection) on the N Port Virtualizer.

Table 2-8 CIM Elements for N Port Virtualizer Profile (continued)

Class	How Used
CISCO_FCPortsInPhysicalComputerSystemextends CISCO_SystemDevice (Gateway FCPort to Gateway System)	Associates N Port Virtualizer Gateway FC ports to the `ComputerSystem` (N Port Virtualizer).
CISCO_FCPortsInPhysicalComputerSystemextends CISCO_SystemDevice(N Port Virtualizer NPIV FCPort to Gateway System	Associates N Port Virtualizer NPIV FC ports to the `ComputerSystem` (N Port Virtualizer).

FDMI Profile

The Fabric Device Management Interface (FDMI) manages host bus adapters (HBA) through the fabric and complements data in the Fabric Profile. It allows any entity in the fabric to expose the HBA information through the SMI without having an agent resident on the host containing the HBA. The Fabric Profile only addresses HBA type devices. The HBA Management Interface defined by FDMI is a subset of the interface defined by the Fibre Channel HBA API specification.

Figure 2-12 shows the FDMI subprofile instance diagram. The classes are defined in CISCO_HBA.mof. If the FDMI- enabled HBA supports the Host name, then CISCO_PortController associates to a platform through CISCO_PortControllerInPlatform. If the FDMI-enabled HBA does not support the host name, then CISCO_PortController associates to a fabric through CISCO_PortControllerInFabric.

Figure 2-12 FDMI Subprofile

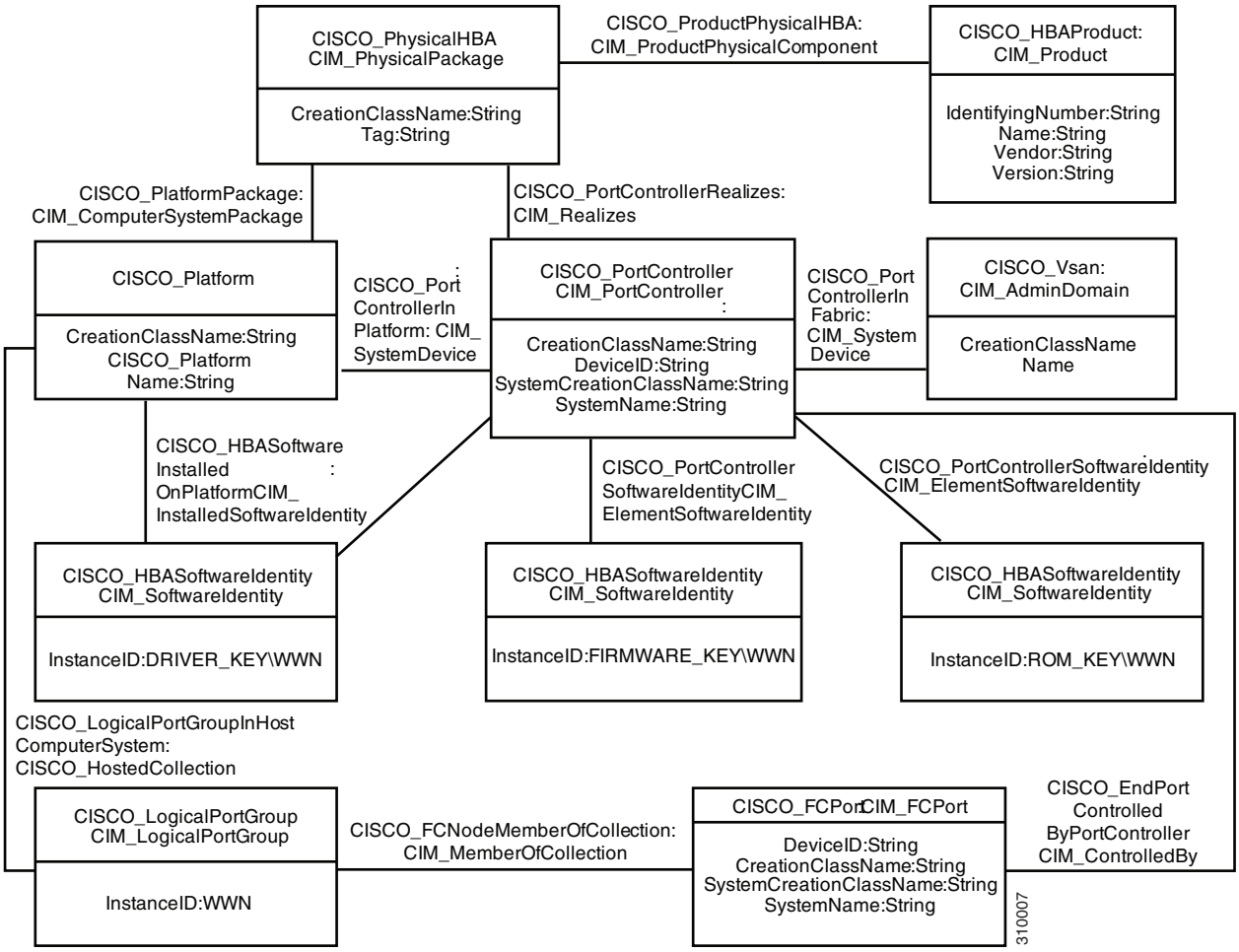


Table 2-9 shows how to use the classes and association classes of the FDMI subprofile.

Table 2-9 CIM Elements for FDMI

Class	How Used
`CISCO_Platform:CIM_ComputerSystem`	Represents a fabric-connected entity, containing one or more Node objects, that has registered with a fabric's Management Server service. This class also represents the HBA host.
`CISCO_HBASoftwareInstalledOnPlatform:CIM_InstalledSoftwareIdentity`	Allows identification of the platform on which HBA driver is installed.
`CISCO_PlatformHostedSANAccessPoint:CIM_HostedAccessPoint`	Associates a `ProtocolEndPoint` and the platform provided. Each platform can host many `ProtocolEndPoints`.
`CISCO_PlatformPackage:CIM_ComputerSystemPackage`	Denotes one or more physical HBAs that recognizes a platform.
CISCO_PortController:CIM_PortController	Represents the port controller of an FDMI-enabled HBA. PortController is a logical device corresponding to a hardware network port controller. Port controllers provide various features depending on their types and versions.

Table 2-9 CIM Elements for FDMI (continued)

Class	How Used
CISCO_PortControllerInPlatform:CIM_SystemDevice	Defines a `SystemSpecificCollection` in the context of a scoping system. The node registered in the platform database must also be registered in the Name Server.
CISCO_EndPortControlledByPortController:CIM_ControlledBy	Represents the relationship between a `Cim_Portcontroller`, which depicts the control services of the port to `CIM_EndPort`.
CISCO_PortControllerSoftwareIdentity:CIM_ElementSoftwareIdentity	Associates any software that is associated with the port controller.
CISCO_EndPort:CIM_FCPort	Models the switch FC port that connects to the host.
CISCO_EndPortsInHostComputerSystem:CISCO_SystemDevice	Identifies end ports in host device.
CISCO_FCNodeMemberOfCollection:CIM_MemberOfCollection	Associates FCPort (end port) to the `LogicalPortGroup`.
CISCO_LogicalPortGroup:CIM_LogicalPortGroup	A collection of one or more ports that are logically grouped for administrative and discovery or topology purposes. LogicalPortGroups define port collections for access control, or for use in routing policy or other management tasks.
CISCO_LogicalPortGroupInHostComputerSystem:CISCO_HostedCollection	Associates the `LogicalPortGroup` (Fibre Channel node) to the hosting system.
CISCO_PhysicalHBA:CIM_PhysicalPackage	Represents an FDMI-enabled physical HBA card attached to a switch.
CISCO_PortControllerRealizes:CIM_Realizes	Defines the mapping between devices and the physical elements that implement them.
CISCO_ProductPhysicalHBA: CIM_ProductPhysicalComponent	Associates `HBAproduct` with `physicalHBA`.
CISCO_PortControllerInFabric:CIM_SystemDevice	Defines a SystemSpecificCollection in the context of a scoping system. This association is created if `CISCO_PortController` cannot be scoped within `CISCO_Platform`.
CISCO_HBAProduct:CIM_Product	Represents product information of an FDMI-enabled physical HBA card attached to a switch.

Virtual Fabrics Subprofile

Fibre Channel SANs can logically separate the hardware into multiple fabrics and keep them physically interconnected. The term for this technology is defined by ANSI T11 as virtual fabrics. ANSI T11 identifies the hardware as core switches.

To be consistent with more DMTF schematics, the Virtual Fabrics subprofile names the partitioning systems. ANSI T11 identifies the switching construct that resides in the partitioning system as the virtual switch. The Fabric profile provides the option to discover virtual fabrics and virtual switches. The Virtual Fabrics subprofile provides the option to discover the underlying partitioning system. The Switch Partitioning subprofile provides the method to configure the partitioning system. Figure 2-13 shows the virtual fabrics subprofile.

Figure 2-13 Virtual Fabrics Subprofile

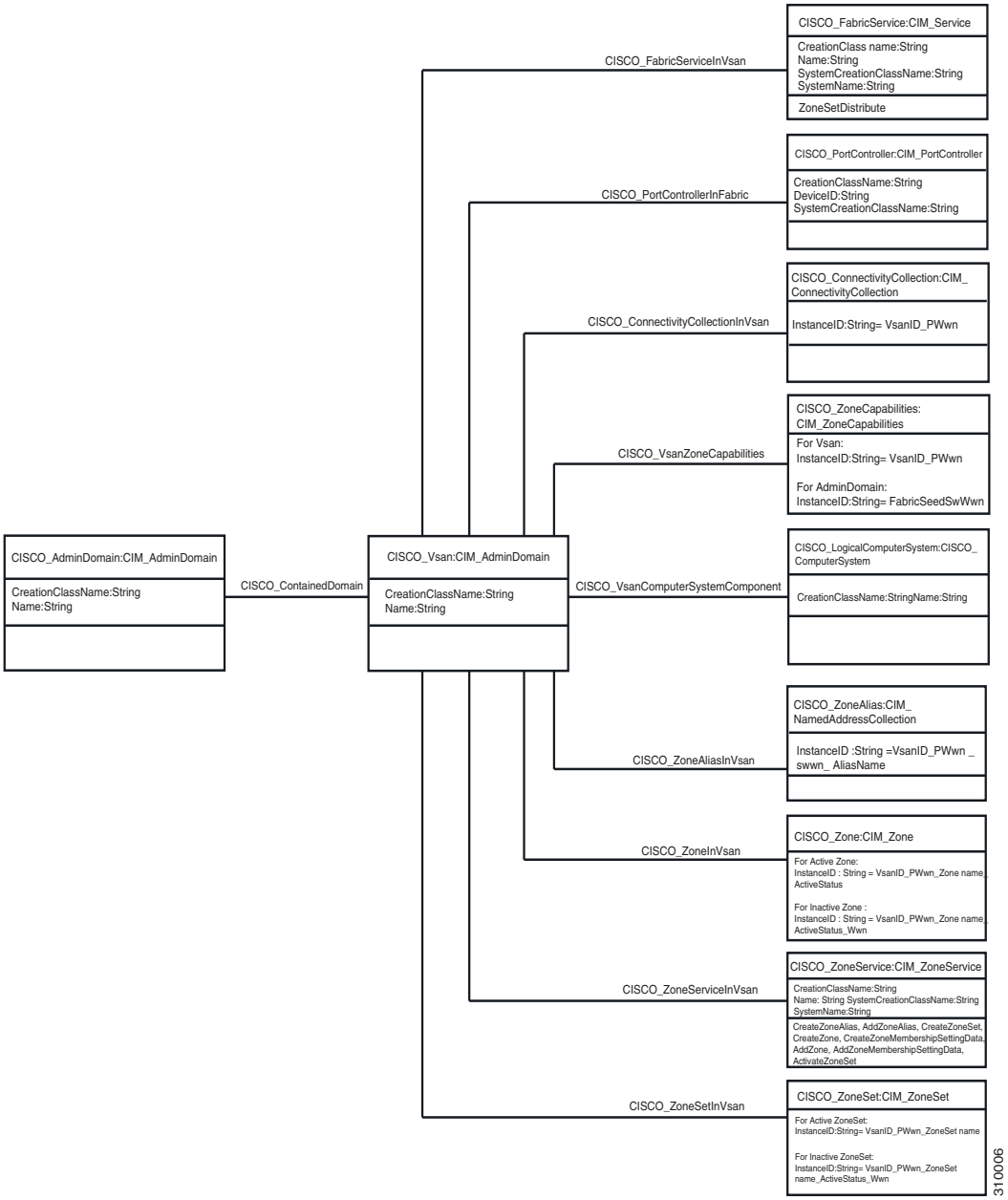


Table 2-10 shows how to use the classes and association classes of theVirtual Fabrics subprofile.

Table 2-10 CIM Elements for Virtual Fabrics

Class	How Used
`CISCO_Vsan:CIM_AdminDomain`	AdminDomain representing the SAN.
`CISCO_ConnectivityCollectionInVsan:CISCO_HostedCollection`	Associates `Cisco_vsan` and `CISCO_ConnectivityCollection`.

Table 2-10 CIM Elements for Virtual Fabrics (continued)

Class	How Used
CISCO_ContainedDomain:CISCO_HostedCollection	Associates Cisco_vsan and Cisco_admindomain.
CISCO_FabricServiceInVsan :CISCO_HostedService	Associates Cisco_vsan and CISCO_FabricService.
CISCO_PortControllerInFabric:CIM_SystemDevice	Associates Cisco_vsan and CISCO_PortController.
CISCO_VsanComputerSystemComponent:CISCO_Component	Associates Cisco_vsan and CISCO_LogicalComputerSystem.
CISCO_VsanZoneCapabilities:CISCO_ElementCapabilities	Represents the association between ManagedElements and their capabilities.
CISCO_ZoneAliasInVsan:CISCO_ZoneHostedCollection	Associates Cisco_vsan and CISCO_ZoneAlias.
CISCO_ZoneInVsan:CISCO_ZoneHostedCollection	Associates Cisco_vsan and CISCO_Zone.
CISCO_ZoneServiceInVsan:CISCO_HostedService	Associates Cisco_vsan and CISCO_ZoneService.
CISCO_ZoneSetInVsan:CISCO_ZoneHostedCollection	Associates Cisco_vsan and CISCO_ZoneSet.

Enhanced Zoning and Enhanced Zoning Control Subprofile

This profile describes the additional zoning functions for enhanced zoning. Sessions are normally part of enhanced zoning, but are included in the base fabric profile to address the various types of zoning operations into a single object model. Figure 2-14 shows a enhanced zoning and enhanced zoning control.

Table 2-11 shows how to use the classes and association classes of Enhanced Zoning and Enhanced Zoning Control subprofile.

Table 2-11 CIM Elements for Enhanced Zoning and Enhanced Zoning Control

Class	How Used
CISCO_ZoneAliasSettingData:CISCO_ElementSettingData	Associates ZoneMembershipSettingData to ZoneAlias.
CISCO_ZoneAliasInVsan:CISCO_ZoneHostedCollection	Associates the zone alias to the AdminDomain.
CISCO_ZoneAliasForZone:CISCO_ZoneMemberOfCollection	Associates the zone alias with zone.
CISCO_ZoneAlias:CIM_NamedAddressCollection	Depicts zone alias.
CISCO_ZoneService:CIM_ZoneService	Allows all of the zoning configuration changes.

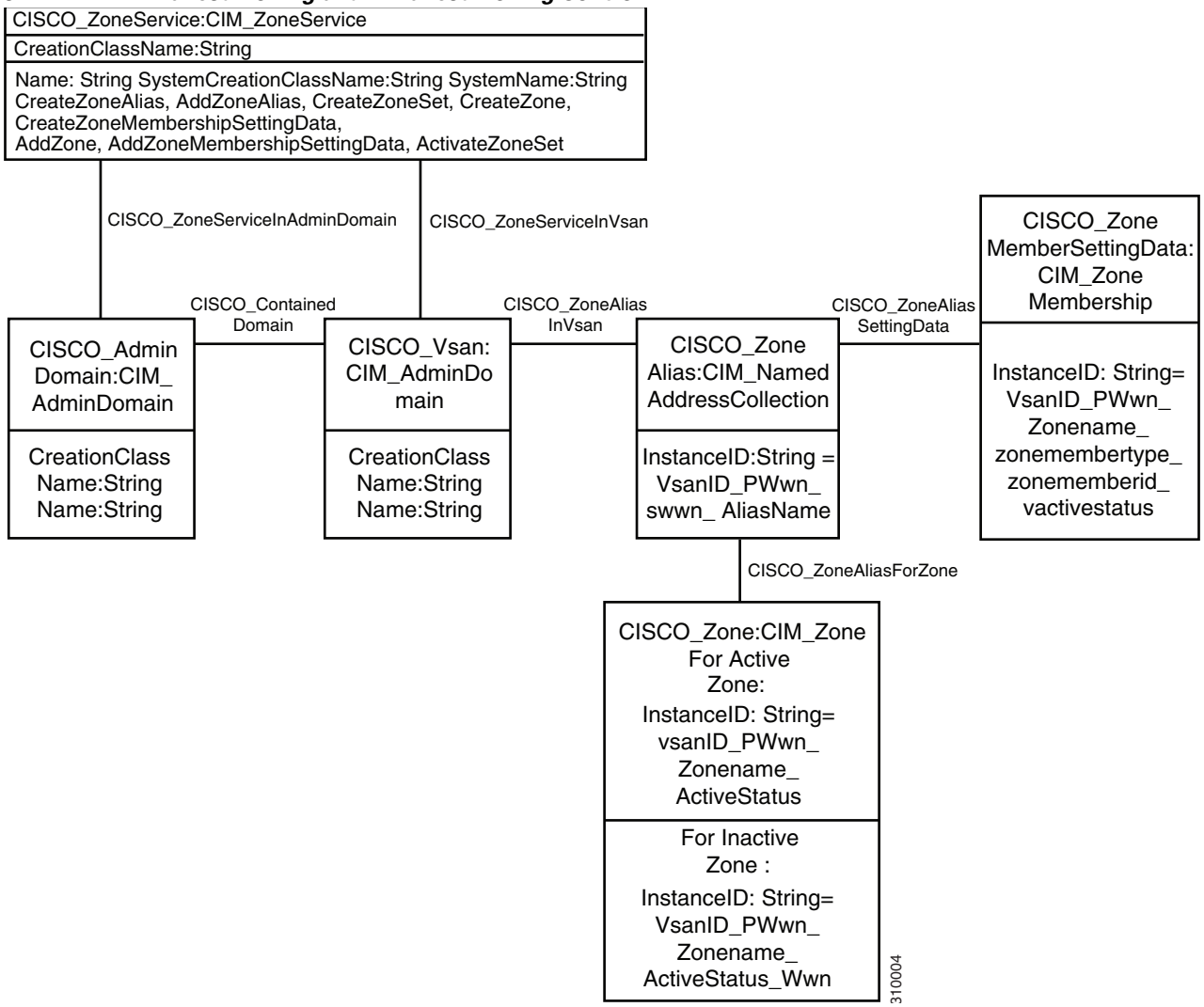
Extrinsic methods for this subprofile are as follows:

- CreateZoneAlias—Creates a ZoneAlias in the principal switch of the selected VSAN.
- AddZoneAlias—Adds the ZoneAlias to the zone.

Intrinsic methods for this subprofile are as follows:

- Delete zonealias—Deletes a zone alias.

Figure 2-14 Enhanced Zoning and Enhanced Zoning Control



Zone Control Subprofile

This profile includes extrinsic methods for creating zone sets, zones, and zone members (see Figure 2-14) and adding zones to zone sets and zone members to zones. SMI-S also defines intrinsic methods for the removing of zone members from zones and zone aliases, zones from zone sets, and deleting zone members, zones, and zone sets.

Table 2-12 shows how to use the classes and association classes of the Zone Control subprofile.

Table 2-12 CIM Elements for Zone Control

Class	How Used
`CISCO_ZoneServiceInAdminDomain:CISCO_HostedService`	Associates the `ZoneService` to the `AdminDomain` representing the fabric.

Table 2-12 CIM Elements for Zone Control (continued)

Class	How Used
CISCO_ZoneServiceInVsan:CISCO_HostedService	Associates the ZoneService and the associated VSAN.
CISCO_ZoneService:CIM_ZoneService	Allows for all of the zoning configuration changes.

Extrinsic methods for this subprofile are as follows:

- CreateZoneSet—The method creates a zone set in the principal switch of the selected VSAN.
- CreateZone—The method creates a zone in the principal switch of the selected VSAN.
- CreateZoneMembershipSettingData—The method creates a zone member and adds it to the specified zone or zone alias depending on the value of the input parameter systemSpecificCollection.
- AddZone—This method adds a zone to a zone set on the principal switch of the selected VSAN.
- AddZoneMembershipSettingData—The method adds the zone member to the specified zone or zone alias depending on the value of the input parameter systemSpecificCollection.
- ActivateZoneSet—This method enables the activation of a zone set.

Intrinsic methods for this subprofile are as follows:

- Delete zoneset—Deletes a zone set.
- Delete zone—Deletes a zone.
- Delete Zonemember—Deletes a zone member.