DMTF Management Standards for Edge Virtual Bridging (EVB) and Network Port Profiles

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DMTF Platform Management Sub-Committee Chair
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Agenda

- DMTF Overview
- IEEE/DMTF Areas of Collaboration
- DMTF Standards for EVB Management and Network Port Profiles
- VM Lifecycle Management
- Open Virtualization Format (OVF)
- Network Port Profiles
- CIM Profiles for Virtual Networking
Distributed Management Task Force (DMTF)

- Develops management standards for enterprise and Internet environments

- Formed in 1992

- More than 4,000 active participants
  - from nearly 200 organizations in over 40 countries

- 3 Major committees and 25+ Working Groups/Forums
  - Committees: Technical, Marketing, Interoperability...

- Over a dozen Alliance Partners
  - SNIA, OGF/GGF, NGN, TMF, TCG, OASIS, etc.

- Developed standards & initiatives
  - CIM, CIM-XML, SMBIOS, CDM, ASF, SMASH, DASH, WS-Management...
DMTF Technology Diagram

Management Initiatives

"DMTF & Industry Management Initiatives"
(CDM, DASH, SMASH, SMI, VMAN)

WBEM – Web Based Enterprise Management

WEEM Protocols
(CIM-XML, WS-Management, SM CLP)

Profiles
(Systems, Devices, Software, ...)

CIM – Common Information Model

WEEM Infrastructure
(Operations, Events, Query Language, Registries...)

Server Hardware

OVF – Open Virtualization Format

Schema
CIM (Models, Classes, Properties, Methods)
& other Schema

CMDBf

CIM Infrastructure
(Meta Schema, Rules, MOF, ...)

DASH – Desktop and Mobile Architecture for System Hardware

SMASH – System Management Architecture for Server Hardware

SMBIOS

SMI – Storage Management Initiative

PMCI
(MCTP, FLDM, NC-SI)

VMAN – Virtualization Management

WS-Man – Web Services Based Management
Platform Management Sub-Committee Overview

- **Cloud Management Working Group (CMMWG)**
  - Focuses on management interfaces between cloud service/consumer and cloud provider

- **Physical Platform Profiles (PPP) WG**
  - Defines platform independent, interoperable, industry standard management data models, profiles and registries for the aspects of managing the physical aspects of platforms

- **System Virtualization, Partitioning, and Clustering (SVPC) WG**
  - Defines platform independent, interoperable, industry standard management data models, profiles, formats and registries for the aspects of managing the virtualization aspects of platforms

- **Server, Desktop, and Mobile Working Group (SDMMWG)**
  - Defines platform independent, interoperable, industry standard specifications for the management of server, desktop, and mobile platforms (owns DASH and SMASH wrapper specifications)

- **Platform Management Components Intercommunications (PMCI) WG**
  - Defines specifications for the “Inside the box” communication between components within the platform management subsystem

- **SMBIOS WG**
  - Defines SMBIOS specifications for low level platform asset information

- **Telco WG**
  - Defines specifications for the management of telecommunications systems, services, and applications
IEEE/DMTF Collaboration Areas

- **Network Port Profiles - SVPC WG**
  - Network Port Profile XML Schema
  - OVF Extensions for Network Port Profiles

- **Edge Virtual Bridge (EVB) Management - SVPC WG**
  - CIM Schema Enhancements for EVB
  - CIM Profiles for EVB Management
    - Virtual Ethernet Switch and Ethernet Port Resource Virtualization Profiles

- **Data Center Ethernet (DCE) Management – PPP WG**
  - CIM Schema Enhancements for DCE
    - Priority-Based Flow Control (PFC) and Enhanced Transmission Selection (ETS) Initially
  - CIM Profiles for DCE Management
    - Ethernet Port and Data Center Ethernet Port Profiles
1. GOAL 1: Define CIM-based data models to allow Management of Network and Storage Networking on the Virtualization Platform
2. GOAL 2: Define OVF extensions in support of Network and Storage Networking deployment on the Virtualization Platform
3. GOAL 3: Define Port Profile XML Schema, for describing VSI Network attributes
VM Lifecycle Management

Develop

Package, Distribute

Deploy

DMTF

Manage

Retire

Virtualization Admin

Deployment Configuration

Source

OVF Package

export

import

OVF Package

Open Virtualization Format (OVF) Scope

SVPC Management Profiles Scope

DMTF

CIM Server

Virtualization Management Service

CIM Client

Management Client

CIM-XML, WS-Management
Open Virtualization Format (OVF)

- **OVF**
  - A distribution format for VMs
  - Supports single VM & multiple VM configs
  - Optimized for distribution & simple automation
  - Vendor and platform independent

- **An OVF package consists of**
  - One OVF descriptor with extension .ovf
  - zero or one OVF manifest (w/ extension .mf)
  - zero or one OVF certificate (w/ extension .cert)
  - zero or more disk image files
  - zero or more additional resource files
    * such as ISO images

OVF Package (myapp.ova)

XML

myapp.ovf

myapp.mf

myapp.cert

web.xxx

images.iso
An OVF Example

<Envelope ...>...
  <VirtualSystemCollection>
    ... Description of VMs
    <VirtualSystem>
      ... Description of a VM
    </VirtualSystem>
  </VirtualSystemCollection>
</Envelope>

<DeploymentOptionSection>
  ... Description of Deployment configuration options
</DeploymentOptionSection>

<StartupSection>
  ... Description of startup sequence
</StartupSection>

<ProductSection>
  ... App Config
</ProductSection>

<EulaSection>
  ... Licensing Info
</EulaSection>

<DiskSection>
  ... Description of Virtual Disks
  <Disk ovf:id="webDisk"
       ovf:fileRef="web"
       ovf:capacity="..."/>
</DiskSection>

<NetworkSection>
  ... Description of VM connectivity
</NetworkSection>
**Network Port Profile**

Refers to a set of network attributes that can be applied to one or more virtual machines
Network Port Profile Use Case

- Network Infrastructure is not pre-provisioned
- Network switch accesses port profile DB during VM deployment
- Network Port profile info is in the OVF package
- VM Admin understands port profile metadata and schema
- VM admin/Manager applies port profile config during VM deployment
- At the deployment time, VM Admin/Manager does not access Port Profile DB
Network Port Profile and OVF

Port Profile DB

URI

OVF Package (myapp.ova)

networkportprofile.xml

myapp.ovf

myapp.mf

myapp.cert

web.xxx

images.iso

XML

OVF Package (myapp.ova)

myapp.ovf

myapp.mf

myapp.cert

web.xxx

images.iso

XML

OVF Package (myapp.ova)

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web.xxx

images.iso

XML

myapp.ova

networkportprofile.xml

myapp.ovf

myapp.mf

myapp.cert

web.xxx

images.iso

XML
<xs:schema xmlns:ppns="http://schemas.dmtf.org/svpc/portprofile/1"
xmns:xs="http://www.w3.org/2001/XMLSchema"
xmns:cim="http://schemas.dmtf.org/wbem/wscim/1/common"
xmns:epasd="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_EthernetPortAllocationSettingData"
xmns:ns1="http://schemas.dmtf.org/svpc/portprofile/1"
targetNamespace="http://schemas.dmtf.org/svpc/portprofile/1" elementFormDefault="qualified" attributeFormDefault="qualified">
   <xs:import namespace="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_EthernetPortAllocationSettingData" schemaLocation="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2.27.0/CIM_EthernetPortAllocationSettingData.xsd"/>

   ......

   <xs:element name="PortProfile">
      <xs:annotation>
         <xs:documentation>Root element of Port Profile</xs:documentation>
      </xs:annotation>
      <xs:complexType>
         <xs:sequence>
            <xs:element name="Item" type="epasd:CIM_EthernetPortAllocationSettingData_Type" minOccurs="0" maxOccurs="unbounded"/>
            <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
         </xs:sequence>
      </xs:complexType>
   </xs:element>
</xs:schema>
Network Port Profile Examples

### Bandwidth Reservation

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ppns:PortProfile ...>
  <epasd:NetworkPortProfileID>http://www.dmtf.org/portprofiles</epasd:NetworkPortProfileID>
  <epasd:NetworkPortProfileIDType>2</epasd:NetworkPortProfileIDType>
  <epasd:Address>00-16-8B-DB-00-5E</epasd:Address>
  <rasd:AllocationUnits>GigaBits per Second</rasd:AllocationUnits>
  <rasd:Reservation>1</rasd:Reservation>
</ppns:PortProfile>
```

### Allowed MAC/VLAN Pairs

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ppns:PortProfile ...>
  <epasd:NetworkPortProfileID>http://www.dmtf.org/portprofiles</epasd:NetworkPortProfileID>
  <epasd:NetworkPortProfileIDType>2</epasd:NetworkPortProfileIDType>
  <epasd:AllowedToTransmitMACAddresses>00-16-8B-DB-00-5E</epasd:AllowedToTransmitMACAddresses>
  <epasd:AllowedToTransmitMACAddresses>00-17-8B-DA-00-5E</epasd:AllowedToTransmitMACAddresses>
  <epasd:AllowedToTransmitVLANs>5</epasd:AllowedToTransmitVLANs>
  <epasd:AllowedToTransmitVLANs>7</epasd:AllowedToTransmitVLANs>
</ppns:PortProfile>
```

**Note:** MAC/VLAN Pairs are represented as indexed arrays.

### Allowed Priorities

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ppns:PortProfile ...>
  <epasd:NetworkPortProfileID>http://www.dmtf.org/portprofiles</epasd:NetworkPortProfileID>
  <epasd:NetworkPortProfileIDType>2</epasd:NetworkPortProfileIDType>
  <epasd:AllowedPriorities>3</epasd:AllowedPriorities>
  <epasd:AllowedPriorities>5</epasd:AllowedPriorities>
</ppns:PortProfile>
```
Management Profiles for EVB/DCB Proposal

• Models Ethernet Port Resource Virtualization/Virtual Ethernet Switch

• Specifically, covers
  – Ethernet adapters (vNIC) – each adapter modeled as an Ethernet Port
  – Virtual Ethernet Switch and switch settings
  – Ethernet switch ports (vSwitch)
  – Connections between vNIC and vSwitch Ports
  – VLANs
  – Port characteristics, settings (MAC, speed, duplex..), statistics...

• Already Published CIM Profiles
  – DSP1014 Ethernet Port Profile
  – DSP1050 Ethernet Port Resource Virtualization Profile
  – DSP1097 Virtual Ethernet Switch Profile
Ethernet Port Profile Class Diagram

- **ComputerSystem** (See Referencing Profile)
  - **Realizes** (See Physical Asset Profile)
  - **PortController** (See Host LAN Network Port Profile)
  - **SystemDevice** (See Host LAN Network Port Profile)
- **NetworkPort** (See Host LAN Network Port Profile)
- **HostedAccessPoint** (See Host LAN Network Port Profile)
- **EthernetPort**
  - **ElementCapabilities**
  - **ServiceAffectsElement** (See Profile Registration Profile)
  - **ElementConformsToProfile** (See Profile Registration Profile)
  - **Realizes** (See Physical Asset Profile)
  - **RegisteredProfile** (See Profile Registration Profile)
    - **ReferencedProfile** (See Profile Registration Profile)
- **LANEndpoint** (See Host LAN Network Port Profile)
  - **ElementCapabilities**
  - **DeviceSAPIImplementation** (See Host LAN Network Port Profile)
  - **HostedService** (See Host LAN Network Port Profile)
- **EnabledLogicalElementCapabilities** (See Host LAN Network Port Profile)
- **NetworkPortConfigurationService** (See Host LAN Network Port Profile)
- **PhysicalElement** (See Physical Asset Profile)
EthernetPort Class

LogicalPort
- Speed : uint64 {units}
- MaxSpeed : uint64 {units}
- RequestedSpeed : uint64 {write}
- UsageRestriction : uint16 {enum}
- PortType : uint16 {enum}
- OtherPortType : string

NetworkPort
- PortNumber : uint16
- LinkTechnology : uint16 {enum}
- OtherLinkTechnology : string
- PermanentAddress : string
- NetworkAddresses : string []
- FullDuplex : boolean
- AutoSense : boolean
- SupportedMaximumTransmissionUnit : uint64 {units}
- ActiveMaximumTransmissionUnit : uint64 {units}
- OtherNetworkPortType : string [D]

EthernetPort
- MaxDataSize : uint32
- Capabilities : uint16[ ] {enum}
- CapabilityDescriptions : string [ ]
- EnabledCapabilities : uint16[ ] {enum}
- OtherEnabledCapabilities : string [ ]
EthernetPortAllocationSettingData Class

<table>
<thead>
<tr>
<th>ResourceAllocationSettingData</th>
</tr>
</thead>
<tbody>
<tr>
<td>ResourceType : uint16 {enum}</td>
</tr>
<tr>
<td>ResourceType : string</td>
</tr>
<tr>
<td>ResourceSubType : string</td>
</tr>
<tr>
<td>PoolID : string</td>
</tr>
<tr>
<td>ConsumerVisibility : uint16 {enum}</td>
</tr>
<tr>
<td>HostResource : string[]</td>
</tr>
<tr>
<td>AllocationUnits : string</td>
</tr>
<tr>
<td>VirtualQuantity : uint64</td>
</tr>
<tr>
<td>Reservation : uint64</td>
</tr>
<tr>
<td>Limit : uint64</td>
</tr>
<tr>
<td>Weight : uint32</td>
</tr>
<tr>
<td>AutomaticAllocation : boolean</td>
</tr>
<tr>
<td>AutomaticDeallocation : boolean</td>
</tr>
<tr>
<td>Parent : string</td>
</tr>
<tr>
<td>Connection : string[]</td>
</tr>
<tr>
<td>Address : string</td>
</tr>
<tr>
<td>MappingBehavior : uint16 {enum}</td>
</tr>
<tr>
<td>AddressOnParent : string</td>
</tr>
<tr>
<td>VirtualQuantityUnits : string</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EthernetPortAllocationSettingData</th>
</tr>
</thead>
<tbody>
<tr>
<td>DesiredVLANEndpointMode : uint16 {enum}</td>
</tr>
<tr>
<td>OtherEndpointMode : string</td>
</tr>
<tr>
<td>PortCorrelationID : string {E}</td>
</tr>
<tr>
<td>NetworkPortProfileID : string {E}</td>
</tr>
<tr>
<td>NetworkPortProfileIDType : uint16{enum, E}</td>
</tr>
<tr>
<td>AllowedPriorities : uint16[] {E}</td>
</tr>
<tr>
<td>ReceiveBandwidthLimit : uint64 {E}</td>
</tr>
<tr>
<td>ReceiveBandwidthReservation : uint64 {E}</td>
</tr>
<tr>
<td>DefaultPriority : uint16 {E}</td>
</tr>
<tr>
<td>PortVID : uint16 {E}</td>
</tr>
<tr>
<td>DefaultPortVID : uint16 {E}</td>
</tr>
<tr>
<td>Promiscuous : boolean {E}</td>
</tr>
<tr>
<td>SourceMACFilteringEnabled : boolean {E}</td>
</tr>
<tr>
<td>AllowedToTransmitMACAddresses : string[] {E}</td>
</tr>
<tr>
<td>AllowedToReceiveMACAddresses : string[] {E}</td>
</tr>
<tr>
<td>AllowedToTransmitVLANS : uint16[] {E}</td>
</tr>
<tr>
<td>AllowedToReceiveVLANS : uint16[] {E}</td>
</tr>
<tr>
<td>OtherNetworkPortProfileIDTypeInfo : string {E}</td>
</tr>
</tbody>
</table>
Useful Links

• CIM Profiles
  – DSP1014 Ethernet Port Profile
    • http://www.dmtf.org/sites/default/files/standards/documents/DSP1014_1.0.pdf
  – DSP1050 Ethernet Port Resource Virtualization Profile
    • http://www.dmtf.org/sites/default/files/standards/documents/DSP1050_1.0.0.pdf
  – DSP1097
    • http://www.dmtf.org/sites/default/files/standards/documents/DSP1097_1.0.0.pdf

• OVF
  – DSP0243 OVF 1.1 Specification
    • http://www.dmtf.org/sites/default/files/standards/documents/DSP0243_1.1.0.pdf
  – DSP8023 OVF 1.1 Envelope XSD
    • http://schemas.dmtf.org/ovf/envelope/1/dsp8023_1.1.xsd
  – DSP8027 OVF 1.1 Environment XSD
    • http://schemas.dmtf.org/ovf/environment/1/dsp8027_1.1.xsd

• White papers
  – DSP 2017 Open Virtualization Format White Paper 1.0.0
    • http://www.dmtf.org/sites/default/files/standards/documents/DSP2017_1.0.0.pdf
  – DSP 2025 Virtual Networking Management White Paper (Work-in-Progress)