



# Open Virtualization Format 2

Lawrence Lamers – Chair OVF Work Group

Hemal Shah – VP of Technology, DMTF

Eric Wells – Co-Editor DSP2017

## Disclaimer

- The information in this presentation represents a snapshot of work in progress within the DMTF.
- This information is subject to change. The Standard Specifications remain the normative reference for all information.
- For additional information, see the Distributed Management Task Force (DMTF) Web site:

[www.dmtf.org](http://www.dmtf.org)



## Outline

- OVF background
- OVF Life Cycle Diagram
- OVF 2 features summary
- OVF 2 features details
- Product Placement Example
- OVF timeline
- Conclusion



## Background

- The *Open Virtualization Format (OVF) Specification* describes an open, secure, efficient and extensible format for the packaging and distribution of software to be run in virtual machines.
- The key characteristics of the format are as follows:
  - Optimized for distribution
  - Optimized for a simple, automated user experience
  - Supports both single VM and multiple-VM configurations
  - Portable VM packaging
  - Vendor and platform independent
  - Extensible
  - Localizable
  - A foundation for interoperability
- OVF has arisen from the collaboration of key vendors in the industry.
- DMTF and ISO/IEC standard



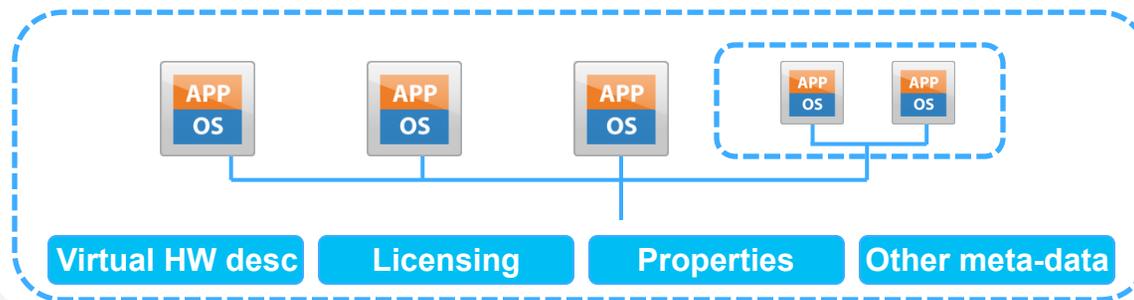
## What is... ?

- What is OVF?
  - Packaging format
  - Consists of OVF Descriptor + Virtual Disks + Manifest
- What is an OVF Descriptor?
  - An XML file describing the software in an OVF package
  - Organized as an envelope with an extensible set of sections
  - Core sections describe virtual hardware, EULA, product information, etc.
- What is an OVF Environment?
  - An XML document conveyed to the guest software
  - Enables adaptation to the deployment environment



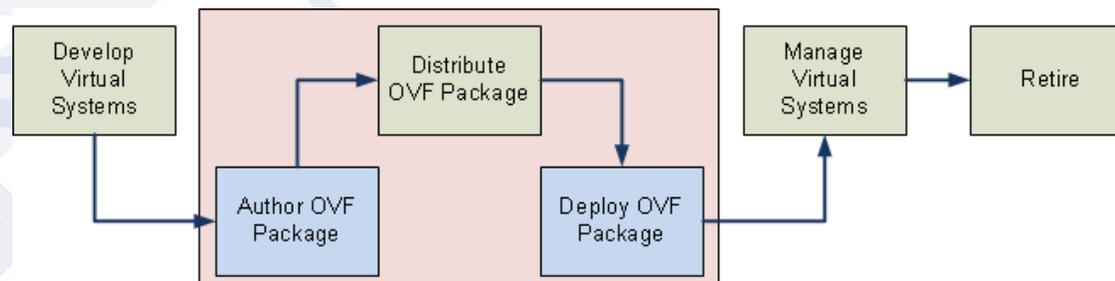
# Open Virtualization Format (OVF)

- A **distribution format** for virtual appliances
  - Provides a complete description of a single VM or complex multi-VMs



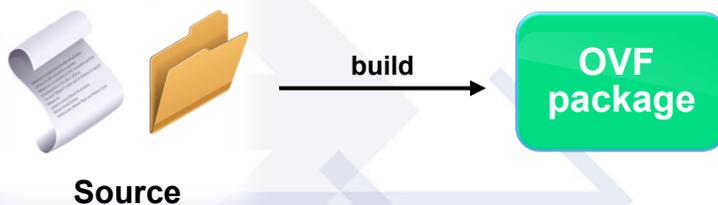
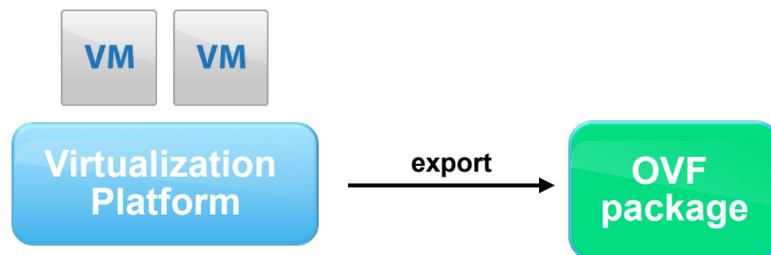
- **OVF Lifecycle (Author → Distribute → Deploy)**

- Author Role: To create a complete package that makes life simple for the deployer
- Deployer Role: Deploy and customize the package for a particular instance





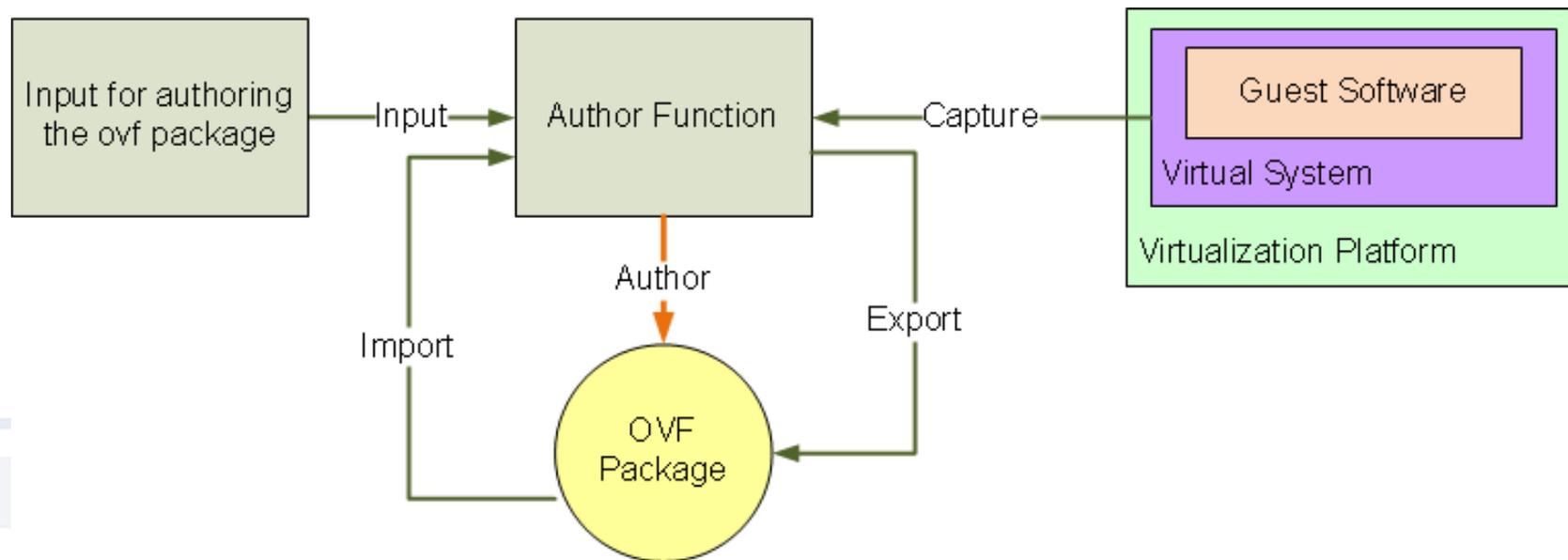
## OVF Authoring



- A virtual machine can be exported into OVF or built from source
- The author can describe “portable hardware” for maximum interoperability or optimum performance
- The virtual machine images can be compressed to facilitate distribution
- The author can sign the package to guarantee its integrity



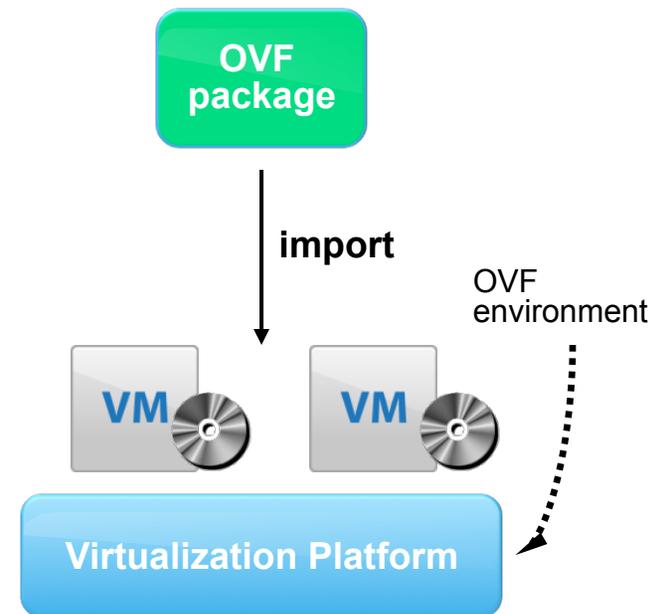
## OVF Authoring Details





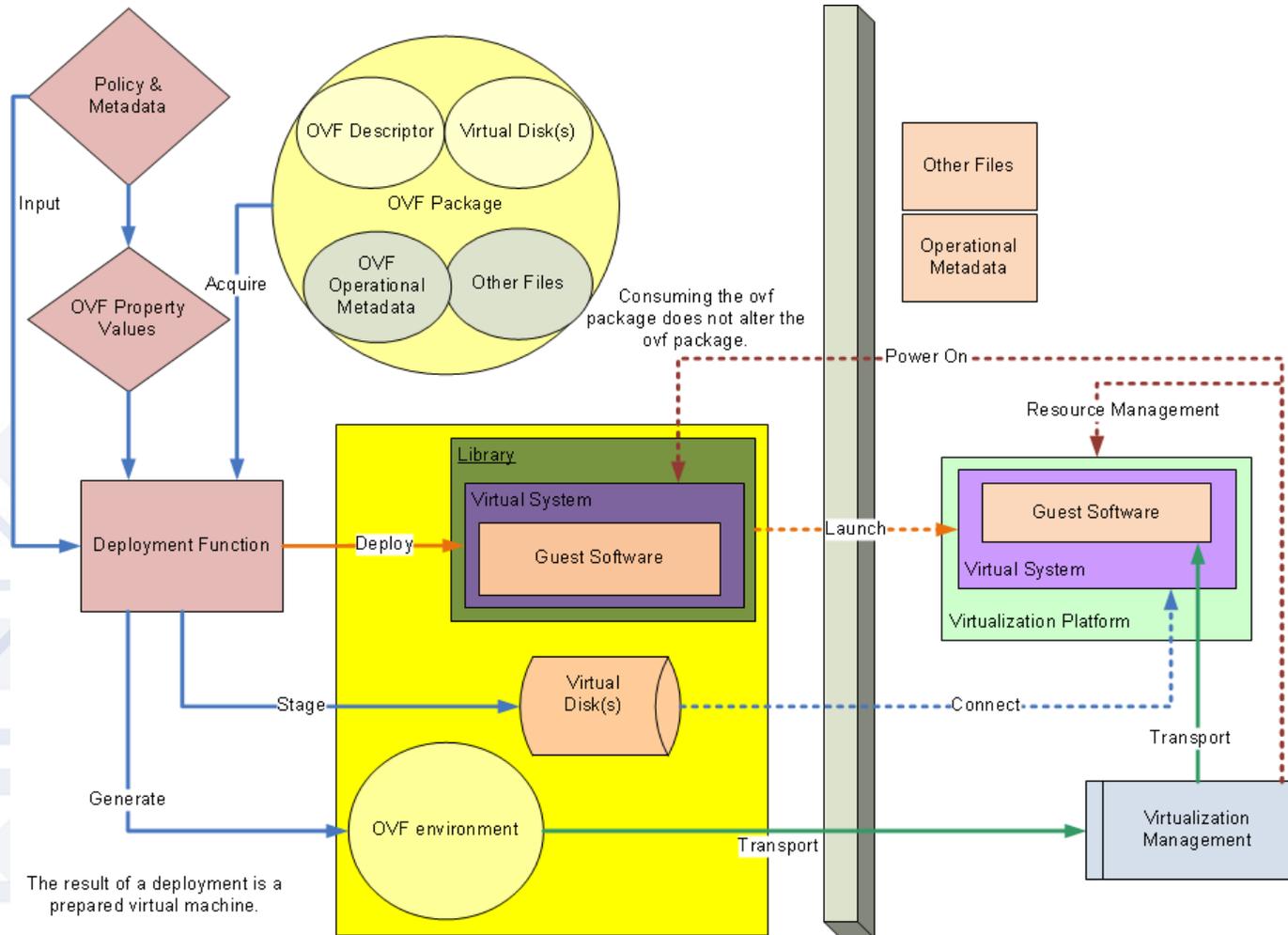
## OVF Deployment

- Validation
  - Verify licensing, security, integrity
  - Resource requirements and placement
  - Application properties
    - such as IP addresses and passwords
- Conversion
  - Convert virtual disks to run-time format
- Installation
  - Provide runtime environment for application
    - customization and localization





# OVF Life Cycle - Deployment





## OVF 1 Features

- Support for packaging one or more virtual systems
- Supports localization of content to serve multiple markets
- Extensible XML schema to meet industry needs
- Product information to describe contents
- Licensing information
- Deployment options to customize installation
- Virtual hardware section to constrain package resource usage
- Resource Allocation Descriptors to set resource consumption



## OVF 2 Features

- Support for Network Port Profiles
- Scaling at deployment time
- Support for basic placement policies – including scoped placement
- Encryption of OVF packages
- Disk sharing at runtime
- Advanced device boot order
- Advanced data transfer to guest software
- Improved support for Internationalization - I18N
- Improved support of HASH functions
- Enhanced shutdown order control
- Updated CIM schema



# Support for Network Port Profiles

- Supports network configuration including IEEE Edge Virtual Bridging
  - By using DSP8049 Network Port Profile XML Schema
- Leverages properties of CIM\_EthernetPortAllocationSettingData

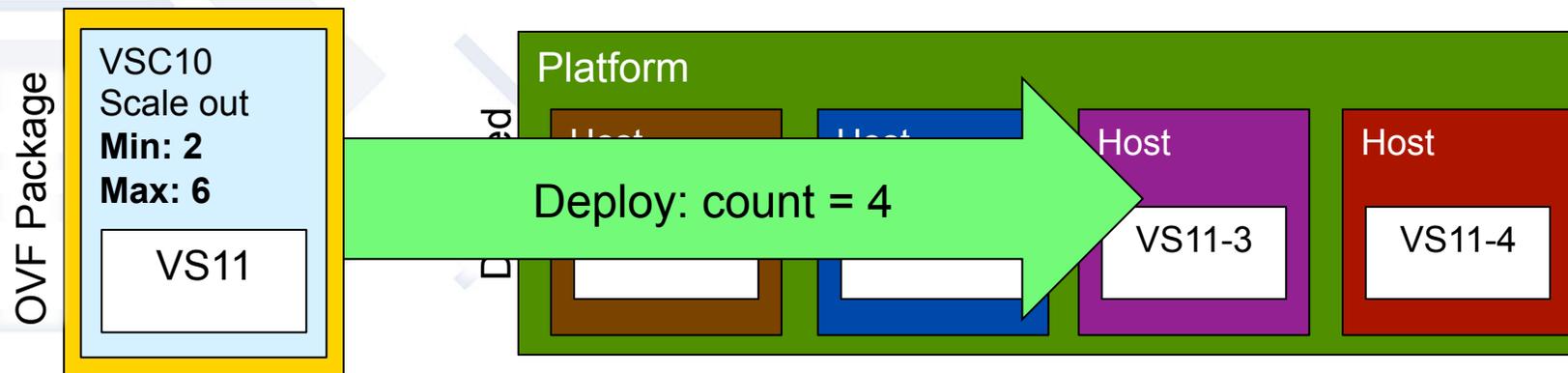


Three different methods...



## Support for Scale Out at Deployment

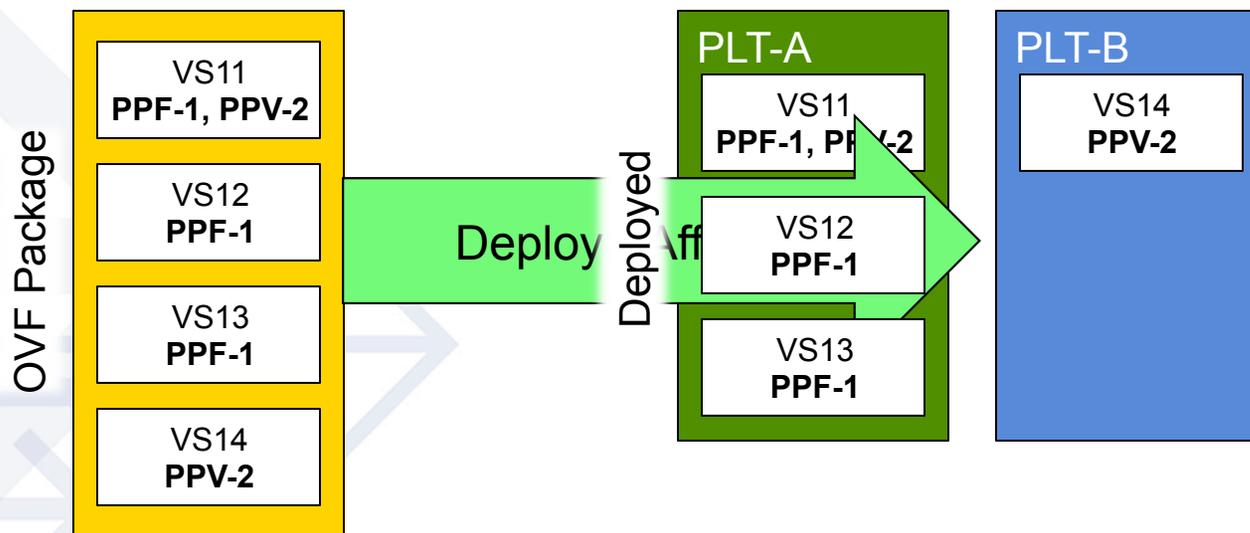
- Allows replication of virtual systems in an OVF package at deployment
- New `ScaleOutSection` defined to address the use case
  - Replicas share startup order
  - Property values configured at deployment - once per replica created
  - `DeploymentOptionSection` can be used to control scaling values
- **Benefits:**
  - Number of instantiated virtual systems becomes deployment time decision
  - Enables both min and max bounds on the number of instantiations





## Support for Basic Placement Policy

- Define a placement policy for a group of Virtual Systems
- Annotate elements with membership of a particular placement policy
  - "affinity" - deploy items to improve communications latency
  - "availability" - deploy items to improve fault tolerance
- New PlacementGroupSection defined to enable use cases





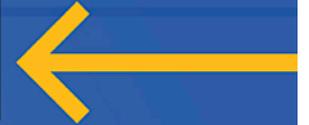
## Support for Scoped Placement Policy

- **Availability – deploy items to enhance availability**
  - Geographic - placed on sites in different geographical area
  - Site - different operator site
  - Rack - different physical rack
  - Chassis - different physical chassis
  - Host - different physical hosts
- **Affinity – deploy items to enhance connectivity**
  - Geographic - placed on sites within same geographical area
  - Site - same operator site
  - Rack - same physical rack
  - Chassis - same physical chassis
  - Host - same physical hosts



## Support for Encryption

- Desirable to have an encryption scheme to exchange OVF securely
- Provides a scheme for encrypting parts of an OVF descriptor or files
- Encryption scheme closely follows the XML Encryption 1.1 standard
- **New** `EncryptionSection` describes one or more encryption methods
  - Approach adopted is extensible to use other methods



## Support for Disk Sharing

- Virtual disks in OVF 1.1
  - Can be referenced by multiple virtual machines, but not shared
  - Any level of sharing done at runtime
    - Deployment platform specific
    - Not visible to the guest software
- Certain applications such as clustered databases
  - Rely on multiple virtual machines sharing the same virtual disk at runtime
- **New** `SharedDiskSection` allows the OVF package author to:
  - Specify virtual disks shared by more than one `VirtualSystem` at runtime



## Support for Advanced Device Boot Order

- Individual virtual machines normally use the default device boot order
  - Provided by the virtualization platform's virtual BIOS
- BootDeviceSection allows the OVF package author to
  - Specify particular boot configurations & boot order settings for virtual systems in the package
- This feature enables booting from non-default devices such as
  - A NIC using PXE
  - A USB device or a secondary disk.
- Boot configuration is modeled using CIM classes
  - CIM\_BootConfigSetting
  - CIM\_BootSourceSetting



## Support for Advanced Data Transfer to Guest OS

- OVF 1.1 OVF environment file with property values
  - Only file delivered to the guest operating system apart from the virtual disk
- In order to provide additional deployment time customizations
  - EnvironmentFilesSection was added (this is different from environment file)
- EnvironmentFilesSection enables OVF package authors to:
  - Specify additional files in the OVF package, outside of the virtual disks
  - Provide custom values to the guest operating system at runtime
  - Increase flexibility in image customization outside of virtual disk capture
  - Customize solutions by combining existing virtual disks without modifying



## Support for Improved Internationalization - i18n

- OVF 2 updated the reference for globalization of the XML content
  - Provide means of adapting the content to different languages, regional differences and technical requirements of a target market
  - Allow for both internationalization and localization
- Based on W3C, *Best Practices for XML Internationalization*, 2008





## Support for Improved HASH on Envelope

- NIST FIPS 180 - Secure Hash Standard is used
- OVF 1 packages are allowed to use SHA-1 digests
- OVF 2 packages allowed use of stronger hash digests if needed
- OVF 2 packages requires use of SHA-256 digests





## Enhanced Shutdown Order Control

- Explicit shutdown order (different from startup order) for virtual systems
  - Important for a certain use cases (e.g. network management)
- New `ovf:shutdownorder` attribute specifies the shutdown order
  - Uses non-negative integer values
  - If the `ovf:shutdownorder = "0"` then the shutdown order is not specified
  - If the `ovf:shutdownorder` is non-zero then the order of execution of the stop action is the numerical descending order of the values
  - If the `ovf:shutdownorder` attribute is not specified the order of execution of the stop action should be the numerical descending order of the start values
  - The Items with same order identifier may be stopped concurrently



## Support for Current CIM Schema

- OVF 2 allows for the use of the current version 2 CIM Schema
  - No lock-in to specific minor version of the schema
  - Enables OVF 2.x to be independently published from CIM Schema
- Namespace reference is to:  
[http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM\\_XXXXXX](http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_XXXXXX)
- Attributes based on CIM Class properties can use the latest version of schema



# CIM Class Property Update

## CIM\_EthernetPortAllocationSettingData in CIM Schema 2.32

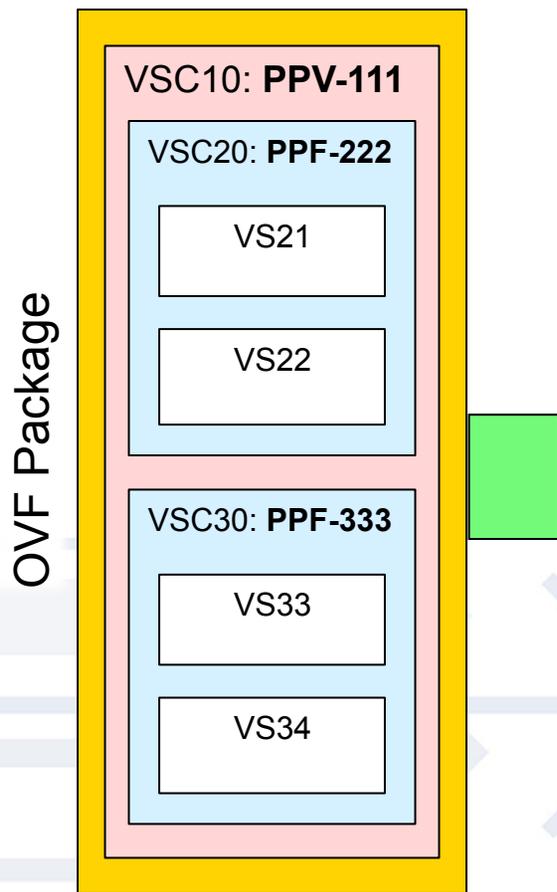
- <xs:sequence>
- <xs:element minOccurs="0" ref="class:Address"/>
- .....
- <xs:element minOccurs="0" ref="class:Caption"/>
- <xs:element maxOccurs="unbounded" minOccurs="0" ref="class:Connection"/>
- ...
- <xs:element minOccurs="0" ref="class:SourceMACFilteringEnabled"/>
- <xs:element minOccurs="0" ref="class:VirtualQuantity"/>
- ...
- </xs:sequence>

## CIM\_EthernetPortAllocationSettingData in CIM Schema 2.37

- <xs:sequence>
- <xs:element minOccurs="0" ref="class:Address"/>
- .....
- <xs:element minOccurs="0" ref="class:Caption"/>
- <xs:element minOccurs="0" ref="class:ChangeableType"/>
- <xs:element minOccurs="0" ref="class:ConfigurationName"/>
- <xs:element maxOccurs="unbounded" minOccurs="0" ref="class:Connection"/>
- ...
- <xs:element minOccurs="0" ref="class:SourceMACFilteringEnabled"/>
- <xs:element minOccurs="0" ref="class:VSIDTypeID"/>
- <xs:element minOccurs="0" ref="class:VSIDTypeIDVersion"/>
- <xs:element minOccurs="0" ref="class:VirtualQuantity"/>
- ...
- </xs:sequence>

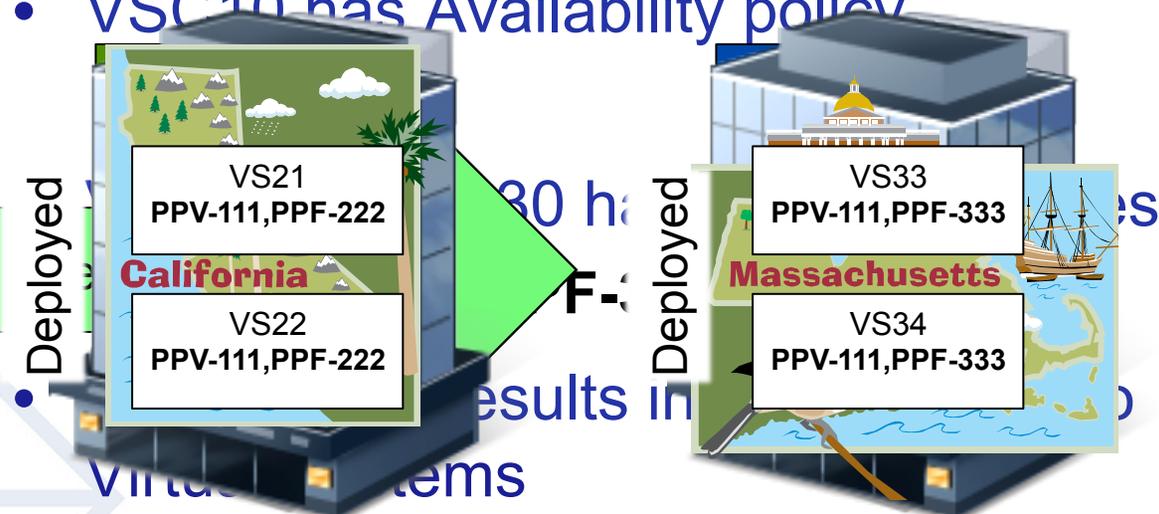


## Product Placement Use Case 1



- **Scoped Policies provide the ability to constrain the placement.**
- VSC10 contains VSC20 & VSC30

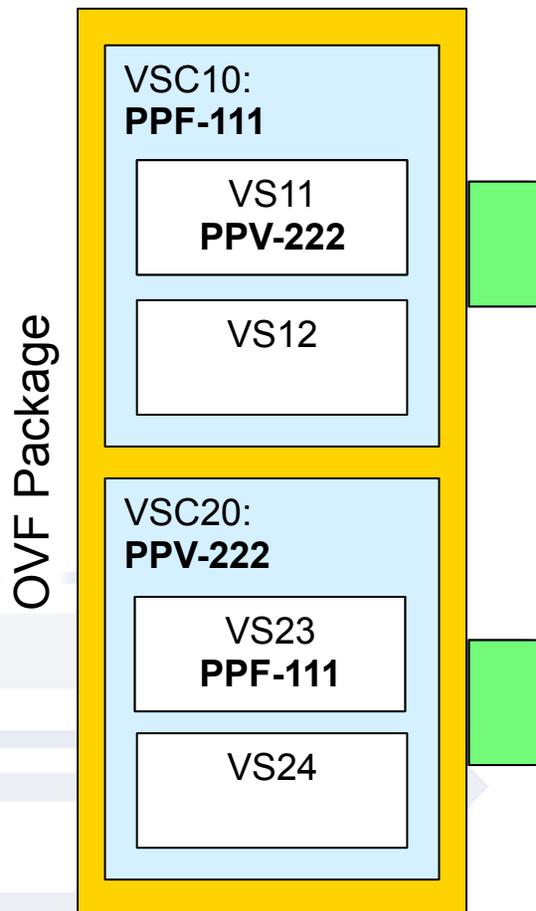
- VSC10 has Availability policy



- Policy differentiation geographies
- ...to derive different geographies then policy from parent



## Product Placement Use Case 2



- Two Virtual System Collections
- Each VSC has two Virtual Systems
- VSC10 has Affinity policy  
**PPF-111**  
To force specific placements add additional policies...
- **PPV-222**
- Two alternative deployments
  - Both valid deployments



# Product Placement Use Case 3





## Timeline

- Initial draft submitted to DMTF in 2007
- DMTF DSP0243 1.0 standard in February 2009
- DMTF DSP0243 1.1 standard in January 2010
- ANSI/INCITS 469-2010 Standard in September 2010
- ISO/IEC 17203 standard in August 2011
- DMTF DSP0243 2.0 standard December 2012
- DMTF DSP0243 2.1 work in progress July 2013
- Contributor Companies:
  - Broadcom, BMC Software, CA Technologies, Citrix, Cisco, Dell, Ericsson AB, Fujitsu, Hewlett-Packard, Hitachi, Huawei, IBM, Intel, Microsoft, NEC, NetApp, Oracle, RSA, Symantec, Telefónica, VMware, ZTE Corporation



# Questions?

**Email contacts:**  
**hemal@broadcom.com**  
**ljlammers@vmware.com**

For feedback or contributions see:  
<http://dmtf.org/standards/feedback>

***Thank you***



## Useful Links

- For a list of current work in progress see:
  - <http://dmtf.org/standards/wip>
    - *DSP0243\_2.1 OVF Specification*
    - *DSP2017\_2.0 OVF Whitepaper*
- For a list of published DMTF standards see:
  - [http://dmtf.org/standards/published\\_documents](http://dmtf.org/standards/published_documents)
- For an overview of DMTF Technologies see:
  - <http://dmtf.org/standards/stackmap>
- For an overview of DMTF Committees and Work Groups see:
  - <http://dmtf.org/about/working-groups>
- For a list of webinars provided by DMTF see:
  - <http://dmtf.org/education/webinars>