

SAPC VNF Deployment Instruction for VMware

Ericsson Service-Aware Policy Controller

INSTALLATION INSTRUCTION

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Contents

1	SAPC VNF Deployment Instruction for VMware Introduction	1
2	SAPC VNF Deployment Instruction for VMware Overview	3
2.1	VMware	3
2.2	Access	3
2.3	Equipment	4
3	SAPC OVF Package Generation	5
3.1	Download the SAPC Virtual Delivery Package	5
3.2	Generate the SAPC Open Virtualization Format (OVF) Package	5
4	Deploy the SAPC for Standalone Deployments using VMware vSphere Web Client	7
4.1	Deploy the SAPC vApp	7
4.2	Post Deploy Activities	12
4.3	Power on the SAPC vApp	23
4.4	Configuration in vCenter	24
5	Deploy the SAPC for Standalone Deployments using VMware vCloud Director	39
5.1	Upload the SAPC vApp and PL Scale-Out Packages to the Catalogue	39
5.2	Deploy the SAPC vApp	45
5.3	Post Deploy Activities	53
5.4	Power on the SAPC vApp	62
5.5	Configuration in vCloud Director	65
6	Verify the SAPC Deployment	75
7	Install Additional SAPC Instances in the VMware Cluster Using VMware vSphere Web Client	77
8	Install Additional SAPC Instances in the VMware Cluster Using VMware vCloud Director	79
9	Deploy the SAPC for Geographical Redundancy Scenarios	81
10	Configure the SAPC	83



10.1	SAPC Hardening after Deployment	83
10.2	Connectivity to the External Networks	83
10.3	Setting the SAPC Licenses Configuration	85
10.4	Final Backup	86



1 SAPC VNF Deployment Instruction for VMware Introduction

The purpose of this document is to describe how to deploy and set up the SAPC on VMware platform. VMware components required to deploy the SAPC are VMware vSphere Web Client and VMware vCenter or VMware vCloud Director. Other VMware components, such as NSX, vSAN and so on might be also part of the environment, however they are not mandatory and they are not part of the scope of this document. The following procedures are covered:

- VMware vCenter configuration to be performed by the Cloud administrators and required to deploy the SAPC:
 - Define Virtual Datacenter (Optional).
 - Define DRS (Distributed Resource Scheduler) Cluster.
 - Define Virtual Distributed Switches (VMware vDS).
 - Define the SAPC Port Groups.
- vCloud Director configuration to be performed by the Cloud administrators and required to deploy the SAPC:
 - Create Catalogue (Optional).
 - Define Organizational Networks.
- Deploy the SAPC vApp based on a generated OVA/OVF file.
- Post Deployment Activities after the SAPC Deployment.
- The SAPC vApp Power On.
- Health check of the SAPC.
- The SAPC Configuration.





2 SAPC VNF Deployment Instruction for VMware Overview

Basic knowledge of **VMware**, **Linux**, and **networking** is mandatory for any user who wants to follow this document.

Read before [SAPC VNF Network Configuration Guide](#).

2.1 VMware

vSphere **5.5**, **6.0** or **6.5** version must be installed and configured in all physical hosts in which the SAPC vApp would be deployed and properly connected to vCenter Server **5.5**, **6.0** or **6.5** composing a Server Cluster. In case of using VMware vCloud Director, version 8 must be installed and configured. Installation of vSphere, vCloud Director and vCenter Server products are out of scope of this document and it is prerequisite for this installation instruction. For further information about VMware products installation, refer to [VMware vSphere Documentation](#) and [VMware vCloud Director Documentation](#).

Warning!

The SAPC deployment requires the configuration of elements in VMware, that are described in Section 4.4 on page 24 and in Section 5.5 on page 64 depending if vCenter or vCloud director is used for deploying the SAPC.

2.2 Access

The following access information is required to deploy the SAPC on VMware:

- Access to the Virtual Delivery Package (VDP) through the SAPC software gateway.
- Access to vCenter: credentials to login the vSphere Web Client must be provided. Also, a VMware Datacenter and DRS cluster connected to a target Virtual Infrastructure Manager (VIM) must be available.
- Access to vCloud Director: credentials to login to the vCloud Director GUI must be provided. Also, a VMware Organization connected to a target VIM and a vCloud Director Catalog must be available.
- Administration userIDs for the SAPC can be found in [SAPC Users and Passwords](#)



2.3 Equipment

To run the OVF generation script (SAPC VNF Descriptor Generator Tool) in the preparation step, it is required to have a Linux host with x86_64 architecture and GNU C Library version 2.12 or newer installed. In the following sections, the host is named "preparation server".



3 SAPC OVF Package Generation

3.1 Download the SAPC Virtual Delivery Package

The required software is listed in Table 1 and can be downloaded from Ericsson Software Gateway under a unique the SAPC ticket number. Refer to Release Notes for specific version information and ticket number.

Make sure that the Software Package file for the SAPC is available on a preparation server. Likewise, make sure that created files generated into preparation server can be accessed from vSphere Web Client or vCloud Director.

Table 1 Software Package

Software Package	Filename
SAPC Virtual Delivery Package	vdp_sapc_vmdk_cxp9032850_<product_revision>.tar.gz

For specific version information, see the release notes.

3.2 Generate the SAPC Open Virtualization Format (OVF) Package

The SAPC OVF package file is generated on the preparation server according to the instruction stated in *SAPC VNF Descriptor Generator Tool*.





4 Deploy the SAPC for Standalone Deployments using VMware vSphere Web Client

4.1 Deploy the SAPC vApp

Make sure that the SAPC OVF package file is available from the vSphere Web Client connected to vCenter Server from which the SAPC will be deployed.

Open vCenter Server application and position into the Host and Clusters view. Select a Host in the Cluster in which the SAPC is going to be deployed and select Deploy OVF Template... submenu item by pressing the right mouse button. The Deploy OVF Template popup window is shown, as in the following example screen capture.

Note: Screen captures are from vCenter 6.5 and the resources displayed depend on the datacenter and OVA/OVF Package uploaded.

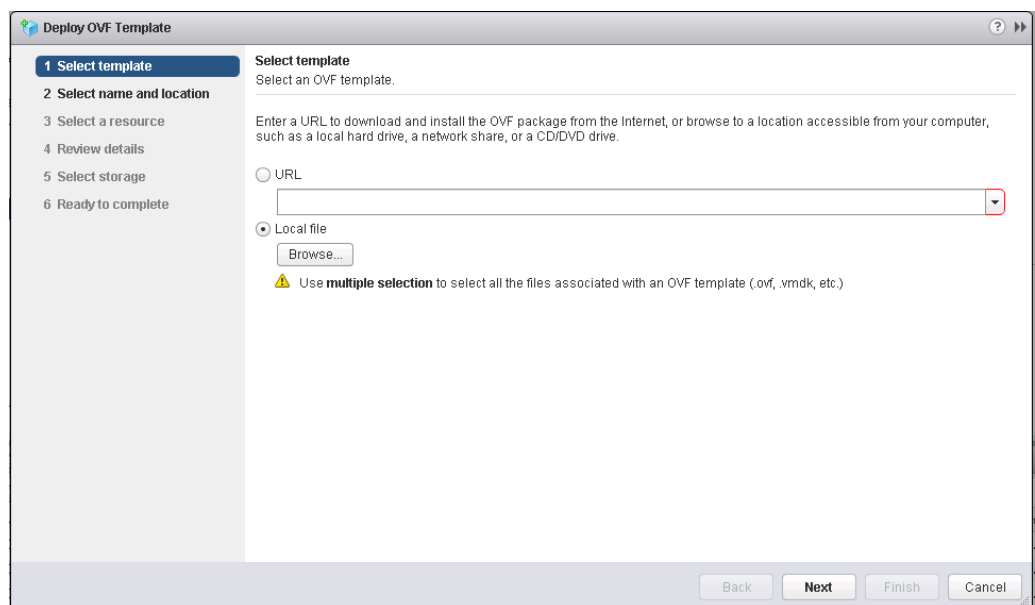


Figure 1 Deploy OVF Template

Press Browse button to obtain File Browser Window to make possible the selection of the OVA/OVF and delivered files to be deployed.

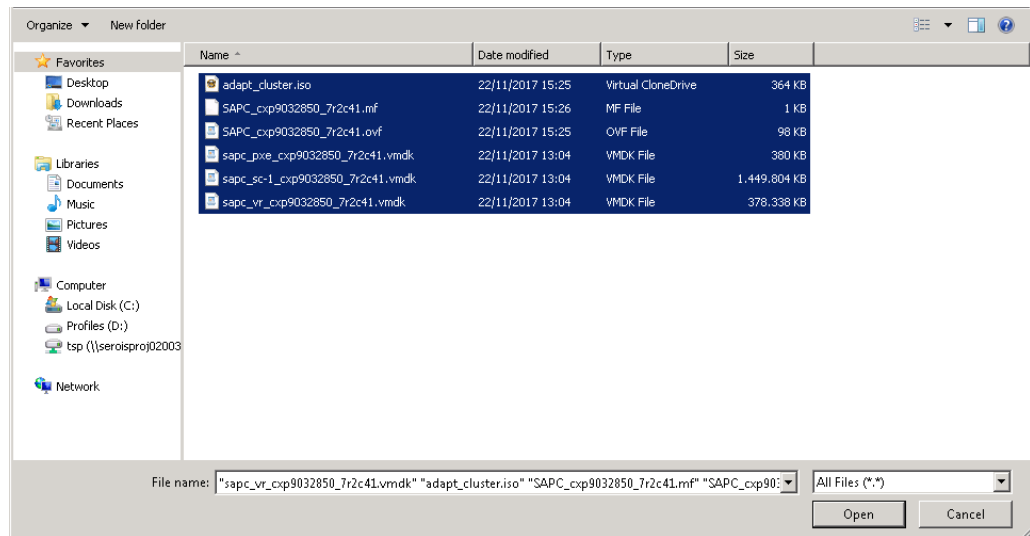


Figure 2 Selection of OVA/OVF file

Locate and select the OVA/OVF file, press Open button to get completed the Deploy from Local file or URL field and press Next button to continue with the wizard.

Note: Please note that vCenter 6.5 incorporate some known bugs in connection with OVA parsing when deploying from OVF Template. Since OVA package is just a tar file containing the whole delivery files, most of the times can be extracted the package and use the OVF with the rest of files as a solution to these known problems. For more information about vCenter 6.5 known issues, refer to [VMware vSphere 6.5 Release Notes](#).

Complete the SAPC vApp Name, select the Datacenter in which the SAPC application is going to be deployed and press Next button to continue with the steps.

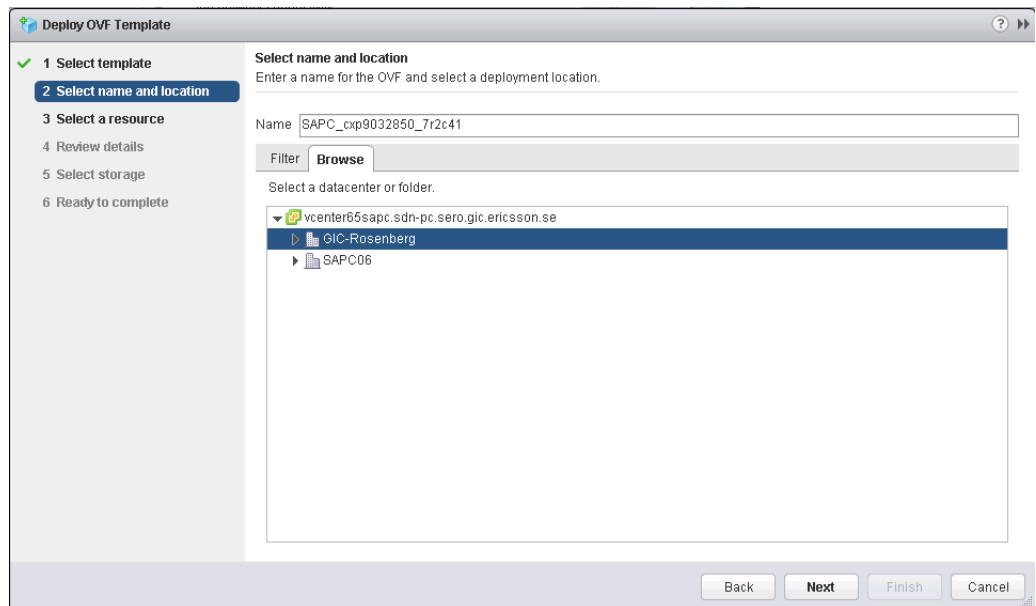


Figure 3 Name of the vApp

Select the specific host within the VMware Cluster in which the SAPC is going to be deployed and press Next button to continue with the steps.

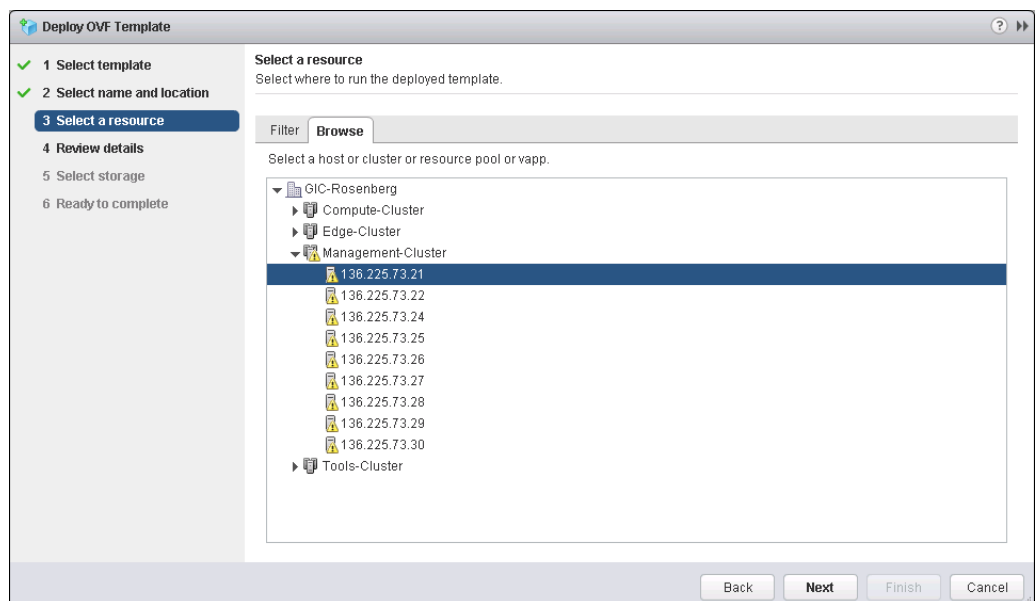


Figure 4 Host and Cluster selection

Leave default values and press Next button to continue with the steps.



Deploy OVF Template

1 Select template
2 Select name and location
3 Select a resource
4 **Review details**
5 Select storage
6 Select networks
7 Customize template
8 Ready to complete

Review details
Verify the template details.

⚠ The OVF package contains advanced configuration options, which might pose a security risk. Review the advanced configuration options below. Click next to accept the advanced configuration options.

Product	SAPC
Version	CXP 903 2850/7R2C41
Vendor	Ericsson
Publisher	No certificate present
Download size	Unknown
Size on disk	Unknown (thin provisioned) Unknown (thick provisioned)
Extra configuration	SC-1: isolation.tools.diskShrink.disable = true isolation.tools.vmxDnDVersionSet.disable = TRUE isolation.tools.memSchedFakeSampleStats.disable = true isolation.tools.copy.disable = true isolation.ghi.hostShellAction.disable = TRUE isolation.tools.unify.disable = TRUE isolation.tools.unify.windowContents.disable = TRUE isolation.tools.unify.push.update.disable = TRUE isolation.tools.diskViper.disable = true isolation.tools.ghi.trayIcon.disable = TRUE

Back Next Finish Cancel

Figure 5 Review Details

Select Thin Provision as disk format tick box and press Next button to continue with the required steps.

Deploy OVF Template

1 Select template
2 Select name and location
3 Select a resource
4 Review details
5 **Select storage**
6 Select networks
7 Customize template
8 Ready to complete

Select storage
Select location to store the files for the deployed template.

Select virtual disk format: Thin provision
VM storage policy: None
☐ Show datastores from Storage DRS clusters

Filter

Datastores Datastore Clusters

Name	Status	VM storage policy	Capacity	Free
datastore1 (13)	Warning	-	1.08 TB	207.19 GB
sharefs_mgmt_cluster	Normal	VM Encryption Po...	243.49 GB	138.01 GB

2 Objects Copy

Back Next Finish Cancel

Figure 6 Select Storage

In case Port Groups have been properly defined, the correspondence between networks is applied, therefore simply press Next button to proceed with the next step. In the case there is not a full name correspondence, map properly the Source Networks with the Destination Networks available into vSphere and press Next



Deploy OVF Template

- 1 Select template
- 2 Select name and location
- 3 Select a resource
- 4 Review details
- 5 Select storage
- 6 Select networks**
- 7 Customize template
- 8 Ready to complete

Select networks
Select a destination network for each source network.

Source Network	Destination Network
SAPC_Internal1	SAPC_Internal1
SAPC_ExtTraffic0	SAPC_ExtTraffic0
SAPC_Internal0	SAPC_Internal0
SAPC_TrafficVip0-0	SAPC_TrafficVip0-0
SAPC_InterlinkOAM	SAPC_InterLinkOAM
SAPC_ExtOAM0	SAPC_ExtOAM
SAPC_InterlinkTraffic	SAPC_InterlinkTraffic
SAPC_OamVip0-0	SAPC_OamVip0

IP Allocation Settings
IP protocol: IPv4
IP allocation: Static - Manual

Back Next Finish Cancel

Figure 7 Network mapping

Default MAC addresses for the SAPC virtual machines are listed as vApp properties. Leave the default values and press Next button.

Deploy OVF Template

- 1 Select template
- 2 Select name and location
- 3 Select a resource
- 4 Review details
- 5 Select storage
- 6 Select networks
- 7 Customize template**
- 8 Ready to complete

Customize template
Customize the deployment properties of this software solution.

All properties have valid values [Show next...](#) [Collapse all...](#)

Property	Value
pl-3.eth0.mac_addr	02:10:40:3C:03:03
pl-3.eth1.mac_addr	02:10:40:3C:03:04
pl-3.eth2.mac_addr	02:10:40:3C:03:05
pl-4.eth0.mac_addr	02:10:40:3C:04:03
pl-4.eth1.mac_addr	02:10:40:3C:04:04
pl-4.eth2.mac_addr	02:10:40:3C:04:05
sc-1.eth0.mac_addr	02:10:20:3C:01:03
sc-1.eth1.mac_addr	02:10:20:3C:01:04
sc-1.eth2.mac_addr	02:10:20:3C:01:05
sc-2.eth0.mac_addr	02:10:20:3C:02:03

Back Next Finish Cancel

Figure 8 OVF Properties

Leave the default values and press Finish button.



Name	SAPC_cxp9032850_7r2c41
Source VM name	SAPC_cxp9032850_7r2c41
Download size	Unknown
Size on disk	Unknown
Datacenter	GIC-Rosenberg
Resource	136.225.73.21
Storage mapping	1
Network mapping	8
IP allocation settings	IPv4, Static - Manual
Properties	pl-3.eth0.mac_addr = 02:10:40:3C:03:03 pl-3.eth1.mac_addr = 02:10:40:3C:03:04 pl-3.eth2.mac_addr = 02:10:40:3C:03:05 pl-4.eth0.mac_addr = 02:10:40:3C:04:03 pl-4.eth1.mac_addr = 02:10:40:3C:04:04 pl-4.eth2.mac_addr = 02:10:40:3C:04:05 sc-1.eth0.mac_addr = 02:10:20:3C:01:03 sc-1.eth1.mac_addr = 02:10:20:3C:01:04 sc-1.eth2.mac_addr = 02:10:20:3C:01:05 sc-2.eth0.mac_addr = 02:10:20:3C:02:03 sc-2.eth1.mac_addr = 02:10:20:3C:02:04 sc-2.eth2.mac_addr = 02:10:20:3C:02:05

Figure 9 Summary of the deployment options

The OVA file containing the SAPC starts to be deployed, creating all Virtual Machines, network port connections and all the different component needed to create the complete vApp.

This activity takes around 10-15 minutes, depending on Network bandwidth, to be fully completed. A new vApp is created containing all Virtual Machines belonging to the SAPC when the operation is successfully executed (check the vCenter taskbar to track Status).

Do!

Additional configuration in VMware **must** be implemented before powering on the vApp (as stated in Section 4.2 on page 12).

Therefore, to start the SAPC vApp successfully, do not select the tick box option Power on after deployment.

4.2 Post Deploy Activities

This section describes some specific actions that need to be configured/executed before power on the vApp to ensure the SAPC resilience if there is a host or virtual machine failure.



4.2.1

Automatic Retry Boot Activation on Boot Failures

To activate automatic boot retries in the event of boot failures, select SC-1 virtual machine under Host and Clusters view, right-click on it and select Edit Settings... submenu items to get the properties window for this virtual machine.

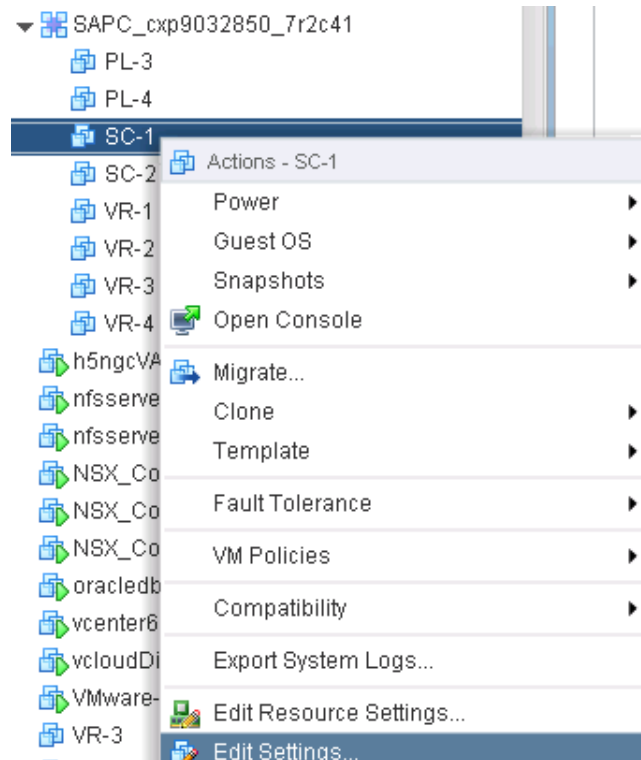


Figure 10 Edit settings of the Virtual Machine

Once the Virtual Machine Properties window is displayed, move to Options Tab -> VM Options and select Failed Boot Recovery tick box to ensure that virtual machine retries booting in the event of failure.

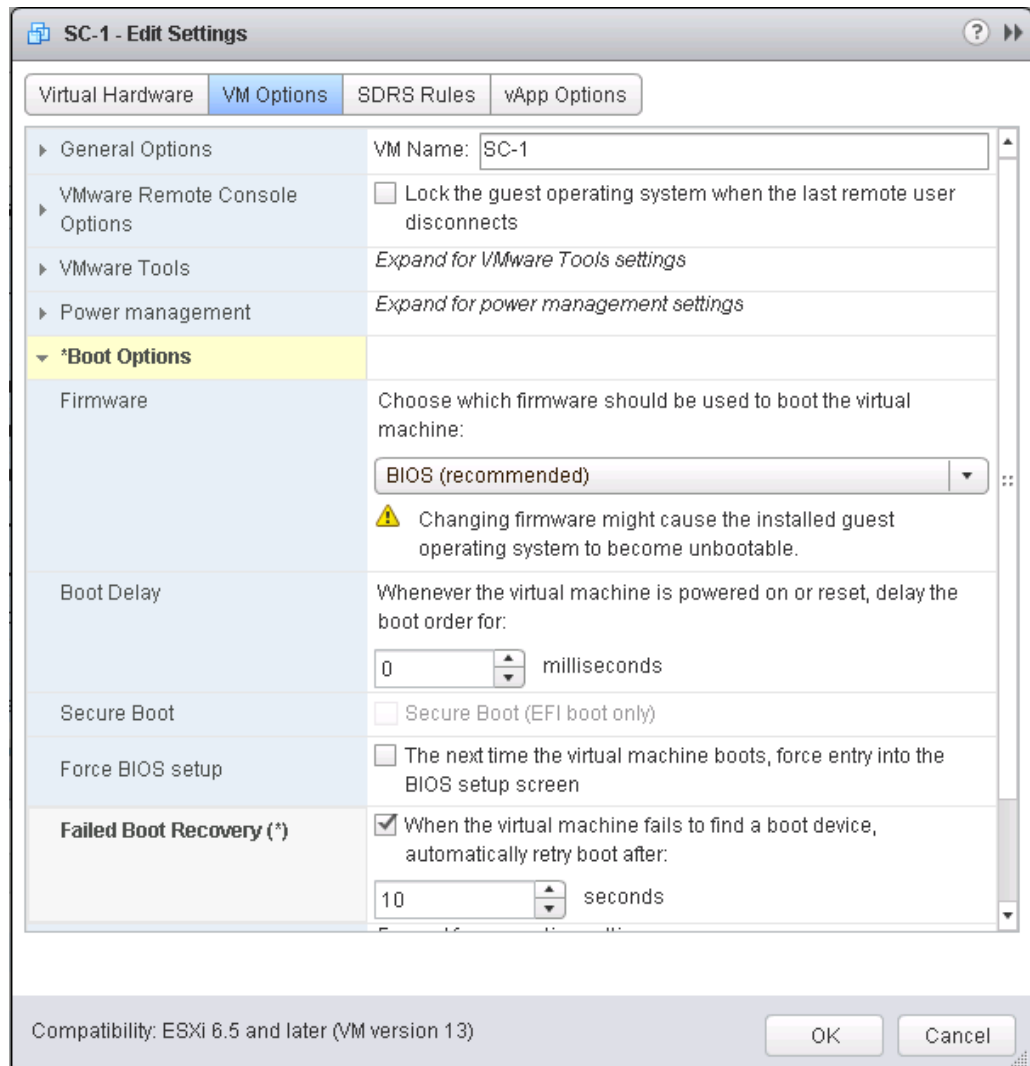


Figure 11 Virtual Machine Properties

Note: Repeat the steps for all Virtual Machines of the vApp.

4.2.2 Antiaffinity Rules between Virtual Machines into the SAPC vApp

Antiaffinity rules between Virtual Machines are recommended to be defined to ensure much better the SAPC resilience in the event of virtual machine or hypervisor malfunctions or crashes.

To define antiaffinity rules, select Cluster Server in which the SAPC were deployed from the Host and Clusters view, right mouse button and select Edit Settings... item to get Cluster Settings popup window.

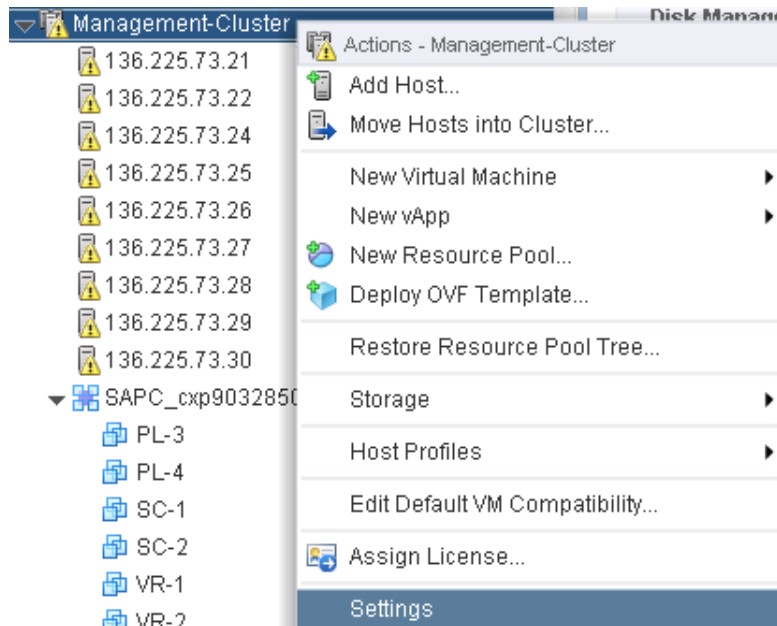


Figure 12 VMware Cluster

Once the Cluster Settings popup is shown, select VM/Host Rules settings on right panel to define specified anti-affinity rules, as it is seen in below picture.

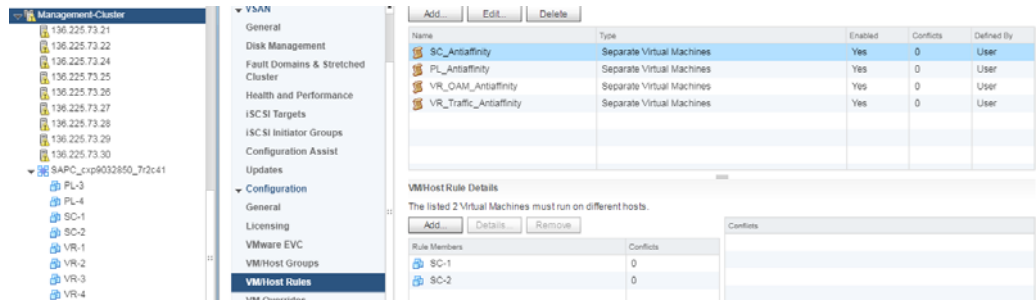


Figure 13 Rules to be added in Cluster

Just for reference is shown one of the Antiaffinity rules described in former window.

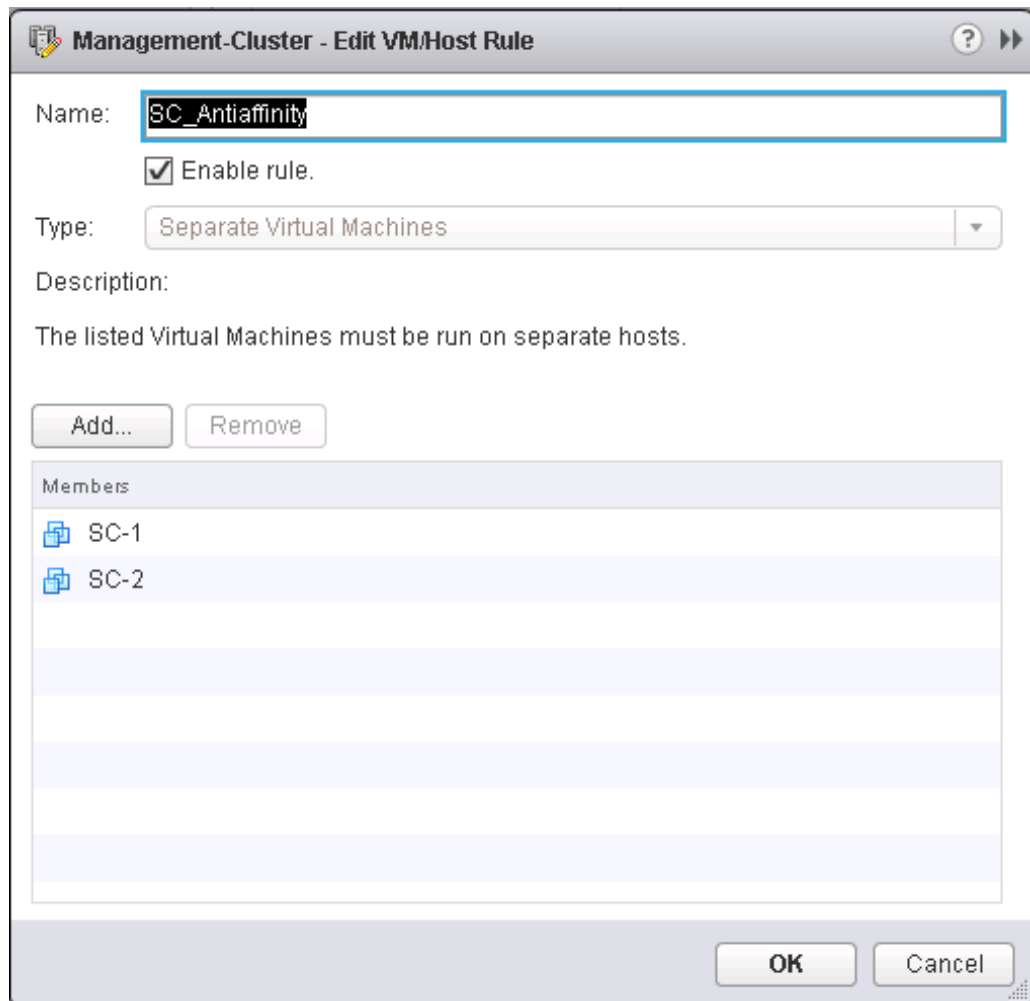


Figure 14 Rule Settings

4.2.3 Virtual Machine Initial Placement

Distribute the Virtual Machines to balance the load or ensure antiaffinity rules before powering on the SAPC application.

Move a virtual machine to a different physical server of the Cluster than the initially assigned. Select the virtual machine to be moved from the Host and Clusters view, right mouse button and select Migrate item to get the Migrate Virtual Machine popup window.

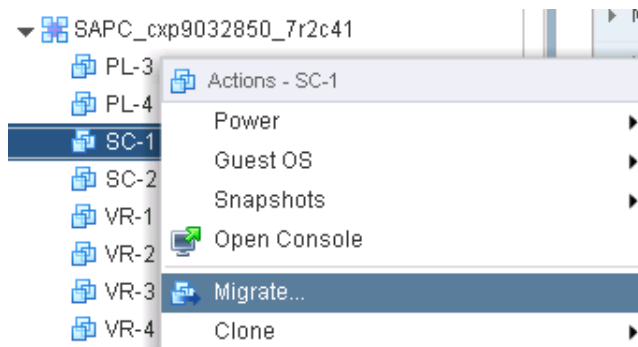


Figure 15 SC1 Virtual Machine Selection

Select **Change both compute and datastore** and press **Next** to continue with the next screen.

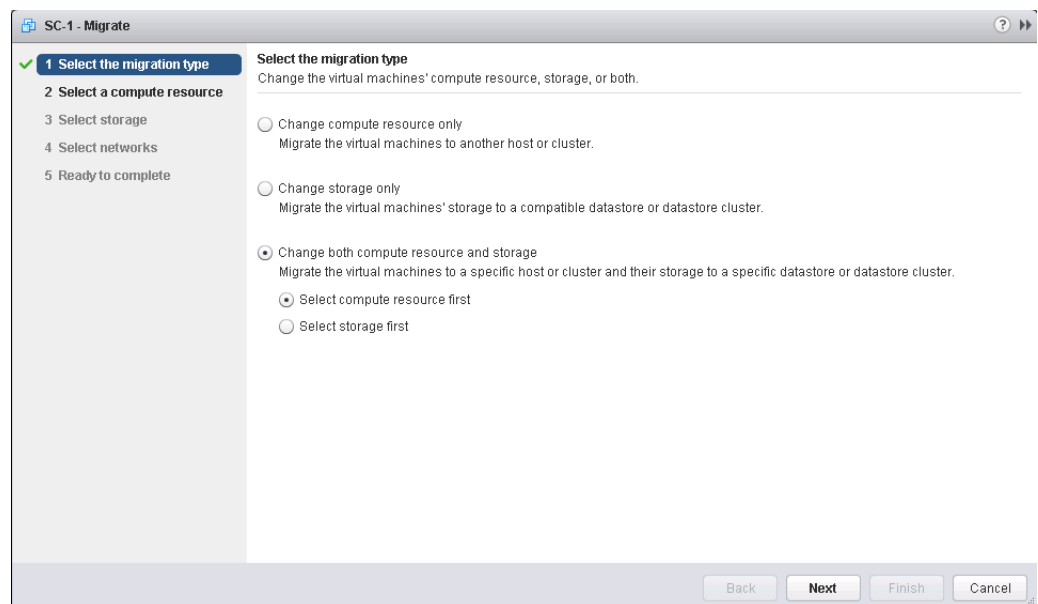


Figure 16 Migrate Compute and Datastore

Select the **Destination Server** to which the virtual machine would like to be initially started, keeping into consideration antiaffinity rules if applicable, and press **Next** to continue with the next screen.

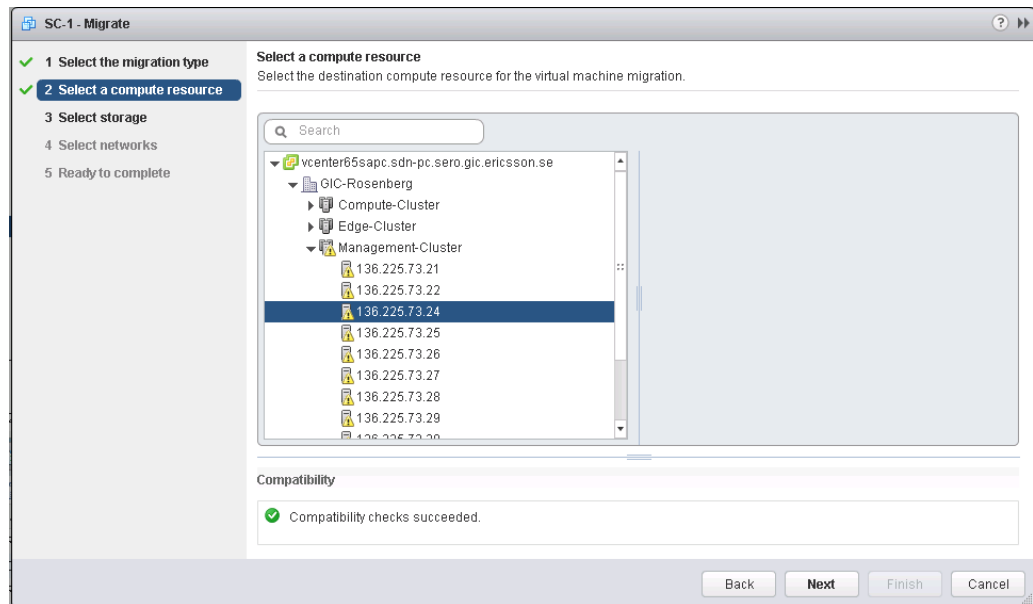


Figure 17 Compute Destination Selection

Select appropriated disk format and datastore, and press Next to continue with the next screen.

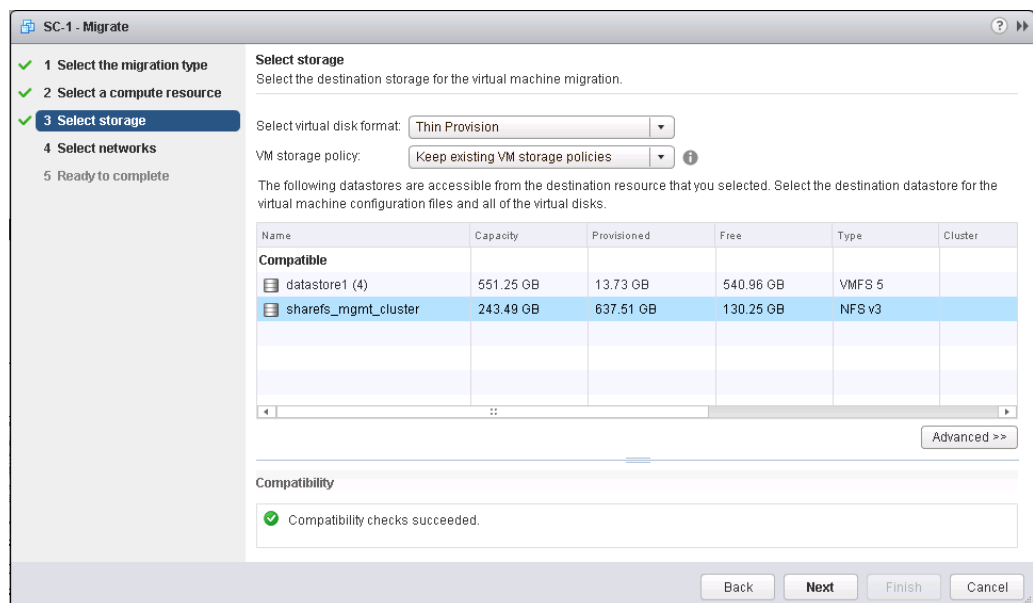


Figure 18 Datastore Selection

Leave default Networking mapping, and press Next to continue with the next screen.



SC-1 - Migrate

1 Select the migration type
2 Select a compute resource
3 Select storage
4 **Select networks**
5 Ready to complete

Select networks
Select destination networks for the virtual machine migration.

Migrate VM networking by selecting a new destination network for all VM network adapters attached to the same source network.

Source Network	Used By	Destination Network
SAPC_Internal1	1 VMs / 1 Network adapters	SAPC_Internal1
SAPC_Internal0	1 VMs / 1 Network adapters	SAPC_Internal0
SAPC_OamVip0	1 VMs / 1 Network adapters	SAPC_OamVip0

Advanced >>

Compatibility
 ✓ Compatibility checks succeeded.

Back Next Finish Cancel

Figure 19 Network mapping

Finally confirm the introduced data by pressing **Finish** button.

SC-1 - Migrate

1 Select the migration type
2 Select a compute resource
3 Select storage
4 Select networks
5 **Ready to complete**

Ready to complete
Verify that the information is correct and click Finish to start the migration.

Migration Type	Change compute resource and storage
Virtual Machine	SC-1
Cluster	Management-Cluster
Host	136.225.73.24
Networks	No network reassignments
Storage	[sharefs_mgmt_cluster]
Disk Format	Thin Provision

Back Next Finish Cancel

Figure 20 Summary of the options of the migration

Warning!

These steps must be repeated as many times as needed to position the SAPC Virtual Machines as it is desired.

4.2.4 Align vApp Properties with VIM

The SAPC allows to customize MAC addresses during the SAPC deployment. This customization can be done either using the Adapt Cluster Tool (see the Interface section in *Adapt Cluster Tool*) or dynamically retrieving the MAC addresses allocated by the vCenter application during the deployment. In the second case, the SAPC vApp properties need to be modified to match the ones in the virtual infrastructure before powering on the SAPC application. In particular, the ones that need to be adapted are MAC addresses for SC-1, SC-2, PL-3 and PL-4 VMs.

4.2.4.1 Get MAC Addresses from VIM

To find out MAC addresses assigned by vCenter to different virtual machines, select SC-1 virtual machine under Host and Clusters view, right mouse click it and select *Edit Settings...* submenu item to get the properties window for this virtual machine.

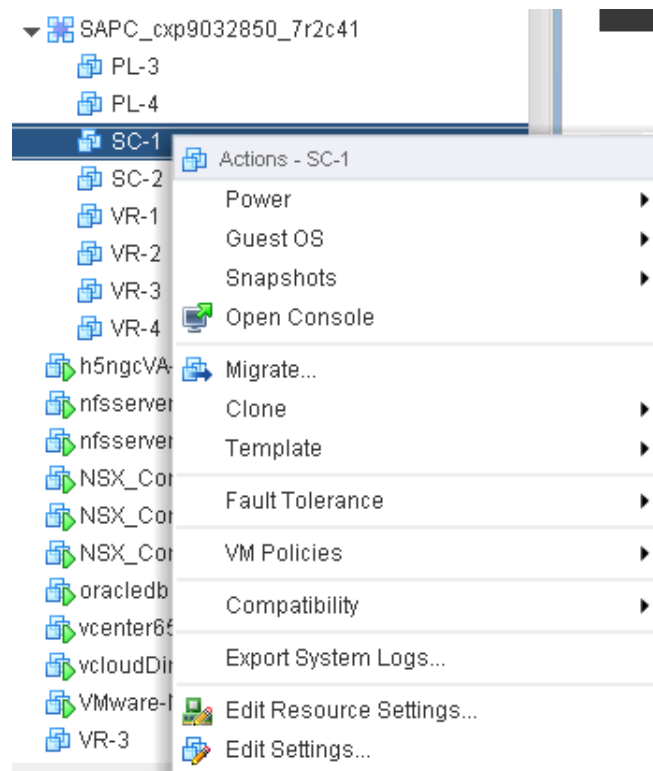


Figure 21 Edit settings of the Virtual Machine

Expand all Network Adapters under *Virtual Hardware* Tab and make note of all assigned MAC addresses for this virtual machine to be later on assigned to SAPC vApp properties fields, Section 4.2.4.2 on page 22.



SC-1 - Edit Settings

Virtual Hardware | VM Options | SDRS Rules | vApp Options

Network adapter 1	SAPC_Internal0 (vDS_Mgmt_And_T		
Status	<input checked="" type="checkbox"/> Connect At Power On		
Port ID	13117		
Adapter Type	VMXNET 3		
DirectPath I/O	<input checked="" type="checkbox"/> Enable		
MAC Address	00:50:56:ab:ef:86	Automatic	
Shares	Normal	50	
Reservation	0	Mbit/s	
Limit	Unlimited	Mbit/s	
Network adapter 2	SAPC_Internal1 (vDS_Mgmt_And_T		
Status	<input checked="" type="checkbox"/> Connect At Power On		
Port ID	13125		
Adapter Type	VMXNET 3		
DirectPath I/O	<input checked="" type="checkbox"/> Enable		
MAC Address	00:50:56:ab:12:ce	Automatic	
Shares	Normal	50	
Reservation	0	Mbit/s	
Limit	Unlimited	Mbit/s	
Network adapter 3	SAPC_OamVip0 (vDS_Mgmt_And_T		
Status	<input checked="" type="checkbox"/> Connect At Power On		
Port ID	13133		
Adapter Type	VMXNET 3		
DirectPath I/O	<input checked="" type="checkbox"/> Enable		
MAC Address	00:50:56:ab:3d:1f	Automatic	
Shares	Normal	50	

New device: ----- Select ----- Add

Compatibility: ESXi 6.5 and later (VM version 13)

OK Cancel

Figure 22 SC-1 VM properties

Do!

These steps must be repeated for SC-2, PL-3 and PL-4 virtual machines.

4.2.4.2 Modify SAPC vApp Properties

Once all assigned MACs during deployment are known simply select SAPC deployed vApp Host and Clusters view, right mouse click it and select Edit Settings... submenu item to get the properties window for SAPC vApp.

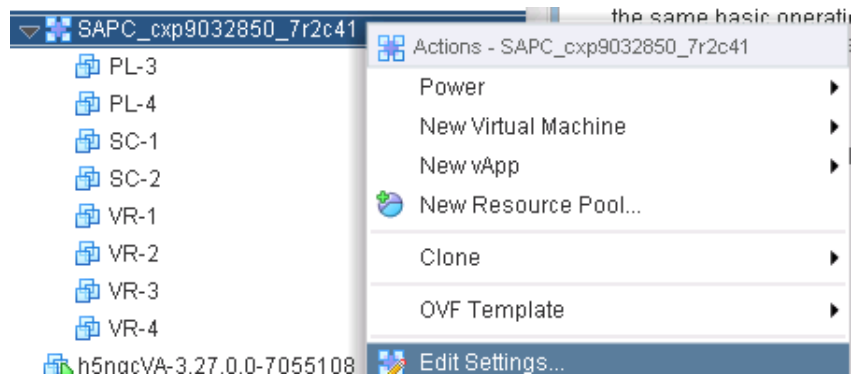


Figure 23 vApp Settings

Expand Uncategorized Field from Edit vApp window and modify all MACs with the ones collected in previous chapter. Once all MACs are aligned, press Ok to apply the changes. SAPC is now ready to be powered on.



SAPC_cxp9032850_7r2c41 - Edit vApp

Application properties - SAPC

Product: SAPC
Version: CXP 903 2850/7R2C41
Vendor: Ericsson

Uncategorized	12 settings
pl-3.eth0.mac_addr	02:10:40:3C:03:03
pl-3.eth1.mac_addr	02:10:40:3C:03:04
pl-3.eth2.mac_addr	02:10:40:3C:03:05
pl-4.eth0.mac_addr	02:10:40:3C:04:03
pl-4.eth1.mac_addr	02:10:40:3C:04:04
pl-4.eth2.mac_addr	02:10:40:3C:04:05
sc-1.eth0.mac_addr	02:10:20:3C:01:03
sc-1.eth1.mac_addr	02:10:20:3C:01:04
sc-1.eth2.mac_addr	02:10:20:3C:01:05
sc-2.eth0.mac_addr	02:10:20:3C:02:03
sc-2.eth1.mac_addr	02:10:20:3C:02:04
sc-2.eth2.mac_addr	02:10:20:3C:02:05

Deployment

- ▶ CPU resources
- ▶ Memory resources

OK Cancel

Figure 24 vApp Properties

4.3 Power on the SAPC vApp

Therefore to start the SAPC application select the vApp from the Host and Clusters view, right mouse click it and select **Power On** item.

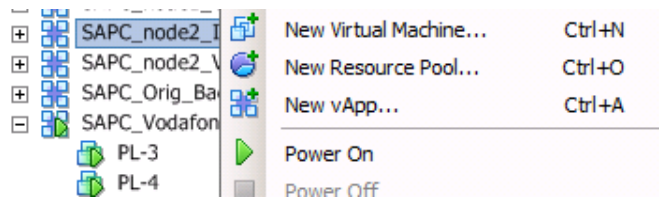


Figure 25 Power On vApp

The Virtual Machines come up in a proper order to ensure that at the end of the process the SAPC is fully available for operation.

4.4 Configuration in vCenter

4.4.1 Define Datacenter (Optional)

This step is optional and only in the case that the SAPC would like to be deployed under a specific Datacenter must be executed, otherwise any of the existing ones can be used. Even though the SAPC works in any case, either if it is defined in a new datacenter or in an existing one, there are some specific VMware operations that do not cross datacenters. Check VMware reference documentation for detailed information about specific operations not allowed between different datacenters.

In case a specific datacenter needs to be created for the SAPC deployment simply select the **New Datacenter** menu item under **vCenter Server Host and Clusters** view.

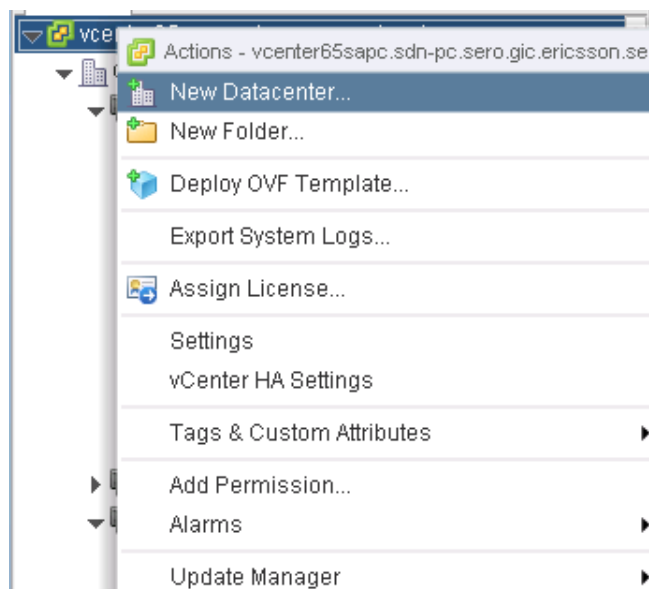


Figure 26 Datacenter definition

Give the Datacenter a unique name. The new created datacenter is displayed listed under vCenter Server left pane tree in the 'Host and Cluster' view.



Note: In this case Hosts must be connected to the newly created Datacenter, to achieve this just position into new created Datacenter and click right mouse button to select “Add Host ...” option.

4.4.2

Define DRS (Distributed Resource Scheduler) Cluster

Select the Host and Clusters view from vCenter GUI and select the Datacenter in which the SAPC is going to be deployed. At this stage, click right mouse button to obtain New Cluster... menu item and select it to obtain New Cluster Wizard pop-up window.

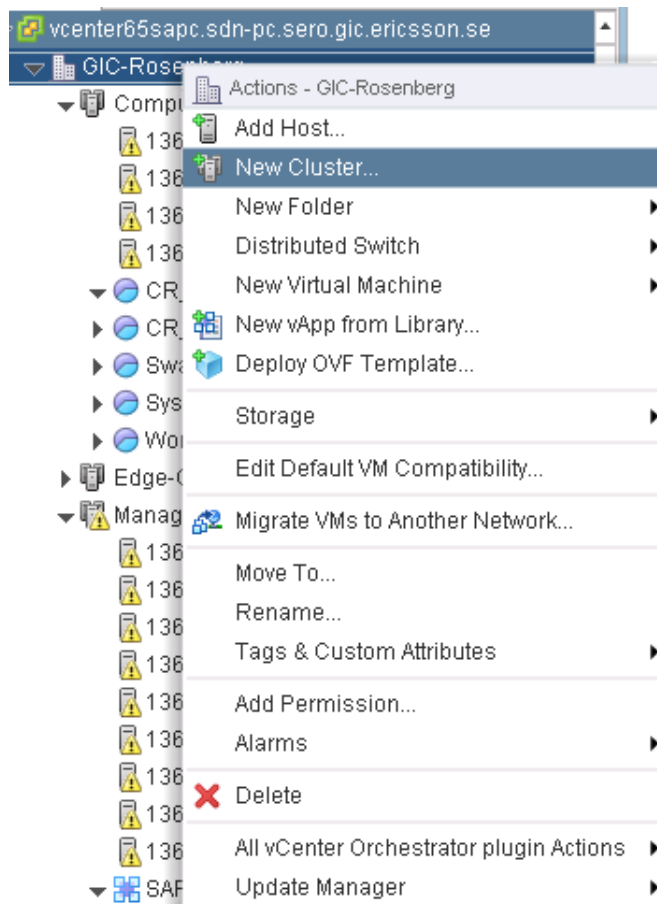


Figure 27 New Cluster definition

Complete the Cluster Server Name, select Turn On vSphere DRS tick box and press

Select Manual as Automation Level Leave default values for EVC, HA and vSAN and press OK button to continue with the cluster creation.

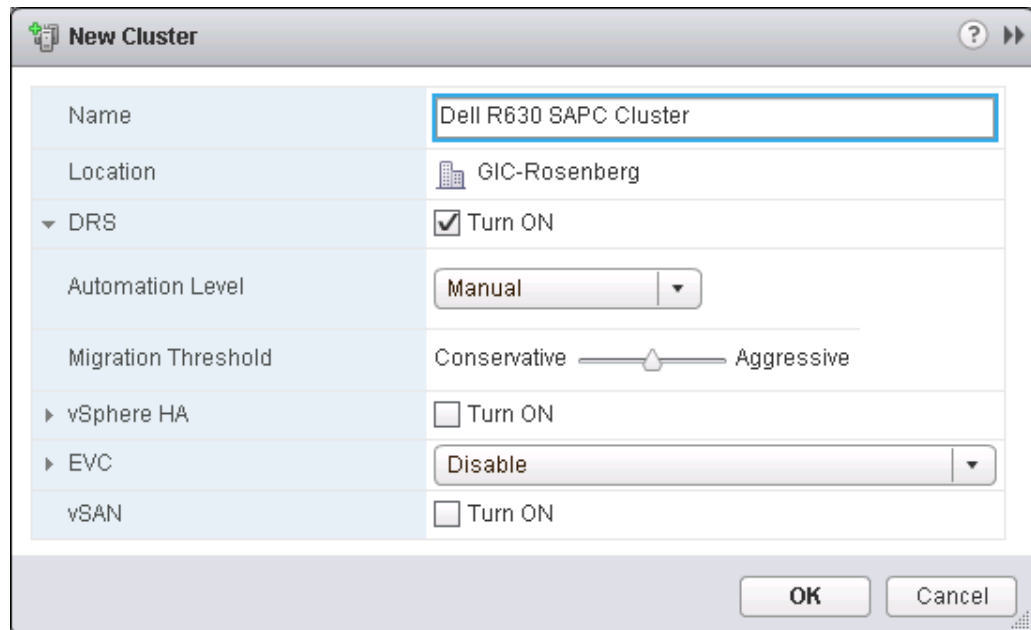


Figure 28 Cluster Features settings

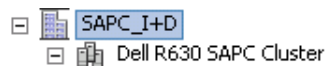


Figure 29 VMware Cluster after creation

Created cluster is displayed under datacenter icon with the previously defined name, however it does not include any hosts as part of it.

Simply Drag and Drop Hosts from Datacenter to Cluster icon to include them as part of the specified cluster. Execute it one by one until include all hosts to be used to deploy the SAPC application as part of the cluster, as it can be seen in the following picture.

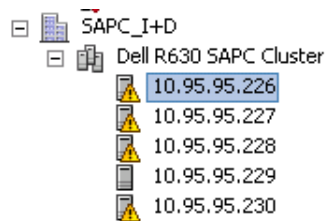


Figure 30 Hosts and Clusters in the Datacenter

4.4.3

Define Distributed Virtual Switches (VMware vDS)

This step determines how physical hosts are interconnected among of them using their physical interfaces through external switches/routers part of the customer infrastructure. Obviously, the virtual switch layout definition is hardware-dependent (NIC available interfaces in the hosts) and it depends on how those interfaces are physically connected to the physical customer network infrastructure.



Therefore there are many possible alternatives, all them valid. One possibility is one NIC per Physical host connected to one Physical Router with no traffic separation. The one presented in this example is four Physical NICs per Physical Host connected to four Routers, two carrying OAM traffic, and two carrying Traffic.

Configuration on any possible layout is out of the scope of this document and only an example is provided as a guide to help during the configuration, taking Virtual Distributed Switches as base. VMware virtual switch configuration must be considered as a prerequisite for the SAPC deployment, from which the SAPC Port Groups are created, and it must follow the customer hardware-specific layout in which the SAPC is going to be deployed.

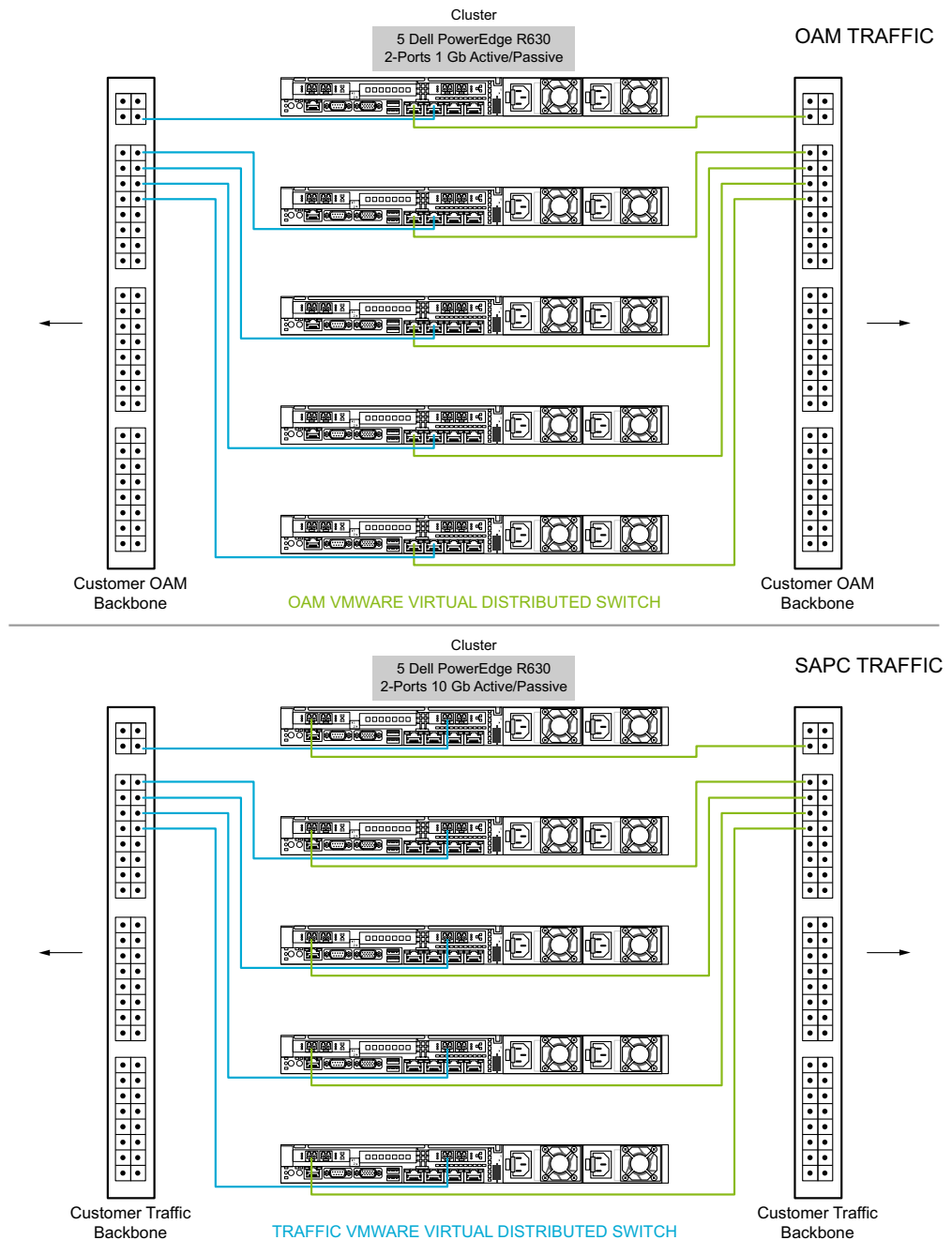


Figure 31 Physical connection of the Hosts, OAM, and Traffic switches

For the specific example mentioned, select the Networking view from vCenter GUI and select the Datacenter in which the SAPC is going to be deployed. Click right mouse button to obtain New vSphere Distributed Switch... menu item and select it to obtain Create vSphere Distributed Switch popup window.

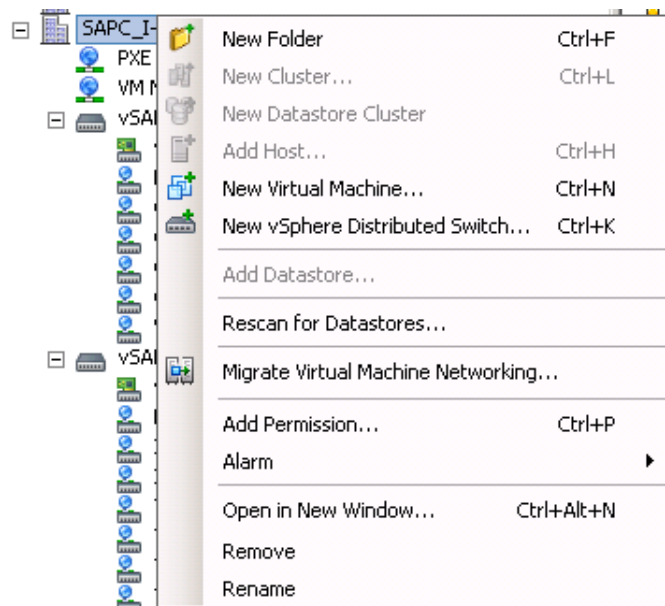


Figure 32 Distributed Switches in the datacenter

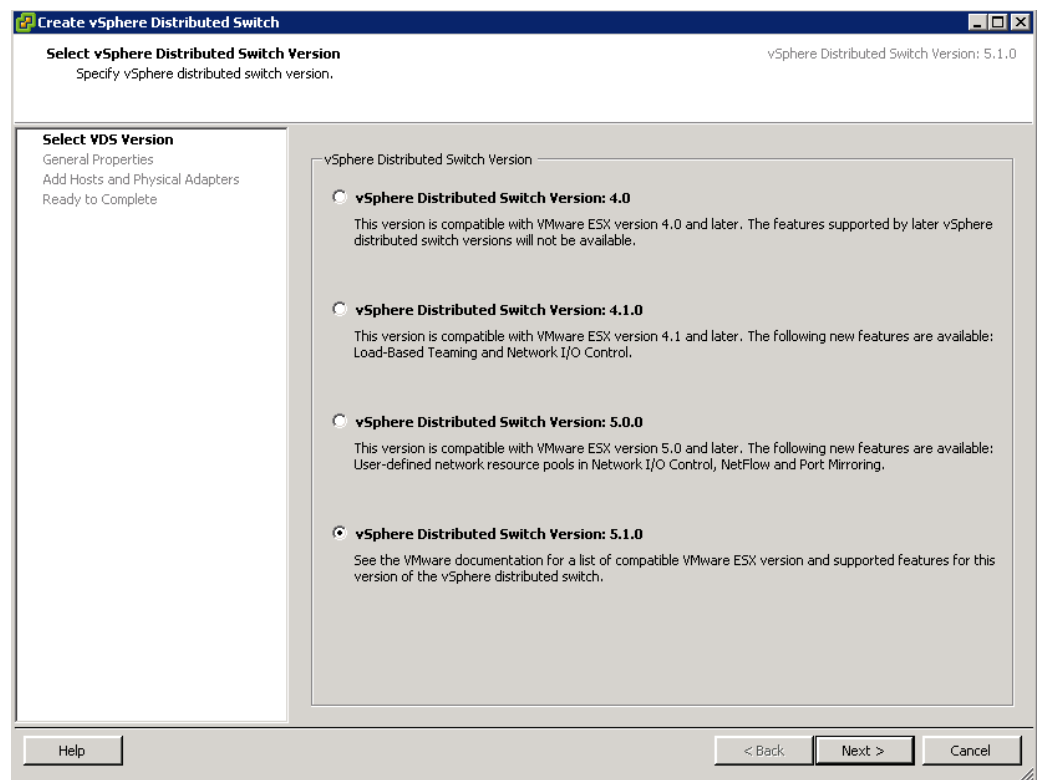


Figure 33 Version of the vDS selection

Select the Default value as vDS version when the popup window is opened. Press Next button to continue with the vDS creation.

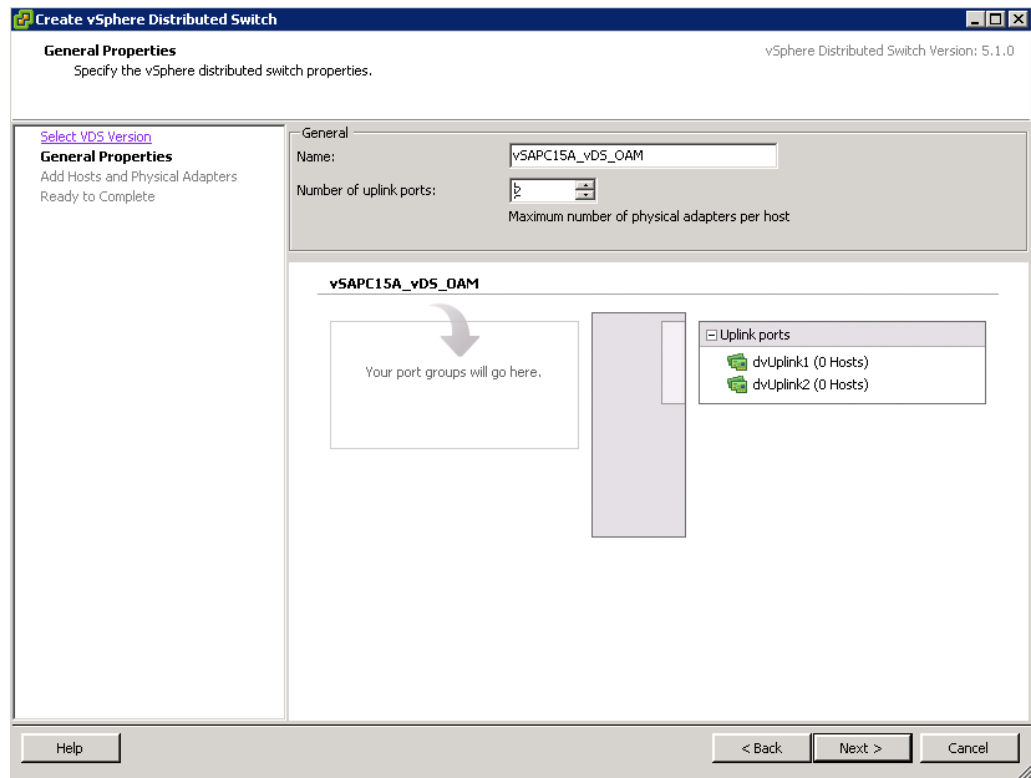


Figure 34 Properties of the vDS

Enter the virtual switch Name and select the Number of uplinks ports to be part of the vDS, in our example 2, once done press Next button to continue with the vDS creation.

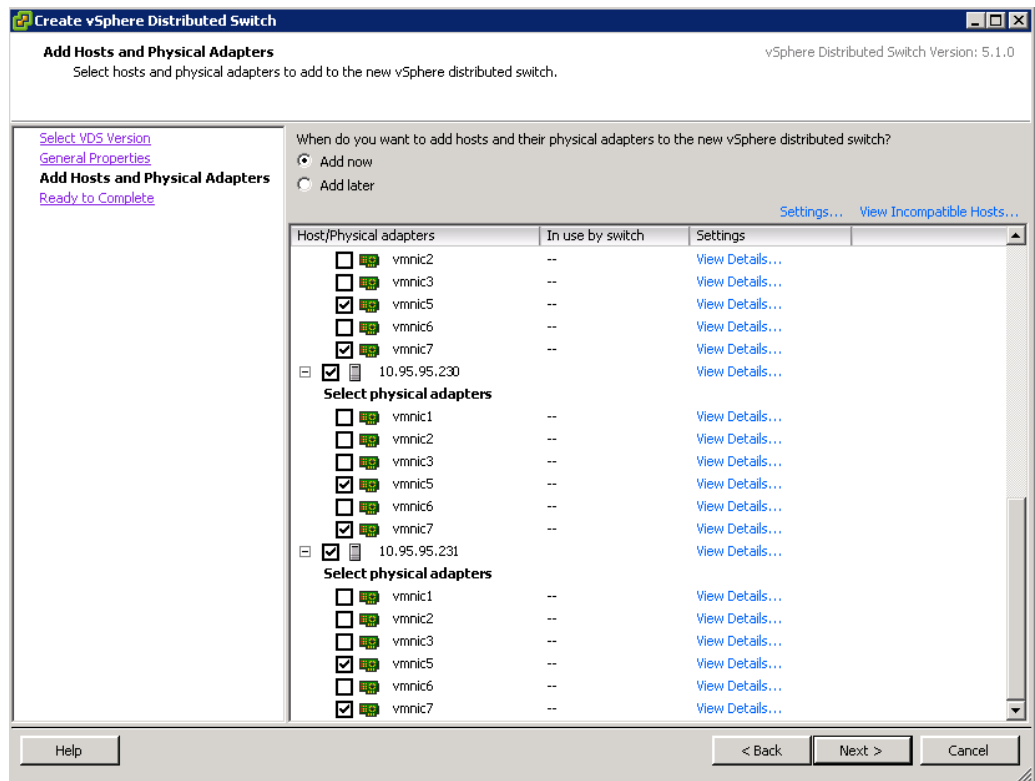


Figure 35 Hosts and Physical adapters selection

Select on each host of the cluster the physical NICs to be used to create the Port Groups traffic among the Physical Hosts, and therefore defining the Uplinks. In our example 2 NICs per host. Once done, press Next button to continue with the vDS creation.

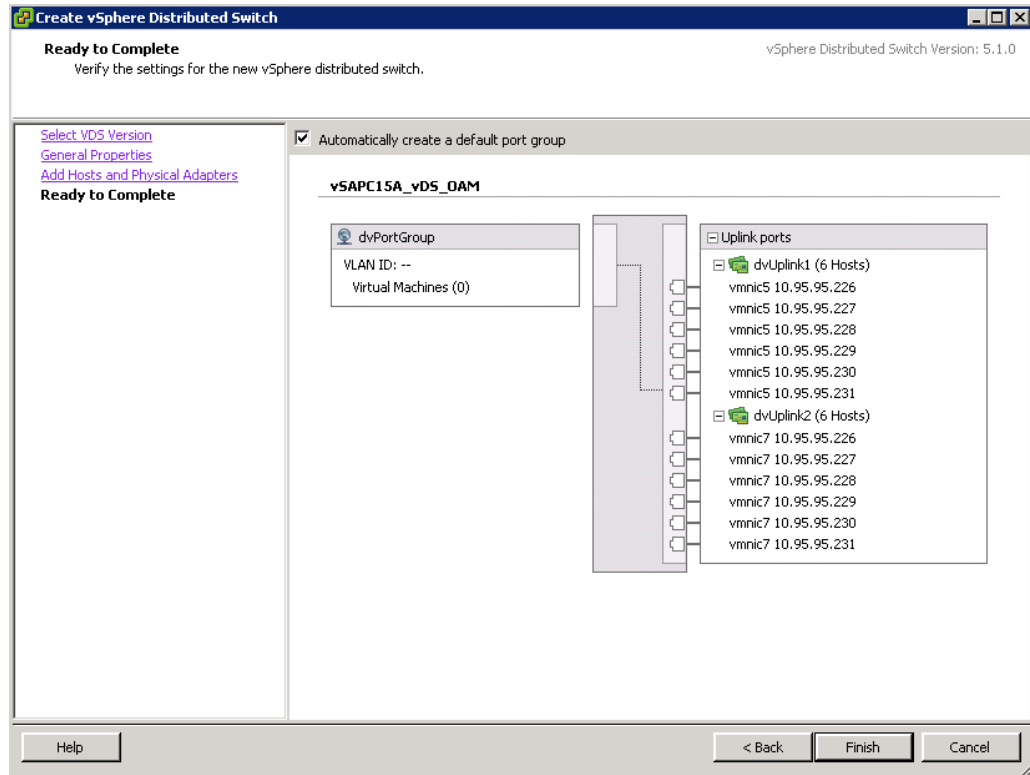


Figure 36 Summary of the Selected options

And finally confirm the virtual switch creation by pressing **Finish** button.

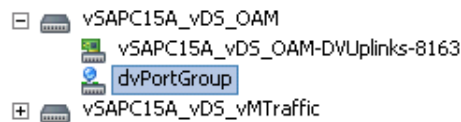


Figure 37 Distributed Switch view

Created virtual distributed switch is displayed under datacenter icon including only a Port Group.

In case bonding is required as it is in our example, port groups can be edited to align with this capability by right click the port group and selecting **Edit Settings...** menu item, otherwise proceed with next section to define required the SAPC Port Groups to allow the SAPC deployment.

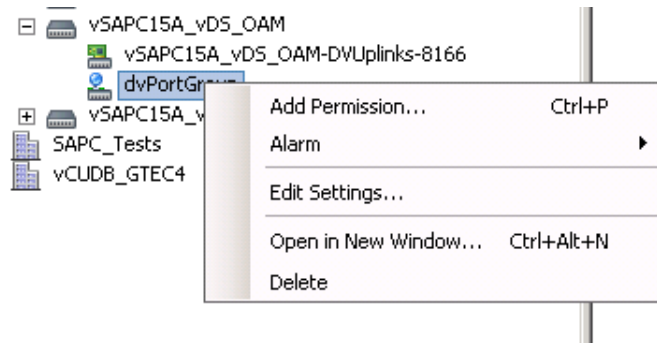


Figure 38 Edit Settings of the Port Group

Whenever port groups have been edited to implement bonding capabilities in any of possible variants, it can be achieved by modifying Teaming and Failover characteristics for the specific port group.

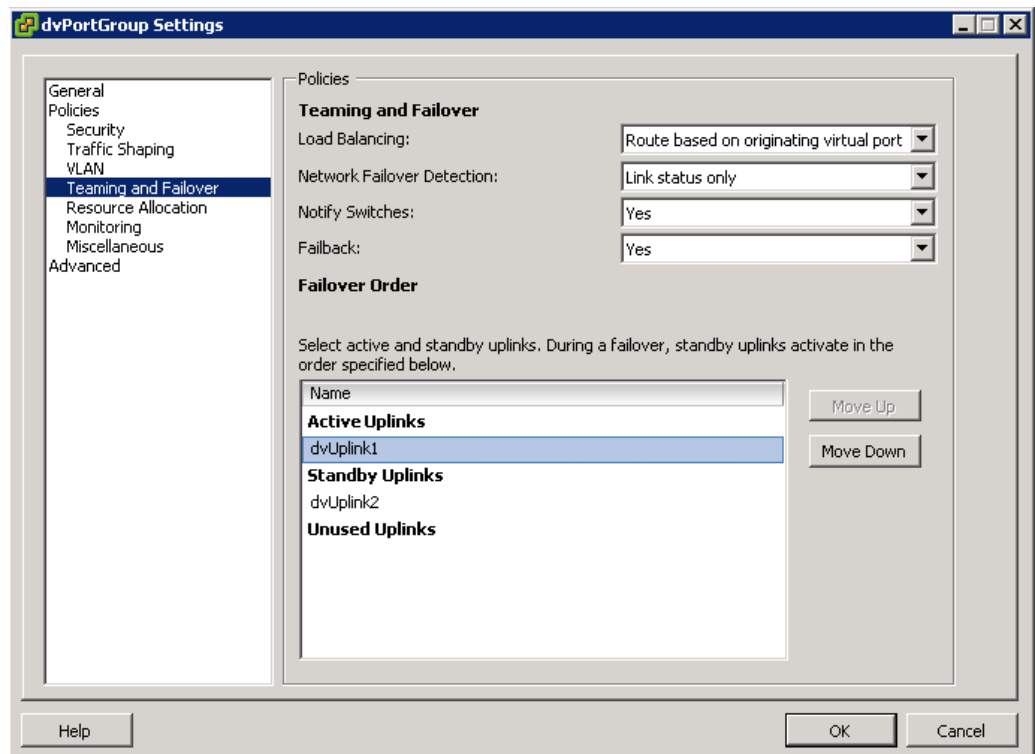


Figure 39 Teaming and Failover options

Note: Follow the same procedure shown to define all vDS that are required to deploy the requested the SAPC Port Groups. In our example repeat at least once more to create another vDS **SAPC_vDS_Traffic** to create specific Traffic Port Groups achieving traffic separation between OAM and Traffic.

4.4.4 Define the SAPC Port Groups

Port Group in VMware terminology is similar as subnet which is normally associated with a VLAN to achieve network separation.

Port Groups are always defined into existing VMware virtual switches either distributed or standard switches.

To deploy the SAPC application, it is required to define the following Port Groups together with their attributes to ensure proper connectivity among all Virtual Machines composing the SAPC application.

Create these port groups under one or several datacenter virtual distributed switches as it has been already mentioned, although other virtual switches distributions are also possible. The following port group distribution between the different virtual Distributed Switches provided is just a suggestion. Following the approach of traffic separation, there is no problem if it is changed as long as it is properly configured into the physical underlying infrastructure.

Note: Agree with the infrastructure owner the VLANs to be used before deploying the SAPC to guarantee fully communication among VMs.

The port groups required are aligned to the subnetworks used by the vApp, which are described in the [SAPC VNF Network Configuration Guide](#) among other internal particularities. To ensure that the SAPC can be successfully deployed, the following port groups are needed:

- Internal-0 (Traffic vDS Port Group)

Used for cluster internal communication (NFS, TFTP, and so on) among all Virtual Machines being part of the SAPC.

- Internal-1 (Traffic vDS Port Group)

Similar than Internal-0 but created for TIPC communication among all Virtual Machines composing the SAPC.

- OAM-VIP-0 (OAM vDS Port Group)

One of the networks used for EVIP OAM propagation through OSPF protocol. It is a point-to-point connection between SCs and VRs Virtual Machines on which OAM VIP address is published.

- Traffic-VIP-0 (Traffic vDS Port Group)

One of the networks used for EVIP Traffic propagation through OSPF protocol. It is a point-to-point connection between PLs and VR Virtual Machines on which Traffic VIP address is published.

- External-OAM (OAM vDS Port Group)



Used for system management purposes (Management access to VRs, in case VRs are part of the SAPC deployment) and a point of interconnection from customer backbone to the SAPC OAM Services.

— External-Traffic (Traffic vDS Port Group)

Used for point of interconnection from customer traffic backbone to the SAPC Traffic Services, in case VRs are part of the SAPC deployment.

Following table specify the required parameters that must be applied for each described Port Groups when Port Groups are provisioned into VMware applications to ensure proper the SAPC connectivity among all Virtual Machines in the vApp.

ALL PORT GROUPS	
General Port Group Attributes	
PARAMETER	VALUE
Number of Ports	Default (128 for 5.x version)
Port Binding	Static Binding
Security Policy Attributes	
PARAMETER	VALUE
Promiscuous Mode	Reject
MAC Address Changes	Reject
Forget Transmits	Reject
Traffic Shaping Policy Attributes	
PARAMETER	VALUE
Ingress Traffic Shaping Status	Disable
Egress Traffic Shaping Status	Disable
VLAN Policy Attributes	
PARAMETER	VALUE
VLAN Type	VLAN
VLAN ID	Site Specific, needs to be configured in Physical Switches
Teaming and Failover Policy Attributes	
PARAMETER	VALUE
Loading Balancing	Routes based on originating virtual port
Network Fallover Detection	Link Status Only
Notify Switches	Yes
Fallback	Yes
Resource Allocation Policy Attributes	
PARAMETER	VALUE
Network Resource Pool	None
Monitoring Policy Attributes	
PARAMETER	VALUE
Netflow Status	Disabled
Miscellaneous Policy Attributes	
PARAMETER	VALUE
Block all Ports	No
Teaming and Failover Policy Attributes	
PARAMETER	VALUE
Advanced	Keep all as default

Figure 40 Port Groups options

To create above port groups from vSphere Web Client from the Networking inventory view, select and click the adequate virtual distributed switch in which Port Group must be created on.

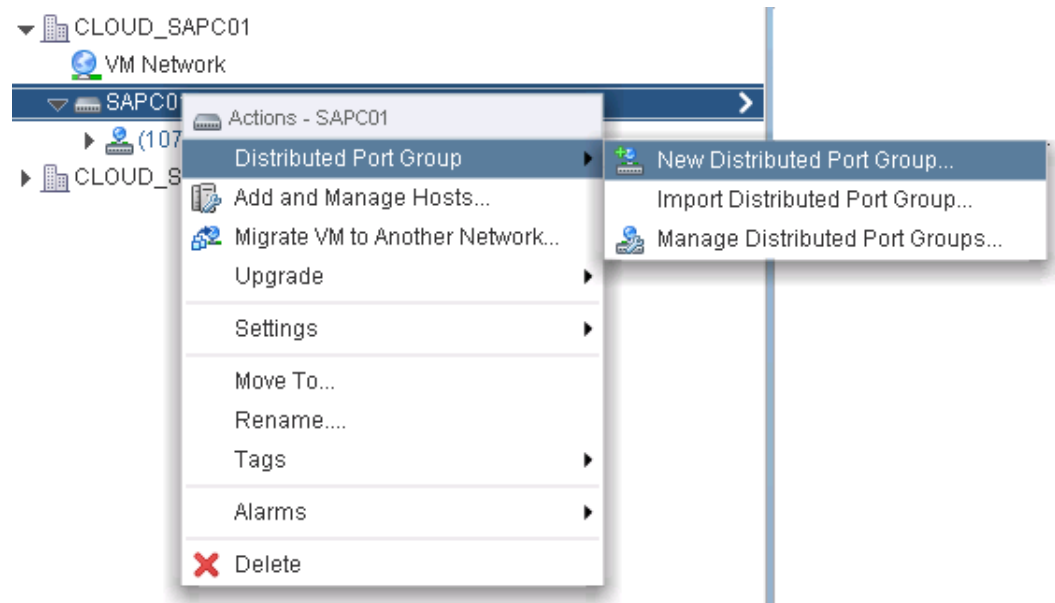


Figure 41 Port Groups creation on a vDS

Right-click on it and select New Distributed Port Group... menu item to obtain the New Distributed Port Group pop-up window.

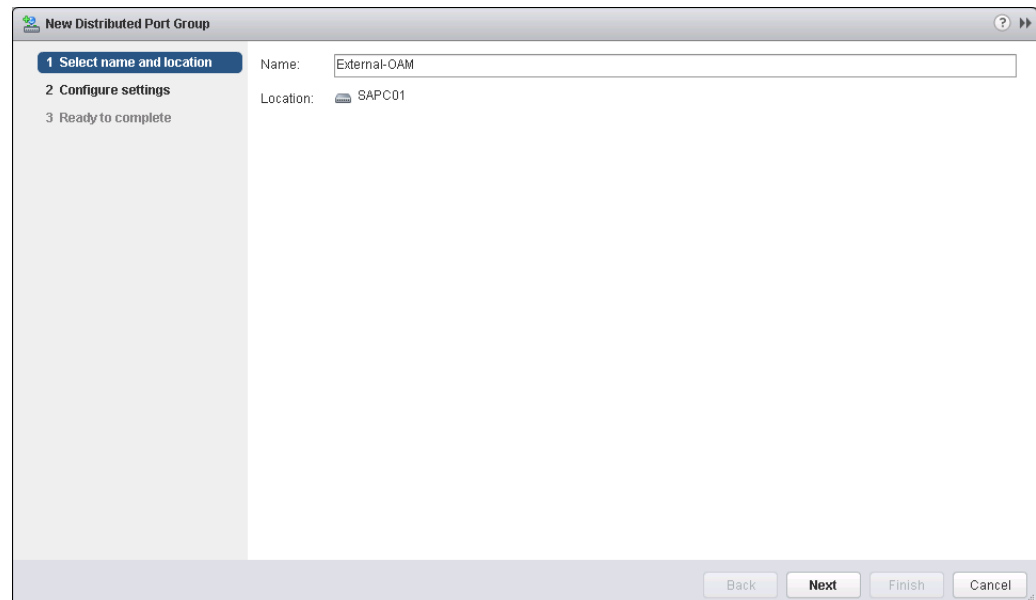


Figure 42 Port Group name selection

Complete Port Group Name and click Next to configure the settings for the Port Group being created.



Figure 43 Configure settings of the Port Group

Check and modify, if necessary, the Port Group parameters shown in Figure 43 according to the values described in Figure 40. Select the **Customize default policies configuration** check-box and click **Next** to customize the Port Group policies according to the table Figure 40.

Figure 44 Security options of the Port Group

After customizing all the settings, at **Ready to complete** step, a summary with the parameters set for the Port Group is shown, as seen in Figure 45. Review them to ensure their correctness and click **Finish** to complete the Port Group creation.

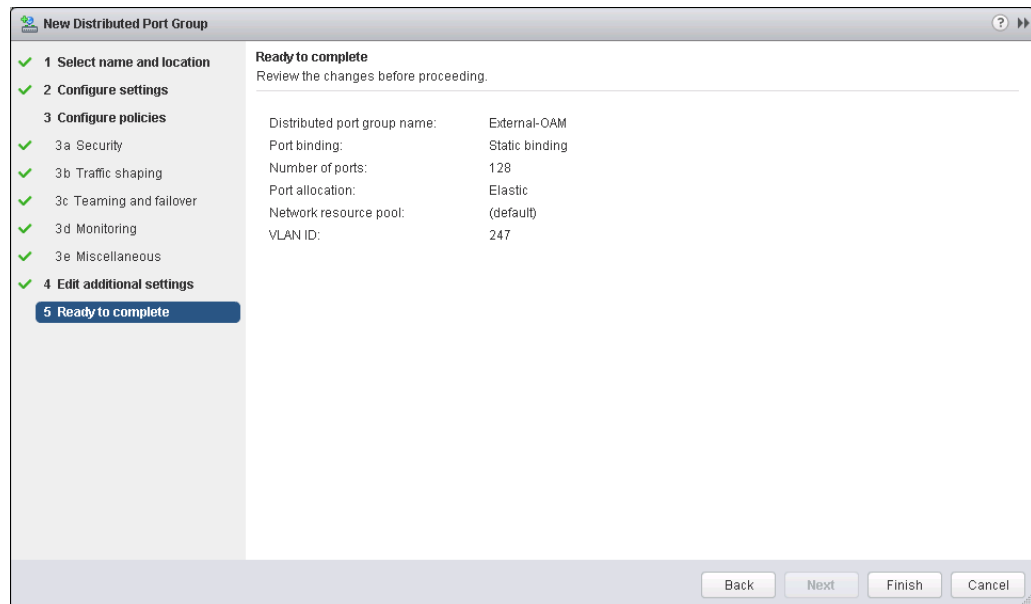


Figure 45 Summary of the parameters set for the Port Group

Note: Repeat the previous steps to create and configure all Port Groups needed to deploy the SAPC as it has been specified earlier. One of the Port Groups per Virtual Distributed Switch can use VLAN “None” (that is External-OAM and External-Traffic Subnetworks).



5 Deploy the SAPC for Standalone Deployments using VMware vCloud Director

During the following procedure related to deployments using VMware vCloud Director, the scope related to networking management in VMware vCloud Director is not covered. The reason for this is the wide range of possibilities and configurations (vApp networks, Organization networks, External networks, and so on).

However as described in Section 5.5.2 on page 67 a suggestion for networking configuration to be used could be to create a number of Organization networks in VMware vCloud Director, and map all of them to the proper SAPC vApp virtual network defined into the OVA/OVF package.

5.1 Upload the SAPC vApp and PL Scale-Out Packages to the Catalogue

Even though it is possible to deploy the SAPC vApp directly from OVA/OVF package without passing through the vCloud Director Catalogue, a more common scenario is to upload the SAPC vApp to the Catalogue, from where it can be deployed at any moment at a later stage. Therefore this is the scenario covered mainly by this document.

Note: The deployment of SAPC through the vCloud Director Catalogue is applicable only when the MAC addresses assigned to the SAPC VMs are dynamically retrieved from the vCenter application during the deployment. If the customization of MACs addresses is done with the Adapt Cluster Tool, deployment from OVA/OVF package is always required. In this case, this chapter is not applicable.

As a previous step to upload the SAPC vApp to the vCloud Director catalogue, make sure the SAPC OVA/OVF package file is available from the VMware vCloud Director to be deployed.

Note: Screen captures are from VMware vCloud Director 8.20 and the resources displayed depend on the Organization, Virtual DataCenter and OVA/OVF Package uploaded.

The first step is to connect to the VMware vCloud Director using a web browser. Then, log in using your credentials.



Figure 46 Log in VMware vCloud Director

After login, click on Manage & Monitor under System. A list of Organizations is displayed.

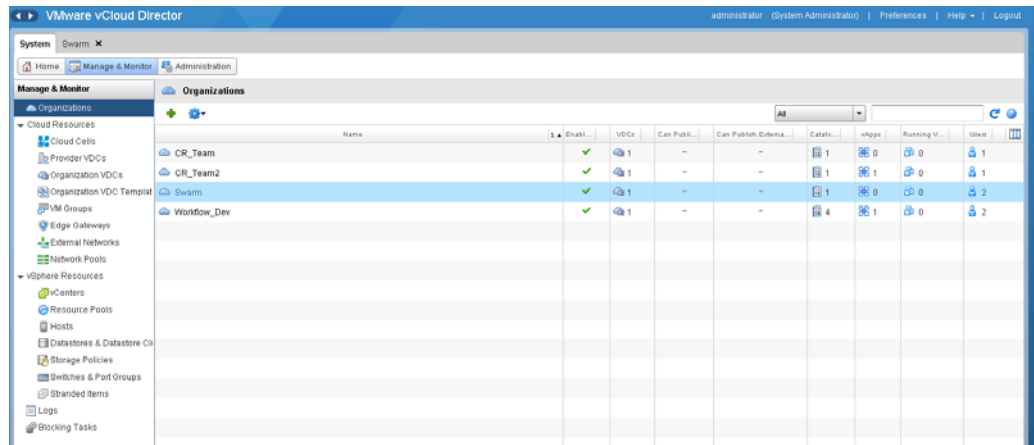


Figure 47 Home View

Double click in your organization to access it, if more than one is shown.

Note: vCloud Administrator might directly provide credentials to the specific Organization in which the SAPC would be deployed, in which case after completing the login, vCloud Director application will present the Organization View automatically, and therefore previous step is not applicable.

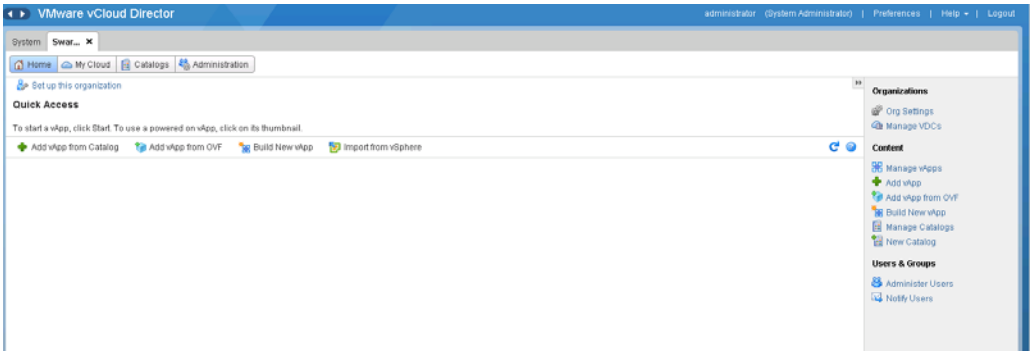


Figure 48 Organizations View

Click on Catalogs Tab, and double click in the Catalogue in which the SAPC will be uploaded, to open Catalogs view.

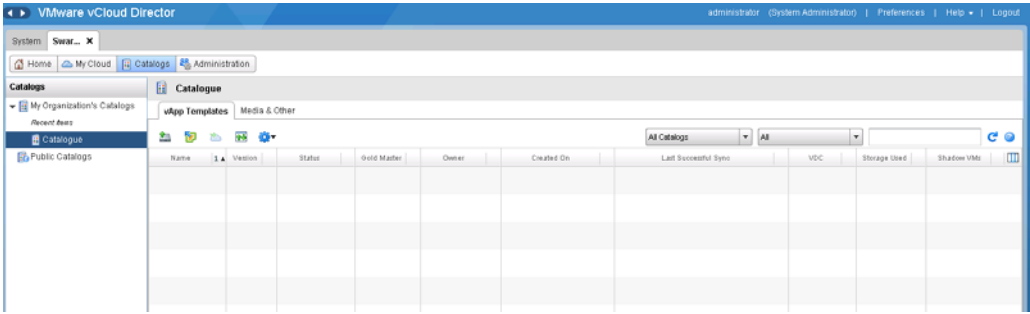


Figure 49 Catalogue View

Press Upload button to start the SAPC vApp to the catalogue.



Figure 50 Upload OVA/OVF icon

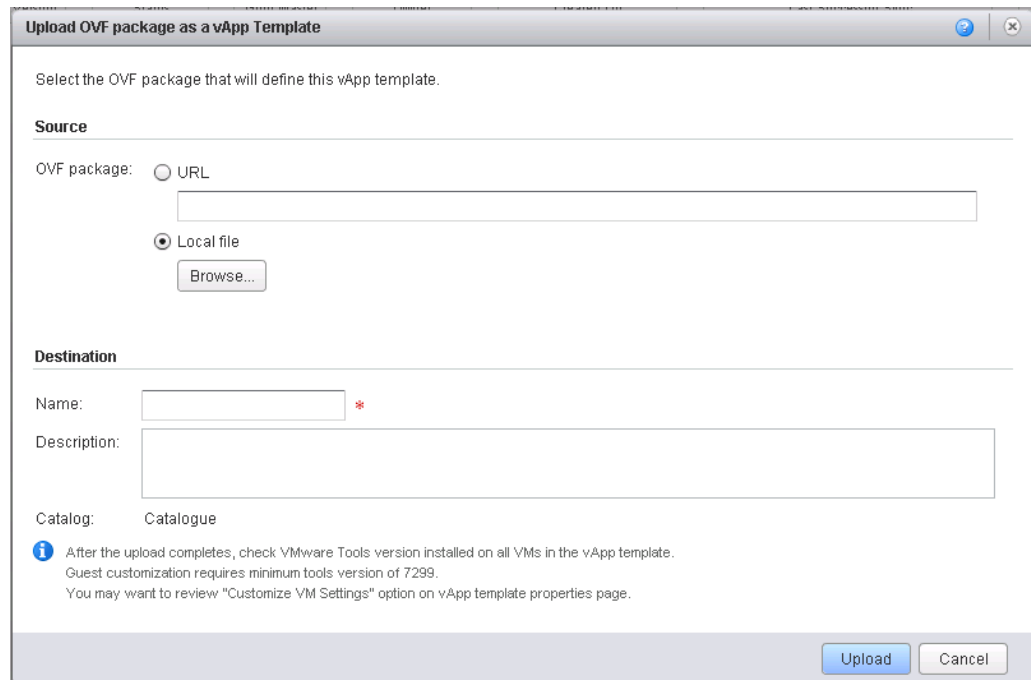


Figure 51 Select Source

Select Local file and press the Browse button to obtain a File Browser window to make possible the selection of the OVF package to be deployed.

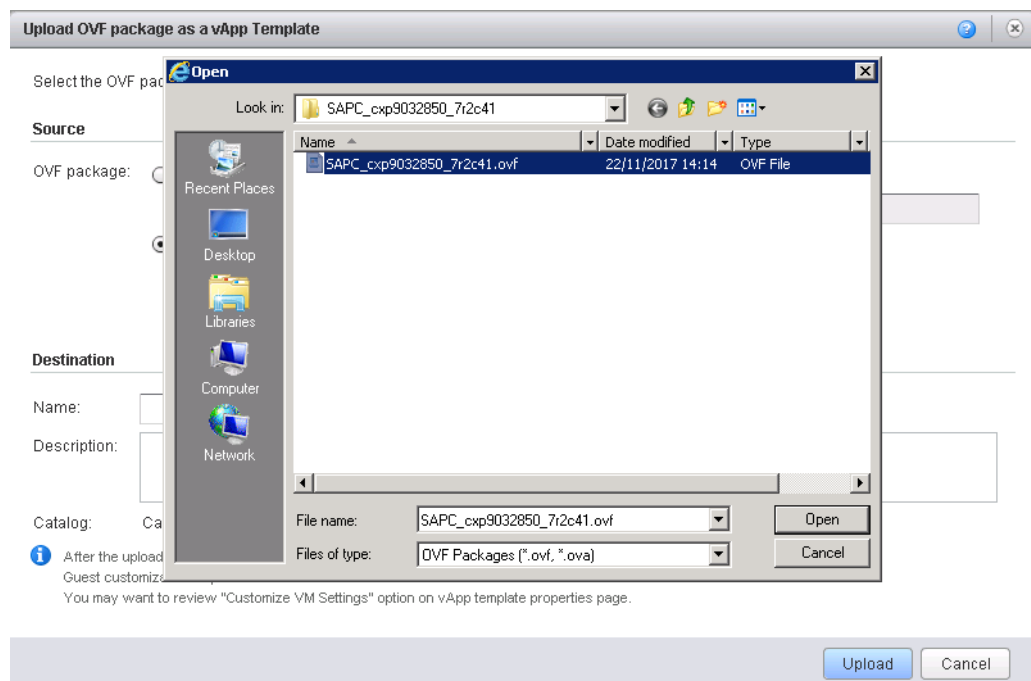


Figure 52 Select the OVF Package



Locate and select the OVF package and click the Open button to get completed the Local File field. Fill in the fields Name (mandatory) and Description (optional). Finally, click Upload to start SAPC upload to catalogue..

Figure 53 Source of the OVF Package

Note: Please note that vCloud Director 8.20 incorporate some known bugs in relation with OVA parsing when uploading from OVF Package. Since OVA package is just a tar file containing the whole delivered files, most of the times the package can be extracted in a directory and the OVF file selected instead, as a solution to these known problems. For more information about vCloud Director 8.20 known bugs, refer to vCloud Director 8.20 Release Notes.

A transfer progress popup window is presented showing the status of the images upload. Once the transfer has been completed the operation still continue for a while importing the vApp.

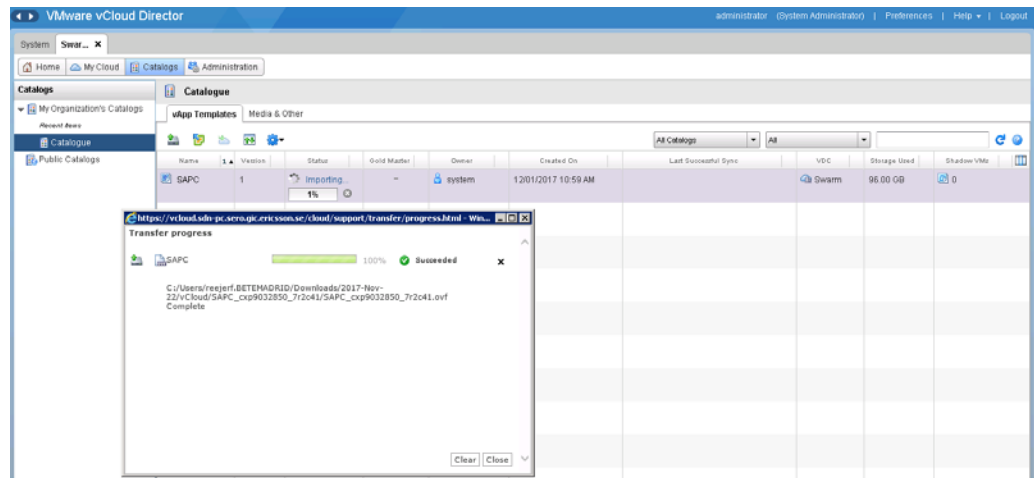


Figure 54 Transfer Progress popup

Wait till upload operation has been fully completed.

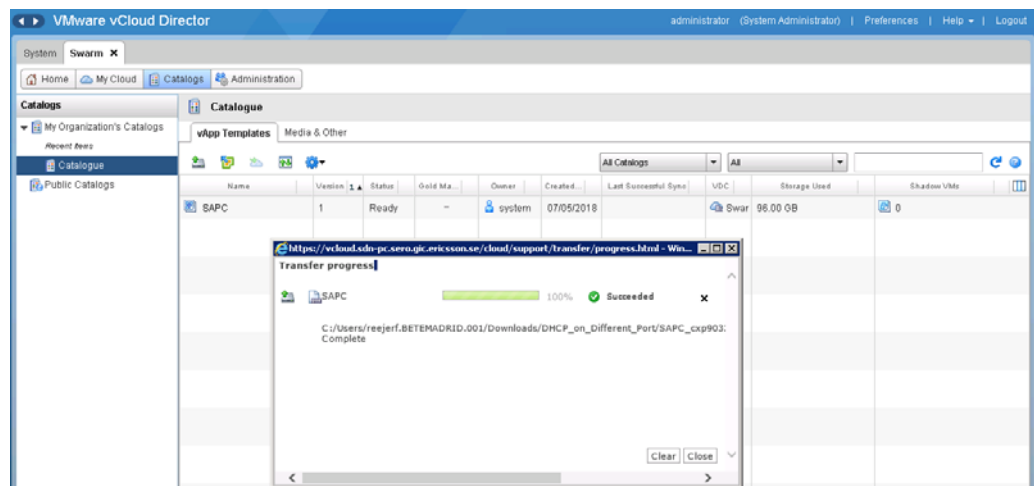


Figure 55 SAPC vApp Uploaded

Do!

To ensure that the SAPC can be scaled out at a later stage in case it is needed, the PL_ScaleOut_Template OVA/OVF package needs to be uploaded to the Catalogue at this stage. Therefore, repeat the steps in this section to upload PL_ScaleOut_Template to the vCloud Director Catalogue.

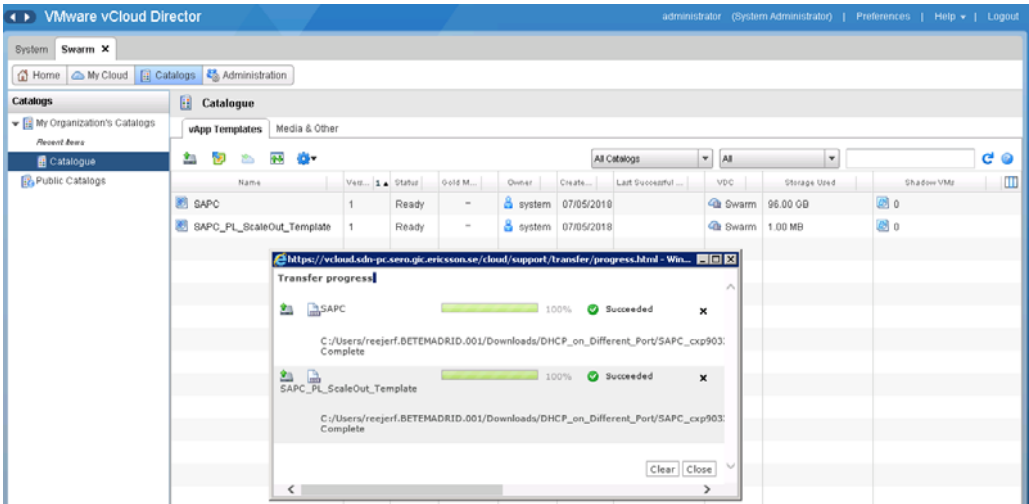


Figure 56 SAPC PL Scale-Out Uploaded

5.2 Deploy the SAPC vApp

To deploy the SAPC vApp from vCloud Director catalogue, simply select SAPC vApp from the Organization catalogue in which was previously uploaded, right click on it and select Add to My Cloud . . . submenu item to start the deployment.

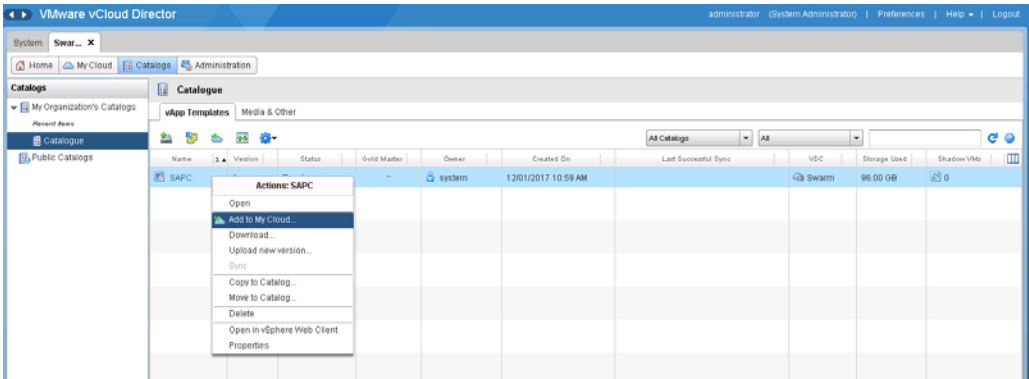


Figure 57 Add to My Cloud

To deploy the SAPC vApp from OVA/OVF package, select the option Add vAPP from OVF to start the deployment.

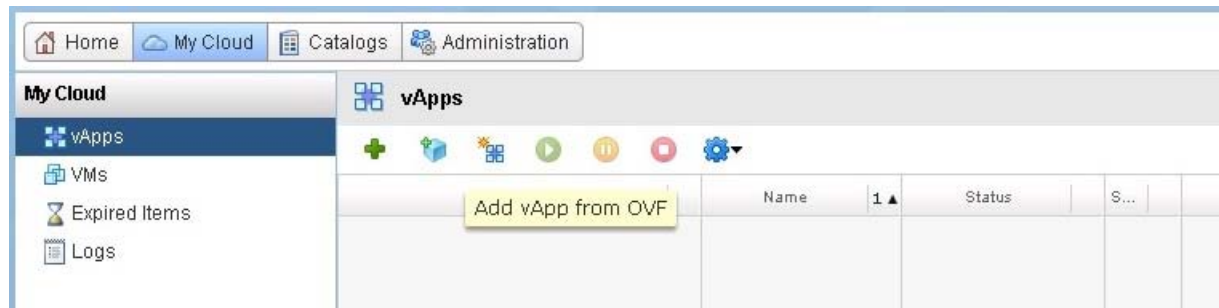


Figure 58 Add vAPP from OVF

Complete the SAPC vApp Name field, which is mandatory, select the Virtual Datacenter where the SAPC vApp is going to be deployed within your Organization, and click on the Next button to continue.

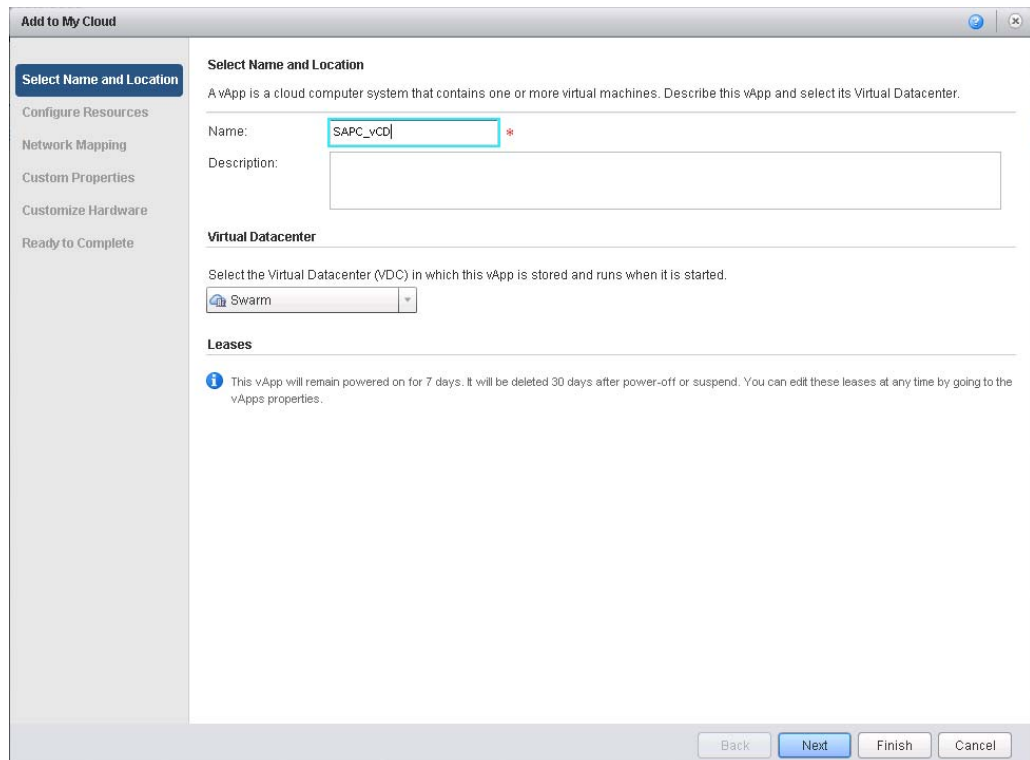


Figure 59 Name of the vApp and Virtual Datacenter

The Virtual Machines part of the SAPC vApp are presented (two System Controllers, two Payloads, and finally, in case of selecting Virtual Routers for the deployment, two Virtual Routers for O&M and two Virtual Routers for Payload Traffic). Select the proper storage policy for the virtual machines and click Next button to continue.



Add to My Cloud

Select Name and Location

Configure Resources

Network Mapping

Custom Properties

Customize Hardware

Ready to Complete

Configure Resources

Select what Storage Policies this vApp's virtual machines will use when deployed.

Virtual Machine	Computer Name	Storage Policy	Template VM Default Storage Policy
VR-3 *	VR-3-007 *	NFS Compute Cluster Datastore	
VR-1 *	VR-1-005 *	NFS Compute Cluster Datastore	
SC-1 *	SC-1-001 *	NFS Compute Cluster Datastore	
PL-4 *	PL-4-004 *	NFS Compute Cluster Datastore	
VR-4 *	VR-4-008 *	NFS Compute Cluster Datastore	
PL-3 *	PL-3-003 *	NFS Compute Cluster Datastore	
SC-2 *	SC-2-002 *	NFS Compute Cluster Datastore	
VR-2 *	VR-2-006 *	NFS Compute Cluster Datastore	

Back

Next

Finish

Cancel

Figure 60 Configure resources

Map Source and Destination Networks. When done, click Next.



Add to My Cloud

Select Name and Location

Configure Resources

Network Mapping

Custom Properties

Customize Hardware

Ready to Complete

Network Mapping

Map networks used in the OVF template to networks in your inventory

Source	Destination	IP allocation	IP protocol
SAPC_Internal0	SAPC_Internal0	Static - IP Pool	IPv4
SAPC_OamVip0-0	SAPC_OamVip0	Static - IP Pool	IPv4
SAPC_InterlinkOAM	SAPC_InterlinkOAM	Static - IP Pool	IPv4
SAPC_InterlinkTraffic	SAPC_InterlinkTraffic	Static - IP Pool	IPv4
SAPC_TrafficVip0-0	SAPC_TrafficVip0-0	Static - IP Pool	IPv4
SAPC_ExtOAM0	SAPC_Ext_OAM_Tenant_101	Static - IP Pool	IPv4
SAPC_ExtTraffic0	SAPC_Ext_Traffic0_Tenant_101	Static - IP Pool	IPv4
SAPC_Internal1	SAPC_Internal1	Static - IP Pool	IPv4

Source: SAPC_Internal1 - Description

SAPC SAPC_Internal1 network

Destination: SAPC_Internal1 - Protocol settings

Gateway: 172.16.101.254

Netmask: 255.255.255.0

DNS: ,

DNS suffix:

Back Next Finish Cancel

Figure 61 Network mapping

MAC addresses for the SAPC virtual machines are listed as vApp properties when their value is configured with the Adapt Cluster Tool. Leave the values and press the Next button.



Uncategorized	
sc-1.eth0.mac_addr:	0210:20:3C:01:03
sc-1.eth1.mac_addr:	0210:20:3C:01:04
sc-1.eth2.mac_addr:	0210:20:3C:01:05
sc-2.eth0.mac_addr:	0210:20:3C:02:03
sc-2.eth1.mac_addr:	0210:20:3C:02:04
sc-2.eth2.mac_addr:	0210:20:3C:02:05
pl-3.eth0.mac_addr:	0210:40:3C:03:03
pl-3.eth1.mac_addr:	0210:40:3C:03:04
pl-3.eth2.mac_addr:	0210:40:3C:03:05
pl-4.eth0.mac_addr:	0210:40:3C:04:03
pl-4.eth1.mac_addr:	0210:40:3C:04:04
pl-4.eth2.mac_addr:	0210:40:3C:04:05

Figure 62 MAC addresses listed as vApp properties

When the MAC addresses correspond to the ones allocated by the vCenter application, None is shown as the default value for them. A later step (see Section 5.3.3 on page 59) is need to configure the definitive values, but, at this stage, leave the default values and press the Next button.

Configure the desired virtual machines resources, or leave the default values offered in this step of the wizard. The values configured here at the same ones available in the OVA/OVF file generated for this deployment. Click Next.



Add to My Cloud

Select Name and Location

Configure Resources

Network Mapping

Custom Properties

Customize Hardware

Ready to Complete

Customize Hardware

Review the hardware of each virtual machine in this vApp.

Virtual Machine	CPUs	Memory	Total storage
VR-3	2	1 GB	4.00 GB
VR-1	2	1 GB	4.00 GB

CPU

Number of virtual CPUs: 2

Cores per socket: 1

Number of sockets: 2

Memory

Total memory: 1 GB

Hard Disks

Disk 0: 4 GB

Increasing disk size might require configuration of the guest OS after powering on the vApp.

Hard disks cannot be made smaller than their template size.

Back Next Finish Cancel

Figure 63 Customize Hardware

Do not select the tick box option **Power on vApp** and press **Finish** button.

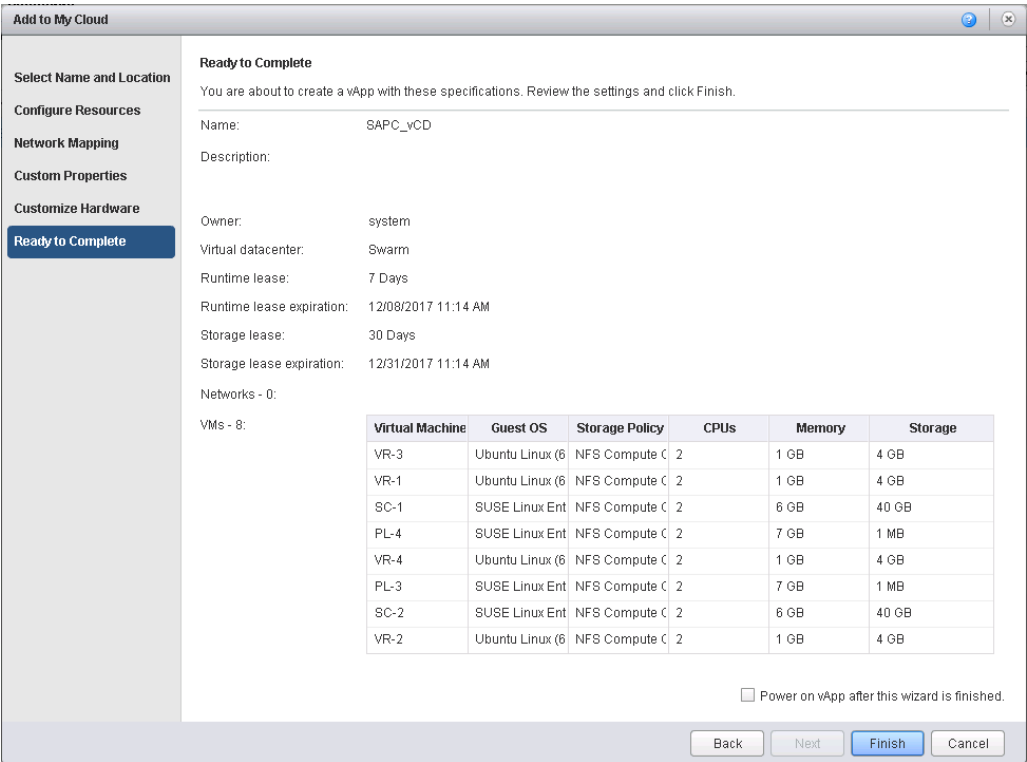


Figure 64 Confirmation pop-up

At this point vCloud Director will create all Virtual Machines, network port connections and all the different component needed to create the complete vApp.

This activity takes a while, depending on the Network bandwidth, to be fully completed. A new vApp is created containing all Virtual Machines belonging to the SAPC when the operation is successfully executed.

Some additional screenshots are shown to illustrate the process.

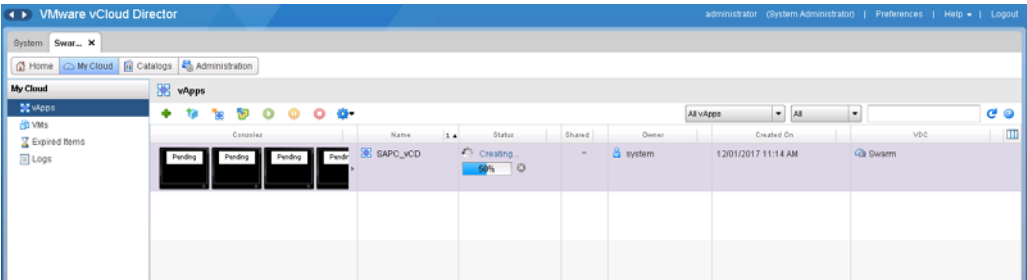


Figure 65 Creating SAPC vApp

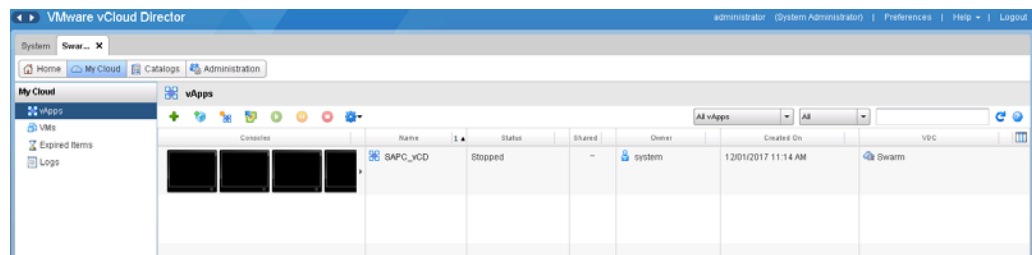


Figure 66 SAPC vApp already created

Warning!

In some vCloud Director releases it has been seen that vCloud Director wrongly map virtual machines vNICs and networks associated to them. In order to guarantee that the SAPC vApp application would start properly providing full functionality virtual machine vNICs should be compared against the order indicated in SAPC VNF Network Configuration Guide document.

To check proper networking mapping for a virtual machine, select the virtual machine and open the Properties menu by right click on it.

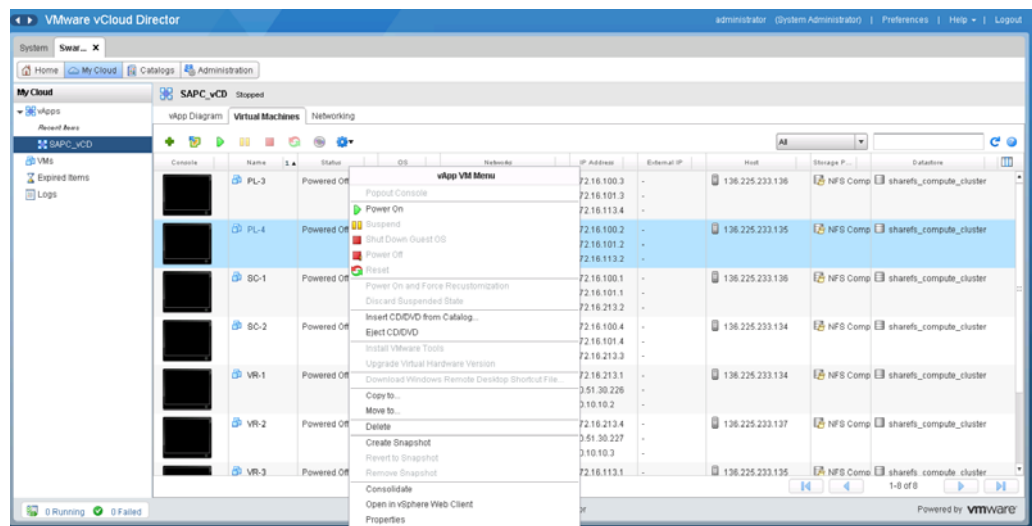


Figure 67 Open the Properties of the virtual machines

Match the virtual machine vNICs with the proper virtual network:

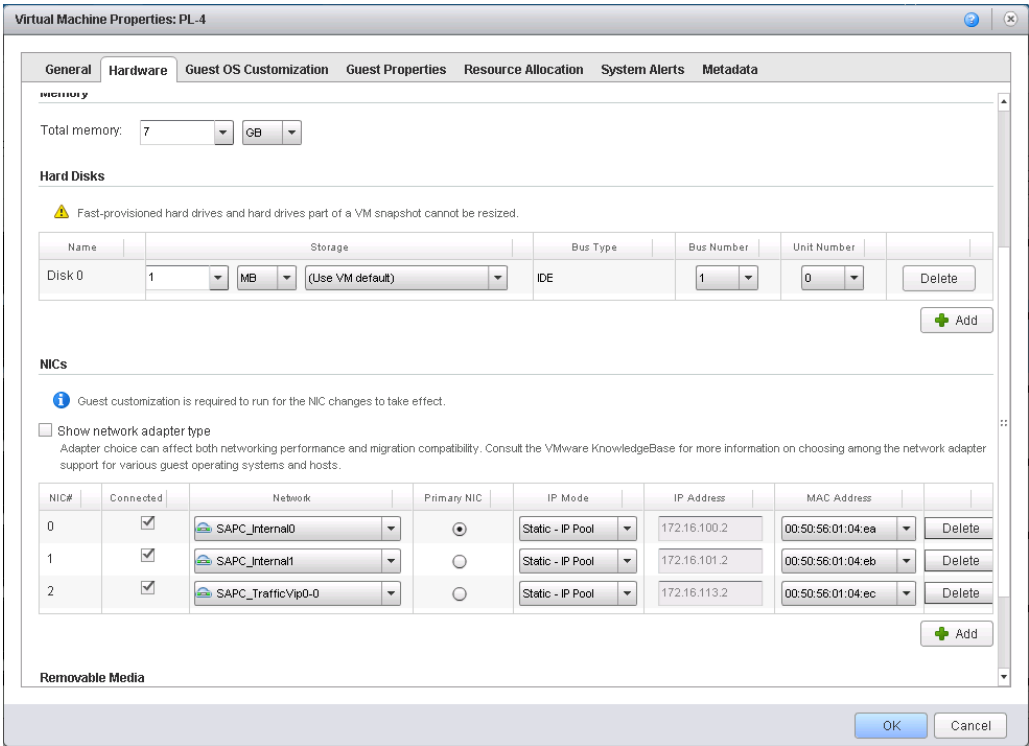


Figure 68 Example of PL-4 virtual machine to check proper network mapping

Warning!

Additional configuration in VMware **must** be implemented before powering on the vApp (as stated in Section 5.3 on page 53)

5.3 Post Deploy Activities

5.3.1 Customize the SAPC vApp

After deploying the SAPC vApp, and to facilitate SAPC customization in case is required, the configuration has to be injected with an ISO image generated with the the Descriptor Generator Tool; see [SAPC VNF Descriptor Generator Tool](#) for details about how to use the tool. The adapt cluster ISO **must** be injected to the **SC-1 and the VRs**. First, go to the Catalogs tab and select your catalog.



Figure 69 Menu tab

Select the Media & Other tab

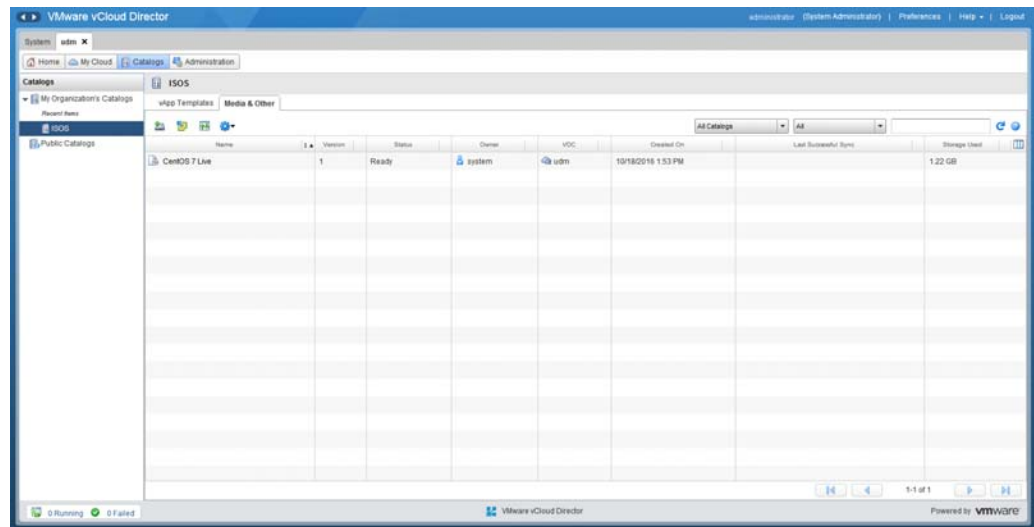


Figure 70 Media & Other tab

Click Upload button. A pop-up window appears.

Figure 71 Upload ISO pop-up

Click Browse. A file browser window appears. Navigate and select your adapt_cluster.iso.

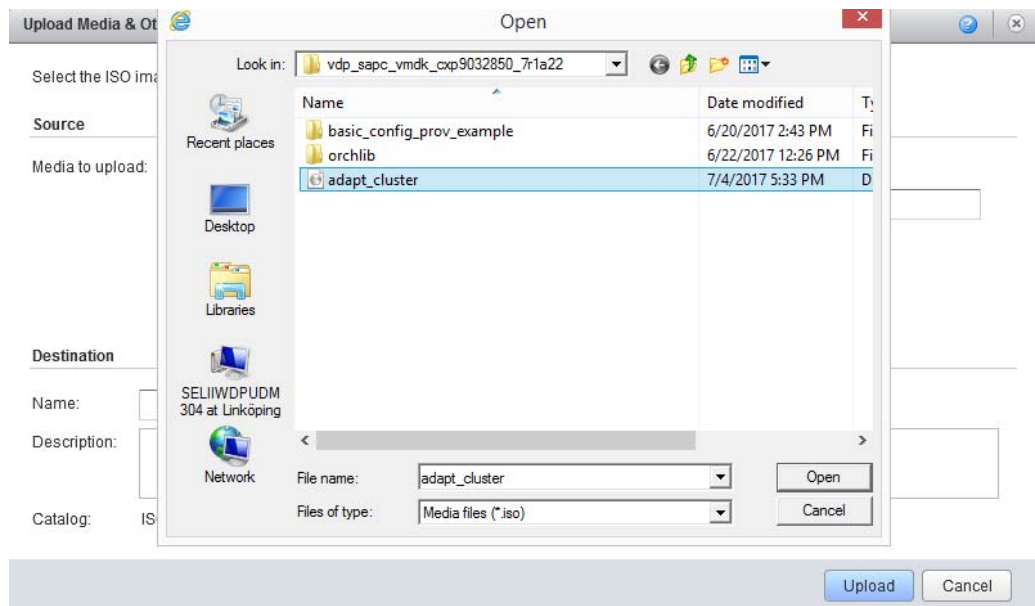


Figure 72 Select the adapt_cluster ISO

Click Open. The path to the selected adapt_cluster.iso file appears in Upload Media & Other pop-up window.

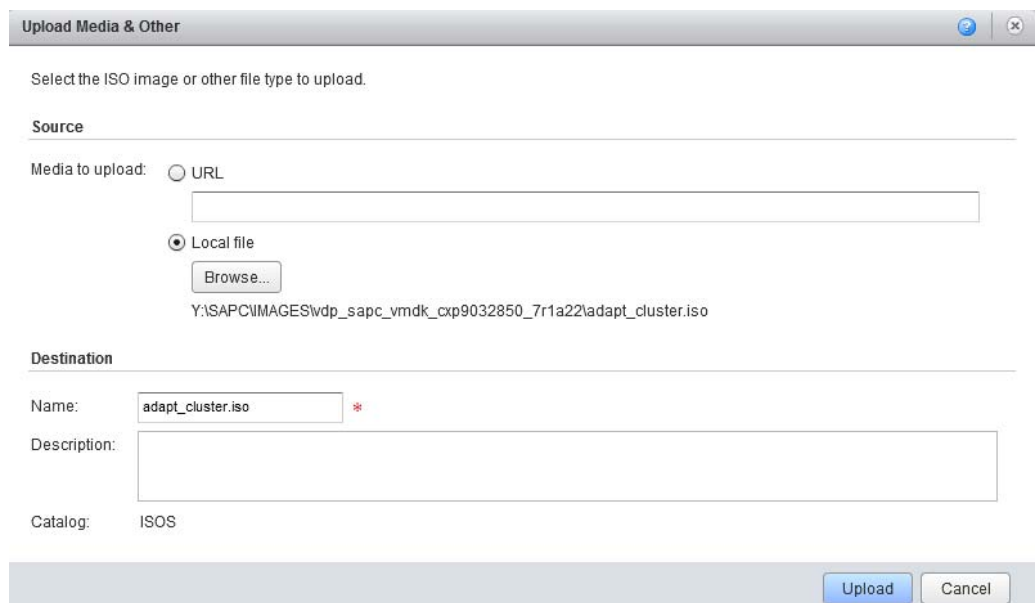


Figure 73 Upload Media filled in

Click on Upload, a progress window appears and Media & Other tab shows the uploaded file.

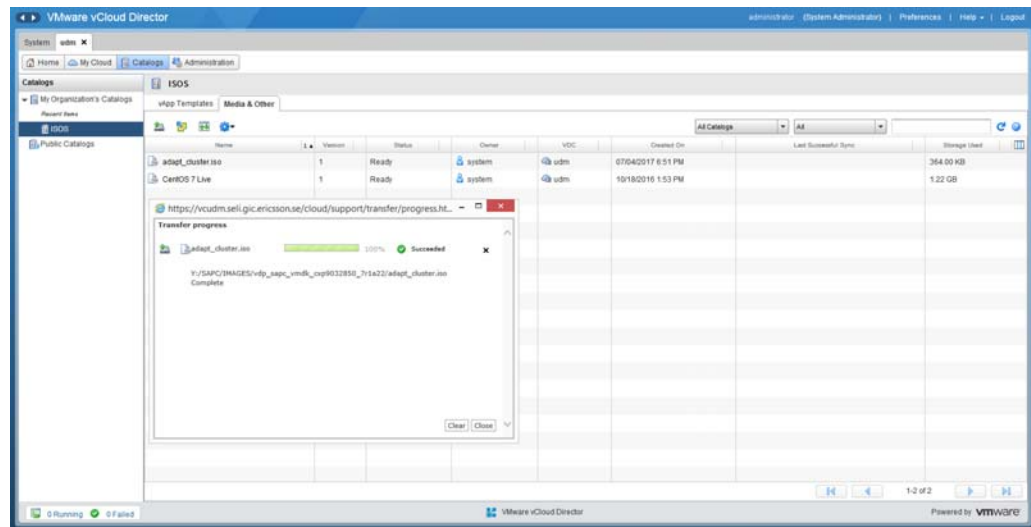


Figure 74 Media & Other tab with ISO uploaded

After uploading the file, go to your SAPC vApp and select the vApp Diagram tab.

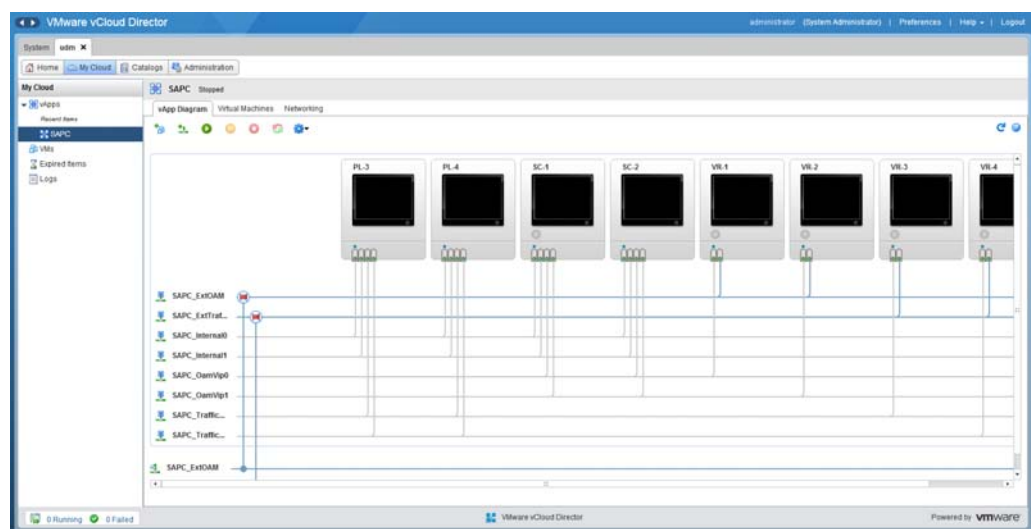


Figure 75 vApp Diagram screen

Right click in SC-1 and click Insert CD/DVD from Catalog....

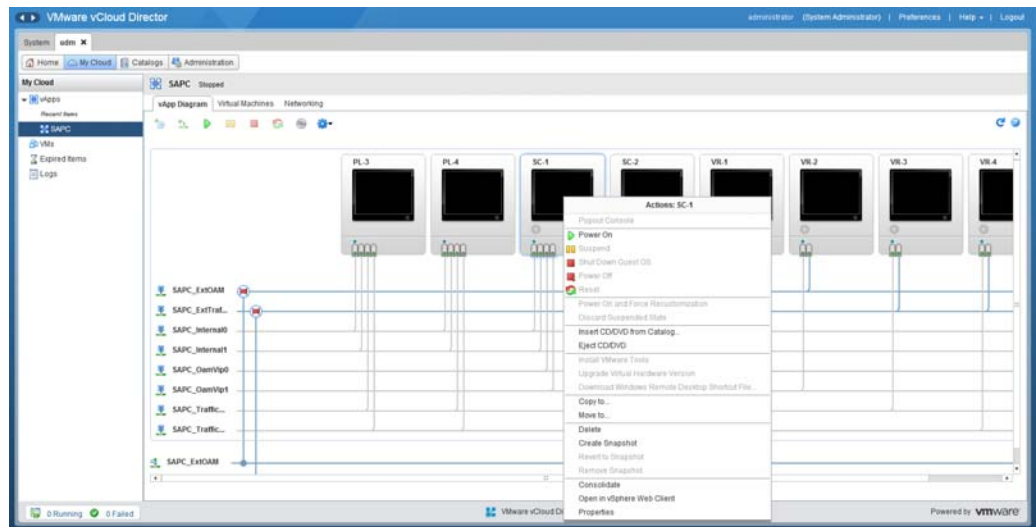


Figure 76 vApp Diagram screen with options

A new pop-up appears. Select the `adapt_cluster.iso` uploaded in the first step. Repeat this process with all the VRs.

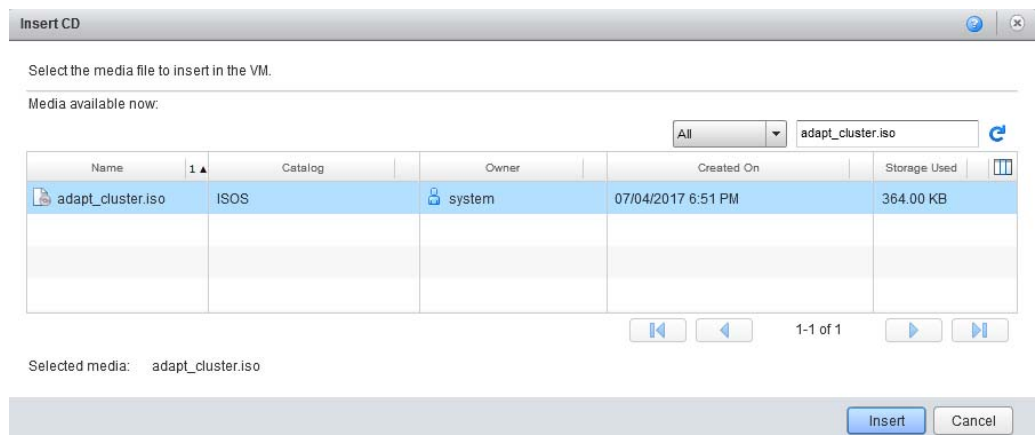


Figure 77 Insert CD pop-up window

After inserting the `adapt_cluster.iso`, a blue symbol appears in each VM with an ISO injected.

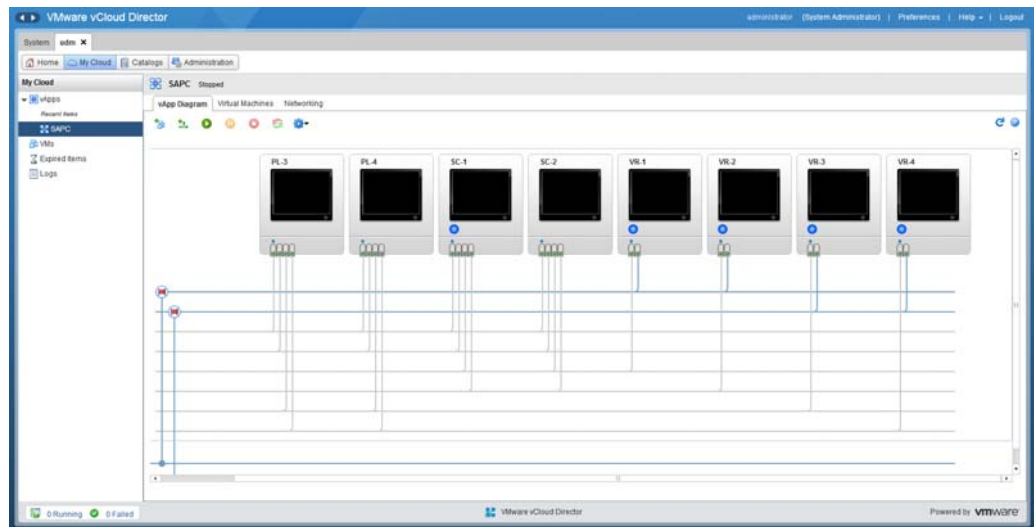


Figure 78 vApp Diagram with injected ISOs

5.3.2

Antiaffinity Rules between Virtual Machines into the SAPC vApp

Similarly to Section 4.2.2 on page 14 antiaffinity rules between virtual machines are recommended to be defined from vCloud Director to ensure SAPC resilience in the event of virtual machine or hypervisor malfunctions or crashes.

To define antiaffinity rules, press Green "+" icon under Anti-Affinity Rules pane after selecting Affinity Rules Tab into My Cloud area inside of the Organization in which the SAPC vApp was deployed.

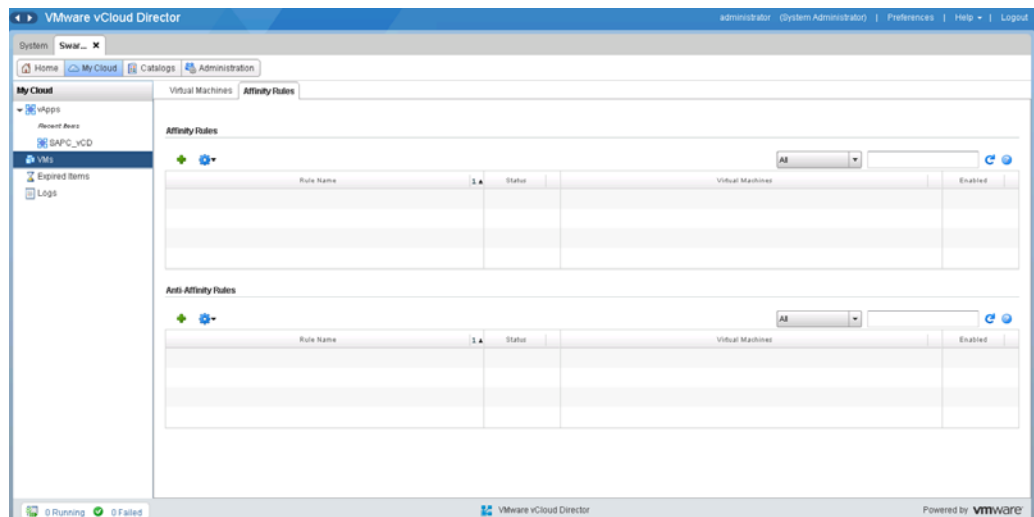


Figure 79 Affinity Rules

Specify a name for the rule and select from the list of virtual machines the ones to which will apply the anti-affinity rule. Finally press OK button to confirm the rule creation.

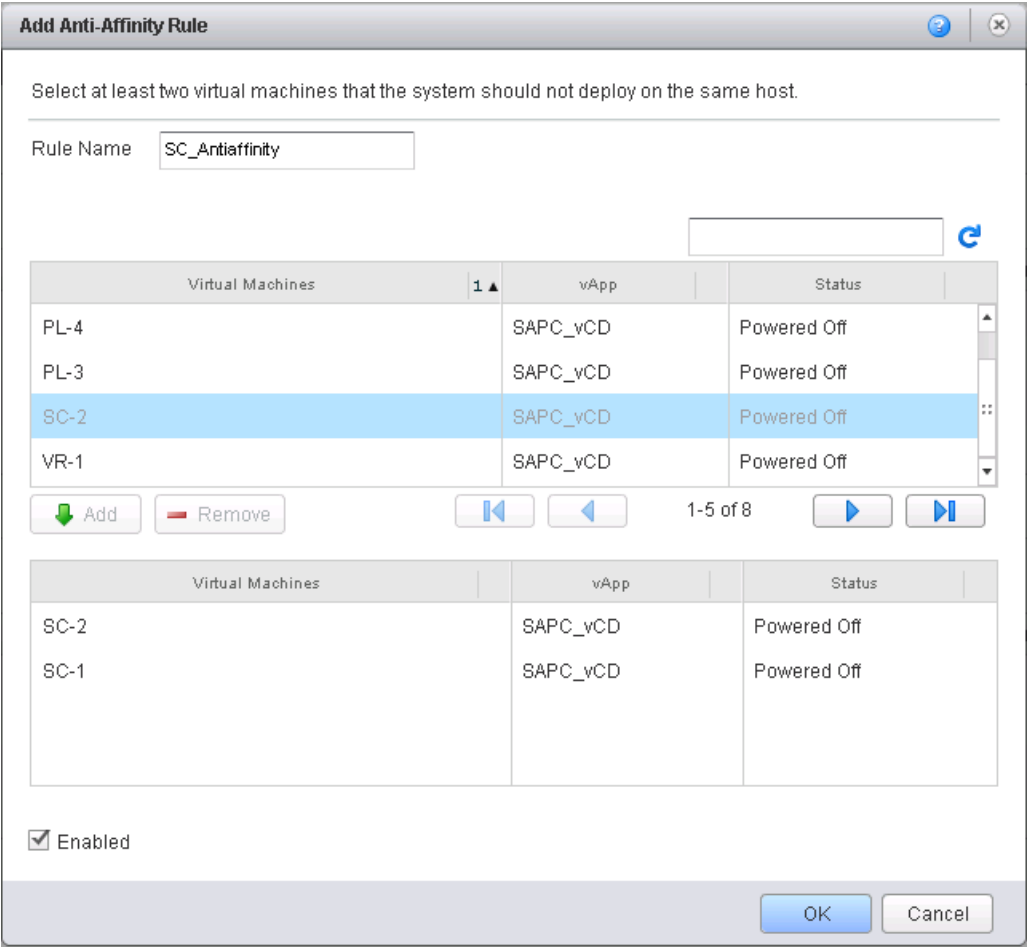


Figure 80 Anti-Affinity Rules

Note: Depending on vCloud Director version used to deploy the SAPC vApp, Affinity Rules functionality might be available or not. In the case this functionality is not available it can be applied directly in the VIM as described in Section 4.2.2 on page 14 in this document.

5.3.3 Align vApp Properties with VIM

Likewise to Chapter Section 4.2.4 on page 19, vApp properties need to be modified to match the ones in the virtual infrastructure in case the MAC addresses for the VMs are the ones allocated by vCenter application during the SAPC deployment.

5.3.3.1 Get MAC Addresses from VIM from vCloud Director

To find out MAC addresses assigned by vCenter to different virtual machines, select SC-1 virtual machine under Virtual Machines Tab in My Cloud Area of my Organization, there, right mouse click it and select Properties submenu item to get the properties window for this virtual machine.

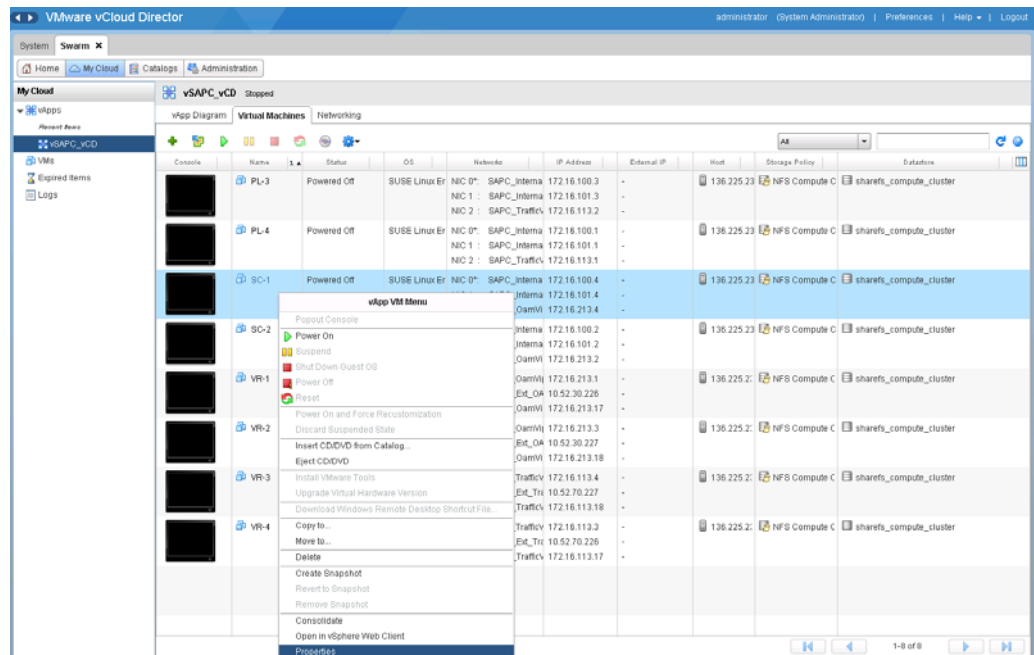


Figure 81 Edit settings of the Virtual Machine

Select Hardware Tab and make note of all assigned MAC addresses for this virtual machine to be later on assigned to SAPC vApp properties.

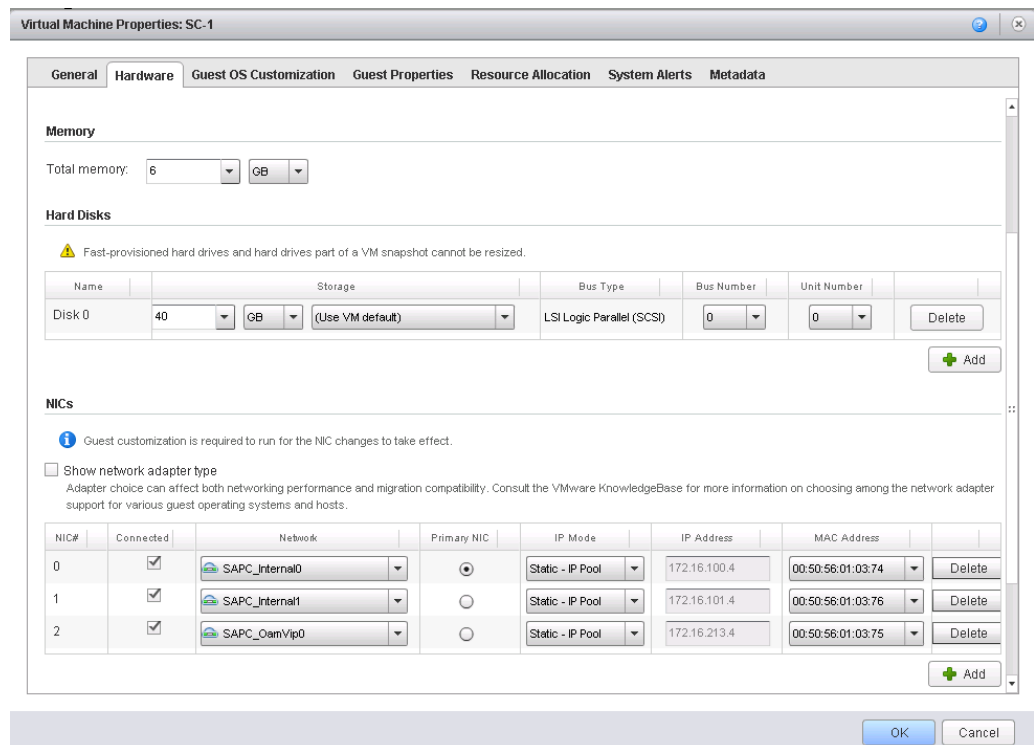


Figure 82 SC-1 VM Properties



Warning!

These steps must be repeated for SC-2, PL-3 and PL-4 virtual machines.

5.3.3.2 Modify SAPC vApp Properties

Once all assigned MACs during deployment are known simply select SAPC VAPP under My Cloud view, right mouse click it and select Properties submenu item to get the properties window for SAPC vApp.

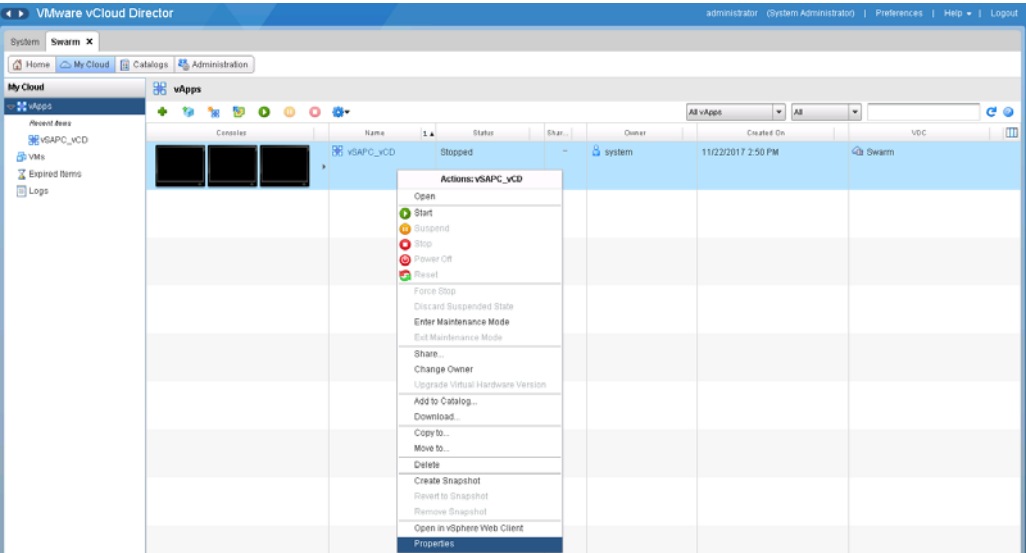


Figure 83 vApp Properties

Select Guest Properties Tab window and modify all MACs with the ones collected in previous chapter. Once all MACs are aligned, press Ok to apply the changes. SAPC is now ready to be powered on.

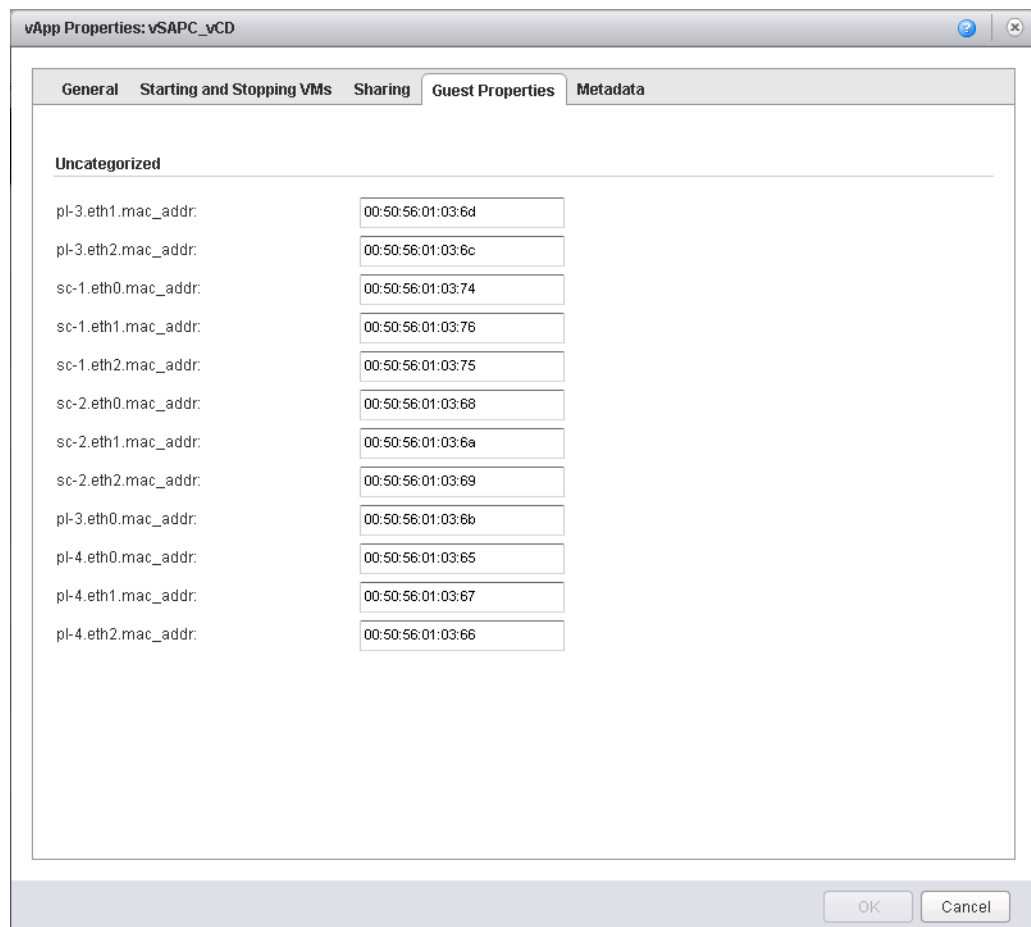


Figure 84 vApp Properties

5.4 Power on the SAPC vApp

To start the SAPC application select the vApp from the 'vApps' view, right mouse click it and select 'Start' item.

The Virtual Machines come up in a proper order to ensure that at the end of the process the SAPC is fully available for operation.

Some screenshots are shown to detail the process.

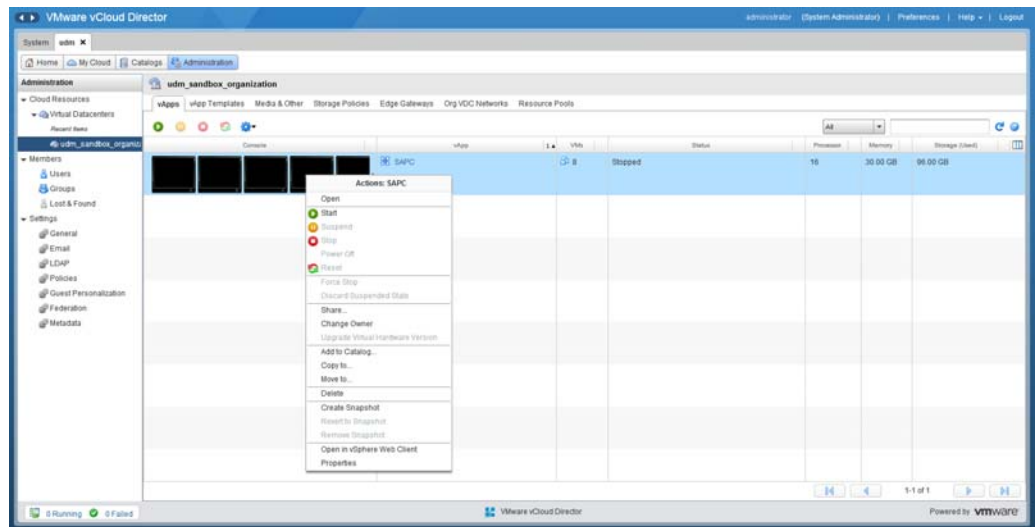


Figure 85 vApps view and right click mouse to start the vApp

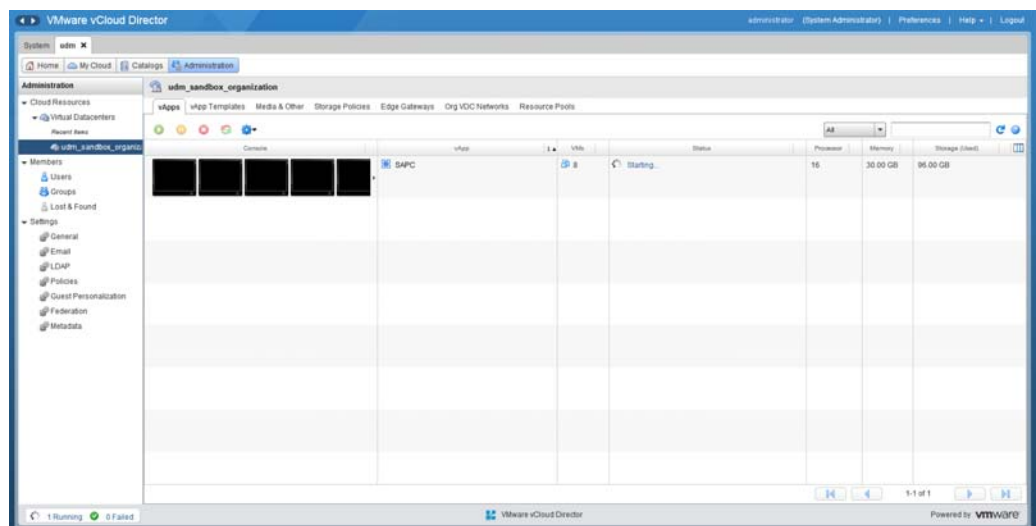


Figure 86 vApp is starting

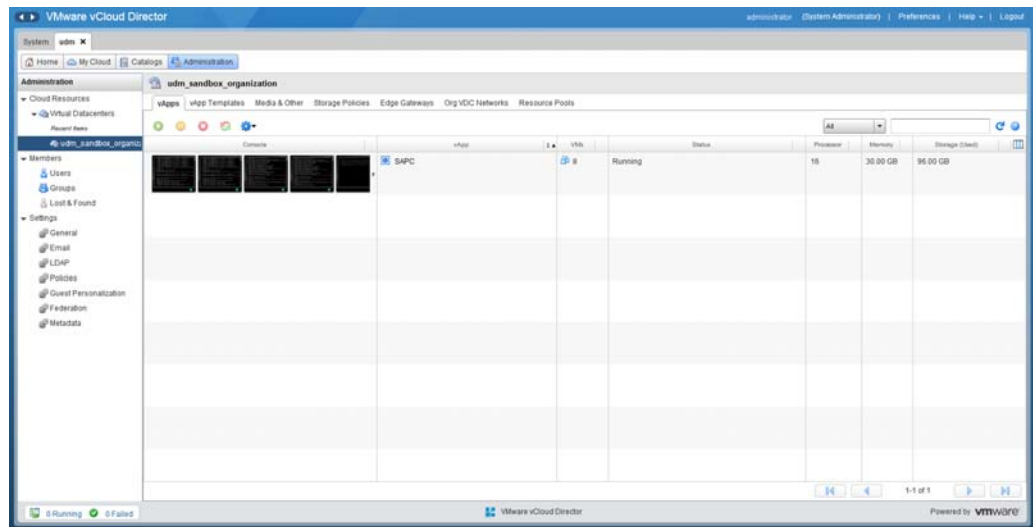


Figure 87 vApp is finally up and running

The vApp Diagram view can be checked to see all the virtual machines running and the networking. In this example, all the networks are Organizational networks in terms of VMware vCloud Director, except the networks for external OAM and payload traffics, which have been mapped to VMware vCloud Director external networks. Anyway, as previously mentioned, given the wide range of possibilities to configure the vApp networking in VMware vCloud Director, this is just an example.

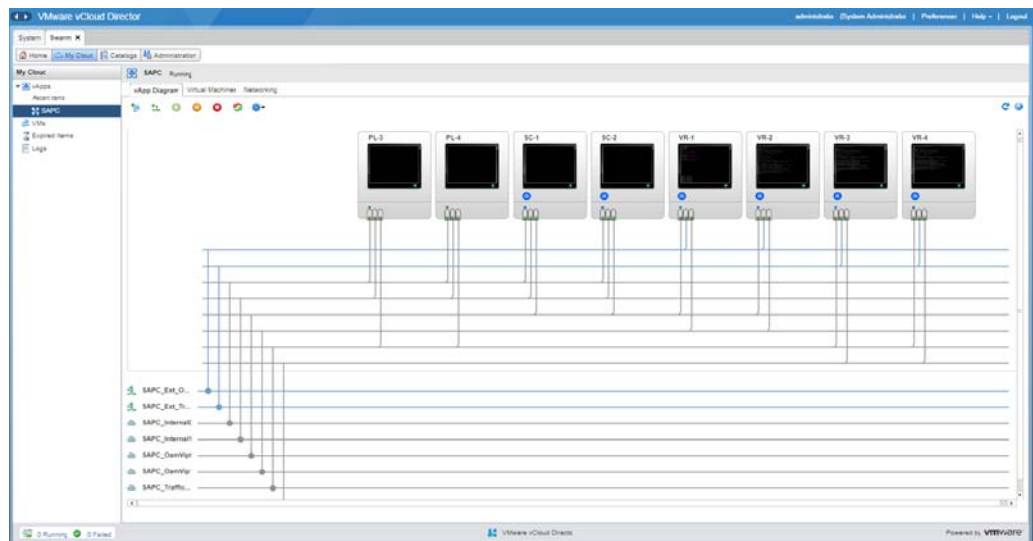


Figure 88 vApp Diagram showing the virtual machines created and its networking



5.5 Configuration in vCloud Director

5.5.1 Create Catalogue (Optional)

This step is optional and it is only in the case that provided Organization to deploy the SAPC is not defined by vCloud System Administrator or it has been indicated to use a Catalogue not currently defined into the Organization.

In case a specific Catalogue needs to be created for the SAPC deployment simply press Green "+" Icon under vCloud Director Catalogs Tab in the selected Organization.

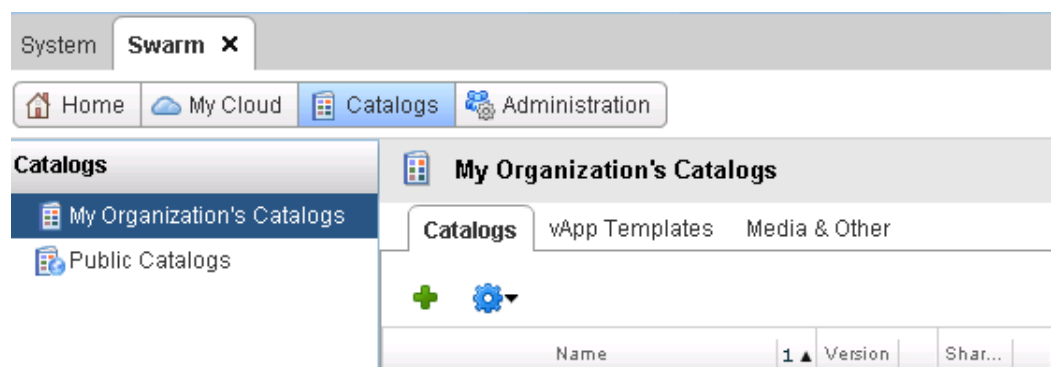


Figure 89 Create Catalogue

Figure 90 Catalogue Name

Enter Catalogue Name, press Next to continue with the next screen.

New Catalog

Name this Catalog

Add Storage


Share this Catalog

Ready to Complete

Select Storage Type

☒ Use any storage available in the organization
Choose this option if you do not need to store catalog items on a specific storage.

☐ Pre-provision on specific storage policy
Choose this option if you want to store catalog items on a specific VDC storage policy.
- vApp templates in this catalog will be fast provisioned on selected VDC storage policy.
- Instantiating a vApp from fast provisioned vApp template is faster.
- A VDC storage policy selected will cause the vApp template size to count against your catalog storage quota.



Back Next Finish Cancel

Figure 91 Associate Storage for Catalogue

Leave default values, and press **Next** to continue with the next screen.

New Catalog

Name this Catalog

Add Storage

Share this Catalog

Ready to Complete

Share this Catalog

With which members of your organization do you want to share this catalog?

Add Members...

Name	Access Level

Back Next Finish Cancel

Figure 92 Share Catalogue

Leave default values, and press **Next** to continue with the next screen.

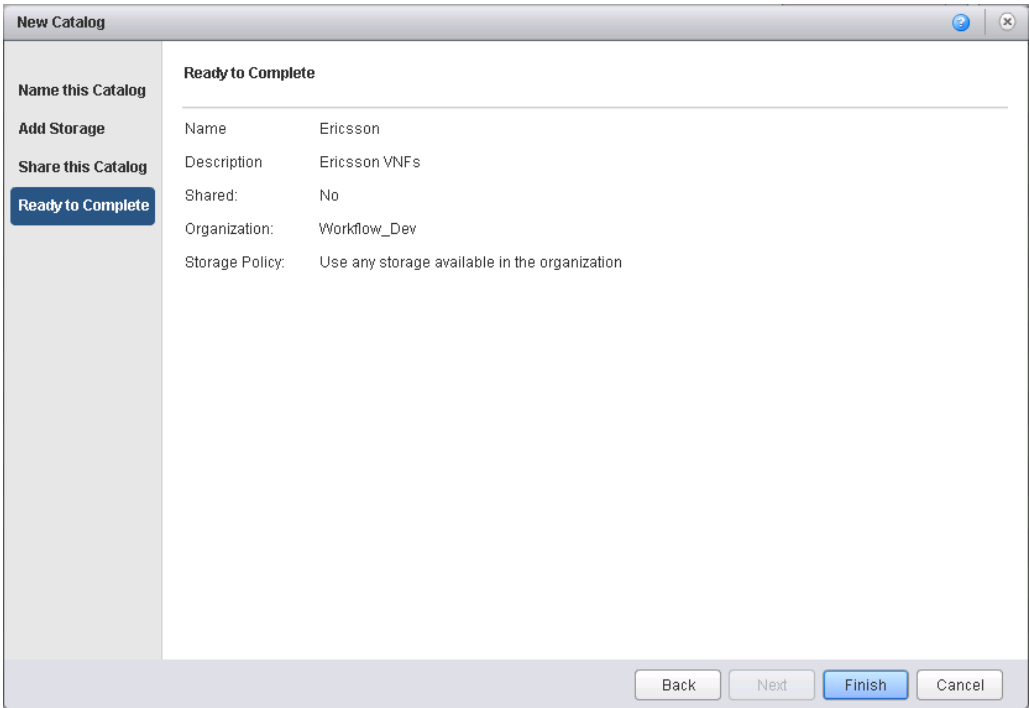


Figure 93 Summary of the options

Leave default values, and press **Finish** to complete the creation..

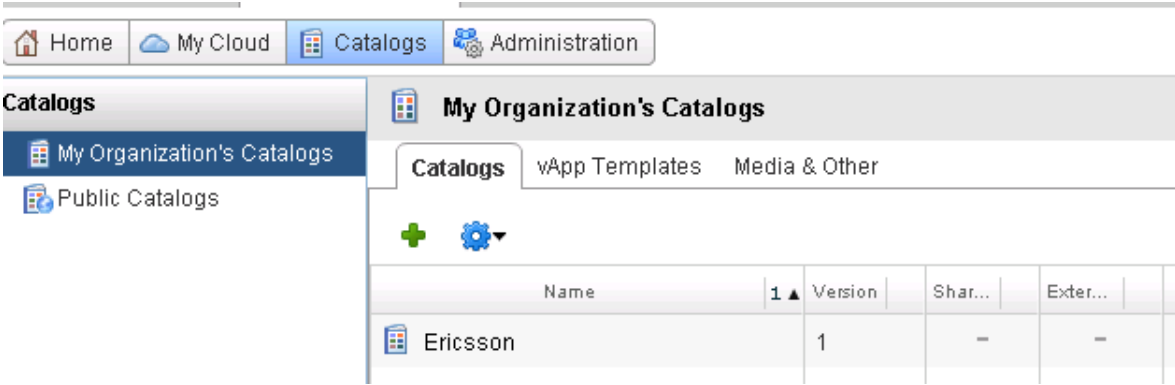
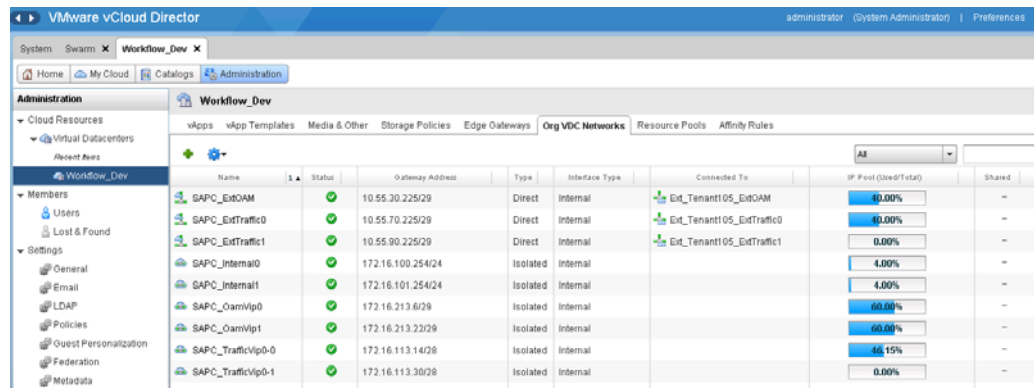


Figure 94 Catalogue View

5.5.2 Define Organizational Networks

This step ensure that proper mapping and network connectivity is provided during the SAPC deployment. To facilitate this task it is **mandatory** that vCloud System Administrator have previously defined in vCloud Director application external networks as part of the System Admin tasks.

A valid proposal for SAPC networks to ensure SAPC application can be successfully deployed is provided below. Note that other variants can be also valid but this is provided as the reference one.



Name	Status	Gateway Address	Type	Interface Type	Connected To	IP Pool (Used/Total)	Shared
SAPC_ExtOAM	✓	10.55.30.225/29	Direct	Internal	Ext_Tenant105_ExtOAM	0.00%	-
SAPC_ExtTraffic0	✓	10.55.70.225/29	Direct	Internal	Ext_Tenant105_ExtTraffic0	0.00%	-
SAPC_ExtTraffic1	✓	10.55.90.225/29	Direct	Internal	Ext_Tenant105_ExtTraffic1	0.00%	-
SAPC_Internal0	✓	172.16.100.254/24	Isolated	Internal		4.00%	-
SAPC_Internal1	✓	172.16.101.254/24	Isolated	Internal		4.00%	-
SAPC_OamVip0	✓	172.16.213.6/29	Isolated	Internal		60.00%	-
SAPC_OamVip1	✓	172.16.213.22/29	Isolated	Internal		60.00%	-
SAPC_TrafficVip0-0	✓	172.16.113.14/28	Isolated	Internal		46.15%	-
SAPC_TrafficVip0-1	✓	172.16.113.30/28	Isolated	Internal		0.00%	-

Figure 95 Organization vDC Networks

As it can be seen in the previous figure there exists two kind of network types, direct and isolated which will be possible to be selected while creating the networks in later steps.

On the other hand, note that below networks might not be applicable to all SAPC releases and configurations, some of them might only require a subset of them while other might need all of them. Anyway, during deployment and based on this naming would be very easy to map them correctly.

To create an organization network simply press Green "+" Icon under vCloud Director Org VDC Networks Tab in the selected Organization.

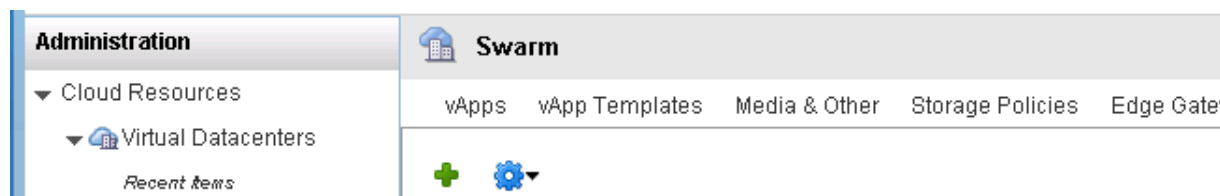


Figure 96 Create Organization Network



New Organization VDC Network

Select Network Type

Create a network for use by vApps in this virtual datacenter.

You can create a routed network that provides controlled access to machines and networks outside of the VDC via an edge gateway, or an isolated network that only machines in this VDC can connect to. You can also create a network that connects directly to an external network.

☒ Create an isolated network within this virtual datacenter.

☐ Create a routed network by connecting to an existing edge gateway:

All

Name	# External Netwo...	# Organization V...	Available Networks

0-0 of 0

☐ Create as subinterface

☐ Connect directly to an external network:

All

Name	IP Pool (Used/Total)
Ext_Tenant101_ExtOAM	0.00%
Ext_Tenant101_ExtTraff...	0.00%
Ext_Tenant101_ExtTraff	0.00%
Ext_Tenant101_ExtTraffic0	40.00%
Ext_Tenant102_ExtOAM	

1-6 of 33

Back Next Finish Cancel

Figure 97 Network Type

Leave default values, and press **Next** to continue with the next screen.



New Organization VDC Network

Select Network Type

Configure Network

Name and Description

Ready to Complete

Configure Network

Enter the network settings of the new organization VDC network for this virtual datacenter.

Gateway address: 172.16.113.14 *

Network mask: 255.255.255.240 *

☐ Use gateway DNS

Select this option to use DNS relay of the gateway. DNS relay must be pre-configured on the gateway.

Primary DNS:

Secondary DNS:

DNS suffix:

Static IP pool:

Enter an IP range (format: 192.168.1.2 - 192.168.1.100) or IP address and click Add.

172.16.113.1-172.16.113.13 Add

172.16.113.1 - 172.16.113.13 Modify Remove

Total: 13

Back Next Finish Cancel

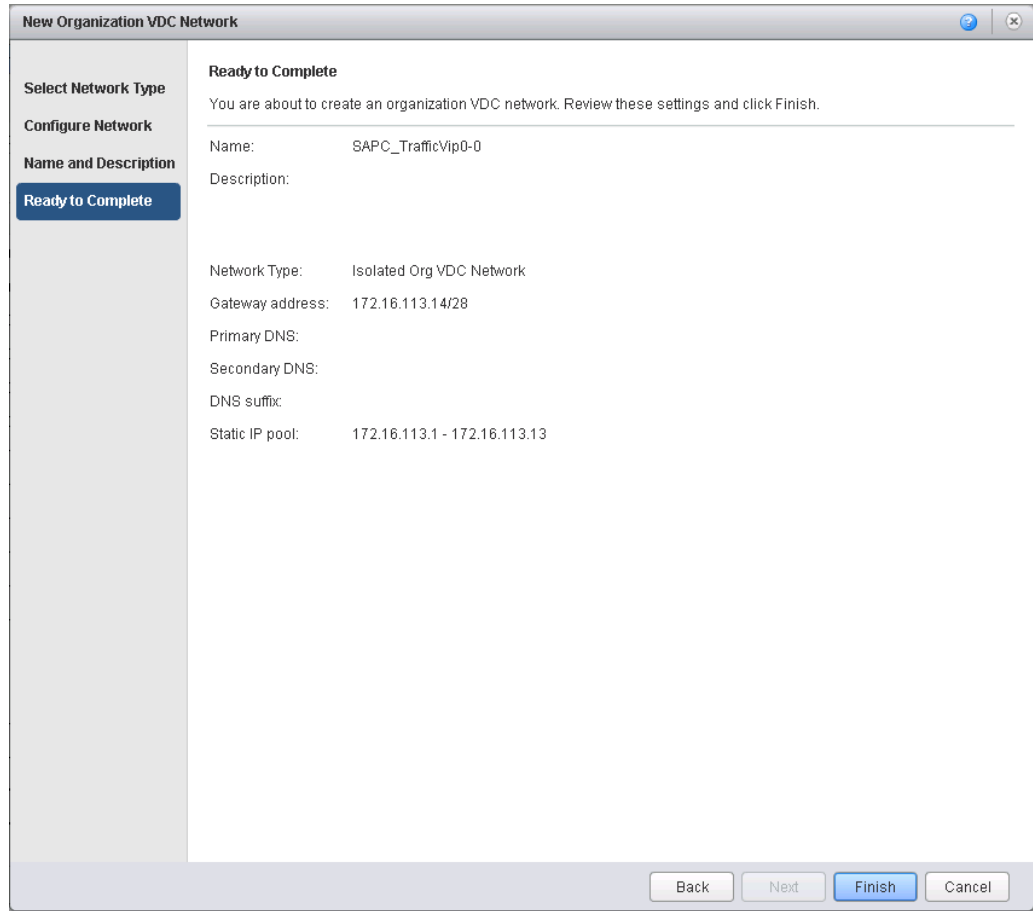
Figure 98 Network Attributes

Complete appropriate Network values, and press Next to continue with the next screen.



Figure 99 Organization Network Name

Introduce Organization network name, and press Next to continue with the next screen.



The screenshot shows a window titled "New Organization VDC Network". On the left is a sidebar with four options: "Select Network Type", "Configure Network", "Name and Description", and "Ready to Complete" (which is highlighted with a blue button). The main area is titled "Ready to Complete" and contains the following text: "You are about to create an organization VDC network. Review these settings and click Finish." Below this, the settings are listed: Name: SAPC_TrafficVip0-0, Description: (empty), Network Type: Isolated Org VDC Network, Gateway address: 172.16.113.14/28, Primary DNS: (empty), Secondary DNS: (empty), DNS suffix: (empty), and Static IP pool: 172.16.113.1 - 172.16.113.13. At the bottom right are four buttons: "Back", "Next", "Finish" (highlighted in blue), and "Cancel".

Figure 100 Summary Window

Finally confirm organization network creation by pressing Finish button.

Warning!

These steps must be repeated as many times as needed to create all Organization networks the SAPC specific configuration will require during deployment.

In the specific case of Organization network creation with **direct type** the steps are fundamentally same apart of the ones shown below which substitute to steps shown in Figure 97 and Figure 98.

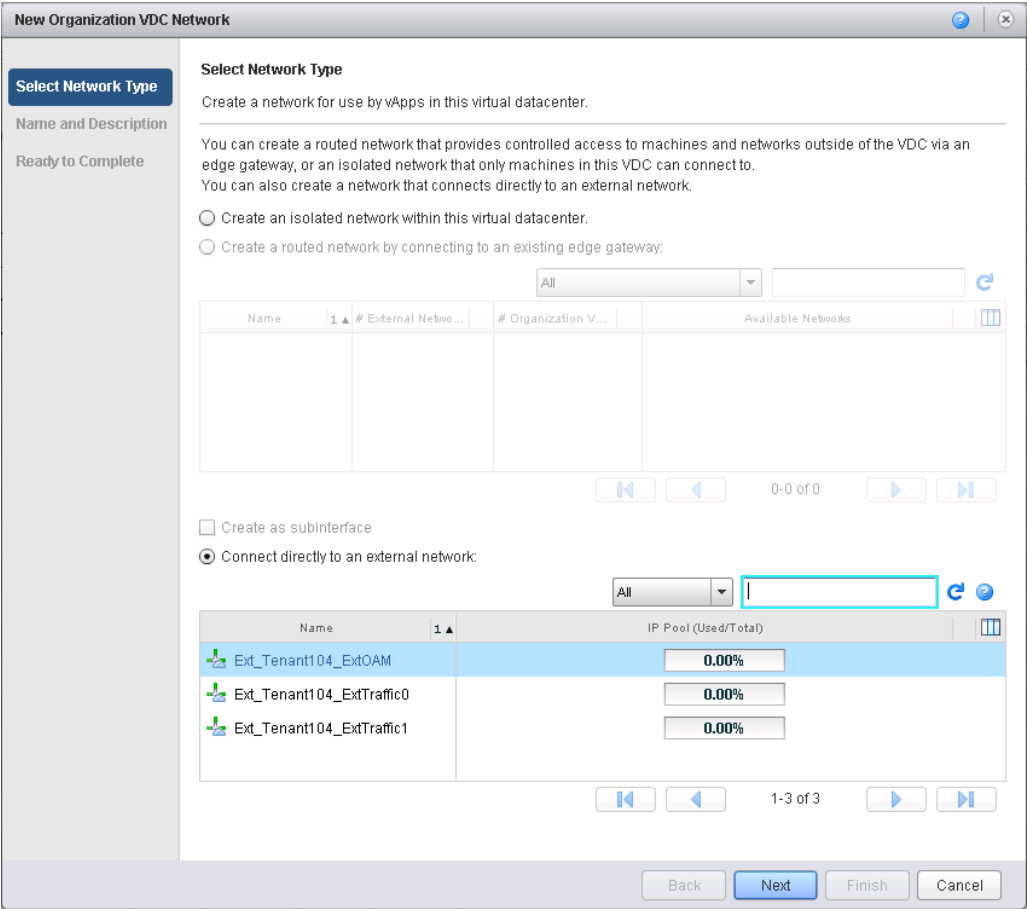


Figure 101 Select Network Type





6 Verify the SAPC Deployment

Even though the SAPC comes up properly after deployment with no manual interaction, a command is provided to be executed in case a check of the SAPC health must be performed for whatever reason. The VMware Virtual Machine Console is used for health check activities in this section.

Log on to the SC-1 VM, through the virtual console from within:

- VMware vSphere Web Client. The virtual console (VM Console) for the SC-1 VM is reachable from the vCenter Server GUI through the blue Open Console menu item.
- VMware vCloud Director . The virtual console for the SC-1 VM is accessible by clicking over the VM icon in the vApp Diagram view.

Note: Copy & Paste to and from the virtual console do not work, everything must be typed manually into the console.

Execute the **sapcHealthCheck** command as explained in the [SAPC Advanced Troubleshooting Guideline](#) document for getting the SAPC state.





7 Install Additional SAPC Instances in the VMware Cluster Using VMware vSphere Web Client

It is possible to deploy additional SAPC instances in the same VMware cluster using VMware vSphere Web Client. A new OVA file containing the details of the new instance must be generated as indicated in Section 3.2 on page 5.

The different instances of the SAPC deployed within the same VMware cluster must use different Port Groups. Define a different set of Port Groups in the Distributed Virtual Switch for the new instance as stated in Section 4.4.4 on page 33.

Follow the steps defined in Section 4.1 on page 7 using the described options, except in the **Network Mapping** step, where the new set of Port Groups defined must be selected for each of the SAPC Networks.

Once the vApp is deployed, follow the remaining sections of Section 4 on page 7, but define a different set of Antiaffinity Rules for the new instance, as stated in Section 4.2.2 on page 14.





8 Install Additional SAPC Instances in the VMware Cluster Using VMware vCloud Director

It is possible to deploy additional SAPC instances in the same VMware cluster using VMware vCloud Director. A new OVA file containing the details of the new instance must be generated as indicated in Section 3.2 on page 5.

The different instances of the SAPC deployed within the same VMware cluster must use different `Organizational Networks`. Define a different set of `Organizational Networks` in the vCloud Director `Organization` for the new instance as stated in Section 5.5.2 on page 67

Follow the steps defined in Section 5 on page 39 using the described options, but taking into account a different vApp Name to avoid collision with the previously deployed SAPC instance, as well as using the proper Network Mapping, where the new set of `Organizational networks` defined must be selected for each of the SAPC Networks.





9 Deploy the SAPC for Geographical Redundancy Scenarios

To perform the SAPC installation on Geographical Redundancy scenario, deploy each of the SAPC nodes as stated in Section 4 on page 7 or Section 5 on page 39, depending on the use of VMware vSphere Web Client or VMware vCloud Director respectively. Additionally, remember during the whole process (Adapt Cluster configuration file, OVF package generation, and so on), if the desired deployment is about an Active-Standby or an Active-Active GeoRed deployment (and considering also the presence or not of Virtual Routers as part of the vApp).





10 Configure the SAPC

10.1 SAPC Hardening after Deployment

Refer to [Security Hardening Guide](#).

10.2 Connectivity to the External Networks

The SAPC application uses a predefined set of Subnetworks that were set up during installation process when the SAPC vApp was created. This is just an example considering basic configuration without traffic separation, in other configurations might exist additional external networks, although the principle shown in this chapter would be the same including the additional external networks.

The networks External OAM (10.41.30.224/29) and External Traffic (10.41.70.224/29) are the ones used to connect the vApp to the external world.

To ensure the SAPC accessibility from outside the cloud and from other nodes (such as EPG and MME), specific routes must be defined into Border Gateway Routers to guarantee access to the vApp VIPs (OAM and Traffic).

The following sections describe an example (four Border Gateway Routers) and just taking an Extreme Switch x460/x670 as a reference, the following routing must be set up.

10.2.1 Configuration Example of OAM Border Gateway Routers (Extreme x670)

Log on to the Border Gateway Routers:

```
PreparationServer :# ssh admin@<Extreme Switch>
```

Check that External-OAM VLAN exists and contains suggested IP address (10.41.30.225 for External-OAM) and required configuration.

```
BorderGatewayRouter :# show vlan
```

```
SAPC_Cloud_2004 2004 10.41.30.225 /29 -f-----
ANY 4 /4 VR-Cloud
```

If the VLAN does not exist, create them:

```
BorderGatewayRouter :# create vlan <Vlan Name 1>, SAPC_Cloud_<tag 1>>
```

```
BorderGatewayRouter :# configure vlan <Vlan Name 1> tag <Tag 1>
```



```
BorderGatewayRouter :# configure vlan <Vlan Name 1> add ports
<Switch Ports> tagged
```

Ensure the SAPC accessibility from outside the cloud and from other nodes (such as EPG and MME):

Configure IP addresses for the External VLAN and IP routing:

```
BorderGatewayRouter :# configure vlan <Vlan Name 1> ipaddress
10.41.30.225 255.255.255.248
```

```
BorderGatewayRouter :# enable ipforwarding vlan <Vlan Name 1>
```

```
BorderGatewayRouter :# configure iproute add 10.58.31.7
255.255.255.255 10.41.30.226
```

Save the configuration changes done in the Site Router switch:

```
BorderGatewayRouter :# save configuration
The configuration file primary.cfg already exists.
Do you want to save configuration to primary.cfg and overwrite it? (y/N) Yes
Saving configuration on master ..... done!
Configuration saved to primary.cfg successfully.
```

```
BorderGatewayRouter :# save configuration secondary
The configuration file secondary.cfg already exists.
Do you want to save configuration to secondary.cfg and overwrite it? (y/N) Yes
Saving configuration on master ..... done! Configuration saved to secondary.c
The current selected default configuration database to boot up the system (prim
Default configuration database selection cancelled.
```

10.2.2 Configuration Example of Traffic Border Gateway Routers (Extreme x670)

Log on to the Border Gateway Routers:

```
PreparationServer :# ssh admin@<Extreme Switch>
```

Check that External-Traffic VLAN exists and contains suggested IP address (10.41.70.225 for External-OAM) and required configuration.

```
# show vlan
```

```
SAPC_Cloud_2005 2005 10.41.70.225 /29 -f-----
ANY 4 /4 VR-Cloud
```

If the VLAN does not exist, create them:

```
BorderGatewayRouter :# create vlan <Vlan Name 2, SAPC_Cloud_<tag
2>>
```




```
BorderGatewayRouter :# configure vlan <Vlan Name 2> tag <Tag 2>
```

```
BorderGatewayRouter :# configure vlan <Vlan Name 2> add ports
<Switch Ports> tagged
```

Ensure the SAPC accessibility from outside the cloud and from other nodes (such as EPG and MME):

Configure IP addresses for the External VLAN and IP routing:

```
BorderGatewayRouter :# configure vlan <Vlan Name 2> ipaddress
10.41.70.225 255.255.255.248
```

```
BorderGatewayRouter :# enable ipforwarding vlan <Vlan Name 2>
```

```
BorderGatewayRouter :# configure iproute add 10.58.31.137
255.255.255.255 10.41.70.226
```

Save the configuration changes done in the Site Router switch:

```
BorderGatewayRouter :# save configuration
```

The configuration file primary.cfg already exists.

Do you want to save configuration to primary.cfg and overwrite it? (y/N) Yes

Saving configuration on master done!

Configuration saved to primary.cfg successfully.

```
BorderGatewayRouter :#
```

save configuration secondary The configuration file secondary.cfg already exists

Do you want to save configuration to secondary.cfg and overwrite it? (y/N) Yes

Saving configuration on master done! Configuration saved to secondary

The current selected default configuration database to boot up the system (p

Default configuration database selection cancelled.

10.3 Setting the SAPC Licenses Configuration

The configuration of the SAPC is done logging in to it through the OAM VIP. This can be done either directly from the X670 switch, or from outside the cloud (for example: Jumpstart Server) if proper routing was in place:

```
ssh vr "VR-Default" root@10.58.31.7.
```

In case of problems logging in to the SAPC VM through the OAM VIP, you can always connect through a virtual console reachable from VMware, as it was specified in former sections.

Configure the Licenses following these steps:

1. Set the fingerprint with the value given during license ordering readLicense Fingerprinting section in LM User Guide for ELIM.



2. Install license key file following [Install License Key File](#).
3. Check the license information following [View License Information](#).

10.4 Final Backup

Once the SAPC configuration is done, create a system backup. Follow the instructions specified in the [Create Backup](#).