A MITEL
PRODUCT
GUIDE

Unify OpenScape Solution Set V9

Virtual Machine Resourcing and Configuration Guide

Service Documentation
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Mitel

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Contents

1 Change Log

Issue	Description
Issue 1	First issue for V9. The base for this document was Issue 18 of the V8 VM Guide.
Issue 2	Updates for: • Section 5.9 "OpenScape CMP and Assistants" • Section 5.11 "OpenScape Contact Center" • Section 5.15 "OpenScape Media Server" • Section 5.18 "OpenScape UC Application" • Section 5.20 "OpenScape Voice"
Issue 3	Section 3.3 " vSphere Versions" updated.
Issue 4	• Section 5.16 updated: Changed vDisk size from 140 GB to 40 GB. • Section 5.21 updated: Changed OS from SLES 11 SP2 to SLES 12 SP4/SP5.
Issue 5	Section 5.4 updated: New table added for "Quorum with Softgate" deployments.
Issue 6	• Section 5.13 "OpenScape Enterprise Express" updated: English version of Windows Server required. • Section 5.17 "OpenScape Session Border Controller (SBC)" updated.
Issue 7	Section 3.3 "Supported VMware vSphere Versions" updated: ESXi V6.0 supported by OpenScape Branch and OpenScape SBC
Issue 8	• Section 3.3 "Supported VMware vSphere Versions" updated. • Section 5.10 "OpenScape Concierge" updated. • Minor corrections throughout the guide (typos etc).
Issue 9	Section 5.18 "OpenScape UC Application" updated: vDisk (No. Req'd) for all deployments changed from 2 to 1.
Issue 10	Section 3.4 "Supported VMware vSphere Features" updated: EVC support column added.
Issue 11	Section 5.13 "OpenScape Enterprise Express" updated for V9 release.
Issue 12	• Section 3.3 "Supported VMware vSphere Versions" updated. • Section 5.8 "OpenScape CC Call Director SIP Service" updated.
Issue 13	• Section 3.3 "Supported VMware vSphere Versions" updated. • Section 5.5 "OpenScape 4000 Manager" updated: Operating System value changed to SLES 12 SP4/SP5.
Issue 14	Section 5.12 "OpenScape DLS" updated.
Issue 15	Section 5.5 "OpenScape 4000 Manager" updated.
Issue 16	• Section 3.3 "Supported VMware vSphere Versions" updated: - OSEE V9 added to the list - OSV V8R1 ESXi 6.0 support • Section 5.9 "OpenScape CMP and Assistants" updated. • Section 5.15 "OpenScape Media Server" updated. • Section 5.18 "OpenScape UC Application" updated.
Issue 17	• Section 3.3 "Supported VMware vSphere Versions" updated for OS4K. • Section 3.4 "Supported VMware vSphere Features" updated for OS4K. • Section 5.4 "OpenScape 4000" updated. • Section 5.21 "OpenScape Voice Survival Authority" updated: vNIC Type: VMXNET3

Issue	Description
Issue 18	• Section 3.3 "Supported VMware vSphere Versions" updated for OS4K. • Section 5.18 "OpenScape UC Application" updated: In Very Large Deployment, max users of Openfire Server changed. • Section 5.19 "OpenScape UC - Openfire Server" updated: Smallest Deployment removed. • Section 5.20 "OpenScape Voice" updated: Physical CPU requirement updated for Simplex and Standard Duplex Large
Issue 19	• Section 4.3.1 "Dimensioning the Required Physical CPUs for a Deployment" updated. • Section 5.17 "OpenScape Session Border Controller (SBC)" updated: vNIC Type changed to VMXNET3.
Issue 20	• Section 3.3 "Supported VMware vSphere Versions" updated: - OpenScape DLS ESXi V6.5 support - Media Server, Mobile Facade Server, UC Application, and Openfire Server ESXi V6.0 support
Issue 21	• Section 5.13 "OpenScape Enterprise Express" updated: VM requirements for Deployment E corrected. • Section 5.20 "OpenScape Voice" updated.
Issue 22	• Section 5.13 "OpenScape Session Border Controller (SBC)" updated: notes corrected. • Section 5.20 "OpenScape Voice" updated: OpenScape Voice (2 nodes) corrected.
Issue 23	Section 3.3 "Supported VMware vSphere Versions" updated.
Issue 24	Section 3.4 "Supported VMware vSphere Features" updated
Issue 25	• Section 3.3 "Supported VMware vSphere Versions" updated. • Section 5.12 "OpenScape DLS" updated: info about VMware vSphere Replication.
Issue 26	Section 5.4 "OpenScape 4000" updated with info regarding vCPU Reserv.
Issue 27	• Section 5.9 heading of the table updated. • Section 5.18 "OpenScape UC Application" updated: Openfire server vDisk Size for very large deployment. • Section 5.19 "OpenScape UC - Openfire Server" updated: vDisk Size.
Issue 28	• Section 3.3 Supported VMware vSphere Versions • Section 5.6 OpenScape Accounting • Section 5.22 OpenScape Web Collaboration • Section 5.26 OpenScape Xpressions
Issue 29	Section 3.3 Supported VMware vSphere Versions
Issue 30	Section 5.17 OpenScape Session Border Controller (SBC)
Issue 31	• Section 5.17 OpenScape Session Border Controller (SBC) • Section 3.3 Supported VMware vSphere Versions
Issue 32	Section 3.3 Supported VMware vSphere Versions
Issue 33	Section 3.3 Supported VMware vSphere Versions
Issue 34	Section 3.3 Supported VMware vSphere Versions
Issue 35	• Section 5.13 OpenScape Enterprise Express • Section 5.12 OpenScape DLS • Section 3.3 Supported VMware vSphere Versions • Added Section 5.28 OpenScape Contact Media Service

Issue	Description
Issue 36	Section 5.23 OpenScape Xpert – MLC (Multi Line Controller)
Issue 37	Section 5.15 OpenScape Media Server
Issue 38	Section 3.3 Supported VMware vSphere Versions
Issue 39	Section 5.18 OpenScape UC Application
Issue 40	Section 3.3 Supported VMware vSphere Versions
Issue 41	Section 5.20 OpenScape Voice
Issue 42	Section 3.3 Supported VMware vSphere Versions
Issue 43	Section 5.28 OpenScape Contact Media Service
Issue 44	Section 3.3 Supported VMware vSphere Versions
Issue 45	- Chapter 2 Objective and Scope - Section 3.3 Supported VMware vSphere Versions - Section 5.6 OpenScape Accounting
Issue 46	- Chapter 5.15 OpenScape Media Server - Section 3.3 Supported VMware vSphere Versions
Issue 47	- Section 3.3 Supported VMware vSphere Versions - Section 5.4 OpenScape 4000 - Section 5.5 OpenScape 4000 Manager
Issue 48	- Section 3.3 Supported VMware vSphere Versions
Issue 49	- Section 3.3 Supported VMware vSphere Versions
Issue 50	- Section 5.7 OpenScape Branch
Issue 51	- Section 3.3 Supported VMware vSphere Versions - Section 5.10 OpenScape Concierge
Issue 52	- Section 5.26 OpenScape Xpressions - Section 5.13 OpenScape Enterprise Express
Issue 53	- Section 3.3 Supported VMware vSphere Versions - Section 5.4 OpenScape 4000
Issue 54	- Section 5.11 OpenScape Contact Center
Issue 55	- Created: Section 5.29 OpenScape Trace Manager
Issue 56	- Section 5.11 OpenScape Contact Center
Issue 57	- Section 3.3 Supported VMware vSphere Versions
Issue 58	- Section 3.3 Supported VMware vSphere Versions
Issue 59	Removed all references to SLES 11
Issue 60	Updated vCPU reservation guidelines
Issue 61	- Section 5.20 OpenScape Voice
Issue 62	- Section 5.19 Openfire Server
Issue 63	- Section 3.3 Supported VMware vSphere Versions - added column ESXi V7.0 and row OS400 V10 R0

Issue	Description
Issue 64	- Section 5.13 OpenScape Enterprise Express - added notice
Issue 65	- Section 5.13 OpenScape Enterprise Express - added cases about vNIC type for THIG scenario
Issue 66	- Section 3.3 Supported VMware vSphere Versions - updated

1.1 Open Issues

1) For each of the products shown in Section 5, the specific deployment model and Call Model used to determine the required virtual machine resource information is required to be provided. At a high level – the deployment model and the Call Model that corresponds to these resourcing figures, i.e., for OSV it may be 20% keyset, CAC enabled, 100% of subscribers with TLS, two CSTA applications, and 3.5 BHCA per user.

2 Objective and Scope

The Objective of this document is to provide a consolidated approach to resource and configure virtual machines that will host Unify applications.

The Scope is reflected by the following product list that supports virtualization in Solution Set V9:

Product	Version	Notes
HiPath CAP Management	V3.0 SMR13	
HiPath QoS Management	V1 R7	
HiPath User Management	V3 R1	
OpenScape 4000	V8	
OpenScape 4000 Manager	V8	
OpenScape Accounting	V3	
OpenScape Branch	V9	
OpenScape CC Call Director SIP Service (CDSS)	V9	
OpenScape Common Management Portal (CMP) & Assistants	V9	
OpenScape Concierge	V4 Rx	
OpenScape Contact Center (CC)	V9	
OpenScape Deployment Server (DLS)	V7 R3	
OpenScape Enterprise Express (OSEE)	V9	
OpenScape Fault Management	V9	
OpenScape Media Server	V9	
OpenScape Mobile Client Façade Server (MCFS)	V7	
OpenScape Session Border Controller (SBC)	V9	
OpenScape UC Application	V9	
OpenScape UC Application – OpenFire Server	V7	
OpenScape Voice	V9	
OpenScape Voice Survival Authority (SA)	V9	
OpenScape Web Collaboration	V7	
OpenScape Xpert	V6 R1	
OpenScape Xpressions	V7	
SESAP SW Suite	V2	

3 Virtualized OpenScape UC Suite

3.1 Advantages of Virtualization

The most important features provided by virtualization are the reduced number of servers and the capability of our solution to be hardware agnostic.

Therefore OpenScape UC Suite V9 operation in a virtual environment enables the following capabilities:

- Server Consolidation

The applications and virtual machines deployed onto a VMware host can use different guest operating systems, i.e. OpenScape Voice (Linux) and OpenScape Concierge (Windows) can both be deployed onto the same VMware host and share its physical resources.

- Hardware Independence

Having many hardware server vendors and models in a Data Center environment adds complexity and cost to the operation, therefore Unify's customers often look to standardize their IT hardware infrastructure.Virtualization allows customers to deploy Unify applications onto any hardware platform, assuming it has been certified by VMware and it meets the resource requirements of the application, as described in this document.

Virtualization further enables OpenScape UC Suite to:

- Improve our staging concept
- Enable the "pay as you grow" concept for hardware investment
- Implement high-availability for all solution components
- Decrease installation costs

3.2 VMware vSphere – Infos and References

For a description of VMware vSphere V5 Virtualization Basics, please follow the link below.It provides an introduction to virtualization, and to its benefits.

- `http://pubs.vmware.com/vsphere-50/topic/com.vmware.ICbase/PDF/vsphere-esxi-vcenter-server-50-basics-guide.pdf`

The list of the certified hardware with VMware hypervisor can be found here:

- `http://www.vmware.com/resources/compatibility/search.php`

For information on the different licensing and packaging of the different VMware editions please see the following:

- `http://www.vmware.com/files/pdf/vsphere_pricing.pdf`

- http://www.vmware.com/products/vsphere/buy/editions_comparison.html

Some important factors to consider when deciding license edition are below.

- What VMware features are required (vMotion, HA, FT, DRS/DPM)
- Max number of vCPUs (virtual CPUs) required per VM
- Max amount of vRAM allowed per ESXi Host (sum of vRAM for all VMs in a host)
- Number of ESXi hosts
- Number of CPUs sockets per server

More information on the Essentials and Essentials plus packages can be found at:

- http://www.vmware.com/vmwarestore/buyvsphere-small-business.html

More information on the Standard, Advanced, Enterprise and Enterprise plus packages can be found at:

- http://www.vmware.com/products/vsphere/buy/editions_comparison.html
- http://www.vmware.com/files/pdf/vsphere_pricing.pdf

Further information on the vSphere features can be found at:

- vMotion: http://www.vmware.com/products/vsphere/features-vmotion
- Storage vMotion: http://www.vmware.com/products/vsphere/features-vmotion
- High Availability (HA): http://www.vmware.com/products/vsphere/features/high-availability
- Distributed Resource Scheduler (DRS): http://www.vmware.com/products/vsphere/features-drs-dpm

Further information on SAN concepts can be found at:

- http://pubs.vmware.com/vsp40_e/wwhelp/wwhimpl/js/html/wwhelp.htm#context=iscsi_san_config&file=c_storage_area_network_concepts.html

3.3 Supported VMware vSphere Versions

	Product Version	ESXi V5.1	ESXi V5.5	ESXi V6.0	ESXi V6.5	ESXi V6.7	ESXi V7.0
HiPath CAP Management	**V3.0 SMR13**	**YES**	**YES**	**YES**	**YES**	**YES**	
	V3.0 SMR14	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Supported HW Version(s)		9	9,10	9,10,11	9,10,11,13	9,10,11,13,14	
HiPath QoS Management	**V1 R7**	**YES**	**YES**				
Supported HW Version(s)							
HiPath User Management	**V3**	**YES**					
	V3 R1	**YES**	**YES**				
Supported HW Version(s)							
OpenScape 4000	**V7 R2**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
	V8	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
	V10 R0	**NOS**	**NOS**	**NOS**	**YES**	**YES**	**YES**
Supported HW Version(s)		9	9	9	9	9	9
OpenScape 4000 Manager	**V7 R2**	**YES**	**YES**	**YES**	**YES**	**YES**	
	V8	**YES**	**YES**	**YES**	**YES**	**YES**	
	V10 R0	**NOS**	**NOS**	**NOS**	**YES**	**YES**	**YES**
Supported HW Version(s)		9	9,10	9,10,11	9,10,11,13	9,10,11,13,14	
OpenScape Accounting	V2	**YES**	**YES**	**YES**	**YES**		
	V3	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)		9	9,10	9,10,11	9,10,11,13	9,10,11,13	
OpenScape Branch	**V7 R1**	**YES**	**YES**				
	V8	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)		9	9,10	9,10,11	9,10,11,13	9,10,11,13	
OpenScape Call Director SIP Service (CDSS)	**V8 R2**	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**		
Supported HW Version(s)			10	10,11	10,11,13		
OpenScape Contact Media Service (CMS)	V8R2	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	

	Product Version	ESXi V5.1	ESXi V5.5	ESXi V6.0	ESXi V6.5	ESXi V6.7	ESXi V7.0
OpenScape CMP / Assistants	**V7R3 / V8R1**	**YES**	**YES**	**YES**			
	V7 R4 / V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape Concierge	**V4 Rx**	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13,14	
OpenScape Contact Center	**V8 R2**	**YES**	**YES**	**YES**			
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape DLS	**V7 R2**	**YES**	**YES**				
	V7 R3	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape Enterprise Express	**V9**	**NO**	**NO**	**YES**	**YES (*1)**	**YES (*1)**	
Supported HW Version(s)				11	11	11	
Hints	The above values are valid for OSEE V9R4 (*1): NOTE: The following applications are being delivered with HW Version 11: OSV,OpenScape UC, OpenScape Voice & OpenScape UC. Update to the latest supported by Unify HW version is allowed. For the OpenScape SBC, OS Xpressions, OSCC, OS Concierge, OS DLS and OSVTM, please consult the individual entries within this table.						
OpenScape Fault Management	**V7**	**YES**					
	V8	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)		8,9	8,9,10	8,9,10,11	8,9,10,11,13	9,10,11,13	
OpenScape Media Server	**V6**						
	V7 R1	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape Mobile Façade Server	**V7 R3**	**YES**	**YES**	**YES**	**YES**		
Supported HW Version(s)		8,9	8,9,10	8,9,10,11	8,9,10,11,13		

	Product Version	ESXi V5.1	ESXi V5.5	ESXi V6.0	ESXi V6.5	ESXi V6.7	ESXi V7.0
OpenScape SBC	**V7 R1**	**YES**	**YES**				
	V8	**YES**	**YES**				
	V9	**NO**	**YES**	**YES**	**YES**	**YES**	
Supported HW (Versions)			10	10,11	10,11,13	10,11,13	
OpenScape UC Application	**V7 R1**	**YES**	**YES**				
	V7 R2	**YES**	**YES**				
	V7 R3	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape UC Application – Openfire Server	**V7**	**YES**	**YES**				
	V9	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape Voice	**V7 R1**	**YES**	**YES**				
	V8 R1	**YES**	**YES**	**YES**			
	V9	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	10,11,13,19
OpenScape Voice SA	**V7 R1**	**YES**	**YES**				
	V8	**YES**	**YES**	**YES**			
	V9	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	10,11,13,19
OpenScape Web Collaboration	**V7**	**No**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape Xpert	**V5R1**		**YES**	**YES**	**YES**		
	V6R1		**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)			10	10,11	10,11,13	10,11,13	
OpenScape Xpressions	**V7 R1**	**YES**	**YES(*2)**	**YES(*2)**	**YES(*2)**	**YES(*2)**	
	(*2) Only supported for up to 10,000 users. VMware Data Protection is not supported						
Supported HW Version			10	10,11	10,11,13	10,11,13	

	Product Version	ESXi V5.1	ESXi V5.5	ESXi V6.0	ESXi V6.5	ESXi V6.7	ESXi V7.0
SESAP SW-Suite	**V1 R4**	**YES**	**YES**	**YES**	**YES**		
Supported HW Version(s)							
OpenScape Trace Management	V8	**YES**	**YES**	**YES**	**YES**	**YES**	
Supported HW Version(s)		9	9,10	9,10,11	9,10,11,13	9,10,11,13	

For a list of the supported and compatible virtual machine hardware versions in VMware vSphere refer to:

https://kb.vmware.com/kb/2007240

3.4 Supported VMware vSphere Features

OpenScape Solution Set V8	vMotion	HA	FT	SRM	vStorage-APIs for Data Protection	VMware-Tools	EVC	vCloud Director
HiPath CAP Management	Y	Y	N	Y	Y	Y	Y	N
HiPath QoS Management	Y	Y	N	Y	Y	Y	Y	N
HiPath User Management	Y	Y	N	Y	Y	Y	Y	N
OpenScape 4000	Y	Y	N	N	Y	Y	Y*	N
OpenScape 4000 Manager	Y	Y	N	Y	Y	Y	Y	N
OpenScape 4000 SoftGate	Y	Y	N	Y	Y	Y	Y	N
OpenScape Accounting	Y	Y	N	Y	Y	Y	Y	N
OpenScape Branch	Y	Y	N	N	N	Y	Y	N
OpenScape CC CDSS	Y	Y	N	Y	N	N	Y	N
OpenScape CMP & Assistants	Y	Y	N	PSR	N	Y	Y	N
OpenScape Concierge	Y	Y	N	Y	Y	Y	Y	N
OpenScape Contact Center	Y	Y	N	Y	N	Y	Y	N
OpenScape DLS	Y	Y	N	PSR	N	Y	Y	N
OpenScape Fault Management	Y	Y	N	Y	Y	Y	Y	N
OpenScape Media Server	Y	Y	N	Y	Y	Y	Y	N
OpenScape Mobile Facade Server	Y	Y	N	N	PSR	Y	Y	N
OpenScape SBC	Y	Y	N	N	N	Y	Y	N
OpenScape UC Application	Y	Y	N	N	Y	Y	Y	N
OpenScape UC Application – OpenFire Server	Y	Y	N	N	Y	Y	Y	N
OpenScape Voice	Y	Y	N	N	Y	Y	Y	PSR
OpenScape Voice SA	Y	Y	Y	Y	Y	Y	Y	N
OpenScape Web Collaboration	Y	Y	N	N	PSR	Y	Y	N
OpenScape Xpert (MLC)	Y	Y	Y (1vCPU)	N	N	Y	Y	N
OpenScape Xpert (SM)	Y	Y	N	N	N	Y	Y	N
OpenScape Xpert (Master TT)	Y	Y	N	N	N	Y	Y	N
OpenScape Xpressions	Y	Y	N	Y	Y	Y	Y	N
SESAP SW-Suite	Y	Y	N	N	Y	Y	Y	N

vMotion: vMotion is supported only during non-business hours or times of minimum system load. Application problems and issues during a vMotion process are not addressable towards the Unify applications. There are known issues when executing the vMotion process under load:

a) OSV might not route incoming/outgoing calls for a short time (seconds)

b) Media Server and Xpressions might create crackling noises, a fax might have black lines or might be terminated during transmission

c) For Microsoft Cluster based solutions, please be aware that vMotion is not supported for vSphere 5.5 and lower by Microsoft. The Microsoft cluster might execute a failover action while executing vMotion, etc.

d) In general UTP packet loss might occur for a limited time

High Availability (HA): HA tries to automatically restart a VM easing the recovery of a host failure. Due to the unpredictable nature of host failures, data inconsistencies (extremely seldom) might inhibit

an instant restart might not be possible. In that case, backup mechanisms have to be used for recovery.

Site Recovery Manager (SRM): SRM is supported in Layer 2 networks only. The failover site need to allow the failed over VMs to operate with identical IP settings (IP-address, DNS, Gateways, etc). The network environment is expected to deal with site outages and execute a proper IP routing to the failover site. Upfront Professional Service involvement is highly recommended for SRM based solutions.

Distributed Resource Scheduler (DRS): DRS uses VMware vMotion to migrate VMs from one ESX server to another one, while the VM provides it's service to the end user. As VMware vMotion is supporting only during off hours, because of known "issues" the DRS feature is supported only with limitations:

a) "DRS in fully automated mode" might cause unpredictable vMotion activities and therefore is not supported by Unify. If customers activate this mode, a conservative setting is recommended. Issues resulting from vMotion operations are not addressable towards Unify).

b) "DRS in partially automated mode" only deals with initial VM placement and does not cause a dynamic system behavior later on. Applying reasonable DRS rules in order to have a reasonable VM placement is recommended and is supported by Unify.

c) "DRS in manual mode" does neither automate initial placement nor does it cause dynamics throughout operations and is supported by Unify.

Enhanced vMotion Compatibility Mode (EVC): Unify defines a reference CPU within the Bill of Materials (BoM) for each product version released. As long as the choice of the EVC mode does not contradict this, EVC can be successfully used for Unify products that support vMotion.

* VMware EVC Mode must be set to a suitable level that supports VHV e.g. "Intel® "Nehalem" Generation" for OS4K Host deployments.

3.5 General Statements and Best Practice Recommendations for Virtualization at Unify

General Support Statement for virtualized Unify products

In a virtualized environment configuration, care must be taken that the customer has two support contracts: one with Unify and one with VMware.

If the customer opens a ticket with the Unify Service Desk, the ticket will be accepted and evaluated to determine the root cause (whether the problem is with a Unify product or with VMware). This can require the involvement of several levels in the Unify support organization including GO and GVS.

If the root cause analysis has determined that the error is not an VMware issue, GVS will investigate further. If it is suspected to be a VMware software issue, the ticket will be routed back to the customer who will then be asked to open a ticket with VMware.

Follow the VMware Best Practice Recommendations

Below you can find a list of Best Practice publications provided by VMware:

VMware Publication	Link
General Performance Best Practice	`www.vmware.com/pdf/Perf_Best_Practices_vSphere5.0.pdf`
General Performance Best Practice (continued)	`www.vmware.com/pdf/Perf_Best_Practices_vSphere5.1.pdf`
VMWare Networking Concepts to be understood	`www.vmware.com/files/pdf/virtual_networking_concepts.pdf`
Best Practice VMWare Tools Installation	`http://kb.vmware.com/kb/2004754`
Time Keeping Best Practice for Linux OS	`http://kb.vmware.com/kb/1006427`
Time Keeping Best Practice for Windows OS	`http://kb.vmware.com/kb/1318`

Usage of Virtual Machine Snapshots:

> ***INFO:*** Snapshots are used as part of official Unify Service procedures. However, the following restrictions must be observed.

1. Snapshots are NOT to be taken on production systems during normal operation.
2. Snapshots taken previously must NOT remain active on a production system during normal operation.

3. Snapshots can be taken, if needed, during maintenance windows, or during the installation procedure.
   Snapshots can be a valuable mechanism during maintenance operations. For example, they allow a quick rollback to a well-defined state of the VM if a mass provisioning script fails.
4. Note that Snapshots are used internally by backup tools such as VDP or VDR. It must be ensured that (a) these backup operations are scheduled off business hours, and (b) that any Snapshots generated by these tools are deleted at the conclusion of the backup operation.

For further information regarding Snapshots please consult the VMware Knowledge Base (KB). A good starting point is KB Article 1025279-Best Practices for virtual machine snapshots in the VMware environment:

`http://kb.vmware.com/kb/1025279`

Usage of Advanced Locking ID (ALI):

The use of Advanced Locking ID is recommended whenever the Unify product supports ALI.

Recommended Disk Mode:

1. For disk mode the default settings should be kept, since this allows for the creation and use of snapshots.
2. The disk mode must not be set to "independent", since this would prevent snapshots from being taken.

4 Virtualization Dimensioning Overview

4.1 VM Co-Residency and Quality of Service policy

This VM Co-Residency and Quality of Service Policy provides the rules for the parties responsible for deploying the Unify VMs and managing the virtual environment when deploying Unify VMs on consolidated network and hardware resources:

- It is up to the parties responsible for deploying the Unify VMs and managing the virtual environment to ensure the performance criteria is met. Uncertainty can be reduced by pre-deployment testing, baselining, and following the rules of Unify VM Configuration and Resource Guide (VM R&C) including this policy.
- VMs with Unify real time and mission critical applications shall be protected from other applications in the routing and switching network to ensure voice/video network traffic get the needed bandwidth and protection from delay and jitter.
- VMs with Unify real time and mission critical applications shall be protected from other applications when the virtualization host shares compute, storage, and network hardware among multiple application virtual machines (e.g. you cannot schedule Unify real time applications to run on a host that insufficient resources for the VM).
- All components in the virtual environment shall be on VMware's Compatibility Guide (https://www.vmware.com/resources/compatibility/search.php).
- All components in the virtual environment shall be designed to fulfill VMware’s best practice guidelines.
- Adherence to Unify Virtualization and Resource configuration rules (e.g. physical/virtual hardware sizing, co-residency policy, etc.) is required in order to ensure Unify VMs get the needed CPU, memory, storage capacity and storage/network performance.
- Unify VMs shall not be hosted on the same HW with third-party VMs that have incomplete resource requirements defined.
- Host hardware shall be continuously monitored (e.g. by vCenter) and operated below 80% CPU usage with a %RDY value of 5% max.
- The total amount of RAM, Storage, and NW (including Storage Network) throughput shall not be exceed the capacity of the Host hardware (no over subscription).
- Even if the host processor is hyper-threading-capable and HT is enabled, a physical core shall only be counted once.
- In case customer wishes VM resources (vCPU reservation) optimized to a minimum then a continuous and close monitoring of the system is absolutely required - As a starting point a vCPU Reservation of 50% of the Unify recommended value can be configured but that percentage will need to be adjusted

by observing the peak CPU consumption required during normal business operation/hours.

IMPORTANT NOTES:

- In general such customizing should not be made for any critical real-time communication platform (e.g. OSV, SBC..).
- In case of any performance issues (e.g. system/component overloads, outage etc.) the recommended values per VM system as described in this document must be applied.
- Please note that the responsibility for such customized configurations lies to the parties that deploy and manage the Unify VMs and the virtual environment.

- vCPU Shares shall be configured to guarantee mission critical Unify VMs (including real time VMs) are never starved for CPU time.

  The following table shows the default vCPU share values for a particular Share Value configured for a virtual machine:

Setting	vCPU Share Value
Custom	Configurable number of shares per virtual CPU (up to 1,000,000)
High	2000 shares per virtual CPU
Normal	1000 shares per virtual CPU
Low	500 shares per virtual CPU

NOTICE: The value configured is per virtual CPU.

IMPORTANT: Configure vCPU Share setting to Custom and value to 1,000,000 for critical Unify VMs.

- Customers are responsible to fulfill the requirements, even if the VM is moved around in the environment, e.g. by manually re-configuring the CPU shares of a VM if it gets moved to another ESXi host or resource pool.
- Disaster Recovery plans need to take into account the additional resources required when failing over to fail over site (datacenter 2).

4.2 Key Support Considerations

Customers must adhere to the following in order to enable Unify TAC to effectively provide support when running virtualized Unify mission critical and real time applications such as OSV, UC app, and Media Server co-resident with Unify non real time/3rd-party app VMs:

- Customers with Managed Services shall verify if Managed Services would agree to operate a particular deployment proposal based on using vCPU shares and reduced vCPU reservations.
- Issues resulting from resource contention cannot be addressed towards Unify. If Unify investigates any issues shown to be related to lacking resources, or the datacenter is unable to provide to Unify the VM diagnostic data required to investigate the issue, the organization receiving the support agrees to reimburse Unify for the investigation time spent.
- Unify support can require to switch back to default settings in case of issues (or when investigating issues).
- Unify must be granted access to vCenter logs and performance metrics.
- Software: Unify TAC may require changes to the software workload to troubleshoot or resolve application performance problems. Examples include:
  - temporary power-down of non-critical VMs to facilitate performance troubleshooting.
  - moving critical VMs and/or non-critical VMs to alternate virtualization host/physical server as a temporary or permanent solution.
- Hardware: Unify TAC may require changes to the physical hardware, to troubleshoot or resolve application performance problems. Examples include:
  - Unify TAC may require additions/upgrades to "fix" an overloaded host as an alternative to powering-down VMs or moving VMs.
  - adding more physical disks to increase storage capacity and/or provide IOPS.
  - decreasing storage latency.
  - adding more physical memory or more physical CPU cores.
  - adding physical NIC interfaces to address LAN congestion.

4.3 Physical Resource Dimensioning

The following resources must be properly dimensioned and configured in order for any application to operate properly in a VMware vSphere environment:

- Virtual Cores (vCPU) – Both, the number of virtual cores consumed by the application(s), and the vCPU power in GHz consumed by the applications.
- Virtual Memory (vRAM) –Amount of memory in GB consumed by the applications
- Virtual Hard Disks (vHD) – The amount of storage in GB consumed by the application(s), and the throughput required.
- Virtual Network Interfaces (vNIC) – The number of virtual network adaptors, and the bandwidth required.

INFO: Virtual core is synonymous to virtual CPU.

4.3.1 Dimensioning the Required Physical CPUs for a Deployment

Two inputs from the product virtualization dimensioning tables are relevant to dimension the resource CPU:

- Number of virtual cores (vCPU) required by this product
- Minimum percentage of the totally allocated CPU resources required for normal operation by this product. This is the percentage that is used for vCPU reservations.

The number of physical CPU cores required by the vSphere host when multiple Unify applications are co-resident on that vSphere host is determined using the following equation:

```
# of Physical Cores > Total Reservation by all applications
/ Physical CPU Frequency
```

NOTE: If a Unify application does not perform CPU reservation at all then use 50% as a minimum for that product (*).

Example: We have 4 Unify applications in the same vSphere host, which has a CPU clocked at 2.0 GHz. The following table lists the requirements of the afore-mentioned applications:

Application	# of vCPU	Reservation percentage	Reservation
A	4	75%	6,000 MHz
B	1	100%	2,000 MHz
C	2	0% (*50%)	2,000 MHz
D	2	100%	4,000 MHz
Total	-	-	14,000 MHz

Using the formula provided above (14,000 / 2,000 = 7) we see that the total number of physical CPU cores must be **greater than 7**.

This method can also be used to estimate the aggregate number of physical cores for an entire solution composed of numerous Unify virtual products over multiple vSphere hosts.

Remarks:

- All VM resourcing information that is provided by development for each product already includes peak load requirements, and
- The hypervisor will reserve some (~10%) of the resources provided by one physical CPU core of a vSphere host. In order to avoid having the hypervisor overhead being multiplied, no hypervisor overhead is considered here when estimating the physical resources required for Unify products/applications.Hypervisor overhead is to be accounted by the vSphere system planners/designers/administrators.This fact needs to be clearly understood by or communicated to those implementing deployments.

4.3.2 Dimensioning the Required Physical RAM for a Deployment

Sum up the virtual memory (vRAM) requirements of each of the Unify virtual products to be deployed and ensure that:

- Amount of physical memory ≥ Sum of vRAM required by selected products

Remarks:

Be aware that extra space is needed by the ESXi host for its own code and data structures, beyond the memory allocated to each virtual machine. Overhead memory depends on the number of virtual CPUs and the configured memory for the guest operating system. A RAM overhead of **4 GB per ESXi host** will cover the majority of deployments. For more information see the following:

`https://pubs.vmware.com/vsphere-55/index.jsp#com.vmware.vsphere.resmgmt.doc/GUID-B42C72C1-F8D5-40DC-93D1-FB31849B1114.html`

4.3.3 Dimensioning the Required Physical Storage for a Deployment

Sum up the virtual storage space (vHD) requirements of each of the Unify virtual products to be deployed and ensure that:

- Amount of physical storage space ≥ Sum of vHD required by selected products.
- A storage space overhead of 25% is accounted.

Remarks:

- Storage latency is expected not to exceed 10ms.
- The number of IOPS is a crucial factor and needs to be taken into account too.

4.3.4 Dimensioning the Network

Initially the required bandwidth per application is not available in our OpenScape UC Suite configuration tables.

However a 1 Gbps Ethernet Interface provides enough bandwidth for an OpenScape UC Suite with up to 10,000 users running in an environment with high traffic.

For redundancy reasons you should not configure a server with less than 2 Ethernet ports.

Whenever the VMware features vMotion, DRS, High-Availability, Fault Tolerance, Data Recovery are used, VMware requires at least 6 x 1 Gbps Ethernet interface.

4.3.5 Usage of other Server Hardware Systems and CPU Architecture

The current reference hardware system is the IBM System x3550 M3. It uses an Intel Xeon X5650 CPU with a clock speed of 2.66 GHz. This reference system has a ‘SPECint_base2006’ value of 34.0.

Whenever using a different hardware system than the reference, and especially if the CPU is different than the reference, apply the following rule to determine if it is suitable:

- Lookup the ‘SPECint_base2006’ value of the proposed alternative hardware system. – See http://www.spec.org/cgi-bin/osgresults?conf=cpu2006
- The alternative hardware server is suitable if the SPECint_base2006 value of this alternative hardware server is **greater or equal** to the reference hardware server. If the value is slightly smaller a request for a PSR can be tried. This rule which provides a permissible deviation based on SPECint_base2006 comparisons **only** applies to CPU clock speed. All other resource requirements, e.g., the number of CPUs, must be followed as stated for each product in Chapter 5.

The following example describes the details of such an exercise:

If in a given customer project ProLiant Servers from Hewlett Packard are a mandatory requirement we perform the following steps to determine the proper server system and CPU type selection.

- Go to http://www.spec.org/cgi-bin/osgresults?conf=cpu2006
- Ensure that ‘Hardware Vendor’ is selected in the dropdown box, and enter ‘Hewlett-Packard’ in the search box
- From the results returned, look at the server systems, which have similar CINT2006 values
- For this example we select ProLiant BL460c Gen8 using a Xeon E5-2620 with a clock speed of 2.0 GHz:
  http://www.spec.org/cpu2006/results/res2012q3/cpu2006-20120813-24226.html
- The SPECint_base2006 value for this ProLiant server is 36.6. Since the value is higher than the one of the reference hardware system, this ProLiant server is a valid choice.

> ***INFO:*** Important - When performing the calculations mentioned in chapter 4.1.1 make sure that you use the clock speed of the alternative CPU.

5 Virtualization Dimensioning Details

The following table lists all ports that are used by more than one product and indicates which of them are configurable.When products that make use of the same port are installed on the same VM, the appropriate adjustments should be made to avoid port overlapping.

Port	Web Col-lab	Concierge	Xpert	TM	SESAP Syslog	DLS	XPR	Accoun-ting	Fault Mgmt
80	FIXED	config.	config.	not used	not used	not used	not used	not used	not used
443	FIXED(2)	not used	not used	not used	not used	not used	not used	FIXED(2)	not used
514	not used	not used	not used	config.	FIXED(1)	not used	not used	not used	FIXED(1)
1433	config.	config.	not used	not used	not used	FIXED	config.	not used	not used
17001	not used	FIXED	not used	config.	not used	not used	not used	not used	not used
17010	not used	FIXED	not used	config.	not used	not used	not used	not used	not used

(1) If OpenScape Fault Management and SESAP are installed on the same VM do not deploy the Syslog server for SESAP.

(2) OpenScape Accounting and OpenScape Web Collaboration should not be deployed in the same VM.

Example (port 80): OpenScape Web Collaboration, OpenScape Concierge and OpenScape Xpert need to be installed on the same VM but all three of them use the same port.Since OpenScape Web Collaboration cannot be configured to use a different port (see table), it will use port 80 while OpenScape Concierge and OpenScape Xpert will be configured to use other ports.

INFO: Always refer to each product's release notes for any possible impacts to the dimensioning details contained in this section of the document.

5.1 HiPath CAP Management

HiPath CAP Management V3.0 SMR13		
General Product Info	Operating System	Windows Server 2003 R2/Windows 2008 R2 – Standard; Enterprise, Windows 7/SLES 12
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** vMotion should not be used during business hours on high system load.
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes **Note:** All VMware requirements (incl. Hardware) and best practices have to be fulfilled. The network between the data center sites has to be a transparent layer 2 network which provides identical environments in both locations.
	Backup with vStorage-APIs for Data Protection	Yes **Note:** vStorage APIs can be used as an additional backup layer for image level backups that allow to restore virtual disk contents after a disk failure fast. The standard backup mechanisms normally used in physical deployments have to be applied in addition.
	VMware Tools Support	Yes **Note:** Installation of VMware Tools is recommended.
	Virtual Appliance (vApp) Support	No

HiPath CAP Management V3.0 SMR13									
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 2**	**Depl. 3**	**Depl. 3**	**Depl. 4**	**Depl. 4**
Depl. Scenarios	Depl. Scenario	Single Node	Single Node	Multi Node	Multi Node	Multi Node	Multi Node	Multi Node	Multi Node
	Number of Nodes	1	1	Frontend Server	Backend Server	Frontend Server	Backend Server	Frontend Server	Backend Server
	Max Users	500	5,000	10,000	10,000	30,000	30,000	50,000	50,000
vCPU	vCPU	1	2	1	2	1	2	1	2
	vCPU Shares	Normal							
	vCPU Reserv.	0	0	0	0	0	0	0	0
		Issues resulting from CPU contention cannot be addressed towards the application							
	vCPU Limit	Unlimited							
vRAM	vRAM	2 GB	2 GB	2 GB	2 GB	4 GB	4 GB	4 GB	4 GB
	vRAM Shares	Normal							
	vRAM Reserv.	2 GB	2 GB	2 GB	2 GB	4 GB	4 GB	4 GB	4 GB
	vRAM Limit	Unlimited							
vNIC	vNIC (No. Req'd)	1	1	1	1	1	1	1	1
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3
	vNIC Manual MAC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.							
		No, if remote CLA is used							
	Network Bandwidth (estimated reqm't)	400 Kbps	400 Kbps	400 Kbps	400 Kbps	400 Kbps	400 Kbps	400 Kbps	400 Kbps
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1	1	1	1
	vDisk Size	60 GB	60 GB	60 GB	80 GB	135 GB	265 GB	135 GB	265 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.							
	vDisk Mode	Keep Defaults (which allows Snapshots)							
	vDisk Format	Thick Lazy-zeroed							
	Addt'l Storage	NO	NO	NO	NO	NO	NO	NO	NO
	Storage Throughput (estimated reqm't)[1]	~200KB/S per SCC	~200KB/S per SCC	~200KB/S per SCC	~50KB/S per SCC	~200KB/S per SCC	~50KB/S per SCC	~200KB/S per SCC	~50KB/S per SCC
	Storage IOPS (estimated reqm't)[2]	2 per SCC	2 per SCC	2 per SCC	2 per SCC	2 per SCC	2 per SCC	2 per SCC	2 per SCC

1 Depends on log level and load
2 Maximum 10 SCCs are allowed per Frontend server

5.2 HiPath QoS Management

HiPath QoS Management V1 R7		
General Product Info	Operating System	Windows Server 2008 R2 – Standard; Enterprise or Datacenter Edition
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** vMotion should not be used during business hours on high system load
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes **Note:** All VMware requirements (incl. Hardware) and best practices have to be fulfilled. The network between the data center sites has to be a transparent layer 2 network which provides identical environments in both locations.
	Backup with vStorage-APIs for Data Protection	Yes **Note:** vStorage APIs can be used as an additional backup layer for image level backups that allow to restore virtual disk contents after a disk failure fast. The standard backup mechanisms normally used in physical deployments have to be applied in addition
	VMware Tools Support	Yes **Note:** Installation of VMware Tools is recommended.
	Virtual Appliance (vApp) Support	No

HiPath QoS Management V1 R7									
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 2**	**Depl. 3**	**Depl. 3**	**Depl. 4**	**Depl. 4**
Depl. Scenarios	Depl. Scenario	Single Node	Single Node	Multi Node	Multi Node	Multi Node	Multi Node	Multi Node	Multi Node
	Number of Nodes	1	1	HPQM Server	QCU	HPQM Server	QCU	HPQM Server	QCU
	Max Users	500	5,000	10,000	10,000	30,000	30,000	50,000	50,000
vCPU	vCPU	1	2	1	2	1	2	1	2
	vCPU Shares	Normal							
	vCPU Reserv.	0	0	0	0	0	0	0	0
		Issues resulting from CPU contention cannot be addressed towards the application							
	vCPU Limit	Unlimited							
vRAM	vRAM	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB
	vRAM Shares	Normal							
	vRAM Reserv.	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB
	vRAM Limit	Unlimited							
vNIC	vNIC (No. Req'd)	1	1	1	1	1	1	1	1
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3
	vNIC Manual MAC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.							
		No, if remote CLA is used							
	Network Bandwidth (estimated reqm't)	200 Kbps	320 Kbps	320 Kbps	320 Kbps	400 Kbps	320 Kbps	400 Kbps	320 Kbps
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1	1	1	1
	vDisk Size	50 GB	50 GB	50 GB	65 GB	135 GB	265 GB	135 GB	265 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.							
	vDisk Mode	Keep Defaults (which allows Snapshot)							
	vDisk Format	Thick Lazy-zeroed							
	Addt'l Storage	10 GB	10 GB	10 GB					
	Storage Throughput (estimated reqm't)	800 Kbps	1920 Kbps	3200 Kbps	640 Kbps	4800 Kbps	800 Kbps	8000 Kbps	1120 Kbps
	Storage IOPS(estimated reqm't)	13 IOPS	30 IOPS	50 IOPS	10 IOPS	75 IOPS	13 IOPS	125 IOPS	18 IOPS

5.3 HiPath User Management

HiPath User Management V3 R1		
General Product Info	Operating System	Windows Server 2008 R2 - Standard, Enterprise or Datacenter Edition
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** vMotion should not be used during business hours on high system load
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes **Note:** All VMware requirements (incl. Hardware) and best practices have to be fulfilled. The network between the data center sites has to be a transparent layer 2 network which provides identical environments in both locations.
	Backup with vStorage-APIs for Data Protection	Yes **Note:** vStorage APIs can be used as an additional backup layer for image level backups that allow to restore virtual disk contents after a disk failure fast. The standard backup mechanisms normally used in physical deployments have to be applied in addition
	VMware Tools Support	Yes **Note:** Installation of VMware Tools is recommended.
	Virtual Appliance (vApp) Support	No

HiPath User Management V3 R1								
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Depl. 5**	**Largest**
Depl. Scenarios	Depl. Scenario	Single Node	Single Node	Single Node	Single Node	Single Node		
	Number of Nodes	1	1	1	1	1		
	Max Users	500	5,000	10,000	30,000	50,000		
vCPU	vCPU	1	1	2	2	2		
	vCPU Shares	Normal	Normal	Normal	Normal	Normal		
	vCPU Reserv.	0	0	0	0	0		
		Issues resulting from CPU contention cannot be addressed towards the application						
	vCPU Limit	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited		
vRAM	vRAM	4 GB	4 GB	4 GB	4 GB	4 GB		
	vRAM Shares	Normal	Normal	Normal	Normal	Normal		
	vRAM Reserv.	4 GB	4 GB	4 GB	4 GB	4 GB		
	vRAM Limit	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited		
vNIC	vNIC (No. Req'd)	1	1	1	1	1		
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3		
	vNIC Manual MAC	Yes	Yes	Yes	Yes	Yes		
		No, if remote CLA is used						
		If parameter is set to Y, please refer to OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide on e-doku.						
	Network Band-width (estimated reqm't)	50 Kbps	50 Kbps	100 Kbps	250 Kbps	400 Kbps		
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1		
	vDisk Size	80 GB	80 GB	80 GB	120 GB	120 GB		
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.						
	vDisk Mode	Keep Defaults (which allows Snapshots)	Keep Defaults (which allows Snapshots)	Keep Defaults (which allows Snapshots)	Keep Defaults (which allows Snapshots)	Keep Defaults (which allows Snapshots)		
	vDisk Format	thick lazy-zeroed	thick lazy-zeroed	thick lazy-zeroed	thick lazy-zeroed	thick lazy-zeroed		
	Addt'l Storage	No	No	No	No	No		
	Storage Through-put (estimated reqm't)	800 Kbps	800 Kbps	1600 Kbps	2000 Kbps	2400 Kbps		
	Storage IOPS(esti-mated reqm't)	13	13	25	32	38		

5.4 OpenScape 4000

OpenScape 4000 V8 Core Simplex/Duplex and SoftGate		
General Product Info	Operating System	SLES 12 SP4/SP5 (64 bit) plus updates. The OS update package is offered by Unify via SWS.
	Native Redundancy Support	Yes
	Redundancy Strategy	Hot Standby (in Duplex mode)
	Voice/Video Media Terminating	Yes (In case Simplex with softGate)
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	Yes
VMware Feature Compatibility	vMotion Support	**Restrictions / Limitations:** This VMware feature should NOT be performed on production systems during normal operation. Using this feature may lead to soft or hard restarts of the system, however the system will return to its normal operating state automatically after the restart. It can be performed, if needed, during maintenance windows. **NOTE:** OS4K nodes should not be part of DRS life migration as it uses vMotion.
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	• SRM can be used for SoftGate Standlone cases. • SRM is supported indirectly by deploying one OS4K node at the Protected site and the other OS4K node at the Recovery site.
	Backup with vStorage-APIs for Data Protection	Snapshots allowed if observing guidelines documented in *Section 3.5 General Statements and Best Practice Recommendations for Virtualization at Unify.*
	VMware Tools Support	Yes, no manual installation allowed; approved updates will be delivered with OS4K Software.
	Virtual Appliance (vApp) Support	Yes, the usage usage of the OS4K OVF templates is mandatory for the configuration of virtual machines.

OpenScape 4000 V8								
		Core System				Survivable		SoftGate only
		Simplex/Separated Duplex	Quorum		Simplex + SoftGate	Survivable Unit	Survivable SG Standard	SG Standard
			Quorum	Quorum with SG Standard				
Depl. Scenarios	Depl. Scenario	OpenScape 4000	Quorum	Quorum with SoftGate	Simplex with SoftGate	Survivable Unit	Survivable SoftGate	Standalone SoftGate
	Number of Nodes	1/2	1	1	1	1	1	1
	SG Max parallel channels			250	250			
vCPU	vCPU	4	2	4	4	4	4	4
	Physical CPU requirement	SPECint_rate2006 ≥ 223 http://spec.org/cpu2006/results/res2010q1/cpu2006-20100315-09915.pdf						
	vCPU Shares	High	High	High	High	High	High	High
	vCPU Reserv.	# vCPU × physical CPU Freq*	0.5 GHz	Must calculate # vCPU × physical CPU Freq*				
		*Systems upgraded from OS4K V7 can continue to operate with previous vCPU Reservations as detailed under OpenScape Solution Set guides V7 & V8 where it is not possible to update the vCPU assignment.						
	vCPU Limit	Unlimited						
vRAM	vRAM	4 GB	2 GB	4 GB	8 GB	4 GB	8 GB	4 GB
		It is important that the hypervisor has sufficient RAM resources on top of the RAM configuration to be potentially used by guest virtual machines. For more details see VMware Knowledge Base						
	vRAM Shares	Normal	Normal	Normal	Normal	Normal	Normal	Normal
	vRAM Reserv.	4 GB	1 GB	4 GB	8 GB	4 GB	8 GB	4 GB
	vRAM Limit	4 GB	1 GB	4 GB	8 GB	4 GB	8 GB	4 GB
vNIC	vNIC (No. Req'd)	3/4	2	3	3	3	3	1
	vNIC Type	VMXNET3						
	vNIC Manual MAC	No	No	No	No	No	No	No
		If parameter is set to Y, please refer to: "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.						
	Network Bandwidth (estimated reqm't)	For details, refer to Chapter "Required Bandwidth per Connection" in OpenScape 4000 V8, Section 4 - IP Solutions, Service Documentation.						
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1	1	1
	vDisk Size	250 GB	30 GB	75 GB	250 GB	250 GB	250 GB	75 GB
		NOTE: vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.						
	vDisk Mode	Keep Defaults (which allows Snapshots)						
	vDisk Format	Thick Lazy-Zeroed						
	Addt'l Storage	No	No	No	No	No	No	No
	Storage Through-put (estimated reqm't)	1250 KBps	1250 KBps	1250 KBps	1250 KBps	1250 KBps	1250 KBps	1250 KBps
	Storage IOPS (esti-mated reqm't)	250 tps	250 tps	250 tps	250 tps	250 tps	250 tps	250 tps

5.5 OpenScape 4000 Manager

OpenScape 4000 Manager V8		
General Product Info	Operating System	SLES 12 SP4/SP5 (64 bit) plus OS updates.
	Native Redundancy Support	Yes
	Redundancy Strategy	Cold Standby (with Smart Switch Over)
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No - SRM is supported indirectly by deploying one OS4k Manager node at the Protected site and the other OS4k Manager node at the Recovery Site.
	Backup with vStorage-APIs for Data Protection	Yes
	VMware Tools Support	Yes. Tools are neither delivered nor installed with the product.Note: Usage of VMXNET3 driver is recommended.
	Virtual Appliance (vApp) Support	No

OpenScape 4000 Manager V8					
		Small Network	**Medium Network**	**Large Network**	**Very Large Network**
Depl. Scenarios	Max number of OS4K systems	8	30	100	200
	Max number of OS4K ports	5,000	10,000	30,000	100,000
	Max users	3	8	16	50
vCPU	vCPU	4	6	8	16
	vCPU Shares	High			
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq			
	vCPU Limit	Unlimited			
vRAM	vRAM	4 GB	8 GB	12 GB	16 GB
	vRAM Shares	Normal			
	vRAM Reserv.	2 GB	2 GB	2 GB	2 GB
	vRAM Limit	Unlimited			
vNIC	vNIC (No. Req'd)	1	1	1	1
		SSO feature requires +1 vNIC with at least 1 Gb bandwidth.			
	vNIC Type	VMXNET3			
	vNIC Manual MAC	No	No	No	No
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.			
	Network Bandwidth (estimated reqm't)	No	No	No	No
		For more information refer to Chapter "Required Bandwidth per Connection" in HiPath/OpenScape 4000 V6/7, Section 4 - IP Solutions, Service Documentation.			
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1
	vDisk Size	200 GB	300 GB	400 GB	600 GB
		Note: SSO feature requires double the Storage vDisk Size.			
	vDisk Mode	Keep Defaults (which allows Snapshots)			
	vDisk Format	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed
	Storage Throughput (estimated reqm't)	1250 KBps	1250 KBps	1250 KBps	1250 KBps
	Storage IOPS(estimated reqm't)	250 tps	250 tps	250 tps	250 tps

5.6 OpenScape Accounting

OpenScape Accounting V3		
General Product Info	Operating System	Windows Server 2012R2 – Standard, Enterprise or Datacenter Edition
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** vMotion should not be used during business hours on high system load
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes **Note:** All VMware requirements (incl. Hardware) and best practices have to be fulfilled. The network between the data center sites has to be a transparent layer 2 network which provides identical environments in both locations.
	Backup with vStorage-APIs for Data Protection	Yes **Note:** vStorage APIs can be used as an additional backup layer for image level backups that allow to restore virtual disk contents after a disk failure fast. The standard backup mechanisms normally used in physical deployments have to be applied in addition
	VMware Tools Support	Yes **Note:** Installation of VMware Tools is recommended.
	Virtual Appliance (vApp) Support	No

OpenScape Accounting								
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Depl. 5**	**Largest**
Depl. Scenarios	Depl. Scenario	Single Node	Single Node	Single Node	Single Node			Multi Node
	Number of Nodes	1	1	1	1			
	Max Users	300	3,000	5,000	10,000			unlimited
								PSR required!
vCPU	vCPU	2	2	2	4			
	vCPU Shares	Normal	Normal	Normal	Normal			
	vCPU Reserv.	0	0	0	0			
		Issues resulting from CPU contention cannot be addressed towards the application						
	vCPU Limit	Unlimited	Unlimited	Unlimited	Unlimited			
vRAM	vRAM	4 GB	8 GB	16 GB	32 GB			
	vRAM Shares	Normal	Normal	Normal	Normal			
	vRAM Reserv.	4 GB	4 GB	4 GB	16 GB			
	vRAM Limit	Unlimited	Unlimited	Unlimited	Unlimited			
vNIC	vNIC (No. Req'd)	1	1	1	1			
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3			
	vNIC Manual MAC	Yes	Yes	Yes	Yes			
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.						
		No, if remote CLA is used	No, if remote CLA is used	No, if remote CLA is used	No, if remote CLA is used			
	Network Bandwidth (estimated reqm't)	TBD.	TBD.	TBD.	TBD.			
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1			
	vDisk Size	60 GB	60 GB	120 GB	120 GB			
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.						
	vDisk Mode	Keep Defaults (which allows Snapshots)						
	vDisk Format	thick lazy-zeroed	thick lazy-zeroed	thick lazy-zeroed	thick lazy-zeroed			
	Addt'l Storage	No	No	No	No			
	Storage Throughput (estimated reqm't)	TBD.	TBD.	TBD.	TBD.			
	Storage IOPS(estimated reqm't)	TBD.	TBD.	TBD.	TBD.			

5.7 OpenScape Branch

OpenScape Branch V9		
General Product Info	Operating System	OpenScape Branch Linux Distribution V9 (based on OpenSuse Linux 13.1)
	Native Redundancy Support	Yes
	Redundancy Strategy	Active / Standby
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	Yes

OpenScape Branch V9						
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Largest**
Depl. Scenarios	Depl. Scenario		OSB 250	OSB 1000	OSB 6000	
	Number of Nodes		1	1	1	
	Max Users		250	1,000	6,000	
vCPU	vCPU		2	4	8	
	vCPU Shares		High	High	Custom [20 GHz]	
	vCPU Reserv.		Must calculate # vCPU × physical CPU Freq			
	vCPU Limit		Unlimited			
vRAM	vRAM		2 GB	2 GB	4 GB	
	vRAM Shares		Normal	Normal	Normal	
	vRAM Reserv.		2 GB	2 GB	4 GB	
	vRAM Limit		Unlimited			
vNIC	vNIC (No. Req'd)		1 (proxy mode) or 2 (SBC mode)			
	vNIC Type		VMXNET3	VMXNET3	VMXNET3	
	vNIC Manual MAC		Yes, only for local license file			
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	Network Bandwidth (estimated reqm't)		1 MB/s (for proxy mode) or 10MB/s (for SBC mode)	2 MB/s (for proxy mode) or 20MB/s (for SBC mode)	6 MB/s (for proxy mode) or 60MB/s (for SBC mode)	
Storage (vDisk)	vDisk (No. Req'd)		1	1	1	
	vDisk Size		40 GB	40 GB	60 GB	
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
	vDisk Mode		Keep Defaults (which allows Snapshots)			
	vDisk Format		Thick Provision Lazy Zeroed			
	Addt'l Storage		No	No	No	
	Storage Throughput (estimated reqm't)		400 KB/s	600 KB/s	600 KB/s	
	Storage IOPS(estimated reqm't)		Shares = N + unlimited IOPS (defaults) 20	Shares = N + unlimited IOPS (defaults) 20	Shares = N + unlimited IOPS (defaults) 30	

5.8 OpenScape CC Call Director SIP Service

OpenScape CC Call Director SIP Service V9		
General Product Info	Operating System	OpenSUSE Linux
	Native Redundancy Support	Yes
	Redundancy Strategy	Active/ active or Active/ standby
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	Yes
VMware Feature Compatibility	vMotion Support	Yes, covered under VMware policy
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes, covered under VMware policy
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	No
	Virtual Appliance (vApp) Support	No

OpenScape CC Call Director SIP Service V9		
Depl. Scenarios	Depl. Scenario	Single deployment
	Number of Nodes	1
	Max Users	200 ports
vCPU	vCPU	2
	vCPU Shares	High
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq
	vCPU Limit	Unlimited
vRAM	vRAM	4 GB
	vRAM Shares	High
	vRAM Reserv.	4 GB
	vRAM Limit	Unlimited
vNIC	vNIC (No. Req'd)	1
	vNIC Type	flexible
	vNIC Manual MAC	Parameter Manual MAC is set to NO, so it is allowed to get the MAC automatically from VMware.
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.
	Network Bandwidth (estimated reqm't)	80 kbps per port in each direction for G.711 48 kbps per port in each direction for G.729

OpenScape CC Call Director SIP Service V9		
Storage (vDisk)	vDisk (No. Req'd)	1
	vDisk Size	160 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.
	vDisk Mode	Keep Defaults (which allows Snapshots)
	vDisk Format	Thick Provision Eager Zeroed
	Addt'l Storage	No
	Storage Throughput (estimated reqm't)	Close to 0 unless logging is enabled
	Storage IOPS(estimated reqm't)	200

5.9 OpenScape CMP and Assistants

CMP Standalone: Whenever you do not have OpenScape UC packages (e.g. OpenScapeUC_MultipleCommunicationServerAdmin deployment), you do have to include the CMP to manage OpenScape Voice, OpenScape Branch, OpenScape Media Server, etc.

OpenScape CMP V7R4 & Assistants V9		
General Product Info	Operating System	SLES 12
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	SRM is offered as a PSR
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	Yes

OpenScape CMP V7R4 & Assistants V9								
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl 4**	**Depl. 5**	**Largest**
Depl. Scenarios	Depl. Scenario		Single-node					Single-node
	Number of Nodes		1					1
	Max Users		5,000					50,000
vCPU	vCPU		4					4
	vCPU Shares		Normal					Normal
	vCPU Reserv.		0					0
	vCPU Limit		Unlimited					Unlimited
vRAM	vRAM		6 GB					8 GB
	vRAM Shares		Normal					Normal
	vRAM Reserv.		2 GB					2 GB
	vRAM Limit		Unlimited					Unlimited
vNIC	vNIC (No. Req'd)		1					1
	vNIC Type		VMXNET3					VMXNET3
	vNIC Manual MAC		Yes					Yes
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.						
	Network Bandwidth (estimated reqm't)		TBD.					TBD.
Storage (vDisk)	vDisk (No. Req'd)		1					1
	vDisk Size		30 GB					30 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data. If the installation medium needs to be stored on the server, increase the vDisk size accordingly.						
	vDisk Mode		See note.					See note.
		NOTE: Independent persistent is recommended - Snapshots allowed if observing guidelines documented in Section 3.5 General Statements and Best Practice Recommendations for Virtualization at Unify.						
	vDisk Format		any thick					any thick
	Addt'l Storage		No					No
	Storage Throughput (estimated reqm't)		TBD.					TBD.
	Storage IOPS(estimated reqm't)		TBD.					TBD.

5.10 OpenScape Concierge

This table shows the hardware requirements for

- small deployments (Smallest & Depl. 1) with up to 10 Attendants working in an environment with up to 30,000 subscribers in the telephone book database and a maximum of 1,200 BHCA (Busy Hour Call Attempts) as well as for
- medium deployments (Depl. 2) with up to 30 Attendants working in an environment with up to 40,000 subscribers in the telephone book database and a maximum of 2,400 BHCA.
- large deployments (Largest) with up to 100 Attendants working in an environment with up to 100,000 subscribers in the telephone book database and a maximum of 6,000 BHCA.

OpenScape Concierge V4 Rx		
General Product Info	Operating System	Windows Server 2016 Always latest service pack and fixes recommended.
	Native Redundancy Support	Yes
	Redundancy Strategy	Active
	Voice/Video Media Terminating	
	Voice/Video Signalling Traffic	
	Other real-time critical requirements	
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** It is recommended to perform a Live Migration only in periods of low traffic. vMotion during normal operation could cause noticeable service interruption and audio/voice quality degradation.
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Distributed Resource Scheduler (DRS) Support	Yes
	Site Recovery Manager (SRM) Support	Yes
	Backup with vStorage-APIs for Data Protection (Data Recovery Support)	Yes
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

OpenScape Concierge V4Rx						
		Smallest	**Depl. 1**	**Depl. 2**	**Largest**	**External SQL Server Std./Enterprise**
Depl. Scenarios	Depl. Scenario	Concierge Plus (with internal SQL Server Express)	Small Concierge Professional (with internal SQL Server Express)	Medium Concierge Professional (with internal SQL Server Std./ Enterprise)	Large Concierge Professional (with external SQL Server Std./ Enterprise)	For Deployments Largest
	Max Users	4	10	30	100	--
vCPU	vCPU	2	2	4	4	4
	vCPU Frequency (min)	2.662 GHz	2.662 GHz	2.662 GHz	2.662 GHz	TBA depending on performance tests
	vCPU Shares	High				
	vCPU Reservation.	750 MHz	1.0 GHz	2.5 GHz	2.662 GHz	TBA depending on performance tests
	vCPU Limit	Unlimited				
vRAM	vRAM	4 GB	4 GB	4 GB	4 GB	TBA depending on performance tests
	vRAM Shares	High				
	vRAM Reserv.	2 GB	2 GB	2 GB	2 GB	TBA depending on performance tests
	vRAM Limit	Unlimited	Unlimited	Unlimited	Unlimited	TBA depending on performance tests
vNIC	vNIC (No. Req'd)	1	1	1	1	1
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3
	vNIC Manual MAC	No	No	No	No	No
	Network Bandwidth (estimated reqm't)	20 Kbps	25 Kbps	40 Kbps	200 Kbps	5 Kbps per Concierge client
Storage (vDisk)	vDisk (No. Req'd)	1 per node	1 per node	1 per node	1 per node	1 per node
	vDisk Size	80 GB	80 GB	80 GB	80 GB	80 GB
		Note: vDisk Size is the total amount of storage needed for the operating system, the application, and the application data. Only a minimum level of logging is assumed for normal operation. If additional logging functionality is to be employed then the storage requirements should be increased accordingly.				
	vDisk Mode	Keep Defaults (which allows Snapshots)				
		Restrictions / Limitations: Snapshots are NOT to be taken on production systems during normal operation. Snapshots taken previously must NOT remain on a production system during normal operation. An active snapshot during normal operation could cause noticeable service interruption and audio/voice quality degradation. Please read section "General Statements and Best Practice Recommendations for Virtualization in the *"OpenScape Virtual Machine Resourcing and Configuration Guide"* for more details about snapshots.				
	vDisk Format	Thin	Thin	Thin	Thin	Thin
	Addt'l Storage	10 GB	10 GB	10 GB	10 GB	10 GB
	Storage Throughput (estimated reqm't)	15 KBps	25 KBps	40 KBps	80 KBps	TBA depending on performance test
		Note: The values can increase depending on log level, if logging is activated.				
	Storage IOPS(estimated reqm't)	20 IOPS	22 IOPS	30 IOPS	40 IOPS	TBA depending on performance test

5.11 OpenScape Contact Center

OpenScape Contact Center: There is no difference between HW requirements for virtual and non-virtual environment for the OpenScape Contact Center Application. For further information please contact Unify Service.

OpenScape Contact Center V9		
General Product Info	Operating System for OSCC V9R3	Windows Server 2012 Standard Datacenter Windows Server 2012 R2 Standard R2 Datacenter Windows Server 2016 Standard Datacenter
	Operating System for OSCC V9R2	Windows Server 2008 (64-bit) R2 Standard Edition with SP1 R2 Enterprise Edition with SP1 Windows Server 2012 Standard Datacenter Windows Server 2012 R2 Standard R2 Datacenter
	Native Redundancy Support	Yes
	Redundancy Strategy	Active/ standby with Microsoft clustering
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	CSTA
	Other real-time critical requirements	Yes, real-time contact center contact processing

OpenScape Contact Center V9		
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** While a virtual machine transfer between two physical machines is being performed using VMotion, we recommend that the OpenScape Contact Center system be under a maximum load of no more than 50 active users. In this condition, no system load issue should occur during OpenScape Contact Center system migration.
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes, covered under VMware policy
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

5.11.1 OpenScape Contact Center V9R3

OpenScape Contact Center V9R3 - Main Server

OpenScape Contact Center V9 R3 - Main Server					
		Smallest	**Depl. 1**	**Depl. 2**	**Largest**
Depl. Scenarios	Depl. Scenario				
	Number of Nodes		1	1	
	Max Users		Up to 750 active users	More than 750 and up to 1,500 active users	
vCPU	vCPU		4	8	
	vCPU Shares		High		
	vCPU Reserv.		Must calculate # vCPU × physical CPU Freq		
	vCPU Limit		Unlimited		

OpenScape Contact Center V9 R3 - Main Server					
		Smallest	**Depl. 1**	**Depl. 2**	**Largest**
vRAM	vRAM (if Application Server is not installed on Main Server machine)		8 GB	8 GB	
	vRAM (if Application Server is installed on Main Server machine, memory must be reserved for Application Server)		12 GB	16 GB	
	vRAM Shares		High		
	vRAM Reserv. (if Application Server is not installed on Main Server machine)		8 GB	8 GB	
	vRAM Reserv. (if Application Server is installed on Main Server machine)		12 GB	16 GB	
	vRAM Limit		Unlimited		
vNIC	vNIC (No. Req'd)		1	1	
	vNIC Type		VMXNET3	VMXNET3	
	vNIC Manual MAC	Parameter manual MAC is set to NO, so it is allowed to get the MAC automatically from VMware.			
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.			
	Network Bandwidth (estimated reqm't, if Application Server is not installed on Main Server Machine)		18 Mbps	24 Mbps	
	Network Bandwidth (estimated reqm't, if Application Server is installed on Main Server Machine)		36 Mbps	74 Mbps	

OpenScape Contact Center V9 R3 - Main Server					
		Smallest	**Depl. 1**	**Depl. 2**	**Largest**
Storage (vDisk)	vDisk (No. Req'd)		1	1	
	vDisk Size		120 GB - 1 TB (See Note 2 below)	120 GB - 1 TB (See Note 2 below)	
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.			
		NOTE 2: When running OpenScape Contact Center in a virtualized environment, a minimum of 120 GB is required for the operating system, OpenScape Contact Center software, and initial Informix database files. If you require additional storage for any other purpose, you must add correspondingly sufficient disk space.			
	vDisk Mode		Keep Defaults (which allows Snapshots)		
	vDisk Format		Thick Provision Eager Zeroed		
	Addt'l Storage		No	No	
	Storage Throughput (estimated reqm't)		57 MBps	57 MBps	
	Storage IOPS (estimated reqm't)		200	200	

OpenScape Contact Center V9R3 - Application Server

OpenScape Contact Center V9 R3 - Application Server					
		Smallest	**Depl. 1**	**Depl. 2**	**Largest**
Depl. Scenarios	Depl. Scenario				
	Number of Nodes		1	1	
	Max Users		Up to 750 active users	More than 750 and up to 1,500 active users	
vCPU	vCPU		2	4	
	vCPU Shares		High		
	vCPU Reserv.		Must calculate # vCPU × physical CPU Freq		
	vCPU Limit		Unlimited		
vRAM	vRAM		4 GB	8 GB	
	vRAM Shares		High		
	vRAM Reserv.		4 GB	8 GB	
	vRAM Limit		Unlimited		

OpenScape Contact Center V9 R3 - Application Server					
		Smallest	**Depl. 1**	**Depl. 2**	**Largest**
vNIC	vNIC (No. Req'd)		1	1	
	vNIC Type		VMXNET3	VMXNET3	
	vNIC Manual MAC	Parameter manual MAC is set to NO, so it is allowed to get the MAC automatically from VMware.			
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.			
	Network Bandwidth (estimated reqm't)		36 Mbps	74 Mbps	
Storage (vDisk)	vDisk (No. Req'd)		1	1	
	vDisk Size		100 GB - 1 TB (See Note 2 below)	100 GB - 1 TB (See Note 2 below)	
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.			
		NOTE 2: When running OpenScape Contact Center in a virtualized environment, a minimum of 100 GB is required for the operating system, OpenScape Contact Center software, and initial Informix database files. If you require additional storage for any other purpose, you must add correspondingly sufficient disk space.			
	vDisk Mode		Keep Defaults (which allows Snapshots)		
	vDisk Format		Thick Provision Eager Zeroed		
	Addt'l Storage		No	No	
	Storage Throughput (estimated reqm't)		57 MBps	57 MBps	
	Storage IOPS (estimated reqm't)		200	200	

5.11.2 OpenScape Contact Center V9R2

OpenScape Contact Center V9R2						
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Largest**
Depl. Scenarios	Depl. Scenario					
	Number of Nodes		1	1	1	
	Max Users		Up to 250 active users	Up to 750 active users	More than 750 and up to 1,500 active users	

OpenScape Contact Center V9R2						
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Largest**
vCPU	vCPU		2	4	8	
	vCPU Shares		High			
	vCPU Reserv.		Must calculate # vCPU × physical CPU Freq			
	vCPU Limit		Unlimited			
vRAM	vRAM		4 GB	8 GB	8 GB	
	vRAM Shares		High			
	vRAM Reserv.		4 GB	8 GB	8 GB	
	vRAM Limit		Unlimited			
vNIC	vNIC (No. Req'd)		1	1	1	
	vNIC Type		VMXNET3	VMXNET3	VMXNET3	
	vNIC Manual MAC	Parameter manual MAC is set to NO, so it is allowed to get the MAC automatically from VMware.				
		If parameter is set to Y, please refer to "OpenScape Solution Set V8, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	Network Bandwidth (estimated reqm't)		12 Mbps	18 Mbps	24 Mbps	
Storage (vDisk)	vDisk (No. Req'd)		1	1	1	
	vDisk Size		120 GB - 800 GB (See Note 2 below)	120 GB - 800 GB (See Note 2 below)	120 GB - 800 GB (See Note 2 below)	
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
		NOTE 2: When running OpenScape Contact Center in a virtualized environment, a minimum of 120 GB is required for the operating system, OpenScape Contact Center software, and initial Informix database files. If you require additional storage for any other purpose, you must add correspondingly sufficient disk space.				
	vDisk Mode		Keep Defaults (which allows Snapshots)			
	vDisk Format		Thick Provision Eager Zeroed			
	Addt'l Storage		No	No	No	
	Storage Throughput (estimated reqm't)		57 MBps	57 MBps	57 MBps	
	Storage IOPS (estimated reqm't)		200	200	200	

5.12 OpenScape DLS

OpenScape DLS V7 R3		
General Product Info	Operating System	Windows Server 2012 R2
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	SRM is offered as a PSR
	Backup with vStorage-APIs for Data Protection	No
	vSphere Replication	No
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

INFO: The DLS performance is measured on the basis of the number of user logons/hour (20K) rather than the number of users.

OpenScape DLS V7 R3								
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Depl. 5**	**Largest**
Depl. Scenarios	Depl. Scenario							
	Number of Nodes							
	Max Users	Min # of users	5,000	10,000	20,000	50,000	up to 100,000 5 logons/second	Max # of users
							PSS only	
vCPU	vCPU	2	2	2	3	4	4	
	vCPU Shares	Normal	Normal	Normal	Normal	Normal	Normal	
	vCPU Reserv.	0	0	0	0	0	0	
	vCPU Limit	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	
vRAM	vRAM	4 GB	6 GB	6 GB	6 GB	8 GB	8 GB	
	vRAM Shares	Normal	Normal	Normal	Normal	Normal	Normal	
	vRAM Reserv.	4 GB	6 GB	6 GB	6 GB	8 GB	8 GB	
	vRAM Limit	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	
vNIC	vNIC (No. Req'd)	2	2	2	2	2	2	
		1 vNIC is sufficient for single-node DLS deployments.						
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	
	vNIC Manual MAC	Yes	Yes	Yes	Yes	Yes	Yes	
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.						
	Network Bandwidth (estimated reqm't)							
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1	1	
	vDisk Size	80 GB	80 GB	80 GB	80 GB	80 GB	80 GB	
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.						
	vDisk Mode	Keep Defaults (which allows Snapshots)						
	vDisk Format	any	any	any	any	any	any	
	Addt'l Storage							
	Storage Throughput (estimated reqm't)							
	Storage IOPS(estimated reqm't)							

5.13 OpenScape Enterprise Express

- All VMs shall be created with **Virtual Machine HW version 11**, with the exception of OpenScape SBC (consult the application's documentation) **Important:** Please consult individual application documentation for the newer VM HW Versions.
- Figures below are based on a typical Enterprise Feature set:
  CPU, NW, and Disk usage may vary based on call load and Feature mix.
- Storage Latency shall not exceed **10 ms** on average (occasional spikes to 30 ms are acceptable unless problems with applications occur).
- Storage may either be local to the ESXi host or reside on a SAN, provided the SAN is equivalent to a local hard disk from a performance point of view.
- OSV Backup and Restore procedures are recommended to be used versus snapshots (the customer is responsible for determining the physical storage requirements for snapshots if used. Snapshots are only allowed during maintenance windows and must be removed from the system at the end of the maintenance window).
- The Virtual Machines (VMs) for OSEE are delivered as Open Virtualizaton Format (OVA) files. The VMs created from the OVAs must be manually configured for 100% CPU and RAM reservations using the vSphere client.
- For OSEE systems with Reduced Hardware Footprint for the 500 users call model, please refer to “OpenScape Enterprise Express V9 Design and Planning Manual Chapter 3 Call Models and VM Requirement”

NOTICE: In cases you are experiencing performance issues on UC server or using fusion clients, please configure the server according to paragraph 5.18 OpenScape UC Application.

OpenScape Enterprise Express V9						
Deployments A and B						
		OSV Node 1	**UC**	**OSCC XPR Concierge**	**DLS OSTM**	**SBC THIG 1**
vCPU	Physical CPU	SPECint_base2006 ≥ **60.8**				
	vCPU	4	8	5	4	4
		NOTE: Hyperthreading: On a dedicated Dell R630 host (28 cores) it is suggested to disable HT. On older hosts (e.g IBM x3550M4/M5) where the cores are ≤ 16 it is suggested that HT is enabled!				
	vCPU Shares	Normal				
	vCPU Reserv.	must calculate # vCPU x physical CPU Freq.				
	vCPU Limit	Unlimited				
vRAM	vRAM	9 GB	12 GB if users ≤ 3000 16 GB if users > 3000	10 GB	6 GB	4 GB
	vRAM Shares	Normal				
	vRAM Reserv.	9 GB	12 GB if users ≤ 3000 16 GB if users > 3000	10 GB	6 GB	4 GB
	vRAM Limit	Unlimited				
vNIC	vNIC (No. Req'd)	1	1	1	1	2
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	V9R0/1: E1000 V9R2/3/4: VMXNET3
	vNIC Manual MAC	N	N	Y	N	N
		NOTE: If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	Network Bandwidth (estimated reqm't)	148-447 KBps	572-1765 KBps	78-294 KBps	41-687 KBps	1286-3934 KBps
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	2	1
	vDisk Size 1000 users	140 GB	300 GB	175 GB	C:100 GB, D:100 GB	40 GB
	vDisk Size 2000 users			245 GB	C:100 GB, D:125 GB	
	vDisk Size 3000 users			310 GB	C:100 GB, D:150 GB	
	vDisk Size 4000 users			430 GB	C:100 GB, D:175 GB	
	vDisk Size 5000 users			430 GB	C:100 GB, D:200 GB	
		NOTE: vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
	vDisk Mode	Keep Defaults (which allows Snapshots)				
	vDisk Format	Thick provision lazy zeroed				
	Storage Throughput (estimated reqm't)	317-3018 KBps	438-1765 KBps	136-257 KBps	1773-3711 KBps	241-825 KBps
		NOTE: It is strongly recommended to not use these figures as maximum values to limit the I/O on the VM				

OpenScape Enterprise Express V9								
Deployments C and D								
		OSV Node 1	**OSV Node 2**	**UC**	**OSCC XPR Concierge**	**DLS OSTM**	**SBC THIG 1**	**SBC THIG 2**
vCPU	Physical CPU	SPECint_base2006 ≥ **60.8**						
	vCPU	4	4	8	5	4	4	4
		NOTE: On a dedicated Dell R630 host (28 cores) it is suggested to disable Hyperthreading. On older hosts (e.g IBM x3550M4/M5) where the cores are <=16 it is suggested that Hyperthreading is enabled!						
	vCPU Shares	Normal						
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq.						
	vCPU Limit	Unlimited						
vRAM	vRAM	9 GB	9 GB	12 GB if users ≤ 3000 16 GB if users > 3000	10 GB	6 GB	4 GB	4 GB
	vRAM Shares	Normal						
	vRAM Reserv.	9 GB	9GB	12 GB if users ≤ 3000 16 GB if users > 3000	10 GB	6 GB	4 GB	4GB
	vRAM Limit	Unlimited						
vNIC	vNIC (No. Req'd)	1	1	1	1	1	2	2
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	V9R0/1: E1000 V9R2/3/4: VMXNET3	V9R0/1: E1000 V9R2/3/4: VMXNET3
	vNIC Manual MAC	N	N	N	Y	N	N	N
		NOTE: If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.						
	Network Band-width (estimated reqm't)	148-447 KBps	94-142 KBps	572-1765 KBps	78-294 KBps	41-687 KBps	1286-3934 KBps	1286-3934 KBps

OpenScape Enterprise Express V9									
Deployments C and D									
			OSV Node 1	**OSV Node 2**	**UC**	**OSCC XPR Concierge**	**DLS OSTM**	**SBC THIG 1**	**SBC THIG 2**
Storage (vDisk)	vDisk (No. Req'd)		1	1	1	1	2	1	1
	vDisk Size	1000 users	140 GB	140 GB	300 GB	175 GB	C:100 GB D:100 GB	40 GB	40 GB
		2000 users				245 GB	C:100 GB D:125 GB		
		3000 users				310 GB	C:100 GB D:150 GB		
		4000 users				430 GB	C:100 GB D:175 GB		
		5000 users				430 GB	C:100 GB D:200 GB		
		NOTE: vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.							
	vDisk Mode		Keep Defaults (which allows Snapshots)						
	vDisk Format		Thick provision lazy zeroed						
	Storage Through-put (estimated reqm't)		317-3018 KBps	317-3018 KBps	438-1765 KBps	136-257 KBps	1773-3711 KBps	241-825 KBps	241-825 KBps
		NOTE: It is strongly recommended not to use these figures as the maximum limit of I/O.							

OpenScape Enterprise Express V9				
Deployment E (Resource Pool)				
			Simplex OSV	**Duplex OSV**
vCPU	Physical CPU		SPECint_base2006 ≥ **60.8**	
	vCPU Shares		Normal	
	vCPU Reserv.		25 × Physical CPU Freq	33 × Physical CPU Freq
	vCPU Limit		Same as vCPU Reserv.	
vRAM	vRAM Shares		Normal	
	vRAM Reserv.	if users ≤ 3000	41 GB	54 GB
		if users >3000	45 GB	59 GB
	vRAM Limit		Same as vRAM Reserv.	
Storage	Disk Size	1000 users	855 GB	1035 GB
		2000 users	950 GB	1130 GB
		3000 users	1040 GB	1220 GB
		4000 users	1185 GB	1365 GB
		5000 users	1210 GB	1390 GB

NOTES:

All CPU calculations on the tables above are based on the SPEC CINT2006 results of PowerEdge R630 (Intel Xeon E5-2620 v3, 2.40 GHz). See https://www.spec.org/cpu2006/results/res2016q3/cpu2006-20160628-42607.pdf

Therefore it is suggested to use a processor with **SPECint_base2006 = 60.8**.

The following table lists the results of testing the

- OSEE V8R1 - IBM 3550M4/M5 with 32GB of RAM and
- OSEE V9 - Dell R630

platforms with 24_7_min and 24_7_extern OSV tracing:

Platform	24_7_min	24_7_extern
IBM 3550M4/M5 (32GB RAM)	1500 users	2000 users
Dell R630	5000 users	5000 users

- Additional resources must be reserved for the ESXi, depending on the installed version:
  - V5.5 : 240 MHz & 3 GB RAM
  - V6.0 : 240 MHz & 4GB RAM

5.14 OpenScape Fault Management

OpenScape Fault Management V9		
General Product Info	Operating System	Windows Server 2008 R2 or Suse Linux Enterprise Server 12
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** vMotion should not be used during business hours on high system load
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes **Note:** All VMware requirements (incl. Hardware) and best practices have to be fulfilled. The network between the data center sites has to be a transparent layer 2 network which provides identical environments in both locations.
	Backup with vStorage-APIs for Data Protection	Yes **Note:** vStorage APIs can be used as an additional backup layer for image level backups that allow to restore virtual disk contents after a disk failure fast. The standard backup mechanisms normally used in physical deployments have to be applied in addition
	VMware Tools Support	Yes **Note:** Installation of VMware Tools is recommended.
	Virtual Appliance (vApp) Support	No

OpenScape Fault Management V9						
		Smallest	**Depl. 1**	**Medium**	**Depl. 3-5**	**Largest**
Depl. Scenarios	Depl. Scenario	Single Node		Single Node		Single Node
	Number of Nodes	1		1		1
	Max Users	unlimited Users unlimited FM Ports up to 2.500 Network IP-Nodes up to 100 SM IP-Nodes (requires 2 separate system management agents) including up to 5,000 Performance Management end points, handled by internal or external PM agent		unlimited Users unlimited FM Ports up to 5.000 Network IP-Nodes up to 200 SM IP-Nodes (requires 4 separate system management agents) including up to 10,000 Performance Management end points, handled by internal or external PM agent		unlimited Users unlimited FM Ports up to 25.000 Network IP-Nodes up to 2.000 SM IP-Nodes (requires 40 separate system management agents) including up to 50,000 Performance Management end points, handled by 5 external PM agents (1 per 10,000 end points)
vCPU	vCPU	1		2		4
	vCPU Shares	Normal		Normal		Normal
	vCPU Reserv.	0		0		0
		Issues resulting from CPU contention cannot be addressed towards the application				
	vCPU Limit	Unlimited		Unlimited		Unlimited
vRAM	vRAM	6 GB		8 GB		16 GB
	vRAM Shares	Normal		Normal		Normal
	vRAM Reserv.	6 GB		8 GB		16 GB
	vRAM Limit	unlimited		unlimited		unlimited
vNIC	vNIC (No. Req'd)	1		1		1
	vNIC Type	VMXNET3		VMXNET3		VMXNET3
	vNIC Manual MAC	Yes		Yes		Yes
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	NOTE:	No, if remote CLA is used		No, if remote CLA is used		No, if remote CLA is used
	Network Bandwidth (estimated reqm't)	480 Kbps		480 Kbps		480 Kbps
Storage (vDisk)	vDisk (No. Req'd)	1		1		1
	vDisk Size	100 GB		200 GB		500 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
	vDisk Mode	Keep Defaults (which allows Snapshots)		Keep Defaults (which allows Snapshots)		Keep Defaults (which allows Snapshots)
	vDisk Format	thick lazy-zeroed		thick lazy-zeroed		thick lazy-zeroed
	Addt'l Storage	No		No		No
	Storage Throughput (estimated reqm't)	2000 Kbps		3600 Kbps		3600 Kbps
	Storage IOPS(estimated reqm't)	32 IOPS		57 IOPS		57 IOPS

5.15 OpenScape Media Server

OpenScape Media Server V9		
General Product Info	Operating System	• SLES 12 SP4/SP5 (64 Bit)
	Native Redundancy Support	Yes
	Redundancy Strategy	N+1
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements (see note)	Yes
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** Only at times with low system usage since voice quality will suffer for a short time during motion
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes
	Backup with vStorage-APIs for Data Protection	Yes
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

INFO: Other real-time critical requirements: Refer to OpenScape Media Server Administrator Documentation for details.

OpenScape Media Server V9							
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Largest**
Depl. Scenarios	Depl. Scenario	OSV Simplex (all in one: UC/MGCP etc)	OSV Duplex (Single MS image for MGCP)	OSV Duplex (2 MS images for MGCP)	Single MS image for OSC-UC (UCAS Large-Deployment)	Single-MS node for NGCP/UC	Multi-Node MS for MGCP+UC (UCAS Large-Deployment)
	Number of Nodes	1	1	2	1	1	N (up to 4)
	Max Users	Depends on used audio/codec and on used HW (there is a load -formular available					
vCPU	vCPU	≥ 4 vCPU	≥ 4 vCPU	≥ 4 vCPU	≥ 4 vCPU	≥ 4 vCPU	12 vCPU
	vCPU Shares	Normal	Normal	Normal	Normal	Normal	Normal
	vCPU Reserv.	Must calculate #vCPU x physical CPU Freq					
	vCPU Limit	Unlimited					
vRAM	vRAM	≥ 8 GB	≥ 8 GB	≥ 8 GB	≥ 8 GB	≥ 8 GB	≥ 8 GB
	vRAM Shares	Normal					
	vRAM Reserv.	≥ 8 GB	≥ 8 GB	≥ 8 GB	≥ 8 GB	≥ 8 GB	≥ 8 GB
	vRAM Limit	Unlimited					
vNIC	vNIC (No. Req'd)	1	1	1	1	1	1
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3
		IMPORTANT: If the ESXi installed is higher than ESXi V4.1 **AND** lower than ESXi V5.0 (821926), then E1000 must be used even though it is is less efficient.. If VMXNET3 is used instead then UDP packets ≤ 40 bytes will be dropped and the application may be unable to communicate with the VM. For further information, refer to: https://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2019944					
	vNIC Manual MAC	No	No	No	No	No	No
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.					
	Network Bandwidth (estimated reqm't)	Depends on load and used codec: 1 G711 ≈ 100 Kbit; 1 H264 Chn ≈ 2 Mbit/sec					
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1	1
	vDisk Size	≥ 80 GB	≥ 80 GB	≥ 80 GB	≥ 80 GB	≥ 80 GB	≥ 80 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.					
	vDisk Mode	Keep Defaults (which allows Snapshots)					
	vDisk Format	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed
	Addt'l Storage	No	No	No	No	No	No
	Storage Throughput (estimated reqm't)	Depends on Media-App and Load: ~8 KB/sec per Audio Channel for VoicePortal; 0 for Conferencing					
	Storage IOPS (estimated reqm't)	Not important for MS (it is not worth mentioning)					

5.16 OpenScape Mobile Facade Server

Remark: these values are a recommendation based on theoretical considerations. They should be used as a starting point. The resource actual virtual machine resource consumption should be closely monitored during the initial deployment phase to confirm that they are suitable/sufficient.

OpenScape Mobile Façade Server V7 R1		
General Product Info	Operating System	SLES 12 SP4/SP5
	Native Redundancy Support	Yes
	Redundancy Strategy	N+1
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	PSR
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No
	Backup with vStorage-APIs for Data Protection	PSR
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

OpenScape Façade Server V7 R1						
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Largest**
Depl. Scenarios	Depl. Scenario	Any				
	Number of Nodes	n				
	Max Users	n*5,000				
vCPU	vCPU	4				
	vCPU Shares	Medium				
	vCPU Reserv.	0 GHz				
	vCPU Limit	Unlimited				
vRAM	vRAM	4 GB				
	vRAM Shares	Normal				
	vRAM Reserv.	4 GB				
	vRAM Limit	Unlimited				
vNIC	vNIC (No. Req'd)	1				
	vNIC Type	VMXNET3				
	vNIC Manual MAC	No				
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	Network Bandwidth (estimated reqm't)	Unknown				
Storage (vDisk)	vDisk (No. Req'd)	1				
	vDisk Size	40 GB				
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
	vDisk Mode	Keep Defaults (which allows Snapshots)				
	vDisk Format	any				
	Addt'l Storage	none				
	Storage Throughput (estimated reqm't)	low				
	Storage IOPS(estimated reqm't)	low				

5.17 OpenScape Session Border Controller (SBC)

VMware Metrics

The following table and notes show the metrics for support of up to 32,000 OpenScape SBC SIP registered users.

Deployment Scenario	Smallest	Config 1	Config 2	Largest
Metric	**250 (Note 1)**	**6,000 (Note 1)**	**20,000 (Note 1)**	**32,000 (Note 1)**
Max. registered hosted remote OpenScape Branch users (Note 2) (without Digest Authentication or TLS; Throttling does not apply) (Note 13)	250 (Note 3)	6,000 (Note 3)	20,000 (Note 3)	32,000 (Note 3)
Max. registered SIP Remote Users (Note 2), eg, home workers (without Digest Authentication, Throttling, or TLS)	250 (Note 3)	6,000 (Note 3)	20,000 (Note 3)	32,000 (Note 3)
Max. simultaneous SIP signaling calls / SBC sessions (Note 4)	250	1,400	2,500	32,000 (Note 12)
Max. simultaneous RTP media streams (full-calls) anchored through OpenScape SBC (without Media Transcoding) (Notes 5, 6, 7,8)	250	1,400	2,500	3,500
Max. simultaneous SRTP secure media streams (either MIKEY0 or SDES) terminated/mediated by SBC (without Media Transcoding)	200	1,120	2,000	2,800
Number of simultaneous SIP Service Providers (SSP)	10 (Note 9)	10 (Note 9)	10 (Note 9)	10 (Note 9)
Busy Hour Call Attempts (full calls) (Note 10)	1,800	23,400	39,600	39,600
Max. peak half-calls (Note 10) per second (without Digest Authentication, Throttling, or TLS)	1 (Note 10)	13 (Note 10)	22 (Note 10)	22 (Note 10)
Registration refresh requests per second (randomized registration steady state condition)	1	4	12	15
Steady state call completion rate	99.99%	99.99%	99.99%	99.99%
Time to recover to steady state operation (99.99% call completion) following simultaneous restart of all endpoint devices (Note 11)	<15 min.	<15 min.	<15 min.	<15 min.

The following notes provide details for the VMware Metrics:

1. Network interface switch speed is set to 1 Gigabit Ethernet.
2. For keysets, each keyset line appearance is counted as one registered user.
3. Subscriber registration interval 3600 seconds. Lower intervals could cause flood of registration and impact SBC and its limits.
4. Add the following penalty (or penalties*) to get the actual registered SIP users limit. To get new numbers, apply penalty1 and on the new numbers apply penalty2.
   - Digest Authentication penalty: 25%
   - Throttling Penalty (600 seconds - reducing this value introduces more penalty): 60%

   * To determine cumulative penalties apply penalty1 and on the new number apply penalty2.
   ** Throttling penalties are not applicable to hosted remote Branch users.
5. An SBC Session is defined as a SIP signaled call with an access-side signaling leg and a core-side signaling leg. A typical voice call between a local OpenScape Voice user and a Remote User registered via the SBC, or to a SIP Trunk connected via the SBC requires one SBC session. A typical video call requires two SBC sessions; one for the video connection and another for the audio connection. An additional 20% penalty on OpenScape SBC capacity should be added for a video connection versus an audio connection due to the extra SIP INFO messages that are exchanged during a video call.
6. Each RTP stream (full-call) anchored through the central OpenScape SBC consists of two half-calls travelling in opposite direction. For example, two half-calls are used when a remote user registered via the SBC is connected to another remote user registered via the SBC, or to a SIP Trunk connected via the SBC. A single half-call is used when a local subscriber registered directly with the OpenScape Voice server is connected to a remote user registered via the SBC, or to a SIP Trunk connected via the SBC.
7. The RTP packet performance (e.g., packet loss) is influenced by several factors:
   a) Hardware BIOS settings relating to performance & power saving,
   b) Hardware BIOS hyper-threading,
   c) VM guest settings hyper-threaded core sharing,
   d) VM guest memory (RAM),
   e) VM guest OS NIC rx ring buffer size

8. RTP packetization time/size. For better performance, choose BIOS performance over power-saving, disable HT, no HT core sharing. Multiple, active VM's and smaller vRAM allocations may decrease RTP packet loss
9. Up to 10 SSP simultaneous SIP trunk interfaces are supported. These interfaces can connect to the same or different SSPs assuming the IP addresses on the SSP side are different. The SSP connection can point to the same or different IP addresses on the OpenScape SBC.
10. A "half call" is a call from either Access side (WAN) to core-side (LAN) or from core-side (LAN) to access-side (WAN). A "full call" consists of two half call legs. i.e. a call being initiated by the Access side (WAN) going to core-side (LAN) and then coming back to the Access side (WAN).
11. Apply the following penalty (or penalties*) to determine the actual OpenScape SBC maximum calls per second limit when the following functions are enabled:
    a) Digest Authentication penalty: 30%
    b) Throttling penalty** (600 seconds throttling interval): 40%
    c) TLS penalty** (600 seconds keep alive interval; no throttling): 50%

    * To determine cumulative penalties apply penalty1 and on the new number apply penalty2
    **Throttling and TLS penalties are not applicable to hosted remote Branch users.
12. When restarting, SIP endpoint devices are required to comply with procedures specified in RFC3261 and OSCAR Chapter 11: Best Practices. With a simultaneous restart of all endpoint devices, when a user becomes successfully registered, that user shall immediately be able to originate and receive calls with a call completion rate of at least 99.99%.
13. The maximum number of simultaneous SBC sessions in the high-capacity model is for signaling-only sessions. If media anchoring, trans-coding, trans-rating or any other feature is in use that requires the media to flow through the SBC, then the maximum number of simultaneous SIP sessions reverts to its old value of 3,500.
14. Throttling is a mechanism used to keep a NAT/firewall pinhole open for the subscriber's SIP signaling connection for a subscriber that is behind a far-end NAT/firewall. In order to do this, REGISTER messages coming from these subscribers responded back with a small expiry interval (configurable, default 60 seconds) to force the subscribers to re-register causing the pinhole in the NAT device to remain open.

VMware Resources

OpenScape SBC V9		
General Product Info	Operating System	OpenScape Branch Linux Distribution V8R1 (based on OpenSuse Linux 13.1)
	Native Redundancy Support	Yes
	Redundancy Strategy	Active/ Standby
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** It is recommended to perform a Live Migration only in periods of low traffic, otherwise noticeable service interruption might occur.
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	Yes

OpenScape SBC V9					
		Smallest	**Config. 1**	**Config. 2**	**Largest**
Depl. Scenarios	Depl. Scenario	Single or redundant node			
	Number of Nodes	1-2	1-2	1-2	1-2
	Max Users	250	6,000	20,000	32,000
vCPU	vCPU	2	4	6	8
	vCPU Shares	High			
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq			
	vCPU Limit	Unlimited			
vRAM	vRAM	2 GB	2 GB	4 GB	4 GB
	vRAM Shares	Normal			
	vRAM Reserv.	2 GB	2 GB	4 GB	4 GB
	vRAM Limit	Unlimited			
vNIC	vNIC (No. Req'd)	2	2	2	2
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3
	vNIC Manual MAC	Yes, only for local license file			
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.			
	Network Bandwidth Capacity (estimated requirement)	Core side (eth0) 100 KB/sec Access side (eth1) 16000 KB/sec	Core side (eth0) 500 KB/sec Access side (eth1) 60,000 KB/sec	Core side (eth0) 1,000 KB/sec Access side (eth1) 120,000 KB/sec	Core side (eth0) 1,000 KB/sec Access side (eth1) 120,000 KB/sec
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1
	vDisk Size	40 GB	40 GB	60 GB	60 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.			
	vDisk Mode	Keep Defaults (which allows Snapshots)			
	vDisk Format	Thick Lazy-Zeroed			
	Addt'l Storage	5 GB	5 GB	5 GB	5 GB
	Storage Throughput (estimated reqm't)	30 KBps	400 KBps	600 KBps	600 KBps
	Storage IOPS (estimated reqm't)	5	20	30	30

5.18 OpenScape UC Application

OpenScape UC + CMP + MS: This is a package that includes OpenScape UC Application, CMP and Media Server for the UC users and features.

Although the Media Server used for OpenScape UC Application can be the same Media Server for OpenScape Voice, the hardware requirements for the voice users must be separately entered into the table.

E/A Cockpit: Each E/A Cockpit user requires about 5 times more resources than a standard OpenScape UC user. Therefore you have to use the following equation to find the new number of UC users and then look-up back into the right table column:

Number of UC users (including E/A cockpit) ≥ UC users + E/A cockpit users * 5.

OpenScape UC Application V9		
General Product Info	Operating System	• SLES 12 SP4/SP5 64-bit
	Native Redundancy Support	Yes
	Redundancy Strategy	vSphere HA
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** not recommended during "busy hours"
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No. - SRM is offered as a PSR w/ PSS involvement only
	Backup with vStorage-APIs for Data Protection	Yes
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	Yes

OpenScape UC Application V9		
	Integrated Deployment	
Depl. scenario	Num. of Computers	1
	Max Users	1,250
For details see column "OpenScape Integrated Simplex" in Section 5.20 "OpenScape Voice".		

OpenScape UC Application V9		
Small Deployment		
Depl. scenario	Num. of Computers	1
	Max Users	2,500
vCPU	vCPU	8
	vCPU Shares	High
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq
	vCPU Limit	Unlimited
vRAM	vRAM	24 GB
	vRAM Shares	High
	vRAM Reserv.	8 GB
	vRAM Limit	Unlimited
vNIC	vNIC (No. Req'd)	1
	vNIC Type	VMXNET3
	vNIC Manual MAC	Yes
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.
	Network Bandwidth (estimated reqm't)	TBD
Storage (vDisk)	vDisk (No. Req'd)	1
	vDisk Size	300 GB
	vDisk Mode	Independent persistent is recommended - Snapshots allowed if observing guidelines documented in Section 3.5 General Statements and Best Practice Recommendations for Virtualization at Unify.
	vDisk Format	Any thick
	Addt'l Storage	No
	Storage Throughput (estimated reqm't)	TBD
	Storage IOPS (estimated reqm't)	Total IOPS ≈ 0.02 IOPS × <number of UC Application users> This approximation only applies if you use the default logging settings.

OpenScape UC Application V9				
Large Deployment				
		Application Computer	**Front-end Computer**	**Media Server Computer**
Depl. scenario	Num. of Computers	1	1 to 4 (2)	1 to 4 (2)
	Max Users	15,000 (1)	5,000 per computer	5,000 per computer(3) 2,500 per computer(4)
		(1) In case of an external Unified Messaging solution.		
		(2) In full configuration a computer system as redundancy.		
		(3) If the voice and conference portal are used in parallel without Media Sever operation for OpenScape Voice **OR** if no video conferences are used.		
		(4) If video conferences are used also.		
vCPU	vCPU	8 per computer		
	vCPU Shares	High		
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq		
	vCPU Limit	Unlimited		
vRAM	vRAM	24 GB	12 GB per computer	
	vRAM Shares	High		
	vRAM Reserv.	24 GB	12 GB	
	vRAM Limit	Unlimited		
vNIC	vNIC (No. Req'd)	1 per computer		
	vNIC Type	VMXNET3		
	vNIC Manual MAC	Yes		
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.		
	Network Bandwidth (estimated reqm't)	TBD		
Storage (vDisk)	vDisk (No. Req'd)	1	1 per computer	
	vDisk Size	300 GB		
	vDisk Mode	Independent persistent is recommended - Snapshots allowed if observing guidelines documented in Section 3.5 General Statements and Best Practice Recommendations for Virtualization at Unify.		
	vDisk Format	Any thick		
	Addt'l Storage	No		
	Storage Throughput (estimated reqm't)	TBD		
	Storage IOPS (estimated reqm't)	Total IOPS ≈ 0.02 IOPS × <number of UC Application users> This approximation only applies if you use the default logging settings.		

OpenScape UC Application V9					
Very Large Deployment					
		Application Computer (per cluster)	**Front-end Computer (per cluster)**	**Media Server Computer (per cluster)**	**Openfire Server**
Depl. scenario	Num. of Computers	1	1 to 4 (1)	1 to 5 (2)	min. 1
	Max Users	40,000	15,000 per computer	10,000 per computer	≈ 100,000
		(1) In full configuration a computer system as redundancy.			
		(2) In full configuration a computer system for increased video performance and a computer system as redundancy.			
vCPU	vCPU	8		12	4
	vCPU Shares	High			
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq			
	vCPU Limit	Unlimited			
vRAM	vRAM	24 GB	12 GB		8 GB
	vRAM Shares	High			
	vRAM Reserv.	24 GB	12 GB		8 GB
	vRAM Limit	Unlimited			
vNIC	vNIC (No. Req'd)	1 per node			
	vNIC Type	VMXNET3			
		IMPORTANT: If the ESXi installed is higher than ESXi V4.1 **AND** lower than ESXi V5.0 (821926), then E1000 must be used even though it is is less efficient. If VMXNET3 is used instead, then UDP packets ≤ 40 bytes will be dropped and the application may be unable to communicate with the VM. For further information, refer to: https://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2019944			
	vNIC Manual MAC	Yes			
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.			
	Network Bandwidth (estimated reqm't)	TBD			
Storage (vDisk)	vDisk (No. Req'd)	1	1 per computer		1
	vDisk Size	300 GB			min. 100 GB
					In case syncUC functionality is required for the Openfire server, it is necessary to create two LVM partitions, 100 GB each.
	vDisk Mode	Independent persistent is recommended - Snapshots allowed if observing guidelines documented in Section 3.5 General Statements and Best Practice Recommendations for Virtualization at Unify			
	vDisk Format	Any thick			
	Addt'l Storage	No			
	Storage Throughput (estimated reqm't)	TBD			
	Storage IOPS (estimated reqm't)	Total IOPS ≈ 0.02 IOPS × <number of UC Application users> This approximation only applies if you use the default logging settings.			TBD

5.19 OpenScape UC – Openfire Server

These values are a recommendation based on theoretical considerations. They should be used as a starting point. The resource actual virtual machine resource consumption should be closely monitored during the initial deployment phase to confirm that they are suitable/sufficient.

NOTICE: The resources listed in this section can also be used in case a stand-alone Openfire Server is set up in Small or Large UC deployments.

OpenScape UC Application V9 – OpenFire Server		
General Product Info	Operating System	• SLES 12 SP4/SP5 64-bit
	Native Redundancy Support	No
	Redundancy Strategy	vSphere HA
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** not recommended during "busy hours"
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No. **Note:** SRM is offered as a PSR w/ PSS involvement only
	Backup with vStorage-APIs for Data Protection	Yes
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

OpenScape UC Application V9 – OpenFire Server		
		Depl. 1
Depl. Scenarios	Depl. Scenario	
	Number of Nodes	1
	Max Users	Total number of UC users
vCPU	vCPU	4
	vCPU Shares	High
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq
	vCPU Limit	Unlimited
vRAM	vRAM	8 GB
	vRAM Shares	High
	Note: If the Chat History feature is enabled, then the RAM must be upgraded to 16 GB	
	vRAM Reserv.	8 GB
	vRAM Limit	Unlimited
vNIC	vNIC (No. Req'd)	1
	vNIC Type	VMXNET3
	vNIC Manual MAC	No
	Network Bandwidth (estimated reqm't)	TBD
Storage (vDisk)	vDisk (No. Req'd)	1
	vDisk Size	100 GB minimum
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data. In case syncUC functionality is required for the Openfire server, it is necessary to create two LVM partitions, 100 GB each.
	vDisk Mode	Independent persistent recommended - Snapshots allowed if observing guidelines documented in Section 3.5 "General Statements and Best Practice Recommendations for Virtualization at Unify".
	vDisk Format	any thick
	Addt'l Storage	No
	Storage Throughput (estimated reqm't)	TBD
	Storage IOPS (estimated reqm't)	TBD

5.20 OpenScape Voice

Virtualization Environment Setup:

- Both nodes of a cluster (duplex OSV system) must be installed as virtual machines. A cluster configuration where one node is deployed as native hardware and the other as a virtual machine is not supported.
- A detailed guideline for installing an OpenScape Voice (OSV) image onto a VMware ESXi virtualized platform is found in the OpenScape Voice V9 Service Manual: Installation & Upgrades.
- The virtualization dimensioning specifications listed in this section (e.g. number of vCPUs, vCPU reservation, etc.) are tested and recommended by Unify. Configurations using different specifications which are not tested, may result in an unstable system and are not recommended. (e.g. since a vCPU is a process for the VM host, using more vCPUs than the recommended, adds overhead to the ESXi (VMkernel) in order to keep up with the increased number of processes). Please address those cases with a PSR.
-

Migrations:

Detailed information for Migrations to OpenScape Voice V9 is found in the OpenScape Voice V9 Service Manual: Installation & Upgrades under Section "Migrations to OpenScape voice V9".

For information regarding the hardware platforms that support upgrades and migrations to, please refer to Section "Overview of Upgrades and Migrations to OpenScape Voice V9" found in the OpenScape Voice V9 Service Manual: Installation & Upgrades.

Knowledge of the VMware environment is a prerequisite for this migration. If the hardware of the source release is reused for this migration scenario, before the OSV Image can be installed the ESXi must be installed and the virtual environment configuration built. This will extend the system down time.

Service considerations:

In a virtualized environment configuration, care must be taken that the customer has two support contracts: one with Unify and one with VMware.

If the customer opens a ticket with the Unify Service Desk, the ticket will be accepted and evaluated to determine the root cause (whether the problem is with a Unify product or with VMware). This can require the involvement of several levels in the Unify support organization including GO and GVS.

If the root cause analysis has determined that the error is on the Unify side, GVS will provide a bug fix. If it is in VMware software the ticket will be routed back to the customer who will then be asked open a ticket with VMware.

OpenScape Voice Deployment:

As of V7R1, virtualization is supported for Integrated Simplex simplex and standard duplex (collocated and geographically separated) configurations. Supports 2 node clustering in co-location and network geographical separation. The co-located OSV can be deployed on 1 (both nodes on same physical host) or 2 hosts. A geo-separated OSV should be deployed on 2 hosts.

OpenScape Voice (2 nodes):

The hardware requirement presented in the table is for two OpenScape Voice nodes. In virtual environments you can install them on the same host/ server, but for obvious reasons it is recommended to install it on separate servers.

The simplex / entry option is not available for virtual environment.

The following additional notes have to be taken into account for this product:

- OSV figures in the table indicate requirements for each node
- OSV figures in the table are based on a typical Enterprise Feature set and call load.
- OSV figures in the table are based on V7 default RTT trace settings (24-7 extern)/distributed registration/Nodes on Separate servers/Active-Standby mode
- OSV nodes are recommended to reside on separate physical servers for HW redundancy.
- OSV uses additional disk space (on the server/SAN) to hold things like images, patch sets, mass provisioning files, restore CD, vApp, CDC ISO, etc)
- The VMware manual MAC is no longer used to lock OSV license files for Virtual deployments starting with OSV V7. Use the CLS to calculate the Advanced Locking ID for OSV license files for OSV V8 Virtual deployments.
- OSV Backup and Restore procedures are recommended to be used versus snapshots
- OSV NW and Disk usage may vary based on call usage and Feature mix
- OSV cps (Calls per Second) formula = # of users×(5/3600×5) (5 calls per user per hour with a loading factor of 5 for features). Ex.: 1000 users = 6.94 cps.
- OSV NW Total Bandwidth KB/s Requirement formula = cps×26.
- OSV X-channel Bandwidth KB/s Requirement formula = cps×13 (Note: starting in V6 cross channel compression is turned on by default)
- OSV HD KB/s formula = cps×3.33
- In case the OSV nodes are hosted on different servers, each one should get its own CPU reservation value calculated using the formula `# vCPU × physical CPU Freq`, even if the physical CPUs are different.

OpenScape Voice V9			OpenScape Integrated Simplex V9
General Product Info	Operating System	SLES 12	SLES 12 64-bit
	Native Redundancy Support	Yes	No
	Redundancy Strategy	Active/ Active or Active/ Standby	VMWare
	Voice/Video Media Terminating	No	Yes
	Voice/Video Signalling Traffic	Yes	Yes
	Other real-time critical requirements	No	No
VMware Feature Compatibility	vMotion Support	Yes	Yes
		Restrictions / Limitations: (vMotion during normal operation would cause some call loss (.5 to 1s second). vMotion impact during SW update/upgrade, node reboot, registration flood is tbd.)	
	High Availability (HA) Support	Yes	Yes
	Fault Tolerance (FT) Support	No	No
	Site Recovery Manager (SRM) Support	No. - SRM is supported indirectly by deploying one OSV node at the Protected site and the other OSV node at the Recovery Site	No
	Backup with vStorage-APIs for Data Protection	VMware VDR is supported **Note:** OSV Backup and Restore procedures are recommended to be used as a first line of defense against data loss.	VMware VDR is supported
	VMware Tools Support	Yes	Yes
	Virtual Appliance (vApp) Support	Yes	No

		OpenScape Voice			OpenScape Integrated Simplex	OpenScape Virtual Standard Duplex Large
		Depl. 1	**Depl. 2**	**Largest**		
Depl. Scenarios	Depl. Scenario	OSV Duplex	OSV Duplex	OSV Duplex	Virtualized Integrated Simplex	Virtualized Standard Duplex Large
	Number of Nodes	2	2	2	1	2
	Max Users	≤ 5,000*	≤ 10,000*	Max Users	5,000 Voice users, of which no more than 1250 may also be UC users	200,000 Voice users, of which 100.000 can be registered at any time
		*This number may be lower under high load, heavy feature usage or high level of tracing.				
vCPU	vCPU	4	4	8	8	8
	Physical CPU requirement	SPECint_base2006 ≥ 36.6 www.spec.org/cpu2006				
	vCPU Shares	High				
	vCPU Reservations	Must calculate # vCPU × physical CPU Freq				
	vCPU Limit	Unlimited				
vRAM	vRAM	9 GB	9 GB	9 GB	10 GB	12 GB
	vRAM Shares	Normal				
	vRAM Reserv.	9 GB	9 GB	9 GB	10 GB	12 GB
	vRAM Limit	Unlimited				
vNIC	vNIC (No. Req'd)	4	4	4	4	4
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3
		Note: For new installations VMXNET3 has to be used. For existing OSV deployments with E1000 it is requested to change to VMXNET3. The method with the detailed steps is documented in the OpenScape Voice Installation and Upgrades Guide, Appendix "T" Change E1000 to VMXNET3 network adapters.				
	vNIC Manual MAC	No	No	No	No	No
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	Network Bandwidth (estimated reqm't)	887 KBps Includes 468 for x-channel	1774 KBps includes 936 for x-channel	8873 KBps includes 4680 for x-channel	3000 KBps	3000 KBps

	OpenScape Voice				OpenScape Integrated Simplex	OpenScape Virtual Standard Duplex Large
		Depl. 1	**Depl. 2**	**Largest**		
Storage (vDisk)	vDisk (No. Req'd)	1 per node	1 per node	1 per node	1	1 per node
	vDisk Size	140 GB	140 GB	140 GB	140 GB	140 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
	vDisk Mode	Keep Defaults (which allows Snapshots)				
		Note: The Virtual disk mode setting "Independent" disallows the creation of Snapshots of a virtual machine. For a customer environment, it is recommended the Mode settings are NOT selected. This is the default configuration. Note: Snapshots are not to be used in a production environment except during initial installation process (e.g., as a backup in case there is a problem with a mass provisioning script). All snapshots are to be removed once the OSV VM is placed into production.				
		Additional information: Mode Independent persistent will leave changes permanently written to disk. Mode Independent Non-persistent writes data to disk but the data will be eliminated on restart (good for a training, lab, or demo environment).				
	vDisk Format	Thick Lazy-Zeroed				
	Addt'l Storage	10 GB	10 GB	10 GB	10 GB	10 GB
	Storage Throughput (estimated reqm't)	116 KBps	231 KBps	1157 KBps	250 KBps	250 KBps
	Storage IOPS (estimated reqm't)	TBD	TBD	TBD	75 IOPS	75 IOPS

5.21 OpenScape Voice Survival Authority

Survivable Authority (SA): SA must be located at a point on the IP network where it can communicate with both OpenScape Voice nodes. SA is included in the package together with CMP; therefore it does not require extra CPU power, RAM and HD.

OpenScape Voice Survival Authority V9		
General Product Info	Operating System	SLES 12
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes **Restrictions / Limitations:** Don't move SA to a device/location that is suspect to a failure that impacts one OSV node, but not its partner
	Fault Tolerance (FT) Support	Yes, but not needed
	Site Recovery Manager (SRM) Support	Yes **Restrictions / Limitations:** Only if SA and both OSV cluster nodes are in the same site and recovered together
	Backup with vStorage-APIs for Data Protection	Yes, but not needed, - SA data are static
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

OpenScape Voice Survival Authority V9						
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Largest**
Depl. Scenarios	Depl. Scenario	Single Node				
	Number of Nodes	1				
	Max Users	Any # of Users				
vCPU	vCPU	1				
	vCPU Shares	Low				
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq				
	vCPU Limit	Unlimited				
vRAM	vRAM	0.5 GB				
	vRAM Shares	Low				
	vRAM Reserv.	0.5 GB				
	vRAM Limit	Unlimited				
vNIC	vNIC (No. Req'd)	1				
	vNIC Type	VMXNET3				
	vNIC Manual MAC	No				
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.				
	Network Bandwidth (estimated reqm't)	5 KBps				
Storage (vDisk)	vDisk (No. Req'd)	1				
	vDisk Size	4 GB				
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.				
	vDisk Mode	Keep Defaults (which allows Snapshots)				
	vDisk Format	Thick Lazy-Zeroed				
	Addt'l Storage	No				
	Storage Throughput (estimated reqm't)	2 KBps				
	Storage IOPS (estimated reqm't)	TBD.				

5.22 OpenScape Web Collaboration

Remark: these values are a recommendation based on theoretical considerations. They should be used as a starting point. The resource actual virtual machine resource consumption should be closely monitored during the initial deployment phase to confirm that they are suitable/sufficient.

It is recommended to outsource the SQL-DB to an extra SQL-Server in case of a deployment with up to 1,000 users.

OpenScape Web Collaboration V7		
General Product Info	Operating System	Windows Server 2012 R2 Windows Server 2016
	Native Redundancy Support	Yes, with PSR
	Redundancy Strategy	N+1
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	Yes
VMware Feature Compatibility	vMotion Support	PSR
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No
	Backup with vStorage-APIs for Data Protection	PSR
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

OpenScape Web Collaboration V7			
		Smallest	**n*1000**
Depl. Scenarios	Depl. Scenario	single-node	multi-node
	Number of Nodes	1	n
	Max Users	1,000	n×1,000
vCPU	vCPU	4	n×8
	vCPU Shares	High	
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq	
	vCPU Limit	Unlimited	
vRAM	vRAM	4 GB	n×8 GB
	vRAM Shares	Normal	
	vRAM Reserv.	4 GB	n×8 GB
	vRAM Limit	Unlimited	
vNIC	vNIC (No. Req'd)	1	n×1
	vNIC Type	VMXNET3	VMXNET3
	vNIC Manual MAC	No	No
	Network Bandwidth (estimated reqm't)	Unknown	Unknown
Storage (vDisk)	vDisk (No. Req'd)	1	n×1
	vDisk Size	140 GB	n×140 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.	
	vDisk Mode	Independent persistent recommended - Snapshots allowed if observing guidelines documented in Section 3.5 General Statements and Best Practice Recommendations for Virtualization at Unify.	
	vDisk Format	any	any
	Addt'l Storage	none	none
	Storage Throughput (estimated reqm't)	low	low
	Storage IOPS (estimated reqm't)	low	low

5.23 OpenScape Xpert – MLC (Multi Line Controller)

OpenScape Xpert - MLC		
General Product Info	Operating System	Debian Linux 8 for OSX 5.1: 32 bit for OSX 6.1: 64 bit
VMware Feature Compatibility	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	Yes (only 1 vCPU)
	VMWare Tools	Yes, recommended.
	vMotion Support	Yes, only in non-working hours & idle load. Otherwise could result in voice interruptions and/or call loss.
	DRS	Only in “Manual/Partially automated” modes. “Fully automated” is not supported
	Storage vMotion	No (could result in call loss)
	Storage DRS (sDRS)	Only in “Manual Mode” for “initial placement”
	Suspend	No
	Snapshot	With running VMs: not supported
	Storage APIs/VDP	No
	SRM	No
	App HA	No
	vSphere Replication	No
	vApp	No
	VM Hardware version	Supported: 10,11,13

OpenScape Xpert - SM				
		MLC, 1 Core	**MLC, 2 Core**	**MLC, 4 Core**
Depl. Scenario	Max connected TTs	≤ 250	≤ 250	≤ 250
	Max parallel RTP streams	≤ 250 (with FT) ≤ 300 (without FT)	≤ 500	≤ 600
vCPU	vCPU cores	1	2	4
	vCPU Shares	High	High	High
	vCPU Reserv.	2,5 GHz	5 GHz	10 GHz
	vCPU Limit	Unlimited	Unlimited	Unlimited
vRAM	vRAM	2 GB	2 GB	2 GB
	vRAM Shares	Normal		
	vRAM Reserv.	2 GB	2 GB	2 GB
	vRAM Limit	Unlimited	Unlimited	Unlimited
vNIC	vNIC (No. Req'd)	1	1	1
	vNIC Type	VMXNET3	VMXNET3	VMXNET3
	req Bandwidth	90 Kbps / one G.711 stream	90 Kbps / one G.711 stream	90 Kbps / one G.711 stream
Storage (vDisk)	vDisk (No. Req'd)	1	1	1
	vDisk Size	40 GB	40 GB	40 GB
	vDisk Shares	High	High	High
	vDisk Format	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed
	Storage Throughput (estimated)	2000 KBps (under heavy load, for logging)	2000 KBps (under heavy load, for logging)	2000 KBps (under heavy load, for logging)

5.24 OpenScape Xpert – SM (System Manager)

OpenScape Xpert - SM		
General Product Info	Operating System	for OSX 5.1: Windows 2008 R2 / 2012 R2 for OSX 6.1: Windows 2012 R2 / 2016
VMware Feature Compatibility	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	VMWare Tools	Yes, recommended
	vMotion Support	Yes, but only in non-working hours and under idle load. Otherwise could result in voice interruptions and/or call loss
	DRS	Only in “Manual/Partially automated” modes. “Fully automated” is not supported
	Storage vMotion	No (could result in call loss)
	Storage DRS (sDRS)	Only in “Manual Mode” for “initial placement”
	Suspend	No
	Snapshot	With running VMs: not supported
	Storage APIs/VDP	No
	SRM	No
	App HA	No
	vSphere Replication	No
	vApp	No
	VM Hardware version	Supported: 10,11,13

OpenScape Xpert - SM				
		SM (50 TTs)	**SM (900 TTs)**	**SM (2000 TTs)**
Depl. Scenario	Max connected TTs	50	900	2000
vCPU	vCPU cores	2	4	6
	vCPU Shares	Normal	High	High
	vCPU Reserv.	2.5 GHz	10 GHz	10 GHz
	vCPU Limit	Unlimited		
vRAM	vRAM	4 GB	4 GB	6GB
	vRAM Shares	Normal		
	vRAM Reserv.	2 GB	All locked	
	vRAM Limit	Unlimited		
vNIC	vNIC (No. Req’d)	1	1	1
	vNIC Type	VMXNET3	VMXNET3	VMXNET3
Storage (vDisk)	vDisk (No. Req’d)	1	1	1
	vDisk Size	60 GB	100 GB	100 GB
	vDisk Shares	Normal	High	High
	vDisk Format	Thick Lazy-Zeroed	Thick Lazy-Zeroed	Thick Lazy-Zeroed

5.25 OpenScape Xpert – Master Trading Turret

OpenScape Xpert - Master TT		
General Product Info	Operating System	Windows 7 x64 / Windows 2012 x64
VMware Feature Compatibility	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	VMWare Tools	Yes, recommended
	vMotion Support	Yes, but only in non-working hours and under idle load. Otherwise could result in voice interruptions and/or call loss
	DRS	Only in “Manual/Partially automated” modes. “Fully automated” is not supported
	Storage vMotion	No (could result in call loss)
	Storage DRS (sDRS)	Only in “Manual Mode” for “initial placement”
	Suspend	No
	Snapshot	With running VMs: not supported
	Storage APIs/VDP	No
	SRM	No
	App HA	No
	vSphere Replication	No
	vApp	No
	VM Hardware version	Supported: 10,11,13

OpenScape Xpert - Master TT		
vCPU	vCPU cores	2
	vCPU Shares	Normal
	vCPU Reserv.	2,5 GHz
	vCPU Limit	Unlimited
vRAM	vRAM	2 GB
	vRAM Shares	Normal
	vRAM Reserv.	All locked
	vRAM Limit	Unlimited
vNIC	vNIC (No. Req’d)	1
	vNIC Type	VMXNET3
Storage (vDisk)	vDisk (No. Req’d)	1
	vDisk Size	50 GB
	vDisk Shares	Normal
	vDisk Format	Thick Lazy-Zeroed

5.26 OpenScape Xpressions

OpenScape Xpressions V7 R1		
General Product Info	Operating System	Windows Server 2012 R2 Windows Server 2016
	Native Redundancy Support	Yes
	Redundancy Strategy	Active/ standby using Windows Server Cluster for kernel N+1 redundancy for satellites.
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes **Restrictions / Limitations:** not recommended during "busy hours"
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No. SRM is offered with PSS/Customer Solution Lab (CSL) involvement only.
	Backup with vStorage-APIs for Data Protection	Yes
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

OpenScape Xpressions V7 R1									
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Depl. 5**	**Depl. 6**	**Largest**
Depl. Scenarios	Depl. Scenario	single-node	single-node	single-node	single-node	single-node	multi-node	multi-node	multi-node
	Number of Nodes	1	1	1	1	1	kernel +	kernel +	kernel +
							2 satellites	3 satellites	4 satellites
	Max Users	up to 100	up to 300	up to 1,000	up to 3000	up to 5000	up to 10,000	via PSR only: up to 15,000	via PSR only: up to 18,000
vCPU	vCPU-kernel	1	1	1	2	3	2	3	4
	vCPU-satellites						2 × 2	3 × 2	4 × 2
	vCPU Shares	N/A CPU is 100% reserved							
	vCPU Reserv-kernel	Must calculate # vCPU × physical CPU Freq							
	vCPU Reserv-satellites	-					Must calculate # vCPU × physical CPU Freq		
	vCPU Limit	Unlimited							

OpenScape Xpressions V7 R1									
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Depl. 5**	**Depl. 6**	**Largest**
vRAM	vRAM	3 GB	3 GB	3 GB	3 GB	3 GB	3 GB	4 GB	6 GB
	Satellites						2 × 2 GB	3 × 2 GB	4 × 2 GB
	vRAM Shares	High							
	vRAM Reserv.	3 GB	3 GB	3 GB	3 GB	3 GB	3 GB	4 GB	6 GB
	Satellites						2 × 2 GB	3 × 2 GB	4 × 2 GB
	vRAM Limit	Unlimited							
vNIC	vNIC (No. Req'd)	1	1	1	1 each	1 each	1 each	1 each	1 each
	vNIC Type	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3	VMXNET3
	vNIC Manual MAC	Yes (due to Licensing)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.							
	Satellites						No for satellite	No for satellites	No for satellites
	Network Bandwidth (estimated reqm't)	not available	1,300 kbps	3,000 kbps	6,400 kbps	12,000 kbps	86,000 kbps	160,000 kbps	not available
Storage (vDisk)	vDisk (No. Req'd)	1	1	1	1	1	1 + 2 × 1	1 + 3 × 1	1 + 4 × 1
	vDisk Size	16 GB	40 GB	85 GB	220 GB	360 GB	690 GB	1,030 GB	1,400 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.							
	Satellites						2 × 20 GB	3 × 20 GB	4 × 20 GB
	vDisk Mode	Keep Defaults (which allows Snapshots)							
	vDisk Format	any thick	any thick	any thick	any thick	any thick	any thick	any thick	any thick
	Addt'l Storage	No	No	No	No	No	No	No	No
	Storage Throughput (estimated reqm't)	N/A	260 kBps	800 kBps	1,250 kBps	2,200 kBps	3,900 kBps	5,100 kBps.	not available
	Storage IOPS (estimated reqm't)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5.27 SESAP SW-Suite

SESAP: You have to consider one per OpenScape UC Suite solution sold to a customer.

SESAP SW-Suite V2		
General Product Info	Operating System	Windows Server 2008
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	No
	Backup with vStorage-APIs for Data Protection	Yes
	VMware Tools Support	Yes
	Virtual Appliance (vApp) Support	No

SESAP SW-Suite V2								
		Smallest	**Depl. 1**	**Depl. 2**	**Depl. 3**	**Depl. 4**	**Depl. 5**	**Largest**
Depl. Scenarios	Depl. Scenario		Single node			Single node	Single node	
	Number of Nodes		1			1	1	
	Max Users		300	1,000	3,000	5,000	10,000	
vCPU	vCPU		1			1	2	
	vCPU Shares		Normal			Normal	Normal	
	vCPU Reserv.		0 MHz			0 MHz	0 MHz	
	vCPU Limit		Unlimited			Unlimited	Unlimited	
vRAM	vRAM		4 GB			6 GB	8 GB	
	vRAM Shares		Normal			Normal	Normal	
	vRAM Reserv.		0 MB			0 MB	0 MB	
	vRAM Limit		Unlimited			Unlimited	Unlimited	
vNIC	vNIC (No. Req'd)		1			1	1	
	vNIC Type		VMXNET3			VMXNET3	VMXNET3	
	vNIC Manual MAC		Yes			Yes	Yes	
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.						
	Network Bandwidth (estimated reqm't)		TBD.			TBD.	TBD.	
Storage (vDisk)	vDisk (No. Req'd)		1			1	1	
	vDisk Size		100 GB			1500 GB	2000 GB	
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.						
	vDisk Mode		Keep Defaults (which allows Snapshots)					
	vDisk Format		thin			thin	thin	
	Addt'l Storage		0 GB			0 GB	0 GB	
	Storage Throughput (estimated reqm't)		TBD.			TBD.	TBD.	
	Storage IOPS(estimated reqm't)		TBD.			TBD.	TBD.	

5.28 OpenScape Contact Media Service

OpenScape Contact Media Service V9		
General Product Info	Operating System	OpenSUSE Linux
	Native Redundancy Support	Yes
	Redundancy Strategy	Active/ active or Active/ standby
	Voice/Video Media Terminating	Yes
	Voice/Video Signalling Traffic	Yes
	Other real-time critical requirements	Yes
VMware Feature Compatibility	vMotion Support	Yes, covered under VMware policy
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	Yes, covered under VMware policy
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	No
	Virtual Appliance (vApp) Support	No

OpenScape Contact Media Service V9		
Depl. Scenarios	Depl. Scenario	Single deployment
	Number of Nodes	1
	Max Users	300 ports
vCPU	vCPU	2
	vCPU Shares	High
	vCPU Reserv.	Must calculate # vCPU × physical CPU Freq
	vCPU Limit	Unlimited
vRAM	vRAM	8 GB
	vRAM Shares	High
	vRAM Reserv.	8 GB
	vRAM Limit	Unlimited
vNIC	vNIC (No. Req'd)	1
	vNIC Type	flexible
	vNIC Manual MAC	Parameter Manual MAC is set to NO, so it is allowed to get the MAC automatically from VMware.
		If parameter is set to Y, please refer to "OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide" on e-doku.
	Network Bandwidth (estimated reqm't)	80 kbps per port in each direction for G.711 48 kbps per port in each direction for G.729

OpenScape Contact Media Service V9		
Storage (vDisk)	vDisk (No. Req'd)	1
	vDisk Size	160 GB
		vDisk Size is the total amount of storage needed for the operating system, the application, and the application data.
	vDisk Mode	Keep Defaults (which allows Snapshots)
	vDisk Format	Thick Provision Eager Zeroed
	Addt'l Storage	No
	Storage Throughput (estimated reqm't)	Close to 0 unless logging is enabled
	Storage IOPS(estimated reqm't)	200

5.29 OpenScape Trace Manager

OpenScape Trace Manager V8		
General Product Info	Operating System	Windows Server 2008 R2/2012 R2/2016
	Native Redundancy Support	No
	Redundancy Strategy	-
	Voice/Video Media Terminating	No
	Voice/Video Signalling Traffic	No
	Other real-time critical requirements	No
VMware Feature Compatibility	vMotion Support	Yes
	High Availability (HA) Support	Yes
	Fault Tolerance (FT) Support	No
	Site Recovery Manager (SRM) Support	SRM is offered as a PSR
	Backup with vStorage-APIs for Data Protection	No
	VMware Tools Support	Yes. Tools are neither delivered nor installed with the product
	Virtual Appliance (vApp) Support	No

OpenScape Trace Manager V8			
		Low-End	**Mid-Range**
Depl. Scenarios	Depl. Scenario	Can be co-hosted	Dedicated Server
	Number of Nodes	1	1
	Calls per Seconds loads	<= 2 CPS	<= 10 CPS
vCPU	vCPU	2	4
	vCPU Shares	Normal	Normal
	vCPU Reserv.	0	0
	vCPU Limit	Unlimited	Unlimited
vRAM	vRAM	4 GB	8 GB
	vRAM Shares	Normal	Normal
	vRAM Reserv.	4 GB	12 GB
	vRAM Limit	Unlimited	Unlimited
vNIC	vNIC (No. Req'd)	1	1
		If parameter is set to Y, please refer to *OpenScape Solution Set V9, How to check MAC Addresses for Virtual Systems, Quick Reference Guide* on E-doku	
	vNIC Type	VMXNET3	VMXNET3
	vNIC Manual MAC	No	No
	Network Bandwidth (estimated reqm't)	1 Gbps Network Connection Recommended	

OpenScape Trace Manager V8			
		Low-End	**Mid-Range**
Storage (vDisk)	vDisk (No. Req'd)	2	2
	vDisk Size	150 GB (OS & OSTM DBs)	300 GB (OS & OSTM DBs)
	vDisk Mode	Keep Defaults (which allows Snapshots)	
	vDisk Format	any	any
	Addt'l Storage	500 GB (Trace File Storage)	>= 1 TB (Trace File Storage)
	Storage Throughput (estimated reqm't)		

NOTICE: Using a RAM Drive Storage for Performance Solutions requires 32 GB of RAM.