

MT App Note 10391 (AN 10391)
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Deploying MiVoice Connect with VMware

Description: This application note is a guide to the resources and requirements for deploying Mitel MiVoice Connect in a virtual environment using VMware.

Environment:

Mitel MiVoice Connect

Target Audience:

Mitel Partners
Mitel Partner Sales Engineers
Mitel Sales Engineers

Mitel supports the deployment of MiVoice Connect using the VMware® vSphere (ESXi) virtual machines platform. This includes the primary headquarter (HQ) server, the remote servers (DVS), and the Linux based virtual appliances (LDVS).

This document is a resource and reference index to the information for deploying MiVoice Connect under VMware. Several other documents and references are part of the regular Mitel documentation resources and are updated regularly with each release. Those documents contain the most current specifications and requirements. This document is not intended as a “step-by-step” manual, but is a reference guide to the specific documents which contain that information.

This document does not provide a VMware tutorial. Knowledge of the VMware vSphere environment, its concepts and terminology, and how to manage the VMware ESXi system are required.

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Supported VMware Versions and Features

VMware vSphere virtual machines (VMs) are supported for Mitel MiVoice Connect HQ servers, DVS servers, SIP Trunk switches, Phone switches, Service Appliance, and SIParator.

The following is supported for MiVoice Connect as of the time of this writing:

- VMware ESXi
- VMXNet3 Virtual adapter (not the E1000)
- VMware High Availability
- VMotion

The following VMware features are not supported for MiVoice Connect:

- Fault tolerance
- Snapshots (which can consume significant CPU and memory resources impacting system operation)
- VMware Workstation

The current supported versions and specifications for MiVoice Connect running on the VMware platform can be found in the *MiVoice Connect Build Notice* for the current release.

Third party solutions are not supported on Mitel virtual machines, unless specifically stated in other Mitel documentation or App Notes. The third-party solution vendor should be consulted for the compatibility of their products in a virtual environment.

Supported versions of Microsoft Windows Server for VMware

The MiVoice Connect main HQ server and the MiVoice Connect distributed servers run on Microsoft Windows Server. The following is supported as of the time of this writing:

- Windows Server 2016 Standard
- Windows Server 2016 Datacenter
- Windows Server 2012 R2 Standard 64-bit
- Windows Server 2012 R2 Datacenter 64-bit
- Windows Server 2008 R2 Standard 64-bit
- Windows Server 2008 R2 Enterprise with SP1 64-bit

The most current supported versions and specifications for the VMware platform can be found in the *MiVoice Connect Build Notice* for the current release.

MiVoice Connect Contact Center is not currently supported for Windows Server 2016.

Supported versions of Linux for VMware

MiVoice Connect can utilize VMware virtual machines for the system appliances. These virtual appliances include virtual phone switches, virtual trunk switch, virtual collaboration Service Appliance (SA), and the Linux DVS. All these system appliances use the Linux operating system.

The compatible version of Linux for each virtual appliance is included with the MiVoice Connect installation software. The system administrator does not have to “pre-install” Linux.

Instructions for downloading and installing the Linux DVS appliance can be found in the current *Mitel Connect Planning and Installation Guide*.

Microsoft Updates support for VMware servers

Each MiVoice Connect build is tested and certified with Microsoft Updates published on or before a specified date. The *MiVoice Connect Build Notice* lists each currently supported version of MiVoice Connect and the date that Microsoft Updates have been tested against.

Mitel recommends that all the latest Microsoft Updates are installed prior to installing or migrating to Mitel Connect.

The most current date for supported Microsoft Updates for a specific MiVoice Connect version can be found in the *MiVoice Connect Build Notice* for the current release.

VMware Virtual Machine hardware configurations for MiVoice Connect

When configuring the various VMware virtual machines for the MiVoice Connect servers and appliances, each virtual machine has specific configuration requirements that will provide the desired capacities and capabilities.

Capacities are based on several capabilities, such as:

- Number of users
- Call load
- Busy Hour Call Completion
- Voice codec
- Number of collaboration ports
- Recording hours
- Mobile users

The configuration parameters are based on the desired capacities, such as:

- Server processor type
- Number of virtual processor cores
- RAM per virtual machine
- Disk space required
- Network

The *Mite Connect Planning and Installation Guide* provides the specific configuration parameters for each VMware virtual machine for several desired capacity ranges. Consult this guide, and the capacity tables, to determine the recommended parameters and sizing.

Planning and Design

Prior to deploying MiVoice Connect on VMware, many decisions need to be made about the system infrastructure and the overall design. As with other complex application systems, care should be taken to plan and design for the desired capabilities, so that the proper system features can be implemented efficiently.

The most complete and current information for planning and designing the deployment of MiVoice Connect on VMware is documented in the *Mite Connect Planning and Installation Guide*.

The following items should be considered when designing the deployment of MiVoice Connect on VMware.

- Understand the routing and hunting requirements of the desired system.
- Create an accurate list of all current or desired user devices, such as end user phones, lobby / kitchen / hallway / lab phones, conference rooms and phones, fax machines, modems, etc.
- Consider the changes to the existing call flow that may require additional trunks, DIDs, or other telco services.
- Perform a complete network assessment.
- Determine the desired hardware capacity needed for each MiVoice Connect capability. See [VMware Virtual Machine hardware configurations for MiVoice Connect](#) above.
- Determine how many virtual servers will be installed (HQ, DVS, LDVS) and the required capacity for each server.
- Determine if VMware High Availability (HA) is required, or is a non-redundant single VM sufficient.
- Determine if live migration is required (via VMware Vmotion).
- Will network storage be used (NAS or SAN), or will the virtual machines and the associated files be stored on the local vSphere disks.
- Determine the server hardware required to run the VMware vSphere environment. This includes capacity planning for all virtual machines running on each vSphere host (CPU, RAM, Storage, Network, etc.). This is for the physical hardware. The capacities for each virtual machine also need to be planned (see above). Consult VMware support documentation for further information.

- Also consider deploying a VMware vCenter server for use in managing multiple vSphere servers. This is an important step and is strongly recommended by VMware. Consult VMware support documentation for further information.

Configuring the VMware vSphere Environment

VMware vSphere is a complex and versatile server environment for creating and managing multiple virtual machines on a single computer server platform. Thorough understanding of vSphere is essential in designing and deploying the MiVoice Connect server infrastructure.

This document does not provide “step-by-step” instructions for exactly how to configure vSphere (ESXi), however general guidelines are provided to familiarize system designers and administrators with the basic concepts. It is strongly recommended that system designers and administrators consult the VMware training and support materials, available through the VMware web site, for detailed instruction for the wide array of configuration options.

General procedures for configuring the vSphere server environment

- Ensure that the IP network infrastructure (routers, services, etc.) is fully deployed and operational.
- Ensure that the desired storage infrastructure is fully deployed, operational, and is certified for use with VMware vSphere.
- Ensure that the physical server hardware is certified for use with VMware vSphere.
- Install the vSphere ESXi software on each physical server and enter the appropriate software license information.
- Install the vCenter software on the vCenter server.
- Install VMware vSphere client software on a Windows workstation. This software is used to manage the vSphere / vCenter servers.
- Launch the vSphere client application, connect to the vCenter server, and perform the initial vSphere host configuration, including adding a datacenter (a logical collection of ESXi hosts), and adding the ESXi hosts to the datacenter.
- Configure the virtual networking and data store volumes using the vSphere client application.
- Configure clusters for VMware High Availability (if desired) and add the appropriate ESXi hosts to each cluster. Consult VMware support documentation for further information.
- Create users and roles (if desired) to grant privileges on specific virtual machines to specific users.

Configuring the MiVoice Connect virtual machines

Deploying MiVoice Connect in a VMware vSphere environment is similar to deploying MiVoice Connect on individual physical servers. A key difference is that the specifications of the virtual servers (CPU, RAM, Storage, Network, etc.) have to be configured and made operational first. Once the virtual machine has been created, the operating system and the MiVoice Connect server services and applications can be installed.

This document does not provide “step-by-step” instructions for exactly how to configure the MiVoice Connect virtual machines, however general guidelines are provided to familiarize system designers and administrators with the basic concepts. It is strongly recommended that system designers and administrators consult the VMware training and support materials, available through the VMware web site, for detailed instruction for the wide array of configuration options.

General procedures for configuring the MiVoice Connect virtual machines

- Create the MiVoice Connect HQ virtual machine within the vSphere environment. Be sure to configure the proper parameters (CPU, RAM, Storage, Network, etc.) per your design and planning specifications and using the recommended settings in the *Mitel Connect Planning and Installation Guide* tables. See [Planning and Design](#) above. There are several options available to accomplish this.
 - Use the VMware vCenter Converter utility to build the virtual machine from an existing physical server.
 - Use the vSphere client application to copy an existing virtual machine or virtual machine template.
 - Use the vSphere client application to create a new virtual machine. This is often the easiest approach with the most predictable results.
- Install the desired Windows Server operating system.
- Install the VMware Tools into the virtual machine.
- Obtain the current MiVoice Connect installation software from the Mitel Support web site.
- Copy the MiVoice Connect install file to the HQ server virtual machine.
- Install the MiVoice Connect system software. Consult the *Mitel Connect Planning and Installation Guide* for complete instructions.
- Install the desired voice switches, trunk switches, collaboration Service Appliance, and any other application servers and appliances, per the instructions in the *Mitel Connect Planning and Installation Guide*.

- Once the full MiVoice Connect system has been installed on vSphere, the rest of the MiVoice Connect system configuration can be performed, following the information in the *Mitel Connect System Administration Guide*.

Configuration Best Practices

VMware publishes several helpful “best practices” documents for planning, deploying, and configuring virtual machines with vSphere / vCenter.

The following items are some recommendations for running MiVoice Connect in the VMware vSphere virtual machine environment. As with most complex system environments, each particular deployment will have its own specific requirements and peculiarities. These items should be considered as suggestions and will vary depending on the individual deployment.

- Do not use vSphere “Snapshots” during the normal execution of a production MiVoice Connect virtual server. Snapshots can cause additional disk I/O, which can cause latency and degraded voice quality. Snapshots should be used only during maintenance operations such as an upgrade or backup. Snapshots should be deleted when the maintenance operations are finished.
- Consult the VMware documentation and the *MiVoice Connect Build Notice* for recommendations for the type of network adapter used for the HQ server (in the virtual machine configuration settings). Several options are available and may change over time.
- Use a dedicated NIC and switches for NAS storage, to prevent disk I/O traffic from impacting other traffic.
- Use a dedicated NIC for Vmotion and vCenter, to prevent VMware management traffic from impacting other traffic.
- If the MiVoice Connect HQ NIC is 1 Gigabit, use a dedicated NIC. If the NIC is a 10 Gigabit or 40 Gigabit NIC, then the network traffic can be shared.
- If the MiVoice Connect HQ network traffic is on a shared NIC, create a high share value user defined network resource pool for all the MiVoice Connect HQ network traffic.
- A dedicated NIC can be shared with all MiVoice Connect virtual appliances. Total bandwidth use should be considered. If real time audio is impacted, then the appliances with real time audio (LDVS, UCB, etc.) should be moved to their own dedicated NIC.
- Never use 100 Mbit Ethernet for any MiVoice Connect virtual server.
- Use shared data stores (SAN or NAS) if High Availability (HA) or Vmotion is needed.
- Use high performance, redundant, low latency storage with to improve disk I/O performance and reliability.
- Ensure that the CPU utilization of the ESXi host and the MiVoice Connect HQ virtual machine is less than 50% during normal operation.

- Ensure that the memory utilization of the ESXi host and the MiVoice Connect HQ virtual machine is less than 80% during normal operation.
- Use the “Thick Provision Eager Zeroed” vSphere disk space setting for the MiVoice Connect HQ virtual machine, if possible. “Thin Provision” is supported, but could cause performance issues when new blocks are allocated.
- Ensure that data store volumes maintain ample free space for vSphere virtual machine and memory files.
- Use default values for most vSphere configuration settings, unless there is a good reason to do otherwise, or unless different values are specified in other support documents.
- If the MiVoice Connect HQ virtual machine is occasionally low on resources because of competition with other virtual machines, reserve CPU or memory resources for the MiVoice Connect HQ virtual machine or increase the “Share” values. However, if the vSphere host shows low utilization and there is little competition between virtual machines for resources, it is not necessary to reserve CPU or memory resources. Note that reserving CPU resources could limit High Availability and failover features.
- In the MiVoice Connect HQ virtual machine, consider putting the operating system and MiVoice Connect data files on different virtual drives (e.g., C: and D:).
- Perform backup or other resource-intensive maintenance operations during times of low server usage, if possible.

Troubleshooting VMware Performance Issues

Performance issues in VMware vSphere are often subtle and not obvious to identify or diagnose. Issues which manifest themselves on a physical server can also appear in virtual servers and some issues are amplified in a virtual environment. Like all troubleshooting tasks, care needs to be taken in order to isolate the cause in order to determine the proper corrective action.

Performance issues in a MiVoice Connect virtual environment can produce symptoms such as:

- Delays in placing and completing calls, delays in call connections, retrieving call information, dropped server connections from phones and other devices, slow response from voicemail, conferencing, or other associated voice applications, etc.
- Freezing or hanging of the server, application appliances, or phone devices.
- Poor voice quality (dropouts, “stuttering”, echo, “warbling”, etc.).

One of the possible causes of performance issues in a MiVoice Connect virtual environment is inadequate or poorly-allocated CPU, memory, disk, or network resources. Any of these could affect the ESXi host system, the MiVoice Connect HQ virtual machine, or for any of the switch or appliance virtual machines.

Inadequate or misallocated system resources can be identified by using the performance monitoring tools in the vSphere client application. The following are some of the conditions which may occur.

- High values for CPU utilization, memory utilization, disk I/O bandwidth, disk I/O latency, network I/O bandwidth, or network latency can indicate resource problems. For example, average CPU utilization for a VM or for an ESXi host that is consistently above 50% may indicate inadequate CPU resources, and average memory utilization that is consistently above 80% may indicate inadequate memory resources.
- If a virtual machine does not have sufficient resources, allocate additional resources from the ESXi host, if they are available.
- Many times, insufficient physical memory for the ESXi host is the cause of performance problems. This can be the result of running too many virtual machines on one physical host or simply not having enough memory on the host itself.

Look at the “Balloon” memory measurement in the performance chart of the ESXi host. Excessive Balloon memory allocation can cause degraded performance of all virtual machines on the ESXi host. Simply adding more physical memory to the ESXi host can alleviate this condition. Consult the VMware support and diagnostic documentation for more information on problems with excessive Balloon memory.

- If an ESXi host does not have sufficient resources, consider moving some of the virtual machines to a different ESXi host.

Another cause of performance issues in a MiVoice Connect virtual environment is suboptimal or incorrect configuration of the ESXi system or the virtual machines, for example:

- Using the wrong versions of drivers or other software.
- Enabling unnecessary VMware features that consume resources.
- Doing maintenance (e.g., backups, upgrades) at inappropriate times.
- Using VMware snapshots during production operation.

Suboptimal or incorrect configurations can be identified as follows:

- Inspect the vSphere configuration settings for the ESXi host, the storage subsystem, the network and its adapters, and the MiVoice Connect virtual machines.
- If the performance problems only occur at certain times, monitor the system to see if any special processes occur during those times, such as backups, report generation, Windows maintenance, etc.

If the source of the configuration problems cannot be found by, save the logs from the ESXi host and send them to VMware Support for analysis. VMware Support can provide details about how to collect the logs.

If the performance of the MiVoice Connect HQ virtual machine itself is less than expected, consider the following items which may help provide explanations and a solution.

- Attempt to characterize the issue in order to focus the search for the cause.
 - Determine if the performance problems happen only at certain times.
 - Determine if other processing is occurring on the MiVoice Connect virtual machine, the ESXi host, the data store, or on the network during the times when performance is poor.
 - Has the performance problem always existed, or did it appear suddenly?
 - Is the performance different for this system than for another similar system that is installed elsewhere?
 - Is the performance less than the performance of a physical system with similar resources?
- Confirm that the MiVoice Connect HQ virtual machine sizing recommendations are being followed, per the recommendations in the *Mitel Connect Planning and Installation Guide*.
- Confirm that the [Configuration Best Practices](#) guidelines are being followed.
- Check the amount of CPU, memory, disk I/O, and network I/O resources that are being used by the ESXi host and the MiVoice Connect HQ virtual machine. Use the

vSphere client application performance monitor. Determine if there are resource shortages.

- Check that the current version of the VMware Tools is installed on the MiVoice Connect HQ virtual machine.
- Verify that vSphere Snapshots are not enabled on the MiVoice Connect systems. Snapshots can have a negative impact on performance, especially on the playback of voice prompts.
- Verify that the disk space for the MiVoice Connect HQ virtual machine is pre-allocated (“Thick Provision Eager Zeroed”) rather than allocated on demand.
- Check that the storage subsystem is configured for optimal performance. See the VMware knowledge base articles for details.
- Perform additional steps that are described in the VMware knowledge base article for troubleshooting virtual machine performance issues.
- Look in VMware community forums for additional information about troubleshooting VM performance issues.

If the cause of the performance problem cannot be determined, submit a support request to VMware.

Additional Information contained in the MiVoice Connect Release Notes

Each version of MiVoice Connect includes the *Release Notes* documentation. The *Release Notes* contain additional information for the specific MiVoice Connect version, including:

- New and updated features for the current version and each preceding version
- Detailed information for specific new and updated features
- Additional information and recommended considerations for the specific release
- Installation and deployment tips for system administrators
- Limitations

The *MiVoice Connect Release Notes* should be consulted along with the *MiVoice Connect Build Notice* whenever deploying or migrating MiVoice Connect on the VMware platform.

The *MiVoice Connect Release Notes* document is available on the Mitel Support site for the MiVoice Connect version.

Hyper-V Supported Configurations and Features

The following information is included for Microsoft Hyper-V. Please consult the current release of the *MiVoice Connect Build Notice* for the most current information.

Microsoft Hyper-V is support for Mitel MiVoice Connect HQ servers and DVS servers. The following is supported as of the time of this writing:

- Microsoft Hyper-V Gen 1 and 2 on Microsoft Windows Server 2008 and 2012 R2 Standard 64bit.
- Hyper-V Replica and Snapshots (can only be performed during service shutdown periods).

The following Hyper-V features are not supported for MiVoice Connect:

- Mitel software installations on non-HQ or DVS servers such as Call Recorder, Contact Center or Virtual Mitel Mobility Router
- Double Take

Additional Resources

- MiVoice Connect Build Notice
- MiVoice Connect Release Notes
- Mitel Connect Planning and Installation Guide
- MiVoice Connect System Administration Guide
- VMware vSphere / ESXi administration, support, and training documentation (available on the VMware web site)

Version	Date	Contributor	Content
1.0	March 8, 2012	Art Kreitman & Dieter Rencken	First release
1.1	April 27, 2012	Dieter Rencken	Updated to reflect compatibility with ShoreTel 12.2
1.2	January 21, 2013	Scott Caddes	Added to Configuration Best Practices
1.3	May 7, 2013	Steve Wood	Updated 5.0 to reflect 5.0/5.1
2.0	March, 2018	W. Toigo	Update for VMware 6, reworked to add references to Build Notes and other docs, Rebranded to Mitel.
2.1	August, 2018	W. Toigo	Removed specific supported VMware versions, and updated the note to consult the Build Notice.