

INTERACTIVE INTELLIGENCE
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VMware View

Technical Reference

Interactive Intelligence Customer Interaction Center® (CIC)™

Version 4.0

Abstract

This document describes the various client application testing that was performed in a VMware View environment. This reference applies to VMware View versions 4.6 and 5.x.

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Introduction

This document provides an overview of tests that were performed on Interactive Intelligence client applications in a VMware View environment. It contains technical insights and a general idea of what one may encounter while evaluating VMware View as a method of centralizing and consolidating contact center agent desktops. The information is presented herein as a courtesy and should not be taken as an exact representation of any customer environment. Our intent is to provide an additional resource for engineers as they consider migrating users of Interactive Intelligence desktop applications to a VMware View managed virtual desktop infrastructure.

Desktop Virtualization with VMware

VMware View is a product built by VMware to manage virtual desktops on the vSphere platform. It provides connection brokering and administrative capabilities not native to vSphere that make managing large quantities of desktop computers a much more simplified task. Instead of a traditional desktop, users connect to virtual machines hosted in the datacenter either using the View Client, or by connecting with a low-wattage Thin Client supporting View. VMware’s website explains in great detail the features and advantages this product can bring to your environment. We recommend visiting their product page if you have not already done so.

From the VMware View 4.6 Architecture Planning Guide:

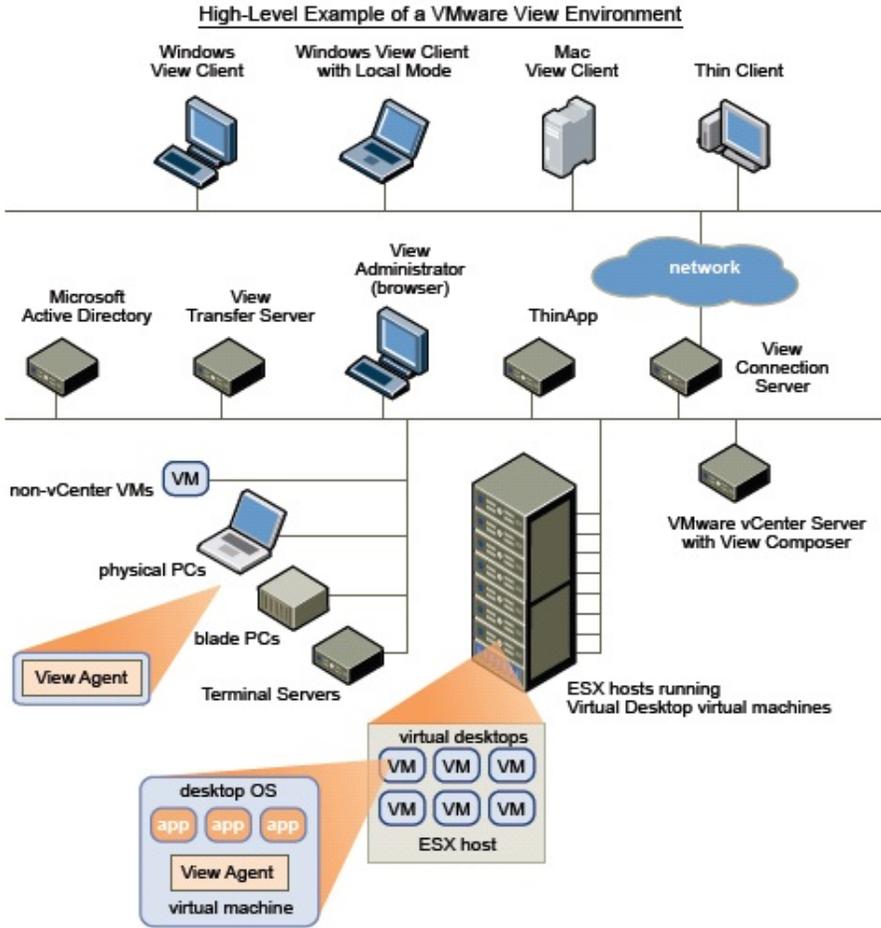


Figure 1

Goals

Our primary goal is to implement our mainstream Interaction Center 4.0 client-side applications into a VMware View environment, test them to ensure proper functionality, and support this type of deployment going forward. This enhances the diversity of implementation strategies available to our current and potential customers by allowing the entire desktop to be hosted centrally as opposed to just hosting the applications. Furthermore, VMware View provides numerous benefits such as ease of scalability, reduced power consumption, increased density per host, and lower administrative costs. This makes for an attractive choice over deployment to traditional desktop computers. VMware View is a creative and compelling solution that is well-suited for today's dynamic and rapidly evolving contact center.

Test Environment

Assets

A dedicated test environment has been built to mimic a small production VMware View cluster and facilitate testing of client-side applications. It includes a dedicated switch, four vSphere hosts, a small iSCSI SAN, physical Interaction Media Server, and two thin clients.

Switch: Cisco Catalyst 3560

vSphere hosts: Dell PowerEdge R610 with dual quad-core Intel Xeon E5620 CPU, 48GB RAM, and ESXi 4.1 Embedded (build 502767)

Storage: NetApp FAS2040 with 12 600GB 15k SAS drives and dual 1GbE iSCSI controllers. Each controller is configured with two interfaces (e0a,e0b) trunked together into a 2Gb virtual interface, making a total of four patch cables connecting the storage to the switch.

Media Server: Interaction Application and Storage Server 360 sourced from our own Global Logistics team.

Thin Clients: HP t5565 and WYSE P20

Phones: Two Polycom IP450 and one Plantronics DA55 with headset (for SIP Soft Phone tests)

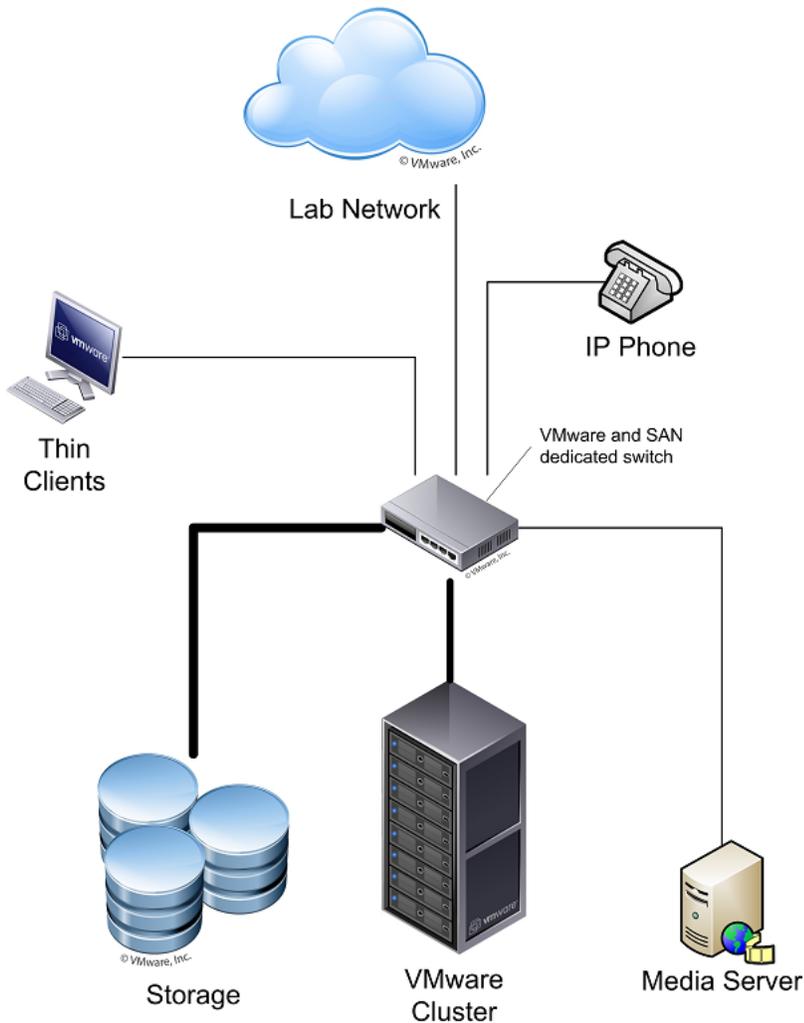


Figure 2: VMware Test Environment

VMware Configuration

Each vSphere host is configured almost identically. Management and vMotion each share a vSwitch, but have a dedicated adapter configured. All guest virtual machine traffic is isolated to a pair of active interfaces with load balancing set to route based on IP hash.

vCenter Server is installed in a virtual machine, as is View Connection Server. View Composer is configured.

Two hosts are licensed with vSphere Enterprise Plus, and two are licensed with vSphere for Desktops.

IC 4.0 Configuration

The virtualized Interaction Center 4.0 environment primarily consists of one virtual IC server, one physical Media Server, and two managed IP phones. The system is configured to use external Microsoft Exchange Server 2010 and Microsoft SQL Server 2008 R2 resources in the Testing lab. All client-side tests were performed on guest virtual machines hosted by the VMware cluster and run Microsoft Windows 7 Enterprise, 64-bit.

Tests, Issues, and Assumptions

Basic Functionality

Basic tests were performed on our mainstream client-side applications to ensure functionality in a VMware View environment. The tested applications all came from the ICUserApps.msi, ICServerManagerApps.msi, and ICBusinessManagerApps.msi packages. Test Cases were selected either to test a specific feature or to ensure that mechanics and presentation of the software performed in the same way as a comparable installation on a standard desktop computer.

Applications such as Interaction Designer, Interaction Host Recorder Client, SOAP Tracer, and Interactive Update Client were not evaluated.

Testing has been performed using VMware View 4.6 as well as version 5.0.

Environment-Specific Tests

Extra effort was placed on ensuring that some tests took advantage of key features present in an enterprise VMware View environment. Furthermore, we simulated issues that would be unique to this infrastructure to replicate some scenarios that users might encounter in their own deployments. These tests were fairly simple and in many cases were extensions of existing basic functionality tests.

For example, one test simply opened a call from a SIP Soft Phone "User1" to a handset "User2". Both users in this scenario use thin clients connected to VMware View virtual desktops using PCoIP. Once the call was established, a vMotion migration was performed moving the User1's desktop from one host to another. We wanted to know if audio would be restored, and if the call would disconnect or not. Other than some gaps (explained in SIP Soft Phone section), we are pleased to say that the call was maintained.

SIP Soft Phone

VMware View 5.0 includes a new feature called View Media Services for Integrated Unified Communications that is designed to improve the efficiency and quality of VoIP applications utilized within VMware View. At the time this document was published, this feature was not utilized by Interaction Client or any other Interactive Intelligence products. Due to serious issues surrounding the way PCoIP decreases audio quality combined with the lack of QoS support for the audio, we are unable to support SIP Soft Phone in VMware View environments. While it is technically possible to attach a headset to a thin client that is using PCoIP to connect to a virtual desktop and experience normal audio quality, it is not recommended for anything but occasional use in a test environment. Simply put, there are too many uncontrollable factors that can affect audio quality.

PCoIP

While PCoIP (Teradici PC-over-IP®) does provide significant improvements to the virtual desktop experience such as streaming audio and video, it does not provide a way to prioritize those elements. PCoIP is a UDP stream. By design, UDP does not have error correction and is thus considered unreliable. However, it does provide performance benefits over TCP in that it will lose packets rather than delaying them. This, in part, is why the desktop experience remains usable even in environments with increased latency.

When using the SIP Soft Phone on a traditional workstation, audio is passed into the headset and transitions into the workstation via the USB port. The SIP Soft Phone application can then generate the RTP packets, which contain the QoS DSCP markings to ensure they can be prioritized on the network, and those RTP packets move on to their destination.

When a headset is attached to a thin client using PCoIP with VMware View 4.6, the data going into the USB port becomes encapsulated within the overall PCoIP stream and is then processed by the virtual machine.

RTP is generated by the virtual machine, just as it would be with a physical desktop. The RTP packets leave the vSphere host with DSCP markings, but up until that point the audio is encapsulated and completely reliant on the success of PCoIP. There is no visibility of the audio within the PCoIP stream, and it cannot be prioritized over other elements of the desktop experience. PCoIP best practices do include configuring QoS to prioritize PCoIP behind VoIP traffic, but this is not enough to guarantee audio quality in congested environments and is instead designed purely to maintain overall desktop usability. When PCoIP is used in congested networks, it will dynamically adjust its bandwidth usage by reducing overall quality, thus affecting the quality of SIP Soft Phone audio.

VMware vMotion

What is vMotion? Simply put, VMware vMotion is a feature that allows a live virtual machine to migrate from one vSphere host to another without having an outage. Appropriate licensing, shared storage, vCenter Server, and a VMkernel port with vMotion enabled on the host are among the key prerequisites to configuring this feature on a vSphere cluster.

The VMware View 4.6 virtual desktop experience relies heavily on having decent bandwidth and lower latency between the thin client or View Client, and the virtual desktop on the vSphere host. When performing a vMotion migration of a desktop virtual machine, it is normal to experience slight freezes of a few seconds as the cutover is made. Where this becomes an issue is when a headset attached to a thin client USB port is used to make a call with SIP Soft Phone. The listener will hear gaps in the audio at certain points in the migration. This is shown in the audio capture below.

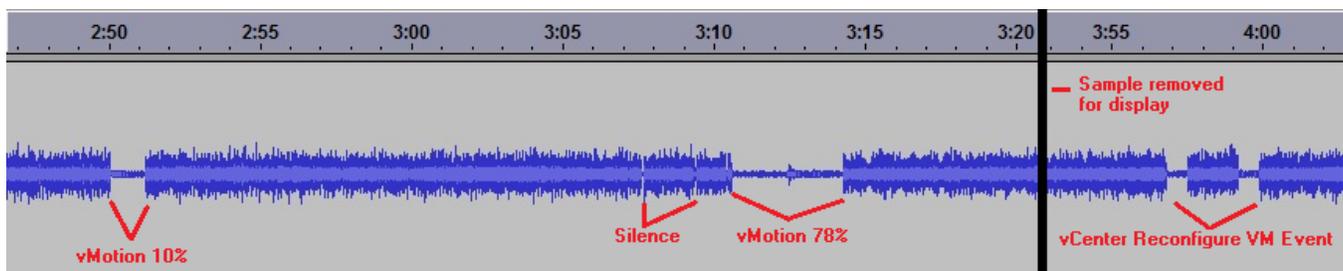


Figure 3: Effect of vMotion on Audio

The waveform in Figure 2 represents a two-way recording made from a call where a user (User1) is using SIP Soft Phone to call another thin client user using a handset. Prior to testing, Interaction Recorder was configured to capture all calls to or from User1. In the test, monaural audio was fed from a handheld music player into a USB audio device attached to a WYSE P20 Zero Client connected to a VMware View virtual desktop using PCoIP. High-quality rock music was played (User1) to the recipient of the call (User2) and both sides of that call were recorded. A vMotion was then initiated and this virtual machine was moved to another host in the cluster. There are several silence gaps in the waveform where environmental noise is captured from the handset, but nothing is transmitted from the SIP Soft Phone user to that handset. The first gap occurred at the 10% mark and was approximately one second long. The second occurred at the 78% mark and was almost four seconds long. There were two minuscule silence gaps only viewable at significant zoom levels, and two "reconfiguration" events that were initialized by vCenter Server following completion of the vMotion that each caused half-second gaps.

It is important to understand the impact that a vMotion can have in your environment and to minimize the impact they can have on your calls. The following events are typical causes for vMotion migrations in production environments:

- Placing a vSphere host into Maintenance Mode
- DRS (Dynamic Resource Scheduler) automatically rebalancing the distribution of workloads in the cluster
- DPM (Distributed Power Management) detecting that hosts can be powered down to conserve resources, placing hosts in standby and thus causing DRS to automatically redistribute the workloads

- Automated actions initiated by administrator-configured alarms (ex: redundant power supply failure raises a custom red alert, initiating a transition into Maintenance Mode)
- Manual vMotion performed by an administrator

VMware HA

Catastrophic failure of a vSphere host is mitigated by using VMware HA, not vMotion. When a host in the cluster fails, all guest virtual machines will immediately start back up on the remaining available hosts. The net effect on a production environment is the same as that of a power failure to a traditional desktop. In the case of SIP Soft Phone, the desktop is processing the RTP for the active call. When this desktop is virtual and the vSphere host fails, the SIP Soft Phone user essentially disappears from an active call without disconnecting. The call will remain active for approximately two minutes before timing out. In the mean time, VMware HA detects the host failure and restarts any guest virtual machines of the failed host, including the one used by our example SIP Soft Phone user. If the user is using a separate handset instead of the SIP Soft Phone, two-way audio remains and the call can be continued without the use of Interaction Client.

Appendix A: Support Matrix

The following is a list of Interaction Center 4.0 applications and features that were tested on Windows 7 in the VMware View test environment and our corresponding support stance. PCoIP (Teradici PC-over-IP®) was used to connect thin clients with desktop virtual machines. RDP (Remote Desktop Protocol) and prior releases of Interaction Center were not tested.

Application/Feature	Supported (View 4.6, 5.x)	Notes
Interaction Client	Yes	Client is not aware that it is running in a Thin Client/PCoIP environment. Loss of connectivity to the datacenter does not affect state of the desktop virtual machine and does not change the user's status.
Interaction Voicemail Player	Yes	
Interaction Fax	Yes	
SIP Soft Phone	No	See the SIP Soft Phone section for details.
IC Server Manager	Yes	
Interaction Process Automation	Yes	Includes Designer, Monitor, and Reporter
Interaction Administrator	Yes	
Interaction Attendant	Yes	
IC System Manager	Yes	
IC Business Manager: Supervisor	Yes	
IC Business Manager: Feedback	Yes	
IC Business Manager: Recorder	Yes	

Appendix B: Environment Tests and Results

Test	Behavior
Thin Client power/network outage/disconnect during a call	Call remains and two-way audio continues. Status remains unchanged. Interaction Client is unavailable to the user although the desktop is still running in the vSphere host. If the user is using SIP Soft Phone with an attached headset, audio goes silent and should restore following a reconnect.
vMotion of a desktop virtual machine	Slight freezes in the user experience typically occur, but otherwise it is a smooth transition. SIP Soft Phone users will have periods of silence where two-way audio is lost.
vSphere host failure	VMware HA will detect the failure and start all failed guest virtual machines on remaining hosts in the cluster. SIP Soft Phone users will drop without disconnecting and a timeout of the call will occur approximately two minutes after the failure.
Unplugging a USB headset from a thin client during a call with SIP Soft Phone	Plugging back in restores audio. In testing, there were iterations where audio did not resume when plugged into a different port on the thin client. This was traced to the removal of an audio device from Windows and creation of a new and different device that was not then initialized by the SIP Soft Phone. It helps to always plug back into the same port, or to establish function on each port prior to taking calls in production.

Change Log

The following changes have been made to this document since release.

Change	Date
Initial Release	March 1, 2012
Revision	March 15, 2012
Revision (following completion of testing on View 5)	December 11, 2012