



Testing Mitel Contact Center and Call Accounting Software with VMware vCenter™ Site Recovery Manager, vSphere™ Advanced Features, and vCloud™ Director

May 2012

DEPLOYMENT AND TECHNICAL CONSIDERATIONS GUIDE

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Introduction

Mitel Contact Center and Call Accounting software delivers a scalable and resilient solution that provides businesses with a “virtual contact center” that streamlines contact center management and improves worker productivity. It integrates the capabilities of the Mitel IP communications platform with a modular suite of web-based applications that support unified communications features including voice, email, web chat, fax, Short Message Service (SMS) distribution, and social media integration.

When Mitel Contact Center and Call Accounting is run in the VMware® vSphere™ virtual environment, this solution can provide for disaster recovery using VMware vCenter™ Site Recovery Manager. In a disaster, Site Recovery Manager can be used to support business continuity and disaster recovery for mission critical applications rapidly within predefined timeframes.

When a disaster occurs, businesses initially expect to operate in “survival” mode by restoring only those business processes that are essential to keep the company running based on their business impact analysis. Site Recovery Manager can support the recovery of critical business processes that are typically defined using two types of objectives:

- **Recovery Time Objective (RTO)** – The RTO defines the criticality of each business process, such as finance or call center operations and its dependencies, in the event of a disaster. The RTO quantifies how rapidly the organization will need to have these business processes up and running.
- **Recovery Point Objective (RPO)** – For each critical business process, the RPO quantifies the minimal amount of data the business needs to restore for recovery, and to what point in time the data needs to be restored, such as to the prior week or month.

In addition to disaster recovery, businesses using Mitel Contact Center and Call Accounting want to ensure the best operational performance using VMware vSphere advanced features including vMotion, Distributed Resource Scheduling (DRS), High Availability (HA), and Fault Tolerance. Many businesses also want to be able to run their solution securely from the cloud by using VMware vCloud Director in order to build secure, multi-tenant private clouds.

As a result of this testing, Mitel supports using VMware vCenter Site Recovery Manager, and vSphere advanced features, with Mitel Contact Center and Call Accounting including Mitel Contact Center Enterprise Edition. Mitel also supports using VMware vCloud Director for cloud-based computing.

This paper describes the functional testing that was performed using Mitel Contact Center and Call Accounting with Site Recovery Manager, advanced vSphere features including vMotion, DRS, HA, and Fault Tolerance, and vCloud Director. This paper is written for experienced architects and engineers who are responsible for the VMware virtualization environment. It assumes that the reader has knowledge of the VMware and Mitel products described in the paper.

Mitel Contact Center and Call Accounting

Mitel provides business communications solutions for small, medium size, and large scale enterprise contact centers. Mitel Contact Center and Call Accounting unites distributed call center operations into one virtual contact center, enabling improved workforce optimization and increased business agility for a lower total cost of ownership (TCO).

The Mitel Contact Center Enterprise Edition is a highly scalable licensed add-on to their Contact Center and Call Accounting software that combines the Mitel IP communications platform, Automatic Call Distribution (ACD), and a modular suite of web-based applications. This Mitel solution streamlines contact center management and enables “agents anywhere” productivity tools. It uses the Multimedia Contact Center (MCC) module to enable unified communications including voice, email, web chat, fax, SMS distribution, and social media integration.

This solution enables the customer’s site configuration to determine the size and scope of the deployment. When the customer wants to expand their site capability, the deployment can be easily scaled based on the number of employees being tracked across the enterprise, rather than by using other factors, such as the number of concurrent network users, contact center traffic levels, or internet connectivity.

The requirements for using Mitel Contact Center and Call Accounting include achieving economies of scale by operating in a virtual contact center environment that:

- Is comprised of multiple sites.
- Includes more than 25 agents and five supervisors per site.
- Handles contacts by phone, email, web chat, fax, and SMS.
- Provides for social media integration.
- Runs enterprise-wide reports including trace and event reports (with over 140 report templates).
- Provides enterprise wide, real time statistics on desktop marquees.
- Identifies and controls in-queue callers and changes their answer priority in real time.
- Requires a resilient setup.
- Forecasts staffing requirements.
- Schedules agents and measures schedule adherence.

For more information on Mitel Contact Center and Call Accounting, see the Resources section later in this paper.

Functional Testing Overview

VMware and Mitel jointly conducted functional testing on the Mitel Contact Center and Call Accounting software and related products running both in the vSphere 4.1 and vSphere 5 virtualization environments.

The testing that was performed was divided into scenarios including:

- **vCenter Site Recovery Manager testing.** Demonstrate that Mitel Contact Center and Call Accounting can run successfully with VMware vCenter Site Recovery Manager to enable disaster recovery in deployments that run both in the VMware vSphere 4.1 and vSphere 5 environments:
 - Confirm that the Mitel Contact Center and Call Accounting server can fail over to the recovery site using Site Recovery Manager with asynchronous replication and maintain application functionality without corrupting the in-use databases.
Note: Site Recovery Manager also supports a synchronous solution, although it was not included in this testing. For more information, see the Resources section later in this paper.
 - Confirm that both the users and the Mitel Contact Center and Call Accounting server can connect once these applications are running at the recovery site.
- **vSphere advanced features testing.** Demonstrate the functionality of the advanced features for VMware vSphere including vMotion, DRS, HA, and Fault Tolerance. Verify that these advanced features can be used to increase IT agility and operational performance with Mitel Contact Center and Call Accounting.
- **Mitel appliances on vCloud Director testing.** Demonstrate the functional capabilities of vCloud Director with Mitel Contact Center and Call Accounting in a cloud-based environment.

This paper provides separate descriptions of each of these testing scenarios in each of the following sections.

vCenter Site Recovery Manager Testing

This testing scenario describes the functional testing that was performed on the Mitel Contact Center and Call Accounting software and related products running both in the vSphere 4.1 and vSphere 5 virtualization environments with VMware vCenter Site Recovery Manager.

This testing scenario describes:

- vCenter Site Recovery Manager
- Test workload generation
- Testing architecture
- Testing scenario
- Solution configuration steps

- Testing results and observations
- Recommendations

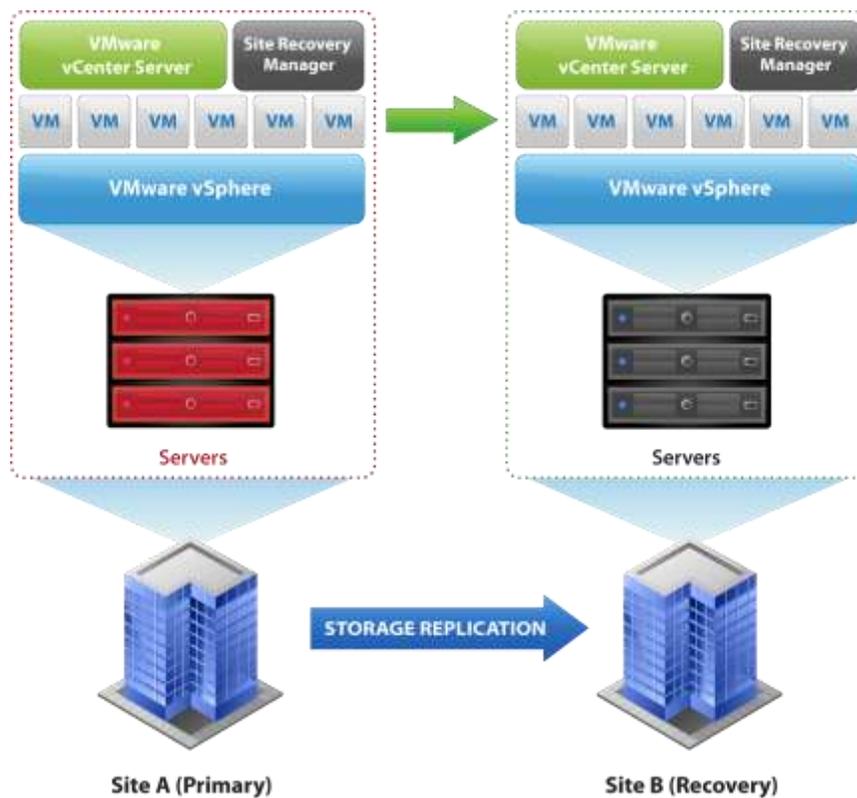
Each of these topics is described in the sections below.

vCenter Site Recovery Manager

Site Recovery Manager is an extension to VMware vCenter that simplifies and automates disaster recovery when Mitel Contact Center and Call Accounting runs as a workload in a VMware environment. Site Recovery Manager orchestrates disaster recovery and integrates failover with other enterprise applications.

Figure 1 depicts the typical architecture of Site Recovery Manager that includes storage array replication across two sites.

Figure 1. Site Recovery Manager architecture



Site Recovery Manager is a business continuity and disaster recovery solution that allows businesses to plan, test, and execute a scheduled migration or emergency failover of vCenter inventory from one site to another.

For Site Recovery Manager, as virtual machines at the protected site are shut down, virtual machines at the recovery site start up and use data replicated from the protected site to provide the same services.

In this scenario:

- The two datacenters are not synchronized in real time (asynchronous replication), although the lag time for replication is just a few seconds. Failover and recovery require only a few minutes.
- Site Recovery Manager controls the transfer of services by using a recovery plan that specifies the order in which the virtual machines are shut down and start up, compute resources are allocated, and network access is given.
- It enables fast and accurate recovery by maintaining duplicate copies automatically when data spanning multiple volumes and storage systems is replicated across long distances.

Site Recovery Manager enables the testing of recovery plans in a way that does not disrupt ongoing operations at either site. For example, Site Recovery Manager:

- Creates a temporary copy of the replicated data to test the failover process and ensures that the secondary image is consistent and usable.
- Relies on independent vCenter servers both at the protected site and recovery site to facilitate the failover process.

With Site Recovery Manager, disaster recovery becomes an integrated part of managing the VMware virtual infrastructure. It is implemented using a storage vendor-supplied storage replication adapter (SRA) that is tightly integrated with vCenter, vSphere, and the storage platform.

The SRA plugin, installed on the Site Recovery Manager server, manages communication with the storage platform. The Site Recovery Manager SRA for the NetApp storage platform used in this testing scenario is tightly integrated with NetApp storage replication technologies, as described below. For a complete list of storage platforms that are compatible with VMware, see the Resources section later in this paper.

Note: The latest release of Site Recovery Manager supports host-based replication, which can eliminate the need to maintain an identical storage array at the recovery site. It can enable the use of low cost, direct-attached storage for disaster recovery purposes and allow for more granular, virtual machine level replication.

For more information, go to What's New in VMware vCenter™ Site Recovery Manager 5.0 at: <http://www.vmware.com/files/pdf/techpaper/Whats-New-VMware-vCenter-Site-Recovery-Manager-50-Technical-Whitepaper.pdf>

By using Mitel Contact Center and Call Accounting with Site Recovery Manager, businesses gain these key advantages:

- Gets you back in business rapidly and it allows customers to avoid loss by expediting failover and recovery from a major service disruption in alignment with the defined RTOs and RPOs.
- Ensures that business critical contact center applications are protected using built-in disaster recovery features that are highly and continually available, redundant, and fully recoverable.
- Accelerates disaster recovery by minimizing its inherent risks and downtime such as by eliminating manual recovery steps.
- Delivers advanced capabilities for disaster recovery management, non-disruptive testing, and automated failover, especially with long-distance replication.
- Enables automated failover across geographically-dispersed locations.
- Requires minimal administration and minimal additional hardware.
- Enables customers to expand protection to other important systems and applications.

SAN Storage and Data Replication

For this testing, Site Recovery Manager was used with the NetApp FAS 3020 storage platform and its SnapMirror 1.4.3 technology using the SRA for NetApp, as described below.

NetApp SnapMirror

For this testing, NetApp Fabric-Attached Storage (FAS) storage platforms were used to test automated asynchronous replication and its effect on the failover of the Mitel Contact Center and Call Accounting server. The NetApp SRA for Site Recovery Manager integrates with SnapMirror to enable the automated failover of Virtual Machine File System (VMFS) datastores from the protected site to the recovery site. Site Recovery Manager uses the NetApp SRA and SnapMirror to enable integration for replication and disaster recovery purposes.

Built on NetApp Snapshot™ technology, SnapMirror replicates only the 4 KB blocks that have been changed or added since the previous update. SnapMirror can be combined with FAS deduplication utilized on the primary storage platform to ensure that only unique data is replicated to the recovery site. This results in increased telecommunications savings and reduced storage capacity at the recovery site. SnapMirror is easily configured using NetApp Protection Manager components such as Data ONTAP® command language interpreter (CLI) and FilerView® web-based graphical management interface.

When the primary storage is not completely lost, SnapMirror resynchronizes both the protected site and recovery site, and transfers only changed or new data back to the recovery site.

Test Workload Generation

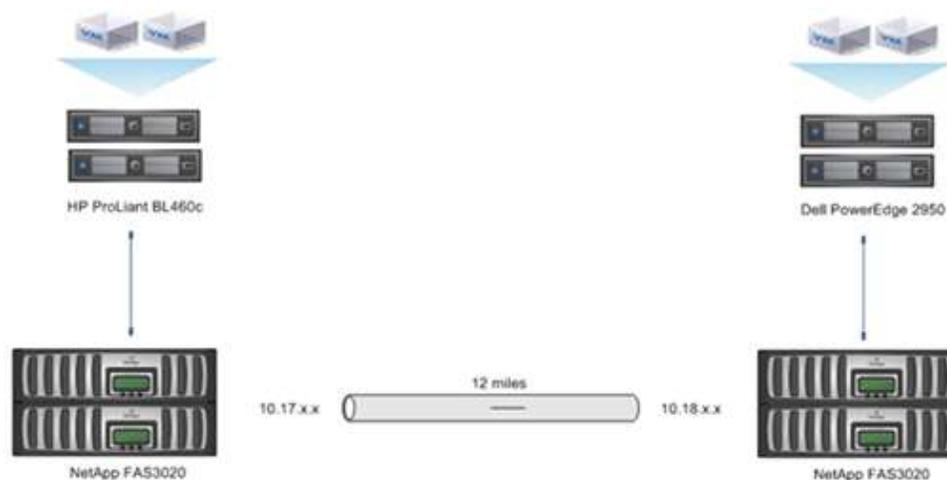
The testing of Mitel Contact Center and Call Accounting with Site Recovery Manager was performed using the Multimedia Contact Center Client. This application was used to connect to Multimedia Contact Center agents to perform tests including:

- Email and fax send and receipt verification. Multimedia Contact Center queue auto acknowledgements; email, fax, and web chat.
- Web chat features including chat initiation, chats submitted on web forms and to agents, chat transcripts sent to the client, invalid email on the Chat Now form, multiple chats in real time update using the Queue Now monitor, and chat logging turned off and on.
- Web chat, email, and fax queues/re-queue timers, hold duration, queue interflow, chat queue business hours, and email business hours.
- New mail, web chat, and fax messages sent to the repository Originals folder, and email, web chat, and fax replies sent to the repository Replies folder.
- Average/total ACD handle time; make busy time/count, IDLE time, and login/logout times.
- Queue ACD opened, completed, interflowed, and re-queued, transferred emails, and junk email.
- Connectivity between the Mitel Communications Director (MCD) and the Mitel phones.

Testing Architecture

VMware provided the facilities used to perform the testing described in this paper. Figure 2 depicts the architecture used to test Mitel Contact Center and Call Accounting workloads with Site Recovery Manager.

Figure 2. VMware Site Recovery Manager testing architecture



The testing architecture is described below:

- The lab environments for the protected site and recovery site were built in two VMware datacenters in Palo Alto, California, with the sites located approximately 12 miles apart.
Both the protected site and the recovery site run VMware vCenter Server in a virtual machine that is configured on VMFS storage. Each vCenter Server runs in a virtual machine in order to take advantage of vSphere advanced features including vMotion, DRS, HA, and Fault Tolerance. The protected site and recovery site are configured using the NetApp FAS 3020 storage platform.
- Site Recovery Manager is installed on independent vCenter servers both at the protected site and recovery site to enable communication between these sites.
- For data replication, the storage platforms used at both the protected site and recovery site were configured using asynchronous replication mode:
 - Asynchronous replication is supported, although it might result in minimal data loss during failover. (Contact the storage vendor for detailed information.)
Note: Site Recovery Manager also supports a synchronous solution, although it was not included in this testing. Synchronous replication is the preferred SAN replication strategy for mission critical data because there is negligible risk of data loss in the event of failover. For more information, see the Resources section later in this paper.
 - Domain Name System (DNS) is set up with its routing capability enabled.
 - After the Mitel Contact Center and Call Accounting server at the protected site fails over to the recovery site, the new IP address is automatically registered in DNS.
 - Once the Mitel Contact Center and Call Accounting server is up and running, communication is established through a fully qualified domain name (FQDN).

Testing Scenario

In this scenario, the testing goals are to verify that Site Recovery Manager can enable disaster recovery in deployments that run in a VMware environment:

- Confirm that the Mitel Contact Center and Call Accounting server can fail over to the recovery site using Site Recovery Manager with asynchronous replication and maintain application functionality without corrupting the in-use databases.
- Confirm that both the users and the Mitel Contact Center and Call Accounting servers can connect once these applications are running at the recovery site.

For asynchronous testing, the NetApp SRA plugin was installed on the vCenter servers at the protected site and recovery site to facilitate a Site Recovery Manager testing workflow, and to create a clone of the replicated logical unit numbers (LUNs) to synchronize data between the two sites. For this testing, the schedule for replicating changed or updated data from primary storage to secondary storage device was every 60 seconds.

The testing exercised the Mitel Contact Center and Call Accounting server using the test workload with a forced failover. During the failover process, the server was not responsive until it was fully up and running at the recovery site. After failover, the Mitel Contact Center and Call Accounting software was tested on the virtual machine at the recovery site.

Solution Configuration Steps

For this testing, Site Recovery Manager enables the VMware environment at the protected site and recovery site to communicate. Each of the sites was configured as outlined below.

Protected Site

The protected site configuration included:

1. Configure the connection between the Site Recovery Manager servers at the protected and recovery sites.
2. Install the SRAs for NetApp FAS 3020 1.4.3 and configure ArrayManager using Site Recovery Manager.
3. Configure the inventory preferences that provide the mappings between compute resources, virtual machine folders, and networks on the protected site, and their counterparts on the recovery site.

Note: To configure the mappings, go to the Site Recovery Manager, Administration Guide and follow the instructions in the Configure Inventory Preferences section at: http://www.vmware.com/pdf/srm_10_admin.pdf

4. Create the protection group named Mitel-Protection for the virtual machines at the protected site.

Site Recovery Manager can be used to add virtual machines that share common resources to protection groups at the protected site. Protection groups can be configured into recovery plans for restoration at the recovery site.

Recovery Site

The recovery site configuration included:

1. Create a recovery plan named Mitel-Recovery.
2. In the recovery plan, enable the option to suspend non-critical virtual machines that are running at the recovery site in the event of a disaster to free computing resources. Typically, the hardware resources at the recovery site are used to host non-critical virtual machines during normal operations such as for Test and Dev instances.
3. Prioritize the start order of the virtual machines as required.
4. Create a post power-on command to execute the script on the virtual machines after failover.

Recovery Plan Execution

When the recovery plan is executed, Site Recovery Manager:

1. Breaks the NetApp SnapMirror relationships between the protected site and recovery site.
2. Maps the LUNs to the existing NetApp snapshots.
3. Triggers the disaster recovery ESX hosts to rescan and detect the storage.
4. If needed, suspends virtual machines such as any Test or Dev instances at the recovery site in order to free computing resources.
5. Reconfigures the virtual machines as defined for the network at the recovery site.
6. Powers on the virtual machines in the order defined in the recovery plan.
7. After boot up, the Mitel Contact Center and Call Accounting server automatically receives the new IP address that was customized using the DNS IP customizer tool.

For more information, go to the Site Recovery Manager Administration Guide, starting with the IP Address Mapping section, at:

<http://www.vmware.com/pdf/srm-admin.pdf>

Testing Results and Observations

After the testing of Site Recovery Manager was completed, these observations were made:

- All the virtual machines were cleanly powered on at the recovery site.
- Using the VMware VIX API, the IP addresses were changed at the guest and application level.
- The server responded to its name properly at the new IP address location.
- When the Mitel Contact Center and Call Accounting server was fully backed up, users were able to connect to the server at the new location without issue.
- All testing of Mitel Contact Center and Call Accounting passed without issue.
- There were no errors to indicate any significant data loss or data contamination.

The testing results demonstrate that Site Recovery Manager provides a flexible, high performance, high availability platform for disaster recovery that is fully compatible with Mitel Contact Center and Call Accounting software when it runs in a VMware environment.

As a result of this testing, Mitel supports using VMware vCenter Site Recovery Manager with Mitel Contact Center and Call Accounting including Mitel Contact Center Enterprise Edition.

The testing included running workloads in an asynchronous configuration only. In this scenario, the potential for data loss such as the loss of email messages is minimal, and it can be anticipated. However, data loss can be minimized within the NetApp array by reducing the synchronization window schedule and/or by using other types of complementary data protection technologies.

Note: When avoiding data loss is a significant issue, consider using a synchronous solution as the best practice.

Recommendations

The recommendations derived from the testing of Site Recovery Manager are described below. These and other recommendations are discussed in more detail in the VMware Site Recovery Manager documentation. For more information, see the Resources section later in this paper.

- Install the Site Recovery Manager database as close to the Site Recovery Manager server as possible to reduce the round-trip time. Reduce the effect of round trips on recovery time performance. Use the same database server to support the vCenter database instance and the Site Recovery Manager database instance.
- Enable faster testing and actual recovery by grouping virtual machines under fewer protection groups. Ensure that the virtual machines have no constraints preventing them from being added to similar protection groups.
- Enable DRS at the recovery site. Migrations might occur as DRS tries to load balance the cluster during recovery.
- Distributed Power Management (DPM) can be enabled on recovery site clusters for the hosts that are in a standby state to ensure that adequate physical resources are available at the recovery site. More hosts lead to increased concurrency for recovering virtual machines, enabling shorter recovery times.
- Chart the dependencies between virtual machines. To reduce overall failover times, define recovery priorities and assign virtual machines to appropriate protection groups.

As an alternative to placing virtual machines in a high priority group, separate all of the virtual machines to be recovered into two logical groups:

- Group1 with level 1 virtual machines – Place Group1 virtual machines in the normal priority group.
- Group2 with level 2 virtual machines (dependent upon virtual machines in Group1) – Place Group2 virtual machines in the low priority group within the same plan.

This will maintain dependency across both of these logical groups and reduce the recovery time by introducing more concurrency for these groups. Dependency is maintained between priority groups. There is no dependency across virtual machines within a single priority group.

- It is strongly recommended that VMware tools be installed in all protected virtual machines in order to accurately acquire their heartbeats and network change notification.
- Make sure any internal script or callout prompt does not block recovery indefinitely.
- Specify a non-replicated datastore for swap files to speed up replication between the two sites and remote calls to vCenter Server. During recovery, delete swap files for all of the virtual machines.

- VMware recommends a minimum of two ESX hosts at the recovery site. Although this is not a requirement, having two ESX hosts ensures availability for VMware services such as vMotion, HA, and DRS, and it improves the recovery time.
- Site Recovery Manager relies on the capabilities of the storage platform for failover. Recovery time can vary depending on the SAN vendor, replication type, and other factors. It can take 5 to 10 minutes to make the changes to the back-end storage. Follow VMware best practices for Site Recovery Manager, along with the SAN vendor's best practices, to ensure an optimal recovery time.

vSphere Advanced Features Testing

This testing scenario demonstrates that vSphere advanced features including VMware vMotion, DRS, HA, and Fault Tolerance can be used to increase IT agility and improve the operational performance of Mitel Contact Center and Call Accounting. The testing results demonstrate that these vSphere advanced features are fully compatible with Mitel deployments that run in a virtual environment.

As a result of this testing, Mitel supports using vMotion, DRS, HA, and Fault Tolerance with Mitel Contact Center and Call Accounting software including Mitel Contact Center Enterprise Edition.

Note: VMware provided the facilities used to perform the testing described in this paper, as described in Figure 2.

vMotion

vMotion enables the live migration of running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. This capability makes hardware maintenance possible at any time and vMotion does not require clustering or redundant servers. In addition, vMotion can move online workloads from one ESX Server host machine to another in order to maintain service levels and performance goals.

Figure 3. VMware vMotion



Testing Results

For this testing, vMotion was used to migrate the Mitel Contact Center and Call Accounting server virtual machine. The test was performed to verify that all Mitel components performed well during and after the migration. The vMotion migration was completed in approximately 80 seconds with no failures, indicating that user activity can continue successfully during vMotion events. No negative affect on transaction execution time was observed. Multiple live migrations were performed without noticeable downtime.

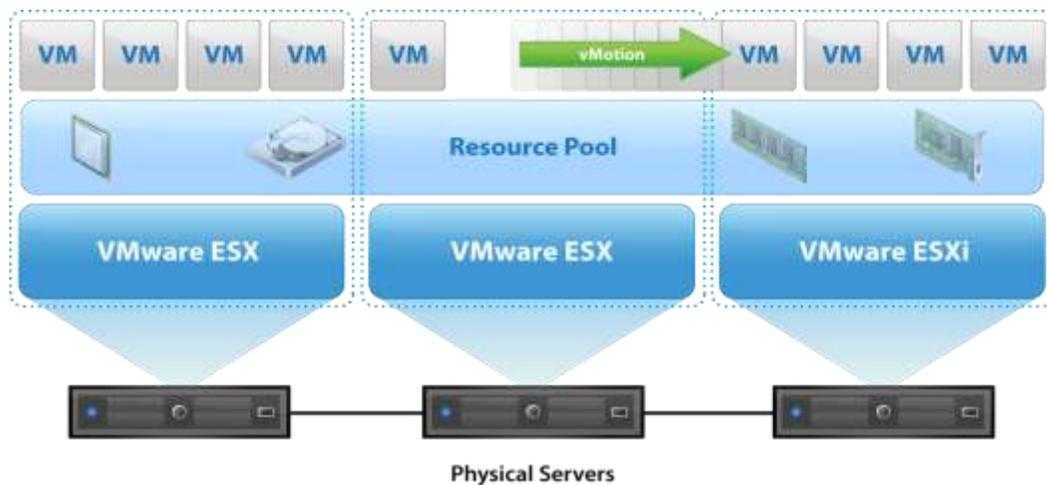
Additionally, the following observations confirm the compatibility of the Mitel Contact Center and Call Accounting during the testing of the vSphere advanced features:

1. All Mitel phones involved in the testing came up cleanly. MCD and other components involved in the tests functioned as expected.
2. View statistics were presented on the desktop marquee for agents and supervisors.
3. All chat services were functional.
4. Exchange was able to send and receive emails without any issues.

Distributed Resource Scheduling

DRS is an automated load balancing technology that takes advantage of vMotion to migrate virtual machines among a set of ESX hosts. DRS provides automatic initial virtual machine placement on any of the hosts in the cluster. It also makes automatic resource relocation and optimization decisions as hosts and virtual machines are added or removed from the cluster. When DRS is configured for manual control, it makes recommendations for review and later implementation only; there is no automated activity.

Figure 4. VMware Distributed Resource Scheduling



Testing Results

VMware DRS was tested with Mitel Contact Center and Call Accounting to verify whether all Mitel components would continue to work after DRS was triggered and the virtual machine moved between different hosts. Since DRS is based on vMotion, this DRS testing also validated the vMotion findings of the previous test.

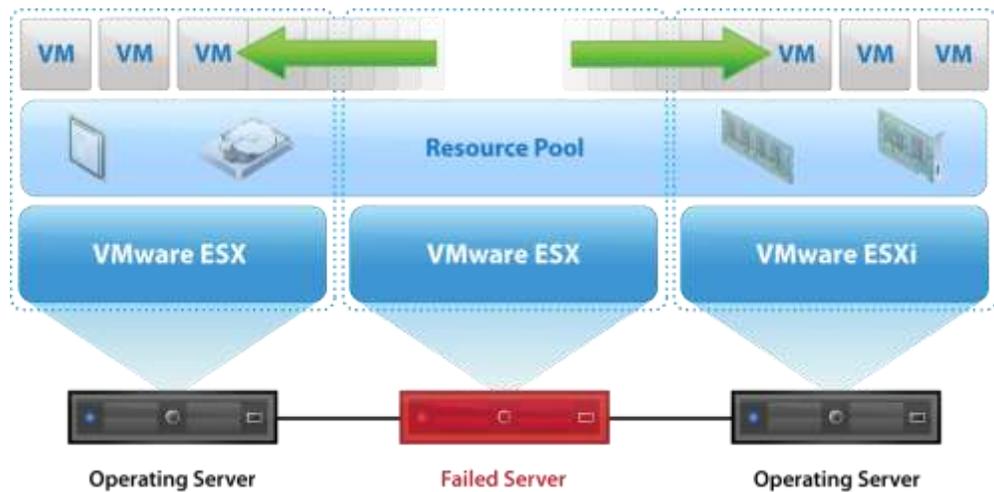
DRS was configured to Automatic-mode with the default Aggressiveness setting enabled. One of the ESX hosts was configured with the virtual machine. After DRS was triggered, it was observed that the virtual machine was migrated from the source ESX to the other ESX host in the cluster. There were no failures reported.

High Availability

VMware HA delivers the high availability many applications running in virtual machines require, independent of its operating system or underlying hardware configuration. HA provides failover protection from hardware and operating system failures in the virtualized IT environment by:

- Monitoring virtual machines to detect operating system and hardware failures.
- Restarting virtual machines on other physical servers in the resource pool, without manual intervention when a server failure is detected.
- Protecting applications from operating system failures by automatically restarting virtual machines when an operating system failure is detected.

Figure 5. VMware High Availability



Testing Results

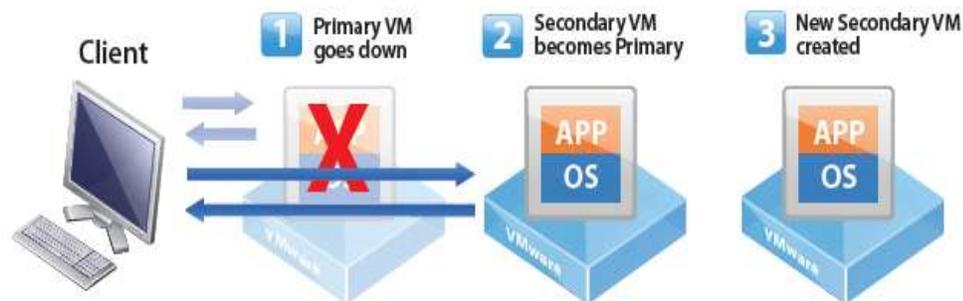
HA testing was performed after an ESX host failure was detected. The Mitel Contact Center and Call Accounting virtual machine was restarted on a different ESX host in the cluster without human intervention. All of the services on the virtual machine were started automatically and no failures were observed. After HA was triggered, the Mitel virtual machine rebooted on the other host in the cluster in approximately three minutes. All application services started automatically without issues.

Fault Tolerance

VMware Fault Tolerance allows virtual machines to continue running even when server failures occur. When Fault Tolerance is enabled on a virtual machine called the Primary VM, a copy of the Primary VM, called the Secondary VM, is automatically created on another host that was chosen by DRS. If DRS is not enabled, the target host is chosen from the list of available hosts. Fault Tolerance then runs the Primary and Secondary VMs in lockstep with each other – essentially mirroring the execution state of the Primary VM to the Secondary VM.

During a hardware failure that causes the Primary VM to fail, the Secondary VM immediately picks up where the Primary VM ended. It continues to run without any loss of network connections, transactions, or data.

Figure 6. VMware Fault Tolerance



Testing Results

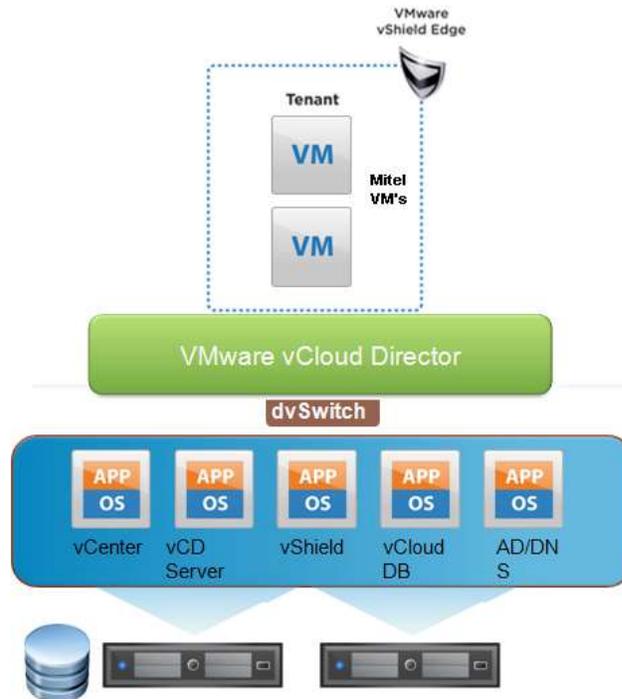
Fault Tolerance was enabled on the Mitel Contact Center and Call Accounting virtual server, making it the Primary VM. The Secondary VM was automatically created and assigned to an ESX host, sharing the same disk as the ESX host running the Primary VM. When the ESX host running the Primary VM failed, the Secondary VM immediately went live and acted as the Primary VM.

Note: Fault Tolerance supports deployments of Mitel Contact Center and Call Accounting with the configuration of virtual machine resources to a maximum of 1 vCPU only. Fault Tolerance does not support larger scale deployments of Mitel Contact Center and Call Accounting that require a multiple vCPU resource allocation.

Mitel Appliances on vCloud Director Testing

VMware vCloud Director enables enterprises to build secure, multi-tenant private clouds by pooling infrastructure resources into virtual datacenters. vCloud Director exposes these resources to users through web-based portals and programmatic interfaces as fully automated, catalog-based services.

Figure 7. VMware vCloud Director architecture



For more information about how to configure vCloud, go to:
http://www.vmware.com/pdf/vcd_10_admin_guide.pdf

Testing Results

The Mitel Contact Center virtual appliance was uploaded to the vCloud Director catalog. Different features of the Mitel Contact Center such as chat and email services using Exchange were tested to ensure that the application worked successfully.

This testing demonstrated that Mitel applications running in the vCloud Director environment can increase business agility by enabling users to deploy preconfigured or custom-built services conveniently. Additional cloud-based resources can be made available as needed, without requiring code rewrites.

Note that the vCloud Director testing was done with Mitel Contact Center only, the Call Management component was not tested.

Conclusion

Mitel provides business communications solutions for small, medium size, and large scale enterprise contact centers. Mitel Contact Center and Call Accounting unites distributed call center operations into one virtual contact center, enabling improved workforce optimization and increased business agility for a lower total cost of ownership (TCO).

This paper describes the functional testing scenarios that were conducted jointly by VMware and Mitel on the Mitel Contact Center and Call Accounting software and related products running both in the vSphere 4.1 and vSphere 5 virtualization environments. These scenarios include testing with vCenter Site Recovery Manager, vSphere advanced features including vMotion, DRS, HA, and Fault Tolerance, and vCloud Director.

For each scenario, all of the tests were performed without any issues. The testing results for each scenario conclude that the Mitel Contact Center and Call Accounting provides the functionality needed to work successfully in a virtualization environment that is powered by VMware.

As a result of this testing, Mitel supports using VMware vCenter Site Recovery Manager, and vSphere advanced features, with Mitel Contact Center and Call Accounting including Mitel Contact Center Enterprise Edition. Mitel also supports using VMware vCloud Director for cloud-based computing.

In a disaster, VMware vCenter™ Site Recovery Manager can be used to support business continuity and disaster recovery for mission critical applications running in a VMware environment. For this testing, Site Recovery Manager enables the rapid recovery of Mitel Contact Center and Call Accounting within defined RTO and RPO timeframes using an asynchronous solution.

Note that Site Recovery Manager also supports a synchronous solution, although it was not included in this testing. Synchronous replication is the preferred SAN replication strategy for mission critical data because there is negligible risk of data loss in the event of failover.

In addition to disaster recovery, this testing demonstrates that businesses using Mitel Contact Center and Call Accounting can optimize operational performance by using vSphere advanced features including vMotion, DRS, HA, and Fault Tolerance.

This testing also demonstrates that businesses can run their Mitel Contact Center and Call Accounting solution securely from the cloud by using VMware vCloud Director, such as via secure, multi-tenant private clouds. Mitel applications running in the vCloud Director environment can increase business agility by enabling users to deploy preconfigured or custom-built services rapidly and conveniently.

Resources

For more information about VMware and Mitel products and the storage platform discussed in this paper, view the links and references below.

Site Recovery Manager

- VMware Site Recovery Manager:
http://www.vmware.com/support/pubs/srm_pubs.html
- VMware Site Recovery Manager Administration Guide:
<http://www.vmware.com/pdf/srm-admin.pdf>
- VIX API:
<http://www.vmware.com/support/developer/vix-api/>

VMware References

- VMware Documentation:
<http://www.vmware.com/support/pubs/>
- VMware Licensing Help Center:
<http://www.vmware.com/support/licensing/>
- Performance Troubleshooting for VMware vSphere 4:
<http://www.vmware.com/resources/techresources/10066>
- Performance Best Practices for VMware vSphere 4.1:
<http://www.vmware.com/resources/techresources/10161>
- VMware Best Practices (see VIOPS links):
<http://communities.vmware.com/community/viops>
- VMware Product Podcasts:
<http://www.vmware.com/technical-resources/podcasts/>
- Community, VMware Knowledge Base:
<http://communities.vmware.com/community/vmtn/resources/knowledgebase>
- VMware KB TV:
<http://blogs.vmware.com/kbtv/>
- VMware TV:
<http://www.youtube.com/user/vmwaretv>
- VMworld TV:
<http://www.youtube.com/user/VMworldTV>
- VMware KB TV (external):
<http://www.youtube.com/user/VMwareKB>

Mitel Contact Center and Call Accounting

- Mitel Contact Center (see Contact Center Enterprise Edition):
<http://www.mitel.com/solutions/contact-center/>
- Mitel Virtualization:
<http://www.mitel.com/solutions/virtualization/>
- Mitel Multimedia Contact Center:
<http://www.mitel.com/DocController?documentId=22292>
- Gartner: Companies Should Use IP Telephony to 'Virtualize' Their Contact Center:
<http://www.gartner.com/DisplayDocument?id=504212>

Storage Platforms

- VMware vCenter Site Recovery Manager in a NetApp Environment:
<http://www.vmworld.com/servlet/JiveServlet/downloadBody/4893-102-1-6694/VMware%20vCenter%20Site%20Recovery%20Manager%20in%20a%20NetApp%20Environment-3671.pdf>
- How to Configure a NetApp Array with VMware Site Recovery Manager:
<http://blogs.vmware.com/kbtv/2010/12/how-to-configure-a-netapp-array-with-vmware-site-recovery-manager.html>
- Knowledge Base: Setting Up VMware vCenter Site Recovery Manager with Partner Storage Arrays:
http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1014610
- VMware Compatibility Guide for a complete list of compatible storage devices:
http://www.vmware.com/pdf/vi35_san_guide.pdf

Acknowledgements

The following individuals contributed to the creation of this paper:

- **Balayya Kamanboina**, ISV Validation Engineer, VMware
- **Robert Campbell**, Staff Technical Alliance Manager, VMware
- **Ed Kus**, Portfolio Manager - Virtual UC Solutions, Mitel
- **Jon Catanzano**, Technical Writer, consultant

Appendix A: Hardware and System Host Configuration

Appendix A describes the solution architecture used in the Mitel Contact Center and Call Accounting testing with VMware, as described in this paper. This includes the host configuration, installed software, and virtual machine configuration shown in the tables below.

Host Configuration

Table 1 describes the configuration of VMware ESX® host servers and storage.

Table 1. Hardware configuration for solution architecture

Hardware	Configuration
Servers	<ul style="list-style-type: none"> • Protected site: 2 Hewlett-Packard Proliant Blade 480c G1 servers. Each server is equipped with: <ul style="list-style-type: none"> • 3 GHz dual quad-core Intel Xeon E5450 • 48 GB RAM • Recovery site: 2 Dell PowerEdge 2950 servers. Each server is equipped with: <ul style="list-style-type: none"> • 2.3 GHz dual quad-core Xeon E5410 • 32 GB RAM
Storage platform (protected site and recovery site)	<ul style="list-style-type: none"> • 1 NetApp FAS 3020 with SnapMirror 1.4.3 (each site)

Installed Software

Table 2 lists the vendor software installed for this solution.

Table 2. Software for solution architecture

Software Provider	Software Configuration
VMware	<ul style="list-style-type: none"> • VMware vSphere 4.1 and vSphere 5, Site Recovery Manager 4.1*
Microsoft	<ul style="list-style-type: none"> • Microsoft SQL Server 2008, Enterprise Edition
Mitel	<ul style="list-style-type: none"> • Contact Center Management / Call Accounting 5.8, Intelligent Queue 5.8, Multimedia Contact Center and Intelligent Queue 5.8, co-located

* Contact Center release 5.8 was used for this testing. The current shipping software release is Contact Center release 6. Mitel's support policy is that any newer version of Contact Center, for example, release 6 and forward, will be supported and is expected to have the same level of interoperability with vSphere 4.1, vSphere 5, and Site Recovery Manager 4.1.

Virtual Machine Configuration

Table 3 describes the configuration of virtual machines running on ESX host servers in this solution.

Table 3. Virtual machines in solution architecture

Virtual Machine	Hardware Configuration
Contact Center Enterprise server	<ul style="list-style-type: none"> • Microsoft Windows 2008 Standard Edition, 32-bit: <ul style="list-style-type: none"> • 2 vCPUs • 4 GB memory • 1 Ethernet card • 40 GB x 1 storage • VMDK only
Client	<ul style="list-style-type: none"> • Microsoft Windows 7, 32-bit: <ul style="list-style-type: none"> • 2 vCPUs • 1 GB memory • 1 Ethernet card • 24 GB x 1 storage • VMDK only
Exchange Server	<ul style="list-style-type: none"> • Microsoft Windows 2008 Standard Edition, 64-bit: <ul style="list-style-type: none"> • 2 vCPUs • 4 GB memory • 1 Ethernet card • 40 GB x 1 storage • VMDK only
Active Directory – domain controller	<ul style="list-style-type: none"> • Microsoft Windows 2008 Standard Edition, 64-bit: <ul style="list-style-type: none"> • 2 vCPUs • 4 GB memory • 1 Ethernet card • 40 GB x 1 storage • VMDK only
vCloud Director	<ul style="list-style-type: none"> • vCloud Director: <ul style="list-style-type: none"> • 2 vCPUs

Virtual Machine	Hardware Configuration
	<ul style="list-style-type: none"> • 4 GB memory • 1 Ethernet card • 40 GB x 1 and 150 GB x 1 storage • VMDK only
vShield Manager	<ul style="list-style-type: none"> • vShield Manager: <ul style="list-style-type: none"> • 1 vCPUs • 2 GB memory • 1 Ethernet card • 10 GB storage • VMDK only
vCloud database	<ul style="list-style-type: none"> • vCloud database: <ul style="list-style-type: none"> • Oracle 11g (Windows) • 4 vCPUs • 8 GB memory • 1 Ethernet card • 75 GB x 1 storage • VMDK only