# VMware Horizon View 5.3 VDI Scalability Testing on Cisco UCS B200 M3 with Storage Accelerator

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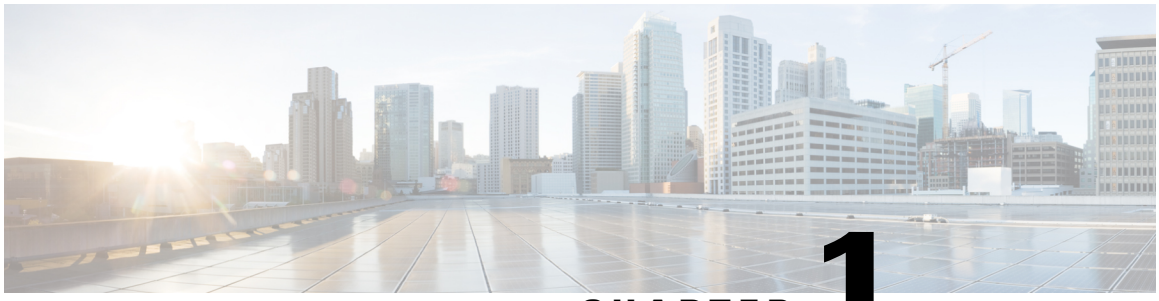


CHAPTER 1

# VMWare VDI Scalability Testing on Cisco UCS B200 M3 Server With Storage Accelerator



## Overview

When deploying your virtual desktop solution, choosing server hardware that is powerful enough across the compute and memory dimensions to support a large number of virtual desktops is crucial. The more virtual desktops per server you can support, the fewer servers you need to buy to provide virtual desktops to support your desired number of users.

To find the virtual desktop capacity of a single Cisco UCS B200 M3 Server, we used the Login Consultants Virtual Session Indexer (Login VSI) 4.0.11 benchmark. The Login VSI workload we used performs a range of tasks to simulate a typical knowledge worker. The benchmark results show the maximum number of virtual desktops that a server can support by measuring response times throughout the test

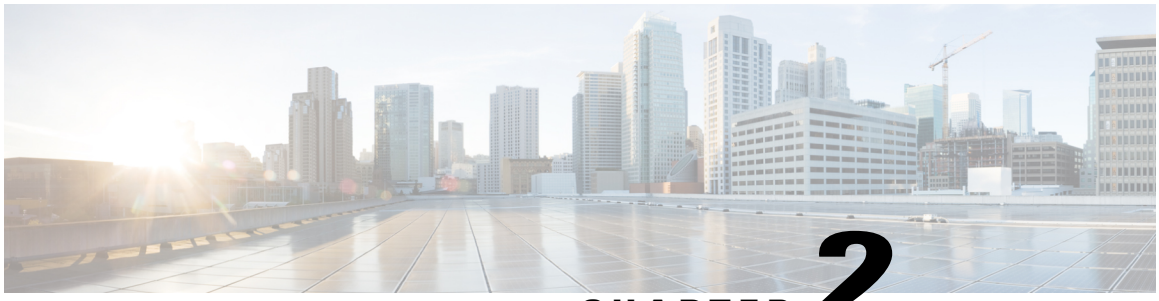
We set out to examine such a virtual desktop solution that consisted of the following components:

- Cisco Unified Computing System (UCS) B200M3 Blade Server with Intel Xeon processor E5-2690 V2 and powered with Cisco Storage accelerator
- VMware vSphere 5.5.0
- A VMware Horizon View 5.3 virtual desktop linked clone pool consisting of Microsoft Windows 7 and Windows 8 x64 VMs
- All Virtual machines in the Desktop Pool are provisioned with 2 vCPU, 1.5 GB of reserved memory for Windows 7 and 2vCPU, 2 GB of reserved memory for Windows 8.
- NetApp FAS 3240 storage array

### Acronyms

| Acronym | Description |
|---|---|
| AD | Active Directory |
| DHCP | Dynamic Host Configuration Protocol |

| Acronym | Description |
|---|---|
| DNS | Domain Name System |
| FCOE | Fiber Channel Over Ethernet |
| LUN | Logical Unit Number |
| MLC | Multi Level Cell |
| OS | Operating System |
| SUT | Server Under Test |
| UCS | Unified Computing System |
| UCSM | Unified Computing System Manager |
| VDI | Virtual Desktop Infrastructure |
| VM | Virtual Machine |
| VSI | Virtual session Indexer |



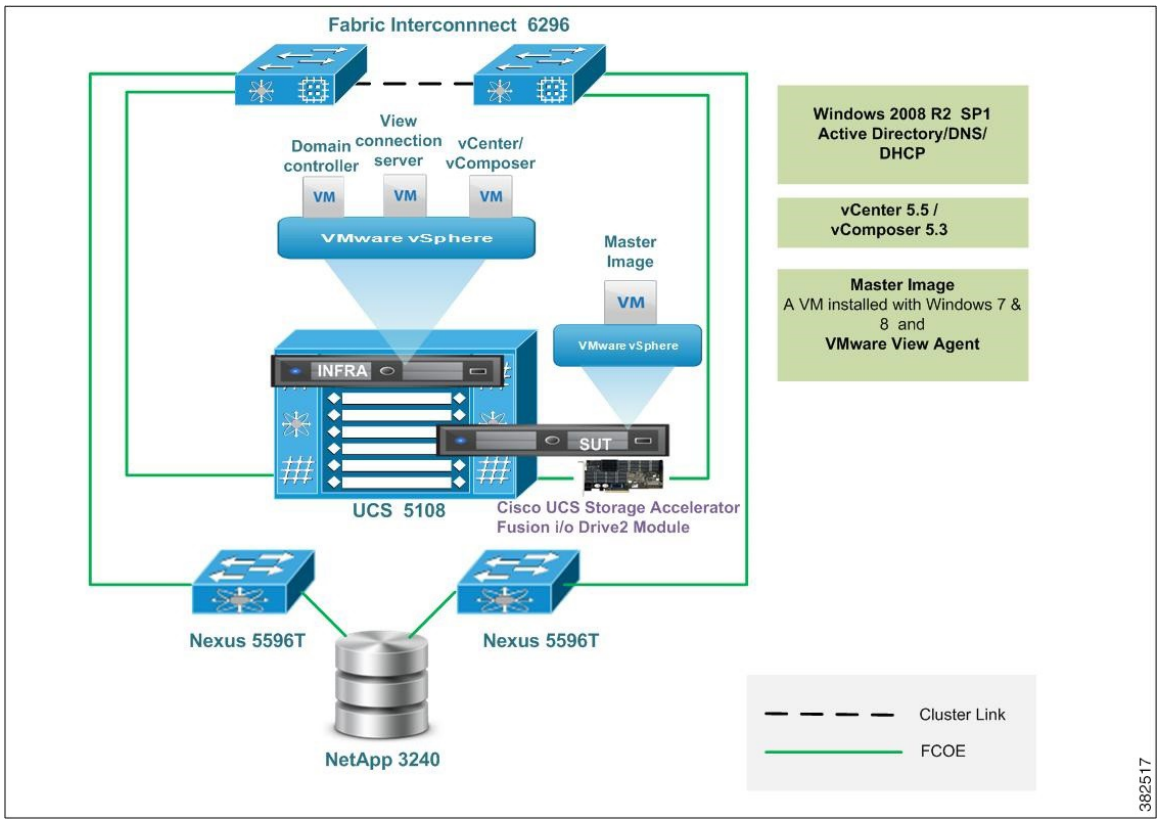
CHAPTER 2

# Test Topology and Environment Matrix



## Test Topology

***Figure 1: Topology in Use***



# Environment Matrix

### Infra Components

| Component | Version |
|---|---|
| UCS Blade server | UCS B200 M3 (for SUT) and UCS B440 M2 (for Infra) |
| UCSM | 2.2(1b) |
| **Operating System** | |
| Windows Server OS | Windows Server 2008 R2 SP1 x64 (Japanese/English) |
| Windows Desktop OS | Windows 7 and 8 Enterprise x64 (Japanese/English) |
| **Hypervisor** | |
| ESXi | VMware ESXi 5.5.0 1331820 |
| **Storage** | |
| NetApp FAS 3240 | 8.0.2 |
| Cisco UCS Storage Accelerator ( Cisco UCS 785-GB MLC Fusion-io ioDrive 2 Adapters) | 7.1.15 |
| **FCoE Switch** | |
| Nexus 5596 T | 6.0(2)N2(3) |
| **Virtual Desktop Delivery Component** | |
| VMware Horizon View | 5.3 |
| **VDI Scalability measuring Tool** | |
| Login VSI | 4.0.11 |
| Active Directory & DHCP | Windows 2008 R2 SP1 server x64 (Japanese/English) |
| Login VSI Launcher, Analyzer and VSI share | Windows 2008 R2 SP1 server x64 (Japanese/English) |

### SUT Components

| Component | Type |
|---|---|
| **CPUs** | |
| Vendor | Intel® Corporation |
| Name | Intel® Xeon® E5-2690 V2 |

| Component | Type |
|---|---|
| Core Frequency (GHz) | 3 |
| **Platform** | |
| Vendor | Cisco |
| BIOS Settings | 2.2(1b) |
| **Memory modules** | |
| Total RAM in the system (GB) | 384 |
| Vendor | Samsung |
| Type | DDR3 |
| Speed (MHz) | 1600 |
| Size (GB) | 16 |
| Number of RAM modules | 24 |
| Chip organization | Double sided |
| Rank | Dual |
| **Hypervisor** | |
| Name | VMWare ESXi 5.5.0 |
| Build number | 1331820 |
| Operating System Power Profile | Maximum Performance |
| **IO Adapters** | |
| Vendor and Model number | Cisco and UCS VIC 1240 |

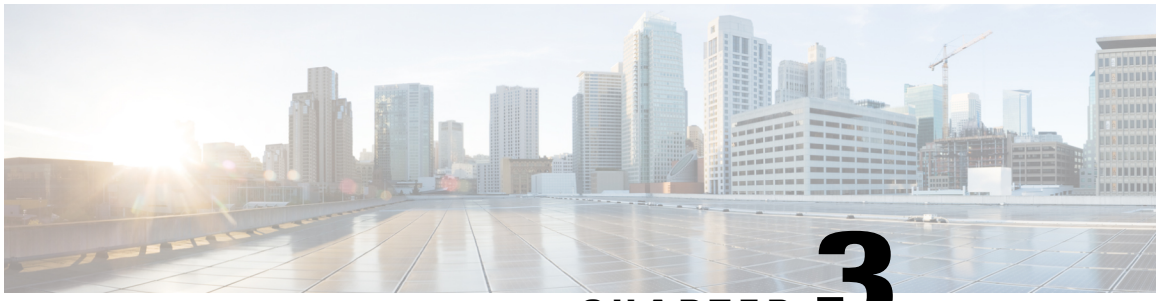
**Tested Windows 7 VM Configuration**

| Components of VM | English | Japanese |
|---|---|---|
| Virtual Desktop - vCPU | 2 | 2 |
| Virtual Desktop - RAM | 1.5 GB | 1.5 GB |
| Virtual Desktop - HardDisk | 32GB (Thin Provisioned) | 32GB (Thin Provisioned) |
| VirtualDesktop -NetworkAdapter | Intel e1000 | Intel e1000 |
| OS Build No | 677651 | 677662 |

**Tested Windows 8 VM Configuration**

| Components of VM | English | Japanese |
|---|---|---|
| Virtual Desktop - vCPU | 2 | 2 |

| Components of VM | English | Japanese |
|---|---|---|
| Virtual Desktop - RAM | 2 GB | 2 GB |
| Virtual Desktop - HardDisk | 35GB (Thin Provisioned) | 35GB (Thin Provisioned) |
| VirtualDesktop -NetworkAdapter | Intel e1000 | Intel e1000 |
| OS Build No | 917522 | 917919 |



CHAPTER 3

# Implementation Steps And Test Execution Details



# Implementation steps for VMware Horizon View

- Infra components such as Active Directory/DNS and DHCP server, vCenter server, View composer and View connections server are deployed as Virtual machines on Cisco UCS B440 M2 server.
- Cisco UCS 785-GB multilevel cell (MLC) Fusion-io ioDrive-2 Adapter is installed on the Server Under Test(B200 M3).
- Master image created on the Server Under Test (B200 M3) and installed with Windows 8 (English/Japanese) resides on the Fusion-io Flash memory module. Additional 2TB LUN is provided from NetApp storage to the SUT server for VM provisioning.
- Login VSI Launcher is deployed as Virtual machine to incrementally login the users to the Virtual desktop sessions (created from master image) and begin the workload (Light, Medium, heavy) on each.

### Cisco UCS Storage Accelerator

The Cisco UCS B200 M3 Blade Server offers on-server cache storage solution known as Cisco UCS Storage Accelerator. The Cisco UCS Storage Accelerator is an excellent server caching solution for delivering uncompromised I/O to support a guaranteed number of users at lower cost and with more predictable performance than a SAN-based infrastructure. Instead of relying on back-end shared storage to host the golden master image and associated clone images for users, the same image can now be stored locally on a Cisco UCS 785-GB multilevel cell (MLC) Fusion-io ioDrive 2 Adapter installed on the Cisco UCS B200 M3 Blade Server.

Because the on-server cache storage approach uses a directly mapped flash storage cache that supports many more IOPS than conventional disk-based storage, VDI environments can boot transparently without bottlenecks and in a fraction of the time and cost required for networked storage solutions. In a VMware VDI solution, the Cisco UCS Storage Accelerator hosts the write cache (and optionally the virtual disk [vDisk]) for optimal performance and scalability.

# Test Execution Details

Login VSI helps to test and compare the performance of different software and hardware solutions in VDI environment. Login VSI used to measure the maximum capacity of current infrastructure in a quick and easy way. The simulated users work with the same applications as your average employee such as Word, Excel, Outlook and Internet Explorer and also can easily add our own custom applications to the tests

**Light Workload**

The light workload runs fewer applications and starts/stops them less frequently. This results in lower CPU, memory and IO usage.

**Medium Workload**

Medium workload is the default workload in Login VSI. The standard Login VSI medium workload designed to run on 2vCPU's per desktop VM. This workload emulates a medium knowledge worker using Office, IE, PDF and Java/ FreeMind.

- Once a session has been started the workload will repeat (loop) every 48 minutes. The loop is divided in 4 segments, each consecutive Login VSI user logon will start a different segments. This ensures that all elements in the workload are equally used throughout the test.
- During each loop the response time is measured every 3-4 minutes. The medium workload opens up to 5 applications simultaneously. The keyboard type rate is 160 ms for each character. Approximately 2 minutes of idle time is included to simulate real- - world users.

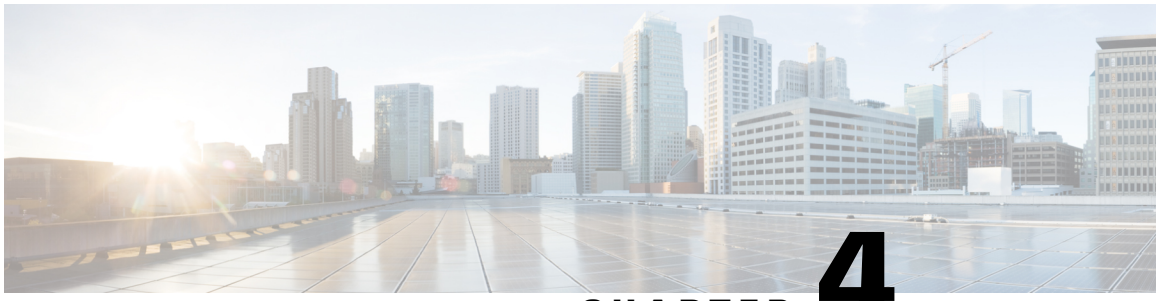
Each loop will open and use:

- Outlook, browse messages.
- Internet Explorer, browsing different webpages and a YouTube style video (480p movie trailer) is opened three times in every loop.
- Word, one instance to measure response time, one instance to review and edit a document.
- Doro PDF Printer & Acrobat Reader, the word document is printed and reviewed to PDF.
- Excel, a very large randomized sheet is opened. Documentation

**Heavy Workload**

The heavy workload is based on the medium workload except that the heavy workload:

- Begins by opening 4 instances of Internet Explorer. These instances stay open throughout the workload loop.
- Begins by opening 2 instances of Adobe Reader. These instances stay open throughout the workload loop
- There are more PDF printer actions in the workload.
- Instead of 480p videos a 720p and a 1080p video are watched.
- Increased the time the workload plays a flash game.
- The idle time is reduced to 2 minutes.



CHAPTER 4

# VMware Horizon View VDI Scalability Testing on Cisco UCS B200 M3 server



## Comparison of Windows 7 performance in Japanese and English Environment

| VSIMAX Result | | |
|---|---|---|
| **Type of Workload** | **English** | **Japanese** |
| **Light** | 162 | 160 |
| **Medium** | 127 | 124 |
| **Heavy** | 116 | 114 |

### Light Workload Result

| Light | | |
|---|---|---|
| **Desktop OS** | **No.of Launched Sessions** | **VSIMax** |
| **English** | 175 | 162 |
| **Japanese** | 175 | 160 |

## Login VSIMax

***Figure 2: English***

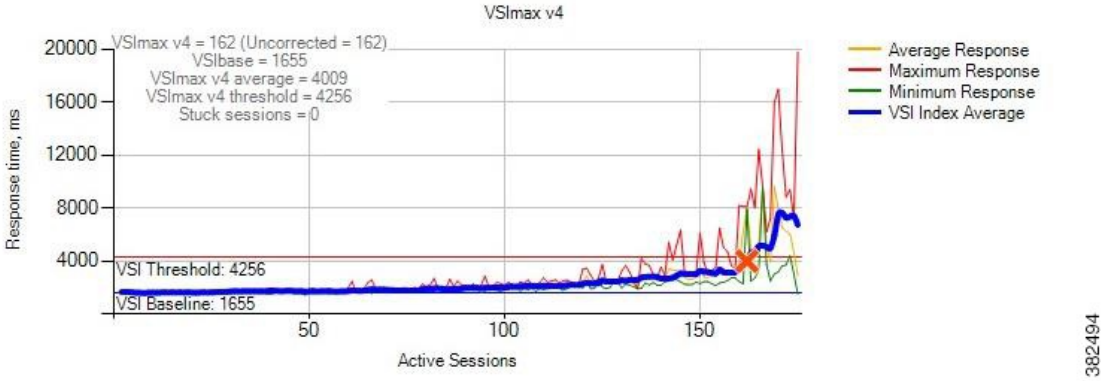



***Figure 3: Japanese***

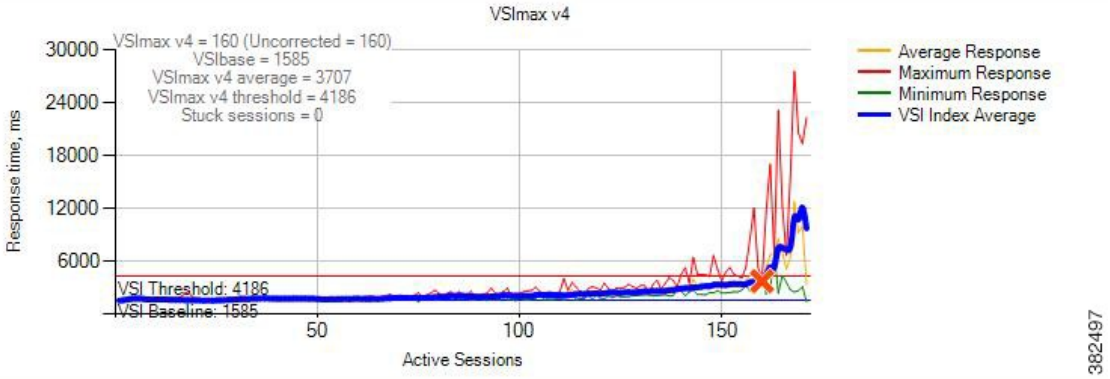



Fig 2 and 3: Average virtual desktop response times at various number of virtual desktops on the Cisco UCS B200 M3 server

## Processor And Memory Utilization throughout the test

***Figure 4: English***

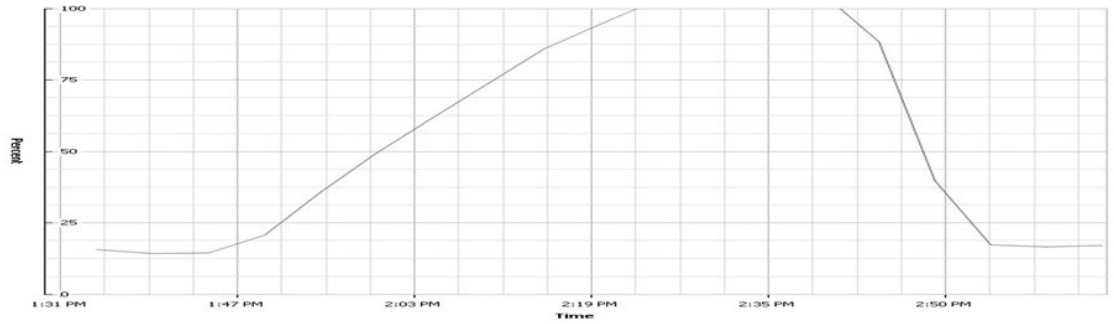



***Figure 5: Japanese***

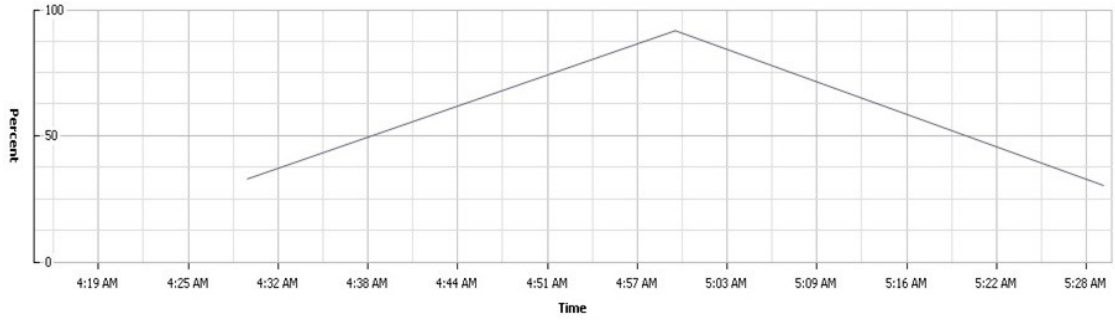


Figure 4 and 5 : CPU utilization throughout the test

***Figure 6: English***

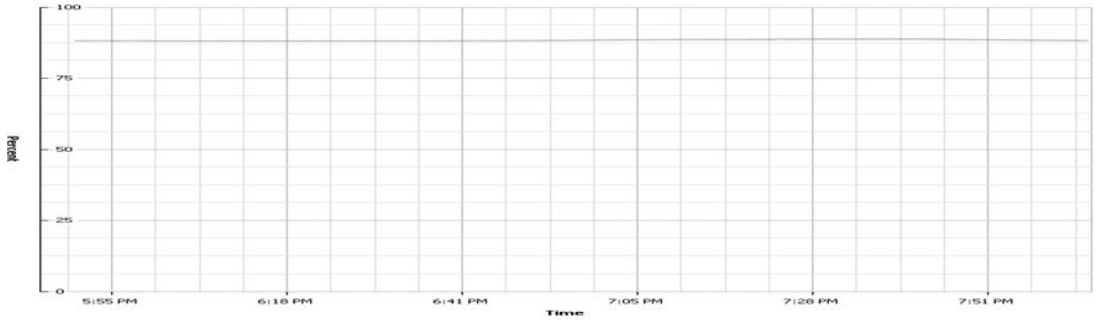



***Figure 7: Japanese***

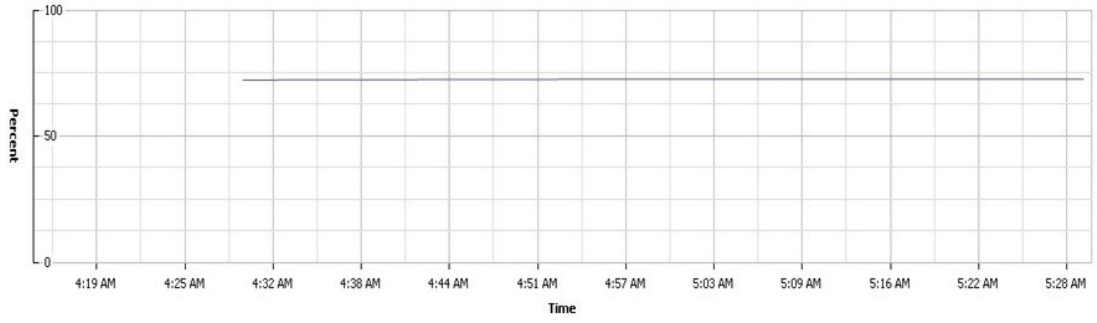



Figure 6 and 7 : Memory usage throughout the test

### Network and Storage Utilization throughout the Test

***Figure 8: English***

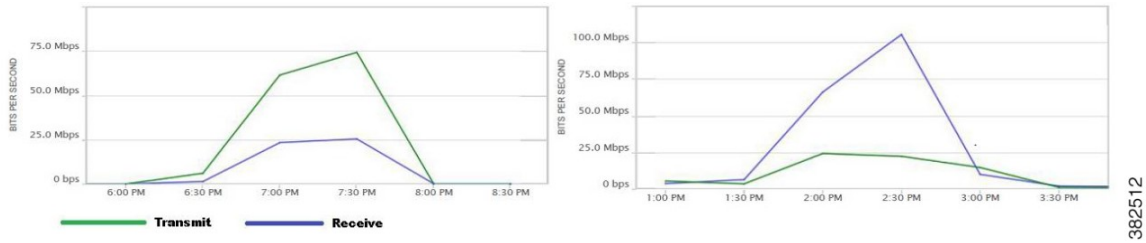



***Figure 9: Japanese***

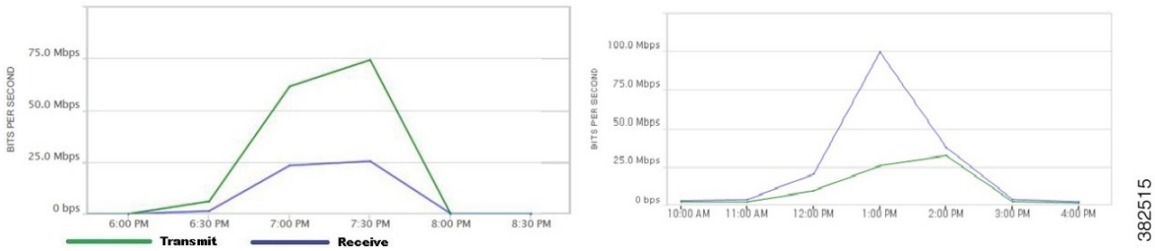



Figure 8 and 9 : Provisioning Services Network and Storage usage throughout the test

### Medium workload Result

| Medium | | |
|---|---|---|
| **Desktop OS** | **No.of Launched Sessions** | **VSIMax** |
| **English** | 150 | 127 |
| **Japanese** | 150 | 124 |

## Login VSIMax

***Figure 10: English***

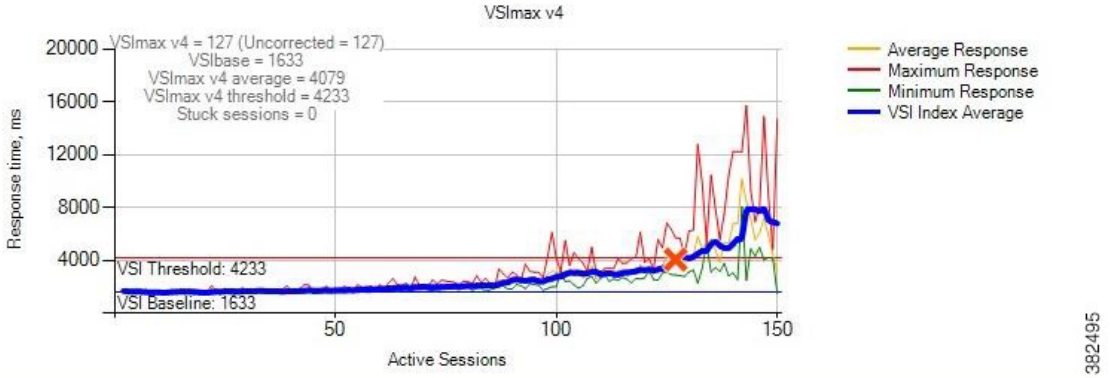



***Figure 11: Japanese***

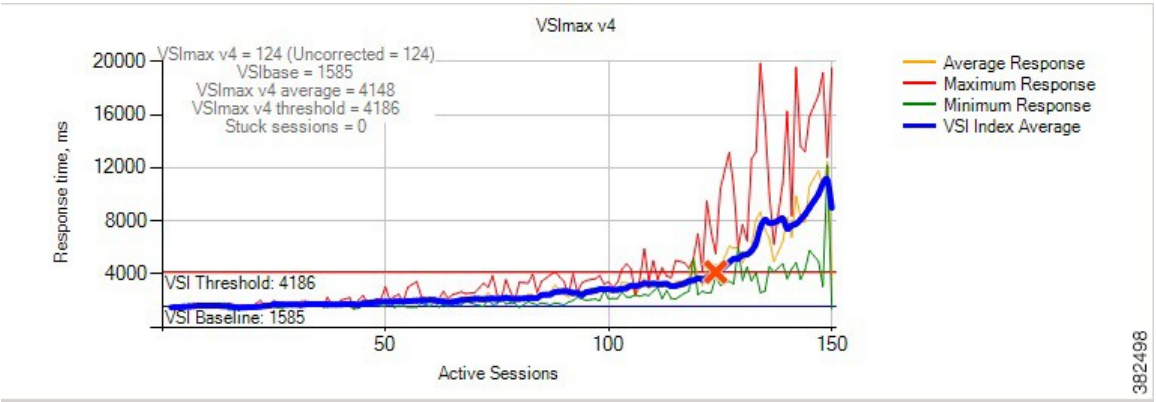



Fig 10 and 11: Average virtual desktop response times at various number of virtual desktops on the Cisco UCS B200 M3 server

### Processor And Memory Utilization throughout the test

***Figure 12: English***

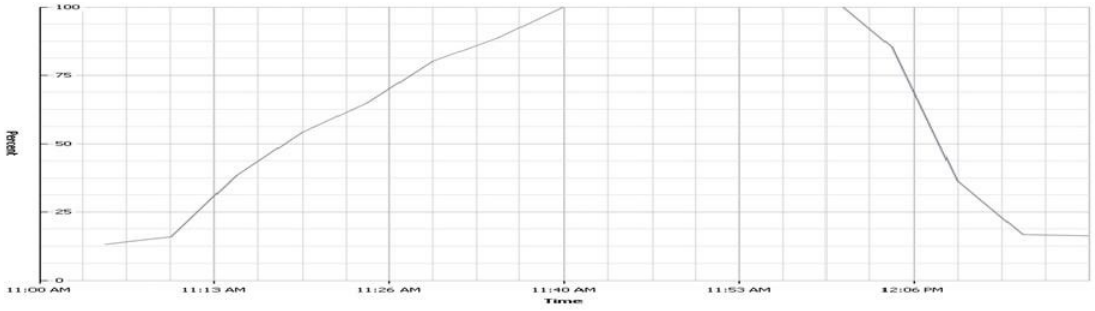



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***Figure 13: Japanese***

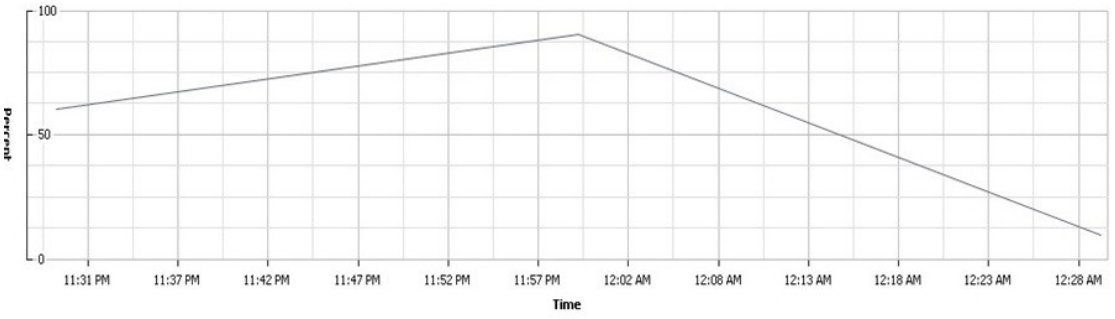


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Figure 12 and 13 : CPU utilization throughout the test

***Figure 14: English***

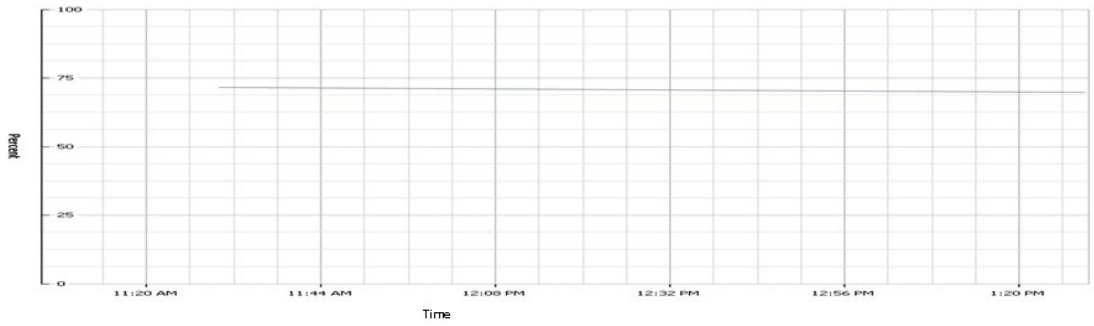


***Figure 15: Japanese***

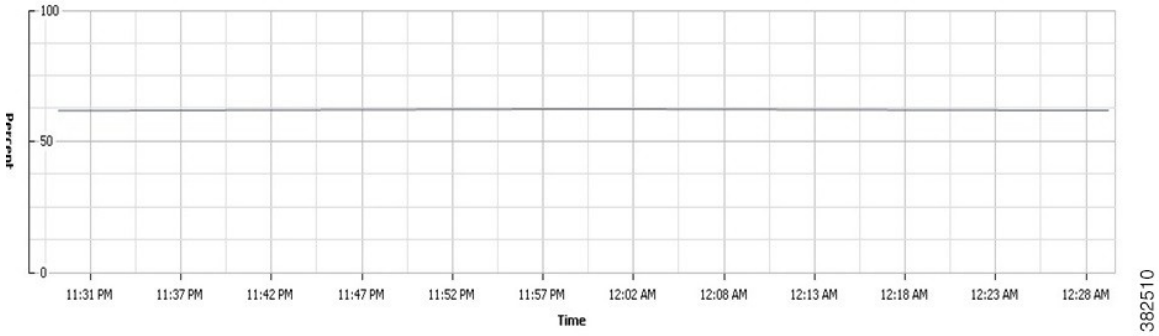


Figure 14 and 15 : Memory usage throughout the test

### Network And Storage Utilization throughout the test

***Figure 16: English***

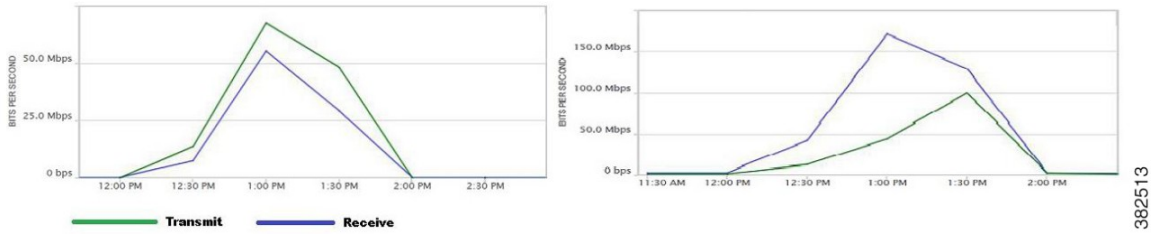


***Figure 17: Japanese***

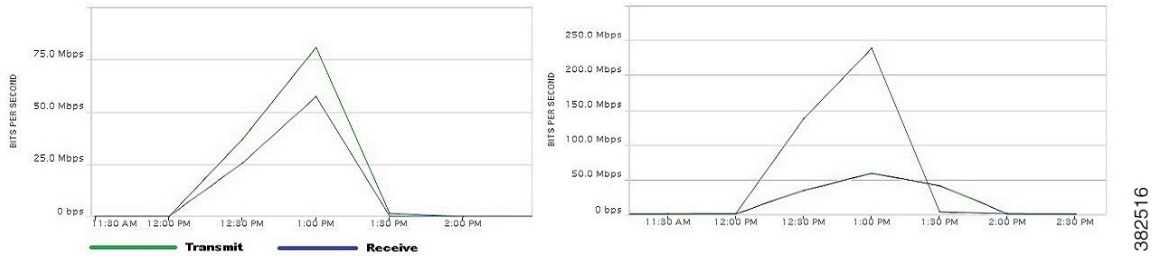


Figure 16 and 17 : Provisioning Services Network and Storage usage throughout the test

### Heavy workload Result

| Heavy | | |
|---|---|---|
| **Desktop OS** | **No.of Launched Sessions** | **VSIMax** |
| **English** | 125 | 116 |
| **Japanese** | 125 | 114 |

## Login VSIMax

***Figure 18: English***

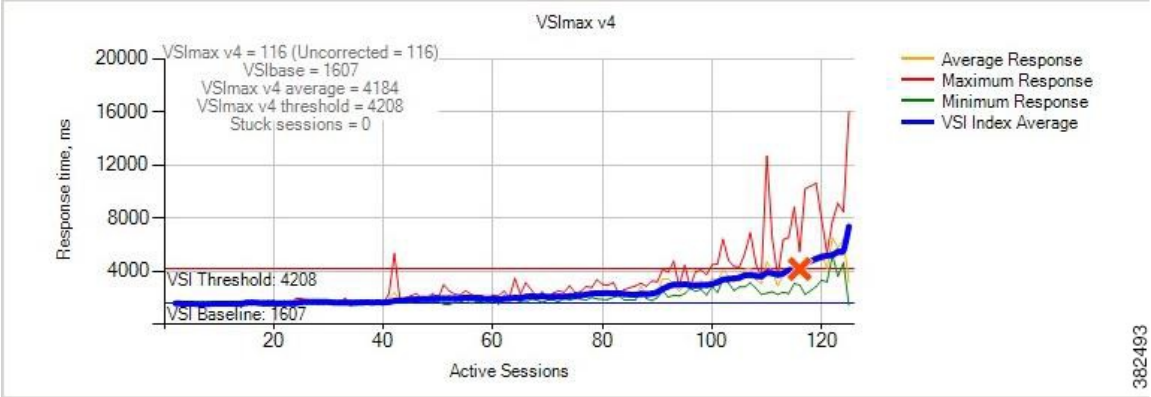


***Figure 19: Japanese***

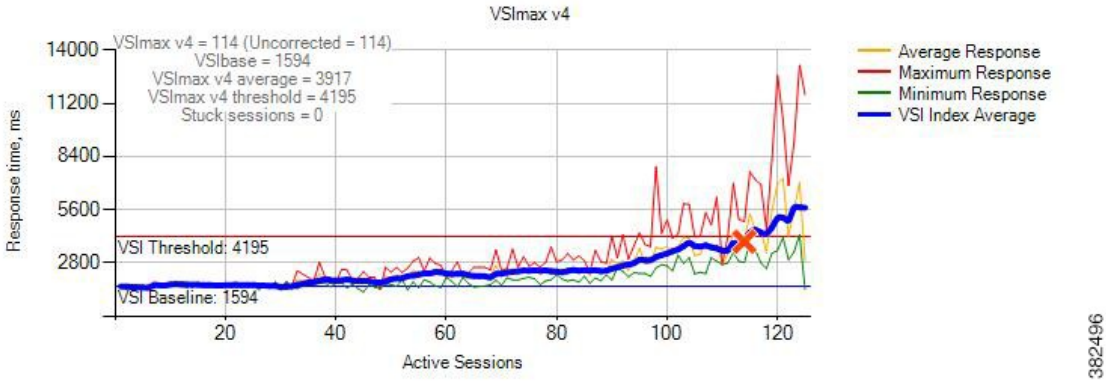


Fig 18 and 19: Average virtual desktop response times at various number of virtual desktops on the Cisco UCS B200 M3 server

## Processor And Memory Utilization throughout the test

***Figure 20: English***

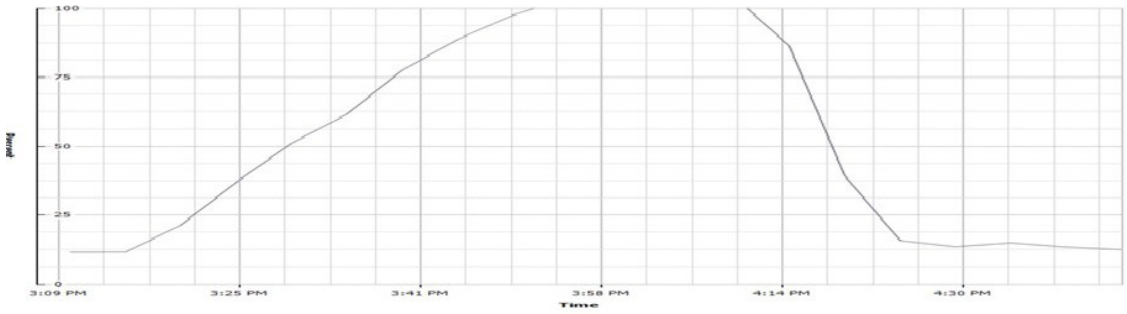


***Figure 21: Japanese***

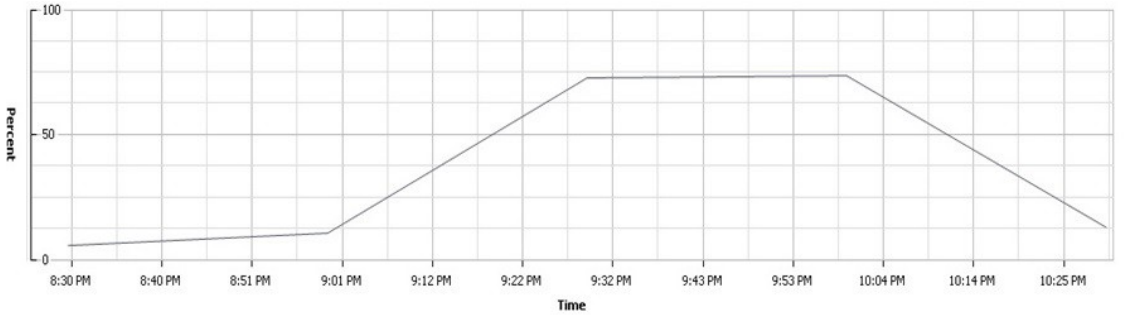

Figure 20 and 21 : CPU utilization throughout the test

***Figure 22: English***

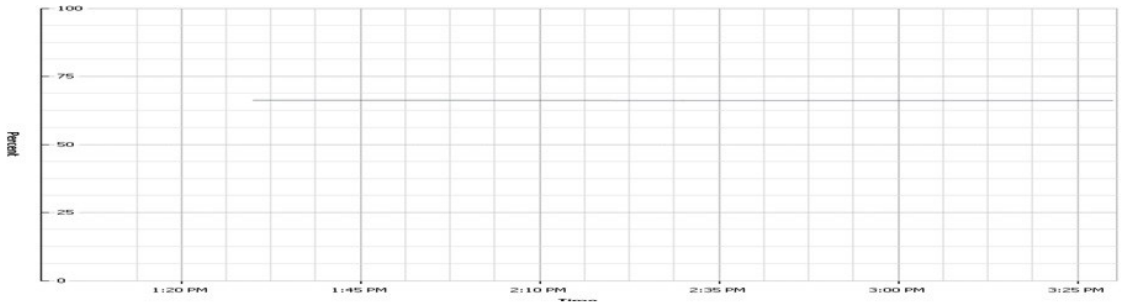


***Figure 23: Japanese***

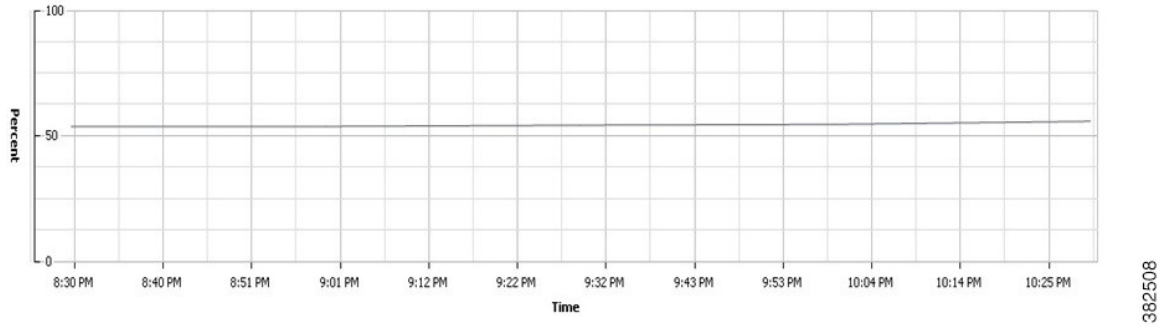


Figure 22 and 23: Memory usage throughout the test

### Network and Storage Utilization throughout the test

***Figure 24: English***

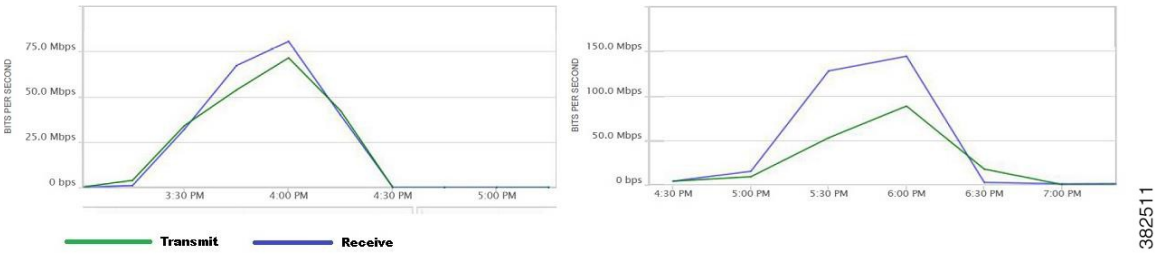


***Figure 25: Japanese***

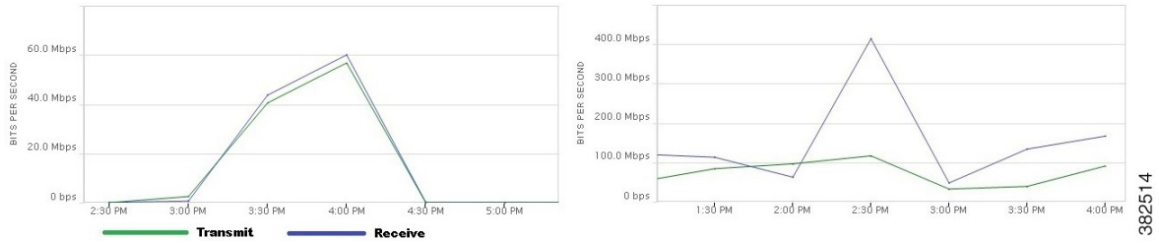


Figure 24 and 25 : Provisioning Services Network and Storage usage throughout the test

# Comparison of Windows 8 Performance in Japanese and English Environment

| VSIMax Result | | |
|---|---|---|
| **Type of Workload** | **English** | **Japanese** |
| **Light** | 122 | 108 |
| **Medium** | 90 | 79 |
| **Heavy** | 80 | 64 |

### Light Workload Result

| Light | | |
|---|---|---|
| **Desktop OS** | **No.of Launched Sessions** | **VSIMax** |
| **English** | 150 | 122 |
| **Japanese** | 150 | 108 |

### Login VSIMax

***Figure 26: English***

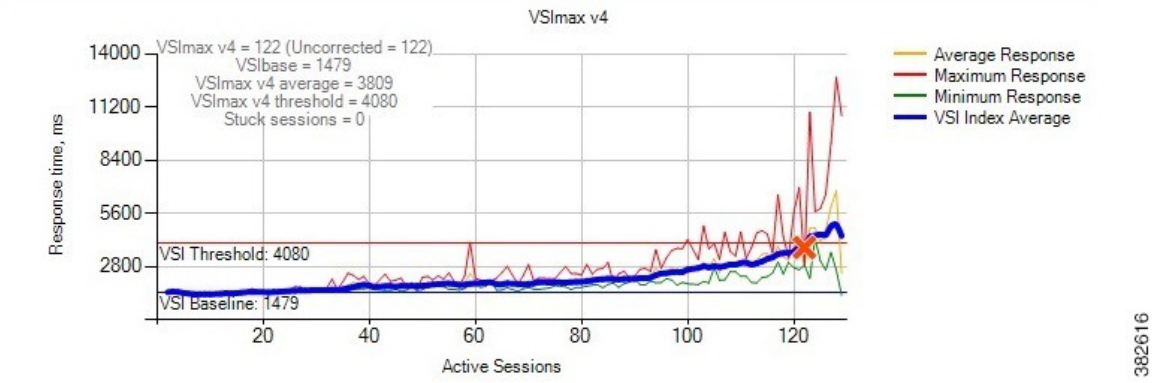


***Figure 27: Japanese***

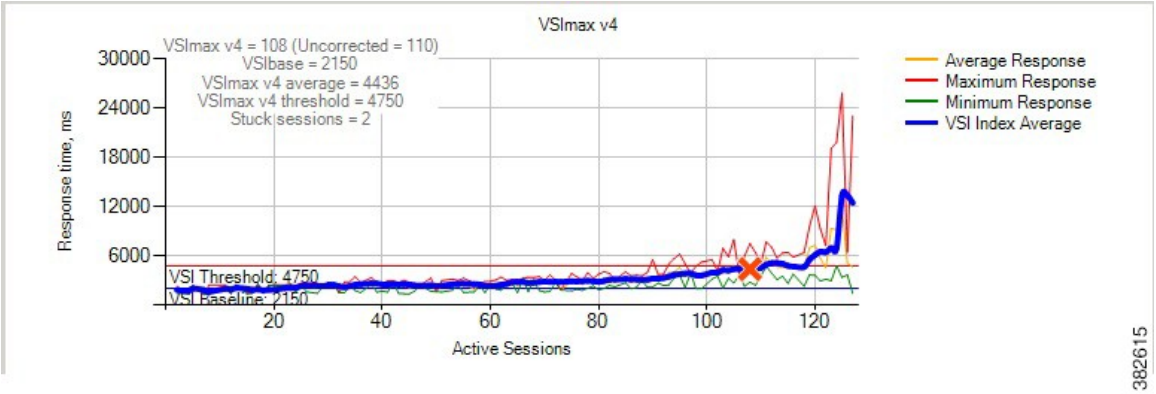


Fig 26 and 27: Average virtual desktop response times at various number of virtual desktops on the Cisco UCS B200 M3 server

## Processor And Memory Utilization throughout the test

***Figure 28: English***

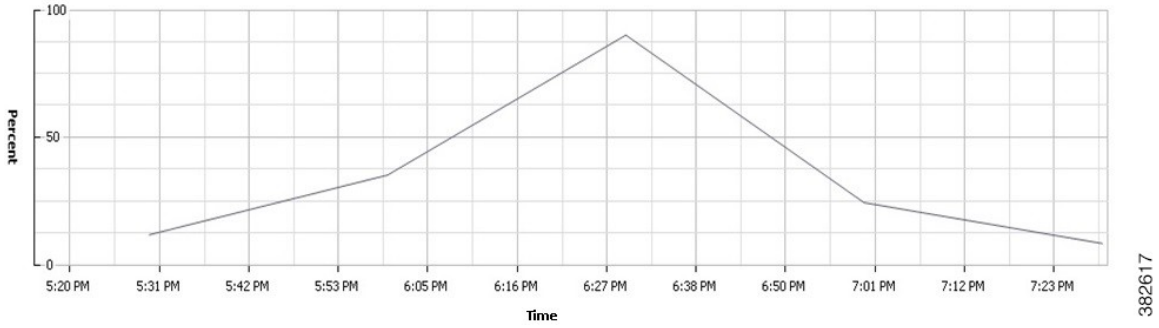


***Figure 29: Japanese***

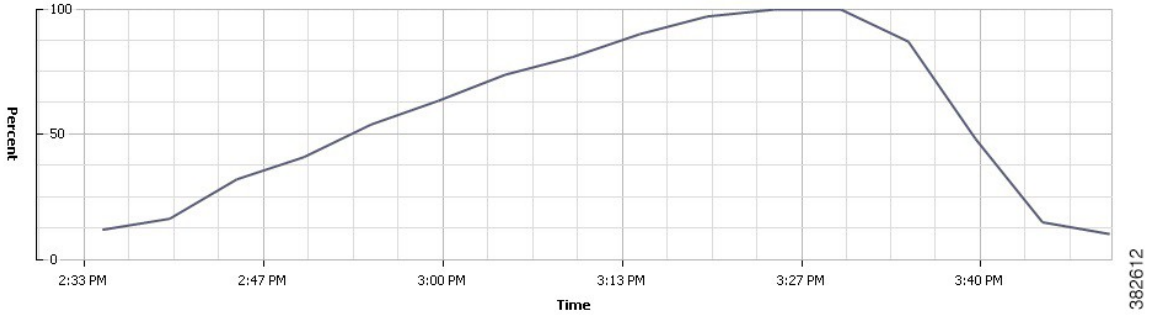

Figure 28 and 29 : CPU utilization throughout the test

***Figure 30: English***

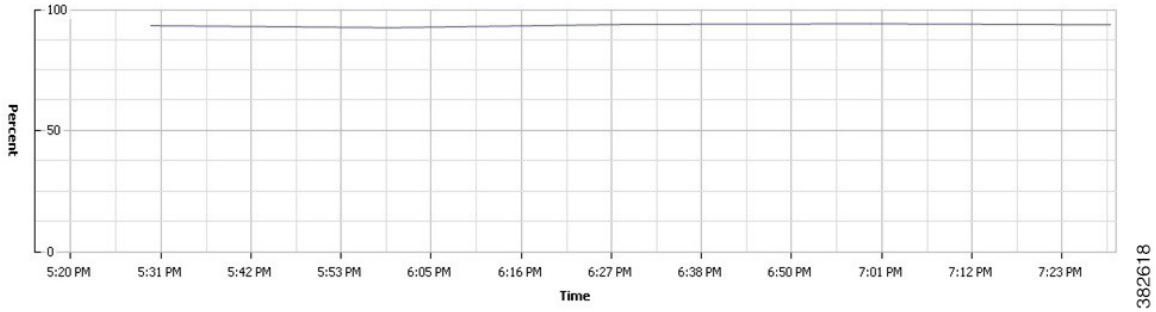


***Figure 31: Japanese***

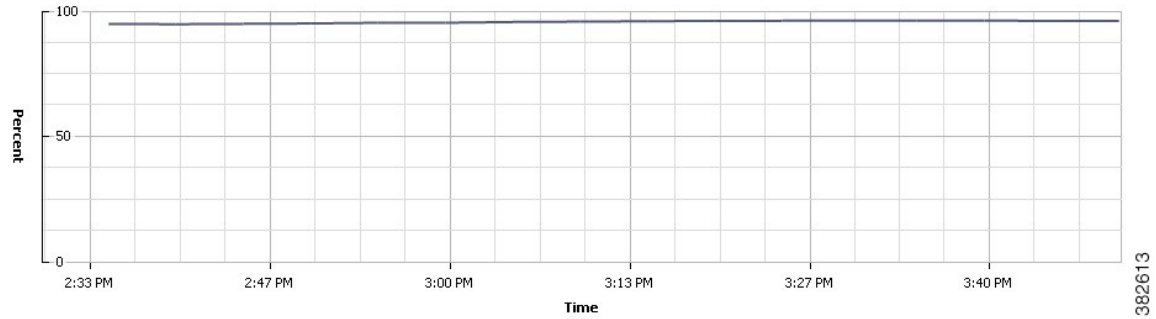


Figure 30 and 31 : Memory usage throughout the test

### Network and Storage Utilization throughout the Test

***Figure 32: English***

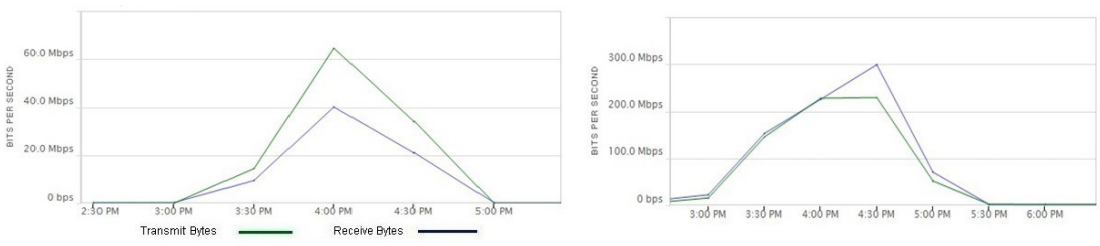


***Figure 33: Japanese***

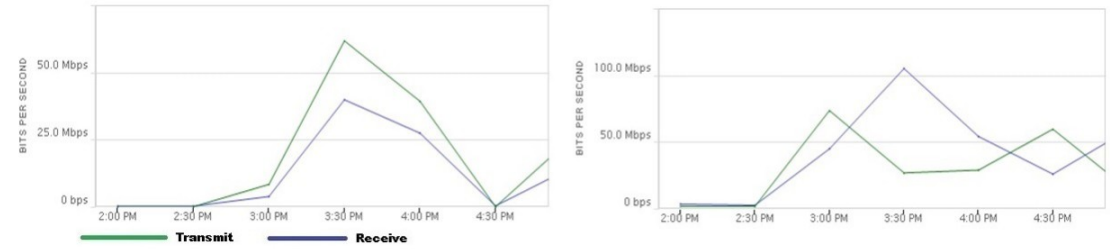


Figure 32 and 33 : Provisioning Services Network and Storage usage throughout the test

### Medium workload Result

| Medium | | |
|---|---|---|
| **Desktop OS** | **No.of Launched Sessions** | **VSIMax** |
| **English** | 125 | 90 |
| **Japanese** | 125 | 79 |

## Login VSIMax

***Figure 34: English***

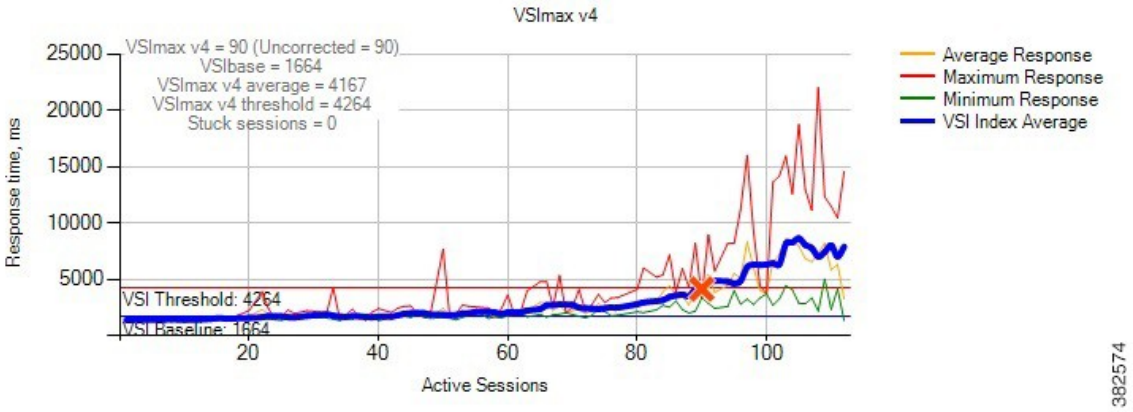


***Figure 35: Japanese***

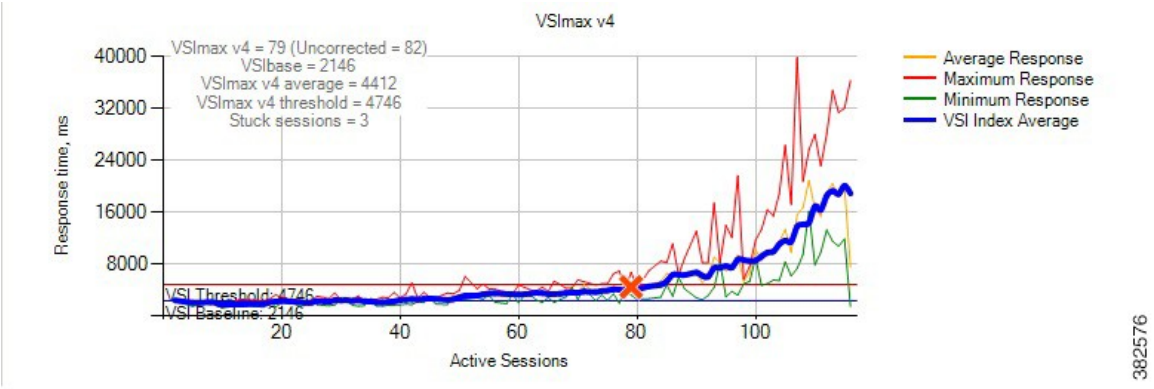


Fig 34 and 35: Average virtual desktop response times at various number of virtual desktops on the Cisco UCS B200 M3 server

### Processor And Memory Utilization throughout the test

***Figure 36: English***

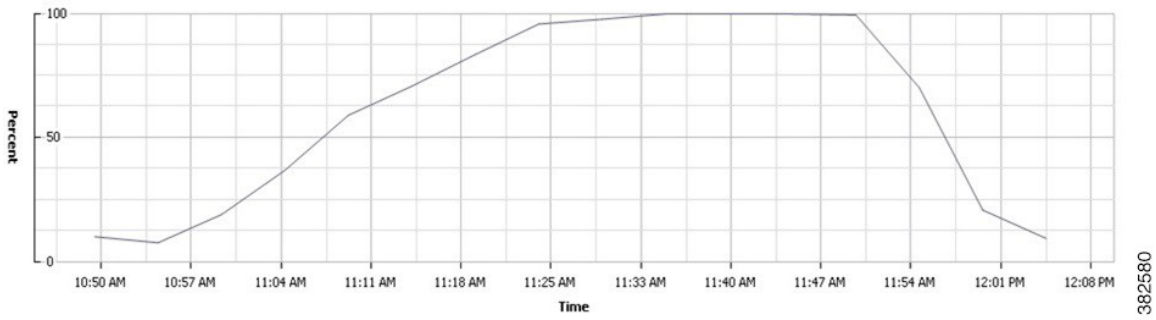


***Figure 37: Japanese***

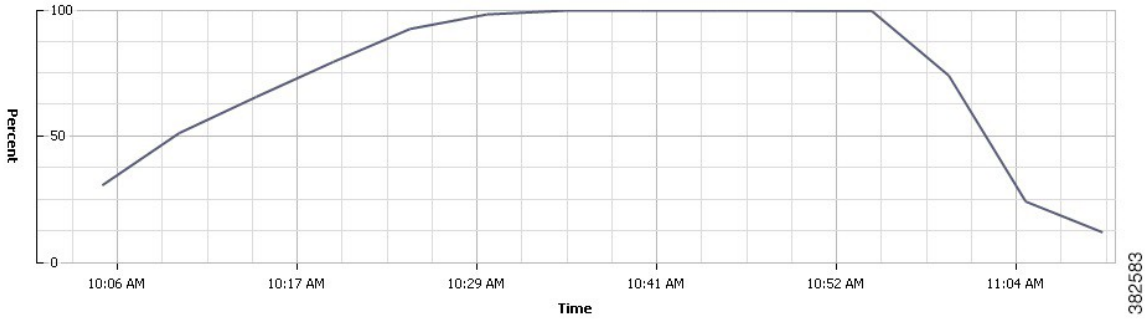

Figure 36 and 37 : CPU utilization throughout the test

***Figure 38: English***

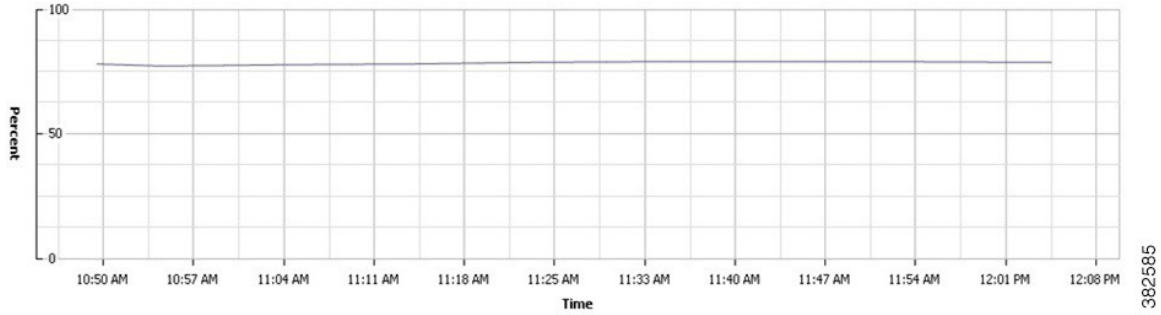


***Figure 39: Japanese***

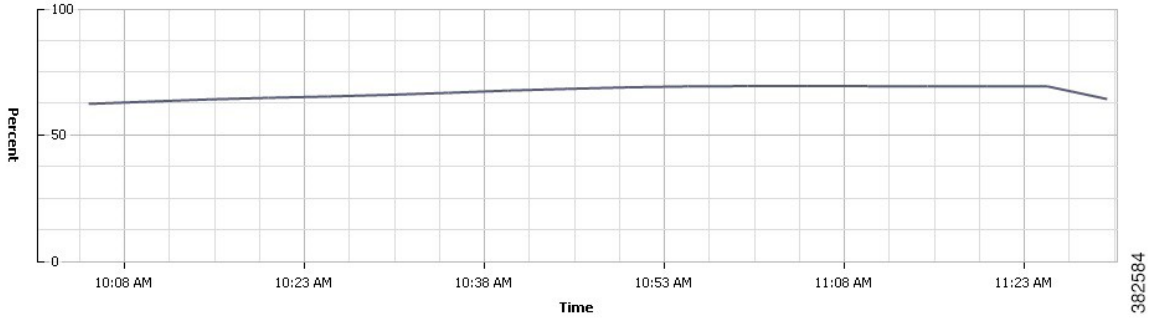


Figure 38 and 39 : Memory usage throughout the test

### Network and Storage Utilization throughout the Test

***Figure 40: English***

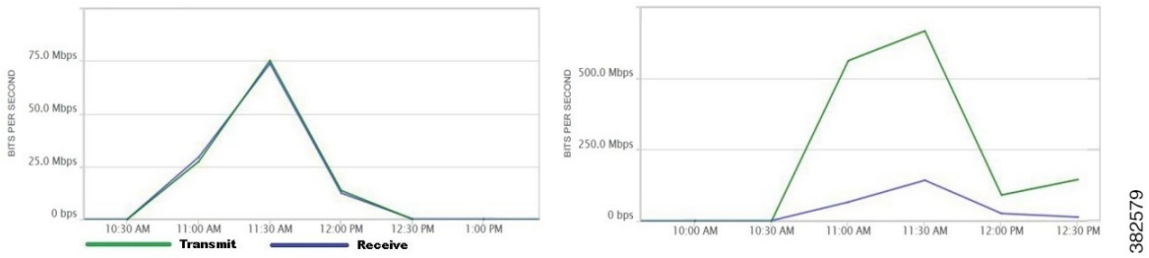


***Figure 41: Japanese***

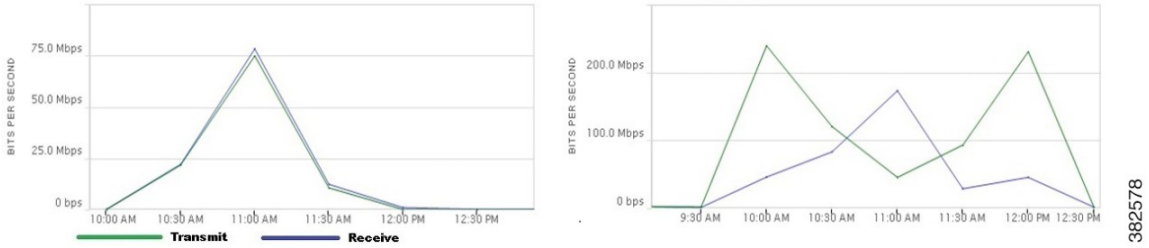


Figure 40 and 41 : Provisioning Services Network and Storage usage throughout the test

### Heavy Workload Result

| Heavy | | |
|---|---|---|
| **Desktop OS** | **No.of Launched Sessions** | **VSIMax** |
| **English** | 100 | 80 |
| **Japanese** | 100 | 64 |

### Login VSIMax

***Figure 42: English***

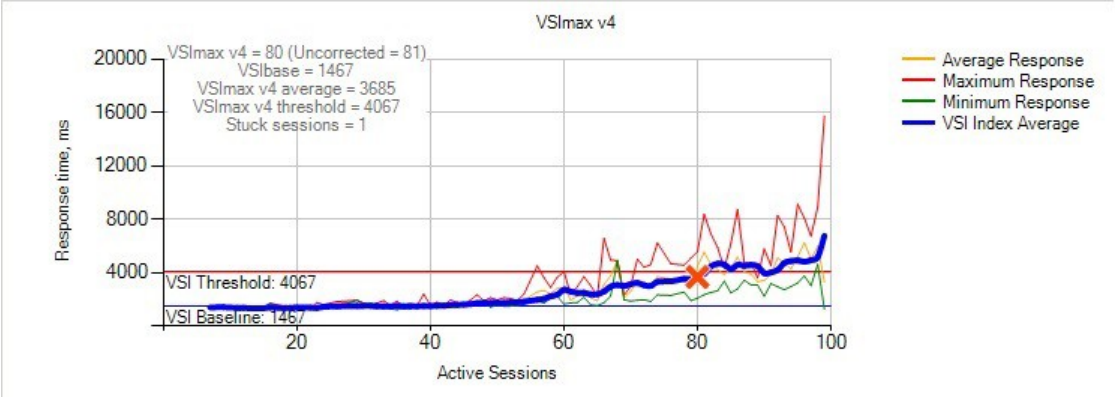


***Figure 43: Japanese***

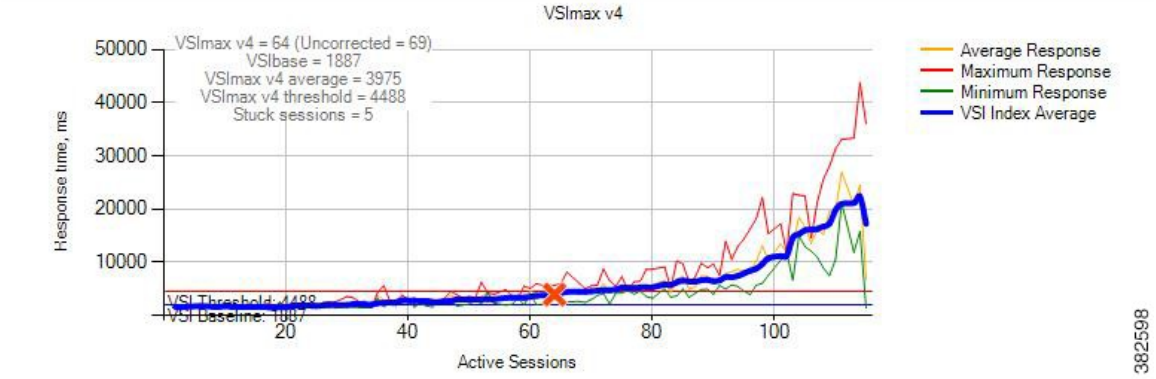


Fig 42 and 43: Average virtual desktop response times at various number of virtual desktops on the Cisco UCS B200 M3 server

## Processor And Memory Utilization throughout the test

***Figure 44: English***

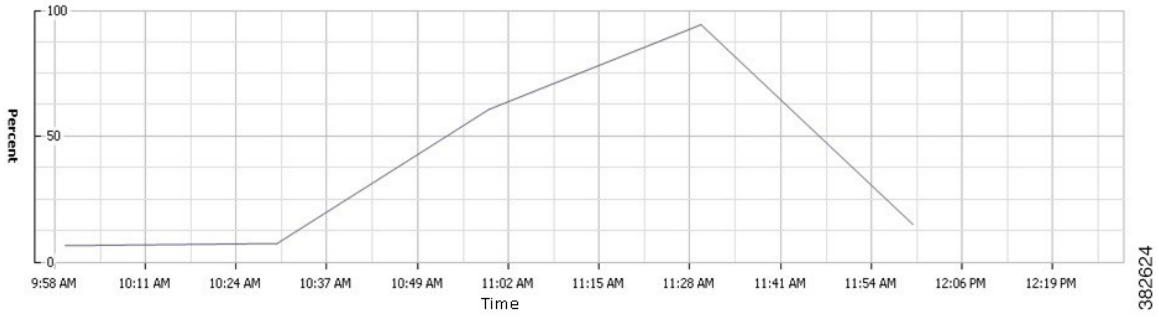


***Figure 45: Japanese***

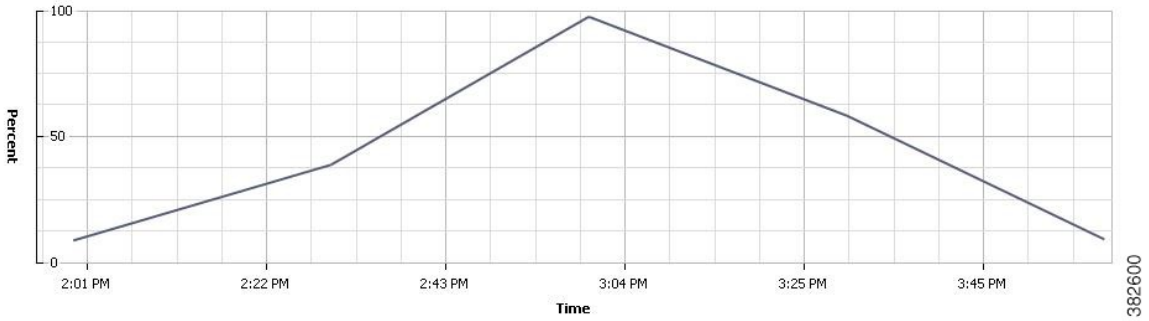

Figure 44 and 45 : CPU utilization throughout the test

***Figure 46: English***

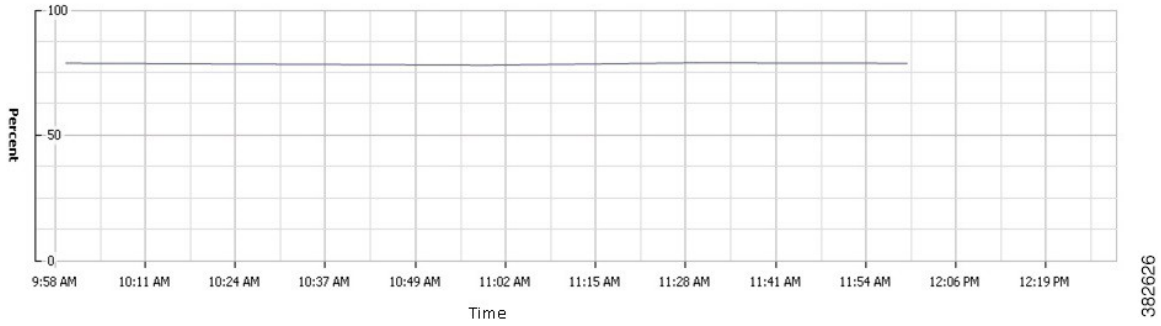


***Figure 47: Japanese***

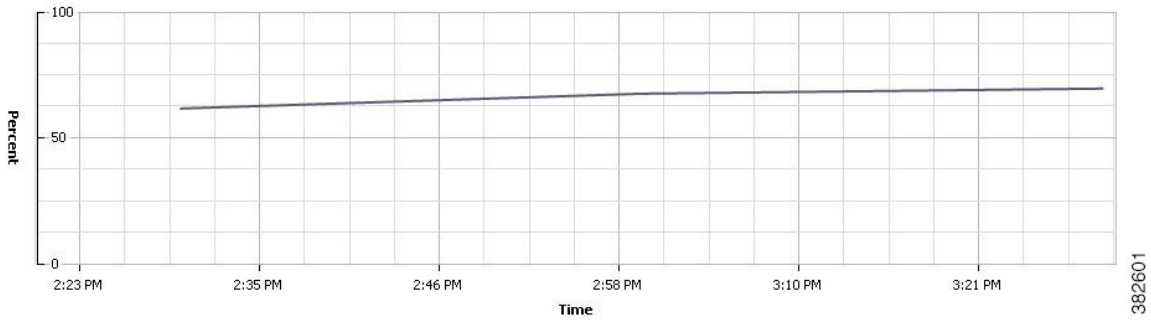


Figure 46 and 47 : Memory usage throughout the test

### Network and Storage Utilization throughout the Test

***Figure 48: English***

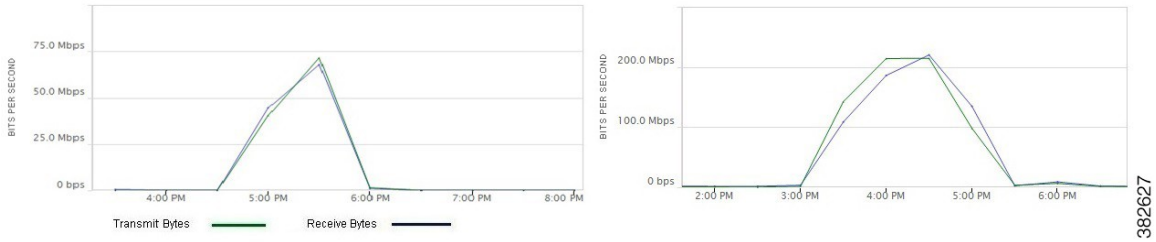


***Figure 49: Japanese***


Figure 48 and 49 : Provisioning Services Network and Storage usage throughout the test

# Related Documentation

### Cisco Unified computing

http://www.cisco.com/en/US/products/ps10265/index.html

http://www.cisco.com/en/US/prod/collateral/ps10265/ps10280/ps12288/data_sheet_c78-700625.html

### Login VSI

http://www.loginvsi.com/documentation/index.php?title=Main_Page

### VMware Horizon View

https://www.vmware.com/pdf/horizon-view/horizon-view-53-feature-pack-document.pdf