1.   Introduction

This *Upgrade Prerequisites Checklist* document describes the requirements and prerequisites necessary to begin planning for the upgrade of an existing VMware Infrastructure 3 to VMware vSphere 4.

This document is intended for those involved in planning, designing, and upgrading an existing VMware Infrastructure to VMware vSphere. The intended audience includes the following roles:

- Architect and planners responsible for driving architecture level decisions

- IT personnel and supporting VMware Authorized Consultants who require knowledge for deploying and upgrading to VMware vSphere infrastructure

It is assumed that the audience has knowledge and familiarity with VMware Infrastructure and VMware vSphere and has access to the necessary product documentation for reference.

2.   Upgrade to vSphere Prerequisites

This checklist will detail the prerequisites identified either as Required, Optional, or Recommended that should be reviewed and completed first, before starting to work on the upgrade from VMware Infrastructure to VMware vSphere.

Required – Unless verified or completed, it can impact the successful outcome of the upgrade or supportability of the environment

Optional – Depending on your business and/or technical requirements and constraints, you may choose to verify or complete

Recommended – Optional but highly recommended by VMware

Required	☐ Ensure that any existing VMware products are compatible with VMware vSphere. Refer to the *Software Compatibility Matrix* guide in the VMware vSphere Upgrade Center on vmware.com*. In particular, certain products and versions that may not be compatible include:
	
	    o VMware View / VDM
	    o VMware Lab Manager
	    o VMware Stage Manager
	    o VMware Lifecycle Manager
	    o VMware Site Recovery Manager
	
	* This step should be completed prior to *any* migration activities in order to determine eligibility for upgrade/migration to vSphere

Required	☐ Ensure that the systems, I/O devices, and storage arrays are on the VMware certified compatibility list for VMware vSphere See the *Hardware Compatibility Guide* on the VMware documentation web site
Required	Ensure that your virtual machine operating systems are supported on VMware vSphere See the *Guest Operating System Installation Guide* on the VMware documentation web site

2.1   VirtualCenter / vCenter Server

Required	☐ Ensure that the vCenter Server is version 2.0 or above (vCenter 1.x cannot be upgraded and will require a clean installation of vCenter Server 4.0)
Required	☐ Ensure that the hardware and/or virtual machine meets the minimum system requirements for VMware vCenter 4.0 See the vCenter Server Hardware Requirements in the *ESX and vCenter Server Installation Guide* on the VMware documentation web site
Optional	☐ It may be necessary to increase the memory and CPU of the hardware and/or virtual machine depending on the size of the virtual infrastructure (number of hosts and VMs) being managed by the vCenter Server
Required	☐ Ensure that the vCenter Server database is supported (Oracle 9i, Microsoft SQL Server 2000 are no longer supported. The database can be upgraded to the supported versions first) Existing unsupported databases must be upgraded to a supported version before upgrading the vCenter Server. Otherwise, a fresh install of vCenter Server must be created See the vCenter Server Database Requirements in the *ESX and vCenter Server Installation Guide* on the VMware documentation web site
Required	☐ On a 64-bit vCenter Server system, use a 32-bit DSN using the 32-bit ODBC administrator
Required	☐ Ensure that the necessary patches required for database schema upgrade support are applied See table 3-3 of the *vSphere Upgrade Guide* on the VMware documentation web site
Required	☐ Reconfirm that you have the login credentials, the database instance name, the database server name (or ODBC system data store name – DSN) that will be used by the vCenter Server database
Required	☐ If the database is 64-bit Oracle, make sure that the default installation path of C:\Program Files(x86) is changed to remove the parentheses (). Do not include any special characters in the installation path
Required	☐ Ensure that for Microsoft SQL database, the system DSN is using SQL Native Client driver

Required	☐ Ensure that the Oracle and Microsoft SQL databases have the appropriate permissions See the Database Prerequisites section in Chapter 3 of the *vSphere Upgrade Guide* on the VMware documentation web site
Required	☐ Ensure that the installation path of the existing vCenter Server does NOT have commas (,) or periods (.)
Required	☐ Confirm that you have READ permission for the Network service account on the root of the system disk of the vCenter Server installation; this is typically your C:\ drive (NOTE: The installer will prompt you if this is not set)
Required	☐ Confirm that the vCenter Server system name is no more than 15 characters

Required	☐ Ensure that the following ports are not used by any existing application on the vCenter Server system and that there are no firewalls preventing these ports from/to the vCenter Server system
	
	    o HTTP – port 80
	    o HTTPS – port 443
	    o LDAP – port 389 (needed even if not using linked mode)
	    o SSL – port 636

Recommended	☐ Ensure that you have taken a complete backup of vCenter Server, vCenter database, templates in vCenter repository, license files, certificate files before the install or upgrade
Required	☐ Ensure you have the VMware vCenter Server 4.0 installation media/files or ISO image

2.2 VMware Infrastructure Client / vSphere Client

Required	☐ Ensure that the operating system and hardware supports vSphere Client See the *Compatibility Guides* on the VMware vSphere documentation web site
Required	☐ Ensure that the Internet Explorer (IE) security settings are set to enable *Allow scripting of Internet Explorer web browser control* (if the IE security settings are set to High)

2.3   VMware Update Manager

Recommended	☐ Ensure that you have taken a complete backup of VMware Update Manager and Update Manager database before the install or upgrade

Required	☐ Ensure that the following ports are not used by any existing application on the VMware Update Manager system and that there are no firewalls preventing these ports from/to the VMware Update Manager system
	
	    o SOAP – port 8084
	
	    o Web – port 9084
	
	    o SSL – port 9087

2.4   VMware ESX/ESXi

Required	☐ Verify the ESX/ESXi version in order to determine the upgrade path (in-place upgrade vs. fresh install) (An ESX 2.5.x host cannot have an in-place upgrade directly to ESX 4.0; VMs on such a host should be evacuated to a new ESX/ESXi 4 host created through a fresh install. Alternatively, if the ESX 2.5.x host was configured with a /boot partition of at least 100MB, the host can be upgraded to 3.x through an in-place upgrade using the ESX 3.x installation CD, which in turn can be upgraded to 4.0 using an in-place upgrade using VMware Update Manager or the Host Update Utility.)
Required	☐ Ensure that the hardware meets the minimum system requirements for VMware ESX/ESXi 4 See the online *Hardware Compatibility Guide* at http://www.vmware.com/resources/compatibility and the hardware requirements in the *ESX and vCenter Server Installation Guide* from the VMware documentation web site
Required	☐ Ensure that there is either a local VMFS volume with at least 10 GB free space, or an accessible shared VMFS volume that is masked/zoned to the ESX host, with at least 10 GB free space per ESX COS to store the ESX 4 COS vmdk
Recommended	☐ Ensure that there is adequate capacity in the cluster to evacuate all the workloads from the ESX/ESXi host being installed or upgraded
Recommended	☐ Ensure that you have backed up your ESX host (service console files, .vmx files, custom scripts, host configuration files, local VMFS file system)
Recommended	☐ Ensure that you have backed up your ESXi host (using VI CLI and vicfg-cfgbackup command)

Recommended	☐ If applicable, check with vendor for updated and supported 3rd party agents/software

2.5   Virtual Machines

Required	☐ Ensure that there are no suspend files for a virtual machine in order to do the VM hardware upgrade
Required	☐ Ensure that the virtual machine has a CD-ROM device configured in order for VMware Tools to mount the virtual ISO and install/upgrade VMware Tools
Optional	☐ Ensure that it is OK to upgrade the virtual machine hardware from v4 to v7. Once upgraded, you cannot revert back to an earlier virtual machine format unless you have created a snapshot of the virtual machine prior to the changes
Recommended	☐ Ensure that the virtual machines used for the upgrade are backed up (example: you can use a backup agent / VMware Consolidated Backup or cloning to another datastore)

2.6   Licensing

Required	☐ Ensure that you have the necessary licenses for the required features of VMware vSphere. The evaluation license is valid for 60 days after you power on the ESX/ESXi host
Optional	☐ Ensure that you have the necessary VMware store account information in order to access and manage the licenses
Recommended	☐ Ensure that you have a backup copy of the existing VMware License Server license files

3.   New VMware vSphere Features Prerequisites

This checklist will detail prerequisites identified either as Required, Optional, or Recommended that should be reviewed and completed in order to evaluate and implement some of the new features and functionality of VMware vSphere.

3.1   Linked Mode

Required	☐ Ensure that each vCenter Server instance in a Linked Mode group is part of a domain and not a workgroup. Each instance can be in a different domain if the domains have a two-way trust relationship between themselves
Required	☐ DNS must be operational in order for Linked Mode replication to work
Required	☐ DNS name of the vCenter Server system must match the actual machine name
Required	☐ Ensure that vCenter Server system is not a domain controller
Required	☐ Ensure that vCenter Server system is not a terminal server
Required	☐ Ensure that the installer is run by a domain user who is an administrator of the vCenter Server machine and the target machine of the Linked Mode group

Required	☐ Ensure that the domain user account has the following permissions:
	
	  o Member of the Administrators group
	
	  o Act as part of the operating system
	
	  o Log on as a service

Required	☐ Ensure that the vCenter Server instances are running network time synchronization and their time is not more than 5 minutes apart
Required	☐ Ensure that the *Network Service* account has permissions to write to the vCenter Server installation folder

3.2   Storage VMotion

Required	☐ Ensure that virtual machines do not have snapshots (VMs with snapshots cannot be migrated using Storage VMotion)

Required	☐ Ensure that virtual machine disks are either in persistent mode or are raw device maps (RDM). Non-persistent disks cannot be migrated using Storage VMotion
Required	☐ Ensure that the host on which the virtual machine is running has a VMware VMotion license and is correctly configured for VMotion
Required	☐ Ensure that the host on which the virtual machine is running has access to both the source and target datastores
Optional	☐ Validate that there is no requirement to run more than four simultaneous migrations using VMware VMotion or VMware Storage VMotion accessing a single datastore. If no other migrations are occurring, up to four concurrent migrations with VMware Storage VMotion involving the datastore can occur simultaneously

3.3   Thin Provisioning

Required	☐ Ensure that virtual machines with thin provisioned disks do not need to be protected with VMware FT (since VMware FT requires virtual machines to have thick-eagerzeroed disks)
Required	☐ If using thin provisioning for an array LUN, consult with the array vendor on compatibility with VMware vSphere, performance, reporting, and alerting capabilities
Optional	☐ Ensure that you understand the time involved for procuring, adding, and configuring additional storage, so that the appropriate alarms can be set in order to send alerts well in advance of running out of physical storage

3.4   VMware HA Improvements

Required	☐ Ensure that all virtual machines and configuration files reside on shared storage
Required	☐ Ensure that all hosts in a HA cluster are configured to have access to the same virtual machine network and network label names are valid and consistent
Required	☐ Ensure that DNS is configured (forward, reverse, short name, and long name / FQDN)

Required	☐ If VM Monitoring is to be used to restart VMs when the VM heartbeat is lost, ensure that the virtual machines have the latest version of VMware Tools installed in order to communicate heartbeats
Required	☐ If physical switches support PortFast (or equivalent), enable it on the physical network switches that connect to the hosts
Required	☐ Ensure that the network isolation addresses respond to ICMP ping requests
Recommended	☐ Ensure that all hosts in a HA cluster are configured with static IP address
Recommended	☐ Ensure that there is a redundant Service Console and VMkernel networking
Recommended	☐ Use a team of two NICs connected to separate physical switches to improve reliability of VMkernel network
Recommended	☐ Add a second network isolation address (in addition to the default gateway) for each network (VMware recommendation to set das.isolationaddress2 to second isolation address and das.failuredetectiontime to value more than 20000 – default is 15000)

3.5   Fault Tolerance

Recommended	☐ Configuration: In order to determine whether the configuration of both software and hardware is suitable for use with VMware FT, download and run the VMware SiteSurvey utility from http://www.vmware.com/download/shared_tuilities.html See http://www.vmware.com/support/sitesurvey for additional information on the SiteSurvey utility
Required	☐ ESX/ESXi Hardware: Ensure that the processors are supported. Download and run the VMware SiteSurvey utility from http://www.vmware.com/download/shared_utilities.html
Required	☐ ESX/ESXi Hardware: Ensure that HV (Hardware Virtualization) is enabled in the BIOS
Optional	☐ ESX/ESXi Hardware: Ensure that power management (also known as power-capping) is turned OFF in the BIOS (performance implications)
Required	☐ Storage: Ensure that FT protected virtual machines are on shared storage (FC, iSCSI or NFS)

Required	☐ Storage: Ensure that the datastore is not using RDM (Raw Disk Mapping) in physical compatibility mode. RDM in virtual compatibility mode is supported
Required	☐ Storage: Ensure that there is no requirement to use Storage VMotion while FT is enabled on the VM. However, customers can disable FT and then use Storage VMotion
Required	☐ Storage: Ensure that NPIV (N-Port ID Virtualization) is not used since NPIV is not supported with VMware FT
Optional	☐ Storage: Ensure that virtual disks on VMFS3 are thick-eagerzeroed (thin or sparsely allocated will be converted to thick-eagerzeroed when VMware FT is enabled requiring additional storage space)
Optional	☐ Storage: Ensure that ISOs used by the VMware FT protected VMs are on shared storage accessible to both primary and secondary VMs (else errors reported on secondary as if there is no media, which might be acceptable)
Optional	☐ Storage: If you are using NFS, increase timeouts and have a dedicated NIC for NFS traffic
Optional	☐ Network: Ensure that at least two NICs are used (NIC teaming) for ESX management/VMotion and VMware FT logging. VMware recommends at least three NICs: one for VMware VMotion, one for VMware FT, and one NIC as a shared failover for both
Required	☐ Network: Ensure that at least gigabit NICs are used (10 Gbit NICs can be used as well as jumbo frames enabled for better performance)
Optional	☐ Redundancy: Ensure that the environment does not have a single point of failure (i.e. use NIC teaming, multiple network switches, and storage multipathing)
Required	☐ vCenter Server: Ensure that the primary and secondary ESX/ESXi hosts and virtual machines are in an HA cluster
Required	☐ vCenter Server: If the HA cluster is configured for one ESX/ESXi host failure, ensure that there are at least three ESX/ESXi hosts in the HA cluster
Required	☐ vCenter Server: Ensure that there is no requirement to use DRS to automatically move VMware FT protected virtual machines (although manual VMotion is allowed)
Required	☐ vCenter Server: Ensure that host certificate checking is enabled (enabled by default) before you add the ESX/ESXi host to vCenter Server
Required	☐ ESX/ESXi: Ensure that the primary and secondary ESX/ESXi hosts are running the same build of VMware ESX/ESXi

Required	☐ Virtual Machines: Ensure that the virtual machines are NOT using more than 1 vCPU (SMP is not supported)
Required	☐ Virtual Machines: Ensure that there is no user requirement to use NPT/EPT (Nested Page Tables/Extended Page Tables) on VMware FT protected VMs, since VMware FT disables NPT/EPT for the VMs
Required	☐ Virtual Machines: Ensure that there is no user requirement to hot add or remove devices since hot plugging devices cannot be done with VMware FT
Required	☐ Virtual Machines: Ensure that there is no user requirement to use USB (USB must be disabled) and sound devices (must not be configured) since these are not supported for Record/Replay and VMware FT
Required	☐ Virtual Machines: Ensure that there is no user requirement to have virtual machine snapshots since these are not supported for VMware FT. Delete snapshots from existing virtual machines before protecting with VMware FT
Required	☐ Virtual Machines: Ensure that there is no user requirement to use vStroage API/VCB or VMware Data Recovery to backup the FT VMs. vStorage API/VCB and VMware Data Recovery are not supported since there is no way to snapshot FT VMs
Required	☐ Virtual Machines: Ensure that virtual machine hardware is upgraded to v7
Optional	☐ Virtual Machines: Ensure that there are will be no more than four (to eight) VMware FT enabled primary or secondary virtual machines on any single ESX/ESXi host (suggested general guideline based on ESX/ESXi host and VM size and workloads which can vary)
Required	☐ Guest OS: Ensure that the virtual machines do not use a paravirtualized guest OS
Required	☐ 3rd Party: Ensure MSCS clustered virtual machines will have MSCS clustering removed prior to protecting with VMware FT (and make sure that the virtual machines are not SMP)

3.6   Host Profiles

Required	☐ Host Profiles requires licensing for vSphere Enterprise Plus
Required	☐ Identify one host that will be used to create a baseline host profile
Required	☐ Ensure that there is at least one additional host of similar hardware, make, model, and configuration that can be used to apply a host profile

Required	☐ Ensure that there is adequate capacity to evacuate the workloads running on the additional host when put in maintenance mode to apply the host profile

3.7   vNetwork Distributed Switch

Required	☐ Distributed Switches requires licensing for vSphere Enterprise Plus
Required	☐ If vDS is being implemented in order to support PVLANs, ensure that the physical switch is PVLAN aware and is configured appropriately
Required	☐ Ensure that no more than 16 vNetwork Distributed Switches are required per vCenter Server (max is 16 per vCenter Server)
Optional	☐ Ensure existing standard vswitches have multiple physical NICs (NIC teaming) in order to have zero downtime to migrate ESX/ESXi hosts from standard vswitches to vDS

3.8   Distributed Power Management

Required	☐ Ensure that there are at least two ESX/ESXi hosts are in a vCenter Server cluster. For an HA cluster with one host failure, ensure that there are at least three ESX/ESXi hosts in the HA cluster
Required	☐ Ensure that VMotion is set up and working correctly. The VMotion network should be a single IP subnet, not multiple subnets separated by routers
Required	☐ If using WOL (Wake on LAN), ensure that the VMotion NIC on each ESX/ESXi host supports WOL
Required	☐ If using WOL, ensure that the switch port that each WOL supporting VMotion NIC is set to auto-negotiate and NOT set to a fixed speed (because many NICs support WOL only if they can switch to 100Mbps or less when the host is powered off)
Required	☐ If using BMC (Baseboard Management Controller) or IPMI (Intelligent Platform Management Interface), ensure that BMC or IPMI settings are configured for each host. The steps will vary according to manufacturer and model
Required	☐ If using BMC, ensure that BMC LAN channel is configured to be "always available" and to allow "operator" privileged commands

Required	☐ If using BMC, ensure you have the user name and password for the BMC account, IP address and MAC address of the NIC associated with the BMC. The BMC may have a dedicated NIC or it may work in-line with one of the system's onboard adapters
Required	☐ If required, ensure that the IP address of the NIC associated with the BMC has a static IP address (or a DHCP address with an infinite lease)
Required	☐ Ensure you test each ESX/ESXi host that is using a BMC or WOL before configuring VMware DPM for the cluster (hosts that fail a BMC or WOL test should be disabled from using power management)

3.9   vCLI and vMA

Required	☐ If using vSphere CLI (Command Line Interface) 4.0, ensure that the target environment is ESX/ESXi 3.5U2 or later with vCenter 2.5U2 and later
Required	☐ If using vMA (vSphere Management Assistant) 4.0, ensure that the target environment is ESX/ESXi 3.5U2 or later with vCenter 4.0 and later

3.10   Data Recovery (vDR)

Required	☐ Ensure that the environment is running vCenter Server 4.0, at least one ESX/ESXi 4.0, and vSphere Client
Required	☐ Virtual machines protected by VMware Data Recovery must be running on ESX/ESXi 4.0 or later
Required	☐ Ensure that there are virtual machines protected by VMware Data Recovery are not one of the following: FT VMs, RDM disks with hardware compatibility, VMs with DirectPath I/O. Data Recovery uses snapshots and you cannot snapshot these VM disks
Required	☐ Ensure that there are no user requirements to protect more than 100 VMs
Required	☐ Ensure that you have created at least one datastore with minimum of 10 GB free space for the deduplication store
Required	☐ Ensure that you do not need more than 2 TB for the deduplication store (1 TB per dedup store x 2 dedup stores)

Required	☐ Ensure that there are no user requirements to do file level backups.
Required	☐ Ensure that there is no user requirement for backing up to tape. VMware Data Recovery is a disk backup solution and cannot backup to tape

3.11 vShield Zones

Required	☐ Ensure that the environment is running vCenter Server 4.0, at least one ESX/ESXi 4.0, and vSphere Client
Required	☐ Ensure you have static IP address for the vShield instance and vShield Manager
Required	☐ Ensure you have connectivity to the Internet from the vShield Manager directly or via proxy