



RED HAT ENTERPRISE VIRTUALIZATION FOR SERVERS: COMPETITIVE PRICING GUIDE



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INTRODUCTION TO RED HAT ENTERPRISE VIRTUALIZATION

Server virtualization offers tremendous benefits for enterprise IT organizations – server consolidation, hardware abstraction, and internal clouds deliver a high degree of operational efficiency. However, today, server virtualization is not used pervasively in the production enterprise datacenter. Some of the barriers preventing wide-spread adoption of existing proprietary virtualization solutions are performance, scalability, security, cost, and ecosystem challenges.

The Red Hat Enterprise Virtualization portfolio is an end-to-end virtualization solution, with use cases for both servers and desktops, that is designed to overcome these challenges, enable pervasive datacenter virtualization, and unlock unprecedented capital and operational efficiency. The Red Hat Enterprise Virtualization portfolio builds upon the Red Hat Enterprise Linux platform that is trusted by millions of organizations around the world for their most mission-critical workloads. Combined with KVM, the latest generation of virtualization technology, Red Hat Enterprise Virtualization delivers a secure, robust virtualization platform with unmatched performance and scalability for Red Hat Enterprise Linux and Windows guests.

The **Red Hat Enterprise Virtualization for Servers** product consists of the following components:

Red Hat Enterprise Virtualization Manager for Servers: A feature-rich server virtualization management system that provides advanced management capabilities for hosts and guests, including high availability, live migration, storage management, system scheduler, and more.

Red Hat Enterprise Virtualization Hypervisor: A modern hypervisor based on KVM which can be deployed either as:

- A standalone, small footprint, high-performance, secure hypervisor based on the Red Hat Enterprise Linux kernel (included with Red Hat Enterprise Virtualization for Servers).
- Or
- **Red Hat Enterprise Linux 5.4:** The latest Red Hat Enterprise Linux platform release (purchased separately) that integrates KVM hypervisor technology, allowing customers to increase their operational and capital efficiency by leveraging the same hosts to run both native Red Hat Enterprise Linux applications and virtual machines running supported guest operating systems.

COMPARING RED HAT ENTERPRISE VIRTUALIZATION PRICING TO VMWARE AND MICROSOFT HYPER-V PRICING

Red Hat Enterprise Virtualization uses a pricing model which is different than the models used by VMware® for vSphere® 4 and Microsoft® for Hyper-V®. It is important to understand these differences to accurately compare costs across platforms.

To help you compare, Red Hat has developed an online TCO calculator and configurator for Red Hat Enterprise Virtualization. For more information, go to <http://www.redhat.com/rhev/server/cost>

In a typical virtualization environment, you may have the following elements: hypervisor, management server, management agent, and guest operating system. For each element, you may also need to think



about an upfront license fee and a subscription fee for maintenance and support. This yields the following matrix of elements you may need to pay for either directly or indirectly:

Hypervisor	Management Server	Management Agent	Guest Operating System
Upfront License	Upfront License	Upfront License	Upfront License
Support/Subscription	Support/Subscription	Support/Subscription	Support/Subscription

Red Hat Enterprise Virtualization for Servers Pricing

All Red Hat products are offered under a subscription model. There are no high, one-time license costs, just an annual subscription based on the level of support you need. Red Hat Enterprise Virtualization for Servers subscription pricing is based on number of managed sockets: each managed socket on a virtualization host requires 1 subscription of Red Hat Enterprise Virtualization for Servers.

Each virtualization host that is fully licensed for Red Hat Enterprise Virtualization for Servers is entitled to run the included Red Hat Enterprise Virtualization Hypervisor, a bare-metal hypervisor based on the full Red Hat Linux Kernel. There is no separate management agent in Red Hat Enterprise Virtualization.

Some customers may desire to host their virtual machines on Red Hat Enterprise Linux or Red Hat Enterprise Linux Advanced Platform. In that case, you purchase a subscription to Red Hat Enterprise Linux and receive an entitlement for either 4 Red Hat Enterprise Linux guests with the standard edition, or unlimited Red Hat Enterprise Linux guests with Advanced Platform. Your desired configuration will inform which configuration is more suitable for you.

Product	Includes
Red Hat Enterprise Virtualization for Servers (1 subscription)	<ul style="list-style-type: none">– Manager for Servers Support/Subscription (1 socket)– Hypervisor Support/Subscription (1 socket)– Management Agent not required– DOES NOT INCLUDE GUEST OPERATING SYSTEM
Red Hat Enterprise Linux (1 subscription) as host hypervisor	<ul style="list-style-type: none">– Hypervisor Support/Subscription (1 host, 2 sockets maximum)– Four (4) Red Hat Enterprise Linux guest operating system subscriptions per host– Management Agent not required– REQUIRES Red Hat Enterprise Virtualization FOR SERVERS FOR MANAGEMENT



Product	Includes
Red Hat Enterprise Linux Advanced Platform (1 subscription) as host hypervisor	<ul style="list-style-type: none">– Hypervisor Support/Subscription (1 host, unlimited sockets)– Unlimited Red Hat Enterprise Linux guest operating system subscriptions per host– Management Agent not required– REQUIRES Red Hat Enterprise Virtualization FOR SERVERS FOR MANAGEMENT

For more detailed information on subscription pricing for Red Hat Enterprise Virtualization for Servers, please see the Whitepaper entitled “Red Hat Enterprise Virtualization for Servers: Pricing Guide.”

VMware vSphere 4 Pricing

VMware sells its vSphere 4 products with both an upfront license fee (“purchasing” the product) and an annual service and support contract called Support and Subscription or “SnS” (which entitles the customer to support, patches, and upgrades). VMware sells the hypervisor and management agent bundled into different “editions” which give the customer different management functionality. The customer must also purchase a VMware vCenter Management server license separately. While VMware markets their ESXi 4 bare metal hypervisor as an effectively “free” product, ESXi does not include support, nor does it support advanced multinode management without “upgrading” it to one of the paid editions of vSphere 4.

vSphere 4 pricing is now based on a per-socket model for the vSphere nodes, and a per-server model for the vCenter Management Server. Each vSphere node license includes a vCenter Management license. VMware vSphere 4 does not include any Guest Operating system licensing. All guest operating system licenses must be purchased separately.

For a typical environment, the customer will need to purchase the following:

Product	Includes
vCenter Management Server License	<ul style="list-style-type: none">– 1 node of vCenter Management Server– NO MANAGEMENT AGENTS– NO HYPERVISOR
vCenter Management Server Support Subscription	<ul style="list-style-type: none">– 1 year of support and updates for above
vSphere 4 (editions include Standard, Advanced, Enterprise, Enterprise Plus) License	<ul style="list-style-type: none">– 1 socket of ESX hypervisor– 1 socket of vCenter Management Agent– Guest Operating System not included– REQUIRES MANAGEMENT SERVER
vSphere 4 Support Subscription	<ul style="list-style-type: none">– 1 year of support and updates for above



Microsoft Hyper-V Pricing

Microsoft sells its virtualization products with both an upfront license fee (“purchasing” the product) and an annual service and support contract (which entitles the customer to support, patches, and upgrades). Microsoft Hyper-V is embedded in the Windows operating system, and the limitations of the particular edition of Windows Server (Standard, Enterprise, or Datacenter) determines the limitations of the virtualization host. In addition, each edition of Windows Server is entitled to different numbers of Windows Server guest instances. Multi-node management is sold as a separate product (System Center Virtual Machine Manager) which must be purchased to take advantage of certain management functionality. While Microsoft now gives away the Microsoft Hyper-V 2008 Server and markets it as a bare metal hypervisor, it is effectively a stripped down version of Microsoft Windows Server 2008 Standard with the limitations of the Standard edition and without free Windows Server guests. Most Microsoft software is sold on a per-node basis. Different editions of the software may limit a particular node to a subset of features. Microsoft Windows Server 2008 Datacenter is sold on a per-socket basis.

For a typical environment, the customer will need to purchase the following:

Product	Includes
Hypervisor and Management Products	
Microsoft System Center Virtual Machine Manager (per node)	– One management agent
Software Assurance for Microsoft System Center Virtual Machine Manager	– 1 year support and updates for above
Hyper-V Server 2008 (per node) “FREE” hypervisor.	– 1 node of Hyper-V server, limited to 4 sockets, 32GB RAM. – INCLUDES NO GUEST OS LICENSES – REQUIRES MANAGEMENT AGENT
Software Assurance for Hyper-V Server 2008	– Only available as part of an enterprise license agreement
Windows Server as Hypervisor (also includes guest licenses)	
Windows Server 2008 Standard Edition (per node)	– 1 node of Hyper-V server, limited to 4 sockets, 32GB RAM. Comes with 1 Virtual Windows Server guests per node – REQUIRES MANAGEMENT AGENT
Software Assurance for Windows Server 2008 Standard Edition	– 1 year of support and updates for above



Product	Includes
Windows Server 2008 Enterprise Edition (per node)	<ul style="list-style-type: none">– 1 node of Hyper-V server, limited to 4 sockets, 2TB RAM. Comes with 4 Virtual Windows Server guest per node– REQUIRES MANAGEMENT AGENT
Software Assurance for Windows Server 2008 Enterprise Edition	<ul style="list-style-type: none">– 1 year of support and updates for above
Windows Server 2008 Datacenter Edition (per socket)	<ul style="list-style-type: none">– 1 socket of Hyper-V server, unlimited sockets, 2TB RAM. Comes with unlimited Virtual Windows Server guests per node– REQUIRES MANAGEMENT AGENT
Software Assurance for Windows Server 2008 Datacenter Edition	<ul style="list-style-type: none">– 1 year of support and updates for above



PRICING SCENARIOS

For each of these pricing scenarios, we examine the first year cost of acquiring and supporting the hardware, the virtualization management and hypervisor software, and the guest operating systems. We assume that because of memory page sharing and other advanced techniques not yet in Microsoft Hyper-V or announced for Hyper-V 2008 R2, that Red Hat Enterprise Virtualization and VMware vSphere 4 nodes yield a higher density of virtual machines, which is reflected in a higher number of servers required for Hyper-V to support the same workload.

In all cases, we assume that when there are multiple choices in how to license a product, the customer will choose the lowest price option. This may not always be optimal for your environment. For example, you may need the flexibility of Red Hat Enterprise Linux as a hypervisor host in a Red Hat Enterprise Virtualization for Servers scenario where the lowest cost option is to use the included Red Hat Enterprise Virtualization Hypervisor hypervisor. This information is not captured in Red Hat's calculations, and should be something you discuss with your reseller or salesperson.

The following are the major assumptions behind our pricing logic:

Red Hat Enterprise Virtualization Hypervisor Pricing

For **Red Hat Enterprise Virtualization for Servers** pricing scenarios, the pricing of the Red Hat Enterprise Virtualization Hypervisor, the customer has three options. Our models will calculate all three options and then choose the least expensive option:

1. Use the **Red Hat Enterprise Virtualization-H** bare metal hypervisor that comes included with the Red Hat Enterprise Virtualization for Servers product. This option costs nothing additional, but does not include guest licenses for Red Hat Enterprise Linux.
2. Purchase **Red Hat Enterprise Linux** for use as a hypervisor. This product is limited to two (2) socket servers, so will not be chosen in four socket configurations. It includes four (4) Red Hat Enterprise Linux virtual guest licenses per node, and additional licenses must be purchased separately.
3. Purchase **Red Hat Enterprise Linux Advanced Platform** for use as a hypervisor. This product can be used with any server with any number of sockets. It includes unlimited Red Hat Enterprise Linux virtual guest licenses per node.

Depending on the pricing scenario, the recommended configuration may use the Red Hat Enterprise Virtualization Hypervisor or one of the Red Hat Enterprise Linux products as a hypervisor. This option is selected based on whichever option yields the lowest cost of Red Hat Enterprise Linux guest licenses. At low density and low number of Red Hat Enterprise Linux guests, the recommendation will usually be to use the Red Hat Enterprise Virtualization Hypervisor that comes with Red Hat Enterprise Virtualization for Servers.



Red Hat Enterprise Linux Guest Pricing

For the pricing of **Red Hat Enterprise Linux** guests with either **Red Hat Enterprise Virtualization for Servers**, **VMware vSphere 4** or **Hyper-V**, there are up to four options, depending on the virtualization platform being priced:

1. Purchase one standalone license of **Red Hat Enterprise Linux** for each guest. This scenario is chosen when there is a very low density and number of Red Hat Enterprise Linux guests in the environment.
2. Purchase the **Red Hat Enterprise Linux as a Virtual Guest 4 Pack** to enable hosts for Red Hat Enterprise Linux guests. Customers must purchase one 4 pack for each host, and are limited to an average density of 4 Enterprise Linux guests or less. This is the usual choice for VMware and Hyper-V environments with a low density of Red Hat Enterprise Linux guests, and is also an option for Red Hat Enterprise Virtualization for Servers customers.
3. Purchase the **Red Hat Enterprise Linux as a Virtual Guest Unlimited Pack¹** to enable hosts for Red Hat Enterprise Linux guests. Customers must purchase at least one Unlimited pack for each socket on each host. This is the usual choice for VMware and Hyper-V environments with a high density of Red Hat Enterprise Linux guests, and is also an option for Red Hat Enterprise Virtualization for Servers customers.
4. **Red Hat Enterprise Virtualization for Servers** customers have the option to purchase **Red Hat Enterprise Linux Advanced Platform** as a hypervisor and make use of its unlimited number of virtual guests per node. This is the option chosen for environments with a very high density of Red Hat Enterprise Linux guests.

Windows Server Guest Licensing

Windows Server guest licensing is a bit more complicated, and depends on whether you are using Hyper-V as your virtualization platform or not. Microsoft may also offer certain customers different licensing entitlements in an enterprise license agreement. This document only uses the entitlements and licensing rules for generally available volume license versions of Windows Server 2008 R2.

There are three flavors of Windows Server considered here: Standard, Enterprise, and Datacenter. Our calculations assume that customers will choose either Enterprise or Datacenter for use a hypervisor host operating systems to be able to use advanced features such as live migration and high availability, but that a minimum of Windows Server Standard is fine for guest operating systems. We do not use the free Hyper-V Server 2008 product as a host, since it is equivalent to Windows Server 2008 Standard and does not enable enterprise virtualization features.

For **Red Hat Enterprise Virtualization for Servers** and **VMware vSphere 4** pricing scenarios, our calculations use the minimum of the cost of:

¹ The intent of this subscription is to provide an unlimited number of Enterprise Linux virtual guests. It is actually implemented by providing 100 Red Hat Network entitlements per socket.



1. Purchase **Windows Server 2008 Standard or Enterprise** licenses individually and float them in the environment. When used in this manner, the licenses are more expensive per unit, but the right to use lives inside the virtual machine and therefore it can be live migrated anywhere in the environment. This scenario is chosen for low density and low total number of Windows guests.
2. Purchase Windows Server 2008 Enterprise licenses for each host, which entitles you to 4 Windows guests on that host, and if necessary stack additional Enterprise licenses to get to your average density. When used in this manner, licenses can be less expensive, but the customer is responsible for ensuring that the number of Windows guests on each host is sized for peak demand, which may cause limitations in implementation.
3. Purchase **Windows Server 2008 Datacenter** licenses for each socket on every host. This gives all the hosts the right to unlimited Windows guests, and allows live migration to any host without licensing issues. This is generally the most expensive option, and chosen when there is a high number and a high density of Windows guests.
4. Purchase **Windows Server 2008 Datacenter** licenses for each socket on a subset of the total hosts, which will then be placed in a Windows-only cluster. This gives all the hosts within the cluster the right to unlimited Windows guests. This option is recommended where there is a high number of Windows guests, but not high enough that Datacenter licenses for all hosts is warranted.

For **Hyper-V** pricing scenarios, the Windows Server operating system is used as a hypervisor, so at least one Windows Server license must be purchased per host. This license will come with a certain number of guest entitlements. If the number of guests supplied by the hypervisors is insufficient, then guests licenses can be added. Our calculations assume that only Enterprise or Datacenter will be used as the hypervisor (otherwise, live migration and other key features will not be available). Therefore, our calculations will choose the minimum of:

1. Purchase **Windows Server 2008 Enterprise as hypervisor hosts**, which come with 4 guest entitlements per host, and then purchase additional **Windows Server 2008 Standard or Enterprise** licenses individually to the required number. This scenario is chosen for low density and low total number of Windows guests.
2. Purchase **Windows Server 2008 Datacenter as hypervisor hosts**. This gives all the hosts the right to unlimited Windows guests, and allows live migration to any host without licensing issues. This is generally the most expensive option, and chosen when there is a high number and a high density of Windows guests.
3. Purchase a mix of **Windows Server 2008 Enterprise and Datacenter as hypervisor hosts**. This gives unlimited Windows guests licenses for each socket on the Datacenter hosts, which will then be placed in a Windows-only cluster, and the Enterprise hosts will generally host non-Windows guests. This option will be recommended where there is a high number of Windows guests, but not high enough that Datacenter licenses for all hosts is warranted.



100 Red Hat Enterprise Linux Guests

For a scenario with 100 Red Hat Enterprise Linux guests in a virtualization cluster, the following is comparison of three year costs for Red Hat Enterprise Virtualization for Servers, VMware vSphere 4 advanced, and Microsoft Hyper-V running on Windows 2008:

Three Year TCO Analysis		Red Hat Enterprise Virtualization	VMware vSphere	Microsoft Windows Hyper-V
Number of Servers		9	9	13
Upfront Costs (One Time)				
√	Server Hardware	\$67,500	\$67,500	\$97,500
√	Windows Software Licenses	\$0	\$0	\$30,654
√	Virtualization Software	\$0	\$67,905	\$11,310
Total Initial Purchases		\$67,500	\$135,405	\$139,464
Annual Support/Subscription Costs				
√	Hardware Maintenance	\$7,425	\$7,425	\$10,725
√	Windows Software Assurance	\$0	\$0	\$7,664
√	Red Hat Enterprise Linux	\$22,491	\$38,700	\$55,900
√	Virtualization Software	\$13,482	\$16,981	\$2,828
Total Annual Costs		\$43,398	\$63,106	\$77,117
Total First Year Costs		\$110,898	\$198,511	\$216,581
Total Three Year Costs		\$197,694	\$324,723	\$370,815



100 Windows Server Guests

For a scenario with 100 Windows Server 2008 Standard guests in a virtualization cluster, the following is comparison of three year costs for Red Hat Enterprise Virtualization for Servers, VMware vSphere 4 advanced, and Microsoft Hyper-V running on Windows 2008:

Three Year TCO Analysis		Red Hat Enterprise Virtualization	VMware vSphere	Microsoft Windows Hyper-V
Number of Servers		9	9	13
Upfront Costs (One Time)				
√	Server Hardware	\$67,500	\$67,500	\$97,500
√	Windows Software Licenses	\$43,290	\$43,290	\$58,950
√	Virtualization Software	\$0	\$67,905	\$11,310
Total Initial Purchases		\$110,790	\$178,695	\$167,760
Annual Support/Subscription Costs				
√	Hardware Maintenance	\$7,425	\$7,425	\$10,725
√	Windows Software Assurance	\$10,823	\$10,823	\$14,738
√	Red Hat Enterprise Linux	\$0	\$0	\$0
√	Virtualization Software	\$13,482	\$16,981	\$2,828
Total Annual Costs		\$31,730	\$35,229	\$28,291
Total First Year Costs		\$142,520	\$213,924	\$196,051
Total Three Year Costs		\$205,980	\$284,382	\$252,633



50 Red Hat Enterprise Linux Guests and 50 Windows Server Guests

For a scenario with 50 Red Hat Enterprise Linux guests and 50 Windows Server 2008 Standard guests in a virtualization cluster, it is cheaper with Red Hat Enterprise Virtualization and VMware vSphere 4 to limit the Windows guests to a subset of the cluster (50%) and use the Windows Server Datacenter Edition product for maximum flexibility in migration. We end up with the following bills of materials and costs for each product:

Three Year TCO Analysis		Red Hat Enterprise Virtualization	VMware vSphere	Microsoft Windows Hyper-V
Number of Servers		9	9	13
Upfront Costs (One Time)				
√	Server Hardware	\$67,500	\$67,500	\$97,500
√	Windows Software Licenses	\$24,050	\$24,050	\$30,654
√	Virtualization Software	\$0	\$67,905	\$11,310
Total Initial Purchases		\$91,550	\$159,455	\$139,464
Annual Support/Subscription Costs				
√	Hardware Maintenance	\$7,425	\$7,425	\$10,725
√	Windows Software Assurance	\$6,013	\$6,013	\$7,664
√	Red Hat Enterprise Linux	\$12,495	\$21,500	\$30,100
√	Virtualization Software	\$13,482	\$16,981	\$2,828
Total Annual Costs		\$39,415	\$51,919	\$51,317
Total First Year Costs		\$130,965	\$211,374	\$190,781
Total Three Year Costs		\$209,795	\$315,212	\$293,415



SUMMARY

The subscription pricing and licensing for Red Hat Enterprise Virtualization for Servers has been designed to simplify the specification and purchasing of your virtualization solution. The Red Hat subscription model offers benefits to both new and existing Red Hat customers, and the straightforward per-socket management subscription and single enterprise-ready edition of Red Hat Enterprise Virtualization Manager for Servers make specification and cost forecasting easy.

Compared to VMware vSphere 4 and Microsoft Hyper-V Server virtualization products, the pricing of Red Hat Enterprise Virtualization is compelling, and the licensing far more straightforward.

To help you compare, Red Hat has developed an online TCO calculator and configurator for Red Hat Enterprise Virtualization. For more information, go to <http://www.redhat.com/rhev/server/cost>

Red Hat Enterprise Virtualization for Servers product offerings, pricing, terms and conditions are accurate as of January, 2010 and are subject to change. Pricing for non-Red Hat guest operating systems are based on published retail or volume license pricing in the United States and is subject to change and local pricing.

For more information on Red Hat Enterprise Virtualization for Servers pricing and configuration, please contact your local Red Hat sales office or Red Hat authorized partner.