Microsoft

# Feature Comparison

## Windows Server 2003 R2, Windows Server 2008 R2, and Windows Server 2012

Windows Server

# Contents

# Introduction

This feature comparison guide compares selected features of Windows Server 2003 R2, Windows Server 2008 R2, and Windows Server 2012. The "Top Ten Features" section provides an overview of some of the most important features of Windows Server 2012, and the "General Features Overview" section compares a wider-range of features across all three releases. The comparison tables in both sections include comments in regard to each release, as well as notation about how well each feature is supported. The legend for this notation is as follows:

## Level of Feature Support

| | |
|---|---|
|  | Feature is supported |
|  | Feature is only partially supported |
|  | Feature is not supported |

# Top Ten Features

This section provides an overview of the top ten features of Windows Server 2003 R2, Windows Server 2008 R2, and Windows Server 2012.

| Features | Windows Server 2003 R2 | Windows Server 2008 R2 | Windows Server 2012 |
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| **Enterprise-class scale and performance** |  |  |  |
| | Scales to 64 LPs and 1 terabyte (TB) of memory (x64 versions) | Scales to 256 LPs and 2 TB of memory<br>Supports 64 LPs, 1 TB of memory, and 512 active virtual machines on Microsoft Hyper-V hosts<br>Hyper-V guests can access four virtual CPUs, 64 gigabytes (GB) of memory, and 2-TB virtual hard disks (VHDs)<br>Clustering support for up to 16 nodes and 1,000 virtual machines | Scales to 640 LPs and 4 TB of memory<br>Supports 320 LPs, 4 TB of memory, and 1,024 active virtual machines with Hyper-V hosts<br>Hyper-V guests can access 64 virtual CPUs, 1 TB of memory, and 64-TB VHDs<br>Clustering support for up to 64 nodes and 4,000 virtual machines |
| **Shared-nothing live migration** |  |  |  |
| | Not available | Not available | Ability to migrate virtual machines among Hyper-V hosts on different clusters or servers with no storage sharing, using Ethernet connection only—with virtually no downtime |
| **Hyper-V Network Virtualization** |  |  |  |
| | Not available | Not available | Ability to isolate network traffic from different business units or customers on a shared infrastructure, with |

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| | | | reduced need for virtual local area networks (VLANs)<br>Ability to move virtual machines as needed within virtual infrastructure, while preserving virtual network assignments |
| **Hyper-V Replica** |  |  |  |
| | Not available | Not available | Storage-agnostic and workload-agnostic solution that replicates virtual machines efficiently, periodically, and asynchronously over networks to a remote site or location for failure recovery |
| **Low-cost, highly available file-based storage** |  |  |  |
| | Server Message Block (SMB) 3.0 File Storage not available | SMB 3.0 File Storage not available | New SMB 3.0 protocol enhancements and low-cost, "commodity" hardware with new File Services for storing server application data such as SQL databases and VHDs for Hyper-V on file shares |
| **Windows PowerShell 3.0** |  |  |  |
| | Support for more than 100 cmdlets | Support for more than 200 cmdlets | Comprehensive management platform for datacenter with 2,300+ cmdlets<br>Resilient remote server sessions for withstanding various interruptions<br>Simplified learning with improved cmdlet discovery and simplified, consistent syntax across cmdlets |

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| **Hybrid applications** |  |  |  |
| | Requirement of virtual private networks (VPNs) or other point-to-point connectivity for communication among geographically separated parts of an application | Requirement of VPNs or other point-to-point connectivity for communication among geographically separated parts of an application | Protection for existing investments in on-premises applications<br>Unified application management<br>Flexibility to build and deploy hybrid applications on-premises and in the cloud |
| **Multitentant, high-density websites** |  |  |  |
| | Challenging to gain high-density in web applications<br>1:1 mapping of Secure Sockets Layer (SSL) certificates to IP addresses<br>Lack of resource isolation and control creates risk of one application bringing down server | Challenging to gain high-density in web applications<br>1:1 mapping of SSL certificates to IP addresses<br>Basic levels of isolation and resource control that are manual and reactive | Extensive support for web applications and cloud-based strategies with new and enhanced features<br>Improved website density to help organizations and hosting providers increase the number of sites they support with the same amount of hardware<br>Sandboxing, CPU Metering, and other features for isolating and securing multitenant environments while closely tracking resource usage |

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| **Simplified, feature-rich Virtual Desktop Infrastructure (VDI)** |  |  |  |
| | Not available | Support for previous versions of VDI provided users with access to more consistent, secure, and personalized experiences, inside or outside the corporate network, while enabling IT to improve compliance through centralized control and management of access to confidential data<br><br>Simplified management with a single, centralized infrastructure across physical and virtual assets, enabling instant provisioning of corporate applications and desktops to reduce user downtime, while equipping IT to provide access to legacy applications | Enhanced ways to simplify and expedite deployment and management tasks for IT administrators, including simplified wizard-based setup procedures for Remote Desktop Services deployment<br><br>Unified management console for virtual desktops and session-based desktops and applications<br><br>Simplified creation, assignment, and patch management of pooled and personal virtual desktops and a richer experience on different devices, in various locations, and over changing network conditions |
| **Dynamic Access Control** |  |  |  |
| | Not available | Not available | New ways to control access to file data and improved compliance with regulations<br><br>Next-generation authorization and auditing controls<br><br>Classification capabilities for applying information governance to unstructured data on file servers |

# General Features Overview

This section compares the major features of Windows Sever 2012, Windows Server 2003 R2, and Windows Server 2008 R2.

| Features | Windows Server 2003 R2 | Windows Server 2008 R2 | Windows Server 2012 |
|---|---|---|---|
| **Identity and Access** | | | |
| **DirectAccess** | ○ | ● | ● |
| | Unified server role that combines three networking services—DirectAccess, routing, and remote access—into one unified server role with remote access<br>Single point of configuration and management for remote access server deployment with a new unified server role for DirectAccess and Routing and Remote Access service (RRAS)[1] [2] | | |
| **Dynamic Access Control** | ○ | ○ | ● |
| | Centralized control and auditing access to file servers with Claims Based Access and File Classification<br>Ability to restrict access to sensitive files regardless of user actions through file security policy at the domain level, which is enforced across virtually all file servers in Windows Server 2012[3] with File Classification[4], access control policies[3], and audit policies | | |
| **Metro-style application network isolation** New | ○ | ○ | ● |
| | Ability to set and enforce network boundaries to prevent compromised applications from accessing restricted networks<br>Customizable firewall rules for Metro-style applications in addition to firewall rules that can be created for programs and services[5] | | |
| **Windows PowerShell cmdlets for Windows Firewall** New | ○ | ○ | ● |
| | Extensive cmdlets for configuring and managing Windows Firewall<br>Fully configurable and manageable Windows Firewall, Internet Protocol security (IPsec), and related features with a more powerful and scriptable Windows PowerShell[5] | | |

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| **Network Access Protection (NAP)** |  |  |  |
| | A client health policy creation, enforcement, and remediation technology to help system administrators establish and automatically enforce health policies, which can include software requirements, security update requirements, and other settings[6] [7] | | |
| **Domain Name System Security Extensions (DNSSEC)** |  |  |  |
| | Support for online signing and automated key management, as part of the update process for DNSSEC support in the authoritative functions of Domain Name System (DNS) servers[8] | | |
| **Extensible Authentication Protocol (EAP)** |  |  |  |
| | Architectural framework that provides extensibility for the authentication methods of commonly-used protected network access technologies, such as Institute of Electrical and Electronic Engineers (IEEE) 802.1X-based wireless access, IEEE 802.1X-based wired access, and Point-to-Point Protocol (PPP) connections such as VPN[9] | | |
| **802.1X Authenticated Wired Access** |  |  |  |
| | IEEE 802.1X Authenticated Wired Service for IEEE 802.3 Ethernet network clients<br>EAP-Tunneled Transport Layer Security (EAP-TTLS) added to the list of network authentication methods included by default[10] | | |
| **Read-only domain controller (RODC)** |  |  |  |
| | Domain controller that hosts read-only partitions of a database in Active Directory<br>New ability to deploy RODC via Windows PowerShell and to virtual machines[11] | | |
| **Kerberos constrained delegation across domains** |  |  |  |
| | Administrative permission needed only for the back-end service account<br>Back-end permitted to authorize which front-end service accounts can impersonate users against their resources[12] | | |
| **Flexible Authentication Secure Tunneling (FAST)** |  |  |  |
| | Protected channel between domain-joined client and domain controller with FAST[12] | | |

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| **Access controls in Active Directory Lightweight Directory Services (AD LDS)** | ○ | ● | ● |
| | Authentication of users requesting access to the directory<br>Use of security descriptors, called access control lists (ACLs), on directory objects to determine which objects an authenticated user has access to[13] | | |
| **Directory Services** | | | |
| **Active Directory Domain Services (AD DS)** | | | |
| **Virtualized domain controller cloning** New | ○ | ○ | ● |
| | Ability to create replicas of virtualized domain controllers through cloning of existing ones<br>Virtualization-safe technologies and rapid deployment of virtual domain controllers through cloning[14] | | |
| **Virtualization supported** New | ○ | ○ | ● |
| | Virtual domain controllers hosted on hypervisor platforms that expose an identifier called VM-Generation ID (hypervisor-agnostic mechanism) that can detect and employ necessary safety measures to protect the sanctity of the AD DS environment if a virtual machine is rolled back in time by an unsupported mechanism (such as the application of a virtual machine snapshot[14] | | |
| **Active Directory Federation Services (AD FS) 2.1 as a server role** New | ○ | ○ | ● |
| | Simplified, security-enhanced identity federation and web single sign-on (SSO) capabilities[15]<br>Full integration of AD FS 2.0 into Windows Server 2012 (can be installed on Windows Server 2003 R2 and 2008 R2) | | |
| **Active Directory Domain Services claims in Active Directory Federation Services** New | ○ | ○ | ● |
| | Ability to populate Security Assertions Markup Language (SAML) tokens with user- and device-claims taken directly from the Kerberos ticket through AD FS (v2.1) in Windows Server 2012[15] | | |
| **Off-premises domain join** New | ○ | ○ | ● |
| | Domain-join computers over the Internet for domains enabled for Direct Access[16] | | |

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| **Fine-grained password policy** |  |  |  |
| | Simplified management of password-setting objects (PSOs) through Active Directory Administrative Center[16] | | |
| **Database Mounting Tool** |  |  |  |
| | Improved recovery processes with ability to compare data as it exists in snapshots or backups that are taken at different times, enabling better decision-making about what data to restore after data loss[17] | | |
| **Active Directory-Based Activation (AD BA)** New |  |  |  |
| | Simplified configuring of the distribution and management of volume software licenses, with the Volume Activation Services server role, Key Management Service (KMS), and activation based in Active Directory[16] | | |
| **Windows PowerShell History Viewer** New |  |  |  |
| | Ability to view Windows PowerShell cmdlets as they run<br>Ability to display the equivalent Windows PowerShell cmdlets in the History Viewer[16] of Windows PowerShell with Active Directory Administrative Center | | |
| **Active Directory Recycle Bin** |  |  |  |
| | Recovery of accidentally deleted objects from backups of AD DS taken by Windows Server Backup with Active Directory domains<br>Active Directory object not physically removed from the database immediately[16] | | |
| **Active Directory Domain Services integration** |  |  |  |
| | Ability to create cluster computer objects in targeted organizational units, or by default in the same organizational unit as the cluster nodes[18] | | |
| Active Directory Lightweight Directory Services (AD LDS) | | | |
| **Server Core installations for Active Directory Lightweight Directory Services** |  |  |  |
| | Role support for Server Core installations[19] | | |

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| **Backup and Restore for Active Directory Lightweight Directory Services** |  |  |  |
| | Ability to back up and restore databases to an existing AD LDS instance[20] | | |
| **Multiple directory service instances on a single server** |  |  |  |
| | Ability to concurrently run multiple instances of AD LDS on a single computer, with an independently managed schema for each AD LDS instance[21] [22] | | |
| Active Directory Rights Management Services (AD RMS) | | | |
| **Active Directory Rights Management Services as a server role** |  |  |  |
| | Available as server role with several new features not available in previous versions[23] | | |
| **Persistent protection** |  |  |  |
| | Protection of content on the go with AD RMS<br>Ability to specify who can open, modify, print, or manage content<br>Rights stay with content—even when its transferred outside the organization[24] | | |
| **Usage Policy Templates** |  |  |  |
| | Ability to create a Usage Policy Template and apply it to content, eliminating the need to recreate usage rights settings for comprehensive file protection[24] | | |
| **Software Development Kit for Active Directory Rights Management Services** |  |  |  |
| | Compatible with rights-enabled applications[24] | | |
| **Self-enrollment of the Active Directory Rights Management Services cluster** |  |  |  |
| | Enrollment via local computer, to help eliminate the need to connect to Microsoft Enrollment Service through a server self-enrollment certificate[23] | | |

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| **Integration with Active Directory Federation Services** | ○ | ● | ● |
| | Integration of AD RMS and AD FS to enable leveraging of existing federated relationships for collaboration with external partners[23] | | |
| **Windows PowerShell for deploying Active Directory Rights Management Services** New | ○ | ○ | ● |
| | Support for more secure and flexible remote server deployment of AD RMS using PowerShell[25] [26] | | |
| **Enhancements in Active Directory Rights Management Services and SQL Server requirements** New | ○ | ○ | ● |
| | Improved support for remote deployment of AD RMS and Microsoft SQL Server[25]<br>AD RMS installer account must have system administration permissions in the SQL Server installation<br>SQL Server Browser service must be running to locate available SQL instances | | |
| Active Directory Federation Services (AD FS) | | | |
| **Integration with Microsoft Office SharePoint Server** | ○ | ● | ● |
| | AD FS can be used to facilitate an out-of-the-box SSO solution for Microsoft SharePoint[24] | | |
| **Integration with Active Directory Rights Management Services** | ○ | ● | ● |
| | AD FS can integrate with AD RMS to support the sharing of rights-protected content between organizations, helping eliminate the need for AD RMS to be deployed in both organizations[24] | | |
| **Integration with Dynamic Access Control scenarios** New | ○ | ○ | ● |
| | AD FS can be used with the user and device claims that are issued using AD DS for various DAC scenarios<br>Ability of AD FS to consume AD DS claims included in Kerberos tickets as a result of domain authentication[15] | | |

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| **Improved installation experience with Server Manager** New | ○ | ○ | ● |
| | Installation of AD FS server role with Server Manager<br>Automatic listing and installing of virtually all services that AD FS depends on during the AD FS server role installation with Server Manager and its configuration wizard when AD FS server role is installed[23] | | |
| **Windows PowerShell cmdlet tools** New | ○ | ○ | ● |
| | New cmdlets for installing the AD FS server role and for initial configuration of the federation server and federation server proxy in addition to management capabilities based in PowerShell that are provided in AD FS 2.0[23] | | |
| Active Directory Certificate Services (AD CS) | | | |
| **Certification authorities (CAs)** | ● | ● | ● |
| | Management of CAs, certificate revocation, and certificate enrollment[27]; root and subordinate CAs; and enterprise and stand-alone CAs | | |
| **Web enrollment** | ● | ● | ● |
| | Enrollment mechanism for organizations that need to issue and renew certificates for users and computers that are not joined to the domain or not connected directly to the network, and for users of non-Microsoft operating systems[28] [29] | | |
| **Microsoft Online Responder Service** | ○ | ● | ● |
| | Ability to configure and manage Online Certificate Status Protocol (OCSP) validation and revocation checking in networks based on Microsoft Windows[30] | | |
| **Network Device Enrollment Service (NDES)** | ● | ● | ● |
| | Microsoft implementation of the Simple Certificate Enrollment Protocol (SCEP), a communication protocol that makes it possible for software running on network devices such as routers and switches, which cannot otherwise be authenticated on the network, to enroll for X.509 certificates from a certification authority[31] | | |
| **Certificate Enrollment Policy Web Service** | ○ | ● | ● |
| | AD CS role service for obtaining certificate enrollment policy information for humans and computers[32] | | |

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| **Certificate Enrollment Web Service** |  |  |  |
| | Certificate enrollment with HTTPS protocol for users and computers[32] | | |
| **Integration with Server Manager** |  |  |  |
| | Integration of AD CS server role and its role services into Server Manager[33] | | |
| **Deployment and management capabilities of Windows PowerShell** |  |  |  |
| | Ability to configure or remove configurations for virtually all AD CS role services with the AD CS Deployment PowerShell cmdlets[33] [34] | | |
| **Active Directory Certificate Services role services on Server Core** New |  |  |  |
| | Ability to install and run virtually all AD CS role services on Server Core installations of Windows Server 2012 or the Minimal Server Interface installation options[33] | | |
| **Automatic renewal of certificates for non-domain joined computers** New |  |  |  |
| | Builds on Certificate Enrollment Web Services by adding the ability to automatically renew certificates for computers that are part of untrusted AD DS domains or not joined to a domain[33] | | |
| **Enforcement of certificate renewal with same key** New |  |  |  |
| | Increased security with AD CS that requires certificate renewal with the same key, enabling the same assurance level of the original key to be maintained throughout its life cycle[33] | | |
| **Support for international domain names** New |  |  |  |
| | Support for Internationalized Domain Names (IDNs) that contain characters that cannot be represented in ASCII with AD CS[33] | | |
| **Increased security with default on certification authorities role service** New |  |  |  |
| | Enforcement of enhanced security by CA role service in requests sent to it<br>Encryption required for packets requesting a certificate[33] | | |

## Virtualization/VDI

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| **Hyper-V Extensible Switch** New | ○ | ○ | ● |
| | A Layer-2 virtual network switch that provides programmatically managed and extensible capabilities to connect virtual machines to the physical network[35] | | |
| **Shared-nothing live migration** New | ○ | ○ | ● |
| | New features for moving a virtual machine from one host to another while running, helping reduce the need for origin and destination servers to share common storage[36] | | |
| **Live storage migration** New | ○ | ○ | ● |
| | Ability to move VHDs that are attached to a running virtual machine<br>Ability to transfer VHDs to a new location for upgrading or migrating storage, performing back-end storage maintenance, or redistributing the storage load[35] | | |
| **Live Merging Snapshots** New | ○ | ○ | ● |
| | Ability to merge snapshots back into the virtual machine while it continues to run Hyper V Live Merge[35] | | |
| **Non-Uniform Memory Access (NUMA) support** New | ○ | ○ | ● |
| | NUMA support inside virtual machines<br>Ability to project NUMA topology onto a virtual machines, guest operating systems, and applications that can make intelligent NUMA decisions[35] | | |
| **Runtime Memory Configuration** New | ○ | ○ | ● |
| | Ability to make configuration changes to dynamic memory (increasing maximum memory or decreasing minimum memory) when a virtual machine is running[35] | | |

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| **VHDX**<br>New | ○ | ○ | ● |
| | Support for VHDX file format with Hyper-V<br>VHDX support for up to 64 TB of storage<br>Protection from corruption due to power failures by logging updates to the VHDX metadata structures<br>Prevention of performance degradation on large-sector physical disks through optimizing structure alignment[35] | | |
| **Hyper-V Resource Metering**<br>New | ○ | ○ | ● |
| | Tracks and reports amount of data transferred per IP address or virtual machine[35] | | |
| **Virtual Fibre Channel**<br>New | ○ | ○ | ● |
| | Fibre Channel ports within the guest operating system[35] | | |
| **Hyper-V Replica**<br>New | ○ | ○ | ● |
| | Ability to replicate virtual machines among storage systems, clusters, and datacenters between two sites to provide business continuity and failure recovery[37] | | |
| **Simultaneous live migrations**<br>New | ○ | ◐ | ● |
| | Ability to migrate several virtual machines with support for simultaneous live migrations at the same time<br>Live migrations not limited to a cluster<br>Virtual machines can be migrated across cluster boundaries and between stand-alone servers that are not part of a cluster[35] | | |
| **Multitenant security and isolation** | ○ | ◐ | ● |
| | Fully isolated network layer of the datacenter with server virtualization, through programmatically managed and extensible capabilities that help users connect virtual machines to physical networks with policy enforcement for enhanced security and isolation[35] | | |
| **Private virtual local area network (PVLAN)**<br>New | ○ | ○ | ● |
| | Ability to isolate virtual machines from each other—for example, virtual machines cannot contact other virtual machines over the network—while still maintaining external network connectivity for nearly all virtual machines[35] | | |

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| **Dynamic Host Configuration Protocol (DHCP) guard and router guard**<br>New | ○ | ○ | ● |
| | Drops server messages from unauthorized virtual machines acting as DHCP servers, and automatically drops DHCP server traffic from other virtual switch ports<br>Router guard drops router advertisement and redirection messages from unauthorized virtual machines acting as routers[35] | | |
| **Extension monitoring and extension uniqueness**<br>New | ○ | ○ | ● |
| | Support for multiple monitoring and filtering extensions at the "enter" and "exit" portions of the Hyper-V Extensible Switch<br>Extension state/configuration unique to each instance of a Hyper-V Extensible Switch on a machine[35] | | |
| **Multiple extensions on same switch**<br>New | ○ | ○ | ● |
| | Multiple extensions that can coexist on the same Hyper-V Extensible Switch[35] | | |
| **Network virtualization**<br>New | ○ | ◐ | ● |
| | Isolation of networks and network traffic to help eliminate the use of VLANs to help eliminate need for hierarchical IP address assignment across virtual machines<br>Easier to manage on a large scale compared to Hyper-V version in Windows Server 2008 R2[35] | | |
| **IP address rewrite**<br>New | ○ | ○ | ● |
| | Mapping of each virtual machine customer address to a unique host provider address<br>Hyper-V network virtualization uses an IP address rewrite to map the customer address to the provider address[35] | | |
| **Generic routing encapsulation**<br>New | ○ | ○ | ● |
| | Mapping of virtual networks to physical networks with Hyper-V network virtualization to generic routing encapsulation (GRE) of IP packets<br>Ability to use as few as one IP address per host[35] | | |

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| **Hyper-V host and workload support** |  |  |  |
| | Ability to configure up to 160 logical processors on hardware, 2 TB of physical memory, 32 virtual processors, and up to 512 GB of memory on a virtual machine<br>Support for up to 64 nodes and 4,000 virtual machines in a cluster[35] | | |
| **Dynamic memory, startup memory, and minimum memory** |  |  |  |
| | Hyper-V can reclaim the unused memory from virtual machines with a minimum memory value lower than their startup value[35] | | |
| **Hyper-V Smart Paging** New |  |  |  |
| | Bridges the gap between minimum and startup memory if a virtual machine is configured with a lower minimum memory than its startup memory (Hyper-V needs additional memory to restart it)[35] | | |
| **Runtime memory configuration** New |  |  |  |
| | Ability to make configuration changes to dynamic memory (increasing maximum memory or decreasing minimum memory) when a virtual machine is running[35] | | |
| **Quality of Service (QoS) minimum bandwidth** New |  |  |  |
| | Hyper-V uses minimum bandwidth to assign specific bandwidth for each type of traffic and to ensure fair sharing during congestion[35] | | |
| **Incremental backup** |  |  |  |
| | Hyper-V supports incremental backup (backing up only the differences) of VHDs while the virtual machine is running<br>Windows Server 2008 R2 – Support for full backups only[35] | | |
| **Clustering** |  |  |  |
| | New support for guest clustering via Fibre Channel, new live migration enhancements, massive scale, encrypted cluster volumes, Cluster Shared Volume 2.0 (CSV), Hyper-V application monitoring, virtual machine failover prioritization, inbox live migration queuing, affinity (and anti-affinity) virtual machine rules, and File Server transparent failover[35] | | |

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| **Application monitoring**<br>New | ○ | ○ | ● |
| | Ability to monitor health of key services provided by virtual machines<br>Higher availability for workloads not supporting clustering with automatic correction (like restarting a virtual machine or moving it to a different server)[35] | | |
| **Storage** | | | |
| **Storage Spaces**<br>New | ○ | ○ | ● |
| | Ability to leverage commodity storage into virtual storage pools, which can then be provisioned as Storage Spaces<br>Virtualized drives that can be formatted and accessed just like a physical drive, which can also be dynamically resized with the addition of more physical drives to the storage pool[38] | | |
| **File System improvements – ReFS, deduplication, thin provisioning and trim, Chkdsk** | ○ | ◐ | ● |
| | Support for multi-terabyte volumes and a new model of Chksdsk that detects corruption even when the volume is online[39]<br>New local file system called Resilient File System (ReFS), which maximizes data availability and online operation despite errors that would historically cause data loss or downtime<br>Support for data deduplication[38]<br>Identification of thinly provisioned virtual disks<br>Standardized notifications when use thresholds are crossed<br>Platform for maximizing application use by giving up storage space when needed[40] | | |
| **Clustered Share Volume** | ○ | ◐ | ● |
| | Storage system for scale-out file servers, which can provide optimized availability and scalable file-based (such as SMB) server application storage<br>CSVs now appear as CSV File System (CSVFS) instead of NTFS[41] | | |
| **Live storage migration**<br>New | ○ | ○ | ● |
| | Ability to perform live migrations of virtual machine storage independently of the virtual machine itself, with virtually no downtime[38] | | |

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| **SMB Direct (RDMA) and SMB Multichannel** New | ○ | ○ | ● |
| | Load balanced failover connections to remote file servers that not only fail over when connections are lost, but also evaluate the condition of available connections to route traffic away from congested links[38]<br>Support for network adapters that have Remote Direct Memory Access (RDMA) and can function at full speed with low latency, while using very little CPU[42] | | |
| **Offloaded Data Transfer (ODX)** New | ○ | ○ | ● |
| | New feature of the storage stack in Windows Server 2012<br>Used with offload-capable SAN storage hardware to enable a storage device to perform a file copy operation without the main processor of the host actually reading the content from one storage place and writing it to another[43] | | |
| **SMB for workloads** New | ○ | ○ | ● |
| | Ability of remote file server shares to be used as storage for workloads such as Hyper-V and SQL Server 2012[42] | | |
| **Network File System (NFS) support** | ○ | ◔ | ● |
| | File-sharing solution for enterprises with a mixed Windows and UNIX environment<br>Ability to reliably store and run VMware ESX virtual infrastructures with FS support on Windows Server 2012, while using the advanced high availability of Windows[44] | | |
| **Built in Microsoft iSCSI Software Target support** New | ○ | ○ | ● |
| | Integrated feature that provides storage from a server over a TCP/IP network, including shared storage for applications that are hosted in a failover cluster[45] [18] | | |
| **Management (Server Manager and PowerShell)** | ○ | ◔ | ● |
| | Single point of access to management snap-ins for virtually all installed roles<br>Snap-in for managing Storage Spaces along with storage that can be managed through PowerShell | | |
| **Web and App Plat** | | | |
| **Internet Information Services (IIS) enhancements** | | | |
| **Multitenant high-density websites** New | ○ | ○ | ● |
| | Hosting-friendly web server platform with FTP Logon Attempt Restriction and | | |

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| | improved site density, centralized SSL certificate support, and server name indication<br><br>Increased IIS scalability with SSL scalability, centralized SSL certificate support, and NUMA-aware scalability | | |
| **Server Name Indication (SNI)**<br>New |  |  |  |
| | Binding a more secure site required a unique network endpoint using an IP address and a port in previous versions of Windows Server, which often meant having a dedicated IP address for each secure site because site owners wanted their secure sites to be running on a standard SSL port<br><br>Support for increased density of secure sites for greater scalability of sites | | |
| **Centralized SSL Certificate Management**<br>New |  |  |  |
| | Central storage of SSL certificates on a file share to simplify certificate management and lower the total cost of ownership<br><br>Rapid addition of servers to web farm to help eliminate the need to individually configuring SSL | | |
| **NUMA-aware scalability**<br>New |  |  |  |
| | Ability to scale up web servers beyond 32 processors and use next-generation hardware | | |
| **IIS CPU Throttling**<br>New |  |  |  |
| | Ability to set maximum CPU consumption for individual IIS 8.0 application pools, helping every application get ample processor time<br><br>Ability to create sandbox for each tenant and ensure that no single tenant consumes virtually all of a web server's processing power | | |
| **FTP Service** |  |  |  |
| | FTP publishing on a web server | | |
| **FTP Logon Attempt Restrictions** |  |  |  |
| | Protection against brute force attacks with automatic detection of attacks in-progress and blocking of future requests from the same address with Windows Server 2012 and IIS 8.0 | | |

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|---|---|---|---|
| **Application initialization** New |  |  |  |
| | Ability to proactively start ASP.NET applications with IIS 8.0<br>Applications available virtually all the time<br>Initialization of ASP.NET applications before users need it<br>Returns static pages to users instead of making users wait on a blank browser page | | |
| **Dynamic IP restrictions** New |  |  |  |
| | Dynamic filters to automatically block potentially harmful IP addresses with IIS 8.0 | | |
| **WebSocket Protocol** New |  |  |  |
| | Encrypted, real-time, bidirectional communications between client and server | | |
| **ASP.NET Support (2.0, 3.0, 3.5, and 4.5)** |  |  |  |
| | Multiple ASP.NET applications with different .NET Framework versions to run simultaneously with Windows Server 2012 with IIS 8.0 | | |
| **ASP.NET 3.5 and 4.5 Application Management** |  |  |  |
| | Graphical and command-line management tools to manage both ASP.NET 3.5 and ASP.NET 4.5 applications with IIS 8.0 in Windows Server 2012 | | |
| **Multiple language support** |  |  |  |
| | Support for programming languages, such as .NET, PHP, Node.js, and Python<br>Enhanced support for PHP and MySQL through IIS extensions<br>ASP.NET 4.5 integration and support for latest HTML5 standards | | |

## Hybrid applications platform (on-premises and cloud)

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|---|---|---|---|
| **Cross-premises application platform** New |  |  |  |
| | Integration of applications between on-premises environments and the cloud (including Windows Azure) | | |
| **Application and programming symmetry** New |  |  |  |
| | Shared development model with Windows Server 2012 and Windows Azure | | |

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|---|---|---|---|
| **Common development platform and tools** New | ○ | ○ | ● |
| | Common development environment for .NET developers to build cloud and on-premises applications on | | |
| **Application-layer connectivity and messaging** New | ○ | ○ | ● |
| | Access to on-premises applications through a cloud-based application | | |
| **Networking** | | | |
| **Single Root I/O Virtualization (SR-IOV) networking devices** New | ○ | ○ | ● |
| | Hyper-V enables support for SR-IOV-capable network devices and enables the SR-IOV virtual function of a physical network adapter to be assigned directly to a virtual machine[35] | | |
| **NIC Teaming** New | ○ | ○ | ● |
| | Prevention of connectivity loss with a team of multiple network interface cards for bandwidth aggregation and traffic failover[46] | | |
| **Network virtualization** | ○ | ◐ | ● |
| | Isolation of networks and network traffic to help eliminate the use of VLANs<br>Reduced need for hierarchical IP address assignment across virtual machines[35] | | |
| **DHCP server failover** New | ○ | ○ | ● |
| | Ability to deploy two DHCP servers for high availability of DHCP services to clients, including replicating lease information between them<br>DHCP servers can be deployed in a non-clustered failover configuration that includes multi-subnet support[47] [37] | | |
| **Hyper-V Replica** New | ○ | ○ | ● |
| | Storage-agnostic and workload-agnostic solution that replicates virtual machines efficiently, periodically, and asynchronously over networks to a remote site or location for failure recovery[37] | | |
| **Dynamic** | ○ | ◐ | ● |

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|---|---|---|---|
| **Virtual Machine Queue (VMQ)** | Enables a host's network adapter to pass DMA packets directly into individual virtual machine memory stacks<br><br>VMQ assigned to each virtual machine device buffer to avoid needless packet copies and route lookups in the virtual switch[48] | | |
| **IP Address Management (IPAM) and Resource Metering**<br>New |  |  |  |
| | Built-in framework in Windows Server 2012 for discovering, monitoring, auditing, and managing IP address space used on a corporate network<br><br>Includes automatic IP address infrastructure discovery, displaying, reporting, and management of custom IP address space, as well as monitoring and management of DHCP and DNS services[49] [35] | | |
| **Hyper-V Extensible Switch**<br>New |  |  |  |
| | Layer-2 virtual network switch that provides programmatically managed and extensible capabilities to connect virtual machines to the physical network[35] | | |
| **Quality of Service (QoS)** |  |  |  |
| | QoS for Hyper-V and other enhancements<br><br>Hyper-V uses minimum bandwidth to assign specific bandwidth for each type of traffic and to help ensure fair sharing during congestion[35]<br><br>Support for hardware compatible with Data Center Bridging (DCB), which makes it possible to use a single ultra-high bandwidth NIC and provides QoS and isolation services to support multitenant workloads expected on private cloud deployments[50] | | |
| **BranchCache** |  |  |  |
| | Improved performance, availability, scalability, and availability<br><br>New features include: Support for offices of nearly any size; single GPO object for nearly all offices; automatic configuration of client computers through Group Policy; integration with Windows file server; use of highly optimized file chunking system for intelligent splitting of files so that users can download only that the changed part of the content; cache encryption; cache preloading; PowerShell support; and new Group Policies[51] | | |
| **Domain Name System (DNS)** |  |  |  |
| | DNSSEC and PowerShell support for DNS configuration and management[52] | | |

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| **Dynamic Host Configuration Protocol (DHCP)** |  |  |  |
| | New enhancements in DHCP in Windows Server 2012: DHCP failover, policy-based assignment, and PowerShell cmdlets for DHCP server[47] | | |
| **Internet Protocol version 6 (IPv6)** |  |  |  |
| | Improved management of IPv6 addresses, better connectivity to Internet using IPv6 addresses, and NAT64/DNS64 protocol translation for DirectAccess clients[53] | | |
| **Low latency workload technologies** New |  |  |  |
| | New capabilities and features for managing latency, such as NIC Teaming[54] | | |
| **Network Load Balancing** |  |  |  |
| | New features in Windows Server 2008 R2 in comparison to Windows Server 2003 R2: Extended affinity, PowerShell for NLB clusters, and support for rolling upgrades<br>Additional features for failover clustering in comparison to Windows Server 2008 R2, including support for scale-out file servers, CAU, virtual machine application monitoring, and iSCSI Software Target integration[55] [18] | | |
| **Remote Access** |  |  |  |
| | Windows Server 2012 Remote Access is a new server role with DirectAccess, routing, and VPN<br>Better management of remote computers, better connectivity, and better manageability of Remote Access services using PowerShell<br>DirectAccess and RRAS unified into a single server role, with ability to co-exist on the same server on the edge<br>Simplified DirectAccess deployment and Network Security Policy, support for NAT64, and DNS64 for accessing IPv4-only resources in the network<br>DirectAccess can now be deployed behind a NAT device, and supports load balancing, multiple domains, NAP integration, one-time password (OTP), automated force tunneling, manage-out and multisite, Server Core, and health monitoring[56] | | |

## Management and Automation

| | | | |
|---|---|---|---|
| **Graphic User Interface as Server Role** | ○ | ○ | ● |
| | Ability to deploy the GUI as a role in Windows Server 2012 using PowerShell 3.0<br>Enables servers to easily remove the full GUI and more to either Server Core or Minimal Installation Shell (PowerShell, Server Manager, and MMC support)<br>Servers can move among Server Core, Minimal Installation Shell, and full GUI using PowerShell commands when required | | |
| **Server Manager** | ● | ● | ● |
| | Single point of access to manage snap-ins for virtually all installed roles<br>Ability to manage a server's identity and system information, display server status, identify problems with server role configuration, and manage virtually all roles installed on the server | | |
| **Multiserver management** New | ○ | ○ | ● |
| | Managing of multiple servers via roles, services, or customized management groups<br>Single view for administrators to view events, roles, services, and other important information for virtually all managed servers[57] | | |
| **Role and feature deployment to remote servers and offline hard disks** New | ○ | ○ | ● |
| | Windows Server 2012 with Server Manager can deploy both roles and features in a single session using the unified Add Roles and Features Wizard<br>Add Roles and Features Wizard perform validation passes on a server selected for deployment as part of the installation process; no requirement to pre-verify that a server in the Server Manager server pool is configured to support a role[57] | | |
| **Integrated console** New | ○ | ○ | ● |
| | Integrated console for IT departments to manage multiple server platforms—whether physical or virtual—more effectively, helping lower IT operational costs (such as file storage management, Remote Desktop Services, and IP address management)[57] | | |
| **Windows PowerShell 3.0** | ○ | ◐ | ● |
| | More than 2,300 cmdlets that are easier to learn and discover<br>Modules that are easier than ever to find, explore, create, and use | | |

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|---|---|---|---|
| | No longer necessary to import modules manually to use cmdlets | | |
| **Windows PowerShell Disconnected Sessions** New | ○ | ○ | ● |
| | Ability to create a session on a remote computer, start a command or job, disconnect from the session, shut down a computer, and then reconnect to the session from a different computer later to check job status or get results[57] | | |
| **Windows PowerShell Workflow** New | ○ | ○ | ● |
| | Provides IT pros and developers with the ability to apply the benefits of workflows to the automation capabilities of PowerShell<br>Management of distribution, sequencing, and completion of multicomputer tasks, freeing users and administrators to focus on higher-level tasks[57] | | |
| **Windows PowerShell Web Access** New | ○ | ○ | ● |
| | Ability to manage Windows servers by using PowerShell within a web browser<br>Target computers compatible with any version of Windows enabled for PowerShell remoting[57] | | |
| **Windows PowerShell Integrated Scripting Environment (ISE) 3.0** New | ○ | ○ | ● |
| | New features to ease beginning users into Windows PowerShell and provide advanced editing support for scripters[57] – Show-Command pane helps users find and run cmdlets in a dialog box; IntelliSense provides context-sensitive command completion for cmdlet and script names, parameter names and enumerated values, and property and method names; Code examples add reusable text to scripts and commands; Collapsible regions in scripts and XML files make navigation in long scripts easier | | |
| **Windows PowerShell Script Sharing** New | ○ | ○ | ● |
| | Access to a community-generated library of PowerShell code snippets, called Integrated Script Snippets, within PowerShell ISE[57] for IT pros with PowerShell 3.0 | | |
| **Windows PowerShell Scheduled Jobs** New | ○ | ○ | ● |
| | Enables administrators to schedule run jobs via the Windows Task Scheduler[57] | | |
| **Windows PowerShell Syntax Simplification** New | ○ | ○ | ● |
| | Simplified, consistent syntax across virtually all cmdlets with PowerShell 3.0<br>Support for intuitive command structure more closely modeling natural language[57] | | |

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|---|---|---|---|
| **Windows PowerShell cmdlet discovery and module auto loading** New |  |  |  |
| Get-Command cmdlet – Gets nearly all cmdlets and functions from virtually all modules installed on a computer, even if the module is not imported into the current session<br>Cmdlets ready for immediate use to help eliminate the need to import modules<br>Windows PowerShell modules – Imported automatically when any cmdlet in the module is used; no longer need to search for the module and import it to use its cmdlets[57] | | | |
| **Device Management and Installation (DMI)** |  |  |  |
| Central management and configuration of hardware and device driver configurations for computers on networks | | | |
| **Initial Configuration Tasks** |  |  |  |
| Helps administrators to configure a server and shorten the amount of time between operating system installation and deployment of the server in an enterprise | | | |
| **Authorization Manager** |  |  |  |
| Flexible framework for integrating role-based access control into applications | | | |
| **Windows Deployment Services** |  |  |  |
| Server role that enables user to remotely (network based) deploy Windows operating systems[58] | | | |
| **Best Practices Analyzer (BPA) for Server Role** |  |  |  |
| Core set of guidance to configure roles and features for Windows Server, including configuration, management, and security<br>BPA now fully integrated into Server Manager[59] | | | |
| **Group Policy** |  |  |  |
| Ability to specify managed configurations for users and computers through Group Policy settings and Group Policy preferences[60] | | | |
| **Remote Group Policy Update** New |  |  |  |
| Schedule remote Group Policy updates (gpupdate.exe) for one or many computers[60] | | | |

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|---|---|---|---|
| **Windows Azure Online Backup (cloud-based backup service)** New | ○ | ○ | ● |
| | Off-site protection against data loss from failure with a cloud-based backup solution which allows files and folders to be backed up and recovered from the cloud[61] | | |
| **Group Policy Infrastructure Status** New | ○ | ○ | ● |
| | Ability to display status of Active Directory and SYSVOL replication as it relates to Group Policy[60] | | |
| **Server Roles** | | | |
| **Active Directory Certificate Services** | ◐ | ◐ | ● |
| | Integration with Server Manager, deployment, and management capabilities from Windows PowerShell; runs virtually all role services on Server Core; automatic renewal of certificates for non-domain-joined computers; enforcement of certificate renewal with same key; support for international domain names; and increased security enabled by default | | |
| **Active Directory Domain Services** | ◐ | ◐ | ● |
| | Enhancements in Windows Server 2012 include virtualized domain controller cloning; virtualization-safe technology; AD DS integration with Server Manager; Relative ID (RID) improvements; deferred index creation; off-premises domain join; Recycle Bin UI; DAC; AD DS claims in AD FS; History Viewer in PowerShell; Fine-grained password policy UI; AD Replication and Topology Windows PowerShell cmdlets; Active Directory Based Activation (AD BA); Kerberos enhancements; and Group Managed Service Accounts (gMSA)[62] | | |
| **Active Directory Federation Services** | ◐ | ◐ | ● |
| | New capabilities in AD FS in Windows Server 2012 include integration with DAC scenarios; improved installation experience using Server Manager; and additional PowerShell cmdlet tools[15] | | |
| **Active Directory Lightweight Directory Service** | ◐ | ○ | ● |
| | Inclusion of AD LDS as a new server role<br>Integration of AD LDS with AD DS[63] | | |

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| **Active Directory Rights Management Services** |  |  |  |
| | Simple delegation and strong cryptography (also made in Windows Server 2008 R2 through recent updates)<br>Changed requirements for installation and deployment: System administrator account permissions instead of local administrator accounts in SQL Server installation; SQL Server Browser service must be running; firewall exceptions for port numbers used by AD RMS; remote deployment; use of Server Manager and Windows PowerShell to deploy AD RMS[25] | | |
| **Application Server** |  |  |  |
| | Updated to support .Net Framework 4.5[64] | | |
| **DHCP Server** |  |  |  |
| | DHCP failover; policy-based assignment; and PowerShell cmdlets for DHCP Server[47] | | |
| **DNS Server** |  |  |  |
| | New features in DNSSEC, Windows PowerShell support for DNS configuration, and management[52] | | |
| **Fax Server** |  |  |  |
| | Windows Server 2012 Fax Server continues as an installable Server Role | | |
| **File and Storage Services** |  |  |  |
| | *File Services* changed to *File and Storage Services*<br>Enhancements include: Data deduplication; iSCSI Target Server; Storage Spaces and storage pools; unified remote management of File and Storage Services in Server Manager; PowerShell cmdlets for File and Storage Services; and ReFS<br>Changes to File Server Resource Manager in FSS include: DAC; automatic classification; manual classification; file management tasks; and access-denied assistance<br>Support for multi-terabyte volumes and a new model of Chkdsk that detects corruption even when the volume is online[39] | | |

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| **Hyper-V** |  |  |  |
| | New features in Windows Server 2012 include shared nothing, SMB, and storage live migration; QoS; Resource Metering; Hyper-V Replica; virtual HBAs; support for ODX and other offloaded hardware support; greater scale; Hyper-V Network Virtualization; Hyper-V Extensible Switch; cluster enhancements; support for runtime memory configuration; NUMA; support for SMB; and more[65] | | |
| **Network Policy and Access Services** |  |  |  |
| | New features in Windows Server 2012 include Print and Document Services role; Type 4 drivers; Branch Office Direct Printing; Print Management Windows PowerShell module; WSD Secure printing; and High Availability Printing | | |
| **Print and Document Services** |  |  |  |
| | Following new features are supported in Windows Server 2012 'Print and Document Services role' – Type 4 drivers, Branch Office Direct printing, Print Management Windows PowerShell module, WSD Secure printing, and High Availability Printing[66] | | |
| **Remote Access** |  |  |  |
| | New server role with DirectAccess, routing, VPN, and more<br>Better management of remote computers, better connectivity, and better manageability of Remote Access services using PowerShell<br>DirectAccess and RRAS unified into a single server role, with ability to co-exist on the same server on the edge<br>Simplified DirectAccess deployment and Network Security Policy, supporting NAT64 and DNS64 for accessing IPv4-only resources in the network<br>DirectAccess can now be deployed behind a NAT device, with support for load balancing, multiple domains, NAP integration, OTP, automated force tunneling, manage-out and multisite support, Server Core support, and health monitoring[56] | | |
| **Remote Desktop Services** |  |  |  |
| | New enhancements in Remote Desktop services as compared to its previous versions: unified central experience; automated and simple single-image management; user personalization; centralized deployment; and fair share experience<br>Configuration changes to RemoteApp and Desktop Connection URL with Group Policy and automatic sending of URLs to users via email message<br>Richer and more consistent user experience[67] | | |

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|---|---|---|---|
| **Volume Activation Services** |  |  |  |
| | Additional volume activation technologies not available in previous versions of Windows Server: Volume Activation Services server role, in-built support for KMS, Active Directory-based Activation, and Volume Activation Tools console[68] | | |
| **Web Server (IIS)** |  |  |  |
| | IIS 8.0 with a unified web platform that integrates IIS, ASP.NET, FTP services, PHP, and Windows Communication Foundation (WCF)<br>New features include Centralized Certificates, Dynamic IP Restrictions, FTP Logon Attempt Restrictions, Server Name Indication (SNI), Application Initialization, and NUMA-aware scalability[69] | | |
| **Windows Deployment Services** |  |  |  |
| | Enhancements in Windows Deployment Services available across previous versions: support for image type (VHDX support); multicasting (supports TFTP and multicasting over IPv6 and DHCPv6, and improved multicast deployment); driver provisioning; and Extensible Firmware Interface (supports x86 clients with 32-bit processors) with Unified Extensible Firmware Interface (UEFI) to network boot and complete an end-to-end deployment using WDS[58] | | |
| **Windows Server Update Services** |  |  |  |
| | Introduced as a Server Role in Windows Server 2012[70] | | |

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