Feature description

The Server Message Block (SMB) protocol is a network file sharing protocol that allows applications on a computer to read and write to files and to request services from server programs in a computer network. The SMB protocol can be used on top of its TCP/IP protocol or other network protocols. Using the SMB protocol, an application (or the user of an application) can access files or other resources at a remote server. This allows applications to read, create, and update files on the remote server. It can also communicate with any server program that is set up to receive an SMB client request. Windows Server 2012 introduces the new 3.0 version of the SMB protocol.

Practical applications

This section discusses some new practical ways to use the new SMB 3.0 protocol.

File storage for virtualization (Hyper-V™ over SMB). Hyper-V can store virtual machine files, such as configuration, Virtual hard disk (VHD) files, and snapshots, in file shares over the SMB 3.0 protocol. This can be used for both stand-alone file servers and clustered file servers that use Hyper-V together with shared file storage for the cluster.

Microsoft SQL Server over SMB. SQL Server can store user database files on SMB file shares. Currently, this is supported with SQL Server 2008 R2 for stand-alone SQL servers. Upcoming versions of SQL Server will add support for clustered SQL servers and system databases.

Traditional storage for end-user data. The SMB 3.0 protocol provides enhancements to the Information Worker (or client) workloads. These enhancements include reducing the application latencies experienced by branch office users when accessing data over wide area networks (WAN) and protecting data from eavesdropping attacks.

New and changed functionality

For information on new and changed functionality in Windows Server 2012 R2, see What's New in SMB in Windows Server.

SMB in Windows Server 2012 includes the new SMB 3.0 protocol and many new improvements which are described in the following table.

Feature/functionality	New or updated	Summary
SMB Transparent Failover	New	Enables administrators to perform hardware or software maintenance of nodes in a clustered file server without interrupting server applications storing data on these file shares. Also, if a hardware or software failure occurs on a cluster node, SMB clients transparently reconnect to another cluster node without interrupting server applications that are storing data on these file shares.
SMB Scale Out	New	Using Cluster Shared Volumes (CSV) version 2, administrators can create file shares that provide simultaneous access to data files, with direct I/O, through all nodes in a file server cluster. This provides better utilization of network bandwidth and load balancing of the file server clients, and optimizes performance for server applications.
SMB Multichannel	New	Enables aggregation of network bandwidth and network fault tolerance if multiple paths are available between the SMB 3.0 client and the SMB 3.0 server. This enables server applications to take full advantage of all available network bandwidth and be resilient to a network failure.
SMB Direct	New	Supports the use of network adapters that have RDMA capability and can function at full speed with very low latency, while using very little CPU. For workloads such as Hyper-V or Microsoft SQL Server, this enables a remote file server to resemble local storage.

Feature/functionality	New or updated	Summary
Performance Counters for server applications	New	The new SMB performance counters provide detailed, per-sha and I/O per second (IOPS), allowing administrators to analyze where their data is stored. These counters are specifically des Hyper-V and SQL Server, which store files on remote file shar
Performance optimizations	Updated	Both the SMB 3.0 client and SMB 3.0 server have been optimized for small random read/write I/O, which is common in server applications such as SQL Server OLTP. In addition, large Maximum Transmission Unit (MTU) is turned on by default, which significantly enhances performance in large sequential transfers, such as SQL Server data warehouse, database backup or restore, deploying or copying virtual

			hard disks.
SMB-specific Windows PowerShell cmdlets	New		With Windows PowerShell cmdlets for SMB, an administrator can manage file shares on the file server, end to end, from the command line.
SMB Encryption	New		Provides end-to-end encryption of SMB data and protects data from eavesdropping occurrences on untrusted networks. Requires no new deployment costs, and no need for Internet Protocol security (IPsec), specialized hardware, or WAN accelerators. It may be configured on a per share basis, or for the entire file server, and may be enabled for a variety of scenarios where data traverses untrusted networks.
SMB Directory Leasing	New		Improves application response times in branch offices. With the use of directory leases, roundtrips from client to server are reduced since metadata is retrieved from a longer living directory cache. Cache coherency is maintained because clients are notified when directory information on the server changes. Works with scenarios for *HomeFolder* (read/write with no sharing) and *Publication* (read-only with sharing).

Hardware requirements

SMB Transparent Failover has the following requirements:

- A failover cluster running Windows Server 2012 with at least two nodes configured. The cluster must pass the cluster validation tests included in the validation wizard.

- File shares must be created with the Continuous Availability (CA) property, which is the default.

- File shares must be created on CSV volume paths to attain SMB Scale-Out.

- Client computers must be running Windows® 8 or Windows Server 2012, both of which include the updated SMB client that supports continuous availability.

> ⓘ **Note**
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> Note that down-level clients can connect to file shares that have the CA property, but transparent failover will not be supported for these clients.

SMB Multichannel has the following requirements:

- At least two computers running Windows Server 2012 are required. No extra features need to be installed—the technology is on by default.

- For information on recommended network configurations, see the See Also section at the end of this overview topic.

SMB Direct has the following requirements:

- At least two computers running Windows Server 2012 are required. No extra features need to be installed—the technology is on by default.

- Network adapters with RDMA capability are required. Currently, these adapters are available in three different types: iWARP, Infiniband, or RoCE (RDMA over Converged Ethernet).

See also

The following list provides additional resources on the web about SMB and related technologies in Windows Server 2012 R2 and Windows Server 2012.

- File and Storage Services Overview
- Scale-Out File Server for Application Data Overview
- Deploy Hyper-V over SMB
- Deploy SMB Multichannel
- Improve Performance of a File Server with SMB Direct
- Deploying Fast and Efficient File Servers for Server Applications
- SMB: Troubleshooting Guide