BranchCache

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- Applies to:

✅ Windows Server 2025, ✅ Windows Server 2022, ✅ Windows Server 2019, ✅ Windows Server 2016

Who will be interested in BranchCache?

If you are a system administrator, network or storage solution architect, or other IT professional, BranchCache might interest you under the following circumstances:

- You design or support IT infrastructure for an organization that has two or more physical locations and a wide area network (WAN) connection from the branch offices to the main office.
- You design or support IT infrastructure for an organization that has deployed cloud technologies, and a WAN connection is used by workers to access data and applications at remote locations.
- You want to optimize WAN bandwidth usage by reducing the amount of network traffic between branch offices and the main office.
- You have deployed or are planning on deploying content servers at your main office that match the configurations that are described in this topic.
- The client computers in your branch offices are running Windows 10, Windows 8.1, Windows 8, or Windows 7 .

This topic includes the following sections:

- BranchCache and the cloud
- Content information versions
- How BranchCache handles content updates in files
- BranchCache installation guide
- Operating system versions for BranchCache
- BranchCache security
- Content flow and processes
- Cache Security

What is BranchCache?

BranchCache is a wide area network (WAN) bandwidth optimization technology that is included in some editions of the Windows Server 2016 and Windows 10 operating systems, as well as in some editions of Windows Server 2012 R2, Windows 8.1, Windows Server 2012, Windows 8, Windows Server 2008 R2 and Windows 7. To optimize WAN bandwidth when users access content on remote servers, BranchCache fetches content from your main office or hosted cloud content servers and caches the content at branch office locations, allowing client computers at branch offices to access the content locally rather than over the WAN.

At branch offices, content is stored either on servers that are configured to host the cache or, when no server is available in the branch office, on client computers that are running Windows 10, Windows 8.1, Windows 8 or Windows 7. After a client computer requests and receives content from the main office and the content is cached at the branch office, other computers at the same branch office can obtain the content locally rather than downloading the content from the content server over the WAN link.

When subsequent requests for the same content are made by client computers, the clients download *content information* from the server instead of the actual content. Content information consists of hashes that are calculated using chunks of the original content, and are extremely small compared to the content in the original data. Client computers then use the content information to locate the

content from a cache in the branch office, whether the cache is located on a client computer or on a server. Client computers and servers also use content information to secure cached content so that it cannot be accessed by unauthorized users.

BranchCache increases end user productivity by improving content query response times for clients and servers in branch offices, and can also help improve network performance by reducing traffic over WAN links.

BranchCache modes

BranchCache has two modes of operation: distributed cache mode and hosted cache mode.

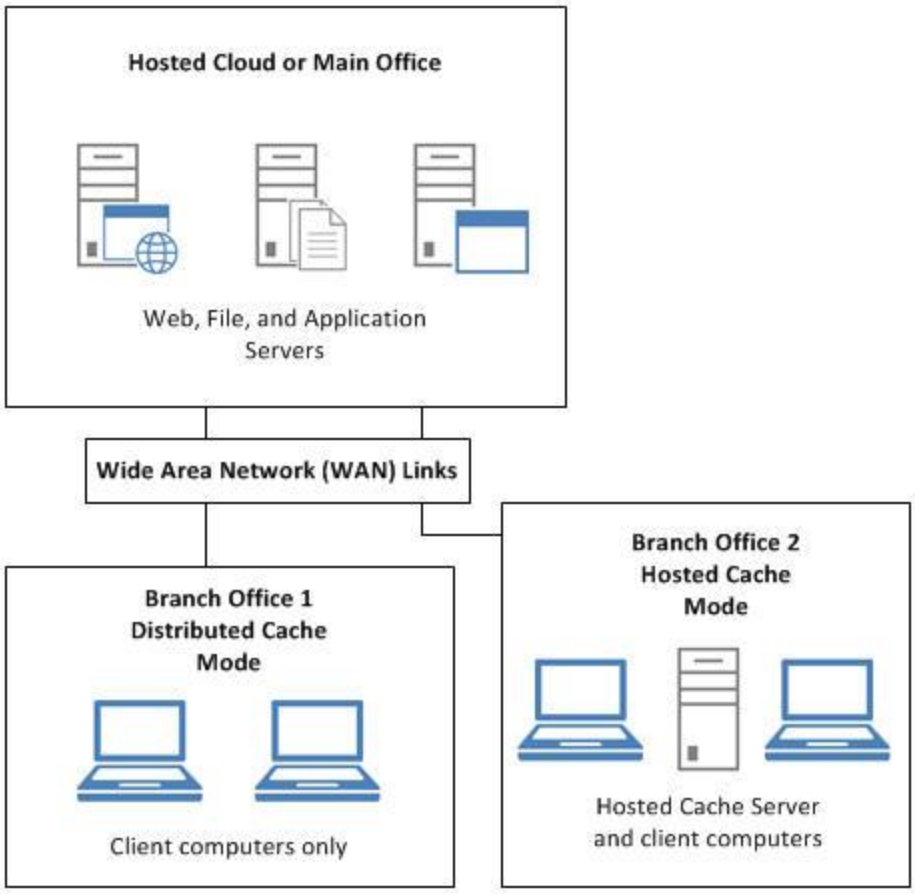
When you deploy BranchCache in distributed cache mode, the content cache at a branch office is distributed among client computers.

When you deploy BranchCache in hosted cache mode, the content cache at a branch office is hosted on one or more server computers, which are called hosted cache servers.

Note

You can deploy BranchCache using both modes, however only one mode can be used per branch office. For example, if you have two branch offices, one which has a server and one which does not, you can deploy BranchCache in hosted cache mode in the office that contains a server, while deploying BranchCache in distributed cache mode in the office that contains only client computers.

In the following illustration, BranchCache is deployed in both modes.



Distributed cache mode is best suited for small branch offices that do not contain a local server for use as a hosted cache server. Distributed cache mode allows you to deploy BranchCache with no additional hardware in branch offices.

If the branch office where you want to deploy BranchCache contains additional infrastructure, such as one or more servers that are running other workloads, deploying BranchCache in hosted cache mode is beneficial for the following reasons:

Increased cache availability

Hosted cache mode increases the cache efficiency because content is available even if the client that originally requested and cached the data is offline. Because the hosted cache server is always available, more content is cached, providing greater WAN bandwidth savings, and BranchCache efficiency is improved.

Centralized caching for multiple-subnet branch offices

Distributed cache mode operates on a single subnet. At a multiple-subnet branch office that is configured for distributed cache mode, a file downloaded to one subnet cannot be shared with client computers on other subnets.

Because of this, clients on other subnets, unable to discover that the file has already been downloaded, get the file from the main office content server, using WAN bandwidth in the process.

When you deploy hosted cache mode, however, this is not the case - all clients in a multiple-subnet branch office can access a single cache, which is stored on the hosted cache server, even if the clients are on different subnets. In addition, BranchCache in Windows Server 2016, Windows Server 2012 R2, and Windows Server 2012 provides the ability to deploy more than one hosted cache server per branch office.

Caution

If you use BranchCache for SMB caching of files and folders, do not disable Offline Files. If you disable Offline Files, BranchCache SMB caching does not function correctly.

BranchCache-enabled content servers

When you deploy BranchCache, the source content is stored on BranchCache-enabled content servers in your main office or in a cloud data center. The following types of content servers are supported by BranchCache:

Note

Only source content - that is, content that client computers initially obtain from a BranchCache-enabled content server - is accelerated by BranchCache. Content that client computers obtain directly from other sources, such as Web servers on the Internet or Windows Update, is not cached by client computers or hosted cache servers and then shared with other computers in the branch office. If you want to accelerate Windows Update content, however, you can install a Windows Server Update Services (WSUS) application server at your main office or cloud data center and configure it as a BranchCache content server.

Web servers

Supported Web servers include computers that are running Windows Server 2016, Windows Server 2012 R2, Windows Server 2012, or Windows Server 2008 R2 that have the Web Server (IIS) server role installed and that use Hypertext Transfer Protocol (HTTP) or HTTP Secure (HTTPS).

In addition, the Web server must have the BranchCache feature installed.

File servers

Supported file servers include computers that are running Windows Server 2016, Windows Server 2012 R2, Windows Server 2012, or Windows Server 2008 R2 that have the File Services server role and the BranchCache for Network Files role service installed.

These file servers use Server Message Block (SMB) to exchange information between computers. After you complete installation of your file server, you must also share folders and enable hash generation for shared folders by using Group Policy or Local Computer Policy to enable BranchCache.

Application servers

Supported application servers include computers that are running Windows Server 2016, Windows Server 2012 R2, Windows Server 2012, or Windows Server 2008 R2 with Background Intelligent Transfer Service (BITS) installed and enabled.

In addition, the application server must have the BranchCache feature installed. As examples of application servers, you can deploy Microsoft Windows Server Update Services (WSUS) and Microsoft Endpoint Configuration Manager Branch Distribution Point servers as BranchCache content servers.

BranchCache and the cloud

The cloud has enormous potential to reduce operational expenses and achieve new levels of scale, but moving workloads away from the people who depend on them can increase networking costs and hurt productivity. Users expect high performance and don't care where their applications and data are hosted.

BranchCache can improve the performance of networked applications and reduce bandwidth consumption with a shared cache of data. It improves productivity in

branch offices and in headquarters, where workers are using servers that are deployed in the cloud.

Because BranchCache does not require new hardware or network topology changes, it is an excellent solution for improving communication between office locations and both public and private clouds.

Note

Because some Web proxies cannot process non-standard Content-Encoding headers, it is recommended that you use BranchCache with Hyper Text Transfer Protocol Secure (HTTPS) and not HTTP.

======= For more information about cloud technologies in Windows Server 2016, see Software Defined Networking (SDN).

Content information versions

There are two versions of content information:

- Content information that is compatible with computers running Windows Server 2008 R2 and Windows 7 is called version 1, or V1. With V1 BranchCache file segmentation, file segments are larger than in V2 and are of fixed size. Because of large fixed segment sizes, when a user makes a change that modifies the file length, not only is the segment with the change invalidated, but all of the segments to the end of the file are invalidated. The next call for the changed file by another user in the branch office therefore results in reduced WAN bandwidth savings because the changed content and all content after the change are sent over the WAN link.
- Content information that is compatible with computers running Windows Server 2016, Windows 10, Windows Server 2012 R2, Windows 8.1, Windows Server 2012, and Windows 8 is called version 2, or V2. V2 content information uses smaller, variable-sized segments that are more tolerant to changes within a file. This increases the probability that segments from an older version of the file can be reused when users access an updated version, causing them to retrieve only the changed portion of the file from the content server, and using less WAN bandwidth.

The following table provides information on the content information version that is used depending upon which client, content server, and hosted cache server operating systems you are using in your BranchCache deployment.

Note

In the table below, the acronym "OS" means operating system.

Expand table

Client OS	Content Server OS	Hosted Cache Server OS	Content Information Version
Windows Server 2008 R2 and Windows 7	Windows Server 2012 or later	Windows Server 2012 or later; none for distributed cache mode	V1
Windows Server 2012 or later; Windows 8 or later	Windows Server 2008 R2	Windows Server 2012 or later; none for distributed cache mode	V1
Windows Server 2012 or later; Windows 8 or later	Windows Server 2012 or later	Windows Server 2008 R2	V1
Windows Server 2012 or later; Windows 8 or later	Windows Server 2012 or later	Windows Server 2012 or later; none for distributed cache mode	V2

When you have content servers and hosted cache servers that are running Windows Server 2016, Windows Server 2012 R2, and Windows Server 2012, they use the content information version that is appropriate based on the operating system of the BranchCache client that requests information.

When computers running Windows Server 2012 and Windows 8 or later operating systems request content, the content and hosted cache servers use V2 content information; when computers running Windows Server 2008 R2 and Windows 7 request content, the content and hosted cache servers use V1 content information.

Important

When you deploy BranchCache in distributed cache mode, clients that use different content information versions do not share content with each other. For example, a client computer running Windows 7 and a client computer running Windows 10 that are installed in the same branch office do not share content with each other.

How BranchCache handles content updates in files

When branch office users modify or update the contents of documents, their changes are written directly to the content server in the main office without BranchCache's involvement. This is true whether the user downloaded the document from the content server or obtained it from either a hosted or distributed cache in the branch office.

When the modified file is requested by a different client in a branch office, the new segments of the file are downloaded from the main office server and added to the distributed or hosted cache in that branch. Because of this, branch office users always receive the most recent versions of cached content.

BranchCache installation guide

You can use Server Manager in Windows Server 2016 to install either the BranchCache feature or the BranchCache for Network Files role service of the File Services server role. You can use the following table to determine whether to install the role service or the feature.

Expand table

Functionality	Computer location	Install this BranchCache element
Content server (BITS-based application server)	Main office or cloud data center	BranchCache feature
Content server (Web server)	Main office or cloud data center	BranchCache feature
Content server (file server using the SMB protocol)	Main office or cloud data center	BranchCache for Network Files role service of the File Services server role
Hosted cache server	Branch office	BranchCache feature with hosted cache server mode enabled
BranchCache-enabled client computer	Branch office	No installation needed; just enable BranchCache and a BranchCache mode (distributed or hosted) on the client

To install either the role service or the feature, open Server Manager and select the computers where you want to enable BranchCache functionality. In Server Manager, click **Manage**, and then click **Add Roles and Features**. The **Add Roles and Features** wizard opens. As you run the wizard, make the following selections:

- On the wizard page **Select Installation Type**, select **Role-based or Feature-based Installation**.
- On the wizard page **Select Server Roles**, if you are installing a BranchCache-enabled file server, expand **File and Storage Services** and **File and iSCSI Services**, and then select **BranchCache for Network Files**. To save disk space, you can also select the **Data Deduplication** role service, and then continue through the wizard to installation and completion. If you do not want to install a BranchCache-enabled file server, do not install the File and Storage Services role with the BranchCache for Network Files role service.

- On the wizard page **Select features**, if you are installing a content server that is not a file server or you are installing a hosted cache server, select **BranchCache**, and then continue through the wizard to installation and completion. If you do not want to install a content server other than a file server or a hosted cache server, do not install the BranchCache feature.

Operating system versions for BranchCache

Following is a list of operating systems that support different types of BranchCache functionality.

Operating systems for BranchCache client computer functionality

The following operating systems provide BranchCache with support for Background Intelligent Transfer Service (BITS), Hyper Text Transfer Protocol (HTTP), and Server Message Block (SMB).

- Windows 10 Enterprise
- Windows 10 Education
- Windows 8.1 Enterprise
- Windows 8 Enterprise
- Windows 7 Enterprise
- Windows 7 Ultimate

In the following operating systems, BranchCache does not support HTTP and SMB functionality, but does support BranchCache BITS functionality.

- Windows 10 Pro, BITS support only
- Windows 8.1 Pro, BITS support only
- Windows 8 Pro, BITS support only
- Windows 7 Pro, BITS support only

Note

BranchCache is not available by default in the Windows Server 2008 or Windows Vista operating systems. On these operating systems, however, if you download

and install the Windows Management Framework update, BranchCache functionality is available for the Background Intelligent Transfer Service (BITS) protocol only. For more information, and to download Windows Management Framework, see **Windows Management Framework (Windows PowerShell 2.0, WinRM 2.0, and BITS 4.0)** at /powershell/scripting/windows-powershell/install/installing-the-windows-powershell-2.0-engine.

Operating systems for BranchCache content server functionality

You can use the Windows Server 2016, Windows Server 2012 R2, and Windows Server 2012 families of operating systems as BranchCache content servers.

In addition, the Windows Server 2008 R2 family of operating systems can be used as BranchCache content servers, with the following exceptions:

- BranchCache is not supported in Server Core installations of Windows Server 2008 R2 Enterprise with Hyper-V.
- BranchCache is not supported in Server Core installations of Windows Server 2008 R2 Datacenter with Hyper-V.

Operating systems for BranchCache hosted cache server functionality

You can use the Windows Server 2016, Windows Server 2012 R2, and Windows Server 2012 families of operating systems as BranchCache hosted cache servers.

In addition, the following Windows Server 2008 R2 operating systems can be used as BranchCache hosted cache servers:

- Windows Server 2008 R2 Enterprise
- Windows Server 2008 R2 Enterprise with Hyper-V
- Windows Server 2008 R2 Enterprise Server Core Installation
- Windows Server 2008 R2 Enterprise Server Core Installation with Hyper-V
- Windows Server 2008 R2 for Itanium-Based Systems
- Windows Server 2008 R2 Datacenter
- Windows Server 2008 R2 Datacenter with Hyper-V
- Windows Server 2008 R2 Datacenter Server Core Installation with Hyper-V