



## Configuring File Services

This chapter describes how to configure Cisco WAAS File Services. This feature allows branch office users to access data stored at centralized data centers more efficiently. The file services feature overcomes the WAN latency and bandwidth limitations by caching data on Cisco Edge Wide Area Application Engines (Cisco WAEs) near branch office users. Cisco Wide Area Application Services (WAAS) file services use Server Message Block (SMB) application accelerators.



**Note** Throughout this chapter, the term Cisco WAAS device is used to refer collectively to the Cisco WAAS Central Managers and WAEs in your network. The term WAE refers to WAE and Cisco Wide Area Virtualization Engine (Cisco WAVE) appliances, and Cisco Virtual WAAS (Cisco vWAAS) instances.

This chapter contains the following sections:

- [About Cisco WAAS File Services, on page 1](#)
- [Cisco WAAS File Services Features, on page 3](#)
- [Prerequisites for Configuring Cisco WAAS File Services, on page 6](#)
- [Configuring the CIFS Accelerator, on page 6](#)
- [Configuring the SMB Accelerator, on page 16](#)

## About Cisco WAAS File Services

Enterprises today have remote offices in different parts of the country and around the world, often with remote offices having their own file servers to store and manage the data needed by local users. This method of operation can be costly to purchase, manage, and upgrade file servers at each remote office, and to protect data in case of server failure. To achieve the required level of data assurance, the remote office must devote resources to back up the data at the remote site and physically move it to a secure location, often at a considerable distance from the site. When this scenario is multiplied by tens, hundreds, and thousands of remote offices, the enterprise data management costs can rise exponentially, along with the increased risks to critical data.

The logical solution is to move all of the enterprise's important data to a central location containing the facilities, trained personnel, and storage mass required to manage the data properly. By having a data center provide backup and other storage-management facilities, the enterprise can achieve better utilization of both personnel and storage, as well as a higher level of data assurance and security.

However, the WAN between the enterprise's data center and its remote offices can be unreliable and slow, with limited bandwidth and high latency. The WAN can also create other obstacles to the implementation of the data center solution, including file server protocols that operate over the WAN. Every file operation generates several exchanges of protocol messages between the client and the file server. While often not noticeable on the LAN, this can quickly cause high latency over the WAN, which sometimes can break the file server protocol altogether. Even when the file server protocol functions correctly over the WAN, there can be long delays between each transaction, which can cause timeouts in user applications such as word-processing programs, image-editing programs, and design tools, or which stop the applications from functioning correctly.

The problems of unreliable WANs, file system protocol compatibility, and user application compatibility diminish productivity, and overall, negatively affect the user experience.

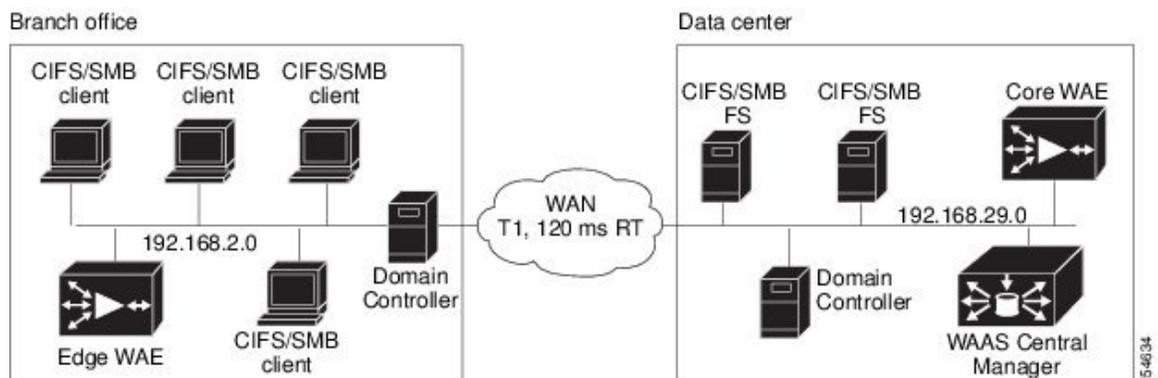
Cisco WAAS File Services overcomes WAN latency and bandwidth limitations by caching data on Edge WAEs near the user. This data caching method allows branch office users to access centralized data at LAN-like speeds over the WAN. The solution is based on several key concepts:

- Use the WAN as little as possible: By minimizing the number of operations that need to traverse the WAN, Cisco WAAS effectively shields users from many of the obstacles that WANs create.
- Use the WAN optimally: Cisco WAAS File Services uses sophisticated caching, compression, and network optimization technologies, which enable the system to use the WAN optimally.
- Preserve file system protocol semantics: Although Cisco WAAS software uses its own proprietary protocol over the WAN, it leaves intact the complete semantics of the standard file system protocol commands. This is essential to preserve the correctness and coherency of the data in the network.
- Make the solution transparent to users: The best solutions are the ones that do their jobs unnoticed, without interfering with end users' operations or forcing users to change their ways of doing business. The Cisco WAAS File Services solution does not require any software installations, either on the server side or at the client-side, and does not require a user to learn anything new. Users derive all the benefits of having a secure data center without needing to change any of their work habits.

By using Cisco WAAS File Services, enterprises can consolidate their file servers to a data center that provides the facilities, IT personnel, and storage devices required to manage the data properly.

The following figure shows a typical deployment scenario after Cisco WAAS File Services have been set up.

**Figure 1: Cisco WAAS File Services Solution**



# Cisco WAAS File Services Features

This section contains the following topics:



---

**Note** To accelerate SMB traffic, use the SMB application accelerator, which handles optimizations of file server operations. These optimizations apply to SMBv1, SMBv2 and SMBv3. For information on how to use the SMB application accelerator to perform specific file server optimizations, see [Configuring SMB Acceleration](#) in the chapter "Configuring Application Acceleration." Legacy-mode Cisco Wide Area File Services (Cisco WAFS) is not supported for Cisco WAAS Version 4.4.1 and later. Before upgrading, legacy Cisco WAFS users must migrate to the SMB accelerator.

---

## Automatic Discovery

The Automatic Discovery feature allows you to enable SMB without having to register individual file servers in the Cisco WAAS Central Manager. With the Automatic Discovery feature, Cisco WAAS attempts to automatically discover and connect to a new file server when a SMB request is received.

## Data Coherency and Data Concurrency

Cisco WAAS software ensures data integrity across the system by using two interrelated features: **data coherency**, which manages the freshness of data, and **data concurrency**, which controls the access to data by multiple clients.

This section contains the following topics:

- [Data Coherency, on page 3](#)
- [Data Concurrency, on page 4](#)

## Data Coherency

Maintaining multiple copies of data files in multiple locations increases the likelihood that one or more of these copies will be changed, which can cause the changed copy to lose consistency or coherency with the other copies. To address this scenario, data coherency manages the freshness of data.

Coherency semantics are used to provide guarantees of freshness (whether the copy is up-to-date or not) and the propagation of updates to and from the origin file server.

The Cisco WAAS software applies the following coherency semantics to its built-in coherency policies:

- **Strict SMB behavior for intra-site:** Users of the same cache are always guaranteed standard, strict SMB coherency semantics.
- **Cache validation on SMB open:** In SMB, the **File Open** operation is passed through to the file server. For data coherency purposes, the Cisco WAAS software validates the freshness of the file on every file that is open, and invalidates the cached file if a new version exists on the file server.

Cisco WAAS software validates data by comparing the time stamp of a file in the cache to the time stamp of the file on the file server. If the time stamps are identical, the cached copy in the Cisco Edge WAE is considered valid, and the user is permitted to open the file from the Cisco Edge WAE cache.

If the time stamps are different, the Cisco Edge WAE removes the file from its cache and requests a fresh copy from the file server.

- **Proactive cache updating:** Cisco WAAS software supports the use of change notifications in SMB environments as a way to keep cached data on the Cisco Edge WAEs up-to-date.

When a client makes a change to a directory or file, the Cisco Edge WAE sends a change notification to the file server. The file server then sends a change notification to all the Cisco Edge WAEs, which includes a list of the modified directories and files. Upon receiving the change notification, each Cisco Edge WAE checks its cache and invalidates the directories and files listed in the notification, and then updates its cache with the latest versions.

Example:

If a user edits an existing Microsoft Word document and saves the changes to the Cisco Edge WAE cache, the Cisco Edge WAE sends a change notification to the file server so that it knows that the file has been modified. The Cisco Edge WAE then sends the changed sections to the file server, and the file server proactively sends change notifications to the other Cisco Edge WAEs in the network. These Cisco Edge WAEs then update their cache so that the file is consistent across all access points.

This process is also applicable when you rename a directory, add a new subdirectory, rename a file, or create a new file in a cached directory.

- **Flush on SMB close:** In SMB, the **File Close** operation forces all the write buffers to be flushed to the file server, and the Close request is only granted after all the updates have been propagated to the file server. From a data coherency standpoint, the combination of **Validate on File Open** and **Flush on File Close** ensures that well-behaved applications, such as Microsoft Office, operate in session semantics. The SMB commands **Open**, **Lock**, **Edit**, **Unlock**, and **Close**, are guaranteed to work correctly on the Cisco WAAS network.

This authorization process prevents users from accessing directories and files in the cache that they do not have permission to access on the file server.

## Data Concurrency

Data concurrency control is important when multiple users access the same cached data to read, or write, or both. Data concurrency control synchronizes this access by establishing and removing file system locks. This file-locking feature ensures data integrity and provides the following benefits:

- Enables a client to aggressively cache file data so that it does not have to rely on retrieving data from the remote file server.
- Provides a performance boost in many applications running on existing CIFS client implementations.
- Preserves data integrity because only one user at a time can make changes to a section of a file.

Cisco WAAS software supports the CIFS OpLock feature, which allows a user to lock a file so that the user can safely read and write data to its local cache instead of using network bandwidth to perform these functions over the WAN on the file server. By using OpLock, a user can proactively cache read-ahead data because it knows that no other user is accessing the file, and therefore, there is no chance of the cached data becoming stale. The user can also write data to its local cache and does

not have to update the file server until it closes the file or until another user requests that the same file be opened.

Oplock applies to files only. The file server does not grant OpLock requests on directories and named pipes.

#### **File-Locking Process:**

When a user opens a file, it sends a lock request to the file server. The Cisco Edge WAE intercepts and forwards all lock requests from the user to the file server as well as all the responses from the file server to the user. If no other user has a lock on the file, the file server grants an exclusive lock request so that the user can safely cache the file.

If a second user requests that the same file be opened, the following actions occur:

- The file server revokes the exclusive file lock obtained by the first user.
- The first user performs the following actions:
  - Flushes any file changes stored in its cache to the file server. This action ensures that the second user opening the file receives the latest information from the file server.
  - Deletes any of its read-ahead buffers for the file because that data is no longer guaranteed to remain up-to-date since a second user will open the file.
- The file server allows the second user to open the file.

## Prepositioning

The prepositioning feature allows system administrators to proactively push frequently-used files from the central storage into the cache of selected Cisco Edge WAEs. This operation provides users with faster first-time file access, and makes more efficient use of available bandwidth.

- When an end user attempts to open a file that is not found in the Cisco Edge WAE cache, the Cisco Edge WAE retrieves it across the WAN from the file server where it is stored.
- The prepositioning feature allows administrators to push large, frequently-accessed files from file servers to selected Cisco Edge WAE caches according to a predefined schedule. Through the appropriate use of prepositioning, administrators can enable users to benefit from cache-level performance even during first-time access of these files.
- Prepositioning improves WAN bandwidth utilization by transferring heavy content when the network is otherwise idle, for example, at night, which frees up bandwidth for other applications during the day.
- The Cisco WAAS Central Manager GUI allows administrators to create multiple, overlapping preposition policies (each with its own schedule), a list of target Cisco Edge WAEs, and defined time and size constraints.

Create preposition directives from the Cisco WAAS Central Manager GUI.

- Prepositioning includes the ability to configure multiple roots. For more information, see [Creating a Preposition Directive for CIFS Files](#) and [Creating a Preposition Directive for SMB Files](#).

# Prerequisites for Configuring Cisco WAAS File Services

This section describes the prerequisites for configuring Cisco WAAS File Services on Cisco WAEs and for configuring Cisco WAAS File Services on a Cisco ISR Router with a Cisco NME-WAE.

- **Prerequisites for enabling file services on Cisco WAEs:**

- If you want to configure multiple devices with the same settings, ensure that you have created a device group that contains all the devices you want to enable with file services. For information on creating device groups, see the chapter "Using Device Groups and Device Locations."
- Identify the file servers that you want to export, and refer to [Checklist for Configuring the CIFS Accelerator](#) to verify that these file servers can operate with Cisco WAAS software.
- Other file servers may operate with Cisco WAAS, but only those listed in the table were tested. The file server must support opportunistic locking (OpLock) and CIFS notifications.
- The CIFS application accelerator does not support file servers that use the FAT32 file system. You can use the policy rules to exclude FAT32 file servers, if any, from CIFS accelerator optimization.
- Certain combinations of operating systems and file systems on a file server can result in the server responding with different timestamp precisions for different SMB commands. In such a situation, you may not get the highest possible CIFS optimization if the CIFS application accelerator avoids using cached files with mismatched timestamps in favor of preserving data coherency.

- **Prerequisites for configuring Cisco WAAS File Services on a Cisco ISR Router with a Cisco NME-WAE:**

- If you are running the Cisco WAAS on a network module that is installed in a Cisco ISR router, there are specific memory requirements for supporting file services. The Cisco WAAS NME-WAE must contain at least 1 GB of RAM to support file services.
- If you try to enable file services and the device does not contain enough memory, the Cisco WAAS Central Manager displays an error message.
- You can check the amount of memory that a device contains in the Device Dashboard window. For details, see [Device Dashboard Window](#) in the chapter "Monitoring Your Cisco WAAS Network."

## Configuring the CIFS Accelerator

This section contains the following topics:

### Checklist for Configuring the CIFS Accelerator

To accelerate CIFS traffic, enable and configure the CIFS accelerator.

The CIFS accelerator relies on automatic discovery and transparently accelerates CIFS traffic with no configuration needed.

The following table provides a checklist for steps that you must complete to configure the CIFS accelerator.

Table 1: Checklist for Configuring CIFS Accelerator

Task	Additional Information and Instructions
1. Prepare for Cisco WAAS file services.	The tasks that you need to complete before enabling and configuring file services on your WAAS devices. For more information, see <a href="#">Prerequisites for Configuring Cisco WAAS File Services</a> .
2. Enable CIFS acceleration.	Enables and configures the CIFS accelerator. For more information, see <a href="#">Enabling and Disabling Global Optimization Features</a> in the chapter "Configuring Application Acceleration."
3. (Optional) Identify dynamic shares.	Identifies the dynamic shares on an exported file server. If your file server uses Access Based Enumeration (ABE) to give users different views of the share, you must configure the dynamic shares on the Cisco WAAS Central Manager. For more information, see <a href="#">Creating Dynamic Shares for the CIFS Accelerator</a> .
4. (Optional) Create a preposition directive.	Defines which files are proactively copied from an exported file server to the Edge WAE cache. For more information, see <a href="#">Preposition Directives for CIFS Files</a> .

## Creating Dynamic Shares for the CIFS Accelerator

### Before you begin

Many file servers use dynamic shares, that is, multiple users can access the same share, but the share is then automatically mapped to a different directory based on a user's credentials. Dynamic shares are most commonly used on file servers to set up user home directories. For example, a directory named Home can be set up as a dynamic share on a file server so that each user accessing that share is automatically redirected to their own personal directory.

If a file server contains a dynamic share or is using Access Based Enumeration (ABE), you must register that dynamic share with the Cisco WAAS Central Manager, as described in this section.

Defining a dynamic share in the Cisco WAAS Central Manager allows each user to see a different view of the share and allows the operation of ABE if it is configured on the Microsoft Windows Server.



**Note** Dynamic share configuration on the Cisco WAAS Central Manager overrides any dynamic share configuration set up directly on the Cisco WAE device using the Cisco WAAS CLI.

Before configuring a dynamic share, consider the following limitations:

- Each dynamic share on a file server must be unique.
- You cannot configure a dynamic share if that share has a preposition directive. You must remove the preposition policy before you can configure the dynamic share.
- You can use the Cisco WAAS Central Manager GUI to define any directory as a dynamic share. However, if a directory is not set up as a dynamic share on the file server, all the users will read or write the same content from the same directory and will not be redirected to different directories based on their credentials.

## Procedure

---

- Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > CIFS File Services > Dynamic Shares**. A list of dynamic shares appears. The **Dynamic Shares** window shows all the dynamic shares that are configured. From this window, you can perform the following tasks:
- To edit the configuration of an existing dynamic share, click the **Edit** icon next to the share. You can delete a dynamic share, or modify any of the dynamic share settings.
  - Add a new dynamic share definition.
- Step 2** To add a new dynamic share, click the **Create New Dynamic Share** icon in the taskbar. The **Creating a New Dynamic Share** window appears.
- Step 3** In the **Name** field, enter a name for the dynamic share.
- The following characters are not supported in the dynamic share name: /, \, :, \*, ?, ", <, >, |. From the **Assigned Domain** drop-down list, choose the Cisco WAAS domain that you want to assign to the dynamic share. Only administrators who are also assigned to this Cisco WAAS domain have permission to edit the dynamic share configuration. The domain does not affect a client's access to the dynamic share.
- Note** A Cisco WAAS domain is not the same as a DNS domain or Microsoft Windows domain. For more information, see [Working with Domains](#) in the chapter "Creating and Managing Administrator User Accounts and Groups."
- The Cisco WAAS domain does not use entities. When defining the Cisco WAAS domain, choose **None** for the **Entity Type**. The Cisco WAAS domain must be assigned to each Cisco WAAS administrative user who needs to edit the dynamic share configuration. For more information, see [Assigning a Domain to a User Account](#) in the chapter "Creating and Managing Administrator User Accounts and Groups."
- Step 4** In the **File Server** field, enter the name or IP address of the file server with the dynamic share. If you specify the file server name, the Edge WAE resolves it to an IP address. The registered file servers are displayed in a drop-down list.
- Step 5** In the **User name**, **Password**, and **Confirm Password** fields, enter the username and password credentials for the file server. If the username is in a Microsoft Windows domain, specify the domain name as part of the **User name** field, as follows: **domain\username**. These credentials are used only to access the file server when you click **Browse**.
- Step 6** In the **Share Name** field, specify the location of the dynamic share by doing one of the following tasks:
- Enter the name of the dynamic share on the file server. The following characters cannot be used in the share name: \, /, :, \*, ?, ", <, >, |.
  - To navigate to the correct root directory, click **Browse** next to the **Share Name** field.
- Note** The **Browse** button appears only if you have at least one Cisco WAE device with the CIFS accelerator enabled and registered to the Cisco WAAS Central Manager.
- Step 7** Ensure that the status of the share is set to **Enabled**. If you change the status to **Disabled**, the share will not be set up as a dynamic share in your Cisco WAAS environment.
- Step 8** Click **Submit**.

The specified directory now functions as a dynamic share on the Cisco Edge WAE cache.

---

## Preposition Directives for CIFS Files

This section contains the following topics:

### About Preposition Directives for CIFS Files

A preposition directive allows you to determine which files should be proactively copied from CIFS file servers to the cache of selected Cisco Edge WAEs. Prepositioning enables you to take advantage of the idle time on the WAN to transfer frequently-accessed files to selected WAEs, where users can benefit from cache-level performance even during first-time access of these files.

Consider the following operating guidelines for preposition directives for CIFS files:

- You can start or stop a preposition task from the Cisco WAAS Device Manager.
- Prepositioning is supported on automatically discovered file servers in the transparent CIFS accelerator.
- When defining a preposition directive, select the Cisco Edge WAEs that you want to be prepositioned with content from the file server, and then specify the root directories on the file server to be prepositioned. Initially, the preposition directive is in the unscheduled state. You must create a schedule that determines when and how often the content is prepositioned. Because content can be prepositioned on a regular basis, you can specify whether each new iteration of the task should copy all designated files, or only those files that have changed over a specified time interval.
- In addition, you can specify time and size limits to prevent a preposition task from consuming too much bandwidth on the WAN or too much space on the Cisco Edge WAE cache. We strongly recommend that you use these limits to optimize network efficiency and prevent misuse of this feature.
- When the activation time of a preposition directive arrives, a preposition task starts on the Cisco Edge WAE. Each preposition task can be monitored in the Cisco WAAS Central Manager GUI during and after processing. You can also terminate active preposition tasks, if required.
- Prepositioning requires that the username and password needed to access the file server be specified. These items are specified directly in the **Creating New Preposition Directive** window, as described in [Creating a Preposition Directive for CIFS Files](#).



---

**Note** When preposition updates are sent to the Cisco WAAS Central Manager, if any preposition file server credentials cannot be decrypted, all further preposition updates are not sent from the Cisco WAE to the Cisco WAAS Central Manager, and decryption failure error messages are logged in **errorlog/cms\_log.current**. You must reconfigure the preposition credentials from the Cisco WAAS CLI.

---

- Prepositioning includes the ability to configure multiple roots. For more information, see [Creating a Preposition Directive for CIFS Files](#).
- When using prepositioning, both branch and data center WAEs are required (the same as for any other accelerated traffic). The branch WAE retrieves prepositioned files through an optimized connection. Verify that you have connectivity between the following network entities:

- Client to branch WAE
  - Branch WAE to data center WAE
  - Branch WAE to file server
  - Data center WAE to file server
- You will need to change any ACLs that might be blocking prepositioning traffic.



**Note** Although preposition directives can be created and managed by using the Cisco WAAS CLI, we recommend that you use the Cisco WAAS Central Manager GUI because you can manage prepositioning for groups of Cisco WAEs from the Cisco WAAS Central Manager. If you mix Cisco WAAS Central Manager and Cisco WAAS CLI configuration, unpredictable results may occur because changes on one device can affect other devices.

## Creating a Preposition Directive for CIFS Files

### Procedure

#### Step 1

From the Cisco WAAS Central Manager menu, choose **Configure > CIFS File Services > Preposition**.

The **Preposition Directive** window appears. This window displays the following information about preposition directives that exist on the system:

- **Preposition Directive:** Name of the preposition directive.
- **Type:** **Full**, **Differential**, or **Since**
  - **Full:** All the files that match the other filters of the task and that are found on the file server are sent to the Edge to be compared with the cache.
  - **Differential:** Only the files that are found as changed since the last successful preposition are sent to the Edge cache. The time of the last successful preposition is taken from the Edge device, so ensure that the clock is synchronized with the file server. The first scan is always a full scan. If you change the preposition task, the last successful scan time is reset.
  - **Since:** Only the files that are found as changed within a specified time period are sent to the Edge cache.
- **Status:** Whether the preposition directive is enabled or disabled.
- **File Server:** Name of the exported file server.

The following tasks are available from the **Preposition Directive** window:

- To edit the configuration of an existing preposition directive, click the **Edit** icon next to the corresponding directive. You can then delete the preposition directive, or modify any of the settings.
- To add a new preposition directive, follow the Step 2 and later steps.

- Step 2** To create a new preposition directive, click the **Create New Preposition Directive** icon in the taskbar. The **Creating New Preposition Directive** window appears.

**Figure 2: Creating a New Preposition Directive Window**

- Step 3** Enter a unique name for the directive. The name cannot contain characters other than letters, numbers, period, hyphen, and underscore; the double quote (") character is not allowed in the name.
- Step 4** From the **Status** drop-down list, choose **enabled** or **disabled**. (Disabled directives are not put into effect.)
- Step 5** (Optional) Define the time and size limitations using the provided fields.

**Note** The table [Table 6: Preposition Time and Size Limitations](#), on page 22 describes the time and size limitation fields. If one of these limits is exceeded during a prepositioning task, the task is terminated and a message is sent to the **Administrator** log. Any remaining files are exported the next time the task is run. If a user requests one of the missing files before this happens, it is fetched over the WAN through Cisco WAAS software as usual.

- Step 6** (Optional) To prevent hidden directories on the file server from being prepositioned, check the **Ignore Hidden Directories** check box. This check box is unchecked by default. If you leave this box unchecked, hidden directories are prepositioned.

- Step 7** In the **File Server** field, enter the unique name of a file server to export. The name cannot contain characters other than letters, numbers, period, hyphen, and underscore; the double quote (") or forward slash (/) characters are not allowed in the name.

**Step 8** From the **Location** drop-down list, choose the device location that will provide browsing services for the file server. Regularly, this is the data center WAE. For the best browsing performance, specify a location that is close to the file server. The location is used only for browsing; each edge WAE will retrieve prepositioned files directly from the file server, not from this location. For more information on defining locations, see [Working with Device Locations](#).

**Step 9** In the **User name**, **Password**, and **Confirm Password** fields, enter the username and password credentials for the file server. If the username is in a Windows domain, specify the domain name as part of the **User name** field, as follows: **domain\username**.

The access credentials that you enter must allow read access to the prepositioned root directories and to their parent directories.

**Step 10** (Optional) Check the **DSCP value for high priority messages** check box if you want to assign a DSCP marking value to the prepositioning traffic. Choose a DSCP value from the drop-down list or enter a number from **0** to **63** in the text field.

DSCP is a field in an IP packet that enables different levels of service to be assigned to the network traffic. Levels of service are assigned by marking each packet on the network with a DSCP code and associating a corresponding level of service. DSCP is the combination of **IP Precedence** and **Type of Service (ToS)** fields. For more information, see RFC 2474.

**Step 11** In the **Root Share and Directories** field, enter the directories on the file server that you want to export. Use any of the following methods to identify a directory:

- Manually enter one or more directory paths in the following format: **protocol://server/share** or **server\share**, for example, **cifs://win12srv/home** or **win12srv\home**. You can enter multiple lines for multiple directories, with each full directory path on its own line. You cannot specify the root directory (/) as a root share.
- When you define multiple root shares, the preposition sequence that is performed for a single root configuration is repeated for each root serially.
- To browse the directories on the file server, click **Browse**.
  - To navigate to a directory, click the **File Folder** icon to the left of the directory name.
  - Check the check box next to the directory that you want to export and then click **Select Directory**. The **Browse** window allows you to choose multiple directories.
  - The **Browse** function operates best when you choose the location of the nearest CIFS accelerator to the file server, from the Location drop-down list. If you do not choose a location, the browse request is sent to all the devices that have the CIFS accelerator enabled, and the request may time out.
- To include all the subdirectories under the specified root directory, check the **Include Sub Directories** check box. If this option is not selected, only the files in the specified root directory are prepositioned and you cannot select subdirectories when you are browsing.
- To narrow the policy definition to a particular type of file, choose a pattern operator from the **File Name** drop-down list and enter the text that describes the pattern in the adjacent text box. For example, enter ends with **.doc**. Do not use a space or the following special characters: |, :, >, <, ", ?, \*, /, \.

**Step 12** Click **Submit**.

The directive is saved and additional tabs appear at the top of the window.

---

## Assigning Edge Devices to a Preposition Directive for CIFS Files

### Before you begin

- After you create a preposition directive, you need to assign Cisco Edge WAEs or device groups to the directive. This task determines which Cisco Edge WAEs will store preposition content in their cache.
- Prepositioning includes the ability to configure multiple roots. See [Creating a Preposition Directive for CIFS Files](#).

### Procedure

---

- Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > CIFS File Services > Preposition**. The **Preposition Directives** window appears, which lists the preposition directives that exist on the system.
- Step 2** Click the **Edit** icon next to the preposition directive that you want to assign to an Edge WAE or device group.
- Step 3** Click one of the following tabs at the top of the window:
- **Assign Edge Devices**: Allows you to select one or more Cisco Edge WAEs to assign to this directive.
  - **Assign Edge Groups**: Allows you to select a device group to assign to this directive.
- The **Edge Device Assignments** window or the **Device Groups Assignments** window appears, depending on the selected option.
- For either view, the assignments window lets you filter your view of the items in the list. Filtering enables you to find items in the list that match the criteria that you set.
- Step 4** Choose the Edge WAEs or device groups to assign to this preposition directive by doing either of the following:
- To assign all the available Cisco Edge WAEs or device groups to this directive, click the **Assign All** icon in the taskbar.
  - To assign individual devices or device groups, click the blue "X" next to each Cisco Edge WAE or device group that you want to assign to this directive.
- Note** If a device or device group is offline (identified by a red "X"), then you cannot assign that device or group to this directive. The preposition directive, when assigned to a device group, is applied only to connected Edge devices in the assigned device group.
- When assigning a CIFS accelerator preposition directive to a device group, the directive is applied only to those devices enabled for CIFS acceleration in the assigned device group.
- Step 5** Click **Submit**.
- The icon next to each edge device or device group you selected changes to a white checkmark inside a green circle.

**Note** If the CIFS accelerator is disabled on a Cisco WAE, the Cisco WAE is removed from any preposition directives to which it is assigned. Also, the preposition directive is removed from the device's running configuration.

## Creating a Preposition Schedule for CIFS Files

### Before you begin

After you create a preposition directive and assign Cisco WAEs to the directive, create a schedule that determines when and how often prepositioning occurs.

Example:

You want to schedule prepositioning to occur at night to minimize the amount of traffic during business hours, or, you may want to schedule prepositioning to occur on a recurring basis if the exported data changes often. This will help ensure that the Cisco WAEs assigned to this directive have the latest file updates in their cache.



**Note** When a preposition task is scheduled to begin at the same time for multiple Cisco Edge WAEs that are located in different timezones, the task will begin on the Cisco Edge WAEs based on the Cisco Core WAE timezone. If the clocks of the Cisco Edge WAE and the Cisco Core WAE are not synchronized, the task will *not* start on time.

### Procedure

- Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > CIFS File Services > Preposition**. The **Preposition Directives** window appears, which lists the preposition directives that exist on the system.
- Step 2** Click the **Edit** icon next to the preposition directive for which you want to create a schedule.
- Step 3** Click the **Schedule** tab at the top of the window. The **Creating New Preposition Schedule** window appears. By default, no schedule is configured.
- Step 4** Choose one of the following scheduling options:
  - **Not Scheduled:** Prepositioning is not scheduled at this time.
  - **Now:** Prepositioning occurs within a few minutes after you submit this schedule.

A **Now** schedule begins again each time you make a change to the preposition directive and click **Submit**. A **Now** schedule also begins again as soon as a Cisco Edge device that has been reloaded comes back online.

  - **Daily:** Prepositioning occurs daily at the defined time.
  - **Date:** Prepositioning occurs at the defined time and date.
  - **Weekly:** Prepositioning occurs on the selected days of the week at the defined time.
  - **Monthly Days:** Prepositioning occurs on the selected days of the month at the defined time.

- **Monthly Weekdays:** Prepositioning occurs on the defined day (as opposed to a defined date) and time during the month. For example, you can schedule prepositioning to occur on the second Tuesday of every month.

**Step 5** Specify a start time for the prepositioning task.

Consider the following guidelines for specifying a start time:

- The time is expressed in 24-hour format with **00:00** representing midnight. The time refers to the local time of the Cisco Edge WAE where the data is to be prepositioned.
- If there are multiple Cisco Edge WAEs in different time zones, the time refers to the local time of the Cisco Core WAE.
- You cannot schedule a start time for the **Now** option.

**Step 6** Click **Submit**.

The message **Changes Submitted** appears at the bottom of the window confirming that your schedule was saved.

**Step 7** Verify that the preposition directive has completed successfully by checking the preposition status. For more information, see [Checking the Preposition Task Status of CIFS Files, on page 15](#).

---

## Checking the Preposition Task Status of CIFS Files

### Before you begin

After you create one or more preposition directives, you can verify the status of all the preposition tasks to ensure that they are completed successfully. If a task does not complete successfully, then some of the prepositioned files may have not been copied to the Cisco Edge WAE cache.

### Procedure

---

**Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > CIFS File Services > Preposition**.

The **Preposition Directives** window, which lists the preposition directives that exist on the system, appears.

**Step 2** Click the **Edit** icon next to the preposition directive that you want to check.

**Step 3** Click the **Preposition Status** tab at the top of the window.

The **Preposition Status** window displays the following information:

- **WAE:** The name of each Edge WAE that received the prepositioned files in its cache.
- **Start Time:** The time the preposition task started.
- **Duration:** The amount of time it took the preposition task to be completed.
- **Amount Copied:** The amount of data copied to the WAE cache, in bytes.
- **Status:** Whether the preposition task is completed successfully.
- **Reason:** The reason a preposition task failed.

**Step 4** Ensure that the **Status** column shows **Completed**.

If this column shows **Failure**, look in the **Reason** column for an explanation that can help you troubleshoot why the preposition task failed. After resolving the issue, you can schedule the preposition task to run again now, or wait until the scheduled start time and verify the status again later.

## Configuring the SMB Accelerator

This section contains the following topics:

### Checklist for Configuring the SMB Accelerator

To accelerate SMB traffic, enable and configure the SMB accelerator.

The following table provides a checklist for steps that you must complete to configure the SMB accelerator.

*Table 2: Checklist for Configuring SMB Accelerator*

Task	Additional Information and Instructions
1. Prepare for Cisco WAAS file services.	The tasks that you need to complete before enabling and configuring file services on your WAAS devices. For more information, see <a href="#">Prerequisites for Configuring Cisco WAAS File Services</a> .
2. Enable SMB acceleration.	Enables and configures the SMB accelerator. For more information, see <a href="#">Enabling and Disabling Global Optimization Features</a> in the chapter "Configuring Application Acceleration."
3. (Optional) Identify dynamic shares.	Identifies the dynamic shares on an exported file server. If your file server uses Access Based Enumeration (ABE) to give users different views of the share, you must configure the dynamic shares on the Cisco WAAS Central Manager. For more information, see <a href="#">Creating Dynamic Shares for the SMB Accelerator, on page 16</a> .
4. (Optional) Create a preposition directive.	Defines which files are proactively copied from an exported file server to the Edge WAE cache. For more information, see <a href="#">Creating a Preposition Directive for SMB Files, on page 20</a> .

## Creating Dynamic Shares for the SMB Accelerator

### Before you begin

Many file servers use dynamic shares, that is, multiple users can access the same share, but the share is then automatically mapped to a different directory based on a user's credentials. Dynamic shares are most commonly used on file servers to set up user home directories. For example, a directory named Home can be set up as a dynamic share on a file server so that each user accessing that share is automatically redirected to their own personal directory.

If a file server contains a dynamic share or is using Access Based Enumeration (ABE), you must register that dynamic share with the Cisco WAAS Central Manager, as described in this section.

Defining a dynamic share in the Cisco WAAS Central Manager allows each user to see a different view of the share and allows the operation of ABE if it is configured on the Microsoft Windows Server.



**Note** Dynamic share configuration on the Cisco WAAS Central Manager overrides any dynamic share configuration set up directly on the Cisco WAE device using the Cisco WAAS CLI.

Before configuring a dynamic share, consider the following limitations:

- Each dynamic share on a file server must be unique.
- You cannot configure a dynamic share if that share has a preposition directive. You must remove the preposition policy before you can configure the dynamic share.
- You can use the Cisco WAAS Central Manager GUI to define any directory as a dynamic share. However, if a directory is not set up as a dynamic share on the file server, all the users will read or write the same content from the same directory and will not be redirected to different directories based on their credentials.

## Procedure

- Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > SMB File Services > Dynamic Shares**.  
A list of dynamic shares appears. The **Dynamic Shares** window shows all the dynamic shares that are configured. From this window, you can perform the following tasks:
- To edit the configuration of an existing dynamic share, click the **Edit** icon next to the share. You can delete a dynamic share, or modify any of the dynamic share settings.
  - Add a new dynamic share definition.
- Step 2** To add a new dynamic share, click the **Add Dynamic Share** icon in the taskbar.  
The **Creating a New Dynamic Share** window appears.
- Step 3** In the **File server** field, enter the name or IP address of the file server with the dynamic share  
If you specify the file server name, the Cisco Edge WAE resolves it to an IP address.  
The registered file servers are displayed in a drop-down list.
- Step 4** In the **Share name** field, specify the location of the dynamic share by doing one of the following tasks:  
Enter the name of the dynamic share on the file server. The following characters cannot be used in the share name: \ / : \* ? " < > |  
To navigate to the correct root directory, click **Browse** next to the Share Name field  
The **Browse** button appears only if you have at least one Cisco WAE device with the SMB accelerator enabled and registered to the Cisco WAAS Central Manager.
- Step 5** To submit the changes, click **OK**.

The specified directory now functions as a dynamic share in the Cisco Edge WAE cache.

## Preposition Directives for SMB Files

This section contains the following topics:

### About Preposition Directives for SMB Files

A preposition directive allows you to determine which files should be proactively copied from SMB file servers to the cache of selected Cisco Edge WAEs. Prepositioning enables you to take advantage of the idle time on the WAN to transfer frequently accessed files to selected WAEs, where users can benefit from cache-level performance even during first-time access of these files.

Considering the following guidelines for creating and using preposition directives for SMB files:



**Note** When preposition updates are sent to the Cisco WAAS Central Manager, if any preposition file server credentials cannot be decrypted, all further preposition updates are not sent from the Cisco WAE to the Cisco WAAS Central Manager, and decryption failure error messages are logged in **errorlog/cms\_log.current**. You must reconfigure the preposition credentials from the Cisco WAAS CLI.



**Note** Although preposition directives can be created and managed by using the Cisco WAAS CLI, we recommend that you use the Cisco WAAS Central Manager GUI because you can manage prepositioning for groups of Cisco WAEs from the Cisco WAAS Central Manager. If you mix Cisco WAAS Central Manager and Cisco WAAS CLI configuration, unpredictable results may occur because changes on one device can affect other devices.

- You can start or stop a preposition task from the Cisco WAAS Device Manager.
- Cisco SMB AO supports accelerating client connections to Microsoft Distributed File System (DFS) shares.
- Prepositioning is supported on automatically discovered file servers in the SMB accelerator.
- When defining a preposition directive, select the Cisco Edge WAEs that you want to be prepositioned with content from the file server, and then specify the root directories on the file server to be prepositioned. Initially, the preposition directive is in the unscheduled state. You must create a schedule that determines when and how often the content is prepositioned.

In addition, you can specify time and size limits to prevent a preposition task from consuming too much bandwidth on the WAN or too much space on the Cisco Edge WAE cache. We strongly recommend that you use these limits to optimize network efficiency and prevent misuse of this feature.

- When the activation time of a preposition directive arrives, a preposition task starts on the Cisco Edge WAE. Each preposition task can be monitored in the Cisco WAAS Central Manager GUI during and after processing. You can also terminate active preposition tasks, if required.

- Prepositioning requires that the username and password needed to access the file server be specified. These items are specified directly in the **Creating New Preposition Directive** window, as described in [Creating a Preposition Directive for SMB Files](#).
- Prepositioning includes the ability to configure multiple roots. For more information, see [Creating a Preposition Directive for SMB Files](#).
- When using prepositioning, both branch and data center WAEs are required (the same as for any other accelerated traffic). The branch WAE retrieves prepositioned files through an optimized connection. Verify that you have connectivity between the following network entities:
  - Client to branch WAE
  - Branch WAE to data center WAE
  - Branch WAE to file server
  - Data center WAE to file server

You will need to change any ACLs that might be blocking prepositioning traffic.

- Do not configure more than 25 preposition directives per device.
- DRE is disabled by default. To enable DRE, choose **Device > Configure > Acceleration > SMB Preposition Settings**, and then select the SMB Preposition DRE settings check box.
  - When DRE is enabled for the all prepositioning tasks, files are cached in Object Cache and DRE cache, particularly when the size of the prepositioned files is huge and this could affect the normal traffic. Otherwise, the files will be cached only in Object Cache.
  - The following table shows the DRE disk capacity, default object cache capacity, and default Akamai Connect Cache capacity by WAVE model.

*Table 3: DRE Disk, Default OC, and Default Akamai Connect Cache by Cisco WAVE Model*

Cisco WAVE Model	DRE Disk Capacity	Default Object Cache Capacity	Default Akamai Connect Cache Capacity
WAVE 294-4G	40	102	59
WAVE 294-4G-SSD	40	57	55
WAVE 294-8G	55	77	65
WAVE 294-8G-SSD	55	46	47
WAVE 594-8G	80	143	200
WAVE 594-8G-SSD	80	125	125

- The following table shows the default and resized DRE disk capacity, object cache capacity, and Akamai Connect Cache capacity by Cisco vWAAS model.

*Table 4: Default and Resized DRE, OC, and Akamai Connect Cache, by Cisco vWAAS Model*

Cisco vWAAS Model	DRE Disk Capacity	Default Object Cache Capacity	Default Akamai Connect Cache Capacity
vWAAS-150	52.3	52	30
vWAAS-150 Resized	51.25	52	30
vWAAS-200	52.23	82	100
vWAAS-200 Resized	52.23	82	100
vWAAS-750	96.75	122	250
vWAAS-750 Resized	96.75	122	250

- The following table shows the DRE disk capacity, default object cache capacity, and default Akamai Connect Cache capacity by Cisco ISR-WAAS model.

*Table 5: DRE Disk, Object Cache, and Akamai Connect Cache by Cisco ISR-WAAS Model*

Cisco ISR-WAAS Model	DRE Disk Capacity	Default Object Cache Capacity	Default Akamai Connect Cache Capacity
ISR-WAAS-200	75	32	30
ISR-WAAS-750	73	32	30
ISR-WAAS-1300	71	32	30
ISR-WAAS-2500	210	52	50

## Creating a Preposition Directive for SMB Files

### Procedure

#### Step 1

From the Cisco WAAS Central Manager menu, choose **Configure > SMB File Services > Preposition**.

The **Preposition Directives** window appears. This window displays the following information about preposition directives that exist on the system:

- **Preposition Directive:** Name of the preposition directive.
- **Status:** Whether the preposition directive is enabled or disabled.
- **File Server:** Name of the exported file server.
- **Schedule Details:** Schedule to determine how often content is prepositioned.

From the **Preposition Directives** window, you can perform the following tasks:

- Edit the configuration of an existing preposition directive by clicking the **Edit** icon next to the corresponding directive. You can then delete the preposition directive, or modify any of the settings.
- To assign the Device or Device Group (s) to the preposition operation, click the **Assign Device/DeviceGroup(s)** icon and select the appropriate one.
- To collect preposition status, click the **Collect Preposition Status** link.
- Add a new preposition directive, as described in the following steps.

**Step 2** To create a new preposition directive, click the **Create New Preposition** icon in the taskbar. The **Creating a New Preposition Directive** window appears.

*Figure 3: Creating a New Preposition Directive Window*

**Preposition Directive**

**Preposition Settings**

Name: \*

Enable Preposition

Total Size as % of Cache Volume: 5 (percentage) (1-100)

Max File Size: KB Min File Size: 20 KB

Duration: min ?

**FileServer Settings**

SMB v2 Signing

File Server: \* Nearest Device: Please make a choice \*

User Name: \* Domain Name:

Password: \* Confirm Password: \*

Configure DNS server to resolve HostName to IP address if File Server is HostName.

Configure the Nearest Device which is closest to the file server to facilitate directory browsing.

In order to access any DFS namespace under a domain, it is recommended to enter domainname/dfsnamespace format instead of specifying individual D host server IPs.

**Content Settings**

Root Share and Directories: \* Browse ?

Include Sub Directories

File Name: any Excludes

**Schedule Settings**

Frequency: Not Scheduled

Start time (HH:MM): 9:1

OK Cancel

**Step 3** At the **Preposition Settings** pane, in the **Name** field, enter a unique name for the directive. The name cannot contain characters other than letters, numbers, period, hyphen, and underscore; the double quote (") character is not allowed in the name.

**Step 4** Click the **Enable Preposition** check box. This denotes status of preposition. This is unchecked by default. If you disable it, preposition is not possible.

**Step 5** (Optional) Define the time and size limitations using the provided fields.

The following table describes the **Time** and **Size Limitation** fields.

**Table 6: Preposition Time and Size Limitations**

Field	Description
Total Size as % of Cache Volume	<p>Percentage of the overall Edge WAE cache that prepositioned files can consume. For example, if you do not want this prepositioning directive to consume more than 30 percent of a WAE's cache, enter 30 in this field. The default value is <b>5 percent</b>.</p> <p>The percentage of the cache defined for a preposition task defines the maximum size that can be prepositioned in a single iteration of the task regardless of how much is already in the cache.</p> <p>The total size of the files to be prepositioned will always be less than or equal to the total percentage of object cache size specified.</p> <p>Example:</p> <ul style="list-style-type: none"> <li>• If the user has specified max-cache directive as 10% and total object-cache size is 100 GB, then the maximum size of the total files to be prepositioned for the task is 10 GB (10% of 100 GB).</li> <li>• If there are 100 files in the configured shares and first 50 files size up to 10 GB, the rest of the files will not be prepositioned.</li> </ul> <p>When the cache is full, regardless of the reason, prepositioning operates like on-demand caching: an eviction process begins and the files with the oldest time-last-accessed values are removed from the cache.</p>
Max File Size	Maximum file size that can be exported. Files that are larger than this value are not exported to the WAE cache.
Min File Size	<p>Minimum file size that can be exported. Files that are smaller than this value are not exported to the WAE cache. It is inefficient to preposition files smaller than 20 KB because these files can be retrieved quickly over the WAN through normal WAAS.</p> <p>The default value is <b>20 KB</b>.</p>
Duration	<p>Maximum amount of time it should take WAAS to export the file server. If it takes WAAS longer than this amount of time to export the file server, WAAS stops the exporting process before all files are copied to the Edge WAE cache.</p> <p>If the preposition task does not start at the scheduled start time, for example, because the Edge and the Core have no connection, the start retries are counted in the duration.</p> <p>If you do not specify a value for this field, WAAS takes as much time as needed to export this file server.</p>

**Note** If one of these limits is exceeded during a prepositioning task, the task is terminated and a message is sent to the **Administrator log**. Any remaining files are exported the next time the task is run. If a user requests one of the missing files before this happens, it is fetched over the WAN through Cisco WAAS software as usual.

**Step 6** To enable prepositioning of this traffic, at the **File Server Settings** pane, check the **SMBv2** check box. The **SMBv2** check box is unchecked (disabled) by default.

**Step 7** In the **File Server** field, enter the unique name of a file server to export. The name cannot contain characters other than letters, numbers, period, hyphen, and underscore; the double quote (") is not allowed in the name.

To preposition a DFS share, enter the DFS workspace name and the file server name. The DFS share can be either a domain name or a domain IP address and can accept a maximum of one forward slash (/) character (/) and one period, for example, **google.com/namespace**.

**Note** The configuration of one forward slash character (/) and one period is only for devices for Cisco WAAS Software Version 6.4.3 and later. The Cisco WAAS Central Manager Device Group lists only the devices that have the appropriate software version.

**Step 8** From the **Nearest Device** drop-down list, choose the device location that will provide browsing services for the file server. Normally, this is the Cisco data center WAE. For optimum browsing performance, specify a location that is close to the file server.

The location is used only for browsing; each Cisco Edge WAE retrieves prepositioned files directly from the file server, not from this location. For more information on defining locations, see [Working with Device Locations](#) in the chapter "Using Device Groups and Device Locations."

**Step 9** In the **User name**, **Password**, and **Confirm Password** fields, enter the username and password credentials for the file server.

Consider the following naming guidelines:

- If the username is in a Microsoft Windows domain, specify the domain name in the **Domain name** field.
- The access credentials that you enter must allow read access to the prepositioned root directories and to their parent directories.
- The following characters cannot be used in **usernames**; | && || : \ / \* ? < > + = , [ ] " ' ` !
- The following characters cannot be used in **server names**; | && || , ~ : ! ` @ # \$ % ^ & ' { } ( ) \_ " "
- The following characters cannot be used in **domain names**; | && || : \ / \* ? < > " ' ` !

**Step 10** Under **Content Settings**, in the **Root Share and Directories** field, enter the directories on the file server that you want to export. Use any of the following methods to identify a directory:

- Manually enter one or more directory paths in the following format: **protocol://server/share** or **server\share**, for example, **smb://win12srv/home** or **win12srv\home**. You can enter multiple lines for multiple directories, with each full directory path on its own line. You cannot specify the root directory (/) as a root share. Special characters like ; | && || : \* ? < > " ' ` ! [ ] + = , are not allowed for top level shares. Additionally, when you create subdirectories inside the shares, the following special characters are not allowed: ; | && || : \* ? < > " ' ` !

**Note** Do not use the special character ";" in files and directory names, because it will generate errors. Additionally, Cisco WAAS Version 6.2.1 does not support extended Unicode characters in files and directories. These files or directories will be skipped and not prepositioned.

When you define multiple root shares, the preposition sequence that is performed for a single root configuration is repeated for each root serially.

- Click **Browse** to browse the directories on the file server. To navigate to a directory, click the File Folder icon to the left of the directory name. Check the check box next to the directory that you want to export and then click **Select Directory**. The **Browse** window allows you to choose multiple directories.

The **Browse** function operates best when you choose the location of the nearest SMB accelerator to the file server from the **Location** drop-down list. If you do not choose a location, the browse request is sent to all the devices that have the SMB accelerator enabled, and the request may time out.

- To include all the subdirectories under the specified root directory, check the **Include Sub Directories** check box. If this option is not selected, only the files in the specified root directory are prepositioned and you cannot select subdirectories when you are browsing.
- To narrow the policy definition to a particular type of file, choose a pattern operator from the **File Name** drop-down list, and enter the text that describes the pattern in the adjacent text box, for example, enter: ends with .doc. Do not use a space or the following special characters: ; | && || : \* ? < > \ / " ` !

**Step 11** By default, a **Now** schedule begins (if the status is enabled) each time you make a change to the **Preposition Directives** window. A new schedule also begins as soon as a Cisco Edge device that has been reloaded comes back online.

- **Not-Scheduled**: This option is displayed by default.
- **Immediate**: Prepositioning occurs within a few minutes after you click **OK** in the **Schedule** dialog box.
- **Date**: Prepositioning occurs at the defined time and date.
- **Daily**: Prepositioning occurs daily at the defined time.
- **Weekly**: Prepositioning occurs on the selected days of the week at the defined time.
- **Monthly Days**: Prepositioning occurs on the selected days of the month at the defined time.
- **Monthly WeekDays**: Prepositioning occurs on the selected month weekdays at the defined time.

**Step 12** Specify the preposition start time from the **Start Time** drop-down list.

- The time is expressed in 24-hour format with **00:00** representing midnight.
- The time refers to the local time of the Cisco Edge WAE where the data is to be prepositioned.
- If there are multiple Cisco Edge WAEs in different time zones, the time refers to the local time of the Cisco Core WAE.

**Step 13** Click **OK**.

The directive is saved and is added to the **Preposition Directive** table.

---

## Assigning Edge Devices to a Preposition Directive for SMB Files

### Before you begin

- After you create a preposition directive, you need to assign Cisco Edge WAEs or device groups to the directive. This task determines which Cisco Edge WAEs will store preposition content in their cache.
- Prepositioning includes the ability to configure multiple roots. For more information, see [.Creating a Preposition Directive for SMB Files, on page 20](#)
- After you create a preposition directive, you need to assign Edge WAEs or device groups to the directive. This task determines which Edge WAEs will store-preposition content in their cache.

### Procedure

---

- Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > SMB File Services > Preposition**. The **Preposition Directives** window appears, which lists the preposition directives that exist on the system.
- Step 2** Select the appropriate Preposition Directive to assign it to the Device or Device Group, and click the **Assign Devices/ Device Groups** icon. The **Assign Device/Device Groups Assignments** window appears. This window lets you filter your view of the items in the list. Filtering enables you to find items in the list that match the criteria that you set.
- Step 3** Choose the Cisco Edge WAEs or device groups to assign to this preposition directive, and then click **Assign**. The **Assigned Status** column changes to **Assigned** next to the selected device or device group. You can also un-assign a device or device group by clicking **Unassign**. The **Assigned Status** column changes to **Not Assigned**.
- Step 4** If there is a delay in sending the preposition details to the device, the **Assigned Status** column displays **Notify Updates In-Progress** for the device or device group.
- Step 5** To see a change in status after the preposition changes have been made to the device, click **Refresh**.
- Step 6** Consider the following operating guidelines:
- If a device or device group is offline (identified by a red "X"), then you cannot assign that device or group to this directive. The preposition directive, when assigned to a device group, is applied only to connected Cisco Edge devices in the assigned device group.
  - When assigning a SMB accelerator preposition directive to a device group, the directive is applied only to those devices enabled for SMB acceleration in the assigned device group.
  - If the SMB accelerator is disabled on a Cisco WAE, the SMB accelerator preposition task will fail with error that SMB accelerator is not enabled on the Cisco WAE.
- Step 7** Click **OK**.
-

## Creating a Preposition Schedule for SMB Files

### Before you begin

After you create a preposition directive and assign Cisco WAEs to the directive, create a schedule that determines when and how often prepositioning occurs.

Example:

You may want to schedule prepositioning to occur at night to minimize the amount of traffic during business hours, or, you may want to schedule prepositioning to occur on a recurring basis if the exported data changes often. This will help ensure that the Cisco WAEs assigned to this directive have the latest file updates in their cache.

Consider the following guidelines for specifying a start time:

- The time is expressed in 24-hour format with **00:00** representing midnight.
- The time refers to the local time of the Cisco Edge WAE where the data is to be prepositioned.
- When a preposition task is scheduled to begin at the same time for multiple Cisco Edge WAEs that are located in different timezones, the task will begin on the Cisco Edge WAEs based on the Cisco Core WAE timezone.
- If the clocks of the Cisco Edge WAE and the Cisco Core WAE are not synchronized, the task will not start on time.

### Procedure

- 
- Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > SMB File Services > Preposition**. The **Preposition Directives** window appears, which lists the preposition directives that exist on the system.
- Step 2** Click the **Edit** icon next to the preposition directive for which you want to create a schedule.
- Step 3** Click the **Schedule** tab at the top of the window. The **Creating New Preposition Schedule** window appears. By default, no schedule is configured.
- Step 4** Choose one of the following scheduling options:
- **Not Scheduled:** Prepositioning is not scheduled at this time.
  - **Now:** Prepositioning occurs within a few minutes after you submit this schedule.
    - A **Now** schedule begins again each time you make a change to the preposition directive and click **Submit**.
    - A **Now** schedule also begins again as soon as a Cisco Edge device that has been reloaded comes back online.
  - **Daily:** Prepositioning occurs daily at the defined time.
  - **Date:** Prepositioning occurs at the defined time and date.
  - **Weekly:** Prepositioning occurs on the selected days of the week at the defined time.
  - **Monthly Days:** Prepositioning occurs on the selected days of the month at the defined time.

- **Monthly Weekdays:** Prepositioning occurs on the defined day (as opposed to a defined date) and time during the month. For example, you can schedule prepositioning to occur on the second Tuesday of every month.

**Step 5** Specify a start time for the prepositioning task.

Consider the following guidelines for specifying a start time:

- The time is expressed in 24-hour format with 00:00 representing midnight.
- The time refers to the local time of the Cisco Edge WAE where the data is to be prepositioned.
- If there are multiple Cisco Edge WAEs in different time zones, the time refers to the local time of the Cisco Core WAE.
- You cannot schedule a start time for the **Now** option.

**Step 6** Click **Submit**.

To confirm that your schedule has been saved, the **Changes Submitted** message is displayed at the bottom of the window.

**Step 7** Verify that the preposition directive has completed successfully by checking the preposition status. For more information, see [Checking the Preposition Task Status of SMB Files, on page 27](#).

---

## Checking the Preposition Task Status of SMB Files

### Before you begin

After you create one or more preposition directives, you can verify the status of all the preposition tasks to ensure that they are completed successfully. If a task does not complete successfully, then some of the prepositioned files may have not been copied to the Cisco Edge WAE cache.

### Procedure

---

**Step 1** From the Cisco WAAS Central Manager menu, choose **Configure > SMB File Services > Preposition**.

The **Preposition Directives** window, which lists the preposition directives that exist on the system, appears.

**Step 2** Select the SMB preposition directive that you want to check and click the **Collect Preposition Status** tab at the top of the window.

The **Preposition Status** window displays the following information:

- **WAE:** The name of each Edge WAE that received the prepositioned files in its cache.
- **Start Time:** The time the preposition task started.
- **Duration:** The amount of time it took the preposition task to be completed.
- **Amount Copied:** The amount of data copied to the WAE cache, in bytes.
- **Status:** Whether the preposition task is completed successfully.

- **Error Reason:** The reason a preposition task failed.

Verify that the **Status** column shows **Completed**.

If this column shows **Failure**, look in the **Reason** column for an explanation that can help you troubleshoot why the preposition task failed. After resolving the issue, you can schedule the preposition task to run again now, or wait until the scheduled start time and verify the status again later.

**Step 3** Click **OK**.

You can also export this data and save it to your local machine.

---