

dBeamer™ and dBeamer!DPM CIFS Best Practice Guide

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1. Prepare the Target Server for BEAMing

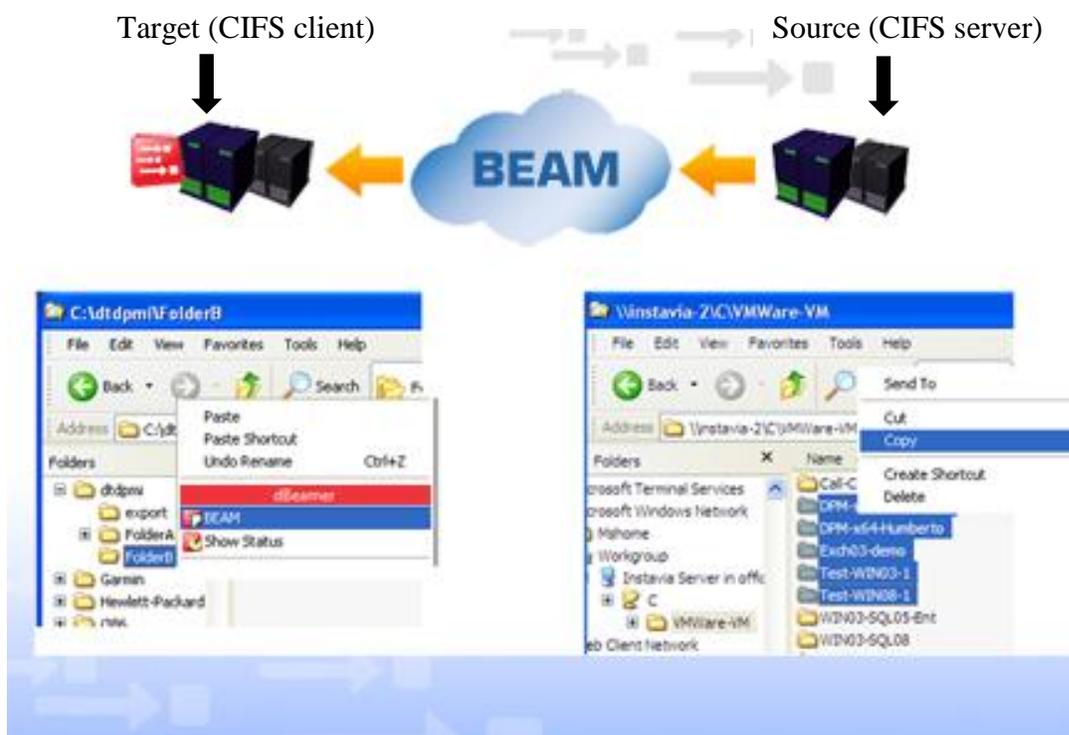
The following is a list of items IT administrators should review before initiating a BEAM operation:

- Make sure the *Source* and *Target* storage subsystems are in good condition, and their I/O performance is reasonably good.
- The server should have at least 4GB of RAM.
- For BEAMing over 50 thousand objects, a 64bit machine is necessary.
- If the system has only 4GB of RAM, make sure that the system does not boot using the /3GB option. This is due to the fact that booting with the /3GB option would leave only 1GB for kernel services; which is extremely low, and may affect the dBeamer™ mini-filter.
- For better performance, turn off search indexing on the *Target* volume by unchecking the volume property that says “*Allow files on this drive to have contents indexed in addition to file properties*”.
- When BEAMing SQL, Exchange, or MOSS databases, the IT administrator is also advised to turn off search indexing for the specific data service. Indexing during a BEAM operation can result in poor I/O performance.
- Turn off NTFS encryption and compression on the *Target* volume.
- The IT administrator is advised to disable real-time anti-virus scanning during a BEAM operation. Real-time scanning can result in poor I/O performance.
- At the *Target* machine, open the **Setup** tab of dBeamer™ Control Center to configure an email address for alert notifications.

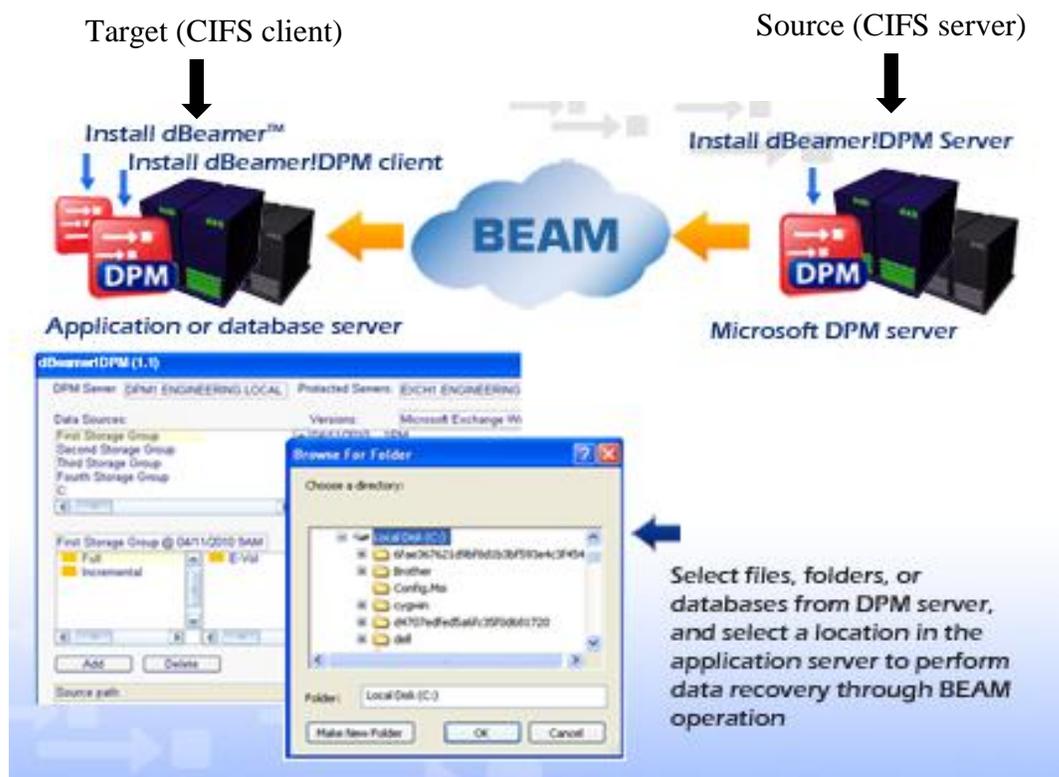
2. BEAMing files from one Server to another Server

2.1. Overview

When migrating files and folders from one server to another server using dBeamer™, the user can select the *Source* files and folders through a network share to initiate a BEAM operation. In this case, the remote data (*Source*) is fetched through the CIFS interface (from the CIFS server to the CIFS client) and a copy is made on the local server (*Target*).



When using dBeamer!DPM to perform an instant data recovery from a Microsoft DPM server, the files and folders are also fetched through the CIFS interface. The files of most data types - with the exception of the file system volume data type - are fetched through the system volume shares (e.g., C\$), which are created for administrative purposes. For the file system volume data type, the specific replica path is exposed through a CIFS share, which is used for the recovery. dBeamer™ requests data through the CIFS client at the *Target* server. The CIFS server retrieves and sends the requested data to the CIFS client at the DPM server.



CAUTION: IT administrators and users should be aware that when a BEAM operation is in progress, no interference or interruption should be made to the *Source* files and folders, the source system, the source storage, or the network. Any interference or interruption that causes the *Source* data to be corrupted or inaccessible for a long period of time will result in a BEAM failure.

2.2. Handling of Network, CIFS, or Source Server Interruption

2.2.1. Retry Timeout

dBeamer™ has a built-in mechanism to handle situations in which it is disconnected from the *Source* data (e.g., the DPM repository) during a BEAM operation.

If there is a brief disconnection, possibly caused by a temporary network interruption, or CIFS service reset, dBeamer™ will automatically attempt to reconnect to the *Source* objects. The default retry period is approximately one minute. However, this timeout value can be adjusted by adding the following line in the dBeamer.config file: <OpenRetryTimes>number of seconds</OpenRetryTimes>.

```
<Configurations>

  <DataTransportSettings>

    <OpenRetryTimes>60</OpenRetryTimes>

  </DataTransportSettings>

</Configurations>
```

NOTE: A long retry timeout value will keep the state of a BEAM operation in memory rather than discarding the state. This allows the BEAM operation to continue when the network connection is resumed. However, an extended retry timeout will not protect against application failure. If the network remains disconnected beyond the I/O timeout that the application allows, the application will fail.

2.2.2. Pause-and-Resume

When a disconnection lasts for over a minute, it is likely that a failure has occurred that the IT administrator must handle. In this case, dBeamer™ stops trying to reconnect and **PAUSES** the BEAM operation instead. When a BEAM operation enters the PAUSED state, an I/O error is returned to the application that has requested access to data that has not yet been fetched. dBeamer™ then sends an alert notification to the IT administrator (provided that an email address for alert notifications was configured from the **Setup** tab of dBeamer™ Control Center).

When the email alert notification is received, the IT administrator should do the following:

1. Fix the problem that caused the *Source* objects (e.g., DPM Repository) to be disconnected or inaccessible.
2. Click on the **RESUME** button in the dBeamer™ Progress Meter, or open dBeamer™ Control Center, click on the **Operations** tab, and then click on the **RESUME** button for the PAUSED BEAM operation.

NOTE: The user should click on the **RESUME** button when the source objects become accessible to dBeamer™. dBeamer™ may fail if the **RESUME** button is clicked while the source objects remain inaccessible.

3. If the application or service that is accessing the target files has failed, stop the application or the service and then restart it. Do not restart the application or service during the PAUSE state.

NOTE: For database services, it is likely that all transactions will fail during the PAUSE state. However, the database service may continue to run. The IT administrator should not stop the

service while the BEAM operation is in the PAUSE state. Stopping a database service during the PAUSE state may result in non-repairable data corruption.

If the IT administrator decides to terminate the BEAM operation, the following steps should be followed:

1. Stop the application or the service that is accessing the recovering data.
2. Open dBeamer™ Control Center, click on the **Operations** tab, and then click on the **CANCEL** button to terminate the operation.
3. Delete the *Target* files and folders.

NOTE: The PAUSE and RESUME capability of dBeamer™ represents a best effort to ensure that a BEAM operation does not abort due to a network interruption, or if the system or storage device where the source objects reside becomes temporarily disconnected. A PAUSE state does not persist through a system reboot at the *Target*. This means that in cases where the *Target* system fails or is restarted, the affected operation cannot be resumed.

CAUTION: During the PAUSE state, a file system error is sent to the application, indicating that the data to be accessed is not available. dBeamer™ will make a best effort to return a meaningful error to the application. The application's behavior upon receiving such an error notification is entirely a function of its own implementation, over which dBeamer™ has no control. Some applications may pause, others may fail gracefully and still others may crash catastrophically. The objective of implementing the dBeamer™ PAUSE and RESUME capability is to reduce the necessity of having to restart the BEAM operation from the beginning if there is a temporary interruption, and to prevent the loss of user-modified data in the event of such an interruption.

CAUTION: The user should not interrupt the BEAM process or power off the *Target* machine when there is a PAUSED BEAM operation. If the machine is powered off or if the BEAM process is terminated manually, all modifications made to the *Target* files will be lost. This is because the *Target* files may only be partially copied, and could thus become corrupted; which would prevent them from being used again.

2.3. Best Practice for BEAMing Files over a Network

This section describes the necessary considerations and suggestions for IT administrators to fine-tune the *Source* and *Target* systems - as well as their services - prior to using dBeamer™ and dBeamer!DPM for data migration and data recovery over a network. IT administrators are encouraged to visit Microsoft's website for more technical information.

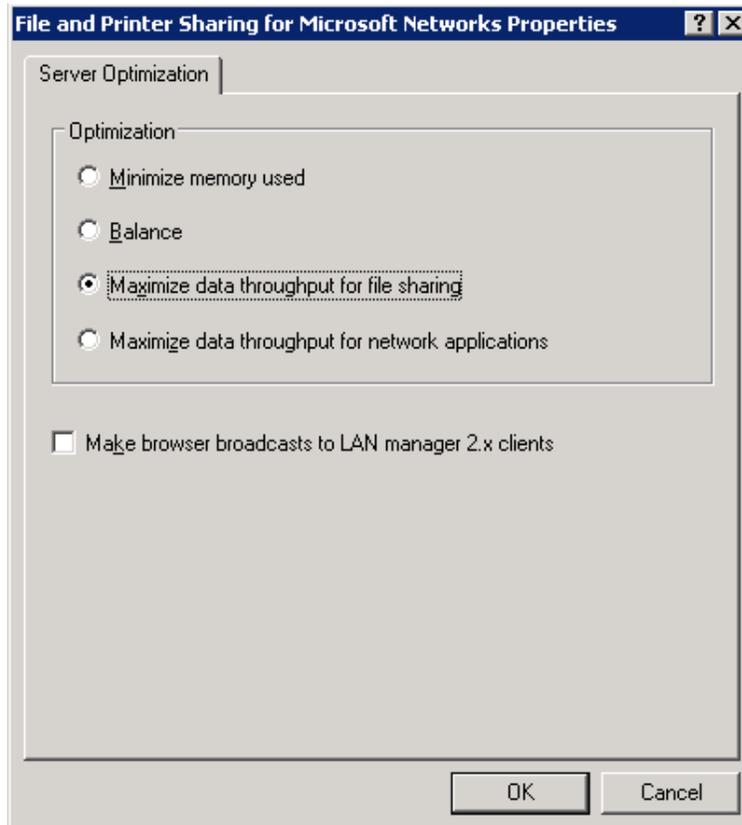
2.3.1. Tune the Source and Target Systems:

- Make sure that the *Source* and *Target* storage systems are in working condition and their I/O performance is reasonably good. For example, highly fragmented *Source* storage can result in CIFS instability and poor performance. When BEAMing a large data set, it is necessary to have a high performance storage subsystem.
- Make sure that the network equipment is in good condition, and that the network transfer rate is reasonably high. When BEAMing a large data set, it is necessary to have a high performance network.
- *Source* and *Target* systems should have at least 4GB of RAM. Use 64bit machines when BEAMing more than 50,000 objects.
- If the system has only 4GB of RAM, make sure not to boot it using the /3GB option, as this would leave only 1GB for kernel services; which is extremely low if one needs to transfer larger data sets through CIFS.
- For better performance, turn off search indexing on the *Target* volume.
- Although not related to CIFS, when BEAMing SQL, Exchange, or MOSS databases, the IT administrator is also advised to turn off search indexing at the *Target* system for the specific data service. Indexing during a BEAM operation can result in poor I/O performance.
- Although not related to CIFS, the IT administrator is advised to disable real-time anti-virus scanning at the *Target* system during a BEAM operation. Real-time anti-virus scanning can result in poor I/O performance.
- During the BEAM operation, make sure that there are few (preferably no) other applications (including Windows Explorer) using network shares at the *Target* system, or accessing the network shares of the *Source* machine. Since CIFS resources are limited, if other applications are concurrently accessing the network shares of either machine, the resulting resource competition could lead to CIFS failure.
- When using dBeamer!DPM to restore data from a DPM server where the End-User Recovery feature is enabled (Note that DPM uses CIFS shares for End-User Recovery), the IT administrator must make sure that the CIFS server configuration is adequate to support both the restoration process of dBeamer™ and the end user access of the CIFS share.
- Make sure not to run any application at the *Target* machine that may open hundreds or thousands of the BEAMing files at once. Opening the *Target* files being BEAMED will trigger the *Source* files to be opened and fetched. As a result, the open file handles may exceed the CIFS limitation and cause the CIFS service to fail.

2.3.2. Tune the CIFS Service:

- A. For machines running Windows 2003, select “Maximize data throughput for file sharing” from the “Server Optimization” tab on the “File and Printer Sharing for Microsoft Networks” Properties sheet:**

- In the “Control Panel”, select the specific network configuration under “Network Connections”.
- Click on “Properties” to bring up the Properties sheet.
- Select “File and Printer Sharing for Microsoft Networks”, and click on “Properties”.
- Click on “Maximize data throughput for file sharing”, as shown below:



B. CIFS Server Configurations:

If no more than two BEAM operations are anticipated at any given time, and there is no other application (including Windows Explorer) using the CIFS interface on both the *Source* and *Target* machines at the time of the BEAM operation, and the applications using the BEAMed *Target* objects are unlikely to open thousands of files simultaneously, then there is no need to change the CIFS server configuration.

However, if changes are deemed necessary, please follow the guidelines below:

The following registry keys are in:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters

Parameter	Lanmanserver Parameter	Default	Recommendation

Buffer size	SizReqBuf (DWORD value)	16644	For better performance, set this to 65536 if BEAMing large files.
Max. concurrent requests	MaxMpxCt (DWORD value)	15, 50, or 125 (Depending on which Operating System release is used)	Set this to 100 if SizReqBuf is set to 65536. Set this to 500 if SizReqBuf is set to 65536 and there are other applications using the server shares. If SizReqBuf is not changed, set this to 1000.
Max. work items	MaxWorkItems (DWORD value)	4096	Set this to 2048 if SizReqBuf is set to 65536. No change otherwise.

Note that the nonpaged pool memory usage calculation is as follows:
 $((\text{SizeReqBuf} + 3836) * \text{MaxMpxCt})$

Once the changes have been made, please follow these steps to restart the Server service:

1. Click “**Start**”, click “**Run**”, then type “**cmd**” in the “*Open*” box and click “**OK**”.
2. At the Command prompt, type “**net stop server**”, then press “ENTER”. If you are prompted to confirm the operation, type “**y**”, then press “ENTER”.
3. Type “**net start server**”, then press “ENTER”.

CIFS Client Configurations:

The following registry keys are in:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanworkstation\parameters

Parameter	Lanmanworkstation Parameter	Default	Recommendation
Max. threads	MaxThreads (DWORD value)	50 (default may be 15 for old systems)	50 for 2-3 BEAM operations and no other application using CIFS shares concurrently. 200 if there are more BEAM operations or when there are other applications (including Windows Explorer) using CIFS shares.
Max. concurrent commands	MaxCmd (DWORD value)	50 (default may be 15 for old systems)	50 for 2-3 BEAM operations and no other application using CIFS shares concurrently.

			200 if there are more BEAM operations or when there are other applications (including Windows Explorer) using CIFS shares.
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Once the changes have been made, please follow these steps to restart the Server service:

1. Click **Start**, click **Run**, then type **cmd** in the *Open* box and click **OK**.
2. At the Command prompt, type **net stop server**, then press **ENTER**. If you are prompted to confirm the operation, type **y**, then press **ENTER**.
3. Type **net start server**, then press **ENTER**.

C. Disable LANMANServer Denial of Service Attack Detection:

Disabling this detection is usually unnecessary. However, under heavy I/O load, disabling DoS attack detection is an option that could be considered as a way to ensure CIFS reliability.

Please refer to this article for instructions on how to disable DoS attack detection:

<http://support.microsoft.com/kb/898468>