
Appendix B: Determining Slow Network Connections



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Algorithm Used by Group Policy to Detect Slow Network Links

Group Policy can detect a slow network connection by using an algorithm. The algorithm that Group Policy uses to determine whether a link should be considered slow is as follows:

1. The client computer that is attempting to process Group Policy sends a zero byte file to the authenticating domain controller, or server, which then returns the file to the client. The client measures the time it takes for the file to complete the round trip, and if it is less than ten milliseconds, the client assumes a fast link is present and sets the fast link flag.
2. If the round trip time in step 1 is more than 10 milliseconds, the client saves the round trip time. Name this value `time_1`.
3. Next, the client sends a compressed file that is two kilobytes (KB) in size to the server, which then returns the file to the client. The client again measures the time it takes the file to complete the round trip. Name this value `time_2`.

Note The file that is sent to the server in this step is actually a JPEG file. JPEG files are compressed by definition. A compressed file is used because of the fact that data sent through a modem is frequently compressed and compressing the file would make the link appear faster than it really is.

4. The client repeats step 3 two more times. Name these values `time_3`, and `time_4`.
5. Next, the client subtracts the value for `time_1` from `time_2`, `time_3` and `time_4`. This is done to remove the overhead caused by session setup. Name these values `delta_1`, `delta_2` and `delta_3`.
6. The average of the values for `delta_1`, `delta_2` and `delta_3` is calculated. Name this value `avg`.
7. Finally, the connection speed is calculated as (the units are shown for clarity):

$$(\text{Connection Speed kilobits/second}) = 2 * (2 \text{ KB}) * (8 \text{ bits/byte}) * (1,000 \text{ milliseconds/second}) / (\text{avg milliseconds})$$

Because 2 KB of data move through each modem, Ethernet card, or other device in the link once in each direction, there is a total of 4 KB, or 2 times the 2 KB, processed. This is why a leading factor of 2 is on the right side of the equation.

Note The connection speed calculated is the average of the upload and download speeds. In most cases, this average is the same as the download speed itself. However, in some cases the upload and download speeds are different enough that you should take this into account. An example of this is Asymmetric Digital Subscriber Line (ADSL). Using ADSL, you might have upload speeds of 128 kilobits per second (Kbps) and download speeds of 768 Kbps.

To specify the threshold value for slow link detection for computer configuration Group Policy settings, you use the Computer Configuration\Administrative Templates\System\Group Policy\Group Policy slow link detection setting. To set this value for user configuration Group Policy settings, you use the User Configuration\Administrative Templates\System\Group Policy\ Group Policy slow link detection setting. The allowed value range is 0 to 4,294,967,200 Kbps. A value of zero indicates that all links should be considered fast.