

100 kb over 20ms delayed link with smbv3

SMBv3 is a more complex protocol than a simple TCP file transfer, with additional overhead for headers, encryption, and other features like window scaling, pipelining, and multi-channel transfers. To adjust our calculations for SMBv3, we need to factor in this overhead. Let's break this down:

1. Overhead for SMBv3

SMBv3 adds protocol headers to each packet. The typical overhead for SMBv3 can range from 60 to 100 bytes per packet depending on the specific implementation, encryption, and other factors. We'll use a conservative estimate of 100 bytes of overhead per packet (this includes SMBv3, TCP, and IP headers).

Thus, the effective payload size of each packet will be reduced from the MTU size of 1470 bytes:

Effective Payload = 1470 bytes - 100 bytes = 1370 bytes

Effective Payload = 1370 bytes

Now we calculate how many packets are needed to transfer the 100 KB file using this reduced payload size: Number of Packets = File Size / Effective Payload = 102,400 bytes / 1370 bytes

Number of Packets = 102,400 bytes / 1370 bytes ≈ 74.82 packets

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Rounding up, we need 75 packets.

SMBv3 also uses pipelining and window scaling to improve efficiency, reducing the need for an RTT for every packet. Let's assume a window size of 10 packets (which is typical for SMBv3 with good pipelining).

For every window, we send 10 packets and wait for 1 RTT for acknowledgment.

Now calculate the number of RTTs based on the window size: Total RTTs = Total Packets / Window Size = 75 / 10 = 7.5 RTTs

Since we can't have a fraction of an RTT, we round up to 8 RTTs.

We already know the RTT for this link is 40 ms or 0.04 seconds.

The total transmission time will be: $\text{Total Transmission Time} = \text{Total RTTs} \times \text{RTT} = 8 \times 0.04 \text{ seconds} = 0.32 \text{ seconds}$ $\text{Total Transmission Time} = \text{Total RTTs} \times \text{RTT} = 8 \times 0.04 \text{ seconds} = 0.32 \text{ seconds}$ 7. Additional Overhead and Processing Time

We'll assume 10% additional time for other processing overheads in SMBv3 (e.g., encryption, decryption, and internal protocol processing).

Thus, the final expected time becomes: $\text{Final Expected Time} = 0.32 \text{ seconds} \times 1.10 = 0.352 \text{ seconds}$ $\text{Final Expected Time} = 0.32 \text{ seconds} \times 1.10 = 0.352 \text{ seconds}$ 8. Conclusion

The expected copy duration for a 100 KB file over a 1470-byte MTU, 20 ms delay link, using SMBv3 (with typical overhead) is approximately 0.352 seconds or 352 milliseconds.

This takes into account SMBv3 protocol overhead, pipelining, and processing time.

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