Empirical Performance Evaluation of Stryqbyte's Secure Peer-to-Peer Transfer Engine

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Disclaimer

This white paper summarizes empirical results obtained under the specific test conditions described. Performance may vary in other environments due to differences in hardware, networks, and workloads. The findings are intended to inform technical evaluation and should not be interpreted as performance guarantees.

1 Introduction

Organizations increasingly work with large, high-value datasets that must move quickly and reliably between teams, systems, and locations. Traditional approaches—such as SMB file sharing, FTP servers, or cloud-based exchange platforms—remain common but introduce limitations. Cloud workflows add dependency on third-party infrastructure and duplicate the number of transfers, while legacy protocols often struggle to maintain high throughput under real-world network conditions.

Stryqbyte provides a secure, high-performance, peer-to-peer transfer solution designed for professional environments. Its architecture emphasizes reliability, integrity, and speed without requiring complex operational tuning. This white paper evaluates Stryqbyte's empirical performance relative to two widely used baseline methods: SMB and FTP.

The goal of this study is to measure real-world throughput and scaling behavior using representative engineering datasets under realistic, imperfect network conditions. The focus is not on synthetic peak performance, but on reproducible, defensible measurements that reflect how these protocols behave in practice.

2 Methods and Test Environment

All tests were conducted between two identical machines using the same files, network, and environmental controls. Each file was transferred multiple times using SMB, FTP, and Stryqbyte. Transfer durations were extracted from structured logs, and per-file statistics (mean, standard deviation, throughput) were computed.

The methodology emphasizes:

- Reproducibility — identical hardware and controlled background activity
- Fairness — no protocol was artificially constrained or tuned
- Environmental clarity — all transfers occurred under the same network conditions

2.1 Hardware and Network Conditions

Transfers were performed between two HP laptops running Windows 11, each equipped with an AMD Ryzen 5 CPU, 8 GB RAM, and SSD storage. The machines communicated over a consumer-grade Wi-Fi mesh network approximately five years old. Such networks typically exhibit:

- 250–350 Mbps real-world throughput per hop
- Occasional latency spikes
- Mixed TCP/UDP traffic from household devices
- QoS arbitration under load

This environment reflects the variable-latency conditions common in offices, labs, and distributed teams.

2.2 Transfer Protocols

Stryqbyte uses a secure, connection-oriented transport with authenticated sessions and integrity validation. Dynamic optimization—such as per-file tuning of concurrency and buffering for large files—is handled automatically by the protocol. No manual tuning was applied.

SMB transfers used standard Windows file sharing with default operating system settings. No special adjustments (e.g., MTU changes, caching modifications) were applied.

FTP transfers used a straightforward client/server setup in binary mode. As with SMB, no protocol-level tuning or acceleration was applied.

Across all methods, real-time malware scanning and cloud-synchronization tools were disabled to avoid measurement contamination.

2.3 Files Tested

Twenty-one files were selected to represent realistic engineering workloads, including medical imaging, 3D models, audiovisual samples, and metadata files. Sizes ranged from small (<5 MB) to large (>500 MB). This diversity ensures the benchmark reflects practical usage rather than synthetic stress tests.

2.4 Measurements

Each file was transferred 12 times per protocol. The transfers were executed in immediate succession to ensure that the measurements captured short-term system and network dynamics that commonly influence real-world performance. Running the transfers back-to-back allows the benchmark to reflect effects such as warm-cache behavior, transient network congestion, and momentary variations in system load. These factors are inherent to practical operating environments and therefore form an important part of an empirical evaluation.

After each transfer, the received file was validated to ensure correctness. Transfer durations were extracted from structured logs, and for every file and protocol, the mean, standard deviation, and effective throughput (Mbps) were computed. These aggregated metrics form the basis for the comparative analysis presented in this paper.

3 Results and Findings

3.1 Baseline performance comparison

Aggregate throughput across all files is summarized in the bar graph shown in Figure 1. The aggregate results were derived by summing the overall payload and duration, and calculating effective throughput in Megabits per second (Mbps). Detailed per-file results appear in Table 2 of the Appendix.

Across the full dataset, Stryqbyte demonstrates higher effective throughput than SMB and FTP, particularly for larger files where transfer duration is dominated by sustained data movement rather than setup overhead.
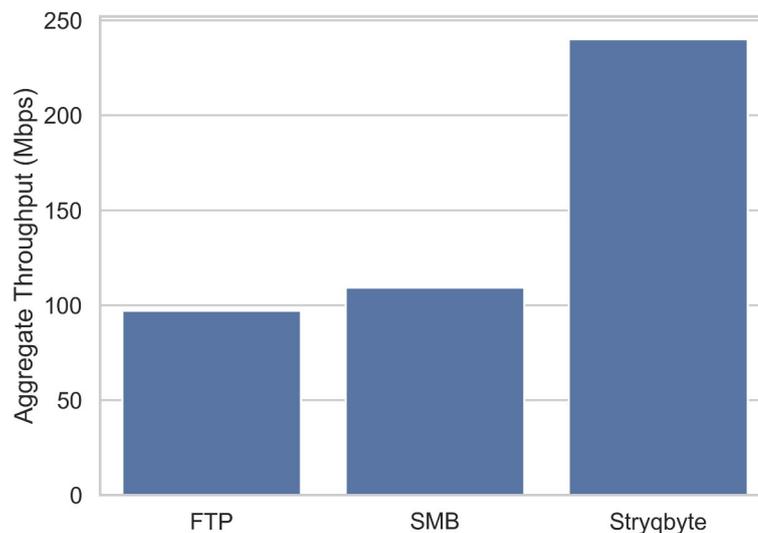
Figure 1: Comparison of the aggregate throughput across all files

3.2   Performance by File Size

When we look at the transfer times in more detail, it can be seen that Stryqbyte outperforms the baseline methods for large files. To quantify this behavior, the files were grouped into three size categories: small (less than 5 MB), medium (5–200 MB), and large (greater than 200 MB). This binning is somewhat artificial, but it provides a useful framework for comparing how each protocol scales with increasing file size.

For small and medium files, all three methods exhibit similar throughput. In these ranges, fixed overhead—such as protocol setup, OS scheduling, and short-duration network variability—dominates total transfer time, causing the results to converge. The differences between protocols become meaningful only when file sizes are large enough for sustained data movement to overshadow these fixed costs.

In the large-file category, Stryqbyte shows a clear performance advantage. The measured throughput reaches 333 Mbps, compared to approximately 99 Mbps for FTP and 113 Mbps for SMB. This corresponds to roughly a **four-fold improvement** over the best of the two baseline methods for the largest files in the dataset. The results indicate that Stryqbyte's design is particularly effective when transfers are dominated by long-running data flows rather than short-lived operations

Protocol	Average throughput (Mbps)		
	Small (<5 MB)	Medium (5-200 MB)	Large (>200 MB)
SMB	23.8	98.4	112.7
FTP	45.8	86.8	99.0
Stryqbyte	16.5	82.1	333.4

*Table 1: Average throughput of the three protocols by file size category*

3.3   Scaling Behavior

Figure 2 plots transfer duration as a function of file size, with a linear fit shown for each protocol. The lines diverge as file size increases, illustrating how the methods scale under sustained data transfer. A flatter line corresponds to higher effective throughput, as the slope is inversely related to the rate at which data is delivered.

The results demonstrate a consistent pattern: Stryqbyte outperforms both SMB and FTP for all except the smallest files. For very small files, the three lines converge, indicating that fixed overhead dominates and the system is effectively bandwidth-limited rather than CPU-limited. As file size increases, the performance gap widens.

Stryqbyte's line remains consistently below those of SMB and FTP, particularly for the largest files in the dataset.

The relative behavior of the baseline methods aligns with well-known protocol characteristics. SMB exhibits the steepest slope, reflecting its reliance on multiple round-trips, chatty negotiation, and stateful session management, all of which introduce latency and reduce throughput for medium and large files. FTP performs better than SMB due to its simpler semantics and fewer required exchanges, but it still trails Stryqbyte across the larger file sizes. These differences are evident in the measurement outcomes and reinforce the scaling trends observed in the benchmark.
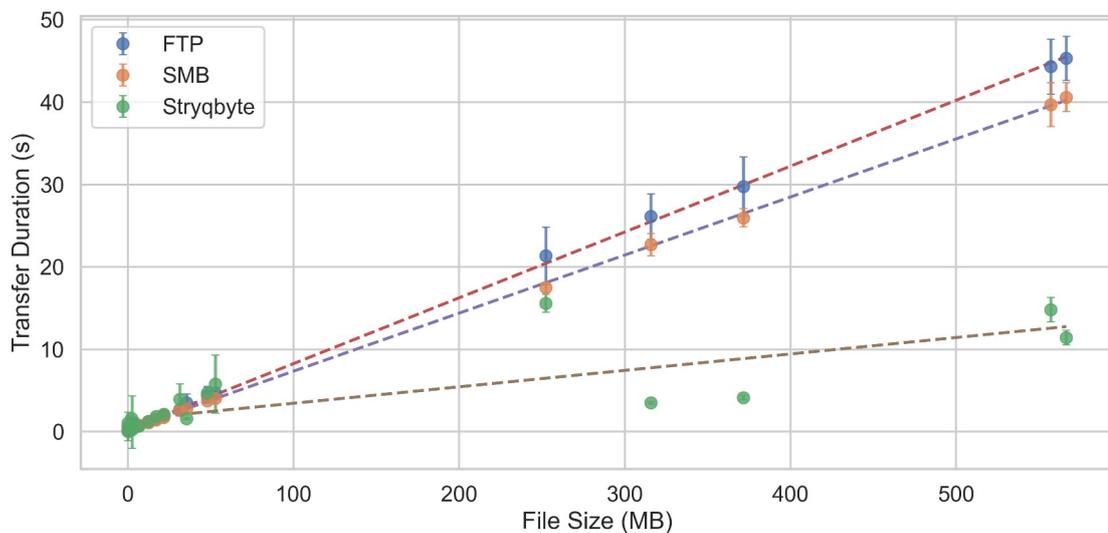
Figure 2: Transfer duration as a function of file size for the tested protocols

3.4   Stryqbyte-Only Observations

Within the Stryqbyte results, large-file transfers show stable and predictable durations with relatively low variance. This reflects the dominance of sustained throughput once the transfer is underway. Small files, by contrast, exhibit higher relative variance due to the proportionally larger impact of setup overhead, OS scheduling, and short-term network fluctuations. These patterns are consistent with expectations for any high-performance transfer system operating across mixed file sizes.

4 Conclusions

The benchmarking results demonstrate that Stryqbyte delivers significant performance advantages over SMB and FTP across realistic engineering workloads, while

maintaining strong guarantees around data integrity and security. The most substantial gains appear for large files, where sustained throughput dominates total transfer time. In this range, Stryqbyte achieves roughly a four-fold throughput improvement over the best of the baseline methods.

These results reflect consistent scaling behavior across the dataset and highlight Stryqbyte's suitability for environments that depend on predictable, high-volume data movement. The methodology, dataset selection, and environmental controls ensure that the findings are empirical, reproducible, and defensible. While no single benchmark captures every deployment scenario, the stability and magnitude of Stryqbyte's performance advantage position it as a secure, reliable, and high-performance alternative to legacy transfer protocols in demanding production settings.

5 Limitations and Recommendations for Future Studies

While the benchmarking methodology emphasizes reproducibility and fairness, several limitations should be acknowledged. All measurements were conducted within a single network environment, and different deployments may involve lower bandwidth, higher latency, or shared infrastructure that could influence absolute throughput. The dataset reflects realistic engineering workloads, but no selection of files can represent every possible scenario or I/O pattern encountered in practice.

These considerations do not diminish the validity of the results, but they do highlight the value of additional studies conducted under a broader range of conditions. Future work could examine how performance scales under parallel or concurrent workloads, and how enabling one of Stryqbyte's optional AES-based payload encryption modes affects throughput. Additional studies across varied file types and network environments would further characterize performance in diverse real-world contexts.

About Stryqbyte

Stryq is a secure, high-performance, peer-to-peer file transfer solution built for professional environments. It emphasizes reliability, integrity, and speed while keeping workflows simple. Designed for cloud-free operation and authenticated, protected sessions, Stryqbyte enables fast, private, and resilient data movement across internal networks or between trusted partners.

Learn more at www.stryqbyte.com

6 Appendix: Detailed Test Results

The appendix contains the complete set of transfer measurements for all files and all protocols across the twelve repeated runs. These results include mean duration, standard deviation, and effective throughput for each file, and they form the empirical basis for the summary statistics and scaling analyses presented in the main body of the paper. The table is provided in full to support transparency, reproducibility, and independent verification of the findings.

Filename	Size	Type	SMB			FTP			Stryqbyte		
			mean	stdev	Mbps	mean	stdev	Mbps	mean	stdev	Mbps
CC-Radiomics-Phantom-3-NBIA-manifest.tcia	35967	metadata / manifest	1.04	0.04	0.28	0.08	0.01	3.60	0.25	0.03	1.15
Vestibular-Schwannoma-MC-RC_NIfTI-seg-mentation-info3.csv	144685	tabular text / metadata	0.64	1.75	1.81	0.11	0.02	10.52	0.33	0.02	3.51
I103	255424	medical imaging	0.07	0.01	29.19	0.14	0.03	14.60	0.32	0.04	6.39
MRI_BRAIN_512_512_12.DCM	526336	medical imaging	0.08	0.01	52.63	0.16	0.01	26.32	0.60	0.14	7.02
Dessicant_lid_v2.STL	1811584	3D model	0.16	0.01	90.58	0.28	0.05	51.76	0.44	0.03	32.94
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.494.0.dcm	2235836	medical imaging	1.63	0.21	10.97	0.31	0.05	57.70	0.38	0.05	47.07
Xray_angio_512_512_8_lossy.DCM	2615370	medical imaging	1.16	3.20	18.04	0.38	0.10	55.06	0.72	0.14	29.06
file_example_PNG_3MB.png	2964729	raster image	0.35	0.03	67.77	0.39	0.05	60.81	0.52	0.02	45.61
sample-5s.webm	6687499	audio-visual	0.70	0.07	76.43	0.70	0.17	76.43	0.81	0.05	66.05
sample-10s.webm	12437421	audio-visual	1.25	0.13	79.60	1.25	0.35	79.60	1.10	0.07	90.45
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.491.0.dcm	17043854	medical imaging	1.85	0.21	73.70	1.57	0.28	86.85	1.45	0.15	94.04
sample-30s.mp4	21657943	audio-visual	2.12	0.24	81.73	1.92	0.26	90.24	1.74	0.11	99.58
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.67.0.dcm	31355128	medical imaging	3.93	1.86	63.83	2.73	0.43	91.88	2.59	0.16	96.85
Dessicant_base_v3_Universal.STL	35431584	3D model	1.61	0.11	176.06	3.51	1.10	80.76	2.83	0.11	100.16
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.69.0.dcm	48058272	medical imaging	4.73	0.62	81.28	4.46	1.03	86.20	3.76	0.19	102.25
sample-30s.webm	52900966	audio-visual	5.78	3.51	73.22	4.66	0.70	90.82	4.05	0.23	104.50
CT_246KB.vol	252266979	Nondestructive testing data	15.60	1.09	129.37	21.34	3.49	94.57	17.51	0.62	115.26
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.518.0.dcm	315799326	medical imaging	3.53	0.15	715.69	26.11	2.75	96.76	22.72	1.35	111.20
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.512.0.dcm	371525712	medical imaging	4.14	0.26	717.92	29.76	3.58	99.87	25.95	1.09	114.54
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.73.0.dcm	557280348	medical imaging	14.83	1.47	300.62	44.31	3.33	100.61	39.68	2.65	112.35
1.3.6.1.4.1.5962.99.1.2280943358.716200484.1363785608958.71.0.dcm	566567966	medical imaging	11.41	0.90	397.24	45.29	2.66	100.08	40.59	1.76	111.67

Table 2: Transfer measurement results