ADDENDUM A — EXPERIMENTAL VALIDATION OF THE LTC SYSTEM

(Supplement to the Provisional Patent Application titled “System and Method for Processing Sequential Data with Just-In-Time Temporal Composition”)

Date: October 28, 2025
Reference: Primary PPA document and technical disclosure.

---

1. Purpose and Scope

This Addendum A documents empirical experiments performed to validate the operational claim that the **Live Temporal Composition (LTC)** architecture executes playback, segmentation, and temporal composition **without producing intermediate files or sustained disk writes** during the interactive (editing/viewing) phase.

The tests described herein were conducted to corroborate the **Zero-I/O Processing** behavior of the LTC paradigm as implemented in the *Tempo-Sync Suite* and the *Vista-Neo Editor* prototypes, under the hardware and software configurations described in Section 2.

---

2. Test Environment and Methodology

2.1 Hardware and OS

- **Notebook:** HP SleekBook 15 (legacy class device)
- **CPU:** AMD A6-4455M APU @ 2.10 GHz
- **RAM:** 4 GB
- **GPU:** AMD Radeon HD 7500G
- **Operating System:** Linux Mint 22 (x86_64)

2.2 Tools and Instrumentation

- **iotop -oPa** — to monitor per-process disk read/write activity and aggregate I/O rates.
- **neofetch and lscpu** — to document system identification and hardware details.
- **Flameshot** — to capture synchronized screenshots of terminal output, system monitor, and application UI.
- **Application builds:** *Tempo-Sync Suite* (temporal synchronization/composition module) and *Vista-Neo Editor* (interactive editor implementing LTC prototype).
- **Test media:** one large MP4 test file (≈ 5 GB) plus additional representative clips including camera-captured video.

2.3 Test Objective

To determine whether playback, segmentation (in/out), and JIT composition actions produce **sustained persistent writes** (e.g., proxy files, temporary renders, or other intermediate materializations) on persistent storage during interactive operation.

2.4 Test Procedure (representative)

1. Boot system and record baseline (neofetch, lscpu).
2. Launch `iotop -oPa` for continuous disk-activity monitoring.
3. Start application (*Tempo-Sync* or *Vista-Neo*) and perform actions described in Figures 7–17 (idle, load file, playback, segmentation, multi-segment edits, multi-source composition).
4. Capture simultaneous screenshots (Flameshot) of `iotop`, system monitor and application UI.
5. For large file tests, observe CPU and memory usage while performing real-time composition of the 5 GB file.
6. Archive logs and screenshots as annexes to the experimental record.

3. Observations and Figure Descriptions

Figures 7–17 correspond to synchronized screenshots documenting disk-I/O behavior and system state at each stage of the experiment.

- **Figure 7 — Tempo-Sync (idle):** System idle; Current DISK WRITE = 0 B/s. Minor micro-spikes reflect OS background tasks and screen-capture events.
- **Figure 8 — Traditional (non-LTC) workflow:** Comparative capture showing sustained disk-write spikes from proxy or temporary files creation.
- **Figure 9 — Tempo-Sync (time-precise synchronization):** Temporal alignment operations maintain Current DISK WRITE = 0 B/s, confirming metadata in-memory processing.
- **Figure 10 — Tempo-Sync (5 GB composition in progress):** CPU usage rises but disk writes remain 0 B/s, proving streaming evaluation without render output.
- **Figure 11 — Tempo-Sync (5 GB composition final):** Final state shows no sustained writes; only transient OS noise.
- **Figure 12 — Vista-Neo (initial state, no segments):** Single file loaded with zero writes during ingest.
- **Figure 13 — Vista-Neo (full playback without edits):** Stable 0 B/s disk writes; one minor spike linked to screenshot capture (interference artifact).
- **Figure 14 — Vista-Neo (multiple segments applied):** Multiple cuts performed with no disk writes; segmentation metadata evaluated on playback.
- **Figure 15 — Vista-Neo (multiple segments zoomed):** No swapping or abnormal I/O activity beyond baseline.
- **Figure 16 — Vista-Neo (two sources, multiple segments):** Multi-source composition maintains 0 B/s disk writes; JIT evaluation in volatile memory.
- **Figure 17 — Vista-Neo (camera capture):** Real camera clip (e.g., dog running) behaves identically to synthetic test files, confirming consistency of Zero-I/O Processing.

4. Results and Interpretation

4.1 Key Empirical Finding

Across all tests, interactive operations (load, playback, segmentation, temporal sync and composition) produced no sustained persistent writes to non-volatile storage. `iotop` readings showed Current DISK WRITE = 0 B/s throughout, except for transient spikes caused by external actions (screen capture or OS updates).

4.2 Nature of Observed Spikes

All recorded spikes were short-lived (< 1 s) and coincided with screenshot operations or system housekeeping; none indicated proxy generation or temporary renders.

4.3 Scope and Limitations

Tests were executed on one hardware configuration (HP SleekBook, AMD A6, 4 GB RAM, Linux Mint 22).
Behavior is expected to generalize to other systems but not guaranteed by this dataset alone.
Explicit export operations are outside scope and expected to produce persistent outputs by design.
Observed performance (CPU/memory) varied as expected with file size and codec; the absence of intermediate writes is the primary verified property.

---

5. Conclusion

The experiments (Figures 7–17), conducted with `iotop -oPa`, `neofetch` and `lscpu`, provide empirical evidence that both Tempo-Sync and Vista-Neo implementations of the LTC paradigm achieve **Zero-I/O Processing**: playback, segmentation and temporal composition occur entirely in volatile memory via metadata evaluation, without creating intermediate files on persistent storage.
These results support the claims of the Provisional Patent Application and demonstrate the technical feasibility of the LTC architecture under real-world conditions.

This Addendum is submitted as factual experimental support to the PPA and shall be considered an appendix to the technical disclosure. All logs, screenshots and raw instrumentation outputs are archived and available for review and corroboration.

6. Digital Proof and Repository Integrity

To ensure verifiable integrity and existence of all experimental materials referenced in this Addendum, both the *Tempo-Sync Suite* and *Vista-Neo Editor* source archives, along with associated hash files and timestamp proofs, were consolidated under a validation directory:

`LTC_Addendum_Validation_2025-10-28/`

A recursive manifest of all files was generated and cryptographically hashed:

Manifes File :

`LTC_Addendum_Validation_2025-10-28_manifest.sha256`

Timestamp proof:

`LTC_Addendum_Validation_2025-10-28_manifest.sha256.ots`
(anchored via **OpenTimestamps** on the Bitcoin blockchain, UTC 2025-10-28).

This manifest root hash authenticates the entire validation package — including source code, figures, logs and proofs — as unaltered from its original state on the date of submission. Together these artifacts establish a complete digital chain of custody for the LTC experimental evidence supporting the Provisional Patent Application.

Prepared by: Manuel Señorans
Inventor / Applicant
Date: October 29, 2025