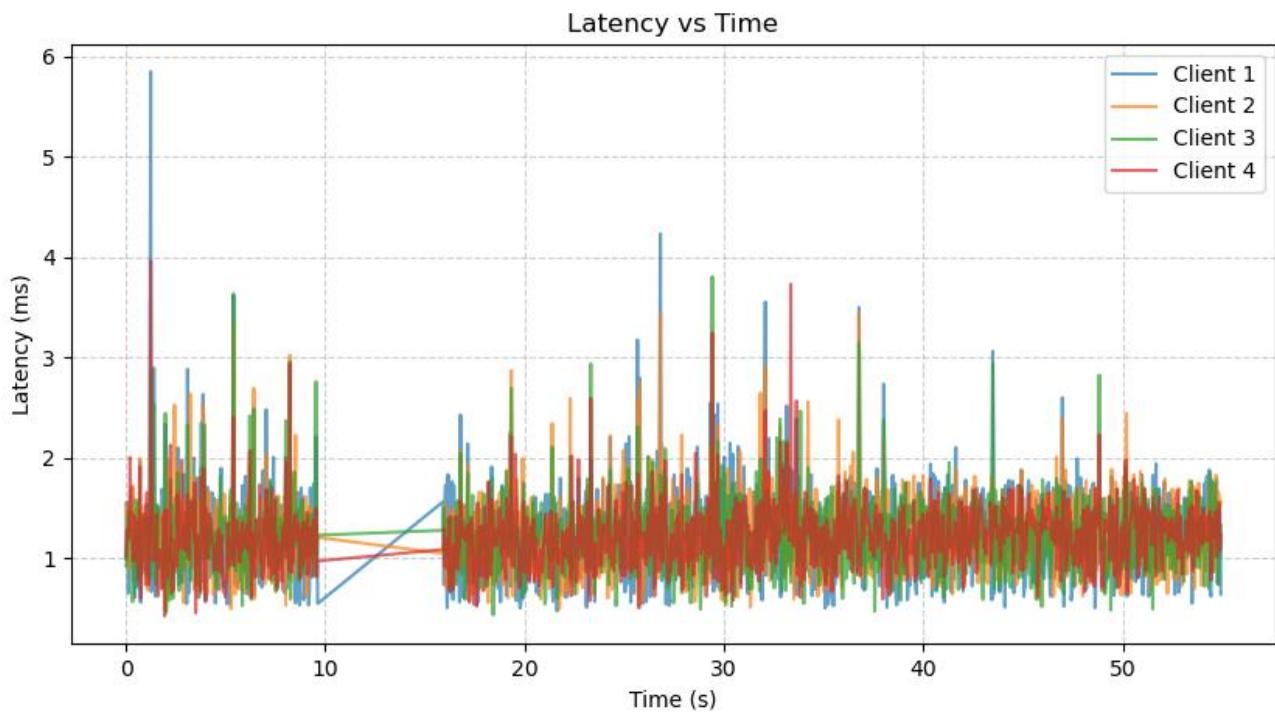


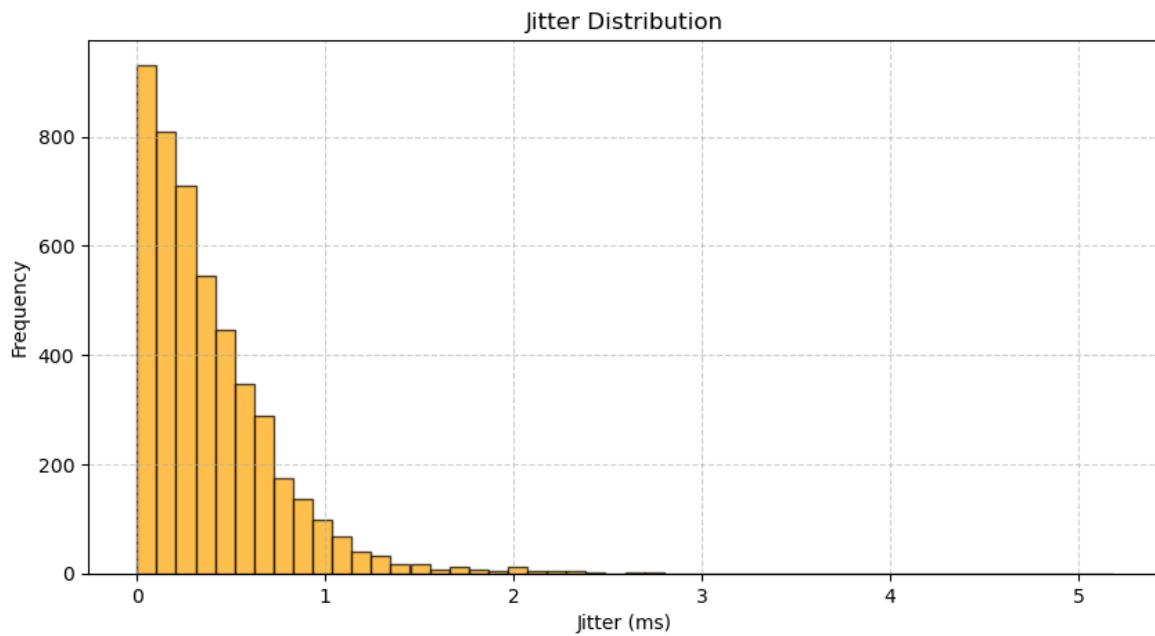
Plots

Baseline

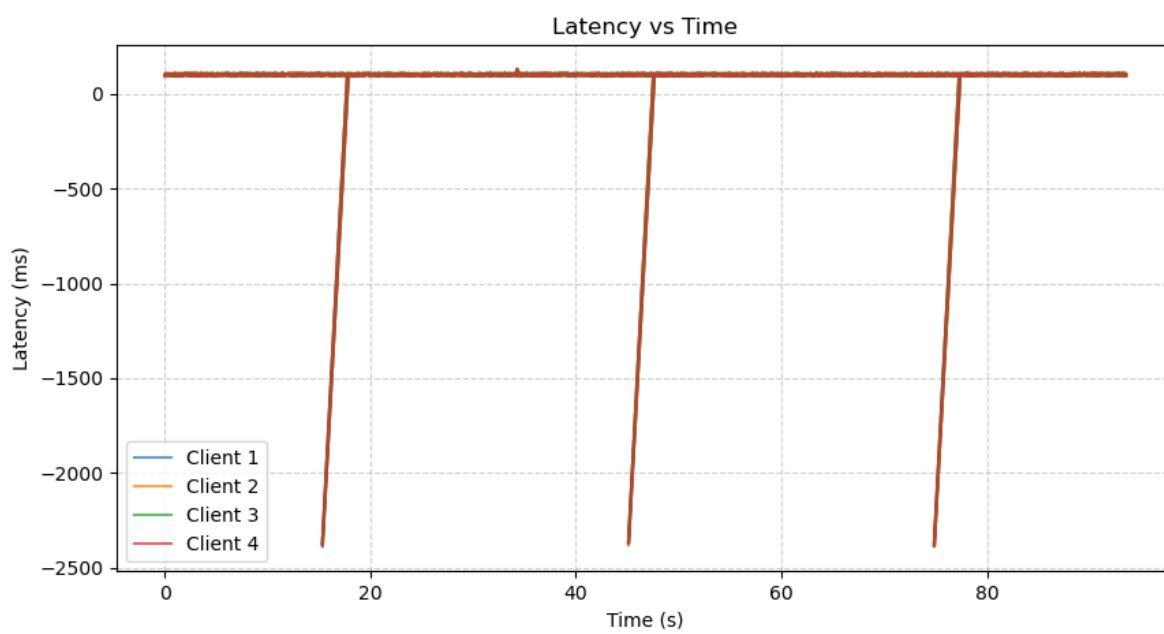
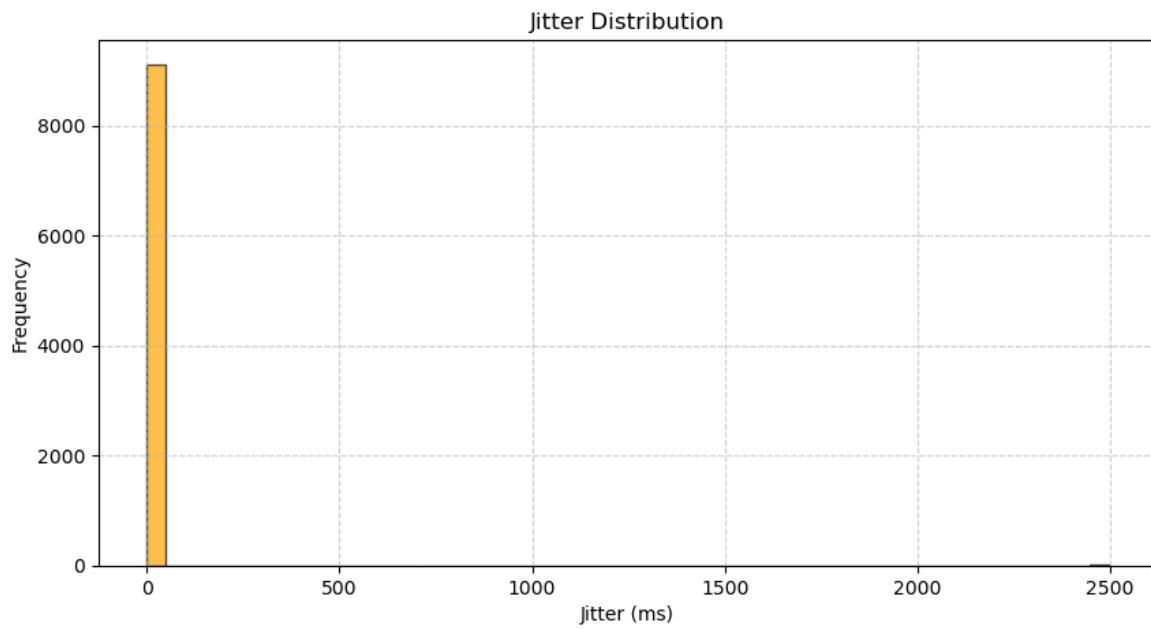
Latency Plot per Client:



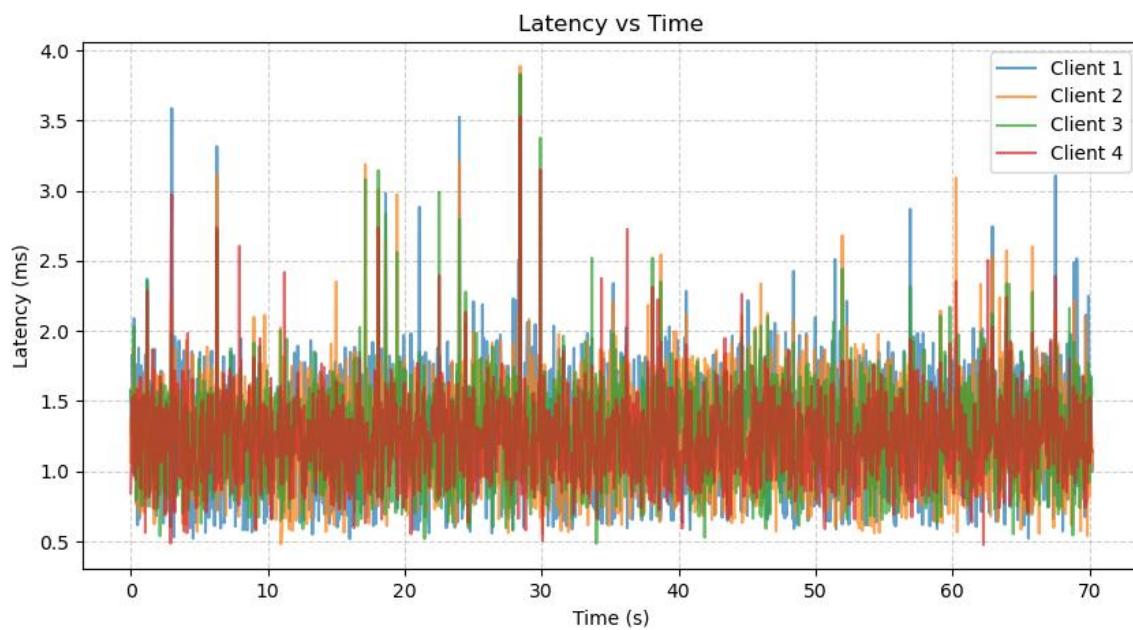
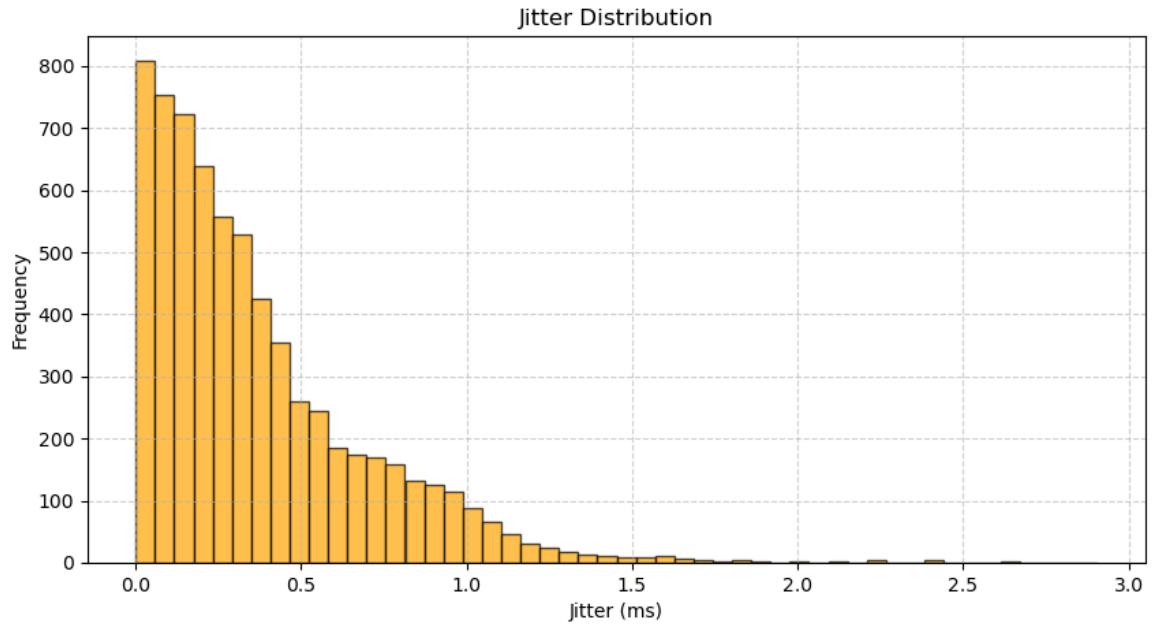
Jitter Distribution Plot:



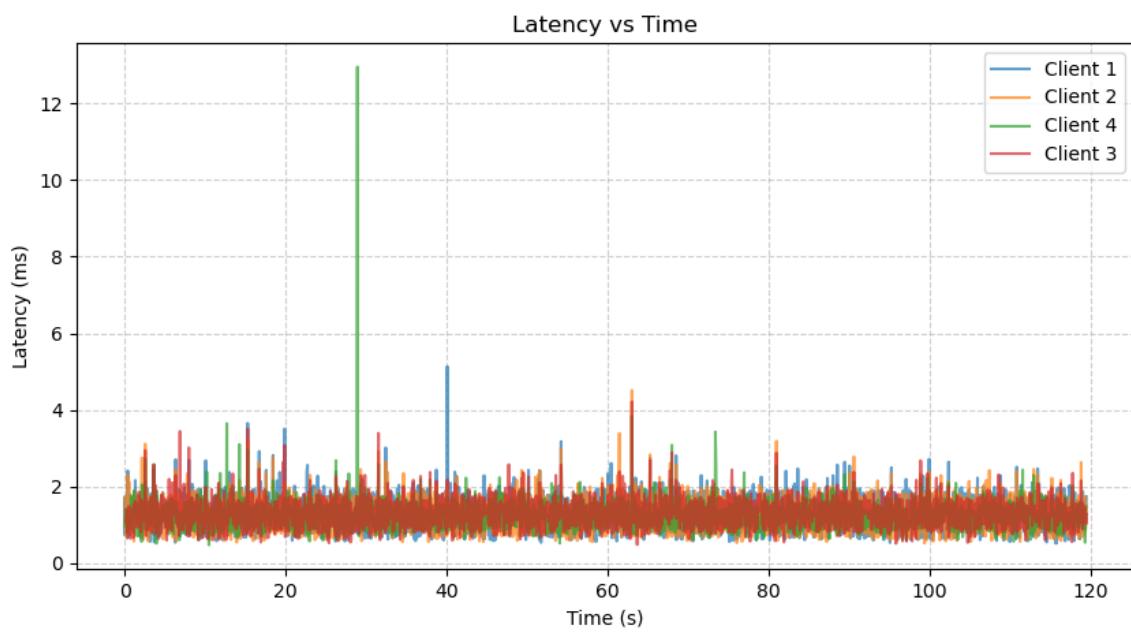
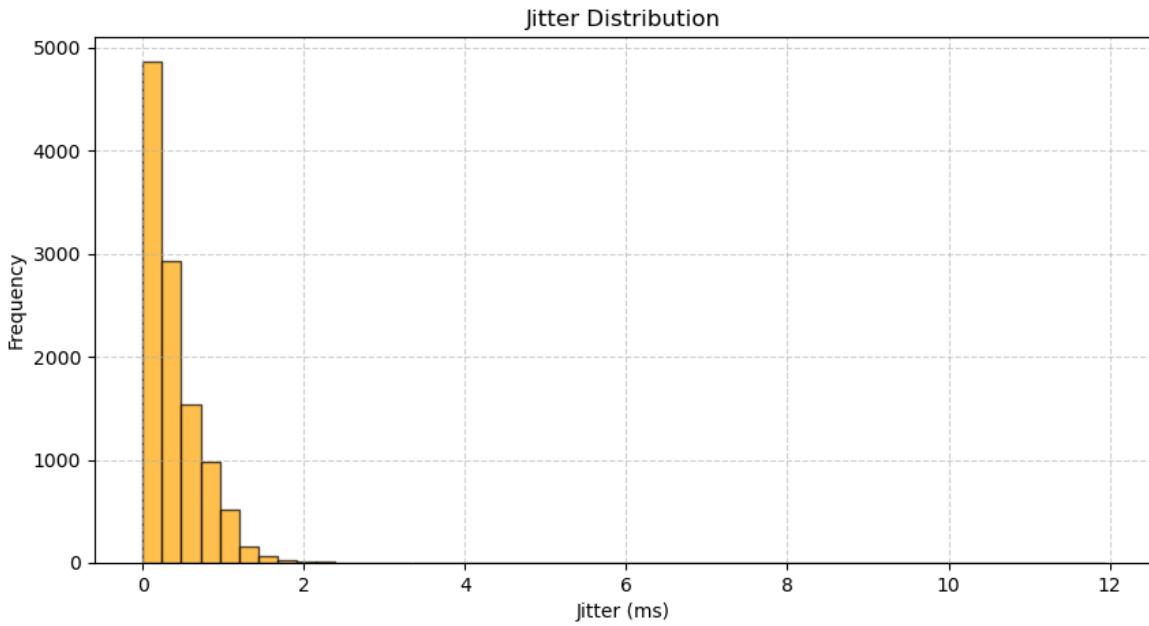
Delay 100ms



Loss 2%



Loss 5%



Automated script to run baseline test code:

```
#!/bin/bash

#
=====

# Baseline Local Test Script — Phase 1
# Project 2: Multiplayer Game State Synchronization (VAP-1)

#
=====

=====

set -e

SERVER_LOG="server_log.txt"
CLIENT_LOG_PREFIX="client"
METRICS_CSV="metrics.csv"
RUN_DURATION=120 # seconds

echo "==== Starting Phase-1 Baseline Local Test ===="
rm -f ${SERVER_LOG} ${CLIENT_LOG_PREFIX}_*.txt
${METRICS_CSV} *.png

#
-----

# Step 1 – Launch server
#
-----

echo "[INFO] Launching server..."
python3 server.py > ${SERVER_LOG} 2>&1 &
```

```
SERVER_PID=$!  
sleep 2  
  
# -----  
# Step 2 – Launch 4 clients  
# ----- for  
i in 1 2 3 4; do  
    LOGFILE="${CLIENT_LOG_PREFIX}${i}_log.txt"  
    echo "[INFO] Launching client ${i}..." python3  
    client.py --id ${i} > ${LOGFILE} 2>&1 &  
    sleep 0.8  
done  
  
# -----  
# Step 3 – Run test  
# -----  
echo "[INFO] Running for ${RUN_DURATION}s..."  
sleep ${RUN_DURATION}  
  
# -----  
# Step 4 – Stop server & clients  
# -----  
echo "[INFO] Stopping server (PID=${SERVER_PID})..."  
kill ${SERVER_PID} 2>/dev/null || true
```

```

pkill -f "client.py" 2>/dev/null || true sleep
1

# -----
# Step 5 – Collect metrics & generate plots
# -----
echo "[INFO] Collecting metrics..."
python3 collect_metrics.py ${SERVER_LOG}
${CLIENT_LOG_PREFIX}*.txt

echo "[INFO] Generating plots..."
python3 plot_metrics.py ${METRICS_CSV}

# -----
# Step 6 – Summary
# -----
echo "==== Baseline Test Complete ===" echo tail -n
15 ${SERVER_LOG} || true echo echo "[INFO]"
Metrics saved to ${METRICS_CSV}"
echo "[INFO] Plots: latency_timeseries.png and jitter_hist.png"
echo
"=====
====="

```

Output:

```
(PythonProject1) awail@fedora:~/PycharmProjects/PythonProject1$ bash baseline_test.sh
== Starting Phase-1 Baseline Local Test ==
[INFO] Launching server...
[INFO] Launching client 1...
[INFO] Launching client 2...
[INFO] Launching client 3...
[INFO] Launching client 4...
[INFO] Running for 120s...
[INFO] Stopping server (PID=34196)...
[INFO] Collecting metrics...
[collect_metrics] 6100 samples → metrics.csv
Latency (ms): mean=0.59, stdev=0.30
Jitter (ms): mean=0.28, stdev=0.27

== Average Cycles per Second (Snapshots/sec) per Client ==
Client 1: 19.60 cycles/sec
Client 2: 19.60 cycles/sec
Client 3: 19.60 cycles/sec
Client 4: 19.60 cycles/sec

Average cycles/sec per client: 19.60
Average CPU usage: 8.90%

⚠ Performance goal not met.
    Target: ≥20 cycles/sec/client, latency ≤50 ms, CPU < 60%
[INFO] Generating plots...
Usage: python3 collect_metrics.py server_log.txt client1_log.txt ...
```