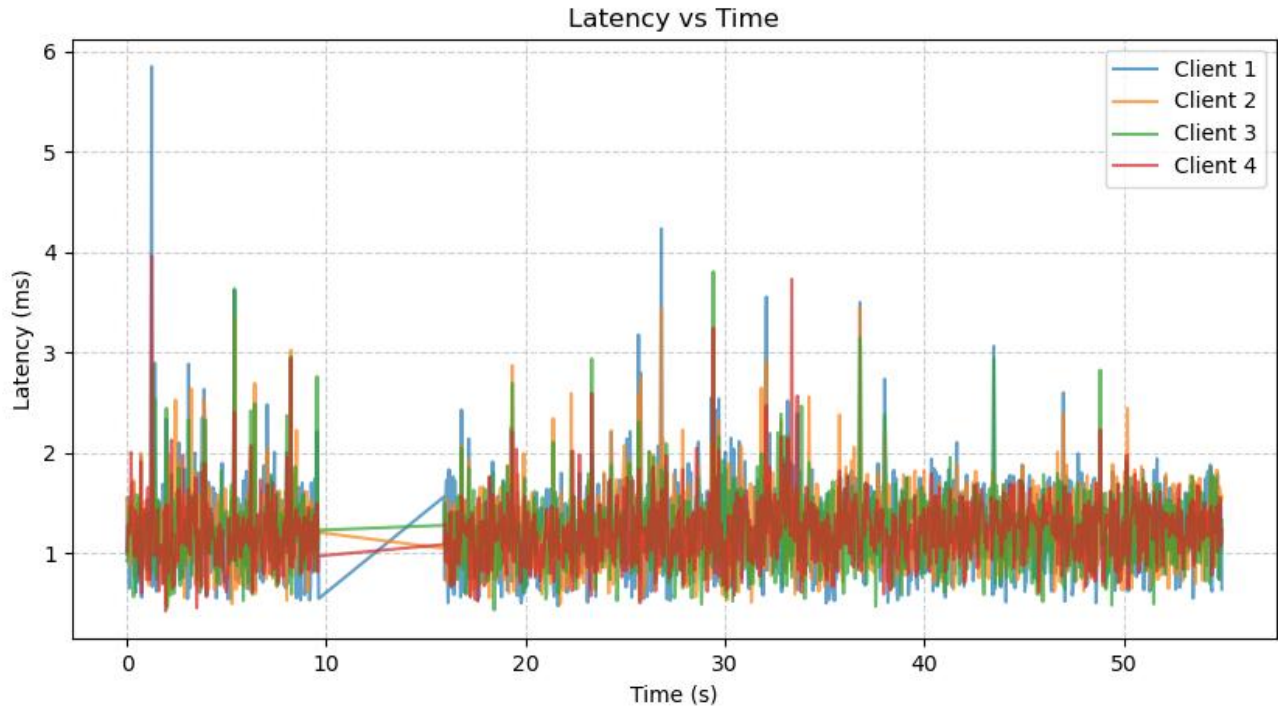


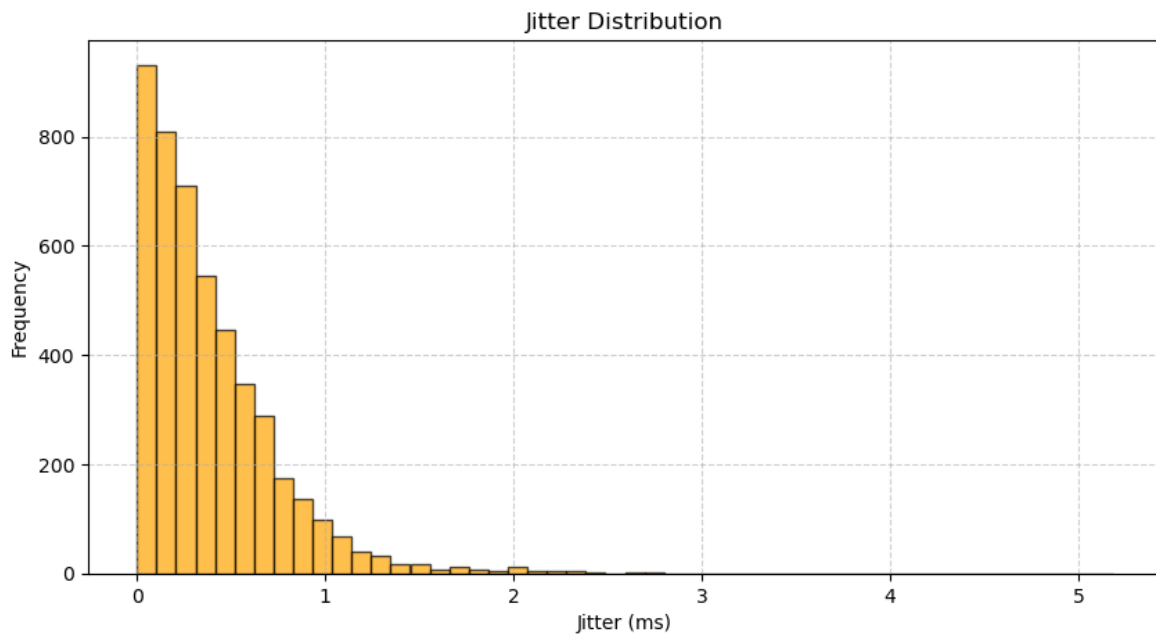
Plots

Baseline

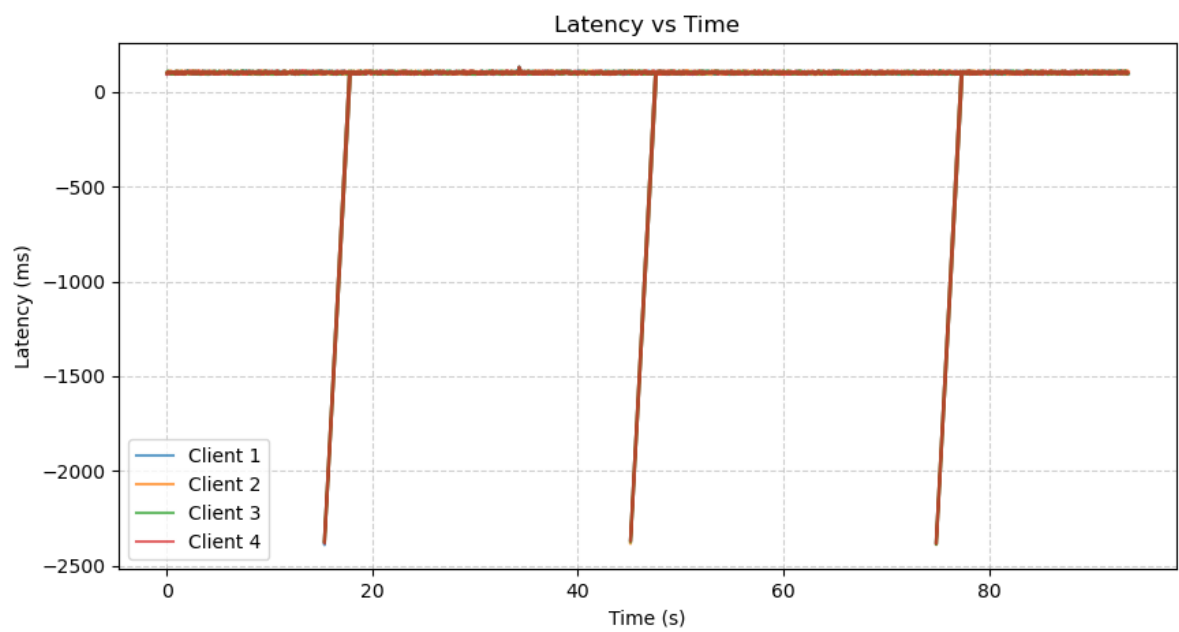
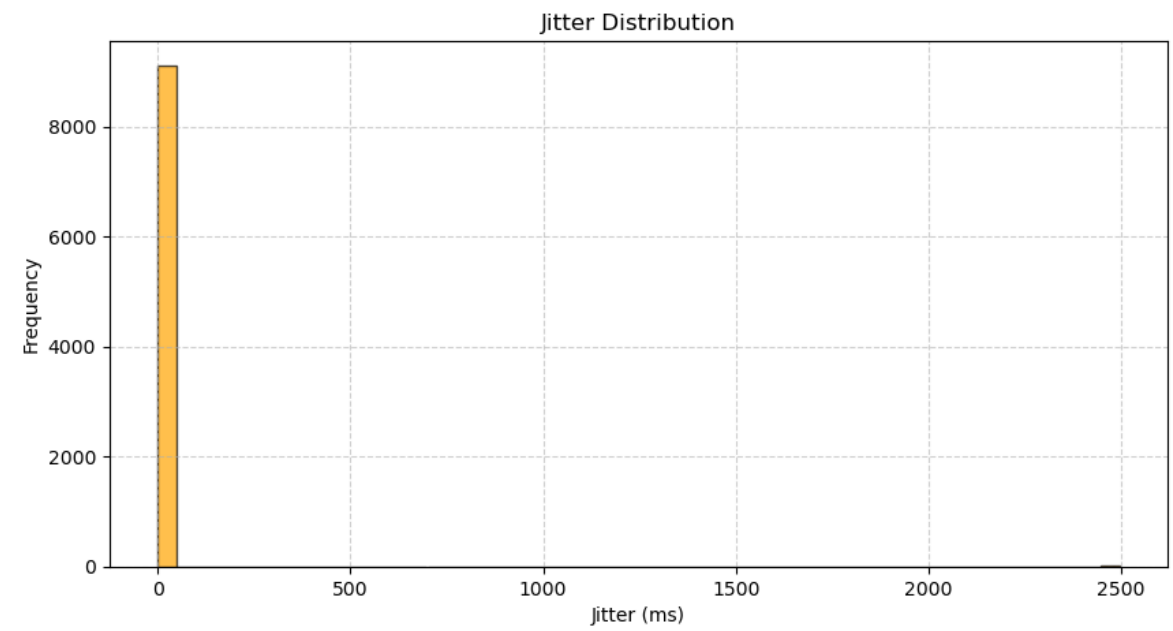
Latency Plot per Client:



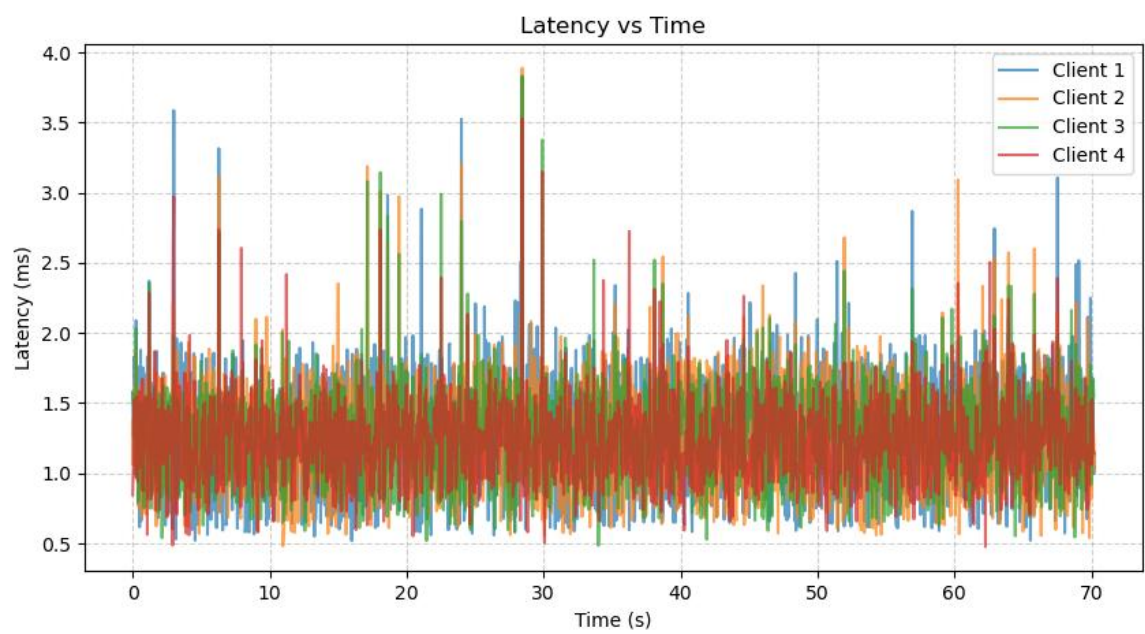
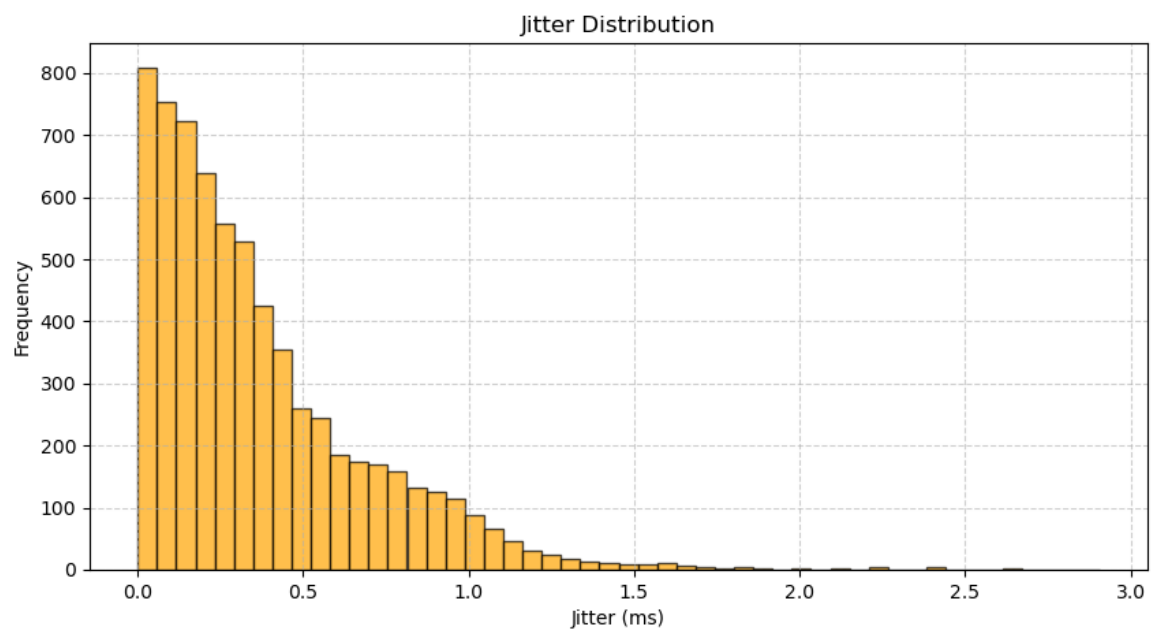
Jitter Distribution Plot:



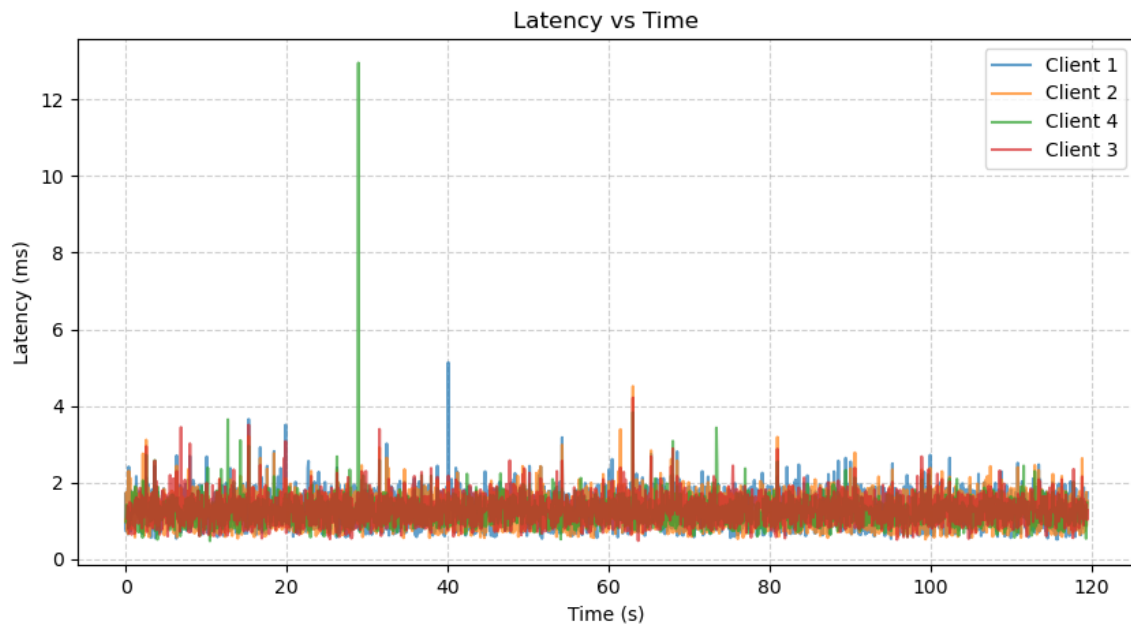
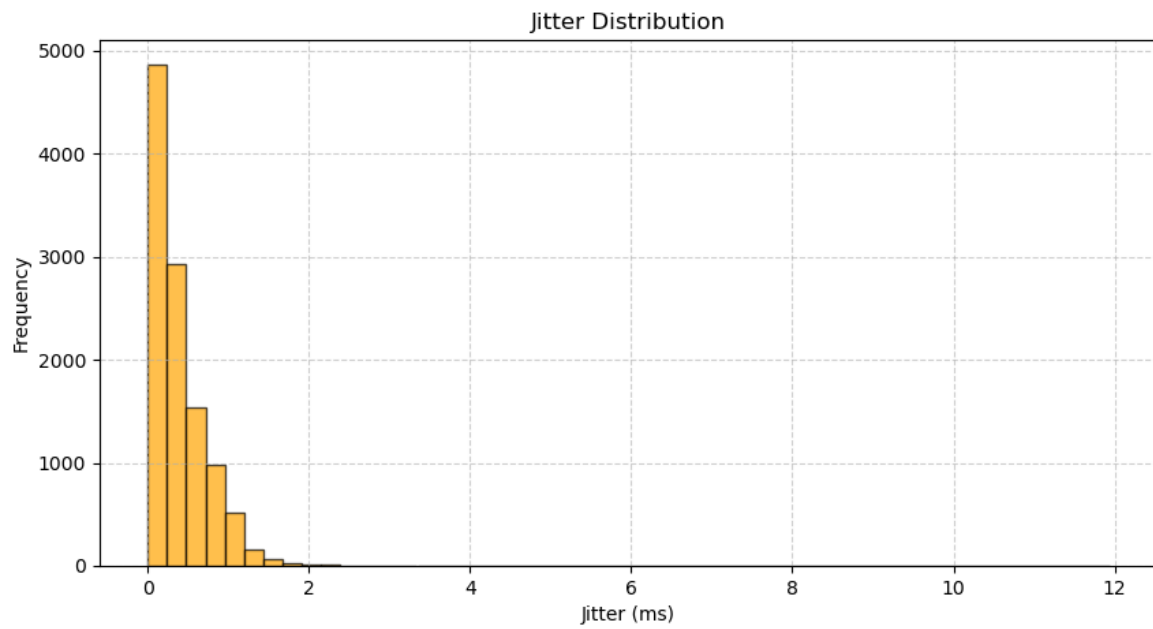
Delay 100ms



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 ...
```