NVIDIA REFLEX

Seth Schneider | Senior Product Manager
<table>
<thead>
<tr>
<th>500M</th>
<th>100M</th>
<th>1.3M</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esports Viewers Worldwide</td>
<td>League of Legends Worlds Viewers</td>
<td>NASCAR iRacing Viewers</td>
<td>GeForce Gamers Play Esports</td>
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</table>

ESPORTS IS THE NEW SPORTS
A SPORT OF MILLISECONDS

TYPICAL GAMER
Reaction Time = 150ms
System Latency = 45ms
Miss!

ESPORTS GAMER
Reaction Time = 120ms
System Latency = 12ms
Hit!

180 ms Target Window
THE PAINS OF LATENCY

HIT REGISTRATION

PEEKER’S ADVANTAGE

FLICK SHOT ACCURACY
Mouse Not Pressed
Mouse Pressed
PEEKER’S ADVANTAGE

Defender

21ms Ping

38ms SYSTEM LATENCY

Peeker

21ms Ping

12ms SYSTEM LATENCY
PEEKER'S ADVANTAGE

Defender

38ms SYSTEM LATENCY

21ms Ping

Peeker

12ms SYSTEM LATENCY

21ms Ping
AIM ACCURACY
AIM ACCURACY

55ms Average System Latency
AIM ACCURACY

- 55ms Average System Latency
- 31ms Average System Latency

15ms Average System Latency
NVIDIA ESPORTS RESEARCH

Latency Impacts Aiming

Small Differences Add Up

Task Completion Time (Time to Kill, Seconds)

NVIDIA REFLEX
Low Latency Esports Technology
SYSTEM LATENCY PIPELINE

INPUT → CPU → RENDER QUEUE → GPU → DISPLAY
SYSTEM LATENCY TERMINOLOGY

INPUT

CPU

Peripheral Latency

Game Latency

Render Queue

Render Latency

PC Latency

GPU

System Latency

Display Latency

DISPLAY

Peripheral Latency

Game Latency

Render Latency

Display Latency

System Latency
NVIDIA REFLEX LOW LATENCY TECHNOLOGY

- Reduced CPU Backpressure
- Zeros Render Queue
- Boosts GPU Clocks
NVIDIA REFLEX IMPROVES PC RESPONSE TIME

System latency measured at 1080p60 on GTX 1660 SUPER, Max Settings, i9 CPU
TODAY GRAPHICS INTENSIVE SETTINGS MEANS HIGH LATENCY
GAMERS REDUCE SETTINGS FOR BETTER RESPONSIVENESS

Time

GPU Bound High Settings
Mouse → CPU → Back Pressure → Render Queue → GPU → Display

CPU Bound Low Settings
Mouse → CPU → GPU → Display
NVIDIA REFLEX OFFERS LOW LATENCY AT HIGH SETTINGS

- **GPU Bound**
  - High Settings
  - REFLEX ON
  
  Time
  
  Mouse | CPU | Back Pressure | Render Queue | GPU | Display

- **CPU Bound**
  - Low Settings
  
  Time
  
  Mouse | CPU | GPU | Display
UPGRADE RESOLUTION WITHOUT ADDING LATENCY

System latency measured at 144Hz on RTX 3080, Max Settings, i9 CPU
NEW NVIDIA G-SYNC ESPORTS DISPLAYS

360Hz IPS Dual-driver panel
NVIDIA Reflex Latency Analyzer
G-SYNC Esports Mode
240Hz ULMB
THE PATH TO ESPORTS GRADE LATENCY

RTX 30 Series GPUs and 360Hz G-SYNC

System latency measured at 1080p, Max Settings, i9 CPU
TODAY'S MEASUREMENT SOLUTION
1000+ FPS Camera and Hand-wired Mouse
WORLD’S FIRST INTEGRATED LATENCY MEASUREMENT SYSTEM

Reflex Latency Analyzer integrated in G-SYNC

USB pass-through with latency monitoring
NVIDIA REFLEX SUPPORTED BY TOP ESPORTS DISPLAYS AND MICE

ASUS ROG Swift 360Hz PG259QNR
Acer Predator X25
MSI Oculux NXG253R
Alienware 25 Gaming Monitor | AW2521H

ROG Chakram Core
Logitech G Pro Wireless
Razer DeathAdder v2
SteelSeries Rival 3
GEFORCE EXPERIENCE PERFORMANCE TOOL

Performance Monitoring

One Click Automatic Tuning

Tuning Parameters
NVIDIA REVIEWER TOOLKIT FOR GPU PERFORMANCE
Simple, Cross-vendor Reviewer Tools For Total Performance Measurement

LATENCY & DISPLAY ANALYSIS TOOL (LDAT)
Standalone system latency tester designed for reviewers

POWER CAPTURE ANALYSIS TOOL (PCAT)
Accurate perf per watt and total board power

FRAMEVIEW 1.1
Integrated frame benchmarking and power measurement software
NVIDIA REFLEX

NVIDIA REFLEX LOW LATENCY TECHNOLOGY

NVIDIA G-SYNC 360HZ WITH REFLEX LATENCY ANALYZER

GEFORCE EXPERIENCE PERFORMANCE TOOL