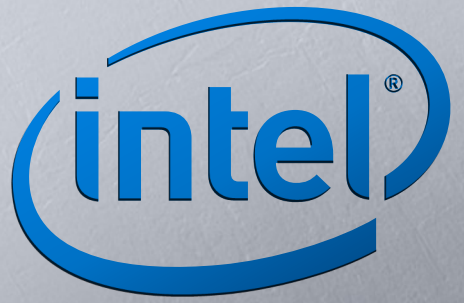
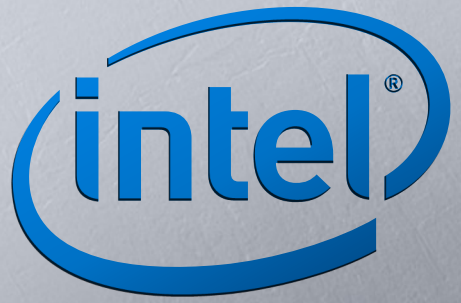


REAL WORLD PERFORMANCE



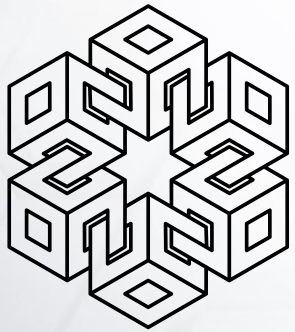
REAL WORLD PERFORMANCE @ IFA

Jon Carvill
VP Tech Leadership Marketing

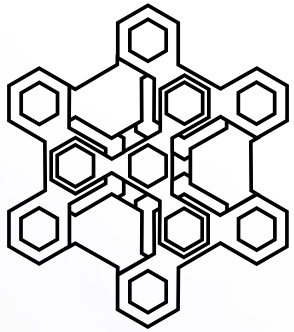
Ryan Shrout
Chief Performance Strategist

WHERE IT ALL BEGINS - THE SIX PILLARS

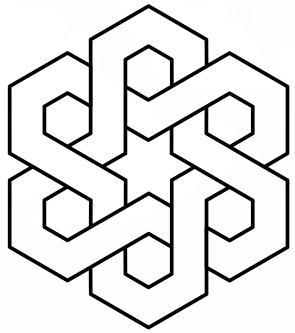
Process



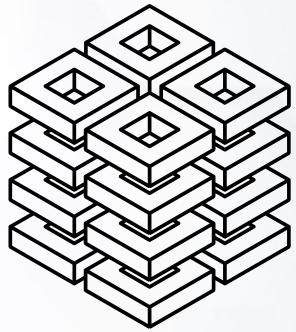
Architecture



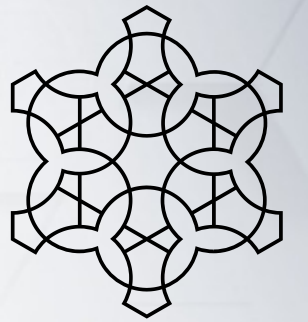
Memory



Interconnect

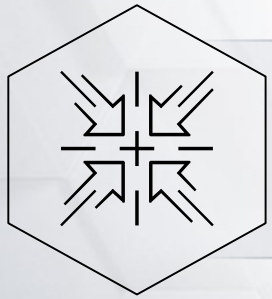


Software

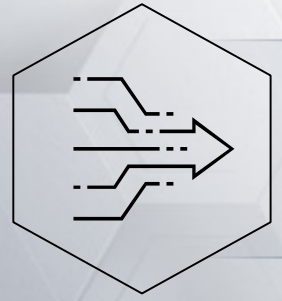


Security

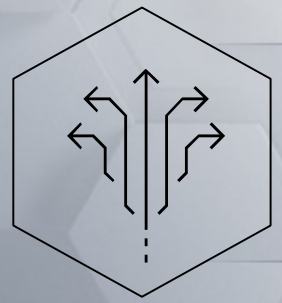
WHAT IS REAL WORLD PERFORMANCE?



Performance Where it Matters Most Today



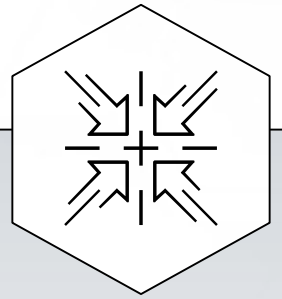
Investments in Performance for Tomorrow



Computing Without Compromise

intel

PERFORMANCE WHERE IT MATTERS MOST TODAY

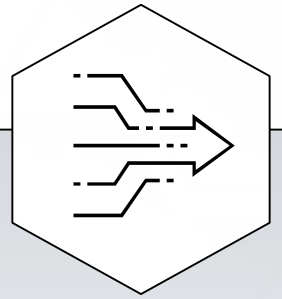


Gaming

Content Creation and Rich Media

Productivity

PERFORMANCE OF TOMORROW



AI on the PC

Faster Connectivity and Responsiveness

Form Factor Innovation

PROJECT ATHENA

Ready to Go
Before You Are

Performance
& Responsiveness

Artificial
Intelligence

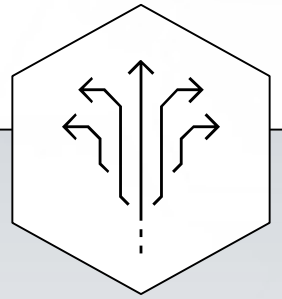
Worry Free Day
of Battery Life

Always Fast,
Reliably Connected

Form Factor
& Interaction

intel

COMPUTING WITHOUT COMPROMISE



Optimized Applications - Out of the Box and Ongoing

Everything Just Works – No Compatibility Confusion

Balanced Approach to Maximize Performance and Battery Life

DESKTOP LEADERSHIP

Leadership on the Desktop

i9-9900KS

WORLD'S BEST GAMING PROCESSOR

MADE EVEN BETTER

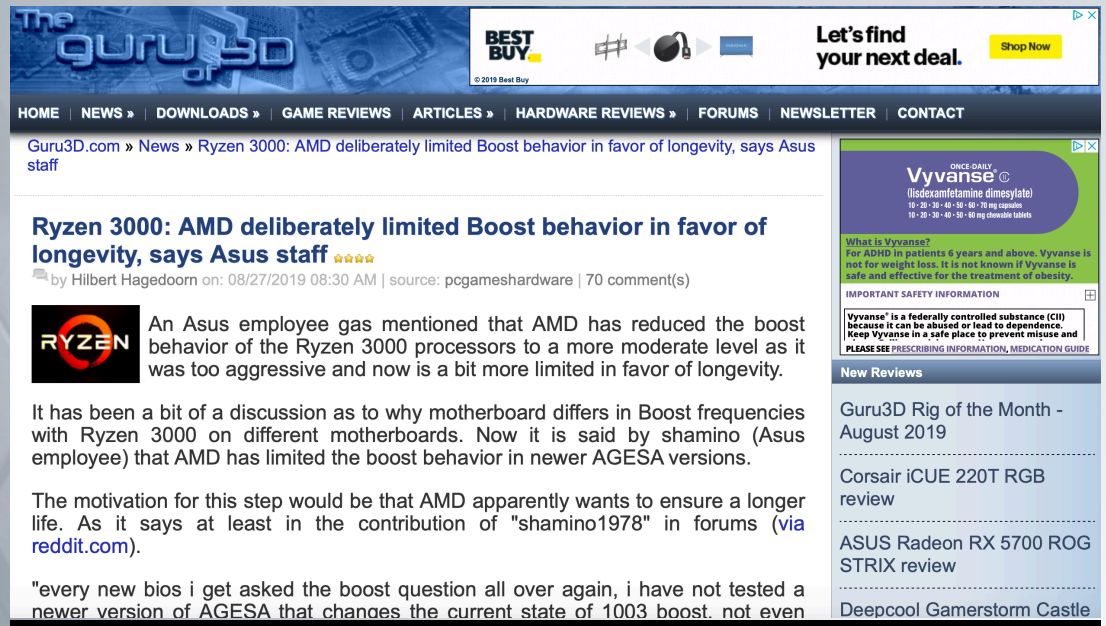
intel

For more complete information about performance and benchmark results, visit www.intel.com/benchmarks.

9TH GEN INTEL® CORE™ i9-9900KS

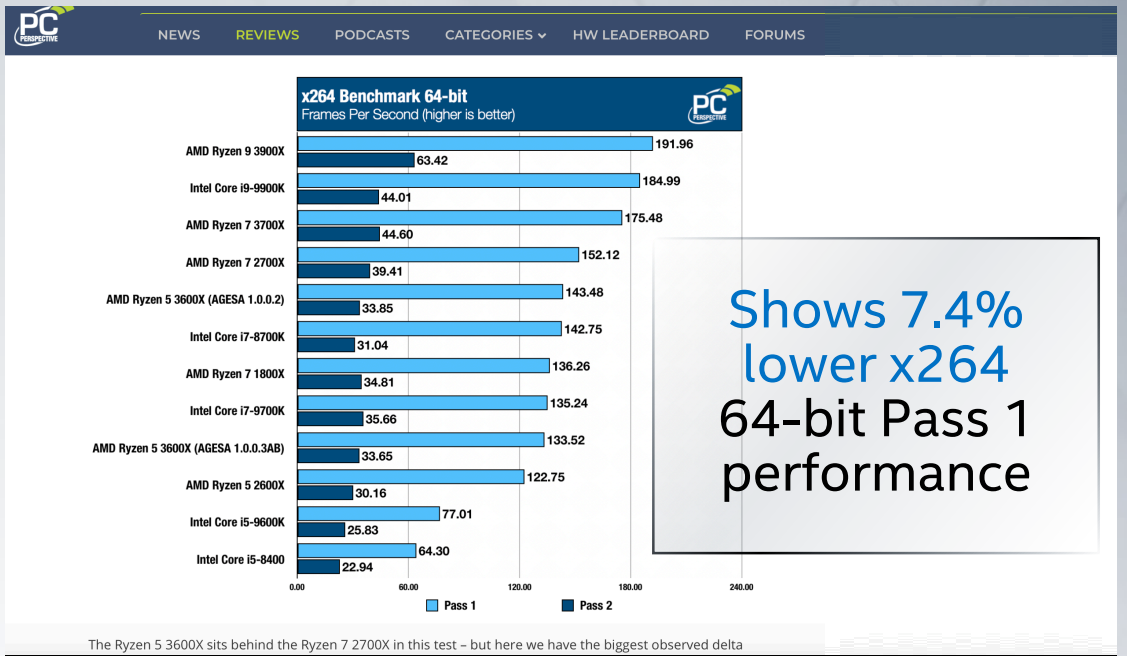
QUESTIONING FROM THE COMMUNITY

Clocks, Performance Consistency, Transparency



https://www.guru3d.com/news-story/ryzen-3000-amd-deliberately-limited-boost-behavior-in-favor-of-longevitysays-asus-staff.html

"An Asus employee has mentioned that AMD has reduced the boost behavior of the Ryzen 3000 processors to a more moderate level as it was too aggressive and now is a bit more limited in favor of longevity."

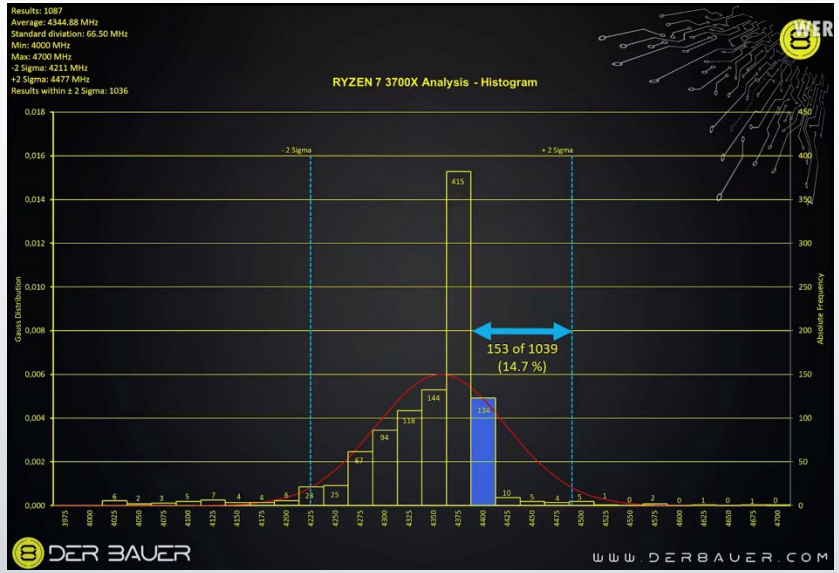


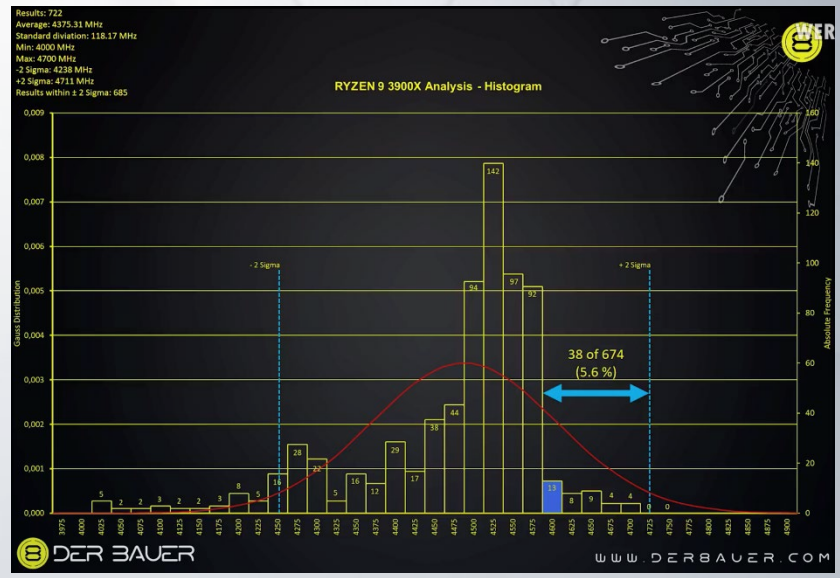
https://pcper.com/2019/08/amd-ryzen-5-3600x-review/

"...here we have the biggest observed delta between AGESA versions, with the first pass of the x264 benchmark dropping a full 10 FPS from 1.0.0.2 to 1.0.0.3AB with the Ryzen 5 3600X."

QUESTIONING FROM THE COMMUNITY

Clocks, Performance Consistency, Transparency



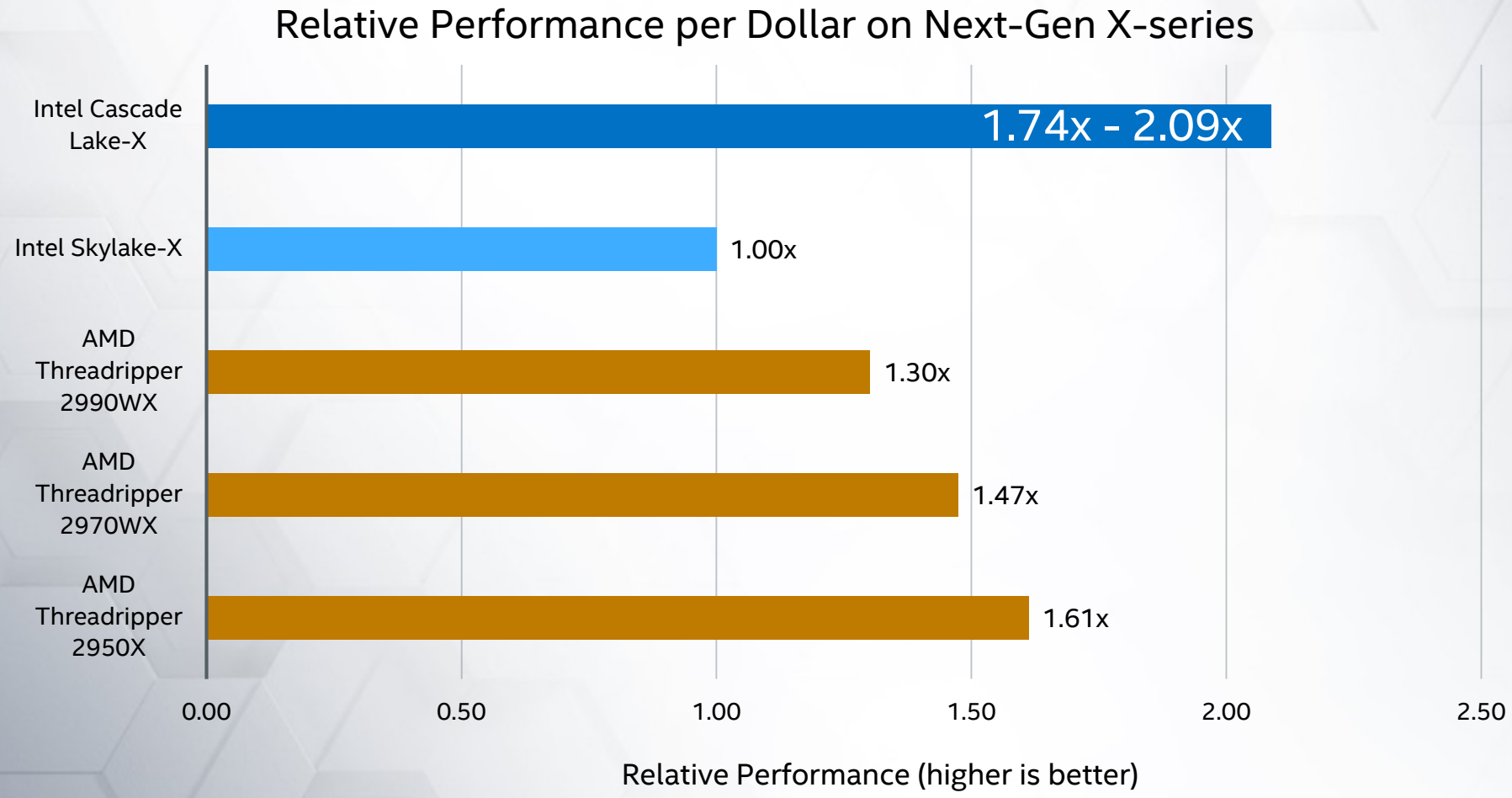


https://www.youtube.com/watch?v=DgSoZAdk_E8

- 2700+ submissions from viewers
- 3900X – 5.6% hitting rated single core clocks
- 3700X – 14.7% hitting rated single core clocks
- 3600X – 9.4% hitting rated single core clocks

EMPOWERING CREATORS

Coming Next Month...



Real World... Not Really

82%

Source: Intel Product Improvement Program Q3 2019: 10,874,856 systems (all notebook/2-in-1)

Real World... Not Really

0.22%

Source: Intel Product Improvement Program Q3 2019: 10,874,856 systems (all notebook/2-in-1)

Real World... Not Really

USERS IN THE SEGMENT DO...

Office applications

Media consumption (WMP, VLC)

Games (Steam + CS: Go, LoL, Battle.net)

Light content creation
(Photoshop, Illustrator)

Intel is offering help to OEMs and press with realistic usage performance testing

Rank	Application	Popularity
3	Chrome	33.660%
8	Word	26.098%
16	Windows Media Player	21.309%
18	Excel	20.591%
19	WinRAR	20.238%
24	Powerpoint	16.510%
31	One Drive	13.358%
32	Skype	13.195%
36	VLC	11.881%
37	Steam	11.788%
70	Photoshop	5.647%
99	Battle.net	4.117%
106	Dropbox	3.744%
114	LoL	3.606%
130	CS: Go	3.066%
218	Illustrator	1.657%
	...	
1,331	Cinema4D	0.221%

Source: Intel Product Improvement Program Q3 2019: 10,874,856 systems (all notebook/2-in-1)

MOBILE
LEADERSHIP

Mobile Leadership

ALL BRANDS ARE NOT EQUAL

intel CORE i7 inside ≠ RYZEN R7

intel

intel CORE i3 10TH GEN

10TH GEN INTEL® CORE™ i3 U-SERIES

VS

RYZEN R7

RYZEN 7 H-SERIES

intel

intel CORE i5 10TH GEN

10TH GEN INTEL® CORE™ i5 U-SERIES

VS

RYZEN R7

RYZEN 7 H-SERIES

intel

intel CORE i7 10TH GEN

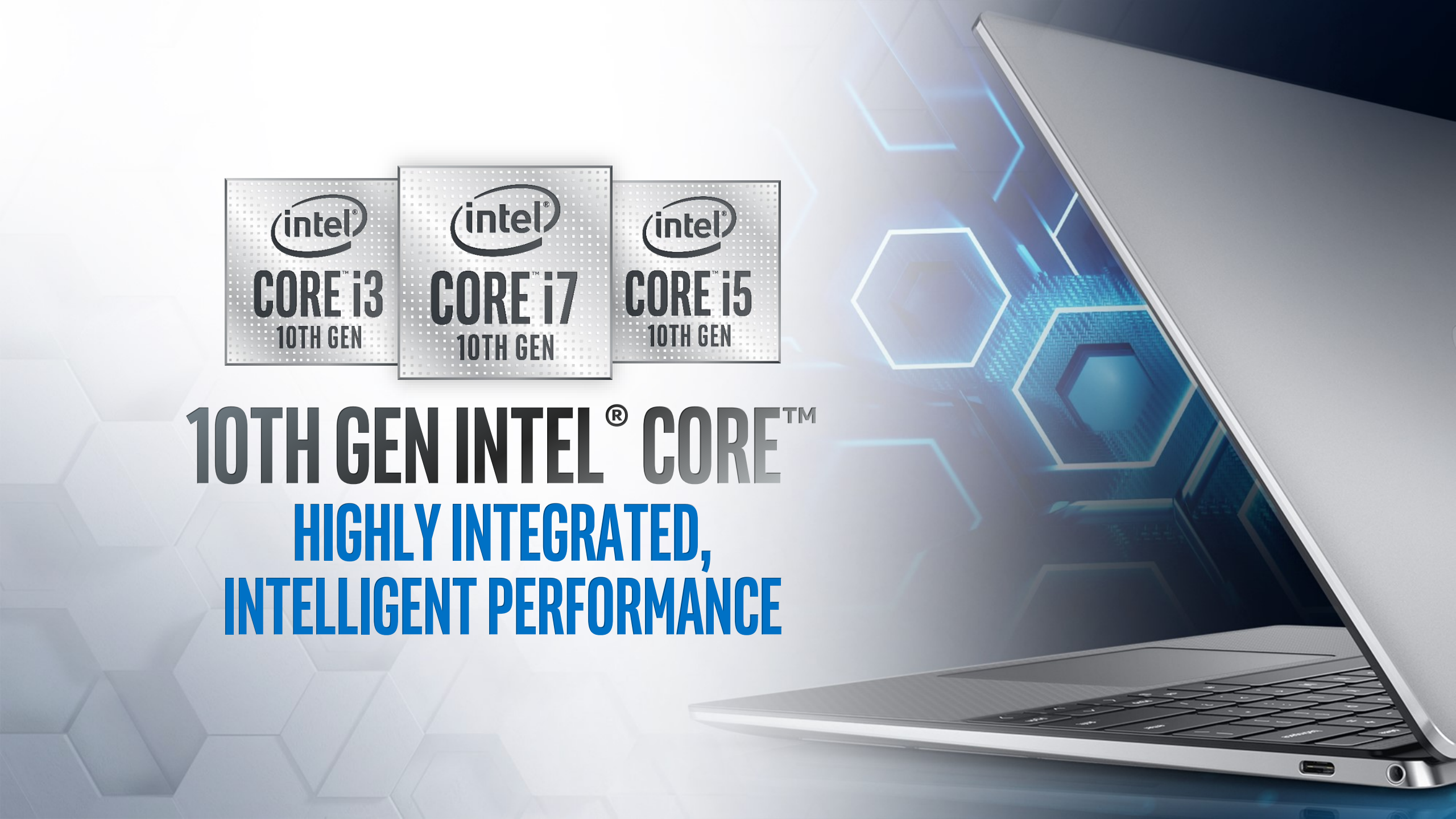
10TH GEN INTEL® CORE™ i7 U-SERIES

VS

RYZEN R7

RYZEN 7 U-SERIES

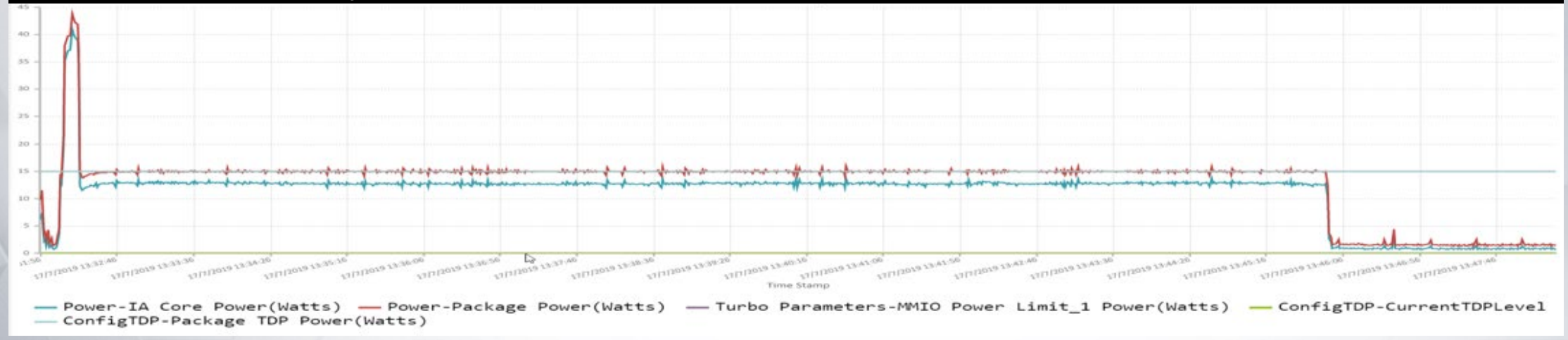
intel


intel
CORE i3
10TH GEN
intel
CORE i7
10TH GEN
intel
CORE i5
10TH GEN
10TH GEN INTEL® CORE™
HIGHLY INTEGRATED,
INTELLIGENT PERFORMANCE

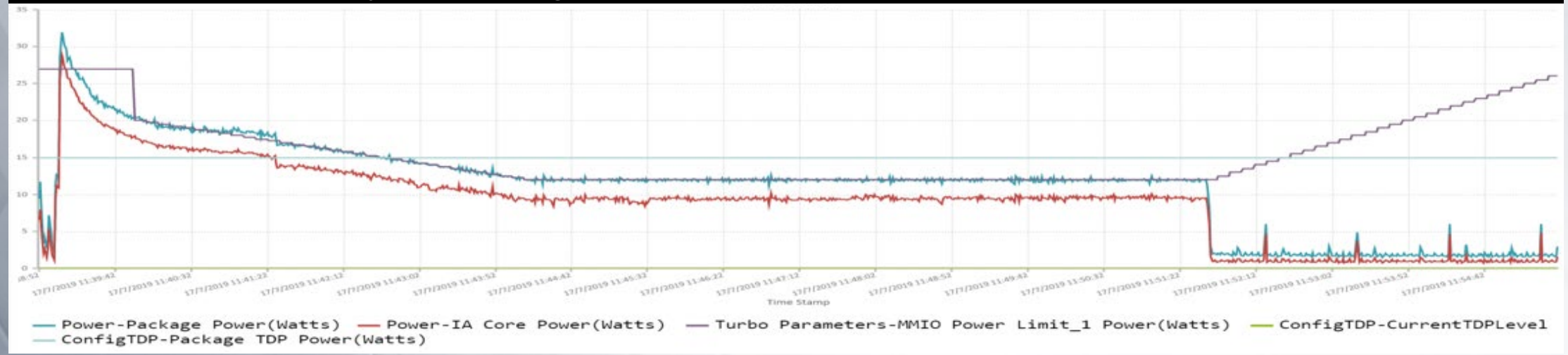
DYNAMIC TUNING AND OEM OPTIMIZATION

Adaptix™ Dynamic Tuning at Work

10th Gen Ice Lake Dev System

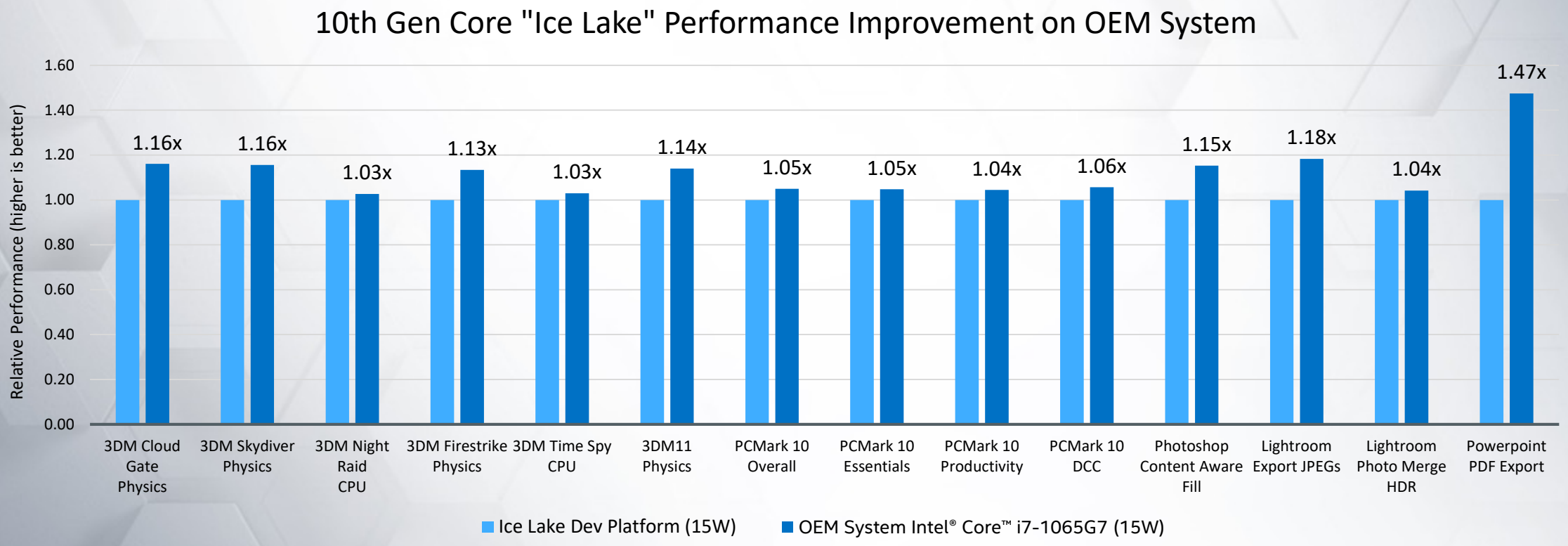


OEM Enabled Adaptix™ Dynamic Tuning



OEM OPTIMIZATION

Performance Through Partnership

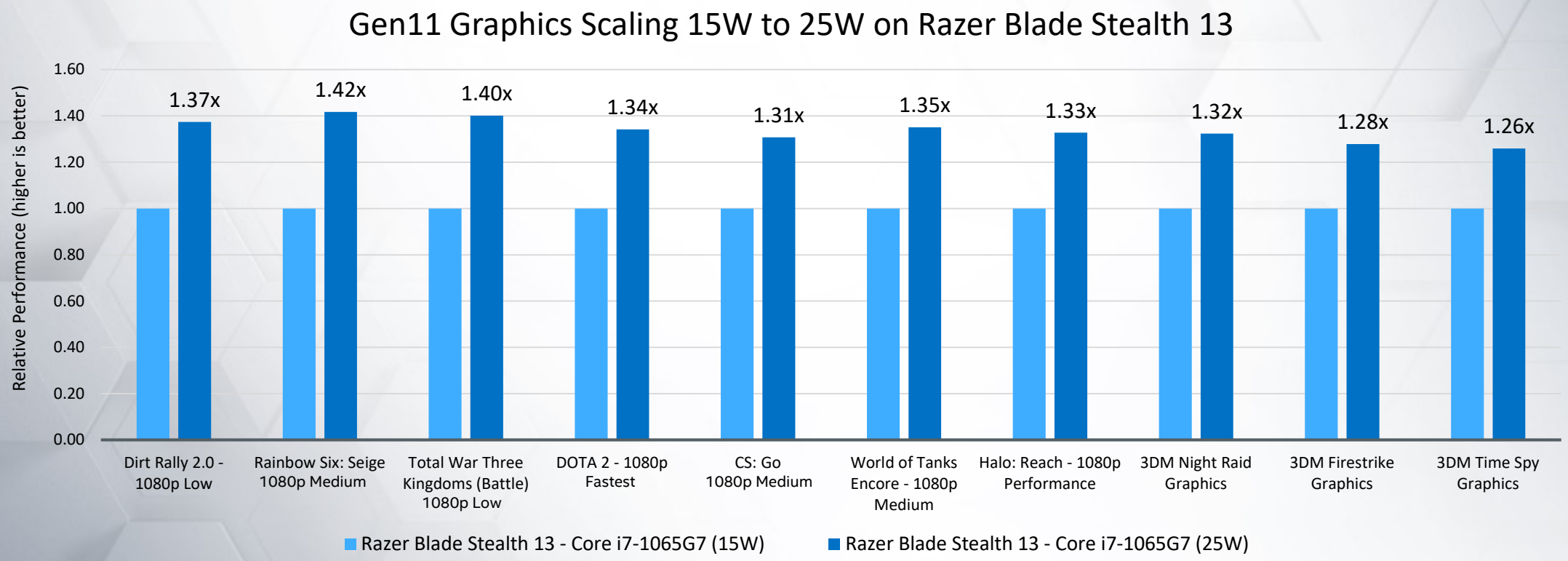


Customers see up to 18%+ better performance in workloads thanks to Intel and OEM collaboration.

For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

ULTRA MOBILE GRAPHICS LEADERSHIP

25W Gaming Performance



Gen11 graphics on 10th Gen "Ice Lake" provides OEMs flexibility to offer amazing gaming performance to customers.

For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

intel

intel CORE i7 10TH GEN

10TH GEN INTEL® CORE™ i7 U-SERIES

VS

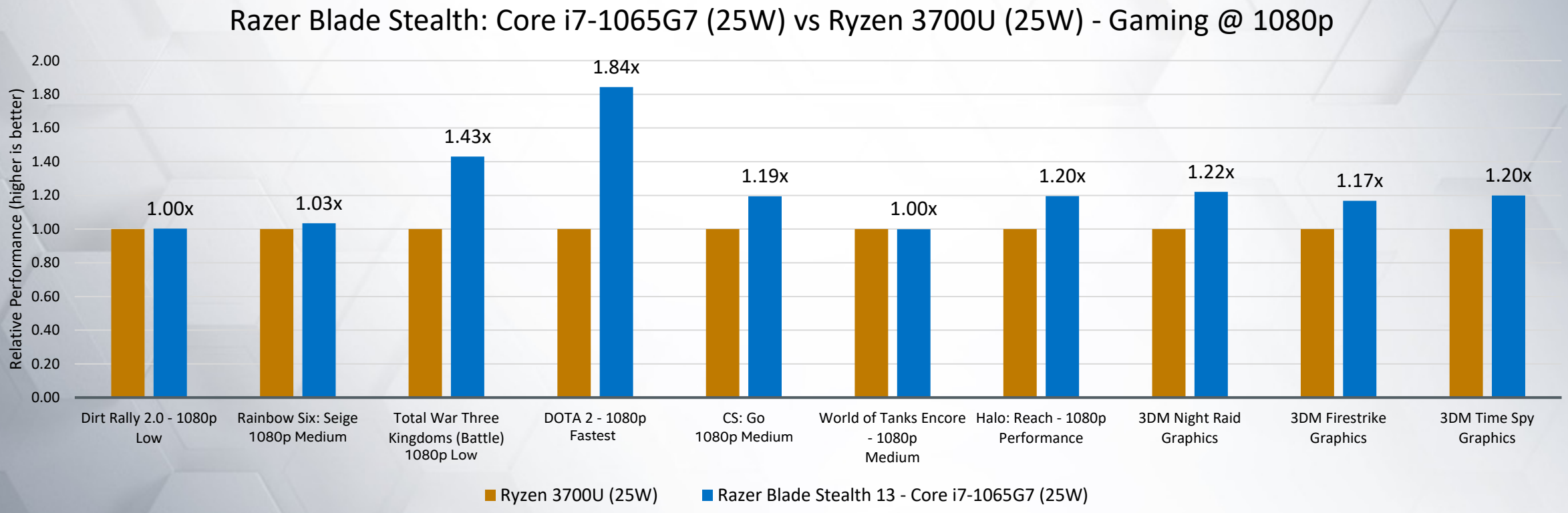
RYZEN R7

RYZEN 7 U-SERIES

intel

ULTRA MOBILE GRAPHICS LEADERSHIP

25W Gaming Leadership



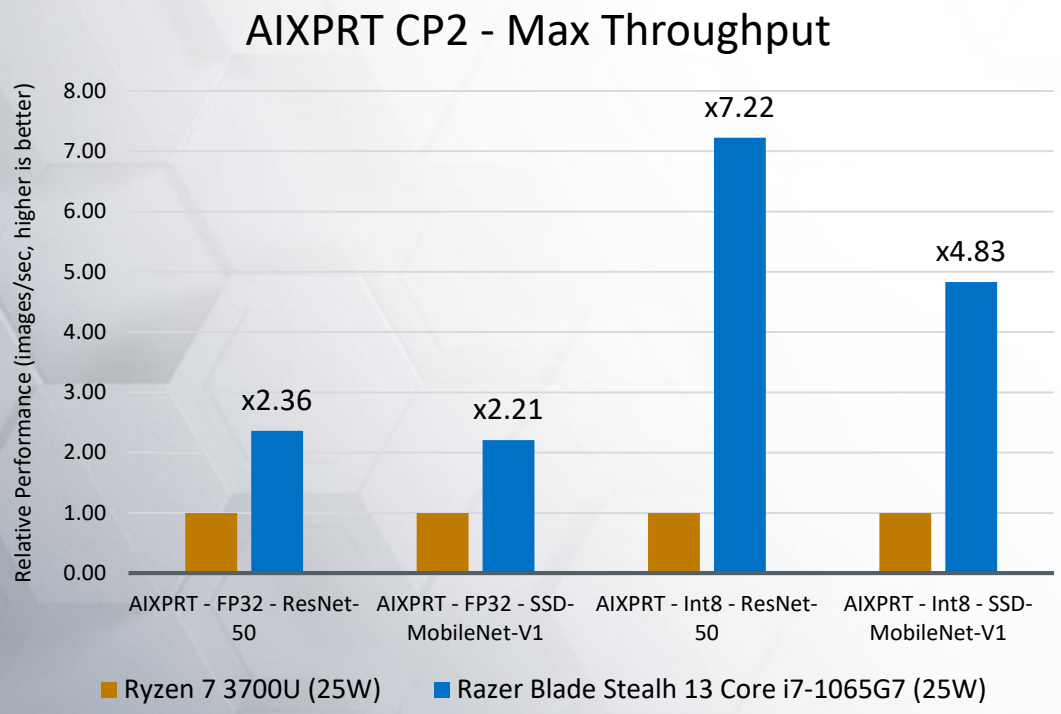
Intel has integrated graphics performance lead over AMD!

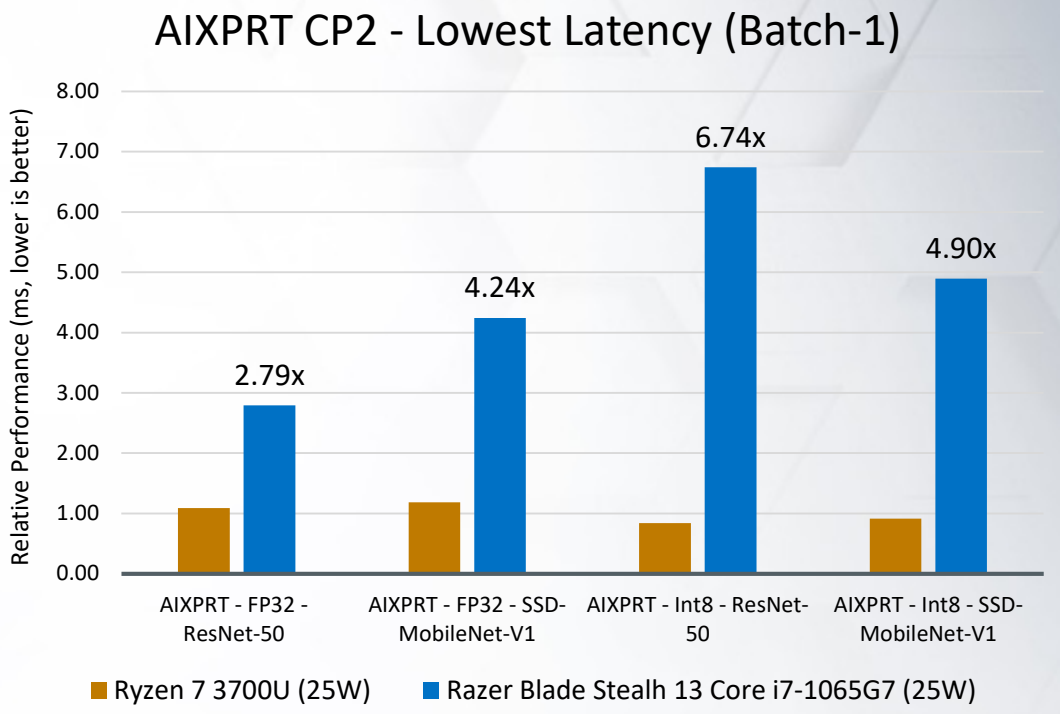
For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

FUTURE OF WORKLOADS WITH AI

AIXPRT COMMUNITY PREVIEW 2

Client AI Inference Leadership





Dramatic client AI performance leadership
in both latency-sensitive and throughput benchmarks!

For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

CLIENT AI FOR GAMING

CPU Performance and Latency Leadership

unity

Machine Learning

At Unity, we aim to maximize the transformative impact of Machine Learning for researchers and developers alike. Our Machine Learning tools, combined with the Unity platform, promote innovation. To further strengthen the Machine Learning community, we provide a forum where researchers and developers can exchange information, share projects, and support one another to advance the field.

Learn what Unity is up to in the area of Machine Learning.

Download ML-Agents

Obstacle Tower Environment

https://unity3d.com/machine-learning

intel Software Developer Zone

Accelerating Deep Learning Based Large-Scale Inverse Kinematics with Intel® Distribution of OpenVINO™ Toolkit

By Tai Ha, JONG IL P., Junsik Park, published on August 22, 2019 Translate

CONTENTS

Introduction
Architecture of Deep Learning-based IK Solver
Training Data
IK Quality Comparison
Optimization: CPU Versus GPU
Optimization: DNN Libraries
Optimization: Batch Processing
Summary
About the Authors
Footnotes

Introduction

Inverse kinematics (IK) technology was launched in the robotics field and studied to calculate joint angles to move robot arms (end effectors) to the target position with specific degrees of freedom (Figure 1). IK uses kinematic equations to determine the joint angles so that the end effector moves to a desired position. IK technology is now applied to many other areas such as engineering, computer graphics, and video games.

Figure 1. An example of inverse kinematics. The left robot arm has three joint angles, one end effector, and the target object. The right robot arm must determine the joint angles to move the end effector to the target object.

https://software.intel.com/en-us/articles/accelerating-deep-learning-based-large-scale-inverse-kinematics-with-intel-distribution-of

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10TH GEN INTEL® CORE™ i7 U-SERIES

VS

RYZEN 7 U-SERIES

WINDOWS
WITHOUT COMPROMISE

intel® X86 | VS | arm

intel®

Download VPN for Windows - P

Tefincom S.A. [PA] | nordvpn.com/download/windows/

Your IP: 192.24.216.40 · ISP: Fuse Internet Access · Your Status: Unprotected

Can't install virtual network device!

NordVPN

Features Pricing Servers

Android Windows macOS iOS · iPhone · iPad Android TV Linux Chrome Firefox

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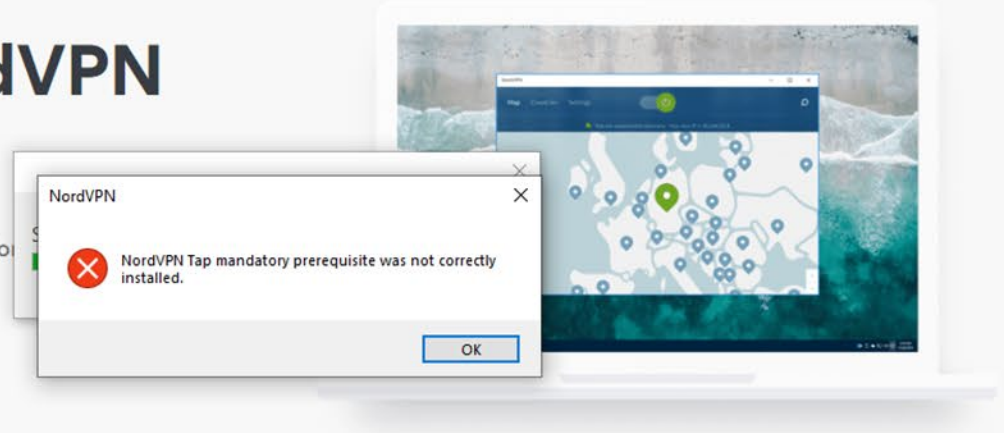
Download



Easy-to-use VPN app

SmartPlay

Access streaming websites securely. Simply connect to any server and let our SmartPlay technology do the job.

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10:15 AM
8/20/2019

Microsoft Store

Home Apps Games Devices Movies & TV Edge Extensions

Purchased, but can't install locally!

Where do you want to install?

We'll install it automatically on all the devices you select.

Get more info

RyanOffice
System manufacturer System
Product Name

Cancel Install now

Adob p Elements

SAVE $40.00

Adobe Photoshop El

Adobe Inc. • Photo & video

★★★★½ 47 Share

Automation makes photo editing easy. Your creativity makes it amazing.

Adobe Photoshop Elements 2019 is photo editing software used by anyone who wants to edit and create with their photos. It offers easy ways to get

More

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See System Requirements

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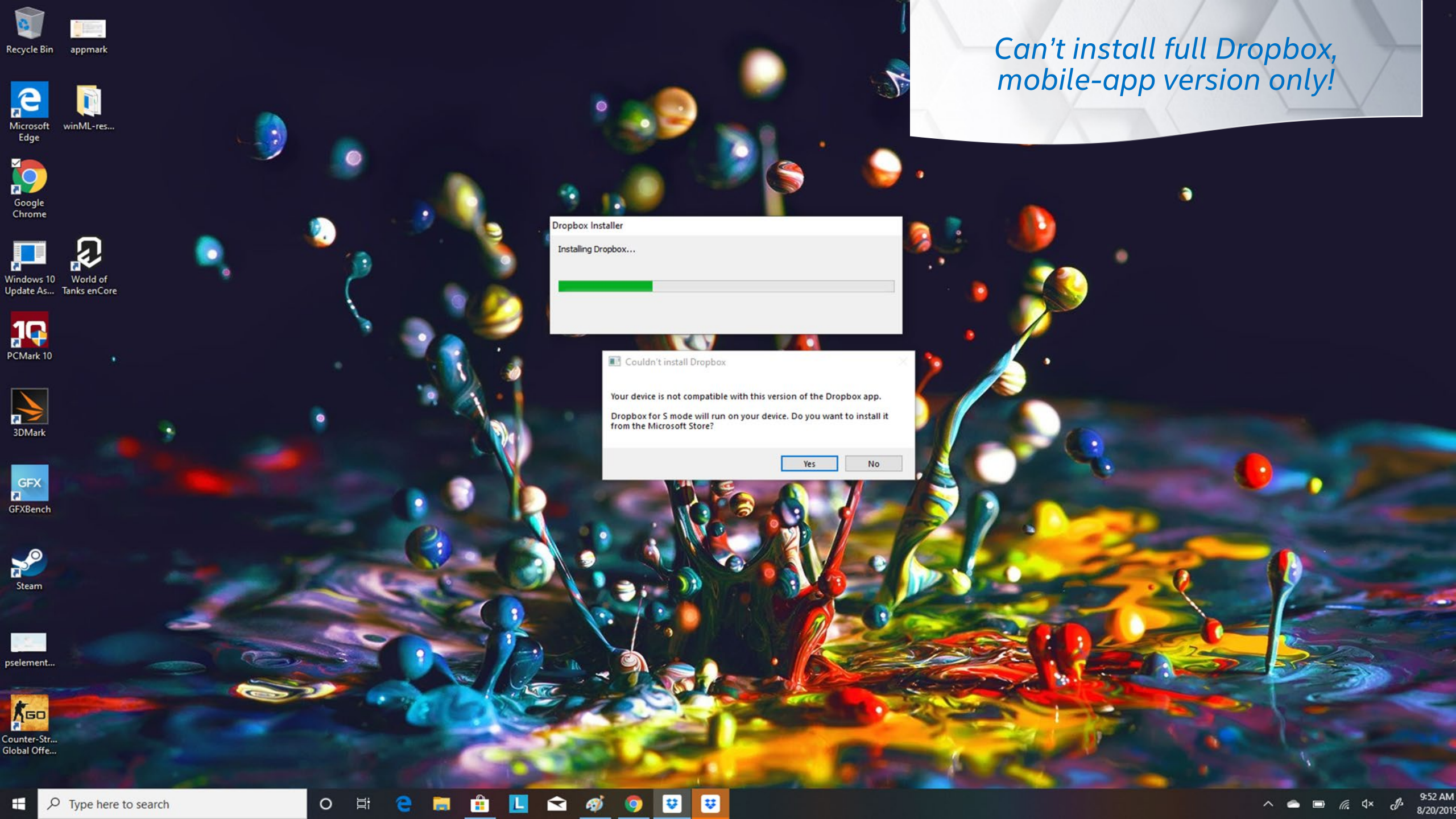
8/20/2019


Recycle Bin
appmark
Microsoft Edge
winML-res...
Google Chrome
Windows 10 Update As...
World of Tanks enCore
PCMark 10
3DMark
GFXBench
Steam
pselement...
Counter-Str... Global Offe...
Dropbox Installer
Installing Dropbox...
Couldn't install Dropbox
Your device is not compatible with this version of the Dropbox app.
Dropbox for S mode will run on your device. Do you want to install it from the Microsoft Store?
Yes
No
Can't install full Dropbox, mobile-app version only!
Type here to search
9:52 AM
8/20/2019

Logitech Options won't install!

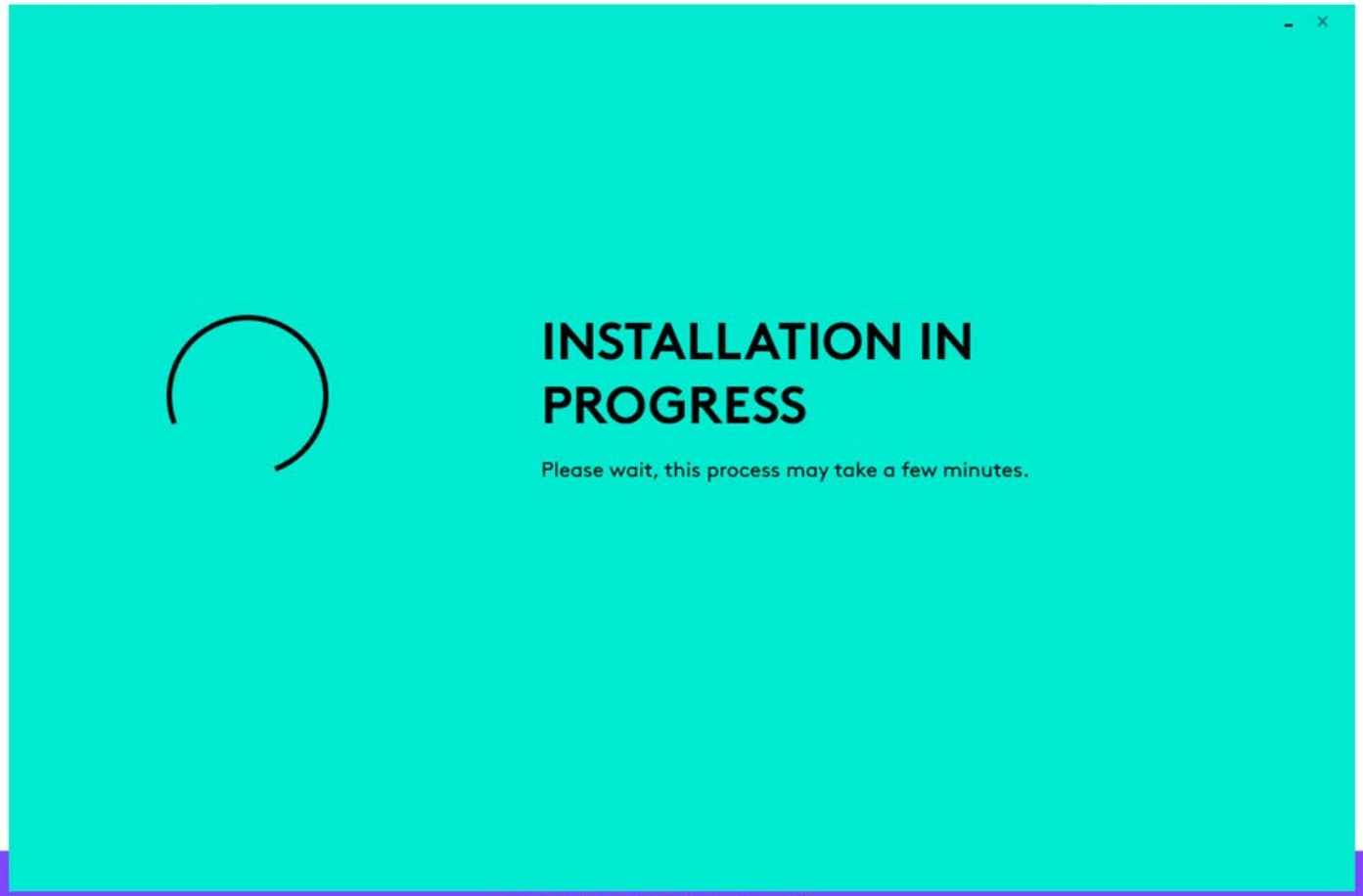
Logitech Options – Logitech Sup

support.logi.com/hc/en-us/articles/360025297893

REGISTER A PRODUCT DOWNLOADS RETURNS/REFUNDS COMMUNITY CONTACT US

Logitech Options

Auto detected OS



STILL NEED HELP?

Want to ask other users with the same product a question? Join the conversation

Type here to search

11:16 AM
8/20/2019

Plantronics Hub won't install!

Logitech Options – Logitech Sup | Plantronics Hub Windows/Mac |

plantronics.com/ca/en/support/downloads-apps/hub-desktop

PLANTRONICS + POLYCOM. NOW TOGETHER AS poly

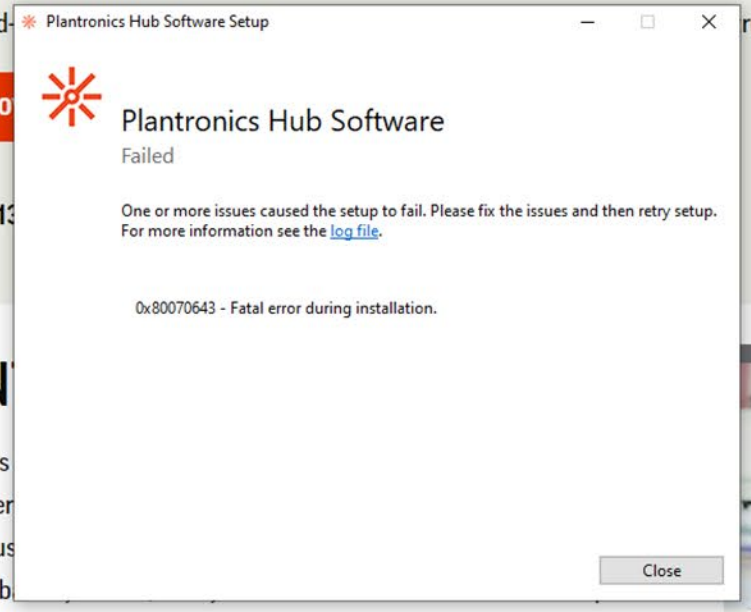
plantronics. PRODUCTS AND SOLUTIONS RESOURCES SUPPORT HOW TO BUY

PLANTRONICS HUB FOR WINDOWS/MAC

Allows end- ronics audio device on their desktop.

WINDO

Version 3.13



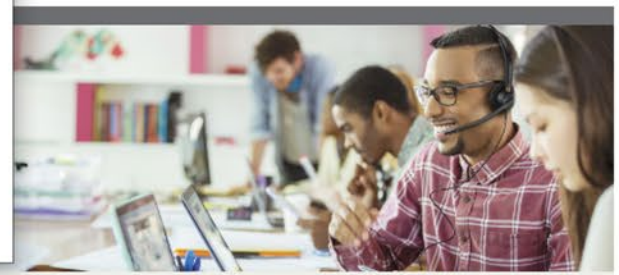
PRODUCTIVITY AND CON

Plantronics Hub for Windows/Mac, part of the Plantronics
control the settings on their Plantronics audio device. User
presence updates, and more. The software enhances the us
state of their Plantronics audio device, such as mute and b

CUSTOMIZE THE EXPERIENCE OF YOUR PLANTRONICS AUDIO DEVICE

- Change device settings
- Visible mute and battery status
- Device-level call control with call answer/end, mute, and volume adjust
- Update your headset firmware
- Change language option for your voice prompts

Some features not available on every device. Download Plantronics Hub to see which features you can customize.



Enterprise Deployments

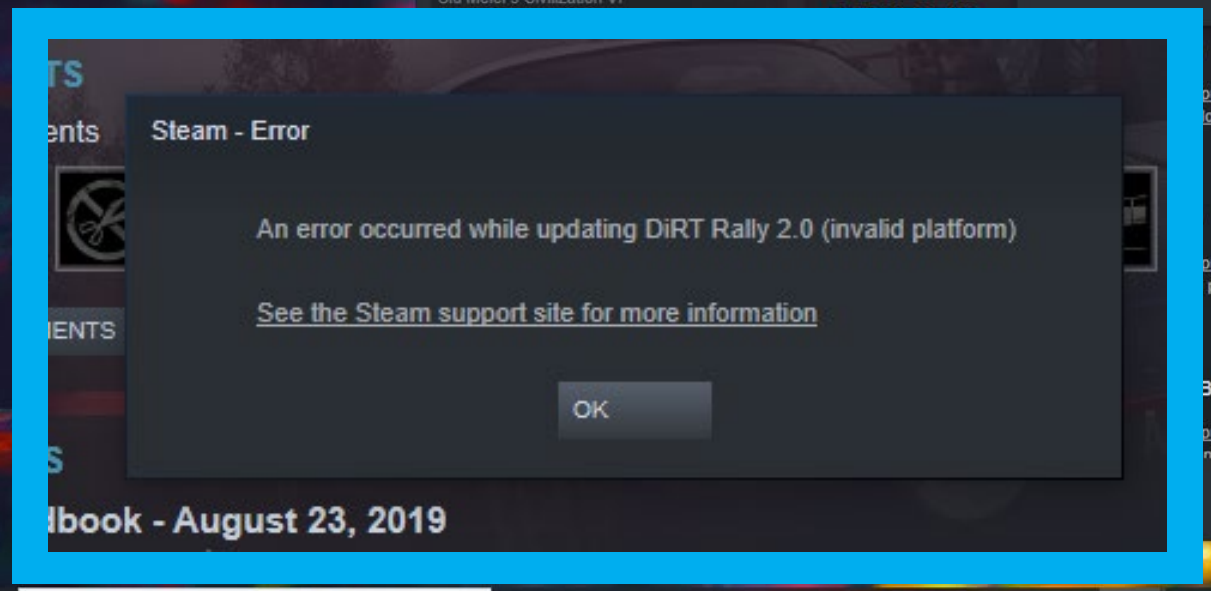
Gain insights, simplify headset adoption, and troubleshoot and respond to individual needs with no interruptions to the customer experience, all from one place.

PLANTRONICS MANAGER PRO

Type here to search

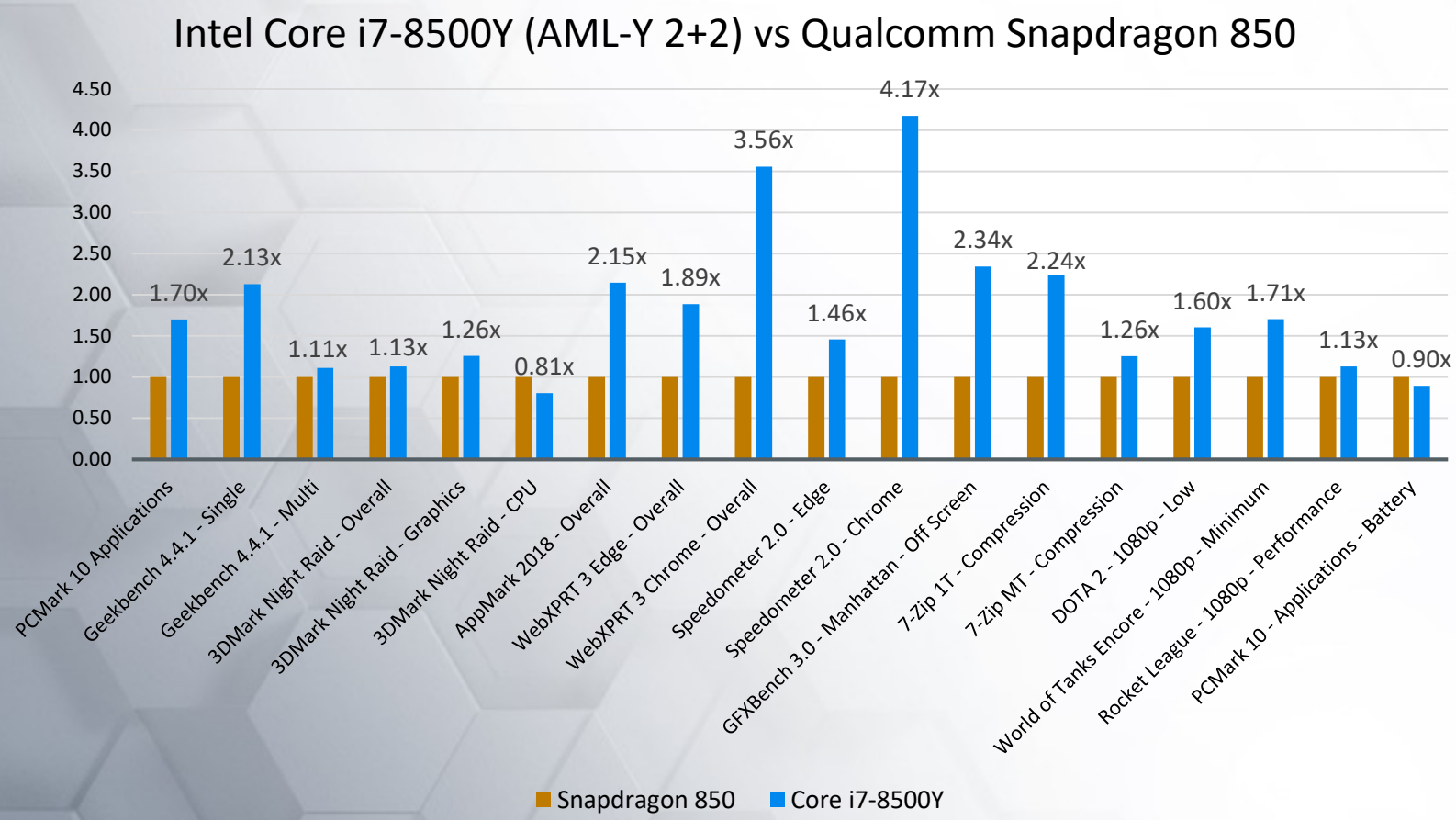
11:14 AM
8/20/2019

Games often utilize 64-bit and won't install!



WINDOWS WITHOUT COMPROMISE

Performance Matters Today



Up to 4.17x performance with current shipping products

Average 2.03x faster across these workloads with Intel 2C product vs 8C Qualcomm SoC

Consumers know performance matters!

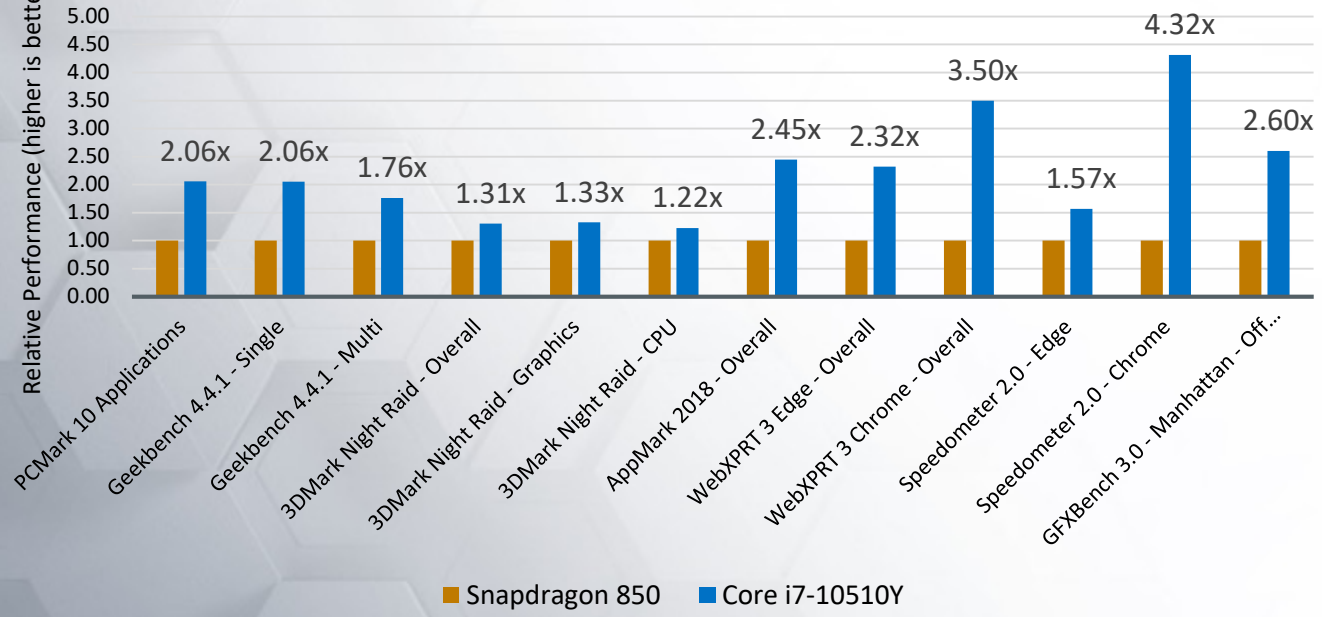
For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

intel

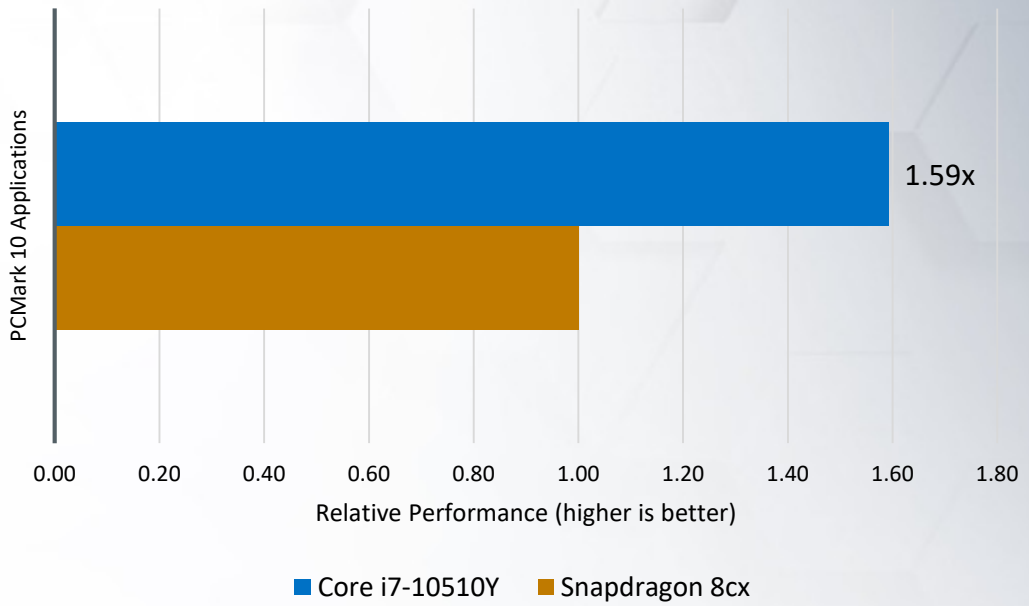
WINDOWS WITHOUT COMPROMISE

Performance Matters Tomorrow

Intel Core i7-10510Y (CML-Y 4+2)
vs Qualcomm Snapdragon 850



Intel Core i7-10510Y (CML-Y 4+2)
vs Qualcomm Snapdragon 8cx



10th Gen Core increases performance lead today,
will lead against Qualcomm 8cx in real-world applications

For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

REAL STORY ON CONNECTIVITY

Intel Leadership

4

30

Qualcomm Notebooks
(current + future)

OEM	Model	Architecture
Samsung	Galaxy Book S	8CX
Samsung	Galaxy Book 2	SD850
Huawei	Matebook E	SD850
Lenovo	C630	SD850

Intel Notebooks
(current + future)

OEM	Model	Architecture
Acer	Swift 3	8th & 10th Gen Core
Acer	Swift 7	8th Gen Core
Dell	Latitude 5300	8th Gen Core
Dell	Latitude 5400	8th Gen Core
Dell	Latitude 5500	8th Gen Core
Dell	Latitude 3500	8th Gen Core
Dell	Latitude 5300	8th Gen Core
Dell	Inspiron	8th Gen Core
Dell	Inspiron	8th & 10th Gen Core
Dell	Inspiron 7000 14”	8th & 10th Gen Core
HP	Envy x360 13”	8th & 10th Gen Core
HP	Spectre x360	8th & 10th Gen Core
HP	Spectre Folio	8th Gen Core
HP	Elitebook 1040	8th Gen Core vPro
Lenovo	X1 Yoga (4th)	8th Gen Core
Lenovo	X1	8th Gen Core
Lenovo	X390	8th Gen Core
Lenovo	T490s	8th Gen Core
Lenovo	T490	8th Gen Core
Lenovo	P53s	8th Gen Core
Lenovo	P53	8th Gen Core
Lenovo	L490	8th Gen Core
Lenovo	L590	8th Gen Core
Lenovo	X390	8th Gen Core
Lenovo	X390 Yoga	8th Gen Core

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DEVELOPER ECOSYSTEM @ SCALE

300 gaming ISVs with over 300,000 developers engaged over the last year

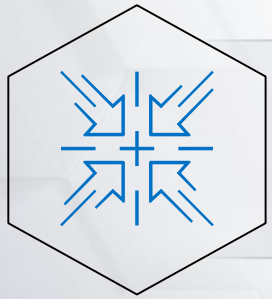
Over 2000 Windows PC designs per year

Over 400 BKCs of Windows tested and 50,000 software kits per year

Top three of contributors to Chromium OS

Number one contributor to the Linux Kernel

IN SUMMARY…



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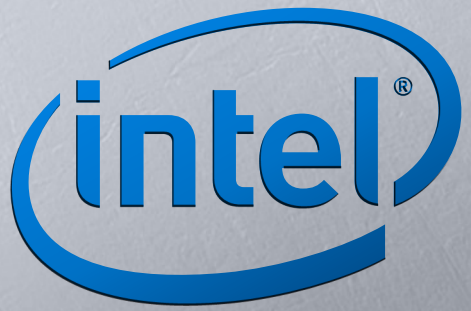
Delivering Computing Without Compromise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WORKLOAD DESCRIPTION FOR GAMING

Dirt Rally 2.0 - v1.7.0

Workload: Integrated Benchmark

- 1920x1080 – Fullscreen
- V-Sync: Off
- Multisampling: off
- Anisotropic Filtering: 4X
- TAA: On
- Preset: Low
- "-benchmark" launch option added
- Measured with: PresentMon, 180 seconds

World of Tanks enCore v0.1

- 1920x1080 - Fullscreen
- Antialiasing: none
- "Medium" quality preset

Rainbow Six: Siege – Y4S1

Workload: 5 minutes of gameplay in "Suburban Extraction" Situation

- 1920x1080 – Fullscreen
- V-sync: Off
- Medium Quality Preset
- Measured with: PresentMon, 300 seconds

Total War: Three Kingdoms – 1.2.0

Workload: "Battle" benchmark scenario

- 1920x1080 – Fullscreen
- V-Sync: off
- Low Quality Preset
- Resolution scaling: 100%

Counter-Strike: Global Offensive - 1.37.1.1

Workload: 5 minutes of gameplay replay

- 1920x1080 – Fullscreen
- Medium Quality Presets
- Multicore Rendering: Enabled
- FXAA: Disabled
- Texture Filtering Mode: Anisotropic 4X
- Vsync: Off

Halo: The Master Chief Collection: Halo Reach – prerelease build

Workload: 5 minutes of gameplay from "winter contingency" mission

- 1920x1080 – Fullscreen
- "Performance" preset

Rocket League – v1.62

Workload: 5 minutes of gameplay against Bots on Mannfield Map

- 1920x1080 – Fullscreen
- Medium Quality Presets
- Vsync: Off
- Anti-Aliasing: Off
- Render Quality: Quality
- Render Detail: Quality
- Texture Detail: Quality
- World Detail: Quality
- Particle Detail: High Quality
- High Quality Shaders: Enabled
- Dynamic Shadows: Enabled
- Weather Effects: Enabled
- Transparent Goalposts: Enabled

DOTA 2 – Client version 3.749

Workload: 5 minutes of gameplay replay

- 1920x1080 – Exclusive Fullscreen
- DX9 renderer
- "Fastest" quality setting

CONFIGURATION DISCLOSURE

OEM Optimization Performance: 3DMark Cloud Gate 1.16x, 3DMark Sky Diver 1.16x, 3DMark Night Raid 1.03x, 3DMark Fire Strike 1.13x, 3DMark Time Spy 1.03x, 3DMark11 1.14x, PCMark 10 Overall 1.05x, PCMark 10 Essentials 1.05x, PCMark 10 Productivity 1.04x, PCMark 10 DCC 1.06x, Photoshop RUG 1025 v1.0.0 1.15x, Adobe Lightroom RUG 1010 v2.0.4 1.18x, Adobe Lightroom RUG 1087 v1.0.1 1.04x, Microsoft Powerpoint RUG 1165 v1.1.0 1.47x Based on performance comparing Intel PreProduction 10th Gen Core i7 U 15W. Configuration: Processor: 10th Gen Intel® Core™ i7 (ICL-U 4+2) PL1=15W TDP, 4C/8T, Intel Gen 11 Graphics, PreProduction driver, Memory: 8GB LPDDR4X-3733, Storage: Intel SSD Pro 7600P 256GB, OS: Microsoft Windows* 10 RS6 Build Version 295 vs. Lenovo Yoga C940 Preproduction system: Processor: 10th Gen Intel® Core™ i7-1065G7, 4C/8T, Intel Gen 11 Graphics, 25.20.100.7011 driver, Memory: 8GB LPDDR4X-3733, Storage: SK Hynix PC401 512 GB, OS: Microsoft Windows* 10 RS6 Build Version 295. Measured by Intel as of August 2019

10th Gen "Ice Lake" gaming performance data: : Dirt Rally 2.0 1.37x, Rainbow Six: Siege 1.42x, Total War: Three Kingdoms 1.40x, DOTA 2 1.34x, CS:Go 1.31x, World of Tanks encore 1.35x, Halo Reach 1.33x, 3DMark Night Raid 1.32x, 3DMark Fire Strike 1.28x, 3DMark Time Spy 1.26x Based on gaming performance on those titles (settings on the next foil) comparing Razer Blade Stealth 13 at 15W and 25W. Configuration: Processor: Intel® Core™ i7 (ICL-U 4+2) PL1=25W TDP, 4C/8T, Intel Gen 11 Graphics, 25.20.100.7011 driver, Memory: 16GB LPDDR4X-3733, Storage: LiteOn CA3 256GB, OS: Microsoft Windows* 10 RS6 Build Version 295. Measured by Intel as of August 2019

10th Gen "Ice Lake" gaming performance competitive data: Dirt Rally 2.0 1.00x, Rainbow Six: Siege 1.03x, Total War: Three Kingdoms 1.43x, DOTA 2 1.84x, CS:Go 1.19x, World of Tanks encore 1.00x, Halo Reach 1.20x, 3DMark Night Raid 1.22x, 3DMark Fire Strike 1.17x, 3DMark Time Spy 1.20x Based on gaming performance on those titles (settings on the next foil) comparing Razer Blade Stealth 13 at 25W. Configuration: Processor: Intel® Core™ i7 (ICL-U 4+2) PL1=25W TDP, 4C/8T, Intel Gen 11 Graphics, 25.20.100.7011 driver, Memory: 16GB LPDDR4X-3733, Storage: LiteOn CA3 256GB, OS: Microsoft Windows* 10 RS6 Build Version 295 VS. Commercially available OEM system with AMD* Ryzen 7 3700U 2.3GHz Turbo up to 4GHz 4C/8T, 25W, AMD* Radeon* Vega 10 graphics, Gfx driver Adrenalin 2019 19.8.1, Memory 8GB DDR4-2400, Storage SK Hynix BC501 256GB, OS – Microsoft Windows* 10 RS6 Build Version 295 Bios F.07. Measured by Intel as of August 2019

AIXPRT performance: Based on AIXPRT Community Preview 2, OpenVINO 1.19.31, inference runtime v2018.5.445, comparing Razer Blade Stealth 13 at 25W. Configuration: Processor: Intel® Core™ i7 (ICL-U 4+2) PL1=25W TDP, 4C/8T, Intel Gen 11 Graphics, 25.20.100.7011 driver, Memory: 16GB LPDDR4X-3733, Storage: LiteOn CA3 256GB, OS: Microsoft Windows* 10 RS6 Build Version 295 VS. Commercially available OEM system with AMD* Ryzen 7 3700U 2.3GHz Turbo up to 4GHz 4C/8T, 25W, AMD* Radeon* Vega 10 graphics, Gfx driver Adrenalin 2019 19.8.1, Memory 8GB DDR4-2400, Storage SK Hynix BC501 256GB, OS – Microsoft Windows* 10 RS6 Build Version 295 Bios F.07. Measured by Intel as of August 2019

Windows without compromise data: PCMark 10 Applications 1.70x, Geekbench Single 2.13x, Geekbench Multi 1.11x, 3DMark Night Raid 1.13x Graphics 1.26x CPU 0.81x, AppMark 2018 2.15x, WebXPRT 3 Edge 1.89x, WebXPRT 3 Chrome 3.56x, Speedometer 2.0 Edge 1.46x, Speedometer 2.0 Chrome 4.17x, GFXBench 3.0 Manhattan Off Screen 2.34x, 7zip 1T 2.24x, 7zip MT 1.26x, DOTA 2 1.60x, World of Tanks enCore 1.71x, Rocket League 1.13x, PCMark 10 Applications Battery 0.90x. Based on performance comparing HP Folio 2-in-1 Configuration: Processor: Intel® Core™ i7-8500Y, 2C/4T, 25.20.100.6617 driver, Memory: 8GB LPDDR3-1866, Storage: 256 GB Samsung PM981, OS: Microsoft Windows* 10 RS6 Build Version 295 VS. Commercially available OEM system with Qualcoimm* Snapdragon 850 8C/8T, Qualcomm Adreno 630, Gfx driver 28.18.10440.0, Memory 8GB LPDDR4X-3733, Storage 128 GB Samsung KLUDG4U1EA-B0C1 UFS 2.1, OS – Microsoft Windows* 10 RS6 Build Version 295 Bios 9ucn22ww. Measured by Intel as of August 2019

Windows without compromise data part 2: PCMark 10 Applications 2.06x, Geekbench Single 2.06x, Geekbench Multi 1.76x, 3DMark Night Raid 1.31x Graphics 1.33x CPU 1.22x, AppMark 2018 2.45x, WebXPRT 3 Edge 2.32x, WebXPRT 3 Chrome 3.50x, Speedometer 2.0 Edge 1.57x, Speedometer 2.0 Chrome 4.32x, GFXBench 3.0 Manhattan Off Screen 2.60x. Based on performance comparing Preproduction Intel system: Processor: Intel® Core™ i7-10510Y, 4C/8T, XXXX driver, Memory: XXXX, Storage: XXXX, OS: Microsoft Windows* 10 RS6 Build Version 295 VS. Commercially available OEM system with Qualcoimm* Snapdragon 850 8C/8T, Qualcomm Adreno 630, Gfx driver 28.18.10440.0, Memory 8GB LPDDR4X-3733, Storage 128 GB Samsung KLUDG4U1EA-B0C1 UFS 2.1, OS – Microsoft Windows* 10 RS6 Build Version 295 Bios 9ucn22ww. Measured by Intel as of August 2019

DEMO CONFIGURATION DISCLOSURE

Demo Productivity:
Microsoft Office 365 saving PowerPoint file to PDF. Based on performance comparing Dell XPS 13 Configuration: Processor Intel® Core™ i3-1005G1, 2C/4T, 25.20.100.7102 driver, Memory 8GB 3733MHz, brand N/A, Storage 256GB NVME Toshiba, OS: Microsoft Windows* 10 Build Version 18362.239 Vs ASUS ROG Zephyrus Configuration: AMD Ryzen 7 3750H, 4C/8T, Memory 8GB DDR4 2400MHz, Storage 500GB Intel SSDPEKNW, OS Windows* 10 Home Build Version 18362.295

Adobe 4K playback: Adobe Premiere Pro, v13.1, Video 4K HDR 10-bit playback. Based on performance comparing Dell XPS 13 2-in-1 Configuration: Processor: Intel® Core™ i7-1065G7, 4C/8T, 25.20.100.7007 Intel Iris Plus Graphics driver, Memory: 16GB LPDDR4-3733, Storage: Toshiba NVMe 512G, OS: Microsoft Windows* 10 Build Version 18362 Bios 1.0.9 VS. Commercially available OEM system with AMD Ryzen 7 3700U 4C/8T, 26.20.13001.40003 Radeon Vega 10 Mobile GFX, Memory 16GB LPDDR4-2400, Storage Lite on CA3-8D256 HP 237 GB Drive, OS – Microsoft Windows* 10 Build Version 18362.295, Bios AMI F.12

Adobe Premiere Pro: v13.1, Export of 4K UHD HEVC (H.265) video. Based on performance comparing ASUS ZenBook Configuration: Processor: Intel® Core™ i5-10210U, 4C/8T, 26.20.100.6952 Intel UHD Graphics driver, 26.21.14.3114 Nvidia GeForce GTX 1650, Memory: 8GB LPDDR4-2133, Storage: Intel Optane 477GB, OS: Microsoft Windows* 10 Build Version 18362.295 Bios GU502DU.203 VS. Commercially available OEM system with AMD Ryzen 7 3750H 4C/8T, 26.20.110161.1 Radeon Vega 10 Mobile GFX, 26.21.14.3602 Nvidia GeForce GTX 1660 Ti with Max-Q Design, Memory 16GB LPDDR4-2400, Storage 477GB GB Intel SSDPEKNW512GB, OS – Microsoft Windows* 10 Build Version 18362.295 Bios UX534FTC.201.

Halo The Master Chief Collection-beta: Halo The Master Chief Collection -beta, "Reach" gameplay. Based on performance comparing Razer Blade Stealth 13 Configuration: Processor: Intel® Core™ i7-1065G7, 4C/8T, 25.20.100.6665 Intel Iris Plus Graphics driver, Memory: 16GB LPDDR4-2400MHz, Storage: Samsung MZVLB256HAHQ-00000 256GB, OS: Microsoft Windows* 10 Build Version 1903 18362.295, BIOS: Razer E1.00 VS. Commercially available OEM system with AMD Ryzen 7 3700U 4C/8T, 25.20.14120.2001 Radeon Vega 10 Mobile GFX, Memory 16GB LPDDR4-2400, Storage Lite on CA3-8D256 HP 237 GB Drive, OS – Microsoft Windows* 10 Build Version 18362.295 Bios AMI F.12

Topaz Labs Gigapixel AI: Gigapixel AI v4.4.0; Image upscaling app using AI software; Lenovo Yoga S940, Processor: Intel® Core™ i7-1065G7, 4C/8T; 25.20.100.7102 Intel Iris Plus Graphics driver; Memory: 16GB LPDDR4-3733MHz, Storage: SAMSUNG MZVLB1T0HBLR-000L2; OS: Microsoft Windows 10 RS6 Build Version 18362.329; Bios: LENOVO AKCN99WW VS. Commercially available OEM system with AMD Ryzen 7 3700U 4C/8T, 25.20.14120.2001 Radeon Vega 10 Mobile GFX, Memory 16GB LPDDR4-2400, Storage Lite on CA3-8D256 HP 237 GB Drive, OS – Microsoft Windows* 10 Build Version 18362.295 Bios AMI F.12

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For more information go to www.intel.com/benchmarks.

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