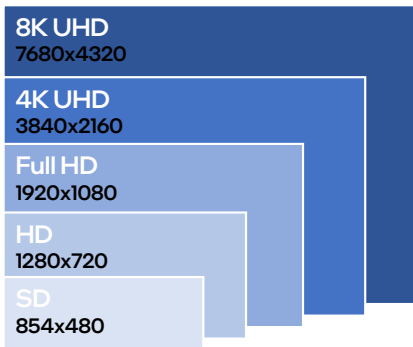


Accelerate AI-Assisted Video Upscaling with Topaz Labs and Intel[®] AMX on Intel[®] Xeon[®] W Processors

Video resolution is a primary component in providing visual clarity in finalized video presentations. Videos produced at higher resolutions have more pixels, which provide crisp, sharp images compared to videos at lower resolutions. Videos with low resolution have fewer pixels, which results in poor image quality. Video upscaling is the process of taking lower-resolution videos and increasing the resolution to enhance image quality. With video upscaling, grainy and blurred footage captured at lower resolutions can be viewed on modern displays with greater detail.



The practice of utilizing artificial Intelligence and machine learning (AI/ML) tools is rapidly advancing creative video editing workflows. AI/ML tools assist video editors by automating manual tasks which reduces time to completion. Topaz Video AI enlarges video images with ultra-sharp detail by restoring lost detail using machine learning. Intel[®] Xeon[®] processors optimize AI inferencing tasks with Intel's integrated accelerator, Intel[®] Advanced Matrix Extensions (Intel[®] AMX), found on the latest generation of Intel[®] Xeon[®] processors by delivering better performance by offloading inferencing tasks from the CPU. Intel[®] Xeon[®] workstations provide the performance required for the most demanding video editing workflows.

Topaz Video AI Key Features

Topaz Labs software intelligently deciphers noise from image detail and incorporates 24 AI/ML models to produce ultra smooth, ultra sharp, and steady video images. Additionally, Topaz Video AI empowers professional editors with the ability to easily upscale videos up to 16K resolution without sacrificing image quality. Topaz Video AI supports workstations as a standalone application or tightly integrates into Adobe Premiere and Blackmagic Design's DaVinci Resolve as a plugin. Additional Topaz AI benefits include creating smooth camera movement or creating new frames from existing footage to achieve a seamless slow-motion effect.



The Benefits of Intel[®] Xeon[®] W Processors

Intel[®] Xeon[®] W processors offer a broad range of technologies designed for creative professionals by delivering scalable performance, security, and reliability. The Intel[®] Xeon[®] workstations offer the configuration and flexibility for selecting the right combination of multi-GPUs, SSDs, and network cards. Large video and project files can be transferred rapidly between devices, and Intel[®] Xeon[®] workstations offer a high memory bandwidth for the most demanding creative workflows. Intel[®] Xeon[®] W processors also feature built-in AI engines to deliver exceptional inference and training performance for AI and machine learning workloads.

What is Intel® AMX?

The “magic” behind Topaz Labs is its deep understanding of images through the training of thousands of similar data sets. Intel® Advanced Matrix Extensions (Intel® AMX) found on the latest Intel® Xeon® W processors improve the performance of training and inferencing on the CPU,¹ which is ideal for the image-recognizing models within Topaz Video AI. Intel® AMX is a built-in accelerator that resides on the CPU core near system memory, making it often less complex to use than discrete accelerators. Intel® AMX works by enabling AI workloads to run on the CPU instead of offloading inferencing to a discrete accelerator, which can improve overall system performance. Intel® AMX supports both BF16 for training and inferencing and int8 for inferencing data types.

Intel® AMX and Topaz Video AI Use Case

Testing Environment	Processor	Cores	Threads
Workstation 1	Intel® Xeon® w7-3565X Processor	32	64
Workstation 2	Intel® Xeon® w7-3465X Processor	28	56

The testing environment included the Topaz Video AI upscaling feature on Intel® Xeon® workstations. The first workstation was equipped with an Intel® Xeon® w7-3565X processor (32C/64T) with Intel® AMX enabled. The second workstation was outfitted with the previous generation Intel® Xeon® w7-3465X processor (28C/56T), also with Intel® AMX enabled. The video used for testing was originally captured in SD (Standard Definition) at a resolution of 854 x 480 and upscaled 2X the original size and format to 1920 x 1080 (Full HD). The measure of units used for performance testing is Frames Per Second (FPS). FPS is the frequency or rate at which consecutive still images are displayed in a video to give the appearance of motion. Three runs (tests) of each workload were performed, with the results being the aggregate of the three tests.

The test resulted in the first workstation (Intel® Xeon® w7-3565X processor) completing video upscaling at 3.27 FPS with Intel® AMX enabled compared to the previous generation (Intel® Xeon® w7-3465X processor) upscaling at 3.07 FPS. The Intel® Xeon® w7-3565X CPU processes upscaling more frames per second, resulting in a faster completion time.

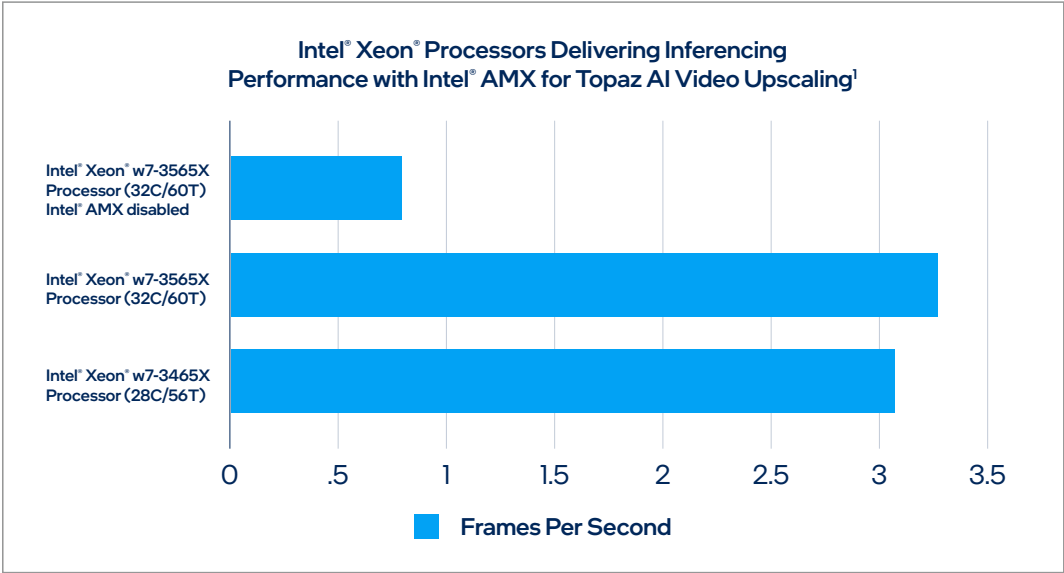


Figure 1. Intel® Xeon® w7-3565X processor with Intel® AMX completed more frames per second than previous generation Intel® Xeon® w7-3465X processor video upscaling AI workloads in Topaz Video AI.

Based on Topaz Labs - Video AI CPU Benchmark score results on Intel® Xeon® w7-3565X vs. Intel® Xeon® w7-3465X processor.¹

The second test included the highest performing CPU, the Intel® Xeon® w7-3565X processor, without Intel® AMX enabled for comparison. This test resulted in the video upscaling being completed in 0.79 FPS, displaying the performance advantage of Intel® AMX for this specific workload.

Conclusion

Intel® Xeon® workstations offer the flexibility, performance, and capacity to support complex video editing workflows. The incorporation of AI into creative workflows can accelerate workflows and time to completion. Intel® workstations with Intel® AMX enabled provided Topaz AI the acceleration needed to quickly upscale a video workload, which can speed up the overall project's completion time. The Intel® Xeon® w7-3565X processor would be recommended out of the tested system by delivering more FPS than the other three systems.

Learn More

- [Intel® Xeon® W Processors](#)
- [Intel® AMX](#)
- [Dell Precision Workstations](#)
- [Z By HP Workstations](#)
- [Lenovo ThinkStations](#)
- [Topaz Labs](#)



¹ Performance results are based on testing as of 7/12/2024

Intel® Xeon® w7-3565X processor, PL1= 335W TDP, 32C/64T, Turbo up to 4.6 GHz, Motherboard Name: Intel FHF RVP, Motherboard type: Pre-production, BIOS:FHFDCRB1.86B.0056.D23.2403040627, Graphics: Nvidia Quadro RTX A4000, Gfx version: 537.13, Memory: 256GB (8x32GB) DDR5-4800MHz ECC RDIMMs, Storage: 1TB Samsung 980 Pro, OS: Microsoft Windows 11 Pro (22H2) Service Pack 22621.2215, CPU Cooler: Air cooled, Tamper Protection (RS6): Enabled, Defender: Enabled, VBS: Enabled.

Intel® Xeon® w7-3465X processor, PL1= 225W TDP, 28C/56T, Turbo up to 4.6 GHz, Motherboard Name: Intel FHF RVP, Motherboard type: Pre-production, BIOS:FHFDCRB1.86B.0056.D23.2403040627, Graphics: Nvidia Quadro RTX A4000, Gfx version: 537.13, Memory: 256GB (8x32GB) DDR5-4800MHz ECC RDIMMs, Storage: 1TB Samsung 980 Pro, OS: Microsoft Windows 11 Pro (22H2) Service Pack 22621.2215, CPU Cooler: Air cooled, Tamper Protection (RS6): Enabled, Defender: Enabled, VBS: Enabled.

Benchmark Description:

Video AI Pro is a video effects and enhancement tool made by Topaz Labs, which utilizes the OpenVINO™ toolkit. Within Video AI Pro is a benchmark tool that measures performance (FPS, higher is better) of AI-enhanced video upscaling across multiple media input resolutions and upscaling targets (1x, 2x, 4x) and can be run on different AI processors, Multi-GPU or CPU. Performance measure utilized the Apollo at 4X Slowmo FPS. For more information about Topaz Lab – Video AI Pro visit: <https://www.topazlabs.com/video-pro>

Performance varies by use, configuration, and other factors. Learn more at www.intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary.

Intel technologies may require enabled hardware, software, or service activation.

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