

**Intel® High Definition Experience & Performance Ratings Test 2009
(Intel® HDXPRT 2009)
Whitepaper**

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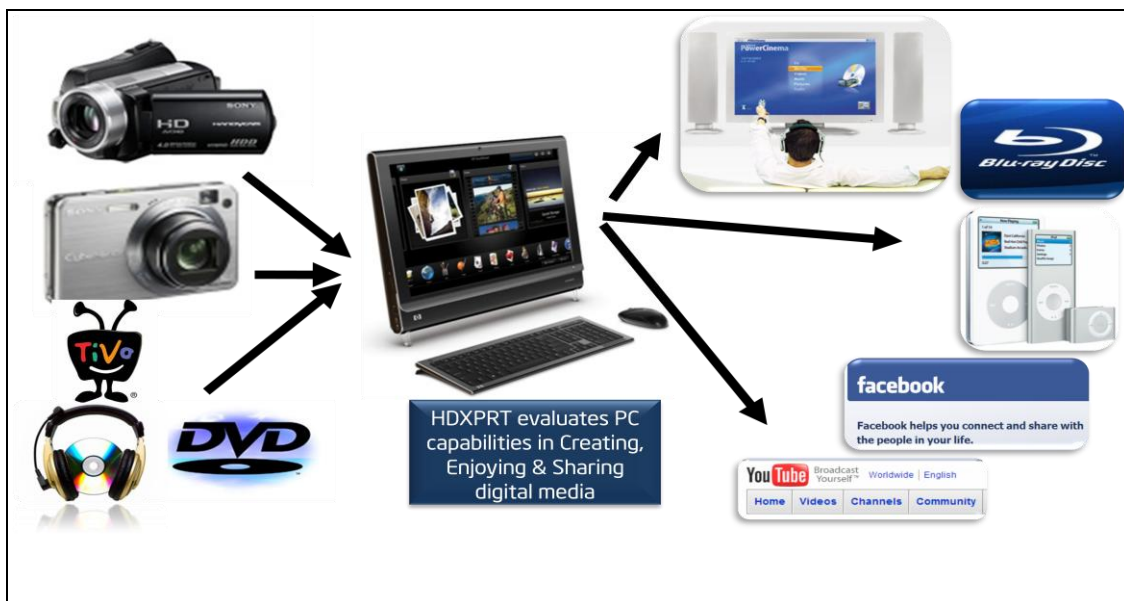
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1. Intel® HDXPRT Overview

The Intel® High Definition Experience & Performance Ratings Test (Intel® HDXPRT) evaluates the capabilities of a PC in consumer digital media usages. Intel® HDXPRT's results are presented in a way that is meaningful to and easily understandable by consumers. Intel® HDXPRT workloads are based on commonly used applications such as Apple® iTunes® and Adobe® Photoshop Elements®.

2. Usage categories measured by HDXPRT 2009

Intel® HDXPRT evaluates PC capabilities in Creating, Enjoying and Sharing digital media content.



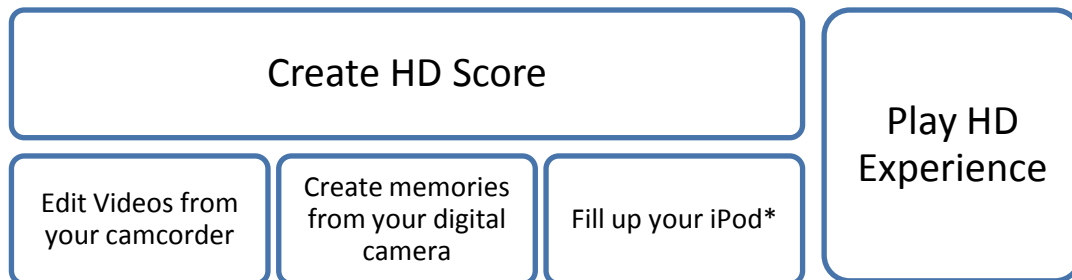
The two major usage categories measured by Intel® HDXPRT are -

1. Digital media creation, and
2. HD Video Playback

The Digital media creation category is comprised of three subcategories - HD Video editing, Photo processing, and media conversion for portable devices.

The following table describes the results produced by Intel® HDXPRT.

HDXPRT 2009 Results



Intel® HDXPRT's 'Play HD Experience' rating describes the playback experience delivered by the test system while playing HD Videos in H.264 and Flash formats.

Intel® HDXPRT's 'Create HD Score' represents the test PC's performance in digital media creation. The 'Create HD Score' is based on the test system's performance in the three subtests - Edit Videos from your camcorder, Create memories from your digital camera, and Fill up your iPod*.

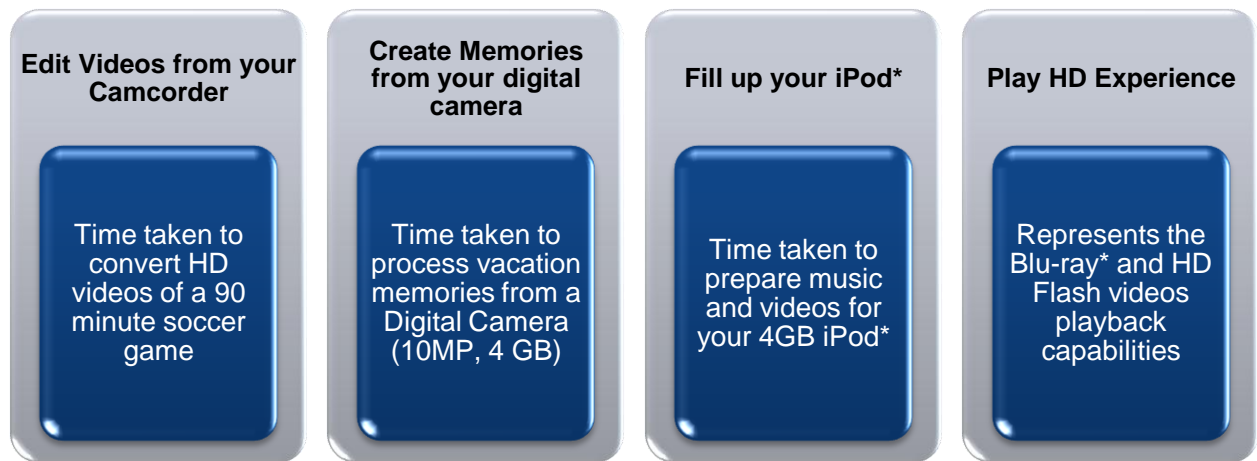
3. Workload scenarios and scoring metrics

This section describes the test scenarios and scoring metrics for each of the Intel® HDXPRT's usage categories in detail.

The media creation usages in Intel® HDXPRT are measured in terms of how fast the test system can complete the entire workload scenario.

Because Play HD Video usage is qualitative in nature, Intel® HDXPRT measures the level of experience delivered to the user. Intel® HDXPRT uses cutting-edge video analysis techniques based on perceptual models to predict the Play HD video experience. These models are based on industry-standard video quality assessment methodologies that incorporate opinions of real people.

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a. Edit Videos from your camcorder

Metric: Time taken to convert 90 minutes of HD video footage to create videos for sharing on the Internet and archiving on Blu-ray*.

Workload Scenario

James recorded his niece's soccer game using his HD camcorder (720p HDV). James wants to upload the videos of the game to YouTube* to share with his niece and her teammates. He also wants to archive the highlights of the game.

James is creating nine 10-minute videos in DivX that cover the entire game to upload to YouTube so that his niece and her teammates can watch the exciting moments of their game.

James then prepares a 10-minute video with highlights of the game in H.264 to create a Blu-ray* disc with highlights of this season.

James then creates a 2-minute Flash video to publish on his website.

b. Create Memories from your digital camera

Metric: Time taken to process vacation photos and videos from a 10 mega-pixel digital camera with 8GB storage capacity.

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Workload Scenario

The Smiths captured memories from their Fiji vacation on their 10 Mega-Pixel digital camera with 4 GB memory (~ 200 photos, 10 minutes of video footage). They want to archive the photos and video clips on their PC and also share with friends and family.

Jane converts the first set of photos (~ 120) from RAW to JPEG.

Jane then converts a video clip (~ 3 minutes) to DivX* to share on YouTube.

Jane creates a Panorama image by stitching photos of their resort in Fiji.

Jane then starts a batch process to convert all the remaining RAW photos to JPEG.

While the photos are being converted she starts encoding the second video clip to DivX.

Jane then starts encoding third video clip to DivX. While the encoding is happening in the background, she starts creating some more Panorama photos of the grand vistas she shot in Fiji.

Jane creates a Photo Book with 100 photos to print.

Jane creates a slide show with selected photos (~ 16) to share with friends.

*c. Fill up your iPod**

Metric: Time taken on the test system to convert 4GB of music and videos to take them on an iPod*.

Workload Scenario

Charlie purchased a new iPod and wants to fill it up with his latest music and favorite videos. Charlie's iPod has 4 GB capacity.

Charlie rips his latest music CDs (~ 10 Albums) to MP3 format.

Charlie rips his favorite music collection (~ 125 songs) to AAC format to copy the music to his iPod.

Charlie then converts a music video (~ 5 minutes, source: HD MPEG2 720p) to iPod format.

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Charlie then converts a video of his music band's recent performance to load on his iPod. After starting the video conversion, Charlie starts ripping some of his recent CDs (~ 5 Albums) to put on his iPod*

The 'Create HD score' is based on the above 3 media creation usages. It is calculated by taking a geometric mean of ratios between test systems scores and scores of a calibration system (Intel® Core 2 Duo E5200, 2 GB DDR2 800 MHz memory, G45, Windows® Vista™ Ultimate) in the three create usages. Intel® HDXPRT 'Create HD Score' represents the system's overall media creation performance. It provides a quick and relative comparison of multiple systems.

d. Play HD Experience

Metric: Intel® HDXPRT's Play HD Experience rating, shown in number of stars, is an average of the experiences delivered by the test system in the two HD playback test cases. The 5 star rating system indicates the quality of experience (Excellent, Good, Fair, Poor or Very Poor) delivered by the test PC.

Intel® HDXPRT Play HD experience measures only the video playback smoothness of High-Definition progressive videos. HDXPRT does not evaluate the frame quality or video post processing capabilities of the test PC. When playing most Film (progressive) content on PCs, the frame quality is typically not affected.

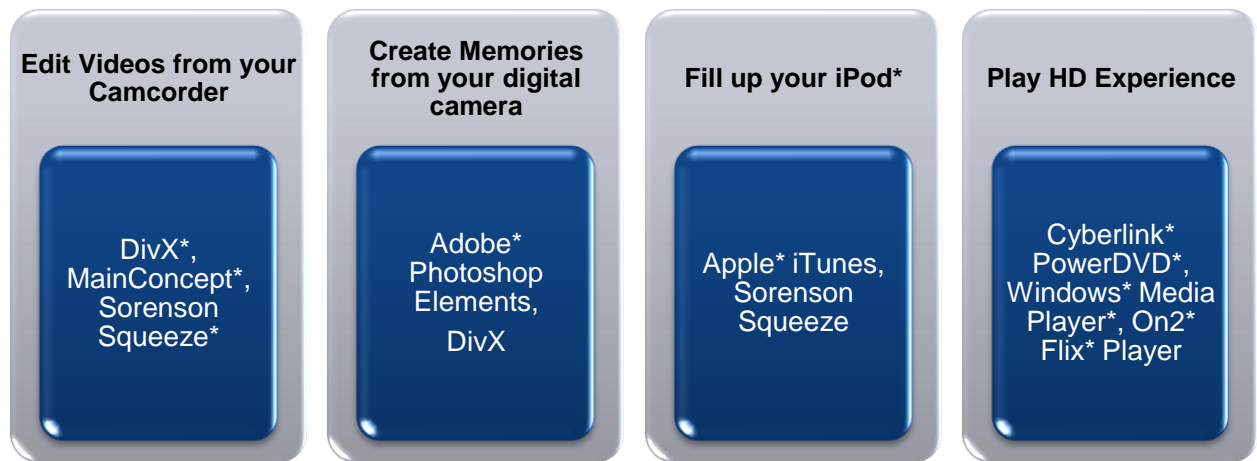
Workload Scenario

Jane and Joe are watching their favorite movie that recently came out on Blu-ray (1080p HD, H.264). They are playing the movie on their Home Theater PC.

Later, Joe watches an HD Movie from an Internet video site while encoding his recent home movie to DivX to publish on YouTube.

4. Applications used in HDXPRT 2009

HDXPRT 2009 workloads are based on usages performed with common consumer applications.



The following applications are required to run a HDXPRT 2009 test. The following is a list of the applications required by HDXPRT 2009:

- i. Cyberlink* PowerDVD* 8 with H.264 support.
- ii. DivX Pro Codec 6.8.5.
- iii. Sorenson Squeeze 5 Pro.
- iv. On2 Flix Standard Demo.
- v. Adobe Photoshop Elements* 7.0.
- vi. Apple iTunes 8.x

To make it easy for users to test HDXPRT, trial versions of some of the required applications are included in HDXPRT setup and are automatically installed when HDXPRT is installed. However, some applications are not bundled in the HDXPRT setup and need to be installed separately by the user. Please refer to the Intel® HDXPRT user manual for more information.

5. Minimum System Requirements

- Intel Celeron® D CPU 430 (1.8 GHz, 800 FSB) or equivalent
- 1 GB Dual Channel DDR2 SDRAM at 533MHz (2 GB recommended)
- Free Disk space - 5 GB
- Video Display resolution - 1024x768
- Microsoft* Windows* Vista* 32/64-bit editions with Service Pack1
- Microsoft* Windows* 7 32/64-bit editions (verified with Windows* 7 Build 7201)

Currently, Intel® HDXPRT can be installed only on English US versions of the supported operating systems.

6. HDXPRT 2009 System characteristics

This section describes the characteristics and sensitivities of Intel® HDXPRT 2009 results to different system components. These components include the Processor frequency, Processor Cores, system memory, video card and storage type. For each of these studies only one system component (e.g. Processor frequency) is varied. All the other system components are held constant.

a. Processor Frequency

Frequency (GHz)	2.66	3	3.33
Frequency	1.0	1.13x	1.25x
System	Intel Core2 Duo E8200	Intel Core2 Duo E8400	Intel Core2 Duo E8600
Create HD Score	1.0	1.10x	1.22x
Edit Video	1.0	1.11x	1.22x
Create Memories	1.0	1.08x	1.19x
Fill iPod	1.0	1.10x	1.24x
Play HD Experience	5 stars	5 stars	5 stars

Intel® HDXPRT 2009 - Processor Frequency Sensitivity (Intel DG45ID motherboard, 2 GB DDR2 800 memory, Seagate 320GB, 1024x768 video resolution, Windows Vista*)*

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b. Processor Cores

Number of Cores	2	4
Frequency (GHz)	2.66	2.66
System	Intel Core2 Duo E8200	Intel Core2 Duo Q9400
Create HD Score	1.0	1.26x
Edit Video	1.0	1.48x
Create Memories	1.0	1.12x
Fill iPod	1.0	1.21x
Play HD Experience	5 stars	5 stars

Intel® HDXPRT 2009 - Processor Core Sensitivity (Intel DG45ID motherboard, 2 GB DDR2 800 memory, Seagate 320GB, 1024x768 video resolution, Windows* Vista*)

c. System Memory

System Memory (GB)	1	2	4
System	Intel Core2 Duo E5200	Intel Core2 Duo E5200	Intel Core2 Duo E5200
Create HD Score	1.0	1.15x	1.18x
Edit Video	1.0	1.03x	1.03x
Create Memories	1.0	1.48x	1.58x
Fill iPod	1.0	1.01x	1.02x
Play HD Experience	5 stars	5 stars	5 stars

Intel® HDXPRT 2009 - System Memory Sensitivity (Intel Core2 Duo E5200, Intel DG45ID motherboard, DDR 800 memory, Seagate 320GB, 1024x768 video resolution, Windows Vista)

d. Graphics card

Graphics Card	Intel G45	ATI* Radeon* HD 3450	nVidia* GeForce* 8800GT
Create HD Score	1.0	1.03x	1.01x
Edit Video	1.0	0.99x	0.99x
Create Memories	1.0	1.04x	1.04x
Fill iPod	1.0	1.04x	0.98x
Play HD Experience	5 stars	5 stars	5 stars

Intel® HDXPRT 2009 - Graphics Card Sensitivity (Intel Core2 Duo E5200, DG45ID motherboard, 2 GB DDR 800 memory, Seagate 320GB, 1024x768 video resolution, Windows Vista)

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e. Disk type

Hard Disk Type	HDD	SSD
Create HD Score	1.0	1.02x
Edit Video	1.0	1.03x
Create Memories	1.0	1.04x
Fill iPod	1.0	1.0x
Play HD Experience	5 stars	5 stars

Intel® HDXPRT 2009 - Disk Type Sensitivity (Intel Core i7-950, Intel X58 motherboard, 3 GB DDR3 1066 memory, Seagate HDD 320GB, Intel SSD 80GB, 1024x768 video resolution, Windows Vista)

7. Contact Information

If you require any additional information or if you want to provide feedback, please email us at ICF_Support@intel.com

For up to date information, please refer to the following URL:

<http://www.IntelCapabilitiesForum.net>