IDF2011
INTEL DEVELOPER FORUM

Microsoft Windows* Platform Evolution and UEFI

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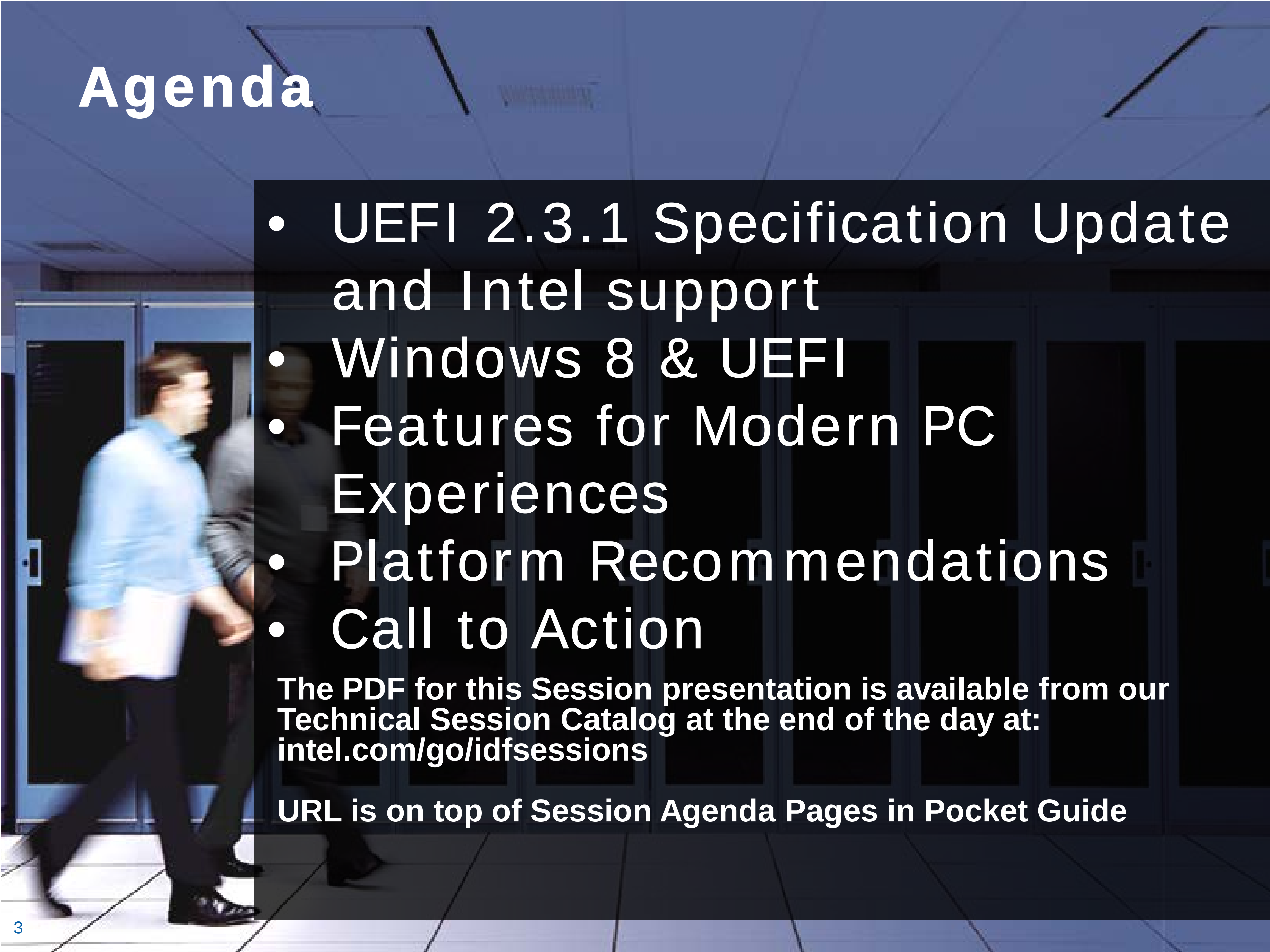
Agenda



- UEFI 2.3.1 Specification Update and Intel support
- Windows 8 & UEFI
- Features for Modern PC Experiences
- Platform Recommendations
- Call to Action

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URL is on top of Session Agenda Pages in Pocket Guide

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UEFI Specifications 2.3.1 Key Features

Released in Q2'11

Security

- Authenticated Variable & Signature Data Base
- Key Management Service (KMS)
- Storage Security Command Protocol for encrypted HDD

Interoperability

- New FC and SAS Device Path
- FAT32 data region alignment
- HII Updates

Technology & Performance Updates

- USB 3.0
- Netboot6 client (report platform ID using DUID-UUID)
- Non-blocking interface for BLOCK-oriented devices

Intel® UEFI Development Kit (UDK) 2010 SR1 (Q4'11 target release)[1]

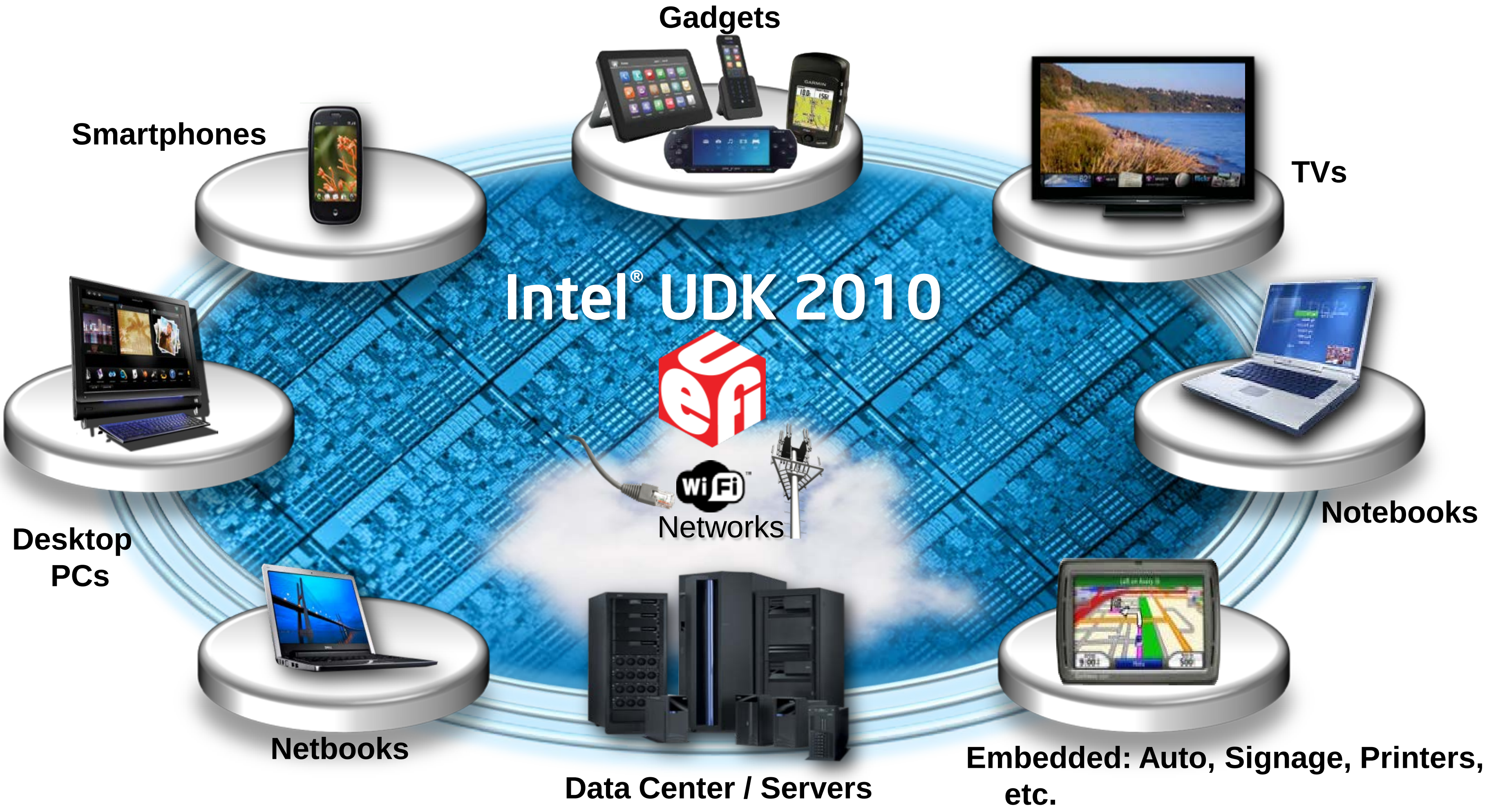
Updated for UEFI 2.3.1+ and PI 1.2+

Enabling key OS partners for UEFI 2.3.1

Enable UEFI 2.3+ Security Features

Intel® UDK 2010 SR1 enables key UEFI features for the industry

[1] Date subject to change without notice



Intel Product Groups are aligned on the Intel common core code base foundation and will be supporting UEFI 2.3.1 on all future platforms

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Why UEFI?

- User Experience value prop from Day one: Fast Boot, OEM Certification, smooth transitions, etc.
- Secure Boot
- eDrive support for BitLocker
- SOC support
- WDS Multicast
- Boot Next support
- Seamless Boot
- Network unlock support for BitLocker
- Support for > 2.2 TB system disks

Windows 8 Certification– UEFI

- **Requirements:**
  - **All Windows 8 Client systems must ship in native UEFI mode**
    - **Class 2 – CSM Disabled**
    - **Class 3**
  - **Baseline is UEFI 2.0 Windows 7 requirements**
    - **Secure Boot[1]**
    - **New graphics requirements**
    - **POST time maximums**
    - **OEM Certification display guidance**
- **If Implemented**
  - **BitLocker network key protector[1]**
  - **BitLocker Encrypted Hard Drive (eDrive) support[1]**

[1]New with UEFI 2.3.1

Windows Deployment Paths

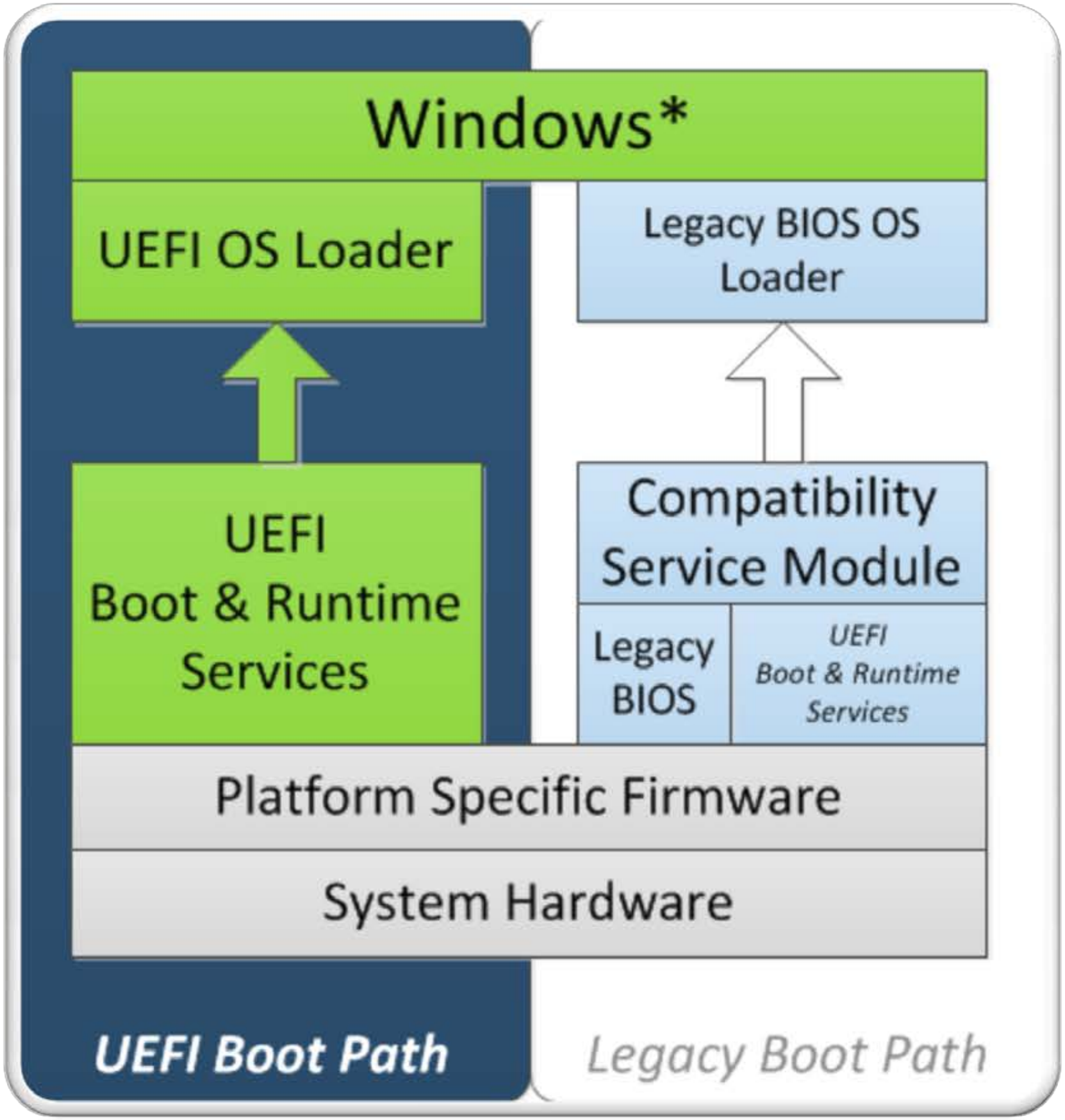
Original OS **UEFI or BIOS mode**	**Upgrade to Windows 8** **UEFI Native[2] Mode**	**Clean Install Windows 8** **UEFI Native[2] Mode**
Windows XP **(BIOS Only)**	No support	No Support
Windows Vista / 7 **(BIOS mode)**	No support	No Support
Windows Vista / 7 **(UEFI mode)**	**Yes**	**Yes**
Windows 8 **(BIOS mode)[1]**	No support	No support

[1] Windows 8 supports install in BIOS mode systems (Legacy), but not feature parity between UEFI and BIOS systems

[2] UEFI Native Mode – UEFI BIOS without CSM

Windows 8 Boot Flow

- Windows 8 installs UEFI OS Loader if UEFI is detected
- Most PCs today boot through CSM path
- For compatibility the CSM boot path available


Windows*
UEFI OS Loader
Legacy BIOS OS Loader
UEFI Boot & Runtime Services
Compatibility Service Module
Legacy BIOS
UEFI Boot & Runtime Services
Platform Specific Firmware
System Hardware
UEFI Boot Path
Legacy Boot Path

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Optimizing for UEFI

- Redesign legacy Option ROMs into UEFI Option ROMs
- IHVs – deploy UEFI option ROM support, manufacturing tools and device drivers with UEFI support
- ODMs – provide service with updated toolsets, 64-bit environments, native factory tools with UEFI
- OEMs – secure your firmware, optimize for speed
- Consumer – look for newer UEFI based platform firmware

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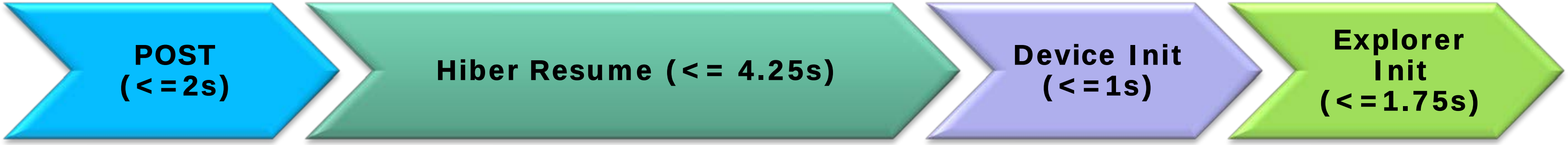
Windows 8 Certification Requirements – UEFI Boot

Boot Performance Requirements


POST (<=2s)

Hiber Resume (<= 4.25s)

Device Init (<=1s)

Explorer Init (<=1.75s)

- Windows 8 aims to support <10s boot, on SSD systems
  - POST: <2s (without TPM; SSD)
  - Resume: <4s (without CSM)
  - Device Init: <2s (varies by quality of driver)
- New WHQL Requirements for hardware design
  - TPM: <300ms init

Introduction to eDrives

What is an eDrive?

- A regular HDD that comes with hardware offload to accelerate crypto processing.

How is it different from SEDs?

- Self-Encrypting Drive
    - TCG standards
- Encrypted Drive
    - TCG OPAL + IEEE 1667

Why should the ecosystem care?

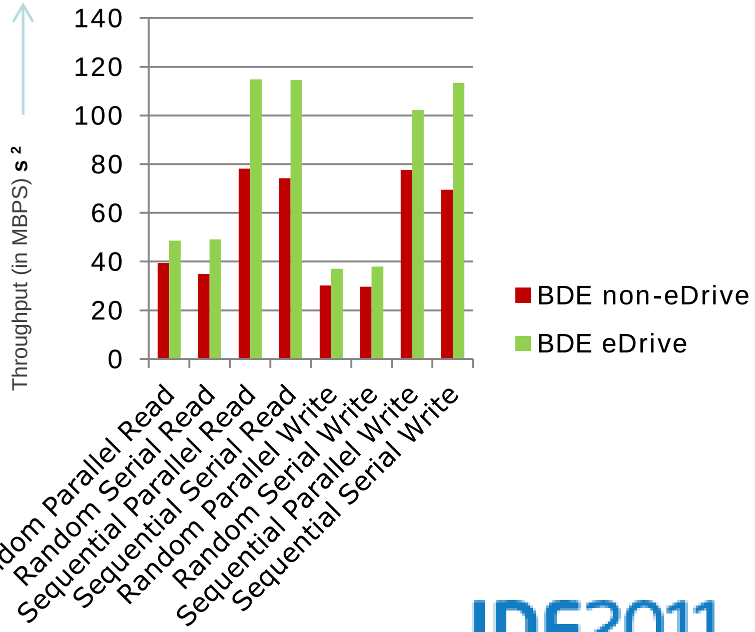
- Initial hardware-based encryption is near line.
- Faster than software-based during standard operation.
- Removes initial and on-going performance hit caused by software-based encryption be it BitLocker or other 3rd party.
- Standardize in-box support can enable broad adoption.

Goals for eDrive

- **Goals of feature:**
  - **Short term: Each OEM supports few PC configurations with eDrives at Windows 8 GA**
  - **Long term: eDrives are ubiquitous**

- **Value Proposition:**
  - **Initial encryption time eliminated**
    - **Non-eDrive: > 1 hour 20 minutes; eDrive: < 5 seconds [1]**
  - **Run time performance significantly improved**
  - **Common scenarios like startup, sleep, hibernate also improved**
  - **eDrive enabled systems have improved battery life**

Run-time Performance comparison



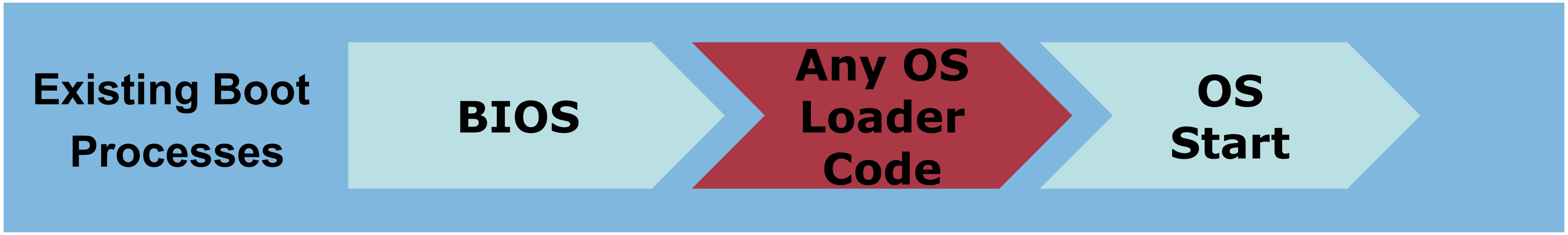
[1] for 150 GB HDD running MSIT standard laptop running Windows 8

[2] Higher throughput is more desirable..

Secured Boot: Improving Malware resistance

- Secure Boot: Firmware policy prevents launch of an untrusted OS by verifying the publisher of the OS Loader
- Anti-Malware Starts First: Reduce the likelihood of a compromised operating system through early launch of approved AM software during the boot process
- Measured Boot: Remotely determine if the operating system has been compromised by malware during the boot process via a comprehensive chain of measurements recorded during the boot process and stored in a Trusted Platform Module (TPM)

Secure Boot



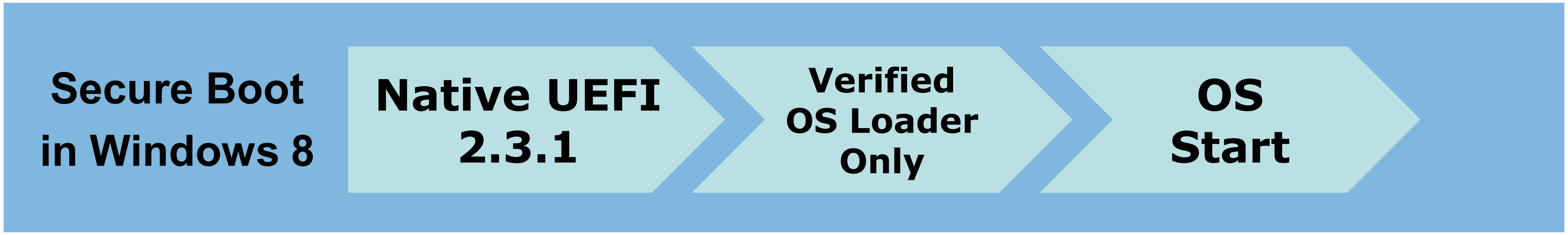
Existing Boot Processes

BIOS

Any OS Loader Code

OS Start

- The BIOS starts any OS loader, even malware
- Now firmware enforces policy, only starting trusted OS loaders
- OS loader enforces signature verification of later components



Secure Boot in Windows 8

Native UEFI 2.3.1

Verified OS Loader Only

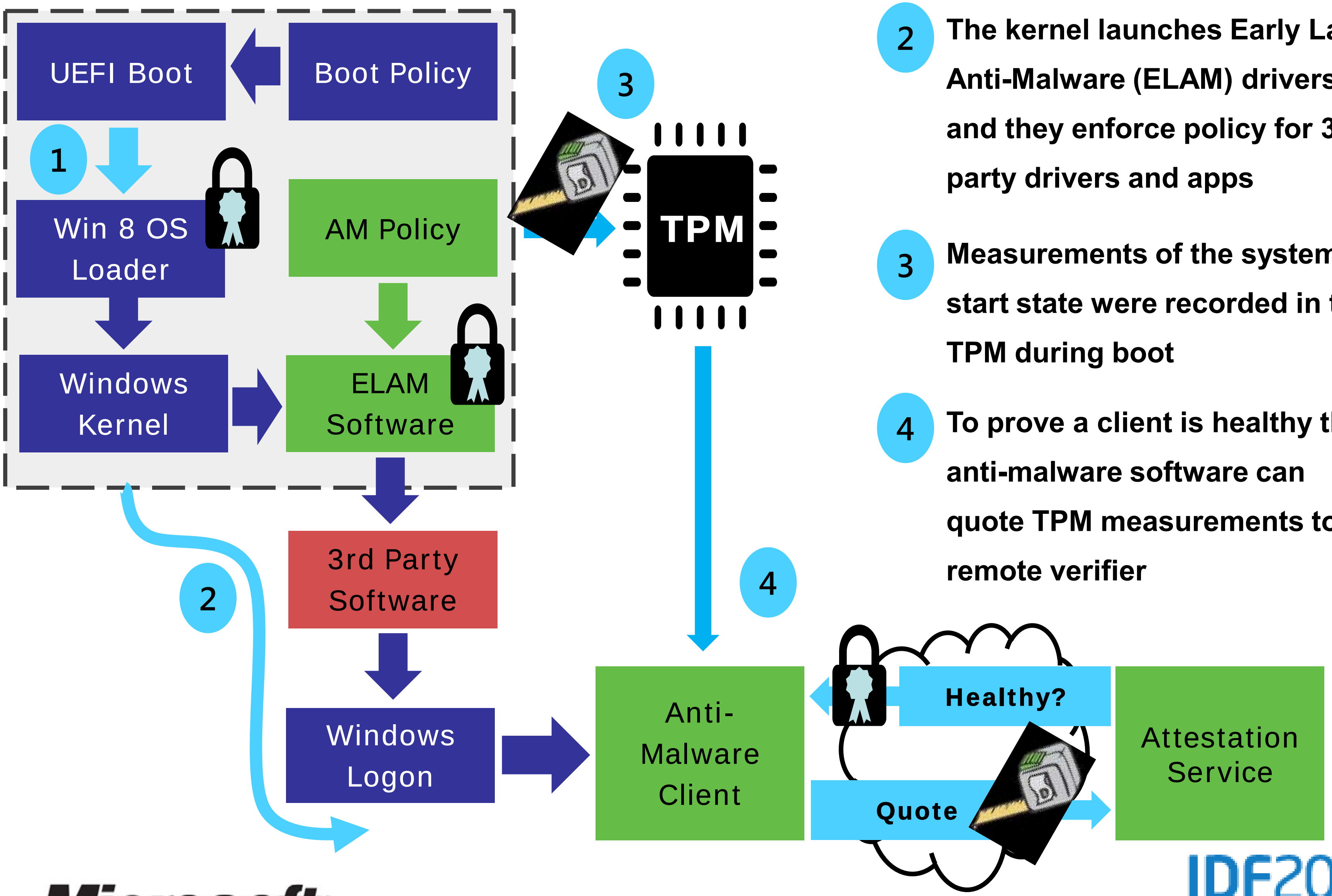
OS Start

- UEFI will only launch a verified OS loader – such as in Windows 8
- Malware cannot switch the boot loader

Secure Boot & Windows 8

- Challenges
  - Growing class of pervasive malware that targets the boot path
  - Should Windows be compromised by this type of attack, often the only plausible method to fix the problem is to reinstall the operating system
- Windows 8 Solution
  - Secure boot and remediation hardens the boot process against malware from the moment of power on through the initialization of anti-malware software
  - All firmware and software in the boot process must be signed by a trusted CA
- Required for all Windows 8 x64 client and SOC systems

Secured Boot Architecture



1 Secure Boot prevents running a unknown OS loader

2 The kernel launches Early Launch Anti-Malware (ELAM) drivers first and they enforce policy for 3rd party drivers and apps

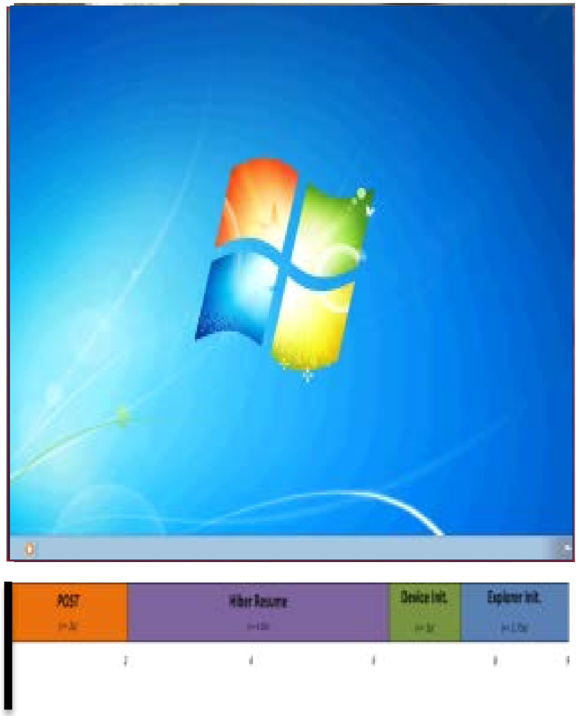
3 Measurements of the system start state were recorded in the TPM during boot

4 To prove a client is healthy the anti-malware software can quote TPM measurements to a remote verifier

A Seamless Boot Experience

…the modern PC experience

- Consistent requests for consumer electronics-like experience
- Current boot process is:
  - Disjointed, inconsistent
  - Displays varying levels of fidelity
  - When errors occur, displays scary text without actionable information
  - Making boot faster doesn't resolve the problem



Boot Visual Experience
with Hybrid Boot

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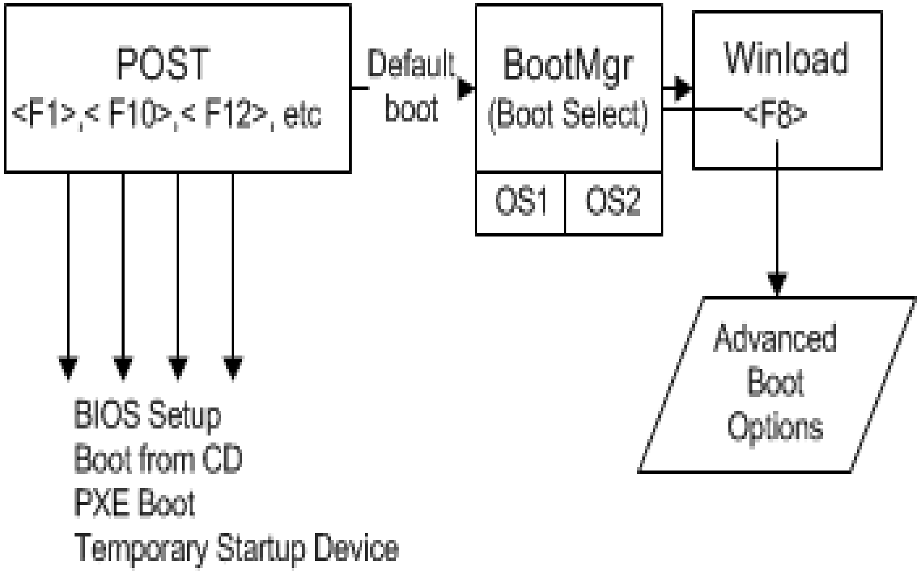
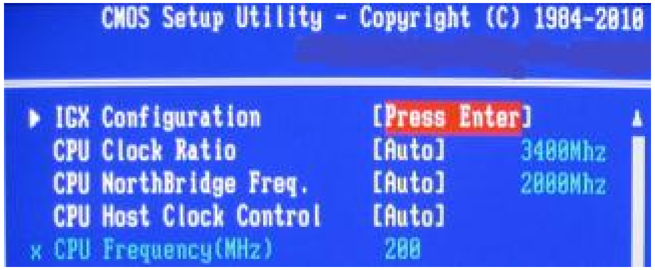
BIOS Legacy Setup

…Problems with today’s Boot Experience

- Lots of <Fn> key options
  - Many are proprietary
  - Lack consistency
- Time delay at POST for <Fn>
- No connection between OS and BIOS boot menus
- BIOS menus circa 1984





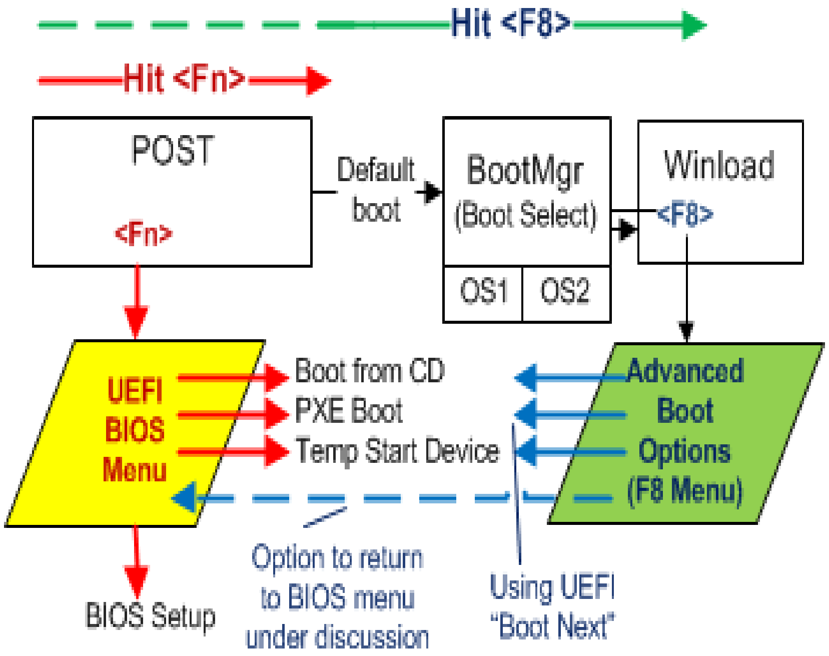
```
        CMOS Setup Utility - Copyright (C) 1984-2010

 ▶ IGX Configuration            [Press Enter]
   CPU Clock Ratio              [Auto]        3400Mhz
   CPU NorthBridge Freq.        [Auto]        2000Mhz
   CPU Host Clock Control       [Auto]
 x CPU Frequency(MHz)            200
```

Pre-OS Firmware Setup

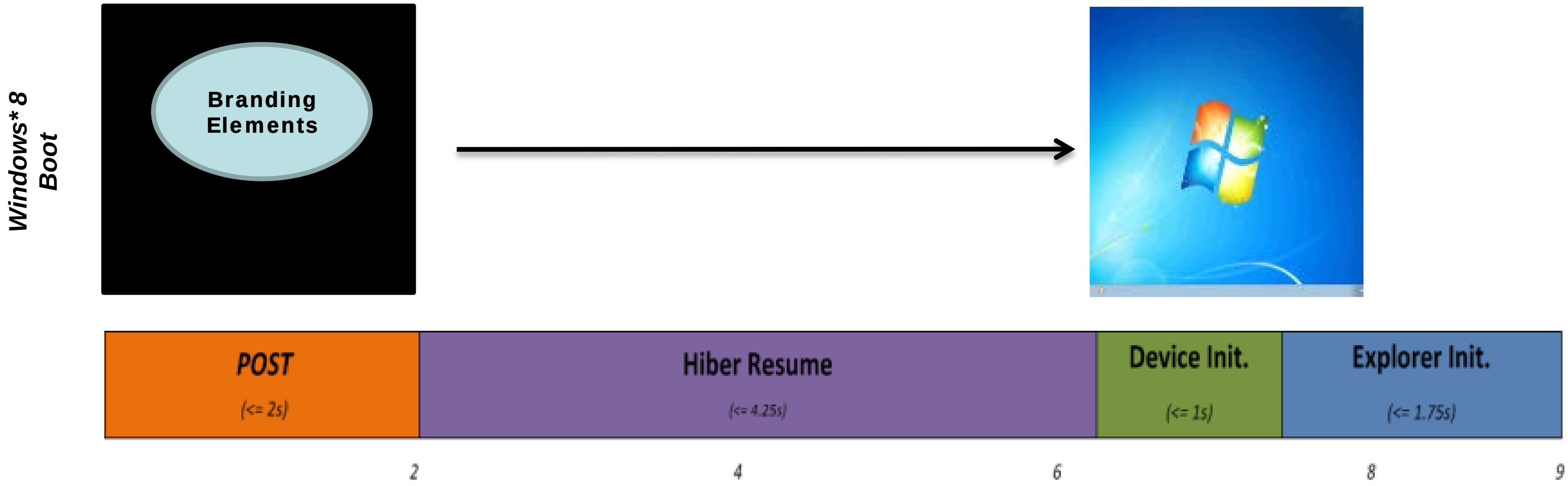
…Adding Firmware boot options to Boot Menu

- New Windows 8 Boot Menu
  - New Standard UI for all boot options
  - <Fn> key at post persisted without delay (keyboard buffer not cleared)
- Single <Fn> key option at POST
  - Standard across platforms
  - Differentiate in UEFI BIOS menu
  - No UI, no perf impact
- Preferred Key: Windows Key



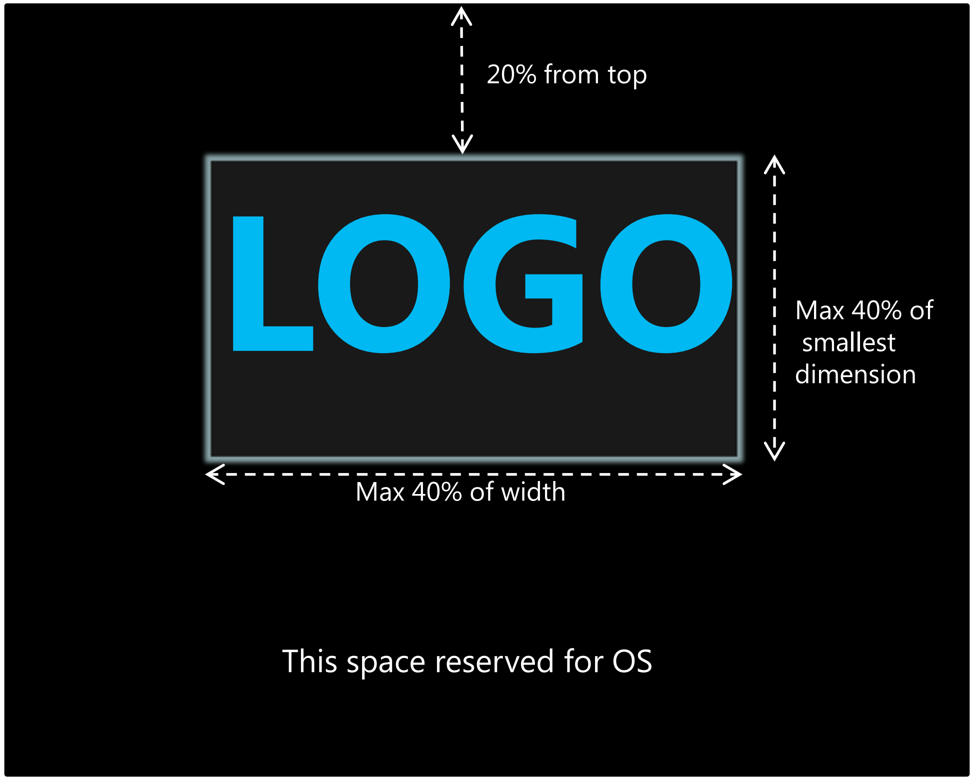
Seamless to the Desktop

…sleek and seamless



- Two visual experiences, seamless transition between them
- Clean up the look and feel of POST—proposed enhancements:
  - Render clean, high-resolution branding elements on black background
  - Remove “Text Mode” items / displays
  - Standardize input methods (e.g., F12 is always boot options across all systems)
- Fix / remove graphics mode switches
  - Several mode switches today—goal to reduce down to one when high-res driver is initialized
  - Systems should post with highest supported native display resolution

OEM Boot Certification



- Certification is always 20% from top
- No text should be placed around logo
- Logos should be no more than 40% in any direction of the height of the screen
- Progress indications will be drawn by OS in the bottom portion of the screen
- Background must be black

Demo

- Demonstrate Windows 8 Boot Experience

For More Information…

- @ IDF: Review sessions from Microsoft Security Presentation
  - SECS004 Integrating Intel® Platform Capabilities on Microsoft* Windows* Security Architecture
- @ BUILD: Review new Windows 8 content
  - http://www.buildwindows.com/
- Download and Evaluate Windows 8 builds!

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Windows 8 Platform Recommendations

- Improve platform security by ensuring that all assets are trusted on the platform
- Leverage UEFI drivers instead of option ROMs
- Design for adequate flash storage to store keys, certificates
- Consider impact of improved security
- Validate firmware components prior to execution
- Warn the customer if platform is not secure

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Summary

- All Windows 8 Client systems must ship in native UEFI mode
- Microsoft will continue to invest in UEFI
- Windows 8 & UEFI are foundation of the modern computing experience

Microsoft Call to Action

- Assess your UEFI readiness
  - Are you ready?
  - Are your processes ready?
  - Are your customers ready?
- Invest in platform firmware
  - Current investment, future potential
- Review //BUILD/ content
- Participate in UEFI plugfests
  - Bring your hardware, plug it in, test
- Join the UEFI Forum!
  - Contribute to the success of UEFI

Tunnel Mountain Intel DQTM57 UEFI 2.3.1 platform

Intel® UDK 2010 Compatible, supports UEFI 2.3.1

Pre-assembled systems available at HDNW, visit

http://www.Tunnelmountain.net

tomk@hdnw.com, (425) 943-5515 ext 42234. Use product name "Tunnel Mountain" when ordering

Comes with class 2 CSM and UEFI enabled firmware
Download site has Class 3 UEFI only firmware(nocsm)

Comes with serial port for debug
Can be ordered with optional ITP connector and socketed SPI flash - AC-SPEC4480

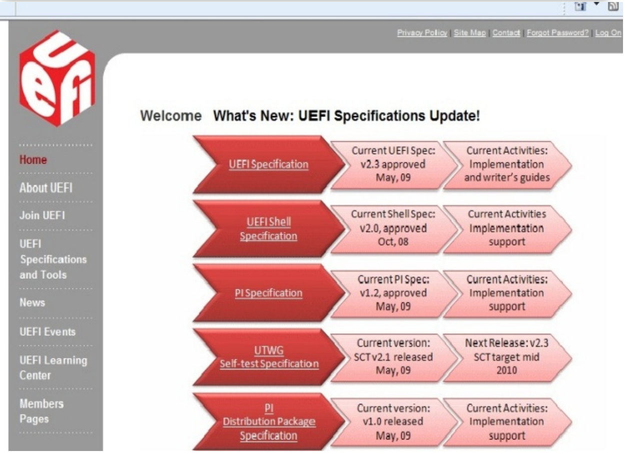
Visit http://developer.intel.com/technology/efi/uefi-ihv.htm for the latest information and other IHVs collateral

Fall 2011 UEFI Plugfest – Taipei, Oct 24-27

Visit www.UEFI.org for Event Info & Registration

UEFI Industry Resources

UEFI Forum



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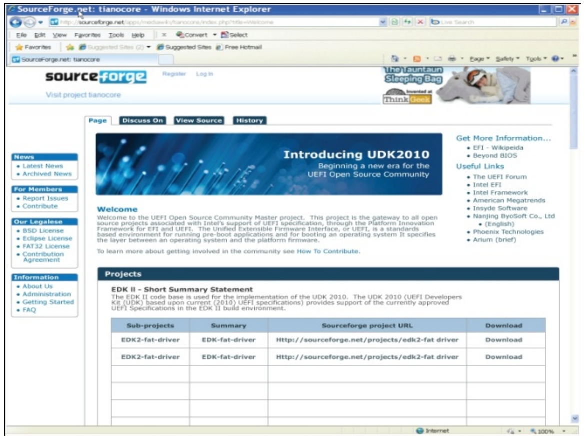
Welcome **What's New: UEFI Specifications Update!**

UEFI Specification	Current UEFI Spec: v2.3 approved May, 09	Current Activities: Implementation and writer's guides
UEFI Shell Specification	Current Shell Spec: v2.0, approved Oct, 08	Current Activities Implementation support
PI Specification	Current PI Spec: v1.2, approved May, 09	Current Activities: Implementation support
UTWG Self-test Specification	Current version: SCT v2.1 released May, 09	Next Release: v2.3 SCT target mid 2010
PI Distribution Package Specification	Current version: v1.0 released May, 09	Current Activities: Implementation support

www.uefi.org

UEFI Open Source



Introducing UDK2010
Beginning a new era for the UEFI Open Source Community

Welcome

Welcome to the UEFI Open Source Community Master project. This project is the gateway to all open source projects associated with Intel's support of UEFI specification, through the Platform Innovation Framework for EFI and UEFI. The Unified Extensible Firmware Interface, or UEFI, is a standards based environment for running pre-boot applications and for booting an operating system It specifies the layer between an operating system and the platform firmware.

To learn more about getting involved in the community see How To Contribute.

Get More Information...
- EFI - Wikipeida
- Beyond BIOS

Useful Links
- The UEFI Forum
- Intel EFI
- Intel Framework
- American Megatrends
- Insyde Software
- Nanjing ByoSoft Co., Ltd
  - (English)
- Phoenix Technologies
- Arium (brief)

Projects

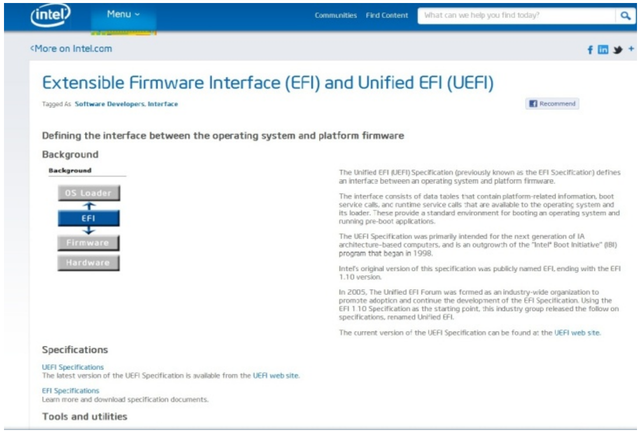
EDK II - Short Summary Statement

The EDK II code base is used for the implementation of the UDK 2010. The UDK 2010 (UEFI Developers Kit (UDK) based upon current (2010) UEFI specifications) provides support of the currently approved UEFI Specifications in the EDK II build environment.

Sub-projects	Summary	Sourceforge project URL	Download
EDK2-fat-driver	EDK-fat-driver	Http://sourceforge.net/projects/edk2-fat driver	Download
EDK2-fat-driver	EDK-fat-driver	Http://sourceforge.net/projects/edk2-fat driver	Download

www.tianocore.org

Intel UEFI Resources



Extensible Firmware Interface (EFI) and Unified EFI (UEFI)

Tagged As **Software Developers, Interface**

Defining the interface between the operating system and platform firmware

Background

The Unified EFI (UEFI) Specification (previously known as the EFI Specification) defines an interface between an operating system and platform firmware.

The interface consists of data tables that contain platform-related information, boot service calls, and runtime service calls that are available to the operating system and its loader. These provide a standard environment for booting an operating system and running pre-boot applications.

The UEFI Specification was primarily intended for the next generation of IA architecture-based computers, and is an outgrowth of the "Intel® Boot Initiative" (IBI) program that began in 1998.

Intel's original version of this specification was publicly named EFI, ending with the EFI 1.10 version.

In 2005, The Unified EFI Forum was formed as an industry-wide organization to promote adoption and continue the development of the EFI Specification. Using the EFI 1.10 Specification as the starting point, this industry group released the follow on specifications, renamed Unified EFI.

The current version of the UEFI Specification can be found at the UEFI web site.

Specifications

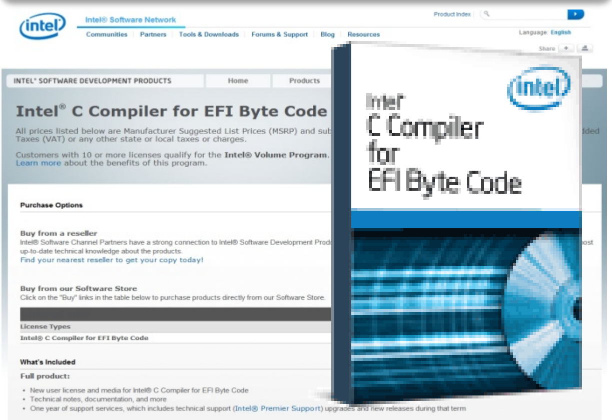
UEFI Specifications
The latest version of the UEFI Specification is available from the UEFI web site.

EFI Specifications
Learn more and download specification documents.

Tools and utilities

www.intel.com/technology/efi/index.htm

Intel EBC Compiler



Intel® C Compiler for EFI Byte Code

All prices listed below are Manufacturer Suggested List Prices (MSRP) and sub... Taxes (VAT) or any other state or local taxes or charges.

Customers with 10 or more licenses qualify for the **Intel® Volume Program**. Learn more about the benefits of this program.

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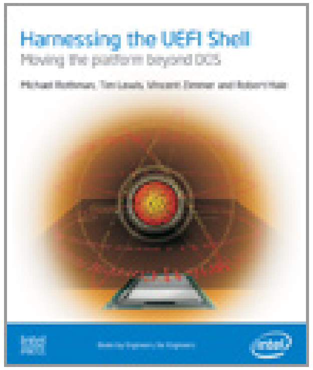
License Types
Intel® C Compiler for EFI Byte Code

What's Included

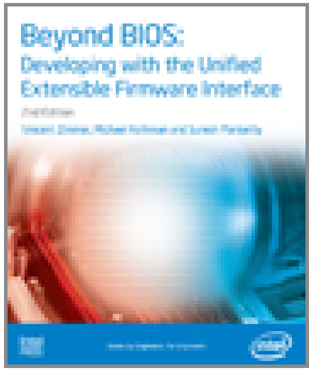
Full product:
- New user license and media for Intel® C Compiler for EFI Byte Code
- Technical notes, documentation, and more
- One year of support services, which includes technical support (Intel® Premier Support) upgrades and new releases during that term

http://software.intel.com/en-us/articles/intel-c-compiler-for-efi-byte-code-purchase/

UEFI Books



Harnessing the UEFI Shell
Moving the platform beyond DOS
Michael Rothman, Tim Lewis, Vincent Zimmer and Robert Hale
intel



Beyond BIOS:
Developing with the Unified Extensible Firmware Interface
2nd Edition
Vincent Zimmer, Michael Rothman and Suresh Marisetty
intel

www.intel.com/intelpress

Training/IHVs Contact

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- Intel IHVs UEFI Support
- Brian.Richardson@intel.com

UEFI Sessions Moscone SF IDF 2011

Session ID	Title	Company	Day / Time	Rm
✓ EFIS001	UEFI Security and Networking Advancements	Intel & Insyde SW	Tue 1:05 - 2:00	2009
✓ EFIS002	UEFI Innovations for Platform Security	Intel & AMI	Tue 2:10 - 3:00	2009
✓ EFIS003	Beyond DOS: UEFI Modern Pre-boot Application Development Environment	Intel & Phoenix Tech. LTD	Tue 3:20 - 4:10	2009
✓ EFIS004	Designing for Next Generation Best-In-Class Platform Responsiveness	Intel	Tue 4:25 - 5:15	2009
✓ EFIQ001	Hot Topic Q&A: UEFI in the Industry	All Speakers	Tue 5:25 - 6:00	2009
✓ EFIS005	Microsoft Windows 8 Platform Evolution and UEFI Requirements	Intel & Microsoft	Thu 1:05 - 1:55	2005
SPCQ003	Hot Topic Q&A: Intel & Microsoft - Windows 8	Intel & Microsoft	Thu 2:05 - 2:55	2005

✓ = DONE

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Q&A

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- Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.
- Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Go to: http://www.intel.com/products/processor_number
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Risk Factors

The above statements and any others in this document that refer to plans and expectations for the second quarter, the year and the future are forward-looking statements that involve a number of risks and uncertainties. Words such as “anticipates,” “expects,” “intends,” “plans,” “believes,” “seeks,” “estimates,” “may,” “will,” “should,” and their variations identify forward-looking statements. Statements that refer to or are based on projections, uncertain events or assumptions also identify forward-looking statements. Many factors could affect Intel’s actual results, and variances from Intel’s current expectations regarding such factors could cause actual results to differ materially from those expressed in these forward-looking statements. Intel presently considers the following to be the important factors that could cause actual results to differ materially from the company’s expectations. Demand could be different from Intel's expectations due to factors including changes in business and economic conditions, including supply constraints and other disruptions affecting customers; customer acceptance of Intel’s and competitors’ products; changes in customer order patterns including order cancellations; and changes in the level of inventory at customers. Potential disruptions in the high technology supply chain resulting from the recent disaster in Japan could cause customer demand to be different from Intel’s expectations. Intel operates in intensely competitive industries that are characterized by a high percentage of costs that are fixed or difficult to reduce in the short term and product demand that is highly variable and difficult to forecast. Revenue and the gross margin percentage are affected by the timing of Intel product introductions and the demand for and market acceptance of Intel's products; actions taken by Intel's competitors, including product offerings and introductions, marketing programs and pricing pressures and Intel’s response to such actions; and Intel’s ability to respond quickly to technological developments and to incorporate new features into its products. The gross margin percentage could vary significantly from expectations based on capacity utilization; variations in inventory valuation, including variations related to the timing of qualifying products for sale; changes in revenue levels; product mix and pricing; the timing and execution of the manufacturing ramp and associated costs; start-up costs; excess or obsolete inventory; changes in unit costs; defects or disruptions in the supply of materials or resources; product manufacturing quality/yields; and impairments of long-lived assets, including manufacturing, assembly/test and intangible assets. Expenses, particularly certain marketing and compensation expenses, as well as restructuring and asset impairment charges, vary depending on the level of demand for Intel's products and the level of revenue and profits. The majority of Intel’s non-marketable equity investment portfolio balance is concentrated in companies in the flash memory market segment, and declines in this market segment or changes in management’s plans with respect to Intel’s investments in this market segment could result in significant impairment charges, impacting restructuring charges as well as gains/losses on equity investments and interest and other. Intel's results could be affected by adverse economic, social, political and physical/infrastructure conditions in countries where Intel, its customers or its suppliers operate, including military conflict and other security risks, natural disasters, infrastructure disruptions, health concerns and fluctuations in currency exchange rates. Intel’s results could be affected by the timing of closing of acquisitions and divestitures. Intel's results could be affected by adverse effects associated with product defects and errata (deviations from published specifications), and by litigation or regulatory matters involving intellectual property, stockholder, consumer, antitrust and other issues, such as the litigation and regulatory matters described in Intel's SEC reports. An unfavorable ruling could include monetary damages or an injunction prohibiting us from manufacturing or selling one or more products, precluding particular business practices, impacting Intel’s ability to design its products, or requiring other remedies such as compulsory licensing of intellectual property. A detailed discussion of these and other factors that could affect Intel’s results is included in Intel’s SEC filings, including the report on Form 10-Q for the quarter ended April 2, 2011.

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