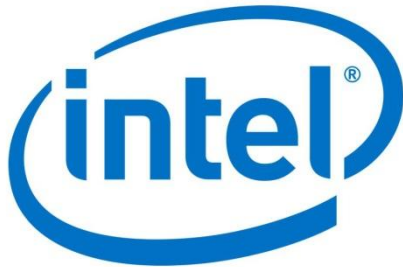


*presented by*



# Open Hardware for UEFI Development

UEFI Plugfest– March 18-22, 2013

Presented by Brian Richardson,  
(Sr. Technical Marketing Engineer, Intel Corporation)

# Agenda



- State of the Industry
- Gaps in UEFI Development
  - UEFI Development Kits
  - Lower Cost Options
  - Open Source
- Open Hardware Options
- Using Minnow Board for UEFI
- Summary & Questions

# State of the Industry

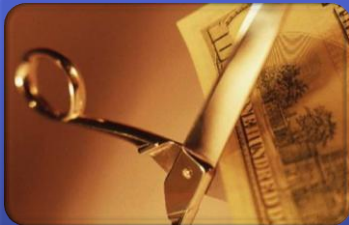


- UEFI adoption is strong in traditional client & server markets
- High adoption rate for operating systems and independent hardware vendors
- However, we're not quite done yet ...

# Gaps in UEFI Development



UEFI Development Kits



Lower Cost Options



Open Source

# UEFI Development Kits



- ✓ Test on EDK II (UEFI 2.3.1+)
- ✓ Includes multiple firmware binaries (release & debug)
- ☒ Limited models
- ☒ Firmware is binary-only
- ☒ Hardware isn't "hackable"

# Lower Cost Options



☒ UEFI Development Kits aren't cheap and have limited form factors

☒ Hobbyist users need more control than the UEFI Development Kit offers

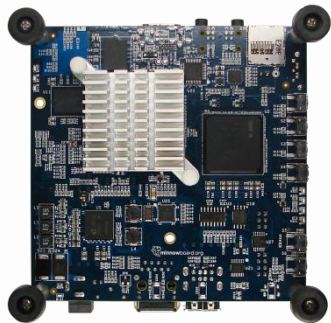


# Open Source



- ✓ UEFI Development Kit is based on EDK II (tianocore)
- ✗ Firmware project isn't available in open source
- ✗ Open source developers can't customize firmware (add/remove features)

# So where are gaps?



- Embedded
  - Small form factor
  - Industrial bus (CAN, I<sup>2</sup>C)
- Hobbyist
  - Lower cost x86
  - Open design (“hackable”)
- Open Source
  - Firmware changes w/o NDA



# Open Hardware Options



- A number of “open hardware” platforms are already supported in [tianocore.org](http://tianocore.org)
- However, UEFI isn't the default firmware
- Intel is changing this with Minnow Board



# minnowboard.org



- Intel® Atom™ CPU
- Intel Architecture for the small and low cost embedded market
- Built for the developer and maker community
- Excellent performance, flexibility, openness and standards for the price





# Hardware Features



- [Intel® Atom™ Processor E640](#) (1 GHz)
- 1 GB DDR2 RAM
- USB, PCIe, SATA & Gigabit Ethernet
- Expansion Bus: I<sup>2</sup>C, SPI, GPIO, SDIO, CAN
- Stackable & Expandable using “Lures”
  - Add-on boards for display, wireless & more
- Under \$200 & works “out of the box”



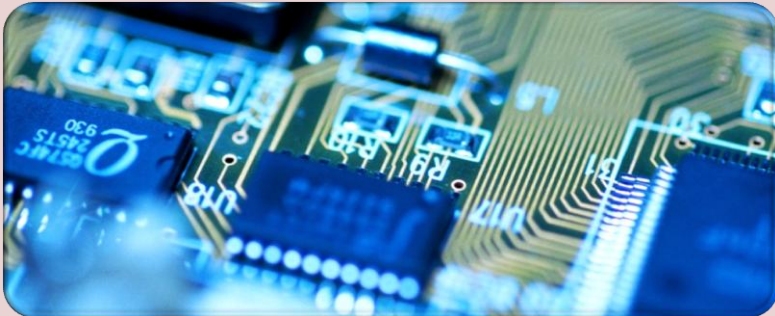
# UEFI Features



- Default firmware (binary)
  - UEFI 2.3.1c firmware with Fast Boot
  - Based on EDK II @ [tianocore.org](http://tianocore.org)
- Open hardware = open schematics
- 4MB SPI Flash with DediProg SPI header



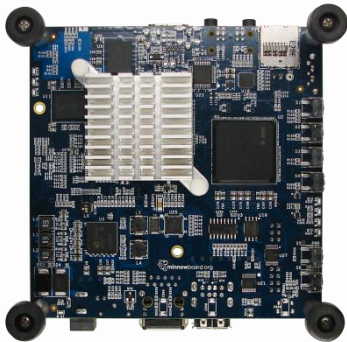
# Firmware Options



**Binary Images:**  
Multiple pre-built images with different payloads. Update via utility or SPI header.

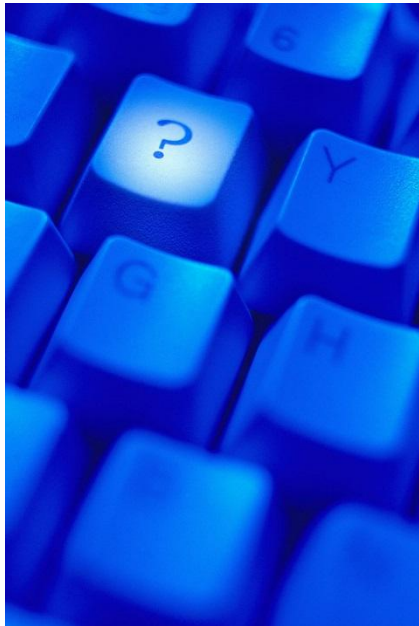
**Source Code:**  
Build firmware using the Minnow Board open source project (UDK2010 or EDK II)

# Summary



- Minnow provides new options for UEFI developers
  - Embedded x86 platform
  - Low cost, easily hackable
  - Open source, open design
  - Customize UEFI firmware
  - Develop without an NDA

# Questions?



- General Minnow Information:  
<http://minnowboard.org/>  
Twitter: [@minnowboard](https://twitter.com/minnowboard)
- Intel UEFI Information:  
<http://uefidk.com/>  
Twitter: [@intel uefi](https://twitter.com/intel_uefi)
- Brian's Contact Info:  
[brian.richardson@intel.com](mailto:brian.richardson@intel.com)  
Twitter: [@intel brian](https://twitter.com/intel_brian)

Thanks for attending the  
UEFI Spring PlugFest 2013



For more information on  
the Unified EFI Forum and  
UEFI Specifications, visit  
<http://www.uefi.org>

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