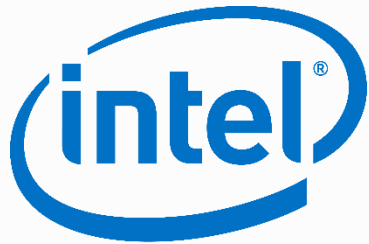


*presented by*



Look Inside.™



# UEFI on Intel Open Hardware

UEFI Plugfest – September 19-20, 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

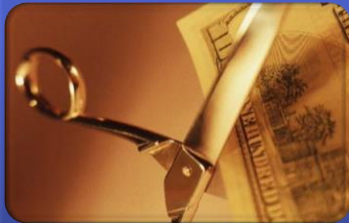


- UEFI adoption is strong in traditional client & server markets
- High adoption rate for operating systems and independent hardware vendors
- However, we're not quite done yet ...

# 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

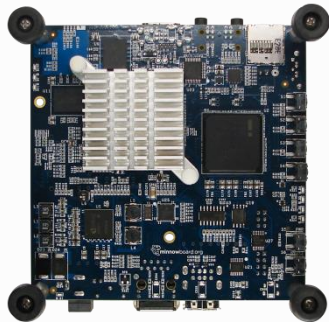


# Open Source



- ✓ 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”)
- Works w/ 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
- Offers performance, flexibility and standards based interfaces





# 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
- \$199 & works “out of the box”
  - Includes power supply and OS on microSD card



# UEFI Features



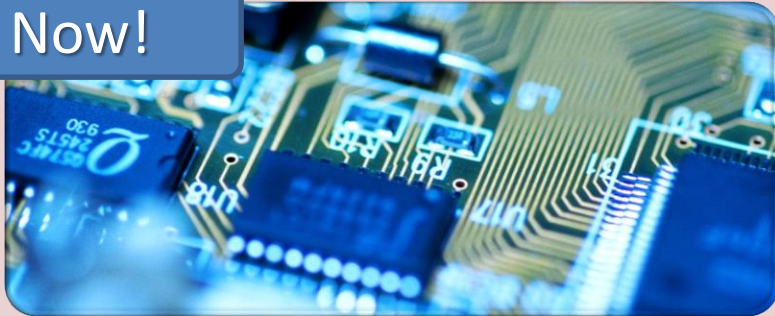
- Default firmware (UEFI 2.3.1c binary)
  - Downloadable from [uefidk.com](http://uefidk.com)
  - Based on EDK II @ [tianocore.org](http://tianocore.org)
- Debugging Capabilities for Firmware
  - 4MB SPI Flash with DediProg SPI header
  - Debug output with USB-to-serial (mini USB)
  - Open hardware = open schematics



# Firmware Options



Available  
Now!



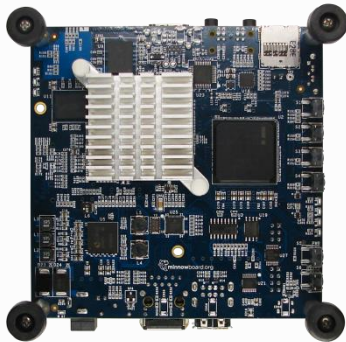
Coming  
Soon!



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

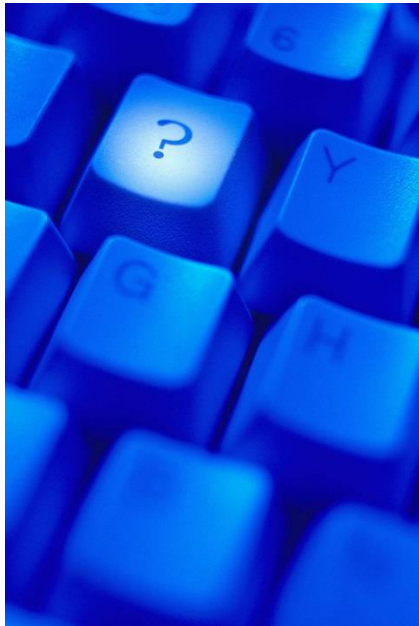
**Source Code:**  
Build firmware using the Minnow Board open source project (UDK2010 or EDK II)

# 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?



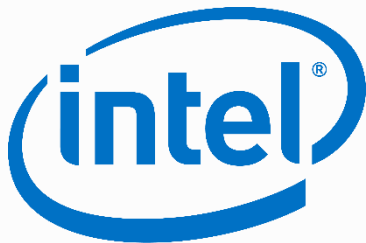
- General Minnow Information:  
<http://minnowboard.org/>  
Twitter: [@minnowboard](https://twitter.com/minnowboard)
- Intel UEFI Information:  
<http://uefidk.com/>  
Twitter: [@intel\\_uefi](https://twitter.com/intel_uefi)
- Brian's Contact Info:  
[brian.richardson@intel.com](mailto:brian.richardson@intel.com)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

Thanks for attending the  
UEFI Plugfest 2013



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

*presented by*



Look Inside.™

