Advanced UEFI Development Environment for Embedded Platforms

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PTAS003
Agenda

- UEFI Development Environment for Embedded Platforms
- Byosoft* Embedded Development Best Known Method
- SBS* Embedded Application Experience Sharing
- Summary
**UEFI Technology Overview**

- **Unified Extensible Firmware Interface (UEFI)** specifies how firmware boots OS loader
- **UEFI’s Platform Initialization Architecture (PI)** specifies how UEFI firmware initializes Si and the platform
- **UEFI and PI specifications** are governed by UEFI forum (www.uefi.org)
- **Intel® UDK2010** is a reference implementation of UEFI and PI specifications

Visit [www.intel.com/udk](http://www.intel.com/udk) for details
Intel® UDK2010 Standard Foundation for the Compute Continuum
## Firmware Difference Between PC and Embedded Market

<table>
<thead>
<tr>
<th>Metric</th>
<th>PC</th>
<th>Embedded</th>
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</thead>
<tbody>
<tr>
<td>OS Support</td>
<td>Full range</td>
<td>Embedded Linux*, Android* &amp; Windows* Embedded</td>
</tr>
<tr>
<td>Distribution Model</td>
<td>Thru IBV</td>
<td>Direct to Customer</td>
</tr>
<tr>
<td>Boot Speed</td>
<td>PC Optimized (~&gt;2 seconds)</td>
<td>Optimized for CE and Handheld (~&lt; 1 second)</td>
</tr>
<tr>
<td>Footprint</td>
<td>PC Optimized (~&gt;1 MB)</td>
<td>Optimized for CE and Handheld (~&lt; 256 KB)</td>
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</table>

*The Needs of Embedded Systems Developers are very different from PC*
Meeting the Needs of Embedded Systems Developers

**Features:**
Rich set of boot time features and capabilities

**Flexibility:** Provides flexibility and control for customization

**Rapid Development:** Tools speed development by abstracting underlying code

**Performance:**
Allows for optimization for reduced boot times and firmware size

**Reusability:**
Modularity and UEFI standards ensure greater reusability across platforms

**Ecosystem:**
Value-added products and services from companies in the Intel® Embedded Alliance

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Intel® Boot Loader Development Kit (Intel® BLDK)
Stack Difference Between PC and Embedded

Intel® BLDK fills the firmware gap for Intel Architecture (IA) for embedded
Intel® BLDK Major Components

Intel® BLDK
Development Application

Intel® UDK2010

Intel® BLDK
Source Code

Intel® UEFI Development Kit 2010 (Intel® UDK2010)

Configuration Files

CPU & Chipset
Initialization Binary Code

Build from GUI

Binary Boot Loader

To Flash Memory

Intel® BLDK
Documentation

BLDK
Spectrum of System Initialization Firmware

Intel® BLDK Provides Flexibility to Scale System Initialization for Embedded Systems
Intel® BLDK Fully Supported within the Embedded Ecosystem

**Operating System Vendors**
- OSV
  - A more integrated stack with firmware and OS

**Independent BIOS Vendors**
- IBV
  - Development tools, custom boot loader implementations and engineering services

**Independent Software Vendors**
- ISV
  - Engineering services for boot loader customization

**Embedded Board Manufacturers**
- EBM
  - COTS platforms with customized boot loaders and integrated Board Support Packages, ready for software development
Agenda

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• SBS* Embedded Application Experience Sharing
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Byosoft* Introduction

- Established in 2006
- Only one local PRC independent BIOS vendor
- Products have been involved Legacy PC, Embedded and Server
- Focus on Chinese Market

Cost Effective  Customer Oriented  Only One PRC IBV  Local PRC Support
# Byosoft* BIOS Roadmap

<table>
<thead>
<tr>
<th>Intel® 处理器</th>
<th>Intel® 平台</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td><strong>Intel® Xeon®</strong> 处理器</td>
<td>Romley  [Intel Xeon E Series]</td>
<td>服务器平台</td>
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<tr>
<td><strong>Intel® Core™</strong> 处理器</td>
<td>Huron River  [Sandy Bridge]</td>
<td>移动平台</td>
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<tr>
<td></td>
<td>Sugar Bay  [Sandy Bridge]</td>
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<td></td>
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<tr>
<td></td>
<td>Chief River  [Ivy Bridge]</td>
<td>台式机平台</td>
<td></td>
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<tr>
<td></td>
<td>Maho Bay  [Ivy Bridge]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intel® Atom™</strong> 处理器</td>
<td>Crown Bay  [Intel Atom E6xx]</td>
<td>嵌入式平台</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cedar Trail  [Intel Atom D/N2000]</td>
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基于 Intel® UDK2010  
基于 Intel® BLDK
Support Customer with Intel® BLDK

- Intel® Boot Loader Development Kit
- Reference Implementation
- Embedded Product
- Customer
- Byosoft* Value-add
- Byosoft* CSM
- CPU and Chipset Initialization Code
- Product-level Service from Byosoft*

*文中涉及的其它名称及商标属于各自所有者资产。
Byosoft* Comprehensive Boot Loader Features and Support

**Features**
- Legacy OS Support
- Legacy USB Support
- Security Support
- Compatibility Support
- Remote Network Management
- Graphic UI
- Authentication
- Fast Boot

**Support Model based on Intel® BLDK**
- Full Source Provider
- Customer Board Porting
- Features Customization
- Technical Consultation and Training
Intel® BLDK Usages BKM

• Platform Porting
• Firmware Customization
• Performance Optimization
• Legacy OS Support
• Network Support
Platform Porting

If you want to port a new platform, you need replace below directory.

- **Chipset Directory**
  - CedarViewPkg
  - Nm10Pkg
  - Npce791Pkg

- **Platform Directory**
  - CedarRockPlatformPkg
Firmware Customization

- Development Application provides the ability to customize firmware
- Hundreds of firmware options are configurable through the Development Application
- No source modification is required
Performance Optimization

- Intel® BLDK boot sequence can be configured for fast boot via the Development Application
- Only drivers required for system boot are dispatched
- Faster boot times can be achieved by optimizing Intel BLDK for a specific target configuration
Legacy OS Support

• Embedded System need Multiple OS Support
• CSM is a key module to support Legacy OS

If you want to add CSM support, you need add below driver.

`#
# Legacy Modules
#

PcAtChipsetPkg/8259InterruptControllerDxe/8259.inf
TianoModulePkg/Csm/LegacyBiosDxe/LegacyBiosDxe.inf
TianoModulePkg/Csm/BiosThunk/VideoDxe/VideoDxe.inf
TianoModulePkg/Csm/BiosThunk/BlockIoDxe/BlockIoDxe.inf
TCPlatformPkg/LegacyBiosPlatformDxe/LegacyBiosPlatformDxe.inf
ByoModulePkg/Csm/LegacyUsb/LegacyUsb.inf`
Network Support

- Support Remote Network Management
- Support PXE Function

If you want to add Network support, you need add below driver.

```bash
# # Network Modules
#
TianoModulePkg/Network\Ip4ConfigDxe\Ip4ConfigDxe.inf
TianoModulePkg/Network\Ip4Dxe\Ip4Dxe.inf
TianoModulePkg/Network\Tcp4Dxe\Tcp4Dxe.inf
```
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SBS* Introduction

• Founded in 1992, SBS Science & Technology Co., Ltd.

• The first member of PC/104 Consortium, PICMG Organization and Intel® Embedded Alliance.

• The leading provider of embedded computing solutions in Chinese market.

• Headquartered in Shenzhen, with a number of branch offices in Beijing, Shanghai, Xi’an, Nanjing, Jinan, Shenyang, Chengdu, Wuhan, Guangzhou, etc.
SBS* Embedded Market Focus

Healthcare Devices
Retail Kiosks
Digital Signage
IVI System
Electric Power System
Train Monitoring System
Intelligent Transport System
Metro AFC System
Embedded Software Requirements

- Modularity, easy for customization
- Fast boot is key for embedded
- Real-time, quick response
- Comprehensive test
- Product differentiation
SBS* Embedded System

- High Reliability
- Low Power Consumption
- Long Product Life
- Upgradeable
- Small Size

- SBS algorithm
- OS: SBS Linux
- SBS board-level driver
- SBS customized firmware
- Application software
Intel® BLDK Meets SBS* Embedded Requirements

• Get rid of legacy BIOS
• Customized and Professional
• Easy for Differentiation
• Fast Boot
• IP Protection
Application Example Based on Intel® BLDK

• Fast boot
  – Power to OS < 2s (BLDK < 1s)
• Easy to Customize Hardware
• Able to Support Multiple Boot Path

Using Intel® Atom™ E6xx platform and Intel® BLDK, SBS* was able to deliver the competitive In-vehicle infotainment (IVI) product
SBS* Product Samples Based on Intel® BLDK

Intel® Atom™ Processor E6xx Series
COMe9440 (55mm X 84mm)

Intel® Atom™ Processor E6xx Series
SCM-9200 (96mmX96mm)

Intel® Atom™ Processor N/D 2000 Series
STM9040 (70mm X 84mm)

Intel® Atom™ Processor N/D 2000 Series
STM9060 (62mm X 68mm)
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Summary

- Intel® BLDK is a royalty-free solution for fixed-function embedded devices
- Intel BLDK is a complete solution that includes source, binaries, debug tools and documentation
- Intel BLDK reference implementations available now for:
  - Intel® Atom™ Processor E6xx Series
  - Intel Atom Processor E6x5C Series
  - Coming Soon: Intel Atom Processor N2000 and D2000 Series

Fast · Simple · Flexible
Call to Action

• Download Intel® BLDK and related whitepapers and documentation (http://intel.com/go/bldk)
• Experiment with Intel® BLDK on your Intel reference platform
• Identify 3rd parties that can assist with development efforts (http://intel.com/go/eca)
• Visit the online community support forum (http://edc.intel.com/community)
# Related Sessions

<table>
<thead>
<tr>
<th>Session ID</th>
<th>Title</th>
<th>Day</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTAC001</td>
<td>Poster Chat: UEFI Application Development using Standard Libraries and Python*</td>
<td>Wed</td>
<td>14:00</td>
<td>Station 7</td>
</tr>
<tr>
<td>PTAC002</td>
<td>Poster Chat: Power and Thermal Analysis using Intel® Platform Profiling Tool</td>
<td>Wed</td>
<td>14:00</td>
<td>Station 8</td>
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<tr>
<td>PTAS001</td>
<td>System Behavior and Performance Prediction using System Modeling and Simulation Tools</td>
<td>Wed</td>
<td>14:15</td>
<td>310</td>
</tr>
<tr>
<td>PTAS002</td>
<td>Shift Left! Leverage Full System Simulation to Reduce Your Time To Market</td>
<td>Wed</td>
<td>15:20</td>
<td>310</td>
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<td>PTAS003</td>
<td>Advanced UEFI Development Environment for Embedded Platforms</td>
<td>Wed</td>
<td>16:25</td>
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<td>PTAQ001</td>
<td>Platform Technologies and Analysis Q&amp;A</td>
<td>Wed</td>
<td>17:15</td>
<td>310</td>
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<td>Implementing Platform Security with UEFI</td>
<td>Thurs</td>
<td>13:10</td>
<td>306B</td>
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<tr>
<td>PTAS005</td>
<td>Platform Optimization Using Open Computing Language (OpenCL*) Tool</td>
<td>Thurs</td>
<td>14:15</td>
<td>306B</td>
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- **Software and Services Group Pavilion - Platform Technologies: UEFI, Analysis Tools, and Simulation**
  - Booth Number 16

![✓ = DONE](image)
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Sweepstakes rules available at Information desk
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