*presented by*


# Firmware Implementation Techniques to Achieve Windows® 8 Fast Boot

UEFI Summer Summit – July 16-20, 2012

Presented by Jeff Bobzin

Insyde Software

# Agenda

- Introduction and Goals
- Cost of Early USB Enumeration
- Firmware Menu Entry Solution
- What if a Keyboard is Needed?
- Other Elements
- Q & A

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# Introduction and Goals

# What Were Our Goals?

- Faster Boot – better turn-on experience
- Streamline boot of installed OS from disk
- Allow other boot targets when needed
- Allow user access to firmware menus when needed

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# Firmware/OS Cooperation

- Example of system improvement only possible due to cooperation facilitated by UEFI
  - Available to all firmware vendors
  - Available to all OS vendors
  - Available in Win 8 public Beta
  - Full function in Insyde current versions

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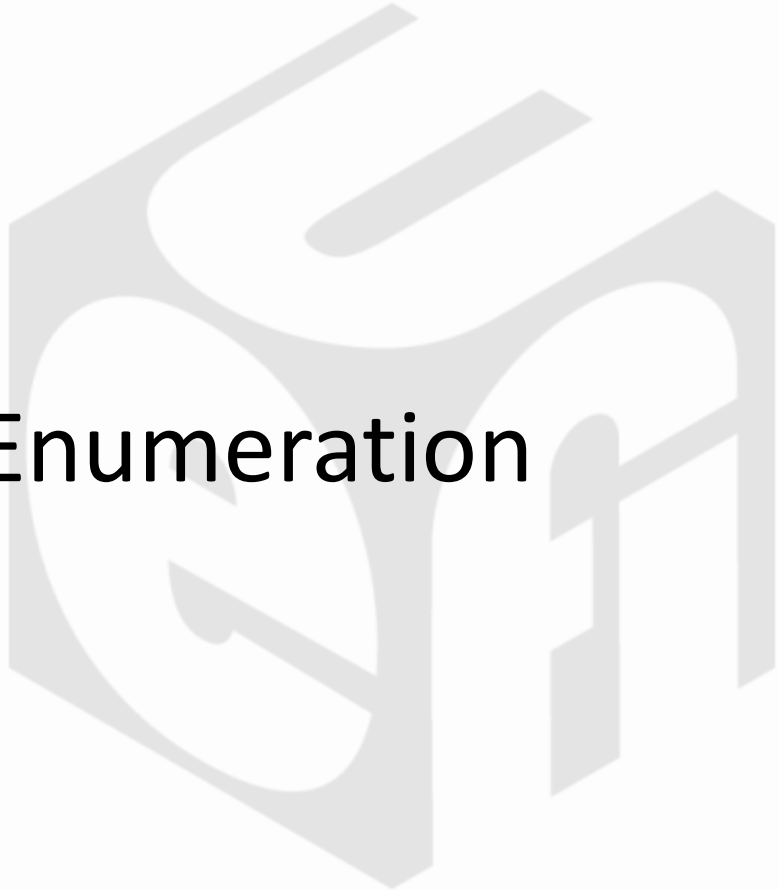
# Cost of Early USB Enumeration



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# Impact of USB Enumeration on Firmware Boot Times

- When the Firmware enumerates the USB bus and searches for keyboard system time-to-boot is increased
- USB bus has certain architected delays
- If multiple devices are attached, the total delay increases

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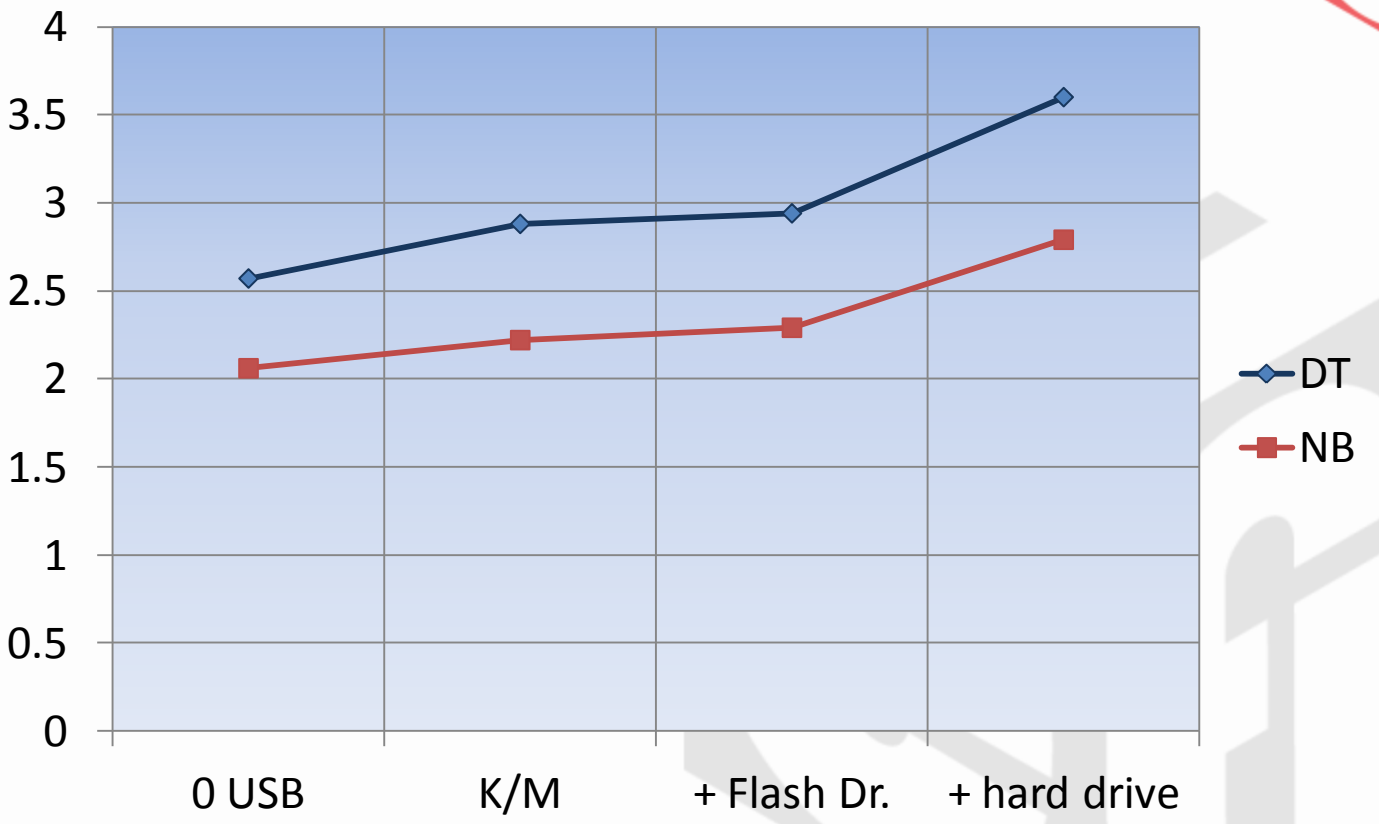
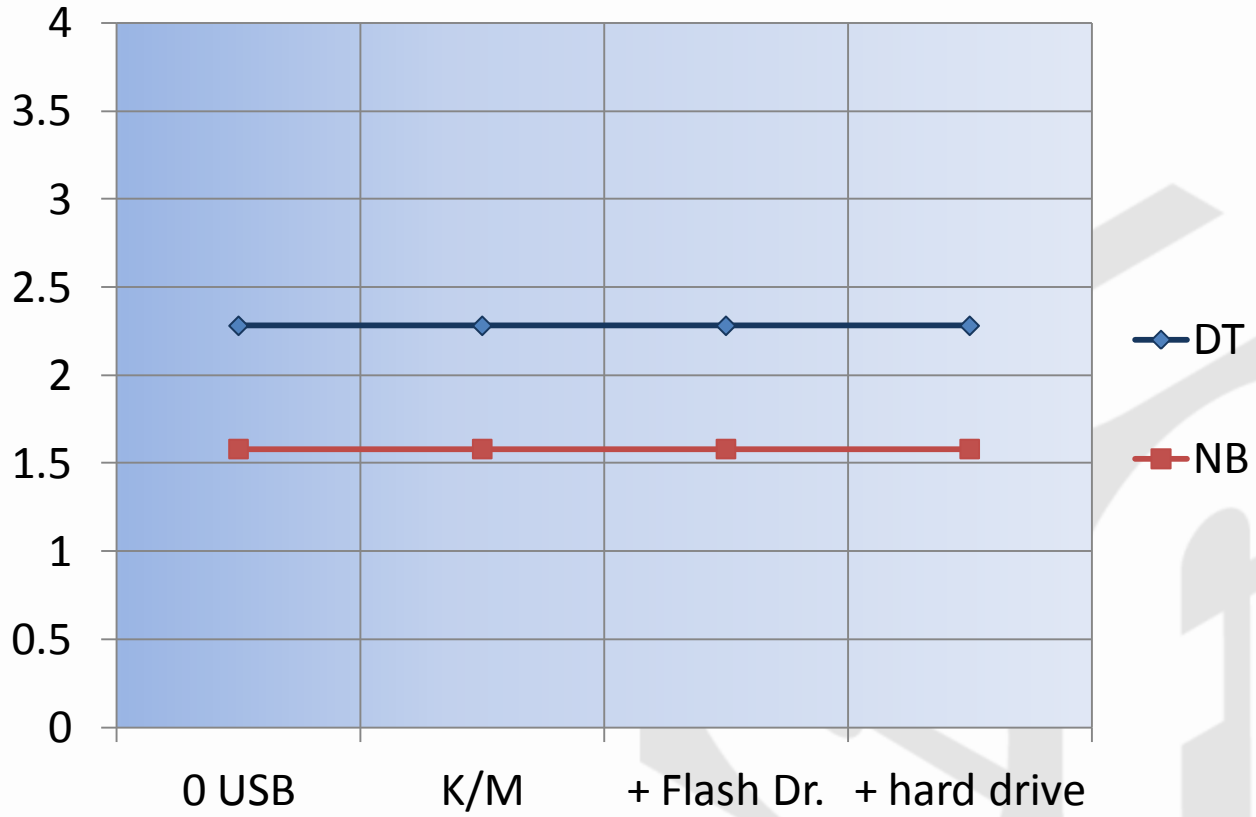


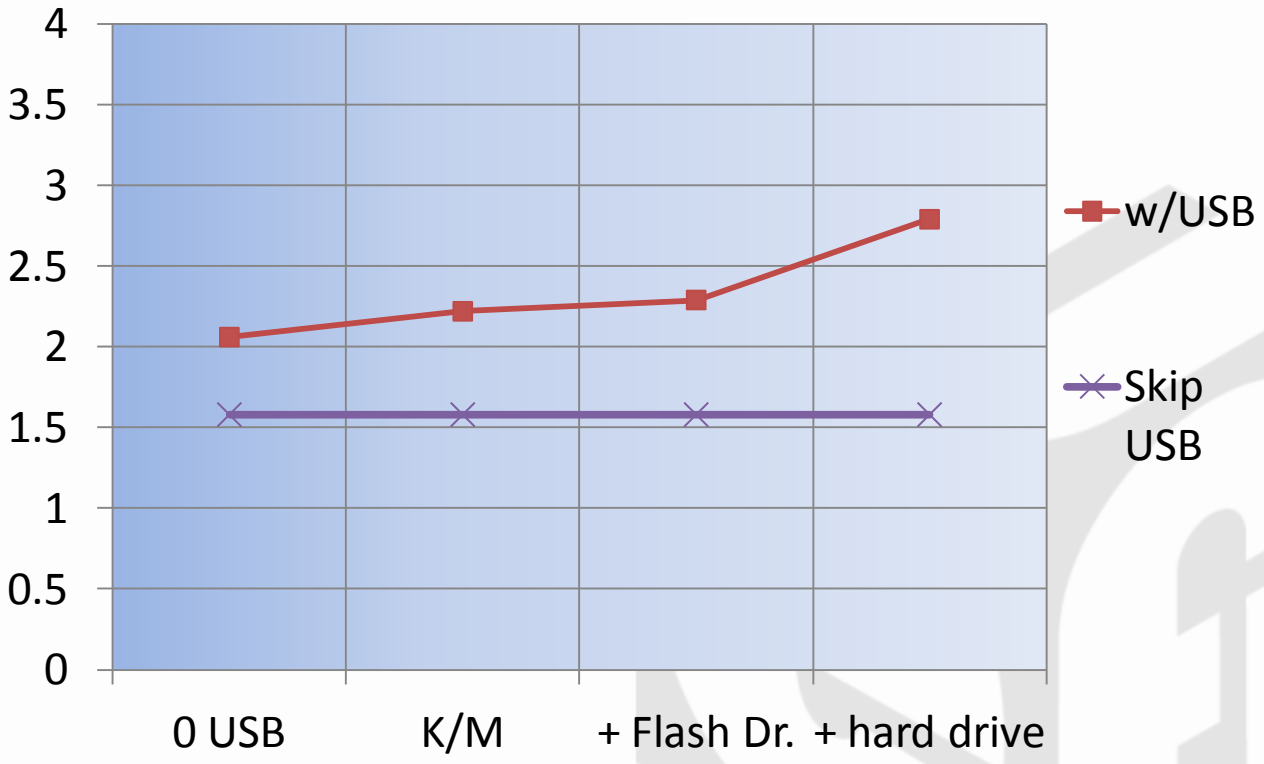

**Firmware Portion of System Boot from Shutdown (SSD Disk)**

# Skipping USB Enumeration

- Skipping USB enumeration pays immediate benefits in faster boot




**Firmware Boot Time when skipping USB Enumeration**




**Improvement when Skipping USB Enumeration**

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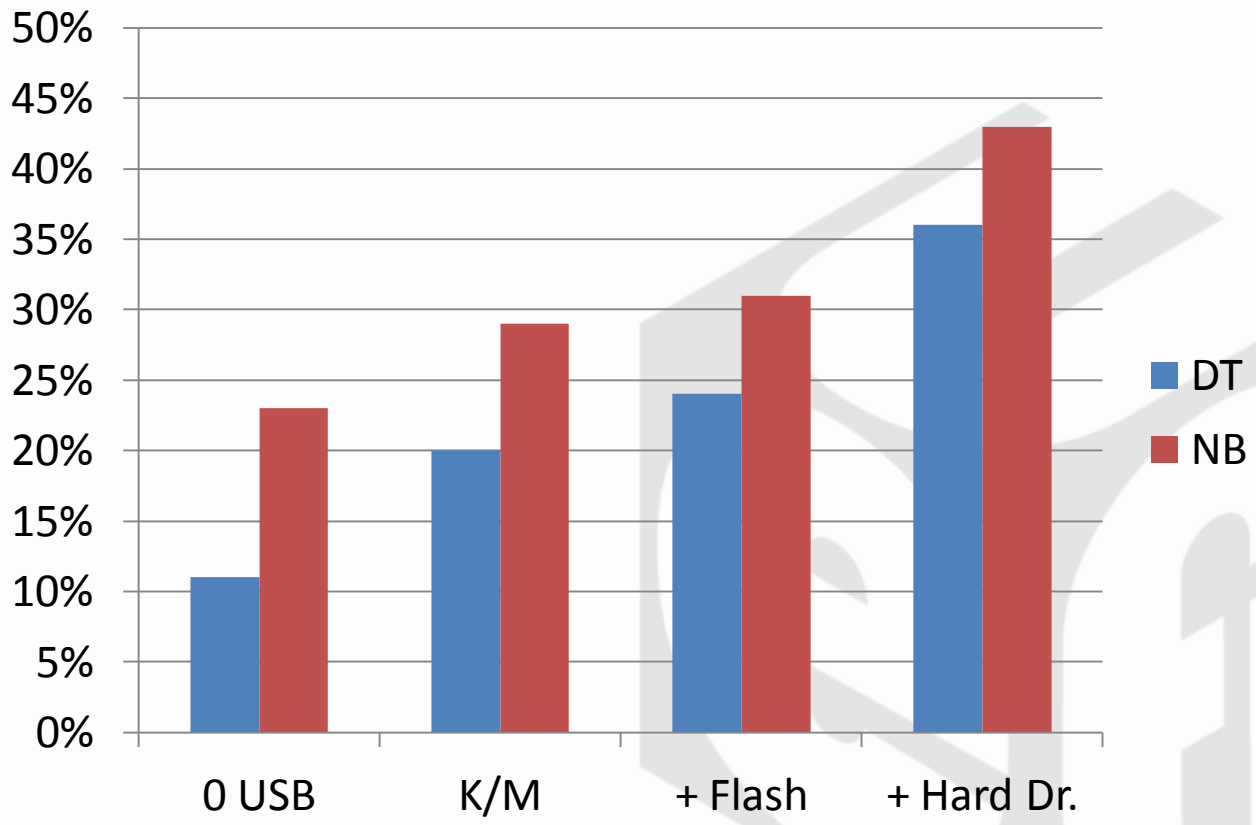


**Boot Time Penalty for Connected USB Devices**

# Firmware Menu Entry Solution

# How to Reach Firmware Menus?

- Skipping USB enumeration removes USB keyboard as tool for user interrupting boot to go to firmware menus
- NOTE – PS/2 style keyboard on NB embedded controller is still available
  - But boot speed is so fast it may be hard for user to hit correct key quickly enough!

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# New OsIndications Variables

- User can use OS menus to signal need for firmware menu
- OS signals to firmware via new variables
  - Added UEFI Spec Update 2.3.1C

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# New UEFI Variables for F/W <-> OS Signaling

| New UEFI Variable | |
|---|---|
| OsIndicationsSupported | Allows the firmware to indicate supported features and<br>actions to the OS. |
| OsIndications | Allows the OS to request the firmware to enable certain<br>features and to take certain actions. |
| **Defined Indicator Bit** | |
| EFI_OS_INDICATIONS_BOOT_TO_FW_UI | 0x0000000000000001 |

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# Windows® 8 Menu Navigation to Request Firmware On Reboot

**Settings | Change PC Settings |**

**General | Advanced Startup [Restart] |**

**Troubleshoot | Advanced Options |**

**UEFI Firmware Settings |**

**[Restart]**

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# What if a Keyboard is Needed by OS Bootloader?

# Scenarios that Require Firmware Keyboard Initialization

1. Bootloader needs keyboard
2. Non-Standard Boot Target
3. Default Boot Fails

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# Bootloader Requests Keyboard Wakeup

- Example Scenarios:
  - Bitlocker Pin
  - GRUB or other Bootloader Options

- When OS bootloader performs first EFI_SIMPLE_TEXT_INPUT_EX_PROTOCOL. *ReadKeyStrokeEx()* the deferred USB Enumeration is performed

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# Win 8 Menu for Alt. Device Boot

- **Windows® 8 provides BootNext select**

  **Settings | Change PC Settings |**

  **General | Advanced Startup [Restart] |**

  **Troubleshoot |**

  **Use A Device | [*Boot-Device*]**

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# Other Elements

# Automatic Enumeration

- USB is enumerated if primary boot target (BootNext or top of BootOrder) is not hard disk
  - Example – USB boot is top of BootOrder list
- USB is enumerated if primary boot target fails to boot
  - Facilitate recovery scenarios

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# Opt-in or Opt-out

- Skipping USB Enumeration allows faster boot
  - But will it confuse users?
- OEM has decision
  - Should new behavior be Factory Default ?

Consider:

1. System Type
2. OS Vendor Recommendations

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# Streamlined Boot Priority

- This technology is built on earlier improvements including:
  - Skip media checks for removable media
  - Pre-set OS boot variables are always top priority
    - Streamlined procedure departs from Legacy BIOS tradition

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# Questions and Answers

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For more information on
the Unified EFI Forum and
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