White Paper

Building a Responsive PC with Intel® Responsiveness Technologies on the Next Unit of Computing (NUC)

Revision History

Revision	Revision History	Date
1.0	Initial release of the Building a Responsive PC with Intel® Responsiveness Technologies on the Next Unit of Computing (NUC) White Paper	November 2012
2.0	Added new SKUs – DCP847SKE, DCCP847DYE	February 2013
3.0	Added new SKUs – D53427RKE, DC53427HYE	May 2013

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Introduction

The Next Unit of Computing (NUC) is a small complete PC powered by a 3rd Generation Intel® Core™ or Celeron processors. It provides responsive performance and energy efficiency at the same time.

Even though the NUC is small in size, it is just as versatile as a full-sized computer while convenient enough to be portable. HDMI display output provides full HD 1080p video playback as well as 7.1 digital audio output (a capable AV Receiver is required). The Thunderbolt port provides the fastest connection to external storage devices and the PCI Express mini-card connector allows for wireless internet connection with an Intel® Centrino® Wireless card.

You can easily bring the NUC with you while travelling and simply connect it via HDMI cable to an LCD TV at a remote office or hotel room. A whole host of capabilities are possible when connected to the internet via broadband. These include:

- Online movie services such as Netflix*, Hulu*, YouTube*
- Accessing personal online storage such as a Network Attached Storage*
- Cloud services like DropBox*.

The NUC is the epitome of versatility and portability.

Hardware and Software Configuration

This document describes the steps required to enable NUC with Intel Responsiveness Technologies which can result in a more responsive and connected system. The following is the minimum recommended hardware and software configuration.

Hardware

- System: Intel Next Unit of Computing Kit DC3217BY
- Memory: One 4GB DDR3 SO-DIMM (or two 2GB for dual-channel memory performance)
- Storage: Intel® SSD 310 Series 40GB PCI Express mini-card mSATA drive
- Networking: Intel® Centrino® Advanced-N 6205 wireless LAN PCI Express mini-card
- Input device: Wireless keyboard and/or mouse

Software

- Microsoft* Windows 7* (32-bit or 64-bit Edition)
- Intel® Rapid Start Technology[1]
- Intel® Smart Connect Technology[1]

[1]Software is available from Download Center.

Intel Responsiveness Technologies

Intel Responsiveness Technologies is a set of technologies designed to improve responsiveness and connectedness of your Intel Next Unit of Computing. It consists of:

Intel® Rapid Start Technology
Intel Rapid Start Technology enables the system to wake from a Hibernate (S5) sleep state almost as quickly as wake from Sleep (S3) while consuming near zero power.

Intel® Smart Connect Technology
Intel Smart Connect Technology ensures online content on the system is always updated even when the system is put into a sleep state. It also allows instant internet access when system is woken up whenever a valid access point is detected.

Intel® Smart Response Technology
Intel Smart Response Technology combines the performance benefits of a Solid State Drive (SSD) with the cost-efficiency of a large conventional Hard Disk Drive (HDD). However, as the NUC products do not support conventional HDDs, this technology is not applicable.

In addition to the Responsiveness Technologies, Intel® Visual BIOS includes features to improve responsiveness:

Fast Boot
Fast Boot is an Intel BIOS innovation which can dramatically speed up system boot time. It allows for various boot initializations to be skipped for a faster boot process. It is not part of the Intel Responsive Technologies but it contributes to the overall responsive performance of NUC.

Setup and Installation

Operating System Setup (case study with Microsoft Windows 7)

Step 1: Install the Operating System

The operating system installation can be completed either with the Windows DVD in an external USB optical drive or with an installation image on a USB flash drive.

Refer to How To: Install Windows 7 or Windows 8 From USB Drive for instructions on how to create a USB flash drive installation image.

Step 2: Install Device Drivers

Download and install all device drivers for the NUC product you have.

Download Center links for Intel Next Unit of Computing Boards and Kits:

- DC3217BY
- DC3217IYE

- DC53427HYE
- DCCP847DYE
- D33217CK
- D33217GKE
- D53427RKE
- DCP847SKE

BIOS Setup

Step 3: Configure the BIOS

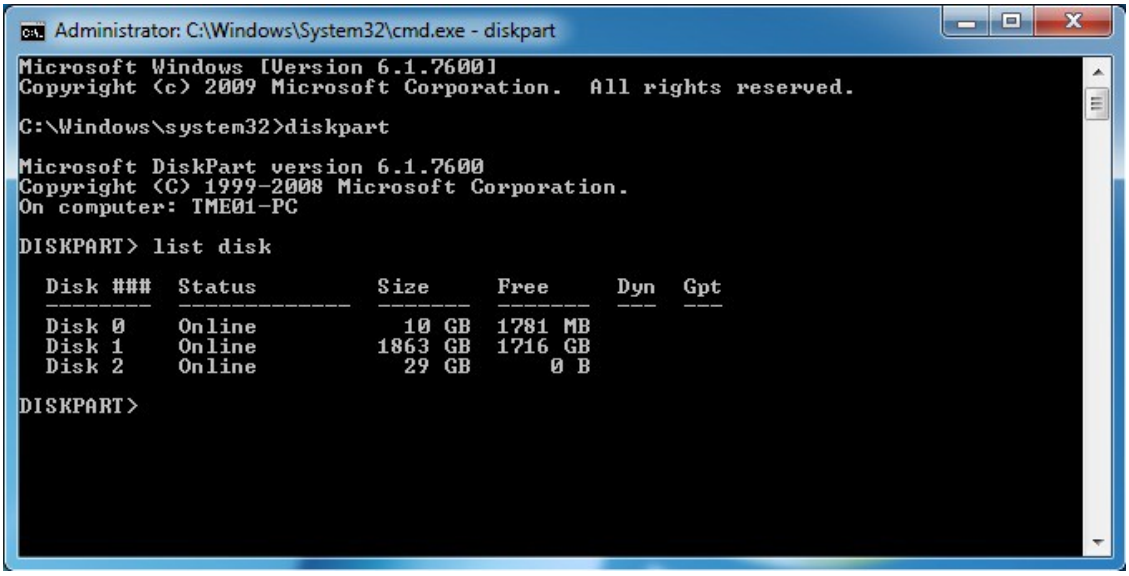
A. Power on the system and press F2 during POST to enter BIOS Setup.
B. Click on Advanced Setup and then click Power.
C. Click the check boxes for Intel Smart Connect Technology and Intel Rapid Start Technology.
D. Press F10 key to save and exit BIOS Setup.

Intel Rapid Start Technology Setup

Step 4: Create a Hibernation Partition for Intel Rapid Start Technology

A. Boot the NUC to Windows.
B. Click the Start button and in the Search box, type cmd.exe and press Enter.
C. In the result that appears, right-click on it and select Run as administrator.
D. A command line tool opens. Type diskpart.exe and press Enter.
E. At the diskpart prompt, type the following commands as shown:

DISKPART> list disk



DISKPART> select disk X

(X is the disk number where you want to create the store partition. Refer to results from list disk *for exact disk number. Disk must be as SSD.)*

DISKPART> create partition primary size=YYYY

(YYYY is the hibernation partition size in megabytes larger than the amount of memory installed on the system. For example, for 4GB of system memory, the value should be 4096 or higher.)

DISKPART> detail disk

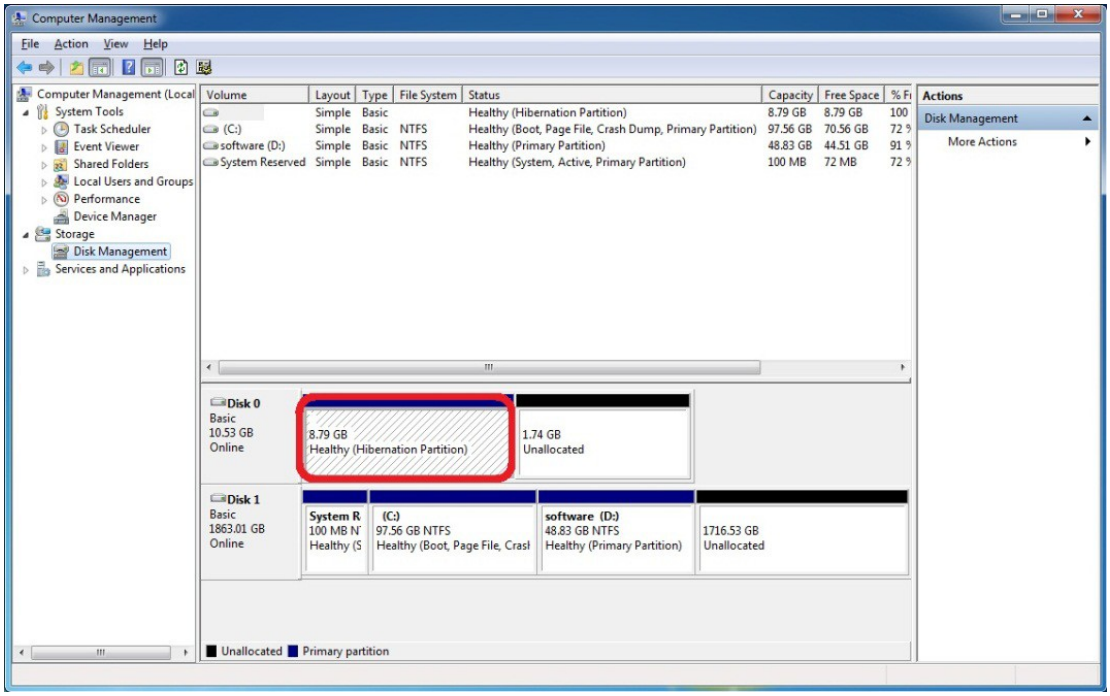
DISKPART> select Volume Z

(Z is Volume of your store partition. Refer to results from detail disk *for exact volume number.)*

DISKPART> set id=84 override

DISKPART>exit

F. You can confirm in the Windows Disk Management tool that a hibernation partition has been successfully created.



G. Restart Windows for the system BIOS to identify the new hibernation partition.

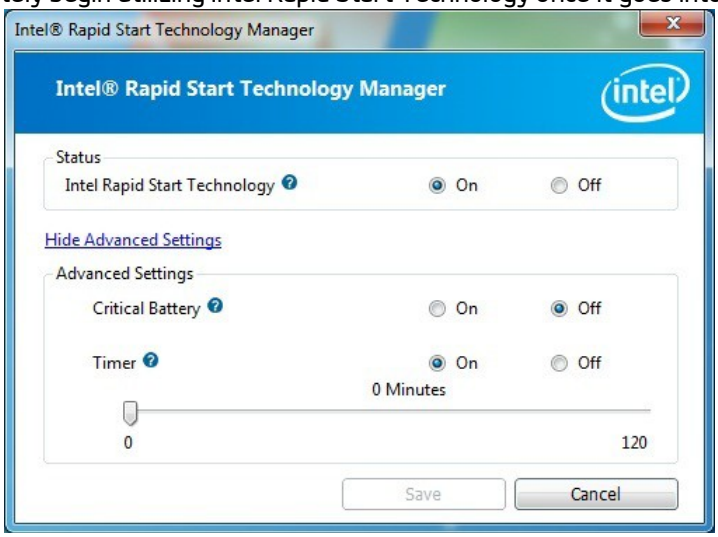
Step 5: Install the Intel Rapid Start Technology software

A. Install the Intel Rapid Start Technology software.

B. At the end of a successful installation, click the Task Bar on the bottom right of the desktop and look for the icon for Intel Rapid Start Technology Manager. Click to launch the tool.

C. Check that the status for Intel Rapid Start Technology is On.

D. Ensure that the Timer is set to On and the slider bar is at position 0. This ensures the computer will immediately begin utilizing Intel Rapid Start Technology once it goes into sleep (S3) mode.



Step 6: Test the Intel Rapid Start Technology

A. You can test the functionality of the Intel Rapid Start technology by putting the NUC into Sleep mode (do NOT choose Hibernate).

B. Observe that system goes into sleep mode, and then quickly wake up again before going into sleep state again. This is normal behavior as the system first transitions into the S3 sleep state (per the OS), and then Intel Rapid Start will wake the system up and move it into the S4 state.

C. System is now in the S4 state as it cannot be woken up using USB devices such as USB keyboard or mouse.

D. Press the Power Button to resume.

E. Observe that the system resume time is as fast as a wake from S3.

Intel Smart Connect Technology Setup

Step 7: Installing the Intel Smart Connect Technology software

A. Install the Intel Smart Connect Technology software.
B. At the end of a successful installation, click the Task Bar on the bottom right of the desktop and look for the icon for Intel Smart Connect Technology Manager. Click to launch the tool.
C. Configure a suitable wake interval for Intel Smart Connect technology.
D. The next time the NUC is in Sleep mode, it will periodically wake itself up to refresh your online contents.

Fast Boot Setup

Step 8: Configure BIOS for Fast Boot

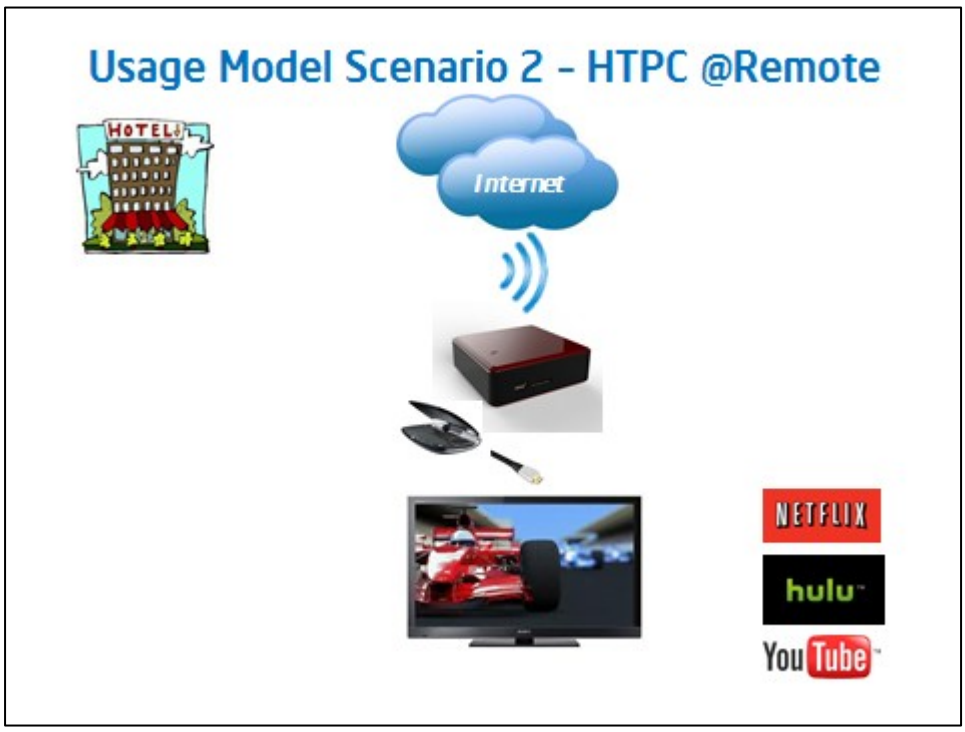
A. Press F2 during boot to enter BIOS setup.
B. Click on Advanced Settings and then click on Boot.
C. Check the box for these items:
   - General Optimization
   - Video Optimization
   - USB Optimization
D. Press F10 to save and exit BIOS Setup.

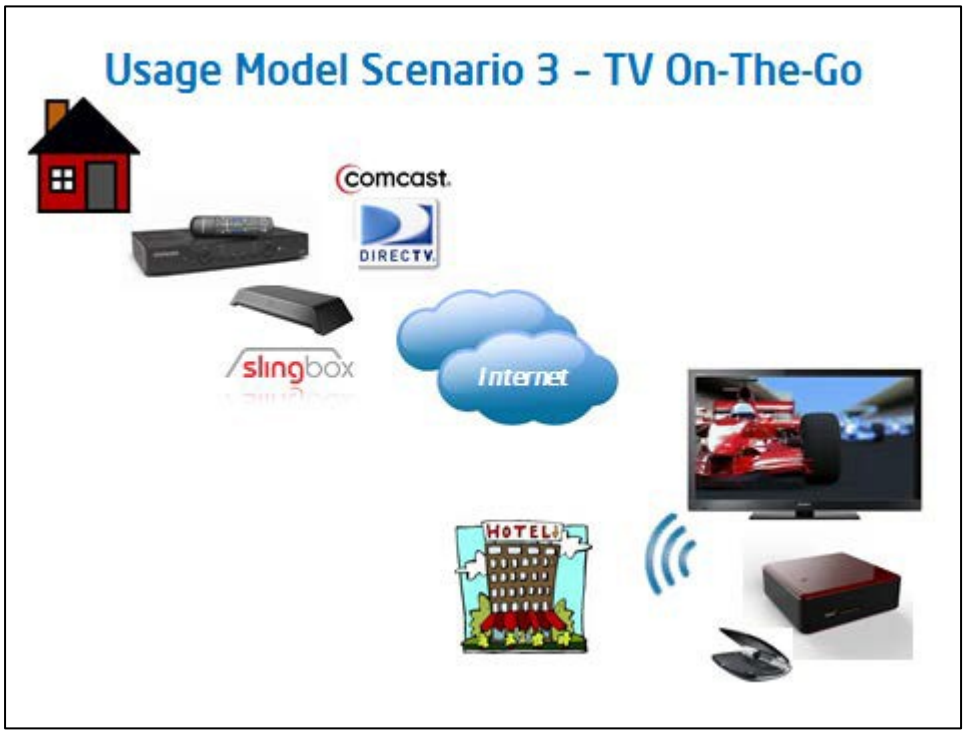
Observe that the BIOS splash screen no longer appears during boot. BIOS boot time should be noticeably faster.

Note: To disable Fast Boot, simply press and hold down the power button for 3 seconds. A message appears on the screen to allow you to disable Fast Boot.

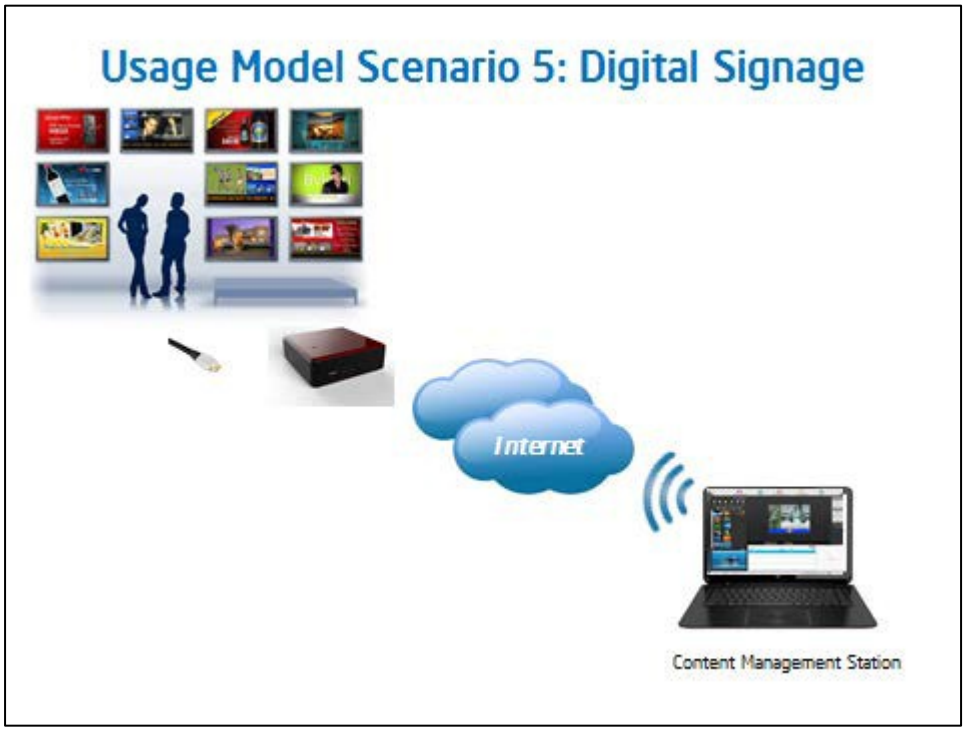
Usage Model Possibilities

With the compact form factor of the Next Unit of Computing, there are endless possibilities of usage models. The following are a few typical usage models which are optimized by some or all of the Intel Responsiveness Technologies.


Usage Model Scenario 2 – HTPC @Remote
HOTEL
Internet
NETFLIX
hulu
YouTube


Usage Model Scenario 3 – TV On-The-Go
comcast
DIRECTV
slingbox
Internet
HOTEL

Usage Model Scenario 4: Access Your Media Anywhere
Windows Home Server
Network Attached Storage
Internet
HOTEL


Usage Model Scenario 5: Digital Signage
Internet
Content Management Station

Usage Model Scenario 6: Digital Surveillance
Internet
Remote Viewer