Intel® 6 Series Express Chipset - Intel® Management Engine 7.0

1.5MB Firmware Bring Up Guide

February 2011

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Revision History

Revision	Description	Date
7.0.0.1012 (rev 0.4)	Initial Revision	March 2010
7.0.0.1019	Alpha1 Release updates: see change bars on left side of pages	March 2010
7.0.0.1041	Alpha2 Release updates: see red change bars on left side of pages	May 2010
7.0.0.1061	Beta Release updates: see red change bars on left side of pages	July 2010
7.0.0.1090	Engineering Release updates: see red change bars on left side of pages	August 2010
7.0.0.1115	Production Candidate (PC) Release updates: see red change bars on left side of pages	September 2010
7.0.0.1121	Production Candidate 2 (PC2) Release updates: see red change bars on left side of pages	October 2010
7.0.0.1135	Production Candidate 3 (PC3) Release updates: see red change bars on left side of pages	October 2010
7.0.0.1135	Production Version (PV) Release updates: see red change bars on left side of pages	October 2010
7.0.0.1135 (Updated)	Production Version (PV) Release updates: see red change bars on left side of pages, Intel® AT updates in Table 3-28	October 2010
7.0.1.1141	Hot Fix (HF) Release updates: see red change bars on left side of pages	October 2010
7.0.2.1164	Hot Fix 2 (HF2) Release updates: see red change bars on left side of pages	December 2010
7.0.3.1184	Hot Fix 3 (HF3) Release updates: see red change bars on left side of pages	January 2011
7.0.4.1197	Hot Fix 4 (HF4) Release updates: see red change bars on left side of pages	February 2011

§

1 Introduction

This document covers the Intel® Management Engine Firmware 7.0 - 1.5MB Firmware (Intel® ME 1.5MB FW) bring up procedure. Intel® ME is tied to essential platform functionality — this dependency cannot be avoided for engineering reasons.

The bring up procedure primarily involves building an Serial Peripheral Interface (SPI) Flash image that will contain:

- **[required]** Descriptor region — Contains sizing information for all other SPI Flash image regions, SPI settings (including Vendor Specific Configuration - or VSCC - tables, SPI device parameters), and region access permissions.
- **[required]** BIOS region — Contains firmware for the processor (or host) and/or Embedded Controller (EC)
- **[required]** Intel® ME FW region — Contains firmware for the Intel® Management Engine.
- **[optional]** GbE region — Contains firmware for Intel® LAN solution

For more details on SPI Flash layout, see the document ***Cougar Point SPI Flash Programming Guide*** and Appendix A. Once the SPI Flash image is built, it will be programmed to the target Cougar Point based platform and the platform will be booted. This document also covers any tests and checks required to ensure that this boot process is successful and that Intel® ME 1.5MB FW is operating as expected.

1.1 Related Documentation

The **Intel® Network Connections (15.6 PV OEM Gen) – LAN Software Drivers – 30-Sep-2010** Kit which contains drivers, tools and product information for Intel® **82579LM** Gigabit Ethernet PHY is available in the following locations:

— **CDI:** http://www.intel.com/cd/edesign/library/asmo-na/eng/458821.htm
  - **Document ID:** 458821
  - **Title:** Intel® Network Connections (15.6 PV OEM Gen) – LAN Software Drivers – 30-Sep-2010
  - **Abstract:** LAN Access Division (LAD) - V.15.6C00072, TIC 226581. 15.6 Production Version Release providing support for 82579 silicon providing support for the Sugar Bay and Huron River platforms. It also includes the Oplin Software Refresh and Shelter Island Halogen Free single port adapter and selected bug fixes.

— **VIP:** Kit# 27986 - Intel® Network Connections LAN Software Production Version 15.6 (OEM Gen Build v15.6C00072, TIC 226581)

1.2 Intel® ME FW Features

This firmware release includes the following applications:

- Platform Clocks – Tune Cougar Point clock silicon to the parameters of a specific board, configure clocks at run time, power manage clocks. **Benefit:** Allows extensive customizability and soft control of “Second generation” clock solution and makes clocks available before CPU powers up.

- Silicon Workaround Capability – Intel® ME FW will have limited capabilities to perform targeted workarounds for silicon issues. **Benefit:** Allows Intel® ME FW to address some issues that otherwise would require a new silicon stepping.
- Thermal Reporting – Intel® ME FW has the ability to collect platform thermal data and provide that data to embedded controllers and super I/O devices over SMLINK1 as well as in memory map I/O space.

1.3 Prerequisites

Before this document is read and utilized, it is essential that the reader first review the 1.5MB FW Release Notes (included with this Intel® ME 1.5MB FW kit).

This document is constructed so that the reader can run through the bring up steps as given for the Intel® Customer Reference Board (CRB). However, in the case that bring up is being performed on a different Cougar Point based platform, this document will highlight any changes that must be imposed onto the bring up steps accordingly.

This document makes only the following assumptions for hardware:

- The platform is Cougar Point based
- The platform is equipped with one or more SPI Flash devices with a total capacity large enough to contain the generated SPI Flash image

1.4 Acronyms and Definitions

1.4.1 General

Acronym or Term	Definition
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
BIOS	Basic Input Output System
CPU	Central Processing Unit
DIMM	Dual In-line Memory Module
DLL	Dynamic Link Library
DMI	Direct Media Interface
EC	Embedded Controller
EEPROM	Electrically Erasable Programmable Read Only Memory
FDI	Flexible Display Interface
GbE	Gigabit Ethernet
HECI	Host Embedded Controller Interface (aka Intel® MEI)
IBV	Independent BIOS Vendor
ID	Identification
Intel® ME	Intel® Management Engine
Intel® MEI	Intel® Management Engine Interface (renamed from HECI)
ISV	Independent Software Vendor
IMSS	Intel® Management and Security Status Application
JTAG	Joint Test Action Group

Acronym or Term	Definition
KVM	Keyboard, Video, Mouse
LAN	Local Area Network
LED	Light Emitting Diode
NVM	Non Volatile Memory
NVRAM	Non-Volatile Random Access Memory
OOB	Out of Band
OS	Operating System
PAVP	Protected Audio and Video Path
PCI	Peripheral Component Interconnect
PCIe*	Peripheral Component Interconnect Express
PHY	Physical Layer
PRTC	Protected Real Time Clock
RNG	Random Number Generator
RSA	RSA is a public key encryption method
RTC	Real Time Clock
SDK	Software Development Kit
SHA	Secure Hash Algorithm
SMBus	System Management Bus
SPI Flash	Serial Peripheral Interface Flash
TCP/IP	Transmission Control Protocol / Internet Protocol
TPM	Trusted Platform Module
UI	User Interface
UNS	User Notification Service
WMI	Windows Management Instrumentation

1.4.2 Intel® Management Engine

Acronym or Term	Definition
3PDS	3rd Party Data Storage
Agent	Software that runs on a client PC with OS running
Intel® AT	Intel® Anti-Theft Technology
CBM	ME CBMs - Core Base Modules, refer to Figure: Intel ME Firmware partitioning
CEM	ME CEMs - Core Extension Modules (also called ME CS)
End User	The person who uses the computer (either Desktop or Mobile). In corporate, the user usually does not have an administrator privileges.
Host or Host CPU	The processor that is running the operating system. This is different than the management processor running the Intel® Management Engine Firmware.
Host Service/Application	An application that is running on the host CPU
INF	An information file (.inf) used by Microsoft* operating systems that support the Plug & Play feature. When installing a driver, this file provides the OS the necessary information about driver filenames, driver components, and supported hardware.

Acronym or Term	Definition
Intel® Management Engine Interface (Intel® MEI)	Interface between the Management Engine and the Host system
IT User	Information Technology User. Typically very technical and uses a management console to ensure multiple PCs on a network function.
LMS	Local Management Service: A SW application which runs on the host machine and provide a secured communication between the ISV agent and the Intel® Management Engine Firmware.
Intel® ME	Intel® Management Engine: The embedded processor residing in the chipset PCH
MECI	ME-VE Communication Interface
NVM	Non-Volatile Memory: A type of memory that will retain its contents even if power is removed.
OOB Interface	Out Of Band interface: This is SOAP/XML interface over secure or non-secure TCP protocol.
OS not Functional	The Host OS is considered non-functional in Sx power state and any one of the following cases when system is in S0 power state: • OS is hung • After PCI reset • OS watch dog expires • OS is not present
System States	Operating System power states such as S0. See detailed definitions in system state section.
UIM	User Identifiable Mark
Un-configured state	The state of the Intel® Management Engine Firmware when it leaves the OEM factory. At this stage the Intel® Management Engine Firmware is not functional and must be configured.

1.4.3 System States and Power Management

Acronym or Term	Definition
G3	A system state of Mechanical Off where all power is disconnected from the system. G3 power state does not necessarily indicate that RTC power is removed.
M0	Intel® Management Engine power state where all HW power planes are activated. Host power state is S0.
M3	Intel® Management Engine power state where all HW power planes are activated however the host power state is different than S0 (Some host power planes are not activated). Host PCI-E* interface are unavailable to the host SW. Main memory is not available for Intel® Management Engine use.
M-Off	No power is applied to the management processor subsystem. Intel® Management Engine is shut down.
OS Hibernate	System state where the OS state is saved on the hard drive.
S0	A system state where power is applied to all HW devices and system is running normally.
S1, S2, S3	A system state where the host CPU is halted however power is connected to the memory system (memory is in self refresh).
S4	A system state where the host CPU and memory are not active.
S5	A system state where all power to the host system is off, however the power cord is still connected.
Shut Down	All power is off for the host machine however the power cord is still connected.

Acronym or Term	Definition
Snooze Mode	Intel® Management Engine activities are mostly suspended to save power. The Intel® Management Engine monitors HW activities and can restore its activities depending on the HW event.
Standby	System state where the OS state is saved in memory and resumed from the memory when mouse/keyboard is clicked.
Sx	All S states which are different than S0.

1.5 Reference Documents

Document	Doc Number/ Location*
Sugar Bay Desktop CRB– Platform Design Guide	428971 / CDI
Huron River Mobile CRB– Platform Design Guide	446729 / CDI
Intel® Management Engine (Intel® ME) and Embedded Controller Interaction for Huron River Platform	446300 / CDI
RS – Intel® Management Engine BIOS Writer's Guide	28745 / *
Intel® Management Engine (Intel® ME) 7.0 - 1.5 MB SKU Firmware Compliance Guide for Intel® 6 Series Express Chipset Family – Sugar Bay / Huron River Compliancy and Testing Guide	442775 / CDI
Intel® 82576 and 82579 Gigabit Ethernet Controllers – Intel Software Support for Cisco's MACsec Protocol Supplicant – 10-Dec-2010	461067 / CDI

Note: * Unless specified otherwise, a document can be ordered by providing its reference number to your Intel Field Applications Engineer.

1.6 Format and Notation

The formats and notations used within this document model are those typically used by BIOS vendors. This section describes the formatting and the notations that will be followed in this document.

Table 1-1. Number Format Notation

Number Format	Notation	Example
Decimal (default)	d	14d. Note that any number without an explicit suffix can be assumed to be decimal.
Binary	b	1110b
Hex	h	0Eh
Hex	0x	0x0E

Table 1-2. Data Format Notation

Data Type	Notation	Size
Bit	b	Smallest unit, 0 or 1
Byte	B	8 bits
Word	W	16 bits or 2 bytes
Double-word	DW	32 bits or 4 bytes
Quad-word	QW	8 bytes or 4 words
Kilobyte	KB	1024 bytes

Table 1-2. Data Format Notation

Data Type	Notation	Size
Megabit	Mb	1,048,576 bits or 128 KB
Megabyte	MB	1,048,576 bytes or 1024 KB
Gigabit	Gb	1,073,741,824 bits
Gigabyte	GB	1024 MB

1.7 Kit Contents

The Intel® ME 1.5MB FW kit can be downloaded from VIP (http://platformsw.intel.com/). The contents of this kit are detailed below (Note that only key files are listed).

Table 1-3. Kit Contents

File or [Directory]	Content Description
[root]	Root directory
1.5MB FW Bring Up Guide.pdf	This document
Cougar Point SPI Programming Guide.pdf	How to program SPI device parameters, VSCC tables, descriptor region details. Also contains a complete SPI Flash softstrap reference.
[Image Components]	
[BIOS]	
S_CPT052_2.rom	BIOS image only for Intel® CRB. This BIOS image works for both desktop and mobile CRBs. **For other Cougar Point based platforms, a custom BIOS image will be required.**
[GbE]	
NAHUM5_LEWISVILLE_DESKTOP_13.bin	Intel® LAN PHY firmware image, supports **PHY A2 and B0 only**. This image is recommended for testing power flows with connectivity. This image is for desktop platforms only.
NAHUM5_LEWISVILLE_MOBILE_13.bin	Intel® LAN PHY firmware image, supports **PHY A2 and B0 only**. This image is recommended for testing power flows with connectivity. This image is for mobile platforms only.
[ME]	
CPT_1.5M_Production.BIN	Intel® ME firmware image (**Production FW**) - supports all of the following Cougar Point PCH steppings: • Fused CPT QS (B1/B2) • Unfused CPT pre-QS (B1 Super SKU) • Unfused CPT ES2 (B0 Super SKU) **Note: For PAVP Testing**, you must match Production FW with Production Part and Non Production FW with Non Production Parts.
CPT_1.5M_PreProduction.BIN	Intel® ME firmware image (**Non Production FW**) - supports **unfused** Cougar Point PCH steppings: • Unfused CPT pre-QS (B1 Super SKU) • Unfused CPT ES2 (B0 Super SKU) **Note: For PAVP Testing**, you must match Production FW with Production Part and Non Production FW with Non Production Parts.
CPT_1.5M_UPD_Production.BIN	Intel® ME firmware Update image - to be used on Cougar Point based platforms. **Cougar Point pre-QS (B1) and QS (B2) PCH must** use this image.
CPT_1.5M_UPD_PreProduction.BIN	Intel® ME firmware Update image - to be used on Cougar Point based platforms. **Cougar Point ES2 (B0) PCH must** use this image.
[Installers]	
Intel(R) ME SW Installation Guide.pdf	Intel®ME SW Installation Guide
[ME_SW]	
readme.txt	Readme for ME_SW Installer package

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Table 1-3. Kit Contents

File or [Directory]	Content Description
Setup.exe	Install executable (non-InstallShield) of Intel® ME Drivers for Windows* OS. See readme.txt for more information.
[ME_SW_IS]	
ME_SW_IS.zip	Zip containing InstallShield* files of Intel® ME Drivers for Windows* OS. See readme.txt in previous directory for more information.
[Tools]	
[CertGenerator]	
[ExternalSecScripts]	
[OpenSSL]	
[SecConfig]	
[SecScripts]	
[ZtcSecScripts]	
[ICC_Tools]	
ICC_Tools_User_Guide.pdf	ICC Tools User Guide
[CCT]	
cct.exe	Clock Control Tool (CCT)
cct.ini	Configuration file for CCT
cctWin.exe	CCT for Windows*
[System Tools]	
Open Watcom Public License.pdf	Sybase Open Watcom Public License version 1.0 document.
System Tools User Guide.pdf	System Tools User Guide
Tools_Version.txt	Tools version information
[Flash Image Tool]	
fitc.exe	Flash Image Tool (FITC & FITC Wizard)
fitc.ini	Configuration file for FITC & FITC Wizard
fitctmpl.xml	FITC Tool XML file
newfiletmpl.xml	FITC Configuration XML file
[Flash Programming Tool]	
[DOS]	
fparts.txt	List of supported SPI Flash devices with specific Flash parameters
fpt.exe	Flash Programming Tool (FPT) for DOS
fptcfg.ini	Configuration file for FPT
[Windows]	
fparts.txt	List of supported SPI Flash devices with specific Flash parameters
fptcfg.ini	Configuration file for FPT
fptw.exe	Flash Programming Tool (FPT) for Windows*
[Windows64]	
fparts.txt	List of supported SPI Flash devices with specific Flash parameters
fptcfg.ini	Configuration file for FPT

Table 1-3. Kit Contents

File or [Directory]	Content Description
fptw64.exe	Flash Programming Tool (FPT) for Windows* (64-bit) OS
[FWUpdate]	
[Local-DOS]	
FWUpdLcl.exe	FW Update Tool (DOS version)
[Local-Win]	
FWUpdLcl.exe	FW Update Tool (Windows* version)
[MEInfo]	
[DOS]	
MEInfo.exe	MEInfo Tool (DOS version)
[Windows]	
MEInfoWin.exe	MEInfo Tool (Windows* version)
[MEManuf]	
[DOS]	
MEManuf.exe	ME Manufacturing Tool (DOS version)
[Windows]	
MEManufWin.exe	ME Manufacturing Tool (Windows* version)

1.8 External Hardware Requirements for Bring Up

Acquire the following hardware tools before moving on to the next step.

Windows* OS System	Flash Burner	DOS Bootable USB Key
Equipment: • Laptop or desktop that supports win32 applications **Purpose:** • Will run image assembly and build process software on the equipment	**Equipment:** • (Optional) For platforms that don't boot, a Flash Chip Programmer will be required • For platforms that can boot to DOS or Windows*, a Flash Programming Tool (FPT) is provided in this kit **Purpose:** • Will be used to burn firmware image onto Flash device(s)	**Equipment:** • A DOS Bootable USB Key (Size > 512 MB) **Purpose:** • Will be used to transfer image created onto a Flash burner • Or acting as a bootable device and will be used to run Flash Programming Tool (fpt.exe) directly on the system that is undergoing Bring Up process

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2 Image Creation: Flash Image Tool Wizard

Flash Image Tool (FITC) can be used to generate either a full SPI Flash binary image with Descriptor, GbE, BIOS, and Intel® ME Regions, or the Intel® ME Region only to be used with a custom SPI Flash binary image assembly solution. Use the steps shown in following sections.

After this image has been created, it will need to be burned onto the target platform's SPI Flash device(s). Section 4, "Programming SPI Flash Devices and Checking Firmware Status" later in this document provides steps to do this.

There are two different interfaces for this tool. A wizard mode and an advanced mode:

- For the wizard mode "FITC Wizard", please continue with this section. FITC Wizard is intended to streamline the Flash image creation process and is designed for ease of use. Most users should use this mode.
- For the advanced mode "FITC", please see Section 3.

Note: The FITC Tool may be updated throughout the release cycles. As a general rule, please ensure you use the tools, images and other content from the same kit and refrain from using different version tools.

2.1 Start FITC and Load the Default Settings XML File

1. Invoke Flash Image Tool. Using Explorer*, navigate to **[root]\Tools\System Tools\Flash Image Tool**. Ensure that FITC's directory contents are intact (see Section 1.7). Double-click **fitc.exe**.
2. In the main menu select **File | Open...**. In the Open dialog that appears navigate to **[root]\Tools\System Tools\Flash Image Tool**. Click on **newfiletmpl.xml** and click **OK**.

2.2 Step-by-Step Guide to Build SPI Flash Image with FITC Wizard Interface

Start the wizard mode by either pressing the **F9 key** or by using the menu option **Help | Wizard**. Next follow the steps in this section to create a 1.5MB SPI Flash image.

Note:

For wimax/3G enabled platform, need to be set **SSC2PARMS = 0x1270_F418** and **SSC2OCPARMS = 0x0000_0300**. The SSC2PARMS and SSC2OCPARMS can only be accessed by using FITC advance mode. These register can be found under ME region --> ICC Data --> ICC profile --> IC registers.

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Table 2-1. FITC Wizard - Serial Flash Configuration

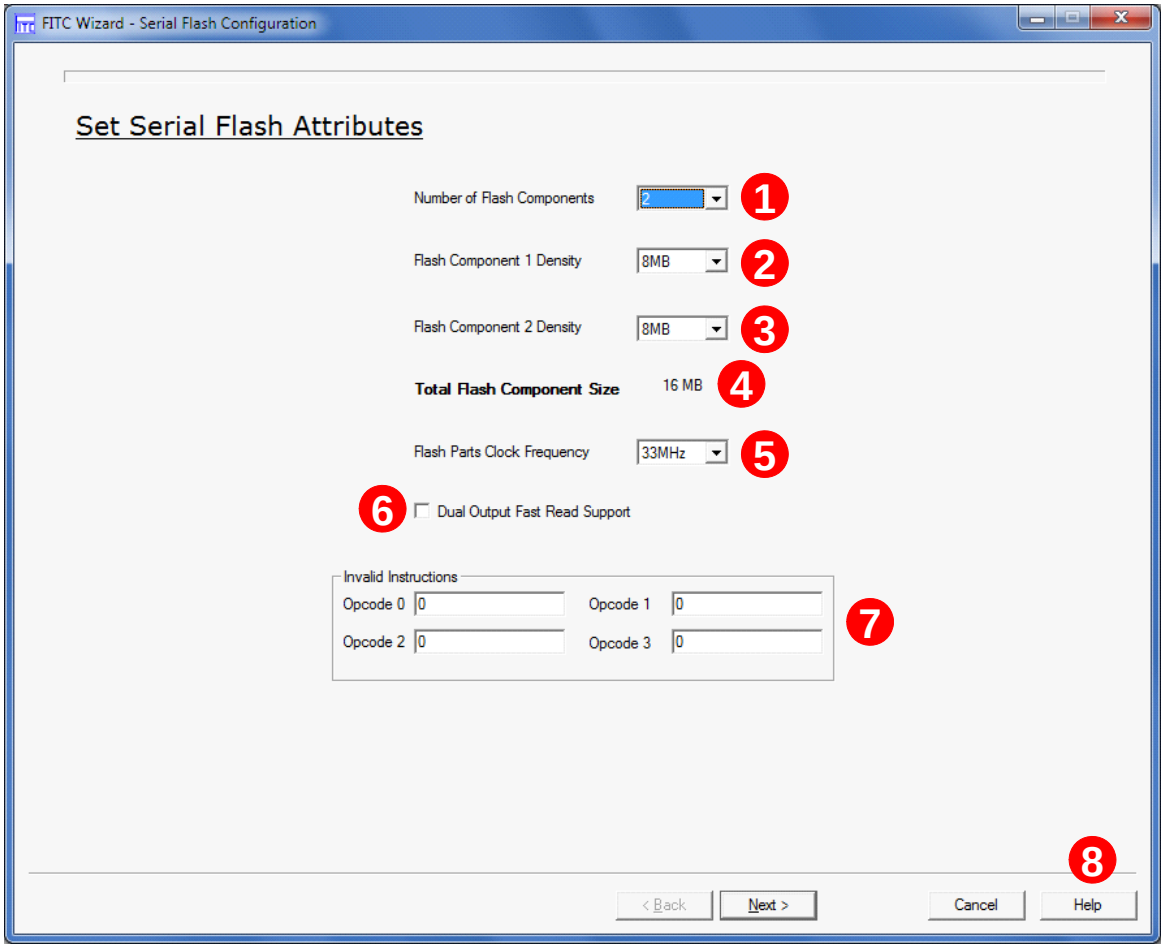
#	CRB Setting	Settings for All Platforms
		
1	2	Set this to match the Number of Serial Flash devices on target platform
2 3	**8MB** for both SPI Flash devices	Set size to match Serial Flash devices on the platform. ***Note:*** Please consult the target hardware designer to determine this setting.
4	Reports the total Serial Flash component size, updated in realtime	

Table 2-1. FITC Wizard - Serial Flash Configuration

#	CRB Setting	Settings for All Platforms
5	33MHz	Set to lowest common frequency of all SPI Flash devices on platform. Sets the following: • Read ID and Read Status clock frequency • Write and erase clock frequency • Fast read clock frequency
6	Unchecked	This is determines if all serial flash attached to the PCH will support the Single Input Dual Output Fast Read using Opcode 3Bh.
7	Set “Opcodes 0-3” to **0**	Opcode entered here will not be allowed by the PCH’s SPI controller for HW sequencing. See Intel® *6 Series Chipset SPI programming Guide* for more details. **0** = no instruction is specified
8	Click the “Help” button on any page to get more information of the parameters and settings.	
Click **Next** to advance to the next screen.		

Table 2-2. FITC Wizard - VSCC Configuration

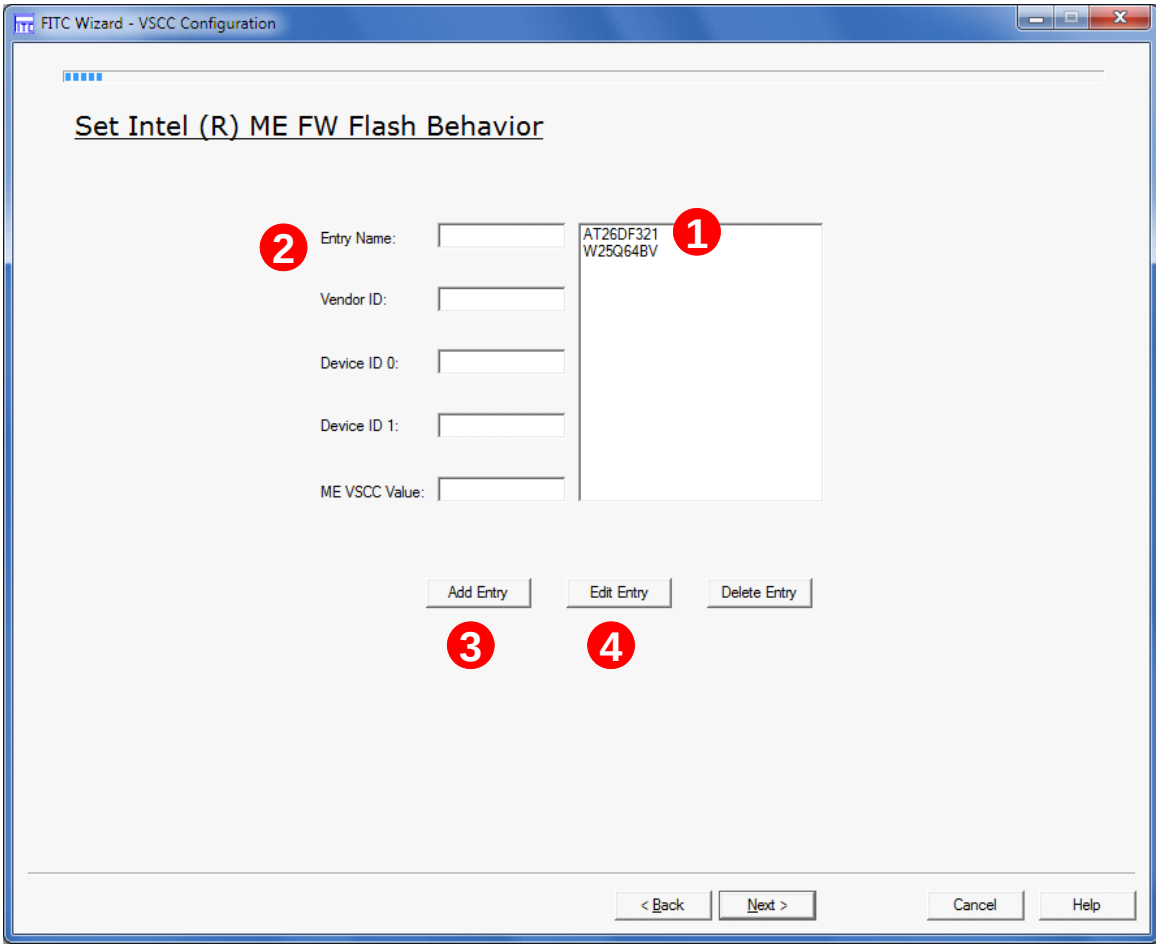
#	CRB Setting	Settings for All Platforms
		
1	Intel® CRBs use Flash devices **W25Q64BV** or **AT26DF321.** If the Flash device used on your platform is listed here, then click **Next** at the bottom of the screen to proceed. Otherwise, continue onto **Step 2** to add your Flash device information.	
2	Entry Name: **W25Q64BV** Vendor ID: **0xEF** Device ID 0: **0x40** Device ID 1: **0x17** ME VSCC Value: **0x20052005**	Using your SPI Flash device datasheet and *Cougar Point SPI Flash Programming Guide*, enter the values for each field.
3	Click **Add Entry** button to add this Flash device to the list	
4	Flash device information can be updated by first selecting the Flash device from the list and then clicking the **Edit Entry** button	
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-3. FITC Wizard - Image Source Files

#	CRB Setting	Settings for All Platforms

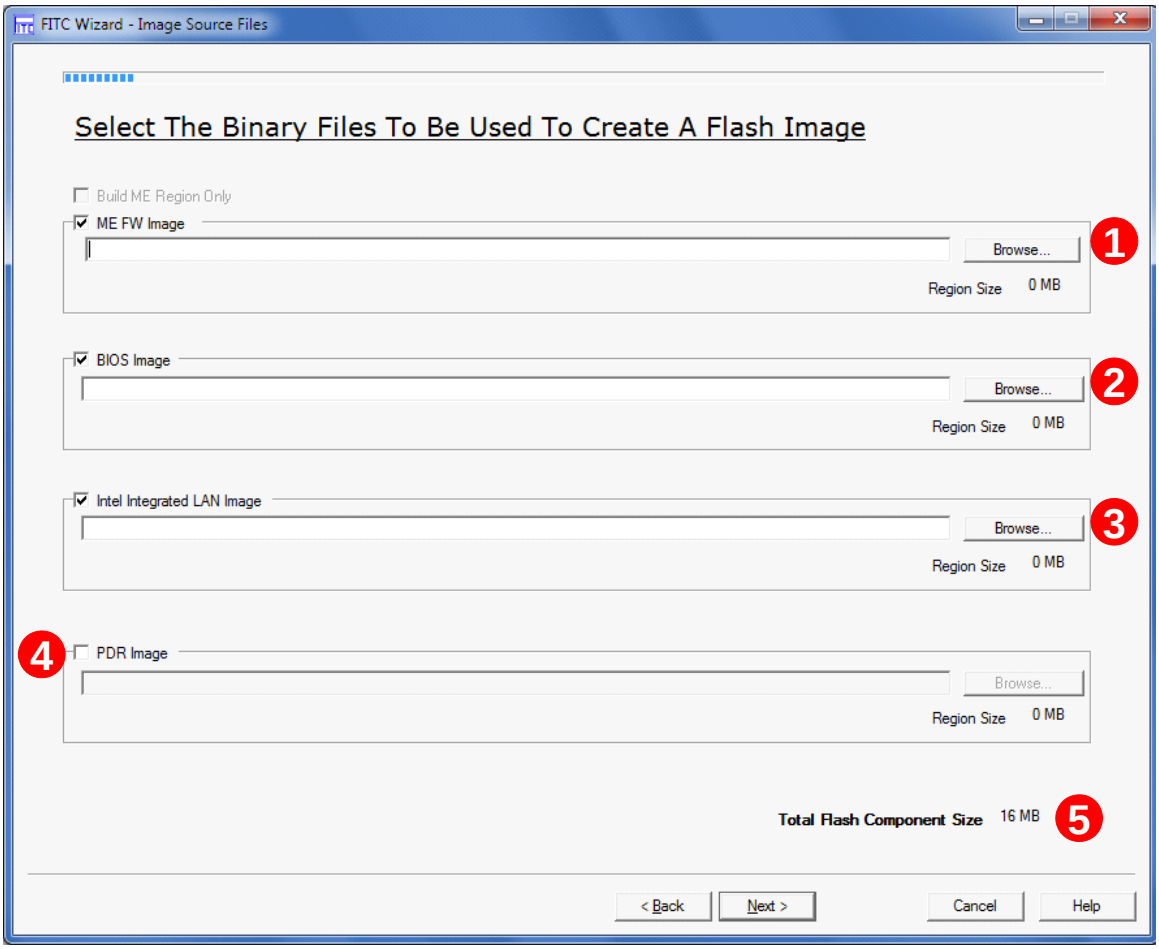


Table 2-3. FITC Wizard - Image Source Files

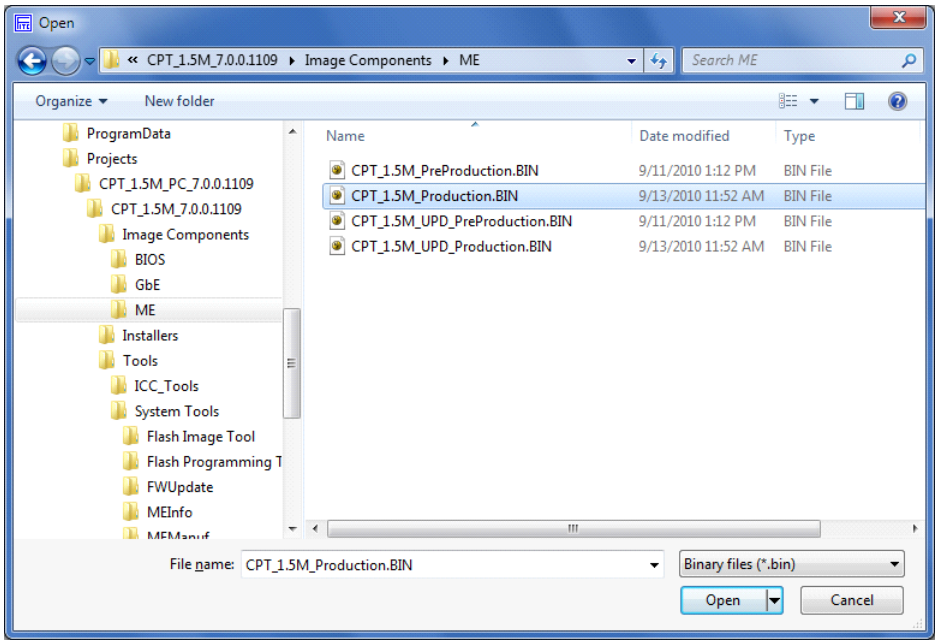
#	CRB Setting	Settings for All Platforms
1	Click **Browse** and select the ME FW image located in folder [root]\Image Components\ME \  	
2	**BIOS Image** box checked and click **Browse** to select desktop/mobile CRB BIOS Image located in the kit at: [root]\Image Components\BIOS	Check the **BIOS Image** box if BIOS is stored in the same SPI Flash as ME FW Image and Integrated LAN Image. Next click **Browse** and choose your BIOS image. ☑ BIOS Image If the BIOS image is stored in a separate SPI Flash device (see Configurations "B", "C", and "D" in Appendix A) then uncheck **BIOS Image** box.
3	**Intel Integrated LAN Image** box checked and click **Browse** to select CRB LAN Image located in the kit at: [root]\Image Components\GbE	☑ Intel Integrated LAN Image Check the **Intel Integrated LAN Image** box if using Intel LAN. Next click **Browse** and choose CRB LAN Image located in the kit at: [root]\Image Components\GbE If not using Intel LAN then uncheck **Intel Integrated LAN Image** box.
4	By default **PDR Image** box is unchecked. Select this box if a Platform Data Region (PDR) is needed for your platform.	
5	Reports the total Flash component size, updated in realtime	
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-4. FITC Wizard - LAN Configuration

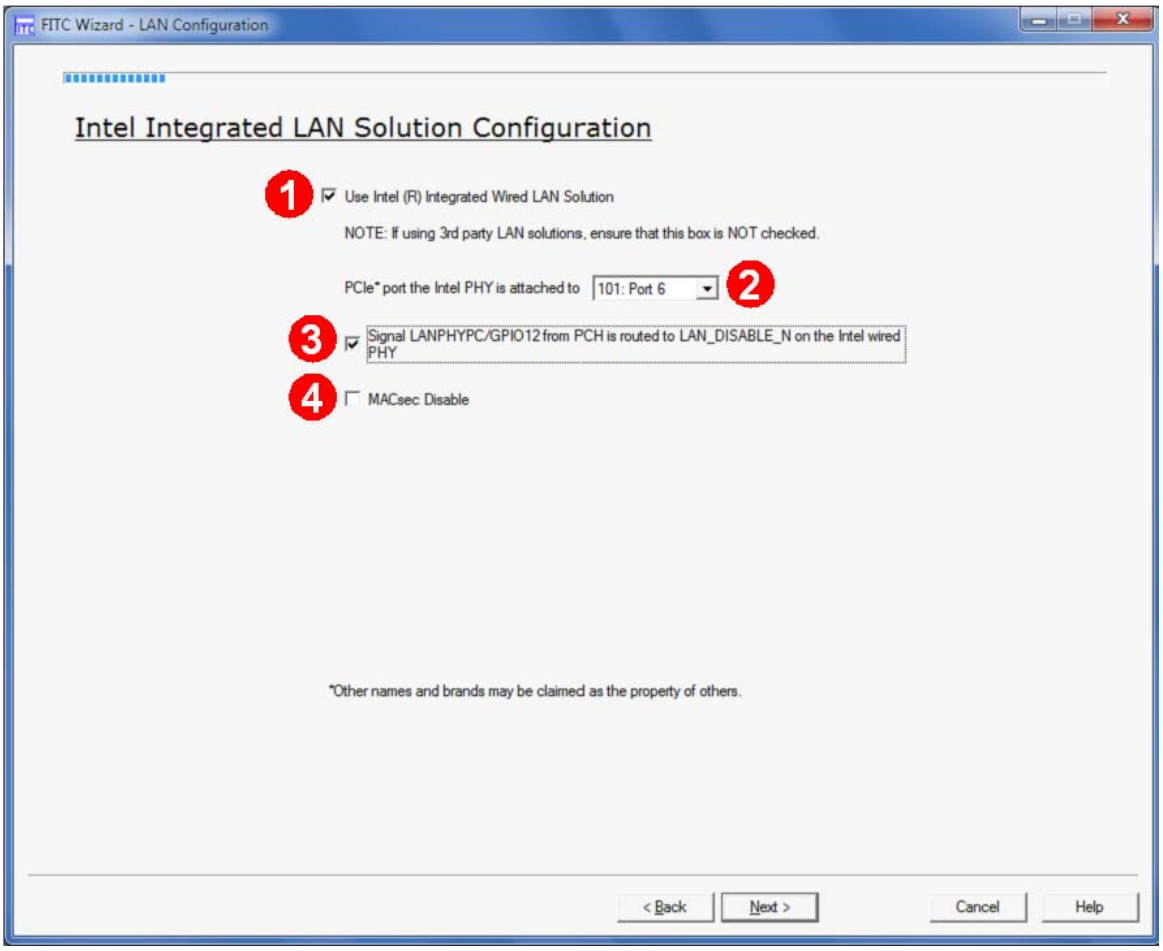
#	CRB Setting	Settings for All Platforms
		
1 2	**Checked** and select **101: Port 6**	**Checked** = Intel LAN is present. Select PCH PCI Express* port utilized for GbE LAN PHY. **Unchecked** = Third-party LAN is present. The port selection parameter will be grayed out. ***Note:*** Please consult with the target hardware designer to determine this setting.
3	**Checked**	**Checked** = Only required if target platform has Intel wired LAN and PCH GPIO12 is used as LANPHYPC for Intel LAN. **Unchecked** = PCH GPIO12 is used as General Purpose Input/Output (GPIO) pin. Must be **Unchecked** if Third-party LAN is present. ***Note:*** Please consult with the target hardware designer to determine this setting.

Table 2-4. FITC Wizard - LAN Configuration

#	CRB Setting	Settings for All Platforms
4	**Unchecked**	This setting should be unchecked to enable MACsec. The “MACsec ready” bit in the ME descriptor region should be enabled for support. • This bit must be set in the manufacturing plant and will not be accessible after shipment. MACsec is a hop-by-hop network security solution. It provides Layer 2 encryption and authenticity/integrity protection for packets traveling between MACsec-enabled nodes of the network. The key components that need to support this functionality are the server, client and switch network interface devices. **Note:** If MACsec is enabled in IT infastructure will not function properly. See ‘CDI #461067’ for further deatils.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-5. FITC Wizard - Intel ME Application Permanent Disable

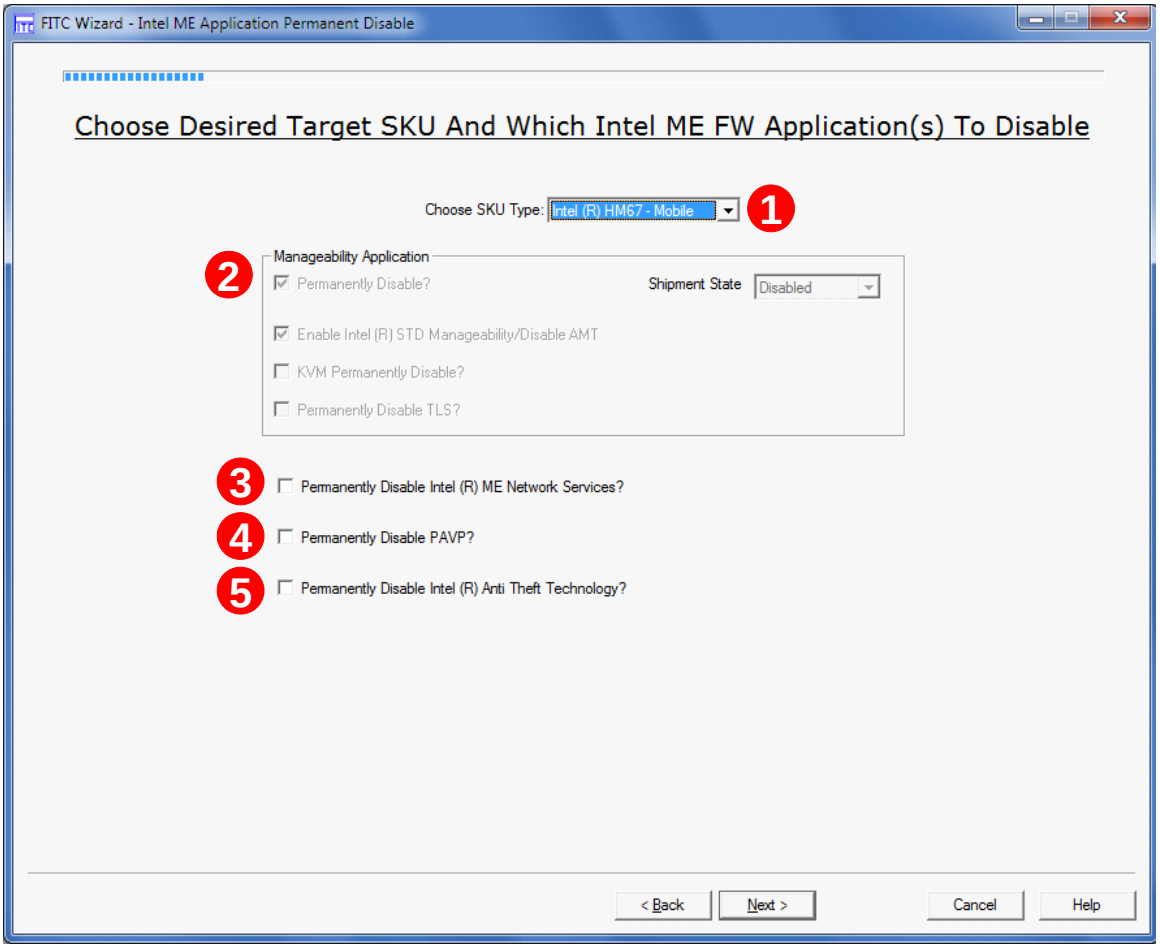
#	CRB Setting	Settings for All Platforms
		
1	• Select the platform SKU type that you wish to emulate on pre-production silicon. Valid Choices are: **Intel® H67 - Desktop** • **Intel® P67 - Desktop** **Intel® H61 - DesktopIntel® Z68 - Desktop** • **Intel® QS67 - Mobile** • **Intel® HM67 - Mobile** • **Intel® HM65 – Mobile** • **Intel® UM67 – Mobile**	
2	Grayed out	Manageability Application feature is not supported on 1.5MB FW SKUs and is grayed out
3	Unchecked	Intel® ME Network Services. If Permanently Disable is checked this will disable all ME Network Services communication except ARP offload and RMCP ping response.

Table 2-5. FITC Wizard - Intel ME Application Permanent Disable

#	CRB Setting	Settings for All Platforms
4	Unchecked	If using Intel integrated graphics solution and the target platform supports HD playback support from the Intel Graphics driver, then PAVP must NOT be Disabled. Availability of PAVP feature is dependent on the SKU Type selected in Step 1. If this feature is not grayed out, then you have the option to permanently disable it by checking this box.
5	Unchecked	Availability of Intel® Anti Theft Technology feature is dependent on the SKU Type selected in Step 1. If this feature is not grayed out, then you have the option to permanently disable it by checking this box.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-6. FITC Wizard - Intel ME Kernel Configuration Parameters

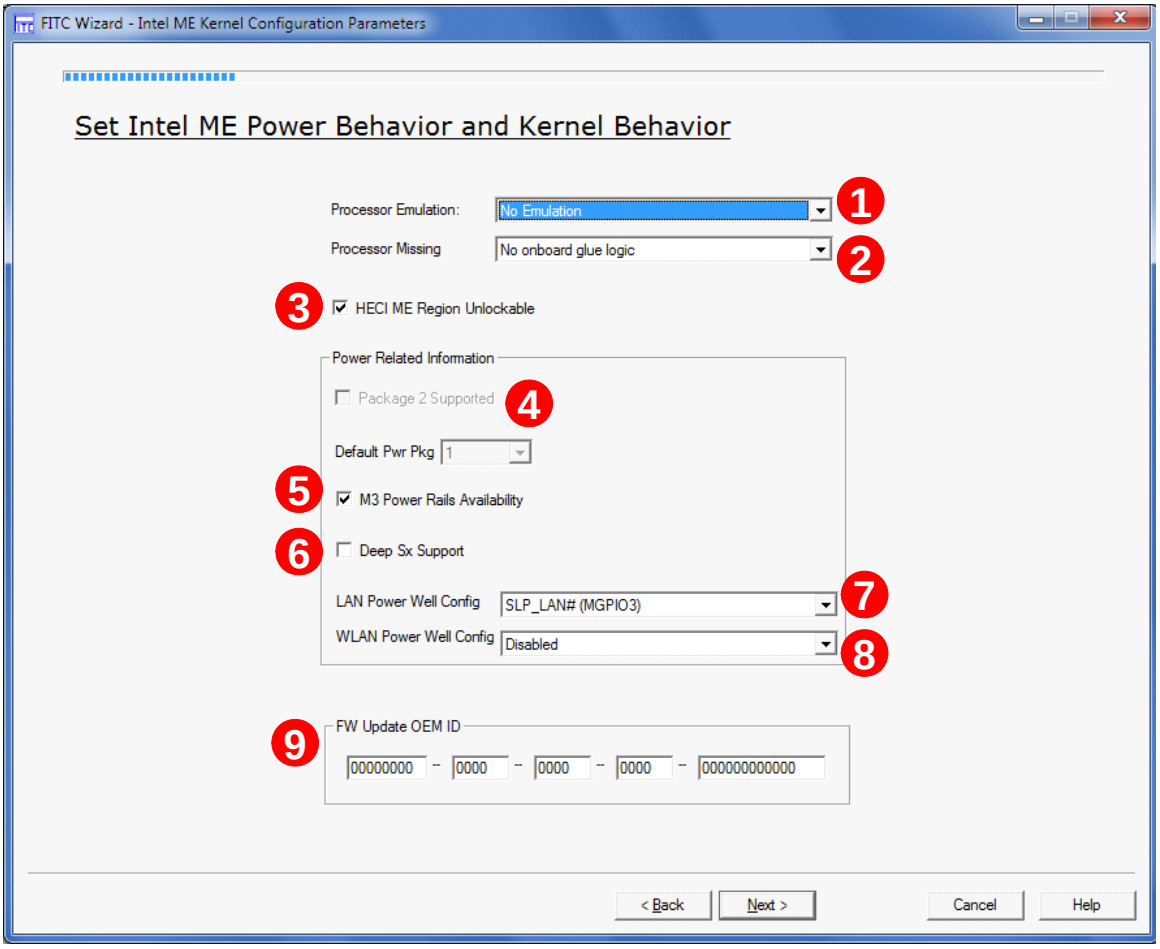
#	CRB Setting	Settings for All Platforms
		
1	**No Emulation**	Set this parameter to the type of processor that the target system will use during production. This field will emulate that processor class for pre-production silicon.
2	**No onboard glue logic**	This value will determine if glue logic is present on a Desktop platform to detect a missing processor. Choices are: • No onboard glue logic • Glue logic tied to GPIO24 ***Note:*** Please consult with the target hardware designer to determine this setting.
3	**Checked**	This option is to allow host access to the ME region during manufacturing/debug environments. See Intel® HMRFPO MEI Message Support in *Cougar Point ME BIOS Writers Guide* for more details. ***Note:*** This setting is dependent on BIOS implementation. Please consult with the target platform's BIOS vendor to determine this setting.
4	Grayed out	**Power Package 2: not supported for 1.5MB SKU**

Table 2-6. FITC Wizard - Intel ME Kernel Configuration Parameters

#	CRB Setting	Settings for All Platforms
5	**Checked**	This value will determine if M3 power rail is present on the platform for proper firmware behavior **Checked** = Platform hardware supports M3 power rail **Unchecked** = Platform hardware has no separate M3 power rail ***Note:*** Please consult with the target hardware designer to determine this setting. ***Note:*** This value is automatically checked and greyed out if Power Package 2 Supported is checked.
6	**Unchecked**	**Checked** = Platform HW configuration supports DSW rail and entry into Deep Sx. **Unchecked** = For mobile platforms, platform EC supports SUSPWRDNACK capability. For desktop platforms, platform does not support DSW rail or Deep Sx. ***Note:*** Please consult with the target hardware designer to determine this setting.
7	**SLP_LAN# (MGPIO3)**	This informs ME how the Intel LAN well is powered. If the target platform is NOT using Intel LAN then set this to **Core Well**. Choices for LAN Power Well Config are: • Core Well • Sus Well • ME Well • SLP_LAN# ***Note:*** Please consult with the target hardware designer to determine this setting.
8	**Disabled**	This informs ME how the Intel WLAN is powered. If the target platform is NOT using WLAN for Manageability Applications (for example: Intel® AMT) then set this to **Disabled**. Choices for WLAN Power Well Config are: • Disabled (Default) • Sus Well • ME Well For Mobile platforms using wireless manageability set one of the following **WLAN Power Well Config** options. If **Deep Sx Support** checked: • Controlled via SLP_M# || SLP_ME_CSW_DEV# If **Deep Sx Support** unchecked: • Controlled via SLP_M# || SPDA For Desktop platforms using the Intel® Centrino® Advanced-N 6205 (Taylor Peak 2x2) for wireless manageability set the **WLAN Power Well Config** option to **Controlled via SLP_M# || SLP_ME_CSW_DEV#.** ***Note:*** Please consult with the target hardware designer to determine this setting.
9	**FW Update OEM ID** 00000000-0000-0000-0000-000000000000	**FW Update OEM ID** This field provides the ability to target FWUpdate (FWUpdLcl.exe) by Platform OEM. This ID will make sure that customers can only update a platform with an image coming from the platform OEM. If set to all zeros, then any input is valid when doing a firmware update.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-7. FITC Wizard - Intel ME Networking Services Setup

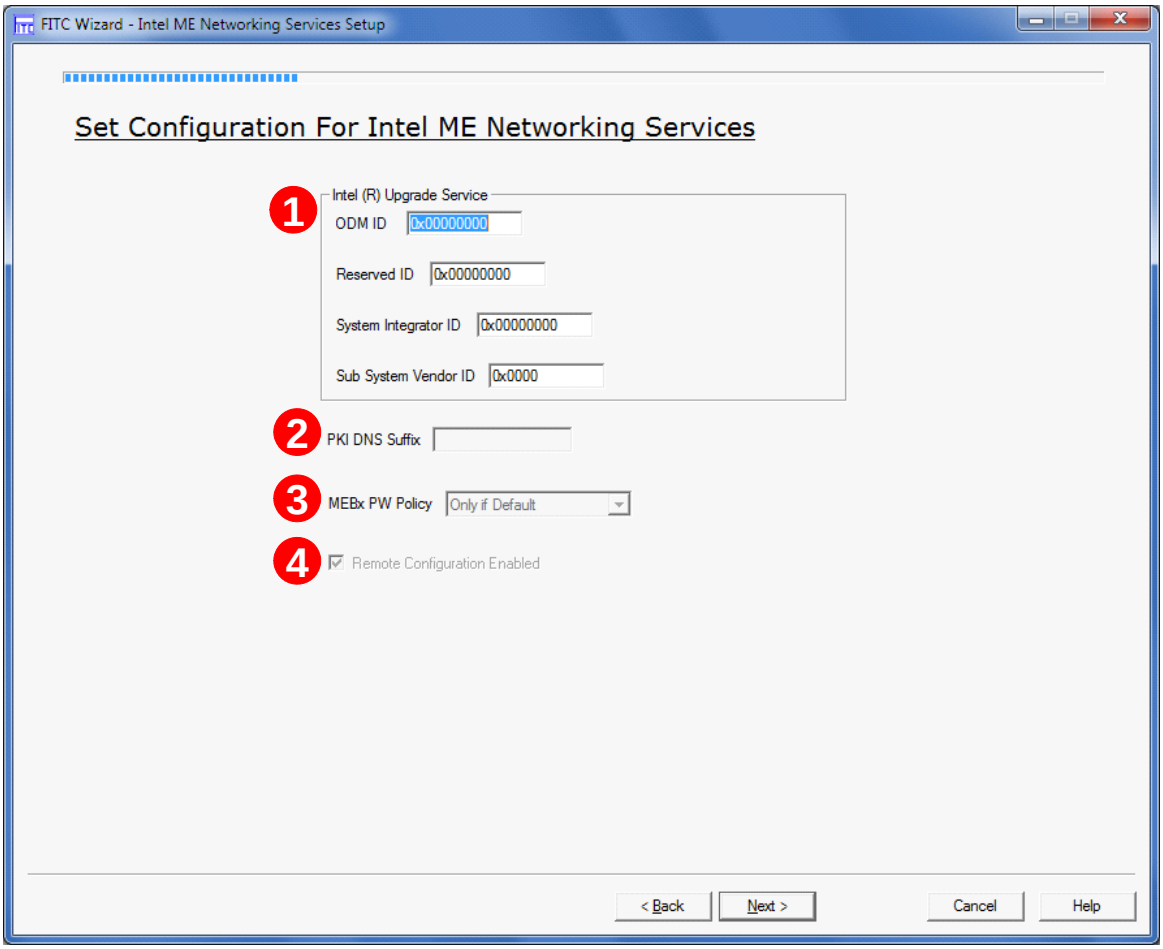
#	CRB Setting	Settings for All Platforms
		
1	ODM ID: **0x00000000** Reserved ID: **0x00000000** System Integrator ID: **0x00000000** Sub System Vendor ID **0x0000**	These fields are used ONLY by Intel® Upgrade Service. If enabling Intel® Upgrade Service, refer the MTP User Guide that is available after registration for detail on how to set this field. Registration and login is available at: http://upgrades.intel.com
2	Grayed out	Treat as reserved.

Table 2-7. FITC Wizard - Intel ME Networking Services Setup

#	CRB Setting	Settings for All Platforms
3	Grayed out	Treat as reserved.
4	Grayed out	Treat as reserved.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Note: The following screen on Intel® Anti Theft Technology Setup can only be accessed if the box for "Permanently Disable Intel® Anti Theft Technology?" (see Table 2-5) is unchecked. Otherwise, continue with the next FITC Wizard screen on the next page.

Table 2-8. FITC Wizard - Intel® Anti Theft Technology Setup

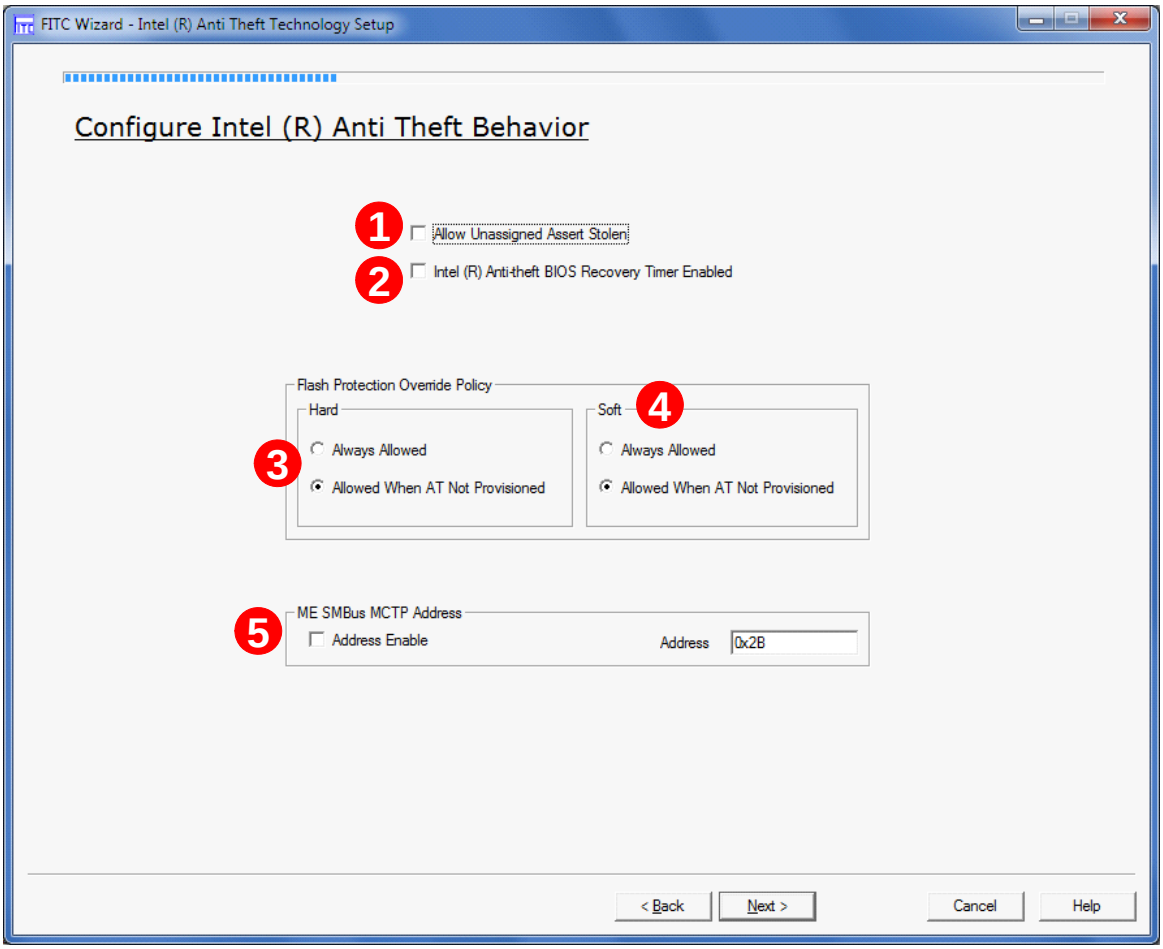
#	CRB Setting	Settings for All Platforms
		
1	Unchecked	**Checked** = The Unsigned Assert Stolen is enabled **Unchecked** = The Unsigned Assert Stolen is disabled
2	Unchecked	This timer will enable a 30 minute window to allow a firmware / BIOS re-flash before the system is powered down ***Note:*** This setting is dependent on BIOS implementation. Please consult with the target platform's BIOS vendor to determine this setting.

Table 2-8. FITC Wizard - Intel® Anti Theft Technology Setup

#	CRB Setting	Settings for All Platforms
3	**Allowed When AT Not Provisioned**	This option determines if the ME will enter a disabled state to allow full SPI device re-flashing when the manufacturing override jumper (HMFPRO) is set. **Always Allowed** - Full SPI re-flash will always be allowed regardless of AT enrollment state. **Allowed When AT Not Provisioned** - Full SPI re-flash allowed if AT has not been enrolled.
4	**Allowed When AT Not Provisioned**	This option determines if the ME will enter a disabled state via BIOS based MEI messages and allow ME only region re-flash. **Always Allowed** - ME region re-flash will always be allowed regardless of AT enrollment state. **Allowed When AT Not Provisioned** - ME region re-flash allowed if AT has not been enrolled.
5	Address Enable **unchecked** Address **0x2B**	This setting is for 3G NIC support for Intel® AT. If this card is supported by the target platform, then select Address enable and set the SMBus address for the card. ***Note:*** Please consult with the target hardware designer to determine this setting.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-9. FITC Wizard - DMI/PCIe* Configuration

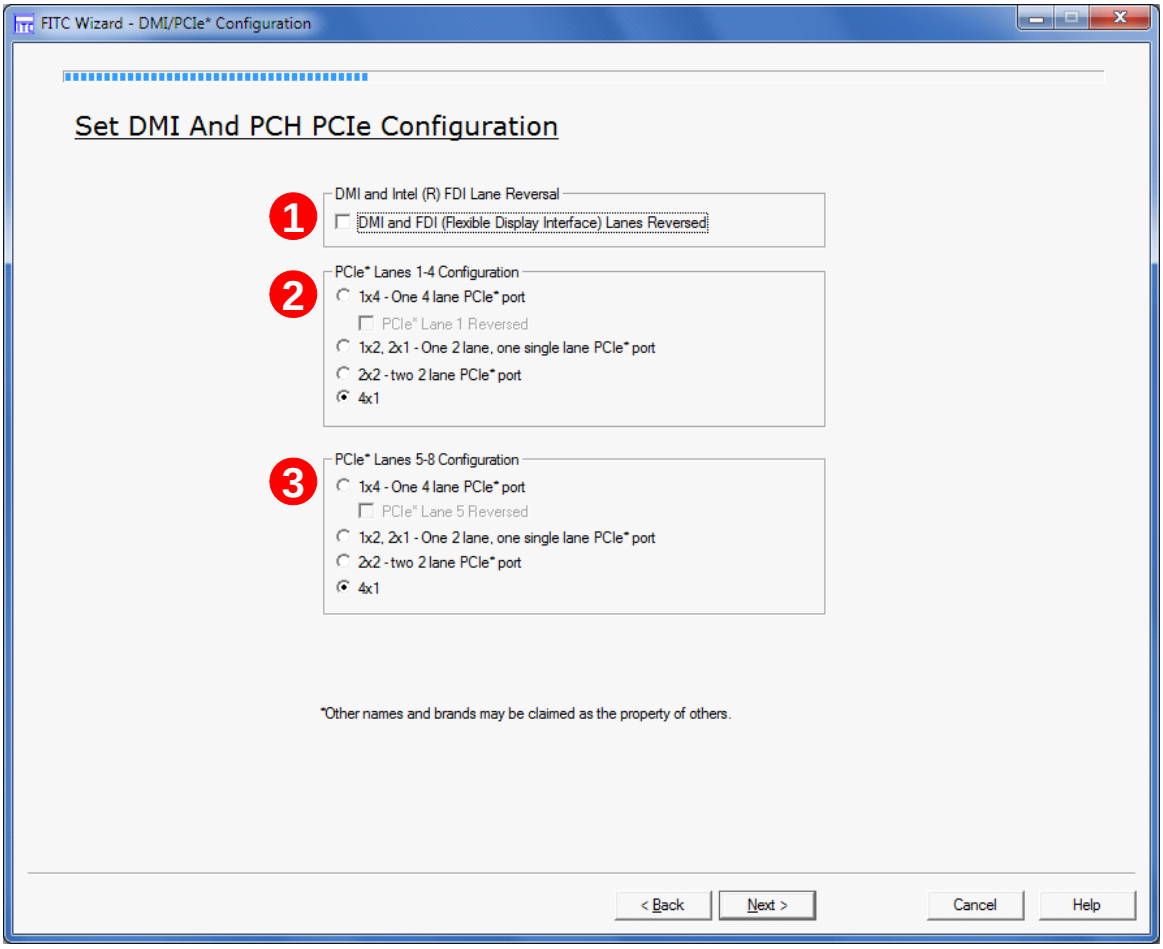
#	CRB Setting	Settings for All Platforms
		
1	**Unchecked**	**DMI and FDI Lanes Reversed** option must reflect platform topology. See *Cougar Point SPI Flash Programming Guide* for more details. ***Note:*** Please consult with the target hardware designer to determine this setting. When using Small Form Factor CRB platforms (SKU QS67), Set this value to '**true**'
2	**4x1**	**PCIe* Lanes 1-4 Configuration** panel must reflect platform topology. ***Note:*** **PCIe* lane 1 reversed** option is available only when **1x4 - one four lane PCIe* port** is selected. ***Note:*** Please consult with the target hardware designer to determine this setting.
3	**4x1**	**PCIe* Lanes 5-8 Configuration** panel must reflect platform topology. ***Note:*** **PCIe* lane 5 reversed** option is available only when **1x4 - one four lane PCIe* port** is selected. ***Note:*** Please consult with the target hardware designer to determine this setting.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-10. FITC Wizard - Thermal Reporting

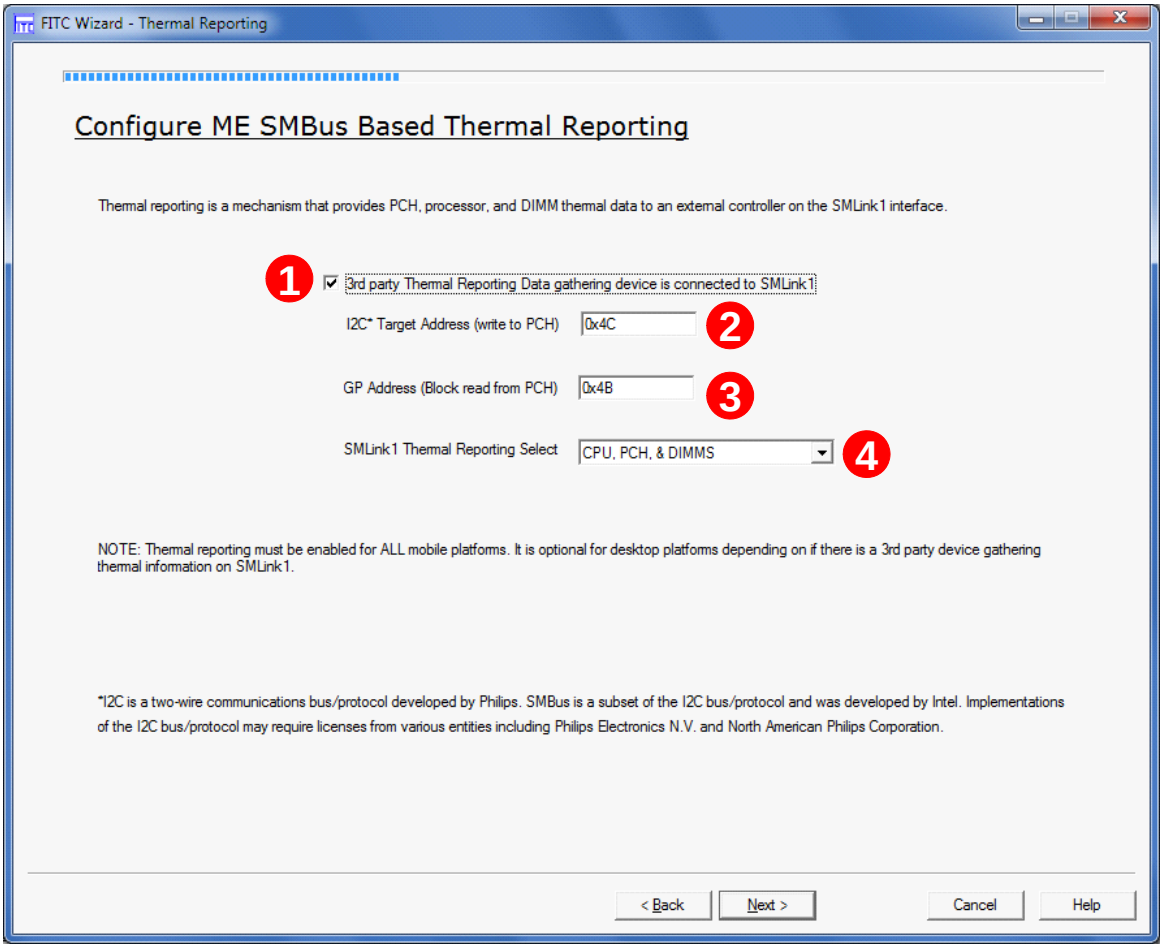
#	CRB Setting	Settings for All Platforms
		
1	**Checked** for CRB	**Checked** =Check this for EC/SIO/BMC to interact Thermal Reporting feature over SMLink1 **Unchecked** = Platform has no EC/SIO/BMC on SMLink1 ***Note:*** Please consult with the target hardware designer to determine this setting.
2	CRB uses **0x4C**	Denotes EC/SIO/BMC SMBus write address over SMLink1. For mobile platforms, this field c**annot be blank or 0x0**, otherwise the **Next** button will be disabled. ***Note:*** Please consult with the target hardware designer to determine this setting.
3	CRB uses **0x4B**	Denotes EC/SIO/BMC SMBus read address over SMLink1. For mobile platforms, this field c**annot be blank or 0x0**, otherwise the **Next** button will be disabled. ***Note:*** Please consult with the target hardware designer to determine this setting.

Table 2-10. FITC Wizard - Thermal Reporting

#	CRB Setting	Settings for All Platforms
4	**CPU, PCH, & DIMMS**	Select between thermal reporting using: • **CPU, PCH, & DIMMS:** Legacy Intel(R) ME FW SMBus based thermal reporting that reports Processor, PCH and DIMMs ***Note:*** ME Thermal Reporting: Advantage = Does not require PECI capability in EC. Disadvantage = no real time temperature alert level control, and no dynamic Sandy Bridge CPU Turbo controls. — PECI from Sandy Bridge processor is connected to PCH — BIOS sets Thermal Reporting Control (TRC) MMIO register at TBARB+1Ah to enable ME reporting of processor, PCH, and DIMM temperatures (as appropriate) — ME thermal reporting PCI device should be enabled for proper interaction with EC, SIO, BMC, or equivalent fan control logic • **PCH Only:** HW based PCH only thermal reporting. This would require PECI to be hooked up directly to EC/SIO in order to get processor temperature ***Note:*** Platform based Thermal Reporting: Advantage = allows full dynamic Sandy Bridge Turbo control. Disadvantage = Requires EC/BMC with PECI capability. — PECI from Sandy Bridge processor is connected direct to EC, SIO, BMC, or equivalent fan control logic — BIOS sets Thermal Reporting Control (TRC) MMIO register at TBARB+1Ah = 0x0, disabling ME reporting of processor, PCH, and DIMM temperatures — ME thermal reporting PCI device should be disabled
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-11. FITC Wizard - Boot Configuration Options

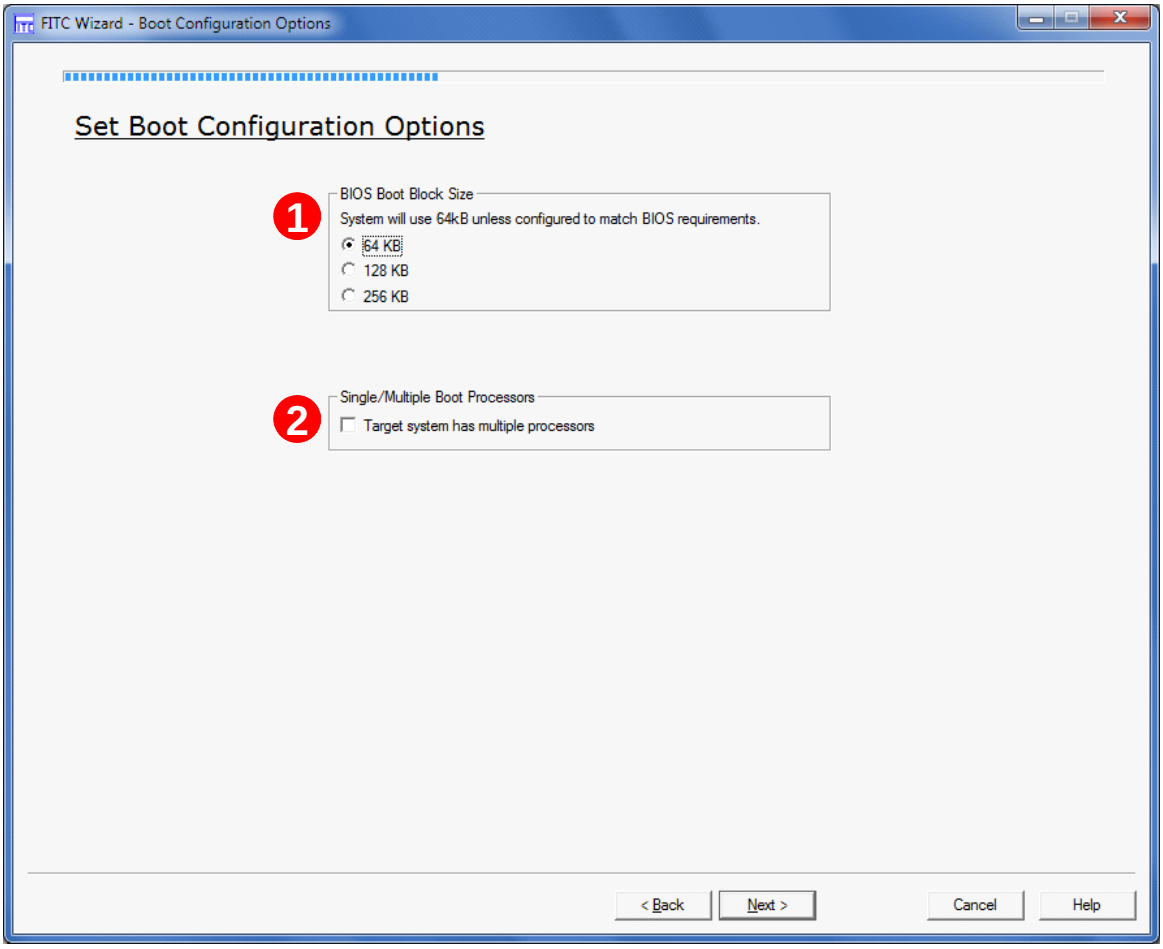
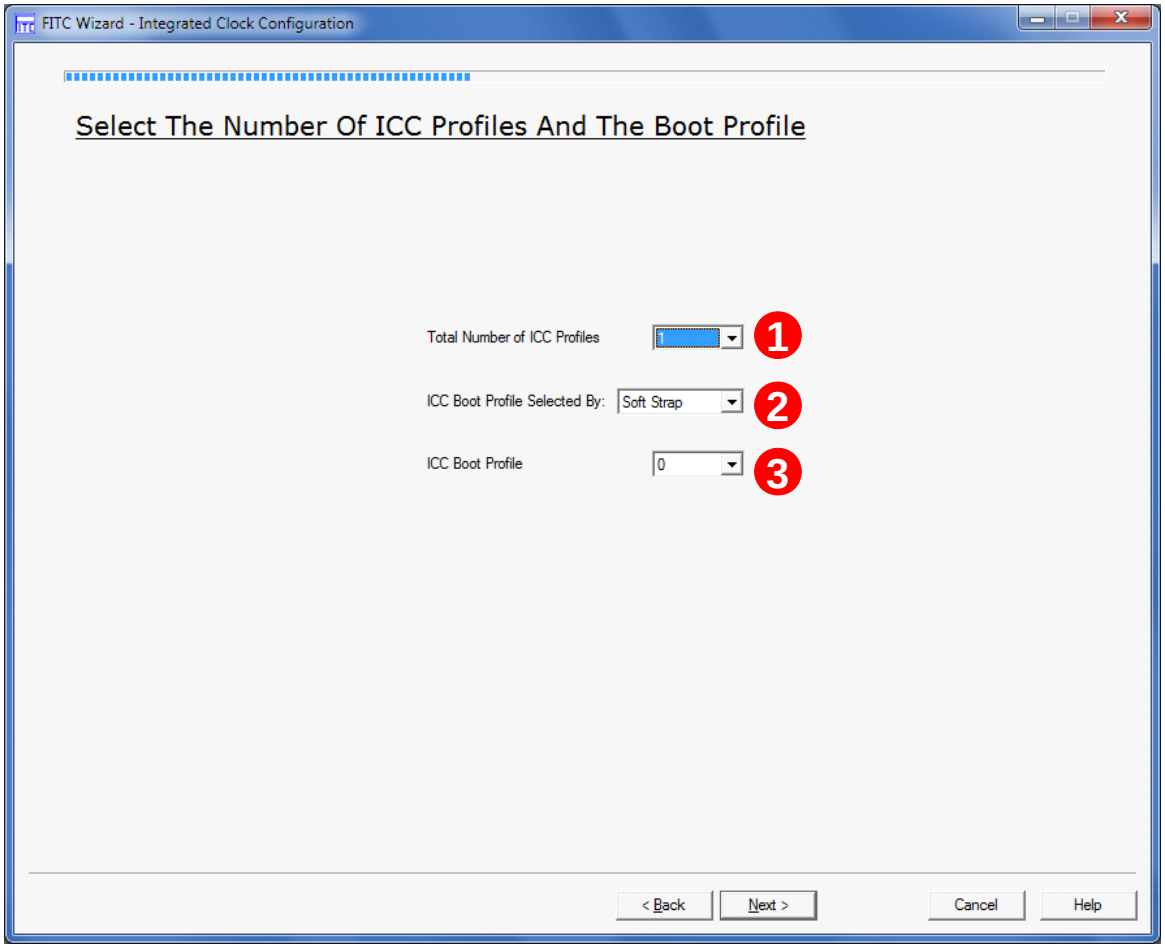
#	CRB Setting	Settings for All Platforms
		
1	64 KB	BIOS Boot Block Size is the bare minimum BIOS code required to boot a platform. This setting allows for proper address bit to be inverted as required by BIOS Boot Block Size. **64KB** = Invert A16 if Top Swap is enabled **128KB** = Invert A17 if Top Swap is enabled **256KB** = Invert A18 if Top Swap is enabled If BIOS is stored in a separate SPI Flash device (see Appendix A for details about Configurations “B”, “C”, and “D”) then leave this parameter at **64KB**. **Note:** This field will be disabled when BIOS Image (see Table 2-3) is not checked. ***Note:*** This must be determined by the target platform BIOS developer.

Table 2-11. FITC Wizard - Boot Configuration Options

#	CRB Setting	Settings for All Platforms
2	Unchecked	Indicates if RequesterID checking during DMI accesses is disabled. This parameter is only applicable for server platforms that contain multiple Processors. **Unchecked** = single Processor in the same platform **Checked** = multiple Processors in the same platform ***Note:*** Please consult with the target hardware designer to determine this setting.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-12. FITC Wizard - Integrated Clock Configuration

#	CRB Setting	Settings for All Platforms



#	CRB Setting	Settings for All Platforms
1	1	SPI flash binary images across multiple board designs can contain the same block of Clock Control Parameters (OEM Request Records), up to 7 sets total. This parameter selects how many total OEM Request Records will be built into the image. ***Note:*** The next 2 screens will be repeated for as many OEM Request Records that will be present.
2	Soft Strap	If more than one OEM Request Record is present in SPI, then this parameter specifies whether Soft Strap or BIOS determines the ICC Boot Profile. Note that the BIOS option has additional BIOS requirements, see *BIOS Writers Guide* for more details. These requirements include: • Details on the Intel® MEI message BIOS can use to read or specify ICC Boot Profile • Details on reset requirements after BIOS has specified an ICC Boot Profile
3	0	Specifies which clock control parameter set is to be used by the final generated SPI flash binary image by the target platform at boot time. This parameter is only used if ICC Boot Profile is specified by Soft Strap. If BIOS is specifying ICC Boot Profile, then this parameter is unused.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-13. FITC Wizard - ICC Profile 0 Single-Ended Clocks

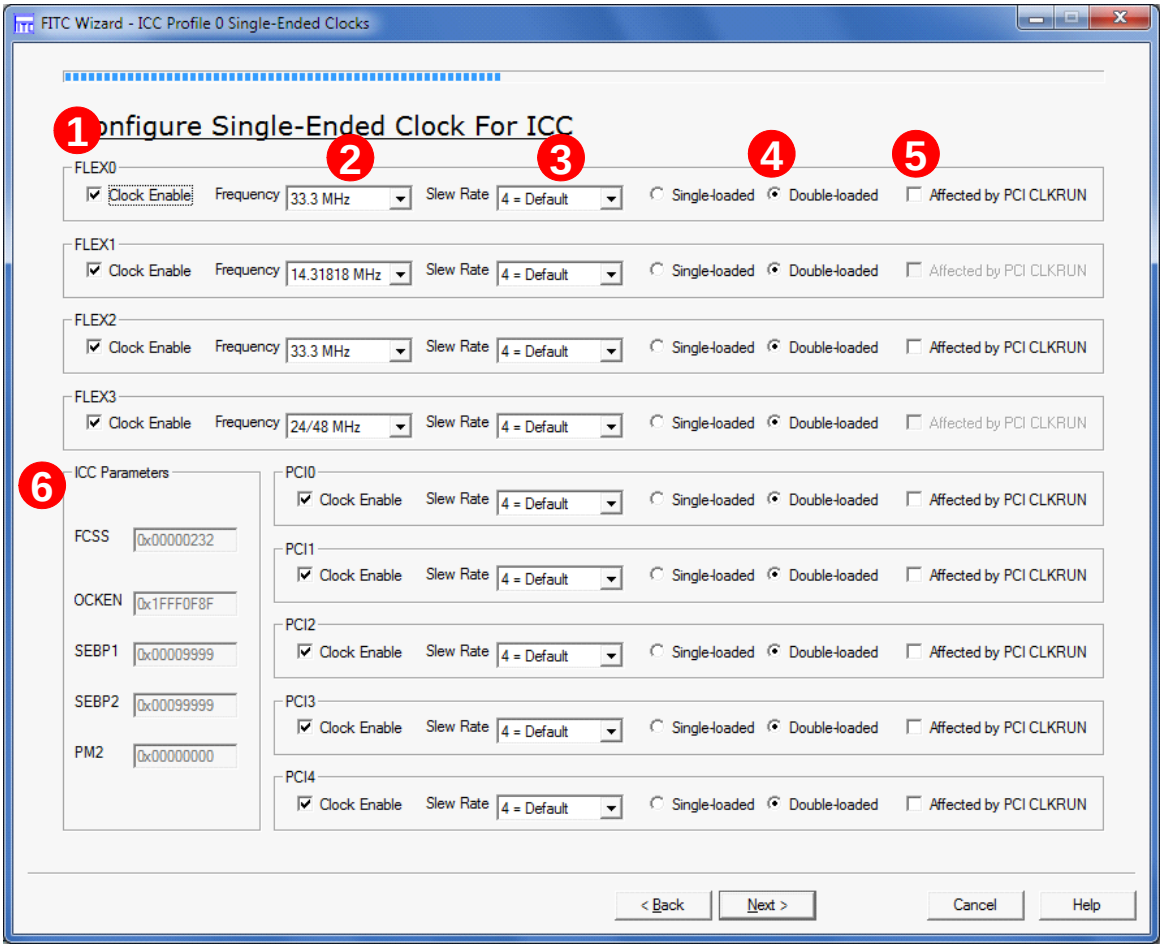
#	CRB Setting	Settings for All Platforms
		
1	**Checked** for all PCI and FLEX clocks	**Unchecked** = Output clock is gated to low state **Checked** = Output buffer is enabled to toggle once its clock source has been initialized
2	**33.3 MHz** for FLEX0, FLEX2 **14.31818 MHz** for FLEX1 **24/48MHz** for FLEX3	Controls muxing to select sources for FLEX clock outputs. ***Note:*** PCI clock outputs are fixed at 33 MHz, but FLEX clock outputs may be configured to act as PCI outputs. ***Note:*** These clock select settings only take effect when this muxed FLEXCLK/GPIO pin is configured for FLEXCLK native usage. Refer to the Ibex Peak EDS for configuration of GPIO vs. native usage.
3	**4-Default Slew Rate** for all PCI and Flex clocks	Controls slew rate for PCI and FLEX clocks. PCI Specifications 2.4 and 3.0 allow for an acceptable slew rate range of 1 to 4 V/ns. ME FW programmability allows for slew rate to be specified between 0.6 to 2 V/ns for two reasons: • Slew rates exceeding 2 V/ns can have adverse effects on platform EMI • Slew rates lower than 1 V/ns can be specified for EMI benefits, at the risk of violating PCI specification
4	**Double-loaded** for all PCI and FLEX clocks	Sets programmable series resistance for PCI and FLEX clocks.

Table 2-13. FITC Wizard - ICC Profile 0 Single-Ended Clocks

#	CRB Setting	Settings for All Platforms
5	Unchecked for all PCI and FLEX clocks	Enables support for CLKRUN protocol for PCI 33 MHz clocks muxed out to CLKOUTFLEX[3:0] and CLKOUT_PCI[4:0]. **Checked** = Corresponding CLKOUTFLEX PCI clock is free-running, unaffected by CLKRUN protocol **Unchecked** = Corresponding CLKOUTFLEX PCI clock is shut off when CLKRUN protocol turns off PCI clocks ***Note:*** When the corresponding CLKOUTFLEX pins are not configured for PCI 33Mhz clock, this option is disabled and **unchecked**.
6	Reports the dword values of FCSS, OCKEN, SEBP1, SEBP2, and PM2 Clock Control Parameters, as they are affected by the settings on this screen. See Appendix B for more information on Clock Control Parameters.	
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-14. FITC Wizard - ICC Profile 0 Platform & Differential Clocks

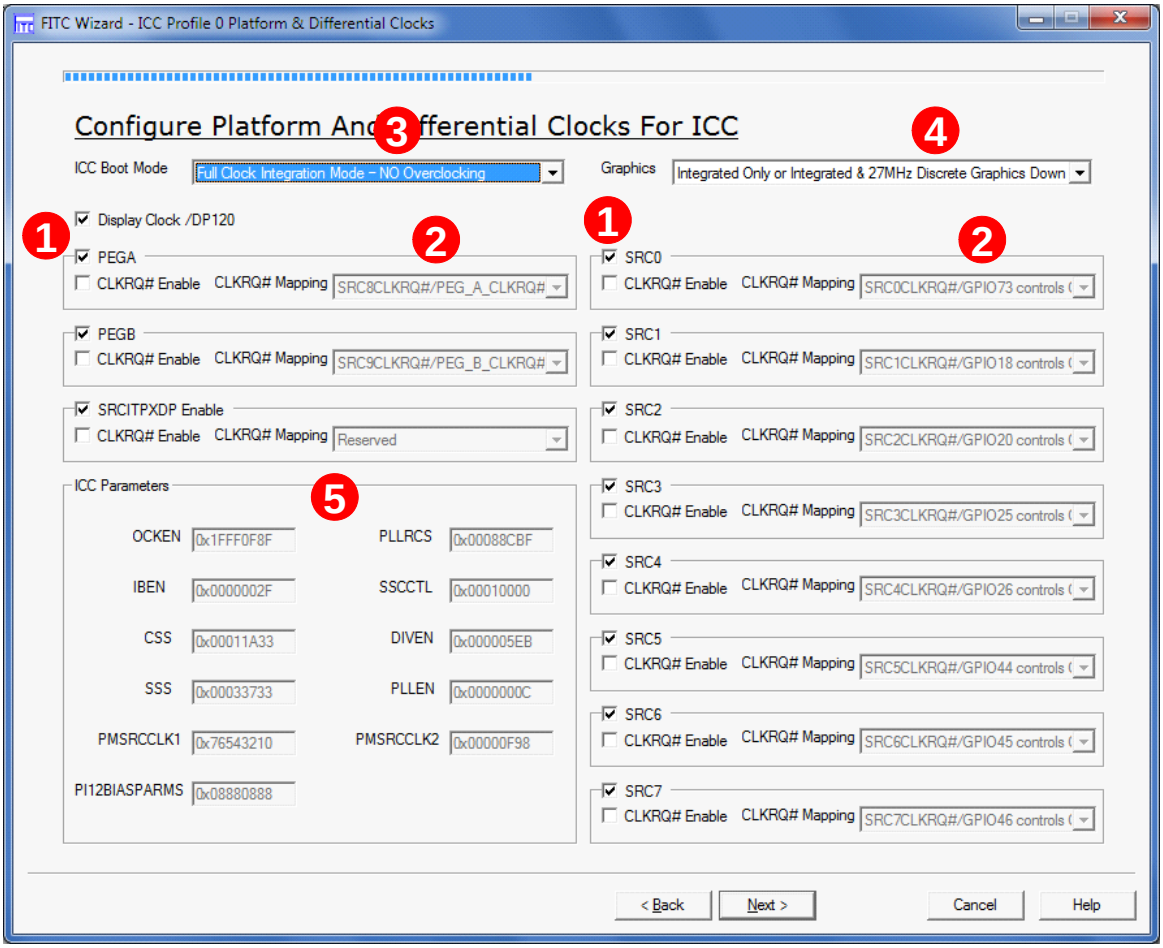
#	CRB Setting	Settings for All Platforms
		
1	**Checked** for all differential clock outputs (PEG[B:A], SRCITPXDP, SRC[7:0], DP120)	**Unchecked** = Output clock is gated to low state **Checked** = Output buffer is enabled to toggle once its clock source has been initialized
2	**Disable dynamic control** for all PCI Express* clocks (PEG[B:A], SRCITPXDP, SRC[7:0])	Assigns dynamic CLKRQ# control of SRC clocks. Each PCI Express* clock may be assigned to a muxed CLKRQ#/GPIO PCH pin. ***Note:*** These CLKRQ# settings only take effect when this muxed CLKRQ#/GPIO pin is configured for CLKRQ# native usage. Refer to the *Ibex Peak EDS* for configuration of GPIO vs. native usage.

Table 2-14. FITC Wizard - ICC Profile 0 Platform & Differential Clocks

#	CRB Setting	Settings for All Platforms
3	**Full Clock Integration Mode - NO Overclocking**	**Full Clock Integration Mode - NO Overclocking** = PCH natively generates all platform clocks. Platform will not utilize BCLK overclocking. **Full Clock Integration Mode - YES Overclocking** = PCH natively generates all platform clocks. Platform WILL utilize BCLK overclocking. **Display Clock Integration**= Display Clock Integration (DCI) Mode clock generation for Display Clock (PCH generation from 25-MHz crystal). All other clocks are generated by discrete clock generator (ie: CK505). Note that this mode of clock generation is only available for debug purposes and is not supported on a production platform. Also note that BCLK overclocking with discrete clock generator (ie: CK505) will not function by selecting this option, since the required configuration is not possible with Cougar Point clock architecture. ***Note:*** You may experience a test fail result for Intel® ME Test Suite (METS) test ICC_TST_11, unless you set an additional value in FITC ***after*** finishing with Wizard. This means you will not Build an image after finishing the Wizard. Instructions: • In FITC (not Wizard mode) navigate to **Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | Clock Range Definition Record 0** (or appropriate record #0-7) • Navigate to subfolder **Clock Range Definition Record | Processor or Platform DMICLK (DIV2-S)**. You will be changing a setting for the main PCI Express* clock divider • Change parameter **Clock Div Min** to 0xC00 • Change parameter **Clock Div Max** to 0xC00 for basic configuration. If using Wimax, set the value to 0xC0E Not taking the above steps has no risk or issue for production configuration and is meant to help platform successfully meet METS requirements for ICC_TST_11 only.
4	**Integrated Only or Integrated & 27MHz Discrete Graphics Down Device**	**External Graphics only** = Use this setting if platform supports external graphics only **Integrated Only or Integrated & 27MHz Discrete Graphics Down Device** = Display clock will be controlled by Intel Integrated Graphics Device Driver and the Display Clock will only be supplied to the Intel Integrated Graphics Device. Any Graphics Down Devices with 27-MHz clock requirement is required to utilize an external 27-MHz crystal since: • PCH cannot simultaneously supply 120 MHz Integrated Graphics clock and 27-MHz Down Device clock simultaneously • Simultaneous clocking is required for both switchable and mixed graphics configurations **Discrete Graphics Down Device Only** = Display Clock can be configured to 27-MHz output for use by Discrete Down Device **External Graphics only** = Use this setting if platform supports external graphics only
5	Reports the dword values of OCKEN, CSS, PLLRCS, DIVEN, PMSRCCLK1, PMSRCCLK2, IBEN, SSS, SSCCTL, PI12BIASPARAMS, and PLLEN Clock Control Parameters, as they are affected by the settings on this screen. See Appendix B for more information on Clock Control Parameters.	
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

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Table 2-15. FITC Wizard - Production / Nonproduction Configuration

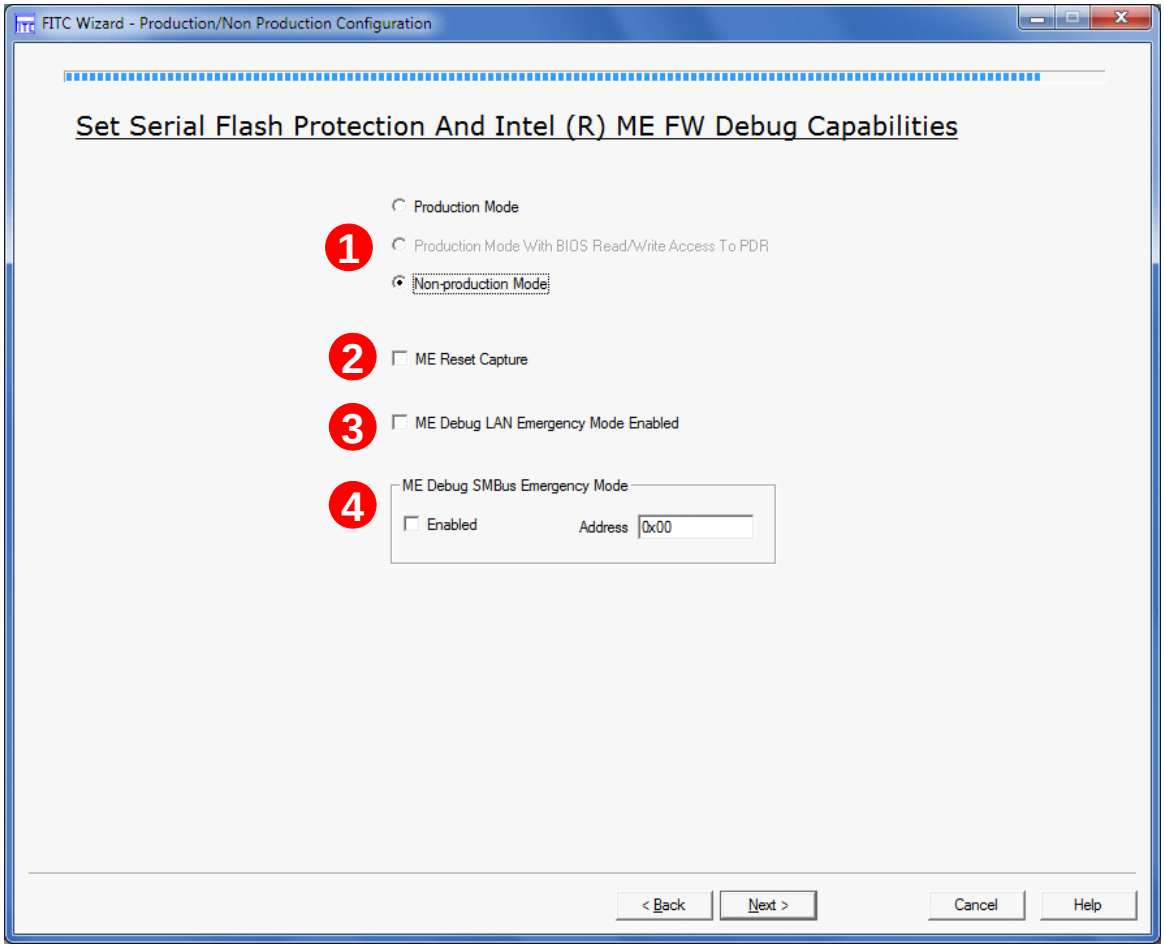
#	CRB Setting	Settings for All Platforms
		
1	**Non-production mode**	Selecting **Production Mode** sets the following: • BIOS Region Master Access Permissions set to **0x0B** for read access and **0x0A** for write access • ME FW Region Master Access Permissions set to **0x0D** for read access and **0x0C** for write access • GbE FW Region Master Access Permissions set to **0x08** for both read and write access • ME SMBus Diagnostic Console capability is disabled • MDDD capability is disabled Selecting **Non-production Mode** sets the following: • Master Access Permissions for all SPI Flash Regions set to **0xFF** for both read and write access • ME SMBus Diagnostic Console capability is disabled • MDDD capability is disabled **Production Mode** is for a system as it would be shipped. **Non-production Mode** is for debug and simplifies flashing new images onto SPI Flash. Production Mode With BIOS Read/Write Access to PDR - This option functions the same as Production Mode with the addition of allowing BIOS Read and Write access to the Platform Data Region for the SPI flash.

Table 2-15. FITC Wizard - Production / Nonproduction Configuration

#	CRB Setting	Settings for All Platforms
2	**Unchecked**	**For mobile platforms only.** When this field is **checked**, Intel Management Engine will assert **CL_RST1#** when it resets. When set to **unchecked**, Intel ME does not reflect this reset.
3	**Unchecked**	Enabled ME Debug to operate in emergency mode. See ME Debug documentation for more detail.
4	Enabled: **Unchecked** Address: **0x00**	**Note:** This option should not be enabled. Treat as Reserved.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

Table 2-16. FITC Wizard - Build

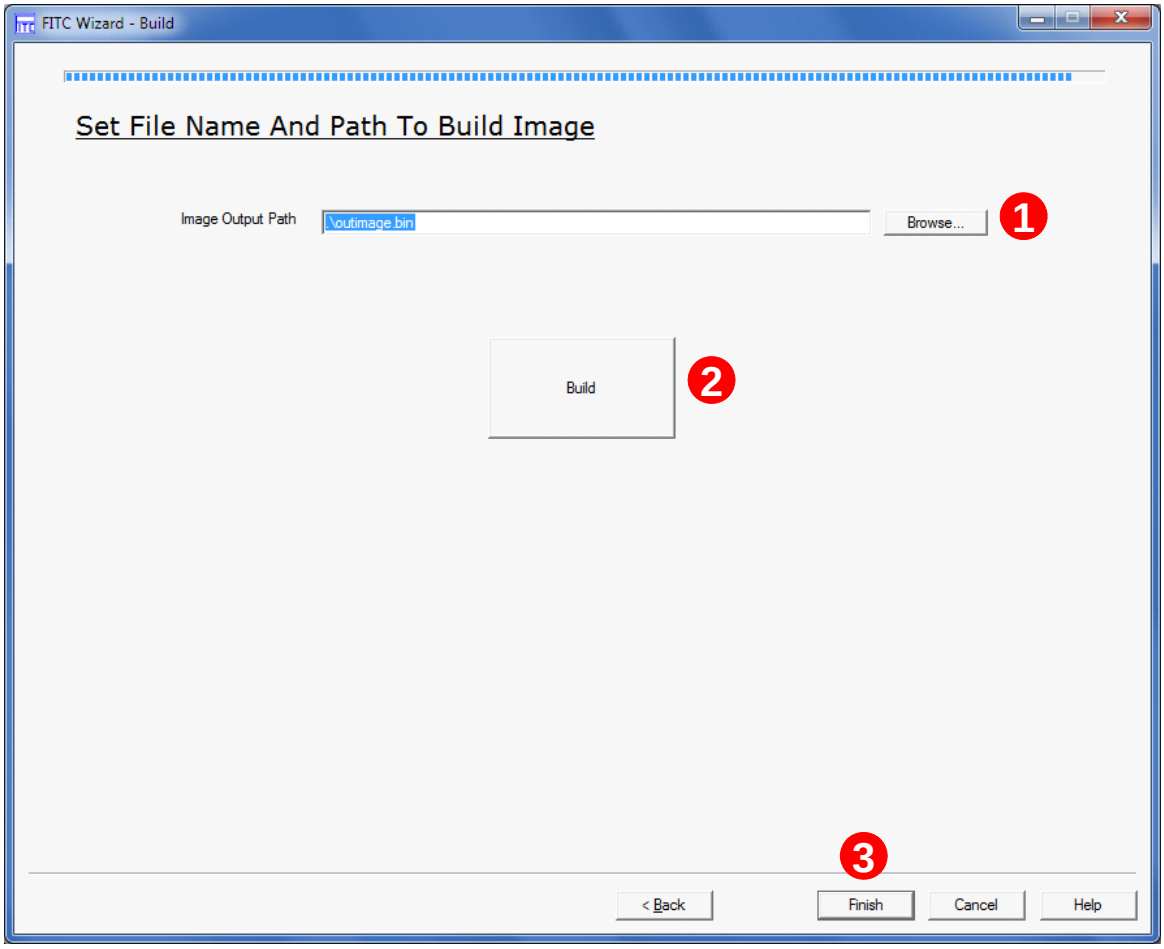
#	CRB Setting	Settings for All Platforms
		
1	Specify filename and directory location of output image. By default, the filename used is **outimage.bin** and the location will be in the same directory as **fitc.exe**.	

Table 2-16. FITC Wizard - Build

#	CRB Setting	Settings for All Platforms
2	Click **Build** to create the SPI Flash image. ***Note***: In addition to the **outimage.bin** file created, there may be two extra output images created as well, • **outimage(1).bin** • **outimage(2).bin** These two images are used for programming the SPI Flash devices separately (for example, using an external Flash programmer). ***Note - Full Clock Integration Mode - NO Overclocking:*** You may experience a test fail result for Intel® ME Test Suite (METS) test ICC_TST_11, unless you set an additional value in FITC ***after*** finishing with Wizard. This means you will not Build an image after finishing the Wizard. Instructions: • In FITC (not Wizard mode) navigate to **Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | Clock Range Definition Record 0** (or appropriate record #0-7) • Navigate to subfolder **Clock Range Definition Record | Processor or Platform DMICLK (DIV2-S)**. You will be changing a setting for the main PCI Express* clock divider • Change parameter **Clock Div Min** to 0xC00 • Change parameter **Clock Div Max** to 0xC00 for basic configuration. If using Wimax, set the value to 0xC0E Not taking the above steps has no risk or issue for production configuration and is meant to help platform successfully meet METS requirements for ICC_TST_11 only.	
3	Click **Finish** to **preserve** all Wizard build settings and parameters and return to FITC advanced mode.	
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

After clicking **Build**, the Flash image will be created and all setting will be present in FITC. If you want to save the setting, use File -> Save as, to save the settings in the **xml** specified.

Now that the 1.5MB SPI Flash image has been created, you may jump to Section 4, “Programming SPI Flash Devices and Checking Firmware Status” .

Section 3, “Image Creation: Flash Image Tool (FITC)” is only intended for advanced Flash image creation and most users will not need to follow it.

§

3 Image Creation: Flash Image Tool (FITC)

Flash Image Tool (FITC) will be used to generate a full SPI Flash binary image with Descriptor, GbE, BIOS, and Intel® ME Regions. Use the steps shown in following sections.

Note: The FITC Tool may be updated throughout the release cycles. As a general rule, please ensure you use the tools, images and other content from the same kit and refrain from using different version tools.

After this SPI Flash image is created, it will need to be burned onto the target platform's SPI Flash device(s). Section 4, "Programming SPI Flash Devices and Checking Firmware Status" later in this document provides steps to do this.

3.1 Start FITC and Set Up The Build Environment

1. Invoke Flash Image Tool. Using Explorer*, navigate to **[root]\Tools\System Tools\Flash Image Tool**. Ensure that FITC's directory contents are intact (see Section 1.7). Double-click **fitc.exe**.
2. In the main menu select **Build | Environment Variables...**. Edit your configuration as shown below. Note that in the example, **[root]\Tools\System Tools\Flash Image Tool is "."**.
   - Keep the Working Directory $WorkingDir as "."
   - Source Directory $SourceDir is where FITC will look to find binary images during the image creation process, change $SourceDir to ".\..\..\..\Image Components"
   - Destination Directory $DestDir is where FITC will save the SPI Flash binary image, keep $DestDir as "."

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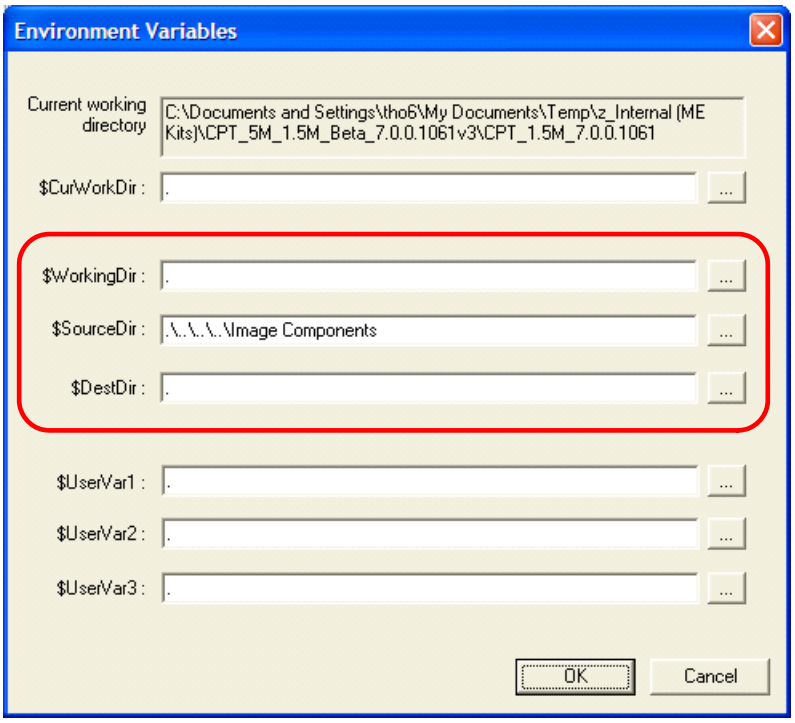
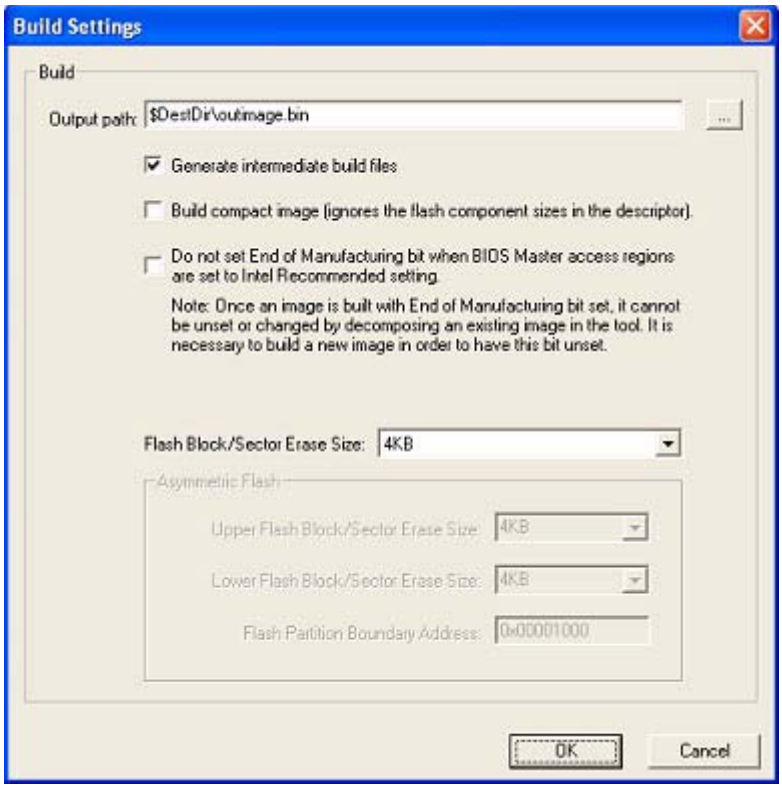
Figure 3-1. Build | Environment Variables



3. Click **OK** to apply your changes.

4. In the main menu select **Build | Build Settings...**. Leave the defaults for **Output path, Generate intermediate build files, and Build compact image** as shown. Change the **Flash Block/Sector Erase Size** as appropriate for your SPI flash part(s). Click **OK** to apply your changes.

Figure 3-2. Build | Build Settings...



5. In the main menu select **File | Open...**. In the Open dialog that appears navigate to **[root]\Tools\System Tools\Flash Image Tool**. Click on **newfiletmpl.xml** and click **OK**.

3.2 Configure PCH Silicon Stepping

Leave the **PCH Silicon Stepping Combo Box** at its default value of **Intel® 6 Series Chipset**.

Figure 3-3. PCH Silicon Stepping Combo Box

3.3 Set Up SPI Flash Regions

Table 3-1. Flash Image | PDR Region

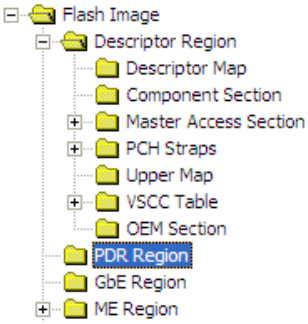
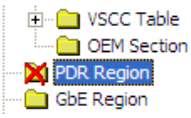
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the Flash Image • Select **Flash Image | PDR Region** • Set the parameters in the **PDR Region** section as shown  	PDR Region Length	PDR Region is disabled	Displays Region size information when **Binary input file** is specified.
	Binary Input File	PDR Region is disabled	Load a Platform Data Region binary if required and available. **Right click on PDR region and click on Enable if PDR region.**
...or if NOT using Platform Data Region (PDR)			
A red "X" will indicate whether this Region is disabled. If this Region is not disabled, disable it by right-clicking on **Flash Image | PDR Region** and selecting **Disable Region**.	 		

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Table 3-2. Flash Image | GbE Region

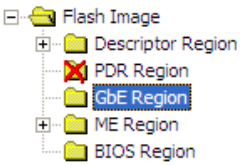
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the Flash Image • Select **Flash Image | GbE Region** • Set the parameters in the **GbE Region** section as shown 	**Yellow means custom settings may be required.**		
	GbE LAN region length	0x00000000	
	Binary input file	Navigate to your **Source Directory** (as specified in Section 3.1) and switch to the **GbE** subdirectory. Choose the appropriate Intel GbE LAN Firmware binary image. **If not using Intel LAN then leave this parameter blank.**	
	Intel® Integrated LAN Enable	true	This field only is editable after an Intel integrated LAN image is loaded. If not planning to validate Intel LAN on target platform, or for debug reasons, set to **false**.
	Major Version	0	Displays major revision value for Intel LAN GbE FW version when **Binary input file** is specified.
	Minor Version	0	Displays minor revision value for Intel LAN GbE FW version when **Binary input file** is specified.
	Image ID	0	Displays image ID value for Intel LAN GbE FW version when **Binary input file** is specified.
...or if not using Intel wired LAN device			
A red "X" will indicate whether this Region is disabled. If this Region is not disabled, disable it by right-clicking on **Flash Image | GbE Region** and selecting **Disable Region**.			

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Table 3-3. Flash Image | ME Region

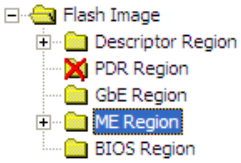
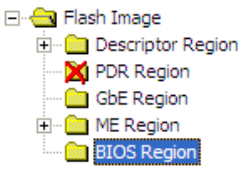
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the Flash Image tab • Select **Flash Image | ME Region** • Set the parameters in the **ME Region** section as shown • **Note:** Loading an ME FW binary image that contains ME ROM Bypass unlocks the **ME Boot from Flash** parameter in **Flash Image | Descriptor Region | PCH Straps | PCH Strap 10**  	**Yellow means custom settings may be required, otherwise use CRB setting.**		
	Binary input file	Navigate to your **Source Directory** (as specified in Section 3.1) and switch to the **Firmware** subdirectory. Choose the ME FW binary image. ***Note:*** You may choose to build the ME Region only. To do so, **Flash Image | Descriptor Region | Descriptor Map** parameter **Number of Flash components** must be set to **0**. ***Note:*** Loading an ME FW binary image that contains ME ROM Bypass unlocks the **ME Boot from Flash** parameter in **Flash Image | Descriptor Region | PCH Straps | PCH Strap 10**.	
	PCH MTP Permit File		Adds the PCH permit data to the ME region for testing purposes. Used ONLY by Intel® Upgrade Service. Registration and login is available at http://upgrades.intel.com
	CPU MTP Permit File		Adds the CPU permit data to the ME region for testing purposes. Used ONLY by Intel® Upgrade Service. Registration and login is available at http://upgrades.intel.com
	* Partition Rom Bypass Enabled		Not a parameter. This information panel appears when an ME FW image enables ME boot directly from Flash.
	Major Version	0	Displays major revision value for ME FW version when **Binary input file** is specified.
	Minor Version	0	Displays minor revision value for ME FW version when **Binary input file** is specified.
	Hotfix Version	0	Displays hotfix value for ME FW version when **Binary input file** is specified.
	Build Version	0	Displays build value for ME FW version when **Binary input file** is specified.

Table 3-4. Flash Image | BIOS Region

Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the Flash Image tab • Select **Flash Image | BIOS Region** • Set the parameters in the **BIOS Region** section as shown  	**Yellow means custom settings may be required, otherwise use CRB setting.**		
	BIOS Revision		Displays BIOS revision information when **Binary input file** is specified.
	BIOS region length	0x00000000	This field allows user to allocate a specific size in the SPI Flash for the BIOS image. If set to 0, FITC will automatically set the size based on the BIOS image.
	Binary input file	For the Intel CRB navigate to your **Source Directory** (as specified in Section 3.1) and switch to the **BIOS** subdirectory. Choose the BIOS binary image.	For all other platforms point this parameter to the appropriate BIOS image. If BIOS is stored in a separate SPI Flash device or in FWH (see Configurations "B", "C", and "D" in Appendix A) then leave this parameter blank.

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3.4 Set Up Descriptor and SPI Flash Device(s)

Table 3-5. Flash Image | Descriptor Region

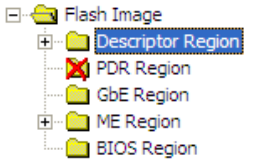
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab. Select **Flash Image | Descriptor Region** • Set the parameters in the **Descriptor Region** section as shown  	**Yellow means custom settings may be required, otherwise use CRB setting.**		
	Descriptor region length	0x00000000	Leave this at zero. Allows FITC to auto-size the descriptor region length.

Table 3-6. Flash Image | Descriptor Region | Descriptor Map

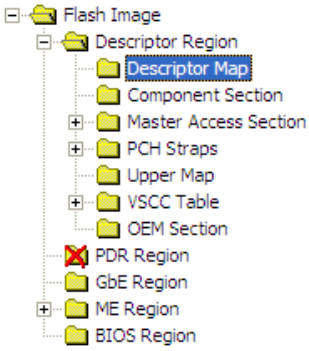
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | Descriptor Map** • Set the parameters in the **Descriptor Map** section as shown  	**Yellow means custom settings may be required, otherwise use CRB setting.**		
	Region base address	0x04	Read Only, See SPI programming Guide for details.
	Number of Flash components	2	Number of SPI Flash devices on the platform **1** or **2** = Total SPI Flash devices **0** = Build ME region only
	Component base address	0x03	Read Only, See SPI programming Guide for details.
	Number of PCH straps	18	Read Only, See SPI programming Guide for details.
	PCH straps base address	0x10	Read Only, See SPI programming Guide for details.
	Number of Masters	2	Read Only, See SPI programming Guide for details.
	Master base address	0x06	Read Only, See SPI programming Guide for details.
	Number of PROC straps	1	Read Only, See SPI programming Guide for details.
	PROC straps base address	0x20	Read Only, See SPI programming Guide for details.

Table 3-7. Flash Image | Descriptor Region | Component Section

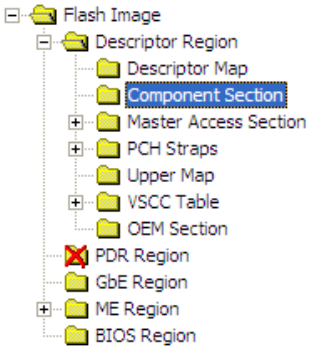
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab. Select **Flash Image | Descriptor Region | Component Section** • Set the parameters in the **Component Section** section as shown 	**Yellow means custom settings may be required, otherwise use CRB setting.**		
	Read ID and Read Status clock frequency	33MHz	Lowest common frequency of all SPI Flash parts on the platform.
	Write and erase clock frequency	33MHz	Lowest common frequency of all SPI Flash parts on the platform.
	Fast read clock frequency	33MHz	In order for PCH HW to override its own internal default value (20 MHz), **Fast read support** must be set To **true**.
	Fast read support	true	**true** = Enables opcode 0Bh opcode on a read. This allows for faster read frequencies on serial flash by having a single dummy byte before valid data is output from the flash.
	Read clock frequency	20MHz	
	Flash component 2 density	8MB	Size of second SPI Flash part on the platform. ***Note:*** This value will be grayed out if the number of SPI Flash components is set to 1 in the Descriptor Map options.
	Flash component 1 density	8MB	Size of first SPI Flash part on the platform.
	Dual Output Fast Read Support	false	This field enables the opcode 3Bh to use Single Input Dual Output Fast Read. This speeds up the fast read throughput of the serial flash part. ***Note:*** This should only be set to 'true' if all Serial Flash parts support the 3Bh command. See Intel® *Series Chipset SPI programming Guide* for more details.
	Invalid instruction 3	0	Opcode entered here will not be allowed by the PCH's SPI controller for HW sequencing. See Intel® *6 Series Chipset SPI programming Guide* for more details. **0** = no instruction is specified
	Invalid instruction 2	0	Opcode entered here will not be allowed by the PCH's SPI controller for HW sequencing. See Intel® *6 Series Chipset SPI programming Guide* for more details. **0** = no instruction is specified
	Invalid instruction 1	0	Opcode entered here will not be allowed by the PCH's SPI controller. See Intel® *6 Series Chipset SPI programming Guide* for more details. **0** = no instruction is specified
	Invalid instruction 0	0	Opcode entered here will not be allowed by the PCH's See Intel® *6 Series Chipset SPI programming Guide* for more details. **0** = no instruction is specified
	Flash Partition Boundary	0x00000000	FPBA. Defines the boundary line between two Flash parts if they have different VSCC values. Configured in main menu option **Build | Build Settings** (see Section 3.1).

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Table 3-8. Flash Image | Descriptor Region | Master Access Section | CPU/BIOS

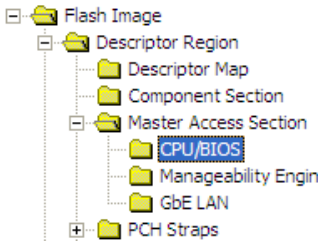
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | Master Access Section | CPU/BIOS** • Set the parameters in the **CPU/BIOS** section as shown  	**Yellow means custom settings may be required.**		
	PCI Bus ID	0	
	PCI Device ID	0	
	PCI Function ID	0	
	Read Access	0xFF	Controls read access by BIOS to: • Bit 0: Descriptor (region 0) • Bit 1: BIOS region (region 1) • Bit 2: ME FW region (region 2) • Bit 3: GbE FW region (region 3) • Bit 4: PDR Region (region 4) • Bits 5-7: Regions 5 through 7 **0x0B** = Production platform **0xFF (default)** = Non-production/debug platform
	Write Access	0xFF	Controls write access by BIOS. Structure is identical to **Read access** parameter. **0x0A** = Production platform **0xFF (default)** = Non-production/debug platform

Table 3-9. Flash Image | Descriptor Region | Master Access Section | Manageability Engine (ME)

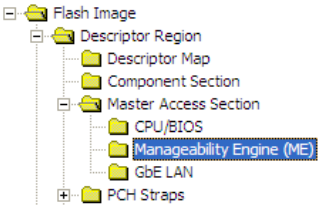
Location	Parameter	CRB Set To	Settings for target platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | Master Access Section | Manageability Engine (ME)** • Set the parameters in the **Manageability Engine (ME)** section as shown  	**Yellow means custom settings may be required.**		
	PCI Bus ID	0	
	PCI Device ID	0	
	PCI Function ID	0	
	Read access	0xFF	Controls read access by ME to: • Bit 0: Descriptor (region 0) • Bit 1: BIOS region (region 1) • Bit 2: ME FW region (region 2) • Bit 3: GbE FW region (region 3) • Bit 4: PDR Region (region 4) • Bits 5-7: Regions 5 through 7 **0x0D** = Production platform **0xFF (default)** = Non-production/debug platform
	Write access	0xFF	Controls write access by ME FW. Structure is identical to **Read access** parameter. **0x0C** = Production platform **0xFF (default)** = Non-production/debug platform

Table 3-10. Flash Image | Descriptor Region | Master Access Section | GbE LAN

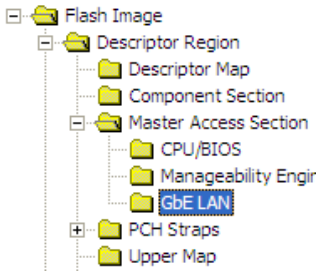
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | Master Access Section | GbE LAN** • Set the parameters in the **GbE LAN** section as shown  	**Yellow means custom settings may be required.**		
	PCI Bus ID	1	1
	PCI Device ID	3	3
	PCI Function ID	0	0
	Read access	0xFF	Controls read access by GbE FW to: • Bit 0: Descriptor (region 0) • Bit 1: BIOS region (region 1) • Bit 2: ME FW region (region 2) • Bit 3: GbE FW region (region 3) • Bit 4: PDR Region (region 4) • Bits 5-7: Regions 5 through 7 **0x08** = Production platform **0xFF (default)** = Non-production/debug platform
	Write access	0xFF	Controls write access by GbE FW. Structure is identical to **Read access** parameter. **0x08** = Production platform **0xFF (default)** = Non-production/debug platform

Table 3-11. Flash Image | Descriptor Region | VSCC Table | Add Table Entry

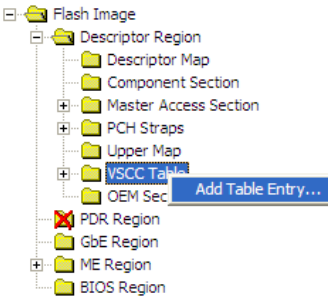
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | VSCC Table** • Right click on **VSCC Table** to add entry name  	ADD Table Entry Value	Intel® CRB use **W25Q64BV** or **AT26DF321**	Set this to the name of the SPI Flash device on the target platform. ***Note:*** The **AT26DF321** and **W25Q64BV** entries are created as part of the default FITC template.

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Table 3-12. Flash Image | Descriptor Region | VSCC Table | W25Q64BV (example)

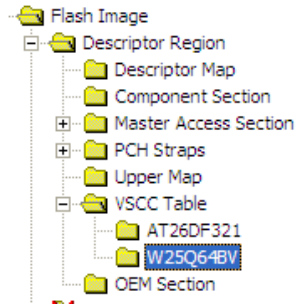
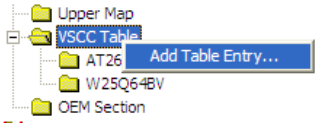
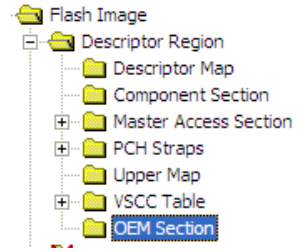
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | Descriptor Region | VSCC Table |** • Set the parameters for the Atmel 4-MB SPI part in the **W25Q64BV** section as shown  • Right click VSSC Table to add a Flash entry.  	**Yellow means custom settings may be required.**		
	VendorID	Intel® CRBs use **0xEF**	For information on values that need to be entered in this section, refer to the Intel® *6 Series Chipset SPI programming Guide* and the SPI Flash device datasheet. Vendor ID, Device ID 0 and Device ID 1 are all derived from the output of the JEDEC ID command which can be found in the vendor datasheet for the specific SPI Flash part. Section *VSCC0 — Vendor Specific Component Capabilities 0* in the Intel® *6 Series Chipset SPI programming Guide* describes the 32-bit VSCC register value. Default is **0x00**.
	Device ID 0	Intel® CRBs use **0x40**	Use values obtained by using Vendor Serial Flash datasheet and Intel® *6 Series Chipset SPI programming Guide* Default is **0x00**.
	Device ID 1	Intel® CRBs use **0x17**	Use values obtained by using Vendor Serial Flash datasheet and Intel® *6 Series Chipset SPI programming Guide* Default is **0x00**.
	VSCC register value	Intel® CRBs use **0x20052005**	Use values obtained by using Vendor Serial Flash datasheet and Intel® *6 Series Chipset SPI programming Guide* Default is **0x00000000**.

Table 3-13. Flash Image | Descriptor Region | OEM Section

Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | Descriptor Region | OEM Section** • Set the parameters in the **OEM Section** section as shown  	**Yellow means custom settings may be required.**		
	Binary input file	(leave blank) Note: On Mobile CRBs modifying this value may cause Multi-BIOS not to behave properly	This is an optional field. Input depends on Customer Design and features support.

3.4.1 Set Up Soft-Straps

Table 3-14. Flash Image | Descriptor Region | PCH Straps | PCH Strap 0

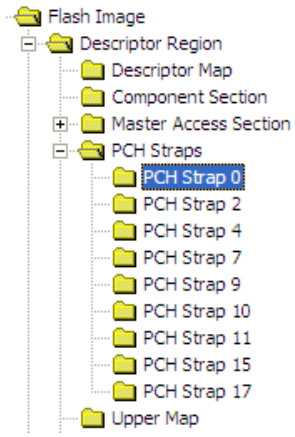
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 0** • Set the parameters in the **PCH Strap 0** section as shown  	**Yellow means custom settings may be required.**		
	BIOS Boot Block Size	64KB	BIOS Boot Block (BBB) is bare minimum BIOS code required to boot a platform. This soft-strap allows for proper address bit to be inverted as required by BBB Size. **64KB (default)** = Invert A16 if Top Swap is set **128KB** = Invert A17 if Top Swap is set **256KB** = Invert A18 if Top Swap is set If BIOS is stored in a separate SPI Flash device or in FWH (see Configurations "B", "C", and "D" in Appendix A then leave this parameter at **64KB**. ***Note:*** This must be determined by the target platform BIOS developer.
	DMI RequesterID Security Check Disable	false	Indicates if RequesterID checking during DMI accesses is disabled. This parameter should only for server platforms that contain multiple Processors. **false (default)** = Single Processor Platform **true** = Multiple Processor Platform ***Note:*** A quad/dual core processor counts as a single processor for this parameter.
	MACsec Disable	false	This setting should be set to 'false' to enable MACsec. This bit must be set in the manufacturing plant and will not be accessible after shipment. MACsec is a hop-by-hop network security solution. It provides Layer 2 encryption and authentication / integrity protection for packets traveling between MACsec-enabled nodes of the network. **Note:** If MACsec is enabled in IT infastructure will not function properly. See 'CDI #461067' for further deatils. ***Note:*** This field is read only if Intel integrated LAN is disabled. See Table 3-2
	LANPHYPC_GP12_SEL	1	**1 (default)** = Only required if target platform has Intel wired LAN and PCH GP12 is used as LAN_PHYPC for Intel LAN. **0** = PCH GP12 is used as General Purpose Input/Output (GPIO) pin. Must be **0** if Third-party LAN and no Intel wired LAN is present. **Note:** Please consult with the target hardware designer to determine this setting.
	Intel® ME SMBus Enable	true	**true** = Set for all platforms
	Intel® ME SMBus Frequency	100kHz	Treat as reserved.
	SMLink0 Enable	true	**true (default)** = Intel LAN is present **false** = Third-party LAN is present
	SMLink0 Frequency	Fast Mode	Treat as reserved.
	SMLink1 Enable	Mobile and Desktop CRB uses **true**	**true (default)** = SMLink1 is being used by EC/SIO/BMC for Thermal Reporting. **false** = Set for all other platforms
	SMLink1 Frequency	100kHz	Treat as reserved.
	Chipset Config	true	Treat as reserved.

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Table 3-15. Flash Image | Descriptor Region | PCH Straps | PCH Strap 2

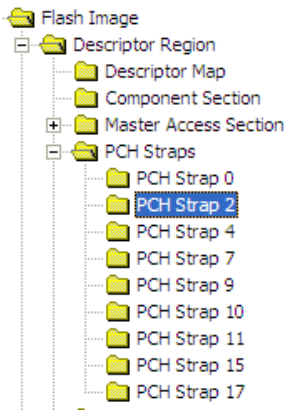
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 2** • Set the parameters in the **PCH Strap 2** section as shown 	**Yellow means custom settings may be required.**		
	SMBus I2C Address Enable (SMBI2CEN)	false	Treat as reserved.
	SMBus I2C Address (SMBI2CA)	0x00	Treat as reserved.
	Intel® ME SMBus MCTP Address Enable	false	**true** = Using Intel® Anti-Theft Technology with a 3G NIC **false =** Not using Intel®Anti-Theft Technology with a 3G NIC
	Intel® ME SMBus MCTP Address	0x2B	This field must be set to an address value if using Intel® Anti-Theft Technology with a 3G NIC **0x00 =** Not using Intel®Anti-Theft Technology with a 3G NIC ***Note:*** Please consult the target hardware designer to determine this setting.
	Intel® ME SMBus ASD Address Enable (MESMASDEN)	false	Treat as reserved.
	Intel® ME SMBus ASD Address (MESMASDA)	0x00	Treat as reserved.

Table 3-16. Flash Image | Descriptor Region | PCH Straps | PCH Strap 4

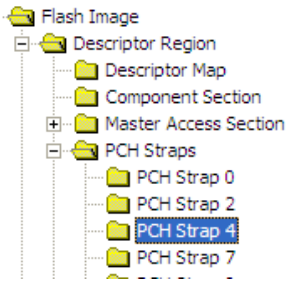
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 4** • Set the parameters in the **PCH Strap 4** 	**Yellow means custom settings may be required.**		
	GbE PHY SMBus Address	0x64	Intel wired LAN PHY SMBus address. No change required for this soft-strap value.
	GbE MAC SMBus Address	0x70	Intel wired LAN MAC SMBus address. No change required for this soft-strap value.
	GbE MAC SMBus Address Enable	true	**true (default)** = Intel integrated LAN is enabled **false** = Third-party LAN is present ***Note:*** This field is read only if Intel integrated LAN is disabled. See Table 3-2
	PHY Connectivity	10: PHY on SMLink0	**10: PHY Connectivity** = Intel LAN is present **00: No PHY Connected (default)** = Third-party LAN is present only ***Note:*** This field is read only if Intel integrated LAN is disabled. See Table 3-2

Table 3-17. Flash Image | Descriptor Region | PCH Straps | PCH Strap 7

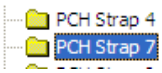
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab. • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 7** • Set the parameters in the **PCH Strap 7** 	Intel® ME SMBus Subsystem Vendor & Device ID for ASF2	0x00000000	Treat as reserved.

Table 3-18. Flash Image | Descriptor Region | PCH Straps | PCH Strap 9

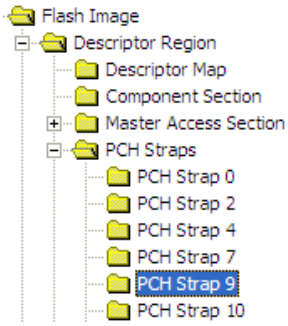
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 9** • Set the parameters in the **PCH Strap 9**  	**Yellow means custom settings may be required.**		
	PCHHOT# or SML1ALERT# Select	SML1ALERT#	This strap determines the native mode operation of GPIO74. PCHHOT#is used to indicate the PCH temperature out of bounds condition to an external agent such as BMC or EC, when PCH temperature is greater than value programmed by BIOS. SML1ALERT# allows the ME SMBus controller to alert an external controller connected to the SMLink interface when it wants to talk to the external controller.
	Subtractive Decode Agent Enable	false	**true** = A PCI Bridge chip is connected to the PCH **false (default)** = A PCI Bridge chip is not connected to the PCH ***Note:*** Please consult the target hardware designer to determine this setting
	Intel® PHY Over PCI Express Enable (PHY_ PCIE_EN)	true	**true (default)** = Intel LAN is present **false** = Third-party LAN is present
	Intel® PHY PCIe Port Select (PHY_PCIEPORTSEL)	101:Port 6	Only necessary if Intel LAN is present. **101** = Third-party LAN is present (don't care setting) ***Note:*** This field is read only if Intel integrated LAN is disabled. See Table 3-2 **000** = Port 1 **001** = Port 2 **010** = Port 3 **011** = Port 4 **100** = Port 5 **101** = Port 6 **110** = Port 7 **111** = Port 8 Default is **101**.
	Chipset Config	true	Must be set to true (1b).
	DMI Lane Reversal	false	***Note:*** Please consult the target hardware designer to determine this setting When using Small Form Factor CRB platforms (SKU QS67), Set this value to '**true**'
	PCIe Lane Reversal 2	false	This parameter must reflect platform topology. ***Note:*** This parameter can only be set to true if **PCIe Port configuration 2** is set to **1x4**.
	PCIe Lane Reversal 1	false	This parameter must reflect platform topology. ***Note:*** This parameter can only be set to true if **PCIe Port configuration 1** is set to **1x4**.
	PCIe Port Configuration 2	00: 4x1 Ports 5-8 (x1)	***Note:*** Please consult the target hardware designer to determine this setting
	PCIe Port Configuration 1	00: 4x1 Ports 1-4 (x1)	***Note:*** Please consult the target hardware designer to determine this setting

Table 3-19. Flash Image | Descriptor Region | PCH Straps | PCH Strap 10

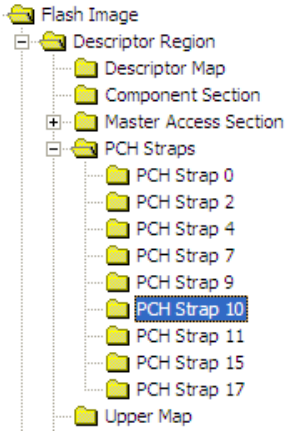
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 10** • Set the parameters in the **PCH Strap 10** section as shown  	**Yellow means custom settings may be required.**		
	ME boot from Flash	false (grayed out)	**false (default)** = No ME Region binary loaded, or ME Region binary does not contain ME ROM bypass image **Note: On B0 and later PCH stepping parts this setting should be set to 'false'**
	Reserved	false	This value must be set to '**false**'
	ME Debug SMBus Emergency Mode Enable	false	**Note:** This option should not be enabled. Treat as Reserved.
	ME Debug SMBus Emergency Mode Address	0x00	**0x38** = Recommended SMBus address for ME Debug Set for non-production/debug platforms. **0x00** = Set for production platforms.
	ICC Boot Profile	0	Specifies which clock control parameter set is to be used by the final generated SPI Flash binary image by the target platform at boot time. SPI Flash binary images across multiple board designs are expected to contain the same block of clock control parameters, up to 8 sets total. The 'Record #' refers to records created under the Configuration Tab, **Flash Image | ME Region | Configuration | ICC Data**. Default is **0**.
	ME Reset Capture on CL_RST1#	false	Determines if ME reset assert/de-assert can be observed on PCH pin CL_RST1#. **true** = ME reset assert/de-assert can be observed on PCH pin CL_RST1# **false** = CL_RST1# usage is available as per *Intel® 6 Series Express Chipset EDS*
	ICC Boot Profile Selected By Soft Strap	true	Specifies if the ICC Boot Profile is selected by Soft Strap or controlled by BIOS.
	Deep Sx Enable	false	**true (default)** = Platform HW configuration supports DSW rail and entry into Deep Sx. **false** = For mobile platforms, EC supports SUSPWRDNACK capability. For desktop platforms, platform does not support DSW rail or Deep Sx. ***Note:*** Please consult with the target hardware designer to determine this setting. ***Note:*** See Section 5.2 – for details on configuring this option.
	ME Debug LAN Emergency Mode	false	**true** = Enables ME Debug LAN Emergency Mode logging. Set for non-production/ debug platforms. **false (default)** = Set for production platforms

Table 3-20. Flash Image | Descriptor Region | PCH Straps | PCH Strap 11

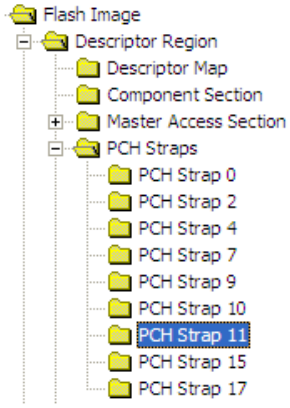
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select the **Flash Image** tab • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 11** • Set the parameters in the **PCH Strap 11** section as shown  	**Yellow means custom settings may be required.**		
	SMLink1 I2C Address Enable	CRB uses **true**	**true (default)** = Enable EC/SIO/BMC to interact Thermal Reporting feature over SMLink1 **false** = Platform has no EC/SIO/BMC on SMLink1
	SMLink1 I2C Address	CRB uses **0x4C**	This parameter defines a write address for PCH over SMLink1. Set this to an address supported by EC/SIO/BMC hardware. Note that PCH/Intel® ME acts as slave on SMLink and EC/SIO/BMC acts as master. **0x4C (default)** = PCH SMBus write address for EC on mobile CRB **0x00** = Platform has no EC/SIO/BMC on SMLink1
	SMLink1 GP Address Enable	CRB uses **true**	**true (default)** = Enable EC/SIO/BMC to interact Thermal Reporting feature over SMLink1 **false** = Platform has no EC/SIO/BMC on SMLink1
	SMLink1 GP Address	CRB uses **0x4B**	This parameter defines a read address for PCH over SMLink1. Set this to an address supported by EC/SIO/BMC hardware. Note that PCH/Intel® ME acts as slave on SMLink and EC/SIO/BMC acts as master. **0x4B (default)** = PCH SMBus read address for EC on mobile CRB **0x00** = Platform has no EC/SIO/BMC on SMLink1

Table 3-21. Flash Image | Descriptor Region | PCH Straps | PCH Strap 15

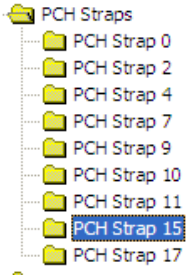
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 15** • Set the parameters in the **PCH Strap 15** section as shown  	**Yellow means custom settings may be required.**		
	SLP_LAN#/GPIO29	false	**true =** Enables GPIO29 and disables SLP_LAN# functionality. **false** =Set to false to use have GPIO behave as SLP_LAN#. ***Note:*** This field is read only if Intel integrated LAN is disabled. See Table 3-2.
	SMLink1 Thermal Reporting Select	false	**false** = Intel ME FW will collect temperature from the processor, PCH and DIMMs. It will be available for polling on SMLink1. ***Note:*** ME Thermal Reporting: Advantage = Does not require PECI capability in EC. Disadvantage = no real time temperature alert level control, and no dynamic Sandy Bridge CPU Turbo controls. — SMLink Thermal Reporting Select = **false** (default) — PECI from Sandy Bridge processor is connected to PCH — BIOS sets Thermal Reporting Control (TRC) MMIO register at TBARB+1Ah to enable ME reporting of processor, PCH, and DIMM temperatures (as appropriate) — ME thermal reporting PCI device should be enabled for proper interaction with EC, SIO, BMC, or equivalent fan control logic **true** = PCH temperature ONLY(1 byte of data) will be available for polling out on SMLink1. Processor and DIMMs temperature monitoring will require an external device. ***Note:*** Platform based Thermal Reporting: Advantage = allows full dynamic Sandy Bridge Turbo control. Disadvantage = Requires EC/BMC with PECI capability. — SMLink Thermal Reporting Select = **true** — PECI from Sandy Bridge processor is connected direct to EC, SIO, BMC, or equivalent fan control logic — BIOS sets Thermal Reporting Control (TRC) MMIO register at TBARB+1Ah = 0x0, disabling ME reporting of processor, PCH, and DIMM temperatures — ME thermal reporting PCI device should be disabled
	Intel® Integrated LAN Enable	true	**true** = Intel LAN is enabled **false** = Intel LAN is disabled ***Note:*** This field is read only if Intel integrated LAN is disabled. See Table 3-2.
	Reserved0	false	Treat as reserved.

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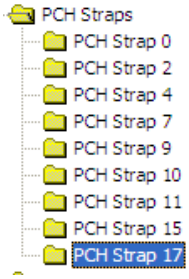
Table 3-22. Flash Image | Descriptor Region | PCH Straps | PCH Strap 17

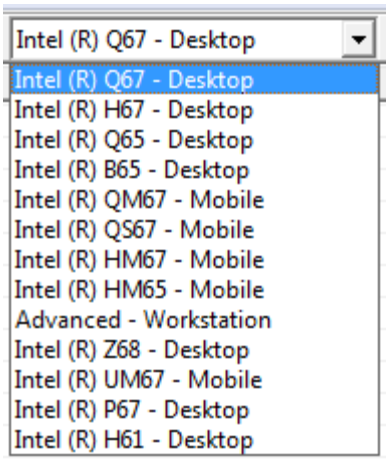
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | Descriptor Region | PCH Straps | PCH Strap 17** • Set the parameters in the **PCH Strap 17** section as shown 	**Yellow means custom settings may be required.**		
	BTM/FCIM	Full Clock Integrated Mode	If PCH clock boot mode is specified by soft strap then this parameter specifies whether the PCH clocks boot in Full Clock Integrated Mode (FCIM) or Buffer Through Mode (BTM).

3.5 Configure PCH Silicon SKU

Use the **SKU Manager Combo Box** to select the appropriate platform type for your specific chipset. For Intel® ME 1.5MB FW, the only valid choices are:

- Desktop: P67, H67, H61 and Z68
- Mobile: QS67, HM67, HM65 and UM67

Figure 3-4. SKU Manager Combo Box



When a PCH SKU is selected in FITC, Super SKU PCH silicon will then behave as if it were the selected Production SKU PCH silicon from ME FW perspective. The SKU Manager selection option has no effect on Production SKU PCH silicon. Features cannot be enabled on such SKUs that do not support them.

Note: The SKU Manager combination box changes the LPC device ID which is used to identify the PCH. If there are issues with drivers, host software, or BIOS that do not recognize the PCH, then select the appropriate SKU with Super SKU DID.

Note: P67 must use a discrete graphics solution. Undesired behavior such as failure to boot may result if using integrated graphics.

Note: For more information see Section 5.1 for ME FW features listed by Production SKU PCH silicon.

Note: Sections of FITC other than the **Features Supported** folder under **Flash Image ME| Region| Configuration** will not reflect what is disabled for the selected PCH silicon SKU and/or ME FW binary.

3.6 ME FW Feature Configuration

Note: Do not load or change any parameters in the Configuration tab until you load an ME Region binary (see Table 3-3).

3.6.1 Firmware Features and Capabilities

Table 3-23. Flash Image | ME Region | Configuration | ME

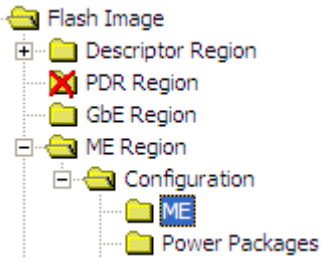
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | ME Region | Configuration | ME** • Set the parameters in the **ME** section as shown  	**Yellow means custom settings may be required.**		
	FW Update OEM ID	00000000-0000-0000-0000-000000000000	This field provides the ability to target FWUpdate (FWUpdLcl.exe) by Platform OEM. This ID will make sure that customers can only update a platform with an image coming from the platform OEM. If set to an all zeros, then any input is valid when doing a firmware update.
	LAN Power Well Config	3	Intel LAN power configuration selection: **0** = Core Well (SLP_S3#) **1** = Sus Well (RSMRST#) **2** = ME Well (SLP_M#) **3 (recommended)** = SLP_LAN#
	WLAN Power Well Config	0x80	**0x80** = Disabled (default) **0x82** = Sus Well **0x83** = ME Well For Mobile platforms using wireless manageability you will need to set one of the following **WLAN Power Well Config** options. **Strap 10 -> Deep Sx Enable** set to '**false**': **0x84** = WLAN Power Controlled via SLP_M# || SPDA - See Table 3-19 **Strap 10 -> Deep Sx Enable** set to '**true**': **0x85** = WLAN Power Controlled via SLP_M# || SLP_ME_CSW_DEV# - See Table 3-19 For Desktop platforms using the Intel® Centrino® Advanced-N 6205 (Taylor Peak 2x2) for wireless manageability set the **WLAN Power Well Config** option to **0x85.**
	M3 Power Rails Availability	true	**true** = M3 power rails designed on platform (ME is powered by standby) **false** = M3 power rails not designed on platform (ME is powered by core) ***Note:*** This field is read only if Power package 2 supported is enabled. ***Note:*** Please consult the target hardware designer to determine this setting.
	HECI ME Region Unlockable	true	**false** = Disable HMFPRO LOCK and HMFPRO ENABLE Intel® MEI messages for BIOS-based FW Update **true** = Enable this capability ***Note:*** Please consult the target BIOS developer to determine this setting.
	Sub System Vendor ID	0x0000	This ID allows OEMs the ability to test boards using Manufacturing Test Permits. Recommend **0x0000**. Used ONLY by Intel® Upgrade Service. If enabling Intel® Upgrade Service, refer the MTP User Guide that is available after registration for detail on how to set this field. Registration and login is available at http://upgrades.intel.com

Table 3-23. Flash Image | ME Region | Configuration | ME

Location	Parameter	CRB Set To	Settings for Any Platform
	PROC_MISSING	No onboard glue logic	Only set if there is glue logic present on the board to enable if the processor is missing. **Note:** This field is read only if a Mobile SKU is selected in the SKU Manager pull down box. ***Note:*** Please consult the target hardware designer to determine this setting.
	Processor Emulation	No Emulation	Set this parameter to the type of processor that the target system will use during production. This field will emulate that processor class for pre-production silicon.
	OEM Tag	0x00000000	This value allows OEMs to set a unique number value in their firmware images to allow for easier identification.
	Hide FW Update Control	false	This option determines if the MEBx FW Update is visable or hidden from end users. **'false'** - The MEBx FW update option will be visable to end users. **'true'** - The MEBx FW update option will not be visable to the end user.
	Debug Si Features	0x00000000	Allows OEM Control to enable FW features to assist with the debug of the platform. This control has no effect if used on production silicon. **Bit 0:** Disable timeout on BIOS HECI messaging **Bit 1:** Disable FW watchdog timer
	Prod Si Features	0x00000000	Allow OEM Control to enable FW features to assist with the production platform. **Bit 1:** Disable FW watchdog timer

Table 3-24. Flash Image | ME Region | Configuration | Power Packages

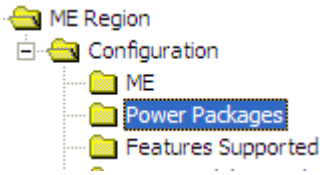
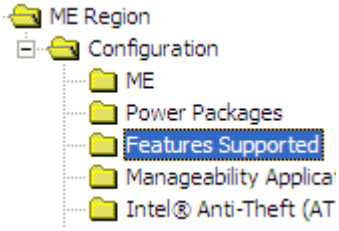
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | ME Region | Configuration | Power Packages** • Set the parameters in the **Power Packages** section as shown 	**Yellow means custom settings may be required.**		
	Power Pkg 2 Supported (Desktop: ON in S0, ME Wake in S3, S4-5)	false	**false** = Set for all platforms (not supported on 1.5MB FW)
	Default Power Package	1	Select the default Power Package from the available packages. Set to **1** for all platforms. **Note:** The ON in S0 package is automatically selected as default in the base firmware binary.

Table 3-25. Flash Image | ME Region | Configuration | Features Supported

Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | ME Region | Configuration | Features Supported** • Set the parameters in the **Features Supported** section as shown 	**Yellow means custom settings may be required.**		
	Enable Intel® Standard Manageability; Disable Intel® AMT	Yes	***Note:*** Setting any of these options to 'Yes' will permanently disable that specific feature. Once the feature is disabled in this manner only re-Flashing the ME region can re-enable the feature. Fields are read only if the feature is not supported by respective PCH SKU selected by PCH SKU pull down (see Section 3.5).
	Intel® Manageability Application Permanently Disabled?	Yes	
	PAVP Permanently Disabled	No	
	KVM Permanently Disabled?	Yes	
	TLS Permanently Disabled?	Yes	
	Intel® Anti-Theft Technology Permanently disabled	No	
	Intel® ME Network Service Permanently disabled	No	
	Intel® Manageability Application Enable/ Disable	Disabled	Disabled (not supported on 1.5MB FW)

Since 1.5MB FW does not support "Manageability Application" when users select **Flash Image | ME Region | Configuration | Manageability Application**, the following Warning message will be displayed.

Figure 3-5. Manageability Application Warning

Table 3-26. Flash Image | ME Region | Configuration | Intel® Anti-Theft Technology

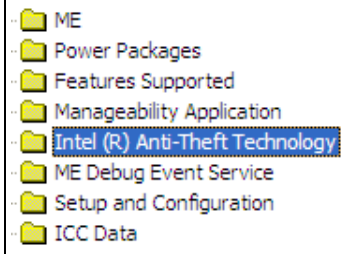
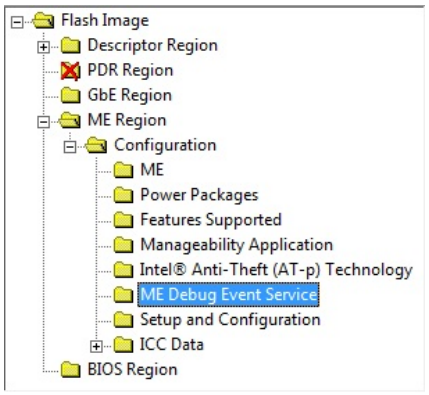
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | ME Region | Configuration | Intel® Anti-Theft Technology** • Set the parameters in the **Intel® Anti-Theft Technology** section as shown 	**Yellow means custom settings may be required.**		
	Allow Unsigned Assert Stolen	false	Treat as reserved.
	Intel(R) Anti-Theft BIOS Recovery Timer	Disabled	This timer will enable a 30 minute window to allow a firmware/BIOS reflash before the system is powered down.
	Flash Protection Override Policy Hard	**Allowed When AT Not Provisioned**	This option determines if the ME will enter a disabled state to allow full SPI device re-flashing when the manufacturing override jumper (HMFPRO) is set. **Always Allowed** - Full SPI re-flash will always be allowed regardless of AT enrollment state. **Allowed When AT Not Provisioned** - Full SPI re-flash allowed if AT has not been enrolled.
	Flash Protection Override Policy Soft	**Allowed When AT Not Provisioned**	This option determines if the ME will enter a disabled state via BIOS based MEI messages and allow ME only region re-flash. **Always Allowed** - ME region re-flash will always be allowed regardless of AT enrollment state. **Allowed When AT Not Provisioned** - ME region re-flash allowed if AT has not been enrolled.

Table 3-27. Flash Image | ME Region | Configuration | ME Debug Event Service

Location	Parameter	ME Debug Disabled (FITC Default)	ME Debug Enabled (CRB Set To)	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | ME Region | Configuration | ME Debug Event Service** • Set the parameters in the **ME Debug Event Service** section as shown	**Green means custom settings may be required (for enabling ME Debug only)**			
	Error Filter	All	All	
	Logging Interface - Network	false	true	Set to **true** only for platforms with Intel LAN.
	Logging Interface - SMBus	false	false	Can be set to **true** for platforms with no Intel LAN. May also be set to **true** if ME Debug logging through SMBus is desired.
	Logging Interface - Flash	false	false	
	Logging Interface - PRAM	false	false	
	Buffer Size	0	24	Default is **0**.
	Buffer Mode	Blocking	Buffered	**Note:** Delayed Flush is not supported.
	Source IP Address	10.2.0.2	10.2.0.2	
	Destination IP Address	10.2.0.255	10.2.0.255	
	Destination MAC Address	0C FF 17 22 FF 2D	0C FF 17 22 FF 2D	This is the MAC address of the SUT.
	Slave Address Enable	false	true	
	Slave Address	0x00	0x56	Default is **0x56**.
	Event Filters	**All values set to**: 0x00000000	**Basic** Filter Group 1: **0x00000001** Filter Group 5: **0x00000003** Filter Group 6: **0x000F0000** Filter Group 70: **0x00000001** **Advanced (Intel LAN)** Filter Group 1: **0x00000001** Filter Group 4: **0x000003F6** Filter Group 5: **0x00000003** Filter Group 6: **0x000F0000** Filter Group 70: **0x00000001** **Advanced (SMBus)** Filter Group 1: **0x00000001** Filter Group 4: **0x000003F6** Filter Group 5: **0x00000003** Filter Group 6: **0x000F0000** Filter Group 70: **0x00000001**	Default is **0x00000000** for all Filter Groups.



Parameter	Value
Error Filter	All
Logging Interface - Network	false
Logging Interface - SMBus	true
Logging Interface - Flash	false
Logging Interface - PRAM	false
Buffer Size	24
Buffer Mode	Buffered
Source IP Address	10.2.0.2
Destination IP Address	10.2.0.255
Destination MAC Address	0C FF 17 22 FF 2D
Slave Address Enable	true
Slave Address	0x56
Event Filters	Click To Edit

Basic Filter configuration:

Filter Group 1	0x00000001
Filter Group 5	0x00000003
Filter Group 6	0x000F0000
Filter Group 70	0x00000001

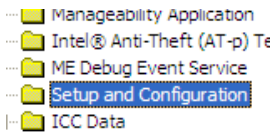
Advanced Filter configuration (LAN):

Filter Group 1	0x00000001
Filter Group 4	0x000003F6
Filter Group 5	0x00000003
Filter Group 6	0x000F0000
Filter Group 70	0x00000001

Advanced Filter configuration (SMBus):

Filter Group 1	0x00000001
Filter Group 4	0x000003F6
Filter Group 5	0x00000003
Filter Group 6	0x000F0000
Filter Group 70	0x00000001

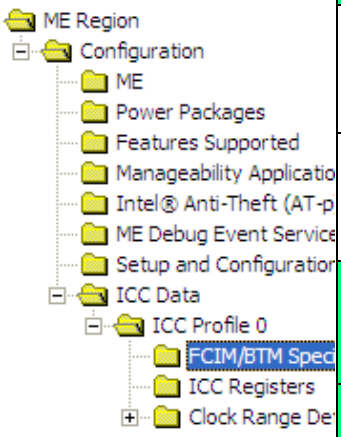
Table 3-28. Flash Image | ME Region | Configuration | Setup and Configuration

Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • Select **Flash Image | ME Region | Configuration | Setup and Configuration** • Set the parameters in the **Setup and Configuration** section as shown 	**Yellow means custom settings may be required.**		
	ODM ID used by Intel(R) Upgrade Service	0x00000000	Used by Intel® Upgrade Service and Intel® AT. If enabling Intel® Upgrade Service, refer the MTP User Guide that is available after registration for detail on how to set this field. The OEM can find thier value by logging on to **http://upgrades.intel.com**
	System Integrator ID used by Intel(R) Upgrade Service	0x00000000	Used ONLY by Intel® Upgrade Service. If enabling Intel® Upgrade Service, refer the MTP User Guide that is available after registration for detail on how to set this field. Registration and login is available at http://upgrades.intel.com
	Reserved ID used by Intel(R) Upgrade Service	0x00000000	Used ONLY by Intel® Upgrade Service. If enabling Intel® Upgrade Service, refer the MTP User Guide that is available after registration for detail on how to set this field. Registration and login is available at http://upgrades.intel.com
	MCTP static EIDs	0x920030	Defines the ME 8 bit MCTP endpoint IDs for Each SMBus segment. Only bits 0-7 are supported to be modified. Bits 8-23 must be left to 0x9200
	MCTP Info 3G	0x32	This field must be set to the 7-bit SMBus address of the 3G NIC. Only supported if using Intel® Anti-Theft Technology with a 3G NIC
	Permit Period Timer Resolution	Days	Treat as reserved.
	MEBx Password Policy	0	Treat as reserved.
	Remote Configuration Enabled	false	Treat as reserved.
	PKI DNS Suffix	Leave Blank	Treat as reserved.

3.6.2 Clock Control Parameters

Table 3-29. Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers

Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • On the navigation tree to the left, select the **Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers** • Set the parameters in the **FCIM/BTM Specific Registers** section as shown in the table below ***Note:*** Do not switch between FCIM and BTM defaults manually. Always use BTM/FCIM Select parameter under **Flash Image | Descriptor Region | PCH Straps | PCH Strap 17** to switch between **Full Clock Integration Mode** and **Buffered Through Mode**.	**Green means custom settings may be required (for overclocking only).** ***Note:*** BCLK overclocking requires the PCH SKU to be set to P67 (Desktop), QS67 (Mobile), QM67 (Mobile), or HM67 (Mobile). Note that BCLK overclocking places the platform in an unsupported configuration and/or operational state and can result in platform instability, physical damage, and data loss. BCLK overclocking margins are not guaranteed or supported.		
	Clock Source Select	**FCIM:** 0x0001_1A33 **BTM:** 0x0000_0200	This parameter controls clock source selection for non-PCI Express* clocks. See Section B.3.1 for more information on this parameter. **0x0001_1A34** = FCIM overclocking
	SRC Source Select	**FCIM:** 0x0003_3733 **BTM:** 0x0000_0000	This parameter controls clock source selection for PCI Express* clocks. See Section B.3.2 for more information on this parameter. **0x0013_3744** = FCIM overclocking
	PLL Reference Clock Select	**FCIM:** 0x0008_8CBF **BTM:** 0x0000_0878	This parameter controls reference clock selection for PLLs. See Section B.3.3 for more information on this parameter. **0x000A_8CBE** = FCIM overclocking
	PLL Enable	**FCIM:** 0x8000_000C **BTM:** 0x8000_000C	This parameter controls PLL enables. See Section B.3.4 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	Input Buffer Enable	**FCIM:** 0x0000_002F **BTM:** 0x0000_0009	This parameter controls enabling of input buffers. See Section B.3.9 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	Divider Enable	**FCIM:** 0x0000_05EB **BTM:** 0x0000_01C3	This parameter controls enabling of divider blocks. See Section B.3.10 for more information on this parameter. **0x0000_05FF** = FCIM overclocking
	SSC Control	**FCIM:** 0x0001_0000 **BTM:** 0x0000_0000	This parameter controls spread spectrum modulation capability of SSC blocks. See Section B.3.15 for more information on this parameter. **0x0000_0000** = FCIM overclocking



Parameter	Value
CSS	0x00011A33
SSS	0x00033733
PLLRCS	0x00088CBF
PLLEN	0x0000000C
IBEN	0x0000002F
DIVEN	0x000005EB
SSCCTL	0x00010000

Table 3-30. Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers

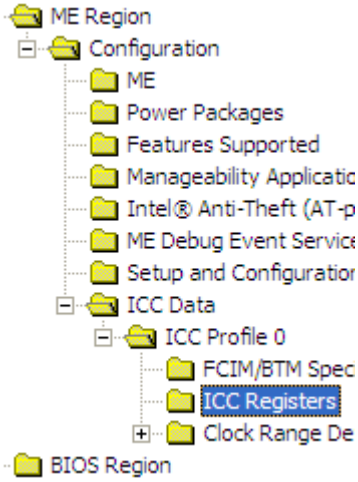
Location	Parameter	CRB Set To	Settings for Any Platform
Follow navigation tree below: • On the navigation tree to the left, select the **Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers** • Set the parameters in the **ICC Registers** section as shown in the table below ***Note:*** BTM/FCIM Select parameter under **Flash Image | Descriptor Region | PCH Straps | PCH Strap 17** has no effect on values in this section.  Parameter / Value FCSS 0x00000232 OCKEN 0x1FFF0F8F Output Clock Allow Enable/Disable Bef... 0x1FFF0F8F Output Clock Allow Enable/Disable Aft... 0x1FFF0F8F PM1 0x0000001F PM2 0x00000000 SEBP1 0x00009999 SEBP2 0x00099999 DIVSET 0x00455551 SSC1PARMS 0x1270A428 SSC2PARMS 0x12704C30 SSC3PARMS 0x12704C30 SSC4PARMS 0x1270A428 PMSRCCLK1 0x76543210 PMSRCCLK2 0x00000F98	**Yellow means custom settings may be required.**		
	FCSS	0x0000_0232	This parameter controls muxing to select sources for Flex Clock outputs. Each nibble from most to least significant bit is for FLEX3:0. See Section B.3.3 for more information on this parameter. Note that 24/48 MHz or 27 MHz options require additional configuration. Recommend keeping defaults for bring up with Intel® ME FW.
	OCKEN	0x1FFF_0F8F	This parameter controls enabling of output buffers. See Section B.3.8 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	Output Clock Allow Enable/Disable Before POST	0x0FFF0F8F	This parameter controls allowing of enable/disable of output buffers **before** BIOS END_OF_POST Intel® MEI message. The structure of this parameter is identical to OCKEN parameter. See Section B.3.8 for more information on this parameter. Change to **0x0FFF0F8F** to disable DMI clock disable before POST by BIOS. Default is **0x00FF_0F8F**.
	Output Clock Allow Enable/Disable After POST	0x00FF0F8F	This parameter controls allowing of enable/disable of output buffers **after** BIOS END_OF_POST Intel® MEI message. The structure of this parameter is identical to OCKEN parameter. See Section B.3.8 for more information on this parameter. Change to **0x00FF0F8F** to disable DMI clock disable before POST by BIOS. Default is **0x00FF_0F8F**.
	PM1	0x0000_001F	This parameter controls power management features of clocks. See Section B.3.11 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.

Table 3-30. Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers

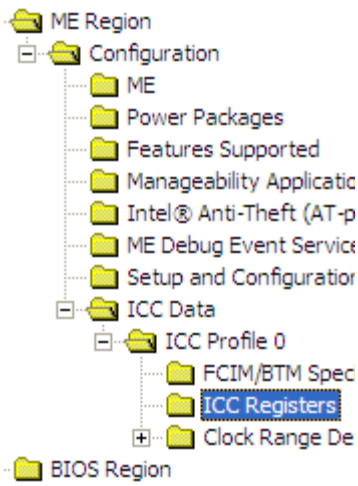
Location	Parameter	CRB Set To	Settings for Any Platform
	PM2	0x0000_0000	This parameter controls power management features of clocks. See Section B.3.12 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	Yellow means custom settings may be required.		
	SEBP1	0x0000_9999	This parameter controls double/single load series resistance and slew rate for FLEX clocks. See Section B.3.13 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	SEBP2	0x0009_9999	This parameter controls double/single load series resistance and slew rate for PCI clocks. See Section B.3.14 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	DIVSET	0x0045_5551	Treat as reserved.
	PI12BiasParms	0x0888_0888	This is a Chipset Configuration (PCHCFG) parameter. 0x0000_0888 = FCIM overclocking
	SSC1PARMS	0x1270_A428	Treat as reserved.
	SSC2PARMS	0x1270_4C30	**Note:** For platform that support Wimax Friendly Clocking- change this registers setting to **0x1270_F418** otherwise treat as reserved. and use default value For more information on PCH SKU that support Wimax Friendly Clocking, see appendix B.3.22
	SSC3PARMS	0x1270_4C30	Treat as reserved.
	SSC4PARMS	0x1270_A428	Treat as reserved.
	SSC2OCPARMS	0x0000_0000	**Note:** or platform that support Wimax Friendly Clocking - change this registers setting to **0x0000_0300** otherwise treat as reserved. and use default value For more information on PCH SKU that support Wimax Friendly Clocking, see appendix B.3.22
	PMSRCCLK1	0x7654_3210	This parameter as signs dynamic CLKRQ# control of SRC clocks. See Section B.3.16 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.
	PMSRCCLK2	0x0000_0F98	This parameter as signs dynamic CLKRQ# control of SRC clocks. See Section B.3.17 for more information on this parameter. Recommend keeping defaults for bring up with Intel® ME FW.

Table 3-31. Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | Clock Range Definition Record 0

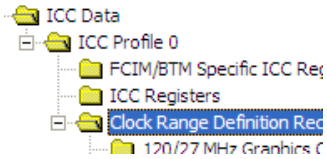
Location	Section			Settings for Any Platform
Follow navigation tree below: • On the navigation tree to the left, select the **Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | Clock Range Definition Record 0** • Set the parameters in the **Clock Range Definition Record 0** section as shown in the table below ***Note:*** ClockDivMin refers to minimum divider value which corresponds to maximum frequency output value. ClockDivMax refers to maximum divider value which corresponds to minimum frequency output value. ***Note:*** Changes are required only if overclocking, otherwise defaults may be used.  Parameter | Value Clock Div Min | 0x0C00 Clock Div Max | 0x0C06 SSC Change Allowed Mask | true SSC Spread Mode Control Up | false SSC Spread Mode Control Center | false SSC Spread Mode Control Down | true SSC Spread Percent Max | 50 Clock Usage | 0x000	**Yellow means custom settings may be required.**			
	Green means custom settings may be required (for BCLK overclocking only). ***Note:*** BCLK overclocking requires the PCH SKU to be set to P67 (Desktop), QS67 (Mobile), QM67 (Mobile), or HM67 (Mobile). Note that BCLK overclocking places the platform in an unsupported configuration and/or operational state and can result in platform instability, physical damage, and data loss. BCLK overclocking margins are not guaranteed or supported.			
	120/27 MHz Graphics Clock (DIV1-S)			Treat as reserved.
	Processor or Platform DMICLK (DIV2-S)			Parameters not shown may be treated as reserved.
	Parameter	**CRB Set To**	**CRB OC Set To**	**Comments**
	Clock Div Min (indicates maximum allowed frequency)	0x0C00	0x0400	Recommended maximum clock divider frequency is 100.0 MHz (clock divider minimum = **0xC00**). Change to **0x180** (800 MHz) if BCLK overclocking is being utilized. If the limit for BCLK overclocking is desired to be lower, use one of the following values: **0x180** = 800 MHz **0x200** = 600 MHz **0x300** = 400 MHz **0x400** = 300 MHz **0x4CC** = 250.1629 MHz **0x554** = 225.2199MHz **0x600** = 200 MHz **0x6DA** = 175.1425 MHz **0x800** = 150 MHz **0x892** = 140.0182 MHz **0x93A** = 130.0593 MHz **0xA00** = 120 MHz **0xAE8** = 110.0287 MHz **0xB6C** = 105.0616 MHz
	Clock Div Max (indicates minimum allowed frequency)	0x0C00	0x0C0E	For Basic platform configuration, recommended minimum clock divider frequency is 100MHz clock divider maximum = **0xC00**) For platform that is using Wimax, the recommended minimum clock divider frequency is 99.5463 MHz (clock divider maximum = **0xC0E**). • Accommodates minimum for WiMax Friendly Clocking.

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Table 3-31. Flash Image | ME Region | Configuration | ICC Data | ICC Profile 0 | Clock Range Definition Record 0

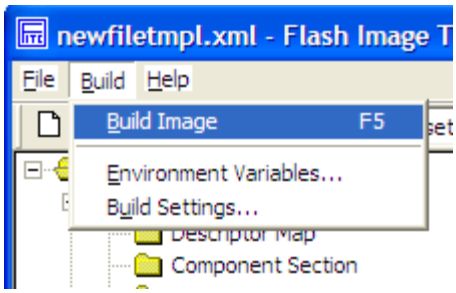
Location	Section			Settings for Any Platform
	SSC Change Allowed Mask	true		This determines if the SSC parameters of this clock resource can be controlled by the handled request record.
	SSC Spread Mode Control Up	false		
	SSC Spread Mode Control Center	false		
	SSC Spread Mode Control Down	true		
	SSC Spread Percent Max	50		
	Clock Usage	0x0DF	0x007	Change to indicate processor/DMI (**0x007**) if overclocking is being utilized. Default is **0x0DF**.
	Section			**Settings for Any Platform**
	PCH DMICLK (DIV3)			Make changes below only if overclocking. Parameters not shown may be treated as reserved.
	Parameter	**CRB Default**		**Comments**
	Clock Div Min (indicates maximum allowed frequency)	0x0C00	0x0C00	Recommended maximum clock divider frequency is 100.0 MHz (clock divider minimum = **0xC00**). Accommodates WiMax Friendly Clocking.
	Clock Div Max (indicates minimum allowed frequency)	0x0C0E	0x0C0E	Recommended minimum clock divider frequency is 99.5463 MHz (clock divider maximum = **0xC0E**). • Accommodates minimum for WiMax Friendly Clocking.
	SSC Change Allowed Mask	true		This determines if the SSC parameters of this clock resource can be controlled by the handled request record.
	SSC Spread Mode Control Up	false		
	SSC Spread Mode Control Center	false		
	SSC Spread Mode Control Down	true		
	SSC Spread Percent Max	50		
	Clock Usage	0x000	0x0D8	Change to indicate PCH PCI Express* and PCI (**0x0D8**) if overclocking is being utilized. Default is **0x000**.
	Section			**Settings for Any Platform**
	120 MHz SSSC Graphics Clock (DIV4)			Treat as reserved.

3.7 Build SPI Flash Binary Image

3.7.1 Build SPI Flash Binary Image

In the main menu select **Build | Build Image**. The image will be saved in the directory specified by **$DestDir** parameter and will be named **outimage.bin**, unless the default **Output Directory** in **Build | Build Settings** was changed (see Section 3.1).

Figure 3-6. Build | Build Image



3.7.2 Save Your Settings

In the main menu select **File | Save As...**. Select a name and location for the XML file that contains all the settings configured thus far. It is recommended that you save this file in your **[root)]\Tools\System Tools\Flash Image Tool** directory for easy access.

Assuming that the custom settings file was saved as **customfile.xml** to the FITC directory (**[root)]\Tools\System Tools\Flash Image Tool**), then these settings could be loaded in the FITC GUI itself using the main menu option **File | Load...**.

Note: Previous platform (ie. Ibex Peak) generations of the FITC tool required multiple configuration files to be edited and saved. For this generation, only one configuration file **(customfile.xml)** is required.

This custom settings file could also be used to generate an SPI Flash binary image using the command line, with a command of the form:

```
fitc.exe [xml_file] [/o <file>] /b
```

Example usage: > fitc.exe newfiletmpl.xml /o .\temp.bin /b

where:

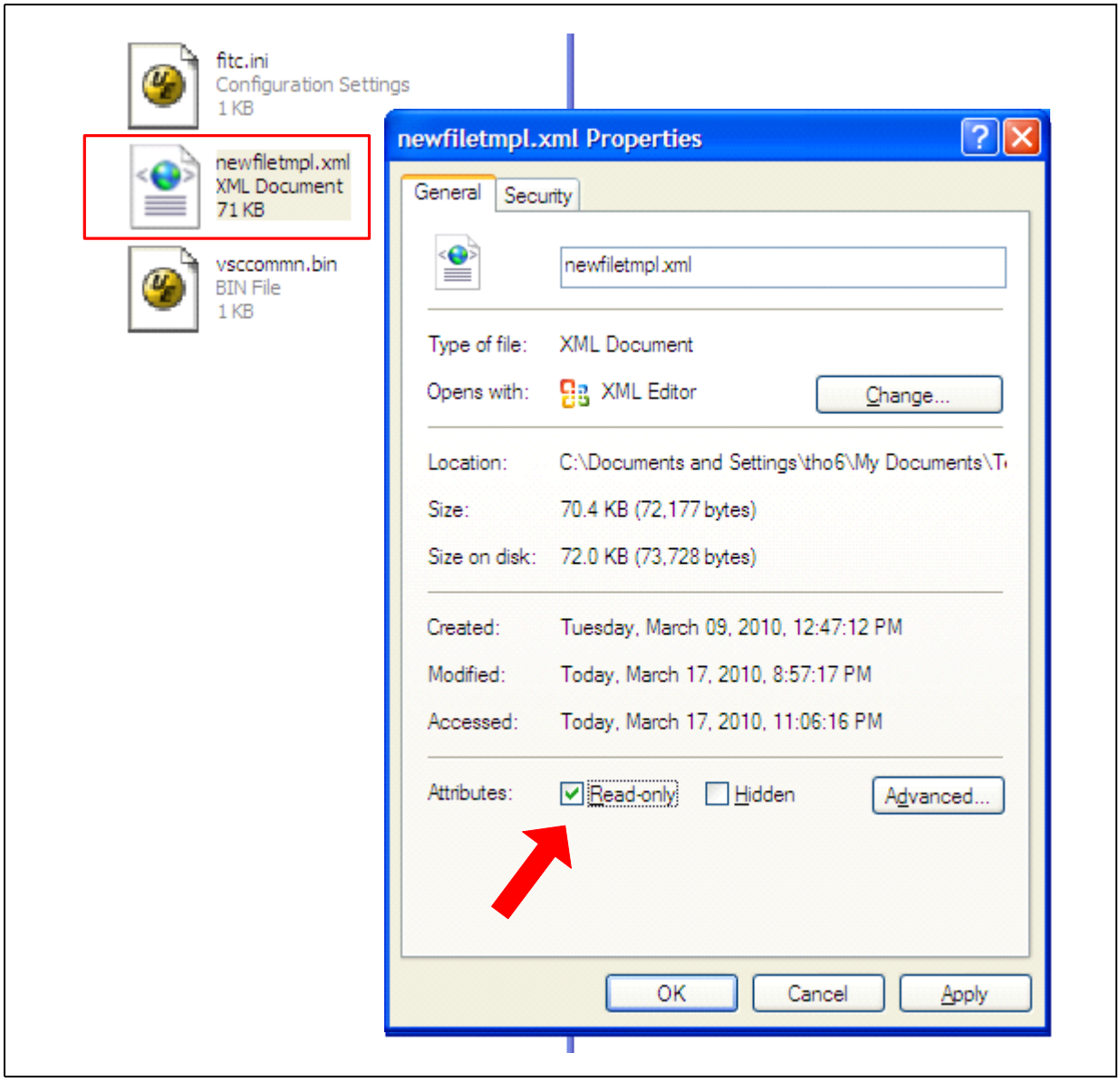
- **<xml_file>** — The XML configuration file saved when configuring FITC.
- **/o <file>** — The path and filename where the image will be saved. This command overrides the 'Output path' in the XML file.
- **/b** — Automatically builds the Flash image. The FIT GUI will not be displayed when this flag is set, since FIT will run in auto-build mode. Error messages will be displayed by FITC, if necessary.

3.7.3 Protect Saved Configuration XML File

To avoid custom-configured values from ever overwritten when loading new binaries files (ie: when loading binaries into BIOS, GbE and ME regions in FITC) do the following (see Figure 3-7):

- After building the SPI Flash binary image and saving your configuration, close Flash Image Tool
- Right-click on the saved FITC configuration XML file (**customfile.xml**) and select **Properties**
- Check the **Read-Only** checkbox and click **OK**

Figure 3-7. Protecting FITC Configuration XML File



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4 Programming SPI Flash Devices and Checking Firmware Status

Now that the Flash image file has been created, it can be programmed into the SPI Flash device(s) of the target machine. For platforms that don't boot, a Flash Chip Programmer will be required. For platforms that can boot to DOS or Windows*, the Flash Programming Tool (FPT) can be used.

4.1 Flash Burner/Programmer

The specific use of a Flash burner/programmer is beyond the scope of this document. However, the following general steps may be followed:

1. Navigate to your **Output Directory** (as specified in Section 2.2 or Section 3.6.2) where your generated SPI Flash image(s) are saved. It is assumed that this image file is named **outimage.bin**.

   If two total SPI Flash devices were specified during the build process, then additional image files will be saved, one for each SPI Flash device. These files are assumed to be named **outimage(1).bin** and **outimage(2).bin**.
2. Utilize a Flash burner/programmer to program the image(s). For multiple SPI Flash devices, the images are numbered sequentially to correspond to the first and second SPI Flash device accordingly.

4.1.1 In-Circuit SPI Flash Programming for Mobile CRB

Mobile CRBs have the SPI Flash devices soldered down. As a result, to program the SPI Flash for mobile CRBs, follow these steps:

1. Leave mobile CRB powered off.
2. Connect Flash Programmer (such as DediProg SF100) header to connector **J8E1** which is labelled **"SPI PROG"**. Make sure to line up pin 1 on the header.
3. Change the jumpers to the **"Programming SPI-0"** mode as shown in Table 4-1 below.

Table 4-1. Jumper Settings for Mobile CRB SPI Flash Programming

Mode	J8C4	J8C5	J8D1
Programming SPI-0	1-2	1-2	1-2
Programming SPI-1	1-2	1-2	2-3
Normal Operation	1-X	1-X	1-X

4. Program the first image [outimage(1).bin] to the CRB.
5. Following Table 4-1, change the jumpers to the **"Programming SPI-1"** mode.
6. Program the second image [outimage(2).bin] to the CRB.
7. Once programming is complete, disconnect the Flash Programmer header. The CRB is now ready for power on.

4.2 Flash Programming Tool (FPT)

FPT can be used to substitute for a Flash burner/programmer, provided the system is capable of booting to a DOS or Windows OS.

Note: FPT will automatically disable the Intel® ME prior to flashing the image to the platform.

FPT DOS Version

The DOS versions supported by FPT are: DOS, Free DOS, and DRMK DOS. Use the following steps to program the SPI Flash devices,

1. Copy all the files in the "(root)\Tools\System Tools\Flash Programming Tool\DOS" directory to the root directory of a bootable USB key.
2. Navigate to your **Output Directory** (as specified in Section 2.2 or Section 3.6.2) where your generated SPI Flash image(s) are saved. It is assumed that this image file is named **outimage.bin**. Copy this image file to the root directory of the USB key.
3. Boot the target system to DOS and change to the root directory of the bootable USB key. At the DOS prompt type:

```
fpt.exe /i
```

   The system should respond with the number of SPI Flash devices available. For example:

```
--- Flash Devices Found ---
W25Q64BV ID:0xEF4017 Size: 8192KB (65536Kb)
W25Q64BV ID:0xEF4017 Size: 8192KB (65536Kb)
```

   Note: If the SPI Flash device does not currently contain a descriptor it may report only a single device.

4. Program the SPI Flash image to the Flash device(s) by issuing the following command at the prompt:

```
fpt.exe /f outimage.bin
```

   If the programming was successful, then the following message will be shown.

```
FPT Operation Passed
```

   If the programming was **NOT** successful, then repeat this step to try again. If programming problems persist, then check the SPI Flash devices and platform hardware.

5. Execute a platform global reset using FPT -greset. Next go to Section 4.3 to check the Intel® ME Firmware status.

4.2.1 FPT Windows* Version

The Windows* OS versions supported by FPT are: Windows* PE, Windows* XP SP2, Windows* Vista and Windows* 7. There are two versions of FPT for Windows*: a 32-bit version and a 64-bit version. Most Windows* OS, Windows* XP, Vista and Win7 (32-bit or 64-bit) can use Windows* version of FPT. However, Windows* OS which do not support 32 bit compatible mode (Win PE 64-bit) **must use** FPT Windows 64-bit version due to compatibility issues.

Use the following steps to program the SPI Flash devices,

1. Navigate to your **Output Directory** (as specified in Section 2.2 or Section 3.6.2) where your generated SPI Flash image(s) are saved. It is assumed that this image file is named **outimage.bin**. Copy this image file to FPT directory located at "(root)\Tools\System Tools\Flash Programming Tool\Windows".
2. Boot the target system to Windows* and open a Command Prompt window. In this window, change to the FPT directory and at the prompt type:

```
fptw.exe /i
```

   The system should respond with the number of SPI Flash devices available. For example:

```
--- Flash Devices Found ---
W25Q64BV ID:0xEF4017 Size: 8192KB (65536Kb)
W25Q64BV ID:0xEF4017 Size: 8192KB (65536Kb)
```

   Note: If the SPI Flash device does not currently contain a descriptor it may report only a single device.

3. Program the SPI Flash image to the Flash device(s) by issuing the following command at the prompt:

```
fptw.exe /f outimage.bin
```

   If the programming was successful, then the following message will be shown.

```
FPT Operation Passed
```

   If the programming was **NOT** successful, then repeat this step to try again. If programming problems persist, then check the SPI Flash devices and platform hardware.

4. Power down the platform with a G3 power cycle (ensure all power is disconnected from the system). Next go to Section 4.3 to check the Intel® ME Firmware status.

4.3 Checking Intel® ME Firmware Status

Use the following steps to check the platform health and Intel® ME FW status,

1. Copy the file **MEInfo.exe** in the "(root)\Tools\System Tools\MEInfo\DOS" directory to the root directory of a bootable USB key.
2. Boot the target system and stop at the BIOS setup menu. Load default values for BIOS (on Intel® CRBs press F3 to load default values). Save and reboot (on Intel® CRBs press F4 and select Yes).
3. Boot the target system to DOS and change to the root directory of the bootable USB key. At the DOS prompt type:

```
MEInfo.exe
```

   The system should respond with a message similar to below.

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```
Intel(R) MEInfo Version: 7.0.0.1041
Copyright(C) 2005 - 2010, Intel Corporation. All rights reserved.

Intel(R) ME code versions:

BIOS Version:                           ASNBCPT1.86C.0022.B00.1005051753
MEBx Version:                           0.0.0.0
Gbe Version:                            5.16.0
VendorID:                               8086
PCH Version:                            600000
FW Version:                             7.0.0.1041

FW Capabilities:                        16784480

    Intel(R) Anti-Theft Technology - PRESENT/ENABLED
    Intel(R) Capability Licensing Service - PRESENT/ENABLED
    Protect Audio Video Path - PRESENT/ENABLED

Level III Manageability Upgrade State:  Not Upgradable
Cryptography Support:                   Disabled
Last ME reset reason:                   Power up
Local FWUpdate:                         Enabled
BIOS and GbE Config Lock:               Disabled
Host Read Access to ME:                 Enabled
Host Write Access to ME:                Enabled
SPI Flash ID #1:                        EF4017
SPI Flash ID VSCC #1:                   20052005
SPI Flash ID #2:                        EF4017
SPI Flash ID VSCC #2:                   20052005
SPI Flash BIOS VSCC:                    20050000
VE Enablement Status:                   Invalid
BIOS boot State:                        Post Boot
OEM Id:                                 00000000-0000-0000-0000-000000000000
```

As in the above example if there are NO errors shown, then

- your platform's health is good
- Intel® ME FW has successfully initialized
- Intel® ME FW is operating normally

Note: This section is only intended to show how to use the MEInfo.exe tool for checking firmware status. For full usage and capabilities of the MEInfo.exe tool, please see the System Tools User Guide.

4.4 Common Bring Up Issues and Troubleshooting Table

Table 4-2. Common Bring Up Issues and Troubleshooting Table

Problem / Issue	Solution / Workaround
System does not boot to DOS	By default, the system will boot to EFI Shell. To boot to DOS, 1. Enter BIOS menu, then go to the 'Boot' screen 2. Change 'Boot Option #1' to be your USB key (ensure USB key is formatted to be DOS bootable) 3. Press 'F4' to save settings and reboot
Hear 3 beeps when platform powers on	Possible device is disconnected or device not found, check • platform power and CPU fan power connectors • DIMM memory modules • USB devices (keyboard, mouse, USB key) may be plugged into inactive USB port • missing/incorrect jumpers • missing CPU or PCH
No display on monitor	Ensure 1.5MB FW SKU supports integrated graphics. Try external graphics card.
USB device not detected or does not work	USB device may be plugged into inactive USB port
System does not boot (Post Code 00)	Incorrect Flash image – possible reasons: • wrong FW selected during Flash image build process • wrong Flash size selected Re-build image with correct settings and re-flash using Flash burner.

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5 Intel® ME Firmware Features - Details and Settings

5.1 Features Supported

These options control the availability/visibility of firmware features.

The ability to change certain options is SKU dependent and some default values will be grayed out and will not be changeable depending on the SKU selected.

All parameters in this section are color-coded as per the key below.

The parameter can be changed
The parameter is read only and cannot be changed

Table 5-1. Feature Default Settings by SKU (Desktop)

	Feature	Default Value
Intel® P67 - Desktop	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	Yes
	Permanently Disable Intel (R) Anti Theft Technology?	Yes
Intel® H67 - Desktop	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	No
	Permanently Disable Intel (R) Anti Theft Technology?	Yes
Intel® H61 - Desktop	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	No
	Permanently Disable Intel (R) Anti Theft Technology?	Yes
Intel® Z68 - Desktop	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	Yes
	Permanently Disable Intel (R) Anti Theft Technology?	Yes

All parameters in this section are color-coded as per the key below.

The parameter can be changed
The parameter is read only and cannot be changed

Table 5-2. Feature Default Settings by SKU (Mobile)

	Feature	Default Value
Intel® QS67 - Mobile	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	No
	Permanently Disable Intel (R) Anti Theft Technology?	No
Intel® HM67 - Mobile	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	No
	Permanently Disable Intel (R) Anti Theft Technology?	No
Intel® HM65 - Mobile	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	No
	Permanently Disable Intel (R) Anti Theft Technology?	No
Intel® UM67 - Mobile	Manageability Application	Disabled
	Permanently Disable Intel (R) ME Network Services?	No
	Permanently Disable PAVP?	No
	Permanently Disable Intel (R) Anti Theft Technology?	No

5.2 Deep Sx Settings

This chapter covers configuration settings for the Cougar Point based Desktop and Mobile CRB platforms Deep Sx operation.

Table 5-3. Deep Sx Settings for Desktop CRB

Desktop boards without F18 rework	Option	Settings
DeepSx Disabled		
FITC Strap 10	DeepSx	False
BIOS	Advanced -> PCH-IO Configuration-> DeepSx Power Policies	Disabled
Desktop boards with F18 rework	**Option**	**Settings**
DeepSx Enabled		
FITC Strap 10	DeepSx	True
BIOS	Advanced -> PCH-IO Configuration-> DeepSx Power Policies	Enabled in S5 or Enabled in S4-S5
DeepSx Disabled		
FITC Strap 10	DeepSx	True
BIOS	Advanced -> PCH-IO Configuration-> DeepSx Power Policies	Disabled

Table 5-4. Deep Sx Settings for Mobile CRB

Mobile boards without DSW rework	Option	Settings
DeepSx Disabled		
FITC Strap 10	DeepSx	False
BIOS	Advanced -> PCH-IO Configuration-> DeepSx Power Policies	Disabled
Mobile boards with DSW rework and KSC >= 1.02	**Option**	**Settings**
DeepSx Enabled		
FITC Strap 10	DeepSx	True
BIOS	Advanced -> PCH-IO Configuration-> DeepSx Power Policies	Enabled in S5/Battery or Enabled in S4-S5/Battery
DeepSx Disabled		
FITC Strap 10	DeepSx	True
BIOS	Advanced -> PCH-IO Configuration-> DeepSx Power Policies	Disabled

Mobile Notes:

1. The EC will default to legacy SUS_PWR_DN_ACK mode when you disable DeepSx in BIOS.

2. The latest DSW rework for mobile will require KSC 1.03.
3. DeepSx will not work with ATX power supply so you must disable DeepSx in both the strap and BIOS if you want to use ATX.

Behavior on Mobile CRB Boards

1. DSW LED will turn on when SLP_SUS# is asserted
   a. When entering DeepSx
   b. When EC powers down SUS due to SUS_PWR_DN_ACK
      c. SLP_SUS# goes low due to RSMRST# assertion, even if SLP_SUS# is not connected
2. The LED is labeled as “DSW”, located next to the ATX power socket.

Behavior on Desktop CRB Boards

1. If DeepSx is enabled, SLP_SUS_N LED will turn off.
2. The LED is located right next to the PostCode Display, with Orange light, labeled as “SLP_SUS_N” CR47EV.

5.3 Configuring the Flash Image for Ignition Functionality

For the previous generation Intel® chipset solution, Intel® 5 Series Express Chipset (codenamed Ibex Peak), a 2MB Firmware SKU called Ignition was supported.

Ignition firmware provided four firmware features for Intel® 5 Series Express Chipset based platforms. These features are integrated clock control, thermal reporting, silicon workaround capability and configuration feature. Integrated clock control provides the capability for configuring the integrated clocks provided by the PCH. Thermal reporting allows the firmware to collect platform thermal data and provide that data to embedded controllers and super I/O devices over SMLINK1 as well as in memory map I/O space. The silicon workaround capability provides some limited ability to workaround chipset issues using ME firmware. Lastly, the configuration feature configures platform features like ECC memory support and integrated graphics based on the processor and PCH SKU that is present in the system.

Follow the steps listed in Section 2 to start. Continue with all steps until you reach Table 2-5.

For Ignition-like functionality, use the following table instead of Table 2-5.

Table 5-5. FITC Wizard - Intel ME Application Permanent Disable

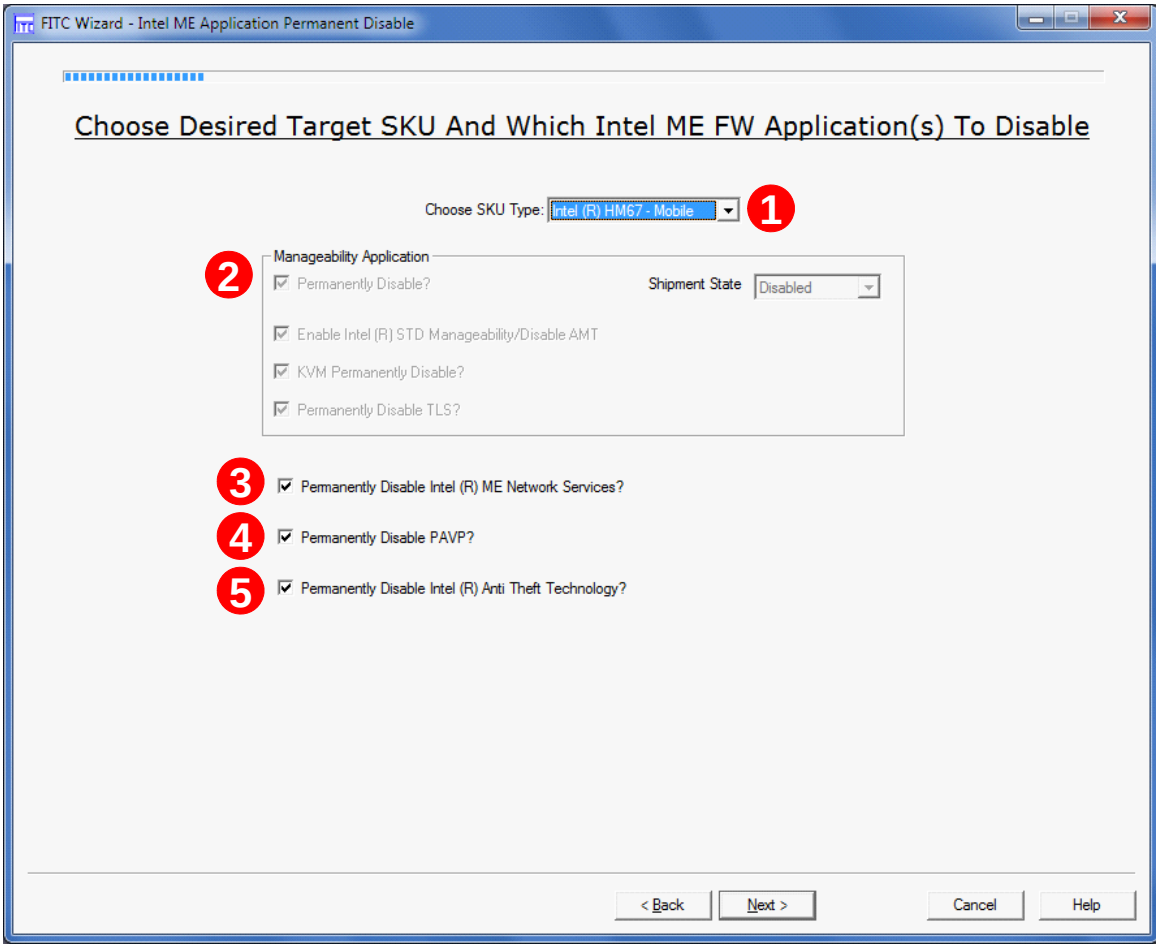
#	CRB Setting	Settings for All Platforms
		
1	• Select the platform SKU type that you wish to emulate on pre-production silicon. Choices are: • **Intel® H67 - Desktop** • **Intel® P67 - Desktop** • **Intel® H61 - Desktop** • **Intel® Z68 - Desktop** • **Intel® QS67 - Mobile** • **Intel® HM67 - Mobile** • **Intel® HM65 – Mobile** • **Intel® UM67 – Mobile**	
2	**Grayed out**	Manageability Application feature. is not supported on 1.5MB FW SKUs and is grayed out
3	**Checked**	Intel® ME Network Services feature is not supported on 1.5MB FW SKUs and is grayed out

Table 5-5. FITC Wizard - Intel ME Application Permanent Disable

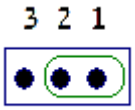
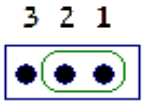
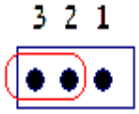
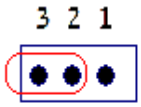
#	CRB Setting	Settings for All Platforms
4	**Checked**	If using Intel integrated graphics solution and the target platform supports HD playback support from the Intel Graphics driver, then PAVP must NOT be Disabled. Availability of PAVP feature is dependent on the SKU Type selected in Step 1. If this feature is not grayed out, then you have the option to permanently disable it by checking this box.
5	**Checked**	Availability of Intel® Anti Theft Technology feature is dependent on the SKU Type selected in Step 1. If this feature is not grayed out, then you have the option to permanently disable it by checking this box.
Click **Next** to advance to the next screen, or **Back** to return to the previous screen.		

After following the above table, continue building the SPI Flash image with Table 2-6.

5.4 Wireless LAN Configuration

The following table outlines the correct Intel® Mobile CRB - Emerald Lake jumper settings for Wireless LAN functionality.

Table 5-6. WLAN Jumper settings

CRB Jumpers			
J7B2		J7D1	
Correct		Correct	
Incorrect		Incorrect	

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A Appendix — Flash Configurations

This chapter covers only the basic information needed for clock control parameter programming. For a more detailed treatment of Cougar Point clocks, see *Cougar Point Platform Clocks* and *Intel® Management Engine — Platform Compliancy Guide for ME Hardware*.

Figure A-1. Configuration "A" — Desktop / Server / Workstation or Mobile

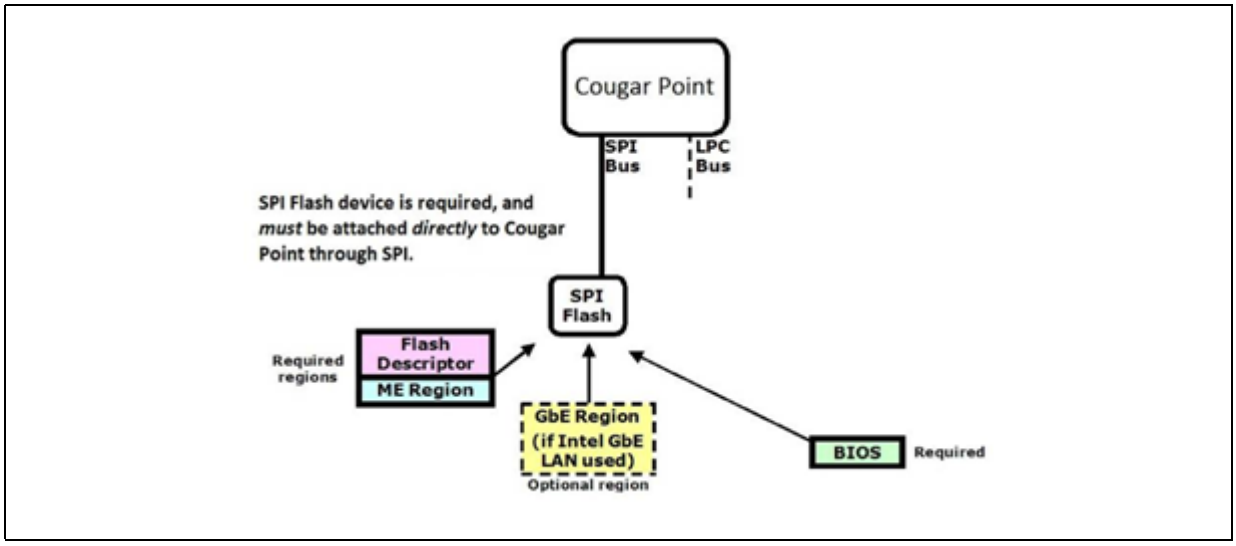


Figure A-2. Configuration "B" — Mobile Only

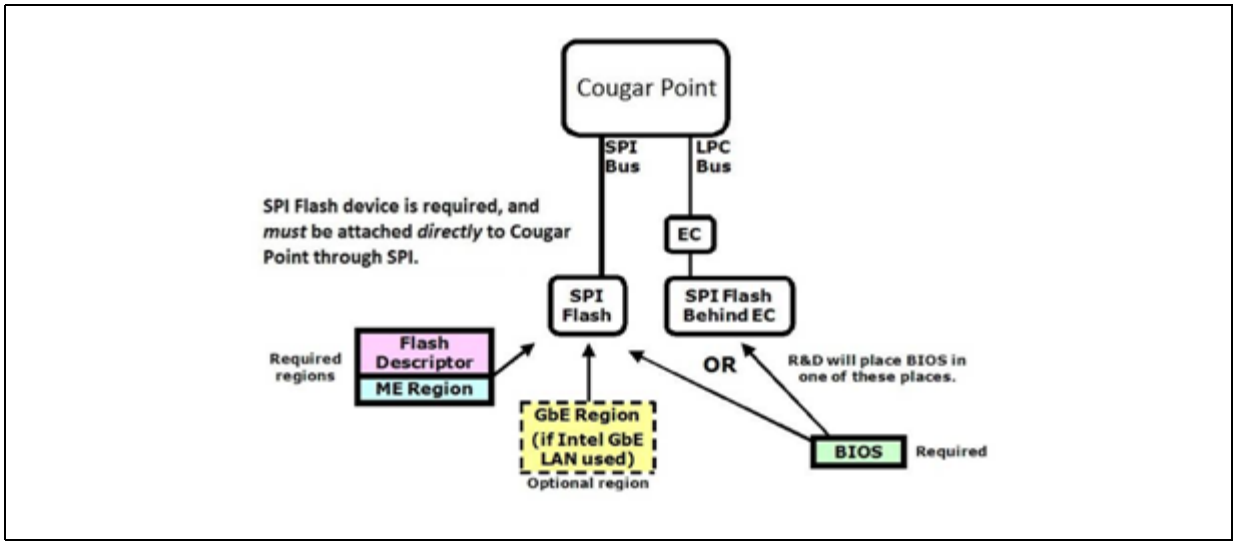


Figure A-3. Configuration "C" — Desktop / Server / Workstation Only

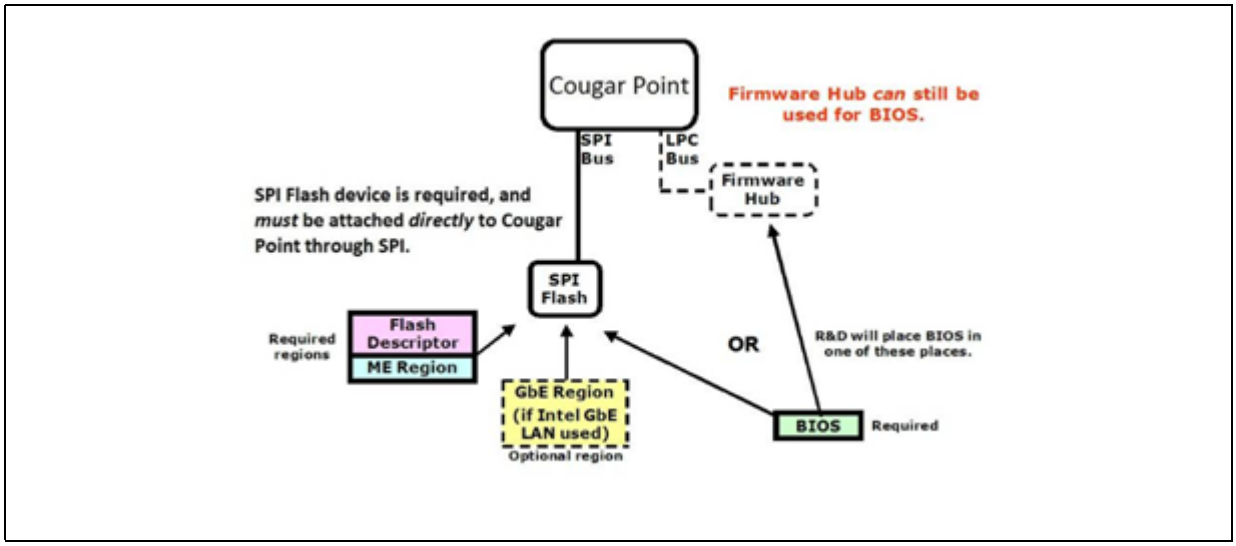
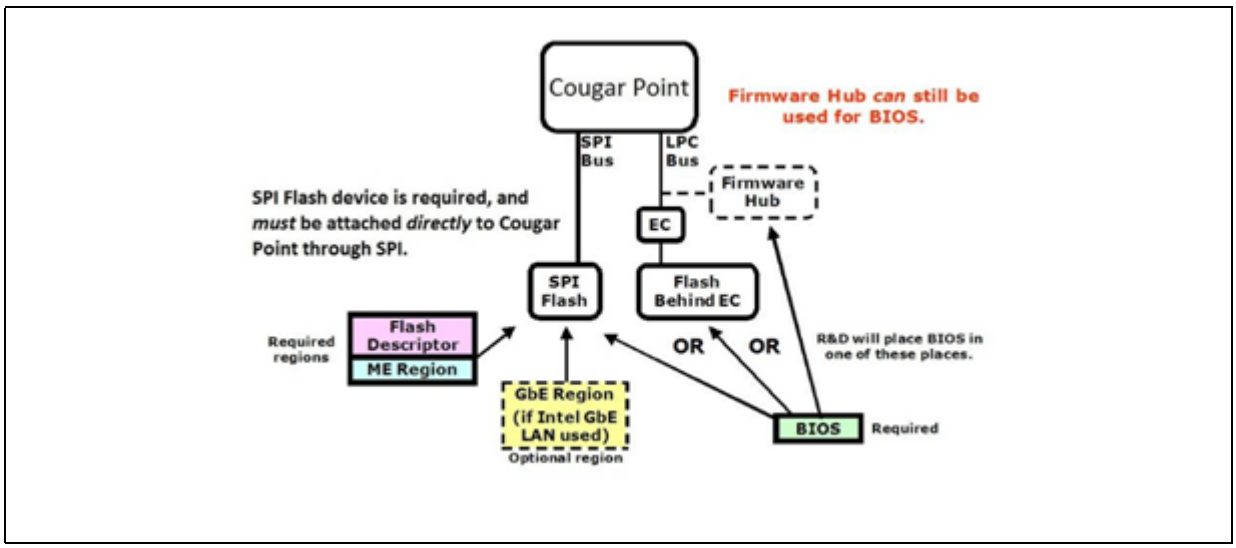


Figure A-4. Configuration "D" — Mobile Only



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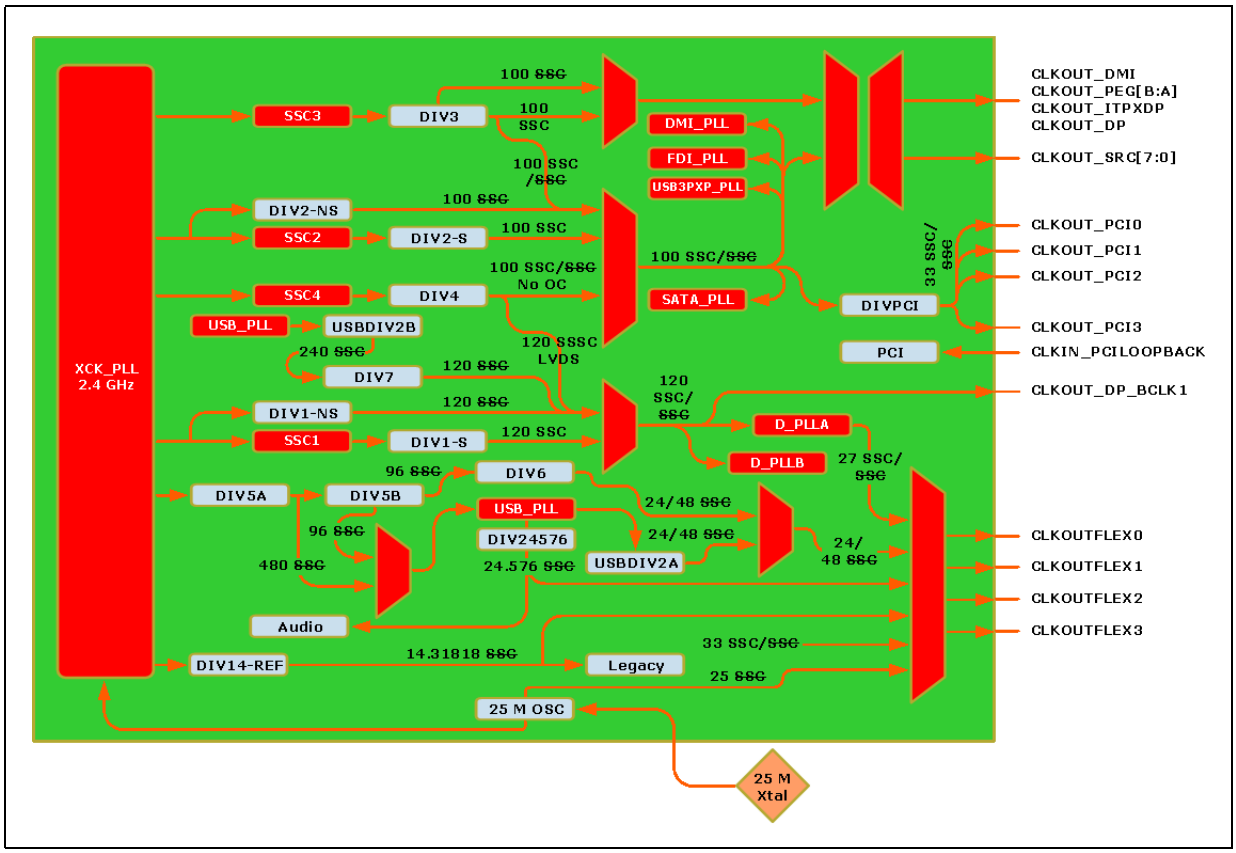
B Appendix — Cougar Point Clock Configuration

This chapter covers only the basic information needed for clock control parameter programming. For more information on validating and checking compliancy for PCH clocks, see *Cougar Point Intel® Management Engine — Compliancy Guide.*

Figure B-1. Cougar Point Full Clock Integration Mode Architecture



Note: 14.31818, 24, 25, 27 with SSC, 27 without SSC, and 48 MHz outputs are guaranteed from CLKOUTFLEX[3:0]. 25-MHz output cannot be used to supply Intel LAN. All other output frequencies are available in PCH hardware, but not extensively tested or recommended for use.

B.1 Functional Blocks

There are 4 spread modulator in PCH, labeled as follows:

Table B-1. SSC Blocks

Modulator	Description
SSC1	Generates single phase 2.4-GHz output with spread for 120-MHz clock with spread generation by DIV1-S. Uses 2.4-GHz output of XCK PLL. Supplies CLKOUT_DP.
SSC2	Generates single phase 2.4-GHz output with spread for 120-MHz clock with spread and overclocking option generation by DIV2-S. Uses 2.4-GHz output of XCK PLL. ***Non-Overclocking:*** Supplies CLKOUT_DMI, CLKOUT_PEG[B:A], CLKOUT_ITPXDP, CLKOUT_SRC[7:0], and SATA. Indirectly supplies CLKOUT_PCI[4:0] and CLKOUTFLEX[3:0]. ***Overclocking:*** Supplies CLKOUT_DMI, CLKOUT_PEG[B:A], and CLKOUT_ITPXDP only.
SSC3	Generates single phase 2.4-GHz output with spread for 120-MHz clock with spread and overclocking option generation by DIV3. Uses 2.4-GHz output of XCK PLL. ***Non-Overclocking:*** Disabled ***Overclocking:*** Supplies CLKOUT_SRC[7:0] and SATA. Indirectly supplies CLKOUT_PCI[4:0] and CLKOUTFLEX[3:0].
SSC4	Generates single phase 2.4-GHz output with spread for 120-MHz clock with spread and no overclocking option generation by DIV4. Uses 2.4-GHz output of XCK PLL. ***Non-Overclocking:*** Supplies SSSC clock for LVDS. ***Overclocking (some configurations):*** Supplies SATA.

There are various clock dividers in PCH, labeled as follows:

Table B-2. Clock Dividers

Modulator	Description
DIV1-NS	Generates 120-MHz clock with no spread. Uses direct 2.4-GHz output of XCK PLL (not passed through SSC1). Supplies CLKOUT_DP.
DIV1-S	Generates 120-MHz clock with spread. Uses output of SSC1. Can be no spread if SSC1 is disabled. Supplies CLKOUT_DP.
DIV2-NS	Generates 100-MHz with no spread and overclocking option. Uses direct 2.4-GHz output of XCK PLL (not passed through SSC2). **Disabled in all ME FW configurations.**
DIV2-S	Generates 100-MHz with spread and overclocking option. Uses output of SSC2. Can be no spread if SSC2 is disabled. ***Non-Overclocking:*** Supplies CLKOUT_DMI, CLKOUT_PEG[B:A], CLKOUT_ITPXDP, CLKOUT_SRC[7:0]. Indirectly supplies CLKOUT_PCI[4:0], SATA, and CLKOUTFLEX[3:0]. ***Overclocking:*** Supplies CLKOUT_DMI, CLKOUT_PEG[B:A], CLKOUT_ITPXDP only.
DIV3	Generates 100-MHz with spread. Generally not expected to be overclocked. Uses output of SSC3. Can be no spread if SSC3 is disabled. ***Non-Overclocking:*** Disabled ***Overclocking:*** Supplies CLKOUT_SRC[7:0] only. Indirectly supplies CLKOUT_PCI[4:0], SATA, and CLKOUTFLEX[3:0].
DIV4	Generates 120-MHz clock with spread. Uses output of SSC4. Can be no spread if SSC4 is disabled. Supplies SATA. May also supply Supplies SSSC option for LVDS and utilized for Display Clock Bending.
DIV5A	Generates 480-MHz clock which is then converted to 96-MHz clock by USBDIV1 (not shown). Uses 2.4-GHz output of XCK PLL. Supplies USBDIV1.
DIV5B	Generates 96-MHz clock. Uses output of DIV5A. Supplies USB PLL.
DIV6	Generates 48-Mhz or 24-MHz clock with no spread. Uses output of DIV5B. Supplies CLKOUTFLEX3.
DIV7	Generates 120-MHz clock with no spread. Uses output of USBDIV2B. Supplies CLKOUT_DP.
USBDIV1	Generates 96-MHz clock with no spread. Uses output of DIV5A. Supplies USB PLL.
USBDIV2A	Generates 24- or 48-MHz clock with no spread. Uses 96-MHz output of DIV5B or USBDIV1 (not shown). Supplies CLKOUTFLEX3.

Table B-2. Clock Dividers

Modulator	Description
USBDIV2B	Generates 240-MHz clock with no spread. Uses USB PLL's 1.92 GHz clock output. Supplies DIV7.
DIVPCI	Generates 33-MHz clock with spread. Uses output of either DIV2-S, DIV2-NS, or DIV4. Can be no spread if DIV2-NS is used or SSC4 is disabled. Supplies CLKOUT_PCI[4:0] and CLKOUTFLEX[3:0].
DIV14-REF	Generates 14.318 MHz clock with no spread. Uses 2.4-GHz output of XCK PLL. Supplies CLKOUTFLEX[3:0].

B.2 Clock Configuration XML

Note: The use of ICC Configuration XML has been deprecated. Configuration of ICC parameters are no longer available via separate XML file. The Flash Image Tool GUI can be used to edit ICC parameters.

B.3 ME FW Clock Control Parameters

The following parameters can be specified for ME FW programming. For more details on how to configure an SPI Flash image with these clock control parameters see the Bring Up Process chapter in the *Firmware Bring Up Guide* included in the ME FW kit.

Note: Clock control parameter specifications may be different between Buffer Through Mode and Full Clock Integration Mode. The specification for each mode is listed separately. For those parameters that are mode-agnostic, only a single specification is given.

B.3.1 CSS – Clock Source Select

Flash Image Tool/ME FW Default for FCIM: 0001_1A33h
Recommended Overclocking Default for FCIM: 0001_1A34h
Flash Image Tool/ME FW Default for BTM: No changes from HW defaults
FCIM HW Default: 0001_1A12h
BTM HW Default: 0000_0200h

Description: This parameter controls clock source selection for non-PCI Express* clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-3. Clock Source Select Parameters

Bits	Default	Description
31:17	0h	**Reserved (RSVD)**
16:12	**BTM** 00000b **FCIM** 10001b	**Chipset Configuration (PCHCFG):** As specified by clock mode.
11:10	**BTM** 00b **FCIM** 10b	**24MHz/48MHz clock source select (24x48CSS):** This field selects the source of 24/48 MHz clock used as a possible source for CLKOUTFLEX outputs. See "FLEXCLK[3:0] Source Select" parameters at FCSS (see **Section B.3.3**). **BTM** **00b** = 48 MHz generated from USB PLL reference clock divide **01b** = 24 MHz generated from USB PLL reference clock divide **1xb** = Reserved **FCIM** **0xb** = Reserved **10b** = 48 MHz generated from XCK_PLL output divide **11b** = 24 MHz generated from XCK_PLL output divide
9:3	**BTM** 40h **FCIM** HW: 42h ME FW: 46h FITC: 46h	**Chipset Configuration (PCHCFG):** As specified by clock mode.
2:0	**BTM** 000b **FCIM** HW: 010b ME FW: 011b FITC: 011b **FCIM Overclocking** FITC: 100b	**PCI Clock Source Select (PCSS):** This field selects the source of 33-MHz clock used as a source for CLKOUT_PCI and CLKOUTFLEX outputs. **BTM** **000b** = CLKIN_DMI **all other values** = Reserved **FCIM** **011b** = SSC2 spread (non-overclocking option) **100b** = SSC3 (overclocking option) **all other values** = Reserved ***Note:*** FCIM overclocking requires a parameter value different from FCIM ME FW defaults. ***Note:*** Spread spectrum can be turned on and off for SSC[3:2] using "SSC[3:2] Enable, Active Low" parameters at SSCCTL[16,8] (see Section B.3.15). Spread spectrum is turned on and off at CK505 in Buffer Through Mode.

B.3.2 SSS – SRC Source Select

Flash Image Tool/ME FW Default for FCIM: No changes from HW defaults
Recommended Overclocking Default for FCIM: 0013_3744h
Flash Image Tool/ME FW Default for BTM: No changes from HW defaults
FCIM HW Default: 0003_3733h
BTM HW Default: 0000_0000h

Description: This parameter controls clock source selection for PCI Express* clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-4. SRC Source Select Parameters

Bits	Default	Description
31:21	0h	**Reserved (RSVD)**
20	**BTM** 0b **FCIM** 0b **FCIM Overclocking** 1b	**DMI Port Clock Select (DMIPORTCS):** Selects PLL source for of 100-MHz clock used as a source for CLKOUT_DMI, CLKOUT_PEG_[B:A], and CLKOUT_ITPXDP outputs. **BTM/FCIM** **0b** = Non-overclockable PXP PLL **all other values** = Reserved **FCIM Overclocking** **1b** = Overclockable DMI PLL **all other values** = Reserved ***Note:*** FCIM overclocking requires a parameter value different from FCIM ME FW defaults. ***Note:*** 100-MHz clock used as a source for CLKOUT_SRC[7:0], and 33-MHz clock used as a source for CLKOUT_PCI[4:0] and CLKOUTFLEX[3:0] are always sourced from non-overclockable PXP PLL.
19	0b	**Reserved (RSVD)**
18:7	**BTM** 00h **FCIM** 66Eh	**Chipset Configuration (PCHCFG):** As specified by clock mode.
6:4	**BTM** 000b **FCIM** 011b **FCIM Overclocking** 100b	**SRC[7:4] Clock Source Select (SRC74CSS):** This field selects the source of 100-MHz clock used as a source for CLKOUT_SRC[7:4] outputs. **BTM** **000b** = CLKIN_DMI **all other values** = Reserved **FCIM** **011b** = SSC2 spread (non-overclocking option) **100b** = SSC3 (overclocking option) **all other values** = Reserved ***Note:*** FCIM overclocking requires a parameter value different from FCIM ME FW defaults. ***Note:*** Spread spectrum can be turned on and off for SSC[3:2] using “SSC[3:2] Enable, Active Low” parameters at SSCCTL[16,8] (see Section B.3.15). Spread spectrum is turned on and off at CK505 in Buffer Through Mode.
3	0b	**Reserved (RSVD)**
2:0	**BTM** 000b **FCIM** 011b **FCIM Overclocking** FITC: 100b	**SRC[3:0] Clock Source Select (SRC30CSS):** This field selects the source of 100-MHz clock used as a source for CLKOUT_SRC[3:0] outputs. **BTM** **000**b = CLKIN_DMI **all other values** = Reserved **FCIM** **011b** = SSC2 spread (non-overclocking option) **100b** = SSC3 (overclocking option) **all other values** = Reserved ***Note:*** FCIM overclocking requires a parameter value different from FCIM ME FW defaults. ***Note:*** Spread spectrum can be turned on and off for SSC[3:2] using “SSC[3:2] Enable, Active Low” parameters at SSCCTL[16,8] (see Section B.3.15). Spread spectrum is turned on and off at CK505 in Buffer Through Mode.

B.3.3 FCSS – Flex Clock Source Select

Flash Image Tool / ME FW Default: 0000_0232h
HW Default: 0000_0304h

Description: This parameter controls muxing to select sources for Flex Clock outputs.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Note: For clock signal integrity reasons related to PCH power-related jitter, it is extremely important to follow the Flex Clock configuration guidelines:

- Prioritize 27/14/24/48/25-MHz FLEX on FLEX1 and FLEX3
- Do not configure 27/14/24/48/25-MHz FLEX clock on FLEX0 and FLEX2 if more than 2 PCI clocks + PCI loopback are routed.
- With 2 PCI clocks routed (or less), prioritize the FLEX clocks to FLEX1 and FLEX3 in this order (ie: first in the list = first to go to FLEX1 or FLEX3):
  - 27 MHz Non-SSC and 27 MHz SSC
  - 14.31818 MHz
  - 48 MHz or 24 MHz or 25 MHz

Table B-5. Flex Clock Source Select Parameters

Bits	Default	Description
31:15	0h	**Reserved (RSVD)**
14:12	000b	**FLEXCLK3 Source Select (F3SS):** Selects the source of clock to be driven out on CLKOUTFLEX3. **000b** = 24/48 MHz (24 or 48 determined by "24-MHz/48-MHz clock source" parameter at CSS[11:10], see Section B.3.1) **001b** = 27 MHz Non-SSC, from DPLLB — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLB VCO Enable" parameter at DPLLBC[30] = **1b** **010b** = Reserved **011b** = 14.31818 MHz **100b** = Disabled (DC logic '0') **101b** = 27 MHz SSC, from DPLLA — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLA VCO Enable" parameter at DPLLAC[30] = **1b** — Requires "DPLLA Reference Select" parameter at DPLLAC[26:24] = **011b** **110b** = Disabled (DC logic '0') **111b** = Reserved ***Note:*** This parameter field also controls the gating of 27-MHz clock source from DPLLB. When this clock is not being used, it is automatically gated off for power savings. When either "FLEXCLK3 or 2 Source Select" parameter field is set to **001b**, 27-MHz clock from DPLLB is enabled and not gated. ***Note:*** These clock select settings only take effect when this muxed FLEXCLK/GPIO pin is configured for FLEXCLK native usage. Refer to the *Intel® 6 Series Express Chipset EDS* for configuration of GPIO vs. native usage.
11	0b	Reserved (RSVD)

Table B-5. Flex Clock Source Select Parameters

Bits	Default	Description
10:8	011b	**FLEXCLK2 Source Select (F2SS):** Selects the source of clock to be driven out on CLKOUTFLEX2. **000b** = 25 MHz from XCK PLL feedback path **001b** = 27 MHz Non-SSC, from DPLLB — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLB VCO Enable" parameter at DPLLBC[30] = **1b** **010b** = 33.3 MHz **011b** = 14.31818 MHz **100b** = 24/48 MHz (24 or 48 determined by "24-MHz/48-MHz clock source" parameter at CSS[11:10], see Section B.3.1) **101b** = 27 MHz SSC, from DPLLA — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLA VCO Enable" parameter at DPLLAC[30] = **1b** — Requires "DPLLA Reference Select" parameter at DPLLAC[26:24] = **011b** **110b** = Disabled (DC logic '0') **111b** = Reserved ***Note:*** These clock select settings only take effect when this muxed FLEXCLK/GPIO pin is configured for FLEXCLK native usage. Refer to the *Intel® 6 Series Express Chipset EDS* for configuration of GPIO vs. native usage.
7	0b	**Reserved (RSVD)**
6:4	000b	**FLEXCLK1 Source Select (F1SS):** Selects the source of clock to be driven out on CLKOUTFLEX1. **000b** = Reserved **001b** = Reserved **010b** = Reserved **011b** = 14.31818 MHz **100b** = 24/48 MHz (24 or 48 determined by "24-MHz/48-MHz clock source" parameter at CSS[11:10], see Section B.3.1) **101b** = 27 MHz SSC, from DPLLA — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLA VCO Enable" parameter at DPLLAC[30] = **1b** — Requires "DPLLA Reference Select" parameter at DPLLAC[26:24] = **011b** **110b** = 27 MHz Non-SSC, from DPLLB — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLB VCO Enable" parameter at DPLLBC[30] = **1b** **111b** = Reserved ***Note:*** These clock select settings only take effect when this muxed FLEXCLK/GPIO pin is configured for FLEXCLK native usage. Refer to the *Intel® 6 Series Express ChipsetEDS* for configuration of GPIO vs. native usage.
3	0b	**Reserved (RSVD)**
2:0	100b	**FLEXCLK0 Source Select (F0SS):** Selects the source of clock to be driven out on CLKOUTFLEX0. **000b** = 27 MHz SSC, from DPLLA — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLA VCO Enable" parameter at DPLLAC[30] = **1b** — Requires "DPLLA Reference Select" parameter at DPLLAC[26:24] = **011b** **001b** = Reserved **010b** = 33.3 MHz **011b** = 14.31818 MHz **100b** = 24/48 MHz (24 or 48 determined by "24-MHz/48-MHz clock source" parameter at CSS[11:10], see Section B.3.1) **101b** = Disabled (DC logic '0') **110b** = 27 MHz Non-SSC, from DPLLB — Requires "DPLLA/DPLLB/SSC1 Ownership" parameter at PLLEN[9] = **1b** (see Section B.3.5) — Requires "DPLLB VCO Enable" parameter at DPLLBC[30] = **1b** **111b** = Reserved ***Note:*** This parameter field also controls the gating of 27-MHz clock source from DPLLA. When this clock is not being used, it is automatically gated off for power savings. When this parameter field is set to **000b**, 27-MHz clock from DPLLA is enabled and not gated. ***Note:*** These clock select settings only take effect when this muxed FLEXCLK/GPIO pin is configured for FLEXCLK native usage. Refer to the *Intel® 6 Series Express Chipset EDS* for configuration of GPIO vs. native usage.

B.3.4 PLLRCS – PLL Reference Clock Select

Flash Image Tool/ME FW Default for FCIM: 0008_8CBFh
Recommended Overclocking Default for FCIM: 000A_8CBEh
Flash Image Tool/ME FW Default for BTM: 0000_0878h
FCIM HW Default: 0008_8CBDh
BTM HW Default: 0000_1078h

Description: This parameter controls clock source selection for PCI Express* clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-6. PLL Reference Clock Select Parameters

Bits	Default	Description
31:20	0h	**Reserved (RSVD)**
19	**BTM** 0b **FCIM** 1b	**Chipset Configuration (PCHCFG):** As specified by clock mode.

Table B-6. PLL Reference Clock Select Parameters

Bits	Default	Description
18:17	**BTM** 00b **FCIM** 00b **FCIM Overclocking** 01b	**SSCn Source Select for PXP PLL (SSCnSSPXPPLL):** Selects the SSC source for use by PXP PLL. • In non-overclocking configurations, PXP PLL is expected to directly supply CLKOUT_DMI, CLKOUT_PEG[B:A], CLKOUT_ITPXDP, CLKOUT_SRC[7:0], and SATA, and indirectly supply CLKOUT_PCI[4:0] and CLKOUTFLEX[3:0] • In overclocking configurations, PXP PLL is expected to directly supply CLKOUT_SRC[7:0], and SATA, and indirectly supply CLKOUT_PCI[4:0] and CLKOUTFLEX[3:0]. DMI PLL is expected to supply CLKOUT_DMI, CLKOUT_PEG[B:A], CLKOUT_ITPXDP. **BTM/FCIM** **00b** = SSC2 **all other values** = Reserved **FCIM Overclocking** **01b** = SSC3 **all other values** = Reserved ***Note:*** FCIM overclocking requires a parameter value different from FCIM ME FW defaults. ***Note:*** Spread spectrum can be turned on and off for SSC[3:2] using "SSC[3:2] Enable, Active Low" parameters at SSCCTL[16,8] (see Section B.3.15). Spread spectrum is turned on and off at CK505 in Buffer Through Mode.
16:2	**BTM** HW: 41Eh MEFW: 21Eh FITC: 21Eh **FCIM** 232Fh	**Chipset Configuration (PCHCFG):** As specified by clock mode.
1:0	**BTM** 00b **FCIM** 11b **FCIM Overclocking** 10b	**SATA PLL Reference Select (SATARS):** Selects the SSC/input pin source for use by SATA PLL. **BTM** **00b** = CLKIN_SATA **all other values** = Reserved **FCIM** **11b** = SSC2 **all other values** = Reserved **FCIM Overclocking** **10b** = SSC3 **all other values** = Reserved ***Note:*** FCIM overclocking requires a parameter value different from FCIM ME FW defaults. ***Note:*** Spread spectrum can be turned on and off for SSC[3:2] using "SSC[3:2] Enable, Active Low" parameters at SSCCTL[16,8] (see Section B.3.15). Spread spectrum is turned on and off at CK505 in Buffer Through Mode.

B.3.5 DPLLAC – Display PLL "A" Configuration

Note: This parameter is not available in the Flash Image Tool GUI. If editing access to this parameter is required, consult *Release Notes* released with this ME FW kit for instructions.

B.3.6 DPLLBC – Display PLL "B" Configuration

Note: This parameter is not available in the Flash Image Tool GUI. If editing access to this parameter is required, consult *Release Notes* released with this ME FW kit for instructions.

B.3.7 PLLEN – PLL Enable

Flash Image Tool/ME FW Default for FCIM: 8000 000Ch
Flash Image Tool/ME FW Default for BTM: 8000 000Ch
FCIM Default: 80000404h (before PCH_PWROK), 8000040Ch (after PCH_PWROK)
BTM Default: 80000404h (before PCH_PWROK), 8000040Ch (after PCH_PWROK)

Description: This parameter controls PLL enables.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-7. PLL Enable Parameters

Bits	Default	Description
31	0b	**Chipset Strap (PCHHWSTRP):** Always reported as **1b**.
30:11	0h	**Reserved (RSVD)**
10	HW: 1b FITC: 0b MEFW: 0b	**SSC4 Ownership (SSC4OWN):** Controls the owner of SSC4 and DIV4 (see Figure B-1). **0b** = Display Driver controls SSC4-associated resources. **1b** = ME controls SSC4-associated resources
9	0b	**DPLLA/DPLLB/SSC1 Ownership (DPLLSSC1OWN):** Controls the owner of DPLLA, DPLLB, and SSC1. **0b** = Display Driver register set controls DPLLA, DPLLB, and SSC1 **1b** = ME FW controls DPLLA, DPLLB, and SSC1. This option **must** be selected if 27-MHz output is required from CLKOUTFLEX[3:0].
8:4	0h	**Reserved (RSVD)**
3:0	Ch	**Chipset Configuration (PCHCFG):** Must be set to **Ch**.

B.3.8 OCKEN – Output Clock Enable

Flash Image Tool/ME FW Default: No changes from HW defaults
HW Default: 1FFF_0F8Fh

Description: This parameter controls enabling of output buffers.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-8. Output Clock Enable Parameters

Bits	Default	Description
31:29	0h	**Reserved (RSVD)**
28	1b	**Chipset Configuration (PCHCFG):** Must be set to **1b**.
27	1b	**PEG_B Output Clock Enable (PBOCKEN):** Controls the enabling of PEG_B clock toggling. When this clock output is not used, it should be gated to low state to save power. **0b** = Output clock is gated to low state **1b** = Output buffer is enabled to toggle once its clock source has been initialized
26	1b	**PEG_A Output Clock Enable (PAOCKEN):** Controls the enabling of PEG_A clock toggling. When this clock output is not used, it should be gated to low state to save power. **0b** = Output clock is gated to low state **1b** = Output buffer is enabled to toggle once its clock source has been initialized
25	1b	**DP120 Output Clock Enable (DPOCKEN):** Controls the enabling of CLKOUT_DP clock toggling. When this clock output is not used, it should be gated to low state to save power. **0b** = Output clock is gated to low state **1b** = Output buffer is enabled to toggle once its clock source has been initialized ***Note:*** Note that in order for this parameter field to take effect, the ownership of the muxed output clock pin CLKOUT_DP must be configured to be clock-module-owned, via "DP120 Output Buffer Ownership" parameter field at PLLEN[8]. When the ownership is under display control, the display logic side (not ME FW) determines whether the output clock pin CLKOUT_DP toggles or gated to low state.

Table B-8. Output Clock Enable Parameters

Bits	Default	Description
24	1b	**ITPXDP Output Clock Enable (ITPXDPOCKEN):** Controls the enabling of CLKOUT_ITPXDP clock toggling. When this clock output is not used, it should be gated to low state to save power. **0b** = Output clock is gated to low state **1b** = Output clock is enabled to toggle once its clock source has been initialized
23:16	FFh	**SRC 7:0 Output Clock Enable (SRC70OCKEN):** Controls the enabling of SRC clock toggling. Each bit position controls the corresponding SRC output clock, e.g. bit 0 controls SRC0. When any clock output is not used, it should be gated to low state to save power. **0b** = Corresponding output clock is gated to low state **1b** = Corresponding output clock is enabled to toggle once its clock source has been initialized (hot plug capable)
15:12	0h	**Reserved (RSVD)**
11:7	1Fh	**PCICLK 4:0 Output Clock Enable (PCI40OCKEN):** Controls the enabling of PCI clock toggling. Each bit position controls the corresponding PCI output clock, e.g. bit 7 controls CLKOUT_PCI0. When any clock output is not used, it should be gated to low state to save power. **0b** = Corresponding output clock is gated to low state **1b** = Corresponding output clock is enabled to toggle once its clock source has been initialized ***A-stepping Note:*** This parameter has no effect and clock output is always enabled. ***B-stepping Note:*** Parameter behaves normally.
6:4	0h	**Reserved (RSVD)**
3:0	Fh	**FLEXCLK 3:0 Output Clock Enable (FLEX30OCKEN):** Controls the enabling of FLEXCLK toggling.Each bit position controls the corresponding FLEXCLK output clock, e.g. LSB (bit 0) controls CLKOUTFLEX0. When any clock output is not used, it should be gated to low state to save power. **0b** = Corresponding output clock is gated to low state **1b** = Corresponding output clock is enabled to toggle once its clock source has been initialized ***Note:*** CLKOUTFLEX[3:0] is muxed with GPIOs. Clock module logic should only enable the weak pull down when the muxed pin is configured for FLEXCLK usage (not DC logic '0') and FLEXCLK is tri-stated. FLEXCLK values can be set in the "Flex Clock Source Select" parameter at FCSS[31:0].

B.3.9 IBEN – Input Buffer Enable

Flash Image Tool/ME FW Default for FCIM: No changes from HW defaults
Flash Image Tool/ME FW Default for BTM: 0000_0009h
FCIM Default: 0000_002Fh
BTM Default: 0000_0008h

Description: This parameter controls enabling of input buffers.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-9. Input Buffer Enable Parameters

Bits	Default	Description
31:6	0h	**Reserved (RSVD)**
5:4	**BTM** 01b **FCIM** 10b	**CLKIN_SATA Input Buffer Disable (CKINSATAInBufDis):** Controls the differential input buffer for CLKIN_SATA. When CLKIN_SATA is not used, its input buffer should be turned off for power saving. **00b** = CLKIN_SATA Differential Input Buffer is subjected to dynamic power management control by the SATA logic as part of the SATACLKREQ# protocol to the external clock generator. This setting is only applicable when CLKIN_SATA is configured to only source PCH SATA PLL but not source any other clock consumers. **01b** = Input buffer is enabled **1xb** = Input buffer is disabled for power saving
3	1b	**Chipset Configuration (PCHCFG):** Must be set to **1b**.

Table B-9. Input Buffer Enable Parameters

Bits	Default	Description
2	**BTM** 0b **FCIM** 1b	**CLKIN_DMI Input Buffer Disable (CKINDMIInBufDis):** Controls the differential input buffer for CLKIN_DMI. When CLKIN_DMI is not used, its input buffer should be turned off for power saving. **0b** = Input buffer is enabled **1b** = Input buffer is disabled for power saving
1	**BTM** 0b **FCIM** 1b	**CLKIN_DOT96 Input Buffer Disable (CKIN96InBufDis):** Controls the differential input buffer for CLKIN_DOT96. When CLKIN_DOT96 is not used, its input buffer should be turned off for power saving. **0b** = Input buffer is enabled **1b** = Input buffer is disabled for power saving
0	**BTM** HW: 0b ME FW: 1b FITC: 1b **FCIM** 1b	**Chipset Configuration (PCHCFG):** Set to **0b** by hardware default (in BTM only), but required to be **1b**.

B.3.10 DIVEN – Divider Enable

Flash Image Tool/ME FW Default for FCIM: 0000_05EBh
Flash Image Tool/ME FW Default for BTM: 0000_01C3h
FCIM Default: 00000DFFh
BTM Default: 0000 08C3h

Description: This parameter controls enabling of divider blocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-10. Divider Enable Parameters

Bits	Default	Description
31:12	0h	**Reserved (RSVD)**
11	**BTM** 1b **FCIM** HW: 1b ME FW: 0b FITC: 0b	**Chipset Configuration (PCHCFG):** Set to **1b** by hardware default, but required to be **0b** (in FCIM only).
10	**BTM** 0b **FCIM** 1b	**14.31818Mhz Fractional Divisor Enable (14FDEN):** Enables fractional divisor for 14.31818Mhz clock generation (see Figure B-1). When not used, the fractional divisor can be disabled for power saving. **0b** = Divider is disabled **1b** = Divider is enabled
9	0b	**Reserved (RSVD)**
8	**BTM** HW: 0b ME FW: 1b FITC: 1b **FCIM** 1b	**DIV7 Enable (DIV7EN):** Enables DIV7 clock divider (see Figure B-1). **0b** = Divider is enabled (120 Mhz generated from USB PLL) **1b** = Divider is disabled (120Mhz generated by XCK PLL)

Table B-10. Divider Enable Parameters

Bits	Default	Description
7	1b	**DIV5 Stage 2 Enable (DIV5BEN):** Enables DIV5B clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
6	1b	**DIV5 Stage 1 Enable (DIV5AEN):** Enables DIV5A clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
5	**BTM** 0b **FCIM** 1b	**DIV4 Enable (DIV4EN):** Enables DIV4 clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
4	**BTM** 0b **FCIM** HW: 1b ME FW: 0b FITC: 0b	**DIV3 Enable (DIV3EN):** Enables DIV3 clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
3	**BTM** 0b **FCIM** 1b	**DIV2-S Enable (DIV2SEN):** Enables DIV2-S clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
2	**BTM** 0b **FCIM** HW: 1b ME FW: 0b FITC: 0b	**DIV2-NS Enable (DIV2NSEN):** Enables DIV2-NS clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
1	1b	**DIV1-S Enable (DIV1SEN):** Enables DIV1-S clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled
0	1b	**DIV1-NS Enable (DIV1NSEN):** Enables DIV1-NS clock divider (see Figure B-1). **0b** = Divider is disabled **1b** = Divider is enabled

B.3.11 PM1 – Power Management

Flash Image Tool/ME FW Default: 0000_001Fh
HW Default: 0000_0000h

Description: This parameter controls power management features of clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-11. Power Management Parameters

Bits	Default	Description
31:5	0h	**Reserved (RSVD)**
4	HW: 0b ME FW: 1b FITC: 1b	**Dynamic SSC1 Shutdown Enable (SSC1DSEN):** Enables dynamic power management of DIV1-S (see Figure B-1, page 98). • Integrated Graphics Device Display Driver may dynamically power manage SSC1 when: — Integrated Graphics Device Display Driver is assigned ownership of SSC1 ("DPLLA/DPLLB/SSC1 Ownership" parameter field at PLLEN[9] = **0b**, see Section B.3.5) — SSC1 is globally enabled ("SSC1 Enable, Active Low" parameter field at SSCCTL[0] = **0b**) • This bit has no effect, (dynamic power management of DIV4 can only be performed through Intel® MEI message SET_ICC_REGISTER from BIOS during POST and S3 resume, not by Integrated Graphics Device Display Driver), when: — ME is assigned ownership (PLLEN[9] = **1b**, see Section B.3.5). The following are logical combinations of this parameter field (MSB) and "Dynamic DIV1S Shutdown Enable" parameter at PM1[0] (LSB). **00b** = Disable dynamic management of DIV1-S and SSC1 **01b** = Dynamic management of DIV1-S only. SSC1 stays up and maintains current state for lower clock recovery latency at the expense of power. **10b** = Reserved **11b** = Dynamic management of both DIV1-S and SSC1. Longer clock recovery latency but more power savings.
3:2	HW: 00b ME FW: 11b FITC: 11b	**Dynamic SSC4 and DIV4 Shutdown Enable (SSC4DIV4DSEN):** Enables dynamic power management of SSC4 and DIV4 (see Figure B-1, page 98). • Integrated Graphics Device Display Driver may dynamically power manage SSC4 when: — Integrated Graphics Device Display Driver is assigned ownership of SSC4 ("SSC4 Ownership" parameter at PLLEN[10] = **0b**, see Section B.3.5) — SSC4 is globally enabled ("SSC4 Enable, Active Low" parameter field at SSCCTL[24] = **0b**, see Section B.3.5) • This bit has no effect, (dynamic power management of DIV4 can only be performed through Intel® MEI message SET_ICC_REGISTER from BIOS during POST and S3 resume, not by Integrated Graphics Device Display Driver), when: — ME is assigned ownership (PLLEN[10] = **1b**, see Section B.3.5) **00b** = Disable dynamic management of DIV4 and SSC4 **01b** = Dynamic management of DIV4 only. SSC4 stays up and maintains current state for lower clock recovery latency at the expense of power. **10b** = Reserved **11b** = Dynamic management of both DIV4 and SSC4. Longer clock recovery latency but more power savings.
1	HW: 0b ME FW: 1b FITC: 1b	**Dynamic DIV1-NS Shutdown Enable (DIV1NSDSEN):** Enables dynamic power management of DIV1-NS (see Figure B-1). **0b** = Disable dynamic power management of DIV1-S **1b** = Enable dynamic power management of DIV1-S
0	HW: 0b ME FW: 1b FITC: 1b	**Dynamic DIV1-S Shutdown Enable (DIV1SDSEN):** Enables dynamic power management of DIV1-S (see Figure B-1). ***Note:*** Do not configure this parameter field on its own. See "DIV1 Shutdown Enable" parameter at PM1[4].

B.3.12 PM2 – Power Management

Flash Image Tool / ME FW Default: No changes from HW defaults
HW Default: 0000_0000h

Description: This parameter controls power management features of clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-12. Power Management Parameters

Bits	Default	Description
31:9	0h	**Reserved (RSVD)**
8:5	0000b	**CLKRUN Control Enable for PCI 33 Mhz on CLKOUTFLEX (CLKRUNCEN_FLEX):** Enables support for CLKRUN protocol for PCI 33 MHz clocks muxed out to CLKOUTFLEX[3:0]. **0b** = Corresponding CLKOUTFLEX PCI clock is free-running, unaffected by CLKRUN protocol **1b** = Corresponding CLKOUTFLEX PCI clock is shut off when CLKRUN protocol turns off PCI clocks ***Note:*** These bits must be clear (**0b**) when the corresponding CLKOUTFLEX pins are not configured for PCI 33Mhz clock.
4:0	0 0000b	**CLKRUN Control Enable (CLKRUNCEN):** Enables support for CLKRUN protocol for CLKOUT_PCI[4:0]. **0b** = Corresponding CLKOUT_PCI is free-running, unaffected by CLKRUN protocol **1b** = Corresponding CLKOUT_PCI is shut off when CLKRUN protocol turns off PCI clocks ***Note:*** This parameter does not enable CLKRUN protocol support for CLKOUTFLEX[3:0].

B.3.13 SEBP1 – Single Ended Buffer Parameters

Flash Image Tool / ME FW Default: No changes from HW defaults
HW Default: 0000_9999h

Description: This parameter controls double/single load series resistance and slew rate for FLEX clocks.
Flash Image Tool Configuration: Not present in Flash Image Tool

Table B-13. Single Ended Buffer Parameters

Bits	Default	Description
31:16	0h	**Reserved (RSVD)**
15:13	100b	**FLEXCLK3 Slew Rate Control (F3SLC):** Controls slew rate for CLKOUTFLEX3. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
12	1b	**FLEXCLK3 Single / Double Load Series Resistance (F3SDLSR):** Sets programmable series resistance for CLKOUTFLEX3. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage
11:9	100b	**FLEXCLK2 Slew Rate Control (F2SLC):** Controls slew rate for CLKOUTFLEX2. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
8	1b	**FLEXCLK2 Single / Double Load Series Resistance (F2SDLSR):** Sets programmable series resistance for CLKOUTFLEX2. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage

Table B-13. Single Ended Buffer Parameters

Bits	Default	Description
7:5	100b	**FLEXCLK1 Slew Rate Control (F1SLC):** Controls slew rate for CLKOUTFLEX1. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
4	1b	**FLEXCLK1 Single/Double Load Series Resistance (F1SDLSR):** Sets programmable series resistance for CLKOUTFLEX1. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage
3:1	100b	**FLEXCLK0 Slew Rate Control (F2SLC):** Controls slew rate for CLKOUTFLEX2. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
0	1b	**FLEXCLK0 Single/Double Load Series Resistance (F0SDLSR):** Sets programmable series resistance for CLKOUTFLEX0. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage

B.3.14 SEBP2 – Single Ended Buffer Parameters

Flash Image Tool/ME FW Default: No changes from HW defaults
HW Default: 0009_9999h

Description: This parameter controls double/single load series resistance and slew rate for PCI clocks. PCI Specifications 2.4 and 3.0 allow for an acceptable slew rate range of 1 to 4 V/ns. ME FW programmability allows for slew rate to be specified between 0.6 to 2 V/ns for two reasons:

1. Slew rates exceeding 2 V/ns can have adverse effects on platform EMI
2. Slew rates lower than 1 V/ns can be specified for EMI benefits, at the risk of violating PCI specification

Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-14. Single Ended Buffer Parameters

Bits	Default	Description
31:20	0h	**Reserved (RSVD)**
19:17	100b	**PCI4 Slew Rate Control (PCI4SLC):** Controls slew rate for CLKOUTPCI4. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
16	1b	**PCI4 Single/Double Load Series Resistance (PCI4SDLSR):** Sets programmable series resistance for CLKOUT_PCI4. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage
15:13	100b	**PCI3 Slew Rate Control (PCI3SLC):** Controls slew rate for CLKOUT_PCI3. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
12	1b	**PCI3 Single/Double Load Series Resistance (PCI3SDLSR):** Sets programmable series resistance for CLKOUT_PCI3. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage
11:9	100b	**PCI2 Slew Rate Control (PCI2SLC):** Controls slew rate for CLKOUT_PCI2. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
8	1b	**PCI2 Single/Double Load Series Resistance (PCI2SDLSR):** Sets programmable series resistance for CLKOUT_PCI2. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage
7:5	100b	**PCI1 Slew Rate Control (PCI1SLC):** Controls slew rate for CLKOUT_PCI1. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)

Table B-14. Single Ended Buffer Parameters

Bits	Default	Description
4	1b	**PCI1 Single/Double Load Series Resistance (PCI1SDLSR):** Sets programmable series resistance for CLKOUT_PCI1. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage
3:1	100b	**PCI0 Slew Rate Control (PCI0SLC):** Controls slew rate for CLKOUT_PCI0. **000b** = Weakest slew rate setting (~0.6 V/ns for a TBD inch trace at double load) **001b** **010b** **011b** **100b** = Default Slew rate setting (~1.4V/ns for a TBD inch trace at double load) **101b** **110b** **111b** = Strongest slew rate setting (~2 V/ns for a TBD inch trace at double load)
0	1b	**PCI0 Single/Double Load Series Resistance (PCI0SDLSR):** Sets programmable series resistance for CLKOUT_PCI0. **0b** = 25 Ohms for single load usage **1b** = 17 Ohms for double load usage

B.3.15 SSCCTL – SSC Control

Flash Image Tool/ME FW Default for FCIM: 0001_0000h
Flash Image Tool/ME FW Default for BTM: No changes from HW defaults
FCIM Default: 0000_0000h
BTM Default: 0000_0000h

Description: This parameter controls spread spectrum modulation capability of SSC blocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | FCIM/BTM Specific Registers**

Table B-15. SSC Control Parameters

Bits	Default	Description
31:27	0h	**Reserved (RSVD)**
26:25	00b	**SSC4 Spread Mode (SSC4_SprdMd):** Select the spread mode for SSC4. **00b** = Down spread **01b** = Center spread **10b** = Reserved **11b** = Reserved
24	0b	**SSC4 Enable, Active Low (SSC4_EnB):** Determines whether SSC4 (see **Figure B-1**, page **98**) is enabled. **0b** = Enable SSC4 **1b** = Power off SSC4 and select bypass path to SSC4 output. SSC4 output will thus be non-spread.
23:19	0h	**Reserved (RSVD)**
18:17	00b	**SSC3 Spread Mode (SSC3_SprdMd):** Select the spread mode for SSC3. **00b** = Down spread **01b** = Center spread **10b** = Reserved **11b** = Reserved
16	0b	**SSC3 Enable, Active Low (SSC3_EnB):** Determines whether SSC3 (see **Figure B-1**, page **98**) is enabled. **0b** = Enable SSC3 **1b** = Power off SSC3 and select bypass path to SSC3 output. SSC3 output will thus be non-spread.
15:11	0h	**Reserved (RSVD)**

Table B-15. SSC Control Parameters

Bits	Default	Description
10:9	00b	**SSC2 Spread Mode (SSC2_SprdMd):** Select the spread mode for SSC2. **00b** = Down spread **01b** = Center spread **10b** = Reserved **11b** = Reserved
8	0b	**SSC2 Enable, Active Low (SSC2_EnB):** Determines whether SSC2 (see **Figure B-1**, page **98**) is enabled. **0b** = Enable SSC2 **1b** = Power off SSC2 and select bypass path to SSC2 output. SSC2 output will thus be non-spread.
7:3	0h	**Reserved (RSVD)**
2:1	00b	**SSC1 Spread Mode (SSC1_SprdMd):** Select the spread mode for SSC1. **00b** = Down spread **01b** = Center spread **10b** = Reserved **11b** = Reserved
0	0b	**SSC1 Enable, Active Low (SSC1_EnB):** Determines whether SSC1 (see **Figure B-1**, page **98**) is enabled. **0b** = Enable SSC1 **1b** = Power off SSC1 and select bypass path to SSC1 output. SSC1 output will thus be non-spread.

B.3.16 PMSRCCLK1 – SRC Power Management

Flash Image Tool / ME FW Default: No changes from HW defaults
HW Default: 7654_3210h

Description: This parameter as signs dynamic CLKRQ# control of SRC clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-16. SRC Power Management

Bits	Default	Description
31:28	0111b	**CLKRQ# Select for CLKOUT_SRC7 (CRQSELSRC7):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC7 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC7 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC7 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC7 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC7 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC7 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC7 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC7 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC7 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC7 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC7 **1x1xb =** Reserved
27:24	0110b	**CLKRQ# Select for CLKOUT_SRC6 (CRQSELSRC6):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC6 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC6 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC6 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC6 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC6 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC6 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC6 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC6 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC6 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC6 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC6 **1x1xb =** Reserved
23:20	0101b	**CLKRQ# Select for CLKOUT_SRC5 (CRQSELSRC5):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC5 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC5 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC5 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC5 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC5 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC5 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC5 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC5 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC5 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC5 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC5 **1x1xb =** Reserved
19:16	0100b	**CLKRQ# Select for CLKOUT_SRC4 (CRQSELSRC4):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC4 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC4 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC4 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC4 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC4 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC4 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC4 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC4 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC4 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC4 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC4 **1x1xb =** Reserved
15:12	0011b	**CLKRQ# Select for CLKOUT_SRC3 (CRQSELSRC3):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC3 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC3 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC3 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC3 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC3 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC3 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC3 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC3 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC3 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC3 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC3 **1x1xb =** Reserved

Table B-16. SRC Power Management

Bits	Default	Description
11:8	0010b	**CLKRQ# Select for CLKOUT_SRC2 (CRQSELSRC2):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC2 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC2 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC2 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC2 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC2 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC2 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC2 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC2 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC2 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC2 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC2 **1x1xb =** Reserved
7:4	0001b	**CLKRQ# Select for CLKOUT_SRC1 (CRQSELSRC1):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC1 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC1 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC1 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC1 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC1 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC1 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC1 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC1 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC1 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC1 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC1 **1x1xb =** Reserved
3:0	0000b	**CLKRQ# Select for CLKOUT_SRC0 (CRQSELSRC0):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC0 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_SRC0 **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_SRC0 **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_SRC0 **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_SRC0 **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_SRC0 **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_SRC0 **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_SRC0 **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_SRC0 **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_SRC0 **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_SRC0 **1x1xb =** Reserved

B.3.17 PMSRCCLK2 – SRC Power Management

Flash Image Tool/ME FW Default: No changes from HW defaults
HW Default: 0000_0F98h

Description: This parameter assigns dynamic CLKRQ# control of SRC clocks.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-17. SRC Power Management

Bits	Default	Description
31:27	0h	**Reserved (RSVD)**
26	0b	**CLKRQ# Control Enable for CLKOUT_ITPXDP:** Enables support for CLKRQ# power management control for PCI Express* clock output to CLKOUT_ITPXDP. **0b** = Disable dynamic control of CLKOUT_ITPXDP clock **1b** = CLKOUT_ITPXDP clock is dynamically controlled by assigned CLKRQ# pin
25	0b	**CLKRQ# Control Enable for CLKOUT_PEG_B:** Enables support for CLKRQ# power management control for PCI Express* clock output to CLKOUT_PEG_B. **0b** = Disable dynamic control of corresponding CLKOUT_SRC clock **1b** = CLKOUT_PEG_B clock is dynamically controlled by assigned CLKRQ# pin

Table B-17. SRC Power Management

Bits	Default	Description
24	0b	**CLKRQ# Control Enable for CLKOUT_PEG_A:** Enables support for CLKRQ# power management control for PCI Express* clock output to CLKOUT_PEG_A. **0b** = Disable dynamic control of corresponding CLKOUT_SRC clock **1b** = CLKOUT_PEG_A clock is dynamically controlled by assigned CLKRQ# pin
23:16	0000 0000b	**CLKRQ# Control Enable for CLKOUT_SRC[7:0]:** Enables support for CLKRQ# power management control for PCI Express* clock outputs to CLKOUT_SRC[7:0]. **0b** = Disable dynamic control of corresponding CLKOUT_SRC clock **1b** = Corresponding CLKOUT_SRC clock is dynamically controlled by assigned CLKRQ# pin
15:12	0h	**Reserved (RSVD)**
11:8	1111b	**CLKRQ# Select for CLKOUT_ITPXDP (CRQSELITPXDP):** Select external input CLKRQ# pin for dynamic control of CLKOUT_SRC7 output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_ITPXDP **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_ITPXDP **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_ITPXDP **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_ITPXDP **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_ITPXDP **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_ITPXDP **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_ITPXDP **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_ITPXDP **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_ITPXDP **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_ITPXDP **1x1xb =** Reserved ***Note:*** The default value for this register is a reserved value. Change to assign CLKOUT_ITPXDP to a CLKRQ# pin, if CLKRQ# functionality is enabled (see "CLKRQ# Control Enable for CLKOUT_ITPXDP" parameter at PMSRCCLK2[26]).
7:4	1001b	**CLKRQ# Select for CLKOUT_PEG_B (CRQSELPEGB):** Select external input CLKRQ# pin for dynamic control of CLKOUT_PEG_B output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_PEG_B **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_PEG_B **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_PEG_B **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_PEG_B **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_PEG_B **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_PEG_B **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_PEG_B **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_PEG_B **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_PEG_B **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_PEG_B **1x1xb =** Reserved
3:0	1000b	**CLKRQ# Select for CLKOUT_PEG_A (CRQSELPEGA):** Select external input CLKRQ# pin for dynamic control of CLKOUT_PEG_A output. **0000b =** SRC0CLKRQ#/GPIO73 controls CLKOUT_PEG_A **0001b =** SRC1CLKRQ#/GPIO18 controls CLKOUT_PEG_A **0010b =** SRC2CLKRQ#/GPIO20 controls CLKOUT_PEG_A **0011b =** SRC3CLKRQ#/GPIO25 controls CLKOUT_PEG_A **0100b =** SRC4CLKRQ#/GPIO26 controls CLKOUT_PEG_A **0101b =** SRC5CLKRQ#/GPIO44 controls CLKOUT_PEG_A **0110b =** SRC6CLKRQ#/GPIO45 controls CLKOUT_PEG_A **0111b** = SRC7CLKRQ#/GPIO46 controls CLKOUT_PEG_A **1000b** = SRC8CLKRQ#/PEG_A_CLKRQ#/GPIO47 controls CLKOUT_PEG_A **1001b =** SRC9CLKRQ#/PEG_B_CLKRQ#/GPIO56 controls CLKOUT_PEG_A **1x1xb =** Reserved

B.3.18 PI12BiasParms – Phase Interpolators 1 & 2 Biasing Parameters

Flash Image Tool/ME FW Default: No changes from HW defaults
HW Default: 0888_0888h
Recommended Overclocking Default for FCIM: 0000_0888h

Description: This parameter control Phase Interpolators 1 & 2 Biasing.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-18. Phase Interpolators 1 & 2 Biasing Parameters

Bits	Default	Description
31:0	0888_0888h	**Chipset Configuration (PCHCFG):** **OC:** Set to 0000_0888h **Non-OC:** Set default value

B.3.19 SSC2OCPARMS – SSC2 Overclock Parameters

Flash Image Tool/ME FW Default: No changes from HW defaults
HW Default: 0000_0000h

Description: This parameter control SSC2 Overclock Parameters.
Flash Image Tool Configuration: Available in **ME Region | Configuration | ICC Data | ICC Profile 0 | ICC Registers**

Table B-19. SSC2 Overclock Parameters

Bits	Default	Description
31:0	0000_0000h	**Chipset Configuration (PCHCFG):** **Wimax enabled platform:** Set to 0000_0300h **Other:** Set default value

B.3.20 PCH Clock output / ICC registers mapping - part A

The following table map each one of the PCH outputs with the ICC registers bit that is configurable in the FITc tool (ICC profile).

Table B-20. PCH Clock output / ICC registers mapping - part A

ICC Registers	CLCKOUT_DMI	CLCKOUT_PEG (A)	CLCKOUT_PEG (B)	CLCKOUT_ITPXDP	CLCKOUT_SRC [7:0]
CSS	**CSS[16:12]** Chipset Configuration (PCHCFG)	**CSS[16:12]** Chipset Configuration (PCHCFG)	**CSS[16:12]** Chipset Configuration (PCHCFG)	**CSS[16:12]** Chipset Configuration (PCHCFG) **CSS[9:3]** Chipset Configuration (PCHCFG)	**CSS[16:12]** Chipset Configuration (PCHCFG)
SSS	**SSS[20]** DMI Port Clock Select (DMIPORTCS)	**SSS[20]** DMI Port Clock Select (DMIPORTCS)	**SSS[20]** DMI Port Clock Select (DMIPORTCS)	**SSS[20]** DMI Port Clock Select (DMIPORTCS)	**SSS[20]** DMI Port Clock Select (DMIPORTCS) **SSS[6:4]** SRC[7:4] Clock Source Select (SRC30CSS) (SSC2 or SSC3) **SSS[2:0]** SRC[3:0] Clock Source Select (SRC30CSS) (SSC2 or SSC3)
FCSS	N/A	N/A	N/A	N/A	N/A
DPLLAC/B	N/A	N/A	N/A	N/A	N/A

Table B-20. PCH Clock output / ICC registers mapping - part A

ICC Registers	CLCKOUT_DMI	CLCKOUT_PEG (A)	CLCKOUT_PEG (B)	CLCKOUT_ITPXDP	CLCKOUT_SRC [7:0]
PLLRCS	**PLLRCS[18:17]** SSCn Source Select for PXP PLL	**PLLRCS[18:17]** SSCn Source Select for PXP PLL	**PLLRCS[18:17]** SSCn Source Select for PXP PLL	**PLLRCS[18:17]** SSCn Source Select for PXP PLL	**PLLRCS[19]** Chipset Configuration (PCHCFG) **PLLRCS[18:17]** SSCn Source Select for PXP PLL
	PLLRCS[16:2] Chipset Configuration (PCHCFG)	**PLLRCS[16:2]** Chipset Configuration (PCHCFG)	**PLLRCS[16:2]** Chipset Configuration (PCHCFG)	**PLLRCS[16:2]** Chipset Configuration (PCHCFG)	**PLLRCS[16:2]** Chipset Configuration (PCHCFG)
PLLEN	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set
	PLLEN[3:0] Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)
OCKEN	**OCKEN[28]** Chipset Configuration (PCHCFG)	**OCKEN[26]** PEG_A Output Clock Enable (PAOCKEN)	**OCKEN[27]** PEG_B Output Clock Enable (PBOCKEN)	**OCKEN[24]** ITPXDP Output Clock Enable (ITPXDPOCKEN)	**OCKEN[23:16]** SRC 7:0 Output Clock Enable (SRC70OCKEN)
IBEN	Only for BTM configuration. For FCIM configuration, use default values				
DIVEN	**DIVEN[4]** DIV3 Enable (DIV3EN)	**DIVEN[4]** DIV3 Enable (DIV3EN)	**DIVEN[4]** DIV3 Enable (DIV3EN)	**DIVEN[4]** DIV3 Enable (DIV3EN)	**DIVEN[4]** DIV3 Enable (DIV3EN)
	DIVEN[3] DIV2-S Enable (DIV2SEN)	**DIVEN[3]** DIV2-S Enable (DIV2SEN)	**DIVEN[3]** DIV2-S Enable (DIV2SEN)	**DIVEN[3]** DIV2-S Enable (DIV2SEN)	**DIVEN[3]** DIV2-S Enable (DIV2SEN)
PM1	N/A	N/A	N/A	N/A	N/A
PM2	N/A	N/A	N/A	N/A	N/A
SEBP1	N/A	N/A	N/A	N/A	N/A
SEBP2	N/A	N/A	N/A	N/A	N/A
SSCCTL	**SSCCTL[10:9]** SSC2 Spread Mode (SSC2_SprdMd)	**SSCCTL[10:9]** SSC2 Spread Mode (SSC2_SprdMd)	**SSCCTL[10:9]** SSC2 Spread Mode (SSC2_SprdMd)	**SSCCTL[10:9]** SSC2 Spread Mode (SSC2_SprdMd)	**SSCCTL[10:9]** SSC2 Spread Mode (SSC2_SprdMd)
	SSCCTL[8] SSC2 Enable, Active Low (SSC2_EnB)	**SSCCTL[8]** SSC2 Enable, Active Low (SSC2_EnB)	**SSCCTL[8]** SSC2 Enable, Active Low (SSC2_EnB)	**SSCCTL[8]** SSC2 Enable, Active Low (SSC2_EnB)	**SSCCTL[8]** SSC2 Enable, Active Low (SSC2_EnB)

Table B-20. PCH Clock output / ICC registers mapping - part A

ICC Registers	CLCKOUT_DMI	CLCKOUT_PEG (A)	CLCKOUT_PEG (B)	CLCKOUT_ITPXDP	CLCKOUT_SRC [7:0]
PMSRCCLK1	N/A	N/A	N/A	N/A	**PMSRCCLK1[31:28]** CLKRQ# Select for CLKOUT_SRC7 (CRQSELSRC7)
					PMSRCCLK1[27:24] CLKRQ# Select for CLKOUT_SRC6 (CRQSELSRC6)
					PMSRCCLK1[23:20] CLKRQ# Select for CLKOUT_SRC5 (CRQSELSRC5)
					PMSRCCLK1[19:16] CLKRQ# Select for CLKOUT_SRC4 (CRQSELSRC4)
					PMSRCCLK1[15:12] CLKRQ# Select for CLKOUT_SRC3 (CRQSELSRC3)
					PMSRCCLK1[11:8] CLKRQ# Select for CLKOUT_SRC2 (CRQSELSRC2)
					PMSRCCLK1[7:4] CLKRQ# Select for CLKOUT_SRC1 (CRQSELSRC1)
					PMSRCCLK1[3:0] CLKRQ# Select for CLKOUT_SRC0 (CRQSELSRC0)
PMSRCCLK2	N/A	**PMSRCCLK2[24]** CLKRQ# Control Enable for CLKOUT_PEG_A:	**PMSRCCLK2[25]** CLKRQ# Control Enable for CLKOUT_PEG_B:	**PMSRCCLK2[26]** CLKRQ# Control Enable for CLKOUT_ITPXDP:	N/A
		PMSRCCLK2[3:0] CLKRQ# Select for CLKOUT_PEG_A (CRQSELPGEA):	**PMSRCCLK2[7:4]** CLKRQ# Select for CLKOUT_PEG_B (CRQSELPGEB):	**PMSRCCLK2[11:8]** CLKRQ# Select for CLKOUT_ITPXDP (CRQSELITPXDP)	
PI12BIASPARMS	**PI12BIASPARMS[31:0]** Chipset Configuration (PCHCFG)	**PI12BIASPARMS[31:0]** Chipset Configuration (PCHCFG)	**PI12BIASPARMS[31:0]** Chipset Configuration (PCHCFG)	**PI12BIASPARMS[31:0]** Chipset Configuration (PCHCFG)	N/A
No- OC Platform					
DIV2-S	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []

Table B-20. PCH Clock output / ICC registers mapping - part A

ICC Registers	CLCKOUT_DMI	CLCKOUT_PEG (A)	CLCKOUT_PEG (B)	CLCKOUT_ITPXDP	CLCKOUT_SRC [7:0]
SSC2PARMS	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)
SSC2OCPARMS	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)
OC Platform					
DIV2-S	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	N/A
DIV3	N/A	N/A	N/A	N/A	**(DIV3)** Clock Div Min[] Clock Div Max[] Clock Usage []
SSC2PARMS	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	N/A
SSC2OCPARMS	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	N/A

B.3.21 PCH Clock output / ICC registers mapping - part B

The following table map each one of the PCH outputs with the ICC registers bit that is configurable in the FITc tool (ICC profile).

Table B-21. PCH Clock output / ICC registers mapping - part B

ICC Registers	CLCKOUT_PCI[4:0]	CLCKOUT_DP_BCLK1	CLCKOUT_FLEX[3:0]	SATA
CSS	**CSS[16:12]** Chipset Configuration (PCHCFG)	**CSS[9:3]** Chipset Configuration (PCHCFG)	**CSS[16:12]** Chipset Configuration (PCHCFG)	**CSS[16:12]** Chipset Configuration (PCHCFG)
			CSS[11:10] 24MHz/48MHz clock source select (24x48CSS)	
	CSS[2:0] PCI Clock Source Select (PCSS) (SSC2 or SSC3)		**CSS[2:0]** PCI Clock Source Select (PCSS) (SSC2 or SSC3) **NOTE:** Only when configured to PCI	
SSS	**SSS[20]** DMI Port Clock Select (DMIPORTCS)	N/A	**SSS[20]** DMI Port Clock Select (DMIPORTCS) **NOTE:** Only when configured to PCI	**SSS[20]** DMI Port Clock Select (DMIPORTCS)

Table B-21. PCH Clock output / ICC registers mapping - part B

ICC Registers	CLCKOUT_PCI[4:0]	CLCKOUT_DP_BCLK1	CLCKOUT_FLEX[3:0]	SATA
FCSS	N/A	N/A	**FCSS[14:12]** FLEXCLK3 Source Select (F3SS)	N/A
			FCSS[10:8] FLEXCLK2 Source Select (F2SS)	
			FCSS[6:4] FLEXCLK1 Source Select (F1SS)	
			FCSS[2:0] FLEXCLK0 Source Select (F0SS)	
DPLLAC/B	N/A	N/A	**DPLLAC[30]** **DPLLAC[26:24]** **DPLLBC[30]** **NOTE:** DPLLAC and DPLLBC are accessible only through XML file	N/A
PLLRCS	**PLLRCS[19]** Chipset Configuration (PCHCFG)	**PLLRCS[16:2]** Chipset Configuration (PCHCFG)	**PLLRCS[19]** Chipset Configuration (PCHCFG)	**PLLRCS[19]** Chipset Configuration (PCHCFG)
	PLLRCS[18:17] SSCn Source Select for PXP PLL		**PLLRCS[18:17]** SSCn Source Select for PXP PLL **NOTE:** Only when configured to PCI	**PLLRCS[18:17]** SSCn Source Select for PXP PLL (SATA)
	PLLRCS[16:2] Chipset Configuration (PCHCFG)		**PLLRCS[16:2]** Chipset Configuration (PCHCFG)	**PLLRCS[16:2]** Chipset Configuration (PCHCFG)
				PLLRCS[1:0] SATA PLL Reference Select (SATARS)
PLLEN	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set	**PLLEN[31]** Chipset Strap (PCHHWSTRP) **Note:** this is a read only reg and cannot be set
		PLLEN[10] SSC4 Ownership (SSC4OWN)		
		PLLEN[9] DPLLA/DPLLB/SSC1 Ownership (DPLLSSC1OWN)	**PLLEN[9]** DPLLA/DPLLB/SSC1 Ownership (DPLLSSC1OWN) **Note:** only if 27-MHz output is required	
	PLLEN[3:0] Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)	**PLLEN[3:0]** Chipset Configuration (PCHCFG)
OCKEN	**OCKEN[11:7]** PCICLK 4:0 Output Clock Enable (PCI40OCKEN)	**OCKEN[24]** DP120 Output Clock Enable (DPOCKEN)	**OCKEN[3:0]** FLEXCLK 3:0 Output Clock Enable (FLEX30OCKEN)	N/A
IBEN	Only for BTM configuration. For FCIM configuration, use default values			

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Table B-21. PCH Clock output / ICC registers mapping - part B

ICC Registers	CLCKOUT_PCI[4:0]	CLCKOUT_DP_BCLK1	CLCKOUT_FLEX[3:0]	SATA
DIVEN	**DIVEN[4]** DIV3 Enable (DIV3EN)	**DIVEN[8]** DIV7 Enable (DIV7EN)	**DIVEN[10]** 14.31818Mhz Fractional Divisor Enable (14FDEN)	**DIVEN[4]** DIV3 Enable (DIV3EN)
			DIVEN[8] DIV7 Enable (DIV7EN)	
			DIVEN[7] DIV5 Stage 2 Enable (DIV5BEN)	
		DIVEN[5] DIV4 Enable (DIV4EN)	**DIVEN[6]** DIV5 Stage 1 Enable (DIV5AEN)	
			DIVEN[4] DIV3 Enable (DIV3EN) **NOTE:** Only when configured to PCI	
	DIVEN[3] DIV2-S Enable (DIV2SEN)		**DIVEN[3]** DIV2-S Enable (DIV2SEN) **NOTE:** Only when configured to PCI	**DIVEN[3]** DIV2-S Enable (DIV2SEN)
		DIVEN[1] DIV1-S Enable (DIV1SEN)	**DIVEN[1]** DIV1-S Enable (DIV1SEN)	
		DIVEN[0] DIV1-NS Enable (DIV1NSEN)	**DIVEN[0]** DIV1-NS Enable (DIV1NSEN)	
PM1	N/A	**PM1[4]** Dynamic SSC1 Shutdown Enable (SSC1DSEN)	**PM1[4]** Dynamic SSC1 Shutdown Enable (SSC1DSEN)	N/A
		PM1[3:2] Dynamic SSC4 and DIV4 Shutdown Enable (SSC4DIV4DSEN)		
		PM1[1] Dynamic DIV1-NS Shutdown Enable (DIV1NSDSEN)		
		PM1[0] Dynamic DIV1-S Shutdown Enable (DIV1SDSEN)	**PM1[0]** Dynamic DIV1-S Shutdown Enable (DIV1SDSEN)	
PM2	**PM2[4:0]** CLKRUN Control Enable (CLKRUNCEN)	N/A	**PM2[8:5]** CLKRUN Control Enable for PCI 33 Mhz on CLKOUTFLEX (CLKRUNCEN_FLEX)	N/A

Table B-21. PCH Clock output / ICC registers mapping - part B

ICC Registers	CLCKOUT_PCI[4:0]	CLCKOUT_DP_BCLK1	CLCKOUT_FLEX[3:0]	SATA
SEBP1	N/A	N/A	**SEBP1[15:13]** FLEXCLK3 Slew Rate Control (F3SLC)	N/A
			SEBP[12] FLEXCLK3 Single/Double Load Series Resistance (F3SDLSR)	
			SEBP1[11:9] FLEXCLK2 Slew Rate Control (F2SLC)	
			SEBP1[8] FLEXCLK2 Single/Double Load Series Resistance (F2SDLSR)	
			SEBP1[7:5] FLEXCLK1 Slew Rate Control (F1SLC	
			SEBP1[4] FLEXCLK1 Single/Double Load Series Resistance (F1SDLSR)	
			SEBP1[3:1] FLEXCLK0 Slew Rate Control (F2SLC)	
			SEBP1[0] FLEXCLK0 Single/Double Load Series Resistance (F0SDLSR)	

Table B-21. PCH Clock output / ICC registers mapping - part B

ICC Registers	CLCKOUT_PCI[4:0]	CLCKOUT_DP_BCLK1	CLCKOUT_FLEX[3:0]	SATA
SEBP2	**SEBP2[19:17]** PCI4 Slew Rate Control (PCI3SLC)	N/A	N/A	N/A
	SEBP2[16] PCI4 Single/Double Load Series Resistance (PCI4SDLSR)			
	SEBP2[15:13] PCI3 Slew Rate Control (PCI3SLC)			
	SEBP2[12] PCI3 Single/Double Load Series Resistance (PCI3SDLSR)			
	SEBP2[11:9] PCI2 Slew Rate Control (PCI2SLC)			
	SEBP2[8] PCI2 Single/Double Load Series Resistance (PCI2SDLSR)			
	SEBP2[7:5] PCI1 Slew Rate Control (PCI1SLC)			
	SEBP2[4] PCI1 Single/Double Load Series Resistance (PCI1SDLSR)			
	SEBP2[3:1] PCI0 Slew Rate Control (PCI0SLC)			
	SEBP2[0] PCI0 Single/Double Load Series Resistance (PCI0SDLSR)			
SSCCTL	**SSCCTL[18:17]** SSC3 Spread Mode SSC3_SprdMd)	**SSCCTL[26:25]** SSC4 Spread Mode SSC4_SprdMd	**SSCCTL[2:1]** SSC1 Spread Mode SSC1_SprdMd)	N/A
	SSCCTL[16] SSC3 Enable, Active Low (SSC3_EnB)	**SSCCTL[24]** SSC4 Enable, Active Low (SSC4_EnB)		
	SSCCTL[10:9] SSC2 Spread Mode (SSC2_SprdMd)	**SSCCTL[2:1]** SSC1 Spread Mode SSC1_SprdMd)	**SSCCTL[0]** SSC1 Enable, Active Low (SSC1_EnB)	
	SSCCTL[8] SSC2 Enable, Active Low (SSC2_EnB)	**SSCCTL[0]** SSC1 Enable, Active Low (SSC1_EnB)		
PMSRCCLK1	N/A	N/A	N/A	N/A
PMSRCCLK2	N/A	N/A	N/A	N/A
PI12BIASPARMS	N/A	N/A	N/A	N/A
No- OC Platform				

Table B-21. PCH Clock output / ICC registers mapping - part B

ICC Registers	CLCKOUT_PCI[4:0]	CLCKOUT_DP_BCLK1	CLCKOUT_FLEX[3:0]	SATA
DIV2-S	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []	N/A	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage [] **NOTE:** Only when configured to PC	**(DIV2-S)** Clock Div Min[] Clock Div Max[] Clock Usage []
SSC2PARMS	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)	N/A	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG) **NOTE:** Only when configured to PC	**SSC2PARMS [31:0]** Chipset Configuration (PCHCFG)
SSC2OCPARMS	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)	N/A	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG) **NOTE:** Only when configured to PC	**SSC2OCPARMS [31:0]** Chipset Configuration (PCHCFG)
OC Platform				
DIV2-S	N/A	N/A	N/A	N/A
DIV3	**(DIV3)** Clock Div Min[] Clock Div Max[] Clock Usage []	N/A	**(DIV3)** Clock Div Min[] Clock Div Max[] Clock Usage [] **NOTE:** Only when configured to PC	**(DIV3)** Clock Div Min[] Clock Div Max[] Clock Usage []
SSC2PARMS	N/A	N/A	N/A	N/A
SSC2OCPARMS	N/A	N/A	N/A	N/A

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B.3.22 ICC SKU Support Matrix

The following table describes features, clock range (maximum and minimum), spread mode supported by Cougar Point PCH SKU. The ICC SKU is divided into 3 categories; Basic, enhanced, and Extreme.

Table B-22. ICC SKU Matrix

PCH SKU	Basic	Enhanced	Extreme
Q67/Q65/B65		X	
P67			X
H67		X	
H61	X		
HM65	X		
QM67			X
QS67			X
HM67			X
Z68			X
UM67			X

Table B-22. ICC SKU Matrix

PCH SKU	Basic	Enhanced	Extreme
Server 3xxx	**X**		
Features Supported	Display Clock Bending	Display Clock Bending Wimax Friendly Clocking	Display Clock Bending Wimax Friendly Clocking CPU BCLK Overclocking
Clock Range Supported	**1. SSC2 (DIV2-S)** [Min - Max] = 100 MHz (0xC00) **2. SSC3 (DIV3)** = Locked	**1. SSC2 (DIV2-S)** [Min - Max] = 99.5463-100 MHz (0xC0E - 0xC00) **2. SSC3 (DIV3)** [Min - Max] = 99.5463-100 MHz (0xC0E - 0xC00)	**1. SSC2 (DIV2-S)** [Min - Max] = 99.5463-800 ** MHz (0xC0E - 0x180) **2. SSC3 (DIV3)** [Min - Max] = 99.5463-100 MHz (0xC0E - 0xC00)
Spread Mode Supported	**SSC1-3 =** Down **SSC4 =** Down , Center	**SSC1-3** = Down **SSC4 =** Down , Center	**SSC1 -2 =** Down, Center * **SSC3 =** Down **SSC4 =** Down , Center
Max Spread % supported	Cougar Point PCH HW only support Max Spread % for SSC1-3 = 0.5% and SSC4 = 2.5%		

Min = Clock Div Max (minimum allowed frequency)

Max = Clock Div Min (maximum allowed frequency)

* Center spread is only allow when platform is configured for overclocking configuration, where all non-overclockable clocks (PCI, PCIe, etc..) are routed to SSC3 source.

Note that enabling center spread will add a small overclocking to the nominal frequency. This places the platform in an unsupported configuration and/or operational state and can result in platform instability, physical damage, and data loss. These margins are not guaranteed or supported.

** ME firmware ensure that if ME clock is on SSC2, then SSC2 frequency cannot be exceed 100MHz and it will also disable center spread support.

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