



Intel[®] Management Engine Firmware Integrated Clock Controller (ICC) Tool

Tools User Guide

March 2016

Revision 0.5

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Revision History

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	0.5	• Alpha release.	March 2016

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1 Introduction

The purpose of the document is to provide guidance on the usage of the tools provided for Intel® Management Engine (Intel® ME) Firmware Integrated Clock Controller (ICC) included within the Intel firmware kit.

1.1 Terminology

Table 1-1. Terminology

Acronym or Term	Definition
API	Application Programming Interface
BIOS	Basic Input Output System
CCT	Clock Commander Tool
CCTwin	Windows* command line version of the Clock Commander Tool.
CPU	Central Processing Unit
DLL	Dynamic Link Library
Intel® FIT	Intel® Flash Image Tool
FW	Firmware
Intel® ICCS	Intel® Integrated Clock Controller Services
Intel® ME	Intel® Management Engine
Intel® MEI	Intel® Management Engine Interface (formerly HECI)
PCH	Platform Controller Hub
Permanent UOB	UOB that is applied on every boot.
UOB	Update on Boot. A record of ICC registers setting that is applied on the next platform boot.



1.2 Reference Documents

Document	Document No./Location
Kaby Lake Platform Controller Hub (KBL PCH) SPI Programming Guide	FW release kit
Kaby Lake Platform Controller Hub (KBL PCH) Intel® Management Engine Firmware Bring Up Guide	FW release kit
Kaby Lake Platform Controller Hub (KBL PCH) External Design Specification (EDS)	Contact your FAE for availability.

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2 Intel® Clock Commander (CCT) Tool

Intel® Clock Commander Tool (CCT) tool is mainly used to collect register programming and clock details of Intel® Management Engine (Intel® ME) Firmware Integrated Clock Controller (ICC) module.

This document covers the usage of the CCT tool available in the `..\Tools\ICC_tools\` directory within the Intel® ME FW kit. Details on tools available in the `..\Tool\System Tool` is available in the Intel® System Tools User Guide document within the Intel® ME FW kit.

Note: The Intel® Clock Commander Tool (CCT) tools included in Intel® ME 11.x.x.xxxx kit are designed to be used with Kaby Lake-H/LP Intel® C620 Chipset Family.

2.1 Command Line Interface

CCT.exe and CCTwin.exe support the following command line options.

Note: The Windows* version of the tool - CCTwin.exe - requires that the Intel® Management Engine Interface driver is loaded for it to function.

The command syntax for the CCT tool is CCT **[Verbose options] command [arguments]**.

The available **options** are:

/v0 - verbose level 0. This is the default mode and provides the smallest amount of information.

/v1 - verbose level 1. This is the debug mode and includes additional debug information including the raw Intel® MEI message information.

The available CCT commands are:

CTT Commands	
CCT	? Or h - Help Menu
	gcc - Get ICC Clocks Capabilities
	gcdr -Get Clock Range Definition Record
	gl -Get Lock
	sl - Set Lock



CTT Commands	
gp	- Get ICC Profile
Sp	-Set ICC Profile
gr	–Get ICC Record
Sr	- Set ICC Record
Sm	-Set Chipset Init Settings
gm	- Get Chipset Init Settings
sc	- Set ICC Clock Settings
Gc	- Get ICC Clock Settings

Note: Refer the next section to get detail of usage, syntax and supported/expected argument options with each command.

2.2 Detail on Supported Commands

2.2.1 ? Or h - Help Menu

Usage: This is command to display help menu. It lists available commands supported by CCT tool.

Syntax:

CCT*.exe ?

Arguments:

No Arguments.

2.2.2 gcc – Get Clock Capabilities

Usage: This command displays the HW Product family/stepping, FW version, ICC HW SKU info, Total NumClocks, Configurable Clocks, ICC boot events, ICC Flags, ICC Debug Flags from platform.

Syntax:

CCT*.exe gcc

Arguments:

No arguments.



2.2.3 gcdr - Get Clock Range Definition Record

Usage: This command reads and displays combined clock range record with no argument used. Information displayed using this command depends on argument used with this command; Refer the below detail for all valid argument options and usage of each argument.

Syntax:

```
CCT*.exe gcdr [argument] [index]
```

Arguments:

Valid Argument Option	Usage
No argument	Lists combined clock range record(Intel+OEM)
"intel"	Intel Clock Range Definition Record for given ICC PCH SKU programmed by Intel® ME FW
"oem"	Requested OEM Clock Range Definition Record for currently selected ICC profile
"oem" [index]	Requested OEM Clock Range Definition Record for given ICC profile defined by [index] parameter.

2.2.4 gl – Get Lock

Usage: This command displays Intel® ME FW lock state and lock flags.

Syntax:

```
CCT*.exe gl
```

Arguments:

No arguments

2.2.5 sl – Set Lock

Usage: This allows setting Lock Policy of ICC registers after EOP. This command must be issued before EOP.

Syntax:

```
CCT*.exe sl [argument]
```



Arguments:

Valid Argument Option	Usage
0	Default lock - Locks all but the registers associated to adjust BCLK nominal clock frequency and spread settings.
1	Lock all registers - Locks all integrated clock registers and disables all writes to these registers via Intel® ME Firmware.
2	Unlock all registers - Leaves pre-EOP integrated clock registers unlocked. This option is mainly used for debug purpose.

2.2.6 gp – Get ICC Profile

Usage: This command displays detail related to the currently used ICC profile number for boo, Failsafe profile index , Runtime profile selection is enabled or disabled and total number of available profiles from Full SPI image flashed on the platform.

Syntax:

CCT*.exe gp

Arguments:

No arguments

2.2.7 sp – Set ICC Profile

Usage: This command allows user to set the ICC profile to the number specified in the profile number argument. This command will not work after the BIOS sends the End of Post Intel® MEI message. Up to 16 ICC profiles can be added via Intel® Flash Image Tool too but only one profile out of all can be used as a boot profile. This command allows user to change ICC boot profile. After this command is used, Intel® ME FW executes global reset to apply the change.

Syntax:

CCT*.exe sp [Index]

Arguments:

Index - requested ICC profile number.



2.2.8 gr – Get ICC Record

Usage: This command displays detail of ICC Record based on argument provided.

Syntax:

CCT*.exe gr [Argument]

Arguments:

Valid Argument Option	Usage
"intel"	Displays Intel ICC Record
"curregs"	Displays Current ICC registers values
"oem[index]"	Displays OEM ICC Record for given ICC profile indicated by index.
"uob"	Displays UOB Record
"dynamic"	Displays dynamic Record
"current"	Displays Current Record, user must specify registers name or address with this argument
"dmr"	Dumps chipset init registers to file named chipset_init_regs_dump.txt

2.2.9 sr – Set ICC Record

Usage: This command allows user to set ICC Record based on argument provided.

Syntax:

CCT*.exe sr [requested_record] [update _param] [selector]

Arguments:

- requested_record - specifies which ICC record to be updated with new changes.

Valid Argument Options for requested_record	Usage
UOB	This allows user to set changes as a UOB record
Current	This allows user to set changes as a current record



- update_ param – This is optional argument; it specifies when to apply changes.

Valid Argument Options for Update_ Param	Usage
"invalid"	This option causes invalidation of an existing UOB Record
"wmrs"	This option applies changes/ update on warm reset

- selector – specifies method to update ICC record.

Valid Argument Options for Selector	Usage
list of pairs "register_name=value"	Use register name/value pair to set ICC record
list of pairs eid.iosf=value"	Use register endpoint ID/value pair to set ICC record
list of pairs "register_name=value:mask"	Use register name/value: mask pair to set ICC record
list of pairs "eid.iosf=value:mask" separated by whitespace	Use register endpoint ID /value: Mask pair to set ICC record

2.2.10 gc – Get ICC Clock Settings

Usage: This command displays detail of ICC clock settings.

Syntax:

CCT*.exe gc [clockid] [settingtype]

Arguments:

- Clockid – specifies clock for which ICC settings should be displayed.

Valid Argument Options for Clockid	Usage
BCLK	Displays ICC settings for BCLK clock
PCIE	Displays ICC settings for PCIE/USB3PCIeGen2 clock

- Settingtype – specifies which ICC record to be used to display clock settings mentioned by clockid.

Valid Argument Options for Clockid	Usage
Current	Displays current ICC settings for clock id mentioned by clockid argument



Valid Argument Options for Clockid	Usage
Boot	Displays boot ICC settings for clock id mentioned by clockid argument
Preboot	Displays preboot ICC settings for clock id mentioned by clockid argument
oem	Displays oem ICC settings for clock id mentioned by clockid argument

2.2.11 sc – Set ICC Clock Settings

Usage: This command allows user to set ICC Clock

Syntax:

CCT*.exe sc [clockid] [flag] [freq] [ssc] [settodefault] [wmrs] [type]

Arguments:

- clockid – specifies clock for which ICC settings should be changed.

Valid Argument Options for Clockid	Usage
BCLK	Sets ICC settings for BCLK clock
PCIE	Sets ICC settings for PCIE/USB3PCIeGen2 clock

- Flag – This is optional parameter to choose how frequency should be set.

Valid Argument Options for Flag	Usage
0	Change frequency value mentioned by [freq] parameter to round down value and no translate
1	Change frequency value mentioned by [freq] parameter to round up value and no translate
2	Change frequency value mentioned by [freq] parameter to frequency round down value and translate
3	Change frequency value mentioned by [freq] parameter to round up value and translate

- freq - user specified frequency in Hz
- ssc - user specified ssc percent(example-50 means 0.5%)
- settodefault – This is optional parameter, when present; clock settings are restored to default.
- wmrs – This is optional parameter, when present, settings applied on warm reset
- type – This is optional parameter.



Valid Argument Options for Type	Usage
perm	Write UOB record only.
dynamic	This is default value; write to HW record only.
both	Write to both UOB and HW record.

2.2.12 gm – Get Chipset Init Settings

Usage: This command displays chipset init data.

Syntax:

CCT*.exe gm

Arguments:

No arguments

2.2.13 Sm – Set Chipset Init Settings

Usage: This command sets chipset init data.

Syntax:

CCT*.exe sm

Arguments:

No arguments

2.3 Examples – How to Use CCT Commands

Below are the examples on how to use CCT tool supported commands.

2.3.1 Help Menu

```
C:\cct>cctwin.exe ?

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.
usage:      cctWin.exe [options] command [arguments]

Available options:
/v0         - Verbose level 0 (default mode, smallest amount of
information).
/v1         - Verbose level 1 (debug). Includes raw HECI messaging.

Available commands:
gl          - Get Lock
sr          - Set ICC Record
gr          - Get ICC Record
gcc         - Get ICC Clocks Capabilities
```



```
gcdr    - Get Clock Range Definition Record
sl      - Set Lock
gp      - Get ICC Profile
sp      - Set ICC Profile
gc      - Get ICC Clock Settings
sc      - Set ICC Clock Settings
gm      - Get Chipset Init Settings
sm      - Set Chipset Init Settings
```

To get help on specific command, use "cctWin.exe command ?"

2.3.2 Get Clock Capabilities

```
C:\cct>cctwin gcc
Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

HW Product Family:SPT-LP
HW Stepping:A0
FW Version Major: 11
FW Version Minor: 0
FW Version Hotfix: 0
FW Version Build: 1072
Total Number Clocks = 2
Configurable Clocks = 0
icc_boot_status_report = 0x80080000
    boot event: "IntelRecordAppliedSuccessfully"
    boot event: "IccReceivedClockSwitchIoctl"
ICC HW SKU = ENHANCED
ICC Boot Status Invalidation Reason = Power Loss
debugflags[0] = 0x26DE2710
debugflags[1] = 0x00CF3208
debugflags[2] = 0x27102710
debugflags[3] = 0x00000000
debugflags[4] = 0x00010010
debugflags[5] = 0x00000001
debugflags[6] = 0xED012112
debugflags[7] = 0x0000051F

HECI CMD Status = 0x00000000 (SUCCESS)
```

2.3.3 Get Intel Clock Range Definition Record

```
C:\cct>cctwin gcdr

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

clock_id = 1      [PCIE]

clock_usage = {BCLK, DMI/OPI, PEG, PCIE, SATA, USB3}
frequency_min           = 99.5000 MHz
frequency_max           = 100.0000 MHz
ssc_change_allowed      = 0
ssc_spread_mode_control_up_allowed    = 0
ssc_spread_mode_control_center_allowed = 0
ssc_spread_mode_control_down_allowed  = 1
ssc_spread_mode_control_halt_allowed  = 0
ssc_spread_percent_max   = 0.50 %

clock_id = 2      [BCLK]
```



```
clock_usage = {} -> NOT USED
frequency_min           = 100.0000 MHz
frequency_max           = 100.0000 MHz
ssc_change_allowed      = 0
ssc_spread_mode_control_up_allowed = 0
ssc_spread_mode_control_center_allowed = 0
ssc_spread_mode_control_down_allowed = 0
ssc_spread_mode_control_halt_allowed = 0
ssc_spread_percent_max  = 0.00 %
```

HECI CMD Status = 0x00000000 (SUCCESS)

2.3.4 Get Lock

```
C:\cct>cctwin gl
```

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

FW Lock State: 0(Default Lock)
FW Lock Flags: 3

HECI CMD Status = 0x00000000 (SUCCESS)

2.3.5 Get Profiles

```
C:\cct>cctwin gp
```

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

```
number_of_icc_profiles      = 1
failsafe_boot_profile_index = 0
icc_profile_is_selected_by  = runtime profile selection NOT allowed
current_boot_profile_index  = 0
Profile0 Name = Profile 0
Profile0 Base = Standard
```

HECI CMD Status = 0x00000000 (SUCCESS)

2.3.6 Set Profile.

```
C:\cct>cctwin sp 1
```

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.
HECI CMD Status = 0x00000008 (PROFILE_NOT_SELECTABLE_BY_BIOS).

2.3.7 Get ICC Record(Intel)

```
C:\ cct>cctwin gr intel
```

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.



```

FLAGS [0x0001004c]
record_length           = 76
SECURITY0               = 0x0000000E
SECURITY1               = 0x00030003
SECURITY2               = 0x000003FF
POW_MGMT                = 0x01090901
SBEPCTRL                = 0x00000110
TMCSRCLK                = 0x99999999
TMCSRCLK2               = 0x99999999
ICCSEC                  = 0x00000705
PM                      = 0x00000003
ICCDBG                  = 0x0003058C
G2PLLCTRL               = 0x00010109

HECI CMD Status = 0x00000000 (SUCCESS)

```

2.3.8 Set ICC Record

```

C:\cct>cctwin sr current 0xed.0x2000=0x11223344

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

Bytes processed = 0x00000014

HECI CMD Status = 0x00000000 (SUCCESS)

```

2.3.9 Get Chipset Init Data

```

C:\CSME_PETS>cctwin gm

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

CRC:0xBCBE
Version:26
Product:SPTLP
stepping:0
GroupTable[0]:0x0
GroupTable[1]:0x301
GroupTable[2]:0xB40C
GroupTable[3]:0xF00
GroupTable[4]:0x0
GroupTable[5]:0x0
GroupTable[6]:0x0
GroupTable[7]:0x0
GroupTable[8]:0x0
GroupTable[9]:0x0
GroupTable[10]:0x0
GroupTable[11]:0x0
GroupTable[12]:0x0
GroupTable[13]:0x0
GroupTable[14]:0x0
GroupTable[15]:0x0
entries:0x7E928
entries:0x812C000F
entries:0x30A
entries:0x7E928
entries:0x8108000F
entries:0x21051C
entries:0x7E928
entries:0x8108000F

```



```
entries:0x21051C
entries:0x7E928
entries:0x8110000F
entries:0x8010804
entries:0x7E928
entries:0x8128000F
entries:0xF000E
entries:0xF
entries:0x7A928
entries:0x8340000F
entries:0x105CF58
entries:0x7A928
entries:0x8344000F
entries:0x105D548
entries:0x7A928
entries:0x8204000F
entries:0x2000064
entries:0x7A928
entries:0x8294000F
entries:0x28292A06
entries:0x7A928
entries:0x8370000F
entries:0x3A40255A
entries:0x7A928
entries:0x8378000F
entries:0x40834060
entries:0x7A928
entries:0x838C000F
entries:0x68858
entries:0x7A928
entries:0x8210000F
entries:0x723F0100
entries:0x7A928
entries:0x82D8000F
entries:0x80400CFF
entries:0x7A928
entries:0x8380000F
entries:0x8A00760
entries:0x7A928
entries:0x8300000F
entries:0x9525010
entries:0x7A928
entries:0x830C000F
entries:0xD29B1F
entries:0x7A928
entries:0x8384000F
entries:0xE0174000
entries:0x7EA28
entries:0x8340000F
entries:0x105CF58
entries:0x7EA28
entries:0x8344000F
entries:0x105D548
entries:0x7EA28
entries:0x8940000F
entries:0x11AC91F
entries:0x7EA28
entries:0x8804000F
entries:0x2000044
entries:0x7EA28
entries:0x8204000F
entries:0x2000064
entries:0x7EA28
entries:0x8894000F
entries:0x28292A02
entries:0x7EA28
```



```
entries:0x8294000F
entries:0x28292A06
entries:0x7EA28
entries:0x89A0000F
entries:0x300010EC
entries:0x7EA28
entries:0x89A4000F
entries:0x303030
entries:0x7EA28
entries:0x8370000F
entries:0x3A40255A
entries:0x7EA28
entries:0x8378000F
entries:0x40834060
entries:0x7EA28
entries:0x8978000F
entries:0x40834060
entries:0x7EA28
entries:0x8904000F
entries:0x550989
entries:0x7EA28
entries:0x89C8000F
entries:0x600D8850
entries:0x7EA28
entries:0x898C000F
entries:0x68028
entries:0x7EA28
entries:0x838C000F
entries:0x68858
entries:0x7EA28
entries:0x8210000F
entries:0x723F0100
entries:0x7EA28
entries:0x8810000F
entries:0x723F0100
entries:0x7EA28
entries:0x8950000F
entries:0x803F3F3F
entries:0x7EA28
entries:0x82D8000F
entries:0x80400CFF
entries:0x7EA28
entries:0x88D8000F
entries:0x80400CFF
entries:0x7EA28
entries:0x8824000F
entries:0x840C0C0F
entries:0x7EA28
entries:0x8928000F
entries:0x88102000
entries:0x7EA28
entries:0x8380000F
entries:0x8A00760
entries:0x7EA28
entries:0x8900000F
entries:0x9524010
entries:0x7EA28
entries:0x8300000F
entries:0x9525010
entries:0x7EA28
entries:0x892C000F
entries:0xA100A
entries:0x7EA28
entries:0x899C000F
entries:0xB00000
entries:0x7EA28
```



```
entries:0x8968000F
entries:0xB8008206
entries:0x7EA28
entries:0x8918000F
entries:0xBF
entries:0x7EA28
entries:0x8820000F
entries:0xD071626
entries:0x7EA28
entries:0x830C000F
entries:0xD29B1F
entries:0x7EA28
entries:0x893C000F
entries:0xE0
entries:0x7EA28
entries:0x8384000F
entries:0xE0174000
entries:0x7EA28
entries:0x8984000F
entries:0xE0174000
entries:0x7EA28
entries:0x8980000F
entries:0xE80760
entries:0x7E928
entries:0x8340000F
entries:0x105CF58
entries:0x7E928
entries:0x8344000F
entries:0x105D548
entries:0x7E928
entries:0x8204000F
entries:0x2000064
entries:0x7E928
entries:0x8294000F
entries:0x28292A06
entries:0x7E928
entries:0x8370000F
entries:0x3A40255A
entries:0x7E928
entries:0x8378000F
entries:0x40834060
entries:0x7E928
entries:0x838C000F
entries:0x68858
entries:0x7E928
entries:0x8210000F
entries:0x723F0100
entries:0x7E928
entries:0x82D8000F
entries:0x80400CFF
entries:0x7E928
entries:0x8380000F
entries:0x8A00760
entries:0x7E928
entries:0x8300000F
entries:0x9525010
entries:0x7E928
entries:0x830C000F
entries:0xD29B1F
entries:0x7E928
entries:0x8384000F
entries:0xE0174000
entries:0xF
entries:0x7EC29
entries:0x344000F
entries:0x301C4CF6
```



```

entries:0x7EC29
entries:0x348000F
entries:0x1FBFE000
entries:0x7EC29
entries:0x340000F
entries:0x14000000
entries:0xF
HECI CMD Status = 0x00000000 (SUCCESS)

```

2.3.10 Get Clock Settings

```

C:\cct>cctwin gc pcie current

Intel (R) Clock Commander Tool Version: 11.6.0.1036
Copyright (C) 2009 - 2016 Intel Corporation. All rights reserved.

frequency           = 1000000000 HZ
user frequency      = 1000000000 HZ
max frequency       = 1000000000 HZ
min frequency       = 995000000 HZ
ssc mode            = 2
ssc percent         = 50
max ssc percent     = 50
current flags       = 0x0000
    ratio:0
    appliedonwrs:0
    type:0
    settodefault:0
    disabled:0
    dynamicsettingsapplied:0
    wrspending:0
    pwrccyclepending:0
support flags       = 0x0042
    ratio:0
    downsprd:1
    upsprd:0
    ctrsprd:0
    changeallowed:0
    haltallowed:0
    PCIE:1
    BCLK:0
HECI CMD Status = 0x00000000 (SUCCESS)

```

2.4 Error and Status Messages

2.4.1 Clock Commander Tool Error and Status Messages

When a command is executed the Clock Commander Tool will display status and error messages to indicate the result of the operations. The messages and their definitions are listed in the following table.

**Table 2-1. CCT Error and Status Messages**

CCT Message	Definition
SUCCESS	The command executed successfully.
FAILURE	The command failed to execute.
INVALID OPTION	An invalid option was specified for the command.
INVALID COMMAND	The command entered was invalid.
INVALID ARGUMENT	The argument entered was invalid.
REGISTER OFFSET OUT OF RANGE	The register offset entered was outside the allowable range.
TOO FEW ARGUMENTS	Arguments missing from the command.
HECI_INITIALIZATION_FAILED	Initialization of the Intel® MEI interface failed.
HECI_READ_FAILED	A read from the Intel® MEI interface failed.
HECI_WRITE_FAILED	A write to the Intel® MEI interface failed.
INVALID_RESPONSE	The command received an invalid response.
INVALID_FUNCTION	An invalid function was sent to the FW.
INVALID_PARAMS	A command failed due to invalid parameters.
FLASH_WEAR_OUT_VIOLATION	FW is indicating a flash wear out violation.
FLASH_CORRUPTION	FW is indicating that the flash is corrupted.



CCT Message	Definition
PROFILE_NOT_SELECTABLE_BY_BIOS	The ICC profile is not selectable by BIOS. It is selectable by a soft strap.
TOO_LARGE_PROFILE_INDEX	The profile sent by the command exceeds the number of profiles present in the flash.
NO_SUCH_PROFILE_IN_FLASH	The profile sent by the command does not exist in the flash.
CMD_NOT_SUPPORTED_AFTER_END_OF_POST	A command was attempted that is not allowed after end of post is received from the BIOS.
NO_SUCH_RECORD	A command attempted to access a non-existent record.
NO_SUCH_REGISTER	A command attempted to access a non-existent register.
NO_SUCH_TARGET_ID	A command attempted to access a non-existent target ID.
TOO_LARGE_REGISTER_INDEX	The register index is outside the allowable range.
TOO_LARGE_UOB_RECORD	A write UOB command failed because the UOB exceeded the allowable size.
REGISTER_IS_LOCKED	Access to the ICC register is denied because it is locked.
FUNCTION_NOT_SUPPORTED_AFTER_EOP_OVER_THIS_HECI	A command was attempted that is not allowed after end of post is received from the BIOS.
FUNCTION_NOT_SUPPORTED_OVER_SMBUS	A command is sent that is not supported over the SMBus.
UOB_RECORD_IS_ALREADY_INVALID	This error occurs when CCT attempts to invalidate a UOB that is already invalid.
ONE_UOB_RECORD_IS_ALREADY_VALID	An attempt is made to create a UOB when one is already valid.
OCCEN_MASK_VIOLATION	An attempt is made to write to the OCCEN register that violates the clock enables mask settings.



CCT Message	Definition
SUCCESS_OCKEN_AUTO_LOCKED	The OCKEN register was successfully auto locked by FW.
RANGE_VIOLATION_FREQ_TOO_HIGH_CLK[x]	A command failed because the frequency exceeded the allowable range.
RANGE_VIOLATION_FREQ_TOO_LOW_CLK[x]	A command failed because the frequency exceeded the allowable range.
SSC_MODE_CHANGE_NOT_SUPPORTED_CLK[x]	A command failed because a change to the spread spectrum mode is not supported for that clock.
AS EXPECTED, RESPONSE FROM Intel® ME FW NOT RECEIVED	No response from Intel® ME FW received

2.4.2 Boot Status

The Clock Commander Tool Command Get Clock Capabilities (gcc) returns an ICC boot status report which provides an indication of the status of integrated clock control after the system has booted. The possible results of the boot status are shown in the following table.

Table 2-2. ICC Boot Status Errors

Boot Status Message	Definition
IccBootRecoveryFailure	There was some failure during the ICC boot recovery.
RecoveredFromIccWdtTimeout	FW detected a watch dog timer expiration.
DisqualifiedIccProfile	The BIOS ICC profile was disqualified. This could be due to the FW not receiving the DRAM init done message.
IccProfileSelectionFailure	Selection of the ICC profile failed.
IccProfileIndexOutOfRange	The selected ICC profile exceeds the number of profiles contained in flash.
OemPitParamsBlockInvalid	The ICC NVAR in flash has an invalid format.
IccCrdrCreationFailure	Creation of the clock range definition record failed.



Boot Status Message	Definition
OemClkRangeMinViolation	The OEM record violates one of the Intel minimum ranges.
OemClkRangeMaxViolation	The OEM record violates one of the Intel maximum ranges.
OemSprPrcntMaxViolation	The OEM record violates the Intel spread spectrum range for one of the clocks.
IntelRecordApplyingFailure	Application of the Intel record failed.
OemRecordViolatedClkRangeLimits	The OEM record violates the range limits for one of the clocks.
OemRecordApplyingFailure	Application of the OEM record failed.
PermUobViolatedClkRangeLimits	The permanent UOB is outside the clock ranges for one of the clocks.
PermUobApplyingFailure	Application of the permanent UOB failed.
SusramRecoveryFailure	FW was not able to successfully restore all the contents from SUSRAM to flash.
IntelCRDRSkuReducedEnhancedUpperRange	FW has detected that Intel® ME clk OC might occur on Enhanced SKU and thus upper range for Intel® ME clk must be changed to basic.
IntelCRDRSkuReducedExtremeRanges	FW has detected that Intel® ME clk OC might occur on Extreme SKU and thus both ranges for Intel® ME clk must be changed to basic.
OemRecordViolatedMEClkRestrictions	FW has detected that Intel® ME clk is trying to be routed to CLK4 in the OEM Record.
UobRecordViolatedMEClkRestrictions	FW has detected that Intel® ME clk is trying to be routed to CLK4 in the UOB Record.

Table 2-3. ICC Boot Status Informational Messages

Boot Status Message	Definition
GetIccProfileReceived	Get ICC profile command received.
SetClockEnablesReceived	Received set clock enables command from BIOS.
LockReceived	Received the lock ICC registers command from BIOS.



Boot Status Message	Definition
CmosBatteryRemoved	FW detected that the CMOS battery was removed.
InvalidatedUobRecord	The UOB record has been invalidated.

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