



Intel[®] Quark SoC X1000 Software

Package Version: 0.9.0

Release Notes

20 January 2014



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Revision History

Date	Revision	Description
20 January 2014	0.9	Updates for software release 0.9.0 are indicated with changebars.
06 November 2013	0.8	Updates for software release 0.8.0 are indicated with changebars.
25 July 2013	0.6	Updates for software release 0.6.0 are indicated with changebars.
20 June 2013	0.5	Initial version of document.

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1.0 Description of Release

This document describes extensions and deviations from the release functionality described in the documentation for the Intel® Quark SoC X1000 (formerly codenamed Clanton).

This release is called: Package Version: 0.9.0 (Beta)

Intel® Quark SoC X1000 Software supports the following Form Factor Reference Design boards (FFRDs):

- Customer Reference Boards:
 - Kips Bay (Fab C, green PCB)
 - Galileo (Fab D, blue PCB)
- Intel® Quark SoC X1000 Industrial/Energy Reference Design, “Cross Hill”
- Intel® Quark SoC X1000 Transportation Reference Design, “Clanton Hill”
- Intel-only System Validation Platform (SVP), “Clanton Peak”

For instructions on building and running the release software, see the Intel® Quark SoC X1000 BSP Build Guide (see [Table 1](#)).

These release notes also include known issues with third-party or reference platform components that affect the operation of the software.

1.1 Features

New features in release 0.9 include:

- IsADC and eADC optional plug-in for timer-based sampling trigger
- Switch from SPI flash mapped platform data to ACPI objects for platform ID, MAC addresses, and serial number
- BIOS Recovery and Update functionality (see [Section 1.1.1](#))

1.1.1 BIOS/Firmware

New features in release 0.9 include:

- Recovery enhancements:
 - Force recovery support added (jumper/strap to force the system into recovery mode)
 - Secure recovery support added (recovery capsules must be validly signed for Secure SKUs)
- Update enhancements:
 - Secure update support added (update capsules must be validly signed for Secure SKUs)



- Secure Lock Down build support added for secure SKUs. Added `-DSECURE_LD` build option for creating image for secure SKUs. This restricts the boot options from EDKII (USB/SD/UEFI Shell boot are not allowed).
- Security enhancements:
 - Updates to Protected BIOS Range registers, thus protecting more SPI flash regions.
 - SMI protection of SPI flash (secure SKUs only). Prevents non-EDKII code from updating SPI flash.
- Name change from Clanton code name to Intel® Quark product name
- ECC scrubbing (memory patrol scrubbing) disabled regardless of fuse setting
- Secure boot using Root Of Trust ROM when using a secure SKU Intel® Quark SoC X1000
- Boot device selection:
 - SD boot
 - USB (OHCI/EHCI) boot
 - Payload boot (application in legacy SPI flash)
 - EFI Shell
- UEFI 2.3.1 compliant
- ACPI 5.0

1.1.2 Bootloader

- Secure boot Root of Trust when using a secure SKU Intel® Quark SoC X1000
- Isolated Memory Region (IMR) protection of compressed Linux* kernel before executing kernel
- Bootloader executed as payload from SPI flash
- Ability to load kernel and root-filesystem from SPI flash
- U-Boot memory tests ported and included

1.1.3 Operating System (OS)

- IMR protection of kernel, text, and data sections
- Kernel logic to parse platform data specific to Clanton Peak, Industrial/Energy Reference Design (Cross Hill), and Transportation Reference Design (Clanton Hill)
- Ethernet
 - Two Ethernet interfaces: Clanton Peak, Industrial/Energy Reference Design (Cross Hill), and Transportation Reference Design (Clanton Hill)
 - One Ethernet interface: Kips Bay and Galileo
- I²C interface
- GPIOs fully programmable as input or output from kernel gpiolib
- SPI master interface x 2
- USB OHCI/EHCI port x 2
- USB device
- SD master interface
- ECC updates configurable at runtime through `/sysfs` interface (formerly `/proc`)



- Small embedded user-space busybox based system < 2 megabytes compressed

1.1.4 OpenOCD

- OpenOCD patch removed from package; patch is available with OpenOCD source
- GDB* server and Telnet* server support
- Halt/Step/Resume CPU
- CPU register access
- Memory access
- IO Access (via OpenOCD command tool, not via GDB)

1.2 Limitations

The software package has the following limitations:

- S3 support is implemented but not validated. It is not recommended for use in this release.
- Legacy SPI flash recovery not implemented.
- eSRAM disabled in this release.
- 1588 time-stamping protocol not supported in this release.
- DMA UART driver not supported in this release.
- Watchdog timer not enabled.
- Automatic version number updating during the update/recovery process is not implemented. Rollback protection (preventing downgrading to a previous software version) requires the version number of a software module to be greater or equal to the corresponding version number stored in the SPI flash. Support to update the version number stored in SPI flash if the corresponding software module is being updated, has not been added.
- UEFI 2.3.1 Secure Boot support is not implemented.
- eADC calibration functionality is not implemented in this release.

1.3 Unplanned Functionality

Support for the following items is not plan of record (POR):

- Network boot
- Legacy OS boot
- ECC scrubbing (also called memory patrol scrubbing)



1.4 Component Versions

1.4.1 Packages

```
clanton_linux_v3.8.7+v0.9.0.tar.gz
grub-legacy_5775f32a+v0.9.0.tar.gz
meta-clanton_v0.9.0.tar.gz
Quark_EDKII_v0.9.0.tar.gz
sha1sum.txt
spi-flash-tools_v0.9.0.tar.gz
sysimage_v0.9.0.tar.gz
```

1.4.2 BIOS/Firmware Version

Development Platform	Version
Clanton Peak SVP	0.9

1.5 Related Documentation

The documents in [Table 1](#) provide more information about the software in this release.

Table 1. Related Documentation

Document Name	Reference Number
Intel® Quark SoC X1000 Software Release Notes (this document)	521235
Intel® Quark SoC X1000 Board Support Package (BSP) Build Guide	329687
Intel® Quark SoC X1000 BSP Programmer's Reference Manual	521233
Intel® Quark SoC X1000 Secure Boot Programmer's Reference Manual	521232
Clanton SoC UEFI Firmware Writer's Guide	517434
Clanton SoC UEFI Firmware Specification Update	539371
Source Level Debug using OpenOCD/GDB/Eclipse on Intel® Quark SoC X1000 Application Note https://communities.intel.com/docs/DOC-22203	330015
Intel® Quark SoC X1000 Datasheet https://communities.intel.com/docs/DOC-21828	329676
Intel® Quark SoC X1000 Core Developer's Manual https://communities.intel.com/docs/DOC-21826	329679
Intel® Quark SoC X1000 Core Hardware Reference Manual https://communities.intel.com/docs/DOC-21825	329678



2.0 Known Issues

Table 2. Summary of Software Open Issues

#45539 - SDMediaDevice.efi is setting older 25 MHz cards to 50 MHz
#46834 - UART interrupt handler not restored after resume from S3
#47110 - Issues writing to certain MMC cards
#48226 - eSRAM driver cannot map code required to do mapping
#60803 - BIOS error when using 2G MMC card
#58381 - Attempting to unload mmc_block driver which is in use causes console to freeze
#58453 - pch_udc driver crash on reload
#59100 - Reboot on non-secure boot issue (Clanton Hill)
#60803 - BIOS error when using 2G MMC card
#61236 - Real Time Clock update issue
#64048 - Cross Hill default GPIO configuration causes continuous ACPI GPE interrupt assertion
#64263 - Error detecting Western Digital USB 3.0 hard drive
#65041 - EEPROM not working on Galileo when alternative I2C address is selected
#65243 - Recent image split causes image-full-galileo not to be booted
#65706 - Hot plug of USB key intermittently fails
#65952 - USB Errors seen with Sandisk Cruzer 4GB Flash Drive
#66218 - Nonfunctional USB key may break the detection for other functional USB keys on Clanton Hill
#66318 - GPIO interrupt silently fails to disable the first time: has to be run twice

2.1 #45539 - SDMediaDevice.efi is setting older 25 MHz cards to 50 MHz

Title	SDMediaDevice.efi is setting older 25 MHz cards to 50 MHz
Reference	45539
Description	25MHz SD cards will not be recognised or usable.
Workaround	Use 'Fast' 50 MHz capable SD cards.

2.2 #46834 - UART interrupt handler not restored after resume from S3

Title	UART interrupt handler not restored after resume from S3
Reference	#46834
Description	Suspected race condition between 8250 restore code and interrupt handler.



Title	UART interrupt handler not restored after resume from S3 (Continued)
Implication	Following resume from S3 8250 will be in polled - not interrupt mode
Resolution	Do not enter into S3

2.3 #47110 - Issues writing to certain MMC cards

Title	Issues writing to certain MMC cards
Reference	#47110
Description	Write errors have been observed using a Transcend TS1GRMMC4 1GB Mobile MMC card.
Implication	Write errors will occur upon attempting to write to the 1G MMC card.
Resolution	Use a different MMC or SD card. SD cards are recommended for card based mass storage use on Clanton.

2.4 #48226 - eSRAM driver cannot map code required to do mapping

Title	eSRAM driver cannot map code required to do mapping
Reference	#48226
Description	eSRAM driver depends on code internally and externally in order to map things into eSRAM. During the mapping process, over-layed sections of DRAM become NULL for a time.
Implication	It is not possible to eSRAM overlay code to itself be overlayed.
Resolution	Do not try to overlay any of the following kernel symbols intel_cln_esram_* intel_cln_sb_* memcpy spin_lock spin_unlock spin_lock_irqsave spin_unlock_irqrestore pci_read_config_dword pci_write_config_dword

2.5 #53887 - Deadlock in bluetooth stack - inherited from upstream kernel

Title	Deadlock in bluetooth stack - inherited from upstream kernel
Reference	53887
Description	When using the bluetooth software stack a potential deadlock message can be found in /var/log/messages. Could potentially cause a lock-up but this has yet to be shown.
Workaround	None.



2.6 #58381 - Attempting to unload mmc_block driver which is in use causes console to freeze

Title	Attempting to unload mmc_block driver which is in use causes console to freeze
Reference	#58381
Description	When SD/MMC mass storage device is mounted and user executes 'modprobe -r mmc_block' then existing console hangs, kernel waits for mass storage device to get unmounted.
Implication	Existing console not usable until board rebooted or mass storage device unmounted from other console.
Workaround	Unmount mass storage device first, then unload mmc_block driver.

2.7 #58453 - pch_ude driver crash on reload

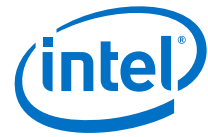
Title	pch_ude driver crash on reload
Reference	#58453
Description	When ehci_pci, ehci_hcd, pch_ude, g_serial drivers are loaded and user executes: modprobe -r g_serial modprobe -r pch_ude modprobe pch_ude then pch_ude driver crashes. Problem seen on Galileo board.
Implication	Driver unusable until board rebooted.
Workaround	Unload first ehci-pci driver to revert to USB1.1, then g_serial and pch_ude drivers can be unloaded or reloaded.

2.8 #59100 - Reboot on non-secure boot issue (Clanton Hill)

Title	Reboot on non-secure boot issue (Clanton Hill)
Reference	#59100
Description	Reboot command from Linux is not supported on Clanton Hill platforms fitted with SKU4 (Non-Secure) SoC.
Implication	Upon issuing "reboot" command from Linux prompt, the platform will not reboot. It will appear to do so at first but then not boot through BIOS.
Workaround	Remove "reboot=efi,warm" from grub.conf. Issue "e" command at Grub menu and remove "reboot=efi,warm".

2.9 #60803 - BIOS error when using 2G MMC card

Title	BIOS error when using 2G MMC card
Reference	60803
Description	2G Transcend MMC card (TS2GMMC4) is not recognised or is unusable.
Workaround	Use alternative MMC card.



2.10 #61236 - Real Time Clock update issue

Title	Real Time Clock update issue
Reference	61236
Description	The initscripts provided in poky release 1.4 do not support the simplified date program used by busybox. This shows an error in the boot log and may prevent Linux from reading time from the RTC clock and from saving time to it.
Workaround	Go to the /etc/init.d/ directory on the target system. In both the bootmisc.sh and save-rtc.sh scripts there, search and replace: "date -u +%4Y%2m%2d%2H%2M" with "date -u +%Y%m%d%H%M" instead.

2.11 #64048 - Cross Hill default GPIO configuration causes continuous ACPI GPE interrupt assertion

Title	Cross Hill default GPIO configuration causes continuous ACPI GPE interrupt assertion
Reference	64048
Description	Cross Hill has a GPIO connected to an external daughtercard. The daughtercard holds an input line to the CPU low by default. This GPIO is configured to generate an ACPI General Purpose Event (GPE) by default in the reference BSP image. As a result, a continuous non-clearing interrupt is asserted to the CPU on an ongoing basis. This results in the ACPI IRQ handler thread being run on a near continuous basis - leading to system usage occupancies of 95%+ and above.
Workaround	Run the following command twice: echo disable > /sys/firmware/acpi/interrupts/gpe0E This has to be run twice because of another inherited defect (66318).

2.12 #64263 - Error detecting Western Digital USB 3.0 hard drive

Title	Error detecting Western Digital USB 3.0 hard drive
Reference	64263
Description	Western Digital USB 3.0 HDD not recognized or usable.
Workaround	Use alternative USB HDD.

2.13 #65041 - EEPROM not working on Galileo when alternative I²C address is selected

Title	EEPROM not working on Galileo when alternative I²C address is selected
Reference	65041
Description	The I ² C address of the EEPROM on Galileo boards is hardcoded in software to 0x50. When pin 0 and 1 are stuffed on J2 pin header, the EEPROM will not function.
Workaround	J2 pin header to stuff pin1 with pin2 (setting EEPROM hardware I ² C address to 0x50).



2.14 #65243 - Recent image split causes image-full-galileo not to be booted

Title	Recent image split causes image-full-galileo not to be booted
Reference	65243
Description	Filename mismatch between built file "image-full-galileo-clanton.ext3" and content of generic, non-galileo specific grub.conf file. System cannot boot and GRUB fails with a "file not found" error message.
Workaround	Either rename the file from image-full-galileo-clanton.ext3 to image-full-clanton.ext3 or Edit grub.conf file the other way round, adding the "-galileo" suffix in the image name.

2.15 #65706 - Hot plug of USB key intermittently fails

Title	Hot plug of USB key intermittently fails
Reference	65706
Description	USB key is not recognized or is unusable.
Workaround	Disconnect and reconnect the USB key.

2.16 #65952 - USB Errors seen with Sandisk Cruzer 4GB Flash Drive

Title	USB Errors seen with Sandisk Cruzer 4GB Flash Drive
Reference	65952
Description	USB Key 'Sandisk Cruzer 4GB' is not recognized or is unusable in BIOS.
Workaround	Use alternative USB key.

2.17 #66218 - Nonfunctional USB key may break the detection for other functional USB keys on Clanton Hill

Title	Nonfunctional USB key may break the detection for other functional USB keys on Clanton Hill
Reference	66218
Description	A nonfunctional USB key may break the detection for other functional USB keys on Clanton Hill. Seen only when non-functional USB key connected to J1. Note that J12 (USB port0) and functional USB key connected to J10 (USB port1 via hub). Issue not seen when positions swapped.
Workaround	Only connect functional USB devices (USB devices that EDKII can function with without errors) to the system.



2.18 #66318 - GPIO interrupt silently fails to disable the first time: has to be run twice

Title	GPIO interrupt silently fails to disable the first time: has to be run twice
Reference	66318
Description	The ACPI general purpose event gpe0E is being enabled twice, once at boot-time and once by the button driver. This causes the need to issue the command 'echo disable > /sys/firmware/acpi/interrupts/gpe0E' twice before the general purpose event is disabled.
Workaround	Issue the command 'echo disable > /sys/firmware/acpi/interrupts/gpe0E' twice to disable the general purpose event. Once this is done, we can enable/disable by issuing the command only once.



3.0 Resolved Issues

This section contains issues that have been resolved in this release.

Table 3. Summary of Software Resolved Issues

#37819 - Yocto's bitbake is non-deterministically trying to link GRUB to ncurses
#45992 - No serial output when building with Ubuntu
#48519 - Linux thermal driver spuriously shut down system after S3 resume
#48766 - Unloading GPIO drivers not supported
#55498 - Ethernet DHCP only works if a DHCP server is available at boot time
#59102 - Secure boot fail to boot when using SD second partition as mounted root
#59104 - Kernel warning on secure SKUs
#59170 - USB related error message showing up early in EDKII boot stage (Clanton Hill)

3.1 #37819 - Yocto's bitbake is non-deterministically trying to link GRUB to ncurses

Title	Yocto's bitbake is non-deterministically trying to link GRUB to ncurses
Reference #	#37819
Description	Depending on the number of threads assigned to bitbake, GRUB will be configured either with or without ncurses.
Implication	Since our current GRUB code does not support ncurses this can make the entire Yocto build fail.
Resolution	Resolved in release 0.8.0 GRUB package has been configured with explicit dependencies and is no longer linked to ncurses.

3.2 #45992 - No serial output when building with Ubuntu

Title	No serial output when building with Ubuntu
Reference #	#45992 / 54155
Description	This problem is still being investigated. Some users have reported no output at all on the serial port even after a flash image build that appeared to be successful. While no root cause could be isolated yet it seems Ubuntu was used to build every time.
Implication	The system does not seem to boot.
Resolution	Resolved in release 0.9.0 Issue was caused by a missing -march=i586 GCC flag in the EDKII compiler configuration file.



3.3 #48519 - Linux thermal driver spuriously shut down system after S3 resume

Title	Linux thermal driver spuriously shut down system after S3 resume
Reference #	#48519
Description	Following resume from S3 Linux thermal driver will shut down the system. Value read back from temperature sensor indicates to system software a temperature threshold has exceeded critical levels.
Implication	Board will reset
Resolution	Resolved in release 0.8.0 Disable thermal polling prior to entry into S3. echo disabled > /sys/class/thermal/thermal_zone0/mode

3.4 #48766 - Unloading GPIO drivers not supported

Title	Unloading GPIO drivers not supported
Reference	#48766
Description	The board setup code registers GPIO-dependent platform devices upon GPIO drivers loading (gpio-sch and intel-cln-gip). If the GPIO drivers are then unloaded and reloaded, the board setup code will register these platform devices once more.
Implication	One or more copies of the same platform device will get registered, and consequently their platform driver will fail probing.
Resolution	Resolved in release 0.9.0

3.5 #55498 - Ethernet DHCP only works if a DHCP server is available at boot time

Title	Ethernet DHCP only works if a DHCP server is available at boot time
Reference	#55498
Description	The DHCP client software provided by default tries to configure Ethernet only once at boot time and never attempts it later.
Implication	No TCP/IP network connectivity will be available unless the Ethernet port is connected to a DHCP server at boot time.
Resolution	Resolved in release 0.9.0

3.6 #59102 - Secure boot fail to boot when using SD second partition as mounted root

Title	Secure boot fail to boot when using SD second partition as mounted root
Reference	#59102
Description	It is not possible to boot release 0.8.0 non-interactively from a "raw" Linux partition on SD. To boot interactively, just insert your partitioned mass storage device, boot from default entry and when it fails and drops to shell execute: exec switch_root -c /dev/console /dev/mmcblk0p2 /sbin/init (for second partition of SD card) or exec switch_root -c /dev/console /dev/sda2 /sbin/init (for second partition of USB stick)
Implication	Kernel waits forever for MMC device that never becomes available.



Title	Secure boot fail to boot when using SD second partition as mounted root
Resolution	Resolved in release 0.9.0

3.7 #59104 - Kernel warning on secure SKUs

Title	Kernel warning on secure SKUs
Reference	#59104
Description	<p>Grub allocates 4kB-aligned pages for the compressed initrd. Under secure boot, it also places the signature header in the first 1kB of the allocated area.</p> <p>From the point of view of the kernel, this operation makes the initrd image not 4k-page aligned. Upon releasing the compressed initrd memory region, the kernel detects an unaligned initrd address and it throws the following warning:</p> <pre>[13.461525] WARNING: at /build/mherber2/v0.8.0-rc3/build/meta-clanton_v0.8.0-rc3/yocto_build/tmp/work/clanton-poky-linux-uclibc/linux-yocto-clanton/3.8-r0/linux/arch/x86/mm/init.c:344 free_init_pages+0x55/0x140() [13.482555] Modules linked in: [13.485989] Pid: 1, comm: swapper Not tainted 3.8.7-yocto-standard #1 [13.493263] Call Trace: [13.496053] [<c102b6ef>] ---[="" 0x111="" 0x140="" 0x150="" 0x1a0="" 0x1d="" 0x20="" 0x258="" 0x30="" 0x3a="" 0x7a="" 0x80="" 0x8a="" 0xb0="" 0xd0="" 0xed="" 13.502145]="" 13.507893]="" 13.513790]="" 13.519549]="" 13.525266]="" 13.530886]="" 13.535973]="" 13.541973]="" 13.547625]="" 13.552556]="" 13.558992]="" 13.564976]="" 13.570781]="" 13.576921]="" 13.582613]="" 13.587592]="" 13.593854]="" 13.598982]="" 7b4a990828805f78="" ?="" [="" [<c100121a>]="" [<c1023115>]="" [<c102b72d>]="" [<c12e0df0>]="" [<c12e0dfb>]="" [<c12e42f3>]="" [<c12ea6fb>]="" [<c1467457>]="" [<c1467a6b>]="" [<c146919b>]="" [<c14692e1>]="" [<c14694df>]="" [<c14751ed>]="" [<c1482cff>]=""]---<="" do_early_param+0x7a="" do_one_initcall+0x10a="" end="" free_init_pages+0x55="" free_initrd+0x71="" free_initrd_mem+0x1b="" kernel_init+0xb="" kernel_init_freeable+0x106="" maybe_link.part.6+0xed="" pci_apply_final_quirks+0xf2="" populate_rootfs+0x1fe="" pre="" printk+0x38="" rest_init+0xb0="" ret_from_kernel_thread+0x1b="" trace="" warn_slowpath_common+0x5f="" warn_slowpath_null+0x1d=""></c102b6ef>]></pre>
Implication	The first compressed initrd page is not freed up by the kernel. This results in a 4kB memory leak.
Resolution	Resolved in release 0.9.0

3.8 #59170 - USB related error message showing up early in EDKII boot stage (Clanton Hill)

Title	USB related error message showing up early in EDKII boot stage (Clanton Hill)
Reference	#59170
Description	<p>USB Error reported on Clanton Hill during BIOS boot.</p> <p>UsbCreateDesc: met mal-format descriptor</p> <p>UsbParseInterfaceDesc: failed to create endpoint(index 0)</p> <p>UsbParseConfigDesc: failed to parse interface setting</p> <p>UsbBuildDescTable: failed to parse configure (index 0)</p> <p>UsbEnumerateNewDev: failed to build descriptor table - Device Error</p>
Implication	Functionality is not impacted, error messages can be ignored.



Title	USB related error message showing up early in EDKII boot stage (Clanton Hill) (Continued)
Resolution	Resolved in release 0.9.0

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