

Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/Intel® Pentium™ Processor N4200 Board Support Package for Yocto Project*

Release Notes

MR1 Release

December 2016



You may not use or facilitate the use of this document in connection with any infringement or other legal analysis concerning Intel products described herein. You agree to grant Intel a non-exclusive, royalty-free license to any patent claim thereafter drafted which includes subject matter disclosed herein.

All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest Intel product specifications and roadmaps.

The products described may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Copies of documents which have an order number and are referenced in this document may be obtained by calling 1-800-548-4725 or by visiting: <http://www.intel.com/design/literature.htm>

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Learn more at <http://www.intel.com/> or from the OEM or retailer.

No computer system can be absolutely secure.

Intel, Atom, Core, Pentium, and the Intel logo are trademarks of Intel Corporation in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.

Copyright © 2016, Intel Corporation. All rights reserved.



Contents

1.0	Introduction.....	6
1.1	Terminology.....	6
1.2	Intended Audience.....	7
1.3	Customer Support.....	8
1.4	Reference Documents	8
2.0	BSP Release Notes	9
2.1	Hardware and Software Compatibility.....	9
3.0	Component Release Notes.....	10
3.1	Input Output (IO)/Kernel	10
3.1.1	Introduction.....	10
3.1.2	New Features	10
3.1.3	Product Features.....	10
3.1.4	Changes to Existing Features	11
3.1.5	Unsupported Features.....	11
3.1.6	Known Issues.....	11
3.1.7	Fixed Issues	12
3.2	Graphics.....	12
3.2.1	Introduction.....	12
3.2.2	New Features	12
3.2.3	Product Features.....	13
3.2.4	Changes to Existing Features	14
3.2.5	Unsupported or Discontinued Features	14
3.2.6	Known Issues.....	15
3.2.7	Fixed Issues	16
3.3	Audio.....	17
3.3.1	Introduction.....	17
3.3.2	Product Features.....	17
3.3.3	New Features	18
3.3.4	Mandatory BIOS Settings	18
3.3.5	Known Issues.....	18
3.3.6	Fixed Issues	19
3.3.7	Limitation	19
3.4	Intel® Integrated Sensor Solution.....	19
3.4.1	Introduction.....	19
3.4.2	New Features	19
3.4.3	Product Features.....	20
3.4.4	Known Issues.....	21
3.4.5	Fixed Issues	21
3.4.6	Limitation	21
3.4.7	Related Documentation	23



4.0	Where to Find the Release	24
5.0	Getting Started with Board Support Package	25
5.1	Setting Up the Host Machine.....	25
5.2	Getting Started with BSP for Yocto Project*.....	25
5.2.1	Default Configuration Set for core-image-sato Image in this BSP.....	25
5.2.2	Your First Build	26
5.2.3	For Subsequent Build	28
5.2.4	Install Image into On-Board eMMC*.....	29
5.2.5	Optional Configuration.....	29
5.2.6	Known Issues (General and BSP for Yocto Project*).....	29

Figures

Figure 1.	Sampling Frequency Example 1	21
Figure 2.	Sampling Frequency Example 2	22
Figure 3.	Machine Driver Options	26
Figure 4.	Build Options.....	27

Tables

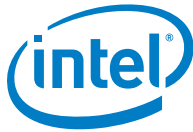
Table 1.	Terminology.....	6
Table 2.	Reference Documents	8
Table 3.	IO/Kernel – Known Issues.....	11
Table 4.	IO/Kernel – Fixed Issues	12
Table 5.	Graphics – Known Issues.....	15
Table 6.	Graphics – Fixed Issues	16
Table 7.	Audio – Product Features	17
Table 8.	Audio – Known Issues.....	18
Table 9.	Intel® Sensor Solution – Product Features.....	20
Table 10.	Intel® Sensor Solution – Known Issues	21



Revision History

Date	Revision	Description
December 2016	002	Maintenance Release 1 (MR1)
August 2016	001	Initial Release (Gold)

§



1.0 Introduction

The Intel Board Support Packages (BSPs), also known as the intel-common BSPs, provide a few carefully selected tune options and generic hardware support to cover the majority of current Intel CPUs and devices. Intel is providing their Yocto Project*-based BSP for the Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/Intel® Pentium™ Processor N4200 for testing/evaluation and project-based software development purposes

1.1 Terminology

Table 1. Terminology

Term	Description
API	Application Programming Interface
BSP	Board Support Package
CRB	Customer Reference Board
DDX	Device Dependent X
DSI	Data Stream Interface
eDP*	embedded Display Port*
DRRS	Display Refresh Rate Switching
DMA	Direct Memory Access
DPMS	Display Power Management System
DRI	Dynamic Range Increase
DRM	Direct Rendering Manager
DDX	Device Dependent X
ECC	Error Checking and Correction
EDID	Extended Display Information Data
eMMC*	Embedded Multi-Media Card
GPIO	General Purpose Input Output
GUI	Graphical User Interface
HDCP*	High-bandwidth Digital Content Protection
HDMI*	High Definition Multimedia Interface*
HID	Human Interface Device
HPET	High Performance Event Timer
I ² C*	Inter-Integrated Circuit

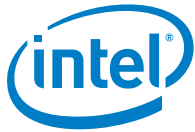


Term	Description
IO	Input Output
IOCTL	Input/Output Control
IIO	Industrial Input/Output
IoT	Internet of Things
LPC	Low Pin Count
LPE	Low Power Engine
LPSS	Low Power Sub-System
LTS	Long-Term Support
MIPI	Mobile Industry Processor Interface
NOR	Notice of Revision
OTC	Over the Counter
OS	Operating System
PSR	Panel Self-Refresh
PCIe*	Peripheral Component Interconnect express*
POR	Plan of Record
PIO	Programed Input/Output
PWM	Pulse Width Modulation
RAM	Random Access Memory
RTC	Real Time Clock
SDIO*	Secure Digital Input Output*
SoC	System-on-Chip
SMBus	System Management Bus
SPI	Serial Peripheral Interface
SSH	Secure Shell
UART	Universal Asynchronous Receiver/Transmitter
UFO	Intel® Unified 3D library
USB	Universal Serial Bus
VPP	Video Post Processing
xDCI	Extensible Device Controller Interface

1.2 Intended Audience

This release note is intended for customers who want to use BSP for Yocto* Project* for Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/ Intel® Pentium™ Processor N4200.

Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/
Intel® Pentium™ Processor N4200 BSP for Yocto Project*



1.3 Customer Support

Contact your Intel representative for support or submit an issue to <http://premiersupport.intel.com>.

1.4 Reference Documents

Table 2. Reference Documents

Document	Document No./Location
Overrun and Underrun Issue in USB2.0	570645

§



2.0 *BSP Release Notes*

2.1 **Hardware and Software Compatibility**

Hardware

Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/Intel® Pentium™ Processor N4200.

Software

BSP MR1 Release, Kernel v4.1.27

§



3.0 Component Release Notes

3.1 Input Output (IO)/Kernel

3.1.1 Introduction

This section contains general release information for I/O and kernel components for the Yocto Project*.

3.1.2 New Features

None

3.1.3 Product Features

Supported IO/Kernel features.

- Storage: Serial Peripheral Interface (SPI) Notice of Revision (NOR), Embedded Multi-Media Card (eMMC*), SD* card, SATA*, USB 2/3 host, USB device
- System: Real Time Clock (RTC), thermal, High Performance Event Timer (HPET), 8253 timer, watchdog
- Low Power Sub-System (LPSS): Universal Asynchronous Receiver/Transmitter (UART)/High Speed-UART (HS-UART), Inter-Integrated Circuit (I²C*), SPI
- Memory: Error Checking and Correction (ECC)
- Power Management: S3, S4, S5, Intel P-state driver, S0ix
- Connectivity: Gigabit Ethernet
- Miscellaneous: Low Pin Count (LPC), Peripheral Component Interconnect express* (PCIe*), System Management Bus (SMBus), General Purpose Input Output (GPIO), Secure Digital Input Output (SDIO*), Pulse Width Modulation (PWM), IOSF-SB
- S0ix power management – Enabled the sleep model s0ix (Refer to [Section 3.1.6, Known Issues](#)).
- S0ix telemetry driver – This driver provide insight to IOSS and PSS IPs power status and s0ix residency for debug purpose.
- Universal Serial Bus (USB) dual role HW detection – With platform HW support, the detection of USB host or device connected is switch automatically.
- USB dual role default mode – Driver module parameter to enable default to host or device configuration during boot up.



- LPSS SPI Programed Input/Output (PIO)/Direct Memory Access (DMA) transfer threshold configuration – The threshold to use PIO or DMA can be configured through board file.
- LPSS I²C* timeout setting configuration - Added new Input/Output Control (IOCTL) interface for I²C controller timeout configuration.
- LPSS I²C speed mode configuration – The speed mode configuration is now done through BIOS. This timing parameter for different speed mode is also control by BIOS which was previously hard coded in driver.
- LPSS HSUART full duplex support – Verified driver full duplex support.

3.1.4 Changes to Existing Features

None.

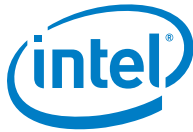
3.1.5 Unsupported Features

None.

3.1.6 Known Issues

Table 3. IO/Kernel – Known Issues

Reference Number	Issue
1504085168	Run Time Power Management doesn't work for xDCI driver
1504294197	High wake up rate 40 per second due to apps and kernel scheduler for autonomous s0ix
1504294212	PCIE Ethernet device I210 driver support RTD3 for autonomous s0ix
1504310725	[Intel® Atom™ E3900 SoC Family]:Ethernet packet respond in less than 500ms during S0ix wake
1504299796	eMMC extcsd recommended settings
1504294197	[Intel® Atom™ E3900 SoC Family]: 8GB micro-sd file content is harmed after removal during read operation
1504295033	S0ix blocked by USB device not power gated
1504104559	SDHC Power Management - Not suspended all time
1504339468	[Apl-i]: Unable to go into S0ix state when PCIE Ethernet card is connected to the SUT
1504338095	emmc CRC errors not following JEDEC specification
1504280598	Serial UART to support RTD3 for autonomous s0ix



3.1.7 Fixed Issues

Table 4. IO/Kernel – Fixed Issues

Reference Number	Issue
1504118795	UART Baud Rate 50 and Baud Rate 3M-4M with Software Flow Control Failed to receive data
1804236847	I2C-designware id allocation issue
1504232605	[Intel® Atom™ E3900 SoC Family]: Frequent "mmc0: Got data interrupt 0x00000002 even though no data operation was in progress" messages observed for micro-SD
1504261722	I2C Arbitration Loss when transmitting numerical values
1504317092	Kernel panic when copy 1GB file from one partition to another partition more than one time in mi...
1504324515	Fail to wakes up system from for S0ix

3.2 Graphics

3.2.1 Introduction

This section contains general release information for the Intel® Internet of Things (IoT) Graphics and Media Driver on Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/ Intel® Pentium™ Processor N4200 for Yocto Project*. Graphics are derived from open source i915 DRM and i965 DRM together with some proprietary components in the RPM (tar ball) format, e.g. Intel® Unified 3D Library, Intel® Media SDK etc.

3.2.2 New Features

- HDCP 1.4
- Several DDX features
- GPU based XVideo adaptors
- Frame Packing Stereoscopic 3D
- Frame Sequential Stereoscopic 3D
- Top-bottom Stereoscopic 3D
- HDCP* daemon support for multiple clients
- Nano libva
- ProcAmp - i965 video driver provides VPP method to adjust ProcAmp values e.g. Brightness, Contrast, Saturation and Hue.

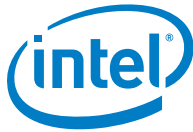


- OTC Video - VP8 encode
- OTC Video - VP9 decode
- Patch for libva stolen memory
- Bug fixes

3.2.3 Product Features

- OpenGL ES 3.1 through Intel® Unified 3D library Dynamic Range Increase (DRI). With this, MESA library usage will not be a POR for broad market.
- i915 atomic interface support.
- i915 atomic: Non-blocking nuclear pageflip.
- Fastboot modeset timing. E.g. i915 driver shall complete full mode set within 20ms in single display, 35ms within dual displays and 55ms or less for triple displays configuration.
- Gamma through i915 driver DRM plane property support.
- DisplayPort* brightness Application Programming Interface (API) interface.
- Splash Screen support with capabilities e.g. image data, image quality, scaling, multiple displays, config displays, config destination size, minimize time to display the splash screen, `request_firmware` interface and no format conversion on splash screen image.
- Hibernation and resume including during 3D and Video.
- Standby and resume including during 3D and Video.
- Prioritized GPU task scheduler.
- Media/Video:
 - a. Intel® Media SDK support. Refer to Intel® Media SDK release note for more detail.
 - i. HEVC/H.265 8-bit encode (Intel® Media SDK)
 - Note:** Refer to [Section 3.2.6 Known Issues](#) for more limitation detail.
 - ii. VP8 2160p decode (Intel® Media SDK)
 - iii. X11 DRI3/Present Extension (Intel® Media SDK)
 - iv. Advance deinterlacing (Over the Counter (OTC) and Intel® Media SDK)
 - v. Gstreamer decode plugin (Intel® Media SDK)
 - vi. Gstreamer sink plugin (Intel® Media SDK)
 - vii. Gstreamer Video Post Processing (VPP) plugin (Intel® Media SDK)
 - b. Open source technology video acceleration:
 - i. HEVC/H.265 10-bit decode
 - ii. Skin tone detection
 - iii. Sharpening

Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/
Intel® Pentium™ Processor N4200 BSP for Yocto Project*



- iv. Up/Down scaling
- v. Denoise
- vi. PRIME buffer sharing
- vii. Advance Deinterlacing

- Updated i915, i965, DRM, and Device Dependent X (DDX) drivers
- Display – single High Definition Multimedia Interface* (HDMI*), DisplayPort*, embedded Display Port* (eDP*)
- Display - Multi displays, rotation, scaling, centering
- Display – plane color key, blending
- Display Power Management System (DPMS), ACPI
- 3D – OpenGL 3.3, OpenGL ES 3.0
- Decode - H264, MPEG2, VC1, JPEG2, VP8, HEVC 8bit, [M]JPEG
- Encode – H264, [M]JPEG
- Video processing, color conversion
- RC6*, Turbo, Display Refresh Rate Switching (DRRS), Panel Self-Refresh (PSR)
- HDCP* 1.4
- Gstreamer plugin (decode and sink)
- eDP1.3

3.2.4 Changes to Existing Features

None.

3.2.5 Unsupported or Discontinued Features

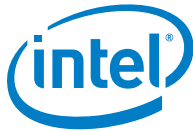
- Text Tuning
- MPEG2 encode
- Shared Virtual Memory
- Display Configuration - genlock
- Gen-Lock multi-pipe
- Display detection override
- CRTC list



3.2.6 Known Issues

Table 5. Graphics – Known Issues

Reference Number	Description	Status
1304657512	standalone shader - simple-egl example - shader compiles but at runtime does not look correct	Open
1405307922	8% performance drop is observed on a couple of subtests of GFXBench 4.0 with UFO DRI	Open
1504313229	Decode GStreamer VAAPI encoded video shown minor distortion for MJPEG	Open
1504326707	Mouse in different positions in clone mode when display is rotated in certain pattern	Open
1504332215	GL42-45 gpu_shader_fp64.varyings causes GPU hang on UFO version 56524	Open
1504335321	Intermittent video freeze on last frame when decoding H264 video with rotation on eMMC	Open
1504335581	UFO nano is not supported on B1 Adopted SKU QKT4	Open
1504340500	Rendercheck triangles test fails	Open
1504340562	Rendercheck gradients test fails	Open
1405395069	eDP blanks after booting upto to Yocto OS	Open
1504349846	MIPI DSI (JDI) is able to boot up, But no display after yocto loading page.	Open
1804660752	Dependencies to X11 from iHD_DRV_video.so need to be removed.	Open
1504349075	Video (HEVC) encode via MSDK Gstreamer may cause GPU hang. Workaround: Do not perform HEVC video encoding. Any application performing HEVC encode may need to be closed and restarted for encode to continue to work	Open
1504229313	Gstreamer VAAPI sharpen element error with minimum and maximum range of value	Open
1504229597	Video upscaling seen in X11 matchbox when Gstreamer VAAPI rotation 90 and 270 with force aspect ratio	Open
1504233919	Stuck in subtest fbc-modesetfrombusy in kms_frontbuffer_tracking in IGT(Intel tools)	Open
1504237918	Failure in subtest small-gtt-forwards and stuck in gem_pwrite in IGT tools.	Open
1504290865	CPU pipe a FIFO underrun messages observed irregularly	Open



Reference Number	Description	Status
1504296858	Hot-plug in not detected intermittently when connected through a repeater on HDMI1	Open
1504300124	X11 Matchbox & Weston compositor Freeze when apply VT Switching during 3D apps running	Open
1504306947	Display with smaller resolution during multiple displays flicker intermittently or blink on off	Open
1504309982	Atomic update failure on pipe A on dmesg while running 72 hours stress test	Open
1504310000	CL_INVALID_WORK_GROUP_SIZE when work dimension exceeds 16.	Open
1804338136	DRM does not expose all universal planes - It only exposes cursor plane instead	Open
1504074120	No Display on DP MST (multi-stream transport) display	Open
1504086462	IGT (Intel-gpu-tools) Plane Support Rotation tested fail	Open

3.2.7 Fixed Issues

Table 6. Graphics – Fixed Issues

Reference Number	Description	Status
1504207130	Segmentation Observed during video playback for resolution that are non-divisible by 16 in X11 using GSTVaapi plugin	Fixed
1504241233	MIPI (JDI Panel) requires multi reboot in order to boot up with display	Fixed
1504254560	Low FPS when encoding 4k with down scaling on certain resolution	Fixed
1504288031	Multi decoding returns abnormal FPS spike when running 16 simultaneous video	Fixed
1504298618	DRM mode video wall flickering seen with MSDK	Fixed
1504298664	DRM mode video wall dual display issue with MSDK	Fixed
1504299750	Display Corruption for Gstreamer VAAPL vaapipostproc hue=-180	Fixed



Reference Number	Description	Status
1504301406	Rollback found in sample_decode DRM mode	Fixed
1504307416	Subtests fail while running kms_fbc_crc in IGT tools.	Fixed
1504308096	Low values of PSNR for 6 VPP composition cases.	Fixed
1504309687	Subtests fail while running kms_plane in IGT tools.	Fixed
1504312051	Unable to install UFO RPM without force install	Fixed

3.3 Audio

3.3.1 Introduction

This section contains general release information for audio.

3.3.2 Product Features

Table 7. Audio – Product Features

I/O Component	Summary of Feature	Feature Availability
HD Audio	48kHz, Stereo HD Audio playback through onboard HD Audio Codec	Yes
	48kHz, Stereo HD Audio capture through onboard HD Audio Codec	Yes
HD Audio (Cont.)	HDMI Audio Playback	Yes
	HTML5 Audio Playback	Yes
	DisplayPort Audio Playback	Yes
	1 HDMI and 1 DisplayPort Audio Playback	Yes
	2 HDMI Audio Playback	Yes
	2 DisplayPort Audio Playback	Yes
	Power management for HDMI Audio, DisplayPort Audio, HDA Codec	Yes
I ² S* Audio	I2S, 48kHz, Master Mode Stereo Playback with Dummy Codec	Yes



I/O Component	Summary of Feature	Feature Availability
I2S* Audio (Cont.)	I2S, 48kHz, Master Mode Stereo Capture with Dummy Codec	Yes
	I2S, 48kHz, Master Mode Stereo Playback with WM8731 Codec	Yes
	I2S, 48kHz, Master Mode Stereo Capture with WM8731 Codec	Yes
	I2S, 48kHz, Master Mode Mono and Stereo Playback with TLV320AIC3107 Codec	Yes
	I2S, 48kHz, Master Mode Stereo Capture with TLV320AIC3107 Codec	Yes
	I2S, 48kHz, Slave Mode Mono and Stereo Playback with TLV320AIC3107 Codec	Yes
	I2S, 48kHz, Slave Mode Stereo Capture with TLV320AIC3107 Codec	Yes
	Power management	Yes
	ACPI NHLT Table	Yes
	Ease use for customer feature	Yes

3.3.3 New Features

None.

3.3.4 Mandatory BIOS Settings

1. Mandatory BIOS settings for HD Audio

DEVICE MANAGER > SYSTEM SETUP > SOUTH CLUSTER CONFIGURATION >
HD AUDIO CONFIGURATION > HD-AUDIO I/O BUFFER OWNERSHIP= HD
Audio Link owns all the I/O buffers

2. Mandatory BIOS settings for I²S

DEVICE MANAGER > SYSTEM SETUP > SOUTH CLUSTER CONFIGURATION >
HD AUDIO CONFIGURATION > HD-AUDIO I/O BUFFER OWNERSHIP=I²S port
owns all the I/O buffers

3.3.5 Known Issues

Table 8. Audio – Known Issues

Reference Number	Issue	Status
1504169268	[HDA] Audio record overrun, Refer to Section 3.3.7, Limitation	Not Fixed



3.3.6 Fixed Issues

None

3.3.7 Limitation

- For SoC revision A0 Stepping, rework is needed to enable HD Audio. Refer to the audio user guide for more details.
- For TLV320AIC3107 codec to work in LPE Audio, rework is needed. Refer to the audio user guide for more details.
- HD Audio and SSP cannot co-exist in one bimage.
- [1504169268] It is not recommended to run audio play/record on the same USB2.0 thumb drive that boot up the board. Refer application note titled "Overrun and Underrun Issues in USB2.0."

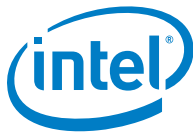
3.4 Intel® Integrated Sensor Solution

3.4.1 Introduction

This document contains general release information for Intel® Sensor Solution.

3.4.2 New Features

1. ISH drivers support S0iX state:
 - Able to enter S0iX suspend mode
 - Able to resume after suspended
 - Sensors functionalities are restored after resuming from S0iX.
2. Soletta sensor sample applications:
 - Accelerometer sensor sample application using flow-based programming (FBP)
 - Ambient light sensor sample application using high level C-api programming
 - Barometer sensor sample application using flow-based programming with MQTT
 - Gyroscope sensor sample application using traditional C programming with MQTT



3.4.3 Product Features

Table 9. Intel® Sensor Solution – Product Features

I/O Component	Summary of Feature
Intel® Sensor Solution	<ol style="list-style-type: none"> Supports accelerometer 3d sensor for Bosch* BMC150 accelerometer & BMA255 acceleration sensors, barometer sensor for Bosch BMP280 barometric pressure sensor, ambient light sensor for Lite-On* AL3010 digital ambient light sensor, and gyrometer sensor for Bosch BMG160 gyroscopes through the IIO interface: <ol style="list-style-type: none"> Read raw IIO triggered buffer Supports polling mode Supports interrupt mode through IIO interface for accelerometer 3d sensor for Bosch BMC150 accelerometer and ambient light sensor for Lite-On AL3010 digital ambient light sensor. ISH drivers consist of intel-ish-ipc.ko, intel-ishtp.ko, and intel-ishtp-hid.ko. Guide to unload and reload ISH modules are as below: <ol style="list-style-type: none"> To unload all three ISH drivers at once: \$ modprobe -r intel-ish-ipc To reload all three ISH drivers at once: \$ modprobe intel-ish-ipc To unload ISH drivers one by one using rmmmod: \$ rmmmod intel-ishtp-hid \$ rmmmod intel-ish-ipc \$ rmmmod intel-ishtp OR \$ rmmmod intel-ish-ipc \$ rmmmod intel-ishtp-hid \$ rmmmod intel-ishtp To reload ISH drivers one by one using insmod: \$ cd /lib/modules/4.1.27apollolake/kernel/drivers/hid/intel-ish-hid/ \$ insmod intel-ishtp.ko \$ insmod intel-ish-ipc.ko OR \$ insmod intel-ishtp.ko \$ insmod intel-ishtp-hid.ko \$ insmod intel-ish-ipc.ko Supports Soletta framework and sample applications for accelerometer 3d sensor, barometer sensor, ambient light sensor, and gyroscope 3d sensor.



3.4.4 Known Issues

Table 10. Intel® Sensor Solution – Known Issues

ID	Issue
1504309966	With AIC standstill, after power up, first buffer data not match compare to subsequent buffer data
1504294361	BXT-P B1: Unable to run S0ix in uncertain power cycle after enabling ISH in BIOS setting
1504290462	B1: Enabling ISH in BIOS menu will cause the S0ix Counter to double up
1504336955	Second accel_3d did not occur in /sys/bus/iio/devices/iio:device*/name
1504340819	Dmesg error during unloading and loading ISH driver modules
1504337496	Unable to read ISH Raw data after S3 mode

3.4.5 Fixed Issues

None

3.4.6 Limitation

3.4.6.1 Sampling Frequency

The IIO Linux* sysfs interface allows users to read and write the sampling frequency of each IIO device.

The unit used for IIO device sampling frequency is Hertz. In the Intel® Sensor Solution Firmware, the sampling frequency is equivalent to the HID Report Interval property. From the HID specifications, the Report Interval value is a 32-bit unsigned integer represented in milliseconds. Hence, during the conversion from Hertz to milliseconds in the IIO driver, the precision of the value is up to milliseconds.

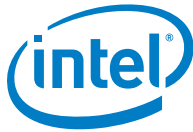
Example 1: User writes 11 Hertz for sampling frequency

User inputs: **11 Hertz** → 90.9090 milliseconds = 90 milliseconds

User reads back: 90 milliseconds → 11.11111 Hertz = **11.1 Hertz** (not 11 Hertz) with the **precision of 1 decimal number**.

Figure 1. Sampling Frequency Example 1

```
root@intel-corei7-64:~# echo 11 > /sys/bus/iio/devices/iio:device4/in_accel_sampling_frequency
root@intel-corei7-64:~# cat /sys/bus/iio/devices/iio:device4/in_accel_sampling_frequency
11.100000
```



Example 2: User writes 48 Hertz for sampling frequency

User inputs: **48 Hertz** → 20.833 milliseconds = 20 milliseconds

User reads back: 20 milliseconds → **50 Hertz**

Figure 2. Sampling Frequency Example 2

```
root@intel-corei7-64:/sys/bus/iio/devices/iio:device0# echo 48 > in_intensity_sampling_frequency
root@intel-corei7-64:/sys/bus/iio/devices/iio:device0# cat in_intensity_sampling_frequency
50.000000
```

Hence, due to this precision limitation, the sampling frequency value entered by user may not be very accurate.

1. Yocto* BSP Soletta recipe has disabled the `FLOW_SAMPLES` config. This config is meant for target build, not for host build.
2. APL MR1 Yocto BSP is based on "system V" initialization system whereas `soletta_dev_app` web browser IDE require "systemd". If user would want to experience `soletta_dev_app`, they could manually enable `systemd` & `soletta-dev-app` in MR1 APL Yocto BSP by following the steps below on their own risk.

systemd enabling steps:

Add below lines into `local.conf`:

```
# Use systemd
DISTRO_FEATURES_append = " systemd"
VIRTUAL-RUNTIME_init_manager = "systemd"
DISTRO_FEATURES_BACKFILL_CONSIDERED = "sysvinit"

# Configure networkd by default
PACKAGECONFIG_append_pn-systemd = " networkd microhttpd"
```

soletta-dev-app enabling steps:

Add below lines into `soletta-dev-app_git.bb`:

```
do_compile_append() {
    # changing the home directory to the working
    directory, the .npmrc will be created in this directory
    export HOME=${WORKDIR}

    # configure http proxy if necessary
    if [ -n "${http_proxy}" ]; then
        npm config set proxy ${http_proxy}
    fi
    if [ -n "${HTTP_PROXY}" ]; then
        npm config set proxy ${HTTP_PROXY}
    fi
}
```



```
# install multer
npm install --save multer
}
```

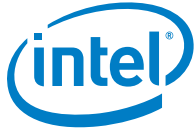
Add below lines into local.conf:

```
# Image features for soletta-dev-app
EXTRA_IMAGE_FEATURES += " tools-sdk"
EXTRA_IMAGE_FEATURES += " ssh-server-openssh"

Append "soletta-dev-app" in local.conf as below:
# Install soletta framework
IMAGE_INSTALL_append = " soletta soletta-dev-app"
```

3.4.7 Related Documentation

1. HID Specification
 - USB HID: http://www.usb.org/developers/hidpage/Hut1_12v2.pdf
 - HID for Windows* OS: [https://msdn.microsoft.com/en-us/library/windows/hardware/dn613934\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/dn613934(v=vs.85).aspx)
2. HID Sensor Custom
 - <http://lxr.free-electrons.com/source/Documentation/hid/hid-sensor.txt>
 - <http://lxr.free-electrons.com/source/drivers/staging/iio/Documentation/>
3. IIO Sensor
 - <http://lxr.free-electrons.com/source/drivers/staging/iio/Documentation/>
 - <http://lxr.free-electrons.com/source/tools/iio/>
4. IIO Generic Buffer App for Accelerometer
 - <http://lxr.free-electrons.com/source/tools/iio/>
5. Soletta github:
 - <https://github.com/soletta-project/soletta/tree/v1>
6. Soletta Presentation Slides:
 - <https://github.com/soletta-project/soletta/wiki/Presentations>
7. Soletta Documentations:
 - <https://github.com/soletta-project/soletta/wiki/Documentation>
8. Soletta c-api:
 - <http://soletta-project.github.io/docs/c-api/>
9. Soletta Flow Node description:
 - <http://soletta-project.github.io/docs/nodetypes/>



4.0 *Where to Find the Release*

A copy of this release note is available at the GitHub repository of the Intel® Atom™ E3900 SoC Family/Intel® Celeron™ Processor N3350/ Intel® Pentium™ Processor N4200.

§



5.0 Getting Started with Board Support Package

5.1 Setting Up the Host Machine

The following are the minimum host system configurations to build BSP for the Yocto Project*:

- Intel® Core™ i7 processor (4 cores)
- Linux* OS of choice for Yocto Project* build is Ubuntu* 14.04 LTS OS
- 4 GB RAM and 500 GB disk space
- High-speed network connectivity

Note: To enable the BSP build for Yocto Project*, set up and enable SSH keys on your host machine. Refer to the Set up Guide for more details.

5.2 Getting Started with BSP for Yocto Project*

Download the BSP for Yocto Project* from Github to your host machine

- HTTPS directly from <https://github.com/01org/bsp-apollo-lake-i> by selecting the appropriate branch/ release version, e.g. gold, from the top left menu or
- SSH using the following command (release_version, e.g. MR1):
`git clone https://github.com/01org/bsp-apollo-lake-i -b <release_version>`

This git tree is maintained as single product branch. In order to get code base from the previous release, e.g. PV release, checkout to the specific tag.

- For PV release: `git checkout E3900-PV`.
- For Maintenance Release Version 1: `git checkout E3900-MR1`

5.2.1 Default Configuration Set for core-image-sato Image in this BSP

- Meta-intel contains an i915 graphics driver. However, they are dependent on gstreamer plugins. These plugins require license flags set to "commercial" in order to be included in the build. You will find `LICENSE_FLAGS_WHITELIST = "commercial"` already set by the template in the `local.conf` for your build.
- To enable full graphics video and display in the image, we have included a package group tailored to showcase the graphics capability on this platform. You will find the `packagegroup-core-graphics-essential` in `meta-intel-middleware`. This packagegroup is set to build into `core-image-sato` by default in this BSP.



- To execute 64-bit standalone applications, you need to enable a multilib environment in your image. The following lines in local.conf are commented out by default. To enable multilib support, remove the “#” in front of these lines.

```
require conf/multilib.conf
DEFAULTTUNE = "corei7-64"
MULTILIBS = "multilib:lib32"
DEFAULTTUNE_virtclass-multilib-lib32 = "corei7-32"
```

- To enable 32-bit libraries into final bootable image, you need to add the following settings in local.conf.

```
IMAGE_INSTALL_append = `` lib32-glib-2.0 lib32-gcc``
```

- The BSP supports FreeGLUT library. However, it is not enabled by default. To enable FreeGLUT library support, you need to add the following line in build/conf/local.conf.

```
IMAGE_INSTALL_append = `` freeglut``
```

5.2.2 Your First Build

1. If this is your first build, run the setup.sh script from your bsp-apollo-lake-i/ directory:

`$. /setup.sh`
2. The setup.sh script will prompt you with a menu for choice of audio machine driver. There are 3 MACHINE types supported by this BSP meta layer for Yocto Project. The machine settings in local.conf will be updated whenever you select features in setup.sh.

Figure 3. Machine Driver Options

```
Select an option:

1. Build kernel image with CAVS HD Audio driver (Default)
2. Build kernel image with CAVS SSP Audio driver
3. Build kernel image with legacy HD Audio driver

Default option is build kernel image with CAVS HD Audio
driver. If no input is received within 20 secs, default will
be used.
```

3. Once the machine driver has been selected, the script will prompt you with another menu for choice of build. By default, the core-image-sato-sdk will be selected. Otherwise, you may key in the numerical selection for core-image-sato or linux-kernel as the bzImage, or set up a custom build.



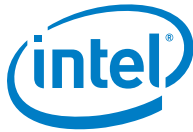
Figure 4. Build Options

```
Select an option:
1. core-image-sato-sdk (Default)
2. core-image-sato
3. linux-kernel
4. custom

Default build target is core-image-sato-sdk. If no input is
received within 20 secs, default target will be built.
```

4. Setup.sh performs the following tasks prior to building the BSP image for Yocto Project*:
 - a. Checks the host machine build environment for the following:
 - Linux* distribution on host machine
 - Required software dependencies (this is only performed for Ubuntu* 14.04 OS)
 - Version of installed Python* programming language, network connectivity, git config settings, and git proxy settings
 - b. Prepares the sources:
 - Downloads Linux Kernel v4.1.27 from Yocto Project.org
 - Applies IOTG Intel® Atom™ E3900 SoC Family kernel patches
 - Combo layer downloads poky Jethro* v2.0.2 and other meta layers based on setup/combolayer.conf
 - Applies patches to BSP recipes for Yocto Project*
 - Sets up the path to local kernel source in Linux* kernel recipe
 - Sets up bblayers for BitBake build
 - Sets up local.conf for BitBake build
 - Prepares the environment for BitBake build
 - Starts the BitBake image, builds automatically based on selection
5. This process will create a build folder named "yocto_build" at the same level of directory as your bsp-apollo-lake-i/ directory. The BitBake component of Yocto Project will be running at this directory: /yocto_build/build/. For setup.sh to run completely, this process may take up to 5 hours depending on the performance of your build machine. When the build process is completed, you may browse for the image from the following path:


```
<path>/yocto_build/build/tmp/deploy/images/intel-corei7-64-
<machine-drivers>/
```



- HDDIMG image file name: core-image-sato-sdk-intel-corei7-64-<machine-drivers>-<build-date-time>.hddimg
- ISO image file name: core-image-sato-sdk-intel-corei7-64-<machine-drivers>-<build-date-time>.iso

5.2.3 For Subsequent Build

1. If you need to modify the recipes or configurations, make your customization in the yocto_build folder after running the/setup script on your host machine.
2. The machine settings in local.conf will be updated whenever you select features in setup.sh. However, you may change it for your own build testing.

Default settings:

MACHINE ??= "intel-corei7-64-cavs-hda"

- The Linux* kernel source code is patched with the kernel tarball that contains audio code base with CAVS Audio support.
- Kernel configurations are set to compile CAVS HD-Audio.

Additional settings:

MACHINE ??= "intel-corei7-64-cavs-ssp"

- The Linux* kernel source code is patched with the kernel tarball that contains audio code base with CAVS Audio support.
- Kernel configurations are set to compile LPE Audio (SSP).

MACHINE ??= "intel-corei7-64"

- The Linux* kernel source code is patched with kernel tarball that contains audio code base with legacy audio support.
- Kernel configurations are set to compile legacy HD-Audio.

In yocto_build/build/conf/local.conf, you will be able to set which MACHINE type and which AUDIO_FEATURES to build.

3. When you are ready to rebuild, go to the yocto_build folder to run the following command:

```
$ cd <path to directory>/yocto_build
```

```
# When you source in your yocto_build directory, you will be  
automatically be routed to the build/ directory
```

```
$ source oe-init-build-env
```

```
# For core-image-sato  
$ bitbake core-image-sato
```

```
# For core-image-sato-sdk  
$ bitbake core-image-sato-sdk
```

```
# For linux-kernel bzImage only  
$ bitbake linux-yocto
```



5.2.4 Install Image into On-Board eMMC*

Note: You need a live bootable USB drive or hard disk to install the image into the on-board eMMC*. These instructions assume installation into a USB drive.

1. Copy the image into the USB drive using the "**dd**" command.
2. Assuming the USB drive is mounted as `/dev/sdc` on the Linux* host machine, change to the directory where the image is stored and type the following command in the terminal:

```
$ dd if=core-image-sato-intel-corei7-64.hddimg of=/dev/sdc && sync
```

3. Plug the USB drive into the Intel® Atom™ E3900 SoC Family platform and choose to boot off the USB drive.
4. Choose the "**Install**" option in the Grub menu. Then, choose the correct partition to install your image from the command line interface.

Note: eMMC* should be detected as `/dev/mmcblk0`.

5. After the installation is complete, remove your USB drive and press "**ENTER**" to reboot.

5.2.5 Optional Configuration

For this released image, log in as root without password on the command line interface.

If you want to use the GUI, follow these steps:

change directory to /home/root

```
$ cd /home/root
```

edit the .xinitrc file as follows:

```
$ vi .xinitrc
```

Comment out the "exec xterm" line and uncomment the "exec matchbox-session" line as follows:

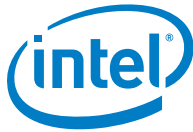
```
#exec xterm
exec matchbox-session
```

Save and close. Type the "startx" command in the command line interface.

```
$ startx
```

5.2.6 Known Issues (General and BSP for Yocto Project*)

- The HDDIMG image file checksum (MD5SUM) changes after being installed in the USB drive using `mkefidisk.sh`.



Background:

The change in the image file checksum is expected because when the image file was mounted and un-mounted, some filesystem-related (ext4 in this case) information (e.g. number of times the image was referenced and the last date and time the image was mounted) were updated into the image, which resulted in a different MD5SUM checksum after the image was flashed.

Solution:

No fix is required. There will be no functional change in the image. The image file checksum is just for reference to ensure the image is not corrupted during the download process.

- [1504212818] Media player unable to play sound files.

Background:

Media player was based on gst-player* that inherit from open source. Since this is 3rd party software, this is low priority to fix by IOTG PED.

Workaround:

Invoke command: `aplay` or `gst-play <sound_file>` to play sound file from terminal.

§