Release Notes for the QNX Neutrino 6.4.0 BSP for Atmel AT91SAM9260-EK Board#

System requirements#

Target system#

- QNX Neutrino RTOS 6.4.0
- Board: Atmel at91sam9260-EK Evaluation Board
- Data-Flash: AT45DCB008D (8 MB) CARD
- SDRAM: 16-bit Micron MT48LC16M16A2 (64 MB) SDRAM
- NAND Flash: Samsung K9F2G08U0A (256 MB) NAND Flash

Host development system#

- QNX Momentics 6.4.0, one of the following host systems:
  - QNX Neutrino 6.4.0
  - Microsoft Windows Vista, XP SP2 or SP3, 2000 SP4
  - Linux Red Hat 8 or 9, Linux Red Hat Enterprise Workstation 3 or 4, Red Hat Fedora Core 3 or 4, or SUSE 10
- Terminal emulation program (Qtalk, Momentics IDE Terminal, tip, HyperTerminal, etc.)
- Windows Machine required SAM-BA appication to download the image on Data-Flash.
- RS-232 serial port
- NULL-modem serial cable
- USB cable to connect board with windows Machine

Getting Started#

Step 1: Connect your hardware#

Connect the DEBUG port of the AT91SAM9260 board to the first serial port of your windows machine. Install the SAM-BA application provided by Atmel. Connect the board with Windows Machine using USB Cable.

Step 2: Build the BSP#

You can build an OS image from the source code or the binary components contained in a BSP package.
For instructions about building an OS image, please refer to the chapter Working with a BSP in the Building Embedded Systems manual. After Building the BSP three bin files will be created in images directory.
*ifs-at91sam9260.bin
*ipl-at91sam9260.bin
*ipl-ifs-at91sam9260.bin

```
mkflashimage script creates a combined IPL/IFS image as ipl-ifs-at91sam9260.bin
The mkflashimage script:

#!/bin/sh
# script to build a binary IPL and boot image for ATMEL AT91SAM9260 Evaluation Kit board
# NOTE the image (ipl-ifs-at91sam9260.bin) must be built as binary, i.e. [virtual=armle,binary] in the buildfile
set -v

#       Convert IPL into BINARY format
${QNX_HOST}/usr/bin/ntoarm-objcopy --input-format=elf32-littlearm --output-format=binary -R.data ../install/armle/boot/sys/
```

```
#       Pad BINARY IPL
mkrec -s4k -ffull -r ipl-tmp-at91sam9260.bin > ipl-at91sam9260.bin

#       Combine the BINARY IPL with the BINARY OS Image
cat ./ipl-at91sam9260.bin ./ifs-at91sam9260.bin > ipl-ifs-at91sam9260.bin

#       Cleaning up temporary files
rm -f *tmp*
```

Step 3: Download the Bootable IFS image.#

The Boot Program integrates different programs that manage download and/or upload into the different memories of the product. First, it initializes the Debug Unit serial port (DBGU) and the USB High Speed Device Port.

- Then NAND Flash Boot program is executed. The NAND Flash Boot program searches for a valid application in the NAND Flash memory. If a valid application is found, this application is loaded into internal SRAM and executed by branching at address 0x0000_0000 after remap.
- If no NAND Flash Boot program is found, the Data-Flash Boot program is then executed. It looks for a sequence of seven valid ARM exception vectors in a Data-Flash connected to the SPI. All these vectors must be B-branch or LDR load register instructions except for the sixth vector. This vector is used to store the size of the image to download. If a valid sequence is found, code is downloaded into the internal SRAM. This is followed by a remap and a jump to the first address of the SRAM.If no valid ARM vector sequence is found, SAM-BA Boot is then executed. It waits for transactions either on the USB device, or on the DBGU serial port.

Install and setup SAM-BA#

1. Install "AT91-ISP v1.12.exe" .

2. Intall "ActiveTcl8.5.5.0.287690-win32-ix86-threaded.exe" i.e.TCL environment which is used by SAM-BA (any other TCL environment can also be used) .

3. Connect serial cable with windows machine, and use any serial port application such as teraterm or hyperterminal, and attach it with COM device, with baud rate set as 115200. Make sure the on-board data flash and NAND flash contain no bootable images.

4. Restart the board, hyperterminal will be showing following message .

```
RomBOOT
>
```

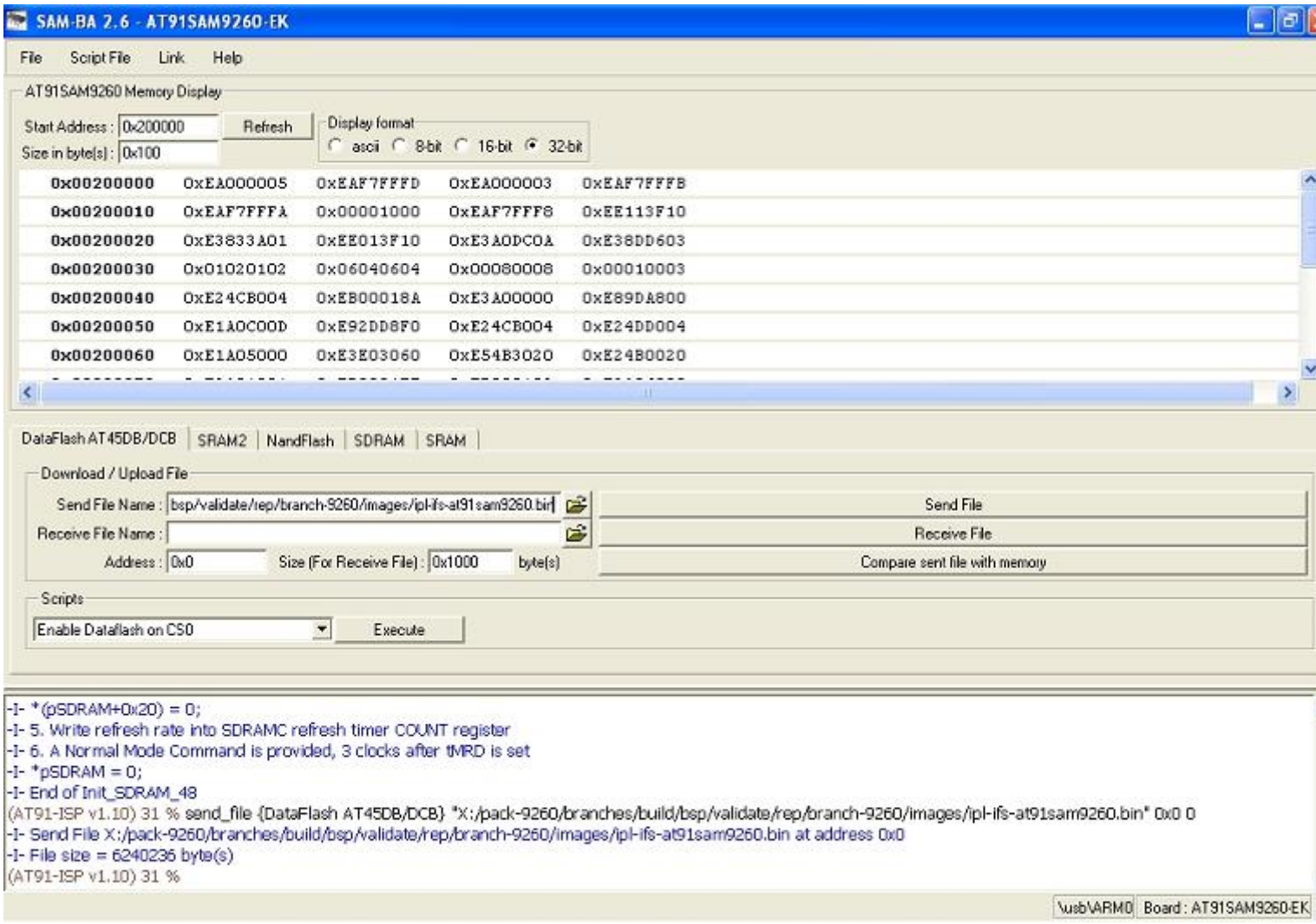
5. Connect usb cable with windows machine, It will prompt with a new usb hardware found message, and will try to install the corresponding driver.

6. Check device has enumerated properly by looking into device manager .

7. Start SAM-BA 2.6 with \usb\ARM0 as connection.

Loading the IFS image using SAM-BA#

- Select the Data-Flash AT45DB/DCB tab in SAM-BA Application. Execute the Enable Data-flash on CS0 script.
- Select the ipl-ifs-at91sam9260.bin file to be sent to the target, and then press Send File. Depending on the size of your file, it will take a few seconds up to a minute.



Press the reset button, now on your terminal you will see output as follows:

```
RomBOOT
>

QNX Neutrino Initial Program Loader for ATMEL AT91SAM9260-EK
Commands:
Press 'D' for serial download, using the 'sendnto' utility
Press 'F' to Boot an OS image from SPI/SERIAL flash
ATMEL AT45DB642D/AT45DCB008D SPI Flash detected.

QNX IFS image detected on page: 00000004 Offset: 000003A0 Size: 005C2240
############################################################Done
found image, calling image setup...
image_setup OK, calling image start...


PIO init : DBGU, USART, NAND,
CPU0: Dcache: 256x32 WB
CPU0: Icache: 256x32
CPU0: 41069265: arm926 rev 5 100MHz
elf_map: 1M va=fe000000 pa=20100000 sz=00100000
elf_map: 1M va=fe000000 pa=20100000 sz=00100000
Header size=0x0000009c, Total Size=0x000004e0, #Cpu=1, Type=4
Section:system_private offset:0x000001f0 size:0x00000068
 syspage ptr user:fc404000 kernel:fc404000
 cpupage ptr user:fc4047e0 kernel:fc4047e0 spacing:84
 kdebug info:00000000 callback:00000000
 boot pgms: idx=0
```

```
   0) base paddr:20110000 start addr:fe03d838
  ramsize:00000000 pagesize:00001000
Section:qtime offset:0x00000148 size:0x00000060
  boot:00000000 CPS:00000000002faf08 rate/scale:320000000/-15 intr:1
Section:callout offset:0x000000a0 size:0x00000048
  reboot:fc404658 power:fc404678
  timer_load:fc40468c reload:fc4046b4 value:fc4046e0
  0) display:fc404700 poll:fc404724 break:fc404748
  1) display:00000000 poll:00000000 break:00000000
Section:cpuinfo offset:0x000001a8 size:0x00000020
  0) cpu:41069265 flags:40000000 speed:00000064 cache i/d:1/0 name:53
Section:cacheattr offset:0x000004a0 size:0x00000040
  0) flags:32 size:0020 #lines:0100 control:fc4044e0 next:255
  1) flags:11 size:0020 #lines:0100 control:fc404534 next:255
Section:meminfo offset:0x000004e0 size:0x00000000
Section:asinfo offset:0x00000320 size:0x00000140
  0000) 0000000000000000-00000000ffffffff o:ffff a:0010 p:100 c:00000000 n:21
  0020) 0000000020000000-0000000023ffffff o:0000 a:0017 p:100 c:00000000 n:28
  0040) 0000000000000000-00000000ffffffff o:ffff a:0010 p:100 c:00000000 n:21
  0060) 0000000020000000-0000000023ffffff o:0040 a:0007 p:100 c:00000000 n:32
  0080) 000000002010e108-00000000206c223f o:0000 a:0005 p:100 c:00000000 n:60
  00a0) 0000000020100000-000000002010e107 o:0000 a:0007 p:100 c:00000000 n:68
  00c0) 000000002010e108-00000000206c223f o:0000 a:0007 p:100 c:00000000 n:76
  00e0) 0000000020000000-0000000020007fff o:0020 a:0007 p:100 c:00000000 n:84
  0100) 0000000020010834-00000000200fffff o:0020 a:0007 p:100 c:00000000 n:84
  0120) 00000000206c2240-0000000023ffffff o:0020 a:0007 p:100 c:00000000 n:84
Section:hwinfo offset:0x000002d8 size:0x00000048
  0) size:3 tag:3 isize:3, iname:0, owner:65535, kids:1
  12) size:3 tag:17 isize:3, iname:9, owner:0, kids:1
  24) size:3 tag:3 isize:3, iname:37, owner:12, kids:1
  36) size:4 tag:46 isize:4, iname:41, owner:24, kids:0
     00 00 00 00
Section:typed_strings offset:0x00000258 size:0x00000020
  off:0 type:5 string:'UNKNOWN'
  off:12 type:2 string:'localhost'
Section:strings offset:0x00000278 size:0x00000060
  [0]'hw' [3]'Group' [9]'unknown' [17]'Bus' [21]'memory' [28]'ram' [32]'1to1'
  [37]'rtc' [41]'NONE' [46]'Device' [53]'arm926' [60]'imagefs' [68]'startup'
  [76]'bootram' [84]'sysram'
Section:intrinfo offset:0x00000460 size:0x00000040
  0) vector_base:00000000, #vectors:32, cascade_vector:7fffffff
     cpu_intr_base:00000000, cpu_intr_stride:0, flags:0000
      id => flags:8000, size:002c, rtn:fc4045a0
     eoi => flags:9000, size:0028, rtn:fc4045cc
     mask:fc4045f4, unmask:fc404618, config:00000000
Section:smp offset:0x000004e0 size:0x00000000
Section:pminfo offset:0x000004e0 size:0x00000000
Section:mdriver offset:0x000004e0 size:0x00000000
Section:boxinfo offset:0x000001c8 size:0x00000028
  hw_flags:00000000
Section:cpu offset:0x00000128 size:0x00000020
  page_flush:fc404564 page_flush_deferred:fc40459c
  upte_ro:00000aae upte_rw:00000ffe
  kpte_ro:0000000e kpte_rw:0000055e
  mask_nc:0000000c
  mmu_cr1:00051078 set:0000317f clr:00000000 -> 0005317f

System page at phys:20010000 user:fc404000 kern:fc404000
Starting next program at vfe03d838
```

```
cpu_startnext: cpu0 -> fe03d838
Welcome to QNX Neutrino 6.4 on the Atmel AT91SAM9260 Board
Starting DBGU driver...
Starting Serial USART 1 driver ...
Starting SPI driver...
Starting NAND driver...
#
```

You can test the OS simply by executing any shell builtin command or any command residing within the OS image (e.g. ls).

Summary of driver commands#

The driver command lines below are specific to the Atmel AT91SAM9260 board. See the online docs for each driver for additional command-line options and other details.

Note: Some of the following drivers are commented out in the default buildfile. To use the drivers in the target hardware, you'll need to uncomment them in your buildfile, rebuild the image, and load the image into the board.

Startup:#

Command:

```
startup-at91sam9260 -vvvvvvv
```

Serial:#

Command:

```
devc-serusart -F -S -u2 -b115200 -c50000000 0xfffb0000^2,6
```

Required binaries:

- devc-serusart

Command:

```
devc-serdebug -e -F -S -b115200 -c50000000 0xfffff200,1
```

Required binaries:

- devc-serdebug

SPI:#

Command:

```
spi-master -u0 -d at91sam9xx base=0xFFFC8000,irq=12,clock=50000000

spi-master -u1 -d at91sam9xx base=0xFFFCC000,irq=13,clock=50000000
```

Required binaries:

- spi-master
- spi-at91sam9xx.so

Network:#

Command:

```
io-pkt-v4 -dat91sam9xx syspage
```

Required binaries:

- devnp-at91sam9xx.so
- io-pkt-v4

MMC SD:#

Command:

```
devb-mmcsd-at91sam9xx mmcsd ioport=0xFFFA8000,irq=9,bs=slot=1
```

Required binaries:

- libcam.so
- fs-dos.so
- fs-qnx4.so
- fs-ext2.so
- cam-disk.so
- io-blk.so

USB:#

Command:

```
io-usb -d ohci ioport=0x500000,irq=20
```

Required binaries and libraries:

- io-usb
- usb
- devu-ohci.so
- libusbdi.so
- class drivers

ETFS NAND flash#

Command:

```
fs-etfs-at91sam9xx -D addr=0x40000000,board_id=at91sam9260-ek -m /fs/etfs
```

Required binaries:

- fs-etfs-at91sam9xx
- etfsctl

Note: For more information about these commands, see the Neutrino Utilities Reference.

Known Issues for This BSP#

- Network driver drops packet due to transmitter under run. A known HW limitation with the Ethernet transmitter and usage of slow SDRAM memory will cause the transmitter to generate under run and flush all packets/fragments in the transmitter queue. For more details about this problem refer to the Atmel AT91SAM9260 reference manual “EMACB Errata” for more details.