Note that we don’t have SDRAM attached to the ATMEL processor. We have a NANDFlash on SPI Bus.

# SAM3X Flashing Explained

The SAM3X comes with a built-in bootloader, called SAM-BA. Standalone SAM-BA tools could be downloaded from the Atmel website. SAM-BA is permanently burned in the chip ROM straight out of factory, and is not using up any of the flash space. This is very different from AVR that AVR doesn't come with any built-in bootloader.

In addition to SAM-BA, SAM3X could be booted in the middle of the flash, instead of the very beginning of the flash like they normally do. One could code their own userspace bootloader in the 0-256KB, and the real application in the 256KB-512KB.

So in short, there is three boot start points - SAM-BA, Flash 0 and Flash 1, this can be controlled by tweaking **the GPNVM bits in EEFC0**.

In most of the scenarios, the code is flashed with SAM-BA tools. Flash 0/1 userspace bootloader is not used.

SAM3X will boot to SAM-BA when: A) the GPNVM bits have been modified (set to 0) to instruct SAM3X to boot to SAM-BA**. It can be done in userspace code**. B) **Erasing the chip (Erase button) which will also clear/zeroing the GPNVM bits** and leads to the SAM-BA again.

In SAM-BA, firmware could be flashed over the native USB port, which will be put in CDC mode, or through the first UART channel. SAM-BA will wait indefinitely without timeout. In other words, once the GPNVM bit is cleared for SAM-BA booting, it will always be there waiting for flashing, even after power cycling.

Of course, the flash content and the GPNVM bits could be flashed over the JTAG, which will not be discussed here.

# USB Programming Port

At 1200 bauds via USB (FTDI)

At any other baudrate, it will reset the SAM3X.

# Network

We add a 2nd level bootloader for Atmel AT91 SoC providing a set of algorithms to manage the hardware initialization such as clock speed configuration, PIO settings, DRAM initialization, to download your main application from specified boot media (NAND FLASH, serial FLASH (both AT25-compatible of DataFlash), serial EEPROM, SD Card, etc.) to main memory and to start it.