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## ATWILC1000 Getting Started with SAMA5D3 Xplained Board

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Atmel SmartConnect

### Introduction

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This document explains how to get started with the Atmel® SmartConnect ATWILC1000 on SAMA5D3 Xplained board. This document also describes how to set up the build environment, how to connect the ATWILC1000 on the SAMA5D3 Xplained board for SDIO or SPI, and how to flash the prebuilt image to the target board.

### Features

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- Hardware Prerequisites
  - Atmel SAMA5D3 Xplained Evaluation Kit
  - Atmel ATWILC1000 SD Pro Card or ATWILC1000-MR110PA
  - Micro-USB cable (Micro-A / Micro-B)
  - USB to Serial Adaptor (for DBGU port)
- Environment Prerequisites
  - Linux® Host PC

Figure 1. Click and type. (Style - fft.features figure title)



## Icon Key Identifiers

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	<b>INFO</b>	Delivers contextual information about a specific topic.
	<b>TIPS</b>	Highlights useful tips and techniques.
	<b>Info:</b>	Highlights objectives to be completed.
	<b>RESULT</b>	Highlights the expected result of an assignment step.
	<b>WARNING</b>	Indicates important information.
	<b>EXECUTE</b>	Highlights actions to be executed out of the target when necessary.

# 1 Configure a Linux Host

## 1.1 Install Linux OS

Playing the demo is possible on Microsoft® Windows® PCs. However, users need a Linux machine to develop the ATWILC1000 with the distributed SDK. The Linux host machine may have higher performance and a lot more memory than the typical embedded system.



**WARNING** The Linux host machine requires more than 1G RAM and 50G hard disk.

There are many kinds of Linux distribution. Because we can't validate all distribution, we focus on Ubuntu® and Mint which many users are using as the host Linux distribution. Atmel recommend the Long-term Supports (LTS) version of the Linux.

- Ubuntu 14.04 LTS: <http://releases.ubuntu.com/14.04/>
- Mint17 LTS: <http://www.linuxmint.com/release.php?id=22>

This document was written based on Linux Mint17 LTS.



### TIPS

If you can't set up another Linux Host PC, there is a way to use virtual machines. Virtual Machines have come a long way over the years and many users are using them without any problems. We already tested there aren't the problems through VirtualBox and VMware. (Downloading Link: [VirtualBox](#), [VMware](#)).

## 1.2 Mandatory Package

To get correct output (build, configure, etc...), certain standard Linux utilities are expected to be already installed on the Linux Host PC. Note that package names may vary between distributions.

- Build tools
  - which, sed, make (version 3.81 or later), Binutils, build-essential (only for Debian based systems), GCC (version 2.95 or later), g++ (version 2.95 or later), Bash, patch, gzip, bzip2, Perl (version 5.8.7 or later), tar, cpio, Python (version 2.6 or 2.7), unzip, rsync, u-boot-tools
- Configuration interface dependencies
  - ncurses5 to use the menuconfig interface
  - Qt4 to use the xconfig interface
  - GLib2, Gtk2, and glade2 to use the gconfig interface
- source downloading and fetching tools
  - GLib2, Gtk2, and glade2 to use the gconfig interface
  - Wget, Bazaar, CVS, Git, Mercurial, rsync, SCP, subversion

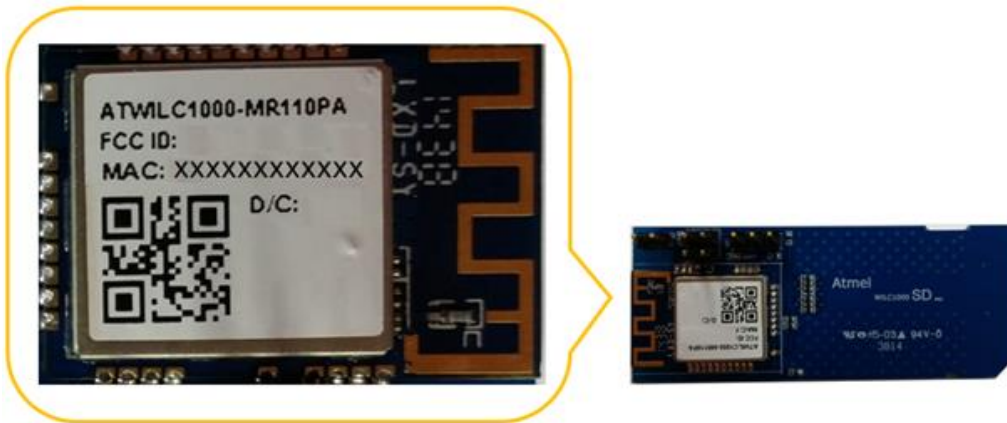
## 2 Getting Started with Atmel Hardware

### 2.1 Atmel SmartConnect ATWILC1000

Atmel SmartConnect-ATWILC1000 is an IEEE® 802.11 b/g/n IOT link controller SoC. The WILC1000 connects to any Atmel AVR® or SMART MCU with minimal resource requirements. The WILC1000 most advanced mode is a single stream 1x1 802.11n mode providing up to 72Mbps PHY throughput. WILC1000 features fully integrated Power Amplifier, LNA, Switch and Power Management. The WILC1000 provides multiple peripheral interfaces including SDIO and SPI.

ATWILC1000-MR110PA is small form factor optimized with ATWILC1000. The ATWILC1000 SD pro is extended to SD Card type by using ATWILC1000-MR110PA.

Figure 2-1. ATWILC1000 SD Pro and ATWILC1000-MR110PX Overview



Refer to [ATWILC1000 Datasheet](#), and [ATWILC1000-MR110PA Datasheet](#).

### 2.2 Atmel SAMA5D3 Xplained Kit

The SAMA5D3 Xplained is a fast prototyping and evaluation platform for microprocessor-based design. The board comes with a rich set of ready to use connectivity and storage peripherals and expansion headers for easy customization. A Linux distribution and software package gets you evaluating fast. A USB device connector can be used to power the board as well as programming and debugging it.

Figure 2-2. SAMA5D3 Xplained Board Overview



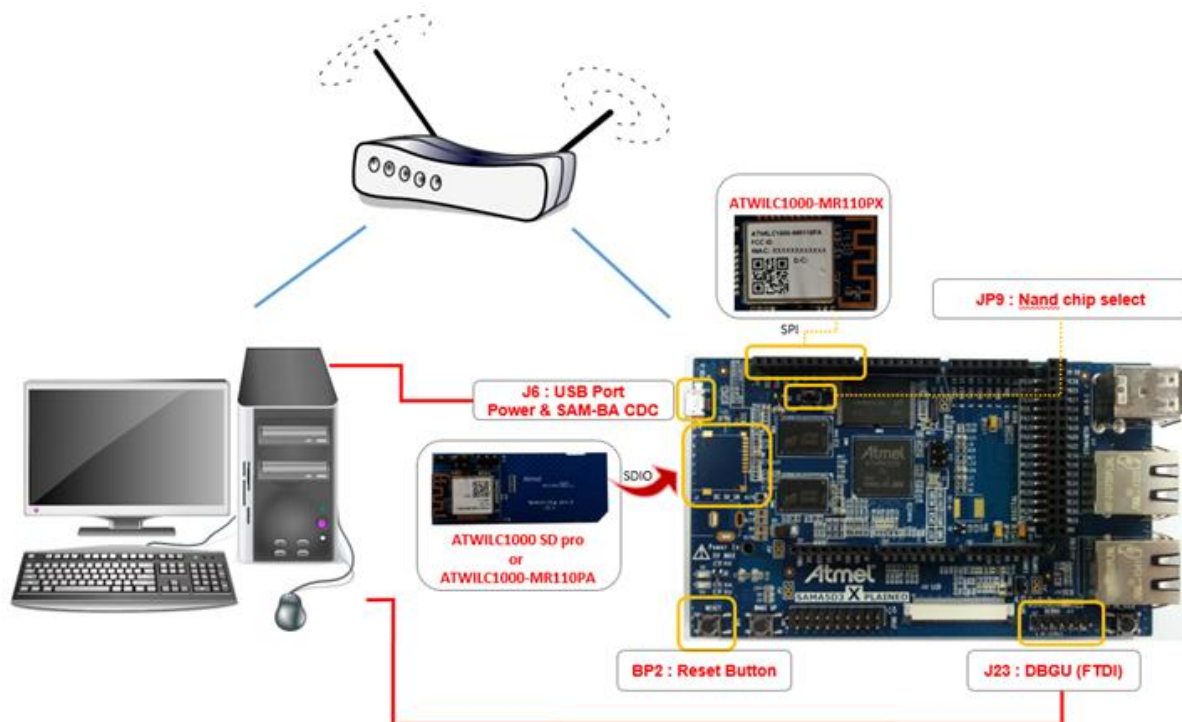
- Features
  - SAMA5D36 Cortex®-A5 Microprocessor
  - 256MB DDR2
  - 256MB NAND Flash
  - LCD connectors
  - Dual Ethernet (GMAC + EMAC) with PHY and connectors
  - Three USB connectors (two host + one device)
  - 1x SD/eMMC and 1x microSD slots
  - Expansions headers, Arduino R3 Shield compatible
  - Power measurement straps
- Expansion Ports
  - UARTs: UART0, UART1
  - USARTs: USART0, USART1, USART2, USART3
  - SPI: SPI1
  - I<sup>2</sup>C: TWI0, TWI1
  - Timer capture and compare: TIOA, TIOB
  - Clock out: PCK0, PCK1, PCK2
  - PWMs: PWML0, PWMH0, PWML1, PWMH1

Refer to the [SAMA5D3-Xplained User Guide](#) for more information.

## 2.3 Demo Environment Overview

The ATWILC1000 may connect to SAMA5D3 Xplained board via SDIO or SPI interface. [Figure 2-3](#) shows the demo environment which this document describes through several sections.

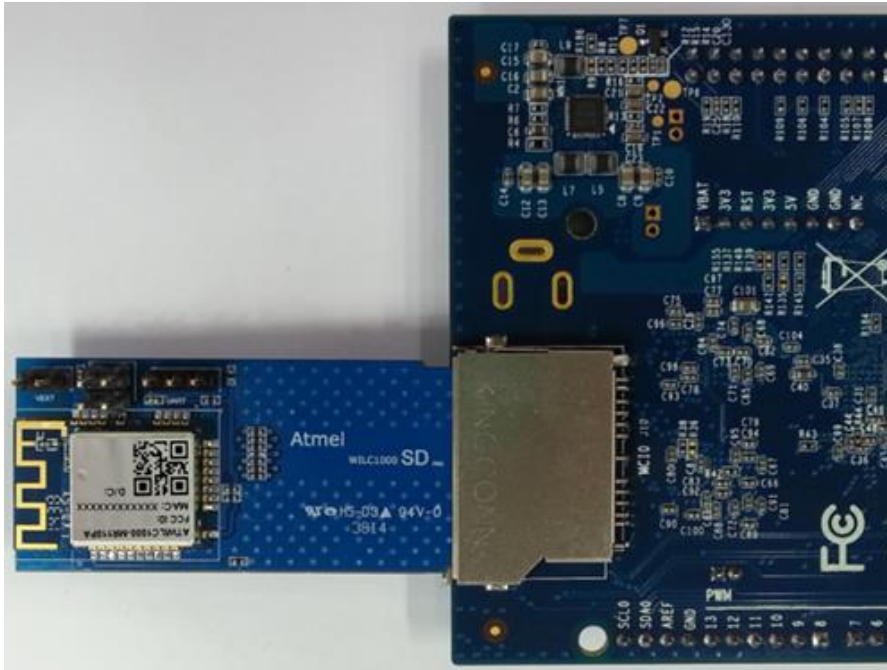
**Figure 2-3. Connection Overview**



## 2.4 SDIO Interface

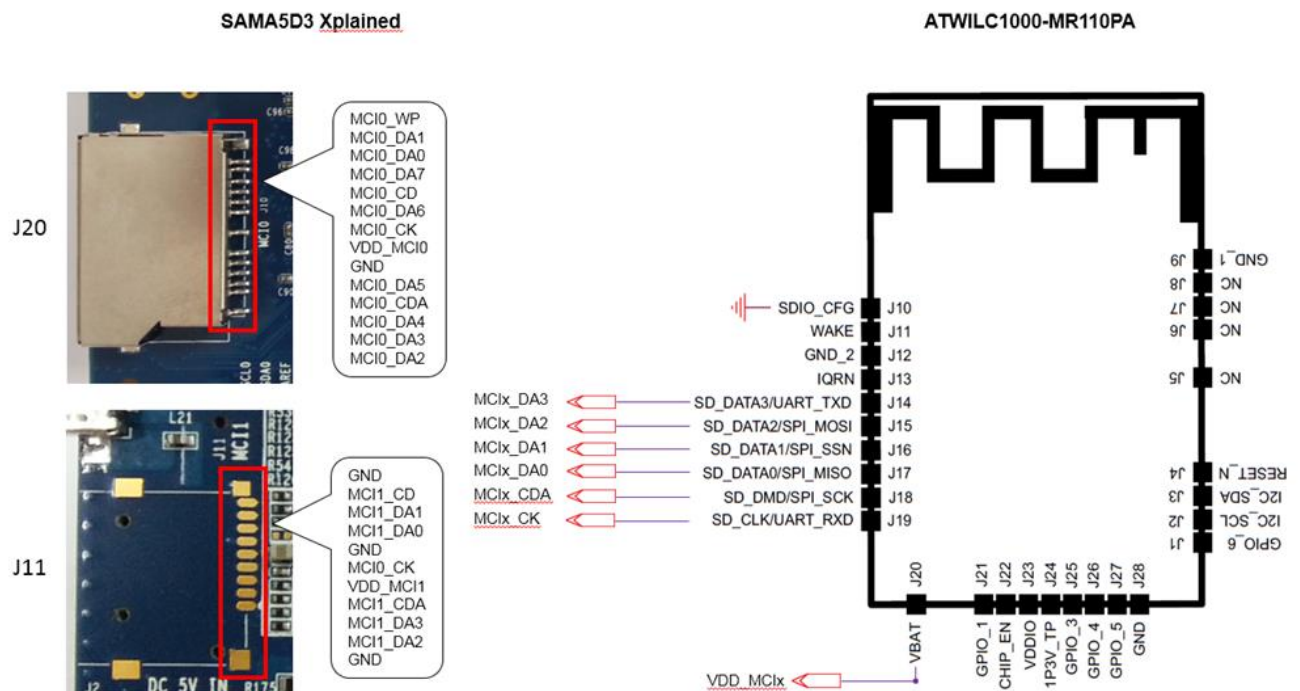
The SAMA5D3 Xplained board has two SDIO ports. Refer to [Figure 2-4](#) if the ATWILC1000 SD pro card is available to work on WLAN via SDIO interface.

**Figure 2-4. ATWILC1000 SD Pro with SAMA5D3 Xplained Board via J20 Socket**



[Figure 2-5](#) shows the pin map and layout to connect the ATWILC1000-MR110PA if ATWILC1000-MR110PA is available instead of ATWILC1000 SD pro card. If J20 socket is reserved, J20 socket can be replaced by J11.

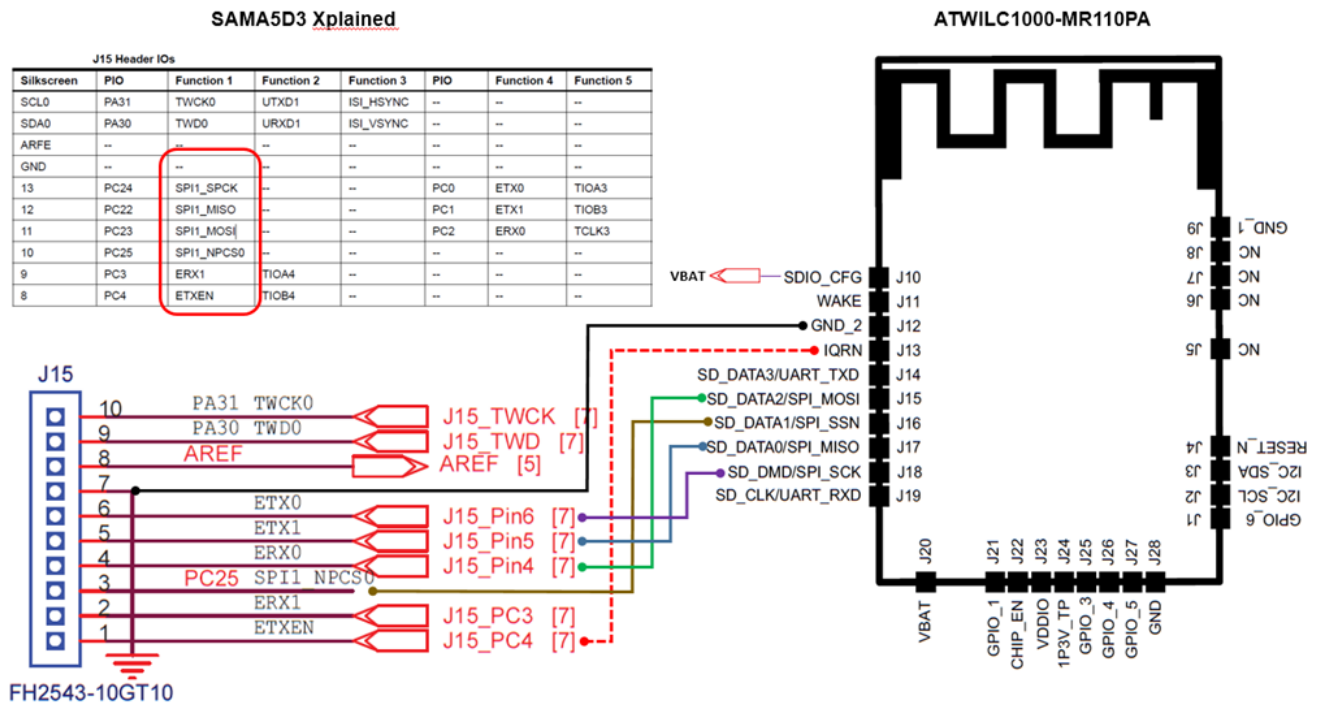
**Figure 2-5. SDIO Pin Routing**



## 2.5 SPI Interface

The ATWILC1000 has SPI interface for WLAN. The ATWILC1000 SD pro is dedicated to the SDIO interface, however, the ATWILC1000-MR110PA module installed in the ATWILC1000 SD pro card has SPI pins connectable to the SAMA5D3 Xplained SPI socket. Refer to the [Figure 2-6](#) for SPI use.

Figure 2-6. SPI Pin Routing



## 3 Getting Started with Flashing Prebuilt Binary

### 3.1 Install Flashing Tool (SAM-BA)

Before flashing the demo, make sure that you have installed the SAM-BA® tool on your host computer.

SAM-BA tool is provided for both Windows and Linux. Atmel SAM-BA software provides an open set of tools for programming the Atmel SAMA5, SAM3, SAM4, SAM7, and SAM9 ARM® core-based microcontrollers.

### 3.2 Flashing Prebuilt Binary

The prebuilt image working WILC1000 on the SAMA5D3 Xplained board is downloadable in the 'demo4sc' GitHub site. This section describes how to flash prebuilt image to the target board. For more information, visit the AT91 site.

1. Connect SAMA5D3 Xplained board with host PC.
2. Open JP9 to disable NAND Flash memory access.
3. Press BP2 reset button to boot from on-chip BOOT ROM.



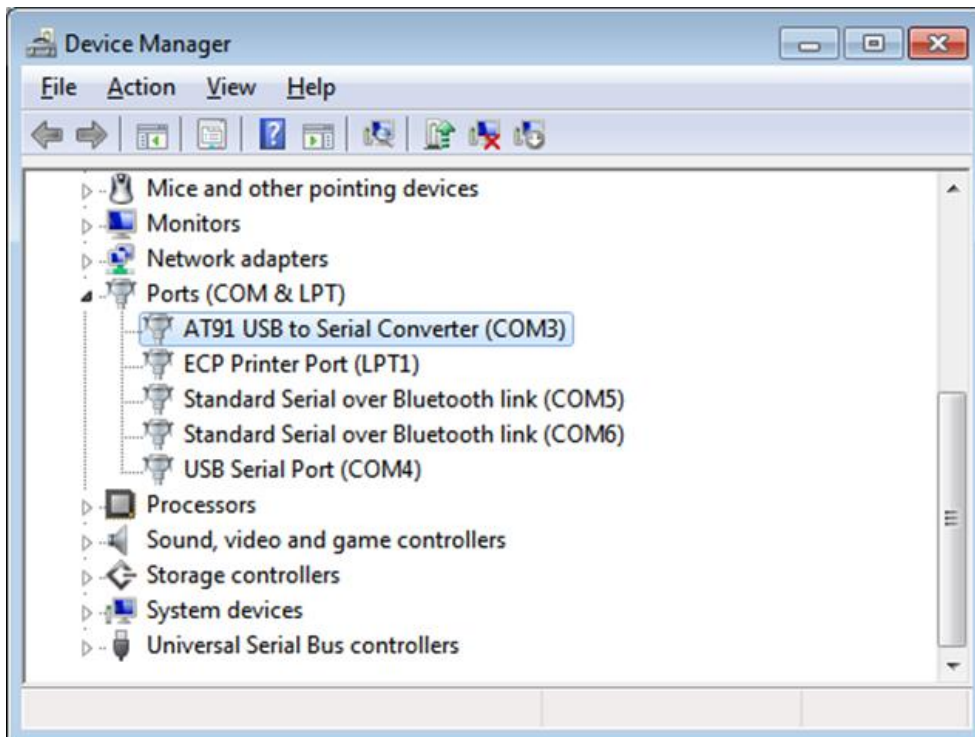
#### INFO

Find the "RomBOOT" message from the console if DBGU port is already connected to the host PC. This means the SAMA5D3 Xplained is in boot mode.

4. Close JP9 to enable NAND Flash memory access.
5. Check ACM driver in your PC.

If you are a Microsoft Windows user, AT91 USB to serial converter should appear in Device Manager, otherwise install the driver in your PC.

Figure 3-1. AT91 USB to Serial Converter in Device Manger





If you are a Linux user, check if there is “/dev/ttyACMx”. Or issue the command, “lsusb | grep at91” and check the output message.

```
$ lsusb | grep at91
Bus 001 Device 002: ID 03eb:6124 Atmel Corp. at91sam SAMBA bootloader
```

6. Run demo\_linux\_nandflash.bat for Windows users or demo\_linux\_nandflash.sh for Linux users.



**RESULT**

When the logfile.log appears (this will take a few minutes), check that = Done. = is written at the end of the file.

7. Press BP2 reset button to boot on NAND Flash memory and launch the demo.

## 4 Getting Started Simple Work (AP Scan)

You can access the serial console via two ways. One is to use the DBGU port (J23) with the help of a USB TTL serial cable. And another is to use USB CDC port (J6).



### INFO

USB CDC device is easily accessible, however, you cannot get access to the console until system boot is completed. In contrast, you can get access to the console immediately after the system boot starts with DBGU.

### 4.1 Register ATWILC1000 Driver

Connect the ATWILC1000 SD pro card to the SAMA5D3 board. Make sure the card is available in the kernel system by checking the following log message.

```
mmc0: new high speed SDIO card at address 0001
```

Load the wilc1000 module by issuing the following command.

```
buildroot login: root
# insmod wilc1000_sdio.ko
*** WILC1000 driver VERSION=[xxx] REVISION=[xxx] FW_VER=[xxx] ***
Driver Initialzing success
```



### INFO

In case of SPI Interface, use wilc1000\_spi.ko instead of wilc1000.ko.

### 4.2 Activate Network Interface

The following command causes the interface to be activated.

```
$ ifconfig wlan0 up
```

If network interface rightly is activated, the following information is outputted as 'ifconfig' command.

```
$ ifconfig wlan0
wlan0      Link encap:Ethernet  HWaddr 00:80:C2:B7:D5:B6
           inet6 addr: fe80::280:c2ff:feb7:d5b6/64 Scope:Link
           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:398 (398.0 B)
```

### 4.3 Scanning Neighboring AP

Scan the neighboring AP by issuing the following command.

```
$ iw wlan0 scan | grep 'SSID'  
SSID: AVRGUEST  
SSID: DEMO_AP
```

If there is more neighboring AP, you can find more result.

Refer to the ATWILC1000 Getting Started with SAMA5D3 document for further usage.

## 5 Conclusion

This application note described how to set up the development environment for the ATWILC1000 with SAMA5D3 Xplained board. This document also provided how to work on WLAN with simple demo.

## 6 Revision History

Doc Rev.	Date	Comments
42434A	03/2015	Initial document release.



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