Introduction to WiPi

WiPi is an 802.11n compliant USB WLAN adaptor supporting data rates of up to 150 Mbps and WPA/WPA2-PSK Security. It uses Cisco CleanAir channel detection technology to minimize interference from non-802.11 modulated sources. This guide covers the setup and use of the WiPi with the Atmel SAMA5D3 Xplained board.

WiPi on the SAMA5D3 Xplained board

Required Hardware

- Atmel SAMA5D3 Xplained Board (2555198 / 07x2224) pre-flashed with the Atmel Yocto/Poky demo.
  For more information please refer to the User Manual or www.at91.com
- WiPi (2133900 / 07W8938)
- USB-A to USB Micro-B cable (included with SAMA5D3 board)
- Ethernet cable
- Computer with one free USB port and software installation privileges

Required Software

- .inf file available from: www.kernel.org/doc/Documentation/usb/linux-cdc-acm.inf
- Serial Connection Software
  The SAMA5D3 Xplained board can connect to a computer via a virtual serial port over USB. In order for your computer to communicate with the board it requires specialized software which differs depending on your operating system.

Windows Users

The recommended software for Windows users is PuTTY. PuTTY is compatible with all versions of Windows from 95 onwards and is available from http://www.putty.org/

Linux

There are several options for Linux users depending on your distribution. Popular choices include Minicom, Picocom and PuTTY.

Proxy Users

You may need to configure the Xplained board to connect via the proxy first. To do this type `vi ~/.bashrc` into the terminal. Then add the following lines to the file:

```
export http_proxy='http://username:password@proxyaddress:proxyport/'
export https_proxy='https://username:password@proxyaddress:proxyport/'
export ftp_proxy='http://username:password@proxyaddress:proxyport/'
```

Substituting username, password, proxyaddress and proxyport for the appropriate values.

If your proxy does not require verification then you need only enter:

```
export http_proxy='http://proxyaddress:proxyport/'
export https_proxy='https://proxyaddress:proxyport/'
export ftp_proxy='http://proxyaddress:proxyport/'
```

Substituting proxyaddress and proxyport for the appropriate values.

Required Packages

- wpa_supplicant
- net-tools
- wireless-tools

All the packages listed above (or their equivalents) are required to get the WiPi working with the Xplained board. To check which packages you currently have installed you can use the command:

```
root@sama5d3 xplained:~# opkg list installed
```

This will return a list of installed packages.

Installing new packages (net-tools in this example) can be done via

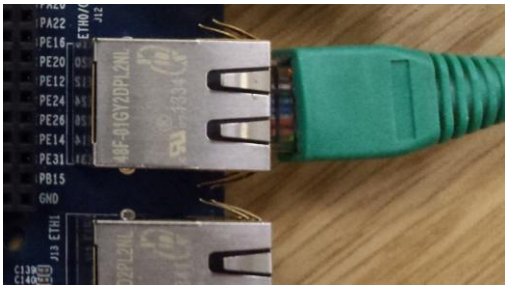
```
root@sama5d3 xplained:~# opkg install net-tools
```

> If this returns an "unknown package" error first check your spelling then use the `root@sama5d3 xplained:~# opkg update` command and try again

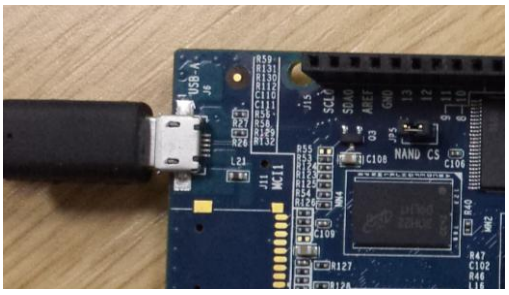
Setup & Connection

Follow the steps below to get the WiPi working with the Xplained board

1. Connect the board to the network via an Ethernet cable



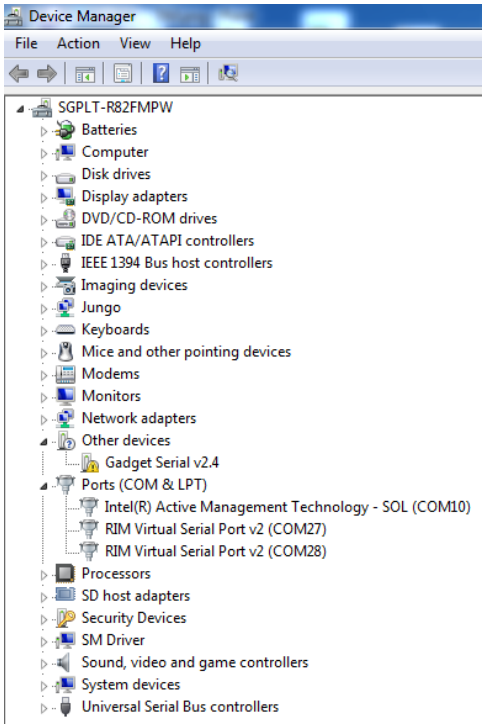
2. Connect the Xplained board to the computer using a USB-A to USB Micro-B cable



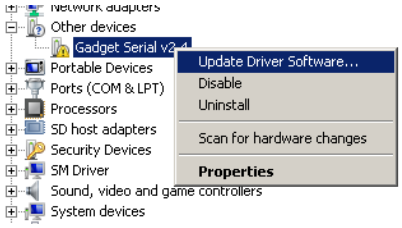
> If you have previously connected to the board via the USB to Serial connection you can skip the rest of this section, otherwise continue with step 3

3. Open the Device Manager (Start -> Run -> devmgmt.msc or type devmgmt.msc into the "search programs and files" area of the start menu)

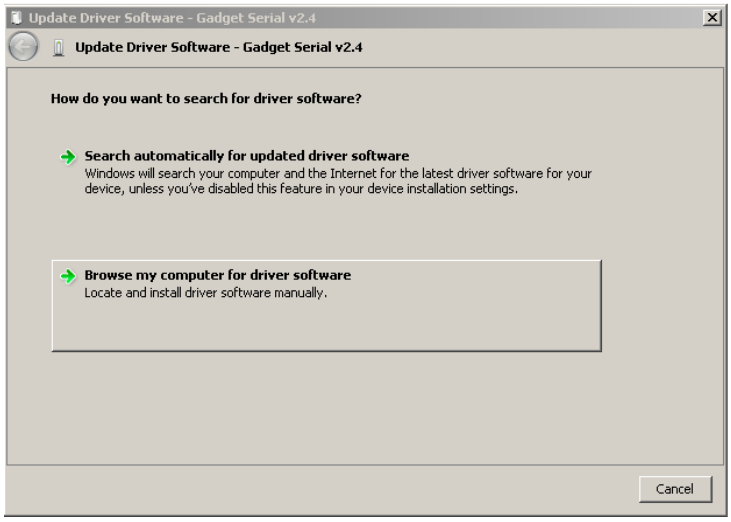
4. In the device manager window the board will be shown as “Gadget Serial v2.4”



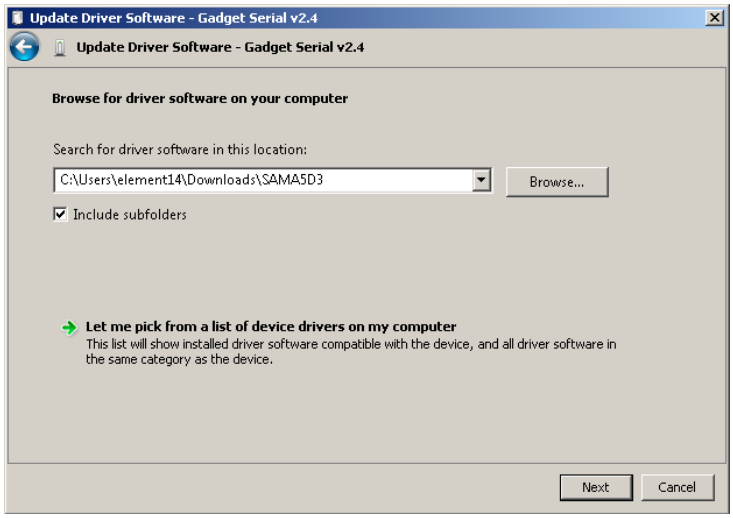
5. Right click the “Gadget Serial v2.4” device and select “update driver software”



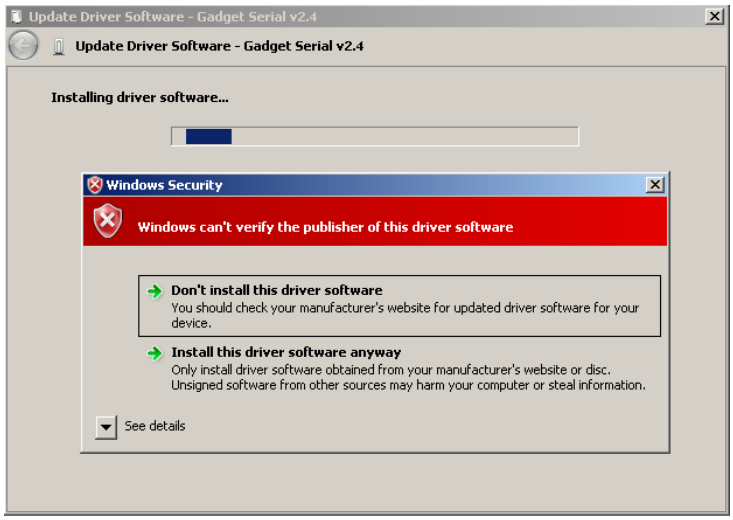
6. Select “Browse my computer for driver software”



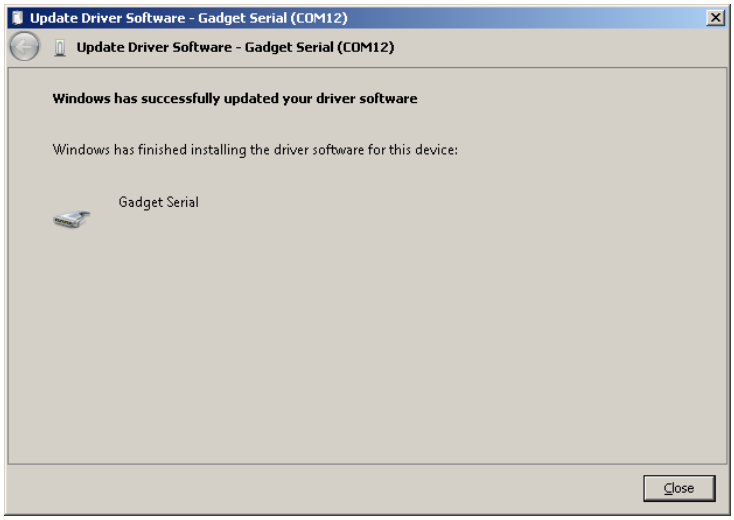
7. Select the location of the previously downloaded .inf file and click next



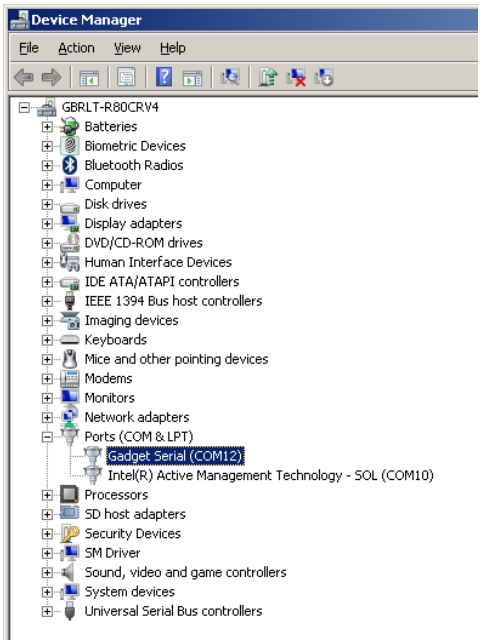
8. You may receive a warning as shown, click “Install this driver software anyway”



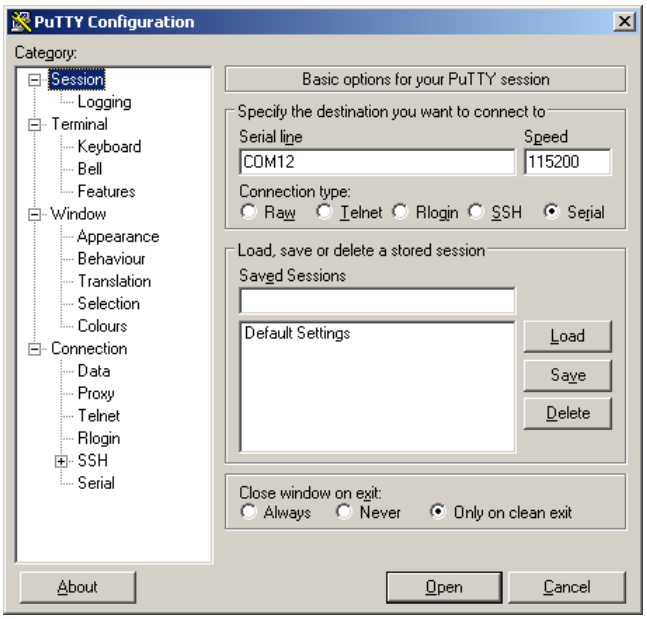
9. Once the installation has completed click “Close”



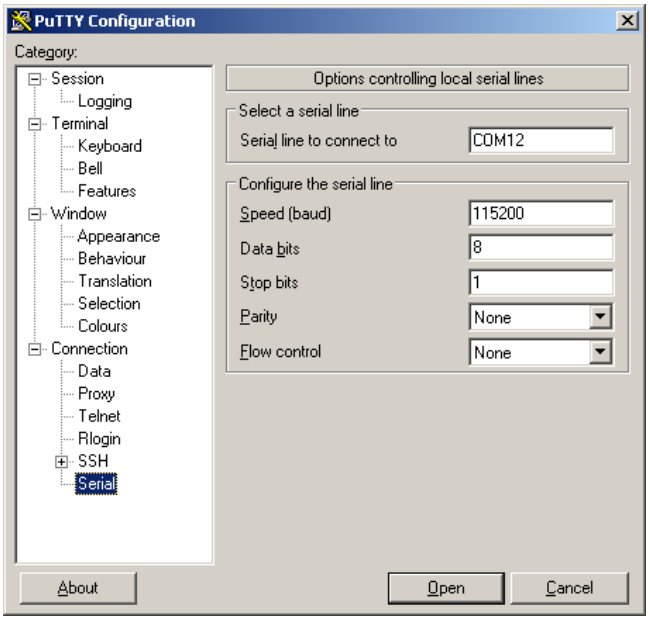
10. The board will now be shown in the Device Manager along with a COM port (COM12 in this case). Take note of this as you will need it later.



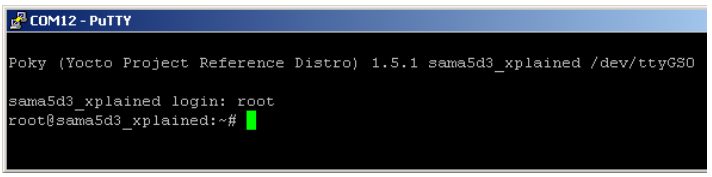
11. You can now close the Device Manager and start PuTTY. Ensure that “serial is selected as the Connection type on the initial screen



12. The following settings need to be configured in the “Serial” section to allow PuTTY to communicate with the SAMA5D3 Xplained board. Replace COM12 with whichever COM port your computer identified in step 11. Then click “Open”

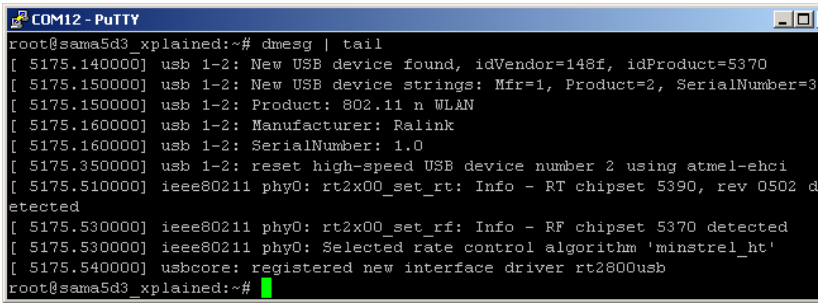


13. You will be presented with a black window, hitting enter on your keyboard will display the login prompt. Login with the username `root` then hit enter to access the terminal on the board.

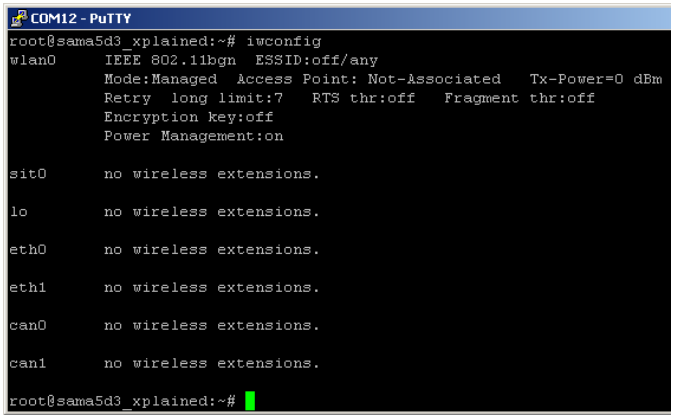


WiPi Setup

14. You can now connect the WiPi to one of the USB headers on the board. Typing `dmesg | tail` into the console will show that the WiPi has been detected and installed

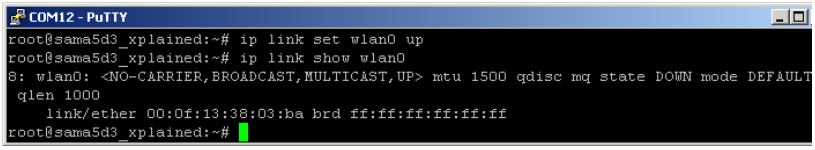


15. You can discover the name of the wireless device by typing `iwconfig` into the terminal, this will display a list of connections. As can be seen in the image below the wireless connection is named “wlan0”



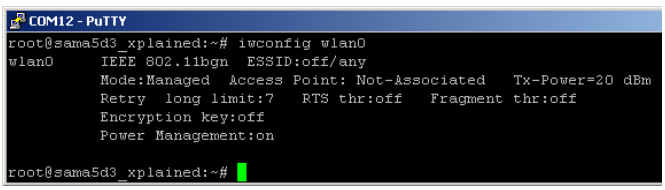
16. Check that the wireless device is up by typing `ip link show wlan0` into the terminal

17. Notice that in step 16 the content inside the angle brackets does not indicate that the device is currently “up”. This can be rectified by entering `ip link set wlan0 up` and re-entering the `ip link show wlan0` command



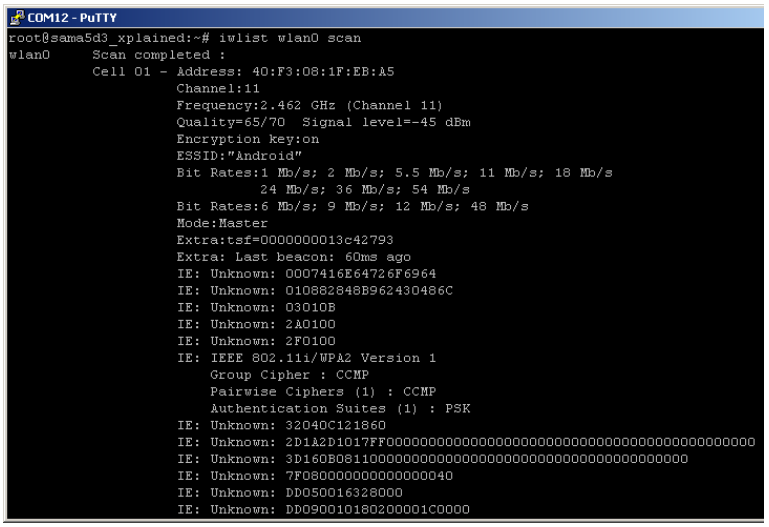
Notice how the device is now up.

18. Check the connection status with `iwconfig wlan0`



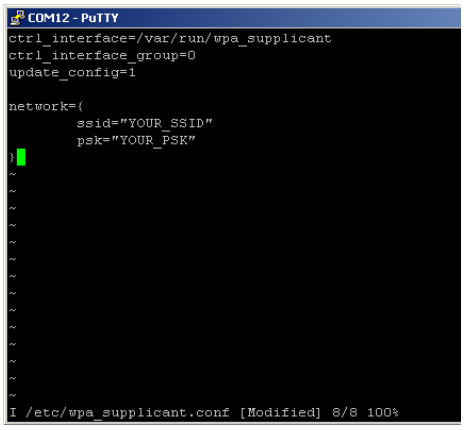
`Access point: Not-Associated` indicates that we are not currently connected to an access point

19. At this point you can scan to show any networks that are in range by using the `iwlist wlan0 scan` command.

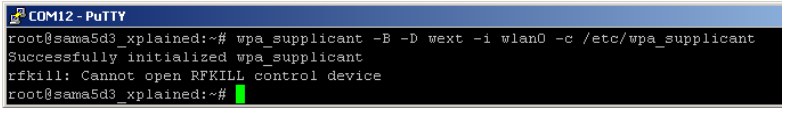


This will show a list containing all WiFi points in range. Each entry is numbered from cell 01 onwards and will show information for each connection such as the SSID and the encryption key status (Android and WPA2 in this case)

20. Edit the file wpa_supplicant to provide the SSID and PSK of the network you wish to connect to. To do this you can enter `vi /etc/wpa_supplicant.conf` and edit the file to look as below (substituting `YOUR_SSID` and `YOUR_PSK` for the appropriate values)

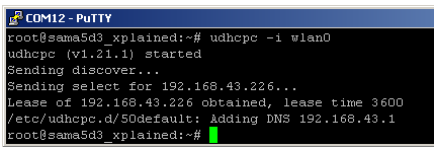


21. Now initialise the WiFi connection with the following command: `wpa_supplicant -B -D wext -i wlan0 -c /etc/wpa_supplicant.conf`



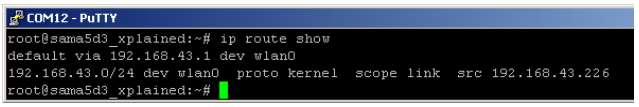
The error message about RFKILL is nothing to be worried about as it is used for hard-switches that block different types of RF radios and we do not use this functionality

22. Get an address from the DHCP server using the command `udhpc -i wlan0`



The Xplained board has been assigned an IP Address (192.168.43.1 in this case)

23. Now typing ip route show will show that you have the correct routing rules:



If these are incorrect you can set the correct rules by typing: `ip route add default via 192.168.43.254 dev wlan0` (substituting the IP Address for the one that was issued in step 21)

24. The connection is now set up!
You can test this if you wish via the ping command: