WIRELESS INTERNET CONNECTIVITY FOR EMBEDDED DEVICES (WICED)

WICED "APPLIANCE" DEMO

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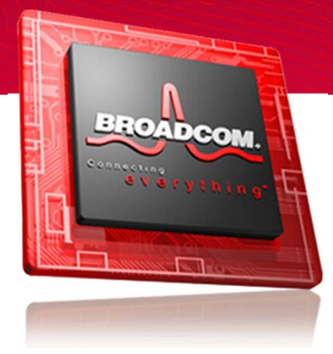

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APPLIANCE DEMO

- **The WICED SDK contains many applications demonstrating different aspects of the WICED functionality.**

- **Provided as source code examples**

- **Contains documentation on using/configuring the features**

HOME APPLIANCE CONTROL APPLICATION

This application demonstrates how a simple web page can be used to send information to a UART when a button on the webpage is clicked. The application mimics a very basic user interface to control a home appliance such as a washing machine or dryer.

Features demonstrated

WICED Configuration Mode
Wi-Fi client mode
HTTP web server with dynamic content
Powersave

Equipment needed to run demo

wiced eval board & usb cable
laptop with IDE/SDK2.4.0 installed
smart device such as phone or tablet
wlan access point

Optional equipment

- spectrum analyser, wispi or InSSIDER
- ‘scope for measuring power consumption

HOW TO SET UP DEMO

Application Instructions

1. Modify the CLIENT_AP_SSID/CLIENT_AP_PASSPHRASE Wi-Fi credentials in the wifi_config_dct.h header file to match your Wi-Fi access point

2. Connect a PC terminal to the serial port of the WICED Eval board, then build and download the application as described in the WICED Quick Start Guide

3. After the download completes, the terminal displays WICED startup information and starts WICED Configuration Mode.

Once the device has been configured, it connects as a client to the Wi-Fi AP selected during configuration mode. The app starts a web server that displays a web page with clickable buttons. A Wi-Fi client (eg. a computer) connected to the same home Wi-Fi network as the WICED module can then connect to the appliance web server using a web browser.

Lets start by loading the SDK onto your laptops, collect a WICED eval board and a WLAN access point.

CONNECTING A DEVICE TO THE NETWORK

- **What do we need to know?**
  - SSID and security credentials (passphrase) for the wlan network we wish to connect the WICED board to.
    - In this case it's helpfully printed on the WLAN AP's I have provided but normally this would be printed on the back of the home gateway or could be found via the GUI on the AP.

- But how do we enter these details into an embedded device that has no screen or keyboard??
  - We will use a special mode of the WICED software that allows the board to start as a softAP that can be easily found using a browser and configured.

SET UP YOUR NETWORK

Now, please power up your WLAN AP and check the SSID, passphrase and the channel it's operating on.

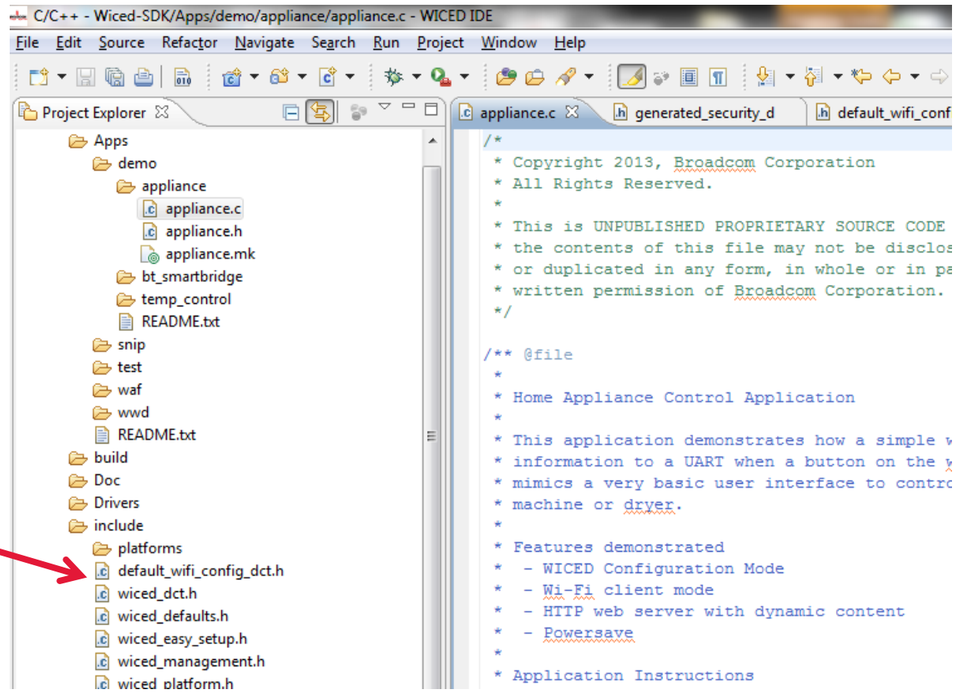
Also, connect the WICED eval board to your laptop via USB cable.

NOW TO CONFIGURE THE WICED APP

Open the WICED SDK and browse to the application app

There is one file we need to modify and enter the details of the wlan network we wish to connect the wiced device too.

- Default_wifi_config_dct.h



CONFIGURING APPLICATION APP

File – default_wifi_config_dct.h

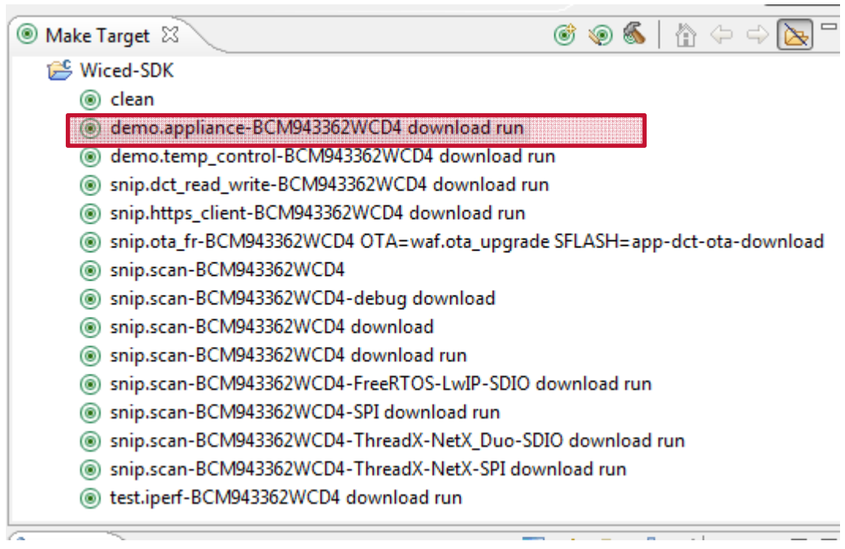
appliance.c | wifi_config_dct.h | wifi_config_dct.h | *default_wifi_config

```
/*****************************************************
 *                      Macros
 *****************************************************/

/*****************************************************
 *                   Constants
 *****************************************************/

/* This is the soft AP used for device configuration */
#define CONFIG_AP_SSID        "WICED Config"
#define CONFIG_AP_CHANNEL     1
#define CONFIG_AP_SECURITY    WICED_SECURITY_WPA2_AES_PSK
#define CONFIG_AP_PASSPHRASE  "12345678"

/* This is the soft AP available for normal operation (if used)*/
#define SOFT_AP_SSID          "WICED Device"
#define SOFT_AP_CHANNEL       1
#define SOFT_AP_SECURITY      WICED_SECURITY_WPA2_AES_PSK
#define SOFT_AP_PASSPHRASE    "WICED_PASSPHRASE"

/* This is the default AP the device will connect to (as a client)*/
#define CLIENT_AP_SSID        "ssid"
#define CLIENT_AP_PASSPHRASE  "passphrase"
#define CLIENT_AP_BSS_TYPE    WICED_BSS_TYPE_INFRASTRUCTURE
#define CLIENT_AP_SECURITY    WICED_SECURITY_WPA2_MIXED_PSK
#define CLIENT_AP_CHANNEL     1
#define CLIENT_AP_BAND        WICED_802_11_BAND_2_4GHZ

/*****************************************************
 *                   Enumerations
 *****************************************************/
```

TIME TO COMPILE, DOWNLOAD AND RUN

On the right hand side of the IDE tools, there is the “make target” window. We have helpfully provided a set of example make files here already, including the one we need today

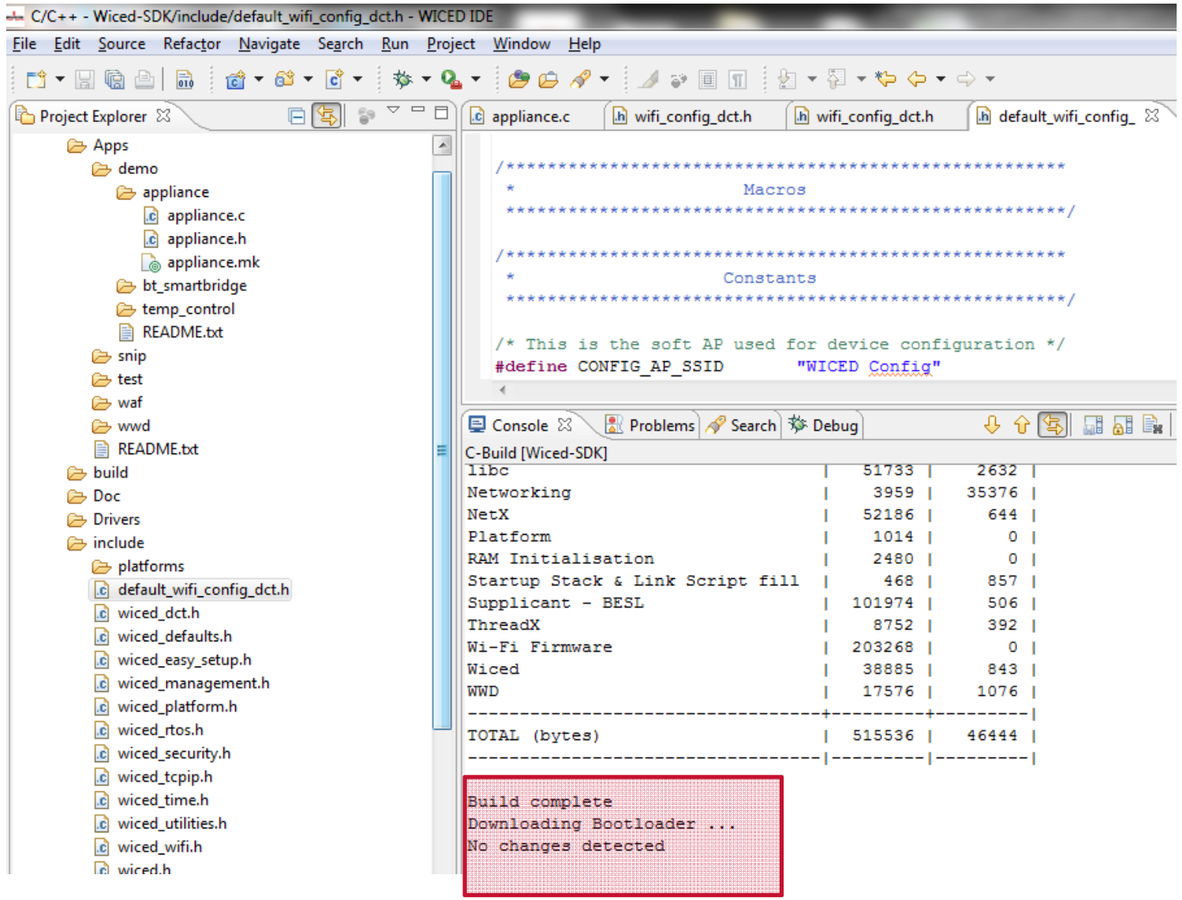
Double click on “demo.appliance-BCM943362WCD4 download run”



TIME TO COMPILE, DOWNLOAD AND RUN

The application will then build and it's progress can be tracked in the "console" window.

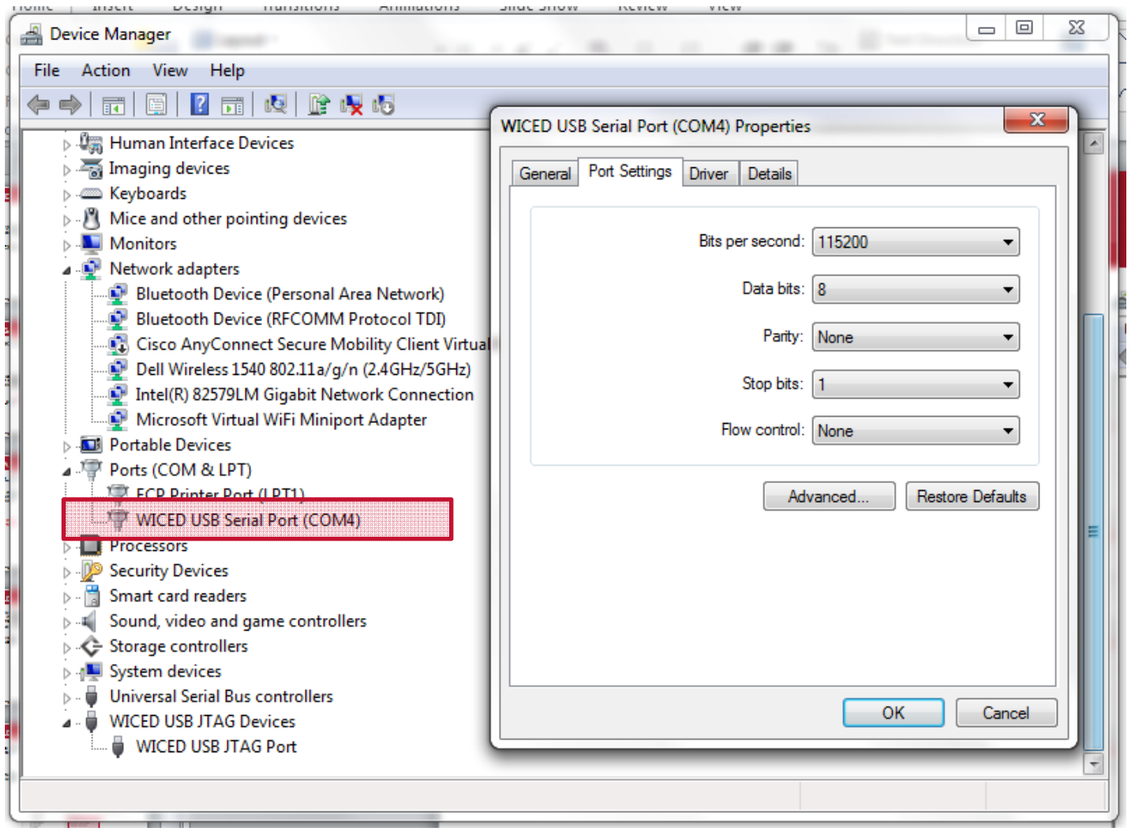
If it compiles and builds correctly then you will see a screen like this



MONITORING THE APP

The status of the wiced app can be tracked using a terminal emulator. Here I am using puTTY.

The port settings will need to be checked in device manager/ports to the settings shown here

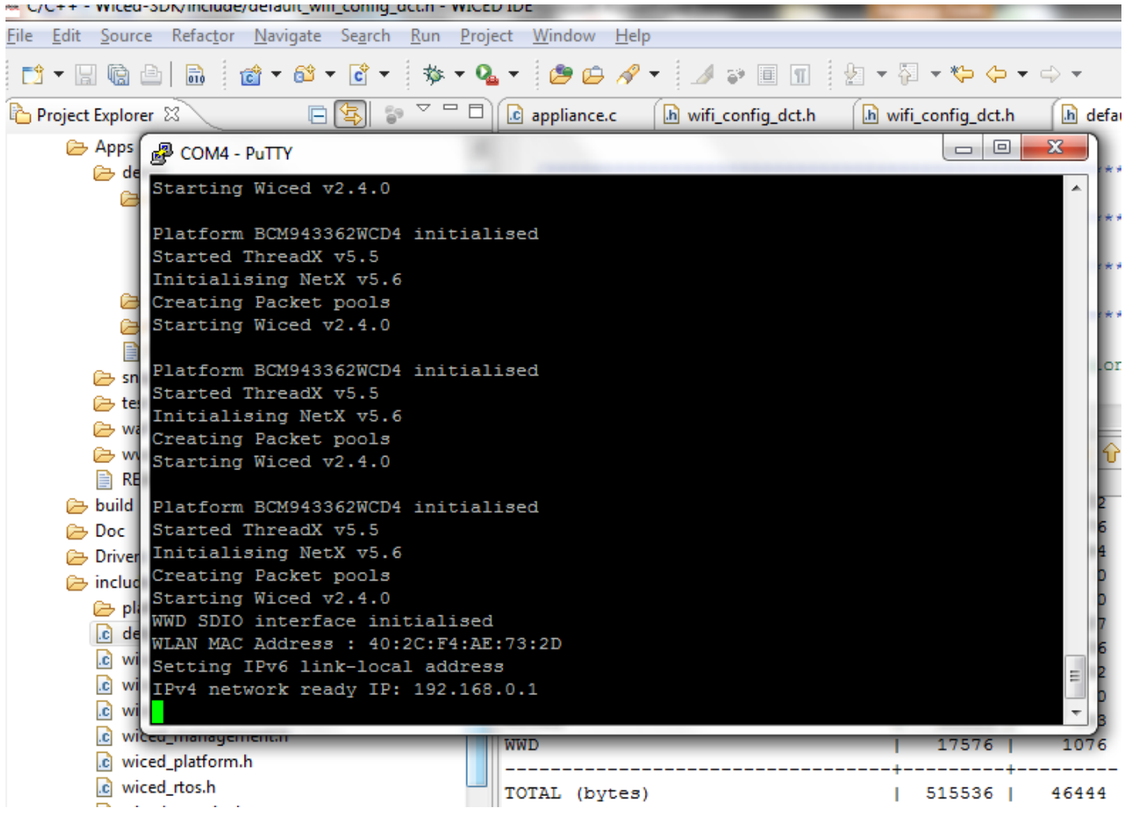


TIME TO COMPILE, DOWNLOAD AND RUN

Open up the puTTY window to monitor status messages from the WICED board

The WICED eval board will now be running the Appliance application and will be in softAP mode.

Note the ip address of the wiced softAP as this may be needed during the next step of the demo setup.



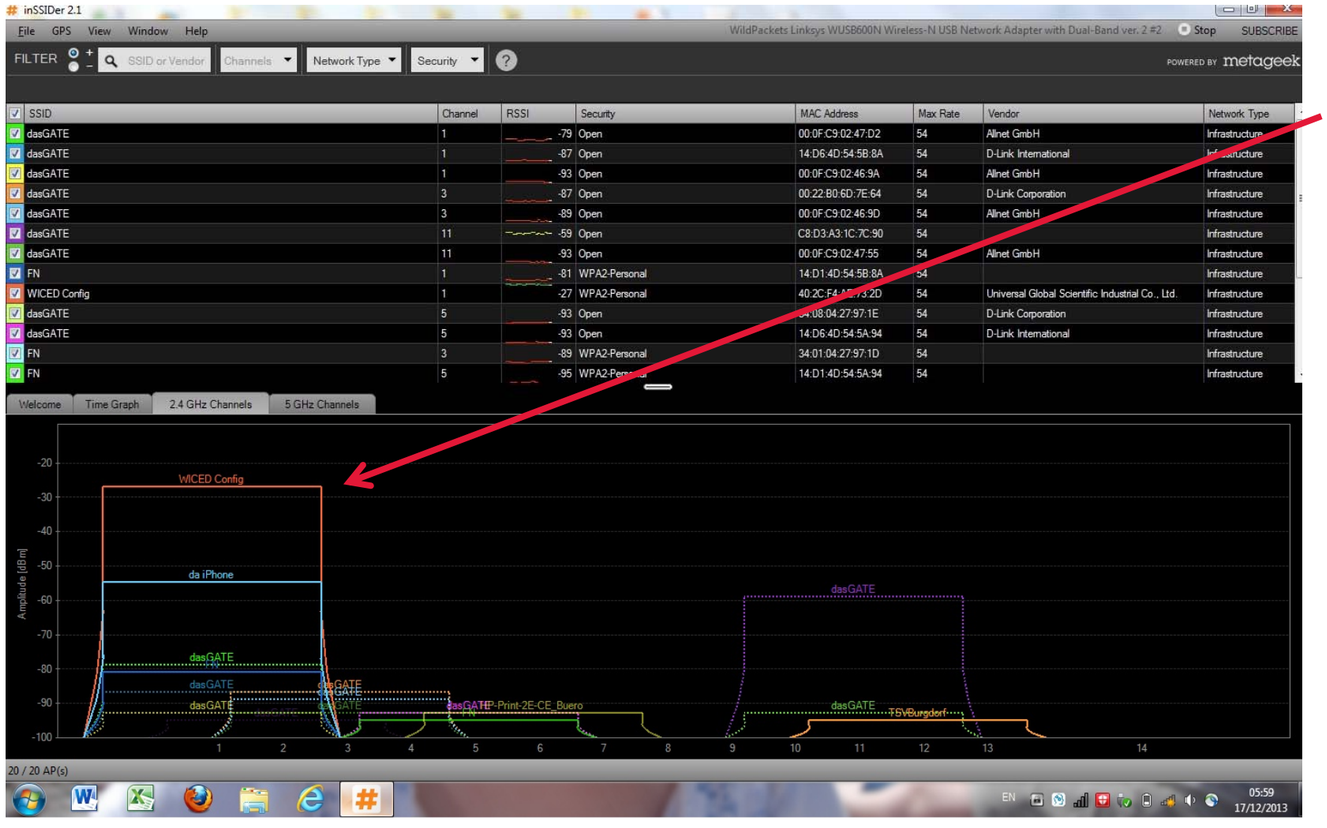
SETTING UP THE DEMO

- Note on demo’s
  - When demonstrating to customers, the environment is typically full of wlan networks so it is useful to perform a site survey to pick a quieter channel.
  - - the operating channel for the softAP is defined in the default_wifi_config_dct.h file/

  - There are many tools available to do this ranging from freeware, through to comprehensive commercial packages such as Wildpackets.

SITE SURVEY

On this occasion I will use a tool by Metageek “InSSIDer” with a wlan usb dongle.



Check you can see the WICED softAP during the site survey

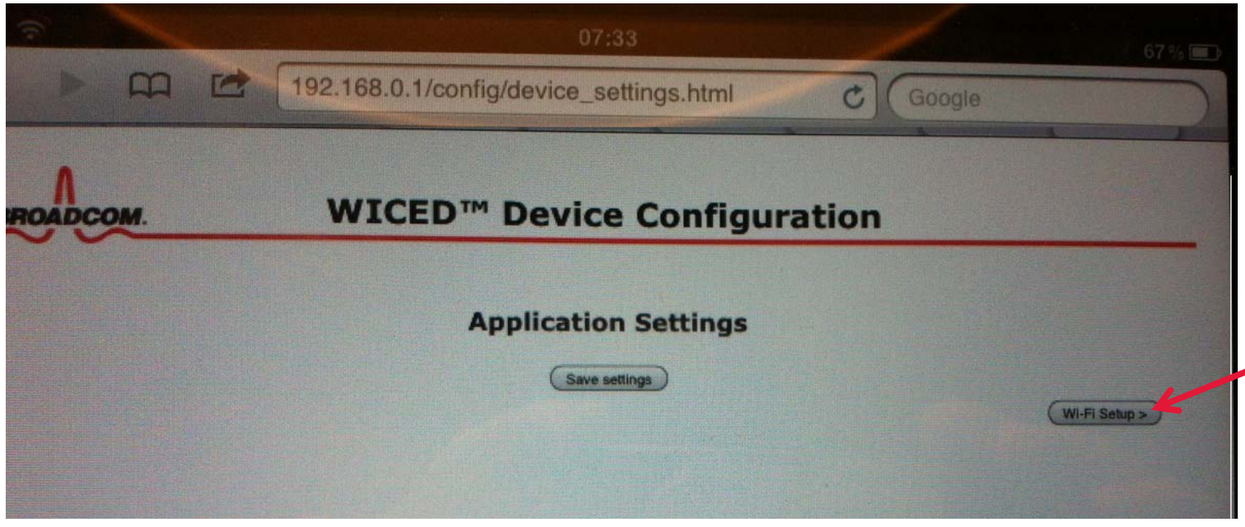
Note:I have configured a wlan hotspot using my iPhone (da iPhone) and this can be seen here alongwide the hotel networks.

Please check that you can see your WLAN AP here too.

CONNECTING WICED TO THE NETWORK

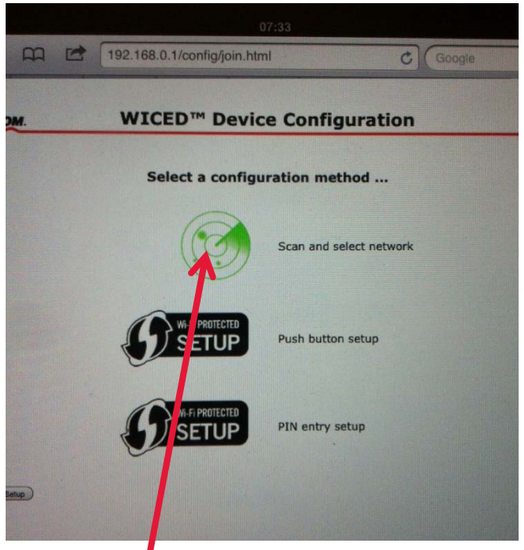
With the WICED board in softAP mode, any wlan device such as laptop, phone etc can connect to it and see the configuration web page provided by the wiced board.

Note: it may be necessary to enter the ip address of the softAP if DNS redirect does not automatically take the browser to the web page served by the eval board. As mentioned earlier, the ip address of the WICED softAP can be found on the console window.

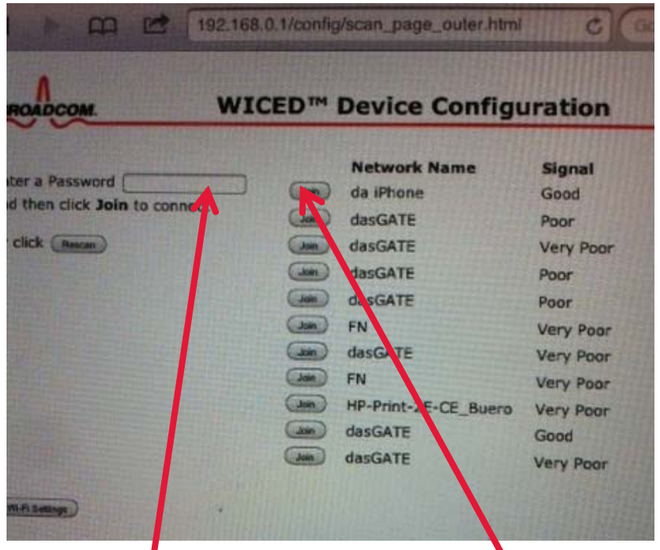


Click here to start the wifi setup

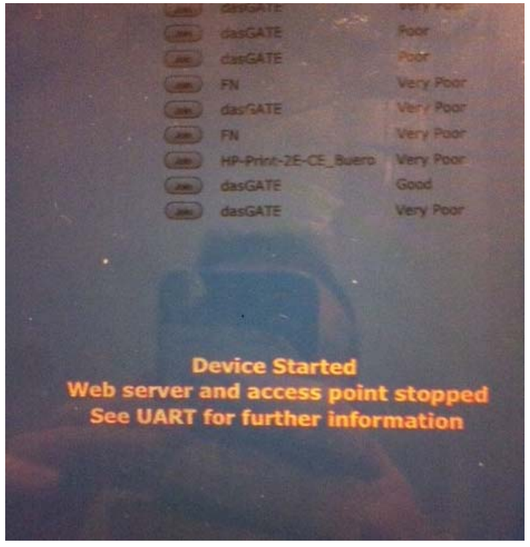
ENTERING NETWORK DETAILS



Click on scan & select networks



Enter the passphrase for your network and then click “join” next to the name of your network



The WICED board will then switch to STA mode and connect to the specified wlan network.

If successful you will see this page

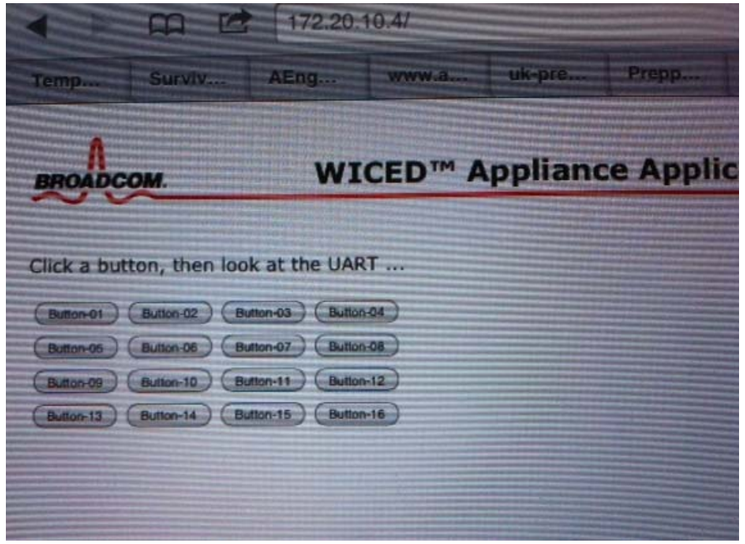
USING THE APPLIANCE APPLICATION

The WICED board is now connected to the home network and simulating being an “appliance” with a very simple user interface.

Using a smart phone or other device, connect to the same wlan network and browse to the new ip address that the wiced board has been given via DHCP by the wlan gateway. Note, this can be found by looking at the console window.

This web page is created and served by the wiced board. Pressing these soft buttons will be detected by the wiced board and could be used to control the “appliance”.

Each button press is also reported in the console window too.



DEVICE CONNECTED

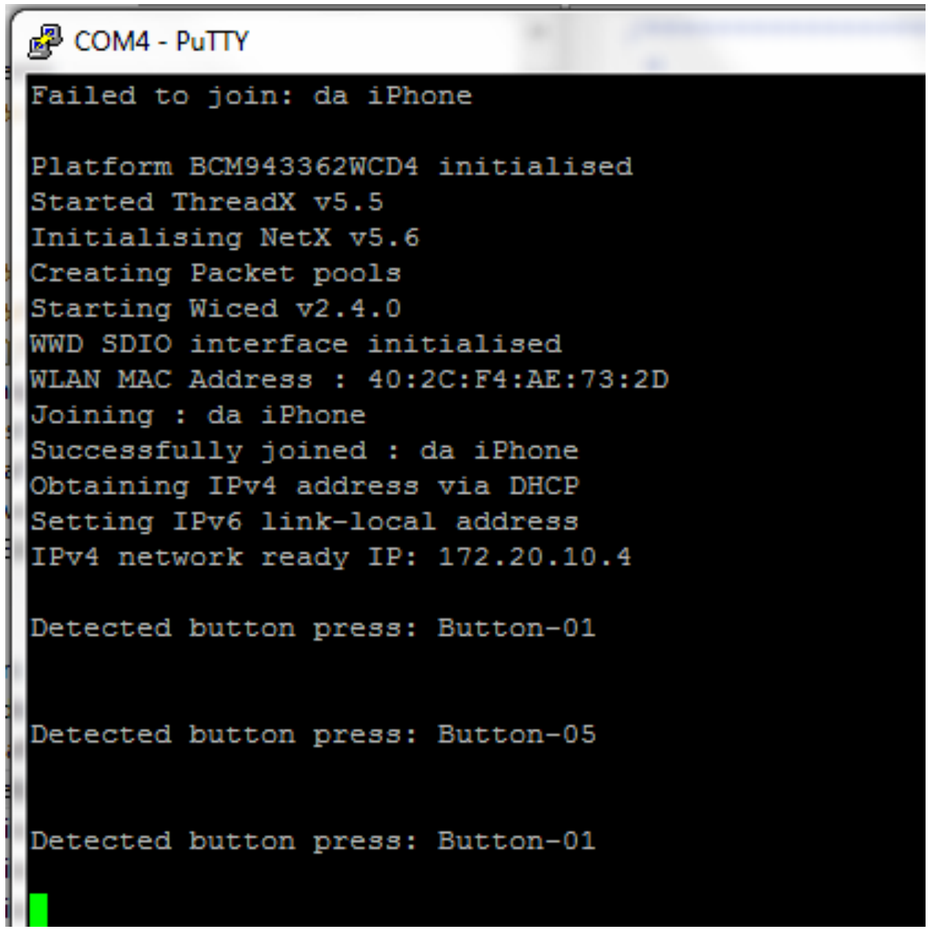
Button presses on WICED board are reported via the web server

Note new ip address which is provided via DHCP by the wlan access point.

Connect laptop/smart phone to the same network. Open web browser and enter ip address of wiced board.

Wiced board is now serving a new web page offering a range of soft buttons.

This is demonstrating that the board can be controlled via a remote web page – console port confirms button presses



ADDITIONAL ELEMENTS TO DEMONSTRATE

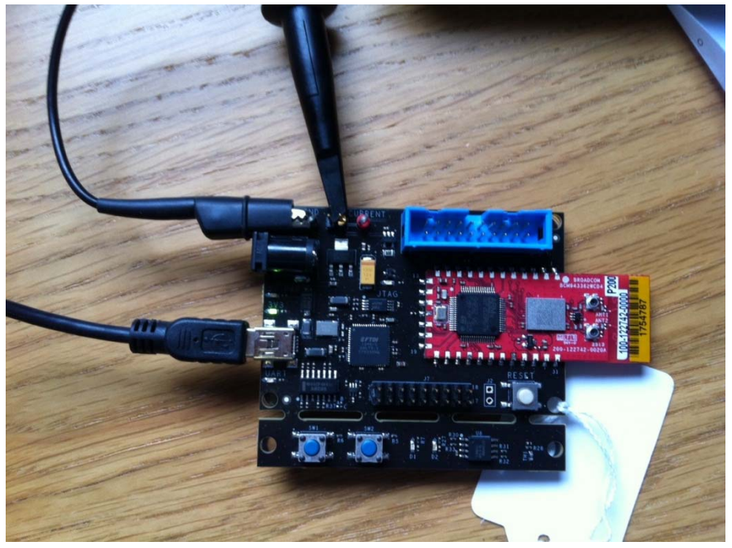
The Appliance application is now fully configured and connected to the specified home network – all without needing to enter any security details directly in the device via buttons or keyboard.

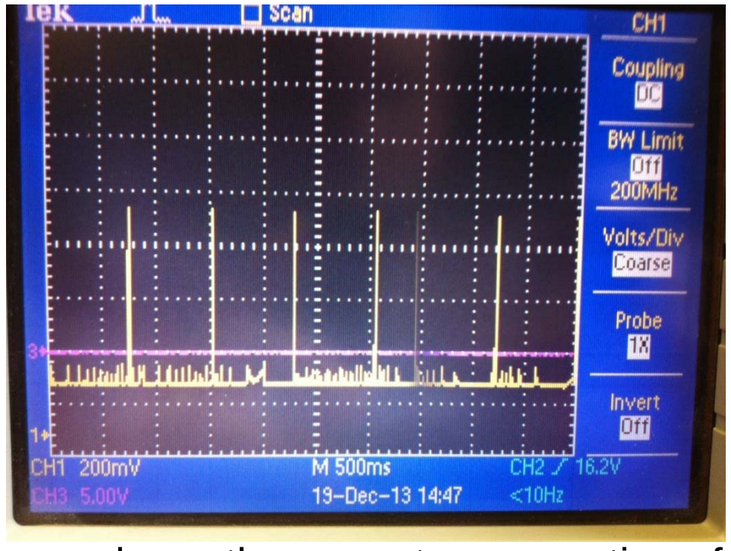
It’s also possible to discover and connect the wiced board by using a number of other secure methods such as WPS, Bonjour (or Gedday) and soon NFC pairing too.

Further areas to explore with this application is the use of wifi powersave mode to reduce power consumption when the radio is not transfering traffic.

The WICED eval board has a port for connecting a scope (or current meter) to measure the board power consumption directly.

POWER CONSUMPTION





The trace shows the current consumption of the wiced board. The peaks are when the radio exits the very low power sleep mode to receive the beacons and then returns to low power mode.

Reference Application note WICED-AN104-R-Powersave-App-Note.pdf for more details of the powersave implementation.