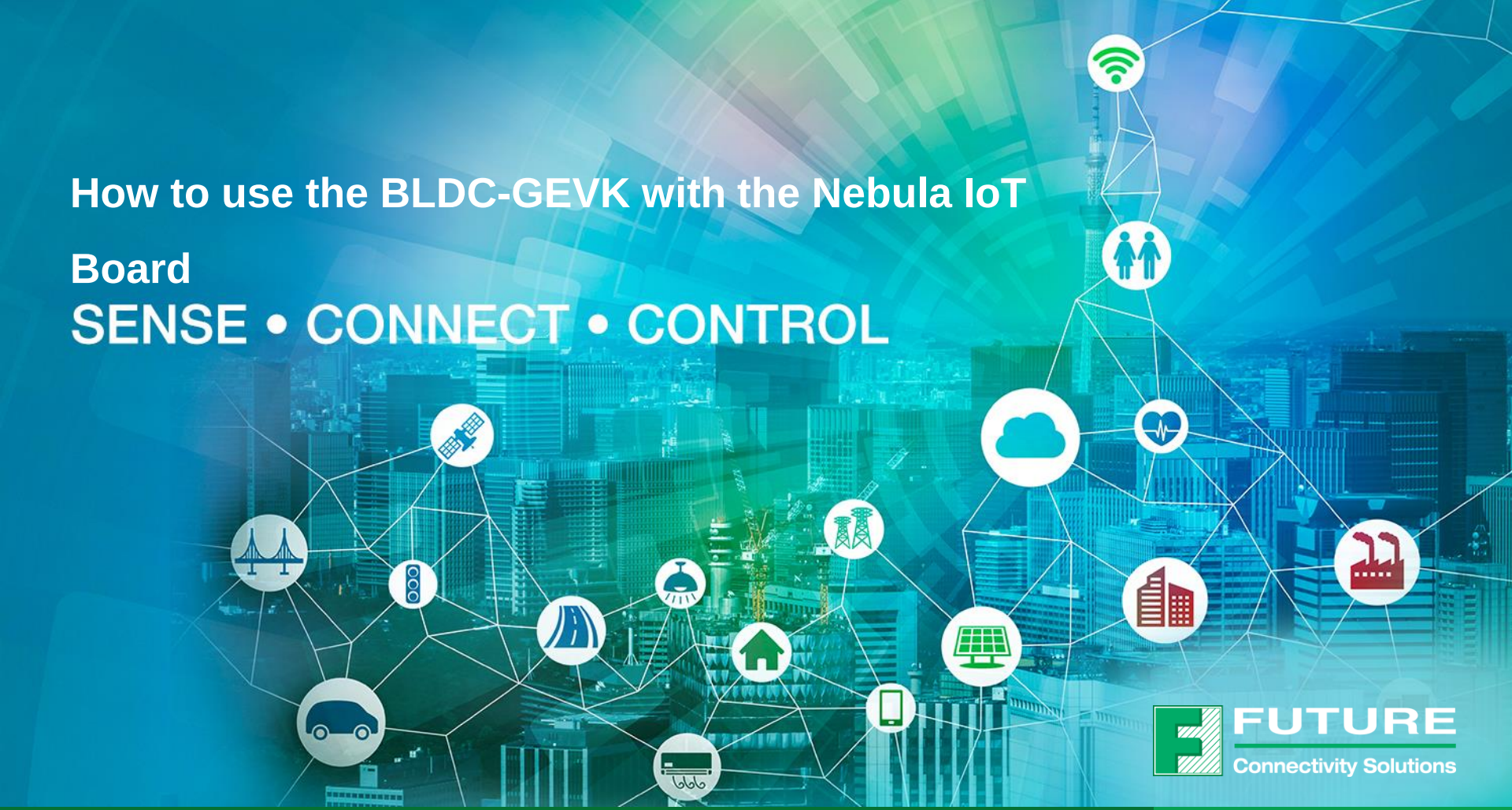
How to use the BLDC-GEVK with the Nebula IoT Board

SENSE • CONNECT • CONTROL

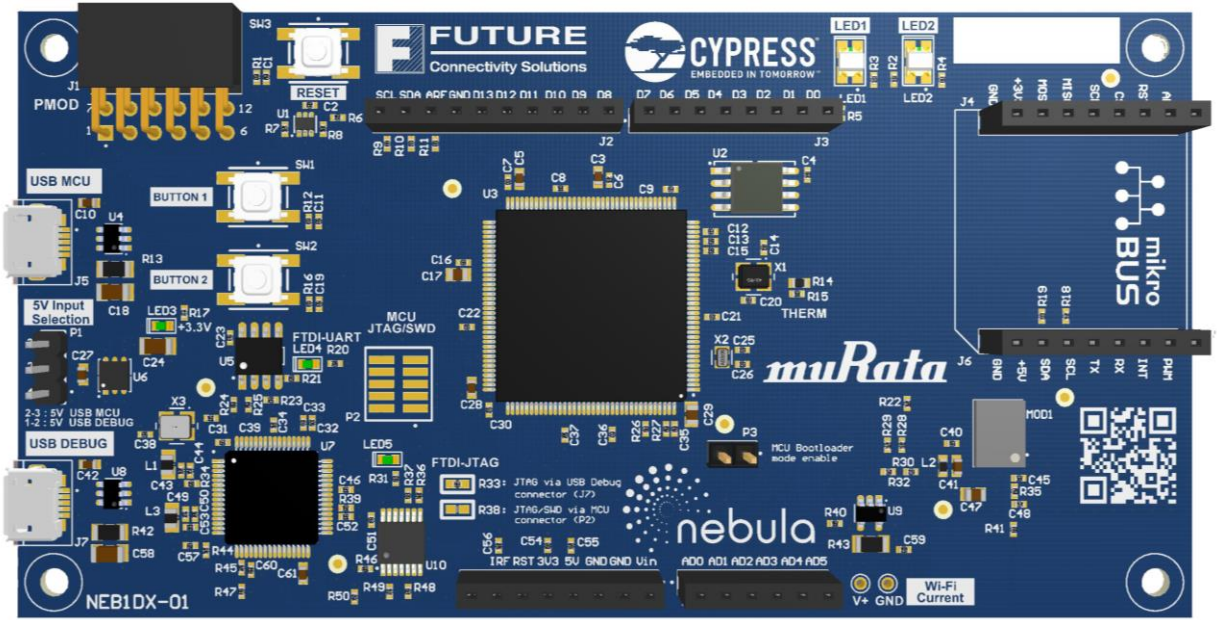


FUTURE
Connectivity Solutions

Nebula IoT Reference Design Board

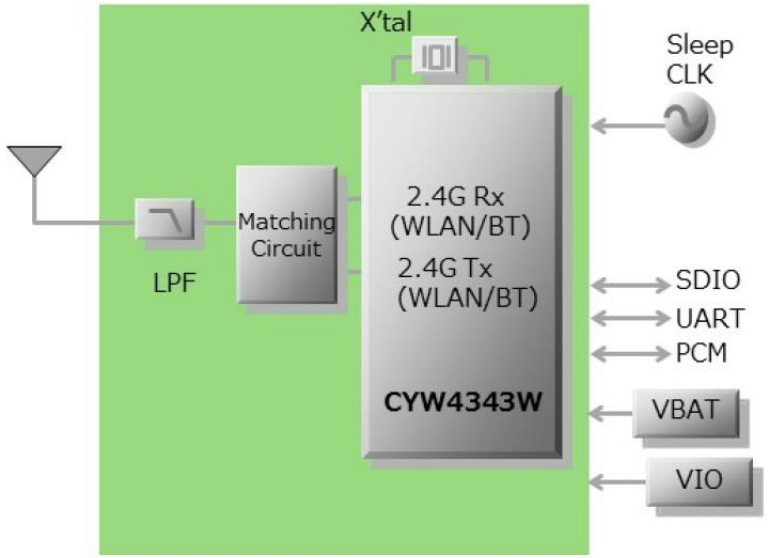
The possibilities are endless!

- Use the different interfaces to add on development boards from our growing list of Future IoT ready boards
- Application Examples:
  - Sensors
    - Proximity
    - Ambient light
    - Motion
    - Temperature
    - Humidity
    - Pressure
    - Gesture Recognition
    - UVA/UVB
  - Motor Control



Cypress Murata Certified Wi-Fi + Bluetooth Combo Module

- Murata 1DX certified module - Part Number LBEE5KL1DX-883
- Inside is a Cypress CYW4343W Wi-Fi and Bluetooth chipset radio
- Single Band 2.4GHz 802.11 b/g/n
  - Over SDIO Interface
- Dual Mode (Classic BT + BLE) Bluetooth v4.2 + EDR Radio
  - Over UART Interface
- Single ended RF port using single antenna
- Radio Regulatory Certifications
  - USA/Canada FCC ID : VPYLB1DX IC : 772C-LB1DX
  - Europe EN300328 v1.9.1
  - 4.2. Bluetooth® Qualification QDID: 7306
- Size: 6.95 x 5.15 x 1.1 mm



CYPRESS EMBEDDED IN TOMORROW™

muRata INNOVATOR IN ELECTRONICS

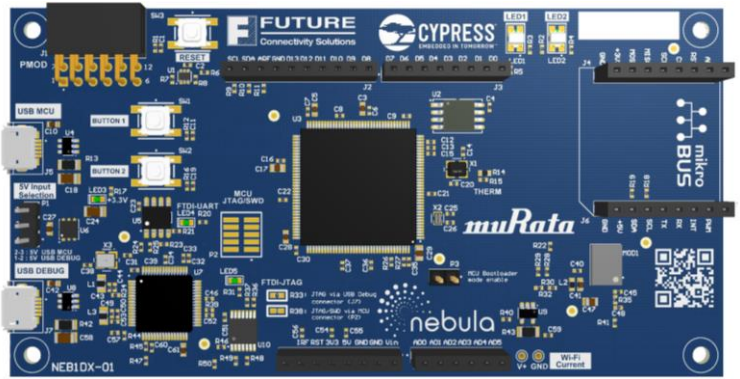
FUTURE Connectivity Solutions

Sensor Companion Shields from ON Semiconductor

Passive Infrared Shield
PIR-GEVB

Motor Driver Shield
BLDC-GEVK

Smart Passive Sensor Reader Board
SPS-Reader-GEVK



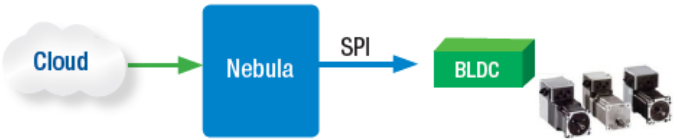
Nebula IoT Reference design board: NEB1DX-01 or NEB1DX-02

BLDC-GEVK Board: ON Semiconductor Evaluation board

- Brushless DC Motor driver shield
- Based on ON Semiconductor's sensor-less three phase brushless DC Motor Controller LV8907UW
- Integrated gate drivers for driving external N-MOSFETs
- Built-in linear regulator, watchdog timer and LIN transceiver for powering an external circuit
- Integrated watchdog timer and a Local Interconnect Network (LIN) transceiver
- Evaluation board connects to the Nebula board through Arduino style connectors
- Dimensions: 7x7 mm

LV8907

Motor Driver Shield BLDC-GEVK



Applications for LV8907

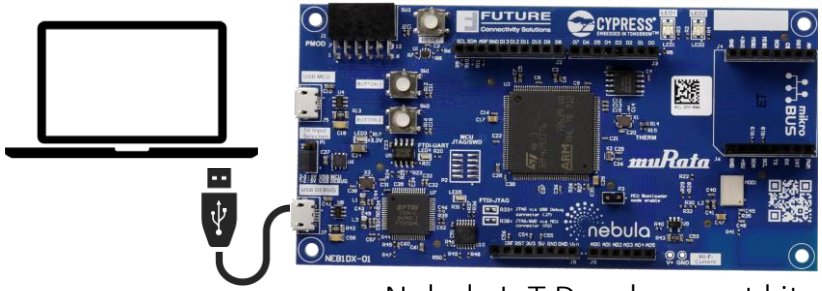
- Smart lighting
- Door Automation
- IoT capability to Motor Control Systems
- Motion triggered events

How to use the BLDC-GEVK with the Nebula IoT Board

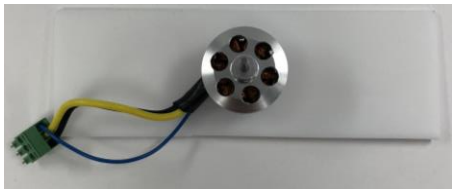
Objective: Use the BLDC-GEVK with the Nebula board to demonstrate reading of BLDC Motor

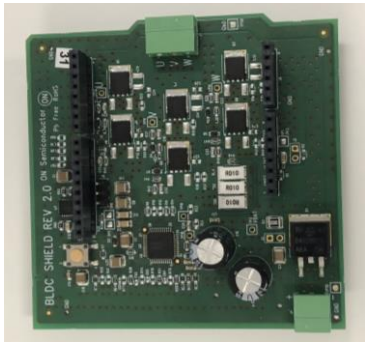
Hardware Prerequisites

- 1 x Nebula IoT development kit (NEB1DX-01 or NEB1DX-02)
- 1 x BLDC motor driver shield Board (SPS-Reader-GEVK)
- 1x USB cable
- 1 PC
- 1 x 12V power supply (not included in kit)



Nebula IoT Development kit

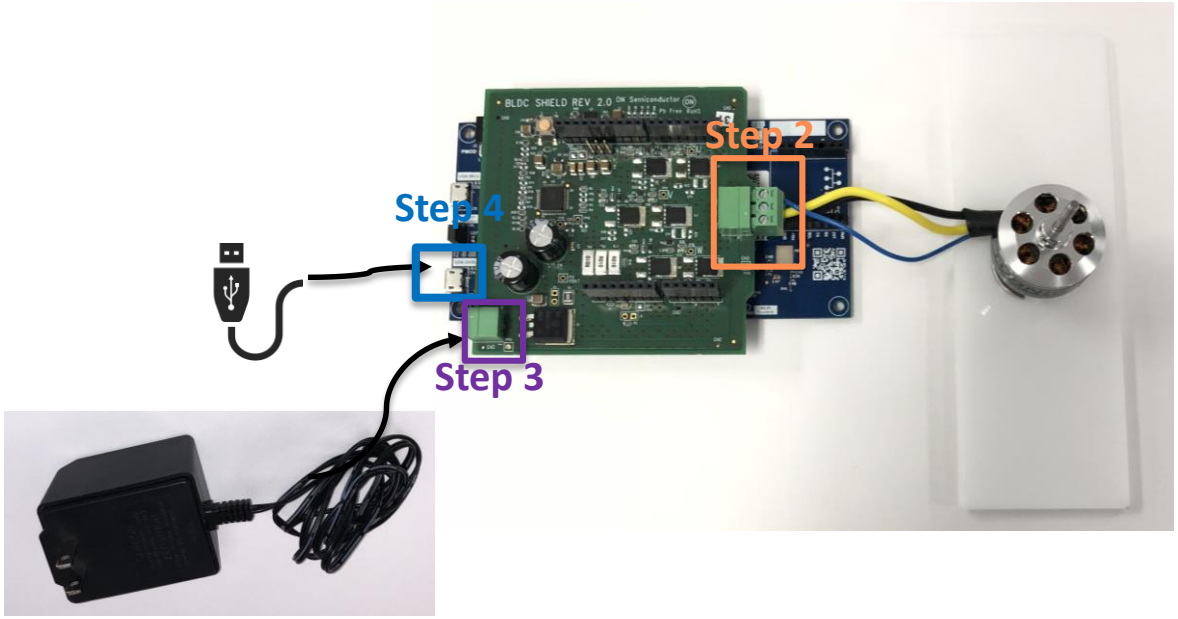




BLDC Motor Driver Shield

12V Power Supply

Hardware Prerequisites Cont'd



Step 1. Using the Arduino connectors, connect the BLDC-GEVK board to the Nebula board.

Step 2. connect the BLDC motor to the BLDC Shield.

Step 3. Power the BLDC-GEVK board using the 12 V power supply

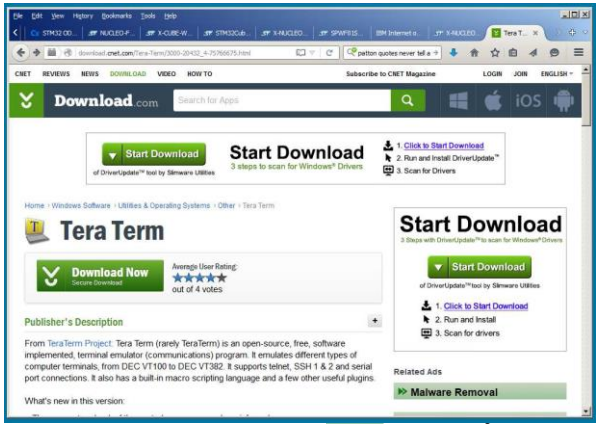
Step 4. Power on the nebula board using USB debug port

Software Prerequisites

- Example code “bluemix_iot_sensors” make target built in WICED
- WICED Studio 5.2 (and later)

Download Terminal Emulator (if you don’t have one)

- TeraTerm Pro is available (for free) at:
  - http://download.cnet.com/Tera-Term/3000-20432_4-75766675.html
  - Download “teraterm-4.89.exe’” (or later)
    - Run it



WICED Walkthrough

WICED Studio SDK: Download

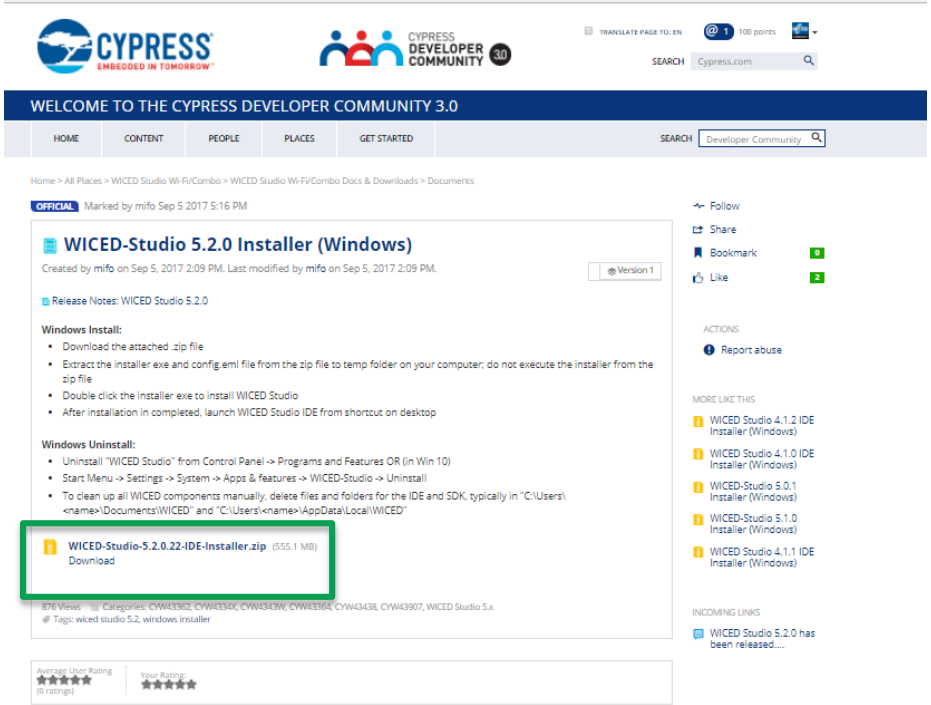
Download **WICED Studio 5.2 or later**:

Windows:

https://community.cypress.com/docs/DOC-13651

Linux or OS X:

https://community.cypress.com/community/wiced-wifi/wiced-wifi-documentation



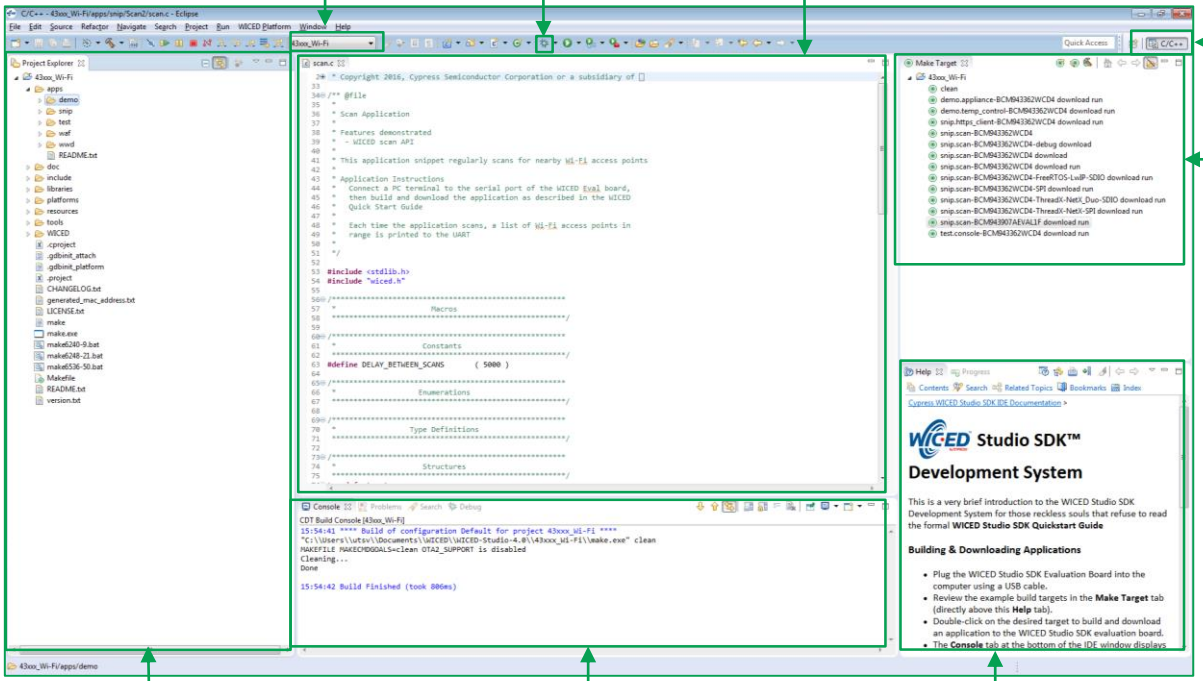
FUTURE Connectivity Solutions

WICED Studio: IDE Overview

Device Selector
Choose your device

Debug Icon
Launch debugger

Editor
Edit the firmware



Workspace Perspective
Switch between editor and debug views

Make Target
Build your application

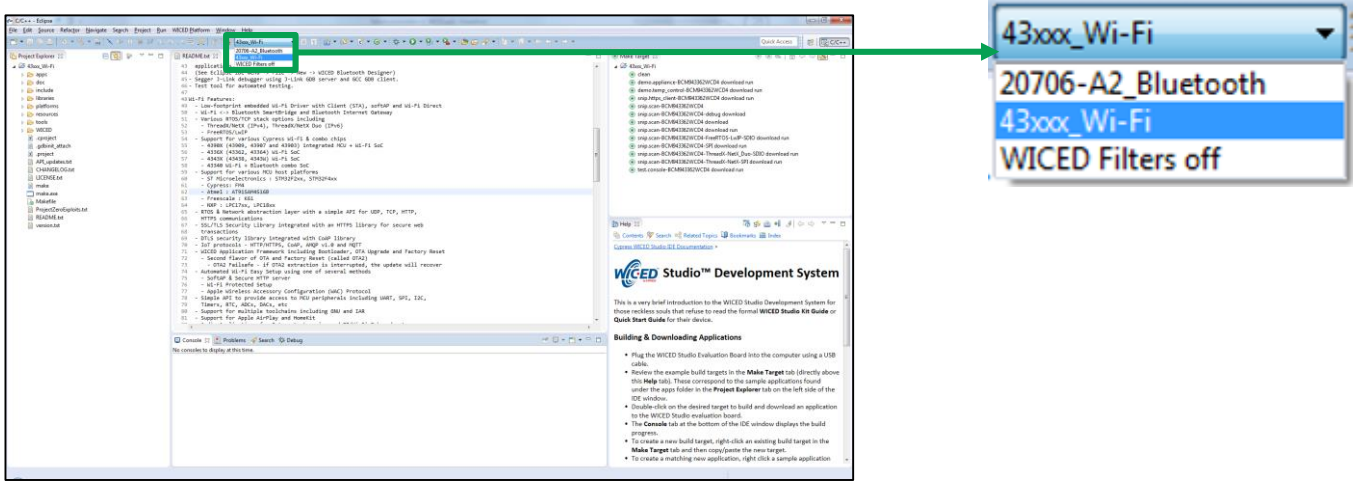
Project Explorer
Explore the SDK

Console Window
View the build output

Help
Learn how to build/run an application

WICED Studio SDK: Device Selection

Use the pull-down menu to change the device



Pull-down menu options:

20706-A2_Bluetooth – Bluetooth (BR/EDR/BLE) SoC with ARM® Cortex®-M3

43xxx_Wi-Fi – Wi-Fi + Bluetooth Combo SoCs, Wi-Fi SoCs with integrated MCU, and Wi-Fi-only SOCs

WICED Filters off – Show all available devices

FUTURE Connectivity Solutions

WICED Studio SDK: Example Applications

Choose the relevant sub-folder from the ***43xxx_Wi-Fi -> Apps*** folder in the ***Project Explorer***

Demo – Advanced applications that combine multiple WICED features

Snip – Application snippets that use various WICED APIs

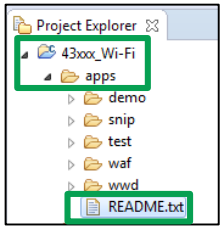
Test – Manufacturing/certification-related test applications and utilities

WAF – Applications that are part of the WICED Application Framework (WAF) like bootloaders

WWD – Applications that use low-level APIs provided by the WICED Wi-Fi Driver (WWD) and do not use the WICED APIs provided by the WICED Application Framework

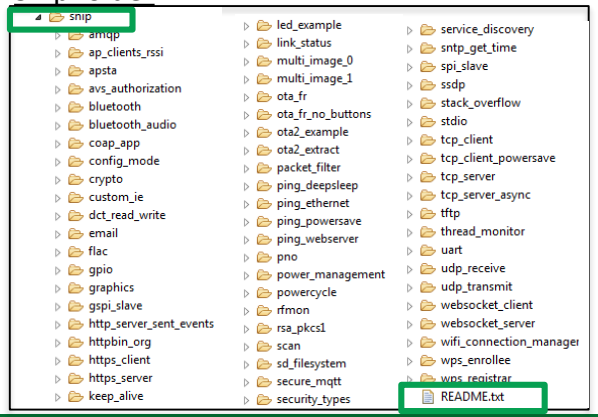
Read the *README.txt* files to learn about the contents of the respective folder

Apps folder



Demo folder

Snip folder



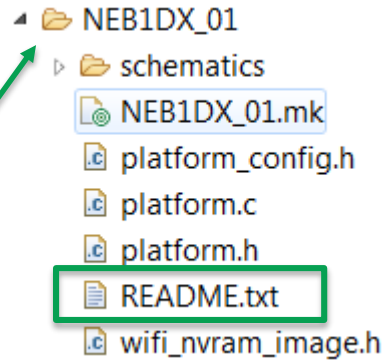
FUTURE Connectivity Solutions

WICED Studio SDK: Platform Selection

Browse the ***43xxx_Wi-Fi*** device folder to the ***Platforms*** folder in your ***Project Explorer*** to view the hardware platforms available for your device.
Read the README.txt file located within the folder for every platform for details about each hardware platform.

Wi-Fi/Wi-Fi + BT Platforms

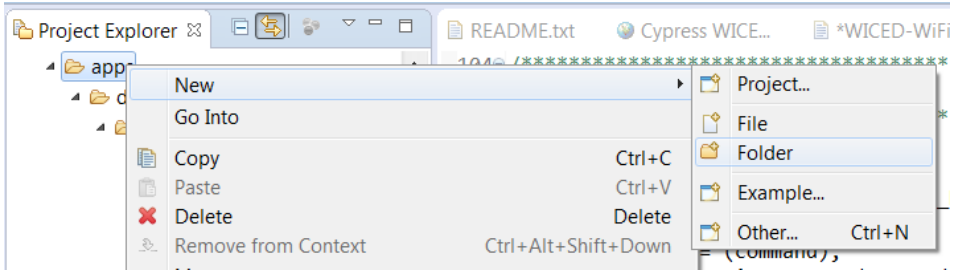
Nebula Platform Folder with README.txt file



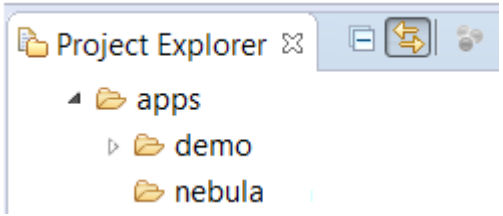
WICED Studio SDK: Create and Build your Own Application

1 Create a new Folder in the ***apps*** folder called ***nebula***.

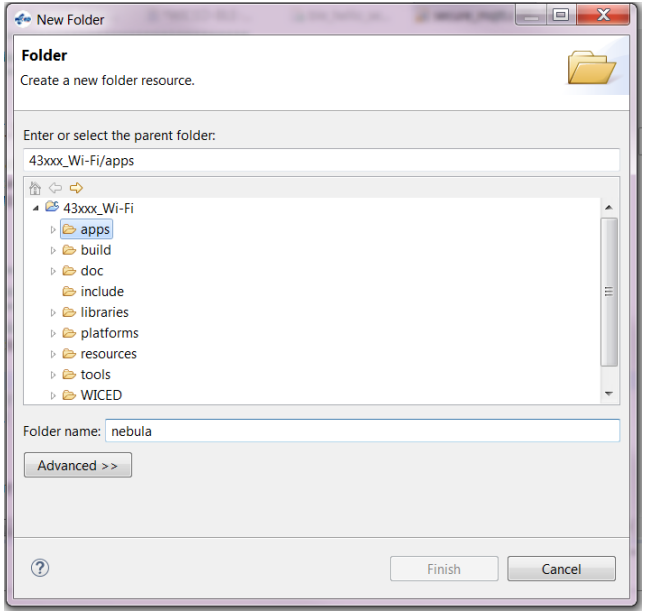
Creating a new folder in the *apps* directory



Expected result:



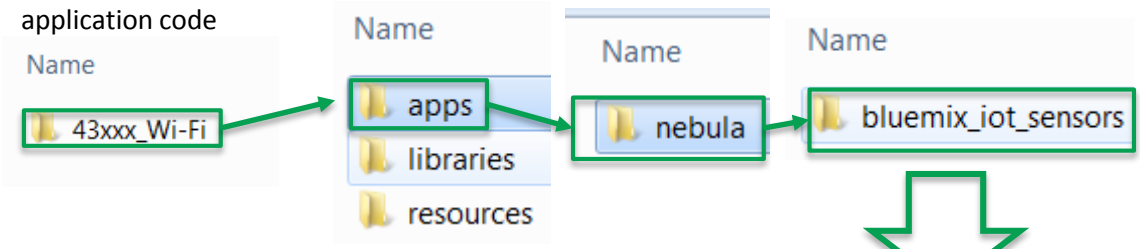
Creating a new folder in the ***apps*** directory



WICED Studio SDK: Create and Build your Own Application

2 Copy the example “bluemix_iot_sensors” code into the nebula folder.

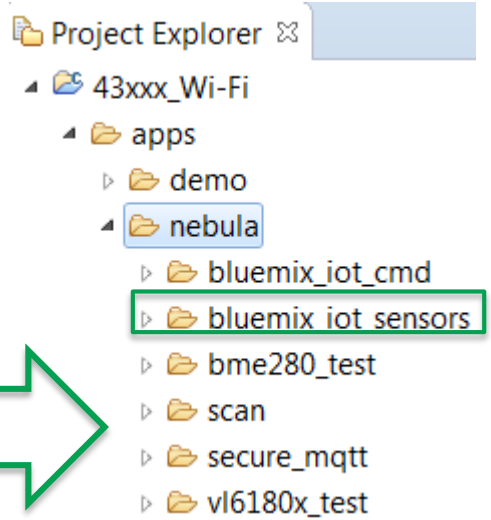
Bluemix_iot_sensors application code



COPY

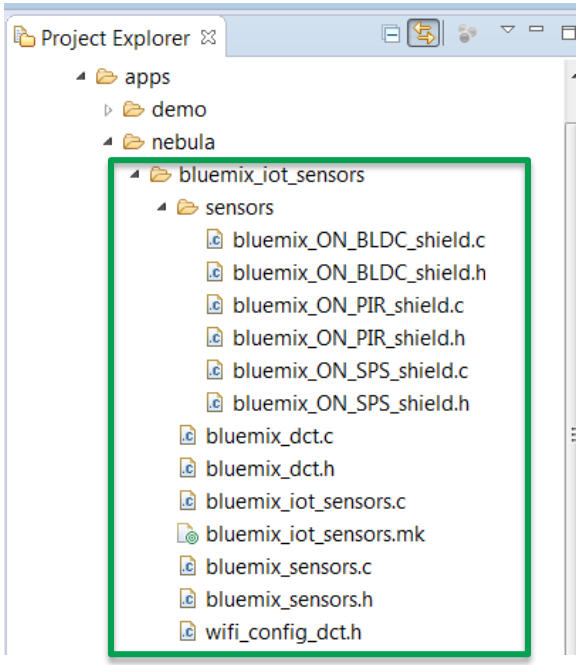
PASTE IN WICED

bluemix_iot_sensors application is copied and pasted under *43xxx_Wi-Fi → Apps → nebula*



WICED Studio SDK: Create and Build your Own Application

3 Ensure the appropriate files are in the directory

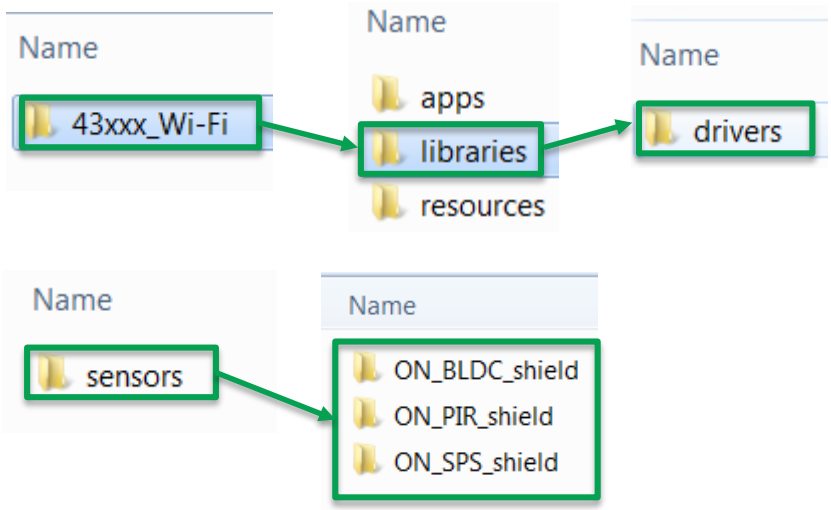


FUTURE Connectivity Solutions

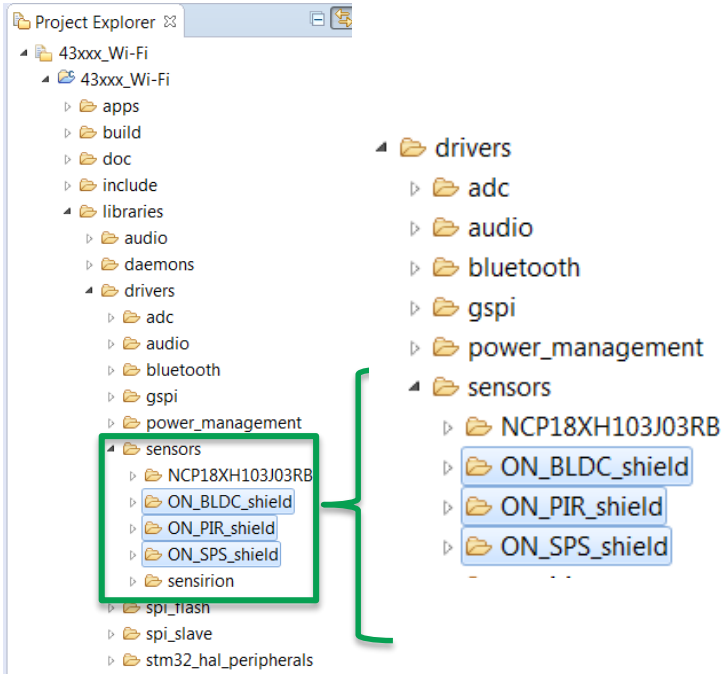
WICED Studio SDK: Create and Build your Own Application

4 Copy the sensor drivers into the WICED directory

Driver code is located under *sensor_code>libraries>drivers>sensors>*

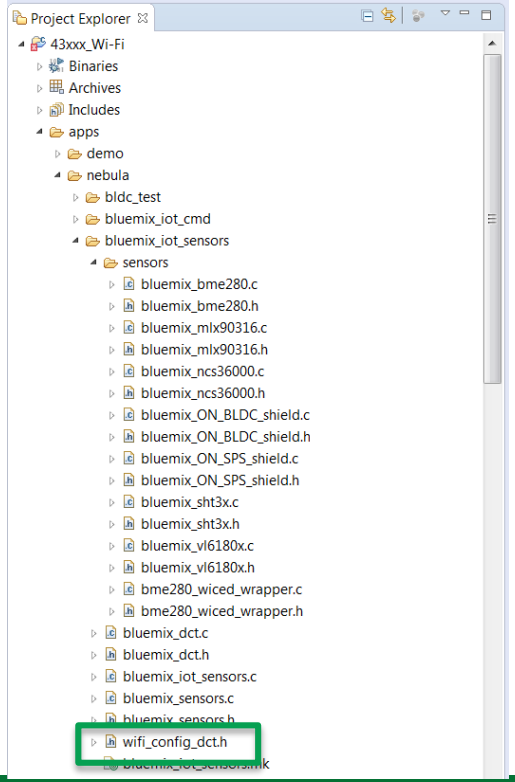


Paste it in WICED under *libraries > drivers > sensors*



WICED Studio SDK: Create and Build your Own Application

5 Enter your Wi-Fi router credentials in **wifi_config_dct.h**



Modify lines 49 and 52 in **wifi_config_dct.h**

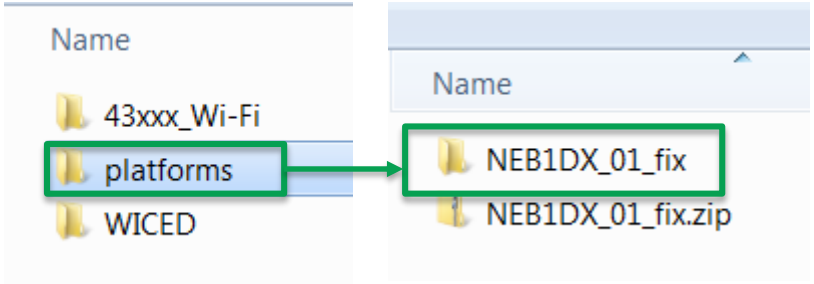
```
48 /* This is the soft AP used for device configuration*/
49 #define CONFIG_AP_SSID       "Your Wi-Fi network"
50 #define CONFIG_AP_CHANNEL    1
51 #define CONFIG_AP_SECURITY   WICED_SECURITY_WPA2_AES_PSK
52 #define CONFIG_AP_PASSPHRASE "your password"
```

FUTURE Connectivity Solutions

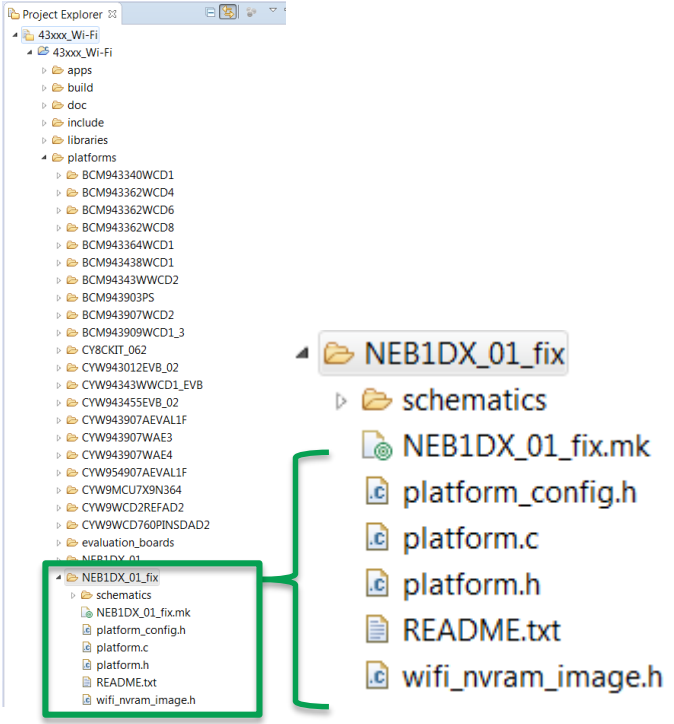
WICED Studio SDK: Create and Build your Own Application

6 Copy the platform folder into the WICED directory

Platform code is located under *Nebula-OnSemi board projects>platforms>*



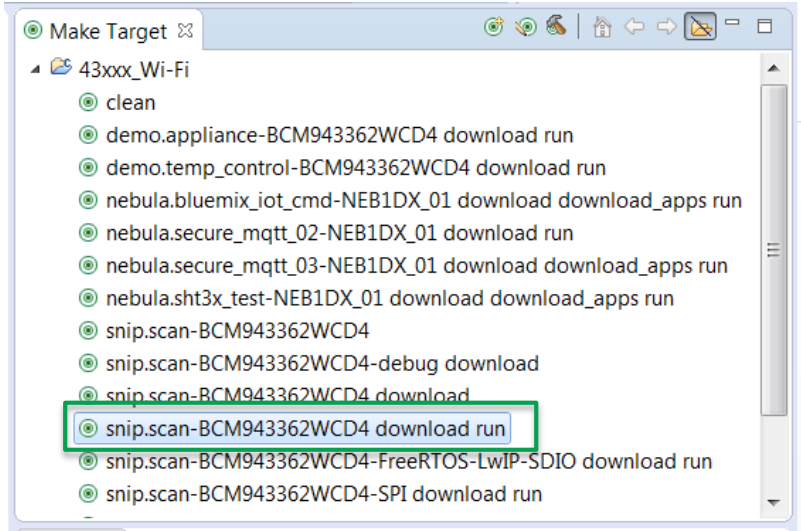
Paste it in WICED under *platforms*



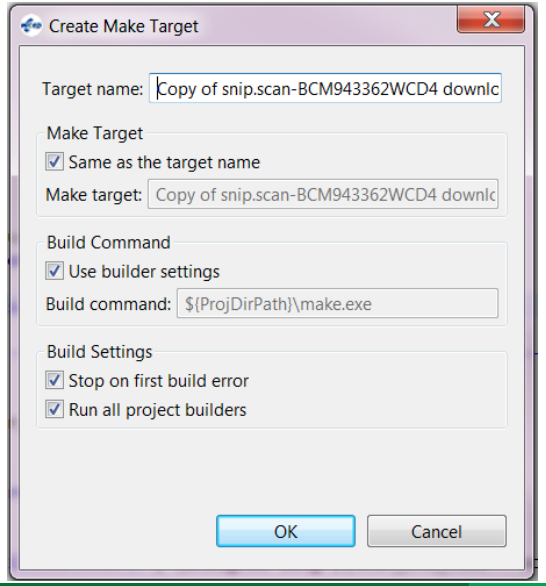
WICED Studio SDK: Create and Build your Own Application

7 In the ***Make Target*** window right-click and copy an example build target that ends with ***download run.***

Select *snip.scan-BCM943362WCD4 download run*



8 Paste the example build target in the ***Make Target*** window. The ***Create Make Target*** window opens automatically to enable you to edit build options.

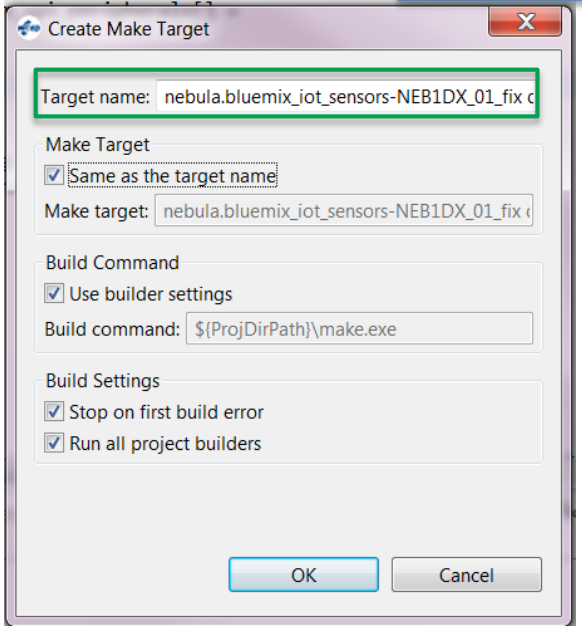


FUTURE Connectivity Solutions

WICED Studio SDK: Create and Build your Own Application

9 Modify the ***Target name*** to match the following format: *<application.folder.path>-<target platform> download download_apps run* and press *OK*.

The target name is modified to ***nebula.bluemix_iot_sensors-NEB1DX_01_fix download download_apps run***



You only need to include the **download_apps** option if you expect that the external flash needs to be updated. Since this is our first build and the Wi-Fi module firmware is a resource stored in the external flash, we need to include this to make sure it is properly programmed.

WICED Studio SDK: Create and Build your Own Application

10 Double-click the newly created make target ***nebula.bluemix_iot_sensors-NEB1DX_01_fix download download_apps run*** to build, download, and run your application.

Console window showing build output

Console | Problems | Search | Debug

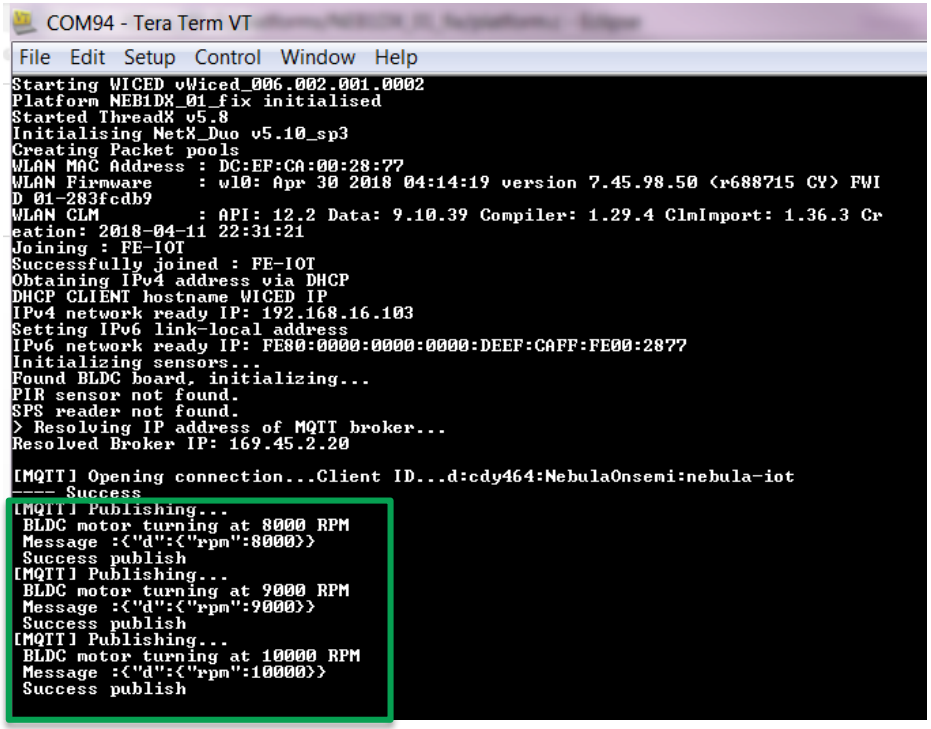
CDT Build Console [43xxx_Wi-Fi]

```
Building apps lookup table
Download complete

Downloading DCT ...
No changes detected

Downloading resources filesystem ... build/nebula.bluemix_iot_sensors-NEB1DX_01_fix/filesystem.bin at sector 1  size 96...
Downloading apps lookup table in wiced_apps.mk ... build/nebula.bluemix_iot_sensors-NEB1DX_01_fix/APPS.bin @ 0x0000 size
Downloading Application ...
Download complete

Resetting target
Target running
Build complete
Making .gdbinit

13:51:46 Build Finished (took 1m:2s.546ms)
```

WICED Studio SDK: Create and Build your Own Application

11 Open a terminal program, observe output.

Expected result



Baud rate: 115200
Data: 8 bit
Parity: none
Stop: 1 bit
Flow control: none

End results display motor rpm and temp.

FUTURE Connectivity Solutions

THANK YOU!

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