# Chapter 1: Tour of WICED WiFi

## Objective

After completing chapter 1 you should understand a top level view of all of the components of the WICED ecosystem including the chips, modules, software, documentation, support infrastructure and development kits. You should have WICED studio installed and working on your computer and should understand how to program an existing project into a kit.

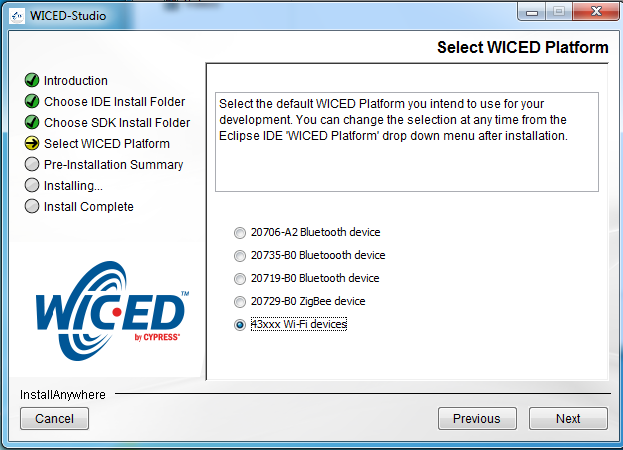
## Time: 1 Hour

## Fundamentals

### Tour of WICED Studio SDK

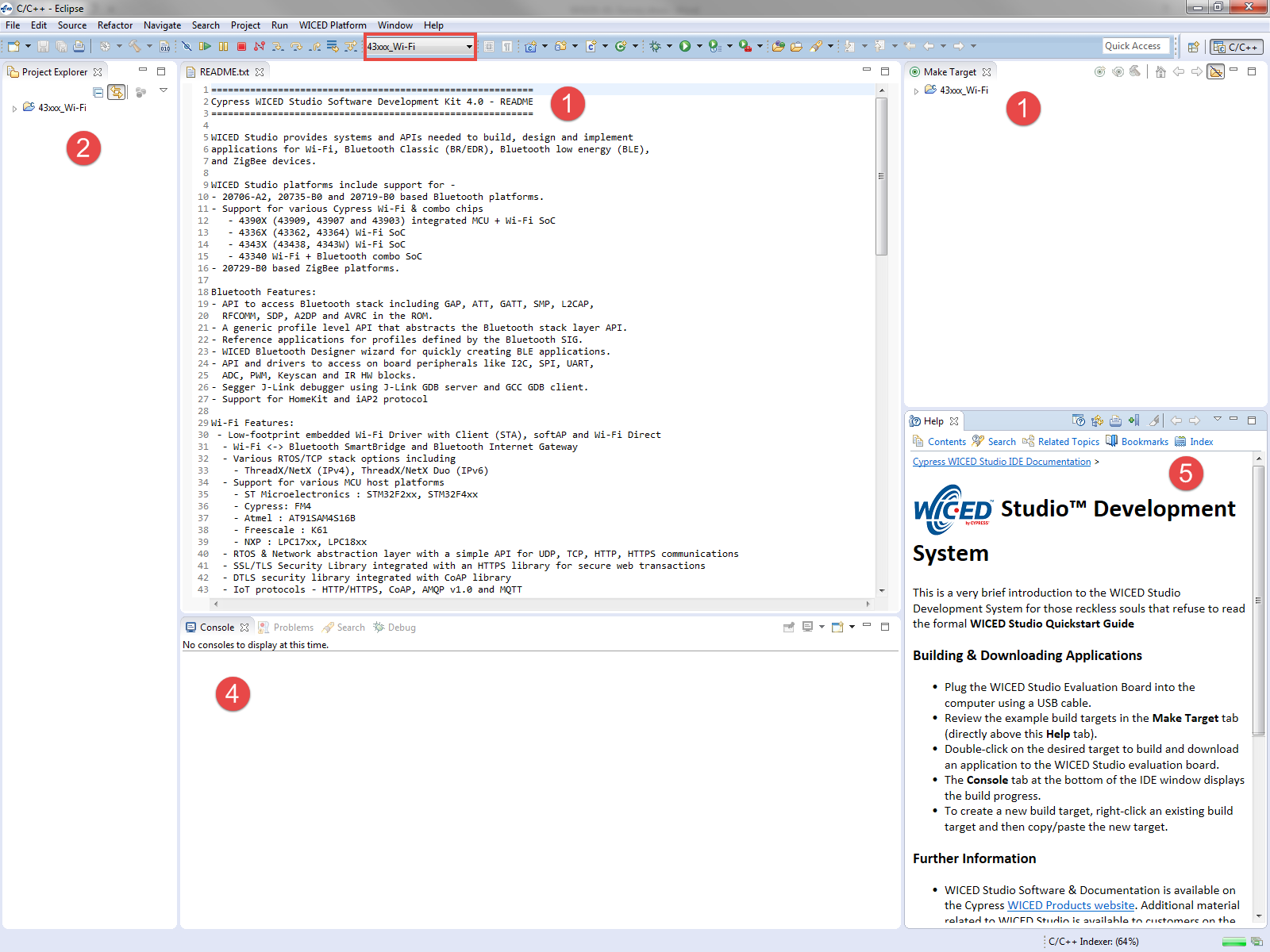
#### First Look

The WICED software tool is called “WICED Studio” and it is based on Eclipse. When you install it, you will be asked for which platform you want to use. We will use *43xxx\_WiFi* for this class, but if you used a different selection don’t worry – you can change it easily from inside the tool as we will show you later.



The Eclipse IDE is installed by default in *C:\Users\<UserName>\AppData\Local\WICED* but the SDK workspace will be installed by default in *C:\Users\<UserName>\My Documents\WICED\WICED-Studio-<version>*. The SDK workspace is where you will typically create your projects. Note that a new set of SDK files is created for each version of the SDK so if you install a newer version your projects will still be available in the old location – you have to copy them over manually if you want to access them in the new SDK.

Once installed, the SDK will show up in Windows under Start > All Programs > Cypress > WICED-Studio. When you first open the program, you will see a window that looks like this:



The major windows are:

1. File Editor
2. Project Explorer
3. Make Target
4. Console
5. Help

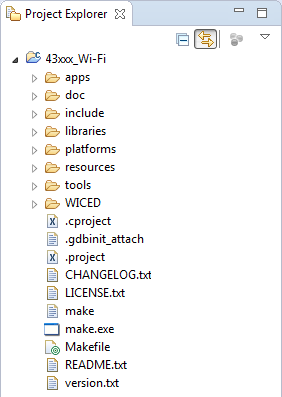
The platform selection is shown inside a red box in the figure above. Use that dropdown if you need to change the platform. For this class we will be using *43xxx\_Wi-Fi*.

If you close a window unintentionally, you can restore the original set of windows using the following procedure:

1. Select Window > Reset Perspective
   1. Note: the perspective shown is *C/C++.* You can open other perspectives by clicking the icon near the top right corner of the screen or by using Window > Open perspective.
2. Click on the Make Target tab in the upper right window
3. Click on the Console tab in the bottom center window
4. Select Window > Show View > Make Target
5. Select Window > Show View > Other… > Help > Help
6. Drag window edges or window tabs around as desired.

#### Project Explorer

If you expand 43xxx\_Wi-Fi from the Project Explorer window you will see the following:



Note: you can access these files from Windows Explorer at: *C:\Users\<UserName>\My Documents\WICED\WICED-Studio-<version>\43xxx\_Wi-Fi.* Files for other platforms supported by the SDK are also provided.

The README.txt file provides basic information about the SDK. This file is open by default in the editor window when the SDK is first opened. Other folders of interest in the Project Explorer are:

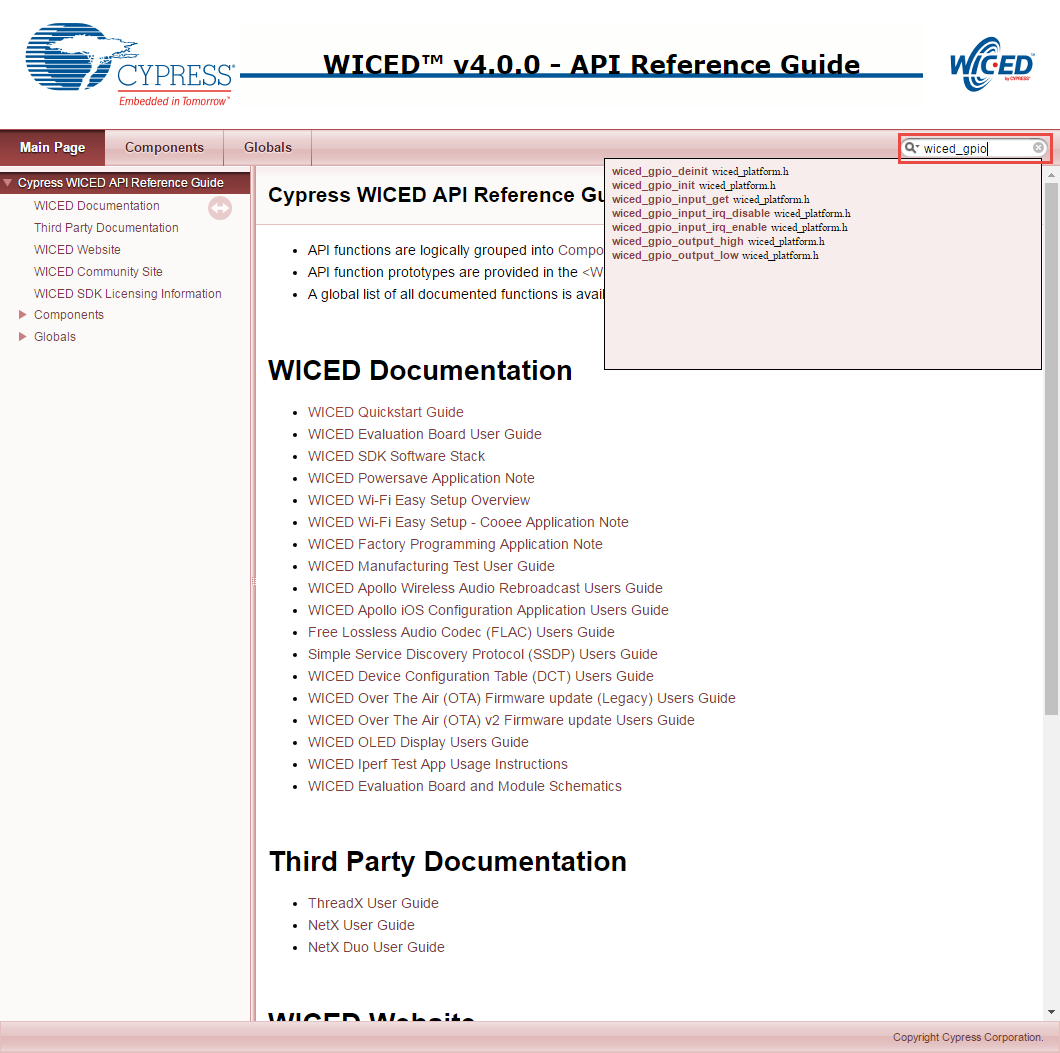
##### Apps

The apps folder is where all of the example projects reside as well as where you will put your own projects. The SDK includes a wealth of example projects. These are broken into categories by folder name. A few of the useful ones are:

1. Snip: These are short examples that typically demonstrate one feature such as how to use GPIOs, or how to scan for WiFi networks.
   1. snip.gpio demonstrates reading buttons and blinking LEDs.
   2. snip.scan will scan for WiFi access points every 5 seconds and will display the results to a terminal window.
2. Demo: These are more complex, complete demonstrations such as a Bluetooth to WiFi Bridge, or temperature control and report application.
3. Test: These are test and utility programs such as a console that allows you to scan for and connect to WiFi access points.
   1. test.console will provide a console application on a terminal window. Type “help” in the console for a list of all supported commands.

##### Doc

The doc folder contains various documentation. Of particular interest is the API.html file which documents all of the WICED API functions. It is usually easier to use that file if you open it in a web browser of your choice rather than from inside the SDK. The first window you will see when you open the API.html file is shown below. You can enter search strings in the window as shown in the figure below. The list will filter dynamically as you type. For example, if you enter “wiced\_gpio” you will see a list of all WICED APIs that are used for controlling IOs.



##### Platforms

The platforms folder contains information on the kit (i.e. hardware platform). These files are necessary in order to program a given project into the hardware you are using. That is, the platform name provided in the make target must match one of the platforms in the platforms folder. In our case, the kit we are using is called BCM94343W\_AVN. That isn’t installed by default so we will have to copy over the platform files before using it. You can even create platform files for custom hardware that you design. We’ll discuss the platforms folder in more detail in chapter 2.

##### Libraries

The libraries folder contains various sets of library function files. For example, there are libraries for working with file systems (in the filesystems folder) and for using U8G graphics LCDs (in the graphics folder). We will discuss the libraries folder in more detail in chapter 4.

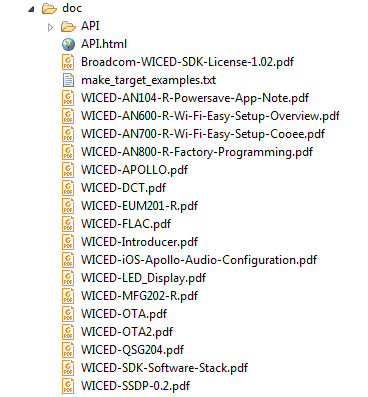
##### Resources

The resources folder is where you store files that are required by your application. For example, if your application contains a web server, the html files for the server would be in the resources folder under *apps\https\_server*.

### Tour of Documentation

#### In the SDK

As discussed previously, the doc folder in the SDK contains various documents such as the API guide. That folder also contains other documents such as the QSG (Quick Start Guide), how to use DCT (Device Configuration Tables), FLAC (Free Lossless Audio Compression), and OTA (Over the Air) Updates. The list of files in the doc directory looks like this:



Each of the files in the doc folder can be accessed either from within the SDK or from Windows explorer.

#### On the Web

[www.cypress.com](http://www.cypress.com) > Design Support > WICED Software will take you to the following site (the direct link is <https://community.cypress.com/welcome>):



Clicking on WICED Wi-Fi will take you to the community page as shown below. From this page, you can download the SDK, purchase kits, search for answers, ask questions, etc.



### Tour of WICED SDK Structure



### Tour of WiFi

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IEEE**  **Standard** | **Mbits/s** | **Freq**  **GHz** | **#**  **Chan** | **Chan Width**  **MHz** | **MIMO** | **Comment** |
| 802.11 | 2 | 2.4 | 14 | 22 | - |  |
| [802.11b](https://en.wikipedia.org/wiki/IEEE_802.11b-1999) | 11 | 2.4 | 14 | 22 | - | Same as 802.11 with new coding scheme |
| [802.11a](https://en.wikipedia.org/wiki/IEEE_802.11a-1999) | 54 | 5 | 22 | 20 | - | New coding scheme OFDM + 5GHz |
| [802.11g](https://en.wikipedia.org/wiki/IEEE_802.11g-2003) | 54 | 2.4 | 14 | 22 | - | New coding scheme OFDM |
| [802.11n](https://en.wikipedia.org/wiki/IEEE_802.11n-2009) | 600 | 2.4  5 | 14  22 | 20/40 | 4 | MIMO=Multiple Antennas  4 streams of 150Mbits/s |
| [802.11ac](https://en.wikipedia.org/wiki/IEEE_802.11ac) | 3600 | 5 | 22  10  5  1 | 20  40  80  160 | 8 | 433Mbits/s per stream  Beam forming directional |

### Tour of Chips

|  |  |  |
| --- | --- | --- |
| **Device** | **Key Features** | **Notes** |
| BCM43362 | * Single band 2.4GHz * 1x1 11n * Modules paired w/ STM32F205 and STM32F411 | Recommend new designs with 43364 |
| BCM4390 | * Single band 2.4GHz * 1x1 11n | Recommend new designs with BCM43903/7  Black Box Only |
| BCM43340 | * Dual band combo 2.4GHz and 5GHz, 1x1 11n * BT4.1/BLE | Currently only production dual band combo in single chip for WICED RTOS SDK |
| BCM43364 | * Single band 2.4GHz, 1x1 11n * Next Gen BCM43362 | Lower power and cost compared to BCM43362 |
| BCM4343W | * Single band combo 2.4GHz * BT4.1/BLE | Lower cost and power compared to BCM43340 |
| BCM43903 | * Single band 2.4GHz , 1x1 11n * SOC w/ ARM CR4 160Mhz * 1MB on chip RAM * Secure OTP and HW crypto engine | Lower cost solution for White Box  High end Black Box features |
| BCM43907 | * Dual band 2.4 and 5GHz, 1x1 11n * SOC w/ ARM CR4 320Mhz * 2MB on chip RAM * Secure OTP and HW crypto engine | Ideal solution for White Box  Multiple low power modes |

### Tour of Modules

![](data:application/pdf;base64,)

![](data:application/pdf;base64,)

### Tour of Development Kits

#### [Cypress BCM94343WWCD1\_EVB Evaluation and Development Kit](http://www.cypress.com/products/ieee-80211abgn-wlan-bluetooth-edr-usb-sdio-and-pcie)

* WiFi + BLE combo kit (BCM4343W)
* 512kB Flash, 128kB SRAM, 8Mb SPI Flash
* 2 User Buttons, 2 User LEDs
* Thermistor
* USB JTAG Programmer/Debugger

#### [Avnet BCM4343W IoT Starter Kit](http://cloudconnectkits.org/product/avnet-bcm4343w-iot-starter-kit)

* WiFi + BLE combo kit (BCM4343W)
* 512kB Flash, 128kB SRAM, 8Mb SPI Flash
* 1 User Button, 2 User LEDs
* Ambient Light Sensor
* Arduino Compatible Headers
* USB JTAG Programmer/Debugger

#### [Adafruit Feather](https://www.adafruit.com/products/3056)

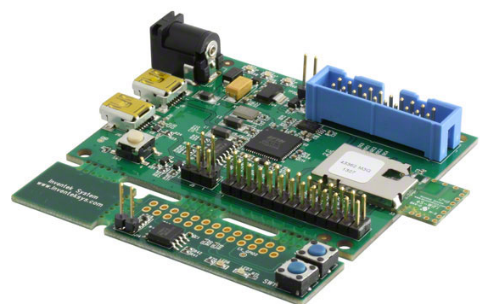
* WiFi kit (BCM43362)
* 128kB Flash, 16kB SRAM, 16Mb SPI Flash
* Programmable using Arduino IDE
* USB Bootloader

#### [Electric Imp](https://www.electricimp.com/platform/)

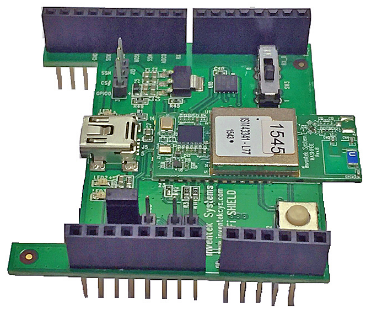
* WiFi kit (IMP003- BCM43362, IMP005 – BCM43907)
* Programmable using imp IDE

#### [Inventek](http://www.inventeksys.com/)

ISM43362-M3G-EVB

* WiFi Kit (BCM43362)
* 2 User Buttons, 2 User LEDs
* Thermistor
* USB JTAG Programmer/Debugger

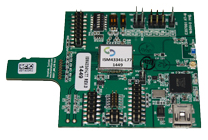
ISM43340-M4G-EVB

* WiFi & Bluetooth Combo Kit (BCM43340)
* 2 User Buttons, 2 User LEDs
* Thermistor
* USB JTAG Programmer/Debugger

ISMART Arduino Shield

* WiFi, Bluetooth, NFC Combo (BCM43362)
* Arduino stackable shield

ISM43340-L77-EVB

* WiFi & Bluetooth Combo Kit (BCM43340)
* WiFi over SDIO
* Bluetooth over UART
* Micro-SD Connector

#### [Particle](https://www.particle.io/products/hardware/photon-wifi-dev-kit) [Photon](https://www.particle.io/products/hardware/photon-wifi-dev-kit)

* WiFi kit (BCM43362)
* 1MB Flash, 128kB SRAM

#### [SparkFun with Particle Photon Module](https://www.sparkfun.com/products/13321)

* WiFi kit (BCM43362)
* 1MB Flash, 128kB SRAM
* Arduino Compatible Headers

## Exercise(s)

### 01 Create a forum account

1. Go to <https://community.cypress.com/welcome>
2. If you already have an account, click “Log in” from the top right corner of the page.
3. If you do not have an account, click “WICED Community” from the panel on the left and sign up for an account.
4. Once you are logged in, click the “WICED Wi-Fi” icon.
5. Click on the “Forums” button.
6. Browse the existing forum articles or search for a particular topic that interests you.

### 02 Open the documentation

1. Open the API.html document from the WICED SDK doc directory.