Chapter 0: Introduction

Time 1 Hour

After completing Chapter 0 you will understand the objectives for the Wireless Internet Connectivity for Embedded Devices (WICED) Wi-Fi® 101 Class, you should be able to explain the learning objectives, agenda, scope of the class, and format of the lab manual.

0.1 Prerequisites 1

0.2 Assumptions 1

0.3 Scope 1

0.4 Agenda 2

# Prerequisites

Solid fundamentals in C-Programming (data types, operators, expressions, control flow, functions, program structure, pointers and arrays, data structures, multi-file module programming).

Some experience with standard MCU concepts and peripherals (Serial communication, PWMs, ADCs).

# Assumptions

There is literally a 96-page PowerPoint presentation in which Cypress presents compelling data that**:**

* Cypress has the most robust Wi-Fi in terms of RF, Chips, Power, Stability, and Partner Integration.
* You should use a partner and buy modules (you should NOT try to design using bare chips).
* You should use a Cloud partner (e.g. AWS, IBM, Ali etc.).

So… that is what we are going to assume and we are not going to address any of those topics.

# Scope

What this class is:

* A discussion of what WICED is today.
* A survey of the WICED Wi-Fi Ecosystem (Chips, Modules, WICED Studio IDE, Software Development Kit (SDK), Forum etc.)
* A survey of using the WICED SDK to create an IoT device by connecting common MCU I/O peripherals to the “Cloud”.
* An introduction to the “TCP/IP Network Stack”.
* An introduction to Wi-Fi.
* An introduction to common cloud application protocols: HTTP, MQTT, COAP, AMQP
* An introduction to JSON and REST.
* An introduction to one cloud provider (Amazon AWS, IBM Bluemix, Microsoft Azure) and a taste of their programming model.

What this class is not:

* A discussion/debate of what WICED should be.
* A C-programming primer.
* A detailed examination of Wi-Fi or RF Parameters.
* A class on using WICED Chip-on-board (unless you are a very special case you should use a module).
* An advanced network programming class.
* An introduction to Bluetooth.
* An introduction to ZigBee.
* A discussion of Linux integrated WICED.
* A discussion of how to pick the correct Wi-Fi Module.
* A detailed examination of MCU peripherals.
* A tutorial of the advanced uses of WICED (Streaming Audio, Bluetooth/Wi-Fi Combos, TCP/IP Bridging/Routing, Wi-Fi Station Introducers, BLE Introducers).

# Agenda

| **Day** | **Time** | **Duration** | **Chapter** | **Topic** | **Purpose** |
| --- | --- | --- | --- | --- | --- |
| 1 | 8:00 – 9:00 | 1:00 | 00-Intro | Lecture | An Introduction to the class (this document) |
| 1 | 9:00 – 9:30 | 0:30 | 01-Tour | Lecture | A tour of the WICED Wi-Fi SDK, Wi-Fi Standard, Chips, Modules, and Kits. |
| 1 | 9:30 – 10:00 | 0:30 | Lab |
| 1 | 10:00 – 10:30 | 0:30 | 02-Peripherals | Lecture | How to create a new project and how to use chip peripherals such as GPIOs, interrupts, UART, I2C, etc. The basic process of building and programming a project is introduced. |
| 1 | 10:30 – 12:00 | 1:30 | Lab |
| 1 | 12:00 – 12:30 | 0:30 | 03-RTOS | Lecture | How to use the Thread-X RTOS in a WICED chip. The debugger is also introduced. |
| 1 | 12:30 – 2:00 | 1:30 | Lab |
| 1 | 2:00 – 2:15 | 0:15 | 04-Library | Lecture | An introduction to the WICED libraries and details on how to use the graphics OLED and JSON parser libraries. |
| 1 | 2:15 – 3:00 | 0:45 | Lab |
| 1 | 3:00 – 3:45 | 0:45 | 05-Wi-Fi | Lecture | How to connect to and interact with Wi-Fi access points |
| 1 | 3:45 – 4:45 | 1:00 | Lab |
| 1 | 4:45 – 5:00 | 0:15 | Wrap-Up | Lecture | Summary of Day 1 |
| 2 | 8:00 – 8:30 | 0:30 | 06a-TCP/IP Sockets | Lecture | Establishing communication using TCP/IP sockets |
| 2 | 8:30 – 9:30 | 1:00 | Lab |
| 2 | 9:30 – 10:00 | 0:30 | 06b-TCP/IP Sockets with TLS | Lecture | Using TLS with TCP/IP sockets for secure communication. |
| 2 | 10:00 – 10:30 | 0:30 | Lab |
| 2 | 10:30 – 10:45 | 0:15 | 07a-Cloud | Lecture | An introduction to cloud Application Layer protocols  (HTTP, MQTT, AMQP, COAP) |
| 2 | 10:45 – 11:15 | 0:30 | 07b-HTTP | Lecture | Using HTTP in WICED |
| 2 | 11:15 – 12:45 | 1:30 | Lab |
| 2 | 12:45 – 1:15 | 0:30 | 07c -MQTT-AWS | Lecture | Using MQTT in WICED with Amazon Web Services (AWS) |
| 2 | 1:15 – 3:15 | 2:00 | Lab |
| 2 | 3:15 – 3:30 | 0:15 | 08-Project | Introduction | Class project |
| 2 | 3:30 – 4:45 | 1:15 | Lab |
| 2 | 4:45 – 5:00 | 0:15 | Wrap-Up | Lecture | Class Wrap-Up and Surveys |
| N/A | N/A | 0 | 09-Shield | Reference | Details on the PSoC AFE shield board |
| N/A | N/A | 0 | 10-Glossary | Reference | Glossary of terms |

Most of the chapters have exercises. Some are marked as “Advanced”. You should focus on the basic exercises first and work on the advanced ones as time allows.

# Electronic Material

A GitHub repository is available at the following location:

<https://github.com/cypresssemiconductorco/CypressAcademy_WW101_Files>

This repository contains, among other things:

1. **Labmanual**: An electronic copy of this manual
2. **Platforms**: Platform files to work with the combination of the PSoC Analog Front End shield (CY8CKIT-032) and various WICED base board kits.
3. **Projects**: Complete solutions to all the lab exercises. Use these AFTER attempting to solve the exercises on your own.