

Chapter 0: Introduction

Objective

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.

Time: 1 Hour

Fundamentals

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).

Assumption

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

- You should use a partner and buy modules (you should NOT try to design using bare chips).
- Cypress has the most robust Wi-Fi in terms of RF, Chips, Power, Stability, and Partner Integration.
- 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 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 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-Survey | 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 creating 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 | How to use WICED libraries for file systems and graphics LCDs |
| 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 – 8:45 | 0:45 | 06-Sockets-TLS | Lecture | Establishing (secure) communication using TCP/IP Sockets |
| 2 | 8:45 – 10:15 | 1:30 | | Lab | |
| 2 | 10:15 – 11:00 | 0:45 | 07a-Cloud | Lecture | An introduction to cloud Application Layer protocols Building a WICED IoT device using MQTT on the Amazon AWS Building a WICED IoT device using HTTP Building a WICED IoT device using AMQP Building a WICED IoT device using COAP |
| 2 | 11:00 – 2:00 | 3:00 | 07b-MQTT-AWS | Lab | |
| | | | 07c-HTTP | | |
| | | | 07d-AMQP | | |
| | | | 07e-COAP | | |
| 2 | 2:00 – 2:15 | 0:15 | 08-Project | Introduction | Class project |
| 2 | 2:15 – 4:45 | 2:30 | | 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 analog co-processor 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 if time allows, but you don’t need to complete all of the advanced exercises before moving onto the next section.