Architectures for Embedded Systems

Review of WiFi Concepts
ESP32 WiFi Support and Examples
Laboratory assignments

Arnaldo S. R. Oliveira
Academic year 2024/25
Universidade de Aveiro – Dep. de Eletrónica, Telecomunicações e Informática

Outline

WiFi

- Basic concepts
- ESP32 modes and features

Lab assignments

- Explore ESP32 WiFi examples
- Define how WiFi will be used in the context of the final project

Questions for Research / Discussion

- How are WiFi networks organized? What is the “anatomy” of a WiFi network?
- What are the frequency bands used in WiFi?
- What are the capabilities of each WiFi version?
- What are the purposes, advantages and constraints of ISM bands?
- What are the protocols/services/applications that share the RF spectrum bands with WiFi?
- Is WiFi adequate for safety-critical applications?
- What WiFi version is supported by ESP32-C3?
- Which WiFi networking APIs are provided with ESP/IDF?
- What are the restrictions on using WiFi and BLE simultaneously in an ESP32-C3 SoC?

Sources of Information

- ESP32 WiFi networking APIs description

https://docs.espressif.com/projects/esp-idf/en/v5.4/esp32c3/api-reference/network/index.html#wi-fi

- ESP32 WiFi examples

C:\Espressif\frameworks\esp-idf-v5.4\examples\wifi

Laboratory Assignments

- Analyse and test the following WiFi examples:

C:\Espressif\frameworks\esp-idf-v5.4\examples\wifi\getting_started\station

C:\Espressif\frameworks\esp-idf-v5.4\examples\wifi\getting_started\softAP

C:\Espressif\frameworks\esp-idf-v5.4\examples\wifi\espnow

- In addition to your ESP32-C3 kit, use also:
  - a second kit from a colleague
  - a portable hotspot on your smartphone
  - the OpenLab network available in the classroom
- Define how WiFi will be explored in the context of the final project

Final Remarks

- At the end of this week, you should be familiar with the:
  - WiFi-based concepts (revisited)
  - WiFi capabilites of ESP32-C3
  - ESP32 WiFi networking API