Answer Key

Chapter 4

Exercise 4.12.1

1. What are the supported options for development environments with Mbed OS?
    - Online compiler
    - CLI
    - Mbed Studio
    - Export to Eclipse
    - Export to VS Code
2. What is the CLI command to import an mbed example? What is the command to import a Cypress example?

    ```
    mbed import <example name>
    git clone <cypress semiconductor git hub address>
    ```

3. What Cypress targets are supported in Mbed OS?

    ```
    TARGET_CY8CKIT_062S2_43012
    TARGET_CY8CKIT_062S2_4343W
    TARGET_CY8CKIT_062_BLE
    TARGET_CY8CKIT_062_WIFI_BT
    TARGET_CY8CKIT_064S2_4343W
    TARGET_CY8CMOD_062S2_43012
    TARGET_CY8CMOD_062_4343W
    TARGET_CY8CPROTO_062S3_4343W
    TARGET_CY8CPROTO_062_4343W
    TARGET_CY8CPROTO_063_BLE
    TARGET_CY8CPROTO_064_SB
    TARGET_CYW943012P6EVB_01
    TARGET_CYW9P62S1_43012EVB_01
    TARGET_CYW9P62S1_43438EVB_01
    TARGET_WHD
    ```

4. What are the dependencies to use the Cypress Enterprise Security?
    - Mbed OS stack version 5.14 or above
    - Cypress Connectivity Utilities Library
5. Is there an example that demonstrates how to connect a kit to WiFi by provisioning via BLE with Cypress targets?
    - Yes - [mbed-os-example-wifi-provisioning-via-ble]

Exercise 4.12.4

7. Where did I get the NTP library?

Exercise 4.12.11

3. How does it know which device to write the filesystem onto?

4. How does it know what pins are attached to the PSoC 6?

Exercise 4.12.12

6. Find and open the map file (in the BUILD directory). Where is function_external_memory located in the XIP memory space?

   0x18000000

Exercise 4.12.13

9. What are the UUID and Characteristic of the LED Service?

   Varies by device.

Exercise 4.12.14

21. How would you change the PSoC 6 MPN for your board?

22. What command can you use to make programming via mbed compile -f work today?

Chapter 5

Exercise 5.12.8

4. What does the project do?

   Blinks an LED using the FreeRTOS template.

5. How many .lib files are in the project? What are they?

   Two. FreeRTOS and Retarget-IO.

Chapter 7

Exercise 7.3.2

1. What other design.* files do you see? What do you see in the GeneratedSources directory?

   design.cycapsense and design.cyqspi

   Source files: cycfg.c/h, cycfg_clocks.c/h, cycfg_system.c/h, etc.

Exercise 7.3.3

19. Measure power consumption again. How did it change for the sleep period?

    Deep Sleep has the lowest power consumption out of the three modes offered.

Exercise 7.4.2

6. Did the device respond to both PING and ARP?

   Yes it should.

7. How does the power consumption change in response to you sending packets? What happens with the power consumption if you are sending the packets continuously?

   The MCU is awake as it is processing all the packets. We are not offloading MCU anyhow at this point.

Exercise 7.4.5

8. Why did we set the IP Protocol to 1?

   Quick Start Guide for the Packet Filters explains that and contains the reference to IP Protocol Numbers. ICMP (ping) has Protocol Number assigned to “1”.

Exercise 7.9.1

7. What is the consumption you see?

   10 mA

15. What is the consumption you see?

    1.5 mA

31. What is the consumption you see?

    0.8 mA

40. What is the consumption you see?

    0.44 mA

Exercise 7.9.2

4. What is the consumption you see?

   12 mA

11. What is the consumption you see?

    2.2 mA

20. What is the consumption you see?

    1.5 mA

28. What is the consumption you see?

    1.2 mA

Chapter 8

Exercise 8.19.4A

1. How long does the device stay in high duty cycle advertising mode? How long does it stay in low duty cycle advertising mode? Where are these values set?

   High: 30 seconds

   Low: 60 seconds

   These are specified in the wiced_bt_cfg.c file in *wiced_bt_cfg_settings.ble_advert_cfg.high_duty_duration* and *wiced_bt_cfg_settings.ble_advert_cfg.low_duty_duration*

Exercise 8.19.4B

1. What items are stored in NVRAM?

   Hostinfo (Remote BDADDR and Button CCCD state)
   Local Keys (Privacy Information)
   Paired Device Keys (Encryption Information)

2. Which event stores each piece of information?

   Hostinfo is stored during BTM_PAIRING_COMPLETE_EVT and in ex03_ble_bond_set_value if the Button CCCD value was written

   Local Keys are stored during BTM_LOCAL_IDENTITY_KEYS_UPDATE_EVT

   Paired Keys are stored during BTM_PAIRED_DEVICE_LINK_KEYS_UPDATE_EVT

   All three are cleared out (i.e. reset) in the button_cback function to allow re-pairing.

3. Which event retrieves each piece of information?

   Hostinfo is retrieved by BTM_ENCRYPTION_STATUS_EVT (if the device was previously bonded

   Local Keys are retrieved by BTM_LOCAL_IDENTITY_KEYS_REQUEST_EVT

   Paired Keys are retrieved by ex03_ble_bond_app_init (at startup) and by BTM_PAIRED_DEVICE_LINK_KEYS_REQUEST_EVT

4. In what event is the privacy info read from NVRAM?

   BTM_LOCAL_IDENTITY_KEYS_REQUEST_EVT

5. Which event is called if privacy information is not retrieved after new keys have been generated by the stack?

   BTM_LOCAL_IDENTITY_KEYS_UPDATE_EVT

Exercise 8.19.4C

1. Other than BTM_IO_CAPABILITIES_NONE and BTM_IO_CAPABILITIES_DISPLAY_ONLY, what other choices are available? What do they mean?

   BTM_IO_CAPABILITIES_DISPLAY_AND_YES_NO_INPUT

   Device can display values (e.g. 6-digit numbers) and can accept a Yes/No input from the user.

   BTM_IO_CAPABILITIES_KEYBOARD_ONLY

   Device can accept input (e.g. numbers) but cannot display any values.

   BTM_IO_CAPABILITIES_BLE_DISPLAY_AND_KEYBOARD_INPUT

   Device can display values (e.g. 6-digit numbers) and can accept input (e.g. numbers).

2. What additional stack callback event occurs compared to the previous exercise? At what point does it get called?

   BTM_PASSKEY_NOTIFICATION_EVT

   This event is called between BTM_PAIRING_IO_CAPABILITIES_BLE_REQUEST_EVT and BTM_ENCRYPTION_STATUS_EVT.