# **Answer Key**

## Chapter 02

## Chapter 03

### Exercise 03

1. How do the MQTT library functions (e.g. wiced\_mqtt\_publish) get into your project?

The line “**$(NAME)\_COMPONENTS :**= protocols/MQTT” in the make file causes the MQTT library functions to be included in the project.

1. What function is called when the button is pressed?

publish\_callback

1. How does the button callback unlock the main thread?

It sets a semaphore using “wiced\_rtos\_set\_semaphore( &wake\_semaphore );”

1. What WICED-SDK RTOS mechanism does the “wait\_for\_response” function use to “wait”?

It gets a semaphore using “wiced\_rtos\_get\_semaphore( &msg\_semaphore, timeout )”

1. Why did the firmware author create a function called “wait\_for\_response”?

This function is used in several of the functions in the main application to cause the thread to sleep until a specific MQTT event occurs.

1. Are all messages sent to the AWS IOT MQTT Message Broker required to be in JSON format?

No, but messages that affect the shadow have to be JSON.

1. What are the 7 WICED MQTT events? What file are they defined in?

WICED\_MQTT\_EVENT\_TYPE\_CONNECT\_REQ\_STATUS

WICED\_MQTT\_EVENT\_TYPE\_DISCONNECTED

WICED\_MQTT\_EVENT\_TYPE\_PUBLISHED

WICED\_MQTT\_EVENT\_TYPE\_SUBSCRIBED

WICED\_MQTT\_EVENT\_TYPE\_UNSUBSCRIBED

WICED\_MQTT\_EVENT\_TYPE\_PUBLISH\_MSG\_RECEIVED

WICED\_MQTT\_EVENT\_TYPE\_UNKNOWN

They are defined in mqtt\_common.h.

1. Do you have to name the client certificate client.cer? How would you change the name?

No, the name can be changed in the make file ($(NAME)\_RESOURCES).

1. What is the naming convention used to differentiate WICED MQTT library functions versus wrappers around those functions in the publisher app?

The library functions all start with ”wiced\_mqtt” while the wrapper functions start with “mqtt”.

1. What steps are required to get an MQTT connection established?

* Initialize wiced\_mqtt\_security\_t with the credentials from the DCT using resource\_get\_readonly\_buffer
* Allocate memory for the MQTT object using malloc
* Get the IP address of the MQTT message broker using wiced\_hostname\_lookup.
* Call wiced\_mqtt\_init to initialize.
* Call mqtt\_open\_connection to open the connection.

1. What prevents a hung connection from deadlocking the publisher app?

The wait\_for\_response function has a timeout parameter that is passed as a timeout to the semaphore.

1. What is the name of the flag that prevents the firmware from sending multiple button presses before the publish is finished?

pub\_in\_progress