Lab 7 - Embedded - The ESP 8266

**DELIVERABLE: Next week, bring your Apache-empowered laptop. I will assign you a name for your Access Point, and require that you connect your laptop to the ESP8266 Access Point, and then display on your KL25z-connected display that your ESP8266 has registered the IP address of your laptop as a client Station.**

1. Wire up the ESP8266 to your KL25z.

2. Send **AT\r\n**. You should get "AT\r\nOK\r\n" as a response.

3. Send **AT+GMR\r\n** to the ESP 8266. It should respond with a string telling an AT version, an ADK version, and a few dates-of.

4. The ESP8266 can act as an access point, which is what you want, so your laptop can connect to it over WiFi.

Send **AT+CWMODE?\r\n**

You hope to get the answer **+CWMODE:2\r\n** (Access point) or ...**:3\r\n** (Access Point and also Network Device).

5. How to prepare your ESP8266 to offer a connection to your laptop.

( https://dominicm.com/esp8266-configure-access-point/)

**Setup ESP8266 as an Access Point**

Set SSID, password, channel and encryption.

* AT+CWSAP="ESP8266","123",3,0

SSID is the network name that will appear when connecting to the wireless network. The password will be required except when encryption mode is set to OPEN. The channel is the network channel that will be used by the module. Security mode is set with the encryption parameter and can be one of four modes. To allow connections without a password set encryption parameter to 0 which is OPEN mode. To allow only users with a valid password, set encryption to 1, 2, 3 or 4. These encryption modes correspond to WEP, WPA-PSK, WPA2-PSK and WPA/WPA2-PSK with WPA2-PSK being the most secure and common for general use.

Verify that the AP settings have been set correctly.

* AT+CWSAP?

## Set ESP8266 Access Point IP Address

Get the IP address of the Access Point.

* AT+CIPAP?

Set the IP address of the Access Point.

* AT+CIPAP="192.168.0.101"

## Set ESP8266 Access Point MAC Address

Get the MAC address of the Access Point.

* AT+CIPAP?

Set the MAC address of the Access Point.

* AT+CIPAPMAC="1a:fe:34:a4:35:42"

## Toggle ESP8266 DHCP Mode

Enable DHCP for AP mode.

* AT+CWDHCP=0,1

DHCP can be set for different modes by setting the first parameter. Apply DHCP setting to AP mode only with 0, Station mode only with 1 or both modes with 2. The second parameter can be set to 0 to enable or 1 to disable DHCP for selected modes.

## Find Stations / Clients connected to ESP8266

Get IP addresses of all stations / clients that are connected to the AP.

* AT+CWLIF

Once the module has been configured in AP or STA mode it can be used to [send & receive data](https://dominicm.com/esp8266-send-receive-data/).

======================================

.

## Configure ESP8266 Server

Get local IP address.

* AT+CIFSR

Configure TCP Server.

* AT+CIPSERVER=1

A value of 1 creates the the server while 0 deletes the server in which case the module needs to restarted. The port can be optionally specified as a second argument otherwise it the default port of 333 is used.

Set connection mode.

* AT+CIPMUX=1

Single connection mode is set with a 0 value while multiple connection mode is set with a value of 1. This mode can only be changed after all connections are disconnected. If server is started, reboot is required.

Set transfer mode.

* AT+CIPMODE=0

Default value of 1 sets transfer to unvarnished transmission mode, while 0 sets it to normal mode.

Get current server timeout.

* AT+CIPSTO?

Set server timeout.

* AT+CIPSTO=10

Server timeout value can range between 0 and 7200 seconds. Default value is 10 seconds.

Start TCP or UDP connection in single connection mode.

* AT+CIPSTART="TCP","192.168.0.65",333

The connection type can be either TCP or UDP. 192.168.0.65 is the IP address of the remove server the connection is being made to. 333 is the port of the same remote server.

Start TCP or UDP connection in multiple connection mode.

* AT+CIPSTART=1,"TCP","192.168.0.65",333

The first argument is the id of the connection. All other arguments are identical to single connection mode.

## Send Data

Send data in single connection mode.

* AT+CIPSEND=15

When in single connection mode only the length of the data in bytes is required. Maximum length is 2048 bytes. Send command should be immediately followed by the actual data that matches the length specified.

Send data in multiple connection mode.

* AT+CIPSEND=1,15

When in multiple connection mode the first parameter is the id of the connection followed by length in bytes.

## Receive Data

Receive data in single connection mode.

* +IPD,4:data

The length of the data that is to be received is specified first followed by a colon and the variable where the received data will be stored.

Receive data in multiple connection mode.

* +IPD,1,4:data

In addition to the length and data the connection id needs to be specified as the first argument.

Close TCP or UDP connection in single connection mode.

* AT+CIPCLOSE

Close TCP or UDP connection in multi connection mode.

* AT+CIPCLOSE=1

To close all connections a value of 5 can be used, otherwise the connection id should be specified.

Check current connection status.

* AT+CIPSTATUS

Current module condition is determined by the STATUS value which can be 2 for IP acquired, 3 for connected and 4 for disconnected. In multiple connection mode the id of the connection is also listed. Connection type will be either TCP or UDP. The ip address and port of the connection are listed as well. The last variable represents the module mode, 0 for client mode or 1 for server mode.