

1 ESP8266 Station Mode Configuration

◆ What is Station Mode?

Station (STA) Mode allows ESP8266 to act as a **Wi-Fi client** and connect to an **existing Wi-Fi router** to access the internet or cloud servers (ThingSpeak, MQTT, HTTP).

◆ Uses

- IoT cloud data upload
- HTTP / MQTT communication
- Mobile / web app integration

◆ Station Mode Configuration Commands

AT Command	Full Form	Description
AT	Attention	Checks communication with ESP8266
AT+RST	Reset	Restarts ESP8266 module
AT+CWMODE=1	Configure Wi-Fi Mode	Sets ESP8266 to Station mode
AT+CWJAP="SSID","PWD"	Connect Wi-Fi Join Access Point	Connects ESP to Wi-Fi router
AT+CIFSR	Check IP Firmware Status Register	Displays IP address
AT+CIPMUX=0	Configure IP Multiple Connections	Enables single connection mode
AT+CIPSTART	Start IP Connection	Opens TCP/UDP connection
AT+CIPSEND	Send IP Data	Sends data to server
AT+CIPCLOSE	Close IP Connection	Closes active connection

Flow (Station Mode):

Reset → Set Station Mode → Connect Wi-Fi → Get IP → Connect Server → Send Data → Close

2 AT Command Mode (AT Firmware Configuration)

◆ What is AT Command Mode?

In **AT Mode**, ESP8266 works as a **Wi-Fi modem** and is controlled using **text-based AT commands** from a microcontroller (Arduino / 8051 / STM32).

📌 ESP8266 runs **AT firmware**, not Arduino sketch.

◆ Common AT Commands with Full Forms

AT Command	Full Form	Purpose
AT	Attention	Tests communication
AT+RST	Reset	Software reset of ESP
AT+GMR	Get Module Revision	Shows firmware version
AT+CWMODE	Configure Wi-Fi Mode	Sets STA / AP / STA+AP
AT+CWJAP	Connect Wi-Fi Join Access Point	Connect to router
AT+CWQAP	Quit Wi-Fi Access Point	Disconnect Wi-Fi
AT+CIFSR	Check IP Firmware Status Register	Shows IP address
AT+CIPSTATUS	Check IP Status	Shows connection state
AT+CIPMUX	Configure IP Multiple Connections	Single or multiple
AT+CIPSTART	Start IP Connection	Connects to server
AT+CIPSEND	Send IP Data	Sends data
AT+CIPCLOSE	Close IP Connection	Closes connection
AT+CIPSERVER	Configure IP Server	Start/stop server
AT+CIPMODE	Configure IP Transmission Mode	Normal or transparent
AT+UART	Universal Asynchronous Receiver Transmitter	Set baud rate

3 Wi-Fi Modes Summary

Mode	Value	Description
Station	1	Connects to Wi-Fi router
Access Point	2	ESP creates Wi-Fi hotspot
STA + AP	3	Both modes enabled

4 Single vs Multiple Connection

Mode	AT Command	Usage
Single	AT+CIPMUX=0	Cloud, HTTP, ThingSpeak
Multiple	AT+CIPMUX=1	Server, multiple clients