ESP32 BLE Provisioning Documentation

**Overview**

ESP32 BLE Provisioning allows users to connect and configure ESP32 devices via Bluetooth Low Energy (BLE). The process helps in configuring Wi-Fi credentials and other configuration parameters in the ESP32 device before it can start communicating over a Wi-Fi network.

**Introduction**

ESP32 BLE Provisioning enables configuration of an ESP32 device using Bluetooth Low Energy (BLE). The BLE provisioning method is especially useful when the device is located in a restricted or non-accessible environment where direct Wi-Fi setup is not feasible. Using BLE, provisioning allows the configuration of Wi-Fi credentials on the ESP32, enabling it to connect to a network. This approach is secure, flexible, and easy to implement.

**Prerequisites**

Before you begin, ensure the following prerequisites are met:  
- An ESP32 development board.  
- The latest version of ESP-IDF or Arduino IDE installed.  
- A Bluetooth-enabled mobile device or computer to provision the ESP32.  
- Basic knowledge of BLE, Wi-Fi, and microcontroller programming.

**Steps to Implement BLE Provisioning**

**Step 1: Set up the ESP32 for BLE**

In this step, the ESP32 needs to be configured to advertise its presence over BLE and to be able to receive provisioning commands. You will use the BLE provisioning libraries to initialize BLE services and characteristics.

**Step 2: Enable Wi-Fi Configuration**

The ESP32 will use BLE to provision Wi-Fi credentials. You need to enable the Wi-Fi provisioning service, which will handle the configuration of SSID and password. This can be done using ESP-IDF libraries or by creating your own provisioning service.

**Step 3: Create a BLE Provisioning App on the Mobile Device**

A mobile app needs to be created or used to handle the interaction with the ESP32. The app will be responsible for discovering the BLE device, sending Wi-Fi credentials, and ensuring proper configuration.

**Step 4: Provision the Device with Wi-Fi Credentials**

The provisioning app will prompt the user to enter the Wi-Fi SSID and password, which will then be sent to the ESP32 device over BLE. The ESP32 will store the received credentials and use them to connect to the configured Wi-Fi network.

**Conclusion**

BLE provisioning for ESP32 is an effective and secure method to configure the device with network credentials without requiring a direct connection to the device. This process is widely applicable in IoT and home automation solutions.

