

# v4.1.0.0 Release Notes

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## ESP32C2-AT

Documentation for Release v4.1.0.0 is available at <https://docs.espressif.com/projects/esp-at/en/release-v4.1.0.0/esp32c2/index.html>. ESP32C2-AT v4.1.0.0 is a major update for ESP32C2-AT [v3.3.0.0](#).

The firmware:

- [ESP32-C2-4MB-G2-AT-V4.1.0.0.zip](#)
- [ESP32-C2-4MB-AT-V4.1.0.0.zip](#)
- [ESP32-C2-2MB-AT-V4.1.0.0.zip](#)

This is the list of changes since release [v3.3.0.0](#):

### Known Issues

- **AT+FS** may fail after repeated read/write operations

### Changelog

#### Basic

- Added the **AT+SYSRAM** setup command to detail memory capacity
- Added the **AT+SYSROLLBACK** query command to obtain the address and version of the current and rollback firmware
- Added the **AT+RFCAL** command to support RF full calibration
- Added deduplication support for the **AT+SYSMFG** command
- Added sleep support in the BLE-only firmware
- Added support to disable sleep when Wi-Fi and BLE coexist
- Fixed an issue where **AT+SYSMGFILTER** did not work when the data contained `\r\n`

#### Wi-Fi

- Added the **AT+CWBANDWIDTH** command to set Wi-Fi bandwidth
- Added the **AT+CWCONFIG** command to set the global inactive time and listen interval
- Expand authmode range for **AT+CWLAPOPT**, **AT+WPS**, **AT+CWSTARTSMART** and **AT+BLUFI**
- Fixed a station-connection failure when using **AT+CWJAP** after connecting to an Enterprise AP with **AT+CWJEAP**
- Fixed a crash when setting hostname length to 32 bytes via **AT+CWHOSTNAME**
- Fixed two WPA2-Enterprise connection issues
- Fixed a potential Wi-Fi issue where the device disconnected immediately after powering on and connecting to the AP
- Fixed an issue where **AT+CWLAP** did not return valid APs when BLUFI was enabled
- Fixed incorrect Wi-Fi reconnection behavior after sending the **AT+CWQAP** and **AT+CWRECONNCFG** commands
- Fixed a Wi-Fi disconnection issue when sending the **AT+CWRECONNCFG** command twice

- Fixed an issue where IPv6 information was output in passthrough mode

## TCP/IP

- Added a `netif` parameter to the `AT+CIPSERVER` command
- Added the `AT+CIPSSLCCIPHER` command to configure the SSL cipher-suite list
- Added a timeout parameter to the `AT+CIPSTART` and `AT+CIPDOMAIN` commands
- Added support for a backup DNS server in `AT+CIPDNS`
- Fixed `AT+CWDHCP` returning an incorrect DHCP state after the DHCP server was disabled
- Fixed an issue where `AT+CIPRECLEN?` always returned a fixed set of five connections
- Fixed several issues where `AT+CIPSTATUS` returned incorrect statuses
- Fixed an infinite-loop issue when the SSL server encountered a PKI read error
- Fixed some potential reconnection issues in passthrough mode
- Fixed an issue where TLS resources were not freed if TLS negotiation failed
- Fixed an issue where `AT+CIPCLOSE` could not close a connection after reaching the maximum number of open sockets
- Fixed an issue where the UDP mode in `AT+CIPSTART` did not work in passive-read mode
- Fixed an asynchronous issue with `AT+CIPRECLEN`
- Fixed an issue where `AT+CIPSTO` did not take effect when data transmission failed

## mDNS

- Added mDNS query support to `AT+MDNS`
- Added the `instance`, `proto`, and `txt` parameters to the `AT+MDNS` command

## HTTP

- Enabled HTTP commands on the `esp32c2-2mb` firmware
- Added HTTP status-code output for HTTP commands
- Added the `AT+HTTPCFG` command to configure certificates for HTTP
- Added HTTP-header deduplication to the `AT+HTTPHEAD` command

## MQTT

- Change MQTT message retransmission interval from 1 second to 5 seconds to improve connection stability
- Fixed a potential issue where MQTT subscribe via `AT+MQTTSUB` failed but returned `OK`
- Fixed an issue where an MQTT QoS 2 PUBREL packet might not be retransmitted

## FatFS

- Added FatFS support on 2 MB flash
- Added a data-length check when writing to FatFS
- Fixed several FatFS mount and unmount issues
- Fixed a mismatch between the generated `fatfs.bin` size and the required size
- Fixed an issue where FatFS did not work if `fatfs.bin` was not pre-burned before flashing
- Fixed an issue where `fwrite()` returned `OK` but data was not written to the file system

## OTA

- Enabled app rollback support
- Added compressed OTA v3 support and a sanity checker

## WebServer

- Fixed a compilation error when WebSocket and info logging were enabled
- Fixed two `slist` issues where the pointer `fail_item` was used after `free`
- Fixed a potential crash when printing if the SSID length was 32 bytes
- Fixed an issue where AT-Web netconfig failed when used with the WeChat applet

## WebSocket

- Added additional parameters to the `AT+WSCFG` command to configure certificates in WebSocket

## Bluetooth

- Fixed AT command response interleaving issues causing data corruption
- Fixed AT command response issues where the `\r` character was missing
- Added BLE light sleep support on esp32c2
- Added BLE adv type information
- Fixed missing `+BLESCANDONE` issue
- Resolved data loss issue in BLE passthrough mode
- Optimized BLE WRITE/INDICATE flow control mechanism
- Fixed crash in BLE transparent transmission mode
- Fixed `AT+BTENCCLEAR` not properly clearing BT pairing information
- Fixed `BLE_TT_MODE` printed twice in BLE passthrough mode
- Fixed missing `+WRITE` response
- Fixed `BLUFI` memory leak
- Fixed issue where MTU size greater than attribute length caused data transmission failure
- Fixed that `AT+RFPower` query not returning BLE power when using nimble protocol
- Fixed extra `+BLEDISCONN` message when sending `AT+BLEDISCONN=0`

## Interface

- Optimized the UART1 clock source
- Fixed a potential crash when AT was not ready but received data
- Fixed a potential UART voltage fluctuation during light sleep
- Fixed some socket interface issues
- Fixed an SDIO compilation warning
- Fixed a heap-corruption issue when using the SDIO interface

## System

- `esp-idf` version updated to `~v5.4.2`
- Added an unfilled factory binary
- Added a checker to prevent duplicate keys in `*.defaults`

- Added some return value checks for driver commands
- Added `pre_wakeup_callback` and `process_light_sleep` hook events
- Added a hook function for memory allocation failure
- Added the `esp_at_ready_before()` API to perform tasks before ESP-AT is ready
- Added the `at_exe_cmd()` API to execute AT commands via ESP-AT itself
- Supported the new log system and improved log readability
- Added support to configure the default system storage mode
- Added support to print the firmware source
- Added support to override default configurations
- Optimized resources to increase available RAM
- Reduced power consumption when a beacon is lost
- Optimized the root CMake file
- Decoupled Wi-Fi and BLE functions from the base commands
- Renamed `esp_at_get_netconn_count()` to `esp_at_get_netconn_max_count()`
- Exposed `esp_at_get_smartconfig_start_config()` API
- Reconfigured TWDT to disable the panic trigger when AT debug is enabled
- Provided some weak symbols to allow external overriding (`esp_at_nvs_set_xxx/esp_at_nvs_get_xxx/esp_at_log_write`)
- Fixed an issue where the factory binary was not generated in some cases
- Fixed an issue where patches could not be applied on Windows
- Fixed several MCU wake-up issues

## Optimization

- **TCP & SSL:** TCP/SSL connections are now proactively closed immediately when their associated netif state changes (netif down, stop, or lost IP). In previous versions, the connections would remain open until a keep-alive timeout, send timeout, or max retry threshold was reached - often taking tens of seconds to close. This change significantly reduces latency in connection teardown and improves system responsiveness.
- Upgraded supported python version and some package versions
- Optimized patching process
- Replaced the previous script with `esptool.py merge_bin`
- Fixed a potential issue where the patch is applied multiple times
- Fixed an issue where `gatts_cfg` was excessively modified by the `at.py` script

## Examples

- Added a `fatfs_to_http_server` example
- Added a `http_get_to_fatfs` example
- Added a WebSocket example document
- Added an AT interface security example

## Documentation

- Improved documentation for AT commands, examples, and development
- Added richer content for new features and changes
- Added a chatbox on [docs.espressif.com/projects/esp-at](https://docs.espressif.com/projects/esp-at)

- Added a disclaimer for the esp-at project
- Added some document format checks