

RA6W1/RRQ61001 FreeRTOS SDK FSP

This document contains the release notes for RA6W1/RRQ61001, RAFW FSP Pack version 2.2.1.

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Terms and Definitions

AP	Access Point
API	Application Programming Interface
CRC	Cyclic Redundancy Check
DHCP	Dynamic Host Configuration Protocol
DMAC	Direct Memory Access Controller
DMIC	Digital Microphone Interface Controller
DNS	Domain Name System
DPM	Dynamic Power Management
DTIM	Delivery Traffic Indication Map
FSP	Firmware Support Package
HIW	Hardware Initialization Wake-up
IDE	Integrated Development Environment
LLD	Low-Level Driver
LwIP	Lightweight IP
MBO	Multi-Band Operation
MQTT	Message Queuing Telemetry Transport
MROM	Mask Read-Only Memory
OFDMA	Orthogonal Frequency Division Multiple Access
OSPI	Octal Serial Peripheral Interface
OTA	Over-the-Air Upgrade
PS	Power Save
PTIM	Power Save Traffic Indication Map
QSPI	Quad Serial Peripheral Interface
RAM	Random Access Memory
RTOS	Real-Time Operating System
SDHI	Secure Digital Host Interface
SDK	Software Development Kit
Soft AP	Software Access Point
STA	Station
TC	Test Case
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TWT	Target Wake Time
UART	Universal Asynchronous Receiver/Transmitter
UDP	User Datagram Protocol
Wdog	Watchdog

1. Release Data

Table 1. Release data

Supported devices	RA6W1, RRQ61001
Device Type	QFN, WLCSP
Operating System	FreeRTOS
Operating System Version	V11.1.0 and later
RF Driver Version	V2.0.25
Software Release Date	Sept 1, 2026
Software Version Number	RAFW FSP 2.2.1
Software Release Type (Note 1)	FULL

Note 1 Releases can be of the following types: FULL (GA), FULL (LA), RELEASE CANDIDATE, ENGINEERING, PATCH, or BINARY.

2. License

Licenses covering this RAFW FSP 2.2.1 release are listed in the `license.txt` file.

Table 2. Open-source licenses

Open-source package	License type	Copyright
FreeRTOS	MIT License	Amazon.com
lwIP	BSD License	Swedish Institute of Compute Science
Network Components	BSD License	Swedish Institute of Compute Science
Wpa_supplicant	BSD License	Jouni Malinen
Arm® Cortex®-M3 MCU mbedTLS	Apache License V20	Arm® Cortex®-M3 MCU
MQTT Client	EDL 1.0	Roger Light
DHCP Server	Apache License V2.0	Espressif Systems
WebSocket Client	Apache License V2.0	Espressif Systems
SEGGER	Revised BSD License	SEGGER Microcontroller GmbH & Co. KG

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3. Related Documentation and References

[1] AT Commands, Manual, Renesas Electronics.

[2] RA6W1 FreeRTOS Test Report, Renesas Electronics.

[3] RA6W1 Datasheet, Renesas Electronics.

[4] RA6W1/RRQ61001 Quick Start Guide, Manual, Renesas Electronics.

[5] RA6W1/RRQ61001 Application Development Guide, Manual, Renesas Electronics.

[6] RA6W2/RRQ61051 Quick Start Guide, Manual, Renesas Electronics.

[7] RA6W2/RRQ61051 Application Development Guide, Manual, Renesas Electronics.

Note 1 References are for the latest published version, unless otherwise indicated.

4. Release Description

4.1 Overview

Release version of RAFW FSP 2.2.1 supports the RA6W1 and RRQ61001 products. This version supports FreeRTOS™, lwIP network stack, GCC compiler 13.3.1, and e² studio.

4.2 Feature List

Table 3. RAFW FSP 2.2.1 feature list

	Functionality	Supported
Wi-Fi	IEEE 802.11b – 1, 2, 5.5, 11 Mbps	Y
	IEEE 802.11g – 6, 9, 12, 18, 24, 36, 48, and 54 Mbps	Y
	IEEE 802.11a – 6, 9, 12, 18, 24, 36, 48, and 54 Mbps	Y
	IEEE 802.11n – MCS 0-7, 1×1, 20 MHz channel bandwidth, 2.4 GHz	Y
	IEEE 802.11n – MCS 0-7, 1×1, 20 MHz channel bandwidth, 5 GHz	Y
	IEEE 802.11ac – MCS 0-7, 1×1, 20 MHz channel bandwidth, 5 GHz	Y
	Wi-Fi 6 – MCS 0-7, 1×1, 20 MHz channel bandwidth, 2.4 GHz	Y
	Wi-Fi 6 – MCS 0-7, 1×1, 20 MHz channel bandwidth, 5 GHz	Y
Station	Authentication OPEN	Y
	Authentication WEP	Y
	Authentication WPA (TKIP) Personal	Y
	Authentication WPA (AES) Personal	Y
	Authentication WPA2 (TKIP) Personal	Y
	Authentication WPA2 (AES) Personal	Y
	Authentication WPA2 (TKIP) Enterprise	Y
	Authentication WPA2 (AES) Enterprise	Y
	Authentication WPA3 (AES) Personal	Y
	Authentication WPA3 (AES) Enterprise	Y
	EAP types for WPAx-enterprise: ■ EAP-TLS ■ EAP-TTLS/MSCHAPv2 ■ PEAPv0/EAP-MSCHAPv2 ■ PEAPv1/EAP-GTC ■ EAP-FAST	Y
	Authentication OWE	Y
	Hidden SSID	Y
	WMM	Y
	WMM-PS	N
	Roaming (MBO 802.11k, 802.11v)	Y
	IPv4 Network Stack	Y
	IPv6 Network Stack	Y
	IPv4 and IPv6 Dual Stack	Y

	Functionality	Supported
Soft AP	Number of associated STAs	5
	WPA2 Personal	Y
	WPA3 Personal	Y
	DHCP server	Y
	DNS server	N
	HTTP(s) server	Y
	Power Save mode	N
	Concurrent STA plus Soft AP – same channel	Y
	Concurrent STA plus Soft AP – multi-channel	N
	Mesh support in Linux driver	N
Wi-Fi Direct	Wi-Fi Direct Group Owner	N
	Wi-Fi Direct Client	N
	Wi-Fi Direct Concurrent mode: STA plus P2P GO – same channel	N
	Wi-Fi Direct Concurrent mode: STA plus P2P client – same channel	N
	Wi-Fi Direct with power save for all relevant modes	N
	DFS support for Soft AP in 5 GHz	N
Mesh 802.11s	Maximum number of connected peers per single node: 4	N
	Maximum number of nodes in the entire network: 32	N
	Authentication SAE	N
	Mesh routing – HWMP	N
	Wi-Fi Easy Mesh support	N
	Rely on open-source Mesh implementation, for example, PurpleMesh	N
Applications	Matter Framework support	Y
Operating System	FreeRTOS	Y
	Linux Driver	Y
Production Tool	Flash programming	Y
	OTP Programming	Y
	Production testing	Y
	RF testing	Y
	Secure key handling	Y
Supported IDE	Fully pre-configured Eclipse	Y
	e ² studio for Renesas integration	Y
	Command-line build using CMake or similar	N
Software Update	Support MQTT protocol for OTA update	N

	Functionality	Supported
Wi-Fi Alliance certifications	Wi-Fi CERTIFIED™ b, g, n, ax	Y
	WPA™ – Enterprise, Personal	Y
	WPA2™ – Enterprise, Personal	Y
	WPA3™ – Enterprise, Personal	Y
	Wi-Fi Direct	N
	Wi-Fi Enhanced Open™	N
	WMM	N
	WMM – Power Save	N
	Wi-Fi Protected Setup™	N
	Wi-Fi Certified Easy Connect	N

4.3 FSP Modules

Table 4. RAFW FSP 2.2.1 supported low-level drivers

Low-level driver module name	Corresponding low-level driver
r_adc_w	ADC
r_cc312_openable_w	Crypt Cell
r_cc312_property_w	Crypt Cell
r_crc_w	CRC
r_dmac_w	DMAC
r_dmic_w	DMIC
r_ext_irq_w	External interrupt (for example, pressing the button)
r_gpio_w	GPIO
r_i2c_master_w	I2C Master
r_i2c_slave_w	I2C Slave
r_i2s_w	I2S
r_ospi_w	OSPI
r_qspi_w	QSPI
r_rtc_w	RTC
r_sdmmc_w	SDHI (SDIO, eMMC)
r_spi_w	SPI
r_tim_w	General-Purpose Timer
r_uart_w	UART
r_wdog_w	Watchdog Timer

Table 5. RAFW 2.2.1 supported middleware FSP modules

Middleware FSP module name	Content
rm_wifi	Wi-Fi FSP
rm_atcmd_transport_sdio_w	AT transport on SDIO
rm_atcmd_transport_spi_w	AT transport on SPI
rm_atcmd_transport_uart_w	AT transport on UART
rm_atcmd_w	AT + AT codeless command
rm_aws_lwip_sock_wrap_w	AWS lwIP sockets wrapper

Middleware FSP module name	Content
rm_aws_pkcs11_pal_littlefs_w	PKCS#11 PAL LittleFS layer implementation
rm_awsiot_w	AWS IoT porting layer
rm_block_media_spi_w	Block Media
rm_cli_w	Command line interface
rm_comms_uart_w	UART communication device
rm_freertos_plus_fat_w	FreeRTOS FAT+
rm_freertos_port_w	FreeRTOS porting layer
rm_https_w	HTTPS
rm_littlefs_flash_w	Little FS (Filesystem)
rm_lwip_w	LWIP
rm_map_persistent_w	Persistent storage
rm_matter_app_port_w	Matter porting layer
rm_mbedtls_w	Mbedtls
rm_mqtt_port_w	MQTT porting layer
rm_ota_w	OTA
rm_pmgr_w	Power manager
rm_psa_crypto_w	PSA
rm_stdio_w	Standard I/O
rm_venn_flash_w	Virtual EEPROM
rm_watchdog_service_w	Watchdog service

4.4 RAFW FSP 2.2.1

4.4.1 Objectives

- Improved Wi-Fi UDP maximum performance
- Improved SDIO functionality
- Improved SDK configuration in e² studio
- Matter application development using the e² studio QE tool
- Improved Sleep 4 functionality in hosted architecture
- Bug fixes

4.4.2 New and Updated Features of 2.2.1

Table 6. RAFW FSP 2.2.1 new features

Feature number	Description
FSP 2.2.1 – 01	Support E2S QE tool for Matter development.
FSP 2.2.1 – 02	Added support for CCA threshold configuration in Wi-Fi test mode.
FSP 2.2.1 – 03	Added support for resumable OTA downloads.

4.4.3 Fixes and Improvements since RAFW FSP 2.1.0

Table 7. RAFW FSP 2.2.1 fixes and improvements

Fix number	Description
FSP 2.2.1 – 01	Improved Sleep 4 over hosted architecture.
FSP 2.2.1 – 02	Improved Wi-Fi UDP performance.
FSP 2.2.1 – 03	Fixed I ² C SCL clock output.

Fix number	Description
FSP 2.2.1 – 04	Improved ping reception under TWT.
FSP 2.2.1 – 05	Fixed TCP connection issues under DPM over hosted SDIO architecture.

4.4.4 Known Issues of RAFW FSP 2.2.1

Table 8. RAFW FSP 2.2.1 known issues

Issue number	Component	Description	User Impact
FSP 2.2.1 – 01	[OTA]	Matter OTA Image fails to flash from index 1.	Boot the Matter OTA image from index 0.
FSP 2.2.1 – 02	[E2S]	UART+DMA is not supported.	UART throughput is not optimized when UART+DMA is required.
FSP 2.2.1 – 03	[CLI] [Stability]	The CLI task might become stuck after eight hours.	Hard reboot is required to restore the CLI task.
FSP 2.2.1 – 04	[ATC]	Sleep 4 is not optimized to the same level as standalone.	Sleep 4 current consumption in hosted architecture can be higher than in standalone mode.
FSP 2.2.1 – 05	[FSP]	The RM_WIFI module has static components that cannot be modified.	You must use the fixed RM_WIFI static component configuration provided in this release.

4.4.5 Known Limitations of RAFW FSP 2.2.1

Table 9. RAFW FSP 2.2.1 known limitations

Issue number	Description
FSP 2.2.1 – 01	Power Management (PMGR, DPM): Not supported to switch DPM and Sleep 4 during runtime.
FSP 2.2.1 – 02	FSP pack backward compatibility: There is no backward compatibility for apps developed prior to FSP 2.0.1 release.
FSP 2.2.1 – 03	Wi-Fi performance: - Wi-Fi TCP TX 28 Mbps - Wi-Fi TCP RX 38 Mbps - Wi-Fi UDP TX 55 Mbps - Wi-Fi UDP RX 55 Mbps
FSP 2.2.1 – 04	Custom flash map is not supported.

5. Release History

5.1 RAFW FSP 2.1.0

5.1.1 Objectives

- FSP clocks
- Updated OSPI module
- External flash property support in e² studio
- Custom Wi-Fi regulatory domain
- Improved SPI and SDIO data flow
- Improved Sleep 4 current consumption
- Improved Wi-Fi TX performance
- User input validation (security)

5.1.2 New and Updated Features of RAFW FSP 2.1.0

Table 10. RAFW FSP 2.1.0 new features

Feature number	Description
FSP 2.1.0 – 01	Added custom Wi-Fi regulatory domain profile.
FSP 2.1.0 – 02	Added external flash support.
FSP 2.1.0 – 03	Added FSP clock support in e ² studio.

5.1.3 Known Issues of RAFW FSP 2.1.0

Table 11. RAFW FSP 2.1.0 known issues

Issue number	Component	Description	User impact
FSP 2.1.0 – 01	[OTA]	Matter OTA Image fails to flash from index 1.	You should point Matter OTA image booted from index 0.
FSP 2.1.0 – 02	[E2S]	UART+DMA is not supported.	UART TPT is not optimized.
FSP 2.1.0 – 03	[SDIO] [DPM]	TCP server information is not saved in NVRAM affecting restoring option after DPM wake-up.	You must configure TCP server per each wake-up.
FSP 2.1.0 – 04	[CLI] [Stability]	The CLI task might stuck after eight hours.	Hard reboot is required to restore the CLI task.
FSP 2.1.0 – 05	[LLD][I2C]	I2C SCL clock output is 50 kHz instead of 100 kHz.	-
FSP 2.1.0 – 06	[ATC]	Sleep 4 is not optimized to the same level as standalone.	-
FSP 2.1.0 – 07	[FSP]	The RM_WIFI module has static components that cannot be modified.	-

5.1.4 Fixes and Improvements since RAFW FSP 2.0.1

Table 12. RAFW FSP 2.1.0 fixes and improvements

Fix number	Description
FSP 2.1.0 – 01	Improved Sleep 4 idle current.
FSP 2.1.0 – 02	Improved Wi-Fi TX UDP.
FSP 2.1.0 – 03	Added API and driver descriptions in e ² studio.
FSP 2.1.0 – 04	Added the clock configurator support in e ² studio.
FSP 2.1.0 – 05	Improved dynamic Wi-Fi regulatory domain.

5.1.5 Known Limitations of RAFW FSP 2.1.0

Table 13. RAFW FSP 2.1.0 known limitations

Issue number	Description
FSP 2.1.0 – 01	Power Management (PMGR, DPM): Not supported to switch DPM and Sleep 4 during run time.
FSP 2.1.0 – 02	FSP pack backward compatibility: There is no backward compatibility for apps which were developed prior to FSP 2.0.1 release.
FSP 2.1.0 – 03	Wi-Fi performance: - Wi-Fi TCP TX 28 Mbps - Wi-Fi TCP RX 38 Mbps - Wi-Fi UDP TX 45 Mbps - Wi-Fi UDP RX 45 Mbps

5.2 SDK 8.0.3 (RAFW FSP 2.0.1)

5.2.1 Objectives

- First outbound release from RAFW Horizontal branch
- UART Baud rate support
- Secure channel for Hosted architecture
- Improved RF – aligned to regulatory certifications
- Improved SPI data flow
- Upgrade MbedTLS version to 3.6.4.

5.2.2 New and Updated Features of RAFW FSP 2.0.1

Table 14. RAFW FSP 2.0.1 new features

Feature number	Description
FSP 2.0.1 – 01	All UART baud rates are supported.
FSP 2.0.1 – 02	NIST-compliant RNG.
FSP 2.0.1 – 03	Support Secured channel.
FSP 2.0.1 – 04	Improved RF.

5.2.3 Known Issues of RAFW FSP 2.0.1

Table 15. RAFW FSP 2.0.1 known issues

Issue number	Component	Description	User impact
FSP 2.0.1 – 01	[Wi-Fi]	Inconsistent RSSI indication in 2.4-GHz band.	Wi-Fi RSSI readings might fluctuate between iterations.
FSP 2.0.1 – 02	[Wi-Fi]	Random disconnections in noisy environment.	Once in several hours Wi-Fi disconnection may occur, affecting link stability. Reconnection is followed automatically.
FSP 2.0.1 – 03	[Wi-Fi]	In RSSI < -74 sometimes ack is not being sent on received packets.	Short term throughput drop might be observed.
FSP 2.0.1 – 04	[OTA]	Matter OTA Image fails to flash from index 1.	No issues with booting from index 0.
FSP 2.0.1 – 05	[TWT] [Network]	TWT individual – IP is not immediately renewed following DHCP renewal.	Requires several renewal retries.

Issue number	Component	Description	User impact
FSP 2.0.1 – 06	[E2S]	UART+DMA is not supported.	UART TPT is not optimized.
FSP 2.0.1 – 07	[QSPI]	QSPI driver cannot apply three dummy bytes.	Execution of commands might be affected.
FSP 2.0.1 – 08	[E2S] [CLOCK]	Clock configurator view is hardcoded.	You can control only the QSPI clocks.
FSP 2.0.1 – 09	[Matter]	First commissioning with Alexa might fail.	You must perform commissioning twice.
FSP 2.0.1 – 10	[E2S] [FLASH]	Data flash size is hardcoded in flash properties.	You cannot create a customized flash map.
FSP 2.0.1 – 11	[Matter][AT] [IOP]	Matter over the AT commands is not compatible with Apple Homepod.	Matter over the AT command does not support Apple Homepod.

5.2.4 Fixes and Improvements since 8.0.2.0.x RAFW FSP 1.0.0

Table 16. RAFW FSP 2.0.1 fixes and improvements

Fix number	Description
FSP 2.0.1 – 01	Improved TWT app flow.
FSP 2.0.1 – 02	Improved Sleep4 idle current.
FSP 2.0.1 – 03	Increased available memory for the AT SPI/SDIO apps.
FSP 2.0.1 – 04	Fixed the SPI/SDIO TLS connection issues.
FSP 2.0.1 – 05	Fixed TWT IOP.
FSP 2.0.1 – 06	Improved visibility of the e ² studio clock configurator.
FSP 2.0.1 – 07	Fixed toggling mechanism between external and internal crystal usage.

5.2.5 Known Limitations of RAFW FSP 2.0.1

Table 17. RAFW FSP 2.0.1 known limitations

Issue number	Description
FSP 2.0.1 – 01	Power Management (PMGR, DPM): Not supported to switch DPM and Sleep4 during run time.
FSP 2.0.1 – 03	Matter: DPM – multi admin is not supported.
FSP 2.0.1 – 04	FSP pack backward compatibility: There is no backward compatibility for apps which were developed prior to FSP 2.0.1 release.
FSP 2.0.1 – 05	Standalone performance: - Wi-Fi TCP TX 28 Mbps - Wi-Fi TCP RX 38 Mbps - Wi-Fi UDP TX 35 Mbps - Wi-Fi UDP RX 50 Mbps

5.3 SDK 8.0.2 (RAFW FSP 1.0.0)

5.3.1 Objectives

- Passed the WFA certification on all modules
- Supports little FS
- Supports data over AT commands in all interfaces
- Improved RF according to FCC and ETSI certification

5.3.2 New and Updated Features of 8.0.2.0.x

Table 18. 8.0.2.0.x new features

Feature number	Description
8.0.2.0.x – 01	Supports Sleep4.
8.0.2.0.x – 02	Supports the WFA certification on all modules.
8.0.2.0.x – 03	Supports little FS.
8.0.2.0.x – 04	Supports SDIO and SPI with the new hardware.
8.0.2.0.x – 05	Supports dynamic HTTPS.
8.0.2.0.x – 06	Improved RF.

5.3.3 Known Issues of 8.0.2.0.x

Table 19. 8.0.2.0.x known issues

Issue number	Component	Description	User impact
8.0.2.0.x – 01	[TWT][APP]	TWT + TCP socket – Entering Sleep mechanism is not optimized.	Higher current consumption between TWT establishment and DPM entrance (30 s duration).
8.0.2.0.x – 02	[SPI]	Cannot connect to server when TLS certificate is enabled.	When TLS data certificate is enabled, connection to TLS server is not supported.
8.0.2.0.x – 03	[Wi-Fi]	Inconsistent RSSI indication in 2.4-GHz band.	Wi-Fi RSSI readings may fluctuate between iterations.
8.0.2.0.x – 04	Operational	In operational, the transmitted power is according to the defaults.	There is no option to control Wi-Fi output power after connection to AP.
8.0.2.0.x – 05	[Wi-Fi]	Random disconnections in noisy environment.	Once in several hours Wi-Fi connection might occur, affecting link stability. Reconnection is followed automatically.
8.0.2.0.x – 06	[UART]	Baud rate 1200, 2400, 4800, and 380400 are not supported.	
8.0.2.0.x – 07	[RED]	Need to reboot to initiate an update process after connecting to the AP.	Requires manual reboot after connection to AP.
8.0.2.0.x – 08	[RED]	Image does not load on the first attempt.	Requires a reboot.
8.0.2.0.x – 09	[Security]	Disconnection from AP leads to BUS Fault Exception with permanent reboot in WPA3-Enterprise 192Bits PEAP/MSCHAPv2 .	Reboot is required.
8.0.2.0.x – 10	[SDIO] [DPM]	First AT command is not addressed in Sleep4.	First AT command should be "AT".
8.0.2.0.x – 11	[SPI]	Bidirectional TCP RX/TX AT command does not work.	Data transfer can be tested either TX or RX.
8.0.2.0.x – 12	[Wi-Fi]	In RSSI < -74 sometimes ack is not being sent on received packets.	Short term throughput drop might be observed.
8.0.2.0.x	[DPM]	Usage Fault Exception during DPM+ping long	Requires a reboot.

Issue number	Component	Description	User impact
– 13	[Stability]	stability run.	
8.0.2.0.x – 14	[ATC]	First Get request AT+NWMQTS=? returns an error.	You must request again for proper output.
8.0.2.0.x – 15	[Wi-Fi][APP]	Provisioning: unable to join the hidden Wi-Fi network.	Hidden Wi-Fi networks are not supported under provisioning app.
8.0.2.0.x – 16	[DPM][Wi-Fi]	Device rarely does not wake up on data packets in 5 G only.	Wi-Fi connection might be lost.
8.0.2.0.x – 17	[TWT]	TWT individual – TCP KA interval is not constant.	Current consumption measurements are affected.
8.0.2.0.x – 18	[Network]	When IPv4 DNS fails in IPv6 Dual-Stack mode, there is no request for IPv6 DNS.	IPV6 DNS is dependent on successful IPV4 DNS.
8.0.2.0.x – 19	[OTA]	Matter OTA Image fails to flash from index.	You should point matter OTA image booted from index 0.
8.0.2.0.x – 20	[TWT] [Network]	TWT individual – IP is not immediately renewed following the DHCP renewal.	You should perform several renewal retries.
8.0.2.0.x – 21	[TWT]	AsusGT-AX6000 AP – De-authentication in the IDLE state may occur.	TWT session may lead to de-authentication with AsusGT-AX6000.
8.0.2.0.x – 22	[E2S]	UART+DMA is not supported.	UART TPT is not optimized.

5.4 SDK 8.0.0

5.4.1 Objectives

- Supports RA6W1 in the same source code (same branch)
- Converted the code to the RA code convention
- Improved stability
- Improved power management
- Supports 2.4 G only and 11N only SKUs
- Supports TWT individual.

5.4.2 New and Updated Features of 8.0.0.0.5

Table 20. 8.0.0.0.5 new features

Feature number	Description
8.0.0.0.5 – 01	Created single SDK to support both RA6W1.
8.0.0.0.5 – 02	Changed from RRQ to RA platform in FSP environment for Wireless project (Initial Phase).
8.0.0.0.5 – 03	Converted device category: RA6W1 (formerly RA6W1).
8.0.0.0.5 – 04	Added SKUs feature.
8.0.0.0.5 – 05	Added PLT AT-Commands (Wi-Fi Only).

5.4.3 Fixes and Improvements since 6.0.5.0.3/7.0.5.0.2

Table 21. 8.0.0.0.5 fixes and improvements

Subject type	Description
Software upgrade OTA	Fixed FSP_OTA bugs.

Subject type	Description
Power Management (Sleep, DPM, PTIM)	Added support TCP/UDP multi-session with TCP Keep-Alive during DPM SLEEP state.
	Fully supports FSP_PMGR (Power Management module) for SLEEP and DPM.
	DPM mode: using WPA2_WPA3 and a DHCP lease time exceeding 30 min, DHCP renewal succeed.
	Fixed higher power consumption due to random unnecessary wake-ups.
	HTTP and MQTT work in DPM mode.
	TWT session is restored after AP reboot or channel change.
Soft AP	Fixed Watchdog exception when configuring AP/STA Concurrent mode.

5.4.4 Known Issues of 8.0.0.0.5

Table 22. 8.0.0.0.5 known issues

Issue type	Description
Wi-Fi STA	Interoperability – Netgear AP – traffic may stop after several hours.
	Occasional traffic drops to 0 Mbps that might require iPerf restart.
Power Management (Sleep, DPM, PTIM)	Rarely, DPM can get stuck after long periods of time (hours).
	No option to configure a maskable wake-up source. Every source can trigger a wake-up.
Power Save (TWT)	Watchdog Fault Exception occurs when TWT teardown is initialized by RA6W1.
	Rarely, TWT flow is not reconfigured after Deauthentication.
	Rarely, PTIM might not wake up for beacon.
	Random reconnections might occur in TWT mode.
Stability	Interoperability – Netgear AP.
	In large time frame (hours), reconnection may occur.
SOFT AP	Station loses IP after couple of hours, requires reboot.
	WPA3-SAE concurrent AP/STA not supported.
MATTER	Interoperability issue with Amazon Alexa – DPM is not optimized.
	In very noise environment – unexpected wake-ups might occur.

5.5 SDK 7.0.5.0.2 ER-D

5.5.1 Objectives

- Wi-Fi 2.4 G and 5 G
- Full support for Wi-Fi FSP API
- Wi-Fi – AT commands
- Provisioning support based on FSP
- Provisioning support based on AT commands
- Improved stability and performance
- Support SPI and SDIO interface
- Support Matter DPM (Wi-Fi only).

5.5.2 New and Updated Features of 7.0.5.0.2

Table 23. 7.0.5.0.2 new features

Feature number	Description
7.0.5.0.2 – 01	Support provisioning based on the AT commands.
7.0.5.0.2 – 02	Supports FSP_AT command for Wi-Fi with SPI/SDIO interface.
7.0.5.0.2 – 03	Created FSP applications.

5.5.3 Fixes and Improvements since 7.0.4.0.2

Table 24. 7.0.5.0.2 fixes and improvements

Subject type	Description
General	Supports concurrent STA/AP in 5 GHz band.
DPM	Supports TCP Keepalive probe function to maintain TCP session during DPM sleep.
	Supports configuration of manual "sleep" duration.
Wi-Fi STA	Supported STA connection in WPA3.
FSP	LWIP and AT_CMD are FSP compliant.
System performance	Optimized stability in very noisy environment.
Power Management (Sleep, DPM, PTIM)	Optimized and improved stability of 2.4 GHz and 5 GHz RF driver.

5.5.4 Known Issues of 7.0.5.0.2

Table 25. 7.0.5.0.2 known issue

Issue type	Description
Stability	Occasionally reconnections in a crowded, high-interference environment, with RSSI level < -60 dBm.
	Occasional Watchdog Fault Exception during TWT, requiring manual reboot.
	Occasional throughput drops to zero in a crowded, high-interference environment.
Power Management	DPM mode: when using WPA2_WPA3 and a DHCP lease time exceeding 30 min, DHCP renewal fails, requiring new IP address assignment.
	DPM mode: Occasional random wake-ups might increase power consumption.
	DPM mode: Reconnections can occur in very noisy environments.
	DPM mode: Wake-up source cannot be configured using AT command. All sources are always available.
	DPM mode: HTTP Server does not work with DPM enabled.
	DPM mode: TWT session is not restored following AP reboot or channel change, meaning that device exits power-save.
	IPv6 global IP might not successfully renew in some DPM circumstances.
	DPM mode: MQTT is not supported.
	PMGR User Application: adding more than one debug print can cause Usage Fault exception.
	AT Wi-Fi DPM: TCP DL is not stable.
	TWT sleep duration is limited to up to 30 s.
Soft AP	RX: random traffic drops to zero for several seconds in noisy environment.
	Watchdog exception when configuring AP/STA concurrent mode.
Security	Watchdog Fault Exception occurs when connecting to MQTT TLS server after entering MQTT AT+CERT.
Wi-Fi direct	Not supported.
Interoperability	*DPM mode: no reconnection after AP changes channel (Only Xiaomi AX6000 (RA72) Model) – manual reconnection required.
	*NetGear (RAXE 200), Throughput drops to zero – requires manual reboot.

5.5.5 Known Limitations 7.0.5.0.2

Table 26. 7.0.5.0.2 known limitations

Limitation number	Description
7.0.5.0.7 – 01	Power Management (MPM, DPM): ■ Unsupported TCP/UDP multi-session with DPM mode.
7.0.5.0.7 – 02	Software: ■ AP/STA concurrent is not working.

5.6 SDK 7.0.4.2 ER-C1

5.6.1 Overview

This is a release of 7.0.4.0.2 binary image and source code supporting the RA6W1 silicon. This version supports FreeRTOS™, lwIP network stack and E2S compiler.

5.6.2 New and Updated Features of 7.0.4.0.2

Table 27. 7.0.4.0.2 new features

Feature number	Description
7.0.4.0.2 – 01	Support BA silicon with better RF performance.
7.0.4.0.2 – 02	Support 5 GHz – RF driver 2.0.84.
7.0.4.0.2 – 03	e ² studio FSP environment – Wi-Fi
7.0.4.0.2 – 04	LLD are fully supported by FSP.
7.0.4.0.2 – 05	Mbedtls, MQTT, HTTPS are fully supported by FSP.
7.0.4.0.2 – 06	Improved stability.

5.6.3 FSP Modules

Table 28. 7.0.4.0.2 FSP modules

Low Level Driver		
r_adc_b	ADC	
r_cc312_openable	Crypt Cell	
r_cc312_property	Crypt Cell	
r_crc_b	CRC	
r_dmac	DMAC	
r_dmic	DMIC	
r_gpt_b	General Purpose Timer	
r_i2s_b	I2S	
r_icu_b	External interrupt (for example, press button)	
r_iic_b_master	I2C Master	
r_iic_b_slave	I2C Slave	
r_ioport_b	GPIO	
r_ospi_b	OSPI	
r_qspi_b_flash	QSPI (Flash)	
r_qspi_b_psrाम	QSPI (PSRAM)	
r_sdhi_b	SDHI (SDIO, eMMC)	
r_spi_b	SPI	
r_uart_b	UART	
r_wdt_b	Watchdog timer	
Middleware		
r_wifi_b	Wi-Fi FSP	
rm_block_media_spi	Block Media	
rm_comms_uart	UART	
rm_freertos_plus_fat	FreeRTOS FAT+	

Low Level Driver		
rm_freertos_port_b	FreeRTOS porting layer	
rm_https_b	HTTPS	
rm_littlefs_flash	Little FS (Filesystem)	
rm_lwip	LWIP	
rm_psa_crypto	PSA	
rm_matter_wifi_allclusters	Matter (Wi-Fi only)	
rm_mqtt_port	MQTT	
rm_watchdog_service_b	Watchdog service	
rm_vee_flash	Virtual EEPROM	

5.6.4 Fixes and Improvements since 7.0.4.0.2

Table 29. 7.0.4.0.2 fixes and improvements

Fix number	Description
7.0.4.0.2 – 01	Fixed Long duration to get IP while trying to connect with AP with enabled OFDMA.
7.0.4.0.2 – 02	Fixed download an image from OTA server.
7.0.4.0.2 – 03	Added the EAP_FAST authentication method.
7.0.4.0.2 – 04	Fixed connection of TLS session with EAP-TLS type.
7.0.4.0.2 – 05	Fixed WPA3_OWE in Soft-AP mode.
7.0.4.0.2 – 06	Fixed output for "wpa_cli ap_status" CLI commands.
7.0.4.0.2 – 07	Fixed WFI operation after WPA CLI commands.
7.0.4.0.2 – 08	Added Country code in Beacon frame in Soft-AP mode.
7.0.4.0.2 – 09	Improved 2.4 CH1 TCP RX performance.
7.0.4.0.2 – 10	Improved 2.4 latency.
7.0.4.0.2 – 11	Improved iPerf traffic stability.
7.0.4.0.2 – 12	Improved RF sensitivity.

5.6.5 Known Issues of 7.0.4.0.2

Table 30. 7.0.4.0.2 known issues

Issue number	Description
7.0.4.0.2 – 01	Unable to configure Concurrent STA/AP in 5 GHz band.
7.0.4.0.2 – 02	Probability of 10% to get no results for scan upon setup connection process.
7.0.4.0.2 – 03	Random tPut drop to 0 Mbps for several seconds (after couple of hours) in 5 GHz band, RSSI < -55 dBm in noisy environment.
7.0.4.0.2 – 04	Low Probability to get "Exception" at iPerf application start in UDP RX test (5 GHz test) with far range.
7.0.4.0.2 – 05	iPerf application self-restart every several minutes in UDP RX test in noisy environment.
7.0.4.0.2 – 06	OFDMA DL does not work when AP configured 5 GHz.
7.0.4.0.2 – 07	More than 65% ping loss in Wi-Fi Direct GO mode (even with single peer).
7.0.4.0.2 –	System stuck in Wi-Fi Direct GO mode was idle for 24 hours.

Issue number	Description
08	
7.0.4.0.2 – 09	TIN in GO and GC mode connection does not work with several mobiles.
7.0.4.0.2 – 10	Often system stucks during configuration of Wi-Fi Direct GO/GC.
7.0.4.0.2 – 11	Wi-Fi Direct does not support 5 GHz.
7.0.4.0.2 – 12	Missing "P2P IE" in Probe Response packet (Wi-Fi Direct GO mode). Certification and interoperability issue.
7.0.4.0.2 – 13	No ping to P2P GC phone client if TIN is P2P GO and operates as DHCP server.
7.0.4.0.2 – 14	Can not connect STA with WPA3 authentication in concurrent AP+STA mode.
7.0.4.0.2 – 15	Random reboot during iPerf traffic in concurrent AP+STA mode.
7.0.4.0.2 – 16	Several times observed User software reboot following "Exception"+Reboot in concurrent AP+STA mode.
7.0.4.0.2 – 17	User software reboot follows to system stuck in concurrent AP+STA mode with WEP authentication.
7.0.4.0.2 – 18	Random disconnections several times per hour under Power Save mode operation in very noisy environment.
7.0.4.0.2 – 19	Random disconnections several times a day (without Power Save) in very noisy environment.
7.0.4.0.2 – 20	MQTT_TLS does not work in DPM state.
7.0.4.0.2 – 21	Can not operate with 2048 B MQTT messages.
7.0.4.0.2 – 22	No connection for TLS session with certificate with manual time config.
7.0.4.0.2 – 23	Fail item in MATTER TH Tool automation test.
7.0.4.0.2 – 24	Manual Item [TC-G-2.2] 1b Fail Occurred.
7.0.4.0.2 – 25	Manual Item [TC-G-2.2] 1d, [TC-G-2.2]3, [TC-G-2.2]5, 126(UNSUPPORTED_ACCESS) occurred.
7.0.4.0.2 – 26	Manual item [TC-G-2.2] 2a GroupTable:0 entries displayed.
7.0.4.0.2 – 27	Manual item [TC-G-2.3]15 status = 0x89 (RESOURCE_EXHAUSTED) or status = 0x7e (UNSUPPORTED_ACCESS).
7.0.4.0.2 – 28	Manual item [TC-G-3.2] pre-conditions result value is different from expected result.
7.0.4.0.2 – 29	Factory reset command failed with <1% probability.
7.0.4.0.2 – 30	Wi-Fi Provisioning application is unable to perform second scan of available Wi-Fi SSID over Android devices.
7.0.4.0.2 – 31	Factory reset does not reset the MAC address to its OTP value.

Issue number	Description
7.0.4.0.2 – 32	Rare provisioning first time scan failure (need to repeat the scan or perform factory reset).
7.0.4.0.2 – 33	Rare DUT stop advertising failure during provisioning.
7.0.4.0.2 – 34	Rare continuous reset during provisioning scan.
7.0.4.0.2 – 35	Happened once – Bus Fault during provisioning.
7.0.4.0.2 – 36	Advertiser application cannot set advertising name.

5.6.6 Known Limitations of 7.0.4.0.2

Table 31. 7.0.4.0.2 known limitations

Issue number	Description
7.0.4.0.2 – 01	RF: Sensitivity should be improved (currently RX RSSI limit to -75 dBm.)
7.0.4.0.2 – 02	Software: ■ LWIP, Wi-Fi module, and AT are not FSP compliant (The code is not clean in FSP manner) ■ Wi-Fi direct: not supported ■ Concurrent mode (STA+Soft-AP) not supported ■ OTA is legacy module module ■ Uplink OFDMA does not work
7.0.4.0.2 – 03	■ No DPM\Power management support yet.

Appendix A Software Versioning Rules

This describes the software version numbers and does not apply to documentation version numbers (as found in the footer of this document).

Each software version number string consists of four numbers: MAJOR. BRANCH. MINOR. and BUILD.

#MAJOR: It is increased (by one only) if the project undergoes a major modification, for example major ROM changes. It usually changes only when the project sources undergo major restructuring affecting most of the repository. It is initialized at 1.

#BRANCH: Used in the case of concurrent projects that for special reasons need to be spun off the major repository. It corresponds to different versions of the repository code that have to be supported concurrently. In this case each branch number corresponds to a different GIT branch. The basic project has BRANCH id 0.

#MINOR: Odd numbers indicate Engineering (or Patch or Binary) versions, even numbers indicate Full release versions or Release Candidates of Full versions. Each Full release increases this number by one. After the Full release, the number is increased by one again. Therefore, Project releases correspond to release numbers like 2.0.1.xxx, 2.0.2.xxx. and so on. The #MINOR number is initialized at 1.

#BUILD: The # BUILD number increases by one at every repository update and thus indicates the total number of changes since repository initialization. The BUILD number is initialized at 1.

6. Document Revision History

Revision	Date	Description
1.04	Sept 21, 2026	FSP 2.2.1 release.
1.03	July 21, 2026	FSP 2.1.0 release.
1.02	June 30, 2026	FSP 2.0.1 release.
1.01	Dec 25, 2025	SDK 8.0.2 or FSP 1.0.0 release.
1.00	Aug 31, 2025	GA release.