# NRC7292 Standalone SDK Release Note

## (version 1.3.4_rev01)

**Ultra-low power & Long-range Wi-Fi**

**Ver 1.0**
**Nov. 04, 2021**

## NEWRACOM, Inc.

**NRC7292 Standalone SDK Release Note (version 1.3.4_rev01)**
**Ultra-low power & Long-range Wi-Fi**



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# 1 Overview

Newracom's NRC7292 is world's first IEEE 802.11ah solution in the market. The IEEE 802.11ah is the new Wi-Fi standard targeting at various IoT applications. NRC7292 offers two different modes, a host and standalone mode. The host mode needs external host like a Raspberry Pi3 used in Newracom's EVK. In this mode, NRC7292 offers 11ah Wi-Fi connectivity. Unlike a host mode, users can write their applications with APIs provided along with a standalone package and build its binary with SDK and runs on NRC7292. By using various peripheral interfaces in NRC7292, users can read sensor data and send it to the server through 11ah network. NRC7292 also provides AT commands application in standalone mode. Users can use the AT commands to utilize the 11ah Wi-Fi.

# 2 Contents of software release package

The software release package contains all the necessary components including the firmware library, header files, api source codes, sample codes, downloader tool, makefile and documents to make use of the latest features. Figure 2.1 and Table 2.1 show the directory structure and contents of the package, respectively. 'standalone_kr_mic' and 'standalone_kr_usn' package. Please reference 'UG-7292-003-S1G_Channel.docx'

```
..
├──standalone─── doc
│               ├─── lib
│               ├─── make
│               ├─── sdk
│               │     ├─── inc
│               │     └─── apps
│               └─── tools
│                     ├─── downloader
│                     └─── AT_CMD_Test_Tool
├──standalone_kr_mic
└──standalone_kr_usn
```

**Figure 2.1 NRC7292 standalone SDK package directory**

**Table 2.1 Contents of NRC7292 standalone SDK package**

| Directory | Description |
|---|---|
| doc | documents for standalone guide ducoument and sdk api lists |
| lib | nrc7292 modem library and 3rd party libraries. |
| make | makefiles and configuration files |
| sdk | standalone user sdk folder |
| inc | sdk api header files and sdk common header file. |
| apps | several kinds of reference sample applications. An AT command application is included. |
| atcmd_binary | ATCMD binaries |
| tools | tools folder |
| AT_CMD_Test_Tool | AT command test tool for UART interface |
| BoardDataEditor | Board data editor |
| external_tools | The XIPFirmwareFlashTool is a firmware uploader.<br>The DM(Diagnostic Monitor) tool can be used to perform LMAC-level TX/RX performance test and graphically monitor relevant statistics in real time.<br>The DUT2DUT Test Program is a windows GUI(graphical user interface) tool for performing various LMAC-level TRX tests and estimating channel noise levels using NRC7292 AH modules |

The information of the library released in this package is as follows.

- Library (including 3rd party)
  - Name : libmodem.a
  - Location : lib/modem
  - Version : 1.3.4 (rev01)
  - Build date : Nov. 04, 2021

# 3 Standalone SDK Package

## 3.1 General guide

The developer can use the 'UG-7292-004-Standalone SDK.docx' docuement for general description. This document explained setup the S/W build environment, compiling standalone binary, download binary and sample applications.
Supported API list are explained in 'UG-7292-005-Standalone SDK API.docx'. The developer can use apis for NRC7292. The user can implement service related to wifi connection, pheriperals. AT-Commnad guide document is 'UG-7292-006-AT_Command.docx'.

## 3.2 Supported 3rd party Libraries

Followings are 3rd party libraries included in NRC7292 standalone SDK package. 'UG-7292-005-Standalone SDK API.docx' has the description and URL for 3rd party libaries. The FreeRTOS, LwIP and Mbedtls is mandatory 3rd party libraries for standalone SDK.

- **FreeRTOS**
- **Lwip**
- **Mbedtls**
- **MQTT**
- **LibCoap**
- **cJson**
- **Mini-XML**
- **AWS (Amazon web service)**
- **TINYCBOR**

# 4 SW Release Package

## 4.1 Features in version 1.3.4

Followings are features included in NRC7292 software release package.

- **Build Environment**
  - Update Linux based build environment (v.1.3.0)
- **ATCMD**
  - AP roaming command (v.1.3.2)
  - FOTA command (v.1.3.2)
  - AP Roaming command (v.1.3.2)
  - Power Save (v1.3.4)
  - WPA3-SAE/OWE (v1.3.4)

## 4.2 Resolved issues

The table is the resolve issues since v.1.3.2.

**Table 4.1 Resolved issues**

| Version | Description |
|---|---|
| v1.3.1 | **Sending block in softap tcp server**<br>Sending block during multiple tcp receving and sending operations in non-blocking socket |
| | **Fix AT+ATZ operation** |
| | **Fix the system assert when the unsupported channel is assigned in softap** |
| v1.3.2 | **Fix ToS(IP Header) to TID/AC mapping issue** |
| | **Fixed to reflect beacon rssi value in scan results** |
| | **Fixed Background scan issue in standalone STA** |
| | **Fix an issue where UART settings are not changed with the AT+UART set command.** |
| | **Improvement downlink throughput in 4MHz** |
| | **Fix Association Timeout Issue : Set Fragment Number to be 0** |
| v.1.3.4 | **Improvement reconnection time after deep sleep** |

| | |
|---|---|
| | **Fix a hang issue during modem sleep** |
| | **Fix abnormal addba/delba operation for AMPDU** |
| | **Fix an issue that the scan is repeated without reassociation** |
| | **Fix an issue that DHCP client is blocked** |
| v.1.3.4 rev01 | **Fix wakeup issues in modem sleep** |
| | **Fix scan results flags for WPA3 in atcmd** |

## 4.3 Changed items

The table is the changed items since v.1.3.2.

**Table 4.2 Resolved issues**

| Version | Description |
|---|---|
| v1.3.1 | **Support KR MIC band (925.5-930.5) in host_kr_mic package**<br>standalone_kr_mic package supports 925.5 – 930.5 Mhz for KR. |
| | **Enhancement ATCMD with uart**<br>Increase the supported max baudrate (115200) using DMA |
| | **Added i2c sensor read operation in sample_ps_tcp_client** |
| | **Added Non-tim mode deep sleep in sample_ps_standalone & sample_ps_tcp_client**<br>Assign interval for deep sleep duration |
| | **Change temperature compensation value**<br>Temperature power offset is now linearly interpolated, etc. |
| v1.3.2 | **RX gain table, RSSI offset, LNA Swithcing point, 2Mhz mode threshold value** |
| | **Restructuring sf_sys_config_t data structure in FLASH** |
| | **Rename for add_network function and added remove_network in wifi api** |
| | **Added 'AT+WFOTA' and 'AT+WROAM'** |
| v1.3.4 | **Support APIs for WPA3 SAE/OWE** |
| | **Added WPS-PBC in sample_wps_pbc** |
| | **Enhancement of stability with WDT Reset** |

| | |
|---|---|
| | **Support BSS Max Idle** |
| | **Support CSA (Channel Switch Announcement)** |
| | **Add new events for FOTA operation** |
| | **Add AT+WSTAINFO, AT+WSLEEP and removed AT+SLEEP, AT+WMCS** |
| v.1.3.4 rev01 | **Add ATCMD sources in a package** |
| | **Disable the default CONFIG_WPS feature in FreeRTOS.config** |

## 4.4 Known issues in the release package

Table 4.3 presents all know issues in the version 1.3.4.

**Table 4.3 Known issues**

| Category | Description |
|---|---|
| Security | First connection time for WPA3-SAE/OWE is quite long (> 15 seconds) for big number operation by SW |
| | |