# User manual

For

WLAN Card

(Ralink RT3070)

Model Number: WUS-N10M

Revision: 1.0

# Revision History

| Rev. | Date | Author | Reason for Changes |
|---|---|---|---|
| 1.0 | Jun. 22,2010 | Dephany Liu | • New released |
| | | | |
| | | | |

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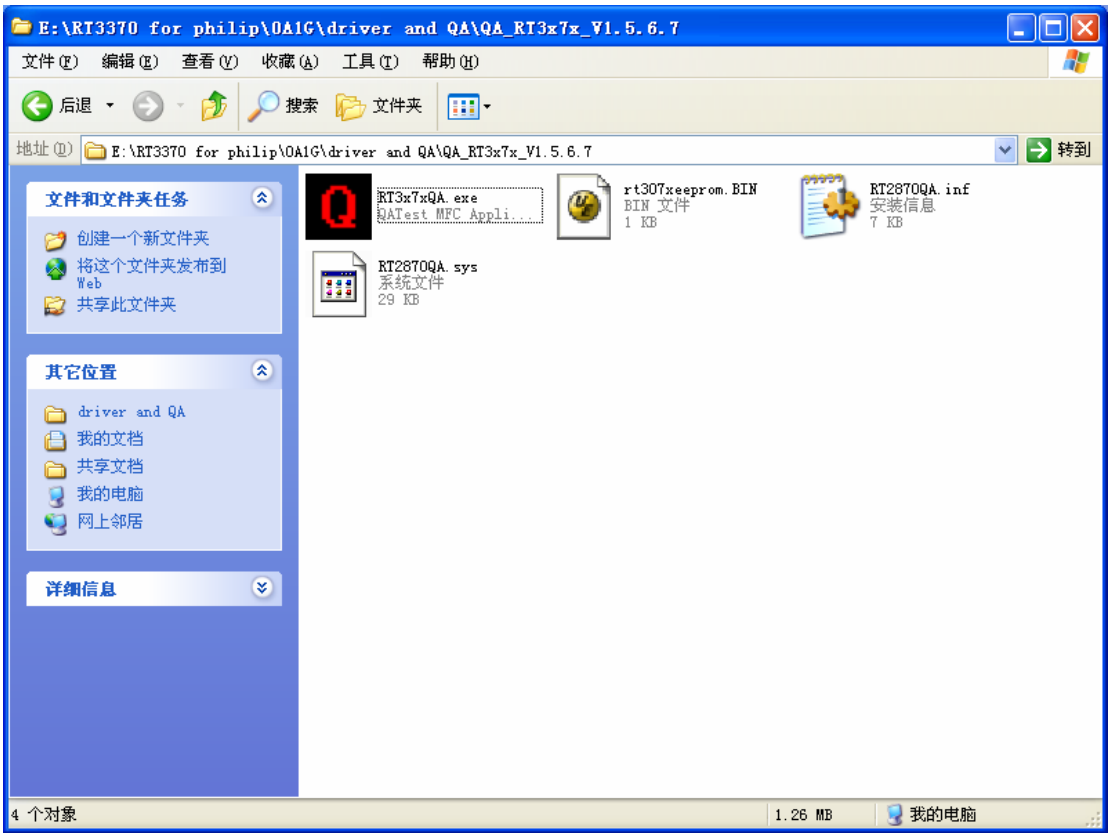
# Operation Manual

## I. Install Driver

### 1. Install the test driver



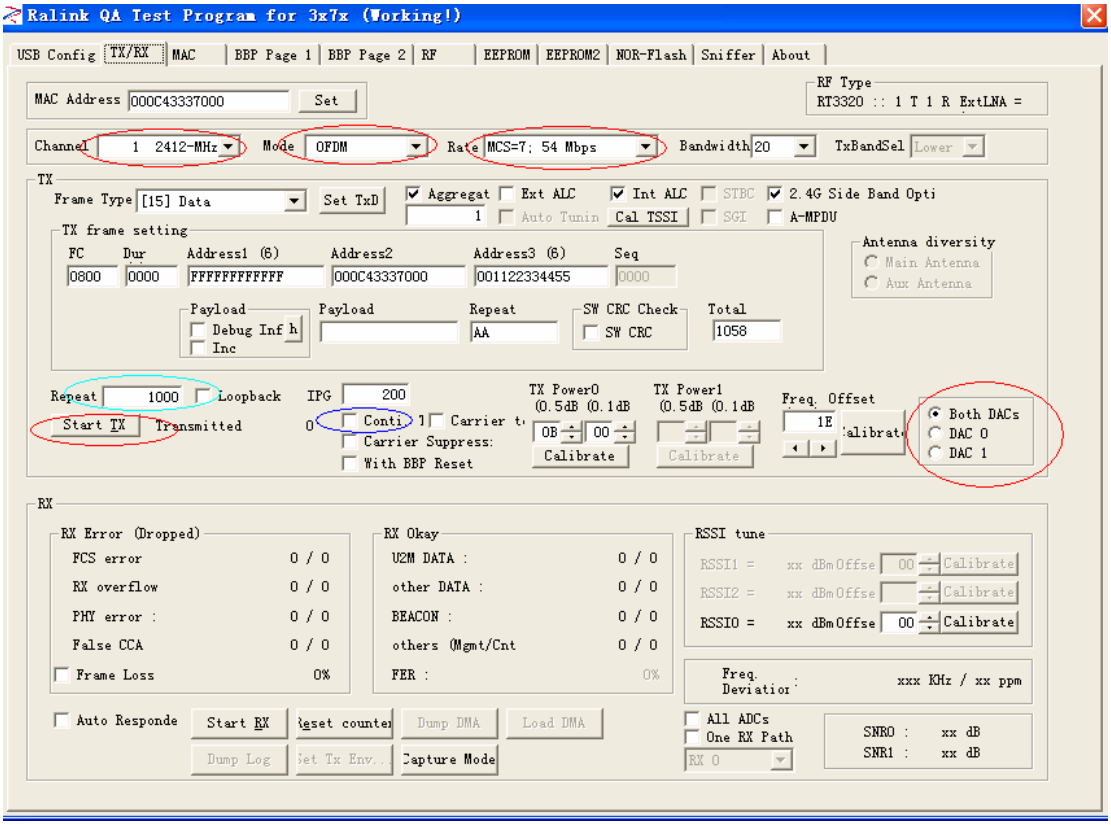
## 2. TX signal command

**(1) Select TX/RX site**

**(2) Select channel, datarate and Chain 0/1**

**(3) 1)For continue TX select conti, press start tx**

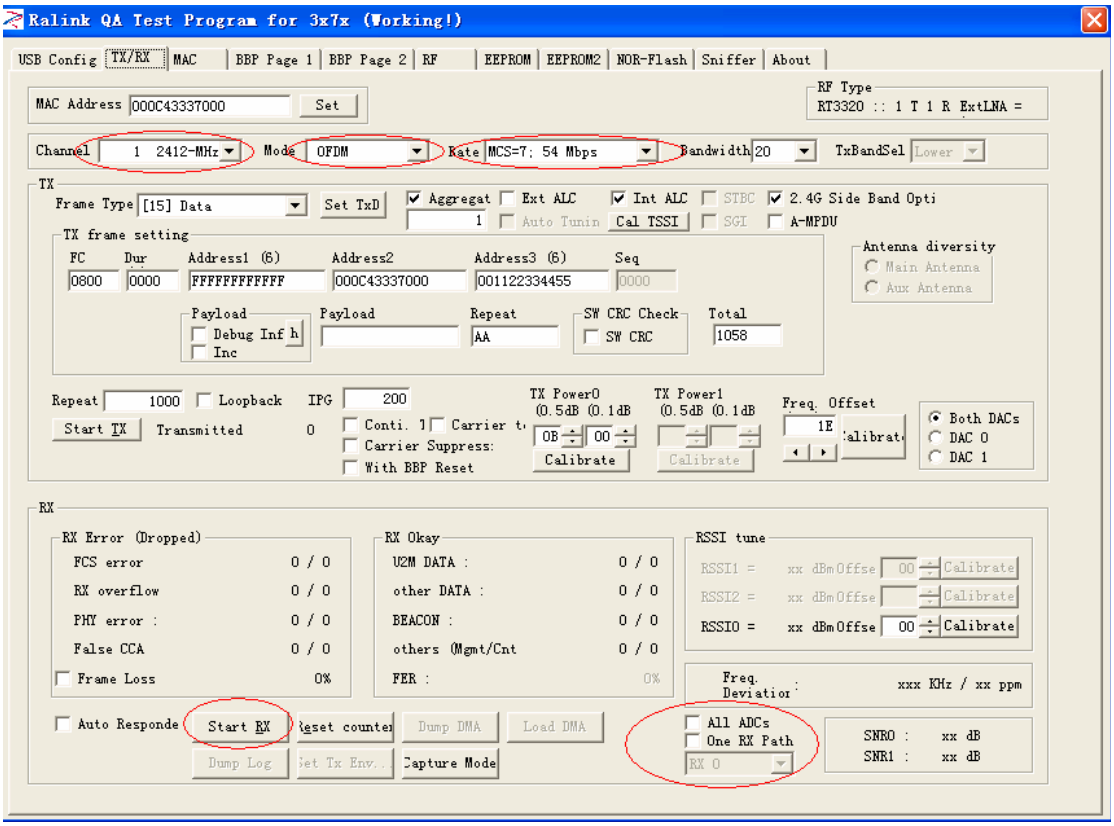
**2)For continue packets tx, set repeat to 0,press start tx**



## 3. RX signal command

### (1) Select TX/RX site

### (2) Select channel, datarate and Chain 0/1



# 1.0 Scope

## 1.1 Document

This document is to specify the product requirements for WLAN Card. This Card is based on Ralink chipset that complied with IEEE 802.11g, IEEE 802.11b, IEEE 802.11n standard from 2.4~2.5GHz, and it can be used to provide up to 54Mbps for 802.11g, 11Mbps for 802.11b and 150Mbps for 802.11n to connect your wireless LAN.

With seamless roaming, fully interoperability and advanced security with WEP standard, WLAN Card offers absolute interoperability with different vendors' 802.11g, 802.11b and 802.11n Access Points through the wireless LAN.

## 1.2 Product Features

- Compatible with IEEE 802.11n draft 2.0 standard to provide wireless 150Mbps data rate.
- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate
- Operation at 2.4 ~ 2.5GHz frequency band to meet worldwide regulations
- Dynamic date rate scaling at 6, 9, 12, 18, 24, 36, 48, 54 for IEEE 802.11g.
- Dynamic date rate scaling at 1, 2, 5.5, and 11Mbps for IEEE 802.11b
- Maximum reliability, throughput and connectivity with automatic data rate switching
- Support wireless data encryption with 64/128-bit WEP for security
- Support infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication
- Support WEP, 802.1x, WPA and WPA2 enhanced security
- Friendly user configuration and utilities
- Drivers support Windows 2K, XP 32/64-bit, Vista 32/ 64-bit
- Support external WPS button to connect Access Point easily
- High speed USB 2.0 interface
- RoHS compliant

## 2.0 Requirements

The following sections identify the detailed requirements of the WLAN Card.

## 2.2 General Requirements

### 2.2.1 IEEE 802.11b Section

| # | Feature | Detailed Description |
|---|---|---|
| 2.2.1.1 | Standard | • IEEE 802.11b |
| 2.2.1.2 | Radio and Modulation Schemes | • DQPSK, DBPSK, DSSS, and CCK |
| 2.2.1.3 | Operating Frequency | • 2400 ~ 2483.5MHz ISM band |
| 2.2.1.4 | Channel Numbers | • 11 channels for United States<br>13 channels for Europe Countries and other regions |
| 2.2.1.5 | Data Rate | • 11, 5.5, 2, and 1Mbps |
| 2.2.1.6 | Media Access Protocol | • CSMA/CA with ACK |
| 2.2.1.7 | Transmitter Output Power | • 19dBm |
| 2.2.1.8 | Receiver Sensitivity | • Typical Sensitivity at each RF chain. Frame (1000-byte PDUs) Error Rate = 8%<br>• –94dBm at 1Mbps<br>• –92dBm at 2Mbps<br>• –90dBm at 5.5Mbps |

| # | Feature | Detailed Description |
|---|---|---|
| | | • –88dBm for 11Mbps |

**2.2.2 IEEE 802.11g Section**

| # | Feature | Detailed Description |
|---|---|---|
| 2.2.2.1 | Standard | • IEEE 802.11g |
| 2.2.2.2 | Radio and Modulation Schemes | • BPSK, QPSK, 16QAM, 64QAM, and OFDM |
| 2.2.2.3 | Operating Frequency | • 2400 ~ 2483.5MHz ISM band |
| 2.2.2.4 | Channel Numbers | • 11 channels for United States<br>13 channels for Europe Countries and other regions |
| 2.2.2.5 | Data Rate | • 6,9,12,18,24,36,48,54Mbps |
| 2.2.2.6 | Media Access Protocol | • CSMA/CA with ACK |
| 2.2.2.7 | Transmitter Output Power | 22dBm |
| 2.2.2.8 | Receiver Sensitivity | • Typical Sensitivity at each RF chain. Frame (1000-byte PDUs) Error Rate <10%<br>• –88dBm at 6Mbps<br>• –86dBm at 9Mbps<br>• –84dBm at 12Mbps<br>• –85dBm at 18Mbps<br>• –78dBm at 24Mbps<br>• –76dBm at 36Mbps<br>• –74dBm at 48Mbps<br>• –72dBm at 54Mbps |

**2.2.3 IEEE 802.11n Section**

| # | Feature | Detailed Description | | | | |
|---|---|---|---|---|---|---|
| 2.2.3.1 | Standard | • Draft 11n | | | | |
| 2.2.3.2 | Radio and Modulation Type | • BPSK, QPSK, 16QAM, 64QAM with OFDM | | | | |
| 2.2.3.3 | Operating Frequency | • 2400 ~ 2483.5MHz ISM band | | | | |
| 2.2.3.4 | Data Rate | | | | | |
| | | MCS | GI=800ns | | GI=400ns | |
| | | | 20MHz | 40MHz | 20MHz | 40MHz |
| | | 0 | 6.5 | 13.5 | 7.2 | 15 |
| | | 1 | 13 | 27 | 14.4 | 30 |
| | | 2 | 19.5 | 40.5 | 21.7 | 45 |
| | | 3 | 26 | 54 | 28.9 | 60 |
| | | 4 | 39 | 81 | 43.3 | 90 |
| | | 5 | 52 | 108 | 57.8 | 120 |
| | | 6 | 58.5 | 121.5 | 65.0 | 135 |

| # | Feature | Detailed Description | | | | |
|---|---|---|---|---|---|---|
| | | 7 | 65 | 135 | 72.2 | 150 |
| | | 8 | 13 | 27 | 14.444 | 30 |
| | | 9 | 26 | 54 | 28.889 | 60 |
| | | 10 | 39 | 81 | 43.333 | 90 |
| | | 11 | 52 | 108 | 57.778 | 120 |
| | | 12 | 78 | 162 | 86.667 | 180 |
| | | 13 | 104 | 216 | 115.556 | 240 |
| | | 14 | 117 | 243 | 130.000 | 170 |
| | | 15 | 130 | 270 | 144.444 | 300 |
| 2.2.3.5 | Media Access Protocol | • CSMA/CA with ACK | | | | |
| 2.2.3.6 | Transmitter Output Power at Antenna Connector | 22dBm | | | | |
| 2.2.3.7 | Receiver Sensitivity at Antenna Connector | • Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% and at room Temp. 25degree C<br><br>■ 2.4GHz Band/HT-20<br>• –86dBm at MCS0/8<br>• –84dBm at MCS1/9<br>• –82dBm at MCS2/10<br>• –80dBm at MCS3/11<br>• –78dBm at MCS4/12<br>• –76dBm at MCS5/13<br>• –74dBm at MCS6/14<br>• –72dBm at MCS7/15<br><br>■ 2.4GHz Band/HT-40<br>• –87dBm at MCS0/8<br>• –83dBm at MCS1/9<br>• –81dBm at MCS2/10<br>• –78dBm at MCS3/11<br>• –76dBm at MCS4/12<br>• –72Bm at MCS5/13<br>• –70dBm at MCS6/14<br>• –68dBm at MCS7/15 | | | | |

**2.2.4 General Section**

| # | Feature | Detailed Description |
|---|---|---|
| 2.2.4.1 | Antenna Type | • External antenna |

| | | |
|---|---|---|
| 2.2.4.2 | Operating Voltage | • 5VDC +/- 10% |
| 2.2.4.3 | Current Consumption | • 220mA at continuous transmit mode<br>• 160mA at receive mode w/o receiving packet |
| 2.2.4.4 | USB | • High Speed USB2.0 Interface |

## 2.3 Software Requirements

The Configuration Software supports Microsoft Windows 2000, XP 32/64-bit and Vista 32/64-bit. This configuration software includes the following functions:

- **Information**
  Information allows you to monitor network status.
- **Configuration**
  Configuration allows you to configure parameters for wireless networking.
- **Encryption**
  Encryption provides WEP, WPA, WPA2, and 802.1X security control
- **Diagnosis**
  Diagnosis allows you to display all channel status and search neighboring access points

### 2.3.1 Information

| # | Feature | Detailed Description |
|---|---|---|
| 2.3.1.1 | General Information | • General Information shows the name of Wireless Adapter, Adapter MAC Address, Regulatory Domain, Firmware Version, and Utility Version. |
| 2.3.1.2 | Current Link Information | • Current Link Information shows the Current Setting ESSID, Channel Number, Associated BSSID, Network Type (infrastructure or Ad-hoc network), WEP Status (enable or disable), Link Status (Connect or Dis-connect), 802.11g Transmit Speed (6, 9, 12, 18, 24, 36, 48, 54Mbps), 802.11b Transmit Speed (1, 2, 5.5, 11Mbps), Signal Strength, and Link Quality. |
| 2.3.1.3 | Site survey | • To search the neighboring access points and display the information of all access points. |

### 2.3.2 Configuration

| # | Feature | Detailed Description |
|---|---|---|
| 2.3.2.1 | ESS ID | • Input an SSID number if the roaming feature is enabled<br>• Supports for ASCII printable characters. |
| 2.3.2.2 | Network Type | • Ad-hoc Mode and 802.11 Ad-hoc Mode for network configurations that do not have any access points<br>• Infrastructure Mode for network configurations with access points |
| 2.3.2.3 | Transmission Speed | • This indicates the communication rates. Select appropriate transmission speed to match your wireless LAN settings |
| 2.3.2.4 | Roaming | • Support Automatic or Manual Rescan to associate with access point. |

### 2.3.3 Encryption

| # | Feature | Detailed Description |
|---|---|---|
| 2.3.3.1 | Encryption | • RC4 encryption algorithm<br>• Support 64/128 bit WEP encryption<br>• Support open system and shared key authentication |
| 2.3.3.2 | WEP Management | • Four WEP keys can be selected<br>• STA with WEP off will never associate any AP with WEP enabled<br>• WEP Key Format: Option for Hex format |

| # | Feature | Detailed Description |
|---|---|---|
| 2.3.3.3 | 802.1x | • Support EAP-TLS, EAP-TTLS, and EAP-PEAP |
| 2.3.3.4 | WPA/WPA2 | • Support WPA/WPA2-PSK and WPA/WPA2-EAP<br>• Support Cipher Mode AES and TKIP |

## 2.4 Mechanical Requirements

| # | Feature | Detailed Description |
|---|---|---|
| 2.4.1 | Length | • 57.5mm |
| 2.4.2 | Width | • 22.6mm |
| 2.4.3 | Height | • 5.8mm(PCBA) |

## 2.5 Compatibility Requirements

This device passes the following compatibility requirements.

| # | Feature | Detailed Description |
|---|---|---|
| 2.5.1 | Wi-Fi | • Meet Wi-Fi certification for IEEE 802.11b/g/n product |
| 2.5.2 | WHQL | • Meet applicable WHQL certification requirements |
| 2.5.3 | Physical Layer and Functionality | • Meet Alpha Networks Engineering Test Plan and Test Report |

## 2.6 Requirements of Reliability, Maintainability and Quality

| # | Feature | Detailed Description |
|---|---|---|
| 2.6.1 | MTBF | • Mean Time Between Failure > 30,000 hours |
| 2.6.2 | Maintainability | • There is no scheduled preventive maintenance required |
| 2.6.3 | Quality | • The product quality is followed-up by Alpha Networks factory quality control system |

## 2.7 Environmental Requirements

| # | Feature | Detailed Description |
|---|---|---|
| 2.7.1 | Operating Temperature Conditions | • The product is capable of continuous reliable operation when operating in ambient temperature of 0 ℃ to +40℃. |
| 2.7.2 | Non-Operating Temperature Conditions | • Neither subassemblies is damaged nor the operational performance is degraded when restored to the operating temperature after exposing to storage temperature in the range of –20 ℃ to +75 ℃. |
| 2.7.3 | Operating Humidity conditions | • The product is capable of continuous reliable operation when subjected to relative humidity in the range of 10% and 90% non-condensing. |
| 2.7.4 | Non-Operating Humidity Conditions | • The product is not damaged nor the performance is degraded after exposure to relative humidity ranging from 5% to 95% non-condensing |

**Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with FCC RF exposure compliance requirements, please follow operation instruction as documented in this manual.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

This device is intended only for OEM integrators under the following conditions:

1) The transmitter module may not be co-located with any other transmitter or antenna,
2) For all products market in US, OEM has to limit the operation channels in CH1 to CH11

for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.
As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling
The final end product must be labeled in a visible area with the following: “Contains TX FCC ID: RRK-WUSN10M”.

Manual Information To the End User
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.