User’s Manual

Model : WUS-ND02

802.11a/b/g/n Draft 2.0 USB Adapter

Revision History

Rev.	Date	Author	Reason for Changes
1.0	Nov 05th, 2007	Joyce Lin	• New released
1.1	May 15th, 2008	Jimmy Yang	• Update the PCBA dimension and working temperature

Contents

1.0 Scope

1.1 Document

This document is to specify the product requirements for **802.11 a/b/g/n USB Dongle**. This Card is based on Ralink RT2870+RT2850 chipset that complied with IEEE 802.11n Draft 2.0, and it is also backward complied with IEEE 802.11a standard from 5.15~5.825GHz wideband and IEEE 802.11b/g standard from 2.4~2.5GHz. It can be used to provide up to 54Mbps for IEEE 802.11a and IEEE 802.11g , 11Mbps for IEEE 802.11b and 300Mbps for IEEE 802.11n to connect your wireless LAN.

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

1.2 Product Features

- Compatible with IEEE 802.11a high rate standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11b high rate standard to provide wireless 11Mbps data rate
- Compatible with IEEE 802.11n draft standard to provide wireless 300Mbps data rate
- Operation at 2.4 ~ 2.5GHz and 5.15 ~ 5.85GHz frequency band to meet worldwide regulations
- Dynamic date rate scaling at 6, 9, 12, 18, 24, 36, 48, 54Mbps for IEEE 802.11a and IEEE 802.11g
- Dynamic date rate scaling at 1, 2, 5.5, and 11Mbps for IEEE 802.11b
- Dynamic date rate of IEEE 802.11n scaling from MCS – 0 to MCS –15 as shown in Appendix I
- Supports infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication
- Supports WEP, 802.1x, WPA and WPA2 enhanced security
- Friendly user configuration and diagnostic utilities
- Drivers support Windows 2K, XP and Vista.
- High speed USB 2.0 interface
- RoHS compliant

2.0 Requirements

The following sections identify the detailed requirements of the **802.11a/b/g/n Draft 2.0 USB Dongle.**

2.2 General Requirements

2.2.1 IEEE 802.11a Section

#	Feature	Detailed Description
2.2.1.1	Standard	• IEEE 802.11a
2.2.1.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM, OFDM
2.2.1.3	Operating Frequency	• 5.15 ~ 5.35GHz. , 5.47 ~ 5.725GHz and 5.725~5.850 GHz for US and Canada • 5.15 ~ 5.35GHz and 5.47~5.725GHz for Japan • 5.15 ~ 5.35GHz and 5.47 ~ 5.725GHz for Europe • 5.725~5.850GHz for China
2.2.1.4	Channel Numbers	• 24 non-overlapping channels for US and Canada • 19non-overlapping channels for Japan • 19 non-overlapping channels for Europe 5 non-overlapping channels for China
2.2.1.5	Data Rate	• 54, 48, 36, 24, 18, 12, 9, and 6Mbps
2.2.1.6	Media Access Protocol	• CSMA/CA with ACK
2.2.1.7	Transmitter Output Power	• The maximum allowable RF power level is subject to specified nation regulation • Typical RF Output Power (tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C • 14dBm at 6M/9M bps • 13dBm at 12M/18M bps • 12dBm at 24M/36M bps • 11dBm at 48M/54M bps
2.2.1.8	Receiver Sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% • –86dBm at 6Mbps • –84dBm at 9Mbps • –84dBm at 12Mbps • –82dBm at 18Mbps • –78dBm at 24Mbps • –75dBm at 36Mbps • –70dBm at 48Mbps • –68dBm at 54Mbps

2.2.2 IEEE 802.11b Section

#	Feature	Detailed Description
2.2.2.1	Standard	• IEEE 802.11b
2.2.2.2	Radio and Modulation Schemes	• DQPSK, DBPSK, DSSS, and CCK
2.2.2.3	Operating Frequency	• 2400 ~ 2497MHz ISM band
2.2.2.4	Channel Numbers	• 11 channels for United States 13 channels for Europe Countries 14 channels for Japan
2.2.2.5	Data Rate	• 11, 5.5, 2, and 1Mbps
2.2.2.6	Media Access	• CSMA/CA with ACK

#	Feature	Detailed Description
	Protocol	
2.2.2.7	Transmitter Output Power	• Typical RF Output Power (tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C • Typical 17dBm (+/-2dB) at 11, 5.5, 2, and 1Mbps
2.2.2.8	Receiver Sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 8% • –89dBm at 1Mbps • –89dBm at 2Mbps • –87dBm at 5.5Mbps • –84dBm for 11Mbps

2.2.3 IEEE 802.11g Section

#	Feature	Detailed Description
2.2.3.1	Standard	• IEEE 802.11g
2.2.3.2	Radio and Modulation Schemes	• BPSK, QPSK, 16QAM, 64QAM, and OFDM
2.2.3.3	Operating Frequency	• 2400 ~ 2483.5MHz ISM band •
2.2.3.4	Channel Numbers	• 11 channels for United States 13 channels for Europe Countries 13 channels for Japan
2.2.3.5	Data Rate	• 6,9,12,18,24,36,48,54Mbps
2.2.3.6	Media Access Protocol	• CSMA/CA with ACK
2.2.3.7	Transmitter Output Power	• Typical RF Output Power (tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C • 17dBm at 6M/9M bps • 16dBm at 12M/18M bps • 15dBm at 24M/36M bps • 14dBm at 48M/54M bps
2.2.3.8	Receiver Sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% • –86dBm at 6Mbps • –84dBm at 9Mbps • –84dBm at 12Mbps • –82dBm at 18Mbps • –78dBm at 24Mbps • –75dBm at 36Mbps • –70dBm at 48Mbps • –68dBm at 54Mbps

2.2.4 IEEE 802.11n Section for 5G Band

#	Feature	Detailed Description
2.2.4.1	Standard	• IEEE 802.11n draft 2.0
2.2.4.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.4.3	Operating Frequency	• 5.15 ~ 5.35GHz. , 5.47 ~ 5.725GHz and 5.725~5.850 GHz for US and Canada • 5.15 ~ 5.35GHz and 5.47~5.725GHz for Japan • 5.15 ~ 5.35GHz and 5.47 ~ 5.725GHz for Europe d. 5.725~5.850GHz for China
2.2.4.4	Data Rate	• From MCS – 0 to MCS –15 as shown in Appendix I

#	Feature	Detailed Description
2.2.4.5	Media Access Protocol	• CSMA/CA with ACK
2.2.4.6	Transmitter Output Power	• Typical RF Output Power(tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C HT20 • 11dBm at MCS0~ MCS15 HT40 • 9dBm at MCS0~ MCS15
2.2.4.7	Receiver Sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% HT20 • –86dBm at MCS0 • –84dBm at MCS1 • –81dBm at MCS2 • –77dBm at MCS3 • –75dBm at MCS4 • –71dBm at MCS5 • –69dBm at MCS6 • –68dBm at MCS7 HT40 • –83dBm at MCS0 • –81dBm at MCS1 • –78dBm at MCS2 • –74dBm at MCS3 • –72dBm at MCS4 • –68dBm at MCS5 • –66dBm at MCS6 • –65dBm at MCS7

.2.4 IEEE 802.11n Section for 2.4G Band

#	Feature	Detailed Description
2.2.4.1	Standard	• IEEE 802.11n draft 2.0
2.2.4.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.4.3	Operating Frequency	• 2400 ~ 2483.5MHz ISM band
2.2.4.4	Data Rate	• From MCS – 0 to MCS –15 as shown in Appendix I
2.2.4.5	Media Access Protocol	• CSMA/CA with ACK
2.2.4.6	Transmitter Output Power	• Typical RF Output Power(tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C HT20 • 14dBm at MCS0~ MCS15 HT40 • 12dBm at MCS0~ MCS15
2.2.4.7	Receiver Sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% HT20 • –86dBm at MCS0 • –84dBm at MCS1 • –81dBm at MCS2 • –77dBm at MCS3

#	Feature	Detailed Description
		• –75dBm at MCS4 • –71dBm at MCS5 • –69dBm at MCS6 • –68dBm at MCS7 HT40 • –83dBm at MCS0 • –81dBm at MCS1 • –78dBm at MCS2 • –74dBm at MCS3 • –72dBm at MCS4 • –68dBm at MCS5 • –66dBm at MCS6 • –65dBm at MCS7

2.2.5 General Section

#	Feature	Detailed Description
2.2.5.1	Antenna Type	• Integrated antenna
2.2.5.2	Operating Voltage	• 5VDC +/- 10%
2.2.5.3	Current Consumption	• 500mA at continuous transmit mode (2 Tx chains on) • 300mA at continuous receive mode (2 Rx chains on)
2.2.5.4	Form Factor and Interface	• High Speed USB2.0 Interface
2.2.5.5	LEDs	Activity LED

2.3 Software Requirements

The Configuration Software supports Microsoft Windows 2000, XP and Vista. 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.
- **Security**
  Supports enhanced security WEP, 802.1x, WPA and WPA2.

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, Security Status, Link Status, Transmit Speed, 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 • Supports for ASCII printable characters.

#	Feature	Detailed Description
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 • Infrastructure Mode for network configurations with access points
2.3.2.3	Power Save	• Extend the battery life of clients by allowing the client to sleep for short periods of time while the Access Point buffers the messages.
2.3.2.4	RTS Threshold	• Set the number of bytes used for fragmentation boundary for messages
2.3.2.5	Fragment Threshold	• Set the number of bytes used for RTS/CTS boundary
2.3.2.6	Transmission Speed	• This indicates the communication rates. Select appropriate transmission speed to match your wireless LAN settings
2.3.2.7	Roaming	• Support Automatic or Manual Rescan to associate with access point.

2.3.3 Security

#	Feature	Detailed Description
2.3.3.1	Encryption	• RC4 encryption algorithm • Support 64-bit and 128-bit WEP encryption • Support open system (OSA) and shared key authentication (SKA)
2.3.3.2	WEP Management	• Four WEP keys can be selected • STA with WEP off will never associate any AP with WEP enabled • WEP Key Format: Option for Hex format
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 • Support Cipher Mode AES and TKIP

2.4 Mechanical Requirements (PCBA)

#	Feature	Detailed Description
2.4.1	Length	• 57.5mm
2.4.2	Width	• 22.6mm
2.4.3	Height	• 5.3mm

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 802.11 product
2.5.2	WHQL	• Meet applicable WHQL certification requirements
2.5.3	Physical Layer and Functionality	• Meet ALPHA Engineering Test Plan and Test Report

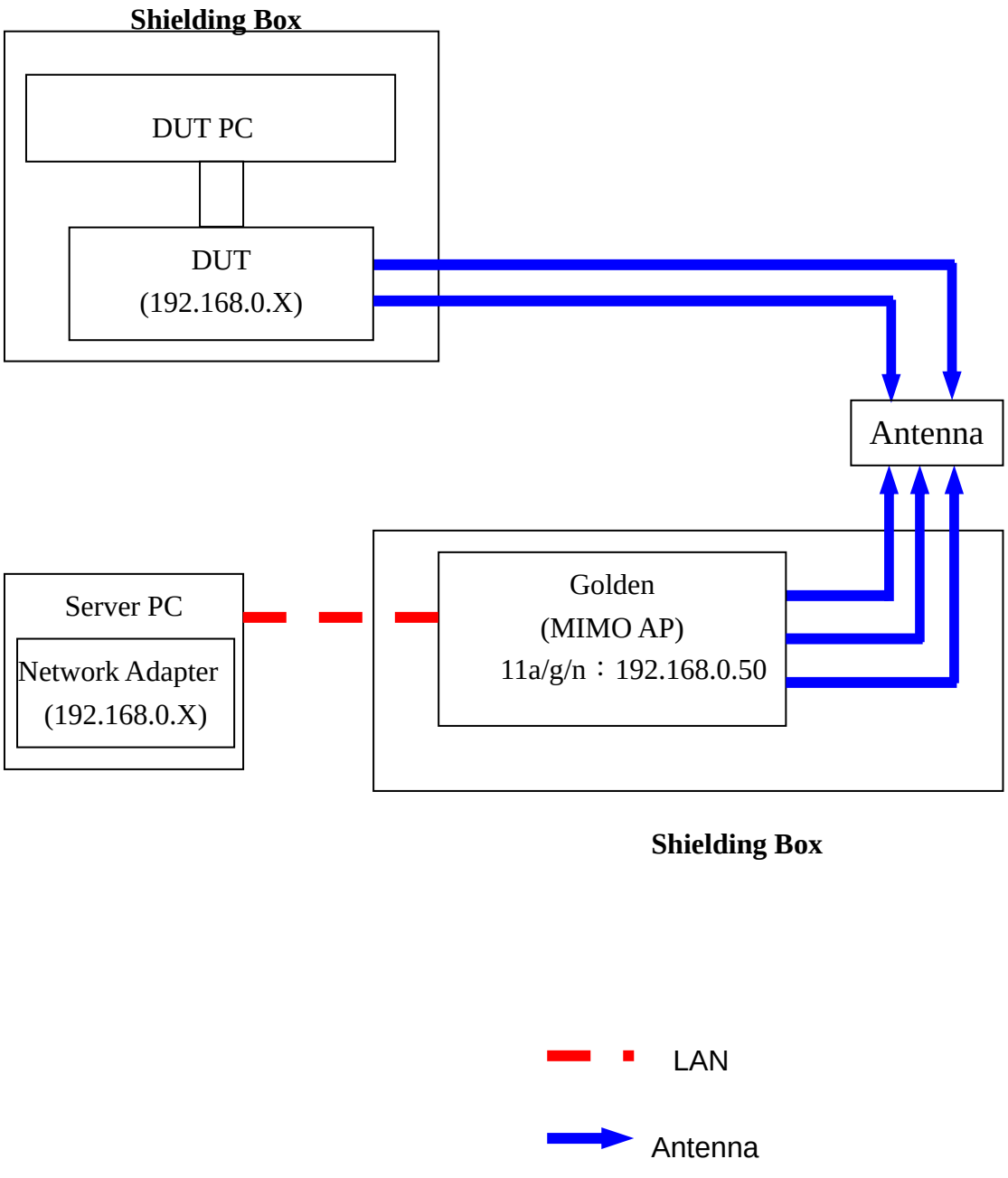
2.6 Requirements of Reliability, Maintainability and Quality

#	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 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 +45℃.
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

Test Environment Diagram/測試環境圖示



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.

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.

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.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

This device is going to be operated in 5.15~5.25GHz frequency range, it is restricted in indoor environment only.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device should be installed in AP/Router/Printer to make sure it could keep 20cm away from the users.

IMPORTANT NOTE: This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module. 20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. USERS MANUAL OF THE END PRODUCT: In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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. LABEL OF THE END PRODUCT: The final end product must be labeled in a visible area with the following " Contains TX FCC ID: RRK-WUSND02 ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.