



# **RALINK TECHNOLOGY, CORP.**

## **RT2501USB Software Release Note for WinCE**

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Product Name	RT2501USB Wireless Adaptor
Interface Supported	USB 2.0
Install Package Version	
Driver Version	1.3.3.2
User Interface Version	None
Date	2009-04-03



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## 1. Introduction

This document guides you how to setup the Ralink RT2501USB series driver in Windows CE operating system. Please refer to the blog for more information:

<http://ralinkce.blogspot.com/>.

## 2. Hardware Requirements

The adapters which made by Ralink RT2573 chipset are supported. Check the link the link <http://ralinkce.blogspot.com/2007/05/support-manufacturerdevice-list-for.html> to find your hardware is supported or not.

## 3. Software Requirements

1. Platform Builder 5.0 or VS2005+Windows CE 6.0
2. Windows CE 5.0 QFE20061231 is a plus. The WPA2 is supported after this QEF.
3. Windows CE5.0/6.0 QFE2007M6 is a plus. The EHCI host driver is updated in this QFE.



#### 4. Wireless Features

- Infrastructure(Station mode)
  - i. Open/None
  - ii. Open,Shared/WEP
  - iii. WPA-PSK/TKIP,AES
  - iv. WPA2-PSK/TKIP,AES<sup>(i)</sup>
  - v. WPA/TKIP,AES
  - vi. WPA2/TKIP,AES<sup>(i)</sup>
- Adhoc(Station mode)
  - i. Open/None
  - ii. Open,Shared/WEP
  - iii. WPA-None/TKIP
- AP Mode
  - i. Open/None
  - ii. Open,Shared/WEP
  - iii. WPA-PSK/TKIP,AES
  - iv. WPA2-PSK/TKIP,AES, TKIPAES(Mixed)
  - v. WPA1PSKWPA2PSK/ TKIP,AES
- WPS Enrollee(Station mode only)
  - i. PIN
  - ii. PBC
- Ratool
  - Ralink Wireless Configure Tool for CMD

Note:

(i). Windows CE 5.0 QFE20061231 is necessary to support WPA2 security features



## 5. Build Image(NK.BIN) Instructions

1. Put \*.dll and \*.bin in your \WINCE500\PROJECT\XXXXX\RelDir\
2. Add \*.bib and \*.reg into your project
3. Change your registry file if you want to change driver default parameters.
4. Rebuild your image
5. After start up, WZC Autoconfig will pop up on screen



## 6. Registry Setting Description

### 1. Please change REGISTRY FILE and match your desired device

```
[HKEY_LOCAL_MACHINE\Comm\RT2501USB]
```

```
"DisplayName"="Ralink RT2501USB Wireless LAN Driver"
```

```
"Group"="NDIS"
```

```
"ImagePath"="RT2501USB.DLL"
```

```
[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\Default\Default\Default\RT2501USB]
```

```
"Dll"="RT2501USB.DLL"
```

```
[HKEY_LOCAL_MACHINE\Drivers\USB\ClientDrivers\RT2501USB]
```

```
"Dll"="RT2501USB.DLL"
```

```
[HKEY_LOCAL_MACHINE\Comm\RT2501USB1\Parms]
```

```
; "CustomizedVID"=dword:148f ; hex
```

```
; "CustomizedPID"=dword:2673 ; hex
```

```
; Use internal table, 1: Use external pair, 2: both
```

```
; "CustomizedControlFlag"=dword:0;
```

#### Note:

(i). If you found your VID/PID pair of the device does not match the internal table of the driver, you can add your VID/PID pair for your device.

### 2. AP Mode Registry Setting Example:

```
[HKEY_LOCAL_MACHINE\Comm\RT2501USB1\Parms]
```

```
"OpMode"=dword:1
```

```
"Channel"=dword:1 ; 1~14
```

```
"SSID"=" RalinkAP-WinCE" ; Max 32-char ascii
```

```
"AuthenType"=dword:0
```

```
; 0: OPEN
```

```
; 1: SHARED
```

```
; 4: WPA-PSK
```

```
; 7: WPA2-PSK
```

```
; 9: WPAPSK-WPA2PSK
```

```
"Encryption"=dword:1
```

```
; 1: NONE
```



```
;      0: WEP
;      4: TKIP
;      6: AES
;      8: TKIPAES
      "WEPKeyUse"=dword:2      ; 1~4
;      Must be 2 if your AuthType is wpa-psk or wpa2-psk
      "WEPKey1"="12345ABCDE"
;      10-char hexadecimal for WEP40
      "WEPKey2"="QWERT"
;      5-char ascii for WEP40
      "WEPKey3"="1234567890ABCDEFABCDEF1234"
;      26-char hexadecimal for WEP128
      "WEPKey4"="ABCDEFGHJKLM"
;      13-char ascii for WEP128
;
;      WEP KEY, 5-char ascii or 10-char hexadecimal for WEP40
;      13-char ascii or 26-char hexadecimal for WEP128

"WPAPSK"="432985e9d4167362a98f3598f17285dd23f8403171f679c2bece83c6c78b34
c9"
;      WPA-PSK or WPA2-PSK's 64-char hexadecimal PMK only
```

**Note:**

- (i). Rebuild the image and load on the platform.
- (ii). After system boot, the driver will be loaded.
- (iii). The auto-config utility for wireless must be disabled when wireless driver is working in AP mode.
- (iv). Authentication and Encryption Combinations as bellow:

OPEN/NONE  
OPEN/WEP  
SHARED/WEP  
WPA-PSK/TKIP  
WPA-PSK/AES  
WPA2-PSK/TKIP  
WPA2-PSK/AES





WPA2-PSK/TKIP/AES

WPAPSKWPA2PSK/TKIP

WPAPSKWPA2PSK/AES

(v). Internet Connection Sharing in CE can be enabled for AP mode. Details can be found in help file or on the MSDN.



## 7. Ratool Description

Ratool is a wireless utility for Windows CE command shell. Ratool is from wzctool and adds more proprietary Ralink OID functions. The user can make use of this tool to modify the Ralink wireless driver details and settings

### AP Command Example

#### 1. OPEN/NONE

```
> ratool -ap [-save or -s] RT2501USB1 -auth open
> ratool -ap [-save] RT2501USB1 -encr none
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### 2. OPEN(SHARED)/WEP40 - 5-CHAR ASCII WEP KEY

```
> ratool -ap [-save] RT2501USB1 -auth open(shared)
> ratool -ap [-save] RT2501USB1 -encr wep
> ratool -ap [-save] RT2501USB1 -key 1/remove(optional)
> ratool -ap [-save] RT2501USB1 -key 1/12345
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### 3. OPEN(SHARED)/WEP40 - 10-CHAR HEXA WEP KEY

```
> ratool -ap [-save] RT2501USB1 -auth open(shared)
> ratool -ap [-save] RT2501USB1 -encr wep
> ratool -ap [-save] RT2501USB1 -key 1/remove(optional)
> ratool -ap [-save] RT2501USB1 -key 1/12345abcde
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### 4. OPEN(SHARED)/WEP128 - 13-CHAR ASCII WEP KEY

```
> ratool -ap [-save] RT2501USB1 -auth open(shared)
> ratool -ap [-save] RT2501USB1 -encr wep
> ratool -ap [-save] RT2501USB1 -key 2/remove(optional)
> ratool -ap [-save] RT2501USB1 -key 2/abcdefghijklm
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### 5. OPEN(SHARED)/WEP40 - 26-CHAR HEXA WEP KEY

```
> ratool -ap [-save] RT2501USB1 -auth open(shared)
> ratool -ap [-save] RT2501USB1 -encr wep
```



```
> ratool -ap [-save] RT2501USB1 -key 3/remove(optional)
> ratool -ap [-save] RT2501USB1 -key 3/12345678901234567890abcdef
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### 6. WPA-PSK(WPA2-PSK)/TKIP(AES) - 8-63-CHAR ASCII PASSPHRASE

```
> ratool -ap [-save] RT2501USB1 -auth wpa-psk(wpa2-psk)
> ratool -ap [-save] RT2501USB1 -encr tkip(aes)
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
> ratool -ap [-save] RT2501USB1 -wpa-psk 1234567890abc...xyz...ABC...XYZ
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### 7. WPA-PSK(WPA2-PSK)/TKIP(AES) - 64-CHAR HEXA KEY

```
> ratool -ap [-save] RT2501USB1 -auth wpa-psk(wpa2-psk)
> ratool -ap [-save] RT2501USB1 -encr tkip(aes)
> ratool -ap [-save] RT2501USB1 -wpa-psk 12345abcdef...67890abcdef
> ratool -ap [-save] RT2501USB1 -ssid RalinkAP
```

#### Note:

(i). You can use “-save” or “-s” option to save the setting into registry. The setting will be reloaded when driver reloaded.

#### WPS Command Example:

##### 1. Configure with PIN mode:

```
> ratool -disablewzcsvc RT2501USB1
> ratool -wps RT2501USB1 -info      ; PIN will be listed
> ratool -wps RT2501USB1 -bssidlist
Key PIN on Registrar(i)
> ratool -wps RT2501USB1 -pin YourSsid
> ratool -wps RT2501USB1 -status auto
> ratool -wps RT2501USB1 -profile 1(ii)
> ratool -enablewzcsvc RT2501USB1
```

(i). Enter the Enrollee's PIN code on the Registrar and start WPS on the Registrar.

Note: How to get the Enrollee PIN code? Use 'ratool -wps R2501USB1 -info' on the Enrollee.

(ii). If the registration is successful, the Enrollee will be given the configuration profiles. The Enrollee can connect to the AP with these new parameters.



## 2. Configure with PBC mode:

```
> ratool -disablewzcsvc RT2501USB1
> ratool -wps RT2501USB1 -info
> ratool -wps RT2501USB1 -bssidlist
Push button on Registrar(i)
> ratool -wps RT2501USB1 -pbc [Or push hardware button on wireless card]
> ratool -wps RT2501USB1 -status auto
> ratool -wps RT2501USB1 -profile 1(ii)
> ratool -enablewzcsvc RT2501USB1
```

(i). Start PBC on the Registrar.

(ii). If the registration is successful, the Enrollee will be given the configuration profiles. The Enrollee can connect to the AP with these new parameters.



## 8. Wi-Fi Protected Setup Overview

This section presents a high-level description of the Wi-Fi Protected Setup(WPS) architecture. Figure 1 depicts the major components and their interfaces as defined by Wi-Fi Protected Setup Spec. There are three logical components involved: the Registrar, the access point (AP), and the Enrollee.

The Enrollee is a device seeking to join a WLAN domain. Once an Enrollee obtains a valid credential, it becomes a member.

A Registrar is an entity with the authority to issue and revoke domain credentials. A registrar can be integrated into an AP.

The AP can be either a WLAN AP or a wireless router.

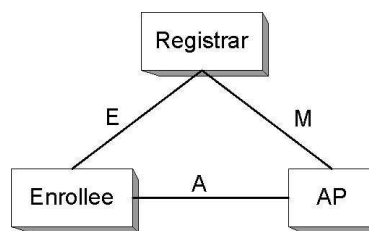


Figure 1. Components and Interfaces

Registration initiation is ordinarily accomplished by a user action such as powering up the Enrollee and, optionally, running a setup wizard on the Registrar (PC).



## 9. Appendix

1. WZC Autoconfig source code is in  
    \WINCE500\PUBLIC\COMMON\OAK\DRIVERS\NETUI\
2. WZCTOOL source code is in  
    \WINCE500\PUBLIC\COMMON\OAK\DRIVERS\NETSAMP\WZCTOOL\
3. The user can add the Internet Connection Sharing or Bridge features to Windows CE kernel in AP mode.