



RALINK TECHNOLOGY, CORP.

RATOOL Software Release Note for WinCE

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Product Name	RATOOL
Product Supported	RT61, RT73, RT28X0, RT307X, RT305X, RT288X
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1.	Introduction.....	4
2.	Hardware Requirements.....	4
3.	Software Requirements.....	5
4.	RATOOL Features	6
5.	Basic Instructions.....	7
6.	Actions in RATOOL.....	11
6.1.	General Action	11
6.2.	Common (CMN) Action	12
6.3.	Station (STA) Action.....	19
6.4.	Access Point (AP) Action	20
6.5.	Wi-Fi Protection Setup (WPS) Action	22
6.6.	Direct Link Setup (DLS) Action.....	23
6.7.	iNIC (inic) Action	24
7.	Command Examples	25
7.1.	Common Configurations.....	25
7.2.	AP Configurations.....	25
7.3.	Wi-Fi Protection Setup (WPS).....	28
7.4.	Wi-Fi Protection Setup (WPS) within iNIC type chipset	30
7.5.	Direct Link Setup (DLS) Configuration	31
8.	Appendix.....	32



1. Introduction

This document guides you how to use the RATOOL. RATOOL is a command line program running under Windows CE command shell. The major purpose is configuring the wireless parameters of Ralink wireless driver.

2. Hardware Requirements

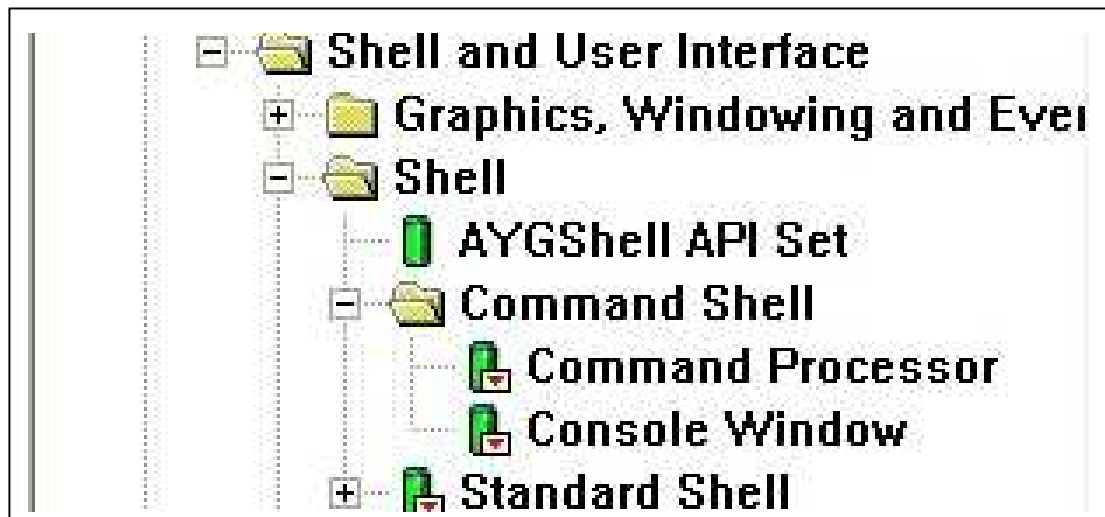
The adapters (made with the Ralink series chipset) are supported as below:

1. Ralink RT256x b/g Wireless PCI chipset.
2. Ralink RT2501USB(RT73) b/g Wireless USB chipset
3. Ralink RT2860 11n Wireless PCI chipset
4. Ralink RT2870, RT307x and Rt207x 11n Wireless USB chipset
5. Ralink RT2880 11n PCI iNIC Wireless PCI chipset
6. Ralink RT305x 11n USB iNIC Wireless USB chipset



3. Software Requirements

1. Platform Builder 5.0 or
2. VS2005+Windows CE 6.0(or higher)
3. Windows CE 5.0 QFE20061231 is a plus. The WPA2 is supported after this QEF.
4. Command Shell component is required



5. The RATOOL package is included four type of the CPU(X86, ARM, MIPS and SH4). The major files description as below:
 - RATOOL.EXE (binary of ratool execution)
 - RATOOL.BIB(Sample BIB file).
 - RATOOL.REG(Sample REG file).



4. RATOOL Features

The RATOOL features are divided in two parts: Station mode and AP mode

1. Station mode
 - i. Common
 - ii. Configuration for Infrastructure
 - iii. Configuration for Ad-Hoc
 - iv. Configuration for WPS
 - v. Configuration for DLS
2. AP mode
 - i. Common
 - ii. AP Configuration

Note:

- (i). To support WPA2 security in Windows CE 5.0, the QFE 2006 must be installed.
- (ii). When driver works in AP mode, WZC must be disabled.



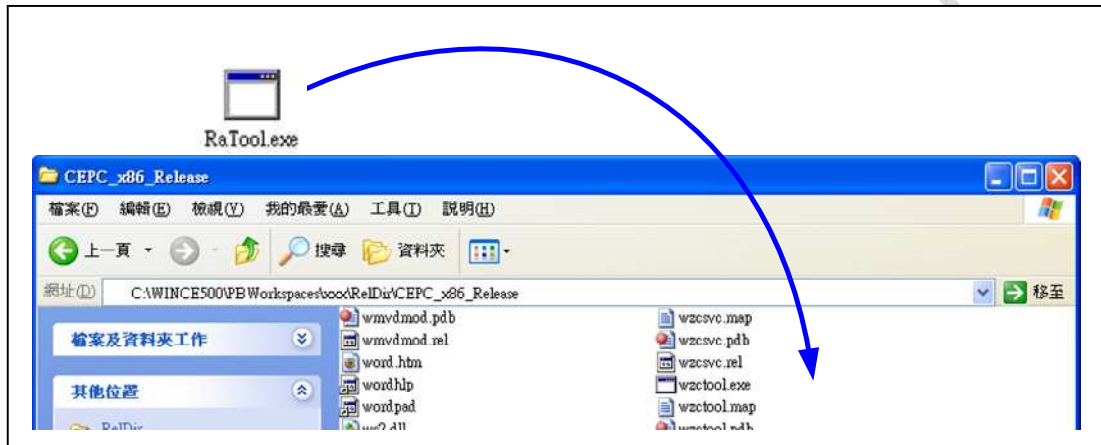
5. Basic Instructions

Here are the major steps to integrate into your Windows CE system.

5.1 Integration

1. Put RATOOL.EXE in your flat build directory

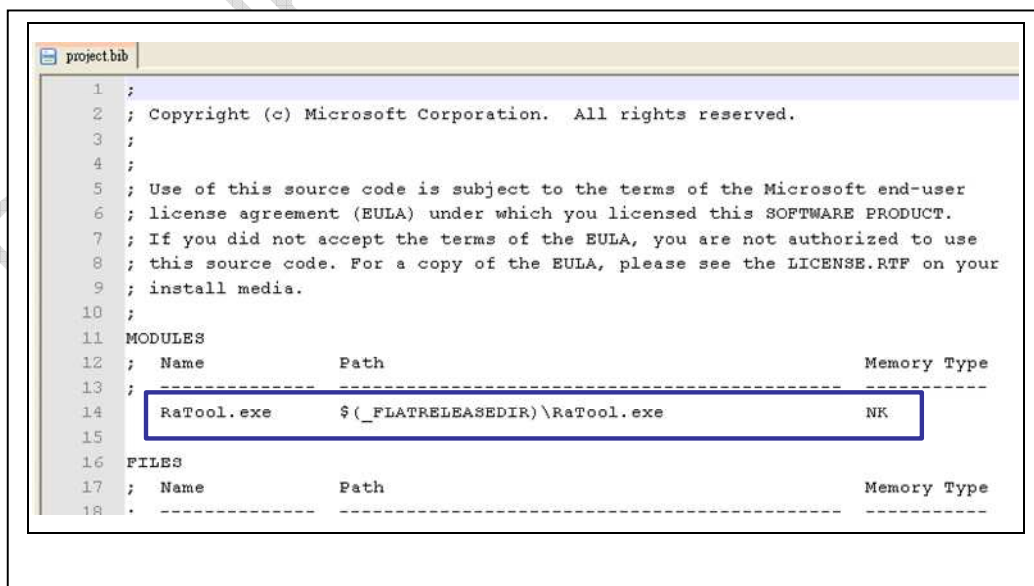
`_WINCEROOT(1)\PROJECT\XXX\RelDir\<release_directory>(2)`



(1). `_WINCEROOT` as "WINCE500" or "WINCE600" depends on your OS.

(2). `<release_directory>` is BSP solution configuration related ex. CEPC x86 release mode default is: CEPC_x86_Release.

2. Add RATOOL.BIB and RATOOL.REG into your PROJECT.REG and PLATFORM.BIB files. Don't change the BIB file if you are not familiar with the image generation settings.





3. Make sure driver already installed.
4. Rebuild your image, RATOOL will be built-in in NK.BIN
5. Open a command box, run RATOOL.

5.2 Command Format

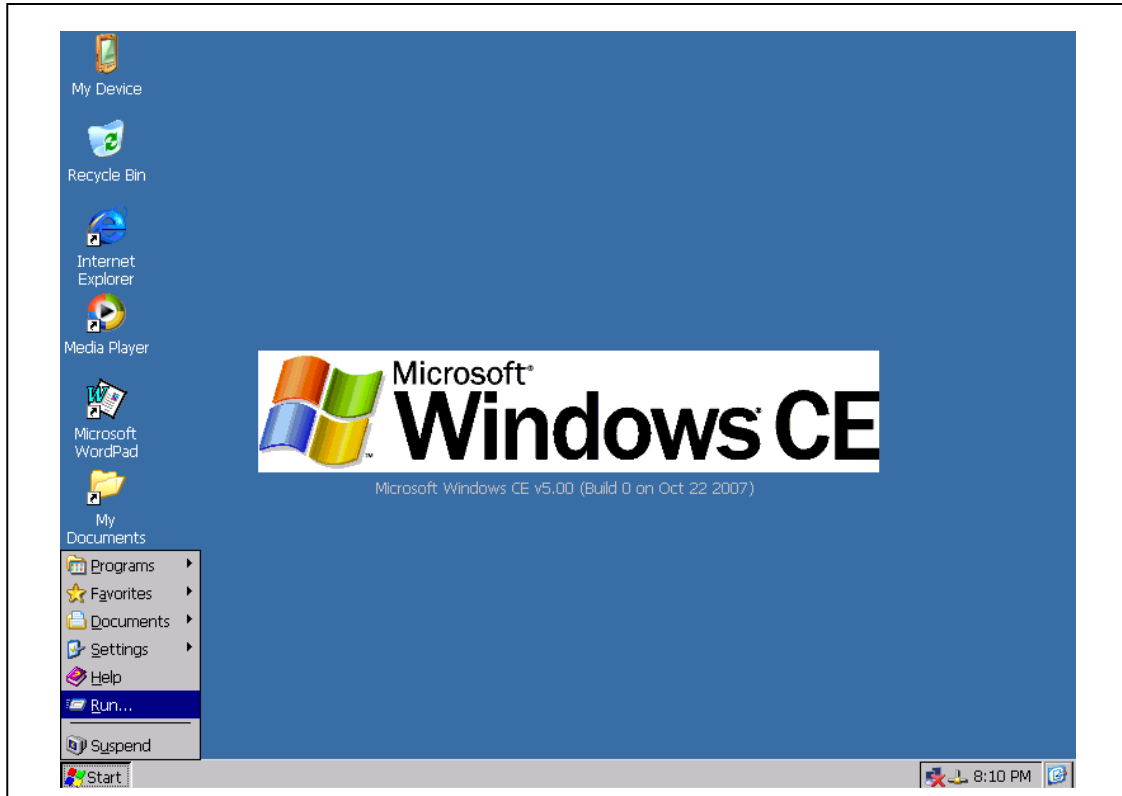
```
\> ratool -action(1) [<CARD NAME>(2)] [-param1(3) [value1(4)]] [-param2 [value2]]  
RESULT PRINTOUT LINE1(7)  
RESULT PRINTOUT LINE2  
\>_
```

- (1). There are several actions in RATOOL.
- (2). You can specific the card name or let RATOOL to look for the first detecting card. The card name as “PCI\RT611”, “RT2501USB1”, “PCI\RT28601”, “RT28701”, “PCI\RT28801” and “RT30521”
- (3). Specific action, you can assign a parameter/parameters.
- (4). Some parameters have been assign an value.
- (5). The bracket “[...]” means optional. You can ether specific an argument or skip it.
- (6). The parameters of same action group can be assigned simultaneously.
- (7). The result will be printed out after command executed.

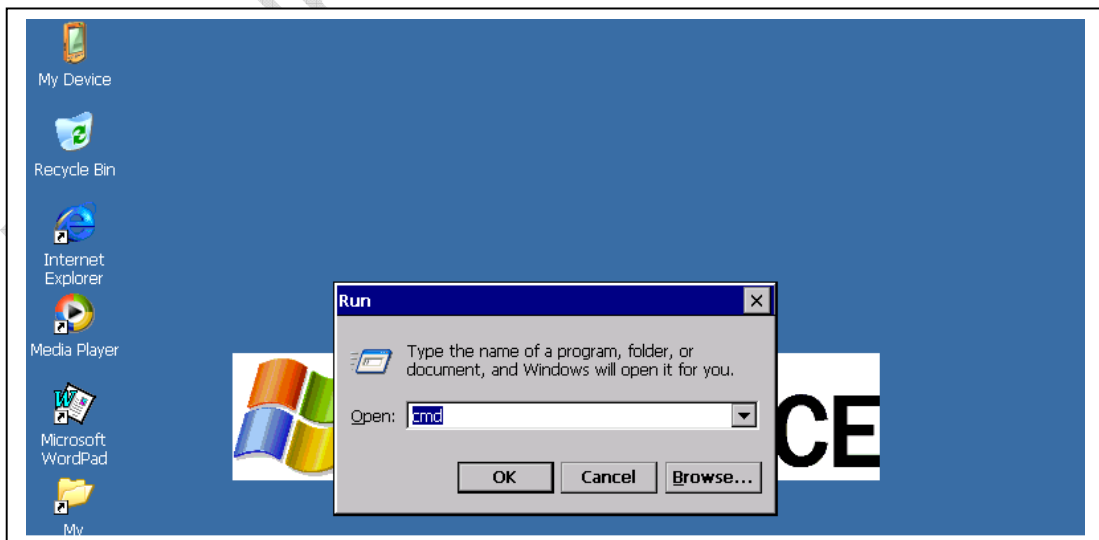


5.3 Simple Example

(1). Open command box in Windows CE desktop shell. Click “Start” button and select “Run” menu.



(2). “Run” window is popped up, input “CMD” and then click “OK” button





(3). Command box is popped up. Command prompt is waiting for your commands. Input “ratool -v” to check the version of RATOOL and ratool -e” to enumerate wireless cards in system.

A screenshot of a Windows command prompt window. The window has a title bar with 'File Edit Help' buttons. The text inside the window shows the following commands and their outputs:

```
\> ratool -v
ratool(rel) V2.2.2.1
(c) Copyright 2002-2009, Ralink Technology, Corp.

WCE500 Build Date: Jul 15 2009 Time: 17:23:47
CPU=Intel
PageSize=4096
ProcessorLevel=15
ProcessorRevision=0003
\> ratool -e
wifi-card [0] = RT28701
\>
```



6. Actions in RATOOL

6.1. General Action

(1). Get the version of the RATOOL

```
\>ratool -v  
\>ratool -version
```

(2). Enable and disable WZC

```
\>ratool -enablewzcsvc  
\>ratool -disablewzcsvc
```

(3). Refresh WZC, forces WZC to reconnect [Preferred Networks]

```
\>ratool -refresh
```

(4). Enumerate wireless network cards detected by WZC

```
\>ratool -e
```

(5). Find wireless card, and query for that adapter.

```
\>ratool -q
```

(6). Reset the [Preferred Networks] in WZC. (So wireless will be disconnected)

```
\>ratool -reset
```



6.2. Common (CMN) Action

The common action will Set/Query OID to Ralink driver which common OID.

- (1). Get current MAC address.

```
\>ratool -cmn -cntaddr
```

- (2). Get the total counter of Rx.

```
\>ratool -cmn -rcvok
```

- (3). Get the total counter of packet that no buffer for receive.

```
\>ratool -cmn -rxnobuf
```

- (4). Get WEP Status.

0, 1: WEP Enabled
2, 3: WEP Disabled
4, 5: WEP Key Absent
6,7: WEP Not Supported

```
\>ratool -cmn -wepstat
```

- (5). Get authentication mode.

0: Open
1: Shared
2: Auto Switch
3: WPA-Enterprise
4: WPA-Personal
5: WPA-None
6: WPA2- Enterprise
7: WPA2-Personal

```
\>ratool -cmn -authmode
```



(6). Get supported rate.

```
\>ratool -cmn -supprate
```

(7). Get desired rate.

```
\>ratool -cmn -desiredrate
```

(8). Get statistics.

```
\>ratool -cmn -statistics
```

(9). Get link status.

```
\>ratool -cmn -linkstat
```

(9). Get PHY mode.

0: B / G mix

1: B

2: A

3: A / B / G Mix

4: G

5: A / B / G / N Mix

6: N

7: G / N Mix

8: A / N Mix

9: B / G / N Mix

10: A / G / N Mix

```
\>ratool -cmn -phymode
```

(10). Get current channel.

```
\>ratool -cmn -curntchannel
```



(11). Get EEprom version / firmware version.

```
\>ratool -cmn -eever  
\>ratool -cmn -fwver
```

(12). Get last Rx rate / last Tx rate.

```
\>ratool -cmn -lastrxrate ; Get last Rx rate  
\>ratool -cmn -lasttxrate ; Get last Tx rate
```

(13). Get link speed.

```
\>ratool -cmn -linkspeed
```

(14). Get / Set Country Region.

```
\>ratool -cmn -cntyreg -show ; Get Country Region  
\>ratool -cmn -cntyreg [value] ; Set value to Country Region
```

(15). Get / Set RTS threshold.

Range of RTS threshold: (0~2347)

```
\>ratool -cmn -rtsthres -show ; Get RTS threshold  
\>ratool -cmn -rtsthres [value] ; Set value to RTS threshold
```

(16). Get / Set fragmentation threshold

Range of fragmentation threshold: (0~2346)

```
\>ratool -cmn -frgmntthres -show ; Get fragmentation threshold  
\>ratool -cmn -frgmntthres [value] ; Set value to fragmentation threshold
```

(17). Get / Set Tx power level

Legal value of fragmentation threshold: (100,75,50,25,10,6)



```
\>ratool -cmn -txpwr -show ; Get
\>ratool -cmn -txpwr [value] ; Set value to Tx power level
```

(18). Get / Set preamble [11n related]

Select to use long / short preamble.

0:long

1:shor

2:auto

```
\>ratool -cmn -pmb -show ; Get
\>ratool -cmn -pmb [value] ; Set value to preamble
```

(19). Get / Set WMM Capable

0:disable

1:enable

```
\>ratool -cmn -wmm -show ; Get
\>ratool -cmn -wmm [value] ; Set value to WMM Capable
```

(20). Get / Set Aggregation Capable

0:disable

1:enable

```
\>ratool -cmn -agg -show ; Get
\>ratool -cmn -agg [value] ; Set value to Aggregation Capable
```



(21). Get / Set HtPhyMode [11n related]

Configuration of Channel Bandwidth / Extension channel / MCS reate / GI / STBC / Preamble type.

<code>\>ratool -cmn -ht -show</code>	; Get configuration of HtPhyMode
<code>\>ratool -cmn -ht [-parameter] [value]</code>	; Set value to Country Region

Parameter and value

1 -htphymode

Parameter descript: Select HT PHY mode

Value: 0 ~ 10

- 0: *B / G mixed*
- 1: *B only*
- 2: *A only*
- 3: *A / B / G mixed*
- 4: *G only*
- 5: *A / B / G / N mixed*
- 6: *N only*
- 7: *G / N mixed*
- 8: *A / N mixed*
- 9: *B / G / N mixed*
- 10: *A / G / N mixed*

2 -htmode

Parameter descript: Select GF(Green field preamble) or MM(Mixed format)

Value: 0 | 1

- 0: *GF*
- 1: *MM*

3 -extoffset

Parameter descript: Extension channel above or below

Value: 0 , 3

- 1: *Above*
- 3: *Below*

4 -mcs

Parameter descript: MCS rate selection.

Value: 0 ~ 15 | 33

- 33: *Auto*



5 -bw

Parameter descript: Support channel width.

Value: 0 | 1

0: 20MHz

1: 40MHz

6 -stbc

Parameter descript: Enable STBC (space-time block code)

Value: 0 | 1

0: Disable

1: Enable

7 -shortgi

Parameter descript: Length of GI (Guard interval)

Value: 0 | 1

0: 800 (Long GI)

1: 400 (short GI)

(22). Get / Set IMMEBA Capable [11n related]

Configuration of A-MSDU / A-MPDU / Block ACK.

```
\>ratoool -cmn -immebacap -show ; Get configuration of IMMEBA Capable  
\>ratoool -cmn -immebacap [-parameter] [value] ; Set value to IMMEBA Capable
```

Parameter and value

1 -policy

Parameter descript: Type of Block ACK

Value: 0 | 1 | 2

0: Delayed BA

1: Immediate BA

2: Not use

2 -mpdud

Parameter descript: Minimum separation of MPDUs in an A-MPDU.

Value: 0 ~ 7

0: no restriction

1: 1/4 μ s

2: 1/2 μ s



3: 1 μ s

4: 2 μ s

5: 4 μ s

6: 8 μ s

7: 16 μ s

3 -amsdu

Parameter descript: Enable aggregation of multiple MSDUs in one MPDU.

Value: 0 | 1

0: Disabled

1: Enabled

4 -autoba

Parameter descript: Enable auto block acknowledgment (BA).

Value: 0 | 1

0: Disabled

1: Enabled

(23). Reset Counter

Reset all counter of statistics

```
\>ratool -cmn -resetcnt
```

(24). Set IEEE802.11H Capable

0:disable

1:enable

```
\>ratool -cmn -80211h [value] ; Set value to IEEE802.11H Capable
```



6.3. Station (STA) Action

The STA action will Set/Query OID to Ralink driver which STA mode related OID. Most order can set by WZC directly, the following action list the command which can't set by WZC.

(1). Get information

<code>\>ratoool -sta -bssidlist</code>	; Get the result of BSSID list scan (site survey)
<code>\>ratoool -sta -scan</code>	; Proform BSSID list scan
<code>\>ratoool -sta -radio</code>	; Get radio status

(2). Set channel

<code>\>ratoool -sta -channel [value]</code>	; Set value to channel
---	------------------------

(3). Set PHY mode

Legal value: bg, b, a, abg, g, abgn, n, gn, an, bgn, agn

<code>\>ratoool -sta -phy mode [value]</code>	; Set value to phy mode
--	-------------------------

(4). Set PHY mode of AdHoc mode

0: B

1: B / G Mix

2: G

3: A

4: A / B / G Mix

5: A / B / G / N Mix

6: N

7: G / N Mix

8: A / N Mix

9: B / G / N Mix

10: A / G / N Mix

<code>\>ratoool -sta -adhocmode [value]</code>	; Set value to PHY mode of AdHoc mode
---	---------------------------------------



6.4. Access Point (AP) Action

The common action will Set/Query OID to Ralink driver which AP mode related OID.

(1). Get information

```
\>ratool -ap -info ; Get information of AP configuration
```

(2). Set enable/disable broadcasting SSID

0: Disable

1: Enable

```
\>ratool -ap -hiddenssid [value]
```

(3). Set SSID (SSID is the name of wireless network)

```
\>ratool -ap -ssid [value]
```

(4). Set channel

```
\>ratool -ap -channel [value]
```

(5). Set Authentication mode

Vaule: open, shared, wpa-psk, wpa2-psk and wpawpa2-psk

```
\>ratool -ap -auth [value]
```

(6). Set Encrytion mode

Vaule: none, wep, tkip, aes and tkipaes

```
\>ratool -ap -encr [value]
```

(7). Set key value for WEP-key

Use '#/<key-value>' form:

'#' is key-index (1 -4), '<key-value>' is WEP key value (40-bit or 104-bit)



```
\>ratool -ap -key [#/<key-value>]
```

Note:

I. 40-bit is either '10-digit hexa numbers' (ex: 0x1234567890) or '5-char ASCII string' (ex: zxcvb).

II. 104-bit is either '26-digit hexa numbers' (ex: 0x12 345678901234567890123) or '13-char ASCII string' (ex: abcdefghijklm)

(8). Set key value for WPA-pre-share key

Set pass phrase for wpapsk

```
\>ratool -ap -wpapsk [value]
```

Note:

Key can be 8-63 char ASCII string (ex: asdfghjk) or key can be 64 char hexadecimal string(ex:

d953302ce548a0f82ff88ae582b01e81f9a876d920693f842eddae6b14653dea).

(9). Set PHY mode

Legal value: bg, b, a, abg, g, abgn, n, gn, an, bgn, agn

```
\>ratool -ap -phymode [value]
```

(10). Set WPA-PSK Group key rekey interval

Unit: Second

```
\>ratool -ap -rekey [value]
```

(11). Save the configuration into registry

This parameter must use with other SET parameter, foe example, see Chapter 7.

```
\>ratool -ap -s [parameter [value]]
```



6.5. Wi-Fi Protection Setup (WPS) Action

The WPS action will configure Ralink driver to act Enrollee / Registrar and perform WPS procedure.

- (1). Get PIN code (Requirement of PIN mode)

```
\>ratool -wps -info
```

- (2). Get bssid list of current WPS AP

```
\>ratool -wps -bssidlist
```

- (3). Start WPS procedure with AP by given SSID [For Enrollee]

```
\>ratool -wps -pin [AP ssid] ; PIN mode  
\>ratool -wps -pbc [AP ssid] ; PBC mode
```

- (4). Configure credential [For Registrar]

```
\>ratool -wps -cred ; Configure credential automatically  
\>ratool -wps -cred  
[-ssid [Ap_ssid]] [-auth [value]] [-encr [value]] [-wep [value]][ -wpapsk [value]]  
; Configure credential manually
```

- (5). Start WPS procedure with unconfig AP by given SSID and PIN code [For Registrar]

```
\>ratool -wps -regpin [pin code] [-ssid [Ap_ssid]]
```

- (6). Get WPS connecting progress/status

```
\>ratool -wps -status ; Get last status  
\>ratool -wps -status loop ; Keep to show current status 120 seconds  
\>ratool -wps -status auto ; Keep to show current status 120 seconds and  
; set configuration to preferred list of WZC when  
; connection is establish
```



(7). Set configuration of WPS into preferred list of WZC

```
\>ratool -wps -profile [profile number]
```

6.6. Direct Link Setup (DLS) Action

The DLS action will configure Ralink driver to perform DLS procedure.

(1). Enable / Disable DLS capable

```
\>ratool -dls -enable  
\>ratool -dls -disable
```

(2). Query entry list of DLS

```
\>ratool -dls -list
```

(3). Add entry into DLS

```
\>ratool -dls -peer [peer MAC address] [-t [second]]  
; Set dls connect to peer MAC address with timeout value
```

(4). Delete entry from DLS

```
\>ratool -dls -teardown [peer MAC address] ; Delete entry by given MAC address  
\>ratool -dls -teardown all ; Delete all entry
```



6.7. iNIC (inic) Action

The iNIC action only takes effect within iNIC type chipset. (e.g. RT2880, RT305X)

(1). Wi-Fi Protection Setup(wps)

The inic command of WPS will configure iNIC type chipset to act Enrollee and perform WPS procedure.

(a). Get PIN code (Requirement of PIN mode)

```
\>ratool -inic -wps wsc_info
```

(b). Configure WPS mode

```
\>ratool -inic -wps -wsc_conf_mode 1 ; Act Enrollee  
\>ratool -inic -wps -wsc_mode 1 ; PIN mode  
\>ratool -inic -wps -wsc_mode 2 ; PBC mode  
\>ratool -inic -wps -wsc_ssid [AP ssid] ; Set AP SSID
```

(c). Connect to WPS AP by configuration

```
\>ratool -inic -wps -wsc_start
```

(d). Get WPS connecting progress/status

```
\>ratool -inic -wps -wsc_status
```

(e). Set configuration of WPS into preferred list of WZC

```
\>ratool -wps -profile
```



7. Command Examples

RATOOL is a wireless utility for Windows CE command shell. RATOOL is based on WZCTOOL and adds more proprietary Ralink OID functions. The user can easily use this tool to modify the detail parameters of Ralink wireless driver.

7.1. Common Configurations

(1). IMME BA setting [11n related]

```
\> ratool -cmn -immebacap -show
; Get configuration about Block ACK
\> ratool -cmn -immebacap -policy 1 -amsdu 1 -authba 1
; Set to use "Immediate BA", "enable A-MSDU"
; "Enable auto BA".
```

(2). HT PHY mode setting [11n related]

```
\> ratool -cmn -ht -show
; Get configuration of HT
> ratool -cmn -ht -phymode 5 -htmode 1 -mcs 33 -shortgi 1
; Set to use "A / B / G / N mixed PHY mode",
; "Mixed format preamble", "Auto MCS rate",
; "short GI"
```

7.2. AP Configurations

(1). Open/None and SSID=RalinkAP

```
\> ratool -ap <card name>(iii) -s(i) -auth open
\> ratool -ap <card name> -s -encr none
\> ratool -ap <card name> -s -ssid RalinkAP
```

(i). Use "-save" or "-s" option to save the setting into registry.

(ii). All print out result texts are not shown in the example.

(iii). <CARD NAME> as "PCI\RT611", "PCI\RT28601", "RT2501USB1" or "RT28701" depends on your hardware. For RTINICUSB series driver, <CARD NAME> is as "RTINICUSB1".



(2). Open(SHARED)/WEP40 - 5-CHAR ASCII WEP KEY and SSID=RalinkAP

```
\> ratool -ap -auth open | shared
\> ratool -ap -encr wep
\> ratool -ap -key 1/remove ; This line is optional
\> ratool -ap -key 1/12345
\> ratool -ap -ssid RalinkAP
```

(3). Open(SHARED)/WEP40 - 10-HEXDECIMAL WEP KEY and SSID=RalinkAP

```
> ratool -ap -auth open | shared
> ratool -ap -encr wep
> ratool -ap -key 2/remove ; This line is optional
> ratool -ap -key 2/12345abcde
> ratool -ap -ssid RalinkAP
```

(4). WPA-PSK(WPA2-PSK)/TKIP(AES) - 8-CHAR ASCII PASSPHRASE and SSID=RalinkAP

```
> ratool -ap -auth wpa-psk | wpa2-psk
> ratool -ap -encr tkip | aes
> ratool -ap -ssid RalinkAP
> ratool -ap -wpapsk 12345678 ; pass phrase
> ratool -ap -ssid RalinkAP
```

(5). WPA-PSK(WPA2-PSK)/TKIP(AES) - 8~63-CHAR ASCII PASSPHRASE and SSID=RalinkAP



```
> ratool -ap -auth wpa-psk | wpa2-psk
> ratool -ap -encr tkip | aes
> ratool -ap -ssid RalinkAP
> ratool -ap -wpapsk 1234567890abc...xyz...ABC...XYZ ; pass pharse
> ratool -ap -ssid RalinkAP
```



7.3. Wi-Fi Protection Setup (WPS)

(1). Station act Enrollee - PIN mode

```
\> ratool -disablewzcsvc
\> ratool -wps -info(ii) ; PIN will be listed
\> ratool -wps -bssidlist ; List WPS AP and key PIN on Registrar(i)
\> ratool -wps -pin RalinkAP
\> ratool -wps -status auto
\> ratool -wps -profile 1(iii)
\> ratool -enablewzcsvc
```

(i). Enter the Enrollee's(station's) PIN code in the Registrar(AP side, SSID= RalinkAP) and start WPS on the Registrar.

(ii). Use "ratool -wps -info" in the shell box to get PIN code of the Enrollee(ststaion).

(iii). When WPS process is successful, the Enrollee(station) will get the configuration profiles from Registrar(AP). The Enrollee(station) can connect to the AP with this configuration.

Note: WZC must disable when WPS procedure is processing.

(2). Station act Enrollee - PBC mode

```
\> ratool -disablewzcsvc
\> ratool -wps -info
\> ratool -wps -bssidlist(i) ; Push button on Registrar(i)
\> ratool -wps -pbc(ii) RalinkAP ; Or push hardware button on wireless card
\> ratool -wps -status auto
\> ratool -wps -profile 1(iii)
\> ratool -enablewzcsvc
```

(i). List WPS AP around your station and push the button(soft button or hardware button) in AP.

(ii). Push the button(soft button or hardware button) in station with 2 minutes.

(iii). When WPS process is successful, the Enrollee(station) will get the configuration profiles from Registrar(AP). The Enrollee(station) can connect to the AP with this configuration.

(vi). Be aware! WPS PBC won't allow two or more PBC handshaking at same time in the area.



(3). Station act Registrar - PIN mode

Configure AP to Open – None, SSID = RalinkAP

```
\> ratool -disablewzcsvc
\> ratool -wps -bssidlist ; List WPS AP
\> ratool -wps -cred -ssid RalinkAP(i) -auth open -encr none
\> ratool -wps -regpin 47904262(ii) -ssid Unconfigure_APSSID(iii)
\> ratool -wps -profile 1
\> ratool -enablewzcsvc
```

(i). You can configure the ssid of AP at here. You can also configure authentication and encryption at here.

(ii). Input the PIN code. You can get it from unconfigure AP.

(iii). Indicate which unconfigure AP that you want to configure and preform WPS procedure.





7.4. Wi-Fi Protection Setup (WPS) within iNIC type chipset

(1). Station act Enrollee - PIN mode

```
\> ratool -disablewzcsvc
\> ratool -inic -wps wsc_info           ;Get pin code(i)
\> ratool -inic -wps wsc_conf_mode 1    ; Act as Supplicant
\> ratool -inic -wps wsc_mode 1        ; PIN mode
\> ratool -inic -wps wsc_ssid RalinkAP  ; Connect to AP that ssid is RalinkAP
\> ratool -inic -wps wsc_start          ; Start to connect
\> ratool -inic -wps wsc_status         ; Check status
\> ratool -inic -wps wsc_profile        ; Add configuration to preferred list
                                         ; of WZC(ii)
\> ratool -enablewzcsvc
```

(i). Enter the Enrollee's(station's) PIN code in the Registrar(AP side, SSID= RalinkAP) and start WPS on the Registrar.

(ii). When WPS process is successful, the Enrollee(station) will get the configuration profiles from Registrar(AP). The Enrollee(station) can connect to the AP with this configuration.

Note: WZC must disable when WPS procedure is processing.

(2). Station act Enrollee - PBC mode

```
\> ratool -disablewzcsvc
\> ratool -inic -wps wsc_conf_mode 1    ; Act as Enrollee
\> ratool -inic -wps wsc_mode 2        ; PIN mode
\> ratool -inic -wps wsc_ssid RalinkAP  ; Connect to AP that ssid is RalinkAP
\> ratool -inic -wps wsc_start(ii)      ; Start to connect
\> ratool -inic -wps wsc_status         ; Check status
\> ratool -inic -wps wsc_profile        ; Add configuration to preferred list
                                         ; of WZC(iii)
\> ratool -enablewzcsvc
```

(i). Push the button(soft button or hardware button) in AP.



- (ii). Push the button(soft button or hardware button) in station with 2 minutes.
- (iii). When WPS process is successful, the Enrollee(station) will get the configuration profiles from Registrar(AP). The Enrollee(station) can connect to the AP with this configuration.
- (vi). Be aware! WPS PBC won't allow two or more PBC handshaking at same time in the area.

7.5. Direct Link Setup (DLS) Configuration

(1). DLS Example

```
\> ratool -cmn -wmm 1 ; Enable WMM
\> ratool -dls -enable ; Enable DLS
\> ratool -dls -peer 001150bbc0f2 -t 0 ; Add entry and connect peer of
; MAC address 00-11-50-bb-c0-f2 (i)
; Entry Timeout = 0 (ii)
\> ratool -dls -list ; Query DLS entry list
\> ratool -dls -teardown 001150bbc0f2 ; Teardown the DLS connection
; of MAC address 00-11-50-bb-c0-f2
\> ratool -dls -disable ; Disable DLS
\> ratool -cmn -wmm 0 ; Disable WMM
```

- (i). You can get peer MAC address by use "ipconfig /all" command at windows platform.
- (ii). The timeout value indicate how long is this entry can exist in DLS list. Set to 0 indicate no timeout policy.

Note: WMM must enable when DSL need to turn on.



8. Appendix

1. WZC Autoconfig source code is in
_WINCEROOT\PUBLIC\COMMON\OAK\DRIVERS\NETUI\
2. WZCTOOL source code is in
_WINCEROOT\PUBLIC\COMMON\OAK\DRIVERS\NETSAMP\WZCTOOL\
3. The user can add the Internet Connection Sharing(ICS) feature into Windows CE kernel. Combining with the Ralink wireless AP mode, the Windows CE system can provide DHCP server and NAT.
4. To measure throughput and CPU utilization, the CETK can be applied.