Quick Guide for Wake on WLAN

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Quick Start Guide for Wake on Lan

(1) Support list:

    .) USB interface: 8188EU, 8188CU, 8192DU, 8192EU, 8723BU, 8812AU.

    .) SDIO interface: 8189ES, 8723BS, 8192ES

(2) Requirements of wakeup via in-band and out-band methods:

    .) In-band requirements:

- SDIO Interface:
    - ✓ SDIO host MUST support remote wakeup feature.
    - ✓ SDIO data1 MUST be wakeup source in the host platform.
    - ✓ The platform MUST keep power to WiFi chip in suspend state.
    - ✓ The platform MSUT work fine between suspend and resume.

- USB Interface:
    - ✓ USB host MUST support remote wakeup feature.
    - ✓ The platform MUST keep power to WiFi chip in suspend state.
    - ✓ The platform MSUT work fine between suspend and resume.

    .) Out-band requirements:

- ✓ The GPIOof the **PLATFORM** MUST be wakeup source.
- ✓ The platform MUST keep power to WiFi chip in suspend state.
- ✓ The platform MSUT work fine between suspend and resume.
- ✓ The WIFI module MUST have the GPIO wakeup pin.

(3) Driver Configuration for Wake on Lan:

    .) In-band configuration:

If using **SDIO DATA1 pin** or **USB protocol D+/D- toggle** in-band method to wakeup the host, driver need to do is only switch **CONFIG_WOWLAN** from "n" to "y" in Makefile as Figure 1.

```
CONFIG_EXT_CLK = n
CONFIG_WOWLAN = y
CONFIG_GPIO_WAKEUP = n
```
(Figure 1)

.) Out-band configuration:

> If using out-band method, driver need to do is modify Makefile and config GPIO. The detail is as following:

- Makefile Configuration:

  Switch **CONFIG_WOWLAN** and **CONFIG_GPIO_WAKEUP** from "n" to "y" as Figure 2.


```
CONFIG_EXT_CLK = n
CONFIG_WOWLAN = y
CONFIG_GPIO_WAKEUP = y
```

(Figure 2)

- GPIO Configuration:
  - ✓ If use the module package, please use the driver default value. The default value depends on HDK document.
  - ✓ If there is any customized requirement about　modify WIFI GPIO number, please modiy the value of CONFIG_WAKEUP_GPIO_IDX in Makefile and **please contact with RTK technical support team first**.
  - ✓ User could use "proc" subsystem to modify the behavior of WIFI GPIO when receive wakeup up packet in non-suspend state.
    - wowlan_gpio_info to show WIFI wakeup host GPIO number and high_active value:

      cat /proc/net/rtlxxxx/wlanX/wowlan_gpio_info
    - modify high_active form 0 to 1 in wowlan_gpio_info:

      echo 1 > /proc/net/rtlxxxx/wlanX/wowlan_gpio_info

      high_active = 0 means pull low wake. (default)

      high_active = 1 means pull high wake.


```
isaac@isaac-B33E:~$ cat /proc/net/rtl8723bu/wlan50/wowlan_gpio_info
wakeup_gpio_idx: 14
high_active: 0
isaac@isaac-B33E:~$ echo 1 > /proc/net/rtl8723bu/wlan50/wowlan_gpio_info
isaac@isaac-B33E:~$ cat /proc/net/rtl8723bu/wlan50/wowlan_gpio_info
wakeup_gpio_idx: 14
high_active: 1
```

(Figure 3)

.) Set up the specific wake up pattern:

- ✓ iw:
  - ■ **iw phyX wowlan enable patterns <pattern>**
- ✓ iwpriv:
  - ■ **iwpriv wlanX wow_set_pattern pattern=<pattern>**
- ✓ Patter Format:

  IP filter This pattern if for a frame containing a ip packet:

  AA:AA:AA:AA:AA:AA:BB:BB:BB:BB:BB:BB:CC:CC:DD:-:-:-:-:-:-:-:EE:-:-:
  FF:FF:FF:FF:GG:GG:GG:GG:HH:HH:II:II

  A: Ethernet destination address

  B: Ethernet source address

  C: Ethernet protocol type

  D: IP header VER+Hlen, use: 0x45 (4 ??is for ver 4, 5 is for len 20)

  E: IP protocol

  F: IP source address (192.168.0.4: C0:A8:00:2C)

  G: IP destination address (192.168.0.4: C0:A8:00:2C)

  H: Source port (1024: 04:00)

  I: Destination port (1024: 04:00)

- ✓ Examples
  - ■ **Wake up on any packet sent to MAC 00:E0:4C:01:F0:EE**
    1. iw phyX wowlan enable patterns 00:E0:4C:01:F0:EE
    2. iwpriv wlanX wow_set_pattern pattern=00:E0:4C:01:F0:EE
  - ■ **Wake up on any ICMP packet sent to MAC 00:E0:4C:01:F0:EE IP 192.168.11.4**
    1. iw phyX wowlan enable patterns
       00:E0:4C:01:F0:EE:-:-:-:-:-:-:08:00:45:-:-:-:-:-:-:-:-:01:-:-:-:-:-:-:c0:
       a8:0b:04:-:-:-:-
    2. iwpriv wlanX wow_set_pattern
       pattern=00:E0:4C:01:F0:EE:-:-:-:-:-:-:08:00:45:-:-:-:-:-:-:-:-:01:-:-:
       -:-:-:-:c0:a8:0b:04:-:-:-:-

(4) The wake yo reasib table:

The DUT could be waked up by the WIFI chip with the following reasons:

Reason Value	Description	Note
0x01	Receive pairwise key change packet.	
0x02	Receive group key change packet.	GTK offload support list: 8723BS/BU, 8192ES/EU, 8812AU
0x04	Receive disassociate packet.	
0x08	Receive de-auth. Packet.	
0x10	AP power off, or could not receive AP's beacon in a period time	
0x21	Receive magic packet.	
0x22	Receive unicast packet.	The unicast packet included IP level.
0x23	Pattern Match	The device could be waked up by specific pattern.