EC2X&AG35-QuecOpen USB Suspend User Guide

LTE Module Series

Rev. EC2X&AG35-QuecOpen_USB_Suspend_User_Guide

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About the Document

History

Revision	Date	Author	Description
1.0	2018-03-21	Gale GAO	Initial

Contents

1 Introduction

This document introduces the usb suspend function between Quectel module and host which can be another solution for sleep/wakeup. But limitation is some hosts don’t support usb suspend which due to operation system kernel version, usb controller and other reasons.

2 USB Suspend Influence Factor

QuecOpen EC2X&AG35 project enable adb debug mode by default, but usb cannot enter into low power mode causes module cannot go sleep. If users confirm usb suspend feature is required, please close adb and refer to ***QuecOpen_EC2X&AG35_Close_Default_ADB_User_Guide.***

Some hosts don’t support usb suspend which due to operation system kernel version, usb controller and other reasons. Specific equipment hardware, software model is not currently doing exact statistics.

Usb Suspend Feature Testing

Please disable adb feature according to Chapter 2.

3 Host Information

3.1.

Intel Sandybridge, Ubuntu 14.04, support usb suspend.

3.2.

Host Check 4G Module

Through dmesg check find that when 4G module plug in host, registered usb node is 1-1.3, then enter this node.

```
1068748.967934] usb 1-1.3: new high-speed USB device number 100 using ehci-pci
1068749.069949] usb 1-1.3: New USB device found, idVendor=2c7c, idProduct=0125
1068749.069954] usb 1-1.3: New USB device strings: Mfr=1, Product=2, SerialNumber=0
1068749.069957] usb 1-1.3: Product: Android
1068749.069960] usb 1-1.3: Manufacturer: Android
1068749.071104] option 1-1.3:1.0: GSM modem (1-port) converter detected
1068749.071255] usb 1-1.3: GSM modem (1-port) converter now attached to ttyUSB1
1068749.071347] option 1-1.3:1.1: GSM modem (1-port) converter detected
1068749.071437] usb 1-1.3: GSM modem (1-port) converter now attached to ttyUSB2
1068749.071536] option 1-1.3:1.2: GSM modem (1-port) converter detected
1068749.071629] usb 1-1.3: GSM modem (1-port) converter now attached to ttyUSB3
1068749.071712] option 1-1.3:1.3: GSM modem (1-port) converter detected
1068749.071811] usb 1-1.3: GSM modem (1-port) converter now attached to ttyUSB4
1068749.073154] GobiNet 1-1.3:1.4 eth1: register 'GobiNet' at usb-0000:00:1a.0-1.3, GobiN
1068749.075024] creating qcqmi1
oot@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1/1-1.3/power#
```

Host Informs Module to Go Sleep and Wakeup

3.3.1. Host inform Module to Go Sleep

Module Terminal:

Module enables autosleep mechanism through API or command line first.

echo mem > /sys/power/autosleep

In order to facilitate debugging, here open the log output:

echo 1 > /sys/module/printk/parameters/perf_mode_console

```
root@mdm9607-perf:~#
root@mdm9607-perf:~# echo 1 > /sys/module/printk/parameters/perf_mode_console
root@mdm9607-perf:~# echo mem > /sys/power/autosleep
root@mdm9607-perf:~#
root@mdm9607-perf:~# [   82.167304] gser_suspend: Un-supported transport: TTY
[   82.171415] msm_otg 78d9000.usb: Avail curr from USB = 2
[   82.176679] msm_hsusb msm_hsusb: CI13XXX_CONTROLLER_SUSPEND_EVENT received
[   82.183872] android_work: android_work: sent uevent USB_STATE=SUSPENDED
[   83.188985] PM: suspend entry 2018-03-20 16:07:49.259793253 UTC
[   83.194077] msm_otg 78d9000.usb: USB in low power mode
[   83.199114] PM: Syncing filesystems ... done.
[   83.226391] Freezing user space processes ...
[   83.231550] Error: returning -512 value
[   83.238220] mbim_read: Waiting failed
[   83.255539] (elapsed 0.025 seconds) done.
[   83.258530] Freezing remaining freezable tasks ... (elapsed 0.002 seconds) done.
[   83.268083] Suspending console(s) (use no_console_suspend to debug)
```

Host Terminal:

Inform module to allow suspend: echo auto > level

3ms bus will always be idle, then usb device go sleep.

```
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# ls
active_duration       connected_duration  runtime_active_kids  runtime_suspend
async                 control             runtime_active_time  runtime_usage
autosuspend           level               runtime_enabled      wakeup
autosuspend_delay_ms  persist             runtime_status       wakeup_abort_co
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# echo auto > level
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
```

3.3.2. Host inform Module to Wakeup

Host Terminal:

Wakeup module, release usb bus suspend state. echo on > level

```
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# echo auto > level
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# echo on > level
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
```

At this time, module will wake up and hold wakelock.

```
4,1069,6614093872,-;Resume: sysfs_notify wakeup_in
6,1070,6614117033,-;msm_hsusb msm_hsusb: CI13XXX_CONTROLLER_RESUME_EVENT received
 SUBSYSTEM=platform
 DEVICE=+platform:msm_hsusb
3,1071,6614117139,-;gser_resume: Un-supported transport: TTY
6,1072,6614117217,-;msm_otg 78d9000.usb: Avail curr from USB = 500
 SUBSYSTEM=platform
 DEVICE=+platform:78d9000.usb
6,1073,6614117471,-;android_work: android_work: sent uevent USB_STATE=RESUMED
6,1074,6614157849,-;PM: resume of devices complete after 74.639 msecs
4,1075,6614159113,-;Restarting tasks ... done.
6,1076,6614168861,-;PM: suspend exit 2017-12-07 09:33:30.736907077 UTC
4,1075,6614159113,-;Restarting tasks ... done.
6,1076,6614168861,-;PM: suspend exit 2017-12-07 09:33:30.736907077 UTC
```

```
root@mdm9607-perf:~#
root@mdm9607-perf:~#
root@mdm9607-perf:~# awk '$6 != 0 {print $1"  "$6}' /sys/kernel/debug/wakeup_sou
rces
name  active_since
msm_otg  24504
root@mdm9607-perf:~#
```

3.4.

Bothway Sleep and Wakeup

Module also can wakeup host. Configure host to echo enabled > wakeup, when host is in sleep mode, module can wake up host by sending data to bus.

(1) Enable host remote wakeup function: echo enabled > wakeup

```
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# cat wakeup
disabled
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# echo enabled > wakeup
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# cat wakeup
enabled
root@roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
```

(2) Host go sleep mode: echo mem > /sys/power/state

```
roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power# echo mem > /sys/power/state
roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
roddick-OptiPlex-790:/sys/bus/usb/devices/1-1.3/power#
```

(3) Module terminal send data to bus to wake up host. (/dev/ttyGS0 are usb virtual device)

```
root@mdm9607-perf:~#
root@mdm9607-perf:~# echo df > /dev/ttyGS0
root@mdm9607-perf:~# [  518.945679] msm_hsusb msm_hsusb: CI13XXX_CONTROLLER_RESUME_EVENT received
[  518.951545] gser_resume: Un-supported transport: TTY
[  518.956450] msm_otg 78d9000.usb: Avail curr from USB = 500
[  518.962361] android_work: android_work: sent uevent USB_STATE=RESUMED
[  523.310237] gser_suspend: Un-supported transport: TTY
[  523.314336] msm_otg 78d9000.usb: Avail curr from USB = 2
[  523.319601] msm_hsusb msm_hsusb: CI13XXX_CONTROLLER_SUSPEND_EVENT received
[  523.326654] android_work: android_work: sent uevent USB_STATE=SUSPENDED
[  525.009555] PM: suspend entry 2018-03-20 16:38:00.156767503 UTC
[  525.014657] msm_otg 78d9000.usb: USB in low power mode
[  525.019679] PM: Syncing filesystems ... done.
[  525.047138] Freezing user space processes ...
[  525.052806] Error: returning -512 value
[  525.059583] mbim_read: Waiting failed
[  525.064669] (elapsed 0.013 seconds) done.
[  525.067662] Freezing remaining freezable tasks ... (elapsed 0.002 seconds) done.
[  525.076978] Suspending console(s) (use no_console_suspend to debug)
```

3.5. Case

(1) Enable module autosleep:
echo mem > /sys/power/autosleep

(2) Host informs module prepare to go sleep, and set module remote waking-up host, meantime host go sleep mode.
echo auto > level
echo enabled > wakeup
echo mem > /sys/power/state

(3) Then through call, SMS, IP data can wakeup module; app code execute wakelock and send data to usb bus to wake up host.