

RALINK TECHNOLOGY, CORP.

RALINK EHCI/OHCI USB POWER SAVING APPLICATION NOTE

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1 INTRODUCTION

This application note describes how the power-saving function works, and the relationship between the Uboot and the Linux EHCI & OHCI driver in SDK 3.5, and its potential issue. This AN could be applied on RT3883/RT3662 chipset.

2 SCOPE

A potential issue may happen if user chooses a mixed version pair of SDK Linux and Uboot. A confirmed pair is RT3883/RT3662 SDK3.5 Uboot + SDK 3.4 Linux, this pair may cause system to freeze during boot up.

3 DESCRIPTION

To reduce power consumption and lower the working temperature, SDK3.5 and later versions disable the USB power and clock gating during the boot-loader initialization stage. The advantage is more power-saving. The detail is SDK 3.5 Uboot would disable the USB HW module by default. And then the SDK 3.5 EHCI/OHCI Linux driver have to re-enable USB HW module before accessing USB related registers.

However, if user chooses an unexpected pair, ex. SDK3.5 Uboot + SDK 3.4 Linux, the system may freeze at OHCI initialization during boot up as following log. This is because the SDK 3.5(or later) Uboot would disable the USB HW module to save power, but then the older SDK Linux(SDK 3.4) EHCI/OHCI driver does not re-enable the USB HW module before accessing USB function.

```
...  
rt3xxx-ohci rt3xxx-ohci: RT3xxx OHCI Controller  
rt3xxx-ohci rt3xxx-ohci: new USB bus registered, assigned bus number 2  
rt3xxx-ohci rt3xxx-ohci: irq 18, io mem 0x101c1000          <<<<< freeze at here
```

To solve the issue(freeze at OHCI init), please disable the USB(EHCI/OHCI) power saving feature in SDK 3.5(and later) Uboot as following:

In Uboot/lib_mips/board.c

```
void board_init_r (gd_t *id, ulong dest_addr)
{
...

    //void config_usb_ehcihci(void);

    //config_usb_ehcihci();

...
}
```

And then rebuild Uboot.

4 CONCLUSION

USB power saving may cause freeze situation if unmatched Linux & Uboot are mixed (SDK 3.5 or later Uboot with SDK 3.4 Linux). We suggest customer to use the matched Uboot & Linux.