

RALINK TECHNOLOGY, CORP.

RALINK Auto-Frequency and Power Save Application Note

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1. Introduction

The RT3352/RT5350 SOC has the capability of auto-frequency and power saving.

- CPU Auto-Frequency (RT3352/RT5350)
- SDR Power Pre-charge Power Down (RT3352/RT5350)
- DDR self Refresh Power Save (RT3352)

Notice: Those new features are supported by SDK 3.5.2.0 or following version.

2. Setup

2.1 How to turn on CPU Auto-Frequency

For RT3352/RT5350, We can turn on CPU auto frequency function by

1. Modifying config.mk in Uboot and rebuild uboot firmware

```
...  
RALINK_DDR_CONTROLLER_OPTIMIZATION = OFF  
RALINK_CPU_AUTO_FREQUENCY = ON  
RALINK_SDR_PRECHARGE_POWER_DOWN = OFF  
RALINK_DDR_SELF_REFRESH_POWER_SAVE_MODE = OFF  
...
```

\$make

2. Set Linux Kernel Configuration and then rebuild linux firmware

\$make menuconfig --->

Machine selection ---> [*] Ralink External Timer

.....

\$make dep; make

2.2 How to turn on SDR Pre-charge Power Down

For RT3352/RT5350, We can turn on SDR power save by

1. Modifying config.mk in Uboot and rebuild uboot firmware

```
...  
RALINK_DDR_CONTROLLER_OPTIMIZATION = OFF  
RALINK_CPU_AUTO_FREQUENCY = OFF  
RALINK_SDR_PRECHARGE_POWER_DOWN = ON  
RALINK_DDR_SELF_REFRESH_POWER_SAVE_MODE = OFF  
...
```

\$make

2.3 How to turn on DDR Self Refresh Power Save

For RT3352 , We can turn on DDR power save by

1. Modifying config.mk in Uboot and rebuild uboot firmware

...

RALINK_DDR_CONTROLLER_OPTIMIZATION = OFF

RALINK_CPU_AUTO_FREQUENCY = OFF

RALINK_SDR_PRECHARGE_POWER_DOWN = OFF

RALINK_DDR_SELF_REFRESH_POWER_SAVE_MODE = ON

...

\$make

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3. Check Function

You can check if those functions are enabled or disabled by register.

- CPU Auto-Frequency

Turn off:

```
#  
# reg s b00000000  
switch register base addr to 0xb0000000  
# reg r 40  
0x34501  
#
```

Turn on:

```
# reg s b00000000  
switch register base addr to 0xb0000000  
# reg r 40  
0x80035f41  
#
```

- SDR Pre-charge Power Save

Turn off:

```
# reg s b0000300  
switch register base addr to 0xb0000300  
# reg r 1c  
0x3ffff  
# reg r 4  
0xe1110600  
#
```

Turn on:

```
# reg s b0000300  
switch register base addr to 0xb0000300  
# reg r 1c  
0x1  
# reg r 4  
0xf1110600  
#
```

- DDR Self Refresh Power Save

Turn off:

```
# reg s b0000300  
switch register base addr to 0xb0000300  
# reg r 1c  
0x3ffff  
# reg r 18  
0x3  
#
```

Turn on:

```
# reg s b0000300  
switch register base addr to 0xb0000300  
# reg r 1c  
0x6d000001  
# reg r 18  
0x13  
#
```