MTK PASR Framework

Outline

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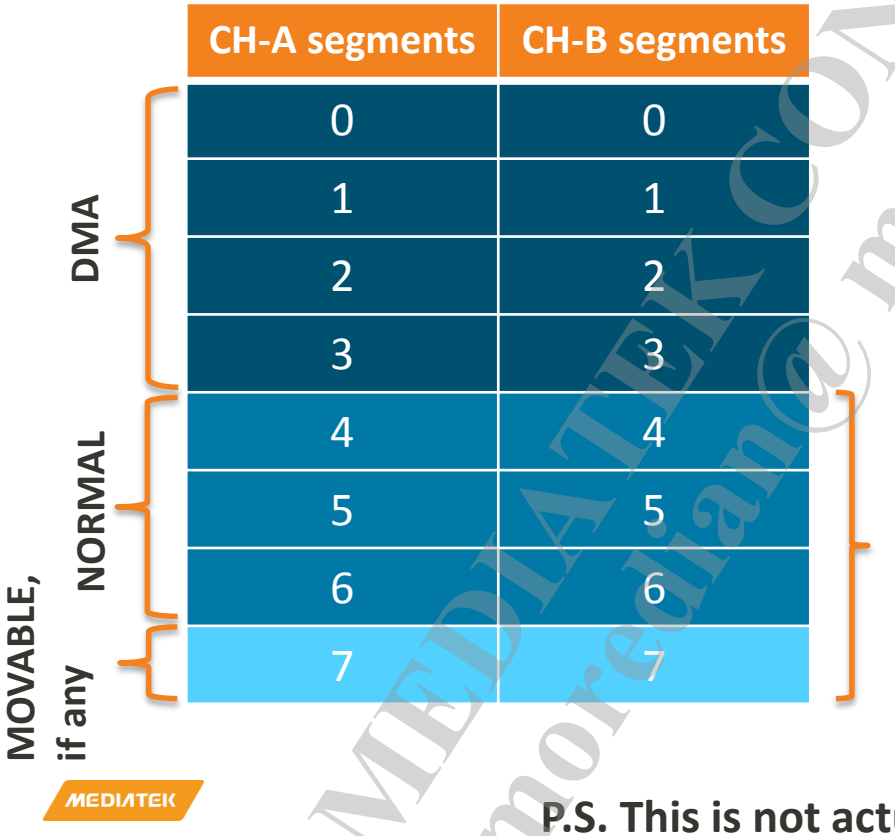
Preliminary

- **Latest MTK PASR is implemented based on the framework of ZMC 2.0 (Zone Movable CMA 2.0)**
  - ZMC is a MTK's proprietary framework to support Memory-Lowpower(PASR)

ZMC 2.0 Data collection flow

- **Segment-based allocation through CMA**
  - No drop of clean file pages for better UX



1st allocation attempt

2nd allocation attempt
if previous one is **successful**

⋮

P.S. This is not actual DRAM segment layout, just for explanation.

PASR CONTROL FLOW

Initialization

Kernel DTS

```
zone-movable-cma-memory {
        compatible = "mediatek,zone_movable_cma";
        size = <0 0xffc00000>;
        /* 256MB alignment */
        alignment = <0 0x10000000>;
        alloc-ranges = <0 0xc0000000 1 0x00000000>;
```

late_initcall

ZMC 2.0 framework

zone_sizes_init

cma_init_reserved_mem

memory_lowpower _task_init

Create memory lowpower thread

Hook to kernel PM

if any ZMC feature exists

N

Y

Destroy ZMC DTS node

mtkpasr_init

Acquire DRAM configuration

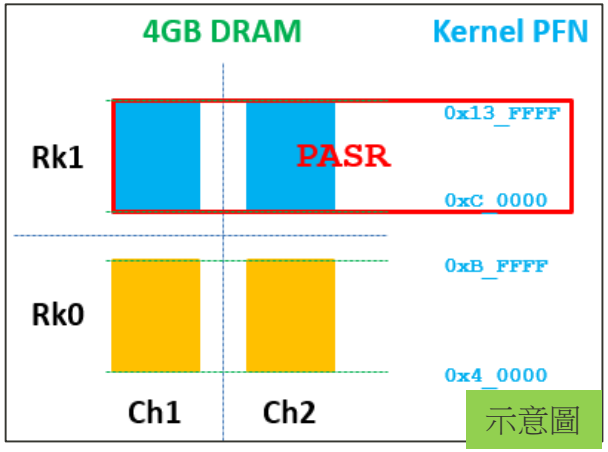
Memory-lowpower driver

Memory-lowpower init done

acquire ZMC's base & size

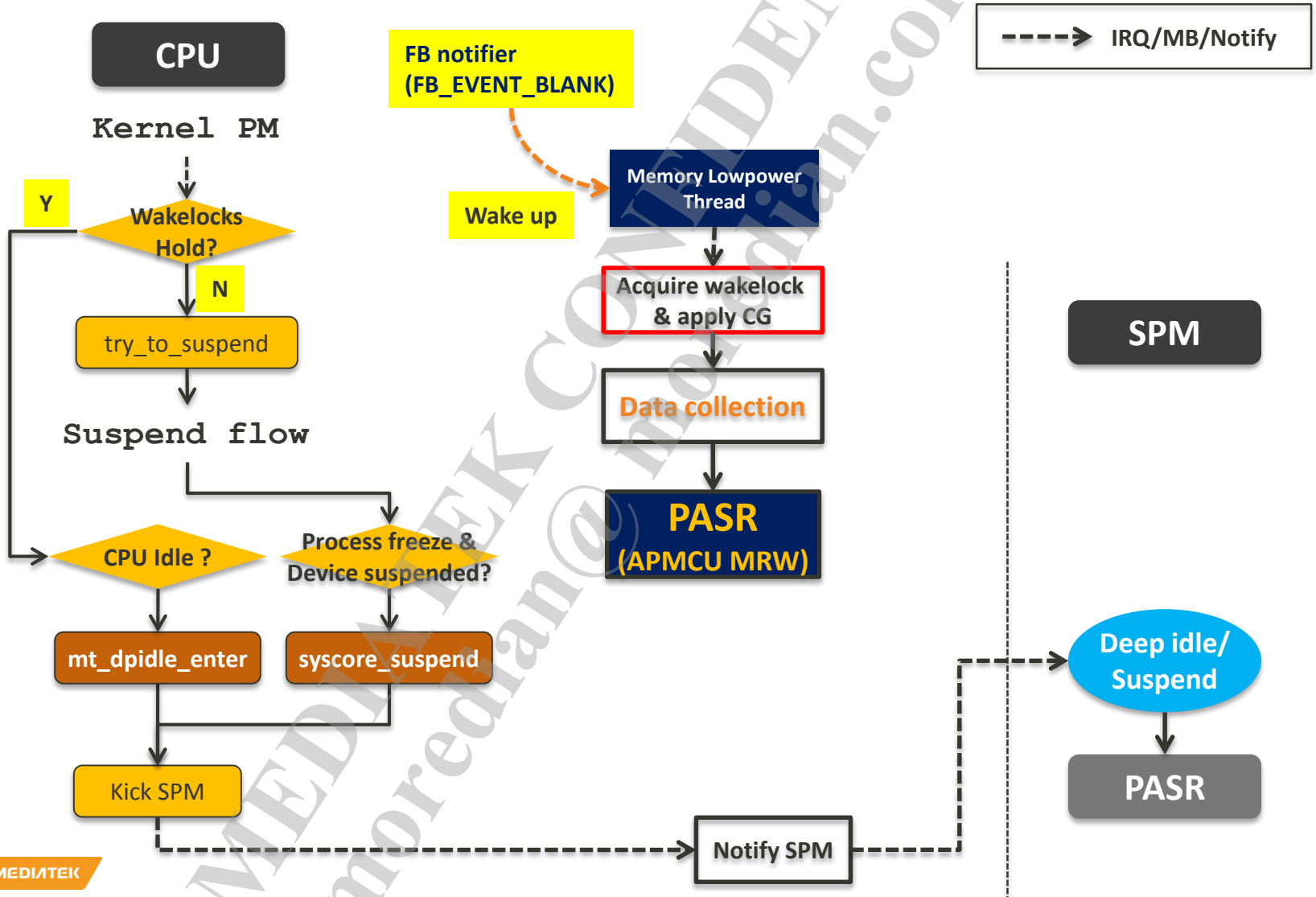
Construct rank/segment

mtkpasr_init done



示意圖

Enter and Exit



RELATED KERNEL SETTINGS

Device Tree Node

```
reserved-memory {
        #address-cells = <2>;
        #size-cells = <2>;
        ranges;

        zone-movable-cma-memory {
                compatible = "mediatek,zone_movable_cma";
                size = <0 0xffc00000>;
                alignment = <0 0x10000000>;
                alloc-ranges = <0 0xc0000000 1 0x00000000>;
        };
};
```

Request size for ZMC 2.0
– **available – 4MB**

Possible range for ZMC reservation
– In this case, it allows the reservation starting from
0xC000_0000

available will be adjusted to the correct value at the stage of LK

Kernel Configuration

- **SW framework**
  - CONFIG_MTK_MEMORY_LOWPOWER=y
    - Memory-Lowpower
  - CONFIG_MTK_PASR=y
    - PASR
- **HW configuration flow**
  - CONFIG_MTK_DRAMC_PASR=y

PASR power saving at flight mode suspend

- MT6763
  - Flight mode suspend約可多省下0.259mA
- MT6771
  - Flight mode suspend約可多省下0.427mA

- 該數據會受到測試當下記憶體用量，以及平台耗電差異的影響，因此會有變動
- 通常2GB LP4 PASR-masked 約可帶來0.4xmA的省電幅度

THANKS