高通电池管理基于QPNP电压模式

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本篇文章主要介绍了"高通电池管理基于QPNP电压模式"，主要涉及到高通电池管理基于QPNP电压模式方面的内容，对于高通电池管理基于QPNP电压模式感兴趣的同学可以参考一下。

MSM8909+Android5.1.1电池管理(3)--PMIC VM-BMS(qpnp-vm-bms.txt学习)

来源：http://www.infocool.net/kb/Android/201611/225970.html

CV:Constant Voltage恒压

SMMB charger：Switch-ModeBattery Charger and Boost peripheral开关模式电池充电器和升压外围设备

OCV：Open circuitvoltage

EOC：End OfCharge充电结束

UUC：UnusableCapacity不可用电量

对应的源代码文件为\kernel\drivers\power\qpnp-vm-bms.c，高通QPNP电压模式的PMIC电池管理系统(Qualcomm'sQPNP Voltage-Mode(VM) PMIC Battery Management System)，提供接口给客户端来读取电池相关属性，它的主要功能是基于周期性采样VBAT(vattery voltage)来计算SOC(state ofcharge)

下面学习kernel\Documentation\devicetree\bindings\power\qpnp-vm-bms.txt

父节点需要的属性如下，见kernel\arch\arm\boot\dts\qcom\msm-pm8909.dtsi文件的pm8909_bms:
qcom,vmbms节点
- compatible : Must be "qcom,qpnp-vm-bms" for the BM driver.

- reg :Offset and length of the PMIC peripheral register map.
比如reg = <0x4000 0x100>;

- interrupts : The interrupt mappings.
The format should be
<slave-id peripheral-idinterrupt-number>.
比如interrupts = <0x0 0x40 0x0>,
<0x00x40 0x3>,
<0x00x40 0x4>,
<0x00x40 0x5>;

- interrupt-names : names for the mappedbms interrupt
Thefollowing interrupts are required:
0: leave CV state离开恒压状态
1: enter CV state
2: good ocv generated
3: ocv_thr
4: fifo update
5: fsm state changed
比如interrupt-names = "leave_cv",
"ocv_thr",
"fifo_update_done",
"fsm_state_change";

Additionally, optional subnodes may beincluded:

此外，可选的子节点可包含：

- qcom,batt-pres-status : A subnode with aregister address for the SMBB
batteryinterface's BATT_PRES_STATUS register. If this node is
added,then the BMS will try to detect offmode battery removal
viathe battery interface's offmode battery removal circuit.

这是带有一个关于SMMB电池接口寄存器BATT_PRES_STATUS地址的子节点，如果增加了此节点，BMS将会尝试通过电池接口的offmode电池接插电路检测offmode电池接插

```
qcom,batt-pres-status@1208 {
                reg= <0x1208 0x1>;
            };
```

- qcom,battery-data : A phandle to a nodecontaining the available batterydata
profiles.See the batterydata bindings documentation for more
details.

此节点的值是一个phandle，它指向一个包含有效电池曲线数据的节点，详见\kernel\Documentation\devicetree\bindings\batterydata\batterydata.txt

在kernel\arch\arm\boot\dts\qcom\msm8909-qrd-skue.dtsi中定义

```
/ {
    qrd_batterydata:qcom,battery-data {
        qcom,rpull-up-kohm= <0>;
        qcom,vref-batt-therm= <1800000>;

        #include"batterydata-qrd-skue-4v35-2000mah.dtsi"
    };
};

&pm8909_bms {
    status= "okay";
    qcom,resume-soc= <95>;
```

```
        qcom,use-reported-soc;
        qcom,force-bms-active-on-charger;
        qcom,battery-data = <&qrd_batterydata>;
};
```

Parent node required properties:

父节点需要的属性

- qcom,v-cutoff-uv : cutoff voltage wherethe battery is considered dead in
micro-volts(微伏).

关机电压，用于计算SOC，如修改关机电压，除了修改这里，还需要修改电池曲线数据的qcom,v-cutoff-uv，其实最好是用电池曲线数据里的。

比如qcom,v-cutoff-uv = <3400000>;

- qcom,max-voltage-uv : maximum voltage forthe battery in micro-volts.

电池最大的电压，单位为毫伏，比如qcom,max-voltage-uv =<4200000>;

- qcom,r-conn-mohm : connector resistancein milli-ohms.

连接器电阻，如qcom,r-conn-mohm = <0>;

- qcom,shutdown-soc-valid-limit : If theocv upon restart is within this
distanceof the shutdown ocv, the BMS will try to force
thenew SoC to the old one to provide charge continuity.
Thatis to say,
if(abs(shutdown-soc - current-soc) < limit)
thenuse old SoC.

如qcom,shutdown-soc-valid-limit =<100>;

- qcom,low-soc-calculate-soc-threshold :The SoC threshold for when
theperiodic calculate_soc work speeds up. This ensures

SoCis updated in userspace constantly when we are near
shutdown.

当SOC低于此阈值，calculate_soc缩短工作周期，这样可以在接近关机的时候不断地更新用户空间的SOC。如qcom,low-soc-calculate-soc-threshold =<15>;

- qcom,low-voltage-threshold : The batteryvoltage threshold in micro-volts for
whenthe BMS tries to wake up and hold a wakelock to
ensurea clean shutdown.

低压阈值，用于关机，当达到此值BMS尝试唤醒和持有唤醒锁来保证一个干净的关机。如qcom,low-voltage-threshold = <3450000>;

- qcom,low-voltage-calculate-soc-ms : Thetime period between subsequent
SoCrecalculations when the current voltage is below
qcom,low-voltagethreshold. This takes precedence over
qcom,low-soc-calculate-soc-ms.

当电池电压低于qcom,low-voltage threshold，随后重新计算soc的时间周期，者优先于qcom,low-soc-calculate-soc-ms，如qcom,low-voltage-calculate-soc-ms = <1000>;。

- qcom,low-soc-calculate-soc-ms : The timeperiod between subsequent
SoCrecalculations when the current SoC is below
qcom,low-soc-calculate-soc-threshold.This takes
precedenceover qcom,calculate-soc-ms.

当前SOC低于qcom,low-soc-calculate-soc-threshold时，随后重新计算SOC的时间周期，这优先于qcom,calculate-soc-ms，如low-soc-calculate-soc-ms = <5000>;

- qcom,calculate-soc-ms : The time periodbetween subsequent SoC
recalculationswhen the current SoC is above or equal
qcom,low-soc-calculate-soc-threshold.

当前SOC>= qcom,low-soc-calculate-soc-threshold时的计算soc的时间周期。如qcom,calculate-soc-ms =<20000>;

- qcom,volatge-soc-timeout-ms : The timeoutperiod after which the module starts
reportingvolage based SOC and does not use the VMBMS
algorithmfor SOC calculation.
如果没有使用VMBMS算法来计算SOC，模块在此时间后基于SOC来报告电压。如qcom,volatge-soc-timeout-ms =<60000>;

- qcom,bms-vadc: Corresponding VADCdevice's phandle.
相应的VADC设备的phandle，qcom,bms-vadc = <&pm8909_vadc>;

- qcom,bms-adc_tm: Corresponding ADC_TMdevice's phandle to set recurring
measurements andreceive notifications for vbatt.
相应ADC_TM设备的phandle，用于设置循环测量和接受vbatt的通知。如qcom,bms-adc_tm = <&pm8909_adc_tm>;

- qcom,pmic-revid : Phandle pointing to therevision peripheral node.
指向revision外围节点的phandle，如qcom,pmic-revid = <&pm8909_revid>;

Parent node Optional properties
父节点可选属性
- qcom,s1-sample-interval-ms: The samplingrate in ms of the accumulator in state
S1.(i.e) the rate at which the accumulator is being
filledwith vbat samples. Minimum value = 0 and
Maximumvalue = 2550ms.
- qcom,s2-sample-interval-ms: The samplingrate in ms of the accumulator in state
S2.(i.e) the rate at which the accumulator is being

filledwith vbat samples. Minimum value = 0 and
Maximumvalue = 2550ms.
- qcom,s1-sample-count: The number ofsamples to be accululated for one FIFO in
stateS1. Possible values are - 0, 4, 8, 16, 32, 64, 128,
256.
- qcom,s2-sample-count: The number ofsamples to be accululated for one FIFO in
stateS2. Possible values are - 0, 4, 8, 16, 32, 64, 128,
256.
- qcom,s1-fifo-legth: Number of FIFO's to be filled in state S1, togenerate
thefifo_update_done interrupt. Possile values - 0 to 8
- qcom,s2-fifo-legth: Number of FIFO's to be filled in state S2, togenerate
thefifo_update_done interrupt. Possible values- 0 to 8
上面几个可选属性没有用到就不描述了。

- qcom,force-s3-on-suspend : Bool propertyto force the BMS into S3 (sleep) state
whileentering into system suspend.
如有此项，当系统休眠时此属性强迫BMS进入S3(sleep)状态。

- qcom,force-bms-active-on-charger: Boolproperty to keep BMS FSM active
ifcharger is present.
只要充电器在，保证BMS FSM激活状态。

- qcom,report-charger-eoc : Bool propertyto indicate if BMS needs to indicate
EOCto charger.
指示BMS需要通知EOC(充电结束)给充电器

- qcom,ignore-shutdown-soc: A boolean thatcontrols whether BMS will
tryto force the startup SoC to be the same as the
shutdownSoC. Defining it will make BMS ignore the

shutdownSoC.

控制BMS是否尝试去强迫启动时SOC和关机SOC一样，如果定义此项将使BMS忽略关机SOC，这意味着开机时不会用上次关机SOC，一般情况下都需要这样，所以没有采用此属性

- qcom,use-voltage-soc : A boolean thatcontrols whether BMS will use
voltage-basedSoC instead of a coulomb counter based
one.Voltage-based SoC will not guarantee linearity.

BMS根据此项的值来决定是否采用基于电压的SOC来替代基于库伦电量计的方式，基于电压的SOC不保证线性性。

- qcom,disable-bms : Bool property to disable the VMBMS hardware module.
Enablethis property if BMS is not supported or an external
fuelgauge is used.

此属性用于关闭VM BMS硬件模块，在不支持BMS或是使用一个外部电量计时使能此属性。

- qcom,s3-ocv-tolerence-uv : The S3 stateOCV tolerence threshold in uV. The
LSBvalue is 300uV and maximum value is 76500uV.

S3状态OCV相容阈值，最低值是300uV和最大值是76500uV。

- qcom,low-soc-fifo-length : The fifolength (of S2 STATE) to be used at lower
SOCs.If this value is not specified the system uses
defaultlenght.

低SOC时S2状态FIFO长度，如果没有指定则系统采用默认长度，这里为qcom,low-soc-fifo-length=<2>;

- qcom,resume-soc: Capacity in percent at which charging should resume
whena fully charged battery drops below this level.

当充满的电池百分比低于此值，则重新开始充电。如qcom,resume-soc =<99>;

- qcom,low-temp-threshold : The temperaturethreshold below which the IBAT
averagingand UUC smoothening is disabled. This value
isin deci-degrees centigrade. If not specified it
defaultsto 0.

当温度阈值低于此值，禁用IBAT求取平均值和UUC(不可用电量)平滑功能，如没指定默认为0，我们这里没有指定。

- qcom,ibat-avg-samples : The number ofsamples to be averaged for IBAT
estimation.If not specified it defaults to 16.
Thepossible values are 1 to 16.

IBAT平均值估算的采用次数，如没有指定默认为16，有效值1~16，我们没有指定。

- qcom,batt-aging-comp : A boolean thatdefines if battery aging compensation
isenabled.

定义此项表示使能电池老化补偿，但我没有用到，建议使用。

- qcom,use-reported-soc : Bool property toenable the reported_soc logic. To
enablethis feature, qcom,resume-soc must be defined as
aproper value. The BMS is also required to control the
charging,discharging and recharging.

此项使能reported_soc逻辑，而且要定义qcom,resume-soc为一个合适的值，BMS也需要控制充电、停止充电和重新充电。高通给出的代码默认是定义qcom,use-reported-soc，但我们核心板厂家注释掉此项，并增加qcom,report-charger-eoc

qcom,batt-pres-status node requiredproperties:
qcom,batt-pres-status节点需要的属性值
- reg : offset and length of the PMIC LBCbattery interface BATT_PRES_STATUS
register.

如qcom,batt-pres-status@1208 {

```
                reg= <0x1208 0x1>;
        };

qcom,qpnp-chg-pres required properties:
- reg : offset and length of the PMIC LBCcharger interafce CHARGER_OPTION
        register.
如qcom,qpnp-chg-pres@1008 {
                reg= <0x1008 0x1>;
        };
```


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