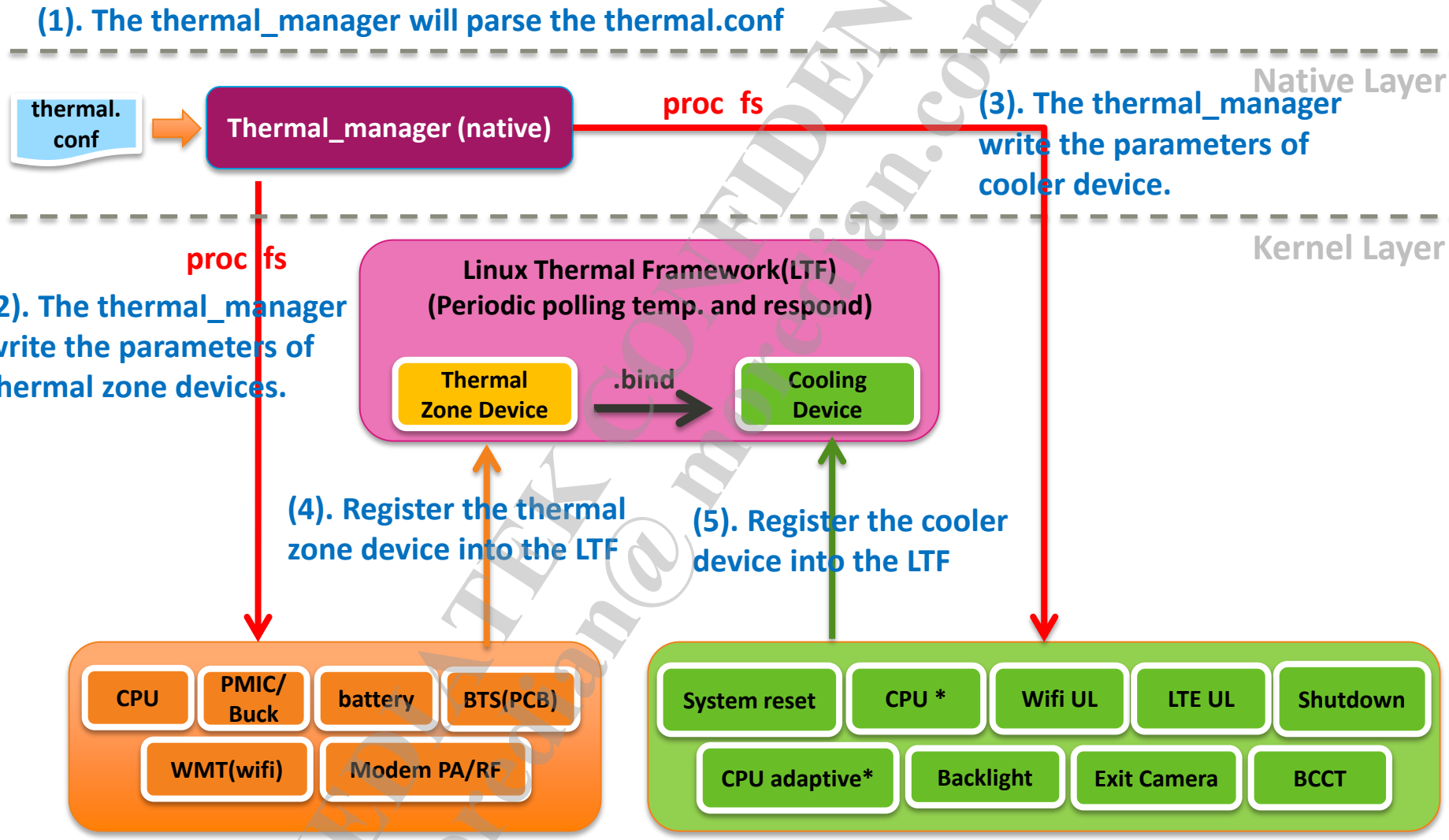
The thermal.conf file introduce

Agenda

- How the thermal.conf works
- How the thermal.conf file is generated
- The parameters in the thermal.conf

How the thermal.conf works

How the thermal.conf works (1)



How the thermal.conf works (2)

In the thermal.conf file, there are the following information:

(1). The configuration parameters of the thermal zone device

(2). The configuration parameters of the cooler device

(3). The relationship parameters of binding between thermal zone device and cooler device.

How the thermal.conf file is generated

Thermal config tool Overview

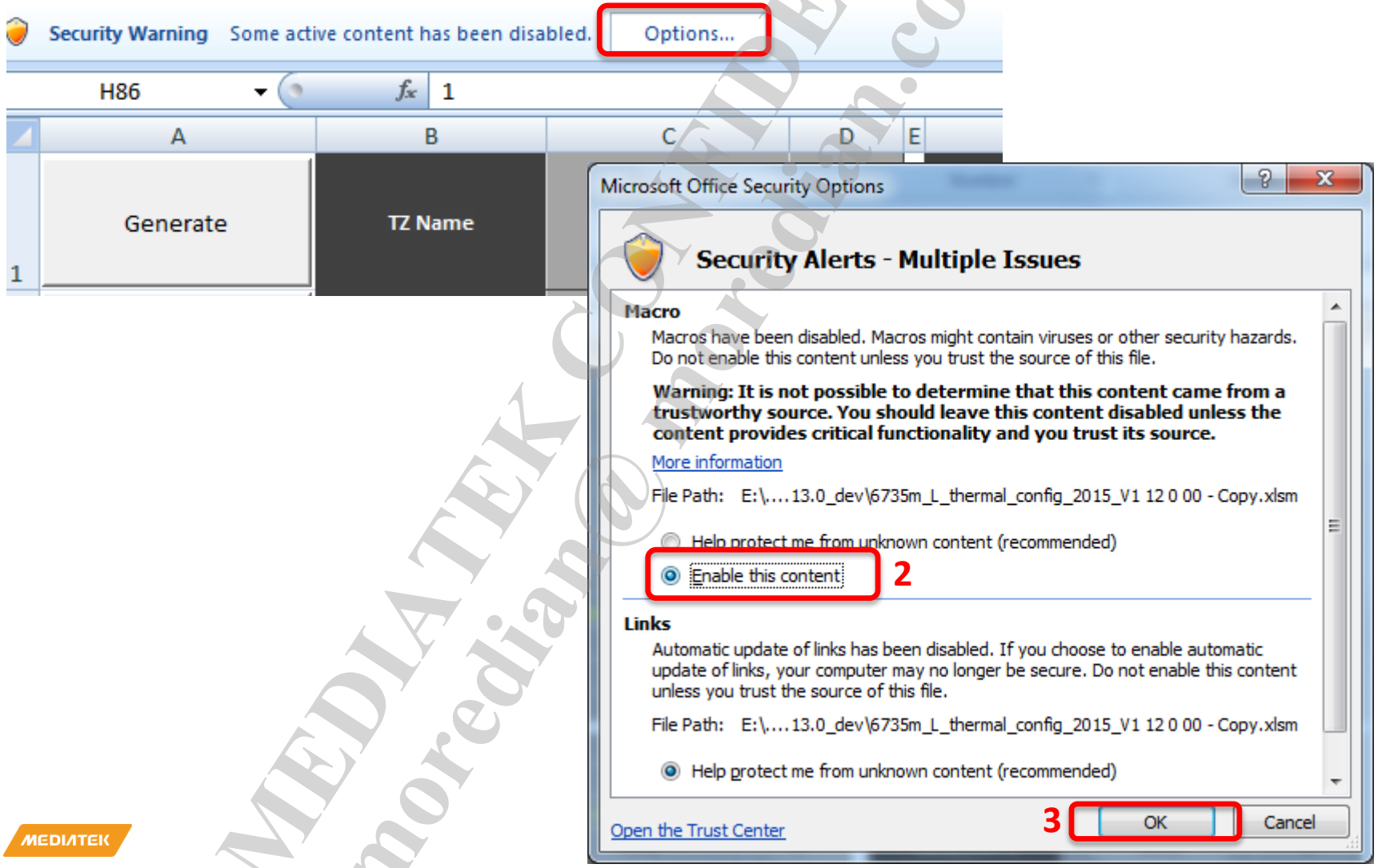
decrypt	Using for decrypt the thermal.conf file
encrypt	Using for encrypt the file
mtc	The thermal policy configuration file generated by excel will in this folder.
parse	

- 6580_L_thermal_config_2015_0504.xlsm
- 6582_K_thermal_config_2007_V1.7.1.xlsm
- 6582_L_thermal_config_2007_V1.10.0.00.xlsm
- 6582lte_K_thermal_config_2007_V1.7.6.xlsm
- 6582lte_L_thermal_config_2007_V1.10.0.00.xlsm
- 6592_K_thermal_config_2007_V1.8.2.08.xlsm
- 6592_L_thermal_config_2007_V1.10.0.00.xlsm
- 6592lte_K_thermal_config_2007_V1.8.3.01.xlsm
- 6592lte_L_thermal_config_2007_V1.10.0.00.xlsm
- 6595_K_thermal_config_2007_V1.9.0.10.xlsm
- 6595_K_thermal_config_2007_V1.9.0.16_MUTT.xlsm

The excel files are using to configure the parameters and to generate the thermal.conf file

How to use the excel files (1)

Step 1: Open the excel file:

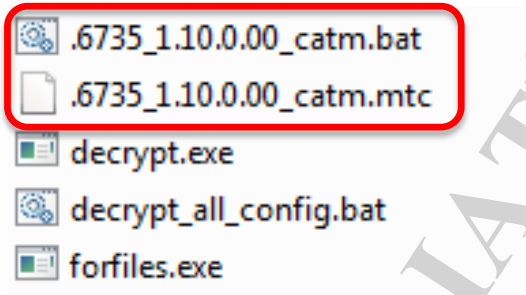


How to use the excel files (2)

Step 2: click the Generate button

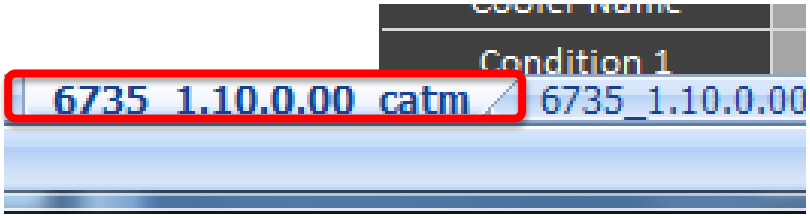
A	B	C	D	E	F	G
Generate	TZ Name	mtktscpu	ENABLE		TZ Name	mtktspmi
Duplicate	Number of Trip	3			Number of Trip	1
Delete	Trip Point	117000			Trip Point	145000
	Type	0			Type	0

Step 3: in the mtc folder, we will get the following files:



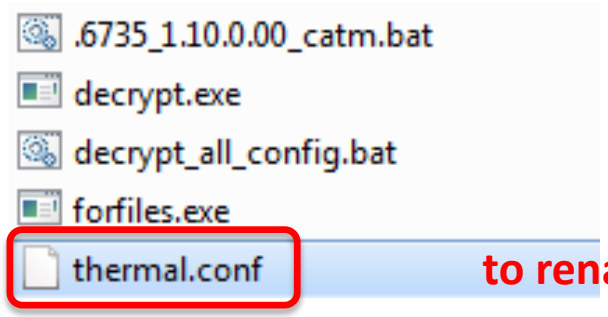
These files are generated by that excel file.

The name of the mtc file is the same as the tag name of the excel file.



How to use the excel files (3)

Step 4: rename the mtc file to “thermal.conf”



to rename “.6735_1.10.0.00_catm.mtc” to “thermal.conf”

Step 5: “adb push” command to replace the file with the same name

```
adb push “thermal.conf” /system/etc/.tp/
```

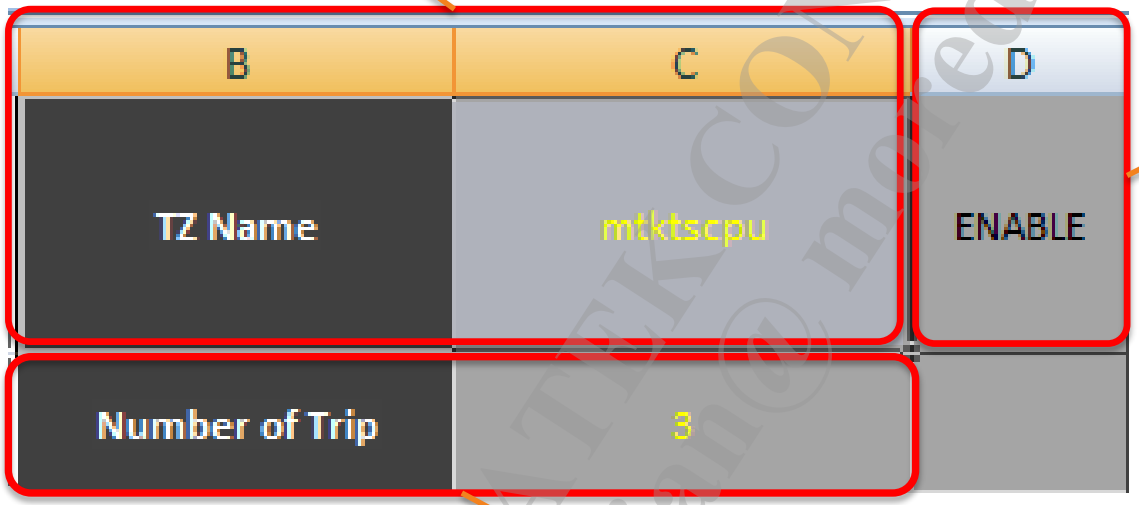
Use the command above to replace the file with the same name in the “/system/etc/.tp” path of the phone.

Step 6: reboot the phone, the new configuration will work.

The parameters in the excel file (1)

About the terms of thermal management, please refer to the document ”Thermal_Management_MT6735m.pdf” first.

thermal zone device is mtktscpu



This thermal zone device is enabled.

There are 3 thermal cooler devices being bound to this thermal zone device.

The parameters in the excel file (2)

Trip Point	117000	
Type	0	
Cooler Name	mtktscpu-sysrst	
Condition 1	NULL	0
Condition 2	NULL	0
Condition 3	NULL	0
Trip Point	100000	
Type	0	
Cooler Name	mtk-cl-shutdown00	
Condition 1	NULL	0
Condition 2	NULL	0
Condition 3	NULL	0
Trip Point	66000	
Type	0	
Cooler Name	cpu_adaptive_0	
Condition 1	EXIT	7000
Condition 2	NULL	0
Condition 3	NULL	0

The temperature point to active the cooler device.

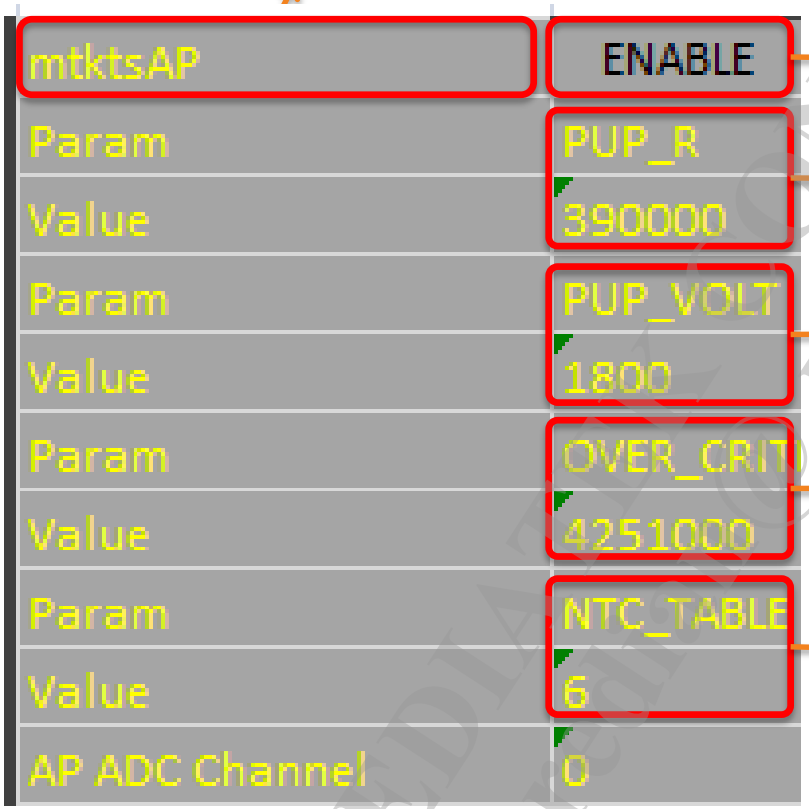
Cooler device is “mtktscpu-sysrst”

Additional condition:
it means the exit point (the temperature point to deactive the cooler device) is 66000-7000

The parameters in the excel file (3)

The following is the configuration table of the NTC on board near AP:

The NTC is used for PCB near AP



The NTC is enabled.

Pull-up resistor is 390K

Pull-up voltage is 1.8V

the reference value when temperature is 0.

The resistor value of NTC is 100K

If NTC is 10K, we should choose 4 for NTC_TABLE.

The parameters in the excel file (4)

The following table means cooler device “mtktswmt-pa1” is disabled.
Thus, we CAN NOT bind it to some thermal zone device.

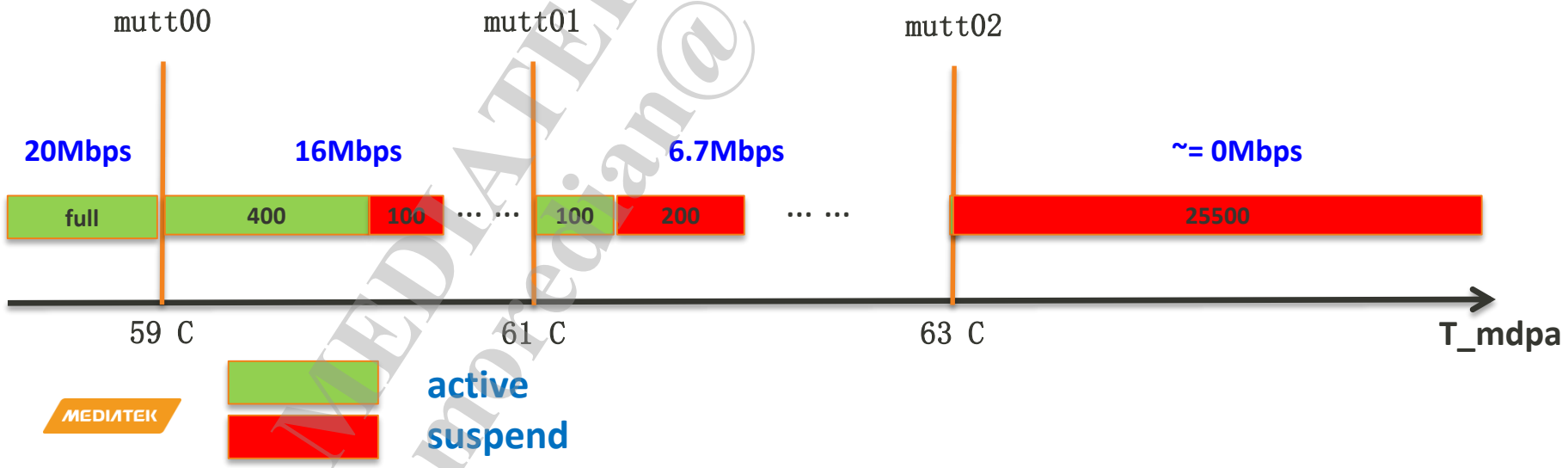
Cooler Name	mtktswmt-pa1	DISABLE
Extra	DurX (Sec)	15
Extra	ThroU (X/Y)	1/3
Extra	DurY (Sec)	5
Extra	ThroL (X/Y)	3/2
Extra	RstX (Sec)	5

The parameters in the excel file (5)

The following is the configuration parameters of cooler device "mtk-cl-mutt00"

Cooler Name	mtk-cl-mutt00	ENABLE
Extra	klog on	1
Extra	mutt00 active ms	400
Extra	mutt00 suspend ms	100
Extra	mutt01 active ms	100
Extra	mutt01 suspend ms	200
Extra	mutt02 active ms	100
Extra	mutt02 suspend ms	25500

When cooler mutt00 is active, the active time and suspend time of the LTE modem.



The parameters in the excel file (6)

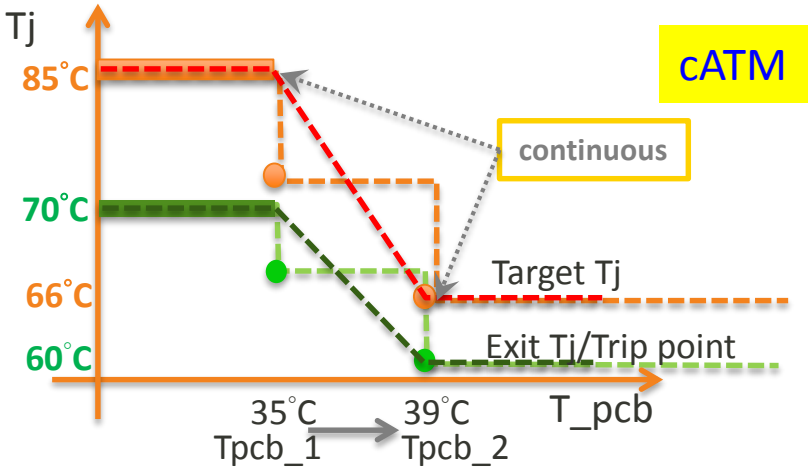
The following is the configuration parameters of ctm

Cooler Name	ctm	ENABLE
Extra	ctm on	1
Extra	Target Tj 0	85000
Extra	Target Tj 2	66000
Extra	Tpcb 1	34999
Extra	Tpcb 2	38999
Extra	Exit Tj 0	70000
Extra	Exit Tj 2	60000
Extra	Enter_a	251245
Extra	Enter_b	4750
Extra	Exit_a	157498
Extra	Exit_b	2500

Case 1:
When Tpcb < Tpcb 1, Target Tj = 85000, Exit Tj = 70000

Case 2:
When Tpcb > Tpcb 2, Target Tj = 66000, Exit Tj = 60000

Case 3:
When Tpcb 1<Tpcb<Tpcb 2, will calculate the Target Tj and Exit Tj.



If we want to decrease the thermal provided by CPU/GPU, we can decrease the Tpcb 1 and Tpcb 2 by 2000~3000;

The parameters in the excel file (7)

Attentions about the mtc:

Trip Point	66000	
Type	0	
Cooler Name	cpu_adaptive_0	
Condition 1	EXIT	6000
Condition 2	NULL	0
Condition 3	NULL	0

ctm	ENABLE
ctm on	1
Target Tj 0	85000
Target Tj 2	66000
Tpcb 1	34999
Tpcb 2	38999
Exit Tj 0	70000
Exit Tj 2	60000
Enter_a	251245
Enter_b	4750
Exit_a	157498
Exit_b	2500

Exit Tj2 = Trip Ponit – Exit Point
eg. 60000 = 66000 - 6000

The parameters in the thermal.conf

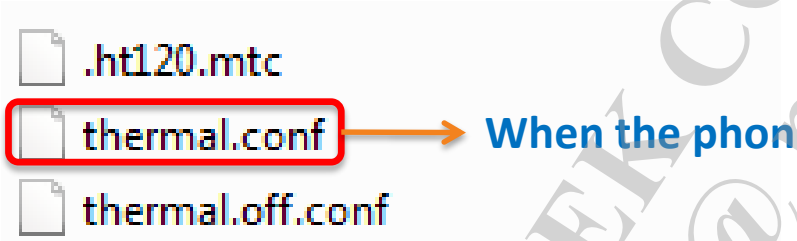
The parameters in thermal.conf (1)

Step 1. get the thermal.conf file from the phone.

adb pull /system/etc/.tp ./

Using the command above to pull the thermal.conf file from the phone to the current folder.

We will get the following three files:

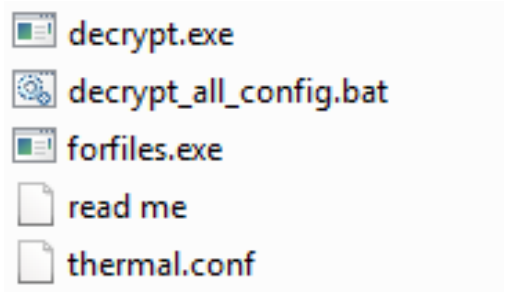


When the phone boots up, will use this conf file.

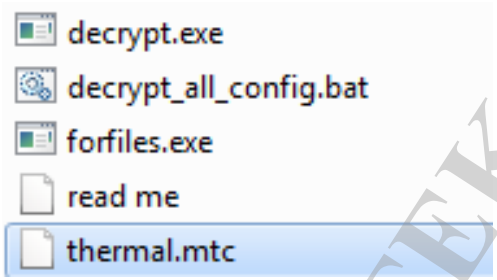
The parameters in thermal.conf (2)

Step 2. decrypt the thermal.conf file

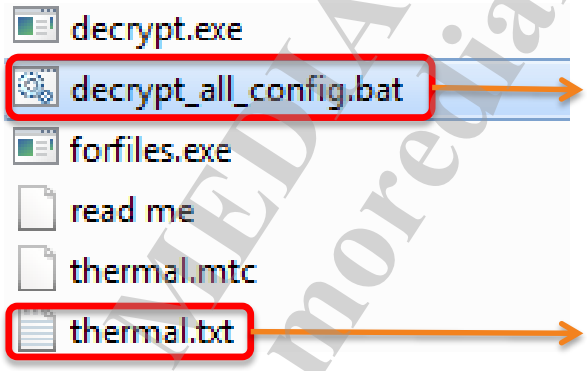
(1). Copy the file to the decrypt folder of thermal config tool



(2). Rename it to “thermal.mtc”



(3). Run “decrypt_all_config.bat” to decrypt it



Run this bat file

It will generate a txt file

The parameters in thermal.conf (3)

Step 3. open the “thermal.txt” with text editor

thermal.txt

```
/proc/mtkcooler/mtktscpu-sysrst

/proc/mtkcooler/mtk-cl-shutdown00

/proc/mtkcooler/cpu_adaptive_0
EXIT 7000
/proc/mtkcooler/mtktspmic-sysrst

/proc/mtkcooler/mtktsbattery-sysrst

/proc/mtkcooler/mtk-cl-shutdown01

/proc/mtkcooler/mtktswmt-sysrst

/proc/mtkcooler/mtktspa-sysrst

/proc/mtkcooler/mtk-cl-bcct02
EXIT 5000
/proc/mtkcooler/mtk-cl-bcct01
EXIT 2000
/proc/mtkcooler/mtk-cl-bcct00
EXIT 2000
/proc/mtkcooler/mtk-cl-shutdown02

/proc/mtkcooler/mtk-cl-mutt02
EXIT 1999
/proc/mtkcooler/mtk-cl-mutt01
EXIT 1999
/proc/mtkcooler/mtk-cl-mutt00
EXIT 1999
/proc/mtkcooler/mtk-cl-backlight02

/proc/mtkcooler/mtk-cl-backlight03

/proc/mtkcooler/mtk-cl-kshutdown00
```

The parameters in thermal.conf (4)

One to one relationship between the parameters in the thermal.conf and ones in the excel.

```
/proc/mtkcooler/cpu_adaptive_0
EXIT 7000
/proc/mtkcooler/mtktspmic-sysrst
```

Trip Point	66000	
Type	0	
Cooler Name	cpu_adaptive_0	
Condition 1	EXIT	7000
Condition 2	NULL	0
Condition 3	NULL	0

```
/proc/mtkcooler/mtk-cl-bcct02
EXIT 5000
/proc/mtkcooler/mtk-cl-bcct01
EXIT 2000
/proc/mtkcooler/mtk-cl-bcct00
EXIT 2000
```

Trip Point	50000	
Type	0	
Cooler Name	mtk-cl-bcct02	
Condition 1	EXIT	5000
Condition 2	NULL	0
Condition 3	NULL	0

Trip Point	48000	
Type	0	
Cooler Name	mtk-cl-bcct01	
Condition 1	EXIT	2000
Condition 2	NULL	0
Condition 3	NULL	0

Trip Point	34000	
Type	0	
Cooler Name	mtk-cl-bcct00	
Condition 1	EXIT	2000
Condition 2	NULL	0
Condition 3	NULL	0

The parameters in thermal.conf (5)

```
/proc/driver/thermal/tzbts param
PUP_R 390000 PUP_VOLT 1800 OVER_CRITICAL_L 4251000 NTC_TABLE 6 0
/proc/driver/thermal/tzbtspa_param
PUP_R 390000 PUP_VOLT 1800 OVER_CRITICAL_L 4251000 NTC_TABLE 6 1
```

NTC	mtktsAP	ENABLE
Extra	Param	PUP_R
Extra	Value	390000
Extra	Param	PUP_VOLT
Extra	Value	1800
Extra	Param	OVER_CRITICAL_L
Extra	Value	4251000
Extra	Param	NTC_TABLE
Extra	Value	6
Extra	AP ADC Channel	0

The parameters in thermal.conf (6)

/proc/driver/thermal/clbcct
0 650 450 200

Cooler Name	mtk-cl-bcct00	ENABLE
Extra	klog on	0
Extra	mtk-cl-bcct00 limit (mA)	650
Extra	mtk-cl-bcct01 limit (mA)	450
Extra	mtk-cl-bcct02 limit (mA)	200

/proc/driver/thermal/clatm_setting
0 1500 15 30 1 550 1500 200 600

Cooler Name	cpu_adaptive_0	ENABLE
Extra	id	0
Extra	First Step (mW)	1500
Extra	Theta(ja) Fall	15
Extra	Theta(ja) Rise	30
Extra	Min Budget Change	1
Extra	Min CPU Power (mW)	550
Extra	Max CPU Power (mW)	1500
Extra	Min GPU Power (mW)	200
Extra	Max GPU Power (mW)	600

/proc/driver/thermal/clmutt
1 400 100 100 200 100 25500

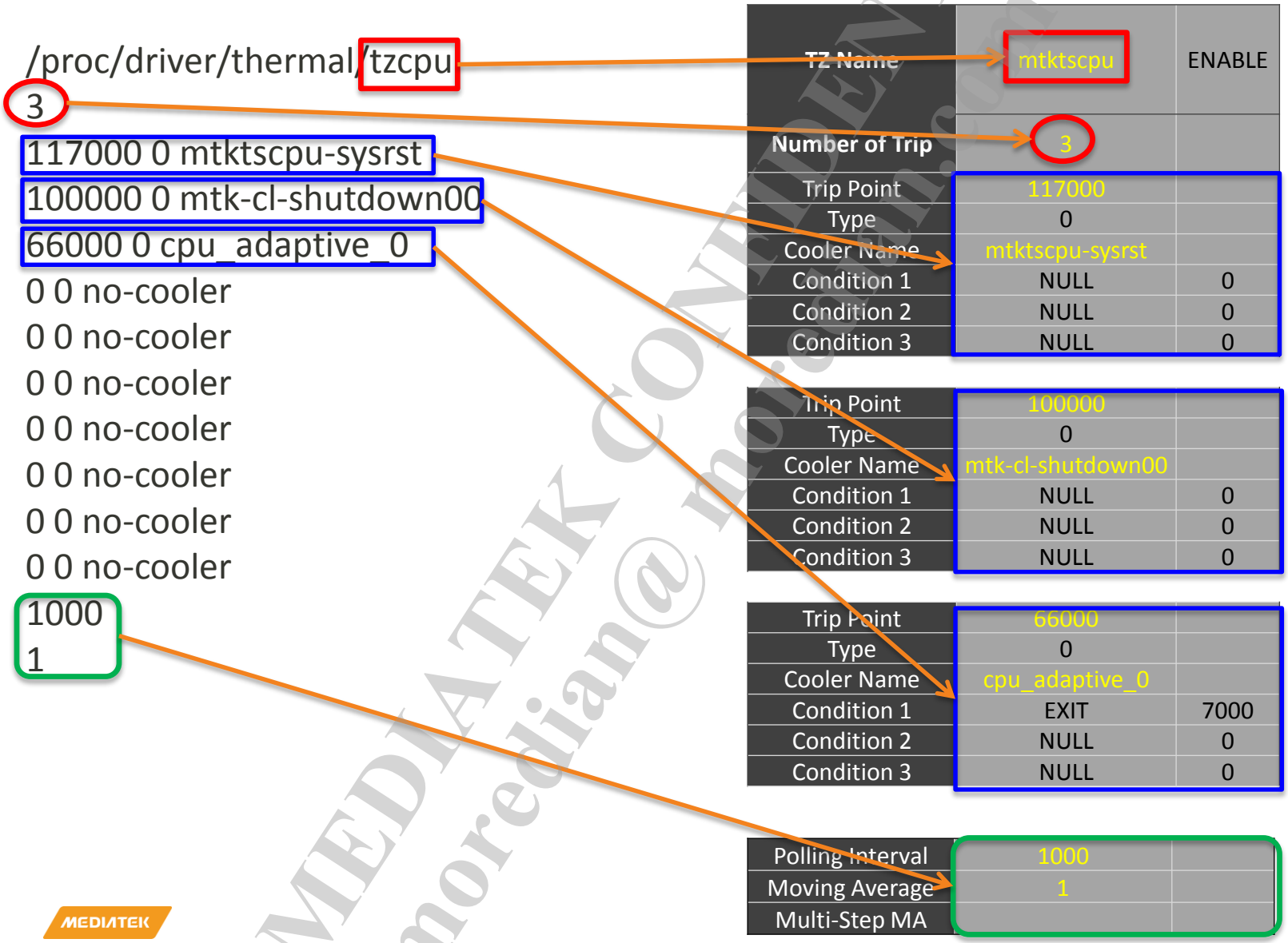
Cooler Name	mtk-cl-mutt00	ENABLE
Extra	klog on	1
Extra	mutt00 active ms	400
Extra	mutt00 suspend ms	100
Extra	mutt01 active ms	100
Extra	mutt01 suspend ms	200
Extra	mutt02 active ms	100
Extra	mutt02 suspend ms	25500

The parameters in thermal.conf (7)

/proc/driver/thermal/clctm
1 85000 66000 34999 38999 70000 60000 251245 4750 157498 2500

Cooler Name	ctm	ENABLE
Extra	ctm on	1
Extra	Target Tj 0	85000
Extra	Target Tj 2	66000
Extra	Tpcb 1	34999
Extra	Tpcb 2	38999
Extra	Exit Tj 0	70000
Extra	Exit Tj 2	60000
Extra	Enter_a	251245
Extra	Enter_b	4750
Extra	Exit_a	157498
Extra	Exit_b	2500

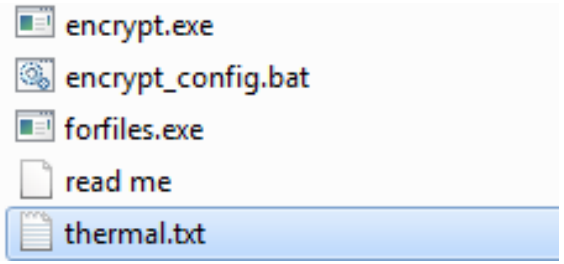
The parameters in thermal.conf (8)



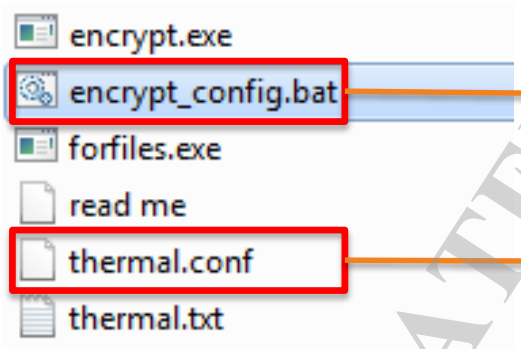
The parameters in thermal.conf (9)

Step 4. modify the thermal.txt and encrypt

(1). Copy the file to the encrypt folder of thermal config tool



(2). run “encrypt_config.bat”



Run this bat file

It will generate a thermal.conf

The parameters in thermal.conf (10)

Step 4. push the new thermal.conf file into the phone

```
adb push ./thermal.conf /system/etc/.tp/
```

Use the command above to replace the file with the same name in the "/system/etc/.tp" path of the phone.

Step 5: reboot the phone, the new configuration will work.

The mapping relationship (1)

Cooler Device	Proc node name
mtk-cl-bcct##	/proc/mtkcooler/mtk-cl-bcct##
mtk-cl-mutt##	/proc/mtkcooler/mtk-cl-mutt##
mtk-cl-backlight##	/proc/mtkcooler/mtk-cl-backlight##
(NTC) mtktsAP	/proc/driver/thermal/tzbts_param
(NTC) mtktsbtsmdpa	/proc/driver/thermal/tzbtspa_param
(table) mtk-cl-bcct00	/proc/driver/thermal/clbcct
(table) cpu_adaptive_0	/proc/driver/thermal/clatm_setting
(table) mtk-cl-mutt00	/proc/driver/thermal/clmutt
(table) ctm	/proc/driver/thermal/clctm

The mapping relationship (2)

Thermal Zone Device	Proc node name
mtktscpu	/proc/driver/thermal/tzcpu
mtktspmic	/proc/driver/thermal/tzpmic
mtktsbattery	/proc/driver/thermal/tzbattery
mtktspa	/proc/driver/thermal/tzpa
mtktswmt	/proc/driver/thermal/tzwmt
mtktsAP	/proc/driver/thermal/tzbts
mtktsbtsmdpa	/proc/driver/thermal/tzbtspa
mtkts1	/proc/driver/thermal/tzts1
mtkts2	/proc/driver/thermal/tzts2
mtkts3	/proc/driver/thermal/tzts3

everyday genius