



SOP – Modem RF Customization tool (**MT6513/ MT6573**)

Version 1.0 2011.06.15



Revision History

Revision	Date (mm/dd/yyyy)	Author	Comments
v0.1.0	05/19/2011	Ivan Hu	[internal version] Draft version
v0.5.0	05/27/2011	Ivan Hu	[internal version] Add notes for some items
v1.0.0	06/16/2001	Guoqiang Wu Shiqian Liao	[release version] 1. descript the flow for customer in detail 2. Add the part : <How to build modem.img into system.img ?>

Announce :

1. 此Tool仅可应用于MT6573和MT6513平台，不兼容MT6516平台！
2. 强烈建议使用MediaTek内部验证过的器件！
3. 修改BPI Timing时，务必谨慎！
4. 禁止修改BSI timing ！

Remind :

If you use **3G RF components Non-Qualified by MediaTek**, and some related system issues lead project couldn't MP in time, that our support maybe not just in time due to our limited resource .

Application :

1. 查看当前modem.img中的RF参数设定
2. 修改当前modem.img中的RF参数设定, 并保存到modem.img中
3. 备份当前RF参数设定, 保存为.csm格式的文本文件
4. 恢复之前备份的RF参数到进版后的modem.img里

Content :

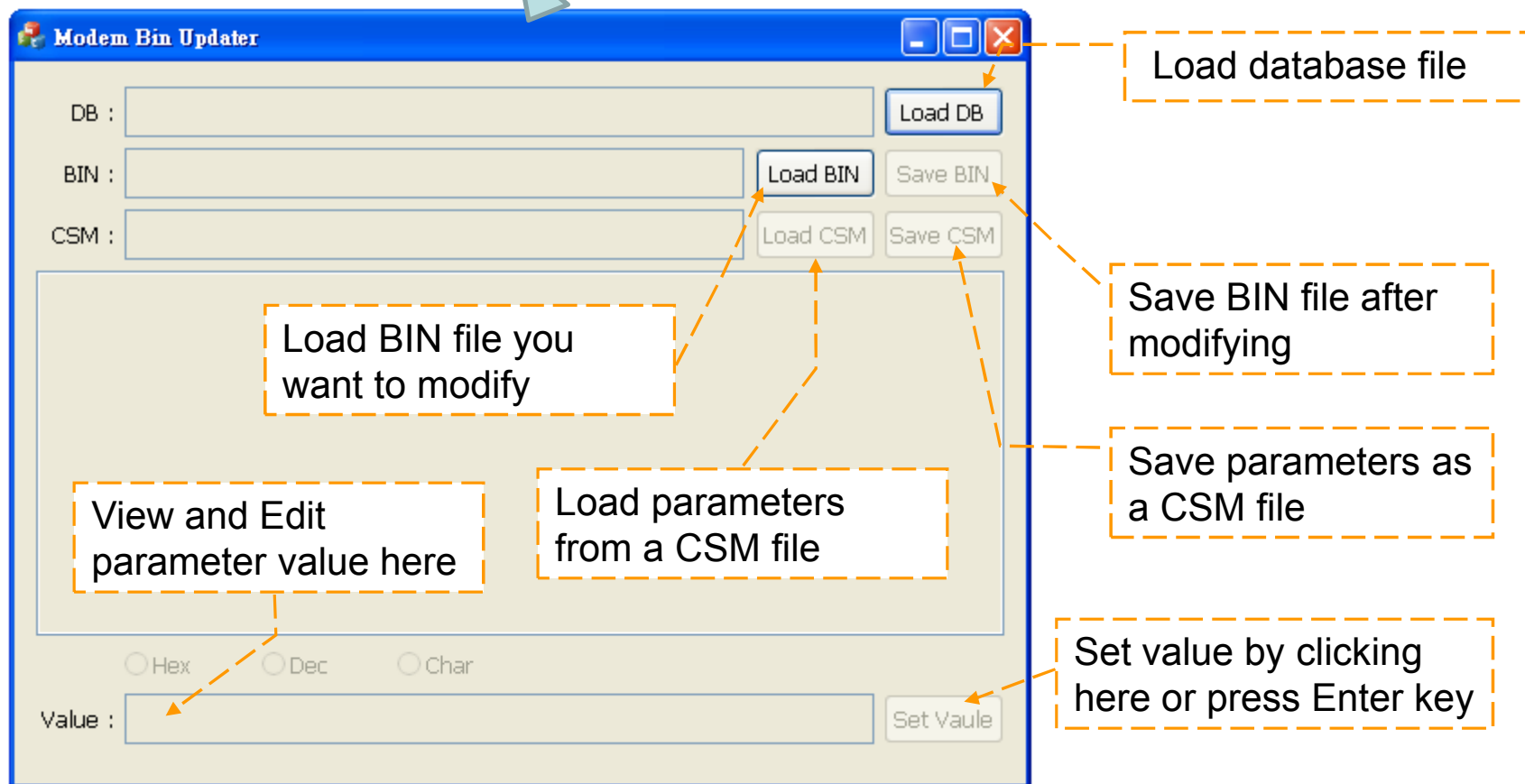
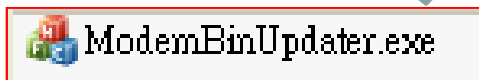
- How to Use ModemBinUpdater Tool ?
- Which parameters you can modify ?
- How to build modem.img into system.img ?



How to Use **ModemBinUpdater** Tool

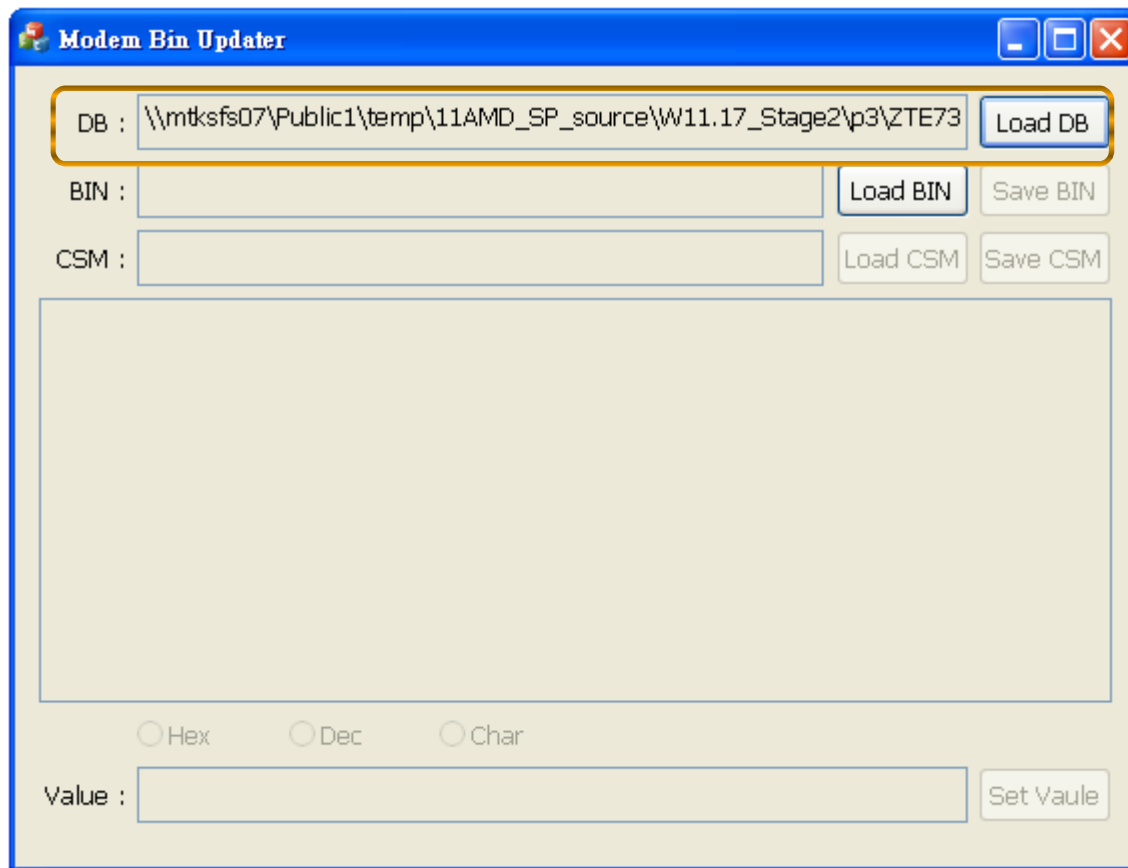


ModemBinUpdater GUI overview



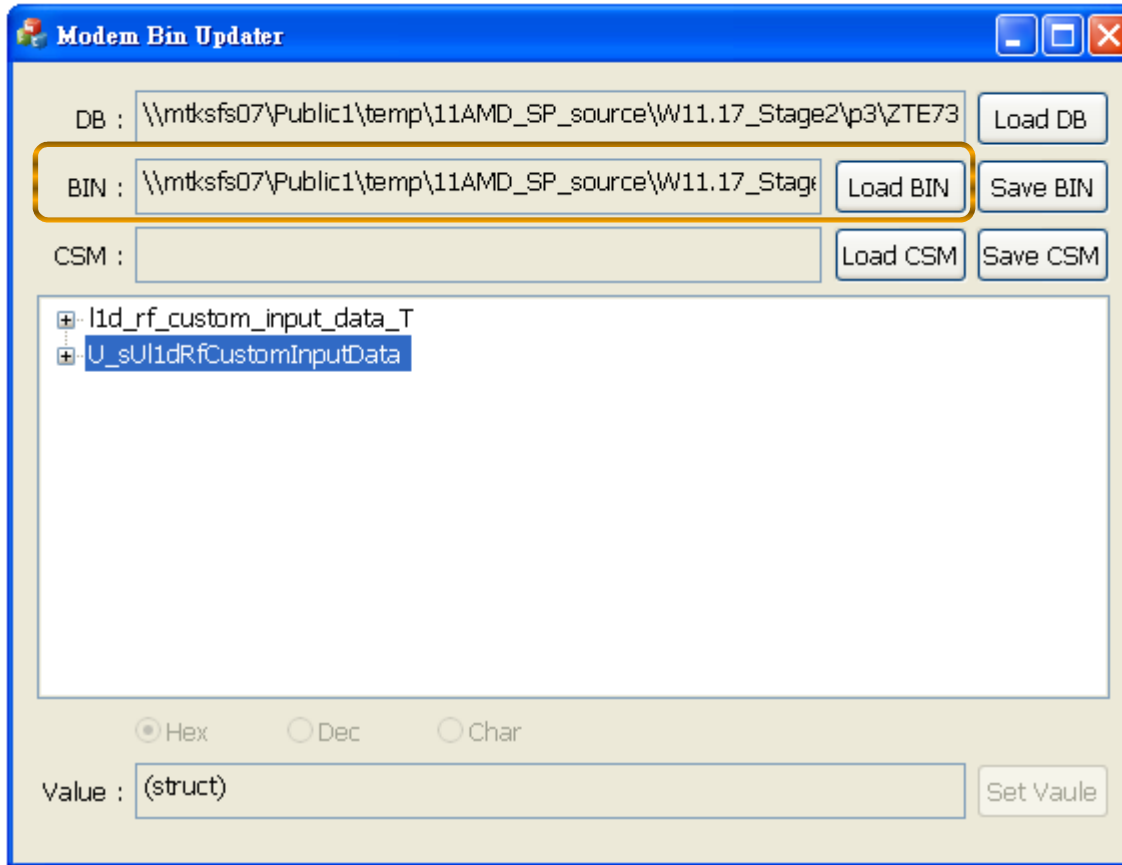
注意：所有这些文件的路径里面，不能包含中文

Step 1. Load Database File



Database 文件可以从Modem Package中取得

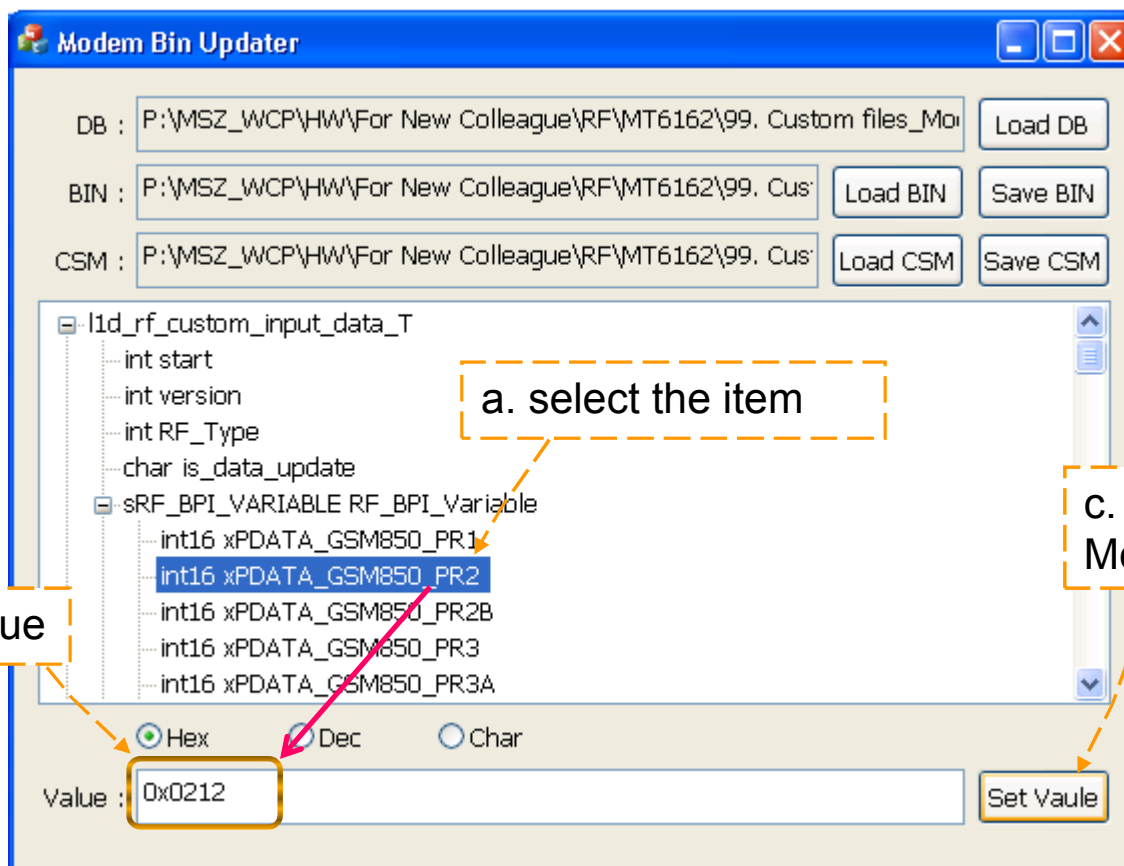
Step 2. Load the BIN File To Be Modified



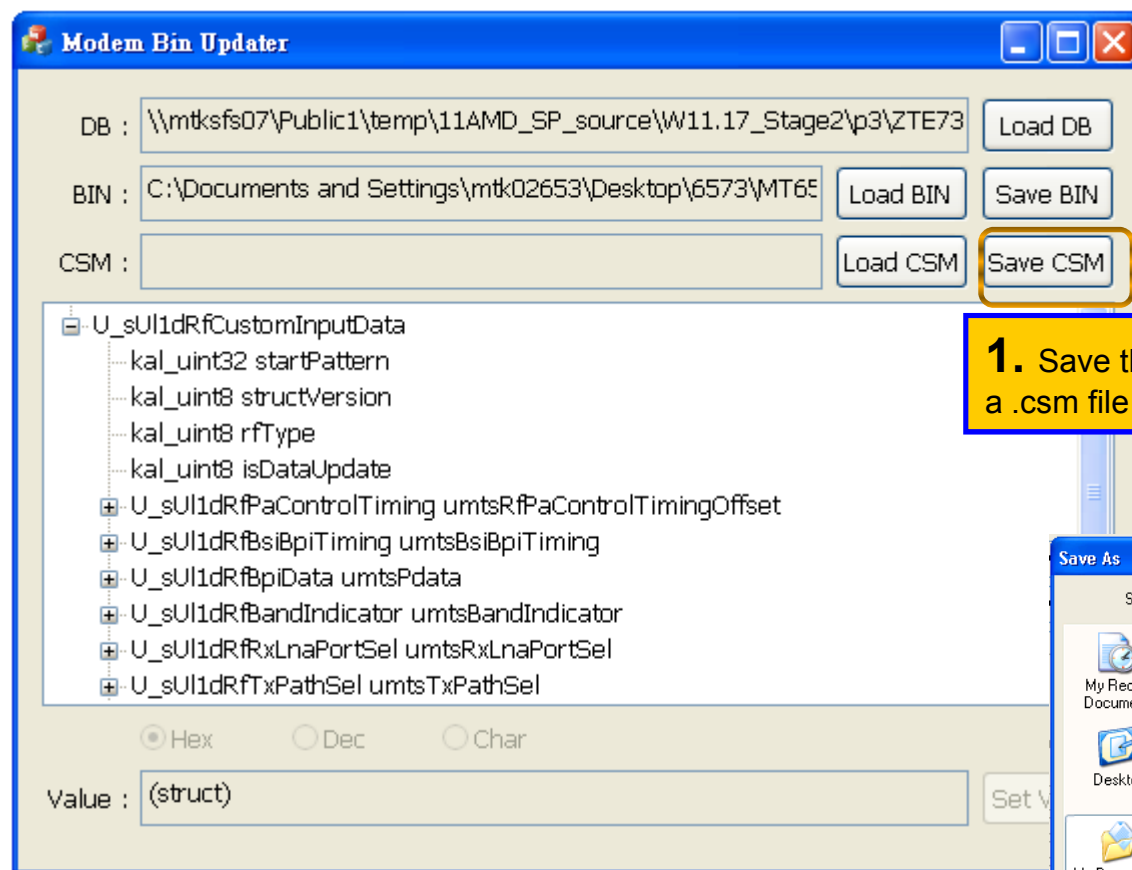
初始的Modem BIN文件可以从Modem Package中取得

Step 3. View and modify RF Parameter

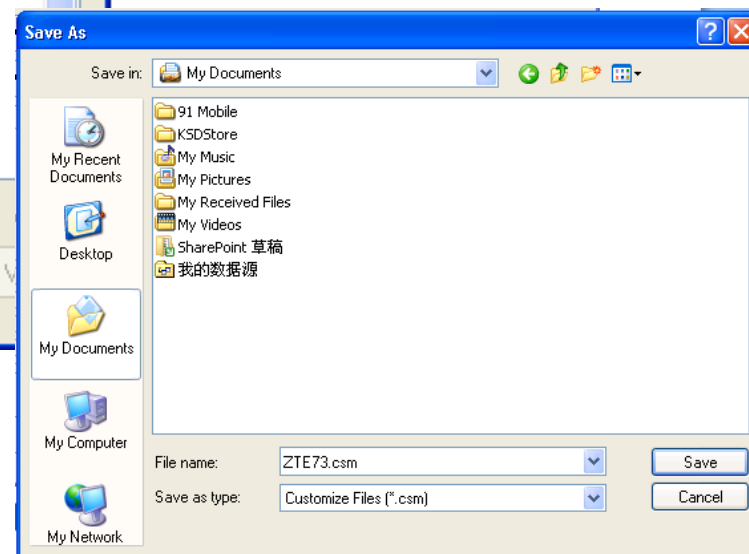
A . 逐个参数修改和保存:



B . 批量参数查看，修改和保存：



1. Save the all RF parammmers to a .csm file

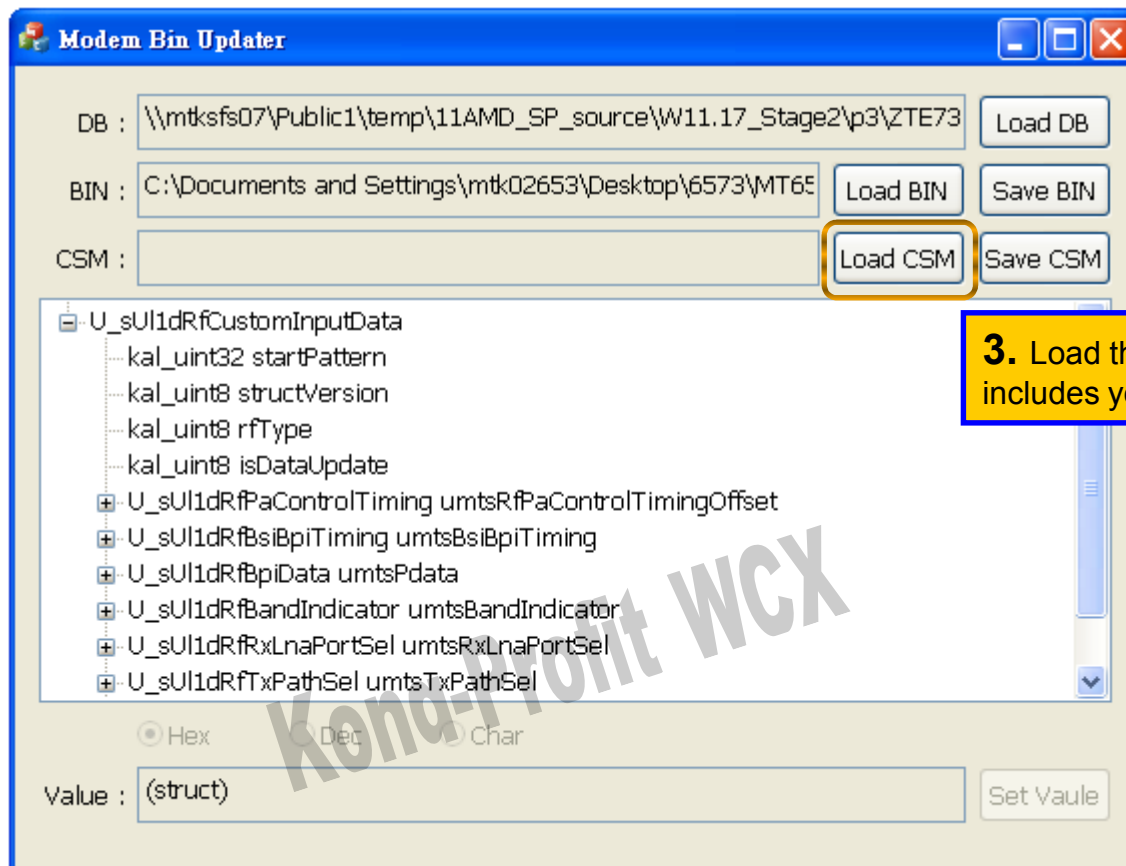


 ZTE73.csm


2. Use any text editor to open previous saved .csm file and modify the wanted parameter value accordingly

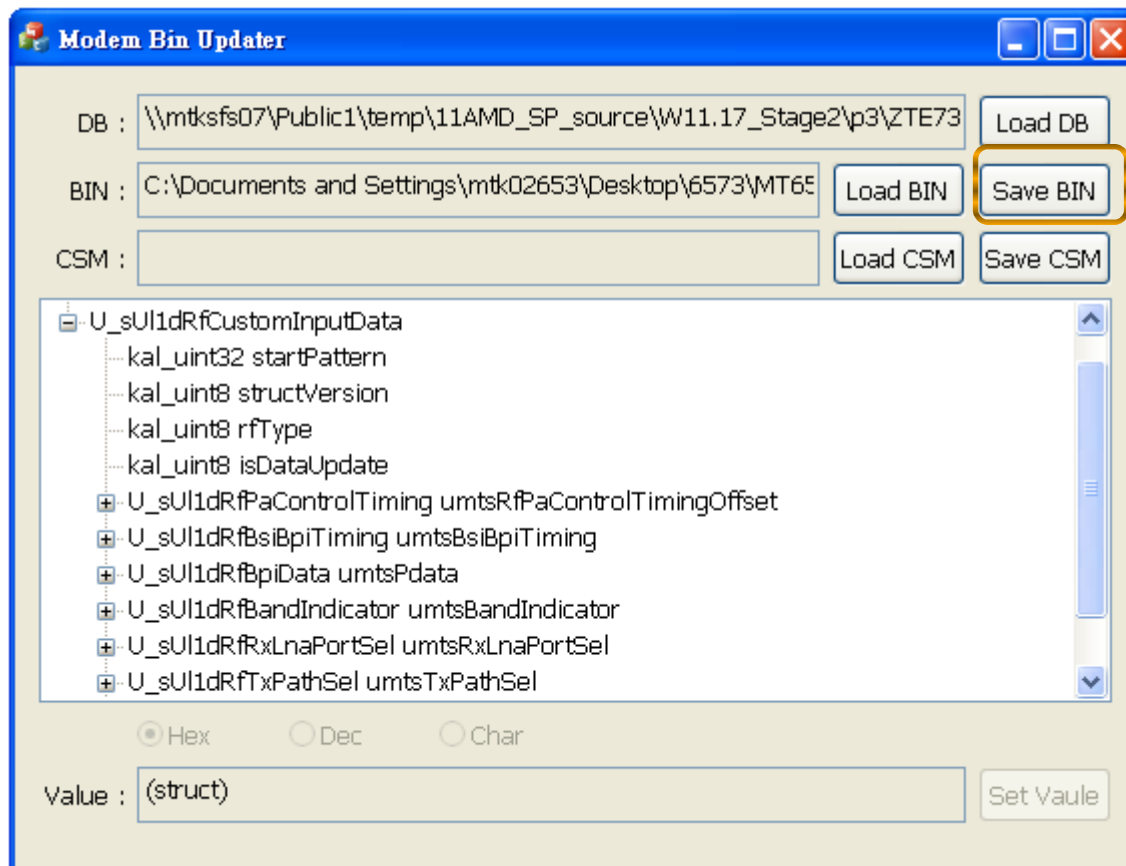
Save the file after modification finished

```
l1d_rf_custom_input_data_T
,int start,0x12345678
,int version,0x00000001
,int RF_Type,0x00000004
,char is_data_update,0x01
,sRF_BPI_VARIABLE RF_BPI_Variable
,,int16 xPDATA_GSM850_PR1,0x0212
,,int16 xPDATA_GSM850_PR2,0x0212
,,int16 xPDATA_GSM850_PR2B,0x0212
,,int16 xPDATA_GSM850_PR3,0x0010
,,int16 xPDATA_GSM850_PR3A,0x0010
,,int16 xPDATA_GSM850_PT1,0x0210
,,int16 xPDATA_GSM850_PT2,0x0230
,,int16 xPDATA_GSM850_PT2B,0x0233
,,int16 xPDATA_GSM850_PT3,0x0010
,,int16 xPDATA_GSM850_PT3A,0x0010
,,int16 xPDATA_GSM_PR1,0x0215
,,int16 xPDATA_GSM_PR2,0x0215
,,int16 xPDATA_GSM_PR2B,0x0215
,,int16 xPDATA_GSM_PR3,0x0010
,,int16 xPDATA_GSM_PR3A,0x0010
,,int16 xPDATA_GSM_PT1,0x0210
,,int16 xPDATA_GSM_PT2,0x0230
,,int16 xPDATA_GSM_PT2B,0x0233
,,int16 xPDATA_GSM_PT3,0x0010
,,int16 xPDATA_GSM_PT3A,0x0010
,,int16 xPDATA_DCS_PR1,0x0216
,,int16 xPDATA_DCS_PR2,0x0216
,,int16 xPDATA_DCS_PR2B,0x0216
,,int16 xPDATA_DCS_PR3,0x0010
```



3. Load the .csm file you modified which includes your specific modification

Step 4. Save the Modifications to BIN File



After parameters modified finished (by either UI or via .csm file), save to BIN file

如果是用.csm文件导入的话，建议Save后再点开修改过的参数，手动再确认一遍。



Which parameters you can modify ?



RF_CLK_BUFFER_VARIABLE

sRF_CLK_BUFFER_VARIABLE	CLK1_EN
	CLK2_EN
	CLK3_EN

- CLK1_EN (default on for BB):
 - OH(MT6162) CLK buffer 1 turn on/off setting
- CLK2_EN
 - OH(MT6162) CLK buffer 2 turn on/off setting
- CLK3_EN
 - OH(MT6162) CLK buffer 3 turn on/off setting

根据原理图，选择是否打开CLK_Buffer . （ CLK1 必须Enable ）

2G Parameter

- 2G Band RX LNA Port Selection
- Setting for Disable EGSM
- 2G BPI Data configuration
- GPRS Power rollback setting
- CLOSED_LOOP_TXPC_TYPE

注意： 2G部分有两个地方修改不了，必须要申请不同的Modem BIN：

1. 2G 支持的Bands，例如900DUAL，850DUAL，或者是QUAD，TRIPLE；
2. EPSK TX/RX是TRUE还是FALSE

可写清楚具体需求，再提交E-service申请对应的Modem BIN

RF_RX_BAND_VARIABLE

sRF_RX_BAND_VARIABLE	GSM850_PATH_SEL
	GSM_PATH_SEL
	DCS_PATH_SEL
	PCS_PATH_SEL

- GSM850_PATH_SEL:
 - Define the RX LNA port selection
- GSM_PATH_SEL
 - Define the RX LNA port selection
- DCS_PATH_SEL
 - Define the RX LNA port selection
- PCS_PATH_SEL
 - Define the RX LNA port selection

```

/*****
/* Define band mode mapped receiver type */
/* DO NOT MODIFY the definitions here. */
*****/
#define LNA_1           0x0
#define LNA_2           0x1
#define LNA_3           0x2
#define LNA_4           0x3
#define LNA_5           0x4
#define LNA_6           0x5
#define LNA_7           0x6
#define LNA_8           0x7
#define NO_USE_BAND     0xF

```

根据原理图，来设置项目所支援的Band占用的LNA port . 未使用的Band请填 0xF .

RF_OTHERS_VARIABLE

sRF_OTHERS_VARIABLE	XO_CapID
	xafc_dac_default
	xafc_inv_slope
	EGSM_DISABLE

- XO_CapID:
 - CapID default value
- Xafc_dac_deafault:
 - The setting of afc dac default value
- Xafc_inv_slope:
 - The setting of afc inv_slope
- **EGSM_DISABLE** (temp solution, only for CTA test):
 - **1**: will set RF only support PGSM; **false**: will set RF support EGSM and PGSM

如果要过CTA，您需要设置EGSM_DISABLE为1 ， 否则Default为(0)支持EGSM。

The Format of CSM file

BPI variable

```
,sRF_BPI_VARIABLE RF_BPI_Variable
,,int16 xPDATA_GSM850_PR1,0x0040
,,int16 xPDATA_GSM850_PR2,0x0240
,,int16 xPDATA_GSM850_PR2B,0x0240
,,int16 xPDATA_GSM850_PR3,0x0000
,,int16 xPDATA_GSM850_PR3A,0x0000
,,int16 xPDATA_GSM850_PT1,0x0040
,,int16 xPDATA_GSM850_PT2,0x0060
,,int16 xPDATA_GSM850_PT2B,0x0263
,,int16 xPDATA_GSM850_PT3,0x0000
,,int16 xPDATA_GSM850_PT3A,0x0000
,,int16 xPDATA_GSM_PR1,0x0040
,,int16 xPDATA_GSM_PR2,0x0244
,,int16 xPDATA_GSM_PR2B,0x0244
,,int16 xPDATA_GSM_PR3,0x0000
,,int16 xPDATA_GSM_PR3A,0x0000
,,int16 xPDATA_GSM_PT1,0x0040
,,int16 xPDATA_GSM_PT2,0x0060
,,int16 xPDATA_GSM_PT2B,0x0263
,,int16 xPDATA_GSM_PT3,0x0000
,,int16 xPDATA_GSM_PT3A,0x0000
,,int16 xPDATA_DCS_PR1,0x0040
,,int16 xPDATA_DCS_PR2,0x0246
,,int16 xPDATA_DCS_PR2B,0x0246
,,int16 xPDATA_DCS_PR3,0x0000
,,int16 xPDATA_DCS_PR3A,0x0000
,,int16 xPDATA_DCS_PT1,0x0040
,,int16 xPDATA_DCS_PT2,0x0070
,,int16 xPDATA_DCS_PT2B,0x0271
,,int16 xPDATA_DCS_PT3,0x0000
,,int16 xPDATA_DCS_PT3A,0x0000
,,int16 xPDATA_PCS_PR1,0x0040
,,int16 xPDATA_PCS_PR2,0x0242
,,int16 xPDATA_PCS_PR2B,0x0242
,,int16 xPDATA_PCS_PR3,0x0000
,,int16 xPDATA_PCS_PR3A,0x0000
,,int16 xPDATA_PCS_PT1,0x0040
```

Timing variable (不建议更改)

```
,sRF_TIMING_VARIABLE RF_Timing_Variable
,,int16 xQB_RX_FENA_2_FSYNC,0x0040
,,int16 xQB_RX_FSYNC_2_FENA,0x0000
,,int16 xQB_TX_FENA_2_FSYNC,0x0098
,,int16 xQB_TX_FSYNC_2_FENA,0x001a
,,int16 xQB_SRO,0xd8f0
,,int16 xQB_SR1,0x00e2
,,int16 xQB_SR2,0x0054
,,int16 xQB_SR3,0x0000
,,int16 xQB_SR2M,0x0024
,,int16 xQB_PR1,0x00f3
,,int16 xQB_PR2,0x0023
,,int16 xQB_PR2B,0x0000
,,int16 xQB_PR3,0x0006
,,int16 xQB_PR3A,0x0007
,,int16 xQB_PR2M1,0x0000
,,int16 xQB_PR2M2,0x0000
,,int16 xQB_ST0,0xd8f0
,,int16 xQB_ST1,0x00e2
,,int16 xQB_ST2,0x009d
,,int16 xQB_ST2B,0x001b
,,int16 xQB_ST3,0x0017
,,int16 xQB_ST2M_G8,0x0016
,,int16 xQB_ST2M_8G,0x0016
,,int16 xQB_PT1,0x00f8
,,int16 xQB_PT2,0x000e
,,int16 xQB_PT2B,0xffff
,,int16 xQB_PT3,0x0019
,,int16 xQB_PT3A,0x001a
,,int16 xQB_PT2M1_G8,0x0012
,,int16 xQB_PT2M2_G8,0x0002
,,int16 xQB_PT2M3_G8,0x0001
,,int16 xQB_PT2M1_8G,0x0012
,,int16 xQB_PT2M2_8G,0x0002
,,int16 xQB_PT2M3_8G,0x0001
,,int16 xQB_APCON,0x0010
,,int16 xQB_APCMID,0x0016
,,int16 xQB_APCOFF,0x0008
,,int16 xQB_APCDAACON,0x0063
```

您需要根据原理图所决定的真值表来修改BPI的配置，如同(u)l1_custom_rf.h 中的一样。

RF_TX_POWER_ROLLBACK_VARIABLE

sRF_TX_POWER_ROLLBACK_VARIABLE	sTX_POWER_ROLLBACK_GSM850_tx_power_rollback_epsk
	sTX_POWER_ROLLBACK_GSM_tx_power_rollback_epsk
	sTX_POWER_ROLLBACK_DCS_tx_power_rollback_epsk
	sTX_POWER_ROLLBACK_PCS_tx_power_rollback_epsk
	sTX_POWER_ROLLBACK_GSM850_tx_power_rollback_GMSK
	sTX_POWER_ROLLBACK_GSM_tx_power_rollback_GMSK
	sTX_POWER_ROLLBACK_DCS_tx_power_rollback_GMSK
	sTX_POWER_ROLLBACK_PCS_tx_power_rollback_GMSK

- This variable define the power rollback value in the different band and the modulation scheme

ep.

```

,,sTX_POWER_ROLLBACK_GSM850_tx_power_rollback_gmsk
,,,char rollback_2t,0x08      ➔ - 1dB
,,,char rollback_3t,0x18      ➔ - 3dB
,,,char rollback_4t,0x20      ➔ - 4dB
,,,char rollback_5t,0x28      ➔ - 5dB

```

设置Multi-Slot时GSM 的输出功率回退值，单位是1/8 dB（十六进制）。

CLOSED_LOOP_TXPC_TYPE

RF_TX_POWERFEEDBACK	CLOSED_LOOP_TXPC_TYPE
	QB_TX_SAMPLE_OFFSET_GMSK
	QB_TX_SAMPLE_OFFSET_EPSK
	TXPC_EPSK_TP_SLOPE_LB
	TXPC_EPSK_TP_SLOPE_HB

■ CLOSED_LOOP_TXPC_TYPE

- 0: turn off this feature
- 1: the power detect is got from AUX ADC
- 2: the power detect is got from BSI



为什么Default的值是0xab呢？

=> 由tool讀到0xAB表示我們還沒有藉由tool去改任何值，在這個情況下我們會依據現在這份load原本是怎麼build的來決定是enable還是disable; 而一旦使用tool把CLOSED_LOOP_TXPC_TYPE做改變之後，我們就會依據tool修改的值來看是要enable還是disable

■ TXPC_EPSK_TP_SLOPE_LB

- The relationship setting between temperature and power level (GMSK mode)

■ TXPC_EPSK_TP_SLOPE_HB

- The relationship setting between temperature and power level (EPSK mode)

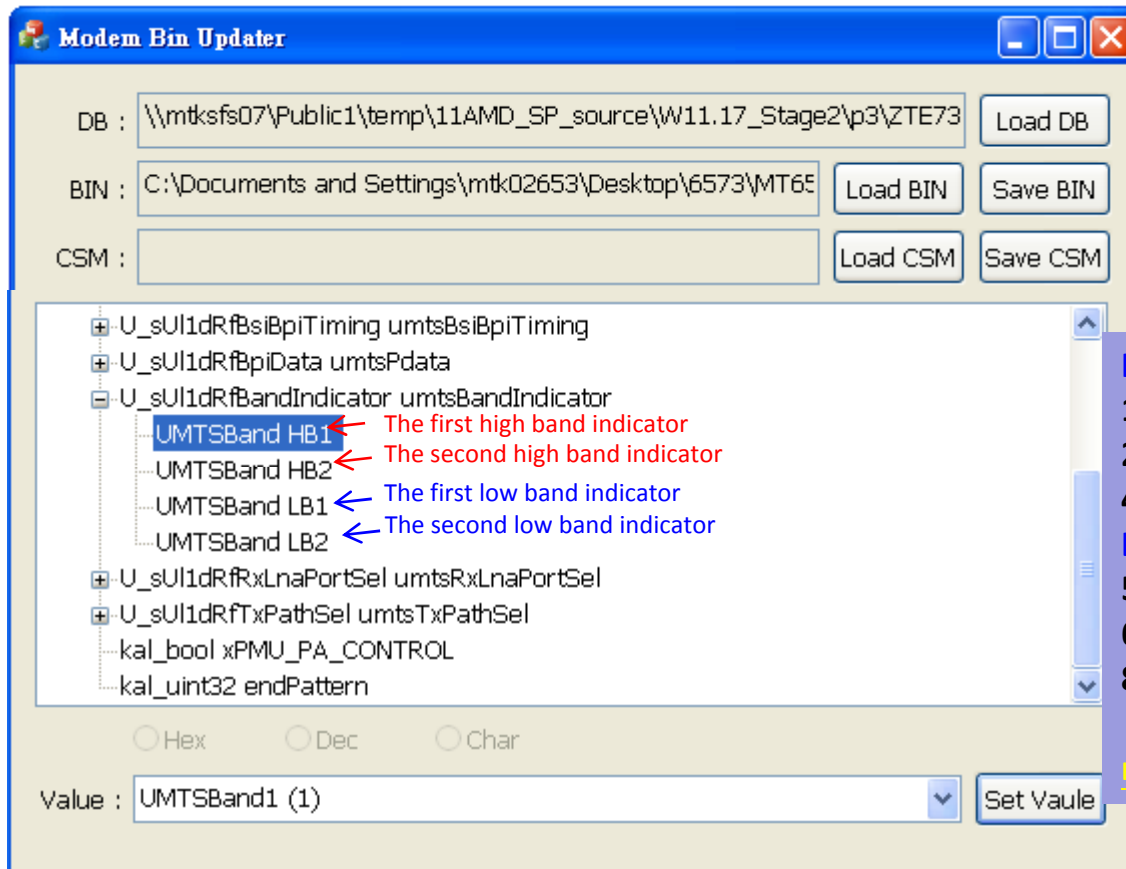
当您有加2G Coupler来做Closed loop时，请设置为2，否则设为0。

3G Parameter

- 3G Band Support Indicator
- RF RX Front-End LNA Port Selection
- RF TX Output Path Selection
- 3G BPI Data configuration refer to Schematics

3G Band Support Indicator Explanations Internal Use

首先，请设置项目所需要支援的bands （默认支援Band I/II/V/VIII）



HB1 / HB2 可以设置为：

1 or UMTSBand1 (1)

2 or UMTSBand2 (2)

4 or UMTSBand4 (4)

LB1 / LB2 可以设置为：

5 or UMTSBand5 (5)

6 or UMTSBand6 (6)

8 or UMTSBand8 (8)

non-used: set 0 or UMTSBandNone (0)

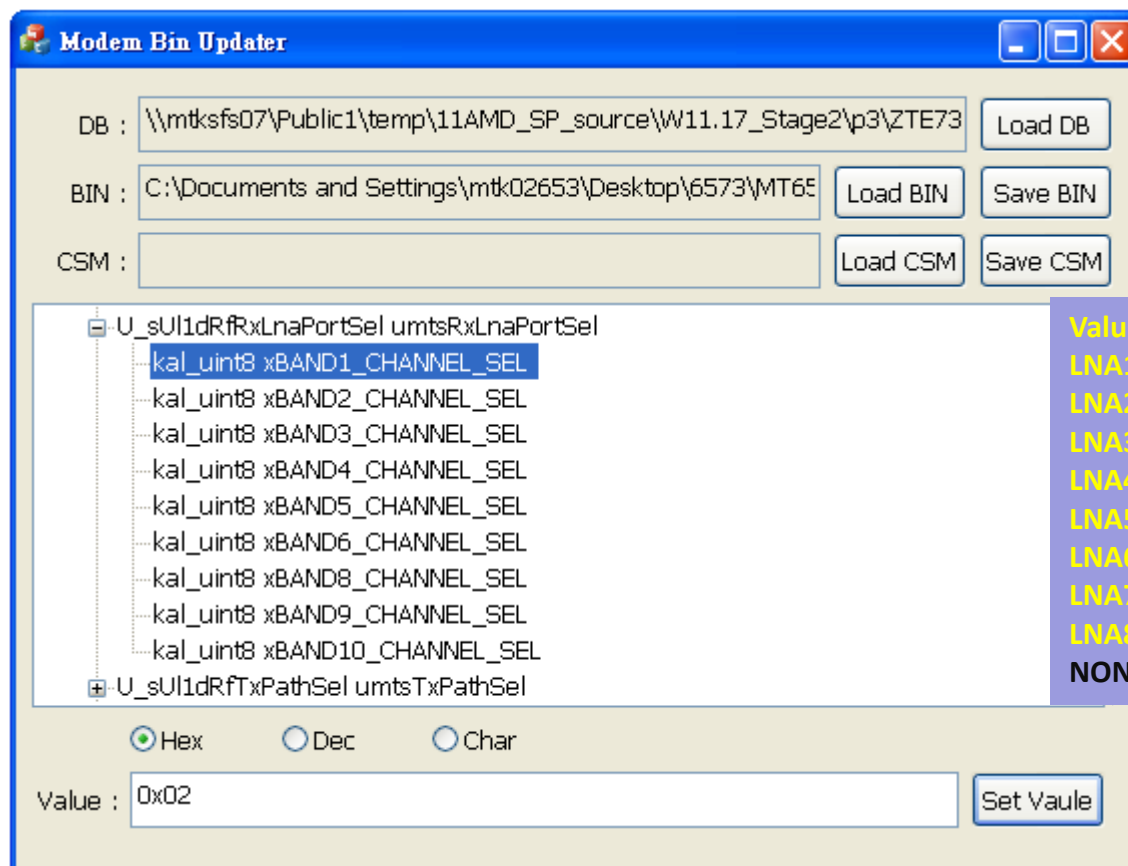
注意：

LB1/LB2其一设置为band5, 那么软件同时支持band5/band6;

LB1/LB2其一设置为band6, 那么软件仅仅支持Band6;

LB1/LB2分别设置为band5 , Band6 , 是不允许的。

RF RX Front-End LNA Port Selection

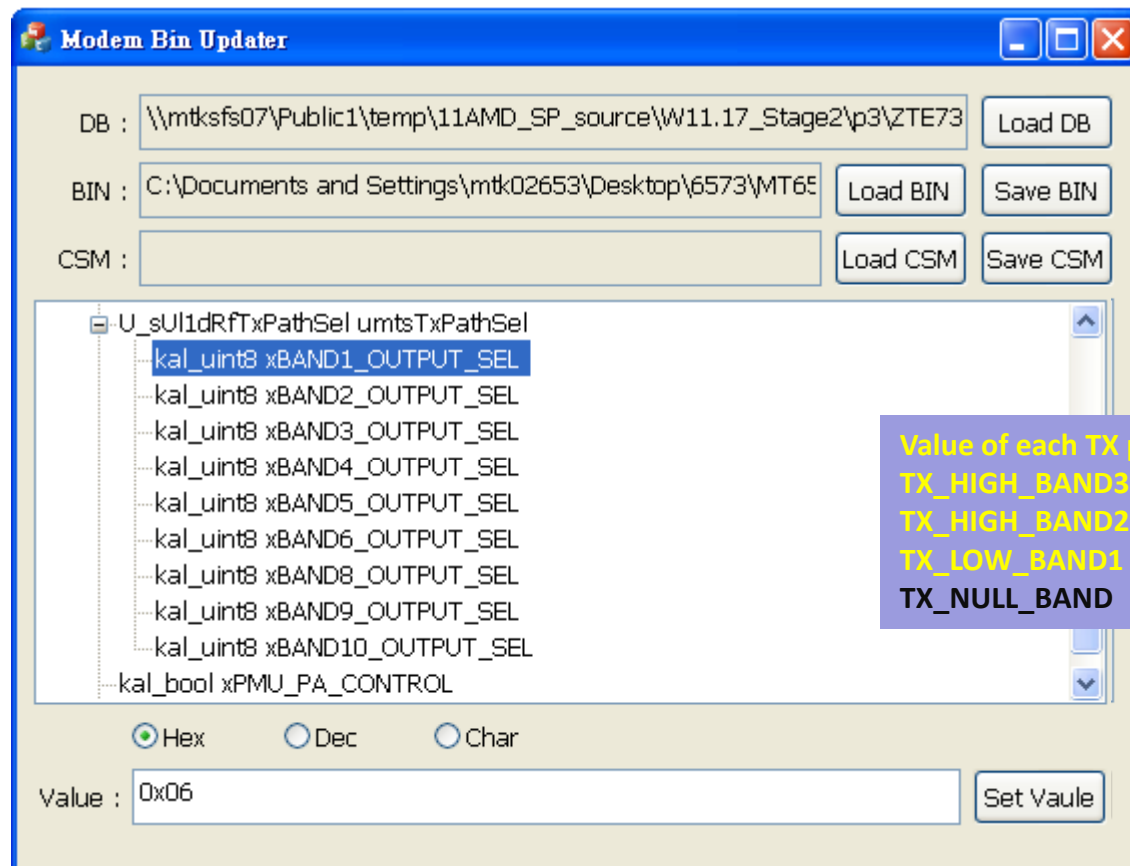


Value of each LNA port define:

LNA1_HIGH_BAND => 0x00
 LNA2_LOW_BAND => 0x01
 LNA3_HIGH_BAND => 0x02
 LNA4_LOW_BAND => 0x03
 LNA5_HIGH_BAND => 0x04
 LNA6_HIGH_BAND => 0x05
 LNA7_LOW_BAND => 0x06
 LNA8_LOW_BAND => 0x07
 NON_USED_BAND => 0x08

根据原理图，来设置项目所支援的Band占用的LNA port . (如: Band1 默认连接LNA3)

RF TX Output Path Selection



Value of each TX path define:

TX_HIGH_BAND3 6

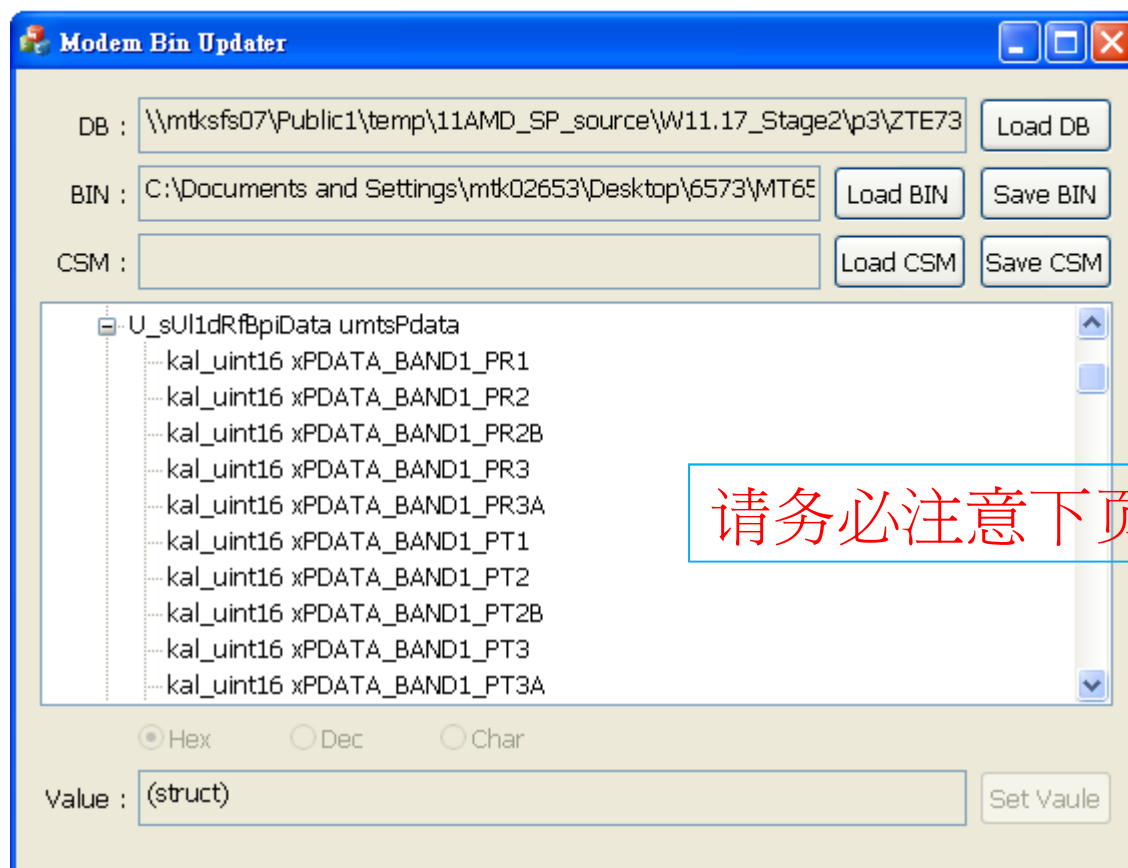
TX_HIGH_BAND2 5

TX_LOW_BAND1 0

TX_NULL_BAND 8

根据原理图，来设置项目所支援的Band占用的TX Path . (如: Band1 默认连接HIGH_Band3)

3G BPI Data Explanations



请务必注意下页BPI Bit map的关系

这里可以看到BPI的状态列表，可以根据原理图以及PA和开关的真值表来修改

3G BPI Data Example

ASM Control Truth Table				
	Vct1	Vct2	Vct3	Vct4
Band 1	H	H	H	L
Band 2	H	H	H	H
Band 5	H	L	L	H

ASM (in reference design) Control Truth Table

```

/*-----*/
/*  define  BPI data for OH  (shall be modified by real case)  */
/*-----*/
/*  PRCB : bit  BPI  pin function  */
/*-----*/
/*      0      0    ASM_VCT1      */
/*      1      1    ASM_VCT2      */
/*      2      2    ASM_VCT3      */
/*      3      3    ASM_VCT4      */
/*      4      4    ASM_VDD       */
/*      5     10    PA1_ON        */
/*      6     11    PA2_ON        */
/*      7     12    PA5_ON        */
/*      8     13    PA6_ON        */
/*      9     14    UMTS_ERR_DET_ID  */
/*-----*/

```

BPI Data Definition in reference design

For example : xPDATA_BAND1_PT2 = 0x237, can be interpreted as follows:

BPI14 → BPI bitmap bit 9 = 1 (internal use only)
 BPI13 → BPI bitmap bit 8 = 0
 BPI12 → BPI bitmap bit 7 = 0
 BPI11 → BPI bitmap bit 6 = 0 (PA2 on)
 BPI10 → BPI bitmap bit 5 = 1 (PA1 on)
 BPI4 → BPI bitmap bit 4 = 1 (ASM_VDD)
 BPI3 → BPI bitmap bit 3 = 0 (ASM_Vct4)
 BPI2 → BPI bitmap bit 2 = 1 (ASM_Vct3)
 BPI1 → BPI bitmap bit 1 = 1 (ASM_Vct2)
 BPI0 → BPI bitmap bit 0 = 1 (ASM_Vct1)

如图示意，尤其留意BPI5~9是没有映射到Bit的，BPI4的下一位是BPI10 ！

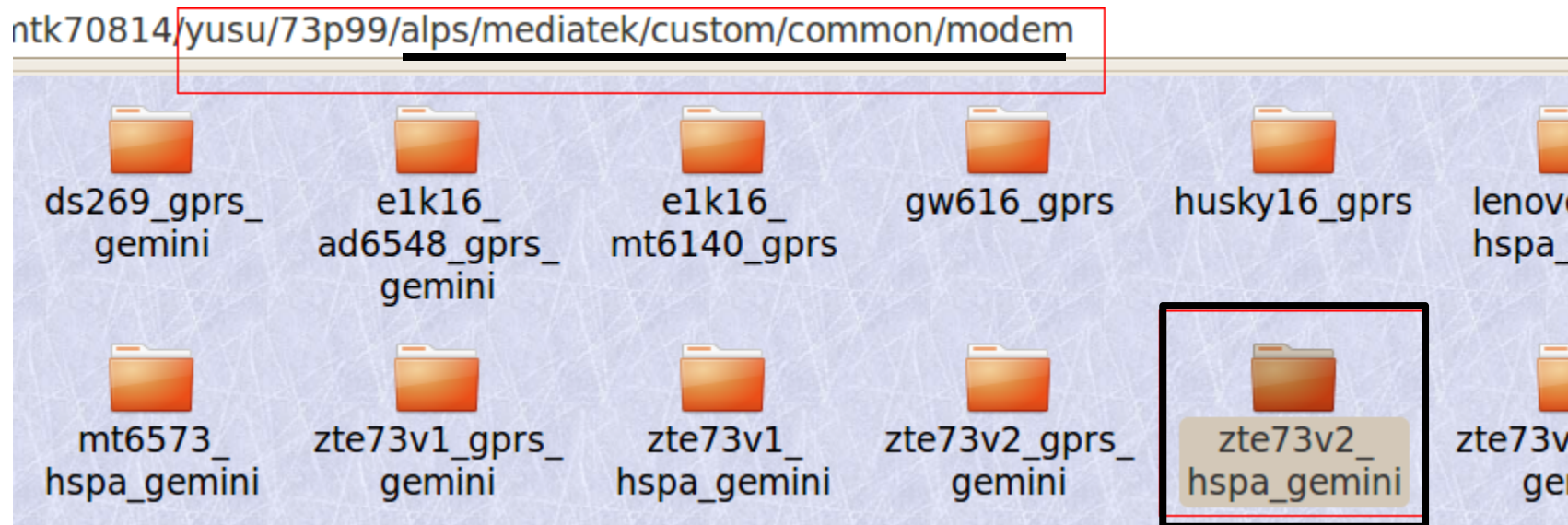


How to build modem.img into system.img?



1. 建立Modem目录

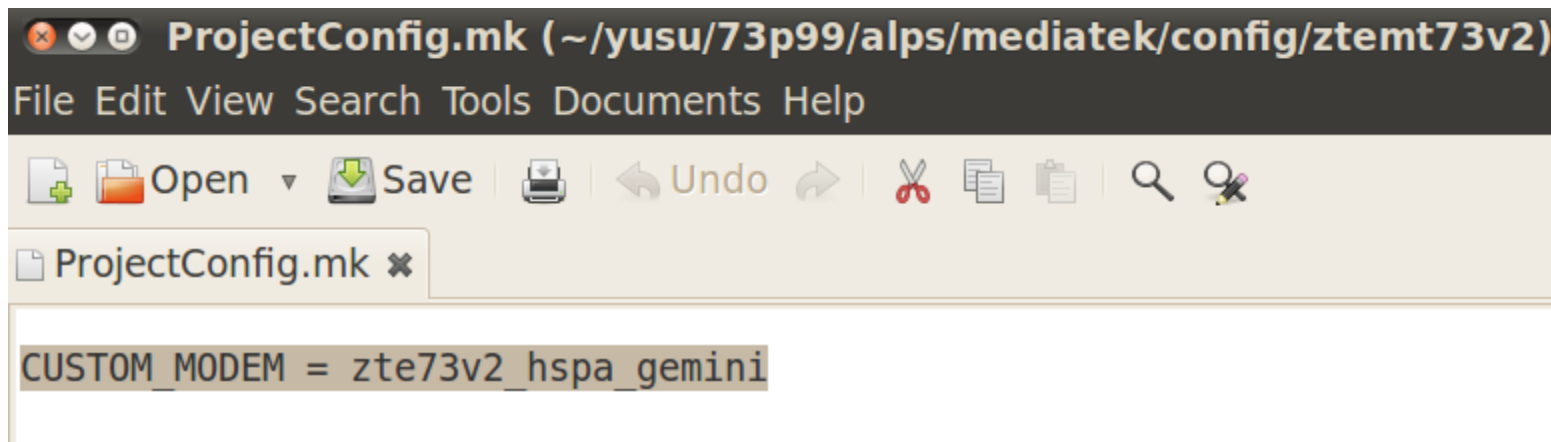
- 获得modem image，并由HW同仁修改modem参数
- 在alps/mediatek/custom/common/modem目录下添加modem image 目录
 - 如zte73v2_hspa_gemini



Modem image需要命名为 **modem.img**，放置到上述文件夹内

2. 设置CUSTOM_MODEM

- 在 alps/mediatek/confi/[prjN]/ProjectConfig.mk 中设置 CUSTOM_MODEM



3. 执行Build命令

- 执行./mk [prjN] n android
- 或者./mk [prjN] new



Q & A

