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NVRAM Customization











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- What is NVRAM
- How to add NVRAM Items
- **NVRAM** Description and Versioning

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NVRAM Introduction

- NVRAM is an abstract, uniform interface to access data stored in the underlying non-volatile storage.
- NVRAM manages fixed-sized critical data of our system, a.k.a (logical) data items.
- NVRAM data items are stored as files in the File System. tial Release for

Services NVRAM Provides:

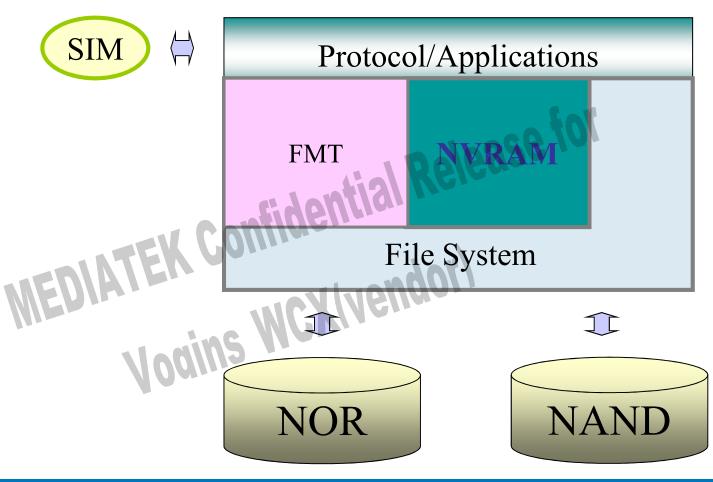
- Data integrity:
 - Multiple copies of mission critical data
 - Auto Recovery (reset to factory default on checksum errors)
 - System-Record protection.

Data security:

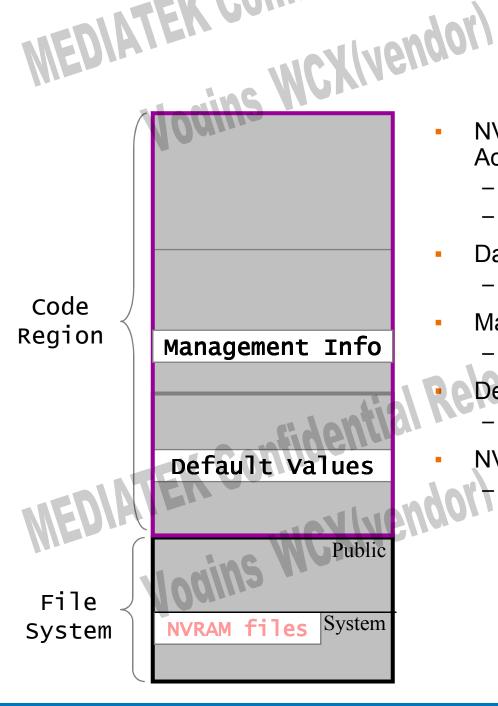
Encryption for confidential critical data Write protection by S/W Lock



Maui Storage Overview



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- NVRAM (Non-Volatile Random Access Memory)
 - A SW task to manage system data
 - The 1st task to be initiated
- Data Item
 - The logical unit conducted by NVRAM
- Management Info
 - details of every data item (in RW)
- Default values
 - Initial data of data items (in RO)
- NVRAM file
 - Instance of data item

Configure data item – Add LID into which confidential B region?

NVRAM

MT region

MP region

CT region

1. LID relate with system

2. Not release to all customer

2. Replace MP LID for special project

How to Add NVRAM Item

- Define new NVRAM Item LID, size, and total number
 - nvram data items.h

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- nvram common defs.h
- nvram user defs.h
- Setting NVRAM Item data items and default values
 - nvram data items.c
 - nvram_common_config.c
 - ram user config.c
 - Provide NVRAM Item version and structure
 - nvram editor data item.h
 - common_nvram_editor_data_item.h
 - custom_nvram_editor_data_item.h



Configure date item – Overview

```
Step 1: Defined LID of data item
typedef struct
                                 Step 2: Defined two constants:
                                 size and total record
    nvram lid enum LID;
                                         Step 4: Defined default
    kal uint16 size;
                                         value of data item,
    kal uint16 total records;
                                         Please use MACRO to wrap
    kal uint8 const *default value the default value
    nvram attr enum attr:
    nvram category enum category;
    kal char fileprefix[FILE PREFIX LEN + 1];
    kal char fileverno[FILE VERNO LEN + 1];
    kal char *description;
                                             Step 3: Defined
    kal uint8 app ID;
                                             Version of data item
                               Step 5: Defined an app id in
                               nvram restore app id enum, if want
                               to restore certain application data
Step 6: Add a new entry for the logical data item
Step 7: Add bit-level description for tool
```

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Structure name	Itable_entry_struct	
Field Name	Туре	Description
LID	nvram_lid_enum(kal_uint16)	Logical Data Item ID.
size	kal_uint16	Size of one record. Either size of entire logical data item if it is transparent, or size of a record of this logical data item if it is linear-fixed.
total_records	kal_uint16	If this value is 1, this logical data item is implicitly defined as transparent; otherwise it is linear-fixed and this value defines number of records of this logical data item.
default_value	kal_uint8 const *	Default value defined for the LID. Must be NULL if default value is not supplied
attr	nvram_attr_enum(kal_uint32)	Attribute of the data item.
category	nvram_category_enum(kal_uint32)	Category that the data item belongs to; could be associated to nvram_reset_category_enum
fileprefix	kal_char[FILE_PREFIX_LEN+1]	The predefined name of the LID for internal access purpose. Please follow the rules of naming.
fileverno	kal_char [FILE_VERNO_LEN+1]	The version number (from 000 to 999) for automatic version resolution. Please follow the versioning rules.
description	kal_char*	This is a short human readable description that is effective only when important user or calibration data need to be backup.
app_ID	kal_uint8	This LID belongs to which application.

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```
ains WCXIvendor
                                               ⊕ 0x0011598C.
                                               ⊕ 0x001159B4.
NURAM EF PHB IDS LID.

    ⊕ 0x001159DC ,

NURAM EF PHB FIELDS LID.
                                               ⊞ ИхИИ115АИ4.
NURAM_EF_PHB_SETTINGS LID.
                                               \Box 0x00115A2C \rightarrow (
NURAM EF PHB CALLER GROUPS LID,
                                                  -LID = 57.
NURAM EF PHB UCARD LID,
                                                  size = 335.
NURAM EF PHB EMAIL SORT LID,
                                                  total_records = 100.
NURAM EF PHB VIDEO LID.

    default_value = 0x085F6B9D.

NURAM EF PHB LN TYPE SEQ LID,
                                                  = attr = 0x0.
NURAM EF PHB COMPARE DIGIT LID.
                                                  categoru = 0x0.
NURAM EF PHB BIRTHDAY LID.

⊞ fileprefix = "MP0q",

NURAM EF PHB INFO LID.
                                                 ⊞ fileverno = "000".
NURAM EF PHB SNE LID.
                                                 \boxplus description = 0x0853AEOC \rightarrow "PHB\_Personal\_Information",
NURAM EF PHB IMPS LID.
                                                  - record_ID = 0)
NURAM EF PHB POC LID,
                                               . 0x0 ⊞
NURAM EF PHB VOIP LID.
                                               ⊞ 0x0.
NURAM EF SMS LID,
                                               . 0x0 ±
NURAM EF SMS CB CHNL LID,
                                               ⊕ 0x0,
NURAM EF SMS CB SMS LID,
                                               □ 0x00115A54 →
NURAM EF SMS CB SMS INFO LID,
                                                 -LID = 62
NURAM EF EMS MY PICTURE NAME LID.
                                                  \cdot size = 84.
NURAM EF EMS MY ANIMATION NAME LID.
                                                  total_records = 31.
NURAM_EF_EMS_MY_MELODY_NAME_LID.
                                                 \oplus default_value = 0x085F6B9D,
NURAM EF SMSAL SMS LID.
                                                  - attr = 0,
NURAM EF SMSAL MAILBOX ADDR LID,
                                                  category = 0,
NURAM EF SMSAL COMMON PARAM LID.

    fileprefix = "MPØv",

NURAM EF CB DEFAULT CH LID.
                                                 ⊞ fileverno = "001",
NURAM EF SMSAL SMSP LID.
                                                 \oplus description = 0x0853AE26 \rightarrow "SMS",
NURAM EF MSG CLUB LID.

    record_ID = 0).

NURAM EF MSG CLUB NUM LID,
                                               ⊞ 0x00115A7C..

⊕ 0x00115AA4.

⊕ 0x00115ACC,

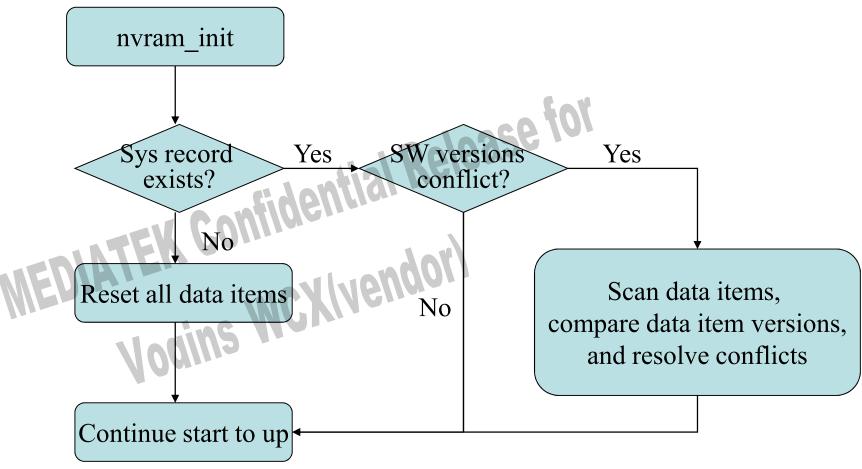
                                               ⊞ 0x0.
                                               ± 0x0,
                                               ⊞ 0x0.

⊕ 0x00115AF4,
```

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NVRAM Versioning System (1/2)

NVRAM behavior in the start-up process:



NVRAM Versioning System (2/2)

No re-calibration:

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- With the versioning system, only updated NVRAM data items will be reset to the new default values. This saves lots of efforts.
- The data item version must be increased for the following cases
 - Size is changed, or
 - Number of sections is changed, or
 - Attribute is changed, or
 - Data structure is changed, or
 - Vogins WCXXV New default values need to be applied.



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Appendix for MEDIATEK Confidential mendix Vocins WCXIvendor)

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Step\1 Define New Data Item

- File:
 - nvram_data_items.hnvram common defs.h(MT region)(MP region)
 - nvram user defs.h(CT region)
- Name convention:
 - "NVRAM_EF_[new data item name] LID"
- Ex: NVRAM EF PORT SETTING LID

```
typedef enum
```

```
NVRAM_EF_ADC_LID = NVRAM_LID_COMMAPP_BEGIN,
NVRAM_EF_CACHE_BYTE_LID,
NVRAM_EF_CACHE_SHORT_LID,
NVRAM_EF_CACHE_DOUBLE_LID,
NVRAM_EF_CUST_HW_LEVEL_TBL_LID,
NVRAM_EF_NOTE_APP_LID,

/* Add new entry in the tail_without its compile optoin */
NVRAM_EF_LAST_LID_COMMAPP
} nvram_lid_commapp_enum;

Note: please
```

Note: please always add the new LID at the tail but before

MCXIneuqon Step 2,3 Define Size, Total and Version

- File:
 - nvram data items.h (MT region) (MP region) nvram common defs.h - nvram user defs.h (CT region)
- name convention:
 - NVRAM EF [new data item name] SIZE
 - NVRAM EF [new data item name] TOTAL
- File:
 - nvram editor data_item.h (MT region) common_nvram_editor_data_item.h (MP region) custom_nvram_editor_data_item.h (CT region)
- name convention:
 - NVRAM EF [new data item name] LID VERNO

Ex:

- #define NVRAM EF PORT SETTING SIZE 16
- NVRAM EF PORT SETTING TOTAL #define 1
- #define NVRAM EF PORT SETTING LID VERNO "000"

Step 4-1 Default Value File:

- File:
 - nvram_data_items.c (MT region) (MP region) nvram_common_config.c
 - (CT region) nvram_user_items.c
- Type of default value:

 - Default value defined by Application

```
nvram ef dm fwu http setting struct const NVRAM EF DM FWU HTTP SETTING DEFAULT[]=
    {"http://wap1.mtk.com.tw/",0},
#endif /* #if defined(__MMI_FWU_VIA_HTTP__) */
```



Step 4-2 Default Value

- Use macro before default value
 - NVRAM_SECUPACK
 - data item in NVRAM_CATEGORY_SECUPACK
 - NVRAM_CUSTPACK
 - data item in NVRAM_CATEGORY_CUSTPACK
 - NVRAM_NORMAL
 - data item NOT in secupack and custpack

```
NVRAM EF MS SECURITY LID,

NVRAM EF MS SECURITY SIZE,

NVRAM EF MS SECURITY TOTAL,

NVRAM CUSTPACK (COMMON NVRAM EF MS SECURITY DEFAULT),

NVRAM ATTR MULTIPLE | NVRAM ATTR CONFIDENTIAL,

NVRAM CATEGORY USER | NVRAM CATEGORY CUSTPACK,

"MP45",

VER (NVRAM EF MS SECURITY LID),

"MS SECURITY",

NVRAM APP RESERVED
```

Step 5 Define Application-ID

- File:
 - custom_nvram_config.h
- name convention:
 - NVRAM_APP_[application name]
- Ex:

MEDIATEK Confidentia MCXIVE Note:

If want to restore all data about certain application, RD should add an app-id. else can use NVRAM APP RESERED

```
typedef kal_uint8 nvram_restore_app_enum;

typedef enum

NVRAM_APP_PHNSET,
NVRAM_APP_CAMCODER,
NVRAM_APP_CAMERAPP,
NVRAM_APP_EDITABLE_EQ,
NVRAM_APP_EDITABLE_EQ,
NVRAM_APP_Q05A_BROWSER,

NVRAM_APP_TOTAL,
NVRAM_APP_RESERVED = NVRAM_APP_PHNSET

nvram_restore_app_id_enum;
```

Step 6 Add a new entry

- File:
 - nvram data items.c (MT region)
 - (MP region) nvram common config.c
 - (CT region) nvram_user_items.c

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Note: The fileprefix MUST be a new name, for example, if the last LID in the MP reign is MP07, the new one must be MP08

```
ltable entry struct logical data item table comm app[] =
     NVRAM EF PORT SETTING TOTAL,
     NVRAM NORMAL (NVRAM EF PORT SETTING DEFAULT),
     NVRAM ATTR AVERAGE,
     NVRAM CATEGORY USER | NVRAM CATEGORY SHADOW,
     VER (NVRAM EF PORT SETTING LID),
     "Port Settings\0",
     NVRAM RESERVED VALUE
```

Step 7 Bit-Level Description

- Add bit-level description for META tool (Optional)
 - Add structure definition or include the header file if need
- File:

```
nvram_editor_data_item.h
common_nvram_editor_data_item.h
custom_nvram_editor_data_item.h
(MT region)
(MP region)
(CT region)
```

ex:

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