Standard Operating Procedure eUICC Consumer Profile Development

Version Control

Document Name	Version	Date
Process for eUICC Consumer profile development	v1.1	30-05-2022

Prepared by	Technical Support Services	30-05-2022
Approved by	Technical Manager	*Saji Krishnan*

Revision History

Issue	Date	Reason for change
1.0	01-08-2021	First Release
1.1	30-05-2022	Removed Profile type setup and provisioning, created as separate SOP

Introduction

This document outlines the standard process for development of an eUICC Consumer profile against customer requirement and in accordance with GSMA standards. This is part of the consumer eSIM BAP process.

Pre-requisite:

- Pre-development Inputs –
  - Customer Specification | Customer Requirement
  - eUICC_Profile_Technical Spec.xlsx
  - eUICC_Profile_Metadata_Information
  - Input file
  - Output file(s) format
- Tools –
  - eUICC Profile Editor tool
  - SDMS
  - UL Mobile Card Profile Tester

Roles and Responsibilities

Technical Consultant:

Please ensure below points should be covered before freezing the customer requirement:

- Customer should be commercially qualified to start the profile development.
- eUICC_Profile_Technical_Spec_v001.xlsx must be filled.
- Get the sign-off on customer requirement to start the profile development (an email confirmation can suffice the sign-off requirement)
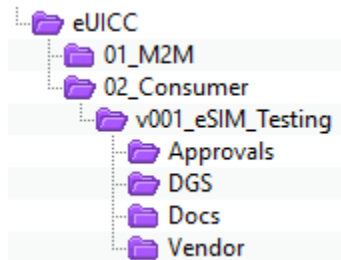
Developer:

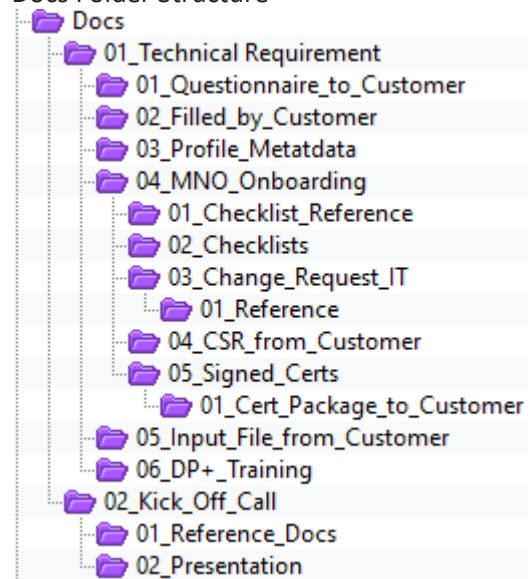Please ensure below points should be covered before starting the profile development

- To ensure the technical spec is received and signed-off by customer or email confirmation.
- To ensure if there is any third-party applet then applet specification document must be provided by customer to configure in the eSIM profile.
- To ensure if there is any in-house applet to be configured in the profile then get the sign-off the on the applet document or email confirmation.
- Always use the latest version of the eUICC Profile Editor and SDMS.

Please follow the below folder structure to archive the technical elements received from customer and to start the profile development.
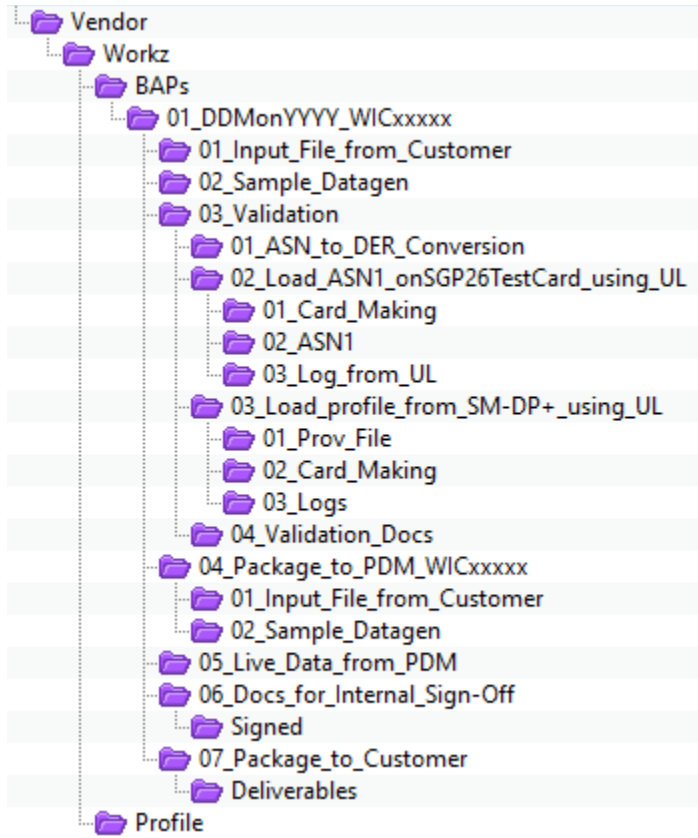
1. Root Structure
   - 📂 eUICC
     - 📁 01_M2M
     - 📂 02_Consumer
       - 📂 v001_eSIM_Testing
         - 📁 Approvals
         - 📁 DGS
         - 📁 Docs
         - 📁 Vendor

2. Docs Folder Structure
   - 📂 Docs
     - 📂 01_Technical Requirement
       - 📂 01_Questionnaire_to_Customer
       - 📂 02_Filled_by_Customer
       - 📂 03_Profile_Metatdata
       - 📂 04_MNO_Onboarding
         - 📂 01_Checklist_Reference
         - 📂 02_Checklists
         - 📂 03_Change_Request_IT
           - 📂 01_Reference
         - 📂 04_CSR_from_Customer
         - 📂 05_Signed_Certs
           - 📂 01_Cert_Package_to_Customer
       - 📂 05_Input_File_from_Customer
       - 📂 06_DP+_Training
     - 📂 02_Kick_Off_Call
       - 📂 01_Reference_Docs
       - 📂 02_Presentation

3. Vendor Folder Sructure

Place all the technical elements in the respective folders.

Naming conventions for -

Profile ePE:

<Operator>_<Country>_<ApplicationReference>_v<MajorVersionNumber>Dot<MinorVersionNumber>Dot<PatchVersionNumber>

E.g. MyT_Mauritius_Prepaid_v02.00.00

Application Reference can be referred from abbreviation table.

Note: This name will be used in RSP platform, and the maximum length should be 50 characters.

DGS:

<Operator>_<Country>_<ApplicationReference>_<PRP>_v<MajorVersionNumber>Dot<MinorVersionNumber>Dot<PatchVersionNumber>

E.g. MyT_Mauritius_Prepaid_v02.00.00

Note: The name should be same as ePE name. Other details can be added In DGS description, like "with MSISDN" or "with MSISDN and Expiry" etc.

Abbreviation Table

SI - Single IMSI

MI - Multi IMSI

CP - Carrier Privileges

ND - No device (Redownload not allowed)

SD - Redownload on same device

AD - Redownload on any device
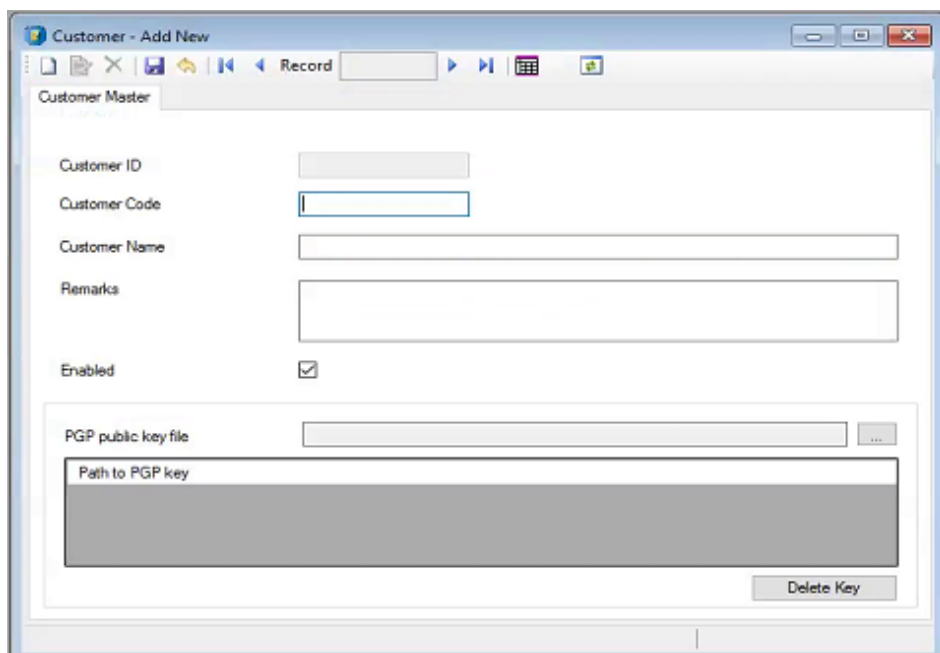
Customer code for new customer entry in SDMS:

To create new customer entry in the SDMS, please follow the below steps:

1. Click on setup option.

2. Click on Customer option.

3. Below window will pop-up to create customer entry. Click on highlighted option.
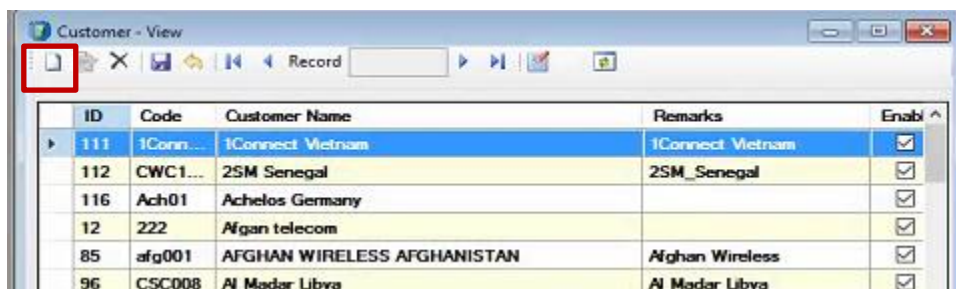
4. Below window will appear to enter the details.

5. Customer ID –

6. Customer code –

7. Customer Name –
   Customer_Name + Country_Name

8. Remarks
   It can be specific details related to the customer.

eUICC Profile Editor Tool

eUICC Profile Editor tool is used –

- ✓ To design the profile as per the customer requirements
- ✓ To configure the MSL
- ✓ To configure the authentication algo and parameters
- ✓ To configure the OTA keysets
- ✓ To configure the applet
- ✓ To generate the ASN.1 file
- ✓ To validate the profile against the standards
- ✓ To generate the electrical profile summary document

Template Creation –

eUICC Profile editor tool has several default templates to create a file system with the default values.

Select the appropriate template(s) for development. The commonly used templates are listed below –

1. eUICC MF template
2. eUICC Telecom template
3. eUICC USIM template
4. eUICC Phonebook template
5. eUICC GSM Access template
6. eUICC OPT-USIM template
7. eUICC ISIM template
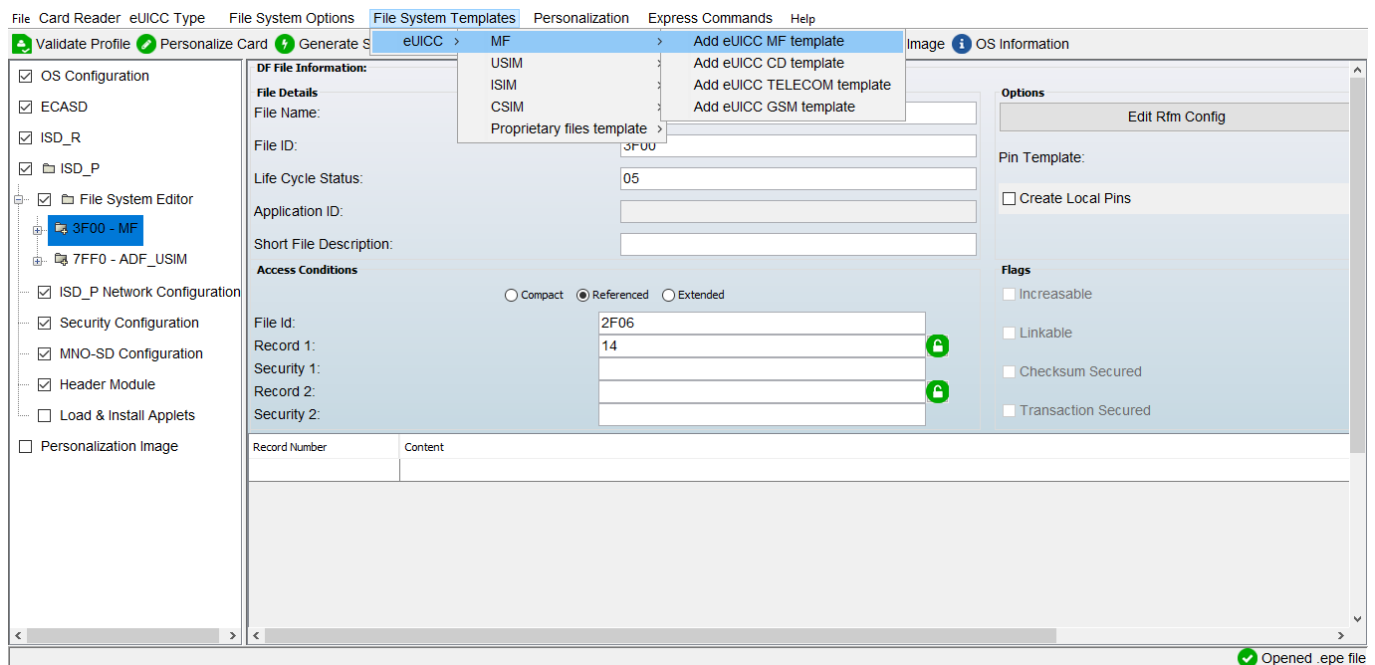
Once the template is created you can configure the profile as per the customer requirement.

Alternatively, an approved profile with similar requirements can be used as a baseline for development.

Checks –

- ✓ Please ensure the profile template is saved before generating the ASN.1 file.
- ✓ Please validate the profile once the development is completed.
- ✓ In case any of the services are enabled in UST and IST and files are not present, then make sure files must be created before freezing the template.
- ✓ If there are any other warning or errors, please ensure template is verified and checked against the customer requirement.
- ✓ Ensure that the major-version and minor-version of profile type is set to '2.0' for all profile types with exception to 5G profile types. Snippet below:

```
profileelement ProfileElement ::=  header : {
            major-version 2,
            minor-version 0,
```

- ✓ Ensure that no 'local PINs' are defined in in 'pincodes' block which is declared just after 'mf' block. This means only globalPINs shall be defined in in the "PIN Context" of the MF.

Best Practice –

- ✓ If MSL is not defined by the customer in the technical spec, then as per the best practice, configure it to '0x16'.
- ✓ EF_EPSLOCI (6FE3) and EF_EPSNSC (6FE4) must be configured for all profiles.
- ✓ Service 85 in the UST must be enabled.
- ✓ If 5G is part of requirement from the customer, then following minimal filesystem needs to be added in the profile (note that this profile type is from v2.3.1 and shall be downloadable on devices with eUICC supporting the same).
    - a. ef-5gs3gpploci
    - b. ef-5gsn3gpploci
    - c. ef-5gs3gppnsc
    - d. ef-5gsn3gppnsc
    - e. ef-5gauthkeys
    - f. ef-uac-aic
    - g. ef-opl5g
    - h. ef-nsi
    - i. ef-routing-indicator

Applet Integration –

- Applet development team needs to provide following deliverables to profile development team:
  a. Applet .cap file.
  b. Technical applet specification document – this should cover applet requirements, applet test cases, proprietary file system of the applet (if present), Install parameters.
- Profile development team will integrate the applet received into the profile using ePE tool.

Support –

- ❖ For any enhancement or any bug related to the eUICC profile editor, you can raise a ticket to email id – support@kigen.com.

Unit Testing – to be done by Developer

- Once the developer completes the development of the profile, unit testing needs to be conducted.
- First step includes validating the profile with ePE (for compliance to specification standards).
- If there are any deviations with the standards, the configuration should be checked and validated against customer requirement for conformance.
- Then perform syntax check for ASN.1 profile developed. This can be done using UL Mobile Card Profile Tester tool by providing ASN.1 (exported with dummy values from ePE) as input and converting it into .der file. If there is any error in conversion, check and perform corrections.
- Once successfully done, place the output (.der file) in folder "01_ASN_to_DER_Conversion".
- Then load the ASN.1 dummy profile on an SGP.26 test card. Save the logs in folder "02_Load_ASN1_onSGP26TestCard_using_UL→ 03_Log_from_UL". Perform 'Enable', 'Disable' and 'Delete' operations.
- If applet is present in the profile, ensure that it is successfully loaded in the card.
  For ex: if STK is present, check that the Menu is appearing in the enabled profile.
  If a Dual IMSI applet is present, check the basic switching scenario using Wojtek tool.
  If IMEI tracker applet is present, check that the IMEI is sent from the enabled profile.
  To summarize, basic unit testing shall be done to ensure that the applet is successfully loaded in the eUICC/eSIM.
- After completing above steps, the developer hands over the provisioning process to deployment team.

The ASN.1 profile developed will be validated against TCA IPP v2.x specification, ASN.1 to DER conversion and profile loading using the UL Mobile Card tester. Please refer SOP: **SOP for Consumer eUICC Functional Tests using UL CPT Tool v1.2**

Pre-requisites
1. Card with SGP.26 based test GSMA certificate loaded (Kigen eUICC OS).
2. UL Mobile Card Profile Tester v3.6.1 (or latest)

ASN.1 to DER conversion and Validation against TCA IPP v2.x specification

Once the validation is completed the ASN.1 will be converted to DER and will check if the conversion is done according to TCA IPP v2.x specification (https://trustedconnectivityalliance.org/technology_overview/esim/).

1. Conversion using UL Tool.
   a. Open the UL Mobile Card Profile Tester tool.
   b. Click on Tools menu and select Encode TCA Profile (ASN.1 to DER).
   c. Save the file by selecting Save DER.
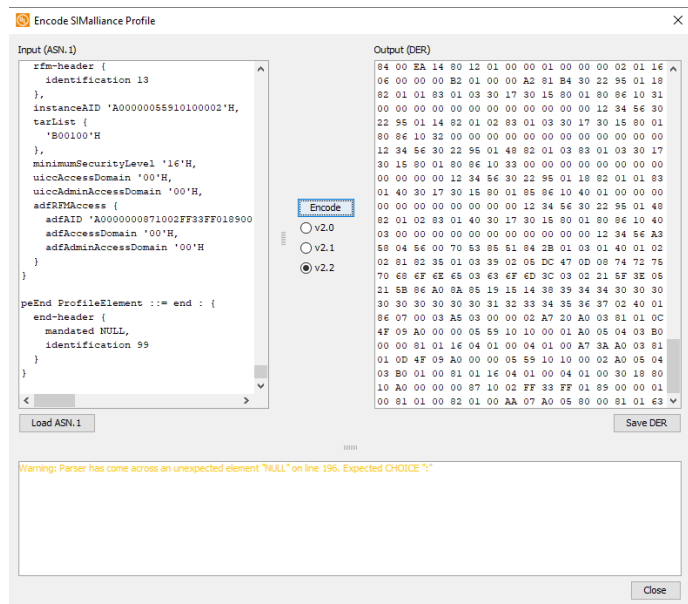
Automated
- ASN.1 format validation.
- PE element structure validation.

Manual

ASN.1 to Der conversion using UL tool will be successful if its PE format is correct. However, the tools don't validate the PE internal file ID/content/size against the TCA specifications.

This check must be done manually against the TCA IPP v2.x specification (https://trustedconnectivityalliance.org/technology_overview/esim/).

Profile loading and functional testing using the UL Mobile Card tester

Installation on SGP.26 based consumer eUICC card
The UL Mobile Card Tester Platform allows us to load an ASN.1/DER profile to an SGP.26 based consumer eUICC card using "**Manage Consumer eUICC Profiles**" component.

Please refer below attached "UL Mobile Card Profile Tester User Manual.pdf" for detailed info.

UL Mobile Card
Profile Tester User M
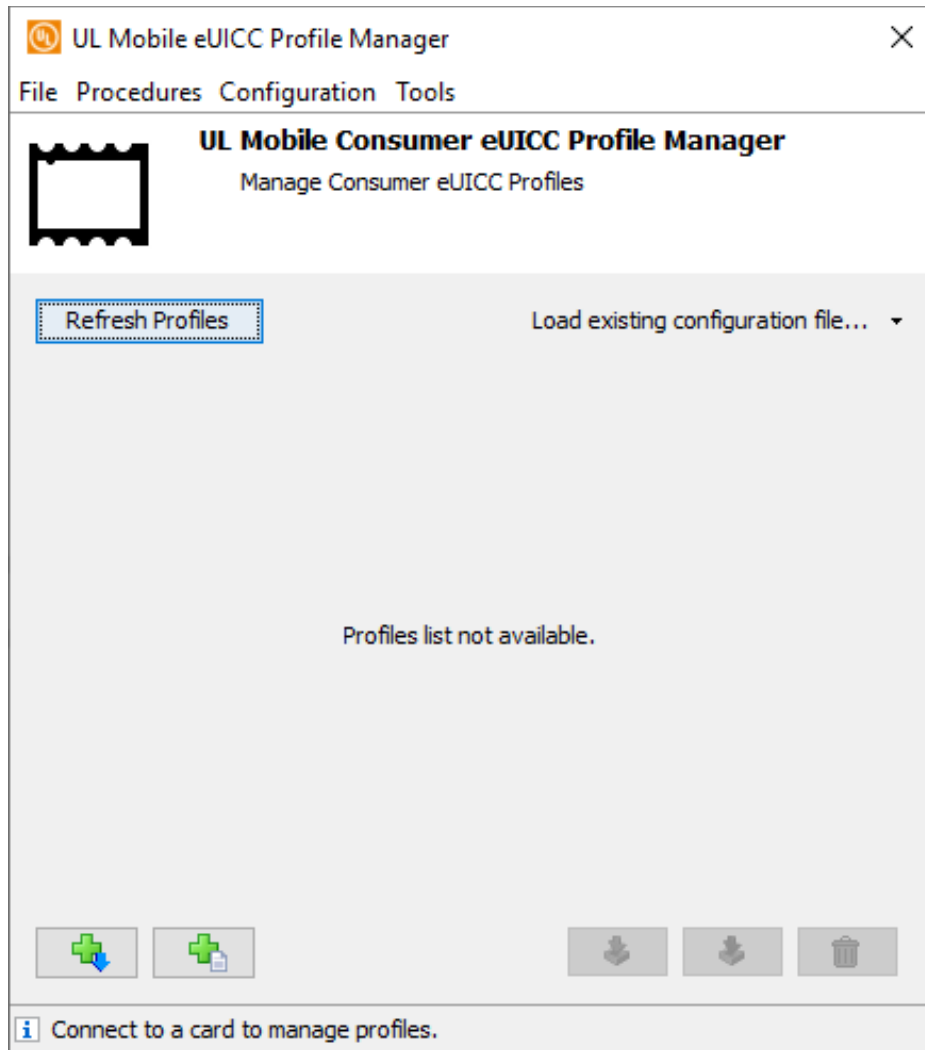
1. Create the configuration. Create a card with Kigen Consumer eUICC OS and use SGP.26 certification from the package SGP.26_v1.2_files.
   https://www.gsma.com/newsroom/resources/sgp-26-v1-2-rsp-test-certificate-description/
   In the configuration page section select SGP.26 certificate as below.

Create eUICC config file   ✕

Create SM-DP+ Simulation File
▶ ECDSA Keys & Certificates
Specify Config File

CI Certificate

CERT.CI.ECDSA Path: [_____] [...]

☑ Use SGP.26 Certificates ⦿ NIST ◯ Brainpool

SM-DP+ Keys Certificates

Authentication

CERT.DPauth.ECDSA Path: [_____] [...]

SK.DPauth.ECDSA Path: [_____] [...]

☑ Use SGP.26 Certificates/Keys ⦿ NIST ◯ Brainpool

Profile Binding

CERT.DPpb.ECDSA Path: [_____] [...]

SK.DPpb.ECDSA Path: [_____] [...]

☑ Use SGP.26 Certificates/Keys ⦿ NIST ◯ Brainpool

[Previous] [Next] [Cancel]

2. The tool will list the available profile and EID details upon clicking the "Refresh Profiles" button.
   Select procedures menu or quick access buttons at the bottom of the window to perform operations like load, enable, disable, delete etc.
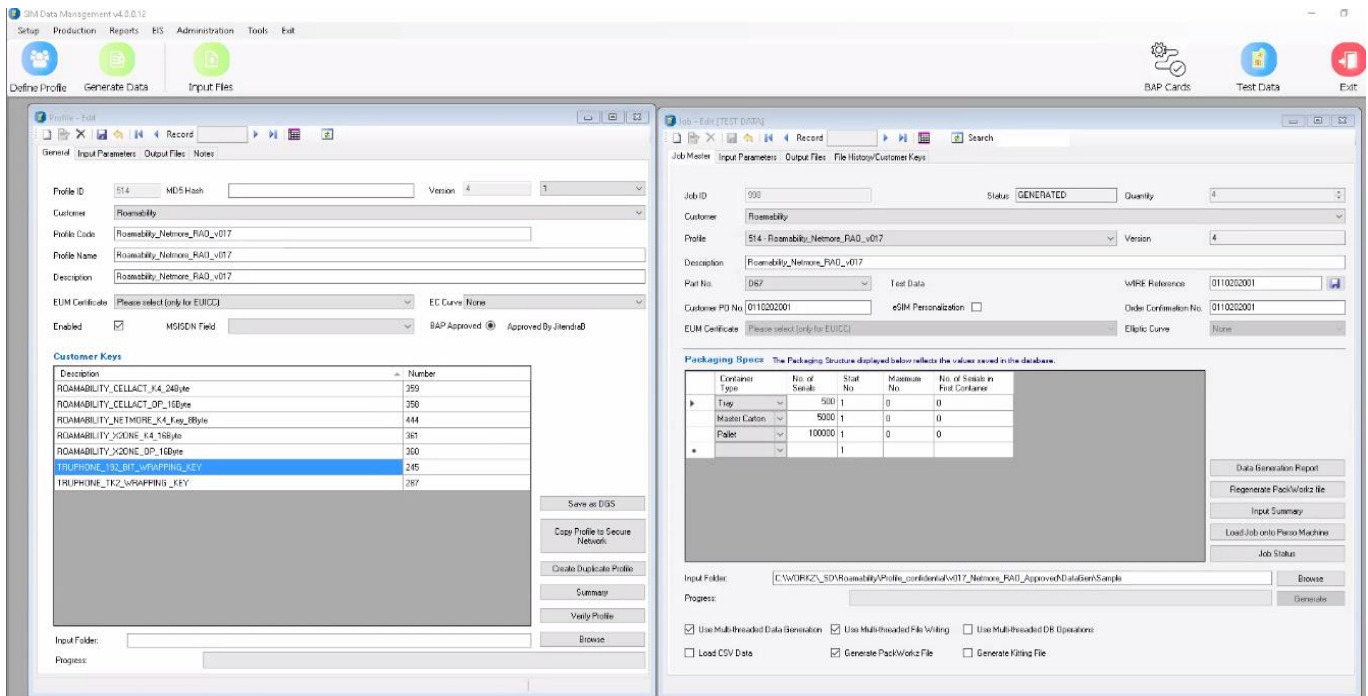
   Please refer "SOP Consumer eUICC functional Test using UL Tool" for detailed information.

Doc ID: 2e632ccb9d5fd3d2ad51aabe85c3db0e8bce7947
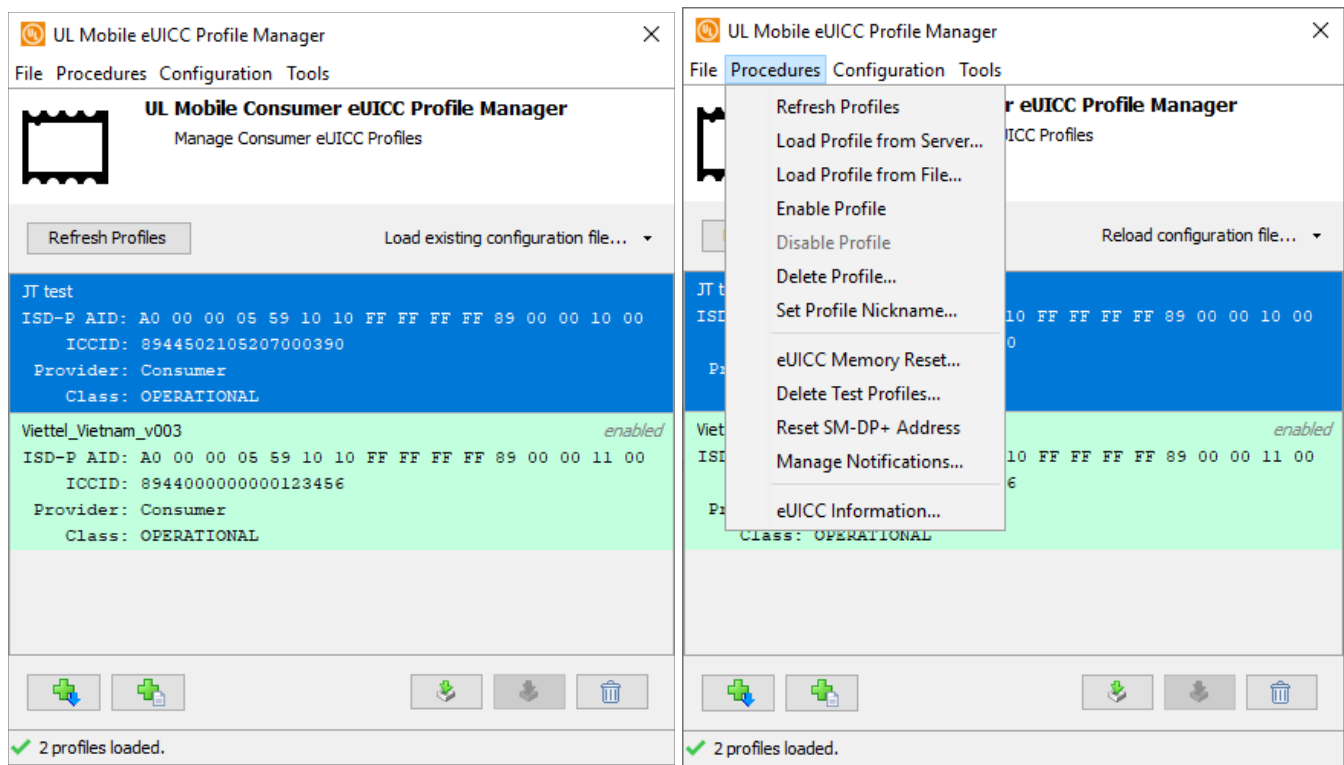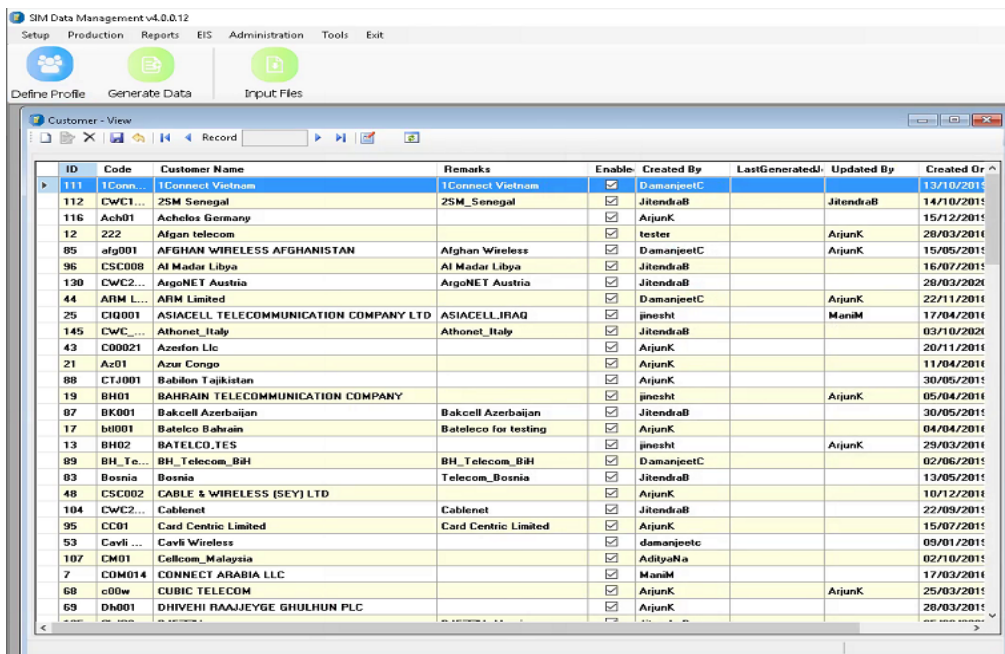
SDMS tool

SDMS tool is used –

- ✓ To design the data generation template as per the customer requirements
- ✓ To configure the Keys
- ✓ To configure OTA keys
- ✓ To configure the Output file
- ✓ To configure XML file for OTA platform
- ✓ To configure any dynamic value
- ✓ To configure graphical value which needs to be printed on the SIM cards
- ✓ To generate Workz factory input file

How to create a customer entry -

- Click on "Setup" → Click on "Customer"
- Above window will appear with the customer list
- Click on New

- Click on "New" below window will appear

- <mark>Enter the customer code – Customer code can be entered</mark>
- Enter the customer's name – "CustomerName_CountryName"
- Enter the Remarks – "CustomerName_CountryName" with some description, if required
- Click on save button to save the customer details

- To delete click on delete button to save the customer details

How to create a new template –
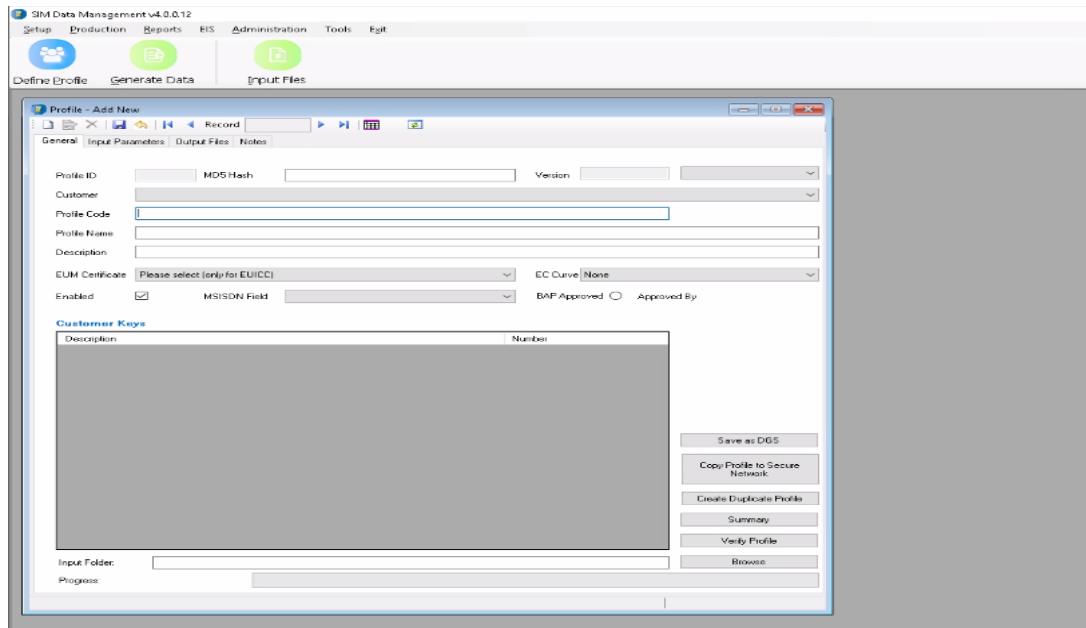
General Tab-

1. Click on "Define profile", new window will pop-up
2. Select the customer from the customer drop-down list
3. Enter the profile code
4. Enter the profile name "make sure EP profile name and DGS profile name should be same"
5. To save the DGS, click on "Save as DGS" and enter the name
6. To transfer the DGS template, click on "Copy profile to secure network"
7. To create duplicate profile, click on duplicate profile and it will create new template with the same information.

Input Parameters-
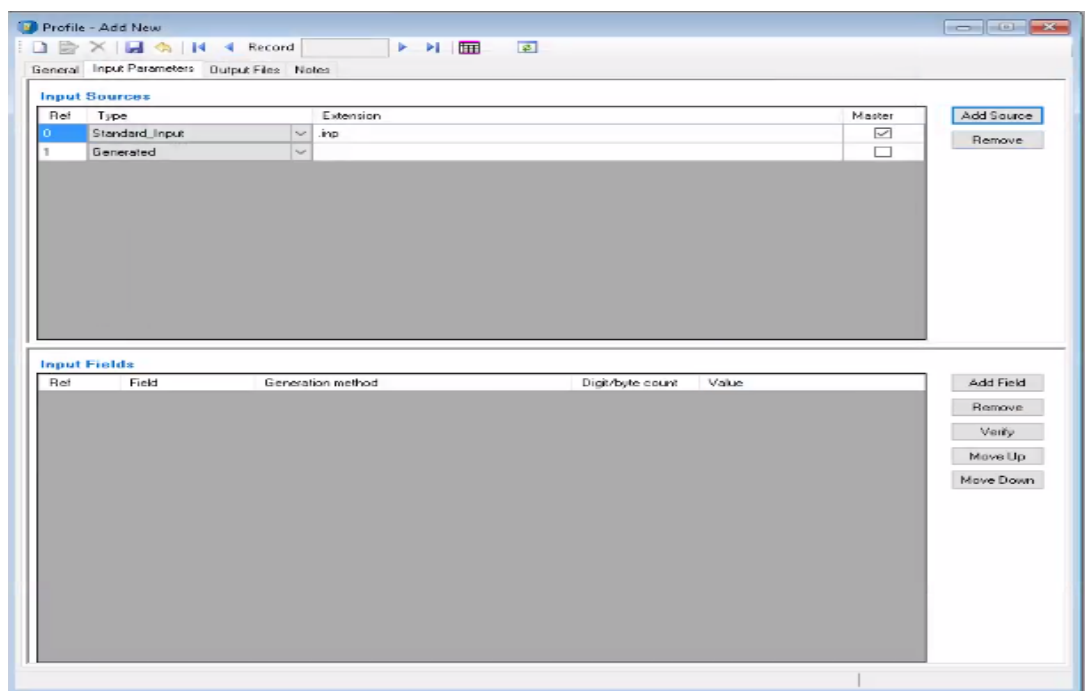
Input sources

1. Click on "Add Source" to add the source of input file
    a. To add ".inp" select standard_input type format
    b. To add ".csv" select csv type format
    c. "Generated" type will select for value generation

Input Fields

1. To add field, click on "Add Field"
2. To remove the field, click on "Remove field"
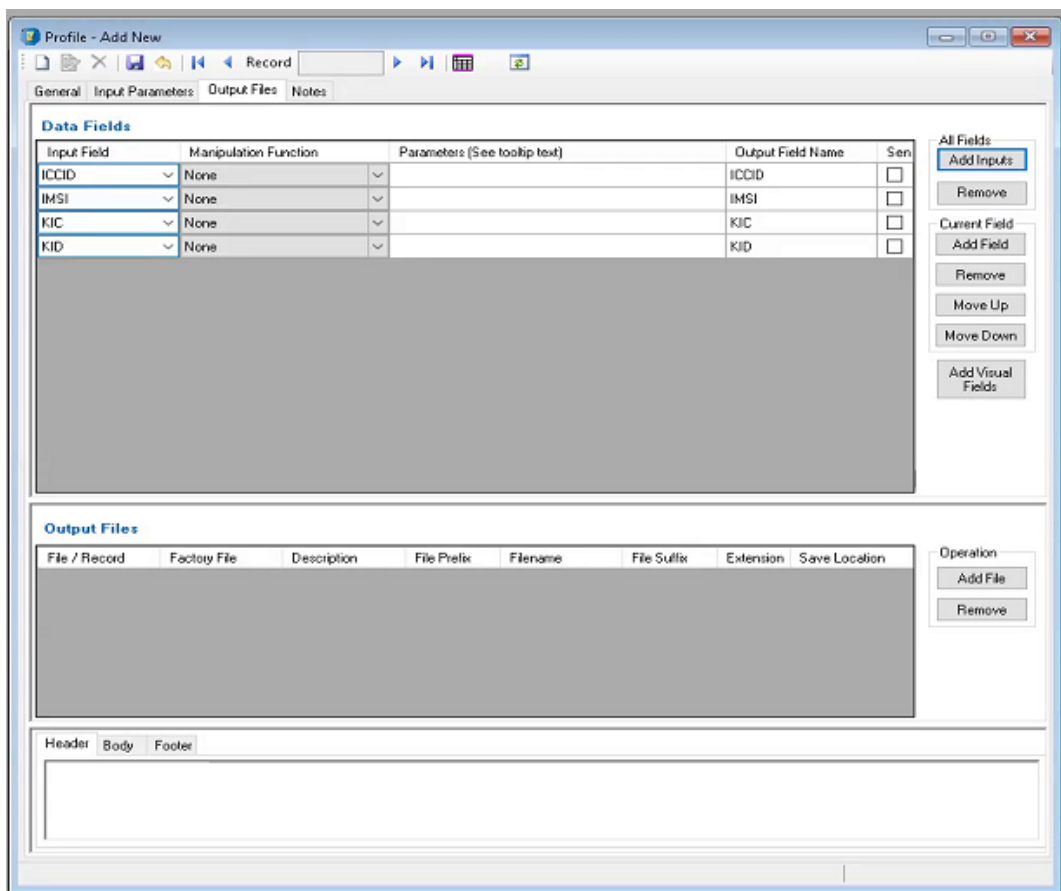3. Click on Move-up and Move-down to change the variables place.

Predefined References

"0" – It means the variables will be picked from the ".inp" file.

"1" – It means the variables are defined will be generated during the data generation (it can be defined with the fix value as well).

"2" – It means the variables are defined will be picked from the ".csv" file.

Output Parameters-

Once the variables are defined as per the input file, the next step will be declaration of variables in the Output file section.

- Click on "Add inputs" to get all variables that are defined in the input parameters section.
- To Remove click on "Remove", it will remove all the input fields.
- To add one variable, click on "Add Field" – this option is used to re-define the variable in different format or for any manipulation if required to achieve the final value.
- "Move up" and "Move Down" options are used to move or to set the order of variables.
- To add the output file and factory input file, click on "Add file"
  - Header – Header of the output file will be defined in this part; Header is the static part of the output file.
  - Body – The dynamic part will be fined in this, like (IMSI, ICCID, PIN etc.…)
    Fix value also can be hardcoded in the body section.
  - Footer – Footer of the output file will be defined in this part; Footer is the static part of the output file.
- Workz factory files are also defined in the same section, as these files are considered as an output file. (Workz factory files are never shared with the customer; these files are used for internal purpose to produce the BAP or commercial cards)
- Workz Factory input file –
  There are two factory file which gets generated during the data generation template creation-

Workz factory file for TSS –

- This file requires header part with the **quantity** field.
- This file does not contain any of the graphical variables.
- This file is only used to personalize the card via desktop.
- Variables of this file and variables of actual factory input file must be same (except graphical variables) Sample of factory input file attached in below.
- Extension will be .inp
- This file used for internal eSIM profile data gen tests

Workz factory file for eSIM personalization: –

- This file requires only header part of the variable.
- This file contains graphical variables along with the other variables.
- This file is used to provision the eSIM profiles in RSP SM-DP+ platform.
- Variables of this file and variables of actual factory input file must be same (except graphical variables) Sample of factory input file attached in below.
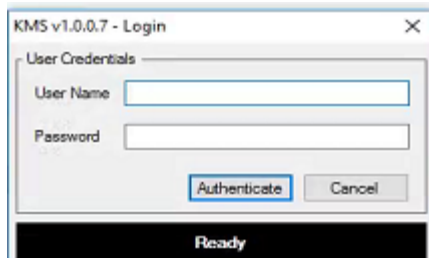- Extension will be ".inp"

P28032020_ArgoNE
T_TestProfile_02_Inp

Support –

❖ For any enhancement or any bug related to SDMS you can raise a ticket to below email id –
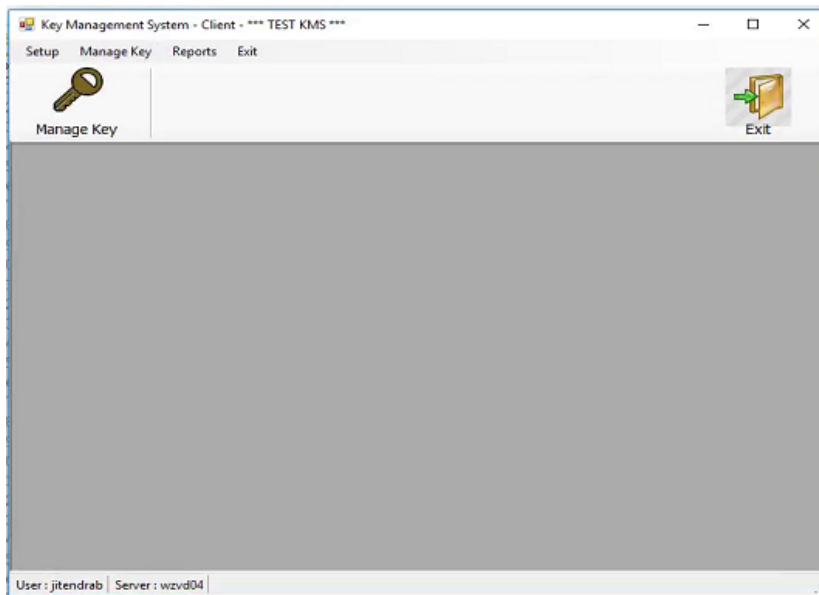Email Id – it.dev@workz.com

KMS tool

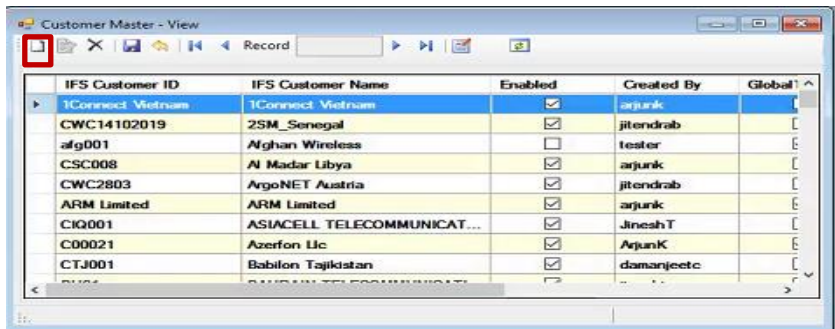**Customer code for new customer entry in KMS:**

New customer entry
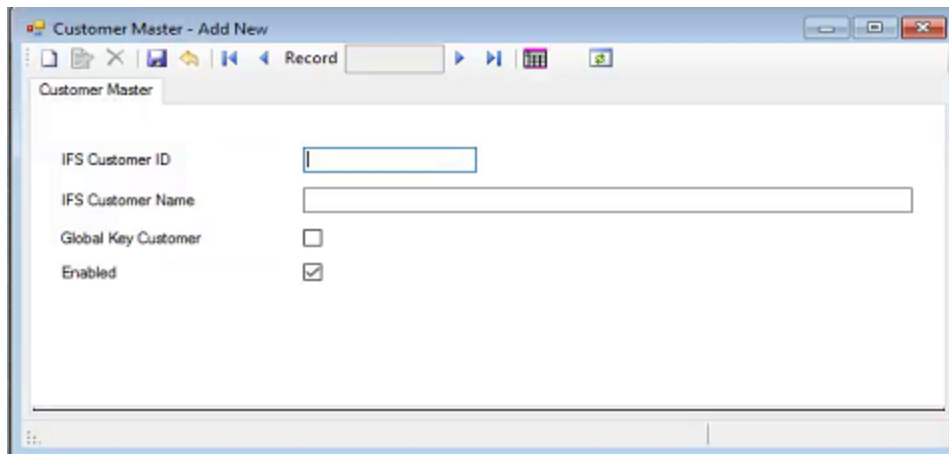
1. Login with user credentials to access the KMS

2. Login with user credentials to access the KMS- below window will appear-

3. Click on Setup →Customer
4. Login with user credentials to access the KMS- below window will appear-

5. Below window will pop-up to enter the customer details –

IFS Customer ID – Enter the same customer that was used during the customer entry creation of SDMS

IFS Customer Name – Enter the same customer name that was used during the customer entry creation of SDMS
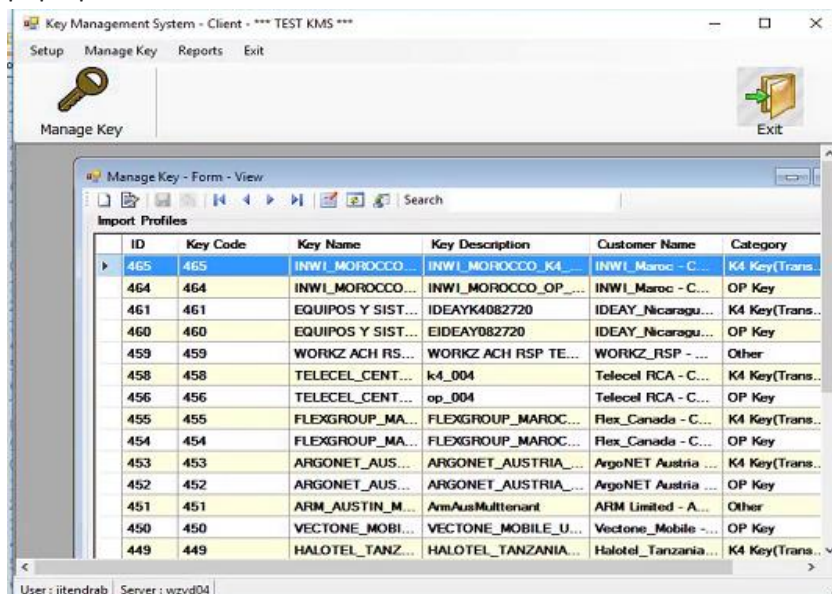
Global Key customer – In case this customer needs to be used for any of the sub-customer, check this box

Click on save option -

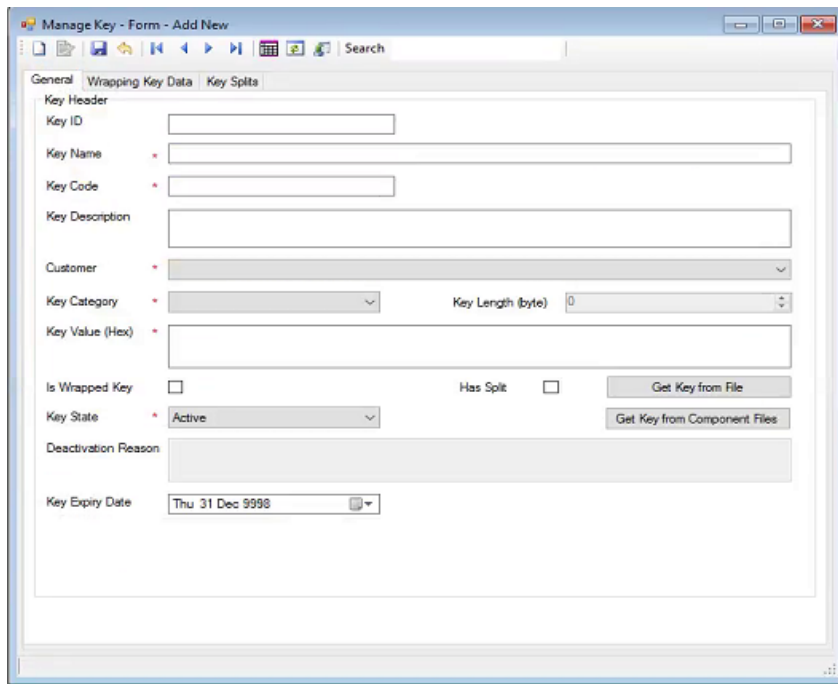6. Below window will pop-up to enter the customer details –

How to enter the network keys into KMS:

1. Click on **Manage Key** after successfully created the customer entry, below option and below window will pop-up –

2. Click on **new button** to enter the key details –

3. Enter the key details from the **"KMS_Key_List.xls"** –

This sheet is managed by PDM team, after importing the keys into KMS the team enter every detail in this sheet with respect to the network keys.

Key ID – Enter the Key ID which is defined in the KMS_Key_List sheet.

Key Name – Enter the key name which is defined in the KMS_Key_List sheet.

Key Code – You can use the Key ID value here.

Key Description - you can use the key name here.

Customer – Choose the customer with respective to the keys.

Key Category – Choose the key type, example – OP Key or Transport key

Key Length – Select the key length that is shared by customer

Key value – Enter the key value of the key, you can use below dummy key values for the entry

        8 Bytes – 112233445566788

        16 Bytes - 1122334455667788 1122334455667788

        24 Bytes – 112233445566778811223344556677881122334455667788

Key State – By default it will be active.

Is wrapped key – This is basically used for eUICC projects.

4. Click on Save 💾 to save the details.

Please follow the below checks –

- ✓ Make sure the customer name in the SDMS and KMS must be the same.
- ✓ Make sure the details enter for the keys should be the correct.
- ✓ Make sure the KSM_Key_List details and KMS details must be the same.
- ✓ Network key type should be carefully chosen while entering.

TITLE	SOP_eUICC_Consumer_Profile_Development_v1.1
FILE NAME	SOP_eUICC_Consume...elopment_v1.1.pdf
DOCUMENT ID	2e632ccb9d5fd3d2ad51aabe85c3db0e8bce7947
AUDIT TRAIL DATE FORMAT	DD / MM / YYYY
STATUS	● Signed

Document history

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SIGNED	**01 / 06 / 2022** 16:14:00 UTC+4	Signed by Saji Krishnan (saji.krishnan@workz.com) IP: 86.99.198.37
COMPLETED	**01 / 06 / 2022** 16:14:00 UTC+4	The document has been completed.