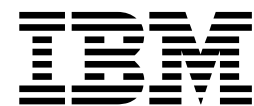




# Analytics Accelerator Framework (AAF) 3.3 Provisioning Guide





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## Note

Before using this information and the product it supports, read the information in the "Notices" on page 15.

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## Edition Notice

This edition applies to Version 3 Release 3 of Analytics Accelerator Framework and to all subsequent releases and modifications until otherwise indicated in new editions.



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# Provisioning

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## Overview

Provisioning of data in AAF 3.3 is performed using a set of command line tools available on the Analytics Platform server (IOP master) of a AAF 3.3 installation. Data is provisioned from a plain text file containing a list of entities, such as Cells, Devices, and Applications.

Analytics Accelerator Framework uses provisioning files that are supplied by the network operator to allow for data to be reported based on the operator's own specification of:

- Cell provisioning
- Fixed line provisioning
- Network Nodes provisioning
- Device provisioning
- Segment Customer Groups based on Customer attributes that are provisioned via CRM file.
- Network Operators (for Roaming)

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## File Transfer

A file can be 'pushed' to the Analytics Accelerator Framework server using SFTP or FTP protocol to the location specified or can be "pulled" by the Analytics Accelerator Framework system from the remote machine using SFTP or FTP protocol.

Default import frequency of provisioning files is once per week. The frequency of file import can vary from operator to operator.

The system imports all records that are provided in the file and update data in the internal storage if updates are required.

**Note:** AAF 3.3 supports the UTF-8 charset.

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## Provisioning File format

Provisioning data is provided as text files to the Analytics Accelerator Framework system through the set of delimiter separated files. Tab, comma or pipe ( | ) are acceptable delimiters. Delimiters are used for any of the values of provisioning fields. The first line of the file might provide the name of the fields populated. There is no defined limit for the size of the file from the application point of view, but the standard limits of OS apply.

The following is a sample of a fragment of the valid file that is expected by the Analytics Accelerator Framework system:

```
#NAME|LABEL|LATTITUDE|COUNT|ACTIVE
TEST1|Test 1|23.2342|3|1
TEST2|Test 2|34.2342|3|0
TEST3|Test 3|0|3|True
TEST4|Test 4|42.52|False
```

The validation rules for each attribute provided in the provisioning file are based on type validation. The system uses the attribute type that is specified during the import process and rejects values not matching the type.

If duplicated records are provisioned in the file the system uses the last record populated.

The system supports the following data types for attributes imported:

- String - limited to 255 characters <sup>1</sup>
- Integer
- Float
- Boolean

Float values should always use a dot as a delimiter independently of system locale.

Boolean values should be represented as “true” or “false” strings case insensitive.

If an attribute value in a .CSV file is blank, this attribute’s value will be marked as empty string for String type and as NULL for other types.

Attribute strings are not case-sensitive. Empty values are not allowed as field names.

---

## File name pattern

The name of the provisioning might match the following pattern:

- Provisioning\_type\_YYYYMMDD.csv

For instance:

- handset\_YYYYMMDD.csv
- cell\_YYYYMMDD.csv

The file can be gzipped. In that case, the extension .gz is added at the end of the file.

---

## Cells provisioning file

The Network Operator must provide a Cells provisioning file. The Cells provisioning file is used to supply location-based aggregations in Service Manager and Customer Manager. The file format is similar for both Gn and LTE Cells, however, there are some variances in the required mandatory fields. A Cell’s provisioning file contains information about an operator’s network. 2G/3G and 4G cells are provisioned as the same dimension “CELL” and use the same table DIM\_CELL.

The provisioning file for 2G/3G cells must contain the field values: MCC, MNC, LAC, CI for every 2G/3G Cell. The provisioning file for 4G cells must contain the field values: MCC, MNC, ECI for every 4G Cell on the operator's network. These fields are used to identify cells seen in the data sources.

For all Cells, **attributes** are predefined as per the table below.

---

1. string attributes used as attribute-based segment customer group will only use the 1st 127 characters.

Table 1. Cells provisioning - cell attributes

Column	Type	Description
cell_key	varchar	Unique ID for Cell
label	varchar	Text label for Cell (as displayed in the product interface)
mcc	varchar	Mandatory: Cell Mobile Country Node
mnc	varchar	Mandatory: Cell Mobile Network Node
lac	varchar	Mandatory: Cell LAC (valid for 2G/3G Cell)
ci	varchar	Mandatory: Cell CI (valid for 2G/3G Cell)
eci	varchar	Mandatory: Cell ECI (valid for 4G Cell)
geolevel1	varchar	Top Level Geographical attribute (for example: State)
geolevel2	varchar	2nd Level Geographical attribute (for example: Region)
geolevel3	varchar	3rd Level Geographical attribute (for example: City)
geolevel4	varchar	4th Level Geographical attribute (for example: Town)
sitename	varchar	Cell Site Name
rat	varchar	Cell Radio Access Technology
cell_band	varchar	Cell supported band(s)
vendor	varchar	Cell Vendor
zip	varchar	Zip Code
latitude	varchar	Cell Site Latitude
longitude	varchar	Cell Site Longitude
azimuth	varchar	Cell Azimuth

Cell attributes can then be used to group the Cells hierarchically (Geographically or otherwise), for example:

- State
  - Market
    - Site
      - Cell

If any of the Network Operator's Cells are not provisioned yet, the associated Mobile Control and User Plane, or Voice and SMS volume metrics (Bytes down, Bytes Up, Bytes total, Packets up...) are not counted in the breakdown by Cells or Cell Groups (Region). The full volume is available in a global network report (without breakdown by Cells). It is possible to check the total volume (for example

Bytes Total) for the full network (report 1) and broken down by Cell (report 2) and review the Cell provisioning if the difference is significant.

## Network nodes provisioning files

All network nodes other than cells available as dimensions (SGSN, GGSN, SGW, DRA, MME, HSS, EIR, IWF, MSC, BSC, VLR, PGW, PCRF, OCS) depending on deployed interfaces monitoring require mappings between the network interface IP addresses and the desired network node labels. IPv6 network addresses are supported in Analytics Accelerator Framework.

An example provisioning for the DRA network nodes file:

```
DRA_IP|LABEL
42.319.802.84|DRA
1358.88.50.305|DRA
142.319.801.66|DRA
2212.46.77.698|DRA
2356.124.23.12|DRA
242.319.800.82|DRA 3
```

A provisioning file is required per network node type depending on deployed datasets and modules as described in the following table:

*Table 2. Network nodes provisioning table.* Network nodes are listed in column 1. Datasets and modules are described in columns 2 to 14.

Mobile Network Node	2G / 3G Core Control Plane and User Plane (Gn)	2G Access (Gb Control Plane) Dataset	3G Access (IuPS Control Plane) Dataset	4G LTE Core Control Plane and User Plane (S1-U, S8, S-11)	4G LTE Access (S1-MME/S6a)	VoLTE	4G LTE User Equipment Identity (S13)	4G LTE Circuit Switched Fall Back (SGs)	Policy Enforcement and Control (Gx)	Online Charging (Gy)	Voice and SMS (A)	Voice and SMS (IuCS)	Mobile RAN
BSC		Required									Required		
DRA					Required		Required	Required					
EIR							Required						
eNodeB				Required	Required	Required							Required
nodeB													Required
GGSN	Required								Required	Required			
HSS					Required								
MME				Required	Required	Required	Required	Required					Required
MSC								Required			Required	Required	Required
RNC	Required											Required	Required
SGSN	Required	Required	Required										
SGW				Required		Required							
VLR								Required					
PGW				Required		Required			Required	Required			
PCRF									Required				
OCS										Required			
DNS	Required			Required									

## Devices provisioning file

The Network Operator provides a devices provisioning file covering all devices (handsets, dongles, M2M devices) in order to provide device-based aggregations. The format is as described in the following.

- **Device File: TACFAC (8 digits) and Label are mandatory. Label is used as unique identifier and in the GUI.**

An example device provisioning file would be:

```
#TACFAC|LABEL
44927595|Motorola V50
44896150|Bang & Olufsen Beocom 9800 Db
44895250|Motorola V2188
```

In the **Service Manger** and **Customer Manager**, if any device used on the operator's network is not provisioned yet, the associated traffic metrics will be marked as "Uncategorized" and not available in **Breakdown by Devices** Groups.

*Table 3. dim\_device attributes*

Device attribute	Type	Description
tacfac	vchar	The Type Allocation Code and Final Assembly Code combined. Used to identify the Device Manufacturer and Model by cross-referencing against a Device Provisioning table
label	vchar	Label
deviceid	vchar	Device ID
std_full_name	vchar	Full name
std_vendor	vchar	Vendor
std_model	vchar	Model
st_marketing_name	vchar	Marketing name
manufacturer	vchar	Manufacturer
year_released	vchar	Year released
gsma_bands	vchar	GSMA bands
gsma_radio_intf	vchar	GSMA radio interface
mobile_device	vchar	Mobile device
primary_hw_type	vchar	Primary hardware
scr_width	vchar	Screen width
scr_height	vchar	Screen height
diagonal_scr_size	vchar	Diagonal screen size
display_ppi	vchar	Display pixels per inch
device_pixel_ratio	vchar	Device pixel ratio
scr_color_depth	vchar	Screen color depth
nfc	vchar	Near field communication
camera	vchar	Camera
is_mobile_phone	vchar	Device is a mobile phone
is_tablet	vchar	Device is a tablet
is_ereader	vchar	Device is an electronic reader
is_games_console	vchar	Device is a games console
is_tv	vchar	Device is a TV
is_set_top_box	vchar	Device is a set top box
is_media_player	vchar	Device is a media player
os_name	vchar	Operating system name
os_version	vchar	Operating system version
os_android	vchar	Operating system is android
os_bada	vchar	Operating system is Bada
os_ios	vchar	Operating system is IOS

Table 3. dim\_device attributes (continued)

os_rim	varchar	Operating system is RIM
os_symbian	varchar	Operating system is Symbian
os_win_mobile	varchar	Operating system is Windows mobile
os_win_phone	varchar	Operating system is Windows phone
os_win_rt	varchar	Operating system is Windows RT
os_web_os	varchar	Operating system is Web operating system
deflt_browser_name	varchar	Deflt browser name
deflt_browser_ver	varchar	Deflt browser version
deflt_browser_render_engine	varchar	Deflt browser render engine
markup_xhtml_basic_1_0	varchar	Markup version
markup_xhtml_mp_1_0	varchar	Markup version
markup_xhtml_mp_1_1	varchar	Markup version
markup_xhtml_mp_1_2	varchar	Markup version
markup_wml1	varchar	Markup version
vcard_download	varchar	Vcard download
img_gif87	varchar	Image format
img_gif89a	varchar	Image format
img_jpg	varchar	Image format
img_png	varchar	Image format
uri_scheme_tel	varchar	URI scheme
uri_scheme_sms	varchar	URI scheme
uri_scheme_sms_to	varchar	URI scheme
cookie	varchar	Cookie
https	varchar	https
mem_limit_markup	varchar	Memory limit markup
mem_limit_embed_media	varchar	Memory limit embedded media
mem_limit_download	varchar	Memory limit download
flash_capable	varchar	Flash enabled
js_support_basic_js	varchar	Javascript support
js_modify_dom	varchar	Javascript support
js_modify_css	varchar	Javascript support
js_support_events	varchar	Javascript support
js_support_evt_listener	varchar	Javascript support
js_xhr	varchar	Javascript support
js_support_console_log	varchar	Javascript support
js_json	varchar	Javascript support
supports_client_side	varchar	Client side support

Table 3. dim\_device attributes (continued)

csd	varchar	Circuit switched data
hscsd	varchar	High speed circuit switched data
gprs	varchar	General packet radio service
edge	varchar	
hspa	varchar	High speed download packet access
umts	varchar	Universal mobile telecommunication service
hspa_plus	varchar	High speed packet access plus
lte	varchar	LTE (Long term evolution)
lte_advanced	varchar	Advanced LTE (long term evolution)
lte_category	varchar	LTE category
volte	varchar	Voice over LTE
wifi	varchar	WIFI
white_list	varchar	White list
gray_list	varchar	Gray list
black_list	varchar	Black list
last_updated_time	varchar	Last updated time

---

## List of MCC-MNC for own subscribers

In order to facilitate the availability of customer-level aggregations in **Service Manager** and **Customer Manager**, the list of MCC-MNC codes for the local operators must be provided. Typically, a network operator would have 1 MCC-MNC code that is assigned, however after business changes the operator's subscribers IMSIs might span a number of MCC-MNC.

**Note:** Per “foreign” subscriber (subscriber of another national network operator or foreign operator) aggregations are not available.

---

## Mobile Subscriber Provisioning

The Network Operator must provide its Customers' attributes provisioning file in order to provide Segment Customer Groups reports and attributes information in the **Customer Manager** view.

This file can contain ALL the Customers periodically (for example, once a month) and only the delta of new and updated customers regularly (for example, Daily).

For mobile subscribers, the format is as described in the following.

- **Subscriber Attributes Provisioning File (CRM): IMSI and MSISDN fields are mandatory. The attributes are available to create Segment Customer Groups and are visible in the Customer attributes window. There can be up to 50 customer attributes.**

```
#IMSI|MSISDN|PLAN|SUBSCRIBER_GENDER|AGE
XXXXYYYYZZZAAAA|785674721|post-paid|Female|18
```

For details on how to set up Segment Customer Groups, see the Customer & Network Analytics User Guide.

## Customer Attribute Deletion

To delete a provisioned customer from the system, include an entry in the customer attributes provisioning file with empty values for all attributes except IMSI and MSISDN. This ensures that all attributes are deleted for that IMSI-MSISDN combination.

```
#IMSI|MSISDN|PLAN|SUBSCRIBER_GENDER|AGE|XXXXXXXXZZZZAAAA|785674721
```

Table 4. dim\_subscriber\_mobile attributes

Column	Type	Description
imsi	vchar	The International Mobile Subscriber Identity (IMSI) of this subscriber
msisdn	vchar	The MSISDN of this subscriber
age	vchar	Age
dob	vchar	Date of birth
gender	vchar	Gender
handset	vchar	Handset
last_updated_time	vchar	Last updated time
account_number	vchar	Account number
corporate_account_name	vchar	Corporate account name
corporate_group_name	vchar	Corporate account group name
first_name	vchar	First name
surname	vchar	Surname
date_of_birth	vchar	Date of birth
address_1	vchar	Address field
address_2	vchar	Address field
ethnicity	vchar	Ethnicity
highest_level_of_education	vchar	Level of education
employment_status	vchar	Employment status
estimated_income	vchar	Estimated income
car_owner	vchar	Car owner
marital_status	vchar	Marital status
number_of_children	vchar	Number of children
tenure	vchar	Tenure
credit_rating_grade	vchar	Credit rating
monthly_arpu	vchar	Monthly ARPU
customer_type	vchar	Customer type
churned_flag	vchar	Churn flag
brand	vchar	Brand
fixmobilebundleflag	vchar	Fixed mobile bundle flag



Table 4. dim\_subscriber\_mobile attributes (continued)

contract_type	vchar	Contract type
plan_name	vchar	Plan name
voice_offering	vchar	Voice offering
sms_offering	vchar	SMS offering
data_offering	vchar	Data offering
plan	vchar	Plan
subscriber_name	vchar	Subscriber name
contract	vchar	Contract
customer_value	vchar	Customer value
sgm	vchar	Segment

## Fixed Line Provisioning

Provisioning for fixed line

### Subscriber & Subscriber Group Provisioning

The fixed line provisioning uses third party injector. There is one to many provisioning and third party injection to provision multiple applications to a single instance of Analytics Accelerator Framework.

Subscriber provisioning for fixed line is based on **CSID** and should have **DSLAM** and **CPE Device** specified as attributes.

Subscriber provisioning for fixed line is similar to usual subscriber provisioning except two things. It is based on CSID and not on IMSI, so CSID is a mandatory field in provisioning files. In addition, the separate dictionary table DIM\_SUBSCRIBER\_FIXEDLINE is used.

Table 5. dim\_subscriber\_fixedline attributes

Column	Type	Description
csid	vchar	Customer ID
dslam	vchar	DSLAM, based on provisioning and the customer
cpedevic	vchar	Customer premises equipment: fixed line broadband router
account_number	vchar	Account number
corporate_account_name	vchar	Corporate account name
first_name	vchar	First name
surname	vchar	Surname
age	vchar	Age
gender	vchar	Gender
date_of_birth	vchar	Date of birth
address_1	vchar	Address field
address_2	vchar	Address field

Table 5. dim\_subscriber\_fixedline attributes (continued)

ethnicity	varchar	Ethnicity
highest_level_of_education	varchar	Level of education
employment_status	varchar	Employment status
estimated_income	varchar	Estimated income
car_owner	varchar	Car owner
marital_status	varchar	Marital status
number_of_children	varchar	Number of children
tenure	varchar	Tenure
credit_rating_grade	varchar	Credit rating
monthly_arpu	varchar	Monthly ARPU
customer_type	varchar	Customer type
churned_flag	varchar	Churned flag
brand	varchar	Brand
fixmobilebundleflag	varchar	Fixed mobile bundle flag
last_updated_time	varchar	Last updated time
sgm	varchar	Segment

## Manual Provisioning

The following dimensions should be provisioned manually as they are Operator specific.

- DSLAM
- CPE Device
- Tier 0
- Tier 1

## DSLAM & CPE Device Provisioning

The names of DSLAM and CPE Device attributes in the subscriber provisioning files must be **DSLAM** and **CPEDEVICE**.

DSLAM and CPE Device attributes in the subscriber provisioning file should contain values that have been used in dimension provisioning for DSLAM and CPE Device.

---

## Roaming Network Operators Provisioning File

The network operator's roaming partners' information must be provisioned in order to provide Roaming In and Out aggregations in **Service Manager** and **Customer Manager**. The format is as described in the following.

**MCCMNC**, **Type**, and **Label** are mandatory fields. **Group** and **Country** fields are recommended to allow for group level or country level roaming reports.

Type is either **HOME** for the local network operator where Customer & Network Analytics is deployed or **INTERNATIONAL** for all other operators.

The Label must be unique for each operator. Multiple MCCMNC codes might map to the same Label.

#MCCMNC	Type	Label	Group	Country
20601	INTERNATIONAL	Vodafone Ireland	Vodafone	Ireland
20602	HOME	02 Ireland	Telefonica	Ireland

## Home and Visited Operator

HPLMN and VPLMN represent operators that should be recognized, based on customer IMSIs values (HPLMN) or MCC/MNC fields in TDR feed (VPLMN).

To recognize operator – these also have to be provisioned. Following values are mandatory.

*Table 6. Home & Visited Operator Values*

Attribute	Description	Example
MCCMNC	Identifies operator. In case if operator has multiple MCC/MNC pairs – multiple rows have to be created for the same operator.	20601 – VFIE
MCC	Separate MCC value	206
MNC	Separate MNC value	01
TYPE	Type of operator: One of 0 (international), 1 (home) or 2 (probe)	1
LABEL (HPLMN/VPLMN/NETWORK)	This should be the unique name of the operator.	VF Ireland
COUNTRY	Country of operator	Ireland
COUNTRY_CODE	Phone Country Code	353
GROUP	Operator's group	Vodafone

**Note:** You have to at least provision all HPLMN / VPLMN values for the local operator's traffic.

**Note:** It is very important to carefully provision these instances. This might result in increasing database size if all operators are loaded.

## Setting up Cell and Devices Groups using the provisioning information

The information that is provided via the set of provisioning files can be used in order to organize the elements that are imported into groups. The fields that are provided via the provisioning files are called Attributes. So the groups built using the information that is provided in the provisioning files are called the attribute-based groups.

The provisioned attributes can be used to:

- Group elements into the group using the exact value of the attributes provided
- Build the hierarchy of groups using the hierarchy of attributes specified

This functionality allows automatic creation of new groups using the exact value of the attribute that is provided in the provisioning file.

The attributes can be organized into a defined hierarchy using the group definition interface. And the system creates the hierarchy of the groups automatically using the values that are provided in the corresponding attributes. For instance: the cells can be organized into the following group hierarchy county\town\district using the values that are provided in the provisioning file.

Multiple group definitions/hierarchies can be defined using the different attributes provided. The quality of the groups that are calculated depends on the quality of the provisioning file provided. Therefore, although the system validates the information that is provided in the provisioning file using the rules that are specified. It is important that the third party prepares the provisioning file of the best quality in order to achieve the best results of automated group creation.

The system supports up to seven levels of group hierarchy for the network elements and up to three levels for subscribers.

---

## Number (Other Party Grouping) for Voice and SMS

Other party groups classify the destination or origination of calls to or from other parties. For example, calls from Ireland to the US would classify the call to a US number as a call to the US other party group.

In order to identify other parties, Analytics Accelerator Framework must be configured to recognize numbers based on patterns in the called or calling numbers by identifying prefix patterns. For example, if a number starts with 00353 it is a part of the Ireland other party group. Other Party numbers can be used to identify international numbers and also any known number pattern such as premium numbers with known prefixes.

Analytics Accelerator Framework is deployed with an initial provisioning file of known international number prefixes. Other party numbers can be provisioned at any time using the Analytics Accelerator Framework provisioning function.

The format of the provisioning file must match the following example:

```
#OTHER_PARTY_GROUP|Label
P1                 |USA
P353               |Ireland
```

**Note:** Note that *P* denotes +00 so P1 for the USA will match numbers beginning with +001. P must be used for international numbers to normalize number identification.

---

## Role/Role-Group Provisioning

Role group provisioning enables users to add and remove roles to/from a role-group. There is a fixed CSV record format which is accepted by the import tool. This is as follows:

```
#ROLEGROUP,ROLE,ACTION
```

1. **ROLEGROUP** column specifies the name of the role-group to which the role is being added/removed from.
2. **ROLE** specifies the name of the role to be added/removed to/from the rolegroup that is specified in 1.
3. **ACTION** column specifies whether the action is to add the role to the role-group, or to remove the role from the role-group if it is present already. Valid values currently are:

- + sign indicates that the restriction is being added to the role
- - sign indicates that the restriction is being removed from the role
- A hash # at the beginning of a line causes the line to be ignored
- Empty lines are ignored
- Lines that have the incorrect count of comma-separated fields are ignored.

Importing is done by using TNFDB Tool utility.

```
cd /opt/tnf/apps/tnfdb-tools/bin
./tnfdbTools.sh
```

In the menu,

1. Select 12. Import Role Groups.
2. Select option. System asks for a CSV file containing the role -role group mappings.
3. Provide a full path to the file, including filename, and then click **Enter**. Observe the console - each stage of the import process is logged, there is also logging in the jboss server.log for any warnings or errors that might occur.

At the end the system prints out the message:

```
Finished importing role/role group assignments...
```



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