Device Homologation Best Practice

Nauman Khalid

Director PTA, Pakistan

naumankhalid@pta.gov.pk

COUNTERFEIT DEVICES || TYPES

Counterfeit IMEIs (International Mobile Equipment Identity) are fake or fabricated IMEI numbers that are programmed into mobile devices to deceive authorities and consumers. Counterfeit devices can be broadly classified into **three types**:

Cloned devices: Cloning of IMEI means transfer of identity (IMEI) from one mobile device to another.

These type of devices used the IMEIs of other device to steal the identity.

These devices often use the IMEI number of the device with different hardware & software from the genuine device by changing the TAC (Type Allocation Code) number of a genuine device.

2. Duplicated devices: Duplication of IMEI means IMEIs found with two or more mobile devices and also includes same IMEI on a dual or more SIM device for each SIM slot.

Duplicated devices are made by copying the hardware and software of a genuine device. This means that the duplicated device will have the same internal components and software as the genuine device. However, the internal components and software of these devices are typically of much lower quality than the genuine device.

3. Non-standard GSMA TAC devices: The GSMA (GSM Association) assigns unique TAC (Type Allocation Code) numbers to mobile devices.

Non-standard GSMA TAC devices are made with TAC numbers that are not authorized by the GSMA. These devices may be made by using unauthorized TAC numbers.

Non-standard GSMA TAC devices are illegal and may pose a security risk to the user and not allowed to use in Pakistan.

"Cloning" means transfer of identity (IMEI) from one mobile device to another

DIRBS Detection Method of Cloning
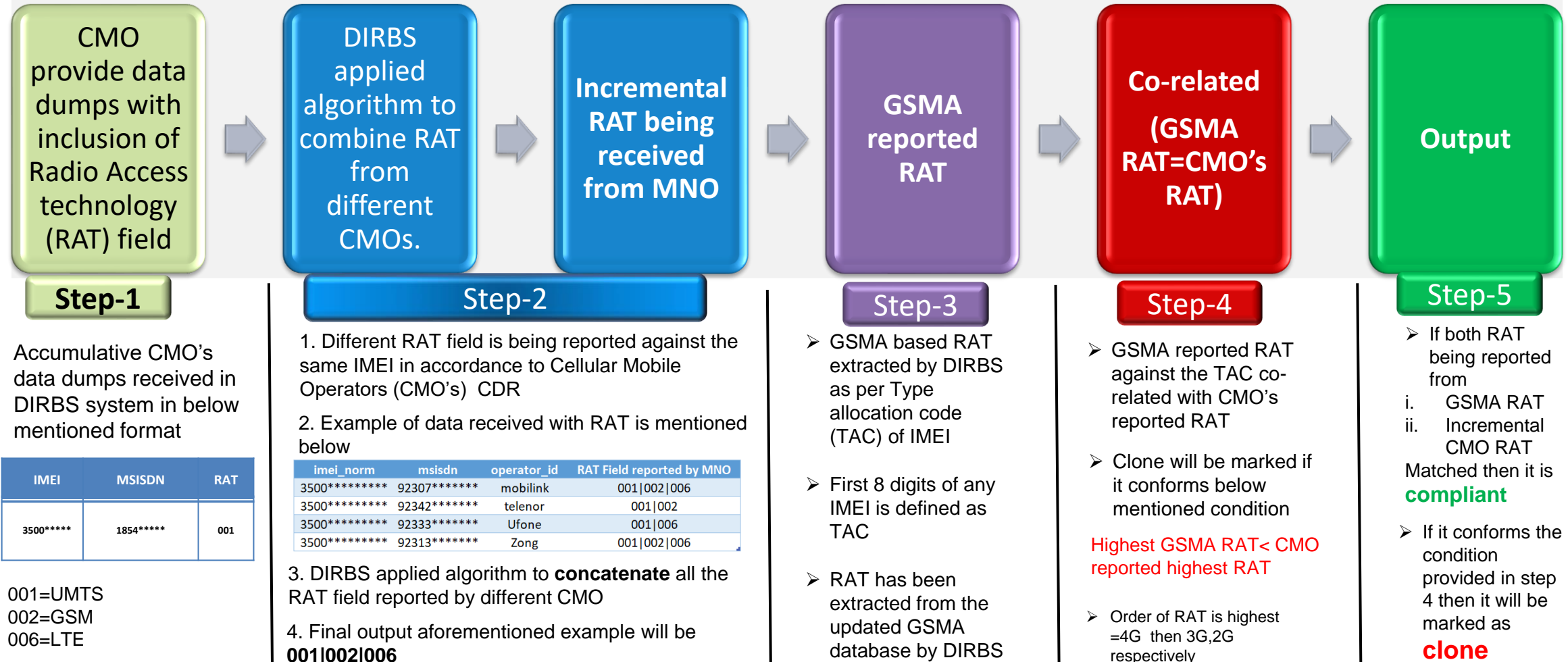
Step-1	Step-2	Step-3	Step-4	Step-5
CMO provide data dumps with inclusion of Radio Access technology (RAT) field	DIRBS applied algorithm to combine RAT from different CMOs. → Incremental RAT being received from MNO	GSMA reported RAT	Co-related (GSMA RAT=CMO's RAT)	Output

Step-1

Accumulative CMO's data dumps received in DIRBS system in below mentioned format

IMEI	MSISDN	RAT
3500*****	1854*****	001

001=UMTS
002=GSM
006=LTE

Step-2

1. Different RAT field is being reported against the same IMEI in accordance to Cellular Mobile Operators (CMO's) CDR

2. Example of data received with RAT is mentioned below

imei_norm	msisdn	operator_id	RAT Field reported by MNO
3500********	92307*******	mobilink	001|002|006
3500********	92342*******	telenor	001|002
3500********	92333*******	Ufone	001|006
3500********	92313*******	Zong	001|002|006

3. DIRBS applied algorithm to **concatenate** all the RAT field reported by different CMO

4. Final output aforementioned example will be **001|002|006**

Step-3

- GSMA based RAT extracted by DIRBS as per Type allocation code (TAC) of IMEI

- First 8 digits of any IMEI is defined as TAC

- RAT has been extracted from the updated GSMA database by DIRBS

Step-4

- GSMA reported RAT against the TAC co-related with CMO's reported RAT

- Clone will be marked if it conforms below mentioned condition

Highest GSMA RAT< CMO reported highest RAT

- Order of RAT is highest =4G then 3G,2G respectively

Step-5

- If both RAT being reported from
  i. GSMA RAT
  ii. Incremental CMO RAT
Matched then it is **compliant**

- If it conforms the condition provided in step 4 then it will be marked as **clone**

"Duplicate IMEI " means IMEIs found with two or more mobile devices and also includes same IMEI on a dual or more SIM device for each SIM slot.

DIRBS Detection Method of Duplicate IMEI

| CMO provide data dumps with inclusion of Radio Access technology (RAT) field | → | DIRBS applied algorithm to combine all MSISDNs reported from all CMOs against same IMEI | → | Number of unique MSISDNs reported in last 30 days of classification Extracted | → | Segregation of IMEI based on threshold defined in DIRBS | → | Output |

Step-1

Step-2

Step-3

Step-4

Step-1
Accumulative CMO's data dumps received in DIRBS system in below mentioned format

Date	IMEI	MSISDN
20160130	35********	92310******
20160130	35********	92310******
20160131	35********	92331******
20160131	35********	92300******

Step-2
1. DIRBS concatenate all data received from different CMOs to identify the number of unique MSISDNs in last 30 days from classification date

Date	IMEI	MSISDN
20160130	35************	92310******
20160130	35************	92310******
20160131	35************	92331******
20160131	35************	92300******
20160131	35************	92302******
20160131	**35**************	92345******

2. DIRBS applied algorithm to find number of **unique MSISDNs** being reported in last 30 days, For aforementioned example MSISDN will be 5

Step-3
Duplicate IMEI will be further classified if it conforms below mentioned threshold

Threshold:

Duplicate	**Unique MSISDN>=8 & Average MSISDN>2.5 in last 30 days**
Duplicate large	Unique MSISDN>=60 in last 30 days

Data granularity will be last 30 days from the classification run date

Step-4
1. If IMEI shall not breach threshold define for duplicate IMEI in last 30 days then it will be mark as **compliant**

2. If it conforms the condition provided in step 3 then it will be marked as **Duplicate/ Duplicate large** based upon count of unique MSISDNs being reported

The GSMA integration in DIRBS helps to address and mitigate the problem of counterfeit device connectivity. GSMA database working and integration in DIRBS benefit are mentioned below.

1. What is GSMA Device database?

The GSMA (Global System Mobile Association) database is a global repository of all valid IMEI numbers of mobile devices that have been approved by the GSMA and implemented worldwide. The GSMA database is integrated with Pakistan national-level mobile device registration and blocking systems named as Device Identification, Registration and Blocking System (DIRBS). The database is regularly updated and maintained by the GSMA and is used by Pakistan Telecommunication Authority (PTA) to identify and track counterfeit devices.

2. How PTA uses GSMA Device database integration to identify counterfeit devices?
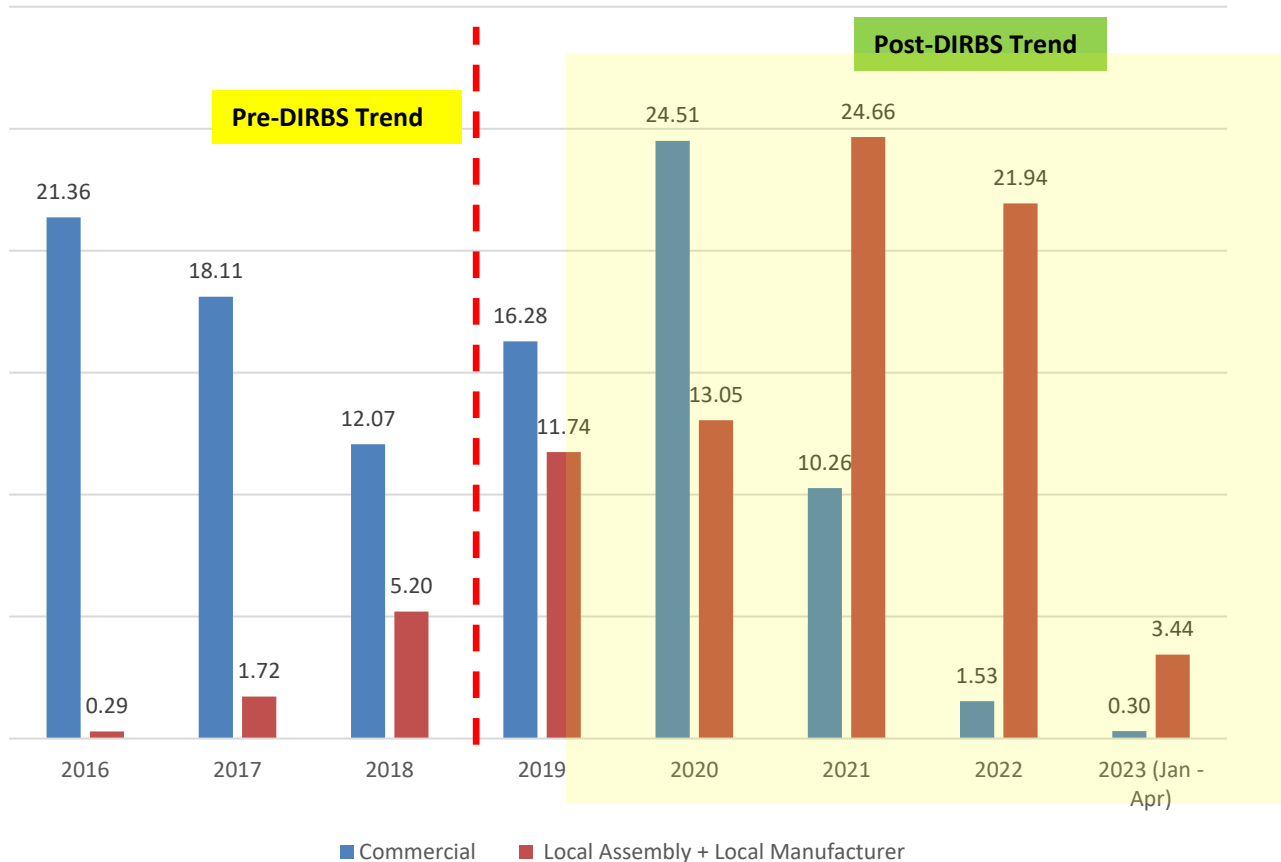
DIRBS is a system that is used by Pakistan Telecommunication Authority to verify the authenticity of mobile devices by co-relating the TAC (Type allocation code) of IMEI number of the device with the GSMA database. If the device IMEI TAC is not registered in the GSMA database, DIRBS identified the device as counterfeit and block the device from accessing the mobile network, thereby preventing it from using intelligence (making calls, sending texts, or accessing the internet).

3. What are the benefits of GSMA Device database integration in DIRBS?

This integration of the IMEI database with DIRBS has helped PTA in following ways
1.Reduce the **number of counterfeit mobile devices** in circulation and has improved the security and safety of mobile users.
2. It has also helped PTA to enforce **mobile device compliance.**
3. Improve the **quality of mobile devices** that are available in the market**.**
4. Pakistan Telecommunication Authority (PTA) has blocked **3 Millions** IMEI pertain to counterfeit devices by using GSMA database.

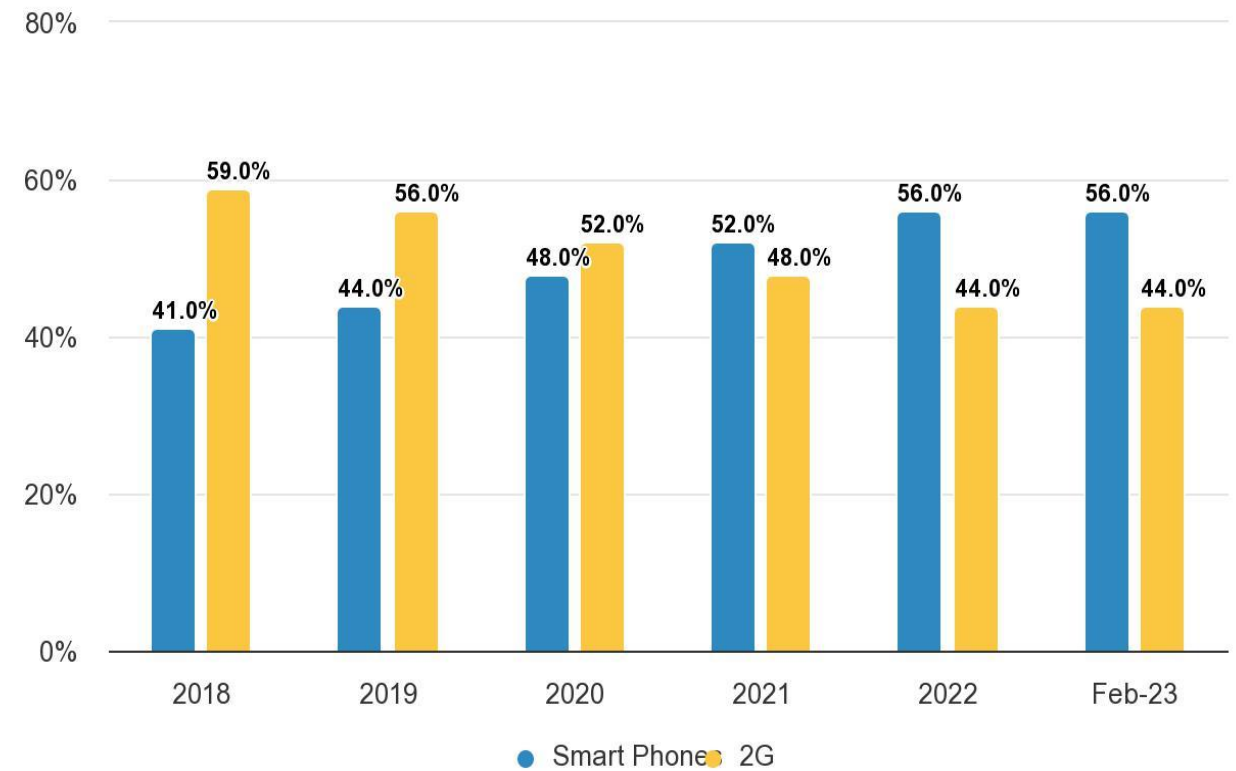Commercial Import Vs Manufacturing/Assembly Trends 2016-2023 (Million)

Pre-DIRBS Trend

Post-DIRBS Trend

Year	Commercial	Local Assembly + Local Manufacturer
2016	21.36	0.29
2017	18.11	1.72
2018	12.07	5.20
2019	16.28	11.74
2020	24.51	13.05
2021	10.26	24.66
2022	1.53	21.94
2023 (Jan - Apr)	0.30	3.44

■ Commercial   ■ Local Assembly + Local Manufacturer

Key Achievements

➢ PTA launched Mobile Manufacturing Regulations 2021, whereby 33 manufacturers issued Authorization for a period of 10 years.

➢ Renowned brands e.g. **Samsung, Xiaomi, Nokia, Oppo, Vivo, Infinix, ZTE, Techno** etc. now being manufactured in Pakistan.

➢ Over **40 Million** phones manufactured in Pakistan in 2021 & 2022 (Aug) reducing import figures for the 1st time for CBU mobile phones.

➢ Approximately **USD 120 million** investment.

➢ Over 50,000 employment created in manufacturing sector in Pakistan.

Context

- Device Identification Registration & Blocking System (DIRBS) established by PTA & operational since 15th Jan, 2019.

- DIRBS has created level playing field for mobile manufacturing industry, encouraging business activities & job creation within Pakistan.

- Prior to DIRBS FBR customs duties collection in 2019 was PKR 22 Billion, Post DIRBS the revenue collection via legal import has exceeded **PKR 148 Billion (2019-2021)** inclusive of **PKR 31 Billion (Mar 2019 - Sep 22)** collected by FBR in Individual Mobile Registration category

Total Mobile Devices on Pakistan Network

Year	Smart Phone	2G
2018	41.0%	59.0%
2019	44.0%	56.0%
2020	48.0%	52.0%
2021	52.0%	48.0%
2022	56.0%	44.0%
Feb-23	56.0%	44.0%

The GSMA database has been successfully implemented in Pakistan by using **DIRBS introduced by PTA in 2019** to address the problem of counterfeit devices and to improve the quality of mobile devices that are available in the market. Here are some of the **key lessons** that have been learned from the usage of the GSMA database in Pakistan:

1. Improved Type Approval Process: The GSMA database has helped to improve the type approval process for mobile devices in Pakistan. Mobile devices are required to go through a type approval process to technical standard before they can be sold in Pakistan. The GSMA database is used to verify the authenticity of the device and to ensure that it meets the required standards for quality and safety.

2. Identifying Fake Certificates: The GSMA database has also been used to identify fake certificates that are used to approve counterfeit devices. By cross-referencing the information in the GSMA database, PTA can verify the authenticity of the certificate and take action against those who produce and use fake certificates.

3. Contribution to improving the TAC database: Mobile network operators and regulatory authorities can contribute to improving the TAC (Type Allocation Code) database by reporting invalid or suspicious TAC numbers or wrong information. This can help to ensure that the TAC database is up-to-date and accurate, and can prevent the use of non-standard TAC numbers. PTA has identified several instants in which manufacturer has declared wrong information of the device in GSMA database and accordingly ask manufacturer to declared correct information in GSMA DB, therefore facilitate all stakeholders.

In conclusion, the GSMA database has been a valuable tool in improving the quality and security of mobile devices in Pakistan. By using the database to verify the authenticity of mobile devices and to identify fake certificates, regulatory authorities can take action against those who produce and sell counterfeit devices and improve the overall quality of mobile devices in the market.