Training Module One: TAC / IMEI Programming Rules

October 2020 v2.0

Introduction

About this document
This is a practical training guide to help understand TAC allocations and IMEI production as specified in GSMA TS.06 IMEI Allocation and Approval Process and TS.30 TAC IMEI Application Forms which can be found on the GSMA IMEI db homepage, together with the GSMA IMEI Security Technical Design Principles document.

Who should read this document?
This document has been compiled for device brand owners and their associates who are required to program a unique IMEI in each mobile device they produce.

About GSMA
The GSMA is the global industry administrator of the TAC and IMEI allocation system, essential to the correct functioning of 3GPP devices and the mobile ecosystem.

If you have any questions or feel a topic is not covered please contact:
imeihelpdesk@gsma.com

TAC (Type Allocation Code) **IMEI** (International Mobile Equipment Identity)

Content

Rules at a Glance

TAC (Type Allocation Code)

TAC identifies the device model, brand owner and OEM
A TAC is allocated to a specific device model and brand owner
Only one device model may be allocated to a TAC
A new TAC is required for each unique device model
TAC is the first 8 digits of an IMEI
One million devices or units / IMEI per TAC
After one million units allocate a new TAC
Only use GSMA allocated TAC

TAC Applications

GSMA allocates TAC via appointed Reporting Bodies
Reporting Bodies are TÜV SÜD BABT, CTIA, MSAI, TAF and TIA
Device brand owners apply for TAC, even if outsourcing manufacture
Modem producers apply for TAC not the end device brand owner
Brand owner HQ location determines which Reporting Body is used
Co-branding: The brand responsible for sales applies for TAC
Brand licencing: The licensee applies for TAC

IMEI (International Mobile Equipment Identity)

3GPP devices must contain an IMEI
IMEI identifies individual unit and device model, brand owner, & OEM
Every IMEI must be globally unique
IMEI implantation shall be **secure and tamperproof**
The first 8 digits of the IMEI are the TAC
Incremental IMEI serial number for each device unit produced
Multi-SIM devices with one transceiver need one IMEI
Devices which are 3GPP and 3GPP2 compliant require one IMEI
Multi-transceiver devices require multiple IMEI
Do not duplicate IMEI
Spare IMEI capacity is prohibited for use in other models
Secure IMEI implementation prevents the IMEI being changed
Repairs involving replacing peripheral components do not impact IMEI
Repairs that replace components that contain a securely stored IMEI result in new IMEI

How are TAC / IMEI serial numbers used?

Consumers	Operators	Law Enforcement	Insurers	Customs & Excise	IoT Service Providers	Manufacturers & OS providers	Government & regulators	Recyclers	Retailers & traders
Support Warranty Authentication Theft reporting Theft checking	Identification Support Device blocking Lawful interception /location Updates Configuration Analytics Sales & marketing Service delivery Whitelisting Fraud detection	Theft checking Lawful interception/ location Compliance checking	Authenticity False claim detection	Taxation Certification Authenticity Counterfeit detection	Identification SW updates Remote control Support Blocking Fraud detection	Updates App mgmt Service delivery Support Warranty Compliance Theft reporting Testing	Certification Type approval Taxation Crime management	Authenticity Warranty Theft checking	Authenticity Compliance Warranty Theft checking

Unique and accurate IMEI are **essential** for the mobile ecosystem

What is an IMEI?

TAC: Type Allocation Code

86

Reporting Body identifier

916102

Type Identifier
Indicating brand owner and device model allocated by Reporting Body

Serial Number

991292

Unique Number assigned to individual devices by the manufacturer

Check Digit

0

A function of the other digits [calculated by the manufacturer]

The 15 digit **TAC code** identifies the brand owner and model

What devices need an IMEI?

3GPP devices require an IMEI.

Rule:

Mobile / Feature Phone

Smartphone

Tablet

IoT Device

Wearable

Dongle

Modem

WLAN Router

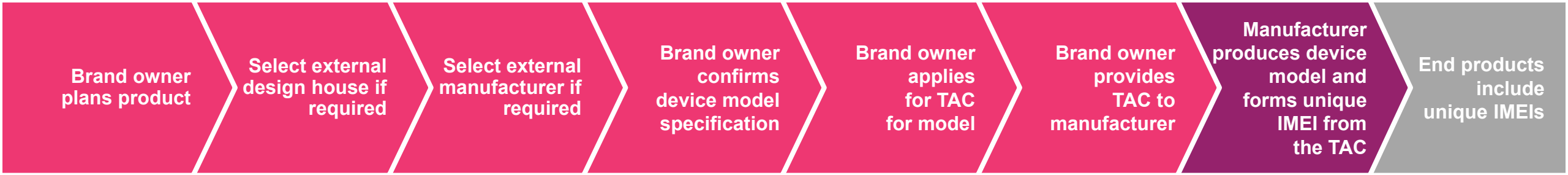
All devices with a 3GPP transceiver
require a unique, persistent and secure IMEI

Key: 3GPP transceiver

Process of applying for TAC

The brand owner is the TAC holder and the manufacturer is named as OEM on the TAC application form.

Rule:

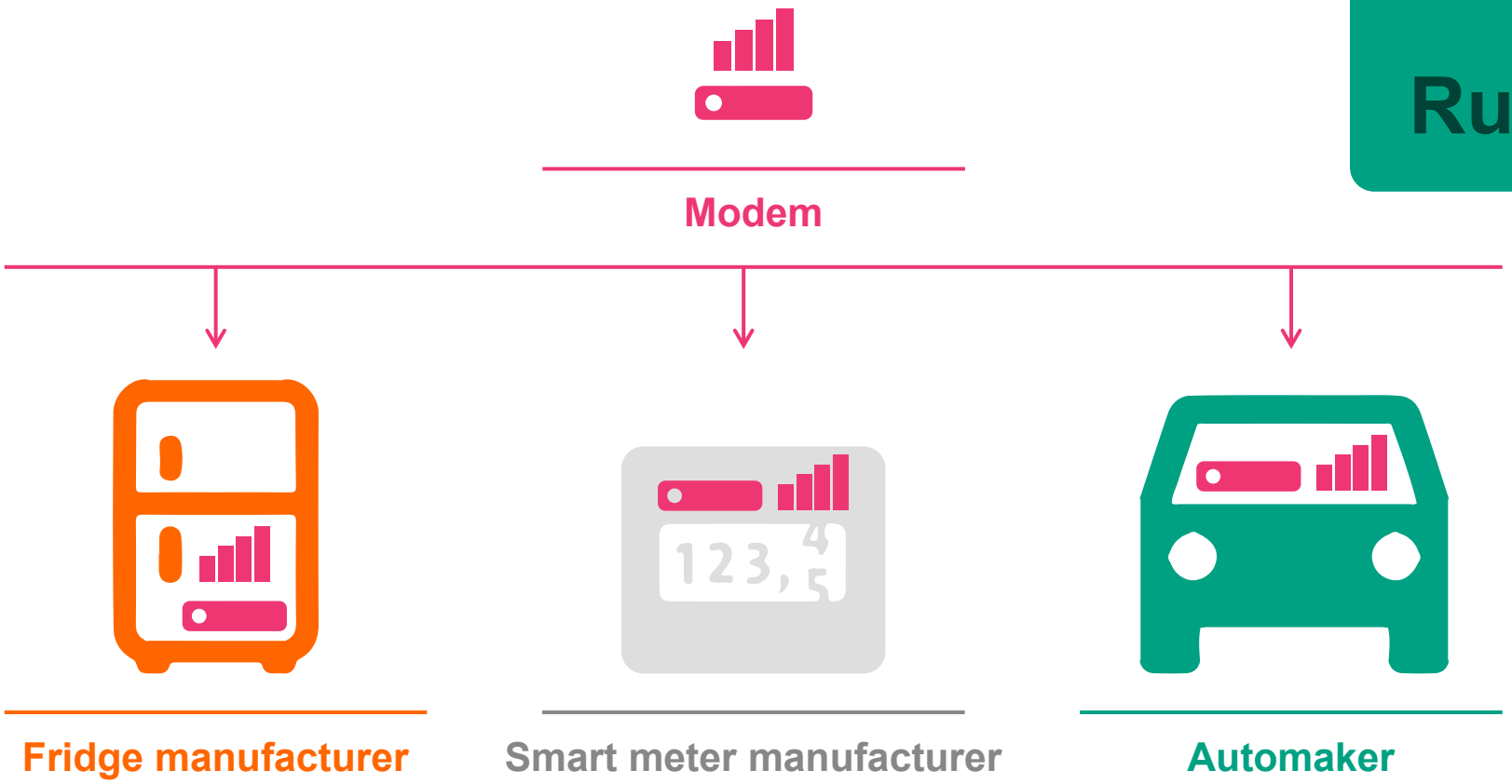


When outsourcing manufacture the **brand owner must be the named TAC holder**

Who applies for TAC when IoT modems are installed in other equipment?

When modems are installed in other machines, the original modem producer applies for TAC.

Rule:



Modem producer applies for TAC

Who issues the TAC code?

GSMA appointed Reporting Bodies issue TAC codes. The HQ location of the brand owner determines which Reporting Body manages an application.

Rule:

3GPP A GLOBAL INITIATIVE

Global Decimal Administrator — GSMA

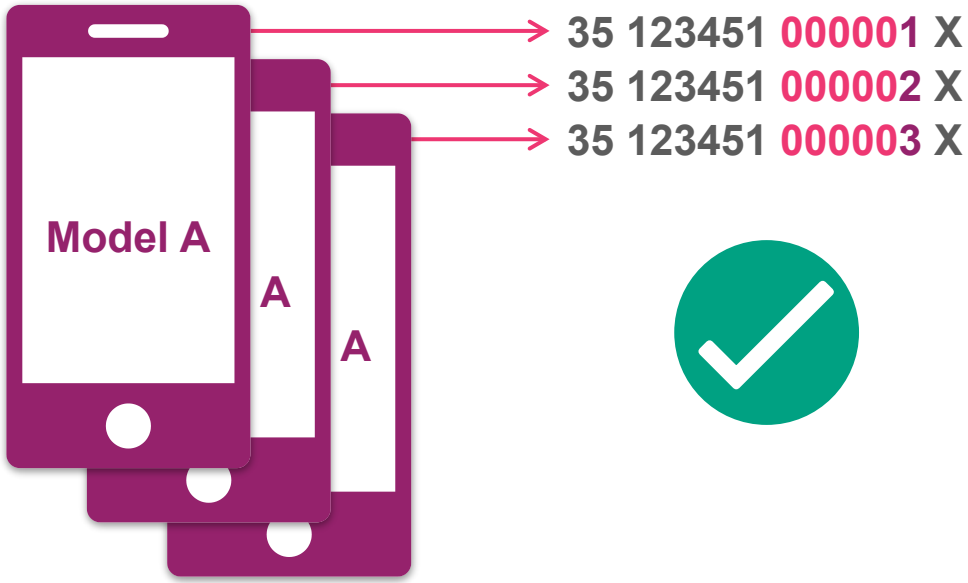
	China	Rest of World	USA	Rest of World
Reporting Body identifier:	86	35		
Reporting Body:	TAF	TÜV SÜD		
Coverage:	All device types	All device types		
Specialist identifier:			01	99
Specialist:			CTIA	TIA
Coverage:			Optional source when applying for PTCRB certification	Optional source for 3GPP / 3GPP2 multi-mode devices

How do you form an IMEI?

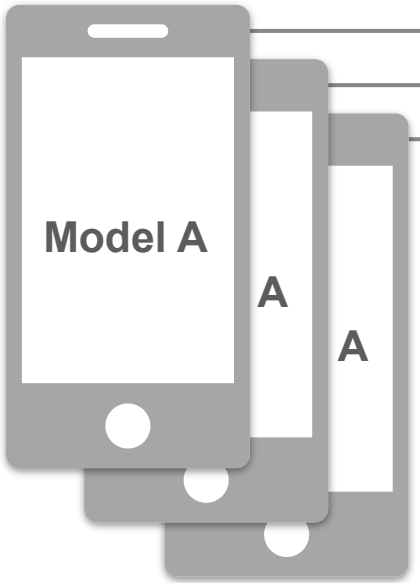
TAC: Type Allocation Code	Serial Number	Check Digit
35 123451	000000	X

The TAC identifies the device model. Only one model per TAC. Each device must have a unique IMEI.

Rule:



35 123451 000001 X
35 123451 000002 X
35 123451 000003 X



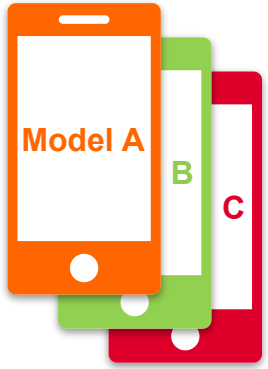
35 123451 000001 X
35 123451 000001 X
35 123451 000001 X

Do not duplicate IMEI

Use the **TAC** allocated to the model and increase the serial number for each unit produced

When do you need a new TAC for a device model?

The following are considered variations to a specification which do require a new TAC



Brand owner

External manufacturer

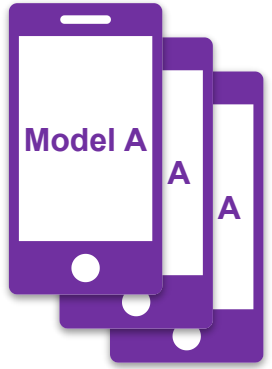
Model Name

Components
Casing
Motherboard
Chipset
Number of cameras

Connectivity
Transceiver capabilities
Frequency bands

Operating system
e.g. Android, Tizen

The following are considered variations to a specification which do not require a new TAC



Different version of same OS
e.g. Android 7, Android 8

User interface differences

Marketing Name

Devices configurations subset of transceiver frequency bands

Manufacturer producing same model in different locations

Minor variations
Camera pixel count
Colour of device
Memory size
Minor components

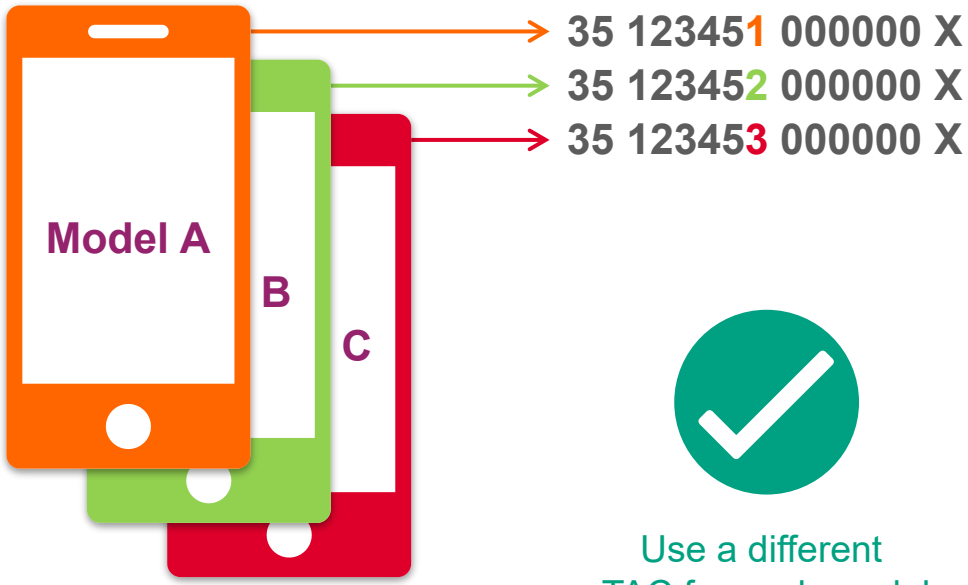
A unique model **requires** a unique TAC

TAC and multiple device models

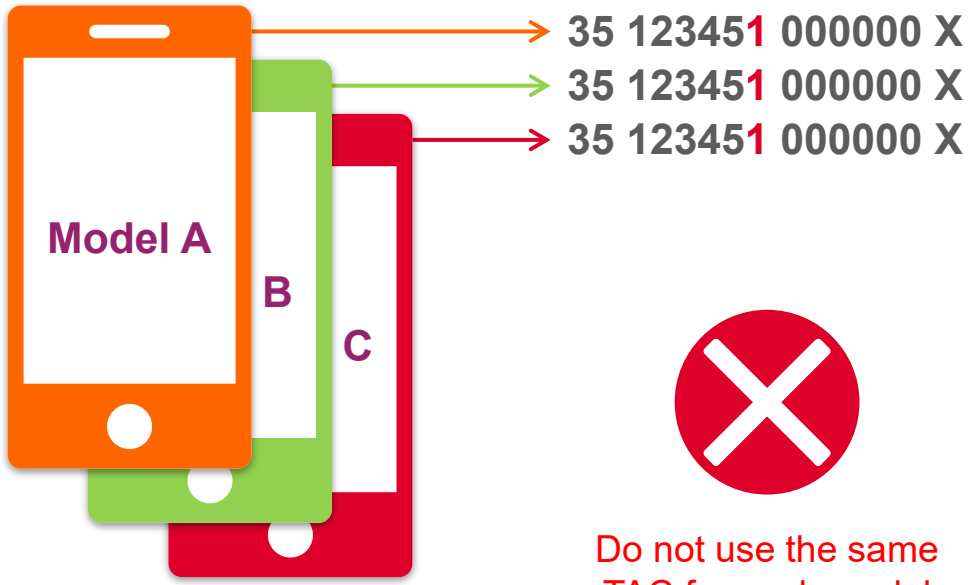
TAC: Type Allocation Code		Serial Number	Check Digit
35	123451	000000	X

Each device model must be allocated a unique TAC.

Rule:



Use a different TAC for each model



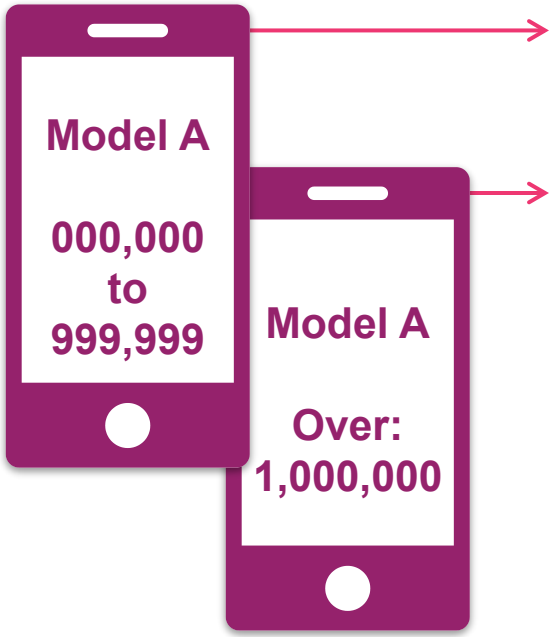
Do not use the same TAC for each model

TAC and high volume production

TAC: Type Allocation Code		Serial Number	Check Digit
35	123451	999999	X

A new TAC is required for every 1 million units produced.

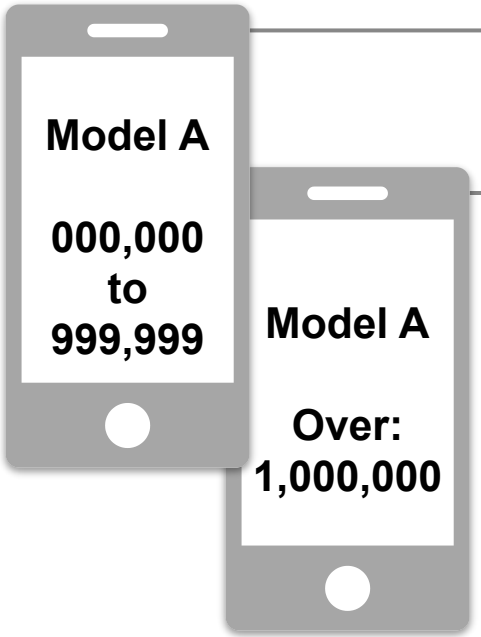
Rule:



From: **35 123451 000000 X**
To: **35 123451 999999 X**

From: **35 123452 000000 X**
To: **35 123452 999999 X**

Use another TAC after 1 million units



From: **35 123451 000000 X**
To: **35 123451 999999 X**

From: **35 123451 000000 X**
To: **35 123451 999999 X**

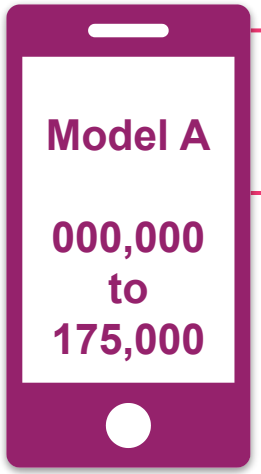
Do not use the same TAC for the next million units

Unused TAC capacity

TAC: Type Allocation Code	Serial Number	Check Digit
35 123451	999999	X

Spare capacity in one TAC cannot be transferred to another device model.

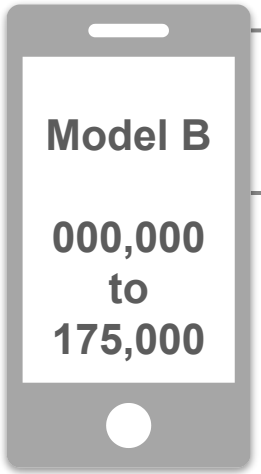
Rule:



35 123451 000000 X

35 123451 175000 X

Unused capacity can only be used for future production of the same model



35 123451 175001 X

35 123451 350000 X

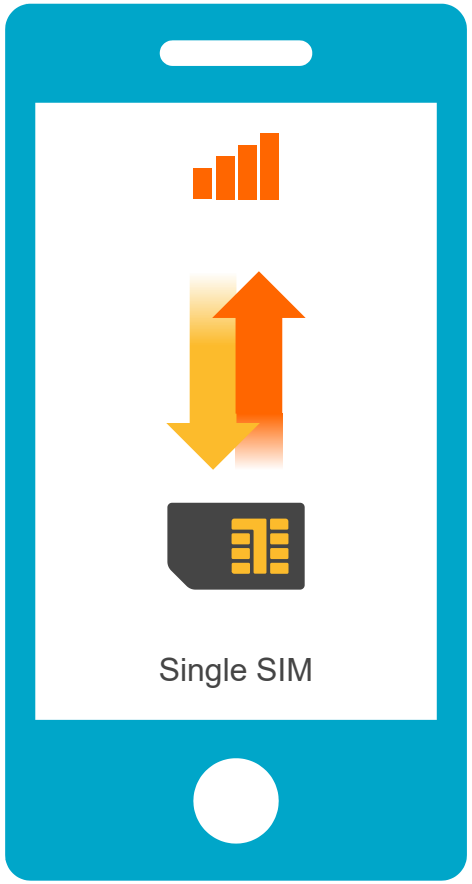
Do not use spare capacity for a different model

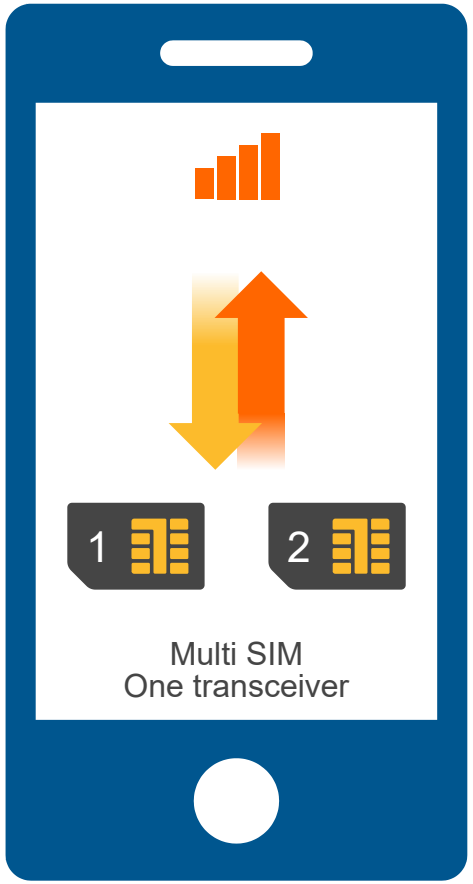
Multiple SIM, UICC and eUICC

When one network connection is present, only one IMEI is required.

Rule:

1 TAC / 1 IMEI





1 TAC / 1 IMEI

Single **transceiver** or single **connection** devices require one IMEI.

Example: 4 SIMs with 1 transceiver requires only 1 IMEI

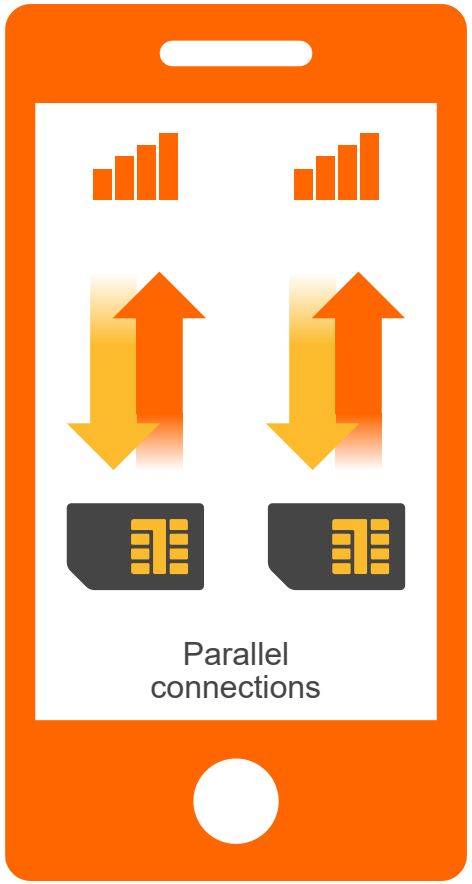
Multiple transceivers

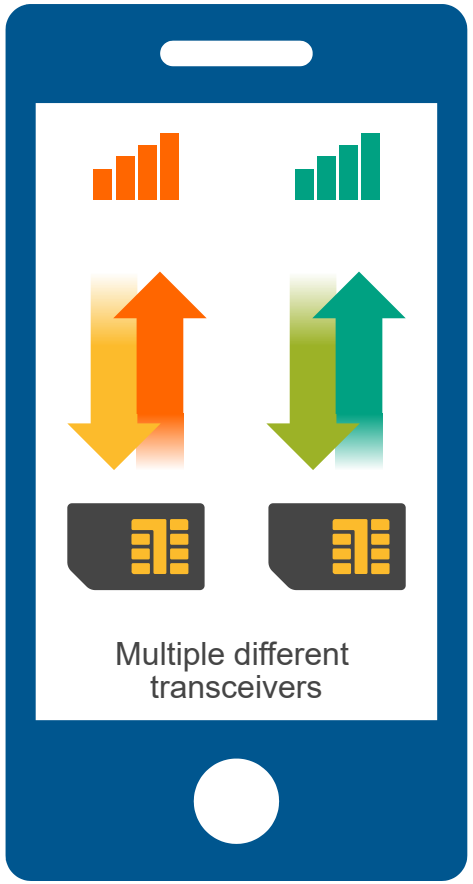
Each parallel connection requires a unique IMEI. Different separate transceivers require unique TACs.

Rule:

1 TAC / 2 IMEI

1 TAC	Serial	Check
86123451	000001	X
86123451	000002	X





2 TAC / 2 IMEI

2 TAC	Serial	Check
86123451	000001	X
86123452	000001	X

One IMEI is required **per parallel connection**

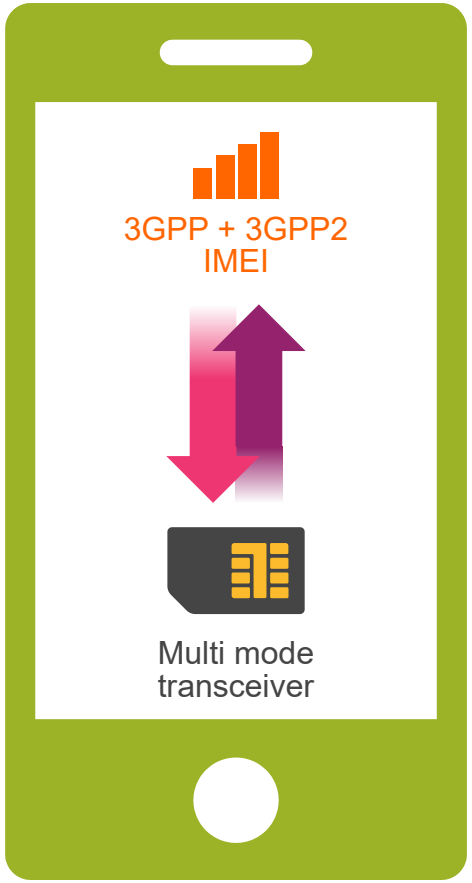
Multiple Radio Access Technology

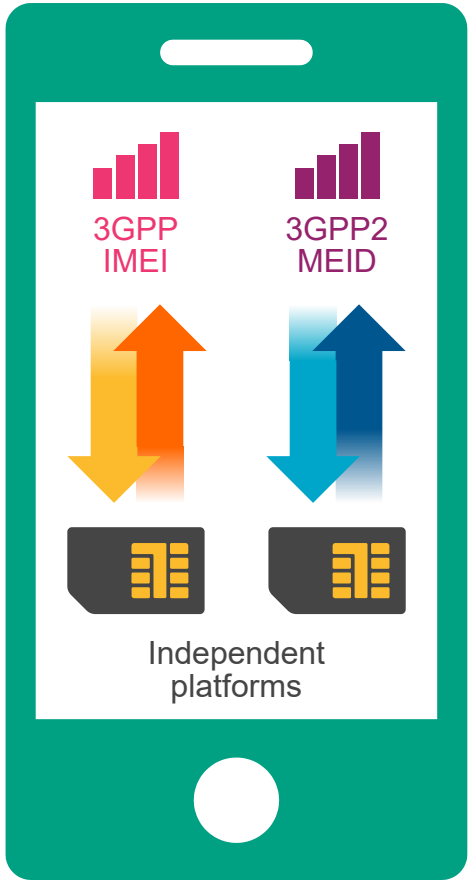
Integrated 3GPP and 3GPP2 devices require only one IMEI.

Rule:

1 TAC + 1 IMEI

Integrated 3GPP and 3GPP2 transceiver requires one IMEI





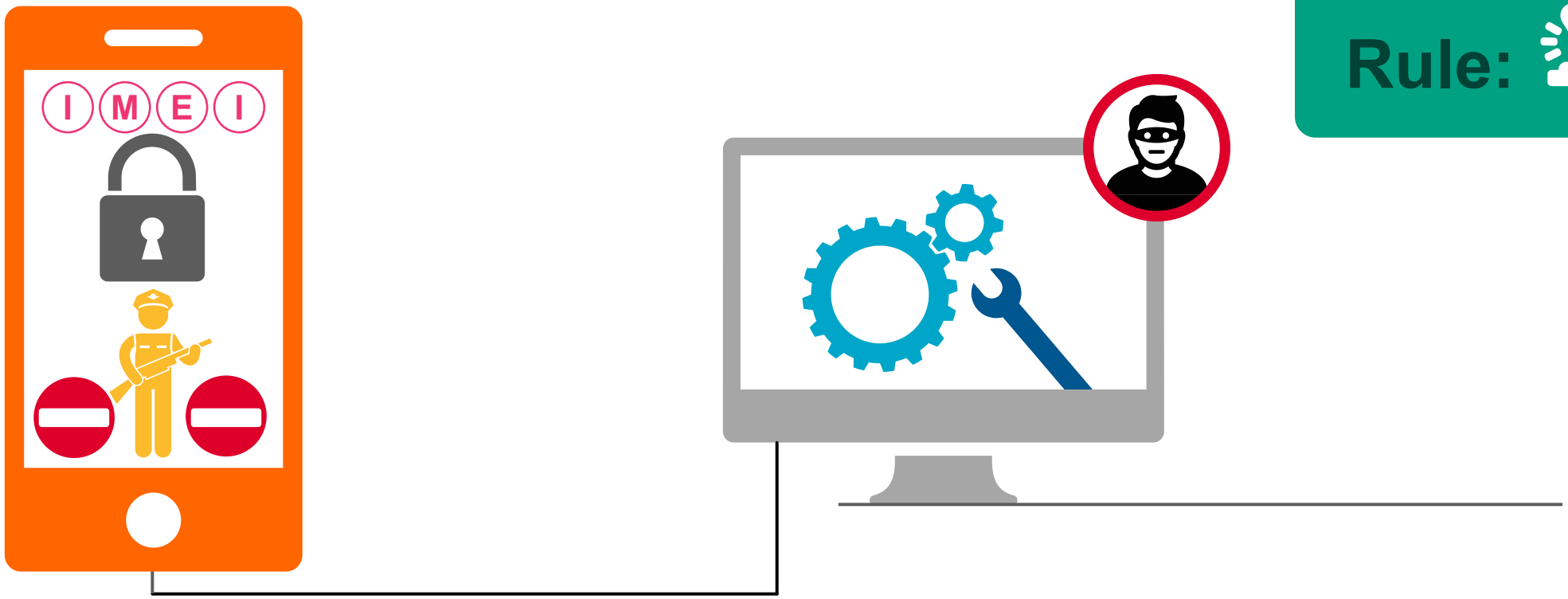
1 IMEI + 1 MEID

Separate parallel 3GPP and 3GPP2 transceivers require one IMEI and one MEID

How secure should an IMEI be?

IMEI implementation shall be resistant to hacking, spoofing or change by any means.

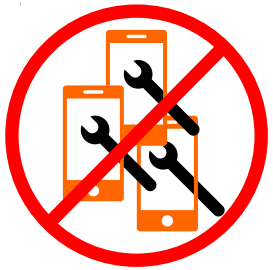
Rule:



Once **implemented in a device** the IMEI cannot be changed.

The IMEI cannot be changed by a menu function.

IMEI secure implementation principles



Here are the recommended GSMA IMEI security technical design principles to help device brand owners develop a comprehensive security architecture to protect the IMEI implementation.

1: Software Integrity

Detect, prohibit and record attempts to alter data or software

2: No Modification

Protect component code against manipulation

3: No Cloning

Prevent IMEI copying between different devices

4: No External Access

Make IMEI implementation inaccessible from outside the device

5: No fallback

Stop unauthorised reversion to old software versions

6: No tampering

Prevent, detect and respond to attempts to change IMEIs

7: Software Quality

Develop software in accordance with best process & techniques

8: No Hidden Menus

No means to access or modify areas that store the IMEI

9: No Substitution

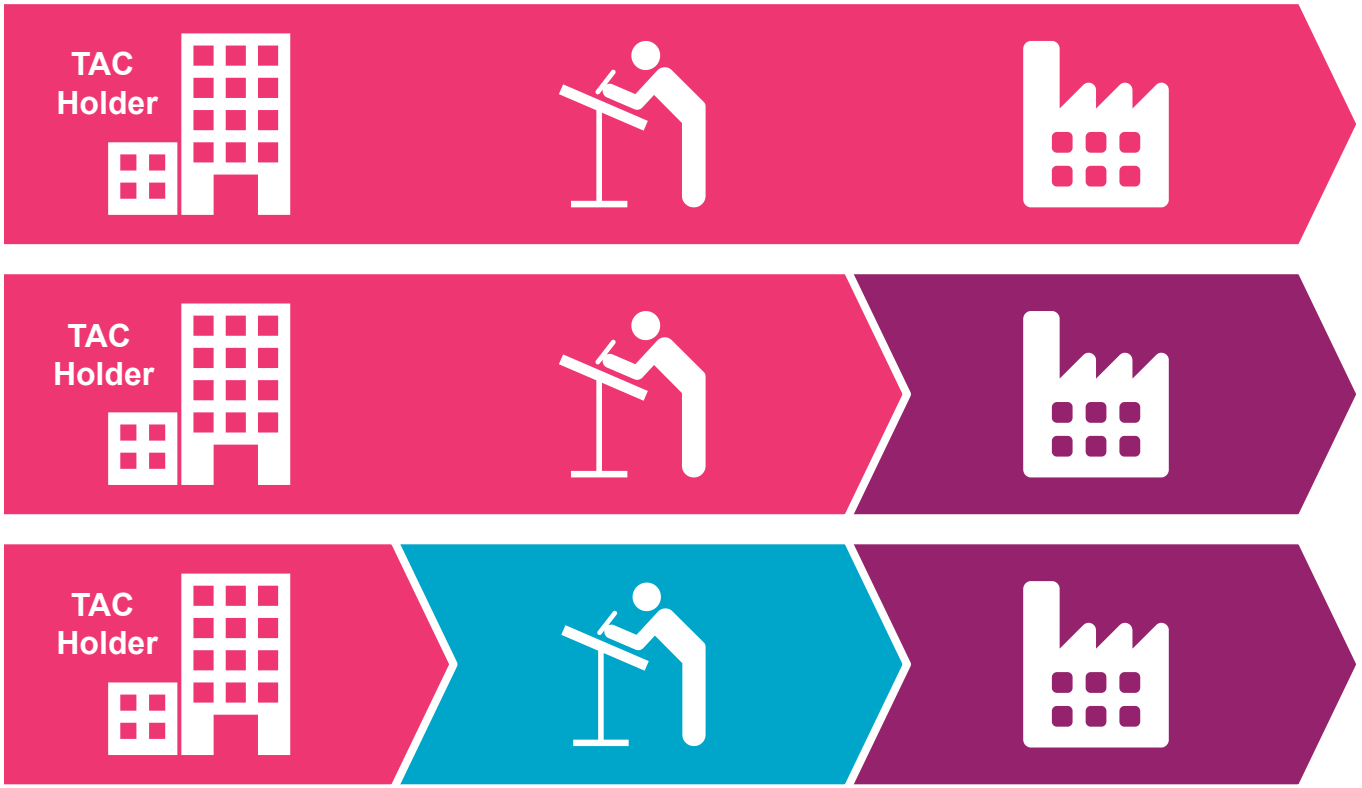
Prevent substitution of components that contain memory

IMEIs must not change after device production.
Adopt these security requirements.

Who applies for TAC when production is out sourced?

The brand owner must apply for TAC.

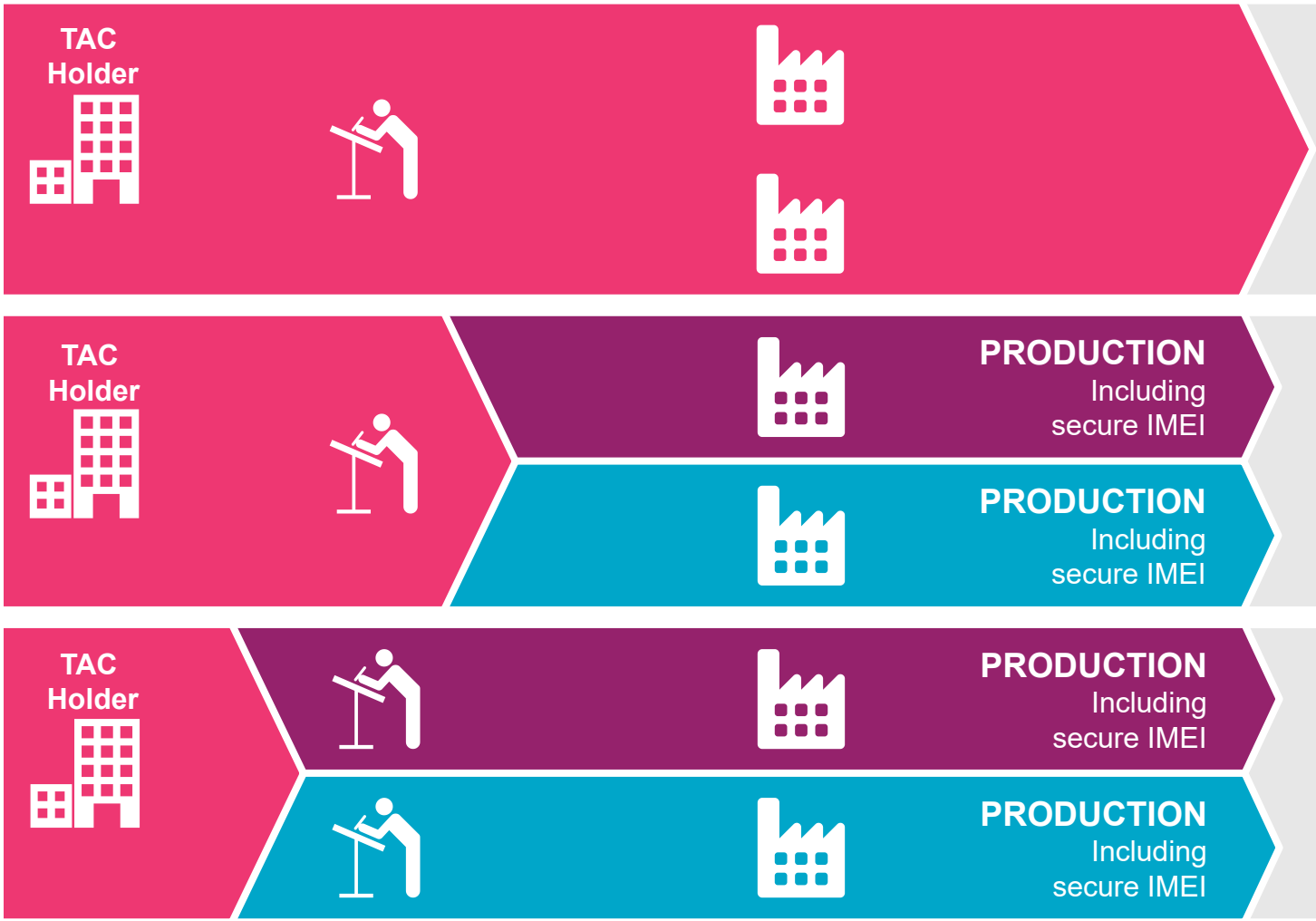
Rule:



Brand owner **provides TAC** to manufacturer if outsourced

Brand owner — Design house — Manufacturer — Internal — Outsourced 01 — Outsourced 02 —

Multiple production facilities and TAC



The same model, produced by the brand owner in multiple factories that they own, requires one TAC.

The same model, produced by different outsourced manufacturers requires two TAC. Each outsourced OEM must be named on the TAC application form.

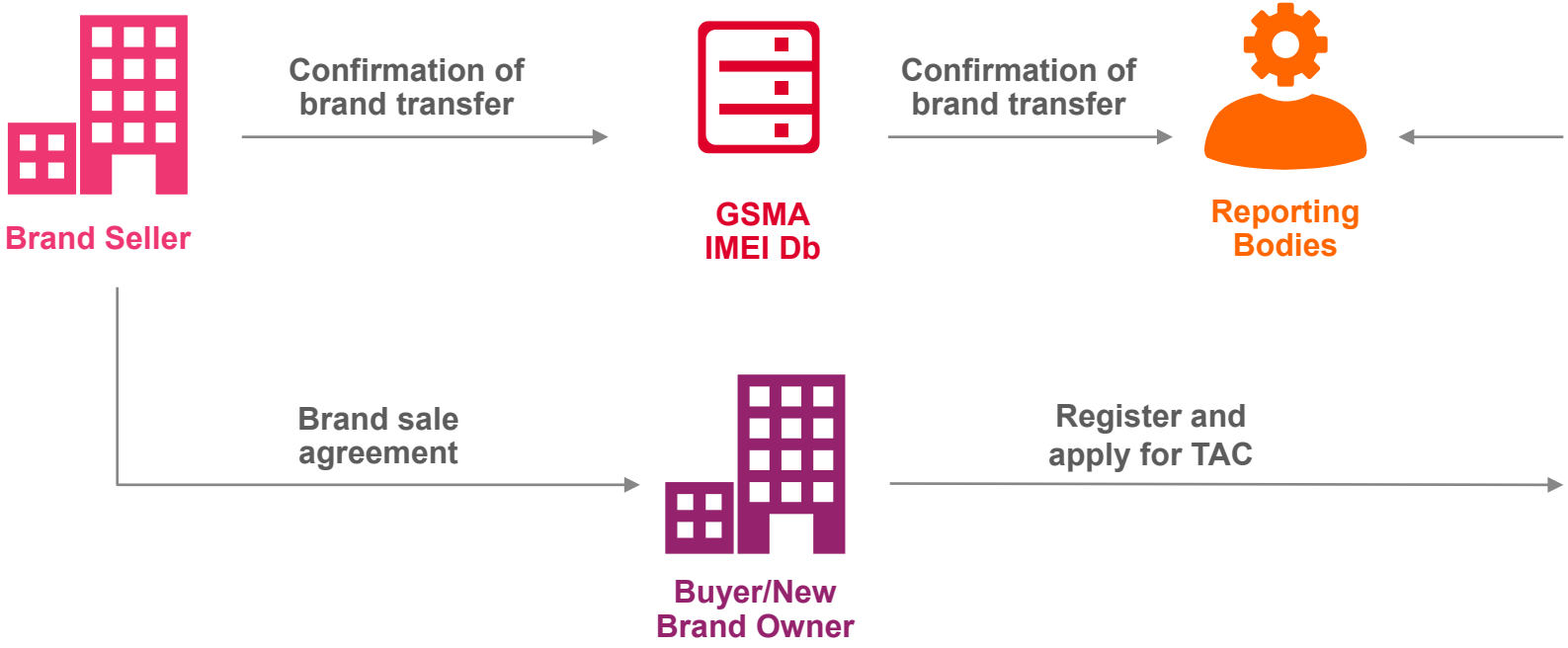
The same model, designed and produced by different outsourced manufacturers requires two TAC. The outsourced OEMs must be named on the TAC application form.

Brand owner — Design house — Manufacturer — Internal — Outsourced 01 — Outsourced 02 —

Sale of Brands and TAC

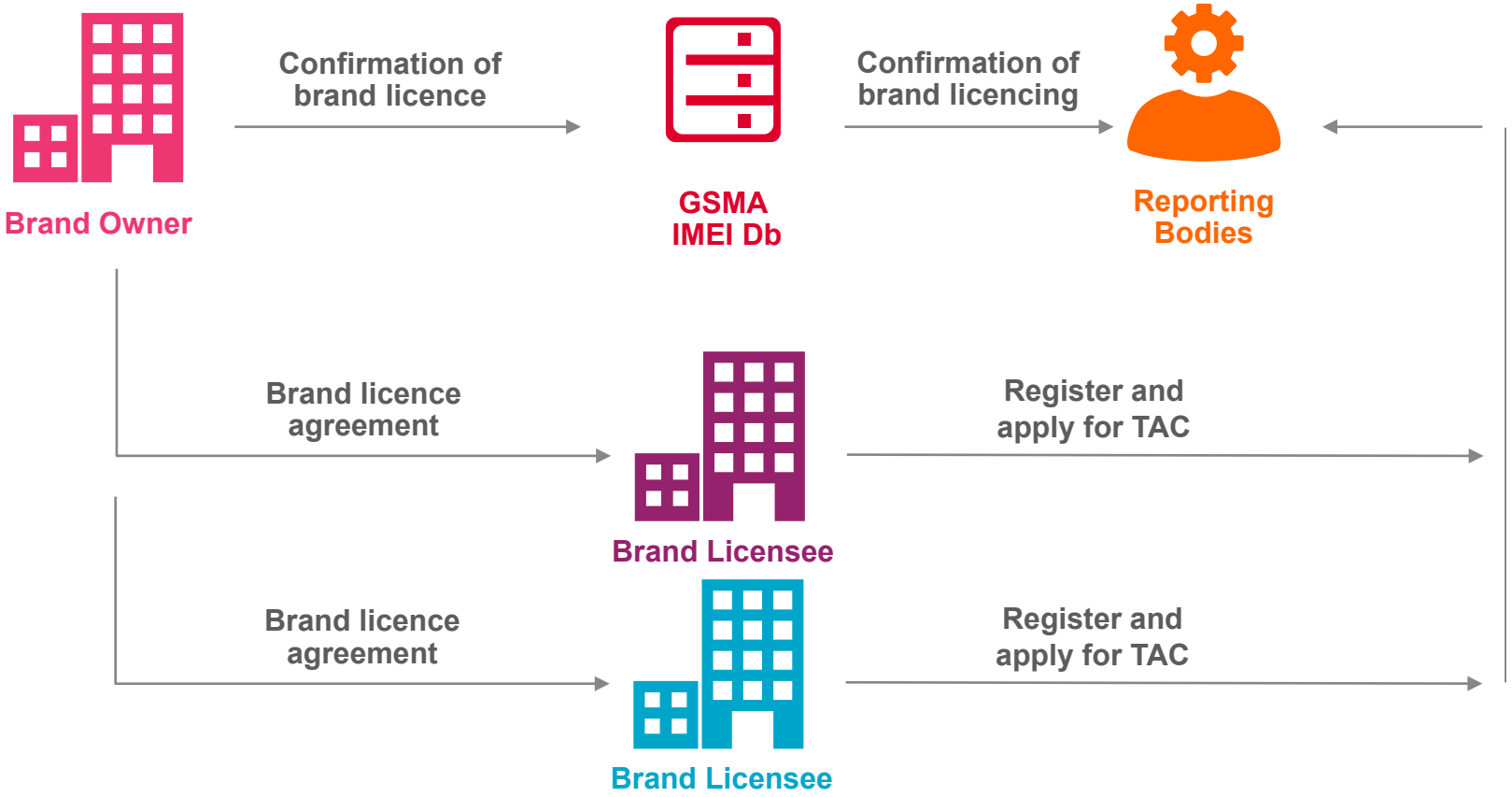
Original brand owner must confirm transfer of brand ownership before TAC allocation can be managed by new brand owner.

Rule:



After the brand seller confirms the new owner, GSMA allocates TAC to the new owner

Brand Licencing and TAC



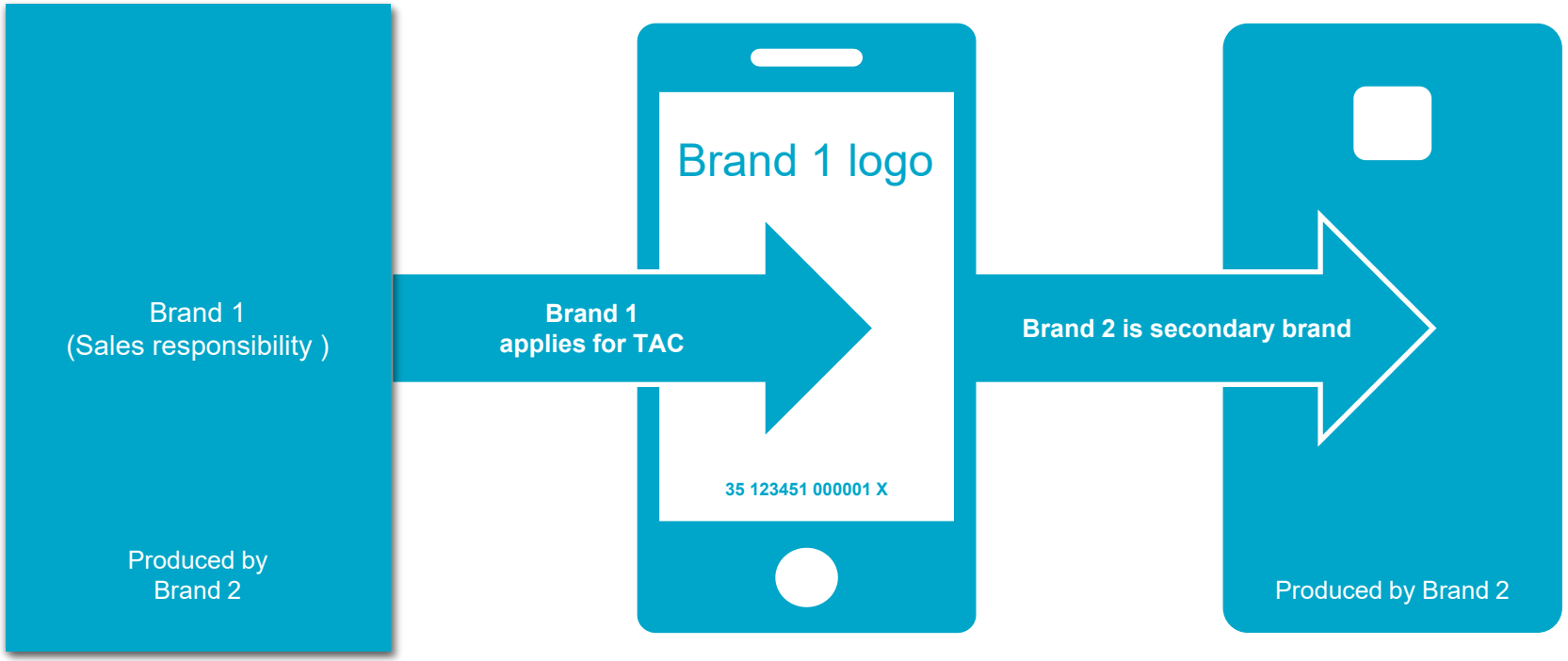
Original brand owner must confirm licencing of brand before TAC allocation can be managed by the licensee.

Rule:

When a brand owner establishes a brand licensee, **GSMA allocates TAC to the licensee** until the brand owner provides other instructions

Who applies for TAC when multiple brands are present?

Example:
Mobile network operator, Brand 1, provides devices in association with manufacturer, Brand 2



Where multiple brands are involved the brand responsible for sales must apply for TAC.

Rule:

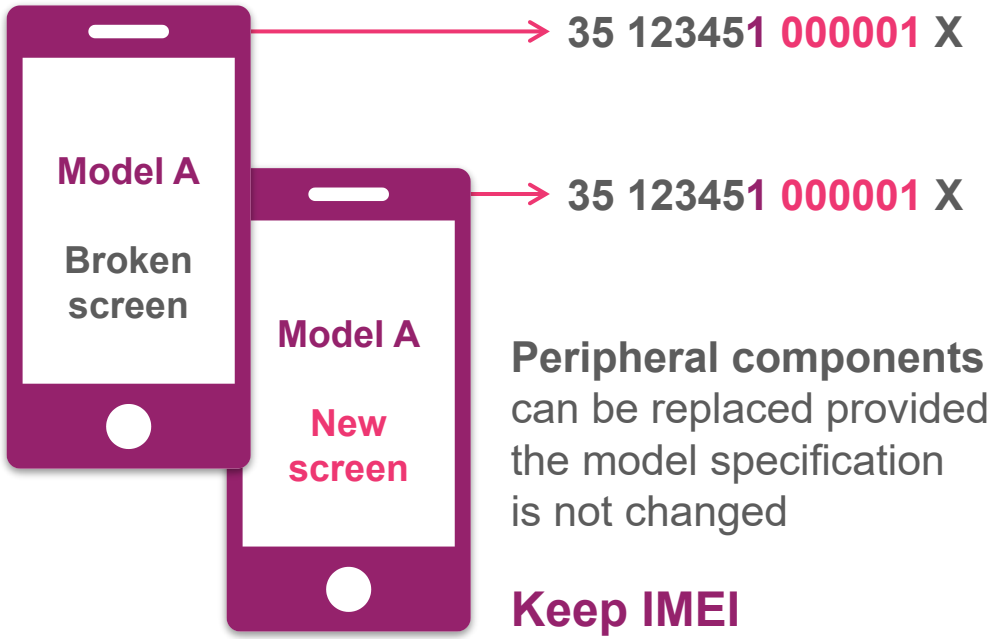
Brand responsible for sales must apply for **TAC**

When does a repair require an IMEI to change?

TAC: Type Allocation Code	Serial Number	Check Digit
35 123451	000000	X

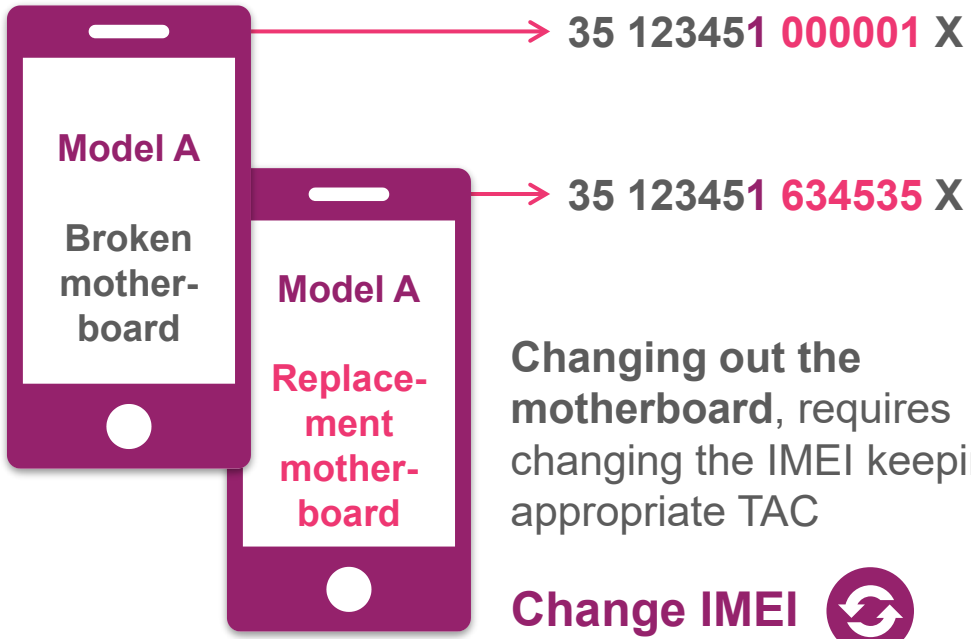
Changing the component that securely stores the IMEI results in a change of IMEI value.

Rule:



Peripheral components can be replaced provided the model specification is not changed

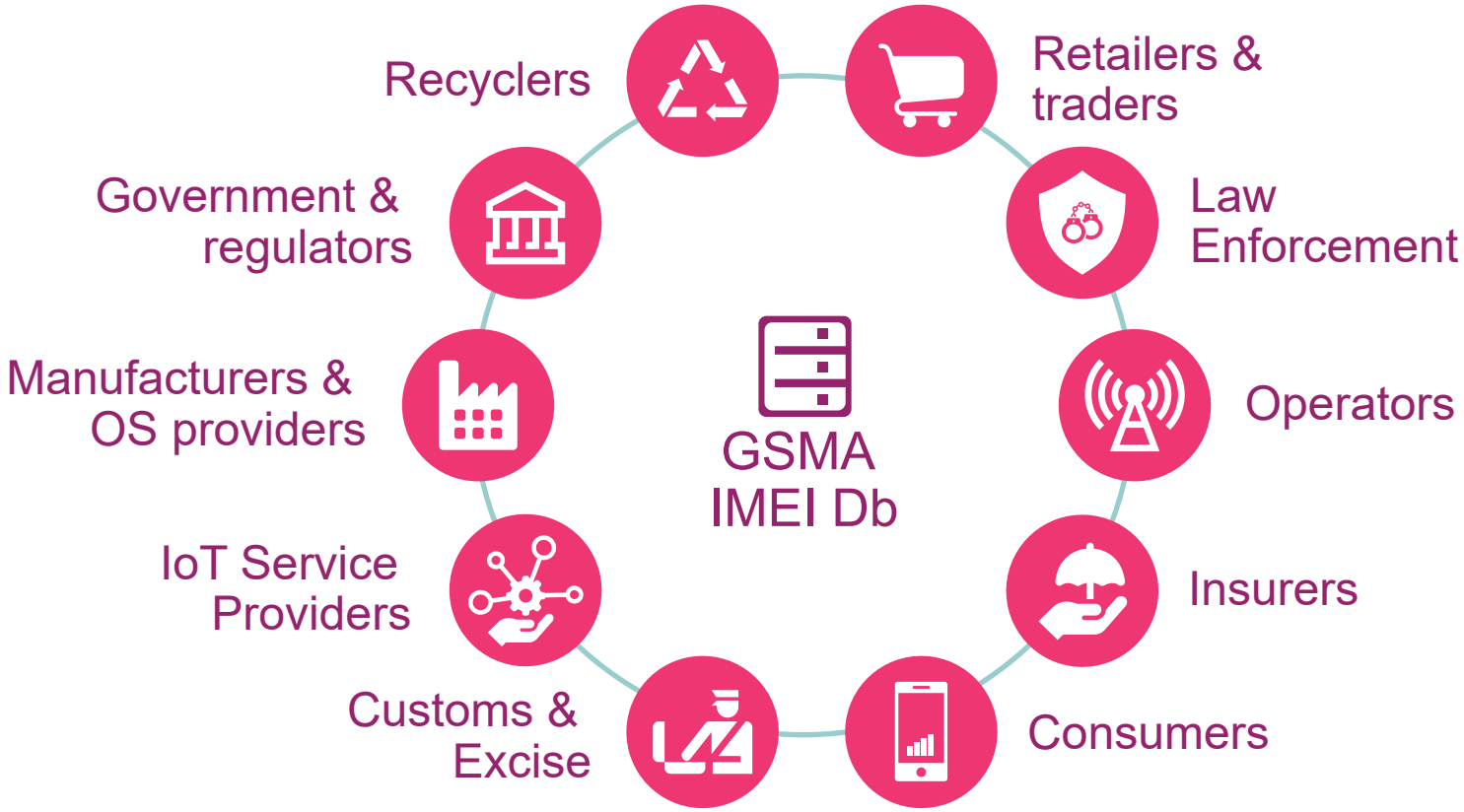
Keep IMEI



Changing out the motherboard, requires changing the IMEI keeping the appropriate TAC

Change IMEI

A well-functioning IMEI ecosystem benefits all



This document is part one of six TAC training modules

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