

# Training Module 1: TAC / IMEI Programming Rules

**December 2023**

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# 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 Application Forms which can be found on [gsma.com/TAC](https://www.gsma.com/TAC), 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 allocation system, essential to the correct functioning of 3GPP devices and the mobile ecosystem.



**If you have any questions please contact: [tac@gsma.com](mailto:tac@gsma.com)**

# 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, TAF, CTIA and TIA

**Device brand owners** apply for TAC, even if outsourcing manufacturers

**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**

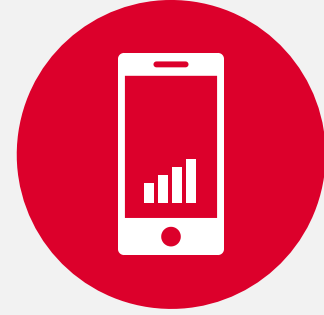
**Spare IMEI** capacity is prohibited for use in other models

**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

Support  
Warranty  
Authentication  
Theft reporting  
Theft checking



Operators

Identification  
Support  
Device blocking  
Lawful interception  
/location  
Updates  
Configuration  
Analytics  
Sales & marketing  
Service delivery  
Whitelisting  
Fraud detection



Law Enforcement

Theft checking  
Lawful interception/  
location  
Compliance checking



Insurers

Authenticity  
False claim detection



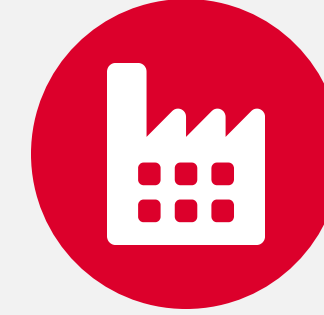
Customs & Excise

Taxation  
Certification  
Authenticity  
Counterfeit detection



IoT Service Providers

Identification  
SW updates  
Remote control  
Support  
Blocking  
Fraud detection



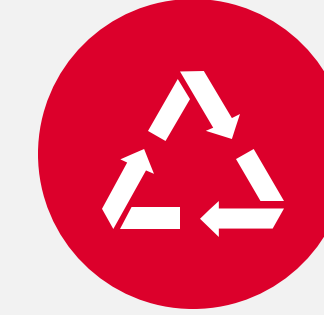
Manufacturers & OS providers

Updates  
App mgmt  
Service delivery  
Support  
Warranty  
Compliance  
Theft reporting  
Testing



Government & regulators

Certification  
Type approval  
Taxation  
Crime management



Recyclers

Authenticity  
Warranty  
Theft checking



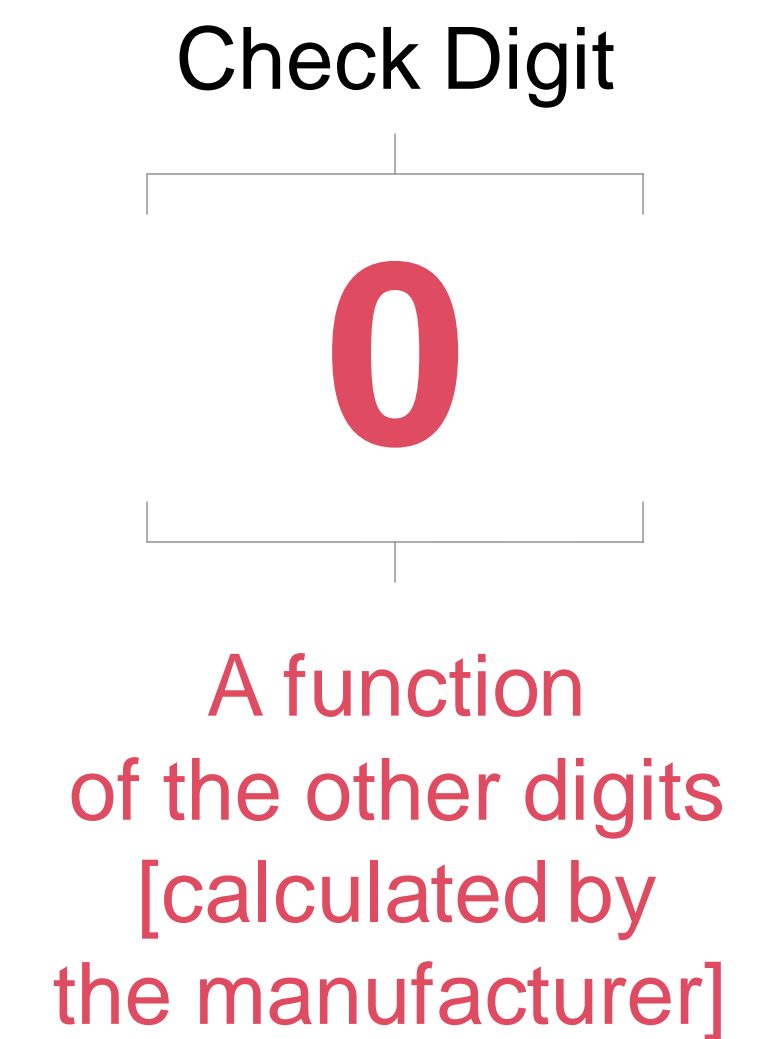
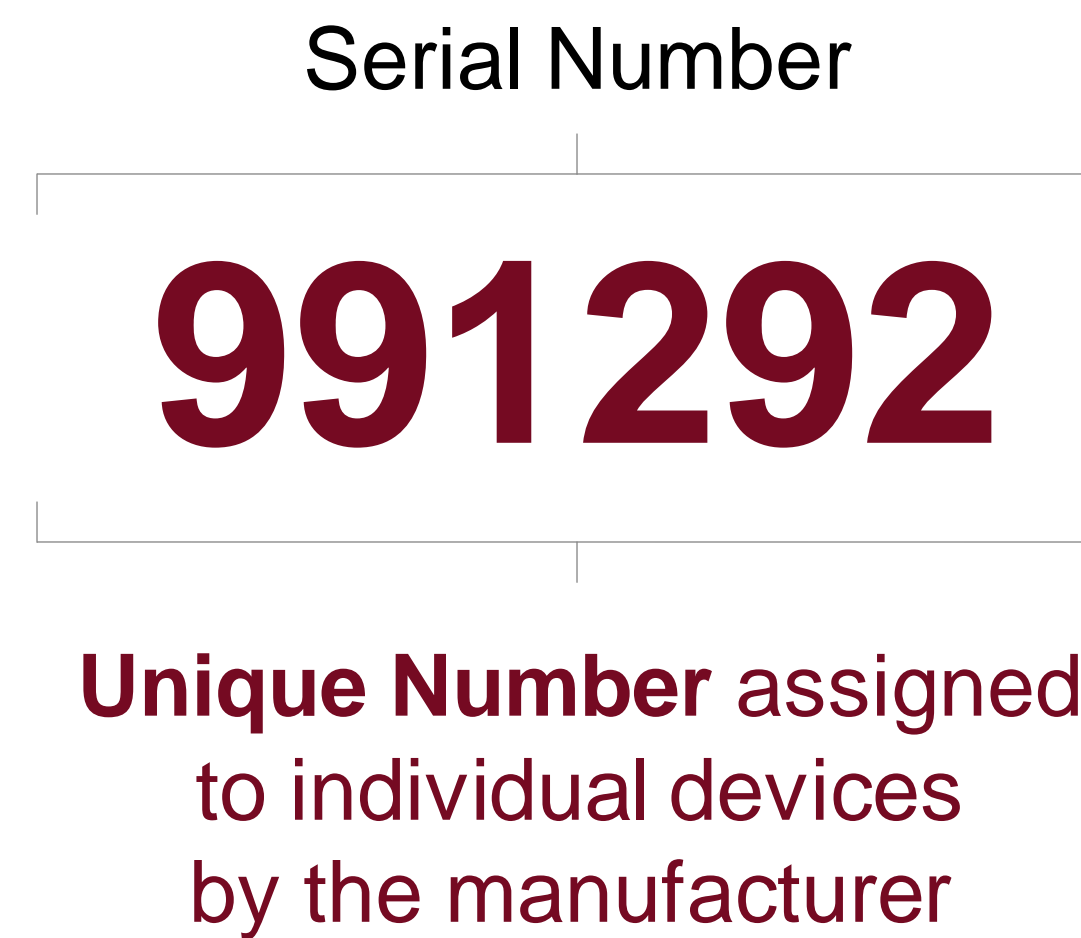
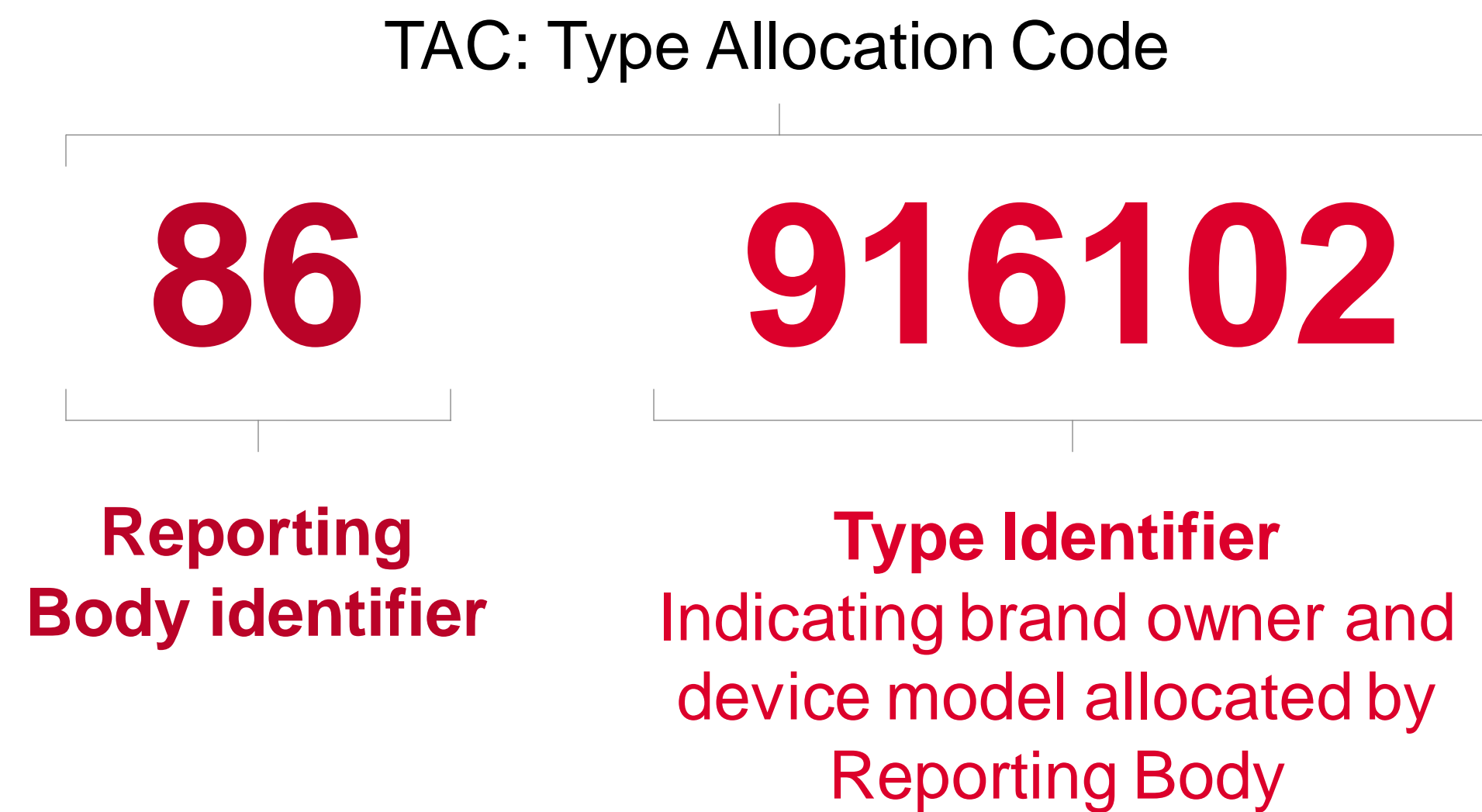
Retailers & traders

Authenticity  
Compliance  
Warranty  
Theft checking



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

# What is an IMEI?

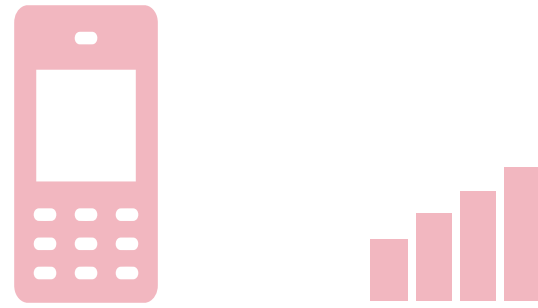


The 15-digit **TAC code** identifies the brand owner and model

# What devices need an IMEI?

3GPP devices  
require an IMEI.

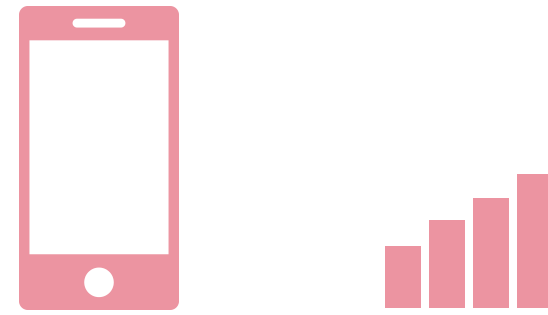
**Rule:** 



**Mobile / Feature  
Phone**



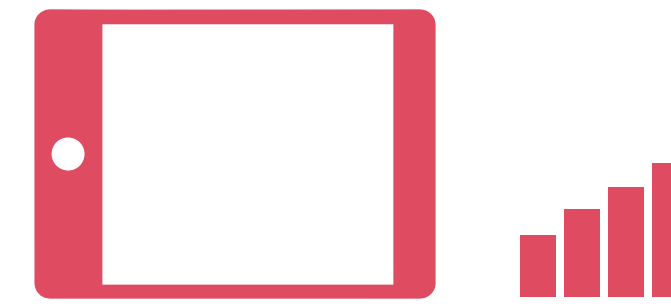
**Wearable**



**Smartphone**



**Dongle**



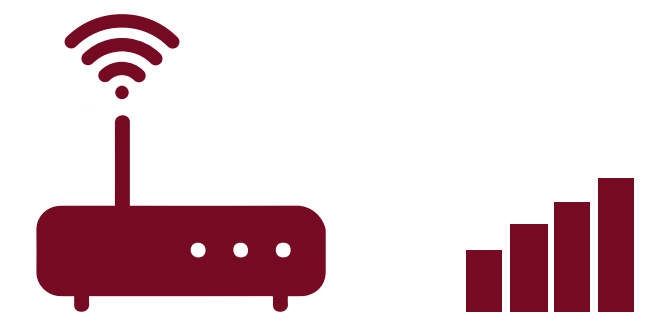
**Tablet**



**Modem**



**IoT Device**



**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:**



Brand owner action —



Manufacturer action —

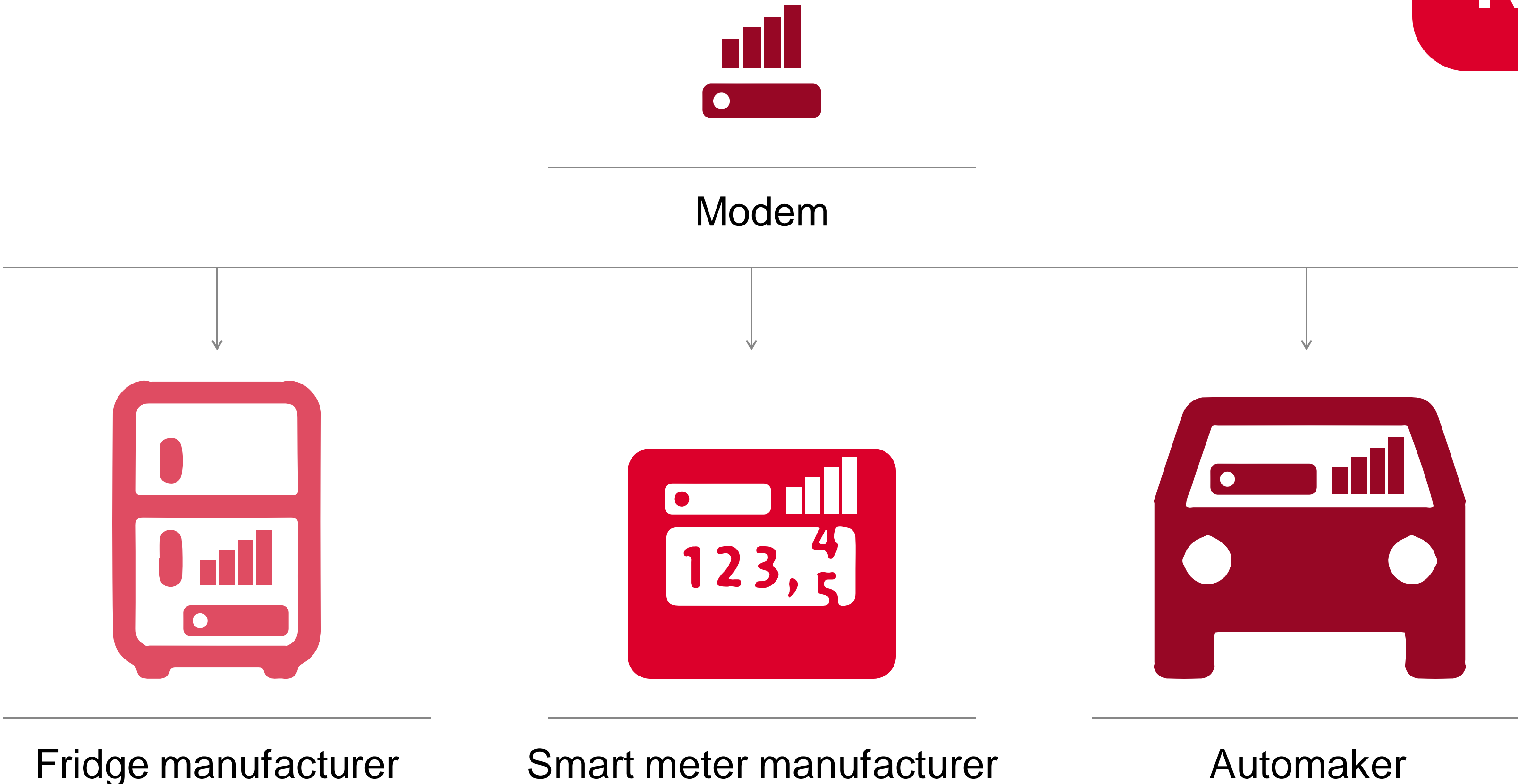


When outsourcing manufacturing the **brand owner must be the named TAC holder**

# 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?



Global Decimal Administrator



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

**Rule:**



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

# How do you form an IMEI?

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

**Rule:** 

TAC: Type Allocation Code

Serial Number

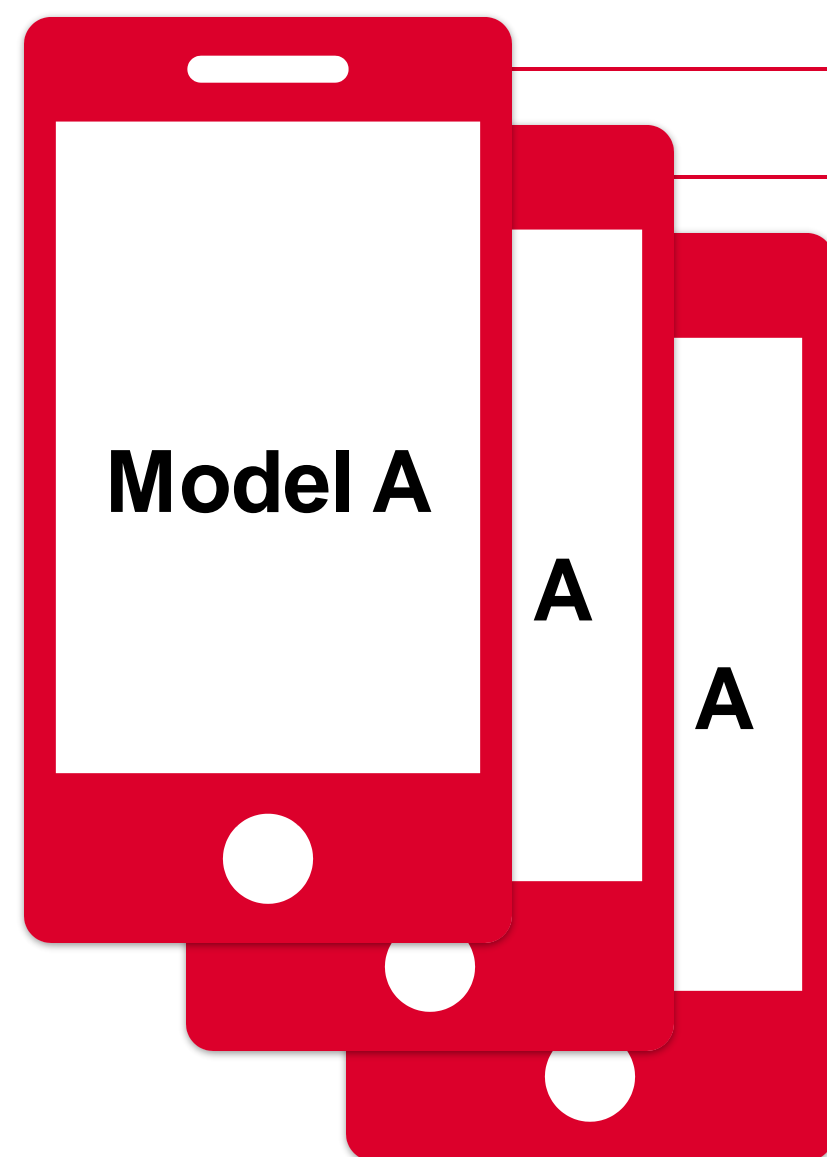
Check Digit

35

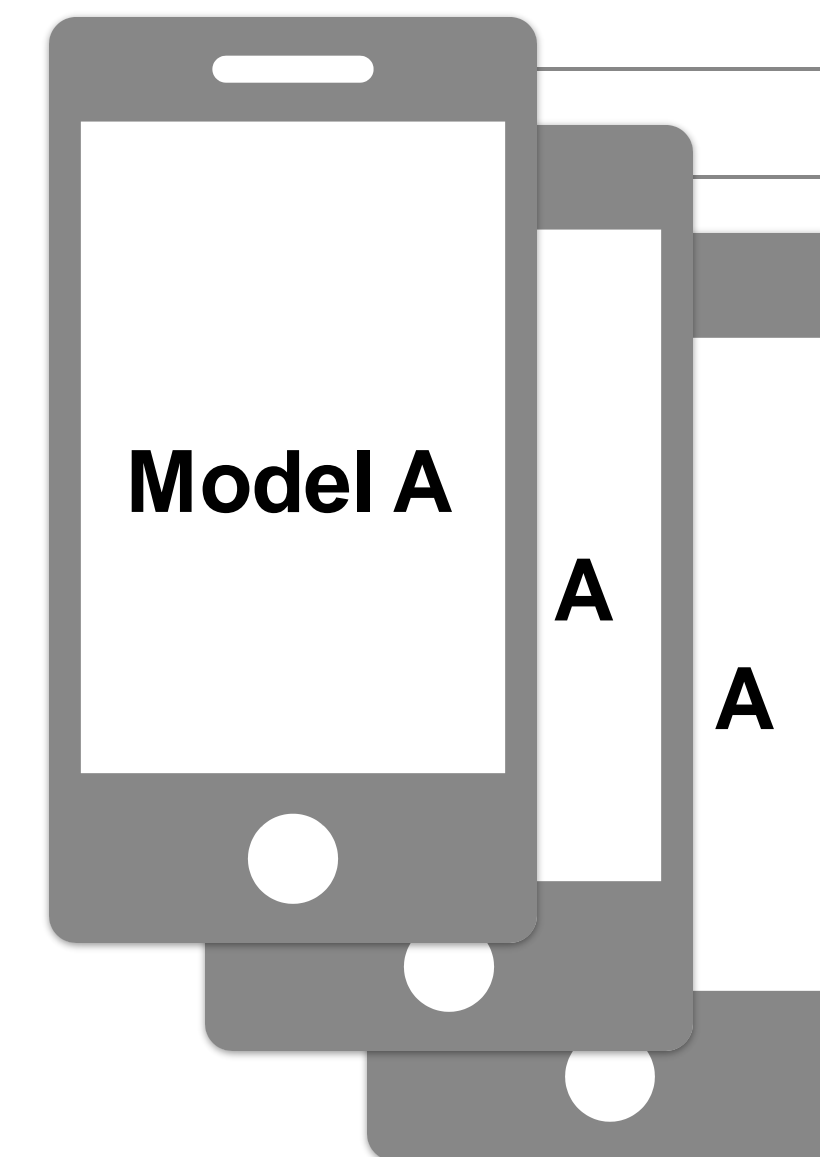
123451

000000

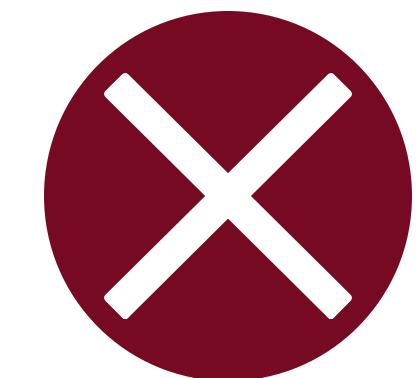
X



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



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



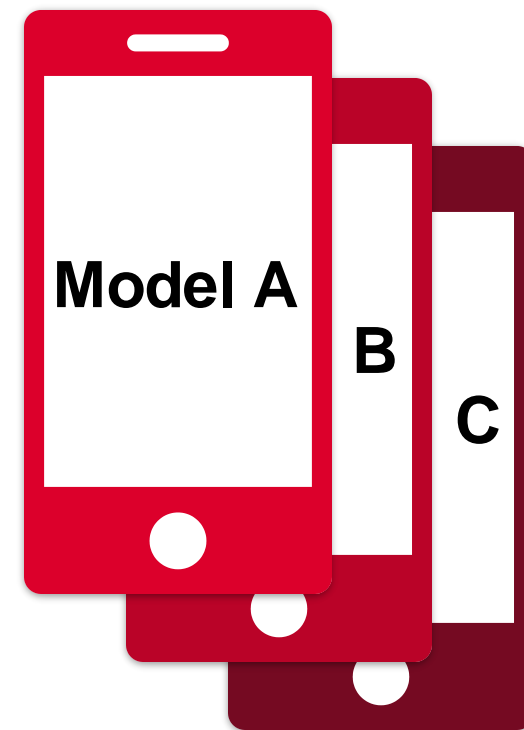
Do not duplicate IMEI



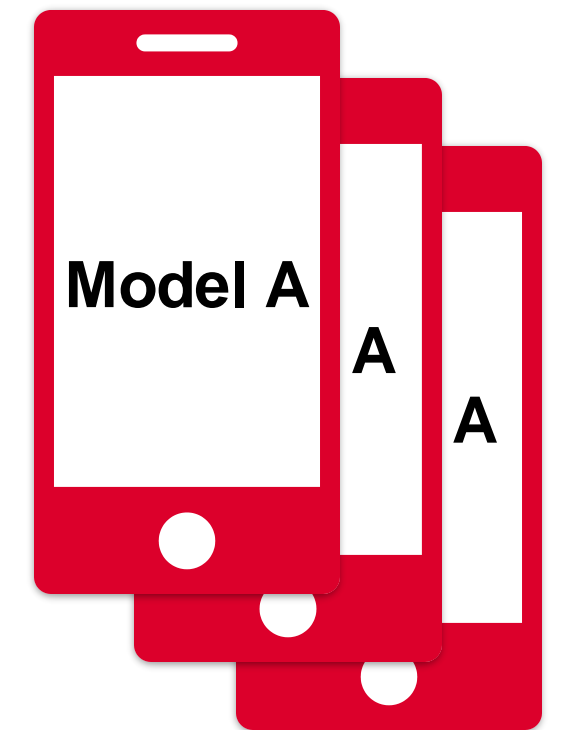
Use the **TAC** allocated to the model and increase the serial number for each unit produced

# 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



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



## Brand owner

## Components

## Connectivity

## External manufacturer

Casing

Motherboard

Chipset

Transceiver capabilities

Frequency bands

## Model Name

Number of cameras

## Operating system

e.g. Android, Tizen

## Different version of same OS

e.g. Android 7, Android 8

## Devices configurations

subset of transceiver frequency bands

## User interface differences

**Manufacturer producing** same model in different locations

## Marketing Name

## Minor variations

Camera pixel count

Colour of device

Memory size

Minor components



A unique model **requires** a unique TAC

# TAC and multiple device models

Each device model must be allocated a unique TAC.

**Rule:** 

TAC: Type Allocation Code

Serial Number

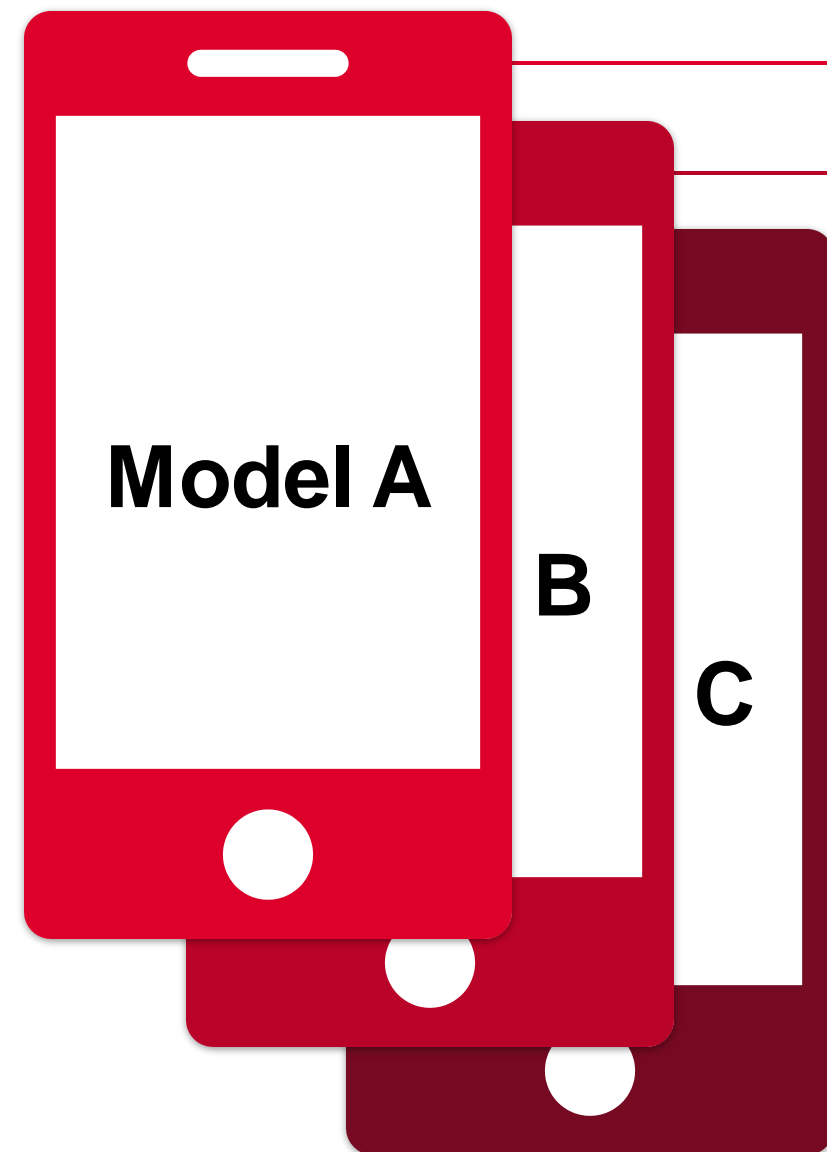
Check Digit

35

123451

000000

X



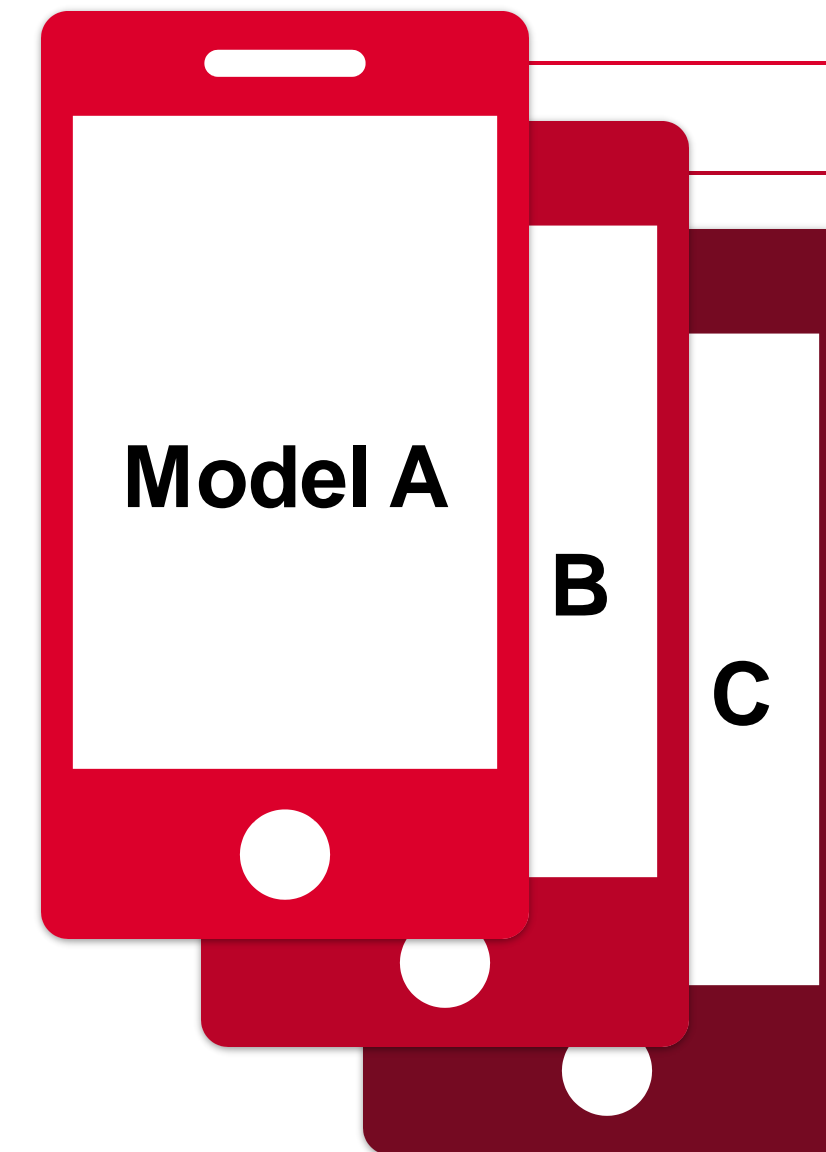
→ 35 123451 000000 X

→ 35 123452 000000 X

→ 35 123453 000000 X



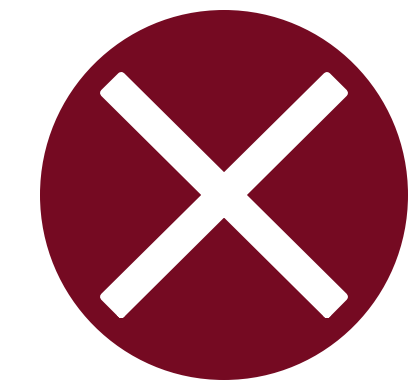
Use a different TAC for each model



→ 35 123451 000000 X

→ 35 123451 000000 X

→ 35 123451 000000 X



Do not use the same TAC for each model

# TAC and high volume production

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

**Rule:** 

TAC: Type Allocation Code

Serial Number

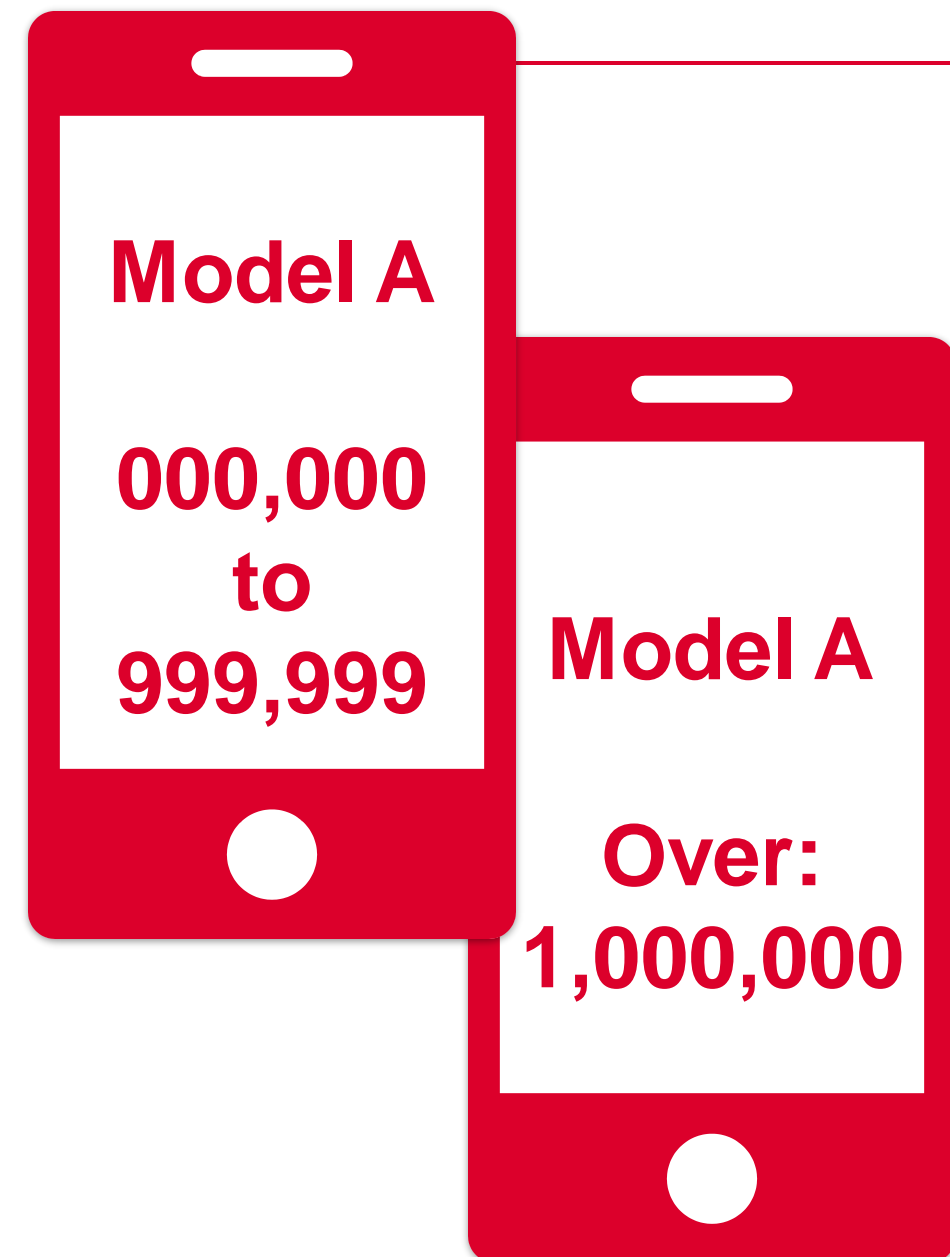
Check Digit

35

123451

999999

X

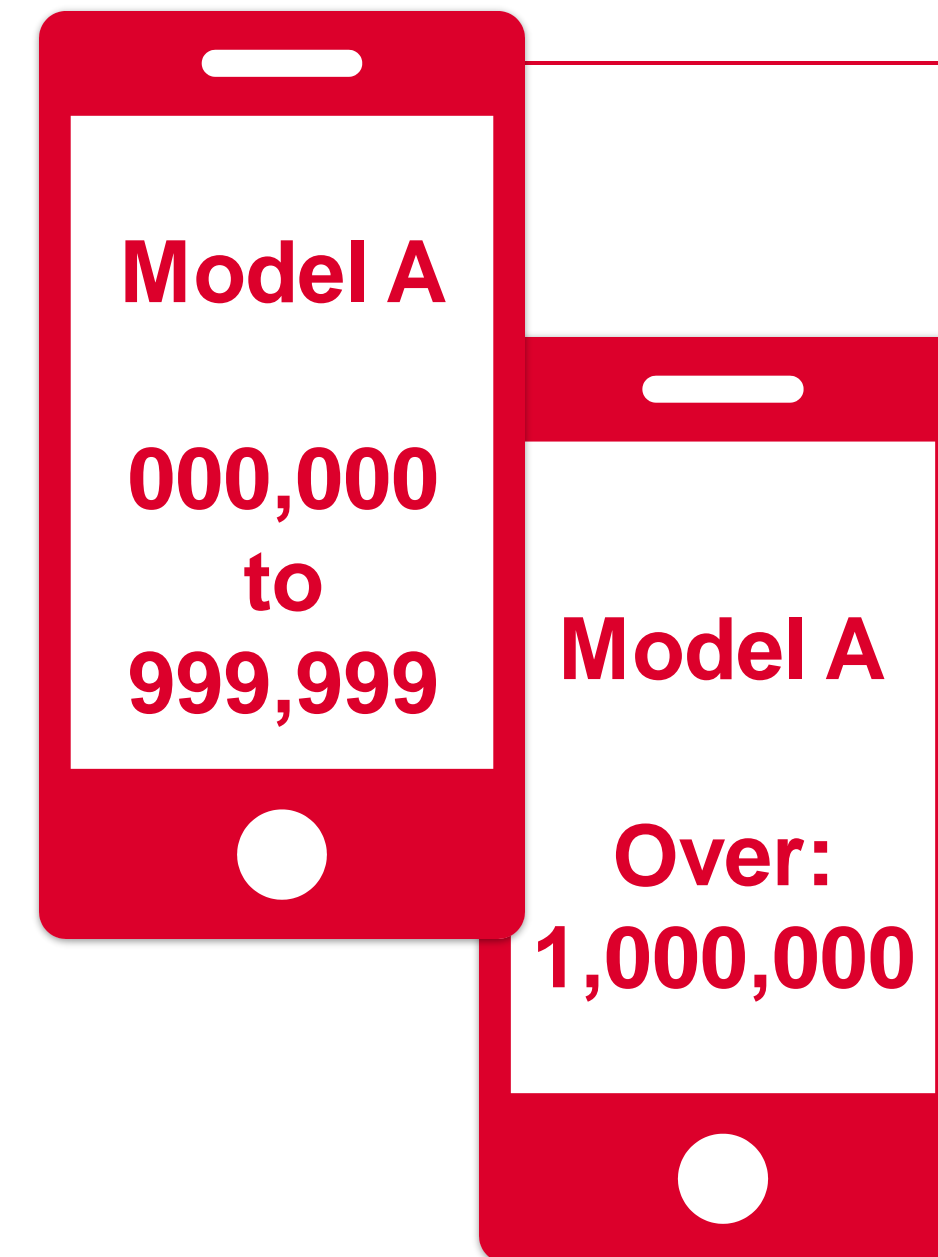


From: 35 123451 000000 X  
To: 35 123451 999999 X

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

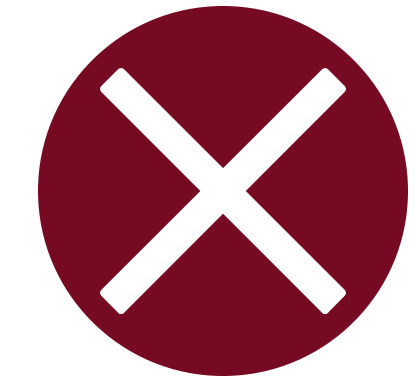


Use another TAC after 1 million units



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

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

**Rule:**



TAC: Type Allocation Code

Serial Number

Check Digit

35

123451

999999

X



Model A

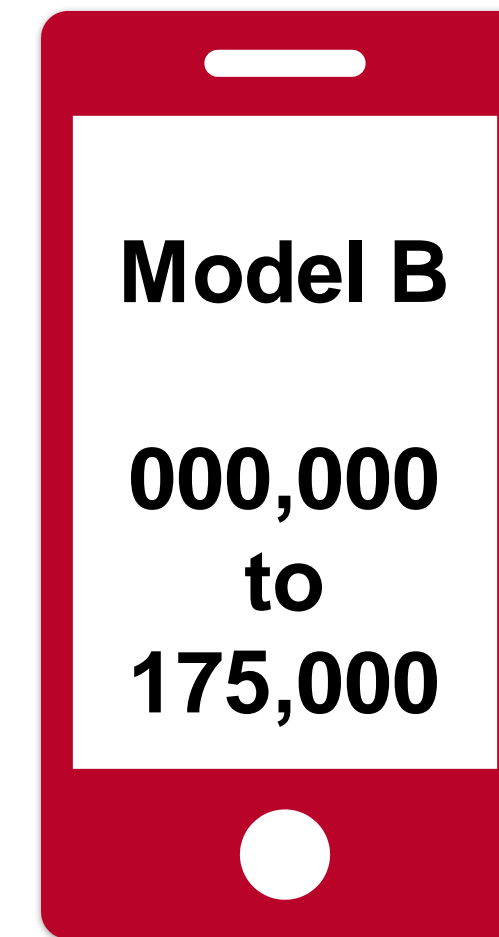
000,000  
to  
175,000

→ 35 123451 000000 X

→ 35 123451 175000 X



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

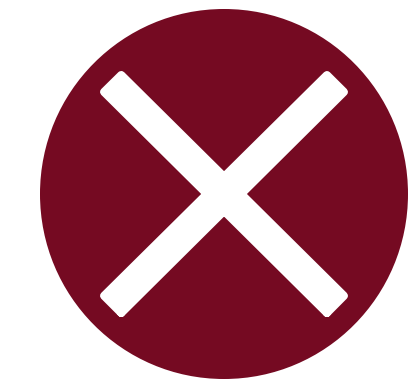


Model B

000,000  
to  
175,000

→ 35 123451 175001 X

→ 35 123451 350000 X



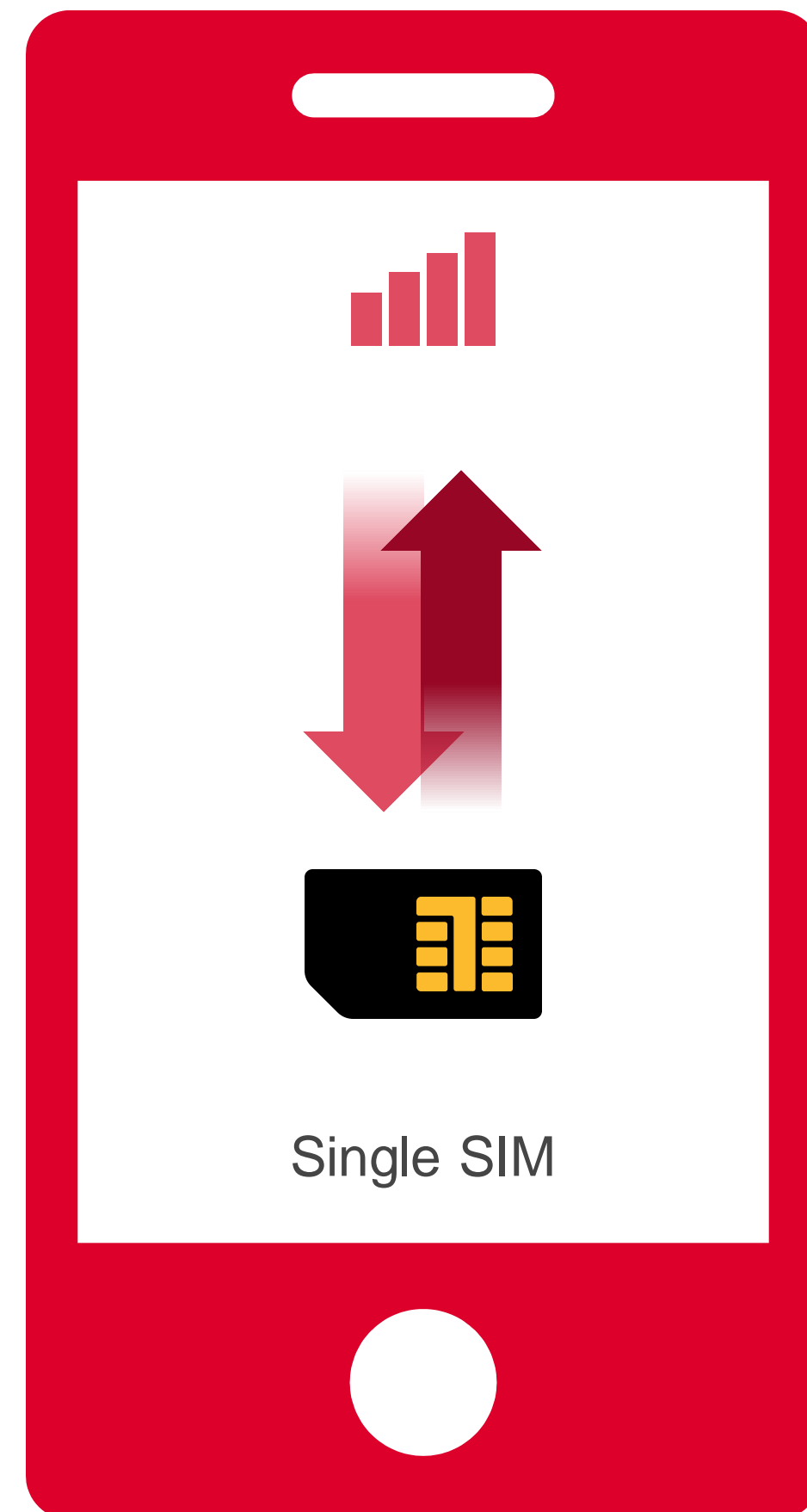
Do not use spare capacity for a different model

# Multiple SIM, UICC and eUICC

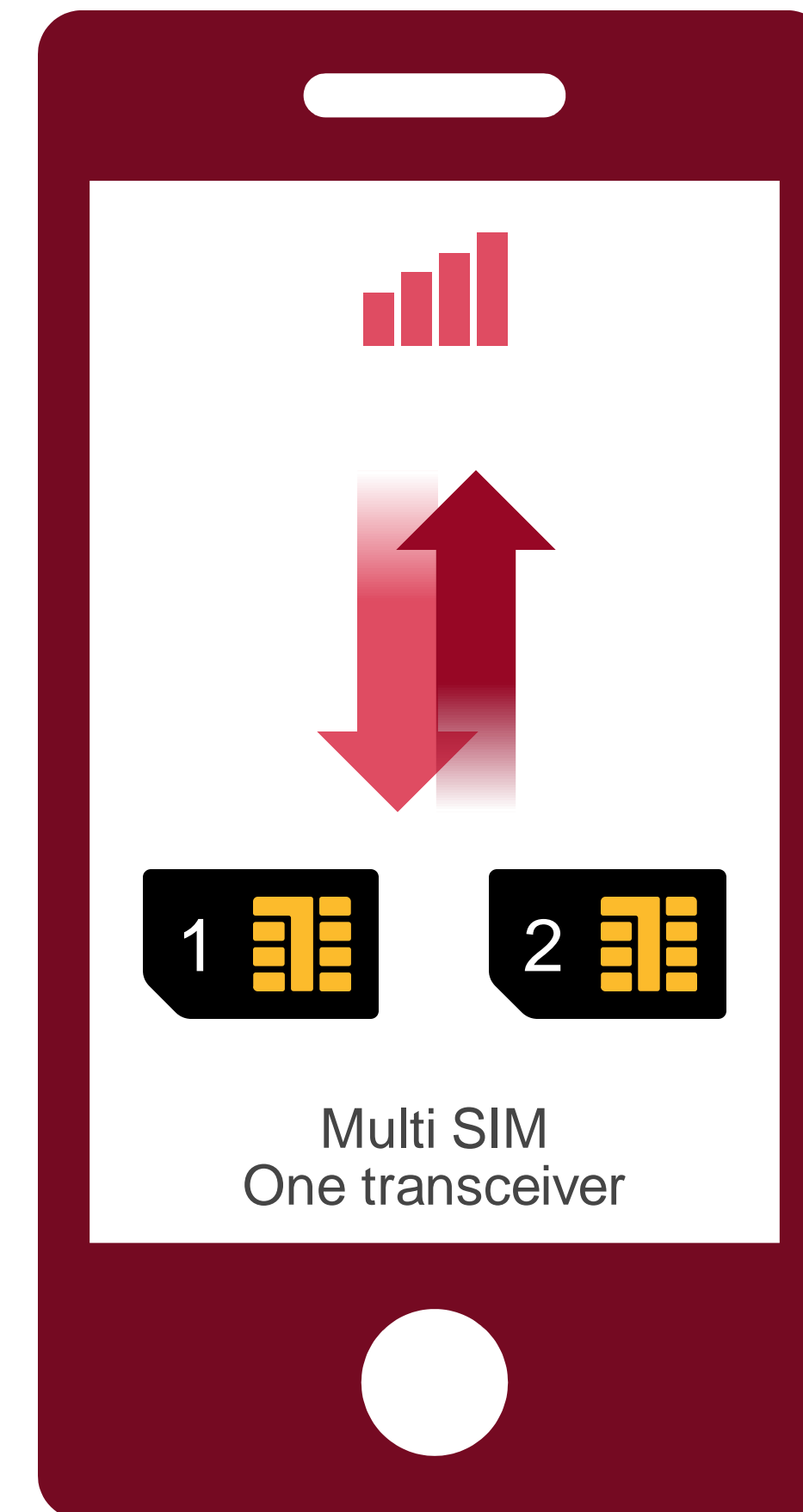
When one network connection is present, only one IMEI is required.

**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

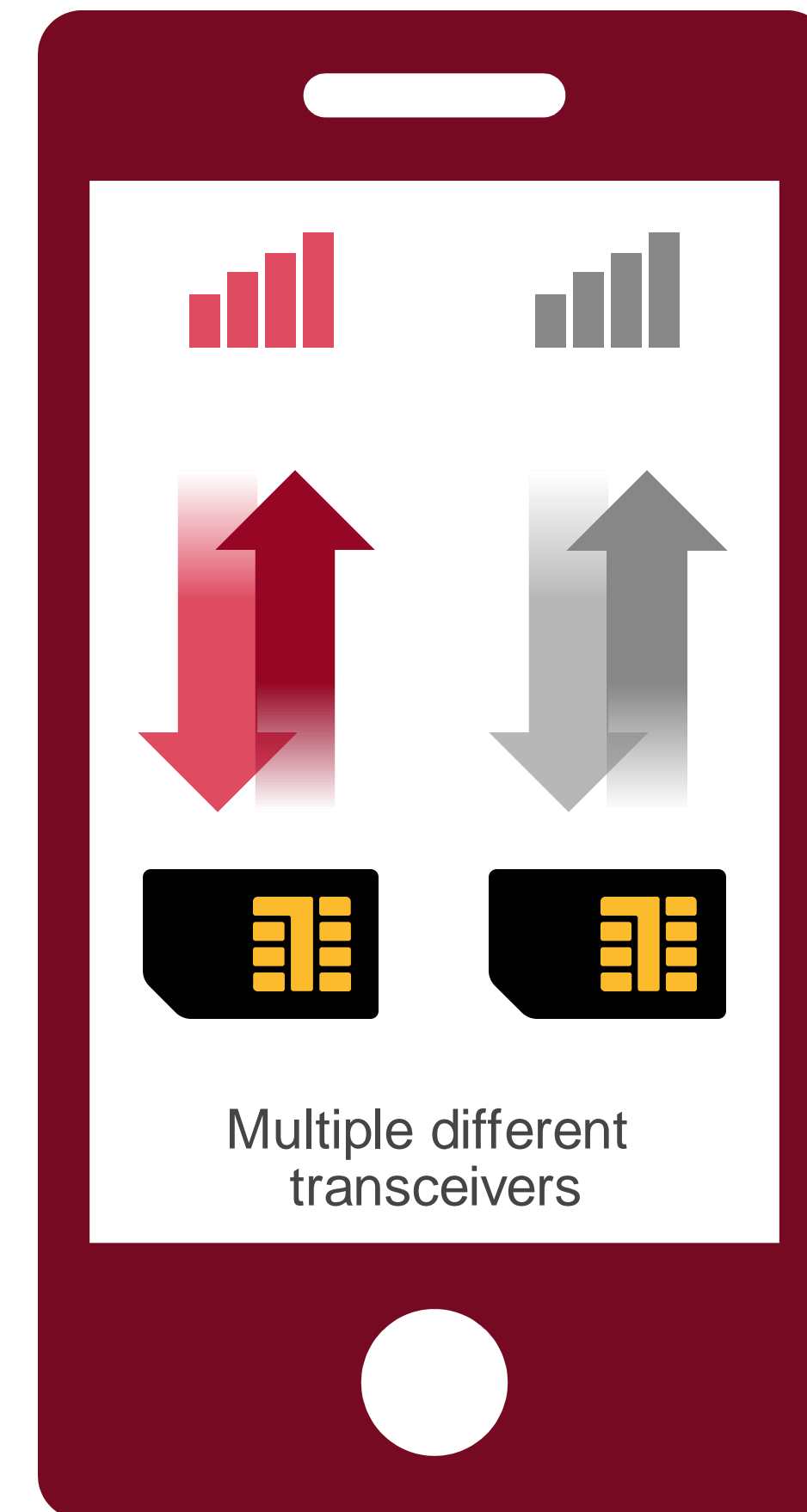
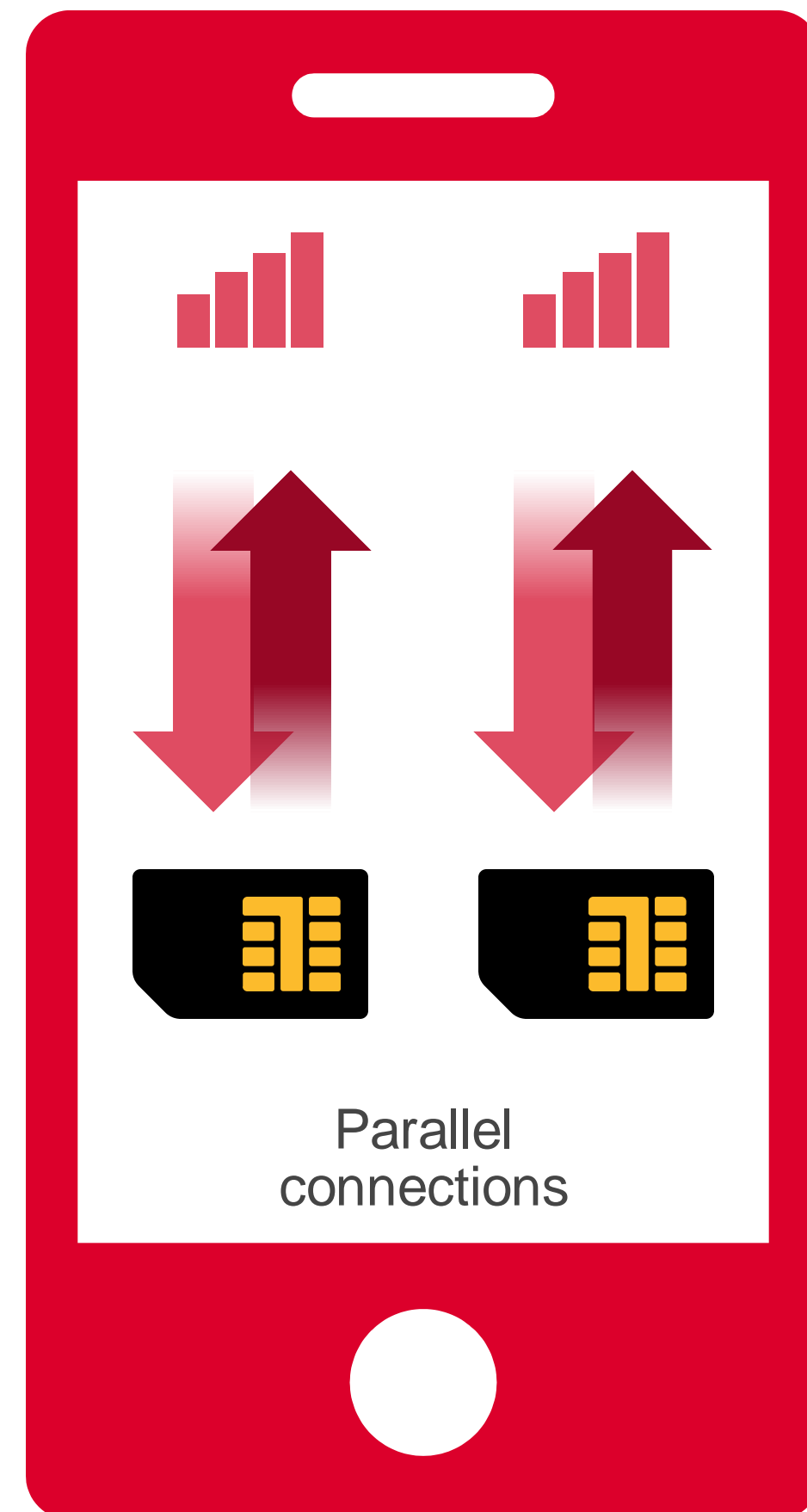
# Multiple transceivers

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



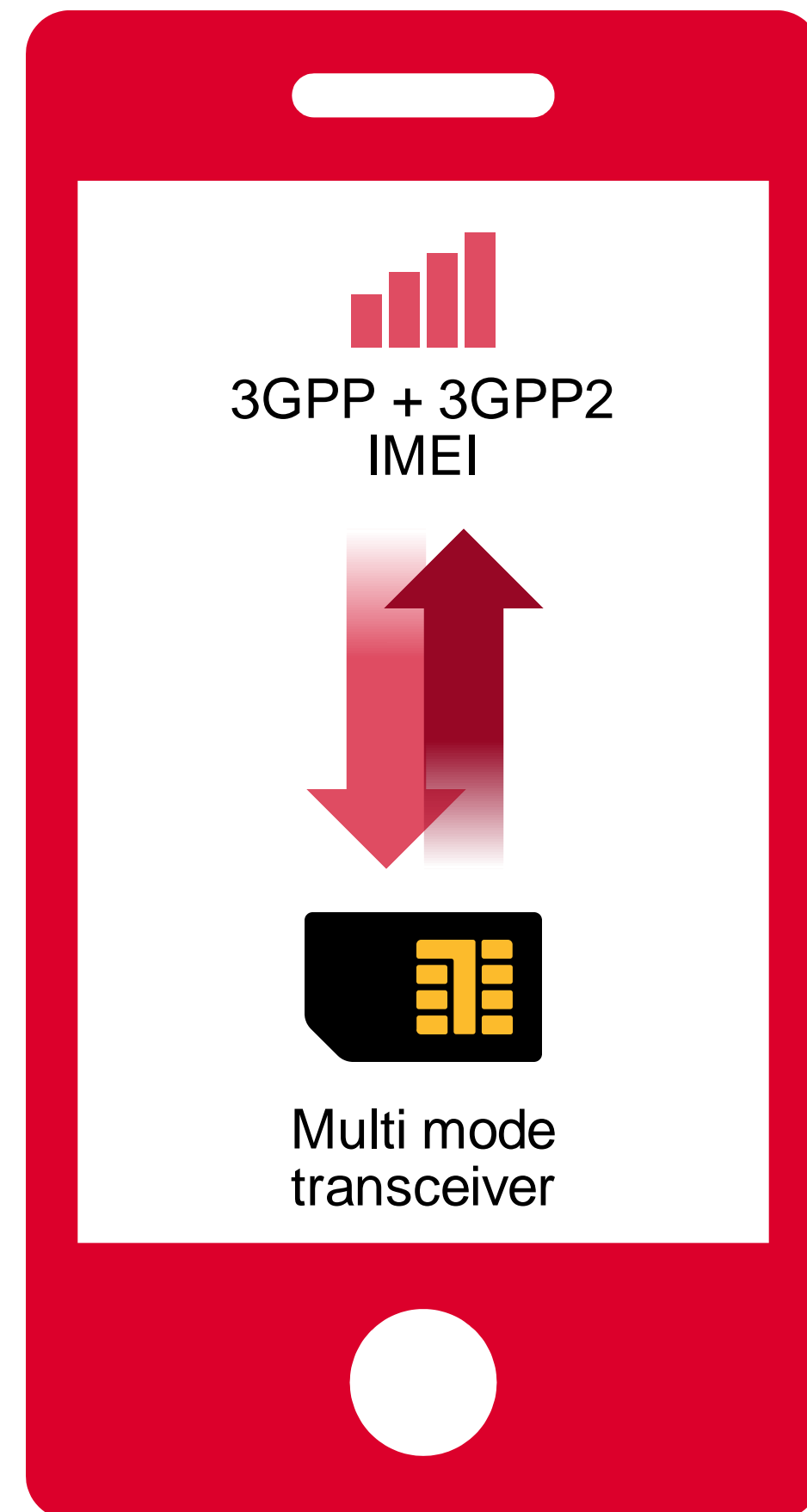
# Multiple Radio Access Technology

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

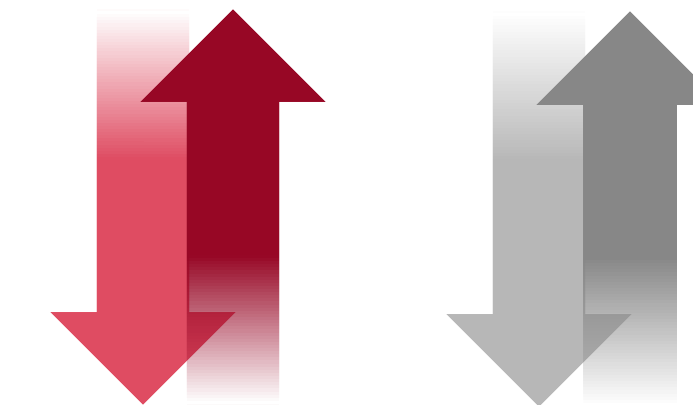
**Rule:** 

1 TAC + 1 IMEI

Integrated 3GPP and 3GPP2 transceiver requires one IMEI



3GPP IMEI      3GPP2 MEID



Independent platforms

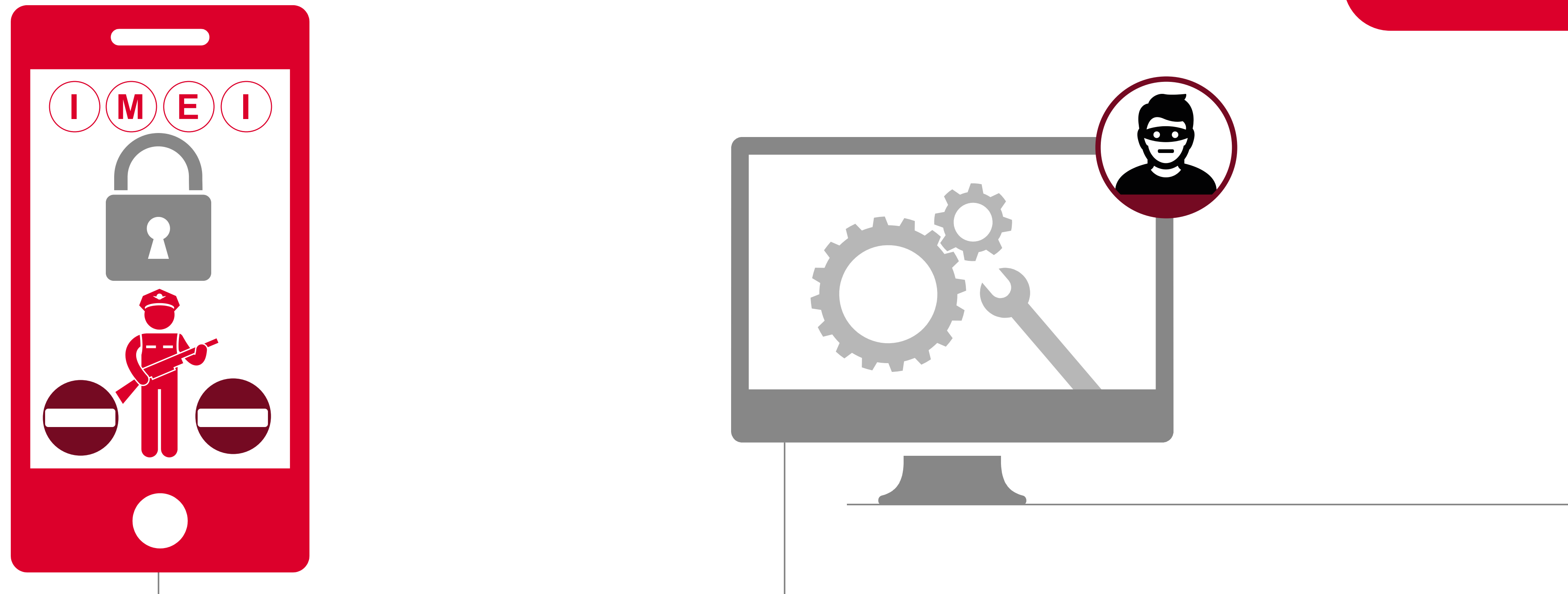
1 IMEI + 1 MEID

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

# How secure should an IMEI be?

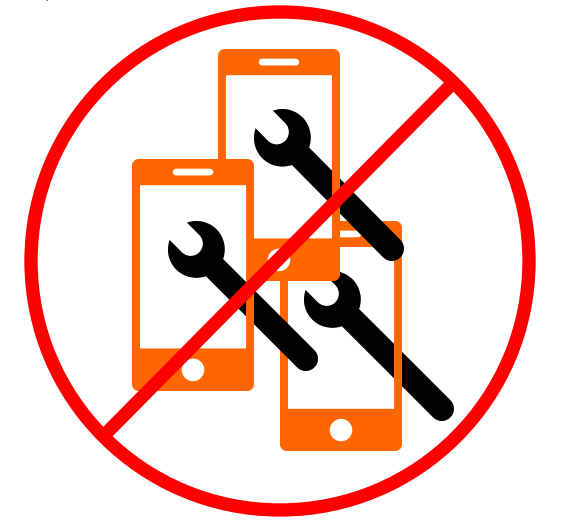
IMEI implementation shall be resistant to hacking, spoofing or change by any means.

**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

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Detect, prohibit and record attempts to alter data or software

## 2: No Modification

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Protect component code against manipulation

## 3: No Cloning

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Prevent IMEI copying between different devices

## 4: No External Access

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Make IMEI implementation inaccessible from outside the device

## 5: No fallback

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Stop unauthorised reversion to old software versions

## 6: No tampering

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Prevent, detect and respond to attempts to change IMEIs

## 7: Software Quality

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Develop software in accordance with best process & techniques

## 8: No Hidden Menus

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No means to access or modify areas that store the IMEI

## 9: No Substitution

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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 — 

Design house — 

Manufacturer — 

Internal — 

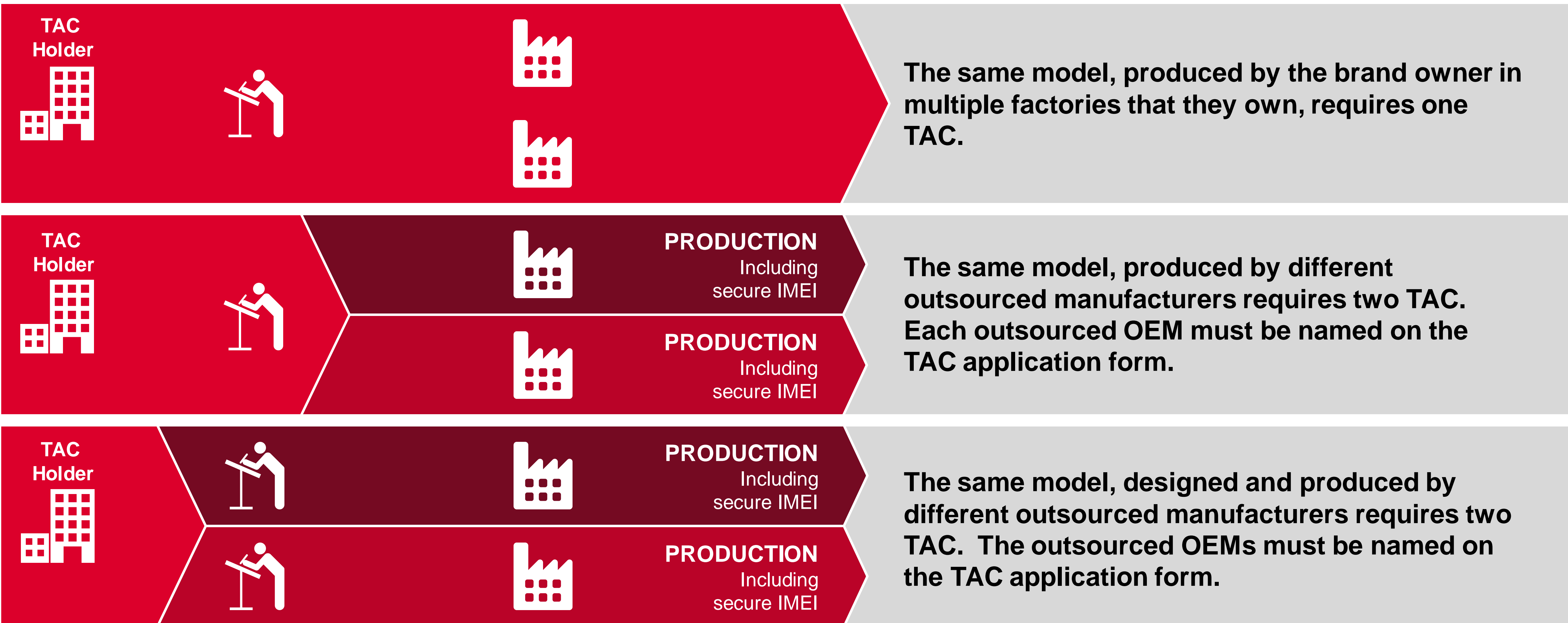
Outsourced 01 — 

Outsourced 02 — 



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

# Multiple production facilities and TAC



Brand owner — 

Design house — 

Manufacturer — 

Internal — 

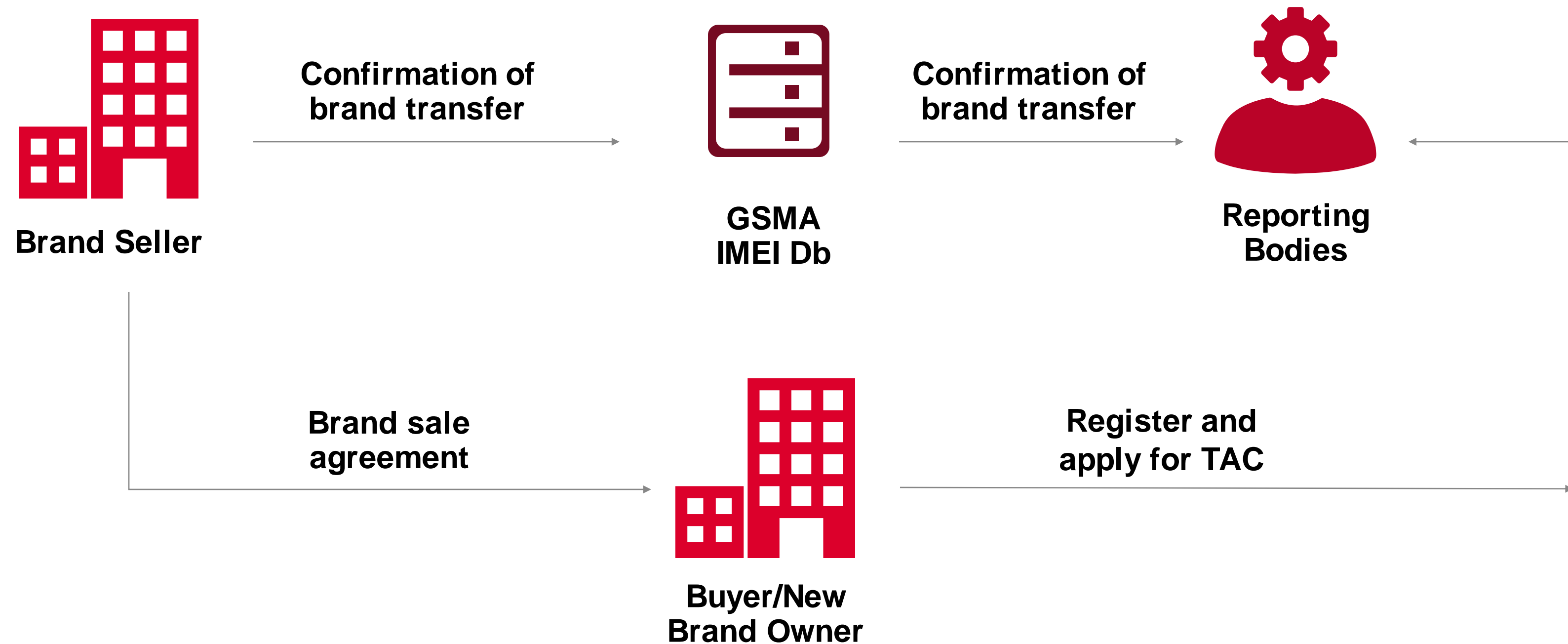
Outsourced 01 — 

Outsourced 02 — 

# Sale of Brands and TAC

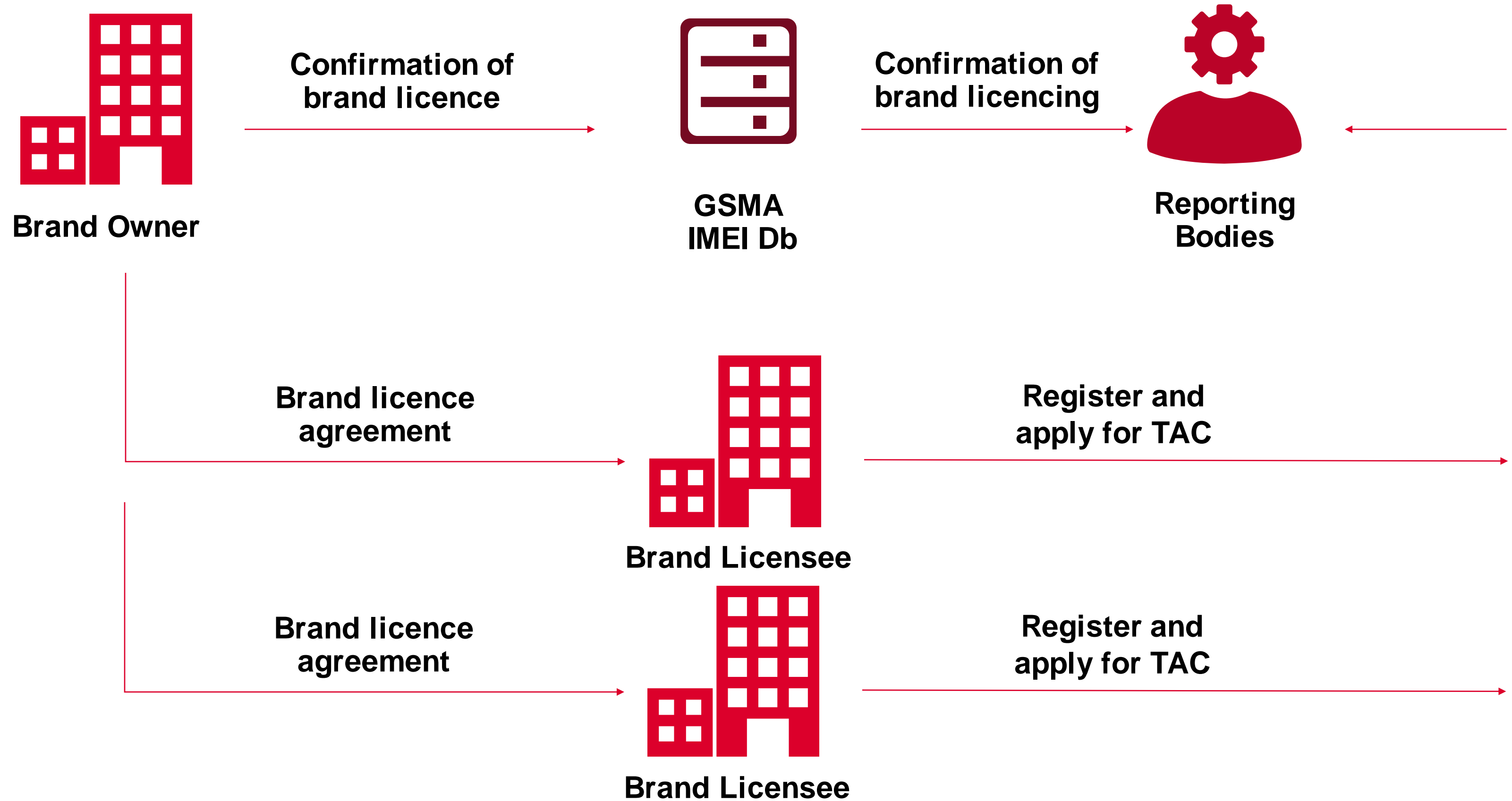
Original brand owner must confirm transfer of brand ownership before TAC allocation can be managed by new brand owner.

**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:**

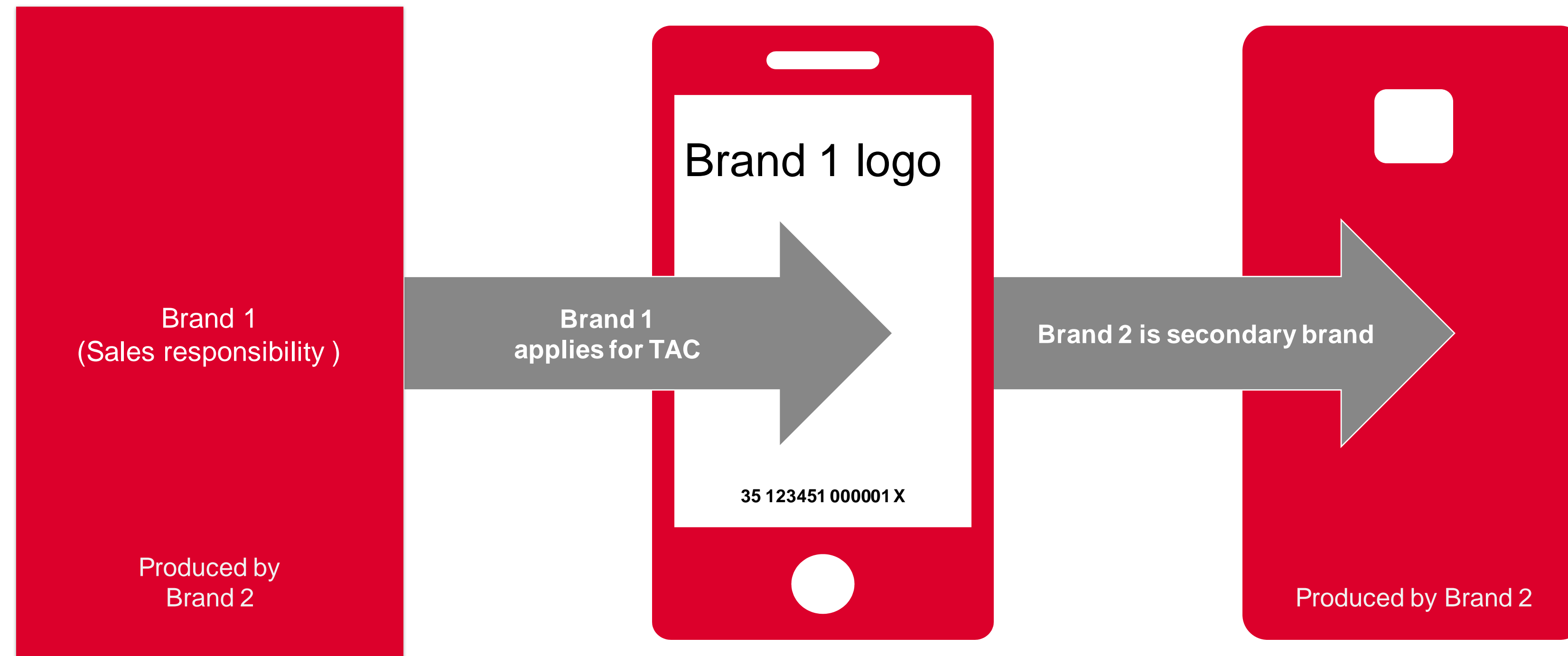


When a brand owner establishes a brand licensee, **GSMA allocates TAC to the licensee** until the brand owner provides other instructions

# 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?

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

**Rule:**



TAC: Type Allocation Code

Serial Number

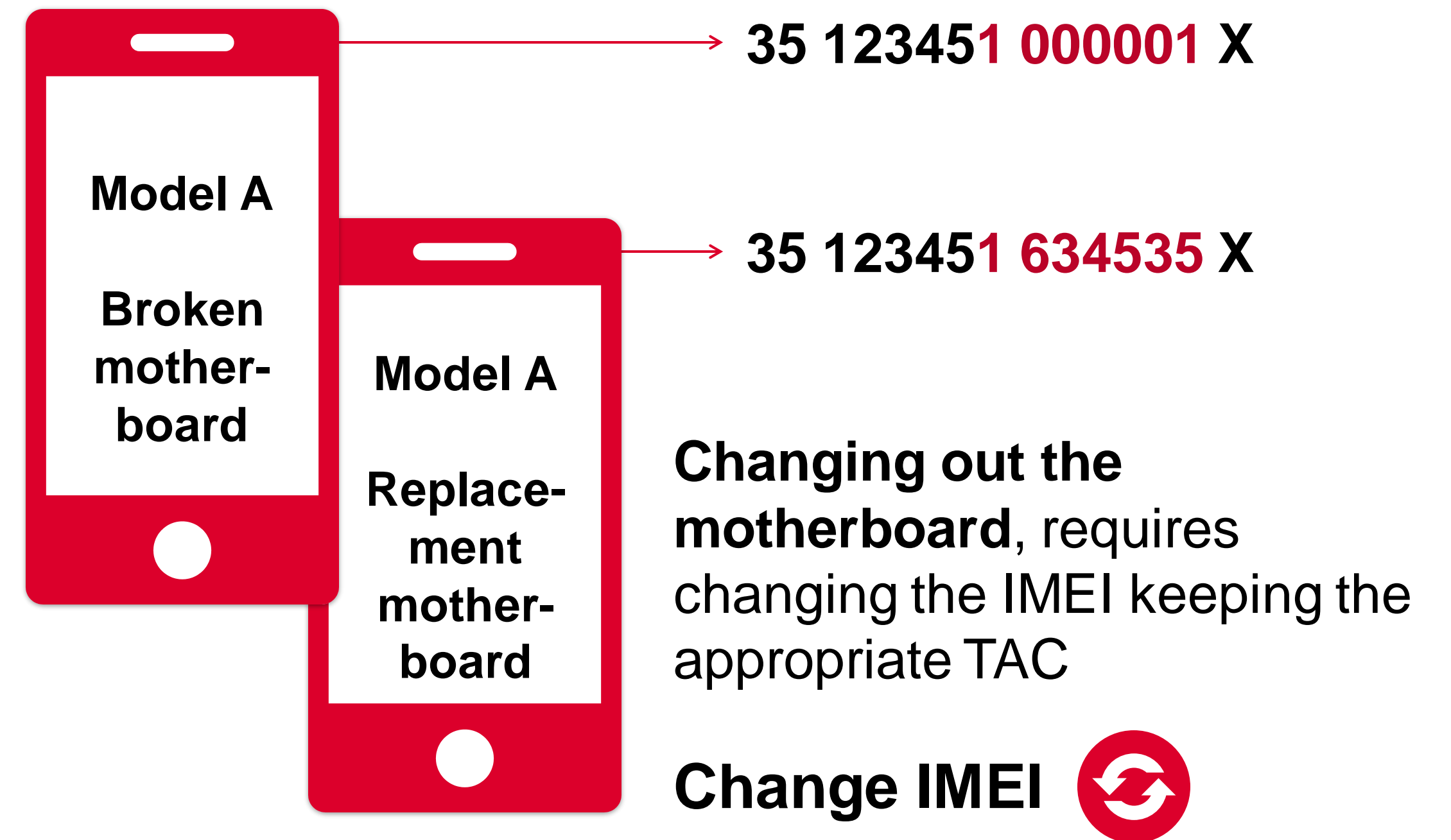
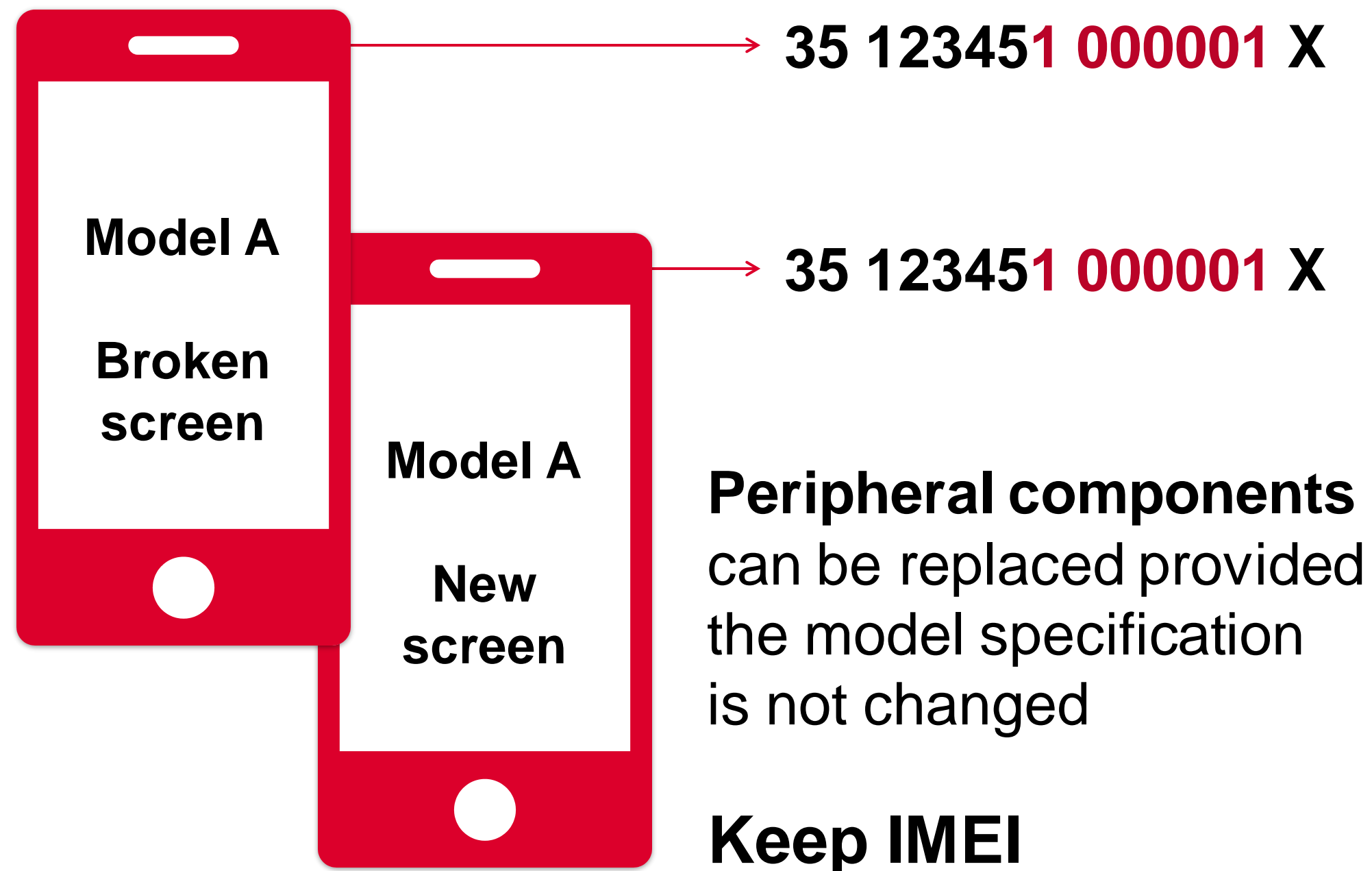
Check Digit

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123451

000000

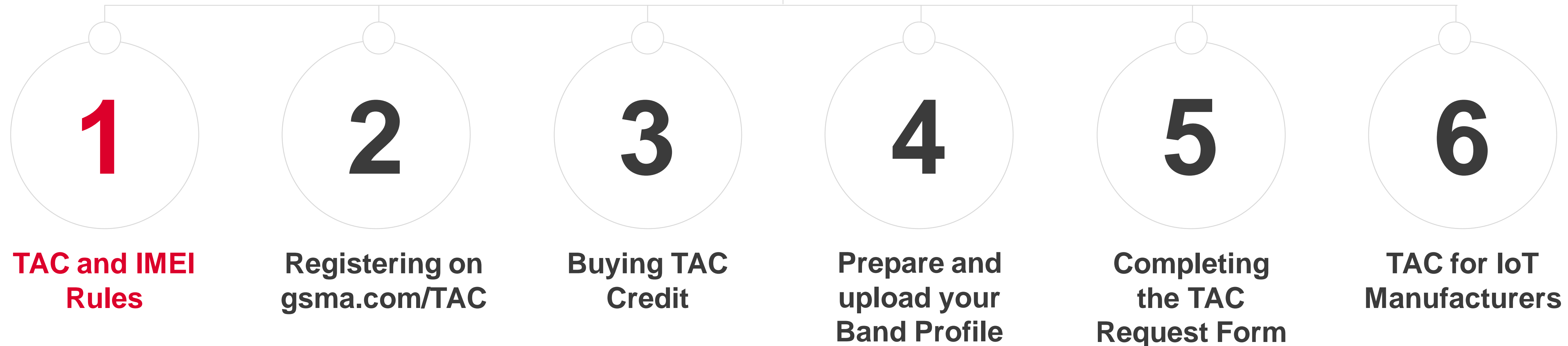
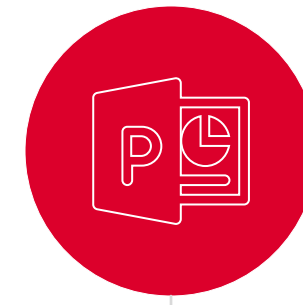
X



# A well-functioning IMEI ecosystem benefits all



# ***This document is part one of six TAC training modules***



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