Training Module One: TAC / IMEI Programming Rules

September 2023 v2.1

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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 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 allocation system, essential to the correct functioning of 3GPP devices and the mobile ecosystem.

i **If you have any questions please contact: tac@gsma.com**

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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
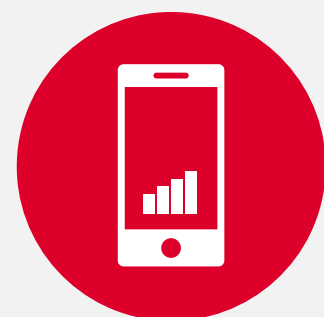**Spare IMEI** capacity is prohibited for use in other models
Secure IMEI implementation prevents the IMEI being changed
Repairs involving replacing peripheral components do not impact IMEI
Repairs that replace components that contain a securely stored IMEI result in new IMEI
Private networks devices working on a private network still require an IMEI

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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	Identification	Theft checking	Authenticity	Taxation	Identification	Updates	Certification	Authenticity	Authenticity
Warranty	Support	Lawful	False claim	Certification	SW updates	App mgmt	Type approval	Warranty	Compliance
Authentication	Device blocking	interception/	detection	Authenticity	Remote control	Service	Taxation	Theft checking	Warranty
Theft reporting	Lawful	location		Counterfeit	Support	delivery	Crime		Theft checking
Theft checking	interception	Compliance		detection	Blocking	Support	management		
	/location	checking			Fraud detection	Blocking			
	Updates					Warranty			
	Configuration					Compliance			
	Analytics					Theft			
	Sales & marketing					reporting			
	Service delivery					Testing			
	Whitelisting								
	Fraud detection								

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

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What is an IMEI?

TAC: Type Allocation Code		Serial Number	Check Digit
86	**916102**	**991292**	**0**
Reporting Body identifier	**Type Identifier** Indicating brand owner and device model allocated by Reporting Body	**Unique Number** assigned to individual devices by the manufacturer	A function of the other digits [calculated by the manufacturer]

The **International Mobile Equipment Identifier (IMEI)** is a unique 15 digit code which identifies each *individual* mobile device

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

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What devices need an IMEI?

Mobile / Feature Phone
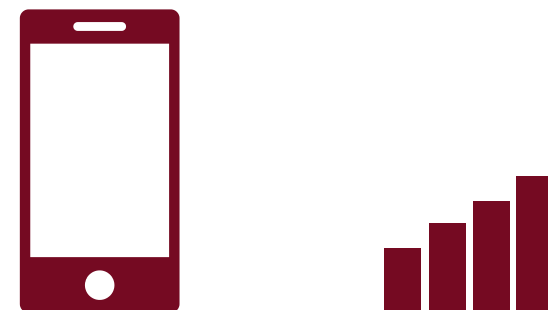
Smartphone

Tablet
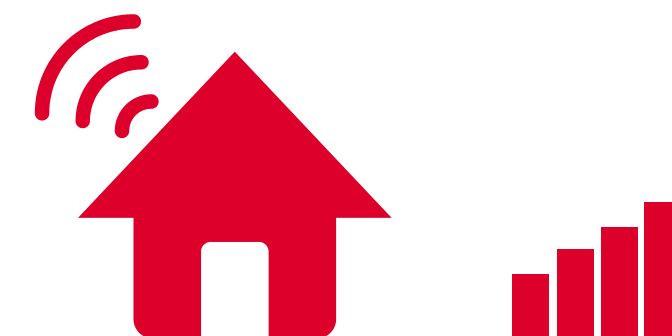
IoT Device

Wearable

Dongle

Modem
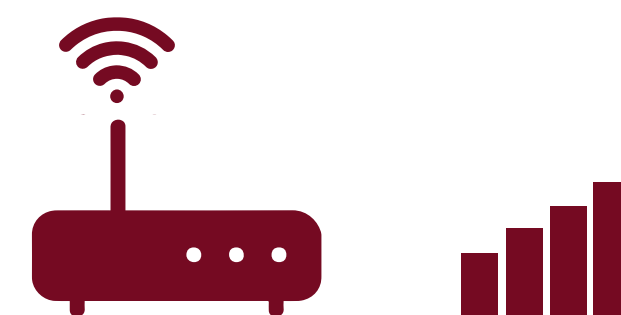
FWA / WLAN Router

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

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Process of applying for TAC

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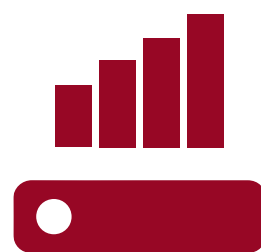
Rule:

| Brand owner plans product | Select external design house if required | Select external manufacturer if required | Brand owner confirms device model specification | Brand owner applies for TAC for model | Brand owner provides TAC to manufacturer | Manufacturer produces device model and forms unique IMEI from the TAC | End products include unique IMEIs |

Brand owner action ▬ Manufacturer action ▬

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

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

Modem

Remote camera

Smart meter manufacturer

Automaker

Modem producer applies for TAC

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Who issues the TAC?

Rule:

3GPP A GLOBAL INITIATIVE

Global Decimal Administrator GSMA

	China	Rest of World		USA	Rest of World
Reporting Body identifier:	**86**	**35**	Specialist identifier:	**01**	**99**
Reporting Body:	TAF	TÜV SÜD	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

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How do you form an IMEI?

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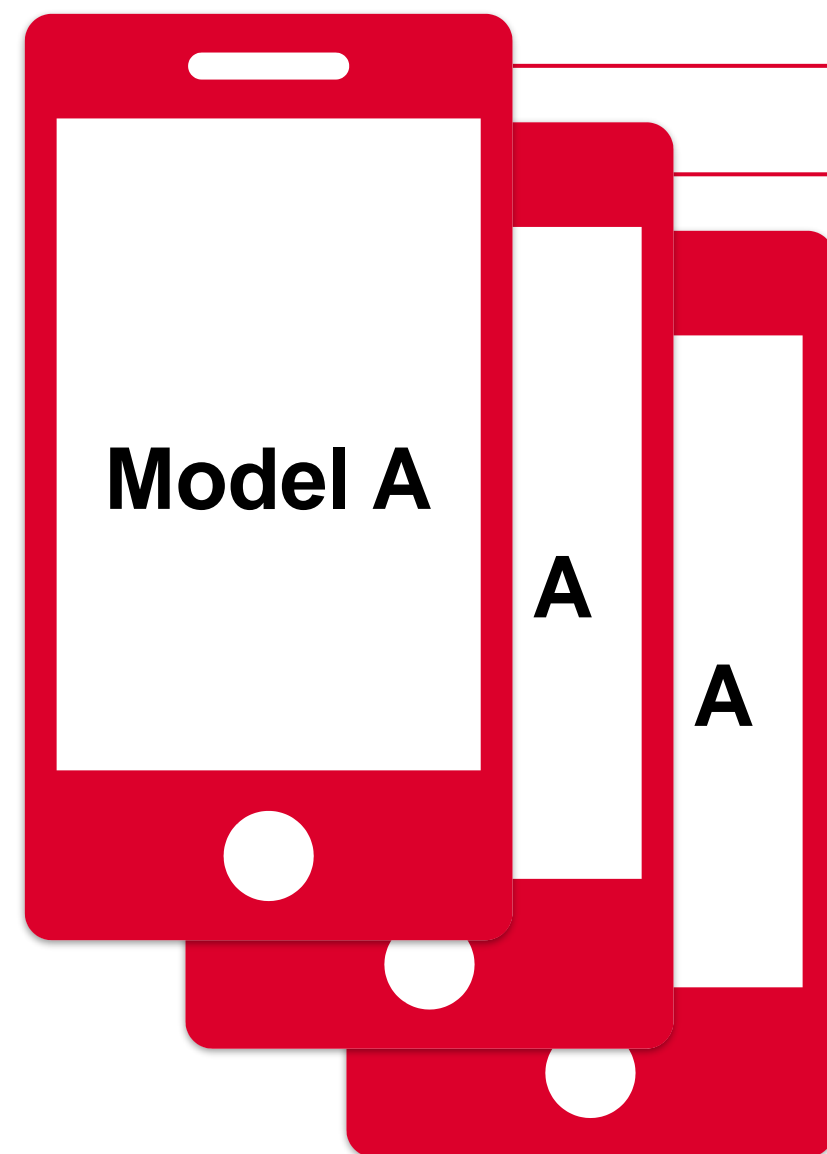
Model A

35 123451 **000001** X
35 123451 **000002** X
35 123451 **000003** X
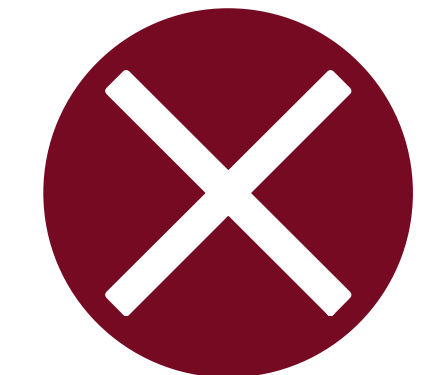
✓
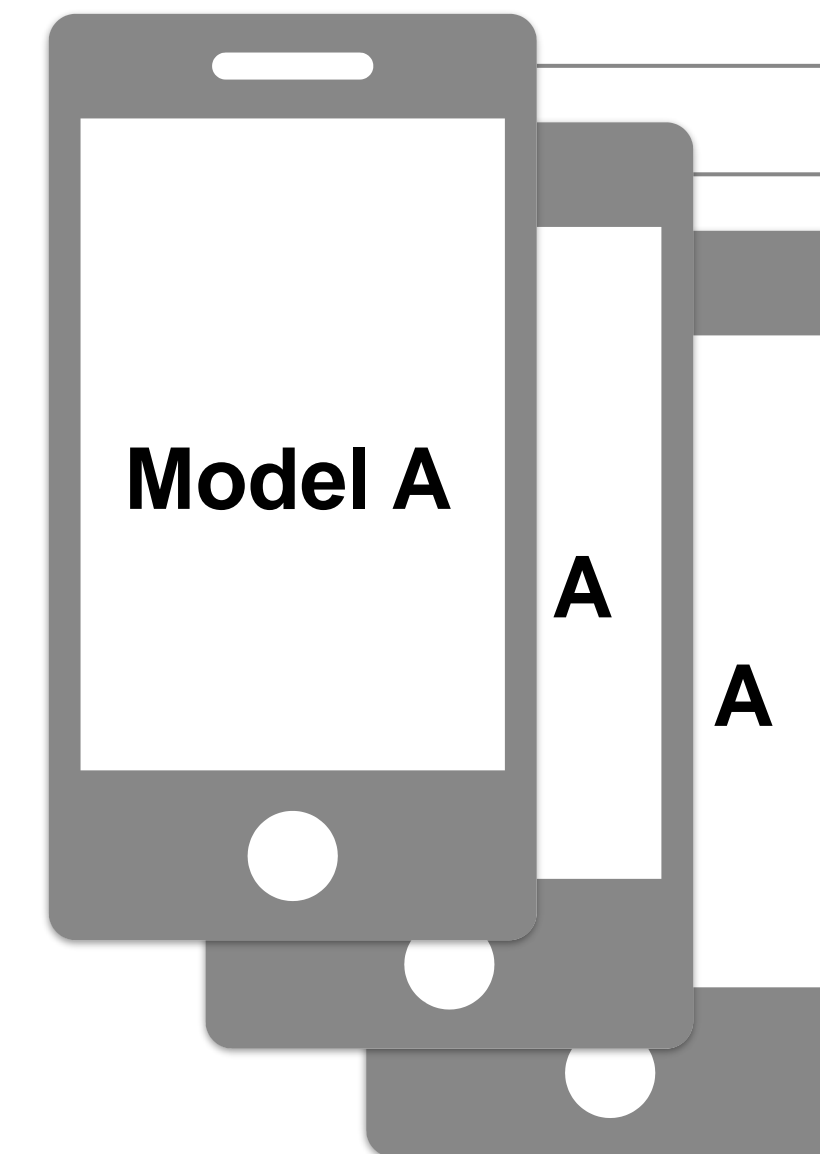
Model A

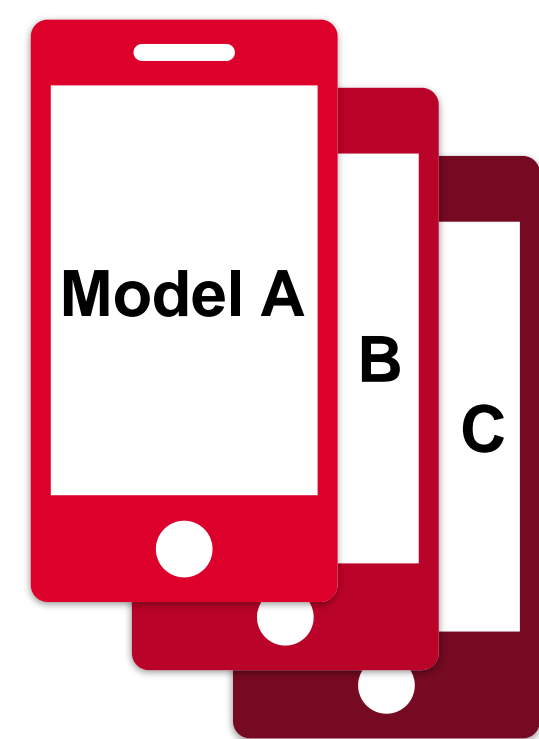35 123451 000001 X
35 123451 000001 X
35 123451 000001 X

✗

Do not
duplicate IMEI

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

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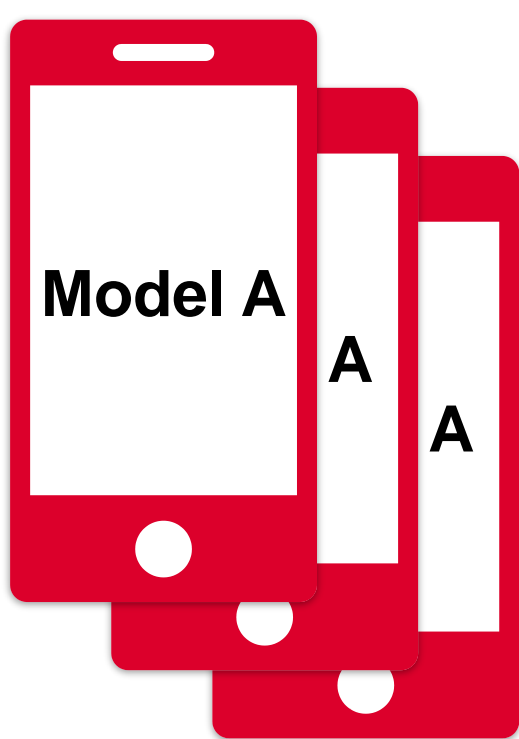
Different version of same OS
e.g. Android 7, Android 8

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

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TAC and multiple device models

Rule:

TAC: Type Allocation Code		Serial Number	Check Digit
35	123451	000000	X
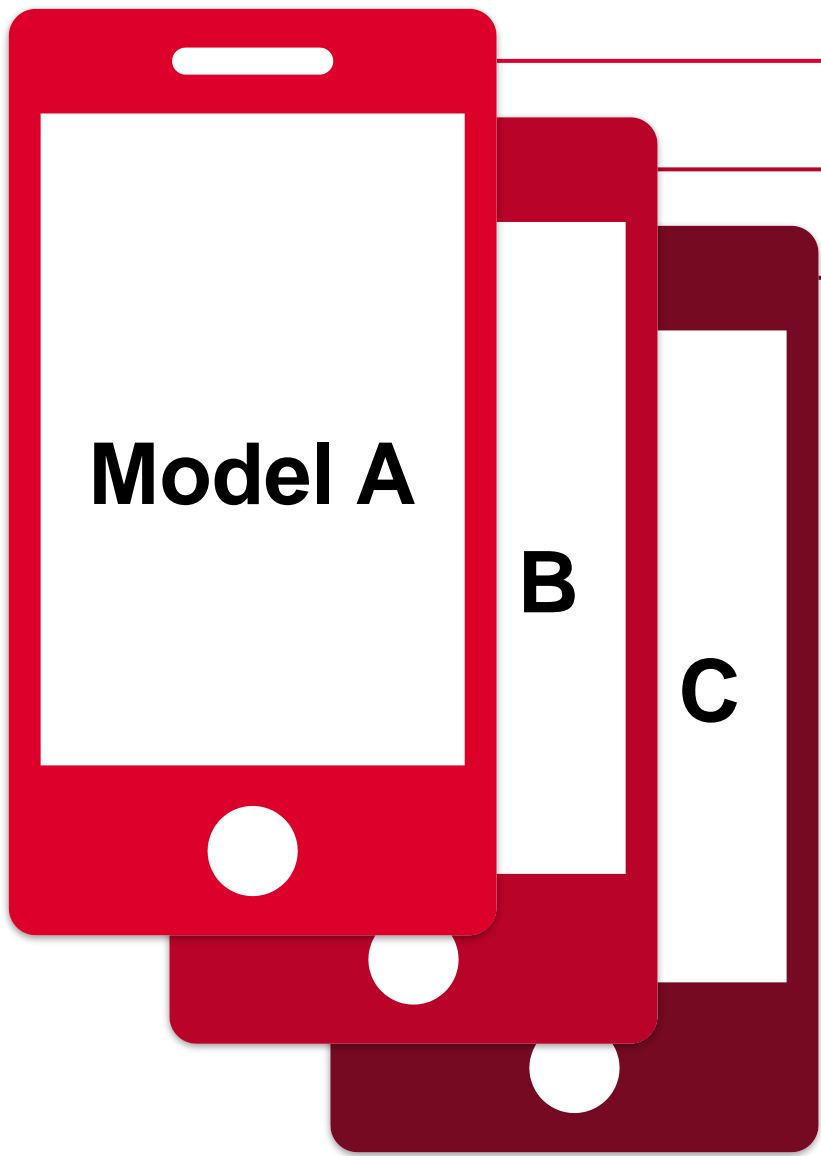
35 123451 000000 X
35 123452 000000 X
35 123453 000000 X

Model A
B
C

✓

Use a different TAC for each model

35 123451 000000 X
35 123451 000000 X
35 123451 000000 X

Model A
B
C

✗
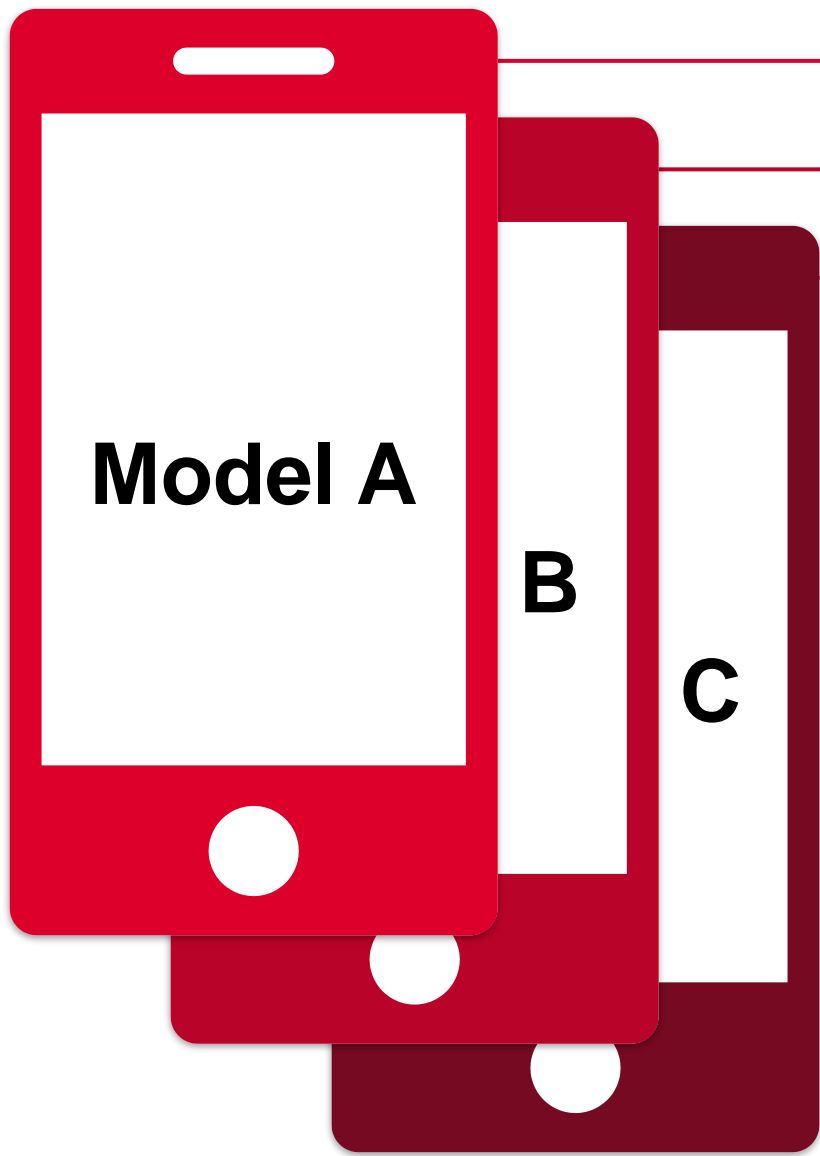
Do not use the same TAC for each model

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TAC and high volume production

Rule:

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

Model A 000,000 to 999,999

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

Model A Over: 1,000,000

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

✓

Use another TAC after 1 million units

Model A 000,000 to 999,999

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

Model A Over: 1,000,000

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

✗
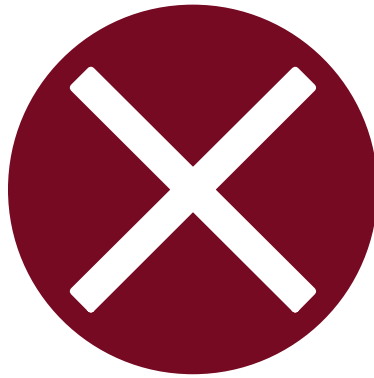
Do not use the same TAC for the next million units

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Unused TAC capacity

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

Model A

000,000 to 175,000
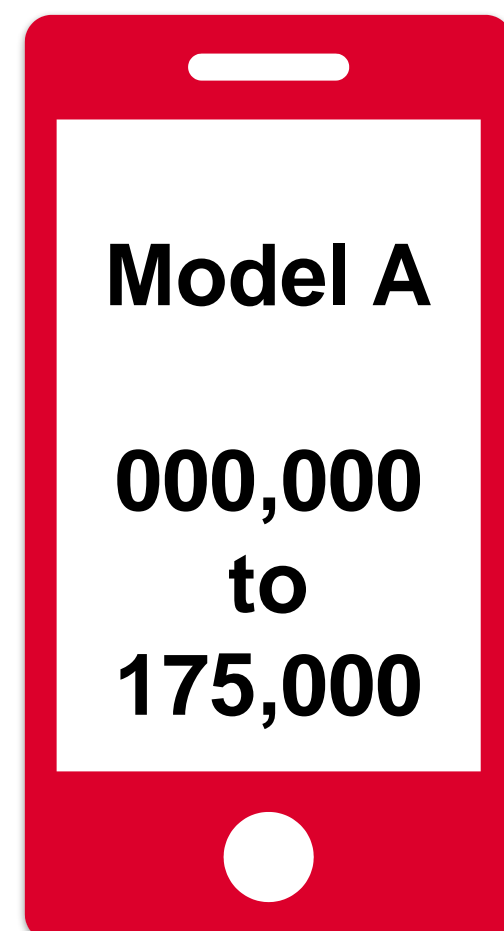
35 123451 000000 X

35 123451 175000 X

✓

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

Model B

000,000 to 175,000
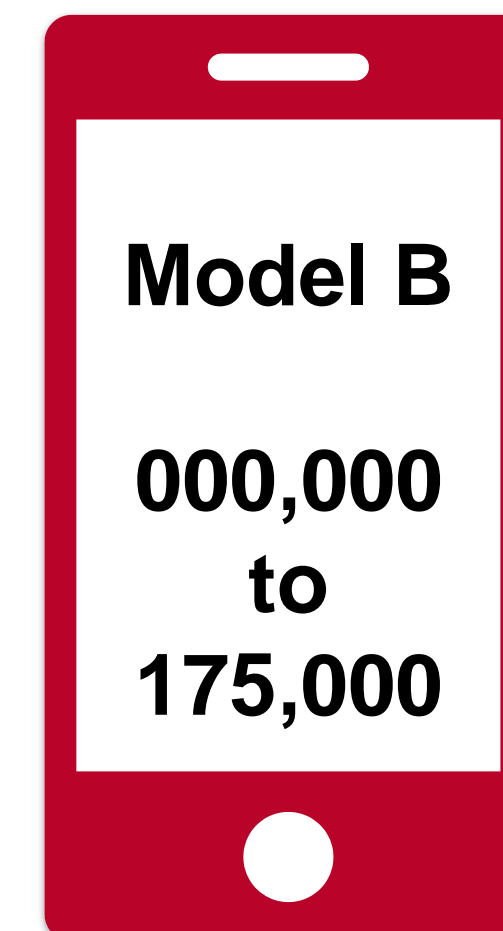
35 123451 175001 X

35 123451 350000 X

✗

Do not use spare capacity for a different model

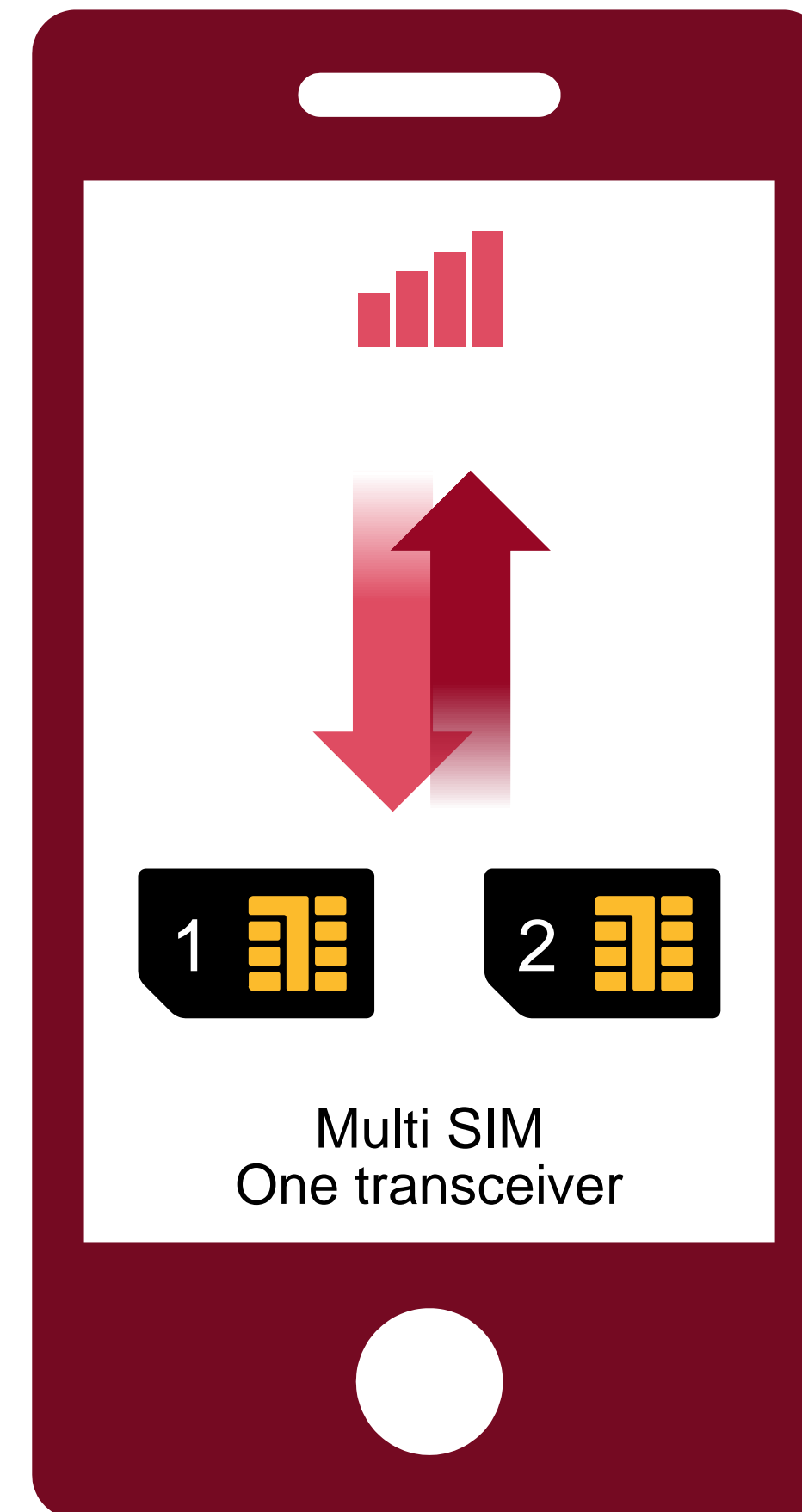**GSMA**

Multiple SIM, SUPI, UICC, or eUICC

Rule:
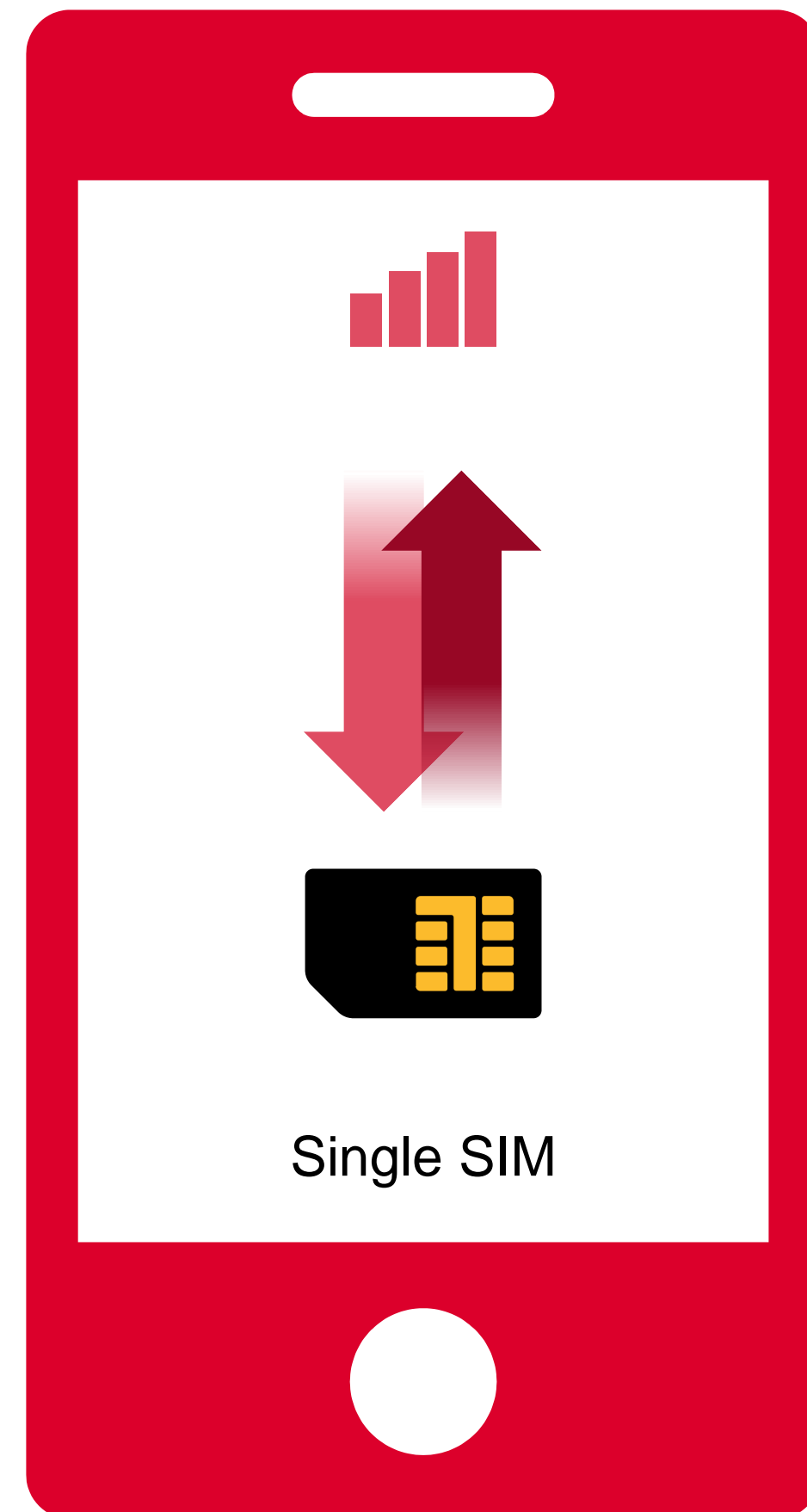
1 TAC / 1 IMEI

Single SIM

Multi SIM
One transceiver

1 TAC / 1 IMEI

Single **transceiver** or single **connection** devices require one IMEI.
Example: 4 SIMs with 1 transceiver requires only 1 IMEI
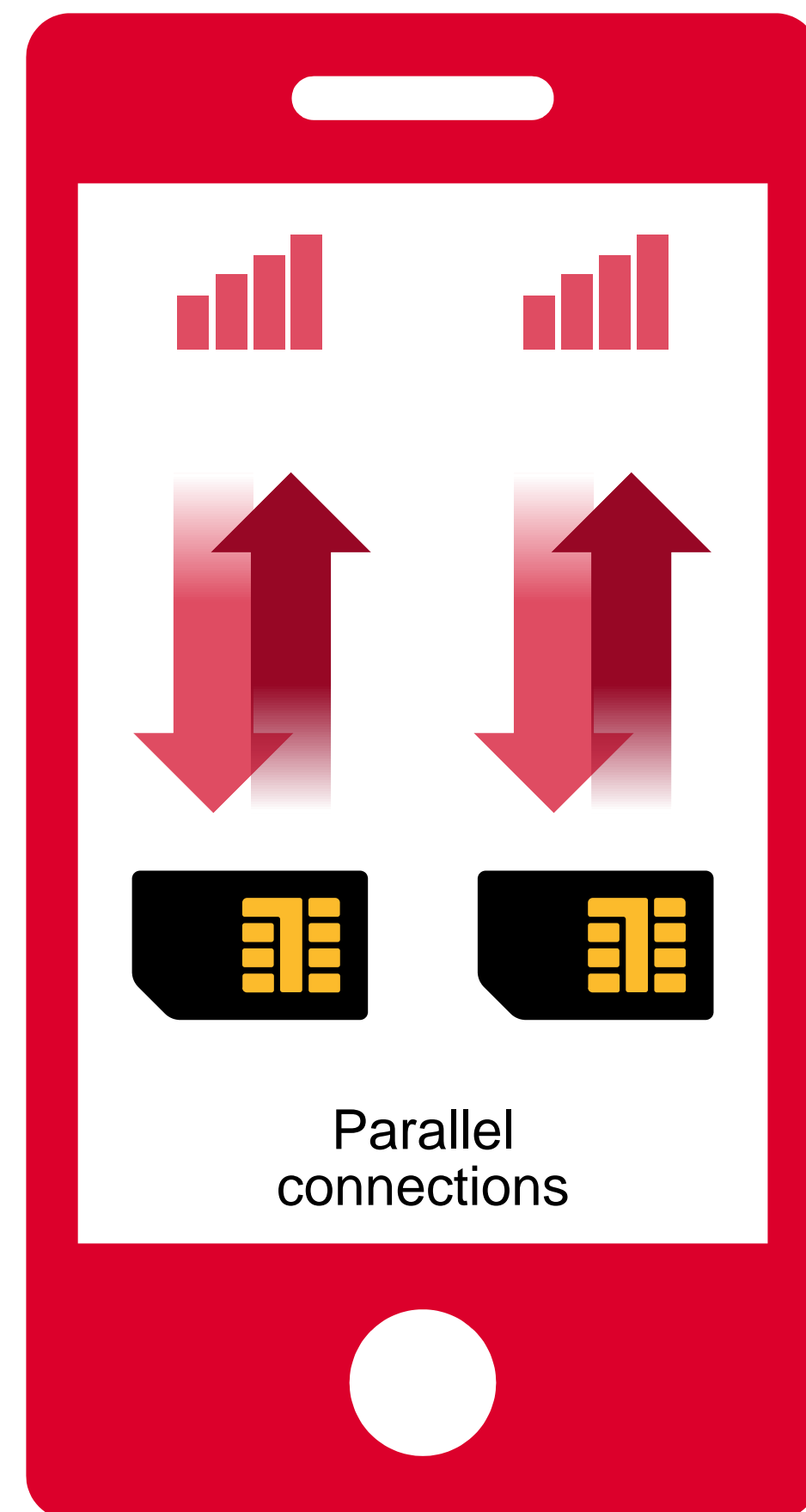For more information on multiple active profiles, see TS.06.

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Multiple transceivers

Rule:

1 TAC / 2 IMEI

1 TAC	Serial	Check
86123451	000000**1**	X
86123451	000000**2**	X

Parallel connections

Multiple different transceivers

2 TAC / 2 IMEI

2 TAC	Serial	Check
8612345**1**	00000**1**	X
8612345**2**	00000**1**	X
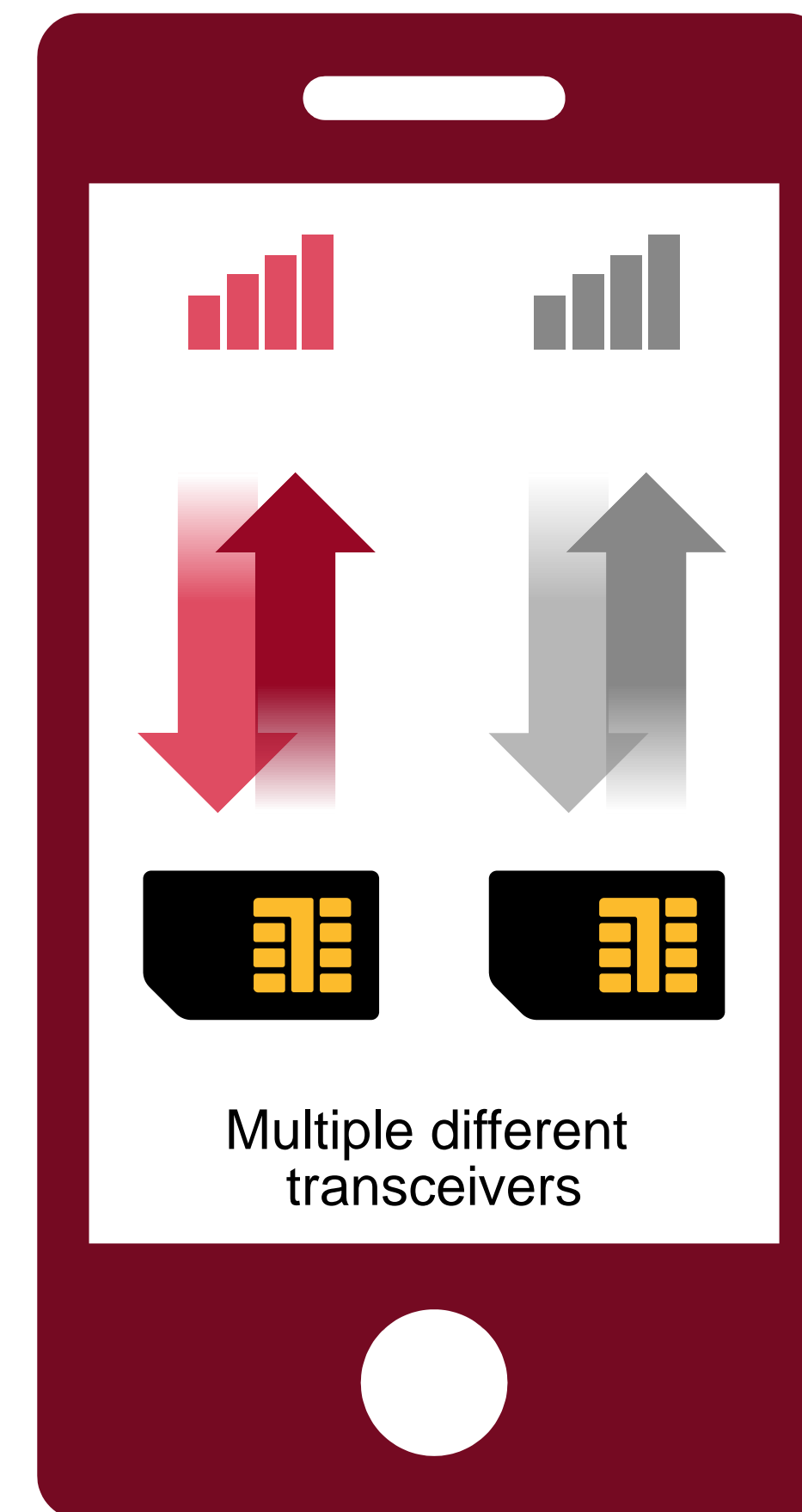
⚠️ One IMEI is required **per parallel connection**
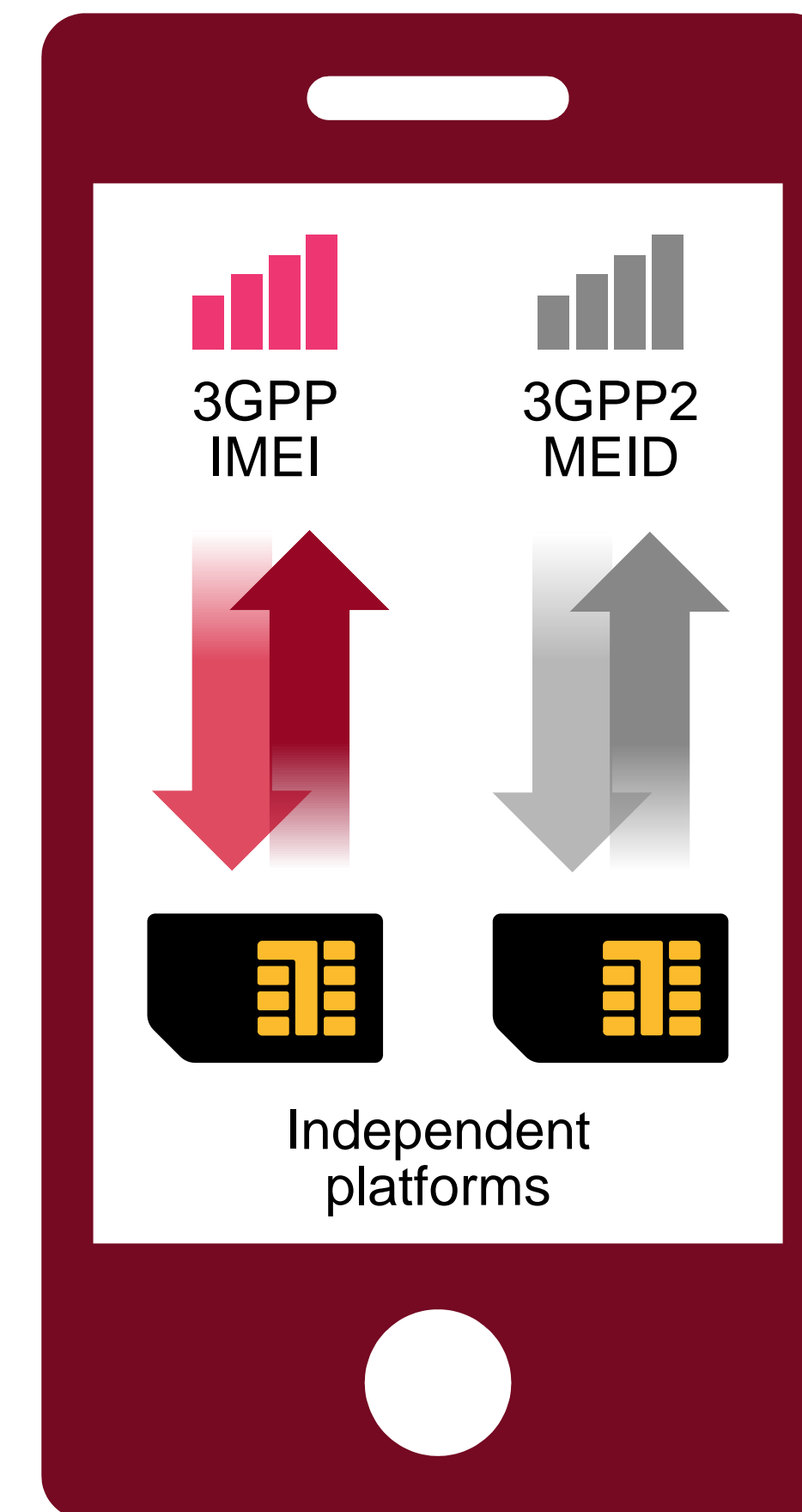
© GSMA 2023
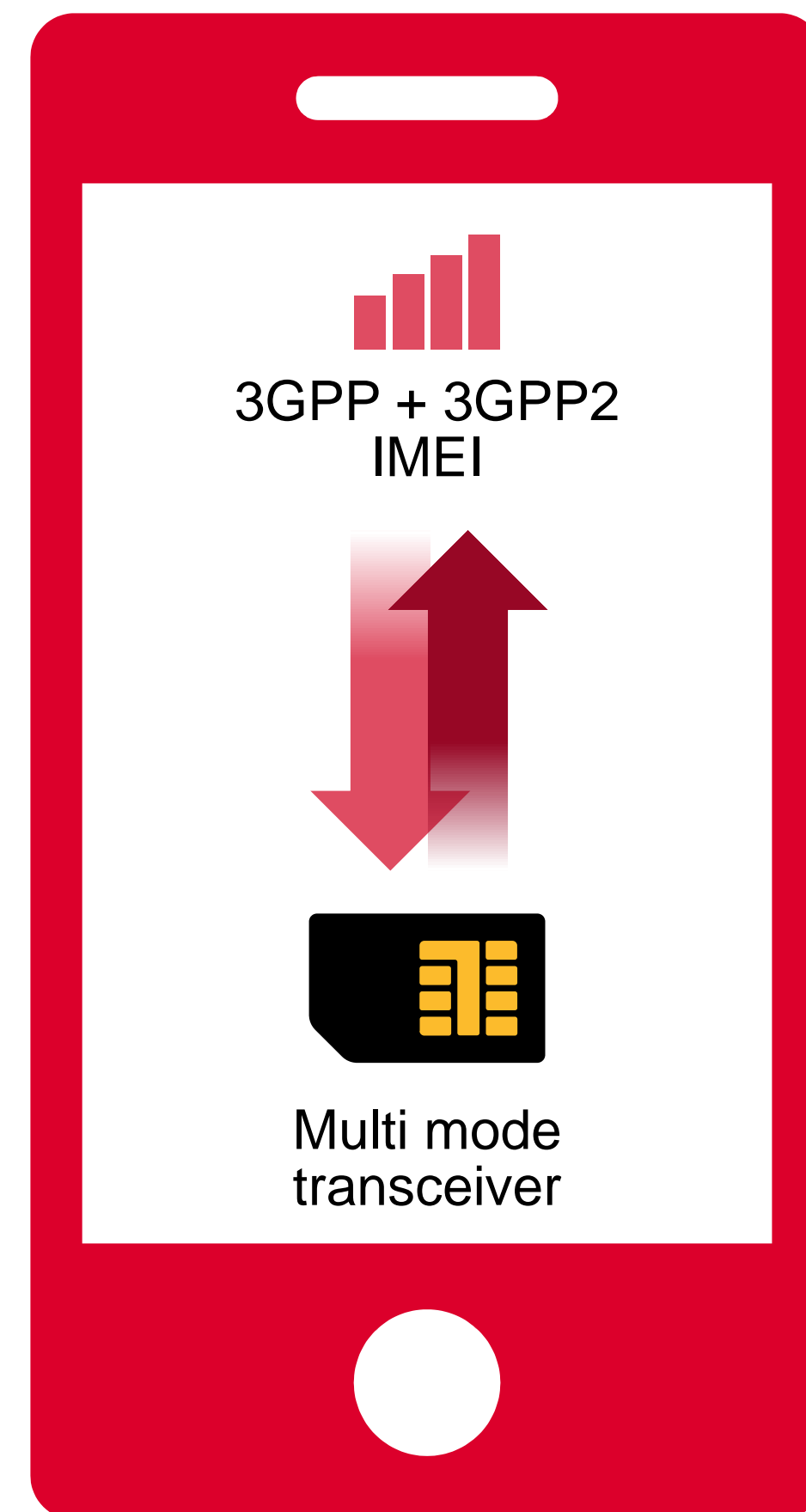
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Multiple Radio Access Technology

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

Rule:

1 TAC + 1 IMEI

Integrated 3GPP and 3GPP2 transceiver requires one IMEI

3GPP + 3GPP2 IMEI

Multi mode transceiver
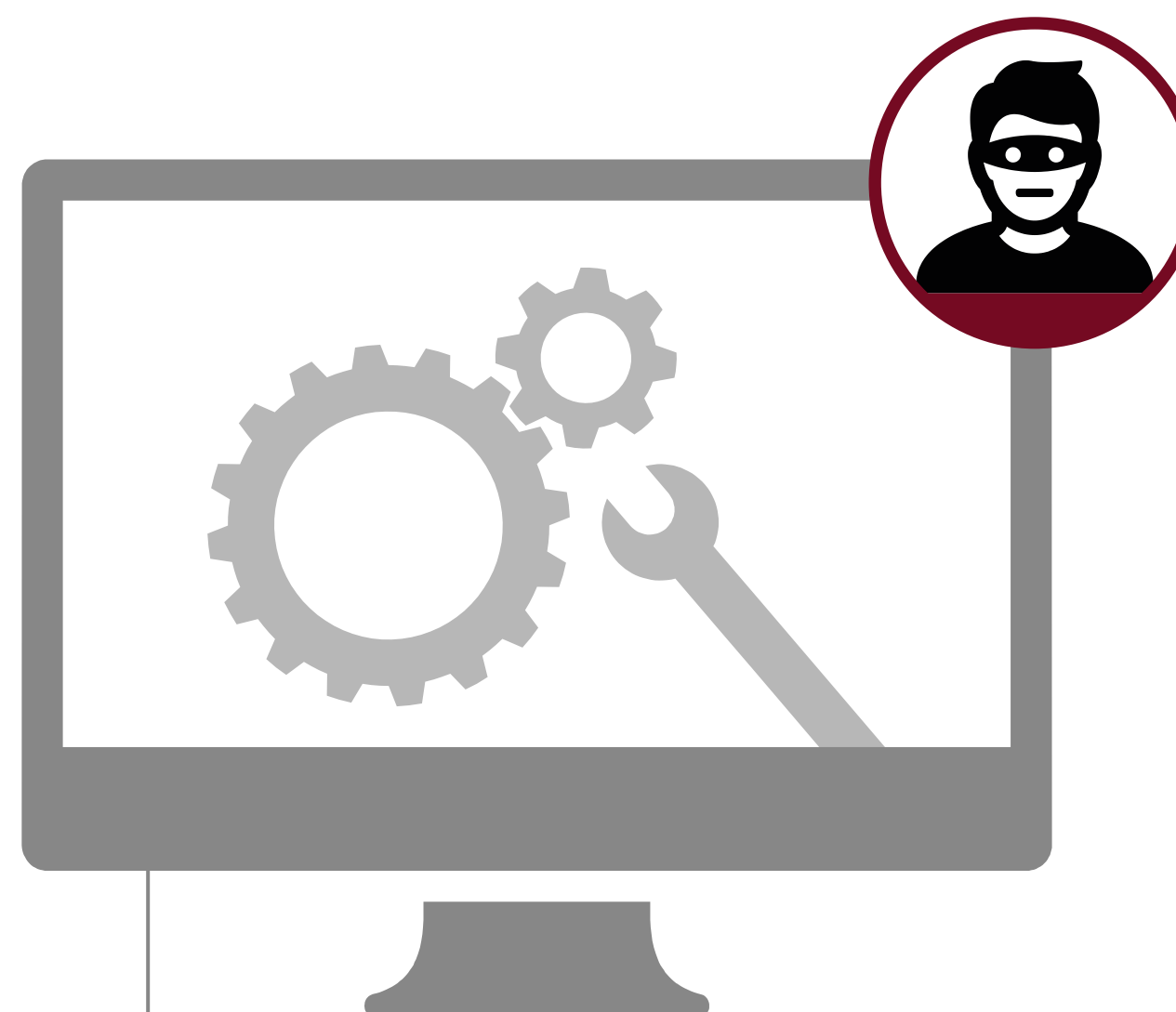
3GPP IMEI   3GPP2 MEID

Independent platforms

1 IMEI + 1 MEID

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

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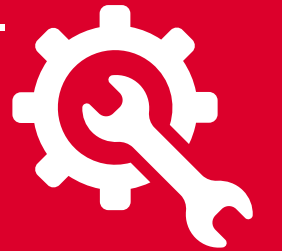
How secure should an IMEI be?

⚠️ Once **implemented in a device** the IMEI must not be changed. The IMEI cannot be changed by a menu function.

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IMEI secure implementation principles

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.

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Who applies for TAC when production is outsourced?

The brand owner must apply for TAC.

Rule:

TAC Holder

TAC Holder

TAC Holder

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

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

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Multiple production facilities and TAC

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

PRODUCTION Including secure IMEI

PRODUCTION Including secure IMEI

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

PRODUCTION Including secure IMEI

PRODUCTION Including secure IMEI

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

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Sale of Brands and TAC

Brand Seller → Confirmation of brand transfer → **GSMA IMEI Db** → Confirmation of brand transfer → **Reporting Bodies**

Brand Seller → Brand sale agreement → **Buyer/New Brand Owner** → Register and apply for TAC → **Reporting Bodies**

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

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Brand Licencing and TAC
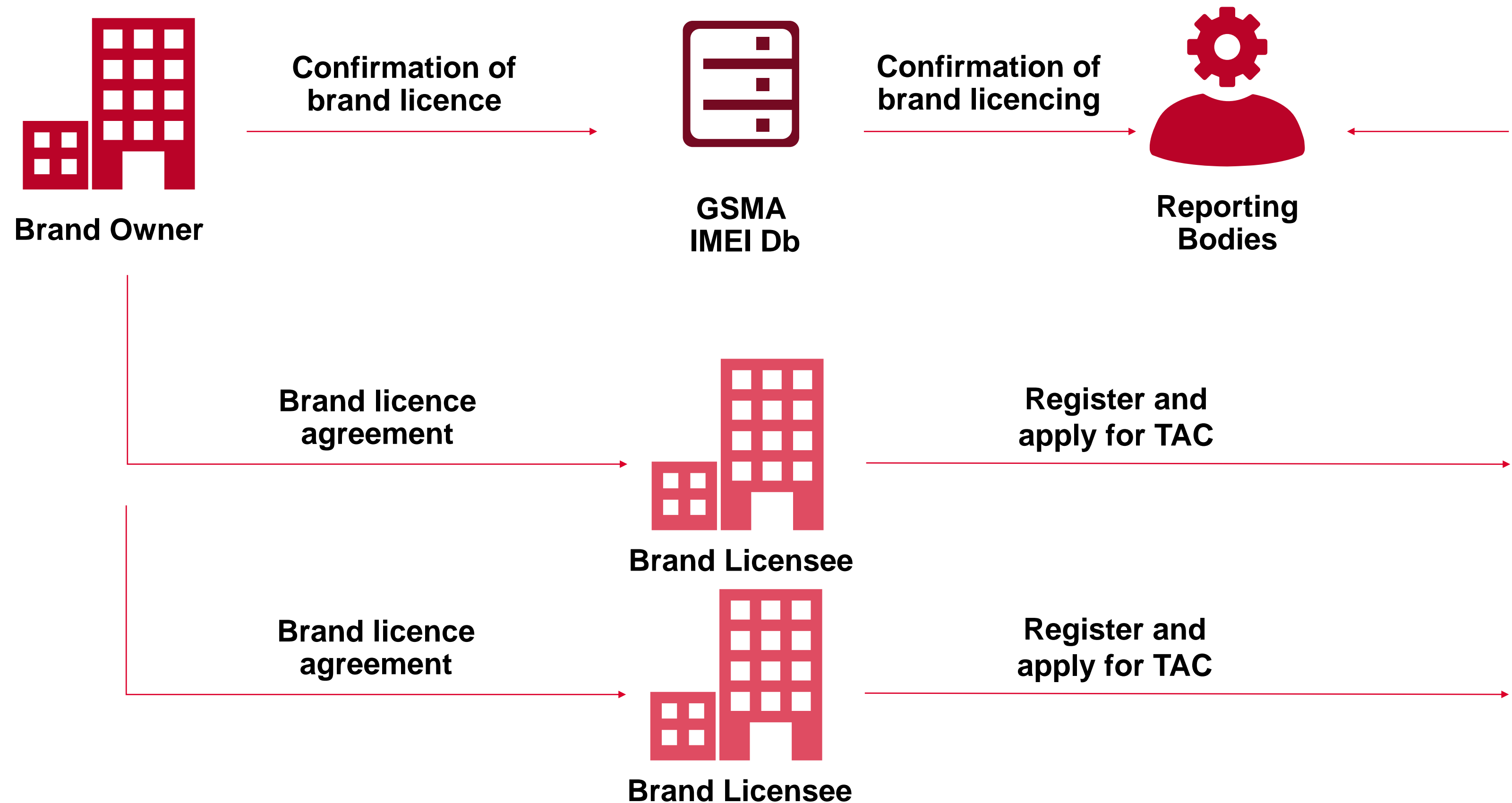
Original brand owner must confirm licencing of brand before TAC allocation can be managed by the licensee.
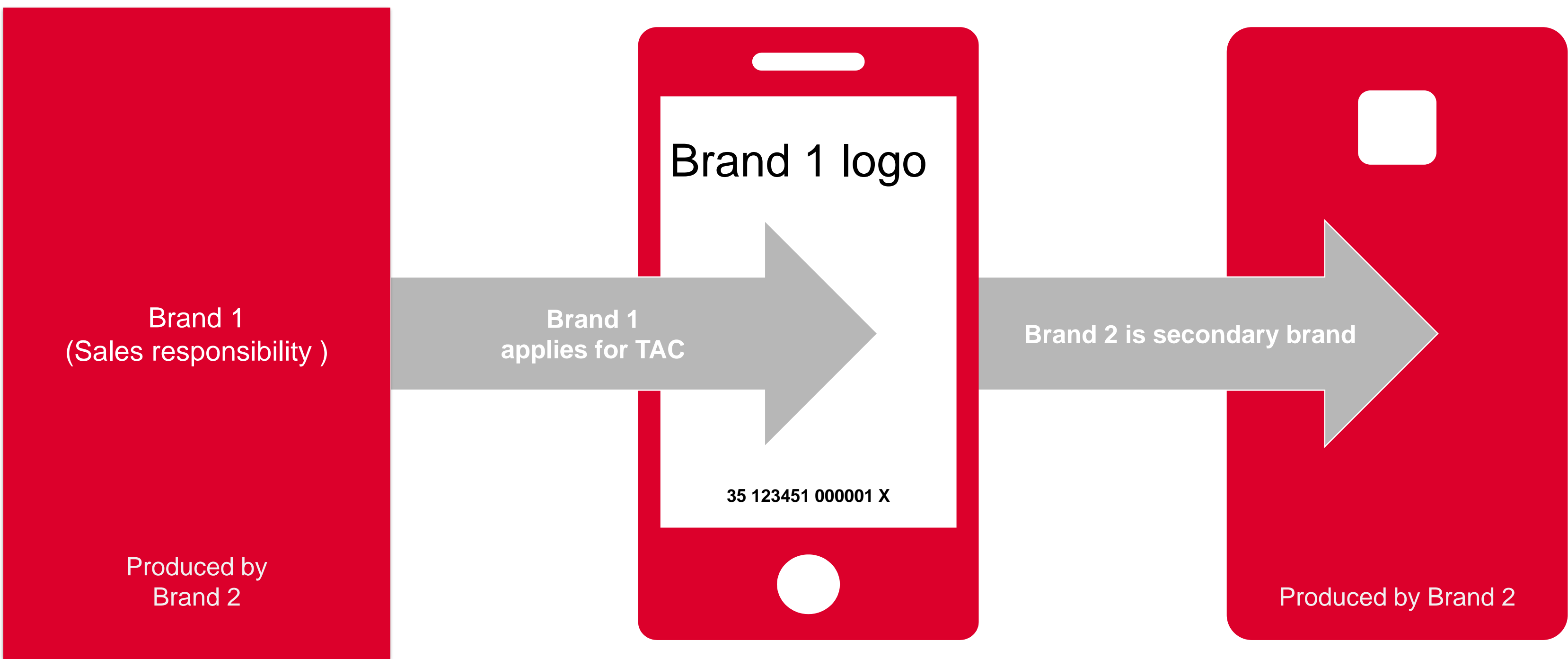
Rule:

Brand Owner — Confirmation of brand licence → **GSMA IMEI Db** — Confirmation of brand licencing → **Reporting Bodies**

Brand licence agreement → **Brand Licensee** — Register and apply for TAC →

Brand licence agreement → **Brand Licensee** — Register and apply for TAC →

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

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Who applies for TAC when multiple brands are present?

Example:

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

Brand 1
(Sales responsibility)

Produced by
Brand 2

Brand 1 logo

35 123451 000001 X

Brand 1 applies for TAC

Brand 2 is secondary brand

Produced by Brand 2

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

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When does a repair require an IMEI to change?

Rule:

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

Model A

Broken screen

→ 35 123451 000001 X

Model A

New screen

→ 35 123451 000001 X

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

Keep IMEI

Model A

Broken mother-board

→ 35 123451 000001 X

Model A

Replace-ment mother-board

→ 35 123451 634535 X

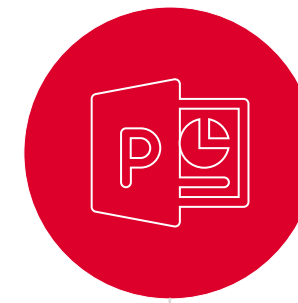**Changing out the motherboard**, requires changing the IMEI keeping the appropriate TAC

Change IMEI

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A well-functioning IMEI ecosystem benefits all

Recyclers

Retailers & traders

Government & regulators

Law Enforcement

Manufacturers & OS providers

GSMA IMEI Db

Operators

IoT Service Providers

Insurers

Customs & Excise

Consumers

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This document is part one of six GSMA TAC training modules

1

TAC / IMEI Rules

2

Registering your company for TAC allocation

3

Buying TAC Credit

4

Prepare and upload your Band Profile

5

Completing the TAC Allocation Request Form

6

TAC for IoT Manufacturers

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