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.

If you have any questions please contact: 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**

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**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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**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
How are TAC / IMEI serial numbers used?

Unique and accurate IMEI are essential for the mobile ecosystem.
What is an IMEI?

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

<table>
<thead>
<tr>
<th>TAC: Type Allocation Code</th>
<th>Serial Number</th>
<th>Check Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>991292</td>
<td>0</td>
</tr>
<tr>
<td>Reporting Body identifier</td>
<td>Type Identifier</td>
<td>Unique Number</td>
</tr>
<tr>
<td>Indicating brand owner and device model allocated by Reporting Body</td>
<td>assigned to individual devices by the manufacturer</td>
<td>A function of the other digits [calculated by the manufacturer]</td>
</tr>
</tbody>
</table>

The 15-digit **TAC code** identifies the brand owner and model.
What devices need an IMEI?

- Mobile / Feature Phone
- Smartphone
- Tablet
- IoT Device
- Wearable
- Dongle
- Modem
- FWA / WLAN Router

Rule: 3GPP devices require an IMEI.

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:

The brand owner must be the named TAC holder when outsourcing manufacture.

<table>
<thead>
<tr>
<th>Brand owner action</th>
<th>Manufacturer action</th>
</tr>
</thead>
</table>

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

Rule:

Modem producer applies for TAC

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

<table>
<thead>
<tr>
<th>Country</th>
<th>Reporting Body identifier</th>
<th>Reporting Body</th>
<th>Coverage</th>
<th>Specialist identifier</th>
<th>Specialist</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>86</td>
<td>TAF</td>
<td>All device types</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest of World</td>
<td>35</td>
<td>TUV sud</td>
<td>All device types</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>01</td>
<td>CTIA</td>
<td>All device types</td>
<td>Optional source when applying for PTCRB certification</td>
<td></td>
<td>All device types</td>
</tr>
<tr>
<td>Rest of World</td>
<td>99</td>
<td>TIA</td>
<td>All device types</td>
<td>Optional source for 3GPP / 3GPP2 multi-mode devices</td>
<td></td>
<td>All device types</td>
</tr>
</tbody>
</table>

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

**Rule:**

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# 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:**

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

<table>
<thead>
<tr>
<th>TAC: Type Allocation Code</th>
<th>Serial Number</th>
<th>Check Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 123451</td>
<td>0000000</td>
<td>X</td>
</tr>
</tbody>
</table>

- **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.
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:

<table>
<thead>
<tr>
<th>Brand owner</th>
<th>Components</th>
<th>Connectivity</th>
<th>Operating system</th>
<th>Marketing Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>External manufacturer</td>
<td>Casing</td>
<td>Transceiver capabilities</td>
<td>e.g. Android, Tizen</td>
<td></td>
</tr>
<tr>
<td>Model Name</td>
<td>Motherboard</td>
<td>Frequency bands</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chipset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of cameras</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Different version of same OS</th>
<th>Devices configurations</th>
<th>Minor variations</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. Android 7, Android 8</td>
<td>subset of transceiver frequency bands</td>
<td>Camera pixel count</td>
</tr>
<tr>
<td>User interface differences</td>
<td></td>
<td>Colour of device</td>
</tr>
<tr>
<td>Manufacturer producing same model in different locations</td>
<td></td>
<td>Memory size</td>
</tr>
<tr>
<td>Minor components</td>
<td></td>
<td>Minor components</td>
</tr>
</tbody>
</table>

*A unique model requires a unique TAC*
TAC and multiple device models

Rule: Each device model must be allocated a unique TAC.

<table>
<thead>
<tr>
<th>TAC: Type Allocation Code</th>
<th>Serial Number</th>
<th>Check Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>123451</td>
<td>000000</td>
</tr>
</tbody>
</table>

Use a different TAC for each model:
- 35 123451 000000 X
- 35 123452 000000 X
- 35 123453 000000 X

Do not use the same TAC for each model:
- 35 123451 000000 X
- 35 123451 000000 X
- 35 123451 000000 X
TAC and high volume production

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

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

Model A
000,000 to 999,999

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

Use another TAC after 1 million units

Model A
Over: 1,000,000

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

Do not use the same TAC for the next million units

Model A
Over: 1,000,000

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

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Unused TAC capacity

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

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

Model A:
000,000 to 175,000

Model B:
000,000 to 175,000

Do not use spare capacity for a different model.

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

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Multiple SIM, SUPI, UICC, or eUICC

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.

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

1 TAC / 1 IMEI

Single SIM

1 TAC / 1 IMEI

Multi SIM
One transceiver

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Multiple transceivers

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

**Rule:**

One IMEI is required per parallel connection

### 1 TAC / 2 IMEI

<table>
<thead>
<tr>
<th>1 TAC</th>
<th>Serial</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>86123451</td>
<td>000001</td>
<td>X</td>
</tr>
<tr>
<td>86123451</td>
<td>000002</td>
<td>X</td>
</tr>
</tbody>
</table>

### 2 TAC / 2 IMEI

<table>
<thead>
<tr>
<th>2 TAC</th>
<th>Serial</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>86123451</td>
<td>000001</td>
<td>X</td>
</tr>
<tr>
<td>86123452</td>
<td>000001</td>
<td>X</td>
</tr>
</tbody>
</table>
Multiple Radio Access Technology

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

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

Rule: IMEI implementation shall be resistant to hacking, spoofing or change by any means.
### IMEI secure implementation principles

<table>
<thead>
<tr>
<th></th>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software Integrity</td>
<td>Detect, prohibit and record attempts to alter data or software</td>
</tr>
<tr>
<td>2</td>
<td>No Modification</td>
<td>Protect component code against manipulation</td>
</tr>
<tr>
<td>3</td>
<td>No Cloning</td>
<td>Prevent IMEI copying between different devices</td>
</tr>
<tr>
<td>4</td>
<td>No External Access</td>
<td>Make IMEI implementation inaccessible from outside the device</td>
</tr>
<tr>
<td>5</td>
<td>No fallback</td>
<td>Stop unauthorised reversion to old software versions</td>
</tr>
<tr>
<td>6</td>
<td>No tampering</td>
<td>Prevent, detect and respond to attempts to change IMEIs</td>
</tr>
<tr>
<td>7</td>
<td>Software Quality</td>
<td>Develop software in accordance with best process &amp; techniques</td>
</tr>
<tr>
<td>8</td>
<td>No Hidden Menus</td>
<td>No means to access or modify areas that store the IMEI</td>
</tr>
<tr>
<td>9</td>
<td>No Substitution</td>
<td>Prevent substitution of components that contain memory</td>
</tr>
</tbody>
</table>

IMEIs must not change after device production. Adopt these security requirements.
Who applies for TAC when production is outsourced?

Rule:
The brand owner must apply for TAC.

Brand owner provides TAC to manufacturer if outsourced.
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.
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 Seller**
  - Brand sale agreement
  - Confirmation of brand transfer

- **GSMA IMEI Db**

- **Reporting Bodies**
  - Register and apply for TAC

- **Buyer/New Brand Owner**

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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

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

Brand responsible for sales must apply for TAC
When does a repair require an IMEI to change?

<table>
<thead>
<tr>
<th>Model A</th>
<th>New screen</th>
<th>TAC: Type Allocation Code</th>
<th>Serial Number</th>
<th>Check Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken screen</td>
<td></td>
<td>35</td>
<td>123451</td>
<td>000000 X</td>
</tr>
</tbody>
</table>

Peripheral components can be replaced provided the model specification is not changed. **Keep IMEI**

<table>
<thead>
<tr>
<th>Model A</th>
<th>Replacement motherboard</th>
<th>TAC: Type Allocation Code</th>
<th>Serial Number</th>
<th>Check Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken motherboard</td>
<td></td>
<td>35</td>
<td>123451</td>
<td>634535 X</td>
</tr>
</tbody>
</table>

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

Rule:

Changing the component that securely stores the IMEI results in a change of IMEI value.
A well-functioning IMEI ecosystem benefits all

- Recyclers
- Retailers & traders
- Government & regulators
- Law Enforcement
- Manufacturers & OS providers
- 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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