**텍스트, 클립아트이(가) 표시된 사진

자동 생성된 설명**

**APT REPORT ON**

**CURRENT STATUS OF VOLUNTARY CERTIFICATION REQUIREMENT FOR THE ACCEPTANCE OF MOBILE DEVICES IN MOBILE NETWORK OPERATORS**

**Edition: September 2024**

**The 33rd Meeting of APT Wireless Group**

**9 – 13 September 2024**

**Bangkok, Thailand (Hybrid)**

***(Source: AWG-33/OUT-10)***

**No. APT/AWG/REP-141**

**APT REPORT ON**

**CURRENT STATUS OF VOLUNTARY CERTIFICATION REQUIREMENT FOR THE ACCEPTANCE OF MOBILE DEVICES IN MOBILE NETWORK OPERATORS**

**Contents**

1. Introduction

2. Objectives and scope

3. Background of the survey

4. Survey Results

4.1. Respondents

4.2. Summary of Questionnaire Responses

4.3. Key findings and implications

5. Overview of Existing Voluntary Certification Programs in the Mobile Industry

5.1. GCF

5.2. CTIA

5.3. PTCRB

5.4. GTI

6. Conclusion and Further Considerations

6.1. Summary of key findings and conclusions

6.2. Areas for further study and exploration

7. References

Appendix 1. Questionnaire (AWG-30/OUT-25)

# Introduction

As the mobile device is embraced with the various bearer technologies such as 3G/4G/5G, the

practical approaches and the means for ensuring the device’s quality and competency to international standards have become more important. In this perspective, there are two types of testing and certification bars. One is the regulatory certification program which is mandated by the government regulatory authorities, the other is the voluntary certification program which is industry-led means of ensuring device quality and interoperability. The voluntary certification program has widely been used and adapted by the mobile operators and manufacturers in most of EU, and North American countries, but not yet in widespread to Asia-Pacific Region Countries. Therefore, this survey report is to share the current status of voluntary certification programs required by the mobile network operators of each APT countries and derive the implications to protect the networks and meet the end users’ expectations on quality of service.

# Objectives and scope

This survey report is to share the information on voluntary testing and certification requirements of mobile devices in MNOs of APT Member countries.

The survey report covers;

* Current requirements for accepting the mobile device in MNOs’ networks
* Whether or not of the awareness on globally-known existing voluntary certification programs
* Willingness to participate for further study in APT about the existing voluntary certification system

The survey results will be utilized for the study to derive the implications for (1) protecting the network from the non-compliant-to-standard device, (2) elevating user satisfaction with the quality of service, (3) guaranteeing the mobile device quality when roamed to other countries and (4) advancing the wireless industry of member countries. Furthermore, in order to achieve these purposes, the study will find and suggest the direction of what tasks can be pursued within the AWG community afterward.

# Background of the survey

The below figure demonstrates the possible testing and certification programs of today’s mobile device which incorporates the high complexity of multi-mode, multi-band wireless technologies. At the bottom of all procedures, the regulatory certification is laid as an essential statutory requirement for all devices reaching to the market. This regulation is about the device performance and whether its radiated RF signals meet the suppression which would not impair the integrity of the allocated frequency bands and bandwidths.



Fig. 1. General overview of the testing and certification requirements of mobile devices

Except at the bottom of the pyramid of testing and certification, the remaining steps are all voluntary industry-led procedures and requirements. In order to define the industry requirements, several industry certification fora have been established since the late 1990s and hundreds of member companies have actively been joining these fora. The globally recognized fora are GCF (Global Certification Forum), CTIA (Cellular Telecommunications and Internet Association), PTCRB (PCS Type Certification Review Board) and GTI (Global TD-LTE Initiative). Such certification fora have their own certification programs. These certifications are based all upon the test cases defined by globally harmonized standards such as 3GPP, GSMA, OMA, oneM2M, and so on. Such voluntary testing and certification programs provide the means of ensuring devices will interoperate correctly with networks (Interoperability, Conformance) and meet the performance expectations of end users (Quality of Service).

Despite the importance and widespread of voluntary certification programs, operators in the Asia-Pacific region countries rarely or only partially utilize them while operators of the EU and North American countries have widely and mainly been using them (See the below table for various cases of voluntary certification requirements of the mobile network operators).

Table 1. Various cases of voluntary certification requirements of MNOs



In AWG-30, Republic of Korea proposed to investigate the current status of the acceptance of voluntary certification systems of mobile operators and resultantly find and suggest the implications for advancing the wireless industry. The detailed intentions of this survey include, but are not limited to, the following, (1) improving mobile device’s competency to standard and reliability, (2) ensuring and improving interoperability within mobile networks, (3) safeguarding the network against potential harm and impairment caused by uncertified and unproven devices connected to the live network, (4) elevating user satisfaction with the quality of service, (5) guaranteeing the mobile device quality when roamed to other countries, and (6) advancing network operation and management skills in APT Countries.

# Survey Results

## **4.1. Respondents**

A total of sixteen inputs from thirteen countries were submitted during questionnaire period (AWG-31, AWG-32, AWG-33). The respondent information is outlined below.

Table 2. Respondent information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Input document | Source | Remarks | No. of responding MNOs |
| Total | 16 Inputs | 13 Countries | 27 MNOs |
| 1 | AWG-31-INP-11 | Bhutan (Kingdom of) |  | 2 |
| 2 | AWG-31-INP-16 | Nepal (Federal Democratic Republic of) |  | 1 |
| 3 | AWG-31-INP-22 | Thailand (Kingdom of) |  | 2 |
| 4 | AWG-31-INP-41 | National Telecom Public Company Limited | Affiliate  (Thailand) | 1 |
| 5 | AWG-31-INP-43 | Palau (Republic of) |  | 1 |
| 6 | AWG-31-INP-59 | Indonesia (Republic of) |  | 2 |
| 7 | AWG-31-INP-84 | Viet Nam (Socialist Republic of) |  | 3 |
| 8 | AWG-31-INP-106 | Korea (Republic of) |  | 3 |
| 9 | AWG-32-INP-12 | Sri Lanka (Democratic Socialist Republic of) |  | 1 |
| 10 | AWG-32-INP-17 | Brunei Darussalam |  | 1 |
| 11 | AWG-32-INP-21 | Pakistan (Islamic Republic of) |  | 1 |
| 12 | AWG-32-INP-26 | Palau (Republic of) |  | 1 |
| 13 | AWG-32-INP-32 | Nepal (Federal Democratic Republic of) |  | 1 |
| 14 | AWG-32-INP-55 | China (People's Republic of) |  | 4 |
| 15 | AWG-32-INP-72 | Japan |  | 2 |
| 16 | AWG-33-INP-105 | Philippines (Republic of) |  | 1 |

## **4.2. Summary of Questionnaire Responses**

The questionnaire (Annex 1) consists of six questions with multiple choices. The responses for each question are as follows:

**Q1.** Which of the following does your company accept the mobile device in your network?

(a) that are directly quality-controlled by the operator’s own method and permission

(b) that are not directly quality-controlled by the operator (same concept of Open Market)

(c) we use both (a) and (b)

Other: \_\_\_\_\_

**A1.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source | (a) | (b) | (c) | Other |
| Bhutan |  |  |  |  |
| Nepal |  |  |  |  |
| Thailand |  |  |  |  |
| Palau |  |  |  |  |
| Indonesia |  |  |  |  |
| Viet Nam |  |  |  |  |
| Korea |  |  |  |  |
| Sri Lanka |  |  |  | (Note 1) |
| Brunei |  |  |  |  |
| Pakistan |  |  |  |  |
| China |  |  |  |  |
| Japan |  |  |  |  |
| Philippines |  |  |  |  |

(Note 1) Type Approval by Telecommunications Regulatory Commission of Sri Lanka

**Q2.** Please put a tick in the box of which your company currently requires for the acceptance of mobile devices from the device manufacturers.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Based on | Requirements | | tick box | **Remarks** |
| Operator  specification | Operators' own Additional Testing  because of the unique features and capabilities of the network (ex. Lab and/or Field) | |  | **(a)** |
| GCF/PTCRB/  CTIA | Network Interoperability Testing | Field Trial |  | **(b1)** |
| In-House Lab |  | **(b2)** |
| GCF/PTCRB/  CTIA | Laboratory Conformance Testing  (ex. RF, Protocol, RRM, (U)SIM, OTA, etc.) | |  | **(c)** |
| Other: \_\_\_\_\_ | <please type here when there are other requirements> | |  | **(d)** |
| - | No specific Certification or Test Report required | |  | **(e)** |

**A2.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | (a) | (b1) | (b2) | (c) | (d) | (e) |
| Bhutan |  |  |  |  | (Note 1) |  |
|  |  |  |  | (Note 2) |  |
| Nepal |  |  |  |  | (Note 3) |  |
|  |  |  |  |  |  |
| Thailand |  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Palau |  |  |  |  | (Note 4) |  |
|  |  |  |  |  |  |
| Indonesia |  |  |  |  |  |  |
|  |  |  |  |  |  |
| Viet Nam |  |  |  |  | (Note 5) |  |
|  |  |  |  | (Note 5) |  |
|  |  |  |  | (Note 5) |  |
| Korea |  |  |  | (Note 6) | (Note 6)  (Note 7) |  |
|  |  |  |  |  |  |
|  |  |  |  | (Note 7) |  |
| Sri Lanka |  |  |  |  | (Note 8) |  |
| Brunei |  |  |  |  | (Note 9) |  |
| Pakistan |  |  |  |  | (Note 10) |  |
| China |  |  |  |  | (Note 11) |  |
|  |  |  |  | (Note 11) |  |
|  |  |  |  | (Note 11) |  |
|  |  |  |  | (Note 11) |  |
| Japan |  |  |  |  | (Note 12) |  |
|  | (Note 13) |  | (Note 13) |  |  |
| Philippines |  |  |  |  | (Note 14) |  |

(Note 1) We didn’t have any requirement for certification, however, for 5G we had to correspond with mobile device manufacturer to field test their devices in order to enable TICL 5G in their devices. After the field test, the manufacturer developed software patches which then gets released with their OS update.

(Note 2) For 5G and VoLTE, we carry out feature support tests in the live network in consultation/coordination with the handset vendors for the various models of their handset.

(Note 3) Type approval is governed by NTA through Telecommunication Act, 1997.

(Note 4) Palau recognized certification bodies

(Note 5) National technical regulation CO&CQ (Certificate of Origin & Certificate of Quality): Shall conform with national technical regulation on mobile terminal. Comply with the manufacturer’s standards registered with the state management agency issuing CO&CQ.

(Note 6) Depends on case.

(Note 7) HW Reliability Testing such as Drop, Extreme Temperature, Water Resistance, Dust Resistance, Electrostatic Discharge, etc.

(Note 8) Test report from accredited laboratory, DOC-Declaration of Conformity

(Note 9) Certificate of conformity and technical specification

(Note 10) PTA carries out type approval for mobile devices, whereby PTA accepts test reports that conform to notified standards from different global bodies and ensures the device offers interoperability. The reports are provided by the manufacturer/ applicants as part of type approval process and lab reports are validated in accordance with local spectrum conditions etc.

(Note 11) National technical regulation and mobile communication industrial standards of China

(Note 12) Regulatory certification

(Note 13) Excluding open market devices (devices are not directly quality-controlled by the operator)

(Note 14) Laboratory Testing Conformance, RF, EMC, & Safety Test Reports

**Q3.** In Q2, if you put a tick in “Laboratory Conformance Testing” based on GCF/PTCRB/CTIA, which of the following does your company requires?

(a) Certification from such voluntary certification forum

(b) Not to require certification, but at least to require the test report from the accredited 3rd party laboratories in accordance with such voluntary certification programs

(c) Not to require certification, but at least to require the test report from the testing by the operator’s own personnel and test equipment in accordance with such voluntary certification programs

Other: \_\_\_\_\_

**A3.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source | (a) | (b) | (c) | Other |
| Bhutan |  |  |  |  |
| Nepal |  |  |  |  |
| Thailand |  |  |  |  |
| Palau |  |  |  | (Note 1) |
| Indonesia |  |  |  |  |
| Viet Nam |  |  |  |  |
| Korea |  |  |  | Depends on case |
| Sri Lanka |  |  |  |  |
| Brunei |  |  |  |  |
| Pakistan |  |  |  |  |
| China |  |  |  |  |
| Japan |  |  |  |  |
| Philippines |  |  |  | N/A |

(Note 1) No laboratory conformance testing available in Nepal

**Q4.** In Q2, if you chose “No specific Certification or Test Report required”, then which of the following reason is/are applicable?

Time burden for testing and certification (Time to market perspective)

Device manufacturer’s cost burden for testing and certification

Because the manufacturers have made a commitment to take full responsibility for the quality of their mobile devices

Not enough information on existing voluntary certification programs (Do not know about such certification programs before)

Other: \_\_\_\_\_

**A4.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source | Time burden | Cost burden | Commitment from manufacturers | Not enough information |
| Bhutan |  |  |  |  |
| Nepal  (Note 1) |  |  |  |  |
| Thailand |  |  |  |  |
| Palau |  |  |  |  |
| Indonesia |  |  |  |  |
| Viet Nam |  |  |  |  |
| Korea |  |  |  |  |
| Sri Lanka |  |  |  |  |
| Brunei |  |  |  |  |
| Pakistan |  |  |  |  |
| China |  |  |  |  |
| Japan |  |  |  |  |
| Philippines |  |  |  |  |

(Note 1) Testing mobile devices is not in scope of responding MNOs

**Q5.** Does your company have any experiences or issues on quality-control of mobile devices?

Yes

No

If “yes”, please describe: \_\_\_\_\_

**A5.**

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Yes | No | If “yes”, describe |
| Bhutan |  |  |  |
| Nepal |  |  |  |
| Thailand |  |  |  |
| Palau |  |  |  |
| Indonesia |  |  | Some MNO conduct testing for parameter, such as receiver sensitivity, throughput, based on the device manufacturer’s data sheet. |
| Viet Nam |  |  | VNPT Vinaphone has had problem with GPRS Service(devices keep sending GPRS Attach Request when they should not) when deploying Gphone service (stationary home phone with 2G mobile network connection). The problem was fixed with software update from OEM. |
| Korea |  |  | Due to the fact that different mobile devices use a variety of chipsets with varying conditions and operations, there are numerous issues that exist in the market. |
| Sri Lanka |  |  | Duplicated IMEI |
| Brunei |  |  |  |
| Pakistan |  |  | As part of type approval certification process, the device in question is tested against the lab reports as well as local spectrum conditions to ensure that device operates within the allowed spectrum and output power/EIRP limits which ensures quality control of mobile device. |
| China |  |  | In November 29th 2022, the MIIT of China published the notification on the pilot project of self-inspection and self-certification of radio transmission equipment model approval[[1]](#footnote-1).  In December 09th 2022, the MIIT of China published the notification on the pilot project of self-inspection and self-certification of tele-communication equipment network access permit[[2]](#footnote-2).  In December 19th 2022, the MIIT of China released the public notice of the pilot enterprises for self-inspection and self-certification of radio transmission equipment model approval[[3]](#footnote-3).  In December 28th 2022, the MIIT of China released the first batch of pilot enterprises for self-inspection and self-certification of telecommunications equipment network access permits[[4]](#footnote-4). |
| Japan |  |  | (Yes) Each device manufacturer and chip vendor has proprietary way of implementation in some parts. We are struggling with adjusting those and making sure interoperability with our NW especially at when device manufacturer and chip vendor come to us in the first time. |
| Philippines |  |  |  |

**Q6.** Is your company willing to participate the further study and discussion if there are more information-sharing opportunities in APT about existing voluntary certification programs? (Using a scale of 1~5)

5 – Yes, we’d love to

4 – Yes, we’d like to

3 – Yes, but neutral

2 – No, we don’t want

1 – Never

**A6.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | 5 – Yes, love | 4 – Yes, like | 3 – Yes, neutral | 2 - No | 1 - Never |
| Bhutan |  |  |  |  |  |
| Nepal |  |  |  |  |  |
| Thailand |  |  |  |  |  |
| Palau |  |  |  |  |  |
| Indonesia |  |  |  |  |  |
| Viet Nam |  |  |  |  |  |
| Korea |  |  |  |  |  |
| Sri Lanka |  |  |  |  |  |
| Brunei |  |  |  |  |  |
| Pakistan |  |  |  |  |  |
| China |  |  |  |  |  |
| Japan |  |  |  |  |  |
| Philippines |  |  |  |  |  |

## **4.3. Key findings and implications**

First, the survey results indicate a variation in the acceptance of voluntary certification programs among mobile network operators in the Asia-Pacific region. While some operators are aware of and embrace these voluntary certification programs, others show partial awareness or adopt them partly. This lack of standardization across the region leads to varied approaches in accepting mobile devices in their respective networks.

Second, some operators have encountered quality control issues because the mobile devices are used with different conditions and proprietary implementations. This situation causes additional efforts by MNOs to adjust and ensure interoperability with their networks.

Lastly, the survey revealed a willingness among operators to participate in further studies and discussions about voluntary certification programs. Specifically, 13 out of 26 operators who responded to Question number 6 expressed a clear and favorable willingness to engage in further studies and discussions on information sharing about these programs.

The implications of these findings are multifaceted and can be summarized in three key points.

First, it would be beneficial for APT to prioritize educational initiatives and workshops aimed at bridging the knowledge gap and increasing awareness about the benefits and processes of voluntary certification programs. Prior to these initiatives and workshops, Chapter 5 will provide comprehensive information on active voluntary certification programs, including their vision, mission, history, organization, and relevance.

Second, harmonizing certification requirements would streamline the acceptance process, reduce testing redundancy and costs, and improve device interoperability.

Finally, strengthening ties with global certification bodies such as GCF, PTCRB,CTIA and GTI would facilitate the adoption of best practices and standards, ensuring that the devices certified in the Asia-Pacific region meet global benchmarks.

# Overview of Existing Voluntary Certification Programs in the Mobile Industry

## **5.1. GCF**

The Global Certification Forum, known as GCF, is an active partnership between mobile network operators, mobile device manufacturers, and the testing industry. GCF was founded in 1999, and its membership has been responsible for creating an independent certification program to help ensure global interoperability between mobile devices and networks. The GCF certification process is based on technical requirements as specified within dedicated test specifications provided by the 3GPP, 3GPP2, OMA, GSM Association, and others.

The GCF envisions leading the global ecosystem that facilitates interoperable devices, networks and services to enable the high quality, reliable, and secure wireless communications demanded by users and industries across the globe. Its mission is to enable the 3 steps of certification: Test, Certify and Connect.

* To enable industry agreed Testing of mobile and IoT products
* To manage industry agreed programs to Certify mobile and IoT products
* To provide assurance to network operators and industrial users to give them the confidence to Connect GCF certified products to networks and services

To accomplish its mission, the organization relies on a structure comprising the Board of Directors, Steering Group, and multiple Agreement Groups and Work Streams. Each entity has a distinct mission, outlined as follows:

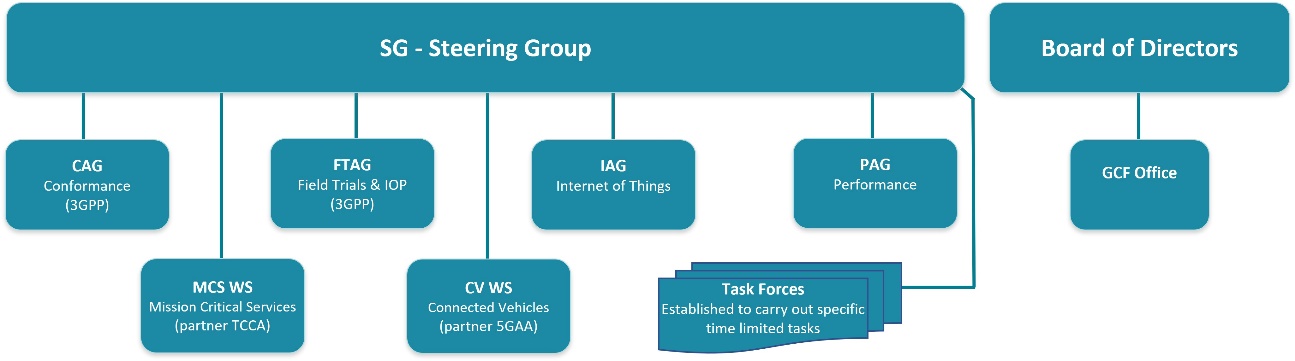


Fig. 2. Structure of the GCF organization

* Steering Group

The Steering Group (SG) is GCF’s body responsible for the certification activities and open to all members. The SG oversees the certification activities of GCF and agrees new Work Items that will define new GCF Certification Criteria. GCF’s technical work based on the Work Items agreed by the Steering Group is implemented by the agreement groups, work streams and task forces.

* Agreement Groups
* Conformance Agreement Group (CAG)

Develops and maintains certification criteria that relate to a product conformance to industry standards. Tests will typically be validated and run on commercial system simulators.

Field Trial & Interoperability Agreement Group (FTAG)

Develops and maintains criteria Field Trial test scenarios and interoperability use cases.

* IoT Agreement Group (IAG)

Focuses on the testing and certification requirements for Internet of Things and IoT devices that make use of mobile connectivity.

* Performance Agreement Group (PAG)

Develops and maintains the GCF Performance Metrics program which defines standardized methods for reporting on product attributes that do not relate to interoperability complementing GCF certification.

* Work Streams
* Mission Critical Services (MCS WS)

Enables compliance assessment for the mission critical industry by managing the development of relevant processes and certification content.

* Connected Vehicles (CV WS)

Enables compliance assessment for the connected mobility industry by managing the development of relevant processes and certification criteria for a standalone certification program.

The GCF Board comprises up to six directors elected by operator members and up to six elected by manufacturer members. The directors on the GCF Board have the authority to appoint industry representatives as Board Members, who serve in an advisory capacity to support the board. Sierra Wireless, Motorola Mobility, u-blox, Huawei and Samsung are the directors from manufacturer side and Orange, China Mobile, Vodafone, Telefonica, Verizon and Telecom Italia are the directors from operator side. These are the companies holding current director positions in September of 2024, and GCF board is potentially changing after each election cycle. The GCF boasts 437-member companies as of 23 Jan., 2024. The GCF office, registered as a UK company, is a virtual team consisting of contractors. This team supports GCF’s day-to-day operations, serves as the primary contact for members, and manages the GCF Devices Certification Criteria Database (DCC) and IT systems.

## **5.2. CTIA**

The Cellular Telecommunications and Internet Association, known as CTIA, represents the U.S. wireless communications industry, from carriers and equipment manufacturers to mobile app developers and content creators. The association was established in 1984. As the voice of America’s wireless industry, CTIA:

* Advocates for legislative and regulatory policies at federal, state, and local levels that foster the continued innovation, investment and increasing economic impact of America’s wireless industry. CTIA is active on a wide range of issues including spectrum policy, wireless infrastructure, and the Internet of Things, among others.
* Convenes the industry to tackle most difficult challenges and coordinates voluntary best practices and initiatives. CTIA works with members to develop test plans and certification processes for mobile devices, coordinates with members and other industry leaders to ensure the security of mobile networks and devices, and leads industry initiatives to enhance accessibility, improve 9-1-1 location accuracy, and deter phone theft.
* Promotes members through numerous campaigns aimed at building awareness among policymakers and the general public, as well as through industry-leading events on topics ranging from cybersecurity to 5G.

Among above missions, one important mission of CTIA is to operate the certification programs for the [wireless](https://en.wikipedia.org/wiki/Wireless_Industrial_Networking_Alliance) industry and publishes wireless industry surveys. Since 1991, CTIA has set the certification programs, CTIA Certification. The CTIA Certification and its working groups have developed industry standards and best practices for the mobile wireless industry. The CTIA Certification programs are recognized globally and they are utilized by network operators and device manufacturers to ensure quality and reliability.

The CTIA Certification operates 7 certification programs, each with its own specific goals and mission, as outlined below:

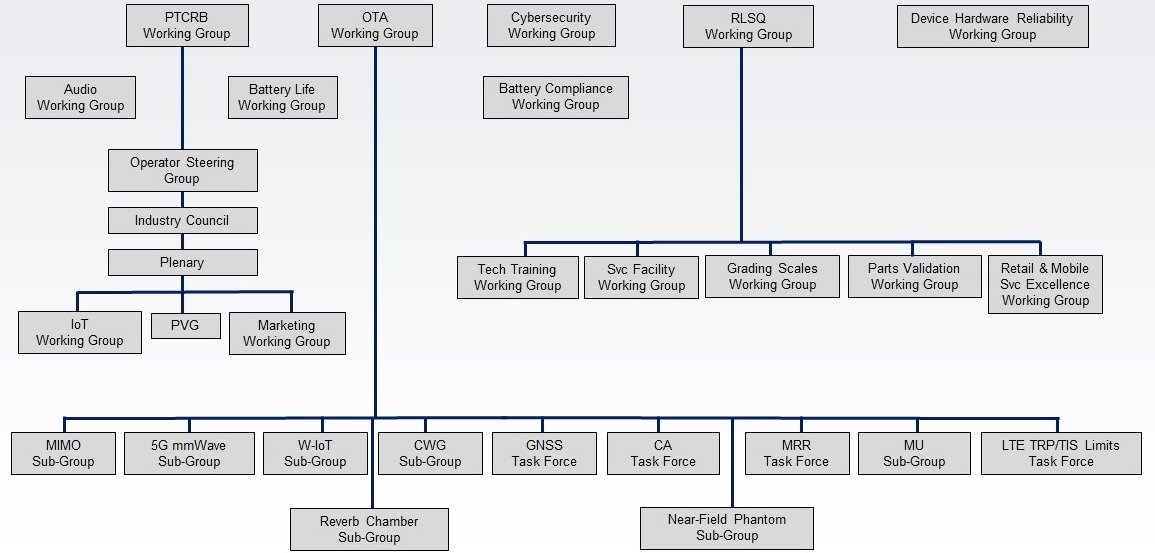


Fig. 3. Structure of the CTIA organization

* Battery Compliance Certification

This certification program sets the industry standard for the quality and reliability of mobile device batteries. The program helps network operators and their suppliers to validate lithium ion batteries’ compliance with the IEEE Standard for Rechargeable Batteries for Cellular Telephones (IEEE Std 1725™) and the IEEE Standard for Rechargeable Batteries for Multi-Cell Mobile Computing Devices (IEEE Std 1625™).

* Battery Life Certification

Various factors affect a device’s battery performance including usage activities and environmental conditions. The purpose of the CTIA Battery Life Certification Program is to provide an estimate of the expected battery life of smartphones and smartwatches under a standardized usage and environmental profile.

* Device Hardware Reliability Certification

This certification program defines a standardized lifecycle testing methodology to predict the expected field performance of today’s sophisticated smartphones. Utilizing modern reliability engineering techniques, this industry-standard certification program allows device manufacturers to eliminate duplicate testing that may be taking place across similar but slightly different methodologies defined by individual network operators. Testing includes drop, tumble, water ingress, and PCBA (Printed Circuit Board Assembly) reliability.

* IoT Cybersecurity Certification

This certification program for IoT devices establishes an industry baseline for device security on wireless networks. The program protects consumers and wireless infrastructure while also creating a more secure foundation for smart cities, connected cars, and other IoT applications.

* IoT Network Certified Program

IoT Network Certified is a custom certification program for cellular-enabled IoT devices. The program has been crafted to meet the specific needs of the IoT community. It simplifies and streamlines the process of certifying an IoT device according to industry standards for excellence, providing an efficient and affordable pathway for manufacturers. By designing a device around a certified wireless module, a manufacturer may certify their IoT device using a process that takes advantage of the rigorous testing and certification already done on the module. Hundreds of modules are available to choose from. IoT Network Certified for Smart Connected Infrastructure™ provides confidence that devices will perform as expected in critical infrastructure applications. In addition to the standard requirements to achieve IoT Network Certified recognition, additional testing is conducted, which is tailored to the unique and demanding needs of this environment.

* Over-the-Air Performance Testing

The CTIA Certification has developed the industry standard for OTA performance testing of wireless devices. CTIA OTA test plans thoroughly measure the expected real-world performance of a device in a simulated laboratory environment. They accurately determine the transmit and receive efficiency of a device’s antenna(s). Network operators throughout the world rely on CTIA Certification’s OTA performance testing to ensure devices operating on their networks will meet the performance expectations demanded by consumers and businesses.

* PTCRB Certification

With PTCRB certification, operators and device manufacturers are confident of a device’s interoperability with wireless networks. Established in 1997 by leading wireless operators, PTCRB certification verifies compliance with global industry standards for wireless cellular devices. The PTCRB Working Group within the CTIA Certification program defines the requirements. Member operators are committed to ensuring device quality through a rigorous certification process. Without PTCRB certification, manufacturers run the risk that their devices will perform poorly on wireless networks. More detail explanation on PTCRB Certification will be introduced in next Chapter (Chapter 5.3). CTIA has been designated as the administrator for the PTCRB Certification program and is responsible for the administration of PTCRB issued IMEIs. CTIA staff members manage all aspects related to PTCRB Certification issues, including organizing face to face meetings.

The CTIA comprises a total of 298-member companies, distributed across various categories, including 30 in the Board of Directors, 99 in the carrier and industry section, and 169 in the general member category. There are more than 100 CTIA Certification Authorized Test Labs (ATLs) located globally. Furthermore, more than 100 companies across the wireless industry actively engage in the CTIA Certification Program Working Groups. These groups play a crucial role in developing and maintaining standards, best practices, and certification programs. The organizational chart for the Working Groups is provided below:

## **5.3. PTCRB**

The PCS Type Certification Review Board, known as PTCRB, was established in 1997 as the certification forum by North American cellular operators. The PTCRB name is now a pseudo-acronym, as it no longer stands for its original meaning of the PCS Type Certification Review Board, which was named after the GSM 1900 MHz PCS band in North America.

The PTCRB is a certification program by leading wireless operators to define test specifications and processes to ensure device interoperability on global wireless networks. The program is managed by several working groups composed of subject matter experts across the wireless industry. Working groups are also responsible to generate input regarding the testing of devices for standards development organizations. The primary objective of the PTCRB is to establish a framework for the certification of GERAN, UTRA, E-UTRA, and NR devices. This framework encompasses various aspects, including but not limited to, defining test specifications and methods essential to facilitate the certification process for wireless devices.

The PTCRB certification program is managed by the PTCRB Working Group within CTIA Certification, and these working groups oversee their respective topics in accordance with their assigned responsibilities. The organizational chart for the working groups is outlined below, along with a description of their respective responsibilities.



Fig. 4. Structure of the PTCRB organization

* PTCRB Plenary

The PTCRB Plenary is responsible for defining and maintaining the requirements for PTCRB certification and for providing oversight of the various PTCRB Working Groups and task forces. The Plenary is composed of PTCRB Working Group member company representatives including, for example, network operators, device manufacturers, test labs and test solution providers. Any company within the wireless industry may join the Plenary for a period of 6 months, without having membership in order to observe the group and determine interest in ongoing participation.

* PTCRB Validation Group (PVG)

The PVG is the technical consultation body of the PTCRB Working Group. PVG is a conformance test management group which serves a consulting role to the PTCRB Plenary and holds separate quarterly face-to-face meetings. The PVG responsibilities include, but are not limited to:

* Management of PTCRB RFTs (Requests for Tests)
* Management of test case validation activities and qualifying of test equipment
* Management of PTCRB TC (Test Case) database technical content
* Consultation with the PTCRB Plenary concerning any technical issues
* Liaising with other bodies (SDOs and other technical groups)
* PVG administration (membership, PVG PRDs, meetings)
* Progress reporting during PTCRB Operator Steering Group, PTCRB Leadership Council and PTCRB Working Group meetings on an as-needed basis
* PTCRB Operator Steering Group (OSG)

This group is composed of network operators that utilize the PTCRB certification program to evaluate device compliance to wireless industry requirements. There are two membership status categories: Active (intending to participate in all meetings) and Passive (not planning to participate in all meetings). PTCRB OSG membership is approved by consensus of the current OSG members. In order to maintain Active status, operators shall attend 50% of PTCRB OSG and PTCRB Plenary meetings (a teleconference or face-to-face counts equally as a “meeting”), and shall not miss more than two consecutive meetings. When decisions are being made, a quorum consisting of at least 50% of the Active PTCRB OSG members is necessary. Votes will be based on a simple majority of operators present. The PTCRB OSG is responsible for:

* Establishing priorities and providing strategic direction to the PTCRB Working Group
* Conflict resolution in cases where consensus is unable to be reached within the PTCRB Working Group
* Acting as a ‘sounding board’ for issues that working group members may not be comfortable taking to the Plenary, PIC, PVG, or other working groups
* Reviewing and responding to waiver requests (Active operators may vote to approve or reject waiver requests)
* Reviewing 1UE validations for potential approval
* PTCRB Industry Council (PIC)

The PIC is composed of the OSG, the leadership of the PVG, the leaders of the PTCRB Working Groups, and the elected representatives from each of the following five wireless industry segments: chipset vendors, module vendors, phone vendors, test equipment vendors, and PTCRB Primary Test Laboratories. The PIC is intended to gather a diverse range of input and experience from the members of the PTCRB Working Groups, therefore delegates from companies that could be eligible for multiple segments will be judged for eligibility based on the core business of the member company, as judged by CTIA Certification. The PIC meets quarterly face-to-face and via teleconference as-needed. PIC representatives shall attend all meetings of the PIC. The PIC is responsible for:

* Coordinating activities among the working groups and task forces
* Approving the formation of new working groups and task forces
* Reviewing and determining next steps for contributions submitted to the PTCRB Working Group

## **5.4. GTI**

GTI (Global TD-LTE Initiative) was kicked off in February 2011 in Barcelona by Bharti Airtel, China Mobile, Sprint (Clearwire), SoftBank Mobile and Vodafone.

To mainly satisfy the customization IoT chipsets, modules and devices test requirements from operators and cross-industrial partners, GTI Device Certification provide industry with the reliable and full-scale quality assessment of products.

A Product for Certification may be:

* A Chipset Platform implementing the communication functionality intended to be integrated into a device or module.
* A Module intended to be embedded in a device to provide that device with communication functionality, noting that the Module should reference a GTI Certified Platform.
* A Device intended to be placed on the vertical industry, noting that the communication functionality of the Device should be provided by an embedded and GTI certified module or chipset platform.

Certification Product

Chipset Platform

Module

Device

GTI Certified

GTI Certified

The GTI Certification Procedure is illustrated in Figure below:

文本

描述已自动生成

Fig. 5. GTI Certification Procedure

* Certification Application

To apply for the test and certification, manufacturer shall submit a product-declaration table to state the product information and supported 3GPP functionality to Test Lab.

* Test Execution

Test lab shall test and demonstrate the compliance of the Product to the certification criteria.

* Certification Declaration

GTI Certification Office shall formalize Certification Report based on test reports submitted by Test Lab.

There are three categories of Test Case in Certification Criteria. It is the responsibility of T&C Standard Task to specify the category attribute of test case in certification criteria

* Category “M”: The test cases are mandatory. The test results will be released in Certification Report. The Product cannot be declared Certified if any of the Category “M” test cases fails.
* Category “O”: The test cases are optional. Manufacture member can select optional test cases to test.
* Category “C”: The test cases are confidential and mandatory. Manufacture member can decide whether to release the test results or provide these test cases.

The Product could be declared Certified once successfully pass the Category “M” Test Cases in Certification Criteria.

# Conclusion and Further Considerations

## **6.1.** **Summary of key findings and conclusions**

The survey results illustrate the varied landscape of voluntary certification acceptance among MNOs in the Asia-Pacific region. Key findings reveal discrepancies in certification requirements, awareness levels, and quality control approaches. These discrepancies highlight the need for increased awareness, standardization, and collaborative efforts among stakeholders, including MNOs, mobile device vendors, and network equipment manufacturers. Positively, the willingness of MNOs to engage in further studies and discussions presents an opportunity for APT to spearhead initiatives aimed at enhancing voluntary certification practices in the region. Collaboration with global certification bodies will ensure that regional practices align with international standards, benefiting both operators and local industries.

In conclusion, addressing the knowledge gap through targeted educational initiatives is valuable for achieving a harmonized approach on the acceptance of mobile devices in networks. Standardized mobile acceptance requirements across the region can lead to more consistent and reliable device performance, improved network interoperability, and economic benefits by reducing testing redundancies and associated costs due to the different requirements and standards, such as GCF.

## **6.2. Areas for further study and exploration**

In order to achieve a harmonized and standardized approach on the acceptance of mobile devices in the region, it is important to adopt existing voluntary certification programs that are already industry standards in regions like EU and North America. For broader adoption of these programs, it is desirable for APT to develop and implement comprehensive training workshops for stakeholders, focusing on the importance, benefits, and processes of voluntary certification programs. These workshops are expected to cover case studies, technical aspects, and practical implementation strategies. Additionally, experienced MNOs can share their knowledge and expertise with those less familiar with voluntary certification programs. Encouraging collaborative study and discussion on this platform can lead to innovative solutions for common challenges, advance the overall interoperability, and reduce the time and cost associated with redundant testing. Ultimately, these concerted efforts will help create a more reliable, innovative, and competitive wireless ecosystem in the region.

# References

[1] Global Certification Forum, “GCF website,” Jan. 2024. Available: https://www.globalcertificationforum.org

[2] CTIA, “CTIA website,” Jan. 2024. Available: https://www.ctia.org

[3] CTIA Certification, “CTIA Certification website,” Jan. 2024. Available: https://ctiacertification.org

[4] CTIA Certification Program Working Groups, “CTIA Certification Program Working Groups website,” Jan. 2024. Available: https://cpwg.ctiacertification.org/

[5] CTIA Certification Database, “CTIA Certification Database website,” Jan. 2024. Available: https://certify.ctiacertification.org

[6] PCS Type Certification Review Board, “PTCRB website,” Jan. 2024. Available: https://www.ptcrb.com

[7] PTCRB Certification Database, “PTCRB Certification Database website,” Jan. 2024. Available: https://certify.ptcrb.com

[8] CTIA, “Process Overview of PTCRB Certification Program and IMEI Control,” Version 3.10, pp. 17-21, Dec. 2024

[9] GTI Certification, “GTI Certification website,”. Available: https://gtigroup.org/gcertification.html

**Annex 1. Questionnaire (AWG-30/OUT-25)**

* **Administration Information and Profile (Company and Person in contact)**
* Country: <please type here>
* Operator name: <please type here> **(Anonymous is possible)**
* Answer date: <please type here>
* **Instructions**
* Please put a tick in the box of your choice or write in the space as the case of “Other”.
* **Multiple choices are possible when applicable.**
* You may skip the answer when the following question is contradicted or not applicable to your previous answer.
* **Questions**

1. Which of the following does your company accept the mobile device in your network?

(a) that are directly quality-controlled by the operator’s own method and permission

(b) that are not directly quality-controlled by the operator (same concept of Open Market)

(c) we use both (a) and (b)

Other: \_\_\_\_\_

(Note) Open Market: Mobile devices are sold by the on/off line shops by the manufacturers or the distribution channel which is not directly related to MNOs. The quality of mobile devices is not controlled by the MNOs. MNOs are only involved in the SIM card authorization and subscription processes.

1. Please put a tick in the box of which your company currently requires for the acceptance of mobile devices from the device manufacturers.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Based on | Requirements | | tick box | Remarks |
| Operator  specification | Operators' own Additional Testing  because of the unique features and capabilities of the network (ex. Lab and/or Field) | |  |  |
| GCF/PTCRB/  CTIA | Network Interoperability Testing | Field Trial |  |  |
| In-House Lab |  |
| GCF/PTCRB/  CTIA | Laboratory Conformance Testing  (ex. RF, Protocol, RRM, (U)SIM, OTA, etc.) | |  |  |
| Other: \_\_\_\_\_ | <please type here when there are other requirements> | |  |  |
| - | No specific Certification or Test Report required | |  |  |

(Note) GCF/PTCRB/CTIA: Please put a tick when your company requires either of the followings.

* + Certification from such voluntary certification forum
  + Not to require certification, but at least to require the test report from the accredited 3rd party laboratories in accordance with such voluntary certification programs
  + Not to require certification, but at least to require the test report from the testing by the operator’s own personnel and test equipment in accordance with such voluntary certification programs

1. In Q2, if you put a tick in “Laboratory Conformance Testing” based on GCF/PTCRB/CTIA, which of the following does your company requires?

Certification from such voluntary certification forum

Not to require certification, but at least to require the test report from the accredited 3rd party laboratories in accordance with such voluntary certification programs

Not to require certification, but at least to require the test report from the testing by the operator’s own personnel and test equipment in accordance with such voluntary certification programs

Other: \_\_\_\_\_

1. In Q2, if you chose “No specific Certification or Test Report required”, then which of the following reason is/are applicable?

Time burden for testing and certification (Time to market perspective)

Device manufacturer’s cost burden for testing and certification

Because the manufacturers have made a commitment to take full responsibility for the quality of their mobile devices

Not enough information on existing voluntary certification programs (Do not know about such certification programs before)

Other: \_\_\_\_\_

1. Does your company have any experiences or issues on quality-control of mobile devices?

Yes

No

If “yes”, please describe: \_\_\_\_\_

1. Is your company willing to participate the further study and discussion if there are more information-sharing opportunities in APT about existing voluntary certification programs? (Using a scale of 1~5)

5 – Yes, we’d love to

4 – Yes, we’d like to

3 – Yes, but neutral

2 – No, we don’t want

1 – Never

* **End of Survey**

1. <https://www.miit.gov.cn/jgsj/wgj/wjfb/art/2022/art_2cabc3d5192046a9ad7ab6d715563dc8.html> [↑](#footnote-ref-1)
2. <https://www.miit.gov.cn/jgsj/xgj/sbgl/art/2022/art_96aa7896c8a742e48bc4acf3e98276f5.html> [↑](#footnote-ref-2)
3. <https://www.miit.gov.cn/zwgk/wjgs/art/2022/art_dcdf0b1751e545d1a7700225cb77fc4d.html> [↑](#footnote-ref-3)
4. <https://www.miit.gov.cn/zwgk/zcwj/wjfb/tg/art/2022/art_1ba9819f2f3646ca88acbfd8f095f080.html> [↑](#footnote-ref-4)