GCF Certification

"Test once, use anywhere" certification for mobile devices

By combining conformance and interoperability tests undertaken in laboratories with field trials on multiple live commercial networks, GCF Certification verifies the interoperability of mobile phones or other wireless devices with network elements and infrastructure equipment from different suppliers.

Initially on GSM and subsequently on 3G, GCF Certification has contributed to an increase in the choice of devices available to the global market and has helped to underpin international roaming services. More recently, GCF Certification has supported the successful commercialization and rapid spread of LTE. From January 2014, the scope of the scheme was extended to the 3GPP2 technology CDMA2000.

A white paper from the Global Certification Forum
Updated: February 2018

Global Certification Forum
Suite 1, 3rd Floor, 11-12 St James's Square,
London, SW1Y 4LB, UK
gcf@globalcertificationforum.org

Introduction

Mobile phones and other wireless devices are becoming ever more complex and sophisticated: the co-existence of multiple 3GPP technologies – GSM, 3G, HSPA and LTE - for wide area communications is now commonplace. Device functionality and capabilities are increasingly diverse: multimedia, email and web browsing have become as ubiquitous as voice and text. LTE has also acted as a catalyst for the convergence of the 3GPP & 3GPP2 (CDMA 2000) families of technologies.

Before adding new mobile devices to their portfolio, network operators will typically subject them to a rigorous programme of acceptance testing - to assure themselves that the devices are interoperable with, and will work well on, their own networks and those of their roaming partners. The complexity and cost of this testing escalates dramatically as the number of technologies and functions implemented in devices increases. GCF Certification has been established by stakeholders drawn from across the mobile industry to provide a cost-efficient and practical solution to this problem. The assurance of interoperability also builds confidence that the certified device should meet end-users' expectations for service access and interaction.

GCF delivers:

- A pragmatic and relevant testing regime – based on tests defined by standards organisations – that is agreed collectively by the industry to meet market needs
- Global best practice to ensure consistency of testing
- A clear distinction between core device capabilities - which are covered by GCF - and operator-specific needs which fall outside the scheme
- Opportunities to cut the cumulative cost of interoperability, conformance and functionality testing benefiting manufacturers and operators
- A clearly-understood framework that encourages harmonisation of operator acceptance testing requirements
- Faster mass-market adoption of new technologies.

The growth in the global sales of mobile devices has mirrored the growth in the variety of GCF-Certified devices.

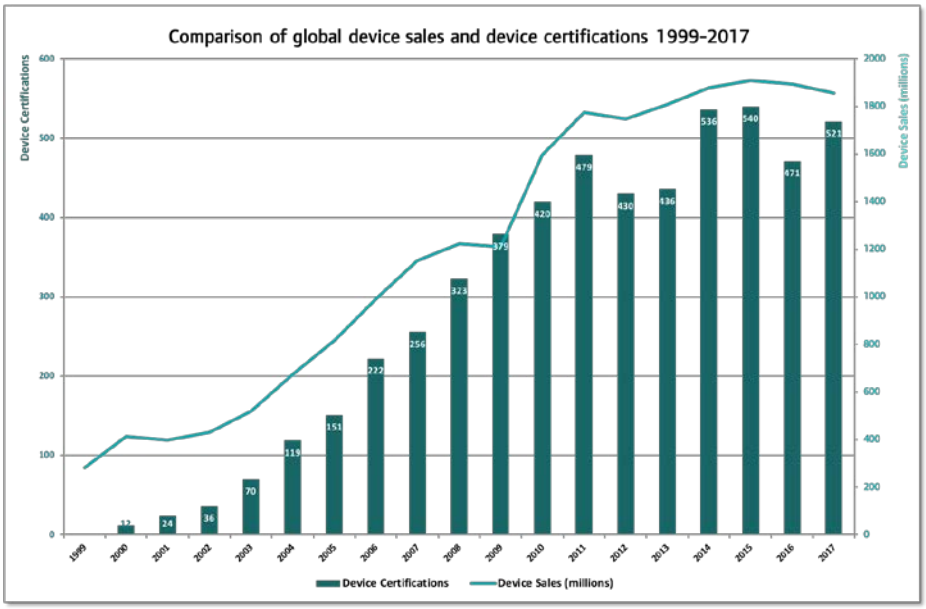


Fig 1: Comparison of global device sales against GCF device certifications (1999-2017)
Sources: Certifications – GCF; Device Sales – Gartner, collated by GCF

GCF enables certification of any mobile device based on 3GPP and/or 3GPP2 bearer technologies: from handsets, smartphones and tablets to wireless broadband USB dongles, wireless modules and M2M/IoT devices. The scheme now covers the 3GPP LPWA IoT technologies of NB-IoT, LTE CAT M1 and EC-GSM-IoT

The transparency, rigour and integrity of the certification processes contribute to the credibility and global recognition of GCF Certification. This voluntary scheme is supported by leading network operators in every region of the world and around 100 mobile device manufacturers.

Compact wireless modules that enable manufacturers to add mobile connectivity to their products in a discrete physical and functional block are adding value to established product categories while acting as a catalyst for the creation of entirely new propositions.

GCF's "test once, use anywhere" ethos is as relevant to developing markets for new device categories as it is for facilitating market entry for traditional mobile handsets and communications products. By demonstrating that a new device has achieved GCF's recognised benchmark for conformance and interoperability, a manufacturer will be better equipped to attract the support of operator partners or other distribution channels when introducing its product to new markets.

GCF has established an Associate Manufacturer membership category for manufacturers of connected devices that incorporate GCF-certified embedded modules.

Alongside operators and manufacturers, Observer Members also make an important contribution to GCF. Observer membership is open to any company that has a genuine interest in mobile devices: component suppliers, test equipment manufacturers and test laboratories, for example. The active involvement of the test community ensures the required test systems and facilities become available in a timely manner. Some 70+ companies participate in GCF as Observer Members.

GCF works closely with Standards Organisations (SOs) such as 3GPP, ETSI, CTIA, NFC Forum and OMA and is reliant on the test specifications these organisations define. GCF also co-operates with relevant industry associations such as GSMA, the NGMN Alliance, Global TD-LTE Initiative (GTI) and the Telecommunications Standards Development Society India (TSDSI).

GCF Certification was extended to include standards-based client applications with the launch of RCS client certification in October 2013.

GCF Certification – an overview

GCF certification follows the principles of a supplier's declaration of conformity (SDoC) as defined in ISO/IEC 17050.

To ensure its integrity, GCF Certification encompasses six distinct processes:

- **Qualification** of manufacturers to demonstrate they have the skills, working practices and resources to participate in the certification scheme.
- **Definition** of Certification Criteria for new features and requirements as agreed jointly by Operators and Manufacturers
- **Validation** of conformance Certification Criteria for new features and requirements.
- **Assessment** of each new device to demonstrate that all relevant certification criteria have been met.
- **Declaration**: GCF Operator Members are advised that a mobile device has successfully met all relevant certification criteria.
- **Contest:** a pre-defined process, designed to underpin the robustness of the scheme, which may be used to challenge a device's certification.

The Certification process involves subjecting a new device to a variety of tests:

- Conformance testing is undertaken to ensure that the device conforms to relevant standards
- Interoperability tests (IOT) verify the correct operation of key interfaces both between devices and between the device and mobile networks

- Field Trials complement laboratory testing to provide valuable insight into a device's real-world operation across live commercial networks which encompass equipment from different suppliers.

As organisations such as 3GPP, OMA and NFC Forum develop core standards for new technologies, they also define test cases as a means of demonstrating compliance to the relevant requirements. The process of bringing new functionalities or technologies into GCF Certification begins when a Work Item proposal receives support from a broad cross-section of members at one of GCF's quarterly Steering Group (SG) meetings.

On occasions when consensus is not clear, matters can be put to a vote. A key element of the governance of GCF is the concept of 'double majority'. To be binding, a Steering Group decision requires the support of more than 50 per cent of the manufacturer member *and* more than 50 per cent of operator member votes cast at the meeting. This culture has been instrumental in maintaining the commitment, engagement and support of both the operator and manufacturing communities.

The conversion of an SG-approved Work Item into new Certification Criteria is undertaken by member companies working together in one of GCF's Agreement Groups.

GCF's **Conformance Agreement Group (CAG)** identify the Certification Criteria to be assessed through laboratory testing. A separate agreement group, **CAG2** defines Certification Criteria for 3GPP2 technologies.

CAG (or CAG2 as appropriate) identifies a subset of the tests defined by the relevant standards organisation that will ensure that conformance testing incorporates the optimum combination of rigour and pragmatism.

For large work items - such as the introduction of a significant new technology - GCF members *prioritise* the tests to be executed in both conformance and interoperability testing. This prioritisation process aligns Certification with the immediate needs of the market: more certification criteria are added as features are enhanced in successive releases of the underlying standards.

GCF's prioritisation guides the test industry in the development of appropriate test platforms and tools. New test platforms and tools must be independently validated in a test lab of a GCF Member. The validation process ensures that each supporting Test Platform complies with the relevant Test Specification. Completed validations are presented to CAG for review and approval before the validated test case and platform combination can be added to the GCF Certification Criteria.

The Field Trial Agreement Group (FTAG) selects field testing criteria for inclusion in certification. Field trialling, a unique feature of GCF Certification, complements laboratory testing with real-world testing across multiple commercial networks, and a variety of network infrastructures, SIM cards and other terminal devices. FTAG draws on the collective experience of operators that has been collated into comprehensive field trial guidelines maintained by the GSMA Terminal Steering Group.

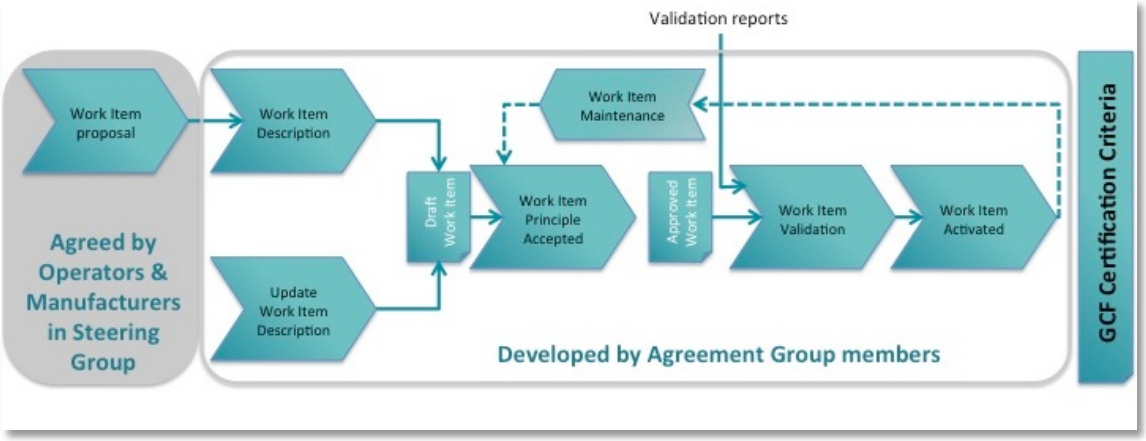


Fig 2: GCF's Work Item process
NB: The validation process is not applicable to Field Trial Certification Criteria

As a complement to certification, GCF has also introduced 'performance items' which give manufacturers the option of declaring device attributes such as battery life using standardised testing methodologies. Whilst these performance items[1] are not directly related to interoperability, they test attributes considered key by the GCF's operator members.

GCF's agreed processes and procedures are defined within a number of Permanent Reference Documents - PRDs. Available to GCF members via the members' area of the GCF website, the key PRDs are:

GCF-PD (Principle Document) provides an overview of the structure and scope of the Global Certification Forum and its scheme.

GCF-CC (Certification Criteria) lists the technical requirements for the certification of devices incorporating the 3GPP technologies and functionalities. The Certification Criteria evolve as 3GPP technologies are developed and mature. As a general rule, devices must be certified against the Certification Criteria in force at the time of testing.

GCF-CC2 (Certification Criteria 2) lists tests required for the certification of devices incorporating 3GPP2 technologies including CDMA2000.

GCF-OP (Organisational Procedures) describes the structure and working procedures of GCF including principles and processes relating to defining and assessing compliance with certification criteria.

GCF-FT (Field Trial Procedures) lists the field trial tests and procedures required for the field trial component of GCF Certification.

GCF-AP (Application Procedures) outlines the process by which a Manufacturer Member certifies a device.

GCF-CP (Client Application Certification Procedures and Criteria) defines GCF's framework for the certification of "standards-based" client applications intended for download onto smartphones. The first client application to be brought within GCF Certification is RCS.

GCF-AD (Abbreviations & Definitions) provides a glossary of the terminology used within GCF

The Certification process

To become certified, a device needs to be assessed against all the Certification Criteria that have been defined for each technology and functionality incorporated within the device.

An Assessment Capable Entity (ACE) determines which tests are required for each new device. All testing must be undertaken by a GCF Recognised Test Organisation (RTO). GCF requires that Conformance testing is performed in ISO 17025 accredited laboratories to ensure quality, impartiality and consistency. Labs must submit their ISO 17025 certification and scope to GCF in order to become recognised as an RTO.

Manufacturer Members have ACE and RTO capabilities within their own organisations. Many test organisations among GCF's Observer Members offer RTO and/or ACE services to Associate Manufacturer Members who wish to certify connected devices that incorporate GCF-certified embedded modules.

All Manufacturer Members are required to demonstrate that they adhere to a recognised quality assurance programme – meeting the requirements of ISO 9000 – and utilise it on a daily basis in the design, development and manufacture of their GCF-certified devices.

[1] Current Performance Items are listed at https://www.globalcertificationforum.org/performance.html

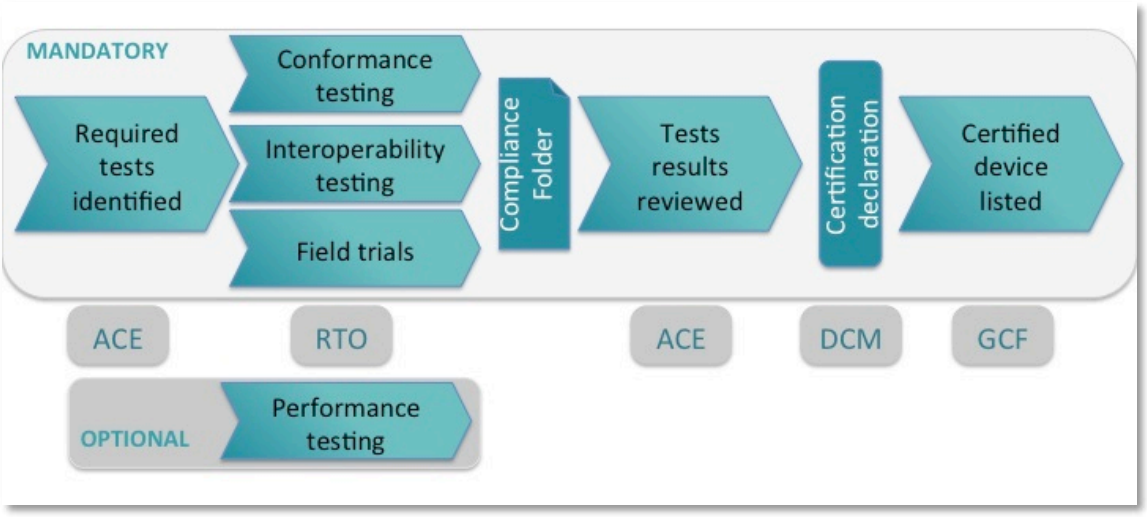
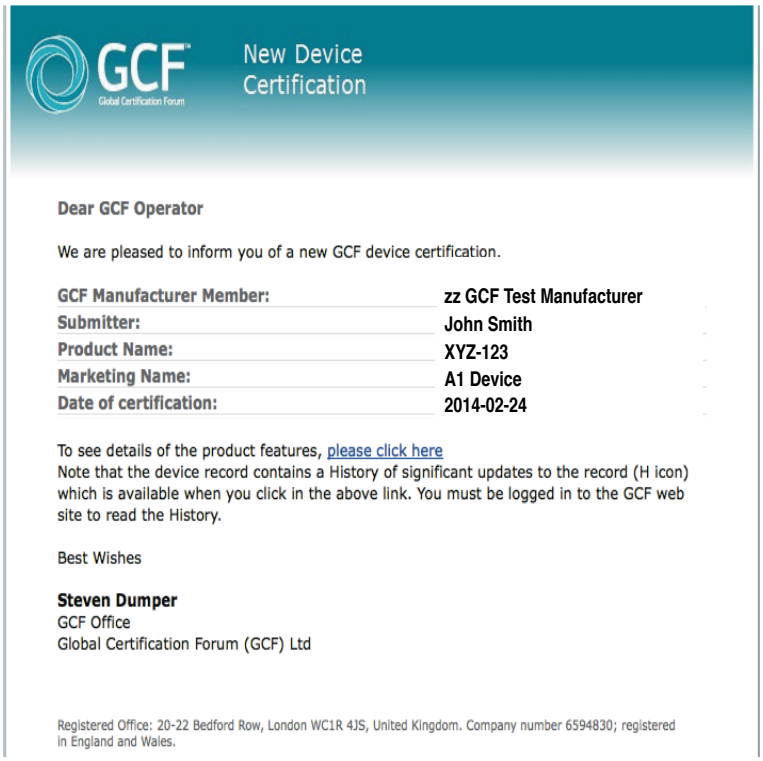


Fig 3: GCF's device certification process

When all relevant conformance, interoperability and field test certification criteria have been met, and detailed corroborative evidence has been uploaded to GCF's members' portal, a device can be declared as 'certified'.

All GCF certifications must reference a current version of the GCF Certification Criteria. However, a manufacturer's Device Certification Manager has the option to defer publication of a certification in order to maintain the confidentiality of a product until, for example, its public launch. Generally, publication cannot be deferred more than 90 days after the completion of the Certification Declaration. Changes made after the Declaration upload must be recorded in a change history.

Through the notification process, more than 100 network operator groups are automatically made aware of a new product.



GCF
Global Certification Forum

New Device Certification

Dear GCF Operator

We are pleased to inform you of a new GCF device certification.

GCF Manufacturer Member:	**zz GCF Test Manufacturer**
Submitter:	**John Smith**
Product Name:	**XYZ-123**
Marketing Name:	**A1 Device**
Date of certification:	**2014-02-24**

To see details of the product features, please click here
Note that the device record contains a History of significant updates to the record (H icon) which is available when you click in the above link. You must be logged in to the GCF web site to read the History.

Best Wishes

Steven Dumper
GCF Office
Global Certification Forum (GCF) Ltd

Registered Office: 20-22 Bedford Row, London WC1R 4JS, United Kingdom. Company number 6594830; registered in England and Wales.

Fig 4: Sample email notification of newly certified device

Information on all certifications published in the last year is also posted to the public area of the GCF website[2]. The public listing includes:

- Manufacturer's name
- Device's model name(s)
- Date of certification
- GSM/GPRS frequency bands supported by the device (i.e. 850, 900, 1800, 1900 MHz)
- 3G (UTRA) modes (i.e. FDDI, FDDII, FDDV) supported
- LTE (E-EUTRA) bands/modes supported (e.g. FDD Band 13 (700 MHz), FDD Band 20 (800 MHz))
- Certified applications

Detailed information on all specific tests undertaken on a particular device is accessible to operator members via the members' area of the site. (The detailed information cannot be accessed by other manufacturers.)

GCF rules mandate that no public reference is made to the GCF certification of any mobile device until it is listed on the GCF website.

Optimized certification process for connected devices

GCF has introduced an optimised certification process for connected devices in which connectivity is provided by a GCF-Certified embedded module[3].

Under the optimised scheme, certification of the device is explicitly linked to the certification of its embedded module. In this way, the number and scope of tests that need to be applied to the connected device can be significantly reduced. Testing focuses on functionality such as antenna, SIM contacts and user-interface that are specifically provided by the connected product rather than its embedded module. Guidelines[4] for the Certification of Connected Devices can be downloaded from the GCF website.

GCF Certification for LTE

Long Term Evolution (LTE) is the latest step in the ongoing evolution of mobile devices and services. It has been designed and specified by 3GPP to deliver further bandwidth and performance improvements compared with 2G and 3G technologies.

Bringing a sophisticated new technology such as LTE within the scope of GCF certification was a massive undertaking. The first stage involved the agreement of the priority tests considered critical for demonstrating acceptable operation in early devices and without which certification could not start. A close liaison between GCF and 3GPP was important at this stage.

Once prioritised, the new conformance tests had to be validated to ensure that each supporting Test Platform complied with the relevant Test Specification. A further group of Priority 2 test cases was agreed in July 2010 to enable the Certification scheme to develop in line with the evolving capabilities of LTE devices.

To meet the initial needs of global markets, the development of LTE Certification was initially focused on:

[2] https://www.globalcertificationforum.org/products/all-certified-products.html
[3] https://www.globalcertificationforum.org/products/certified-modules.html
[4] https://www.globalcertificationforum.org/asset/4094D7F1%2D084B%2D4854%2DA55FB3089BDFF261/

- 700 MHz, 800 MHz and 2100 MHz FDD frequency bands
- 2300-2400 MHz and 2570-2620 MHz TDD bands

However, GCF structured LTE certification so that, as the need arose, it could be extended quickly and efficiently to other frequency bands.

LTE device certification was introduced in December 2010 and has subsequently been extended to multiple FDD and TDD bands[5] as different spectrum has been allocated to operators in different regions around the world. In 2017, 84 per cent of all GCF-Certified devices incorporated LTE in at least one band.

The scope of GCF's LTE certification has continued to evolve with the introduction of tests for multi-mode and multi-band usage scenarios and for the deployment of enhancements such as carrier aggregation. The scheme will continue to develop as LTE evolves through LTE-Advanced, LTE-Advanced Pro and onwards towards 5G.

More information

Further information on the GCF membership application process can be found at:
https://www.globalcertificationforum.org/certification/certifiable-technologies/lte/4g-lte-bands.html

[5] http://www.globalcertificationforum.org/certification/lte.html