GCF™
Global Certification Forum

Guidelines

For the certification of devices incorporating embedded wireless modules

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Introduction

Wireless communication based on mobile technologies such as GSM, CDMA2000, 3G, HSPA and LTE are being incorporated into diverse connected devices for an increasingly wide variety of consumer, enterprise, industrial, automotive and medical applications.

The presence of mobile networks in virtually every country on the planet creates potentially massive opportunities for manufacturers of these new connected devices. Mobile operators, who will help realise the added-value of wireless connectivity, are ready to support the development of new markets. However they also need to be assured that new devices will not interfere with other devices or adversely impact their own networks and the services offered to other customers.

Multi-band devices have enabled manufacturers to offer the same product in markets where operators have different spectrum allocations. However, as the number of available wireless technologies, bands and functionalities grow, the complexity and cost of conformance and interoperability testing increases dramatically. Today, subjecting a new device to multiple rounds of testing in order to secure entry into individual target markets is neither economic nor practical.

The Global Certification Forum – GCF – maintains an independent certification programme that addresses this challenge. An active partnership between network operators, device manufacturers and the test industry, GCF's remit is to help ensure global interoperability between devices and networks. Through its commitment to the principle of "test once, use anywhere", GCF facilitates market entry for manufacturers while reducing the acceptance testing burden on operators.

GCF Certification – an overview

Since 1999, GCF Certification has confirmed interoperability between GSM mobile phones and mobile networks – irrespective of network equipment vendor. The scheme made, and continues to make, a significant contribution to the spread and success of GSM worldwide and underpins the ability of operators to offer international roaming services. As GSM has evolved, so has GCF Certification. Today Certification embraces all technologies maintained by the 3GPP standards body: GSM, GPRS, 3G (UMTS/WCDMA), HSPA and LTE. GCF's scope was extended to include CDMA2000 devices from January 2014.

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 mobile standards. Inter-operability tests (IOT) verify the correct operation of key interfaces both within the device 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.

The technologies, features, functionalities and application enablers included within GCF Certification are agreed collectively by GCF's operator and manufacturer members and reflect the current real needs of the market.

GCF certification operates in line with open and fair processes which 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 current tests required for the certification devices incorporating the various 3GPP technologies and functionalities embraced within the scheme. 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 3GPP-capable 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.

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

Connected devices incorporating embedded modules

Compact wireless modules are now available that enable manufacturers to add mobile connectivity to their products in a discrete physical and functional block. This capability adds value to established product categories and is 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 devices as it is for facilitating market entry for traditional mobile handsets, smartphones and communications products. Operators and manufacturers alike can benefit from significant reductions in the overheads associated with acceptance testing.

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 a new category of Associate Manufacturer Members open to manufacturers who only wish to certify connected devices that incorporate GCF-certified embedded modules.

Basic principles for the certification of connected devices

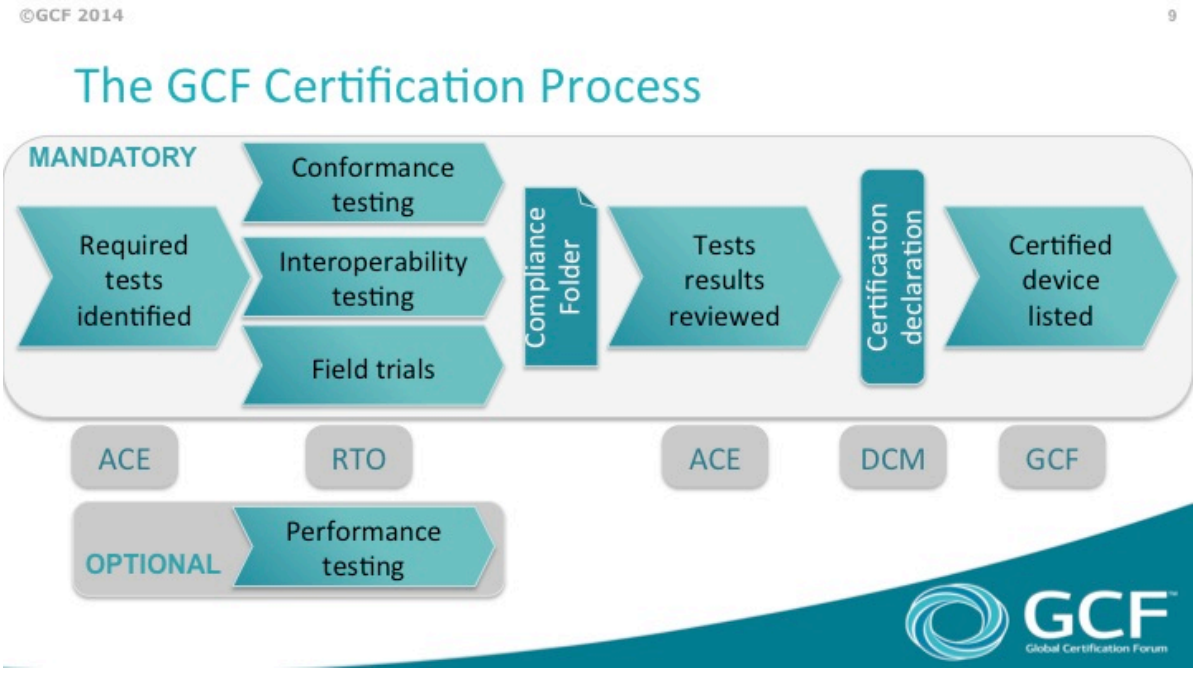
An optimised certification process has been developed for connected devices which incorporate GCF-certified embedded wireless modules. This is an evolution of the process that has been applied to the thousands of devices certified previously, and maintains the robustness and integrity of GCF.

There are three essential requirements for a connected device to qualify for certification by this alternative process.

- The embedded wireless module that provides mobile connectivity must itself be GCF-Certified
- The wireless module must have been certified less than three years prior to the certification of the connected device in which it is embedded[1]
- Mobile communications cannot be the primary function of the connected device. (Embedded modules, like mobile phones, USB modems, portable Wifi hotspots and other devices which have mobile communications as their primary function are required to undergo full GCF Certification.)

[1] See https://www.globalcertificationforum.org/products/certified-modules.html for a list of eligible certified modules

In practice, qualifying embedded modules (which will have been designed specifically for the purpose of adding mobile connectivity to other devices) will typically be supplied to the connected device manufacturer by a third party who is a Manufacturer Member of GCF. However, the certification of a connected device incorporating a certified embedded module is the responsibility of the manufacturer of the connected device itself.



The optimized certification process for connected devices

By explicitly linking the certification of a device to the certification of its embedded module, GCF has been able to reduce the number and scope of tests that need to be applied to connected devices.

Under the optimised scheme, 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.

An Assessment Capable Entity (ACE) must identify which Conformance, Field Trial and IOP tests need to be undertaken in order to demonstrate that a manufacturer's connected device is compliant with all the relevant GCF Certification Criteria. An ACE is any organization that has demonstrated to GCF that it has the skills and experience to correctly determine the range of required tests. Manufacturer Members of GCF have ACE capabilities in-house. Associate Manufacturer Members select a Third Party ACE – a suitably qualified test organization from among GCF's Observer Members[2] - to provide technical support and guidance during the Certification process.

The required tests are identified by

- reviewing the functionality and features supported by the connected device against the functionality and features in the embedded module

[2] See https://www.globalcertificationforum.org/certification/certification-process/ace/tpace.html for a list of qualified ACEs

- determining whether the functionality or performance of the module has been altered during its integration in the connected device.

The tests applicable to connected devices are defined in Annex F.5 and Annex G of the GCF Certification Criteria.

Annex F.5 lists field trial requirements while Annex G describes the lab-based conformance and inter-operability tests. From the two lists, the ACE determines which tests need to be undertaken by considering the wireless functionality offered by the product, any changes made to the module, the environment in which the module is implemented, and the original Certification of the module.

The connected device is certified against the GCF-Certification Criteria valid at the time of its testing rather than the Certification Criteria that were in place when the module was certified. Under GCF's rules, all the required testing must be undertaken by a Recognised Test Organisation[3].

Where a manufacturer wishes to use a range of modules, or modules from multiple sources, within a connected device, each combination of device and module must be certified and listed separately in the GCF-certified devices list.

The most up-to-date versions of the Annexes are always available to GCF members as part of the GCF-CC PRD via the members' area of the GCF website.

Certification declaration

Once a connected device has been subjected to all applicable tests, the ACE reviews the results. If the ACE is satisfied that the device meets all relevant certification criteria, the manufacturer's Device Certification Manager submits a 'Certification Declaration' via the members' area of the GCF website.

The Certification Declaration for a connected device is made up of the following information and documentation:

F.1: Device Declaration – a formal declaration signed by the Associate Manufacturer Member's responsible manager – often the senior Quality Manager

F.2 GCF Certified Device Declaration – provides a summary of supported bands, application enablers etc

F.5 Field Trial results

F.3.10 OTA - Antenna Performance Measurements (the requirement for this evidence is determined by an assessment of the module's antenna implementation)

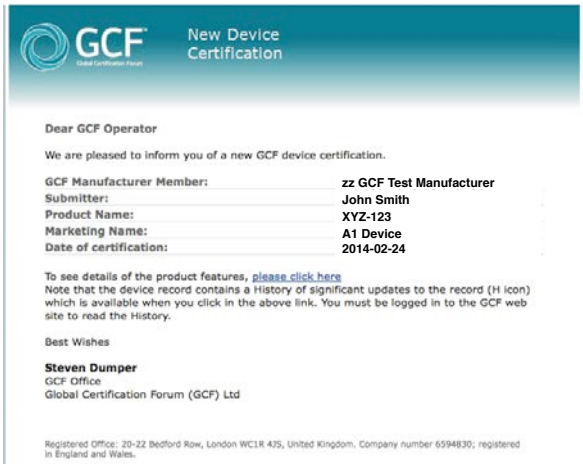
F.4.2 Certification Criteria Applicability List – derived from the analysis of the applicability table in Annex G described above.

Templates are provided for all documentation required for the Certification Declaration.

A manufacturer's Device Certification Manager has the option to select a "Public Availability Date". This is to allow the manufacturer to maintain the confidentiality of a product until, for example, its public launch. However, the Public Availability Date must be within 90 days of the Certification Declaration, which must be complete when uploaded. In addition, the date of certification must be within the validity period of the Certification Criteria version stated in the Certification Declaration. Changes made after the Declaration upload must be recorded in a change history.

An automatic e-mail notification is sent to all operators in GCF's membership whenever a new Certification Declaration is uploaded, or on the Publicly Available Date if specified.

[3] See https://www.globalcertificationforum.org/certification/certification-process/rto.html for lists of Conformance, IOT and Field Trial RTOs



GCF 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

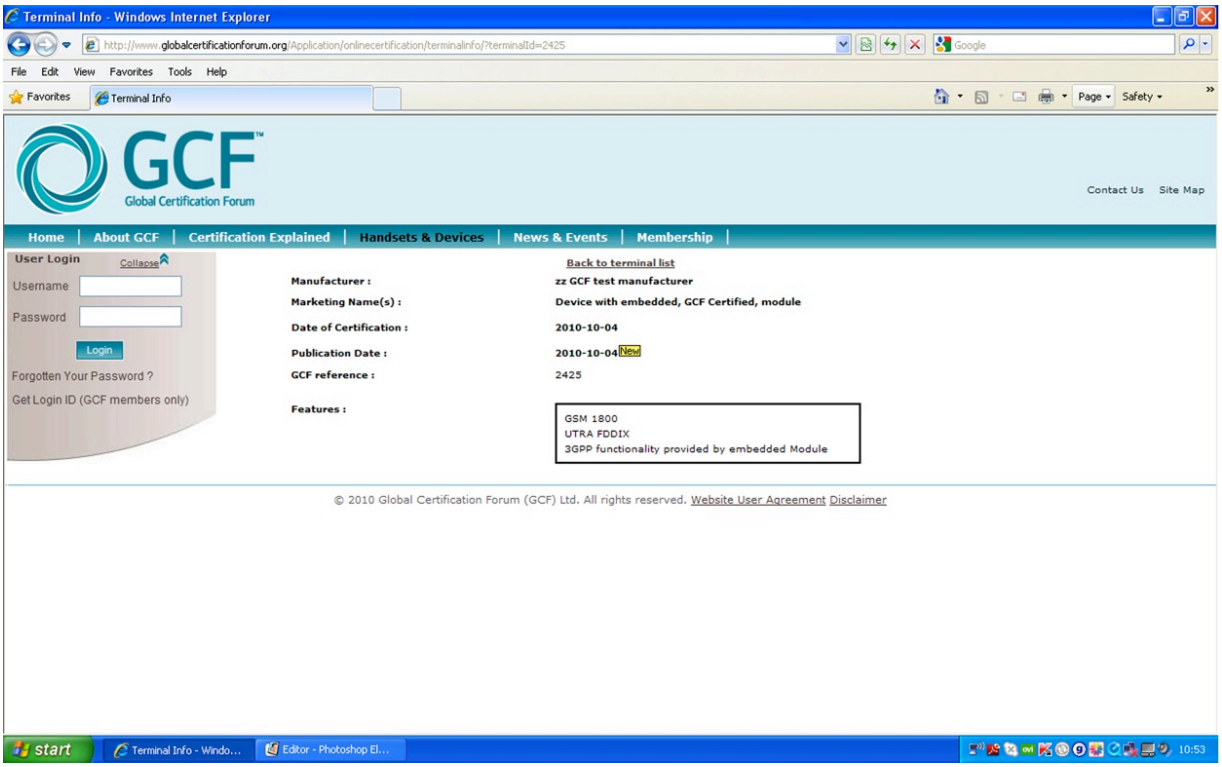
Steven Dumper
GCF Office
Global Certification Forum (GCF) Ltd

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

If changes have been made to a device between upload and a Publicly Available Date, the change history is sent with the notice of certification. Through the notification process, more than 100 operators groups are automatically made aware of a new product.

Information on all certifications is also posted to the public area of the GCF website. The public listing includes:

- Manufacturer's name
- Device's marketing 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))
- Application enablers supported



Operator Members have the right to contest a Certification if they perceive it is incorrect or incomplete. Issue resolution procedures are defined within GCF's PRDs.

Compliance folder

Connected device manufacturers are required to maintain a compliance folder containing evidence that the device has been developed and tested according to the manufacturer's Quality Assurance Program Requirements and that the device conforms with the relevant GCF Certification Criteria. Evidence may be in any form (electronic, paper etc) that is appropriate to the manufacturer's accredited processes, provided that the information is under issue control, and applicable to a specific device.

For connected devices, the compliance folder can refer to the relevant embedded module's GCF Certification as evidence that common functionality and features are compliant with the GCF Certification Criteria. (The module manufacturer will separately be maintaining a compliance folder for the module.)

The compliance folder needs to describe which functionality and features of the module are common to the connected device. Where there are differences between the module and the connected device, the compliance folder must provide evidence that any differences do not compromise compliance with the relevant GCF Certification Criteria.

The folder also holds evidence of the conformance, interoperability and field trial assessments performed. These records must be maintained for at least the period that the device is available on the market.

Separate Compliance Folders must be maintained for each device/module pair if alternative modules have been sourced.

Under normal circumstance, the Compliance Folder remains confidential to the manufacturer. However, in the case of a dispute and issue resolution, relevant information may be requested for review by the GCF Office.

Changes to hardware and software configurations

Module manufacturers are required to ensure the continued compliance of their devices against the GCF Certification Criteria in force at the time of certification for as long as the module remains on the market.

Although the connected device manufacturer is not responsible for any changes made by the module manufacturer, there is an obligation to ensure the continued compliance of the implementation of the module.

When a certified device is modified, changes in the device hardware and/or software configuration must be recorded in the Compliance Folder together with evidence of continued compliance with the applicable Certification Criteria. For example, regression testing can be employed to demonstrate continued compliance.

The applicable Certification Criteria are those that were applicable on the date of the original Certification Declaration. Tests that are incorporated in GCF Certification after the device was first certified are not applicable, nor are changes to the tests made after the device was certified.

Any change to the device build state which invalidates the manufacturer's Declaration must be notified to the GCF Office within thirty days, accompanied by a request to withdraw a device from holding Certified Status. Build changes that require a modification to the information within the Declaration but do not invalidate the original Declaration must also be notified to the GCF Office within 30 days.

Who can use GCF Certification?

GCF Certification is open to any Manufacturer or Associate Manufacturer Member of GCF.

To qualify for membership, a manufacturer is required to demonstrate 'Quality Qualified' and 'Quality Assessment' compliance.

Quality Qualified requires a declaration that the manufacturer's design, development and manufacturing processes are, and remain, compliant with a recognised quality assurance standard such as ISO 9000 or an appropriate regional equivalent. The manufacturer's quality system must be under regular review by a recognised third-party accreditation organisation.

Quality Assessment Compliance demonstrates the manufacturer, with the assistance of a Third Party ACE if necessary, has access to the skills and expertise to assess the conformity of their product.

To maintain the rigour and credibility of GCF Certification, all conformance testing must be performed by a Recognised Test Organisation in an ISO/IEC 17025-accredited test facility. This can be the manufacturer's own facility or outsourced to a suitably qualified and recognized third-party test house. Several module suppliers and test houses within GCF's membership offer services to third parties.

Each Manufacturer Member appoints a named person from within the quality framework of their company to act as Device Certification Manager. The Device Certification Manager is responsible for overseeing the certification process and making the Certification Declaration for each device that is successfully certified.

More information

Further information on the GCF membership options can be found at:
https://www.globalcertificationforum.org/membership.html