GCF Certification

"Test once, use anywhere" certification for mobile devices
A white paper from the Global Certification Forum

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

Initially on GSM and latterly on 3G, for more than a decade the Global Certification Forum has underpinned international roaming. The benefits of GCF Certification are currently being extended to LTE.

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Introduction

Mobile phones and wireless devices are becoming ever more sophisticated. The need for co-existence of multiple radio technologies – GSM, 3G, HSPA and LTE for wide area communications, together with others such as WiFi or GPS for location-specific services - is increasingly the norm. Device functionality and capabilities are increasingly diverse: text, multimedia, email and web browsing are fast becoming as ubiquitous as voice.

Before accepting a new device, mobile operators want to be sure it will work well on their own networks and those of their roaming partners. As the number of technologies and functions grows, the complexity and cost of undertaking this conformance and interoperability testing increases exponentially. As it is neither practical nor economically viable for a mobile operator to undertake comprehensive testing of every new device, GCF Certification has been established to provide an assurance that the core functionality in today's devices will fulfil customers' expectations with regard to interoperability of services and the operators' expectations with regard to correct network interoperability.

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 (covered by GCF) and operator specific needs (not covered by GCF) to define a boundary between the testing responsibilities of manufacturers and operators
- Opportunities to reduce overheads for interoperability, conformance and functionality testing for manufacturers and operators
- Faster mass-market adoption of new technologies.

GCF enables certification of any mobile device based on 3GPP bearer technologies: from handsets, smartphones and tablets to wireless broadband USB dongles, data cards and wireless modules for embedding in laptop and netbook PCs, consumer electronic devices or machine-to-machine (M2M) applications.

By drawing together leading players from across the mobile industry, GCF maintains an independent certification scheme that is accepted across the industry.

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 from every region of the world and around 50 mobile device manufacturers.

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 3GPP mobile devices: test equipment manufacturers and test laboratories, component suppliers, software and application developers. The active involvement of the test community ensures the required test systems and facilities become available in a timely manner. Around 70 companies participate in GCF as Observer Members.

This very active GCF partnership works closely with Standards Organisations (SOs) such as 3GPP, ETSI 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 and IMTC.

GCF Certification – an overview

GCF Certification encompasses two distinct processes:

- Scheme definition and maintenance
- Implementation

GCF Certification is defined and maintained by GCF members collectively. The GCF Certification Criteria to be assessed through laboratory testing are identified by GCF's Conformance and Interoperability Group (CAG).

As organisations such as 3GPP or OMA develop new technologies, they define a multitude of test cases to validate the standards. For Certification, CAG identifies a subset of the available tests that will ensure that Certification incorporates the optimum combination of rigour and pragmatism. The test industry develops appropriate test platforms and tools and implements the agreed conformance test cases.

Working with independent test houses, GCF *validates* the conformance test cases to ensure they adequately reflect likely real-world situations.

Field testing criteria for inclusion in certification are selected by GCF's Field Trial Agreement Group (FTAG).

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

Test case selection and prioritization

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: the scheme can be expanded as further features are introduced in new releases of the underlying standards.

Once the relevant test cases have been published by a standards organisation such as 3GPP or OMA, GCF's prioritisation guides the test industry in the development of appropriate test platforms and tools.

Maintaining cross-industry support

Decisions on what to include within GCF Certification are taken by members within the GCF Steering Group and are usually reached by consensus. On occasions when consensus is not clear, matters can be put to a vote. A

[1] Current Performance Items are listed at http://www.globalcertificationforum.org/WebSite/public/performance_items.aspx

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 percent of the manufacturer member *and* more than 50 percent 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.

Ensuring integrity

The integrity of the scheme is ensured by requiring that all participants to demonstrate and verify that their organisation has an appropriate quality management system.

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 mobile devices.

Manufacturers must also declare that they have access to the necessary 'means of test' to assess that their products meet the relevant certification criteria. GCF requires that testing is performed in ISO 17025 accredited laboratories to ensure quality, impartiality and consistency.

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[2] maintained by the GSMA Terminal Steering Group.[3]

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'.

Outline information about the newly certified device is listed on the public GCF website[4]. 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 require that no public reference is made to the GCF certification of any mobile device until it is listed on the GCF website.

[2] GSMA Device Field- and Lab Test Guidelines Visit: http://www.gsma.com/documents/ & search for Document ref "TS.11"
[3] See GCF's white paper on Field Trials for more information http://www.globalcertificationforum.org/WebSite/document/public/GCF-WP-Field_Trials.pdf
[4] Certified devices are listed at http://www.globalcertificationforum.org/Application/onlinecertification/terminallist/ Operator members have access to more detailed information on all certified devices through the members' area of the website.

Extending GCF Certification to LTE

Long Term Evolution (LTE), the next step in the ongoing evolution of mobile phones and services, is designed to deliver further bandwidth and performance improvements compared with existing 2G and 3G technologies. LTE is attracting interest from mobile operators with GSM and 3G legacy networks, as well as operators new to 3GPP technologies, around the world.

A global device certification scheme incorporating conformance, interoperability and field testing is a key milestone along the road to mass market LTE. The foundations for an effective certification scheme are:

- Stable core specifications
- Readiness of test specifications from the relevant standards organisations
- Availability of mature LTE reference terminals for test case validation
- Effective prioritisation of LTE test cases and requirements
- Investment from the test industry in test platforms

Bringing a sophisticated new technology such as LTE within the scope of certification is a massive undertaking. The first stage involves the agreement of the priority tests considered critical for demonstrating acceptable operation in early devices and without which certification should not start. A close liaison between GCF and standards organisations is important at this stage. For LTE, more than 280 completely new conformance tests were identified as Priority 1.

Once prioritised, the new conformance tests had to be validated on commercial test platforms to ensure their correct operation in use. A further group of Priority 2 test cases was agreed at the July 2010 GCF CAG meeting: these test cases will enable the Certification scheme to develop in line with the evolving capabilities of future LTE devices.

To meet the needs of the US, Japanese and European markets, the development of LTE Certification was initially focused on the FDD frequency bands at 700 MHz, 2100 MHz and 2600 MHz respectively. For TDD, initial priorities were the 2300-2400 MHz and 2570-2620 MHz bands that have been allocated for large-scale LTE trials in China and the USA. However, GCF structured LTE certification so that, as the need arose, it could be extended quickly and efficiently to other frequency bands. The 1800 MHz and 800 MHz bands were added to the LTE work programme in April and July 2010 respectively and the Korean 850 MHz and US AWS bands were added in early 2011.

A flexible approach has been critical; work items have been organised so that if any delays are experienced in one frequency band, development of certification in other bands will not be compromised.

In early 2010, GCF changed its baseline to the 3GPP Release 8 December 2009 update to reflect the intended network deployments. This update introduced changes related to SMS-over-LTE and the WCDMA-to-LTE handover. The requirements for the bandwidths at which test cases are validated have also evolved. Initially, the default was a 5 MHz bandwidth for all bands. This was subsequently increased to 10 MHz and even 20 MHz on some bands in response to requests from operators actually deploying LTE.

The first tranche of test cases were approved as validated by the GCF CAG in January 2010. GCF requires 80 per cent of LTE test cases to be validated before LTE certification can start.

Since early 2008, GCF's role has been to focus the efforts of operators, manufacturers, and the test industry to bring the necessary building blocks for LTE certification together in a timely fashion.

LTE device certification for 700 MHz (US SMH/Band 13) was introduced in December 2010. Further bands[5], including two TDD bands, were brought within Certification during 2011 and LTE devices for three regions – Asia, US and Europe – were certified by the end of the year.

In delivering LTE certification, GCF will continue to underpin the interoperability in the next generation of mobile devices.

[5] Updates on LTE Certification can be found at http://www.globalcertificationforum.org/WebSite/public/news_events.aspx