

# NTT DOCOMO's Initiatives with the Global Certification Forum

*We present an overview of the GCF, which certifies mobile terminals guaranteeing interconnectivity with mobile networks, and introduce NTT DOCOMO's past activities and future prospects with the GCF.*

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## 1. Introduction

Since mobile communications have been improving from Second-Generation (2G) to Third-Generation (3G) mobile communications, mobile services have also improved and diversified. Videophone, e-mail, Internet access and other sophisticated services can be provided. It has also become usual for these services to be available globally, so that even if an operator offers an advanced technology or service, mobile terminals must maintain interconnectivity with foreign networks so that these services are available world-wide. As part of efforts to ensure this interconnectivity, NTT DOCOMO has been promoting activities of the Global Certification Forum (GCF), which has been helpful in this area.

This article provides the general overview of the GCF and briefly introduces NTT DOCOMO's activities at the GCF.

## 2. GCF Overview

### 2.1 Founding Objectives

In recent years, due to the increasingly rich functionality of mobile communications networks and rising usability of mobile terminals, demand has increased for global mobile communications that is usable without difficulty overseas as well as in Japan. With increasing worldwide demand for a mechanism to ensure interconnectivity between mobile communications networks and mobile terminals, the Global System for Mobile Communications Association (GSMA)<sup>\*1</sup> began discussing certification to guarantee terminal interconnectivity in 1999, and

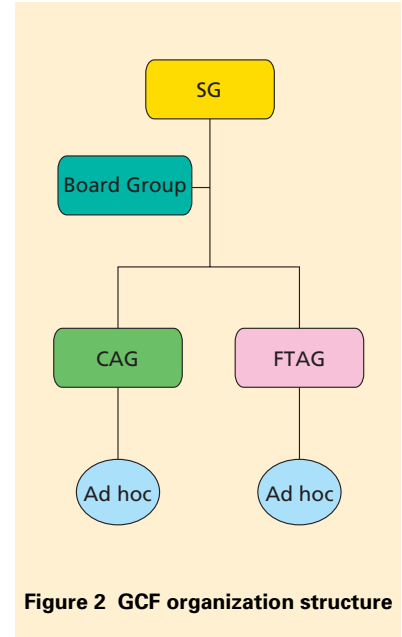
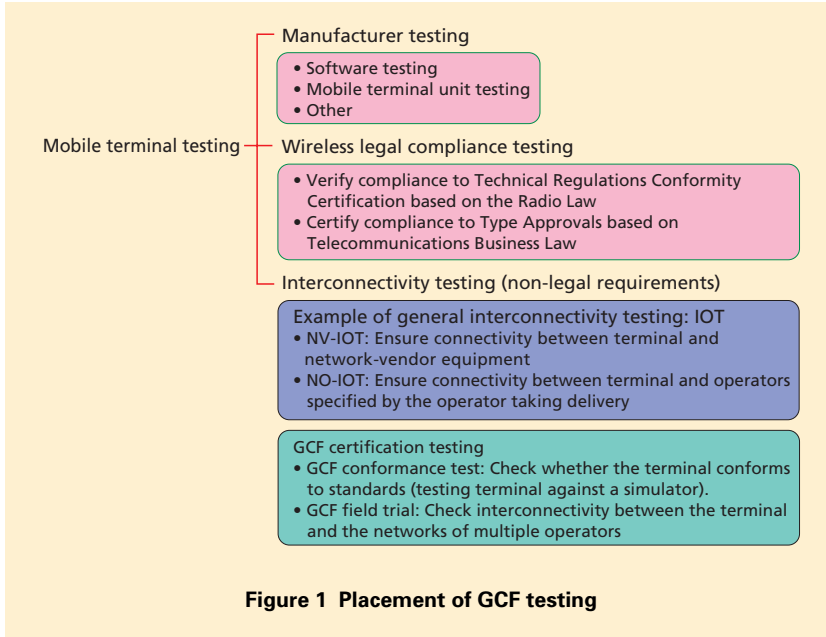
established the GCF under the GSMA in 2000. A headquarters was set up in London, and in March, 2008 the GCF was incorporated, continuing its activities as GCF Ltd.

### 2.2 GCF Placement

**Figure 1** shows the relationship between legal testing requirements for mobile terminals and GCF certification. Taking Japan as an example, mobile terminals are legally required to prove compliance with Technical Regulations Conformity Certification based on the Radio Law (according to the standards certification system for radio-transmission devices), and to be certified as compliant with Type Approvals based on the Telecommunications Business Law (according to the standards certification system for mobile devices).

\*1 **GSMA:** An organization for members of the GSM industry. Currently also covers W-CDMA and has participation from 750 operators in 218 regions.

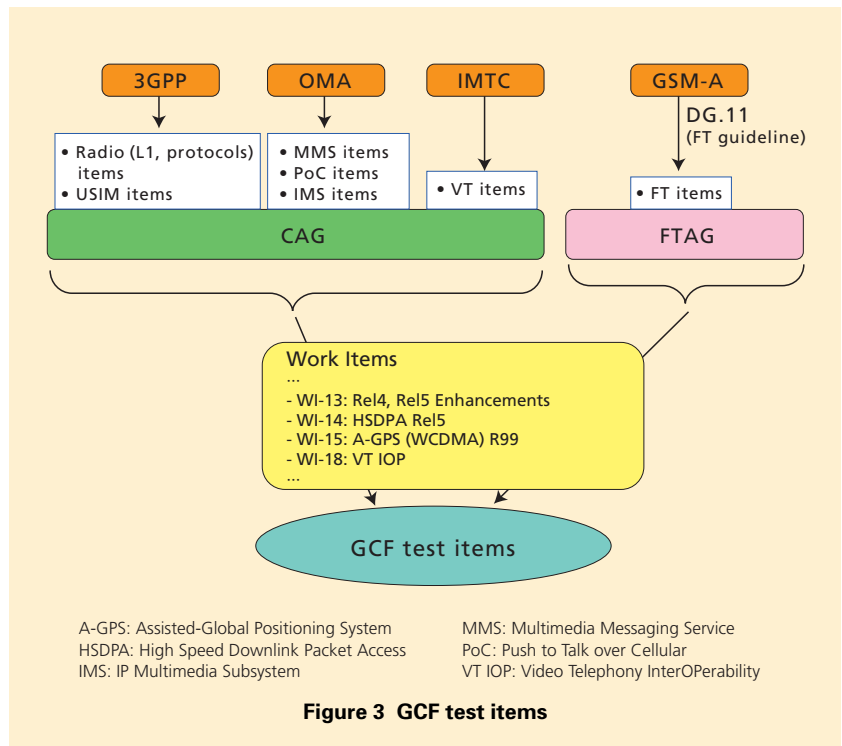
# Standardization



In contrast, GCF certification is not mandatory from a legal perspective. GCF tests are used as one means to ensure interconnectivity, along with Network-Vendor InterOperability Tests (NV-IOT) and Network-Operator InterOperability Tests (NO-IOT). If a vendor obtains GCF certification for each of its mobile terminal products, this means that the relevant terminals are internationally recognized to maintain a prescribed level of interconnectivity.

### 2.3 Organization Structure

The organization structure of the GCF is shown in **Figure 2**, and the process for determining GCF test items is shown in **Figure 3**. The GCF is



made up of the following five groups.

#### 1) Steering Group (SG)

This group determines the policies on overall activity and strategy for the GCF. It also make proposals related to GCF operations, budget, future activities and gives approval of recommendations. All GCF members can participate in the SG.

#### 2) Board Group

The board group acts on behalf of the SG in areas entrusted by the SG, deciding on strategic plans for GCF activities and acting as the executive committee to execute them. It also makes recommendations in consultation with the SG. The board consists of 14 members, including a chairman (one-year term), a vice-chairman (one-year term), six operator positions and six manufacturer positions (two-year terms). The chairman and vice-chairman are appointed from operator and manufacturer members in alternating years.

#### 3) Conformance & Interoperability Agreement Group (CAG)

This group performs technical studies for simulator test (conformance test) and application test items. It handles GCF Work Items (WI) related to GSM and Universal Mobile Telecommunication System (UMTS)<sup>\*2</sup> conformance tests. The GCF does not create

test items itself, but rather selects test items from those standardized by standards organizations such as the 3rd Generation Partnership Project (3GPP), the Open Mobile Alliance (OMA)<sup>\*3</sup> and the International Multimedia Teleconferencing Consortium (IMTC)<sup>\*4</sup>.

#### 4) Field Trial Agreement Group (FTAG)

This group performs technical studies to create requirements for field testing. FTAG did not exist when GCF was first established, but there was increasing need for field trials of 2G and 3G equipment, so FTAG was formally established in December, 2005 to discuss and agree on test items for these trials. FTAG requirements are extracted mainly from the requirements discussed by the GSMA Devices Group (DG).

#### 5) Ad hoc Groups

The Ad hoc groups meet before the regular CAG and FTAG meetings to advance the activities for WI test selection, but they do not have decision-making authority, so their activities are limited to making recommendations. However, because members participating for a given item are limited, discussion can proceed more efficiently, making their activities quite effective.

## 2.4 GCF WI

The GCF WI list as of May, 2008 (GCF PRD CC Annex E) is shown in **Table 1**. In order to receive GCF certification, a terminal must pass all of the test items for all WIs that the terminal supports. WIs are proposed and approved at the SG meetings. Technical study of the approved WIs is carried out by CAG and FTAG groups, as shown in Fig. 3. In the CAG and FTAG groups, the two steps of selecting and validating test items for each WI are performed. GCF test items are selected from among test items prescribed by various standards organizations. Test items are validated by testing on at least two terminals (of differing platform) to confirm that the test item is appropriate. So far, the CAG has approved 52 WIs, and the FTAG, eight WIs. As of May, 2008, 38 of the CAG WIs and four of the FTAG WIs have been adopted as certification tests.

## 2.5 Membership

GCF members are classified into three types: operator, manufacturer or observer. Members of the GSMA that are operating a GSM or 3G service are eligible to apply for operator membership. Companies that are selling GSM or 3G terminals under their own brand-

\*2 **UMTS**: The 3G mobile communications system used in Europe. It has two forms: W-CDMA, adopted by NTT DOCOMO, and TD-CDMA, adopted mainly in Europe.

\*3 **OMA**: An industry standardization organization that aims to standardize service and application technology and achieve interoperability in mobile communications.

\*4 **IMTC**: A public-service corporation which promotes development of multimedia teleconferencing systems and having over 125 members from North America, Europe and the

Asia-Pacific regions.

Table 1 GCF WI list

name are eligible to apply for manufacturer membership. Any other members are classed as observers.

As of June, 2008, the membership consisted of 157 operators, 42 manufacturers, and 69 observers. While membership is somewhat weighted towards European companies, all global regions are represented (**Figure 4**[1]).

### 3. NTT DOCOMO Activities

#### 3.1 Objectives for GCF Activities

In December, 2004, NTT DOCOMO

began selling terminals supporting global roaming and providing global-roaming services. We continue to develop and sell terminals which support global roaming, and currently the majority of NTT DOCOMO terminals support it. All terminals supporting global roaming are tested in a process equivalent to GCF testing, and GCF test procedures are used as one of the steps to ensuring interconnectivity [2].

In addition to activities for ensuring the interconnectivity of our own terminals (roaming-out services

for NTT DOCOMO terminals), NTT DOCOMO is also undertaking activities to ensure interconnectivity of our 3G network with overseas terminals (roaming-in services for overseas terminals). We are proactively participating in study for GCF conformance and field tests, having established several GCF WI. We are also using the GCF effectively as a means to ensure interconnectivity between the NTT DOCOMO network and overseas terminals, by having test items approved for functions implemented



Figure 4 GCF global membership

on NTT DOCOMO network and terminals.

### 3.2 CAG Activities

NTT DOCOMO has attended all CAG meetings for the past four years. Since the CAG is the technical group for selecting conformance test items, its activities are closely related to those of 3GPP RAN5<sup>\*5</sup>, the group within 3GPP which standardizes conformance tests for mobile terminals. In 2008, NTT DOCOMO was appointed chairmen of both RAN5 and the GCF, and made contributions including the smooth introduction of test items standardized in RAN5 to the GCF, and in particular, establishing WI related to 3GPP standard specification R99,

Rel4, Rel5 and Rel6. We also made significant contributions to interconnectivity, establishing WI for video telephony (WI-18 VT IOP Testing, WI-19 VT Conformance Testing) [3], and USIM<sup>\*6</sup> Testing (WI-35 Universal SIM Application Toolkit (USAT)<sup>\*7</sup> conformance testing).

### 3.3 FTAG Activities

NTT DOCOMO has attended all FTAG meetings since it was established in December, 2005. In June 2005 NTT DOCOMO registered as a Field-Trial Qualified Operator (FTQO) with a 3G network [4], and contributes to ensuring interconnectivity between overseas terminals and NTT DOCOMO's network by accept-

ing terminals for field interconnectivity testing.

Being an FTQO indicates qualification from the GCF to conduct field testing for terminal interconnectivity in a commercial-network environment. FTQOs are required to update their network-operation information at least once per year. As of June, 2008, 22 operators were registered as FTQO (Table 2).

NTT DOCOMO is also working with other members of the Conexus Mobile Alliance—an alliance of mobile operators in Asia—encouraging them to register as FTQO in the interests of ensuring interconnectivity.

\*5 **3GPP RAN5**: A 3GPP technical Working Group, and an abbreviation for "RAN WG5." The group performs technical studies for terminal conformance tests (Simulator tests).

\*6 **USIM**: An IC card used to store information such as the phone number from the subscribed mobile operator. The module used to identify W-CDMA mobile communications subscribers under the 3GPP is called a USIM.

\*7 **USAT**: The USIM Application Toolkit as specified by 3GPP TS22.038.

# Standardization

Table 2 GCF FTQO list

Operator name	Country (Region) name	Operator name	Country (Region) name
AT&T	U.S.A.	Telefonica Moviles	Spain
Chungha Telecom	Taiwan	TeliaSonera	Finland
Far EasTone Telecommunications	Taiwan	Telstra	Australia
Mobilkom Austria	Austria	TMN	Portugal
NTT DOCOMO	Japan	Vodafone Portugal	Portugal
O2 UK	U.K.	Vodafone D2 Germany	Germany
O2 Germany	Germany	Vodafone Espana	Spain
O2 Ireland	Ireland	Vodafone Ireland	Ireland
Orange France	France	Vodafone Omnitel	Italy
TDC Mobile	Denmark	Vodafone Panafon	Greece
Telecom Italia Mobile	Italy	Vodafone UK	U.K.

As of June 2008

## 4. Conclusion

NTT DOCOMO is promoting the activities of the GCF as one measure to ensure interconnectivity between NTT DOCOMO terminals and overseas networks, and between overseas terminals and NTT DOCOMO's 3G network. In addition to efforts so far, NTT DOCOMO will proactively promote GCF activities to ensure early

interconnectivity for the new wireless telecommunication technology called Super 3G (Long Term Evolution (LTE)<sup>\*8</sup>). In particular, the LTE CAG WI proposed by NTT DOCOMO was approved in March, 2008 at the GCF SG #34.

In the future, technical studies for Radio Frequency (RF) tests<sup>\*9</sup> of Frequency Division Duplex (FDD)<sup>\*10</sup> and Time Division Duplex (TDD)<sup>\*11</sup>, pro-

ocol test and System Architecture Evolution (SAE)<sup>\*12</sup> tests will be continued in the CAG. In parallel with CAG activities, we plan to establish an LTE WI at the 2009 FTAG and begin technical studies.

## REFERENCES

- [1] GCF: "An Introduction to GCF, Mobile Asia Congress," Nov. 2007.
- [2] S. Hagiwara et. al "IMT/GSM Dual Mobile Terminal N900iG Supporting International Roaming," NTT DoCoMo Technical Journal, Vol. 7, No. 1, pp. 32-39, Jun. 2005.
- [3] H. Kurihara et. al "Activities on Improving Video Telephony Interoperability in W-CDMA," NTT DoCoMo Technical Journal, Vol. 8, No. 1, pp. 71-73, Jun. 2006.
- [4] R. Sawada et. al "GCF Certification Scheme," NTT DoCoMo Technical Journal, Vol. 7, No. 3, pp. 72-73, Dec. 2005.

\*8 **LTE**: The working name for a high-speed wireless access system which extends the 3G mobile communication system and is currently being studied by the 3GPP. The specifications being studied under LTE are called E-UTRAN/E-UTRA.

\*9 **RF test**: Tests related to the radio component. In this article, it refers to tests related to the

radio characteristics of a mobile terminal.

\*10 **FDD**: A bidirectional transmit/receive system. Different frequency bands are allocated to the uplink and downlink to enable simultaneous transmission and reception.

\*11 **TDD**: A bidirectional transmit/receive system. It achieves bidirectional communication by allocating different time slots to uplink and downlink

transmissions that use the same frequency.

\*12 **SAE**: A working name for the system for developing an evolved GSM core network, currently under study by the 3GPP. It covers accommodation for E-UTRAN and presumes that all services will be implemented over IP. The specifications being studied under SAE are called Evolved Packet Core (EPC).