

# INTERNATIONAL GNSS SERVICE: TERMS OF REFERENCE

*Formally adopted December 2010*

## **PREAMBLE**

A proof of concept for the International Global Positioning System (GPS) Service for Geodynamics (IGS) was conducted with a three-month campaign during June through September 1992, and continued until December 1993 as a Pilot Service until the establishment of the IGS as a service of the International Association of Geodesy (IAG). The IGS formally began on 1 January 1994. IGS operates in close cooperation with the International Earth Rotation and Reference Systems Service (IERS). As a result of the review of IGS objectives, the name of the service was changed to International GPS Service (IGS) on 1 January 1999. Following further expansion of IGS, integrating data from the Russian GLONASS system and from future Global Navigation Satellite Systems, the name was changed to "International Global Navigation Satellite Systems (GNSS) Service" on 14 March 2005, in the scope of an update of the Terms of the Service. The organization retains the acronym "IGS". Developments in the intervening period necessitated a further update of these Terms of Reference in 2010<sup>1</sup>.

## **MISSION**

*The International GNSS Service provides the highest-quality GNSS data and products in support of the terrestrial reference frame, Earth rotation, Earth observation and research, positioning, navigation and timing and other applications that benefit society.*

## **GOALS AND OBJECTIVES**

### **The IGS strives to:**

- Serve as the premier source of the highest-quality GNSS related standards and conventions, data and products, openly available to all user communities.
- Attract leading-edge expertise to pursue challenging, innovative projects in a collegial, collaborative and creative culture.
- Incorporate and integrate new systems, technologies, applications and changing user needs into IGS products and services.

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<sup>1</sup> The present update includes *inter alia* the mission statement and goals and objectives from the IGS Strategic Plan 2008-2012 (see the IGS website <http://igs.org> under "Publications"); sections on the newly established Infrastructure Committee and on IGS Workshops; new versions of the Charters on Analysis Centers, Data Centers and the Policy for Establishment of IGS Working Groups, Pilot Projects and New Operational Products; and a new Charter of the IGS Associates Committee.

- Facilitate the integration of IGS into GGOS and other more broadly based Earth observing and global navigation systems and services.
- Maintain an international federation with committed contributions from its members, and with effective leadership, management and governance.
- Promote the value and benefits of IGS to society, the broader scientific community, and in particular to policy makers and funding entities.

The IGS collects, archives and distributes GNSS observational data sets of sufficient accuracy to satisfy the objectives of a wide range of applications and experimentation. These data sets are used by the IGS to generate the following data products:

- High accuracy GNSS satellite ephemerides and related information
- Earth rotation parameters
- Coordinates and velocities of the IGS tracking stations
- GNSS satellite and tracking station clock information, timescale products
- Ionospheric information
- Tropospheric information

The accuracies of these products are sufficient to support scientific objectives including:

- Realization of global accessibility to, and the improvement of, the International Terrestrial Reference Frame (ITRF)
- Monitoring deformation of the solid Earth
- Monitoring Earth rotation
- Monitoring variations in the hydrosphere (sea level, ice sheets, etc.)
- Scientific satellite orbit determination
- Ionosphere monitoring
- Climatological research, and eventually weather prediction models
- Time and frequency transfer

The IGS accomplishes its mission through the following components:

- Networks of tracking stations
- Data Centers (DCs)
- Analysis and Associate Analysis Centers (ACs, AACs)
- Analysis Center Coordinator (ACC)
- Working Groups, Pilot Projects (WG, PP) and Committees
- Coordinators for special products or components, e.g., Reference Frame, Network, Timing, etc.
- Central Bureau (CB)
- Governing Board (GB) and Executive Committee
- Associate Members

## **NETWORKS OF TRACKING STATIONS**

IGS stations provide continuous tracking using high accuracy receivers and have data transmission facilities allowing for rapid (minimally: daily) data transmission to the

data centers (see below). The stations must meet physical and operational requirements as defined in the "IGS Site Guidelines" document available from the CB and published on the IGS website (<http://igs.org>).

The ensemble of the IGS stations is the IGS network.

## **DATA CENTERS**

IGS data centers fall into three categories: Operational, Regional, and Global Data Centers (DCs). Each has varied duties which must be carried out continually and with a minimum of delay or downtime, although the multiplicity of DCs provides a measure of redundancy. The description and responsibilities of each type of DC are detailed in the separate policy document "Charter for IGS Data Centers" and include duties such as collecting data from GNSS tracking stations and ancillary equipment, data validation, permanent archival, providing online availability, and transmittal to and equalization with other DCs. The set of DCs provides for open access to IGS data and products by IGS participants and all external users. DCs are approved by the IGS GB following demonstration of qualifications and commitment.

## **ANALYSIS CENTERS**

The analysis centers fall into two categories: Analysis Centers (ACs) and Associate Analysis Centers (AACs). The analysis centers receive and process tracking data from one or more data centers for the purpose of producing IGS products. The ACs are committed to submit products for combination into IGS products, without interruption, using designated standards and conventions, and within a specified time delay to meet IGS requirements.

The ACs generally provide the core products of ephemerides, Earth rotation parameters, station coordinates, and clock information, as well as other recommended products, such as rapid, predicted or real-time orbit and Earth rotation solutions.

AACs produce specialized products recognized by the GB, e.g., ionospheric information, tropospheric parameters, or station coordinates and velocities for a global or regional sub-network.

The "Charter for IGS Analysis Centers and Associate Analysis Centers" is a policy statement of the GB and is available from the CB and from the IGS website (<http://igs.org>).

## **ANALYSIS CENTER COORDINATOR**

The Analysis Center Coordinator assists the ACs and monitors their activities to ensure that the IGS objectives are carried out. Specific expectations include quality control, performance evaluation, and continued development of appropriate analysis standards. The Analysis Center Coordinator is also responsible for the appropriate combination of the ACs' products into a single set of orbit and clock products, which are official IGS products delivered to the Global Data Centers.

The Analysis Center Coordinator is a voting member of the IGS GB (see below) and interacts regularly with the CB and the IERS. The Analysis Center Coordinator (or designee as approved by the GB) is one of the two IGS representatives to the IERS Directing Board.

Generally the responsibilities for the Analysis Center Coordinator shall rotate among the ACs with appointments and terms specified by the GB.

## **WORKING GROUPS, PILOT PROJECTS, AND PRODUCT COORDINATORS**

A Working Group works on a particular topic related to the IGS mission according to goals and schedule specified in the Working Group's charter. A Pilot Project aims at the development of new IGS product(s) relying on the IGS infrastructure. A Product Coordinator is responsible for a specialized product related to the IGS missions and components, as set out in its charter. Each Product Coordinator is supported by a Working Group, whose members take responsibility for providing routine contributions to a combined product, and/or make expertise available to the Working Group.

The GB establishes and terminates Working Groups and Pilot Projects, and appoints the Working Group and Pilot Project Chairs and Product Coordinators. A minimum initial commitment for any Product Coordinator is four years. The document "Policy for the Establishment of IGS Working Groups, Pilot Projects and New Operational Products" is a policy statement of the GB and is available from the CB and the IGS website (<http://igs.org>).

Chairs of Working Groups and Pilot Projects are non-voting members of the IGS GB (see below). The Coordinators of the fundamental products shall be voting members of the Board (Analysis Center Coordinator, Reference Frame Coordinator, Timing Coordinator). Coordinators of derived products are non-voting members.

In the case of products requiring significant joint expertise, the GB may approve GB membership of a representative of a partner organization, in order to ensure appropriate representation and communication. Such a representative is designated by the partner organization and is a non-voting member of the GB. It will normally be expected that the GB will in turn be invited to appoint an IGS representative to the Directing Board, or equivalent body, of the partner organization.

## **CENTRAL BUREAU**

The Central Bureau (CB) is the executive arm of the IGS GB, responsible for the general management, coordination and day-to-day operations of the IGS consistent with the directives, policies and priorities set by the GB. In this role the CB, within available resources, coordinates IGS activities, facilitates communications, coordinates general aspects of the IGS network operations, promotes compliance to IGS standards, monitors network operations and quality assurance of data, maintains documentation, organizes meetings and workshops, and coordinates and publishes reports.

The CB actively coordinates with the IGS Pilot Projects, Working Groups, Product Coordinators, and committees and ensures the compatibility of IGS and IERS by interfacing with the IERS. The CB acts as the outreach office and promotes use of IGS data and products, maintaining and expanding the visibility of the IGS.

The CB operates the information system for the IGS and produces the IGS Annual Reports and Directory. The CB coordinates the publication of other documents required for the satisfactory planning and day-to-day operation of the Service, including standards and specifications regarding the performance, functionality and configuration requirements of all elements of the Service.

Although the Chair of the GB is the official representative of the IGS to external organizations, the CB, consonant with the directives established by the Governing Board, is responsible for the day-to-day liaison with such organizations.

Through the existing reciprocity agreement between IGS and IERS, the CB represents the IGS as the GNSS Technique Center for IERS; as such, its designated representative (subject to Governing Board approval) is a member of the IERS Directing Board (together with the Analysis Coordinator or designee). This representative is to be selected from the membership of the IGS Governing Board. In turn, the IERS Directing Board designates a representative to the IGS Governing Board. This arrangement is to assure full cooperation between the two services.

The long term functioning of IGS is assured through redundancy of most of its components, though this does not apply to the CB. For this reason the performance of the Central Bureau is to be formally reviewed by the GB at least every five years. On these occasions the CB will either reconfirm its commitment to the IGS for the next period of five years or announce that it will terminate operations after a transition phase of at least one year. The GB will formally approve the CB's proposal, or, alternatively issue a Call-for-Proposal for a new IGS CB to take over responsibilities after the transition phase.

In summary, the CB performs primarily a long-term coordination role to ensure that IGS participants contribute to the Service in a consistent and continuous manner and adhere to IGS standards.

## **INFRASTRUCTURE COMMITTEE**

The IGS Infrastructure Committee (IC) is a permanent body established to ensure that the data requirements for the highest quality GNSS products are fully satisfied while also anticipating future needs and evolving circumstances. Its principal objective is to assure that the IGS infrastructure components that collect and distribute the IGS tracking data and information are sustained to meet the needs of principal users, in particular the IGS Analysis Centers, fundamental Product Coordinators, Pilot Projects, and Working Groups. The IC reports directly to the GB. The Chair of the IC is a non-voting member of the GB.

## GOVERNING BOARD

The principal roles of the Governing Board (GB) are to set policy and to exercise broad oversight of all IGS functions and components. It also controls general activities of the Service, including restructuring, as appropriate to maintain efficiency and reliability, while taking full advantage of the advances in technology and theory.

The GB consists of up to eighteen voting members and a number of non-voting members. They are distributed as follows:

Elected by IGS Associates:	Analysis Center representatives	3
	Data Center representative	1
	Network representatives	2
Elected by the Governing Board upon recommendations from the Central Bureau, for the next term:	Representatives of Analysis, Data Centers or Networks	2
	Members at large (up to)	3
Appointed members:	Director of the Central Bureau	1
	Analysis Coordinator	1
	Reference Frame Coordinator	1
	Timing Coordinator	1
	Representative of the IERS	1
	IAG representative	1
	President of IAG or designee from the IAG Executive Committee	1
Total voting members (up to)		18

Working Group and Pilot Project chairpersons, the Network Coordinator, the Chair of the Infrastructure Committee, and Product Coordinators are GB members with voice but without vote. A representative of the BIPM, appointed by the BIPM/CCTF<sup>2</sup> with agreement of the IGS GB, is a non-voting member of the GB. In turn, the IGS appoints a representative point of contact to the BIPM/CCTF. The IERS appoints a representative to the IGS GB. In turn, the IGS GB appoints two IGS representatives to the IERS Directing Board: the IGS Analysis Center Coordinator (or designee) and the IGS/CB representative.

The elected persons (up to eleven) must be members of different organizations. The appointed members are considered ex-officio and are not subject to such restrictions. All elected persons have staggered four-year terms, which are renewable once. The GB membership should be balanced with regard to supporting organizations, as well as geographically.

<sup>2</sup> Comité Consultatif du Temps et des Fréquences (Consultative Committee for Time and Frequency), a committee of the Bureau International des Poids et Mesures (International Bureau of Weights and Measures), see [www.bipm.org](http://www.bipm.org).

For the first six positions, which represent components of the IGS that are elected by the IGS Associate Members, a Nominating Committee conducts the elections. The Nominating Committee consists of three members, the chair of which is appointed by the Chair of the GB and who is a member of the GB holding a position not currently up for re-election. For elections, the Nominating Committee presents to the Associate Members a list of at least two candidates for each position to be filled. The election will be determined by the number of votes received from the Associate Members. In the case of a tie, the election is by the members of the GB.

For the four positions elected by the GB, four weeks prior to the election by the GB, the CB presents its proposed candidate(s) to the GB. Based on recommendations of the GB members, or on the outcome of the elections by the IGS Associate Members, the CB may present a revised list at the GB meeting where the election of the new Board members takes place.

In case of a resignation from the Board, after consulting with the appropriate IGS components, the CB will nominate replacement candidates for election by the GB. The replacement will serve until the end of the term of the resigned Board member.

The Chairperson is one of the members of the GB elected by the Board for a term of four years with the possibility of re-election for one additional term. The Chairperson does not vote, except in case of a tie. He/she is the official representative of IGS to external organizations. The immediate past Chairperson, if no longer a voting member of the Board, will be invited to continue as a non-voting member of the GB for a period of one year after completion of the term(s) as Chair.

The IAG representatives are appointed by the IAG Bureau.

Members of the GB are eligible to be considered for IAG Fellowship with the appropriate rights and privileges after an initial two-year period.

Most GB decisions are to be made by consensus or by a simple majority vote of the members present, provided that there is a quorum consisting of a simple majority of voting members of the GB. In case of lack of a quorum the voting may be by mail. Voting by e-mail, fax, or mail on any issue is permitted by these Terms of Reference, and the number of mail or e-mail responses must be sufficient to constitute a quorum. Changes in Terms of Reference can be made by a 2/3 majority of all voting members of the GB. At any time the GB can ask for the resignation of the Chair, or any member of the Board, if a majority vote of all voting members of the GB so requests.

The Board shall meet at least annually and at such other times as shall be considered appropriate by the Chairperson or at the request of five members. The CB provides the secretariat of the GB.

For the GB to effectively assess the value of IGS Services to the user communities, and to ensure that the service remains up to date and responsive to changing user needs, the GB will organize reviews of the IGS components at appropriate intervals. The GB will select, on an annual basis, those groups (Analysis Centers, Data Centers, Network Stations, and the Central Bureau) that are to be reviewed and from time to time may select other activities for review as it deems appropriate.

Strategic planning and implementation is a major and continuous task of the GB. A five-year Strategic Plan shall be developed, approved and published by the GB. Annual Implementation Plans shall be drawn up and presented for approval by the GB at its last meeting prior to the year concerned.

## **EXECUTIVE COMMITTEE**

The Executive Committee (EC) of the IGS Governing Board is established as a committee that has specific responsibilities allowing it to act on behalf of the GB for the following purposes: 1) to formulate and organize issues that are to be brought to the GB for action, 2) to act for the GB when a quorum of the Board is not present, 3) to act for the GB when a full Board meeting is not possible or necessary. The EC is responsible for exercising the powers of the GB in the management of the business and affairs only to the extent set forth in these Terms of Reference. Any actions are communicated to the GB as soon as possible and reported and validated at the next Board meeting. The EC shall consist of five voting members, and one non-voting member, of the GB:

- Chair of the GB
- Immediate Past Chair (non-voting)
- Director of the CB and
- Three additional voting members of the GB proposed by the Chair of the GB and approved annually by the GB.

Except for the power to amend these Terms of Reference, the EC shall have all of the powers and authority of the Board in the intervals between meetings of the GB, and subject to the direction and control of the GB. Three votes of EC members are needed for any decision. EC meetings are open to any GB member.

## **IGS ASSOCIATE MEMBERS**

Associate Members are persons representing organizations that participate in any of the IGS components. The membership is balanced with respect to IGS components, organizational representation and geography, and is meant to represent institutions which contribute significantly to the IGS on a continuous basis. There shall be a maximum of ten Associates from any single organization. Members of the Central Bureau shall be counted separately from those of their parent organization.

The list of IGS Associate members is maintained by the IGS Associates Committee. The document "Charter of IGS Associates Committee" is a policy statement of the GB and is available from the CB and the IGS website (<http://igs.org>).

Associate Members elect the six members of the GB representing Analysis Centers, Data Centers and Networks (except for those nominated by the CB). The list of Associate Members eligible to vote in elections must be approved by the GB prior to the election process. Current and former GB members are considered Associate Members.

## **WORKSHOPS**

IGS Workshops provide a forum for presentation and discussion of all aspects of IGS activities (strategy, analysis, network, data centers, current and future projects, working groups, products, user applications, and others). Workshops are to be held at least every two years, and are open to all interested persons. A Scientific Organizing Committee appointed by the GB shall be responsible for the organization of the technical sessions and shall ensure, in collaboration with the CB, that the workshop is appropriately documented through online proceedings and a “Recommendations” document. The GB shall approve the Recommendations document, which will be made available to the community via the IGS website (<http://igs.org>).

The GB may organize ad hoc workshops or meeting as necessary, including “mini-workshops”, with a more limited scope and duration. These will focus on a few topics considered to merit particular attention and may be used as the mechanism for reviews of specific IGS elements, as mentioned above.

## **IGS CORRESPONDENTS**

“Correspondents” are persons on a mailing list maintained by the CB, who do not actively participate in the IGS but express interest in receiving IGS publications, wish to participate in workshops or scientific meetings organized by the IGS, or generally are interested in IGS activities. Ex officio IGS Correspondents are the following persons:

- IAG President and Vice-President
- IAG Secretary General
- President of IAG Commission 1: Reference Frames
- President of IAG Commission 4: Positioning and Applications
- Chairs and Directors of affiliated IAG Services
  - International VLBI Service for Geodesy and Astrometry (IVS),
  - International Laser Ranging Service (ILRS),
  - International Earth Rotation and Reference Systems Service (IERS),
  - International Doris Service (IDS), etc.,
- Chair of the Global Geodetic Observing System (GGOS)
- IUGG Secretary General
- Former Governing Board Members

*The rules contained in the current edition of ‘Robert’s Rules of Order Newly Revised’ shall govern the IGS in cases to which they are applicable and in which they are not inconsistent with these Terms of Reference and any special rules that the IGS GB may adopt.*