NGS Antenna Calibration Policy

Policy Document **National Geodetic Survey** National Ocean Service National Oceanic and Atmospheric Administration	
AUTHORIZED BY: _____ _____ **Director, National Geodetic Survey** **Date** **Juliana P. Blackwell**	Tracking Number: **NGS 2019-1202-02** Effective Date: 06/01/2019

Official Policy Title: NGS Antenna Calibration Policy
Tracking Number: NGS 2019-1202-02
Date Reviewed by ESC: May 21, 2019
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Internal or External: External
Associated Procedures/Policies: GNSS Antenna Calibration Procedures
Authority/Reference: none
Supersedes: "NGS Policy 2012-09: GNSS Antenna Calibration" approved by Products and Services Committee on 15 March 2012 and NGS Antenna Calibration Policy 2016-1202-02.
Review Schedule: Every two years
Responsible Office/Position: Chief, Geosciences Research Division
The Instrumentation and Methodologies Branch Chief has the authority to approve procedures associated with this policy.

Purpose/Scope:

NGS provides calibration services and calibration data to provide more accurate access to the National Spatial Reference System (NSRS).

NGS provides calibration services to the general public, free of charge, for eligible antennas. Minimum requirements for eligible antennas are sales-ready models of dual-frequency GPS antennas which are intended for geodetic applications such as surveying and mapping.

Any person or organization who qualifies as an eligible provider is encouraged to participate in the program. However, this is a strictly voluntary program; the NGS will not solicit antennas for calibration, except when such calibration would benefit the NGS in its stated mission and goals. It is the responsibility of interested parties (either antenna manufacturers or equipment users) to contact NGS and request calibration, as outlined in the associated Procedures document.

Background: The NSRS is tied to the wide variety of GNSS antennas that are available and in use in U.S. networks. To properly use these antennas and define the NSRS, antenna characteristics must be accurately and consistently measured, so that the physical position of the points being positioned may be unambiguously determined. NGS conducts these calibrations as an essential service for the surveying, mapping, and engineering infrastructure of the U.S. These calibrations are an essential component of GNSS data processing and are used by vendor-supplied software as well as NGS' Online Positioning User Service (OPUS).

This policy and the associated procedures help the NGS calibration program to meet a number of organizational goals:
- Maintain the high standards of accuracy expected for NGS calibrations
- Maintain consistency of calibrations appearing in the NGS calibration database

- Serve the general public by emphasizing type mean calibrations of sales-ready antennas
- Provide calibration services and final published values to the public at no charge
- Encourage a healthy, competitive atmosphere among manufacturers that results in a much greater freedom of choice for the positioning community
- Increase accessibility of services rendered by the positioning community to the general public

Exceptions: In most cases, NGS will not calibrate pre-production antennas which are not yet marked for individual sale on the open market. Additionally, although NGS may attempt to calibrate some antennas, calibration is not guaranteed because a calibration may not be possible if the data are too noisy.

Definition of Terms:

GNSS - Global Navigation Satellite System. This term generally refers to any satellite navigation system, such as the U.S.'s Global Positioning System (GPS).

Antenna Calibration - An antenna calibration is the act of determining the point of reception of the GNSS carrier phase signals. Antenna calibrations are necessary to obtain the most precise and accurate GNSS positions possible. Antenna hardware such as the antenna elements and pre-amplifiers create signal phase advance and delay before the signal is passed to the receiver. The phase advance/delay changes the range measurement, and will introduce error to position solutions. The point of signal reception of an antenna is not a physically measurable location, and varies depending upon the direction of the satellite signal being received. Therefore antenna calibrations create a map of phase advance and delay which depends on the satellite position in an antenna-centric frame.

GNSS Antenna Calibration Policy

The National Geodetic Survey (NGS) will serve the high-precision needs of the U.S. surveying and geodesy communities by conducting antenna calibrations and publicly distributing calibration values.

NGS will conduct antenna calibrations for eligible geodetic-grade antennas. NGS calibrations will be conducted and formatted in accordance with International GNSS Service (IGS) standards. Operational details and detailed eligibility information will be maintained in a companion document, the NGS Antenna Calibration Procedures.

All antenna calibrations published on the NGS ANTCAL web page http://geodesy.noaa.gov/ANTCAL/ have been approved by NGS for use in all its products and services.

NGS reserves the right to accept antennas for calibration under special circumstances.

RECORD OF REVIEW AND CHANGES

This policy is a living document that is reviewed every two years. It will be updated, when appropriate, to reflect changes in controlling Federal policies, organizational strategic goals/objectives, technology, or other matters that may have an impact on this policy. Modifications made to this document are recorded in the below table. This record shall be maintained throughout the life of the document.

Version Number	Date	Section/ Page Affected	Summary of Change or Annual Review	Author / Reviewer
02	9/20/2016	All	Entire policy revised to meet new NGS administrative requirements and incorporate any updates	GRD/GSD
02	5/3/2019	All	Entire policy was reviewed, no changes were necessary.	GRD/GSD