Recommendation for Committee Decision

Prepared by: Space Users Subgroup
(Working Group, or individual Members or Associate Members)

Date of Submission: 11 December 2019

Issue Title: Release of GNSS Transmit Antenna Patterns including Side Lobes

Background/Brief Description of the Issue:

The use of GNSS for spacecraft navigation has increased in general over the last decade. In fact, navigation employing GNSS observations for spacecraft in Low Earth Orbit is considered routine. However, the situation is quite different for space missions that intend to employ GNSS in the Space Service Volume (including MEO, GEO, HEO or missions to Moon and beyond). For these space missions, the reception of signals from GNSS transmit antenna side lobes is essential to improve availability and performance. This recommendation extends recommendation #3 from Working Group-B 'Additional Data for Space Service Volume', made on 10 November 2016, which addressed provision of antenna pattern data at least to the extent of the main lobe signal as outlined in the SSV Booklet.

Discussion/Analyses:

The joint use of interoperable GNSS signals, especially the signals in the side lobes, will enable and/or improve the on-board navigation of spacecraft in the Space Service Volume. In this context, the knowledge of the full antenna pattern (main lobe and side lobes) from the transmitting antennas of each of the GNSS satellites in the various constellations is essential for missions in MEO, GEO, HEO or to Moon and beyond, to allow mission analysis, mission design as well as for GNSS equipment (receiver and antennas) manufacturers and also for the spacecraft operators for the development of respective operations concepts.

Recommendation of Committee Action:
WG-B recommends that GNSS Service Providers consider releasing the antenna gain patterns or equivalent representative modelling information (including both main lobe and side lobes for each frequency, for open services) for each of the transmit antennas of the GNSS satellites in the respective satellite constellations in order to enable and/or improve the use of GNSS in the SSV. In addition, for future satellite developments, WG-B recommends that GNSS Service Providers consider conducting antenna gain measurements, testing and/or characterization, including both main lobe and side lobes for each open service signal.

Members Consensus Reached_____X_____; **No Consensus Reached**_____

Chairperson Signature: _____ **Date:** _____