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| U.S. Radiocommunication SectorFact Sheet |
| **Working Party:** ITU-R WP 7D | **Document No:** USWP7D\_25Sept-doc5-RA.[GeoVLBI] |
| **Ref.** Doc [7D/186](https://www.itu.int/md/R23-WP7D-C-0186/en), Annex 13 | **Date:** 7/14/2025 |
| **Document Title:** Addressing the Preliminary draft new Recommendation ITU-R RA.[GEOVLBI] - Guidance to administrations regarding geodetic very long baseline interferometry networks |
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| **Purpose/Objective:** To propose completion and elevation of this document. |
| **Abstract:** At the previous meeting, this brief document saw several refinements consistent with the U.S. position. The document is at Preliminary Draft status, and while an editor’s note on the document indicates it “may require further refinement”, at this point the document is approaching completed form.This input is intended to review for any final edits, and if no showstoppers are found, proposed elevation of the document to Draft status. |

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| TBD September 2025 |
| English only |
| United States of America |
| Addressing the Preliminary draft new Recommendation ITU-R RA.[GEOVLBI] |
| Guidance to administrations regarding geodetic very long baseline interferometry networks |

**Summary**

At the previous meeting, this brief document saw several refinements after a lengthy discussion. The U.S. proposes language to address those areas requiring further refinement in ***further considering c*** and ***recommends as guidance 1***. U.S. edits are indicated with blue highlighting on top of the existing changes.

This input is intended to review for any final edits, and propose elevation of the document to Draft status.

**Attachment**

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| **Radiocommunication Study Groups** | A blue logo with a black background  AI-generated content may be incorrect. |
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| Source: Document 7D/TEMP/67 | Annex 13 toDocument 7D/186-E |
| 2 April 2025 |
| English only |
| Annex 13 to Working Party 7D Chair’s Report |
| DRAFT NEW RECOMMENDATION ITU-R RA.[GeoVLBI] |
| Guidance to administrations regarding geodetic very long baseline interferometry networks |

ATTACHMENT

(202x)

Scope

This guiding Recommendation describes Geodetic VLBI observations, which are required to deliver data products of utmost importance to a wide range of governmental, economic, societal, and scientific purposes, and recommends that administrations provide assistance in avoiding harmful interference to the stations of the International VLBI Service for Geodesy and Astrometry (IVS).

Keywords

Geodetic very long baseline interferometry (VLBI), radio astronomy service (RAS), VLBI global observing system (VGOS), geodesy, interference

Abbreviations/Glossary

IVS International VLBI Service for Geodesy and Astrometry

RAS Radio astronomy service

UN United Nations

VGOS VLBI Global Observing System

VLBI Very Long Baseline Interferometry

Related ITU Recommendations, Reports

Recommendation [ITU-R M.1583-1](https://www.itu.int/rec/R-REC-M.1583/en) – Interference calculations between non-geostationary mobile‑satellite service or radionavigation-satellite service systems and radio astronomy telescope sites

Recommendation [ITU-R M.2101-0](https://www.itu.int/rec/R-REC-M.2101/en) – Modelling and simulation of IMT networks and systems for use in sharing and compatibility studies

Recommendation [ITU-R P.452-17](https://www.itu.int/rec/R-REC-P.452/en) – Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 0.1 GHz

Recommendation [ITU-R P.676-13](https://www.itu.int/rec/R-REC-P.676/en) – Attenuation by atmospheric gases and related effects

Recommendation [ITU-R P.2108-1](https://www.itu.int/rec/R-REC-P.2108/en) – Prediction of clutter loss

Recommendation [ITU-R P.2109-2](https://www.itu.int/rec/R-REC-P.2109/en) – Prediction of building entry loss

Recommendation [ITU-R RA.517-4](https://www.itu.int/rec/R-REC-RA.517/en) – Protection of the radio astronomy service from transmitters operating in adjacent bands

Recommendation [ITU-R RA.611-4](https://www.itu.int/rec/R-REC-RA.611/en) – Protection of the radio astronomy service from spurious emissions

Recommendation [ITU-R RA.769-2](https://www.itu.int/rec/R-REC-RA.769/en) – Protection criteria used for radio astronomical measurements

Recommendation [ITU-R RA.1031-3](https://www.itu.int/rec/R-REC-RA.1031/en) – Protection of the radio astronomy service in frequency bands shared with active services

Recommendation [ITU-R RA.1513-2](https://www.itu.int/rec/R-REC-RA.1513/en) – Levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the radio astronomy service on a primary basis

Recommendation [ITU-R RA.1631-0](https://www.itu.int/rec/R-REC-RA.1631/en) – Reference radio astronomy antenna pattern to be used for compatibility analyses between non-GSO systems and radio astronomy service stations based on the epfd concept

Recommendation [ITU-R RS.2066-0](https://www.itu.int/rec/R-REC-RS.2066/en) – Protection of the radio astronomy service in the frequency band 10.6-10.7 GHz from unwanted emissions of synthetic aperture radars operating in the Earth exploration-satellite service (active) around 9 600 MHz

Report [ITU-R RA.2131-0](https://www.itu.int/pub/R-REP-RA.2131) – Supplementary information on the detrimental threshold levels of interference to radio astronomy observations in Recommendation ITU-R RA.769

Report [ITU-R RA.2188-1](https://www.itu.int/pub/R-REP-RA.2188) – Power flux-density and e.i.r.p. levels potentially damaging to radio astronomy receivers

Report [ITU-R RA.2259-1](https://www.itu.int/pub/R-REP-RA.2259) – Characteristics of radio quiet zones

Report [ITU-R RA.2428-0](https://www.itu.int/pub/R-REP-RA.2428) – Parameters needed for the registration of distributed radio astronomy systems

Report [ITU-R RA.2507-0](https://www.itu.int/pub/R-REP-RA.2507) – Technical and operational characteristics of the existing and planned Geodetic Very Long Baseline Interferometry

The ITU Radiocommunication Assembly,

considering

*a)* that Very Long Baseline Interferometry (VLBI) is the most accurate measuring technique to determine positions in the universe and on Earth, and is therefore a fundamental tool for science and applications in radio astronomy and geodesy;

*b)* that Geodetic VLBI products are the Celestial Reference Frame, the Terrestrial Reference Frame, and the associated Earth orientation parameters such as the position of the rotational axis and the length-of-day. These are used for geodesy, the monitoring of Global Change, and the applications of space navigation and satellite orbit determination;

*c)* that Geodetic VLBI is realized by global networks of independent radio telescopes simultaneously observing cosmic radio sources on a daily basis;

*d)* that the frequency range 2-14 GHz is most favorable for Geodetic VLBI observations because of the physical properties of the atmosphere in this frequency range, and to meet the performance goals of the global geodetic observing system, a minimum of 32 channels, each with a bandwidth of 32 MHz, is required. Within this range allocations to the radio astronomy service include 2 655-2 670 MHz (secondary), 2 670-2 690 MHz (secondary), 2 690-2 700 MHz (primary), 4 800-4 990 MHz (secondary), 4 990-5 000 MHz (primary), 10 600-10 680 MHz (primary/shared), and 10 680-10 700 MHz (primary), which may not be sufficient to meet the performance goals;

*e)* that under certain circumstances the performance of the observations and thus the quality of the geodetic data products may be degraded  by the emissions from terrestrial and spaceborne transmitters;

*f)* that the Geodetic VLBI stations are part of a global network infrastructure which can only function if all stations in the network can observe at the same time and in the same frequency bands without being disturbed by harmful interference,

further considering

*a)* that Geodetic VLBI stations are registered as RAS stations at the ITU-R;

*b)* that Report ITU-R RA.2507 contains technical and operational characteristics of existing and planned Geodetic VLBI systems, provides an operational overview of the worldwide network, and describes strategies to maximize system performance;

*c)* that Report ITU-R RA.2507 contains the threshold levels of interference which may adversely affect VLBI observation systems, derived from the levels of interference specified in Recommendation ITU-R RA.769-2, Table 3;

*d)* that Report ITU-R RA.2259 describes the characteristics of Radio Quiet Zones to secure the undisturbed observation of cosmic radiation,

recognising

that Recommendation ITU-R TF.460-6 defines UT1 as UT0 corrected for the effects of small movements of the Earth relative to the axis of rotation (polar variation) and these movements are being observed by Geodetic VLBI,

noting

that the further development of VLBI would benefit from administrations seeking to support observatories in research and development of methods of interference mitigation, including enhancing receiver resilience and data analysis techniques,

recommends

1 that administrations should consider as guidanceimplementing techniques to enhance interference mitigation for Geodetic VLBI operation, including  work to enhance receiver resilience and data analysis and other mitigation and compatibility techniques specified in ITU-R documentation;

2 that administrations should consider as guidance the radio frequency environment (time and spatial) and preferentially choose an existing site with prior coordination requirements, such as a national radio quiet zone, when planning or introducing new Geodetic VLBI stations and coordinate, as appropriate, with neighboring countries, and to minimize constraints on active services.

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