



UNITED NATIONS GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT

SUBCOMMITTEE ON GEODESY

Working Group on Frequency Protection for Geodetic VLBI

Progress Report to the SCoG



UN-GGIM

United Nations Committee of Experts on
Global Geospatial Information Management

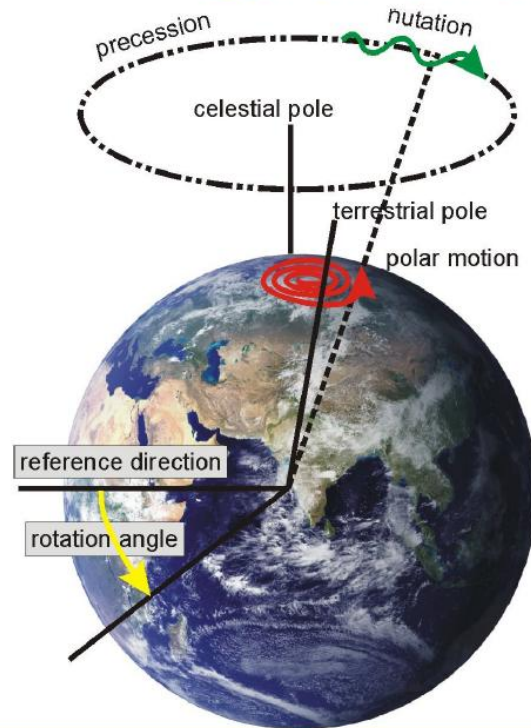
Subcommittee on
Geodesy

Positioning geospatial information to address global challenges

ggim.un.org

Why this matters

Earth Orientation Parameters (EOP)

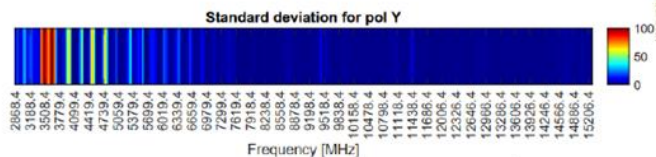
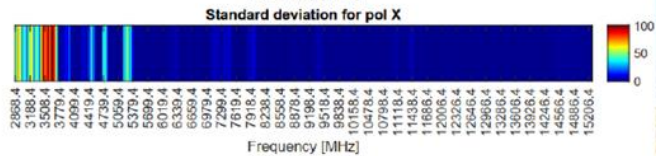
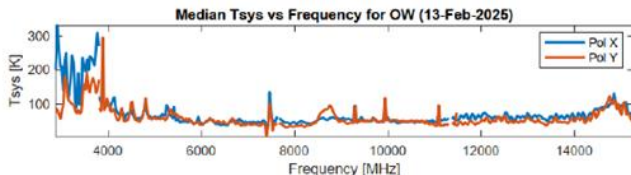


- The transformation parameters CRF \Leftrightarrow TRF
- Traditionally expressed as:
 - Precession and nutation (dX, dY)
 - Earth rotation angle (UT1-UTC)
 - Polar motion (x_p, y_p)
- EOP are important for satellite systems
 - satellite systems need nutation and UT1-UTC for precise orbit determination (POD), for both scientific and commercial satellite systems
 - however, satellite systems can neither determine nutation nor UT1-UTC themselves!
- => VLBI is unique to provide all EOP (!)

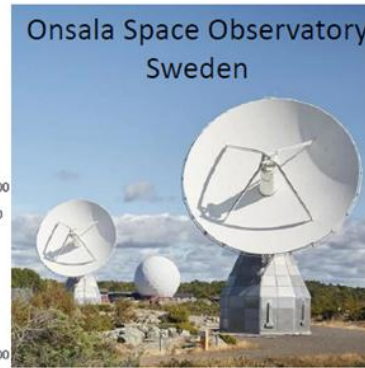
Why this matters

What observers see at their radio telescope...
... interferences

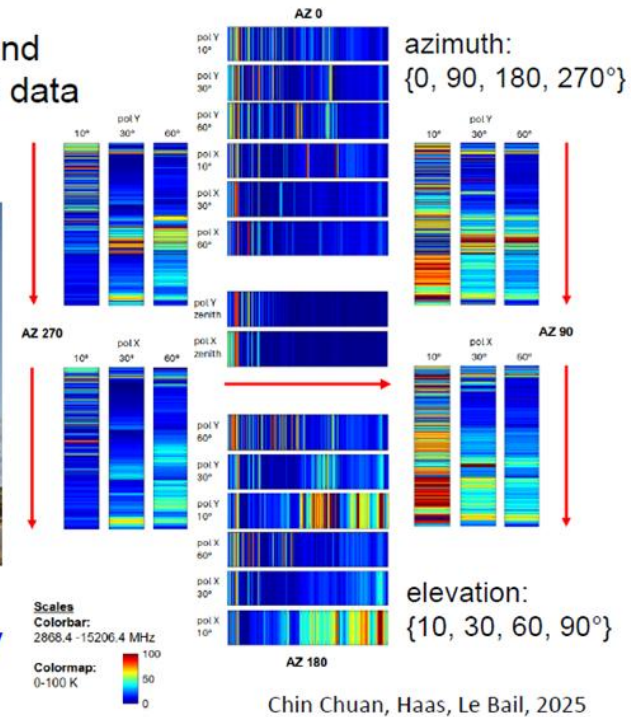
Radio-frequency interference can compromise the accuracy and reliability of VLBI measurements, directly affecting the precise data needed for geodetic applications. Example: Tsys monitoring



zenith direction (elevation = 90°)



dark blue = quiet sky



Credits:
Hayo Hase,
Rüdiger Haas



Objective

The WG was established by the SCoG to advocate for formal spectrum protection of the VLBI Global Observing System (VGOS) with the main objective to secure **a dedicated Agenda Item on geodetic VLBI** at WRC-31, enacted through a new ITU-R Resolution at WRC-27.



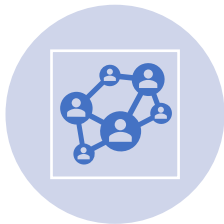
Key tasks



Develop and refine the draft WRC-31 Agenda Item proposal



Provide technical background to national spectrum authorities



Coordinate outreach through UN-GGIM regional structures



Assess compatibility with incumbent radio services



Current group composition



Interim Chair: Hayo Hase



UN-GGIM member states: Argentina, Belgium, Egypt, Germany, Ivory Coast, Japan, New Zealand, Norway, Saudi Arabia, South Africa, Russia, Uruguay, USA



Supporting organizations: IVS, CRAF, ITU-R, UN-GGCE, IAU



Progress November 2025 – February 2026

Presentations on spectrum threats, VLBI's role in the geodetic data supply chain, and spectrum management for RAS. Timeline urgency established.

25 Nov.

25 Dec.

Terms of Reference finalized and approved. IVS outreach flyer updated. Decision to pursue CEPT input by June 2026.



Progress November 2025 – February 2026

Draft WRC-31 Agenda Item proposal reviewed. Target frequency bands draft. National outreach to UK and France initiated. Parallel White Paper approach endorsed.

26 Jan.

26 Feb.

Frequency band selection refined (IMT allocations under WRC-27 AI 1.7 excluded). EuroGeographics webinar approach. Report to SCoG prepared.



Relevant documents produced



Terms of reference

251210TermsOfReferenceWG.pdf



IVS outreach flyer updated with a focus on timing

IVS_flyer_2025_005.pdf



Draft WRC-31 Agenda Item Proposal

260127-WGFP-WRC31-AI-VGOS-draft-proposal.docx



Minutes of meeting

251114Minutes-WG-Frequency-Protection-for-Geodetic-VLBI.pdf,
251210Minutes-WG-Frequency-Protection-for-Geodetic-VLBI.pdf,
260114Minutes-WG-Frequency-Protection-for-Geodetic-VLBI.pdf,
260211Minutes-WG-Frequency-Protection-for-Geodetic-VLBI.pdf



How to protect geodetic VLBI – IVS Flyer

HOW TO PROTECT GEODETIC VLBI

1. Registration of VLBI site at ITU-R

Geodetic VLBI sites should be registered at the International Telecommunications Union (ITU) as Earth station for Radio Astronomy through the national spectrum authority. Your station can be determined here:

<https://www.itu.int/go/ITUSpaceExplorer>

2. Introduction of local protection zone

A local protection zone around the radio telescope site should be granted by the national spectrum authority. Ideally, it would be a radio-quiet zone. In populated areas, coordination zones may avoid conflicts between new services and the VLBI observations.

3. Allocation of bands used by geodetic VLBI

The frequency bands used by geodetic VLBI observations should be entered in the Radio Regulations (RR). “Geodetic VLBI” must be a new Agenda Item at the World Radio Conference 2031 (WRC-2031), whose agenda will be set at WRC-2027.

National spectrum agencies should propose Geodetic VLBI as a preliminary Agenda Item to the WRC-2027 and/or support such an initiative in a joint proposal.

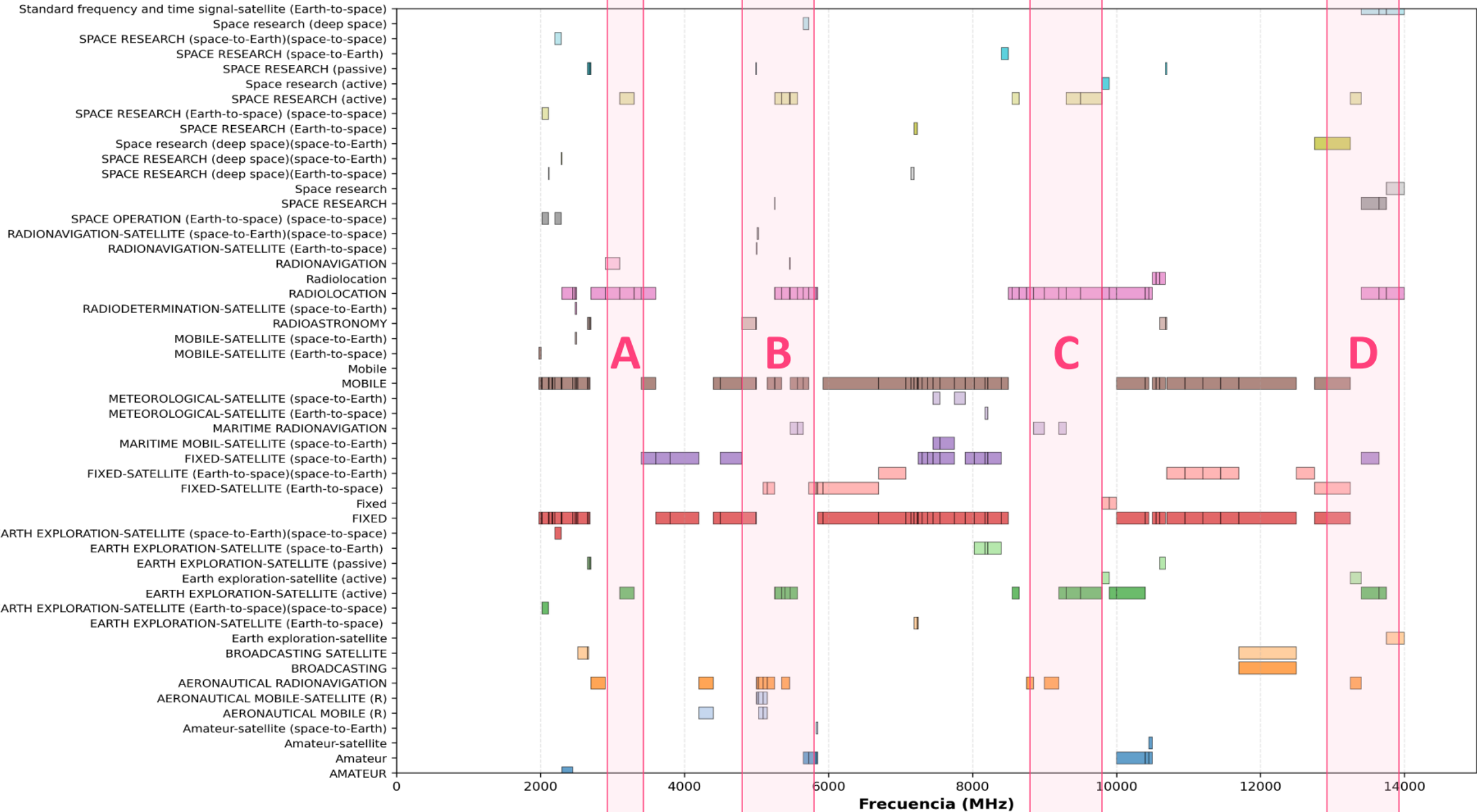
Without such protective measures, the demand for high-quality geodetic VLBI data that we all depend on is not effectively fulfilled. It endangers the goals of the UN GA Resolution 69/266 “A global geodetic reference frame for a sustainable development”:

https://ggim.un.org/documents/a_res_69_266_e.pdf

Credits:
IVS Flyer



Asignación de Frecuencias - Region I



Target frequency bands

	VGOS-channel bands	Radio Regulations equivalent bands
Subband A:	3.0004-3.3844 GHz	2 900 – 3 400 MHz
Subband B:	4.8244-5.8164 GHz	4 800 – 5 850 MHz
Subband C:	8.7604-9.7524 GHz	8 750 – 9 800 MHz
Subband D:	12.9844-13.9764 GHz	12.75 – 14.00 GHz

... to consider possible new primary allocations **in parts of the frequency bands** contained in the ranges of 2 900-3 400 MHz, 4 800-5 850 MHz, 8 750-9 800 MHz, 12.750-14.000 GHz to the radio astronomy service.



VGOS observation channels

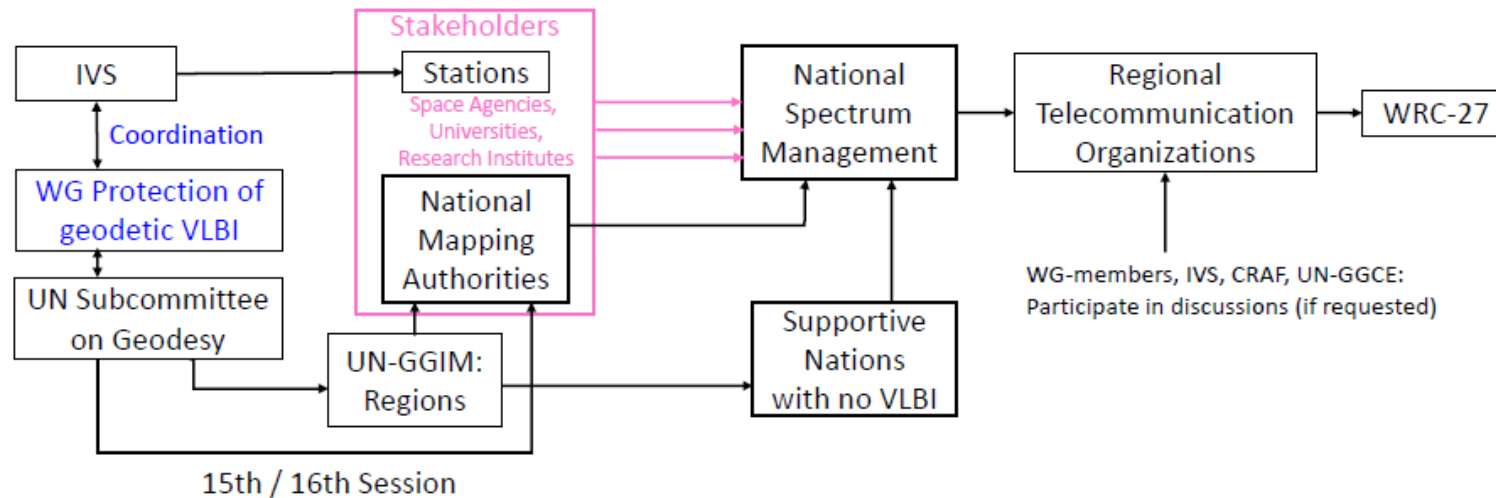
Sub-band	A	B	C	D
Start [MHz]	3000.4	4824.4	8760.4	12984.4
N*bw + 3000.4	0	57	180	312
bandwidth [MHz]	32			
Band	Start [MHz]	Stop [MHz]	Sequence	unused [MHz]
A1	3000.4	3032.4	0	0
A2	3032.4	3064.4	1	0
A3	3064.4	3096.4	2	64
A4	3160.4	3192.4	5	0
A5	3192.4	3224.4	6	32
A6	3256.4	3288.4	8	32
A7	3320.4	3352.4	10	0
A8	3352.4	3384.4	11	
B1	4824.4	4856.4	0	32
B2	4888.4	4920.4	2	64
B3	4984.4	5016.4	5	192
B4	5208.4	5240.4	12	256
B5	5496.4	5528.4	21	128
B6	5656.4	5688.4	26	64
B7	5752.4	5784.4	29	0
B8	5784.4	5816.4	30	

C1	8760.4	8792.4	0	32
C2	8824.4	8856.4	2	96
C3	8952.4	8984.4	6	160
C4	9144.4	9176.4	12	256
C5	9432.4	9464.4	21	128
C6	9592.4	9624.4	26	64
C7	9688.4	9720.4	29	0
C8	9720.4	9752.4	30	
D1	12984.4	13016.4	0	32
D2	13048.4	13080.4	2	96
D3	13176.4	13208.4	6	160
D4	13368.4	13400.4	12	256
D5	13656.4	13688.4	21	128
D6	13816.4	13848.4	26	64
D7	13912.4	13944.4	29	0
D8	13944.4	13976.4	30	

Regional outreach

Phase 1: Raise awareness, forge alliances

- Member States should become more aware of the importance of frequency protection for geodetic VLBI (critical infrastructure)
- Alliances at regional level should be forged; at least 3 of the RTO should be on board



Credits:
Hayo Hase

Regional outreach - actions

Africa

South Africa, leveraging its leadership in radio astronomy, is engaging partner nations.

Americas

USA is conducting bilateral outreach with NASA and USNO. SIRGAS has referenced spectrum protection in its November 2025 resolutions. Outreach planned through regional conferences.

Arab states

Arab states highlight the need for international coordination to protect the frequency bands used by VLBI stations and call for continued collaboration with the International Telecommunication Union to ensure the sustainable operation of these critical components of the geodetic infrastructure.



Regional outreach - actions

Asia-Pacific

Japan, Australia and China has initiated national-level dialogues. Coordination within APT (Asia-Pacific Telecommunity) is the next step.

Europe

Germany initiates a common European proposal by June 2026 for submission to CEPT. Engaging UK and France (CEPT-CPG-PTC coordinators). Telecon being prepared to engage heads of European Cadastral and Mapping Agencies.



Pending items & timeline

Deadline	Action
March 2026	Finalize IVS frequency tests; complete White Paper / draft WRC-31 AI proposal
March 9–12, 2026	SCoG meeting — this report
June 2026	Common European proposal ready for CEPT
August 2026	White Paper submitted as reference document to UN-GGIM annual meeting
Early 2027	National inputs to regional telecommunication organizations (CEPT, APT, ATU, etc.)
April 5–15, 2027	WRC-27 Conference Preparatory Meeting (CPM) — Agenda Item 10
2027	WRC-27 (Shanghai) — adoption of new ITU-R Resolution defining WRC-31 AI
2031	WRC-31 — decision on primary RAS allocations for geodetic VLBI

! Open item: Election of a permanent WG Chair !



Requests for Action by the SCoG

Take	Take note of this report and the work done by the WG
Nominate	Nominate a permanent Chairperson
Urge	Urge member states to engage national spectrum authorities



Discussion

How do you look at the intended lifespan of the WG beyond WRC-31?

- Should the mandate extend beyond securing the WRC-31 Agenda Item
- Should spectrum monitoring, advocacy, and engagement with national spectrum authorities and international bodies/groups be envisaged as longer-term activities

What do you need to facilitate a meeting with your national spectrum authority?

