



Next Generation Very Large Array

next-generation Very Large Array (ngVLA) Transition Advisory Group

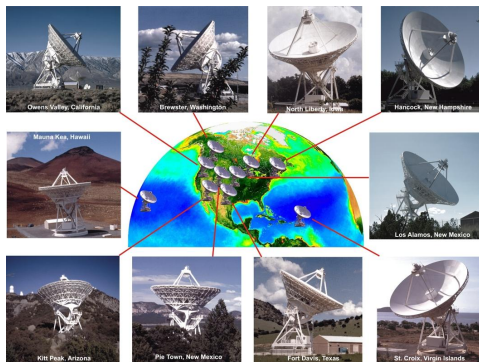
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ngVLA.nrao.edu



next generation Very Large Array Transition

2023 - VLA and VLBA operating robustly



2024 - ngVLA science operations beginning



2023

2024

2025

2026

2027

2028

2029

2030

Construction

ngVLA Transition Advisory Group

Charge: Guided by the scientific opportunities planned for the coming decade, the VLA/VLBA to ngVLA Transition Advisory Group (TAG) is charged to develop, quantitatively assess, and evaluate a finite number of possible VLA/VLBA to ngVLA transition options that can be prioritized on their scientific promise, cost and technical/personnel impacts.

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Process - ngVLA Transition Matrix

	Technical Transition Option	Technical Transition Option	Technical Transition Option	Technical Transition Option
Science Case				
Science Case				
Science Case				
Science Case				
Community Consideration (e.g., student training)				
Other Facility				



drawn from NRAO
presentation, TAG
suggestions; current set ~ 15



drawn from Science Book, TAG suggestions; current set ~ 50

Process - ngVLA Transition Matrix

Status

	Technical Transition Option	Technical Transition Option	Technical Transition Option	Technical Transition Option
Science Case	<p>ngVLA Transition Advisory Group conducted quantitative assessment of each Technical Transition Option on each Science Case or other Consideration.</p> <p>→ Current Status: Assessing Technical Transition Options to determine which ones allow rapid transition to ngVLA while minimizing effects on science</p>			
Science Case				
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drawn from Science Book, TAG suggestions; current set ~ 50

Assessments and Findings

Maintain community and train new generation - ensure that ngVLA users exist!

The frequency and angular resolution dynamic ranges of the VLA and VLBA are unique and compelling scientific capabilities.

Frequency dynamic range of more than 100:1 is unparalleled.

Time domain science is a compelling opportunity for the next decade.

Identified as such in *Pathways to Discovery*; Radio wavelength observations provide key information about physics of sources and ambient medium, particularly in the multi-messenger astronomy arena

Near-term Planetary Science and Heliophysics missions offer compelling opportunities for complementary observations.

Near-simultaneous observations of the Sun and Solar System planets, e.g., Parker Solar Probe, the Jupiter Icy Moons Explorer (JUICE), Dragonfly, and Europa Clipper

The focus of the Transition is on the VLA capabilities.

Fewer options to reduce VLBA capabilities without significant harm to scientific return

*Not listed in any particular priority order

Boundary Conditions

- VLA and VLBA capabilities must be maintained until the start of ngVLA construction
- No gap in observational capability is acceptable during the ngVLA construction.
- If ngVLA construction delayed by three years or more, conclusions of Transition Advisory Group should be revisited.



Elements of Recommendation

- Maintain VLBA observational capabilities as-is
- Reassess, and potentially reduce, “call out” time for VLA repairs
Allow more antennas to be inoperative for longer durations, resulting in lower instantaneous sensitivity
- Reduce or eliminate configuration changes
Resulting in reduced range of angular resolution or surface brightness sensitivity or both
Need simulations to assess
- Reduce number of receivers per antenna, with at least five common frequency bands available on all antennas
Resulting in reduced spectral dynamic range

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p	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	24	28	32	36	40	48	56	64	72	L km
A								✓					✓			✓		✓	✓	✓	✓	✓	✓	✓	21.0
B				✓				✓			✓		✓		✓	✓	✓	✓	✓						6.4
C		✓		✓		✓		✓		✓	✓	✓	✓	✓											2.0
D	✓	✓	✓	✓	✓	✓	✓	✓	✓																0.6
F			✓					✓				✓			✓		✓		✓	✓	✓	✓	✓		17.1

F configuration (Wrobel & Walker, ngVLA Memo 97; https://library.nrao.edu/public/memos/ngvla/NGVLA_97.pdf)

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VLA+VLBA Transition to ngVLA

Transition to ngVLA needs to balance science and efficiency

Transition Advisory Group has developed

- initial set of assessments and findings
- boundary conditions

Current elements of likely recommended approach

- lengthening “call-out” time, effectively fewer antennas
- fixed configuration
- reduced receiver suite

Community feedback

<https://tinyurl.com/ngVLA-Transition>





