National Radio Astronomy Observatory (NRAO)

Request for Information (RFI)–– High Resolution Subarray antennas

Section 1: Introduction

This RFI seeks to gather information from potential suppliers to inform the development of a comprehensive strategy that utilizes commercial solution(s) to meet NRAO requirements. NRAO is seeking industry feedback, recommendations, and best practices during the market intelligence phase of this effort. Please do not provide generic capability statements. NRAO is seeking well defined responses, with supporting documentation, that demonstrate capability to manufacture and construct a predesigned antenna to assist in developing our acquisition strategy.

The Next Generation Very Large Array (ngVLA) High Resolution Subarray (HRS) is a project of the National Radio Astronomy Observatory (NRAO). The deliverable will be a long baseline astronomical observatory that will operate at centimeter wavelengths (25 to 0.26 centimeters, corresponding to a frequency range extending from 1.2 GHz to 116 GHz). This will be a synthesis radio telescope composed of approximately 10 reflector antennas each of 18 meters diameter operating in a phased or interferometric mode.

The antenna sites are currently assumed to include locations such as Alaska, Hawaii, Puerto Rico, West Virginia, Connecticut, and Florida, but these locations are preliminary and likely to change.

*****This is not a request for proposals. All information provided is optional; and it will be used to assist NRAO in determining its future acquisition strategy.*****

Section 2: Project Overview

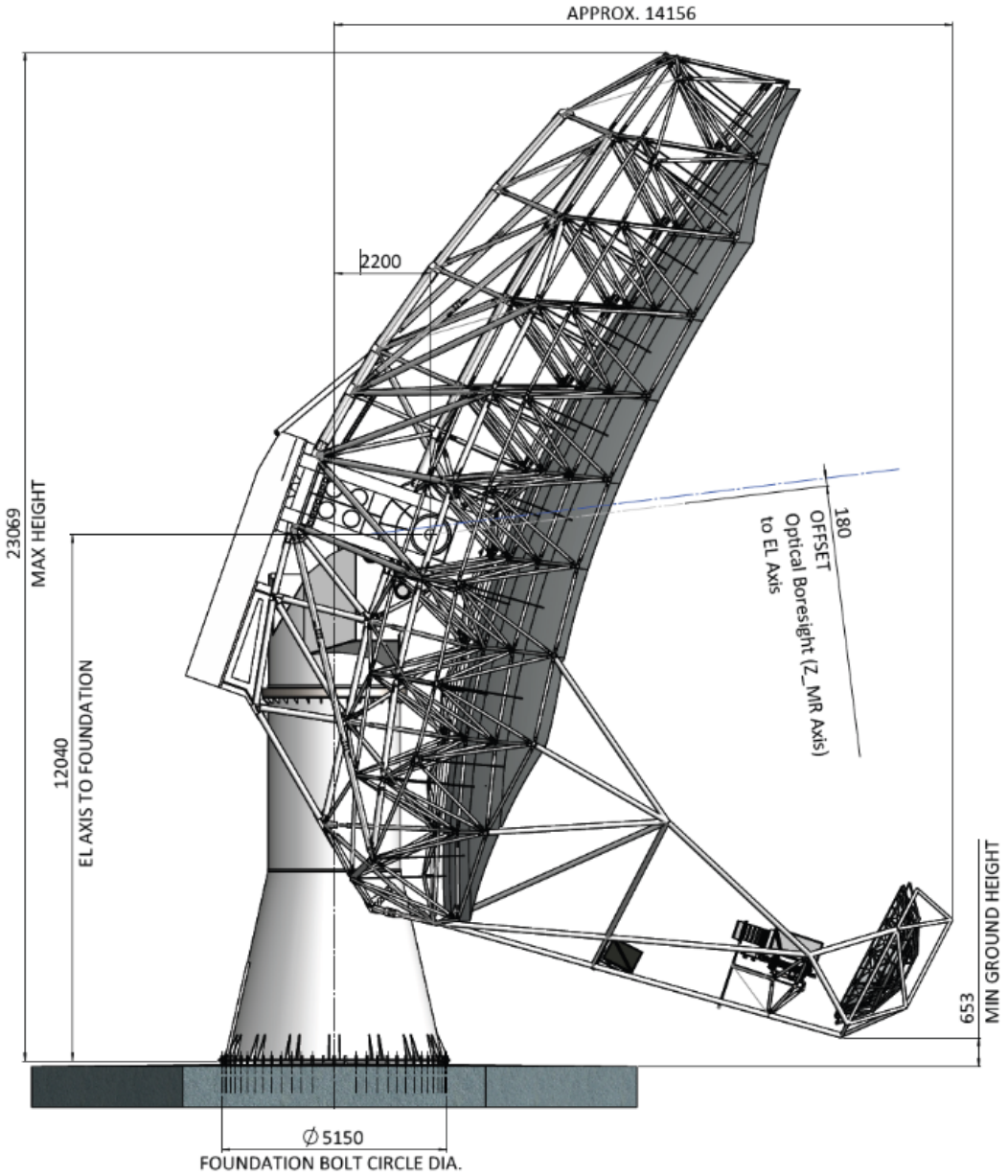
Description(s):

This RFI is issued by NRAO. Additional market research may or may not be conducted. Responses from all sizes of vendors are encouraged.

In order to provide the reader with a high-level view of the antenna to be manufactured and assembled a subset of the major requirements are listed in Table 1 and Figure 1 provides a graphical representation of the antenna.

Table 1 – A subset of the HRS antenna requirements

Parameter	Summary of Requirement
Frequency Range	1.2–116 GHz
Diameter	18 m
Antenna Geometry	Offset Gregorian, with focal point on bottom.
Max. Aperture Plane Error	**Precision Operating Conditions:** 320 μm rms (surface equiv. to 160 μm rms , λ/16 @ 116 GHz) **Normal Operating Conditions:** 600 μm rms (surface equiv. to 300 μm rms)
Pointing Accuracy	**Precision Operating Conditions**: Absolute pointing: 18 arc sec rms Referenced pointing: 3 arc sec rms (3 deg angle, 15 min time) **Normal Operating Conditions:** Absolute pointing: 30 arc sec rms Referenced pointing: 5 arc sec rms (3 deg angle, 15 min time)
Tracking Range	**Azimuth:** ±270 deg **Elevation:** 7 deg to 88 deg
Movement Rate	**Slew:** Azimuth 90 deg/min (Goal: 180 deg/min), Elevation 45 deg/min (Goal: 90 deg/min). **Tracking:** Azimuth 7.5 deg/min, Elevation 3.5 deg/min (Goal: support tracking rates up to the slew rate at reduced pointing accuracy).
Environmental Conditions	**Survival Conditions at Stow Position:** wind ≤ 50 m/s, temperature ≥ –30 C, 2.5 cm radial ice, 25 cm snow in dish, 2.0 cm diameter hailstones **Precision Operating Conditions:** Nighttime only, wind ≤ 5 m/s, temperature ≥ –15 C, no precipitation **Normal Operating Conditions**: Day and night, wind ≤ 7 m/s, temperature ≥ –15 C, no precipitation
Non-Repeatable Residual Path Length	The non-repeatable residual path length shall not exceed 18 μm rms over a 5 minute period, with motion up to 5 degrees, in the precision operating environment.
Design Life	The antenna shall be designed for a service life of 30 years.
Lifecycle Optimization	The antenna design shall minimize its lifecycle cost assuming 30 years of operation.
Country of Origin	The antenna should meet US federal procurement regulations for country of origin content.
Preventive Maintenance Cycle	Preventive maintenance shall not be required at intervals shorter than 12 months.
Preventive Maintenance Effort	Periodic preventive maintenance shall require no more than a 2-person team and no more than 2 8-hour workdays.
Mean Time Between Failures	MTBF ≥25,000 hrs. Goal of MTBF ≥35,000 hrs.
Main Array Antenna Interchangeability	It is a goal to maximize service part interchangeability and service requirements with the 18m Main Array Antenna design.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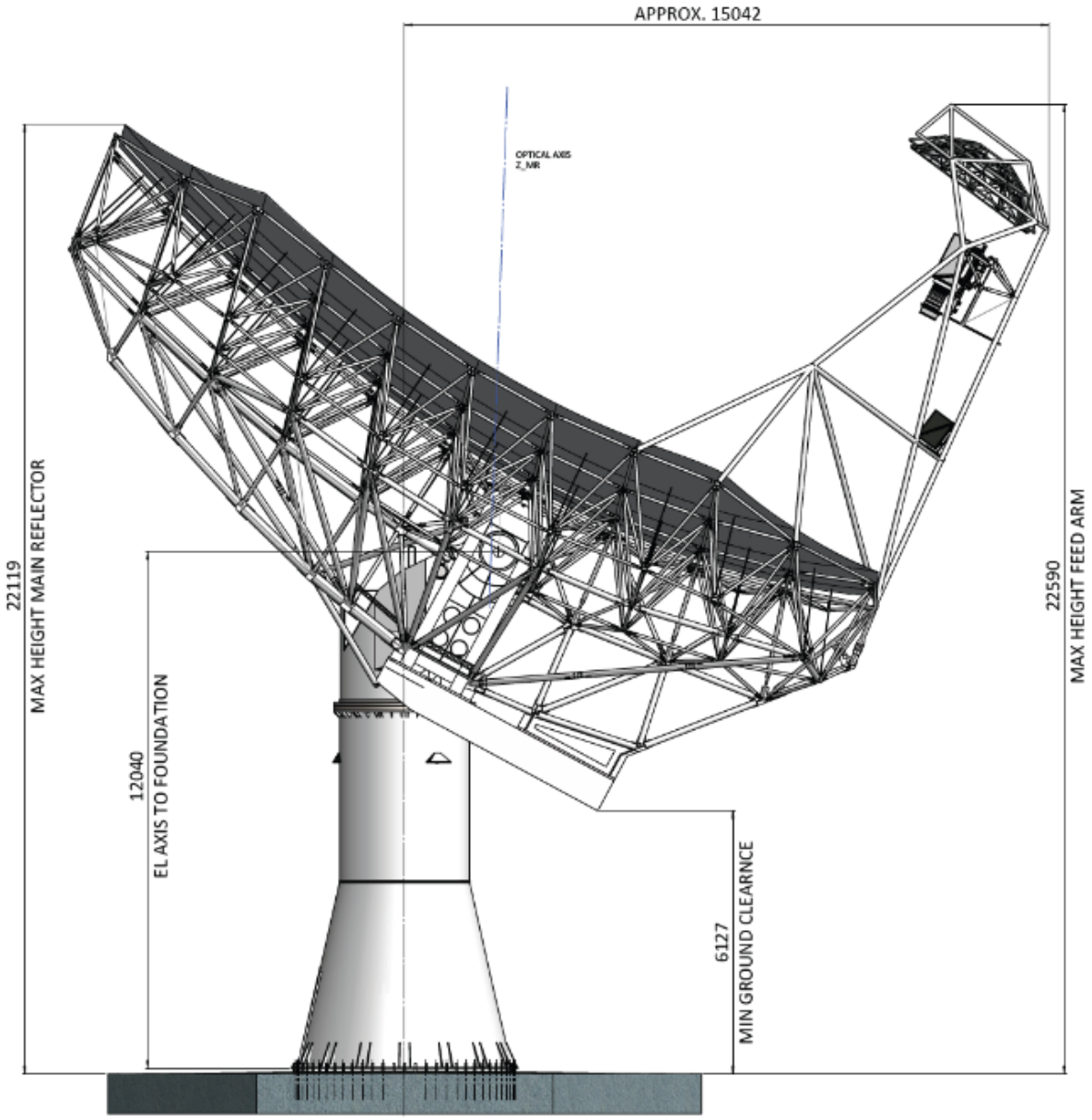

Figure 1 – Envelope dimensions of the HRS antenna at 7 degree elevation and 88 degree elevation respectively, design is still in work so final dimensions may be slightly different.

The ngVLA HRS antenna is a variant of the ngVLA Main Array Antenna (MAA). NRAO has successfully built and is in the process of testing the MAA 18m ngVLA prototype at their facilities in NM. The design report, and other additional information, for the MAA antenna can be found on NRAO's public ngVLA site here:

https://ngvla.nrao.edu/page/projdoc

The document titled "Final Design and Prototype of ngVLA 18m Antenna (DRD-22)" provides a detailed overview of the mechanical design of the Main Array Antenna.

A very simplistic summary of the differences between the HRS variant and the MAA 18m design are highlighted below:

The HRS Antenna:

- Turn head height is increased by 1000mm
- Pedestal height is increased by 500mm
- Lowest elevation is 7 deg vs 12 deg for MAA
- Requires additional counterweight

This RFI focuses on the following areas:

- **Technology Innovation:** NRAO seeks solutions for the following technical priorities:
  - Technical performance of the proposed antenna design:
    - Responsiveness to the subset of the technical requirements described in Table 1 (above).
    - Ability to meet or exceed the Table 1 requirements.
  - Validity of engineering analyses, tests, and demonstrations supporting the claimed performance of the antenna.
  - Understanding of the technical risks and difficulty of achieving the technical requirements.
  - Methods of assuring compliance with specifications.
  - Reliability, maintainability, and safety of the proposed design.
- **Commercial Delivery and Pricing Models:** NRAO seeks information on innovative commercial delivery and pricing structures. Schedule will be a crucial requirement for this procurement which is driven by the delivery of all 10 fully functional reflector antennas within a five-year period beginning in FY 2027.
- **Collaborative Partnerships:** NRAO highly encourages collaboration with international and academic partners to accelerate innovation and delivery of operationally resilient capabilities. Respondents should describe existing or potential partnerships that leverage complementary expertise and infrastructure in support of the schedule objectives.

Section 3: Requested Information

Respondents are requested to provide information on the topics below, referencing the strategic priorities outlined in Section 2.

1. **Applicable Technologies and Capabilities**
   a. Describe your company's technology or capability applicable to design and build of an astronomical observatory experience in these areas:
      i. Experience with 12m+ diameter shaped surface antenna design/construction, preferably with an offset feed arm, at frequencies at or above 90 GHz
      ii. Experience with transportation of Antenna Construction Materials to remote locations
      iii. Experience with Antenna Assembly in remote locations

b. Describe your company's capability related to the project schedule:
    i. Ability to produce and install 10 antennas starting as soon as January 2027 and concluding 5 years after start.
    ii. Provide any industrial partnerships/experience and time required for different stages of the schedule.
c. Identify supporting software envisioned to be used for monitoring and control of the antenna.
d. As appropriate, provide an assessment of the Technology Readiness Level (TRL) (https://www.nasa.gov/directorates/somd/space-communications-navigation-program/technology-readiness-levels/) and anticipated development milestones. Clearly identify operational assumptions, constraints, and/or limitations related to the production and assembly of the HRS antennas. Describe any known technical risks and regulatory, operational, or market challenges that are foreseen in development and deployment that you are considering regarding the manufacturing and installation of the HRS array.

2. **System Development, Testing, and Demonstration Readiness**
    a. Summarize environmental, qualification, and functional testing performed or planned, including test objectives and outcomes where available.
    b. Provide information on heritage, TRL, or analogous system demonstrations, if applicable.

3. **Scalability, Affordability, and Tailoring**
    a. Explain how your company leverages other commercial or shared architectures to reduce non-recurring engineering and operational costs.

4. **Integration, Compatibility, and Data Standards**
    a. Vendors should have an established Systems Engineering function within their organization and provide their Systems Engineering Management Plan (SEMP). As an example, the ngVLA SEMP (NRAO Doc. #: 020.10.00.00.00-0001-PLA, Version C) is available on the project web page (ngvla.nrao.edu).

5. **Incorporation of Intellectual Property**
    a. Please provide your organization's preference for incorporating Intellectual Property, if necessary. How would your organization like to address design clarifications?

Section 4: Submission Guidelines

Vendor Information Requested: Submissions should include your organization's pertinent information as listed below:

a. Vendor Name and Parent Company (if applicable)
b. Cage Code (if registered)
c. Business Type SB/Large
d. Vendor Point of Contact: Name/Phone number/email

Response Submissions: RFI responses should be submitted via email with the subject line "ANTENNA RFI – (Company Name)" to the Contracting Officer listed below no later than 29 May, 2026 by 1700 MT.:

- Anthony Kaiser, akaiser@nrao.edu

Questions: Questions regarding this RFI shall be submitted in writing to email above. Answers to questions, and if necessary, any supporting documentation will be posted to the NRAO Business Opportunities page at https://info.nrao.edu/oas/cap/oas/cap/open-rfps. NRAO cannot guarantee that questions received after 22 May, 2026 by 1700 MT will be answered.

Response Format: Interested vendors are requested to respond to this RFI at an unclassified level via a white paper. Submissions should not exceed seven (7) pages, single spaced, 12-point, Times New Roman with at least one-inch margins on 8 1/2" X 11" page size. The title page and front matter such as transmittal letter, cover page, table of contents, and appendices such as technical specifications of drawings, will not count against the page limit. The response should not exceed a 5 MB e-mail limit for all items associated with the RFI response. Responses must specifically describe the contractor's capability to meet the requirements outlined in this RFI.

Section 5: Additional Information

The NRAO Business Opportunities page will be the repository for all information related to this RFI.

This RFI is issued solely for information and planning purposes (market research) to inform future NRAO astronomical observatory requirements and architectural trades. As part of a comprehensive market research and technical review process, please be advised that all submissions may be shared with other Government agencies and partners, including but not limited to the National Science Foundation (NSF). This RFI does not constitute a solicitation (Request for Proposal or Request for Quotations), or a promise to issue a solicitation in the future. This RFI does not commit NRAO to contract for any supply or service whatsoever. Responses to this RFI, due 29 May, 2026, are not offers and cannot be accepted by NRAO to form a binding contract. Furthermore and, at this time, NRAO is not seeking proposals and will not accept any unsolicited proposals. Respondents are advised that NRAO will not pay for any information or administrative costs incurred in response to this RFI. All costs associated with responding to this RFI will be solely at the responding party's expense. Not responding to this RFI does not preclude participation in any future solicitations, if any are issued. Any information submitted by respondents to this RFI is strictly voluntary. All submissions become AUI/NRAO property and will not be returned. **Proprietary information,** if any, should be kept to a minimum and **MUST BE CLEARLY MARKED**. All information in response to this RFI marked proprietary will be handled accordingly. NRAO shall not be liable for or suffer any consequential damages for any proprietary information not properly identified. Proprietary information will be safeguarded in accordance with applicable regulations.