

HAT CREEK RADIO OBSERVATORY

TECHNICAL DETAILS AND RATE SHEET



1 JULI 2025

OVERVIEW

The Hat Creek Radio Observatory is a multi-disciplinary facility which is operated by the SETI Institute. The observatory houses a number of instruments and research projects including the 42-element Allen Telescope Array.

HCRO USE

Use of the Hat Creek Radio Observatory is available for shared-risk scientific and research activities. Observing time on the ATA is available on a proposal and cost-recovery basis. Proposals are evaluated based on scientific merit and are accepted from all research and educational institutions as well as individual investigators. Guest experiments, instruments and equipment must comply with observatory policies including those related to electromagnetic interference minimization.

SERVICES

HCRO offers the following services to research and educational institutions:

- Observations using the Allen Telescope Array
 - As individual antennas, groups of antennas or the entire array
 - Using the ATA's general purpose DSP backend
 - Using USRP and other SDR peripherals
 - Using user-supplied equipment
- ATA general DSP backend modes
 - Raw digitized signals available via 100Gbit ethernet
 - Arbitrary spectral or temporal resolution full Stokes spectroscopy
 - Wide-bandwidth multi-antenna voltage recording
- Hosting guest instruments on site including colocation in the ATA Signal Processing Room
 - Complete systems
 - Antennas
 - Guest receivers on ATA dish(es)

COMMERCIAL RATE FEE

Activity / Equipment	Commercial Rate	Academic Rate
ATA (Single Antenna - without digital instrumentation)	\$150 / hour	\$100 / hour
ATA (Full Array - includes available instrumentation)	\$910 / hour	\$600 / hour
Observing and Instrumentation Support (9am - 5pm)	\$200 / hour	\$125 / hour
Observing and Instrumentation Support (24 hour)	\$400 / hour	\$200 / hour
Other Hosted Equipment (as available, up to 10 m ²)	\$200 / month + utilities	

Colocation	Commercial Rate	Academic Rate
1U space allocation (2 Amp / 100 Mbps / Gateway)	\$150 / month	\$125 / month
Static IP Address (as available)	\$25 / month	\$25 / month
Network and Server Support (9am - 5pm / Mon-Fri)	\$200 / hour	\$125 / hour
Network and Server Support (24 hour)	\$400 / hour	\$200 / hour

Accommodations	Commercial Rate	Academic Rate
Dormitory Housing (based on double occupancy)	\$75 / night	\$50 / night
Residential-style housing (3 br / 2 ba)	\$800 / month + utilities	
Trailers / Campers	Contact	

Utilities	Rate
Power (line)	\$0.25 per kw-hr
Power (conditioned / UPS)	\$0.50 per kw-hr
Waste Disposal and Other Utilities	Contact

**ALTERNATIVE ARRANGEMENTS FOR NON-PROFIT EDUCATIONAL AND/OR RESEARCH USE ARE AVAILABLE.
PLEASE CONTACT US FOR MORE INFORMATION.**

LOCATION

Name	Hat Creek Radio Observatory
Address	42231 Bidwell RD, Hat Creek, CA 96040
Altitude	1019.222 m
Latitude	40° 49' 02.75" N
Longitude	121° 28' 14.65" W

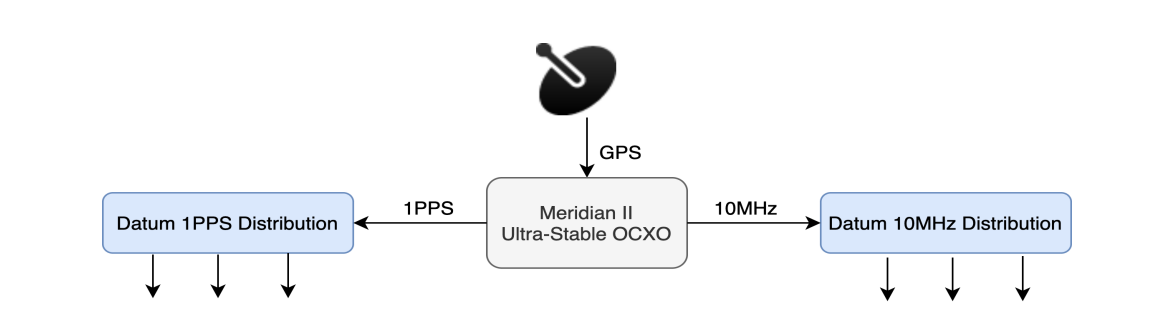


ANTENNAS

Architecture	42 dishes – 6.1 m offset Gregorian
Currently available for observations	28 as of 1 July 2025
Array maximum baseline	300 m
Elevation range	16 to 87 deg
Max elevation speed	1 deg/sec
Azimuth range	-90 to 450 deg
Max azimuth speed	3 deg/sec
Operating frequency	1 – 11.2 GHz
Feed design	Log-periodic
Polarization	Dual linear
Feed operating temperature	80 Kelvin
System temperature (T_{sys})	45 Kelvin @ 2 GHz; 60 Kelvin @ 8 GHz
HPBW	3.5° @ 1 GHz; 0.58° @ 6 GHz; 20.9' @ 10 GHz;

TIME STANDARD

Time sync	GPS (Meridian II)
Station clock	Ultra-Stable OCXO
Available reference signals	10MHz; 1PPS

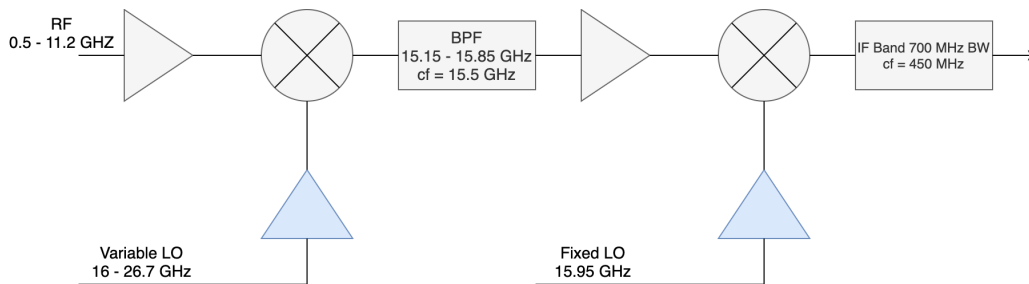


RADIO FREQUENCY (RF)

Cryogenic low noise amplifier	LNF-ABLNC1_15A; 35dB gain; 1 – 15 GHz
Post amplifier module (PAM)	60dB gain; 0 - 63 dB variable attenuator; 0.5 dB step
PAM 1 dB gain compression	+8 dBm
Analog fiberoptic link converter	Photonic Systems; PSI 1601
Fiber link noise figure	≤ 45 dB
Fiberoptic 1 dB gain compression	+11 dBm
Fiberoptic connectors	FC/APC
Optical wavelength	1550 nm

INTERMEDIATE FREQUENCY (IF)

Number of independent IF bands	4
IF bandwidth	700 MHz
Number of tunable LO	4
Number of fixed LO	1
Frequency range of tunable LO	16 – 26.7 GHz
Frequency of fixed LO	16.012 GHz
AAF center frequency	512 MHz
IF output power range	-10 dBm to -30 dBm
IF output connector	SMA

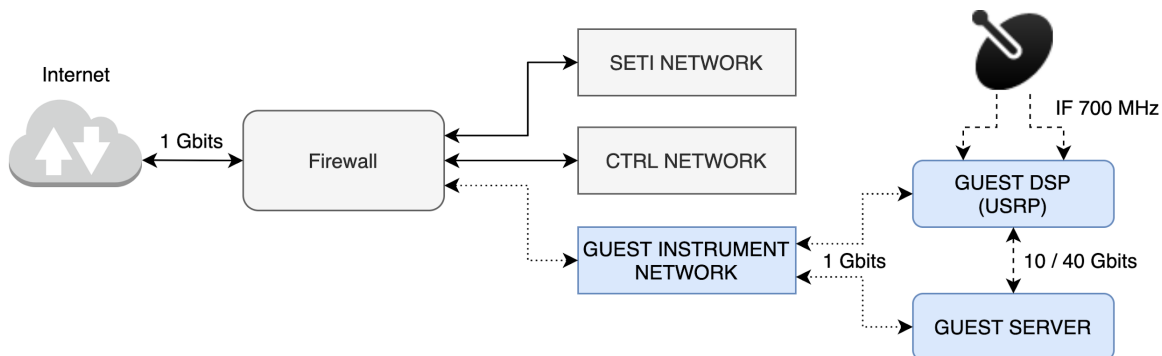


CONTROL INTERFACE

Telescope control software	Python 3.5 based library; ATATools.ata_control
GitHub location	https://github.com/SETIatHCRO/ATA-Utils
Software version	1.0.3
Requirements	'ephem'; 'astropy'; 'numpy'; 'ftplib'; 'pyuvdata'

NETWORK

Internet connection	1 Gbps full duplex
Site access	VPN; SSH
Available public IPs	254



PROCESSING BACKENDS

USRP mode	Value
Number of antennas	2
Number of polarization per antenna	2
Sampling rate	Variable
Usable bandwidth	Variable
USRP model (2 currently available)	N320 and N321
Output rate	Variable

Voltage record mode	Value
Number of antennas	20
Number of polarizations per antenna	2
Number of simultaneous tunings	2
Sampling rate	2048 MSPS
Usable bandwidth	672 MHz
Polyphase filterbank (PFB)	Yes
PFB channel width	0.5 MHz
Output format	RAW
Output bitwidth	8+8 bit complex unsigned-int
Output throughput (total usable, per tuning)	54 GB/s

Correlator mode	Value
Number of antennas	20
Number of polarizations per antenna	2
Number of simultaneous tunings	2
Sampling rate	2048 MSPS
Usable bandwidth	672 MHz
Polyphase filterbank (PFB)	Yes
PFB channel width	0.5 MHz
Correlator integration length	1 – 20 seconds
Correlator output format	UVH5
Spectral line (high frequency resolution) mode	Not currently supported
Output throughput (total usable, per tuning)	Variable

Beamformer mode	Value
Number of antennas	20
Number of polarizations per antenna	2
Number of simultaneous tunings	2
Sampling rate	2048 MSPS
Usable bandwidth	672 MHz
Number of simultaneous tunings	2
Polyphase filterbank (PFB)	yes
PFB channel width	0.5 MHz
Number of beams currently supported	1 (boresight)
Requires calibration*	yes
Output bitwidth	16+16 bit complex half precision float
Output throughput (total usable, per tuning, per beam)	5.4 GB/s

*For a maximum beamformer efficiency, it is advised that the beamformer be calibrated once every 4 hours when observing at frequencies above 5GHz. Phase and delay solutions, empirically, seem to stay stable for 10 hours at low frequencies.

CONTACT INFORMATION:

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