



We acknowledge the Gomeroi people as the traditional owners of the Observatory site.

BIGCAT Update

ATUC Open Session - November 9, 2022

Australia's National Science Agency



ATCA-BIGCAT overview

- BIGCAT: Broadband Integrated GPU Correlator for ATca
 - Replacement of CABB digitisers and correlator with a hybrid FPGA+GPU backend
- Key aspects of BIGCAT:
 - Double instantaneous bandwidth to ~ 8 GHz
 - Spectral resolution of at least 0.6 kHz
 - Improved reliability
 - More flexibility:
 - Many more options wrt. frequency resolution and integration times
 - Ability to change quickly between different observing modes
 - More adaptable to automated observing (e.g. rapid ToO follow-up)
 - Retain standard CABB features (e.g. mosaicing)



ATCA-BIGCAT signal chain

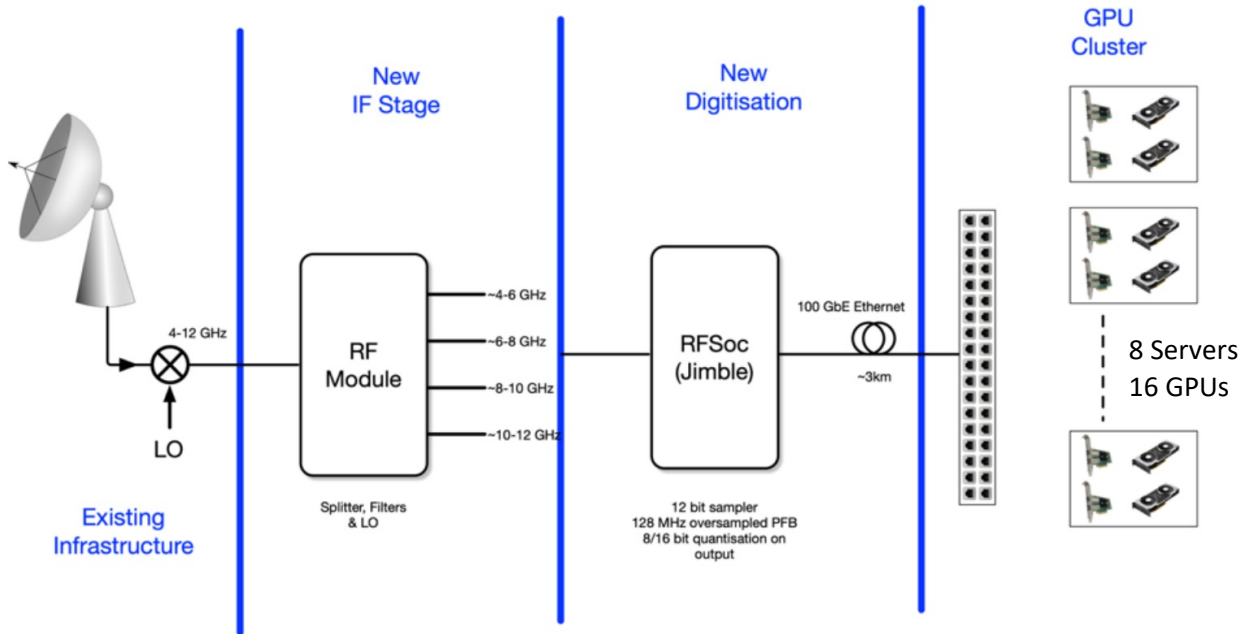
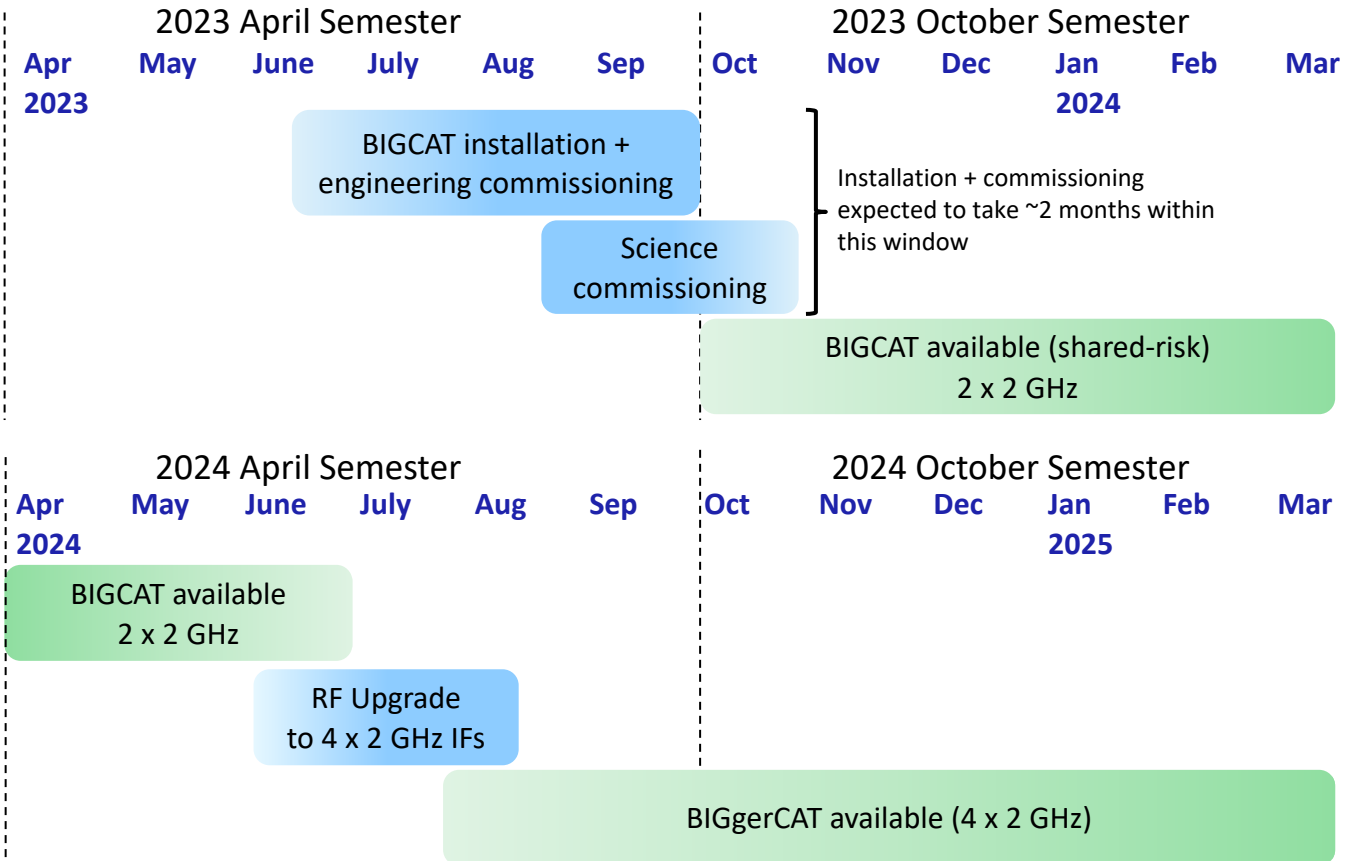


Figure 1: Overview of the BIGCAT signal chain

Installed ~ mid 2024

Installed ~ mid 2023

Timeline



Progress since last ATUC meeting

- Full bandwidth GPU backend demonstrated
 - 120 Gbps streamed from network into GPU and processed
- RF upgrade design well on track
 - Rev1 boards out for manufacturing
- Jimble data streaming tested in labs
- Control software development progressing well (e.g. new CAOBS)
- Science commissioning plan currently being prepared

Upcoming BIGCAT meetings

- BIGCAT technical update ([tentatively Dec, 2022](#))
 - ~half day meeting, providing more detailed technical update of the project
- BIGCAT information sessions ([early 2023](#))
 - Similar format to the recent CryoPAF info sessions
 - ~1hr, repeated meetings to suit different timezones
 - Predominately focused on science commissioning and future use cases for BIGCAT

Science Commissioning

Timeframe:

- Science commissioning to take place over ~4 week block after installation/engineering commissioning
- Ongoing commissioning windows throughout semester once BIGCAT offered for standard observing proposals

Test Fields:

- Identify a small set of ATCA test fields for science commissioning
 - Single pointing: known calibrator, strongly polarised src
 - Mosaic mode: larger field, e.g. GAMA 23?
 - Spectral line mode: HI, high-z CO, masers
 - VLBI tests
 - Automated triggering/override tests
- Plan to observe these with CABB prior to installation of BIGCAT to provide benchmark observations

Science Commissioning – available observing modes

Phase 1 (after initial 4 week science commissioning block):

- Standard ATCA observing modes:
 - Continuum and spectral line mode
 - Flexible spectral line set-ups, at least as good as offered by CABB
 - Mosaic mode
 - Rapid response mode/automated triggering
 - VLBI capabilities

Phase 2 (within ~6 months of BIGCAT installation):

- Pulsar binning mode
- Satellite tracking, Space Situational Awareness (SSA) modes

Phase 3 (requires further development):

- Subarrays
- RFI mitigation

Feedback and questions:

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Useful links:

BIGCAT overview: https://www.atnf.csiro.au/research/bigcat/BIGCAT_Overview.pdf

BIGCAT Requirements: https://www.atnf.csiro.au/research/bigcat/bigcat_techreq.pdf



Thank you

*We acknowledge all the traditional owners of the lands in which we live and work across Australia.
We pay our respect to their Elders past & present*

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