ASKAP Update

ATUC, July 2012

John Reynolds, ASKAP System Scientist

11 July 2012

CSIRO Astronomy and Space Science
www.csiro.au

Latest ASKAP News

http://www.atnf.csiro.au/projects/askap/news.html

All ASKAP antennas assembled at the MRO, June 2012

All 36 of CSIRO's ASKAP antennas have been assembled at the Murchison Radio-astronomy Observatory (MRO) in Western Australia.

Two more PAFs installed at the MRO

Two more PAFs were installed at the MRO (18 June). Integration testing is underway.

Dual SKA site welcomed by CSIRO, May 2012

The A$2.5 billion Square Kilometre Array radio telescope will be deployed in Australia-New Zealand, as well as South Africa, the international SKA Organisation has announced.

ATNF Steering Committee visits ASKAP, May 2012

Members of the CSIRO Australia Telescope National Facility (ATNF) Steering Committee visited ASKAP at the Murchison Radio-astronomy Observatory as part of their annual meeting.

MRO support facility construction underway, February 2012

Construction has begun on CSIRO's new facility in Geraldton to support the Murchison Radio-astronomy Observatory.

Antennas

- Construction of all 36 antennas is now complete.
- To mark the ‘end of build’ a dinner was held on 9 June 2012 at Boolardy with the whole CETC54 team and many CASS MRO and ANT IPT team members.
- Site acceptance tests for all 36 antennas have begun. CETC54 are planning to return a small team to site during July/August to rectify any remaining problems.
- We expect to sign off all 36 antennas by 30 September 2012, and therefore be able to pay off all milestones under the contract.
- Discussions are underway with CETC54 regarding an end-of-contract debrief.

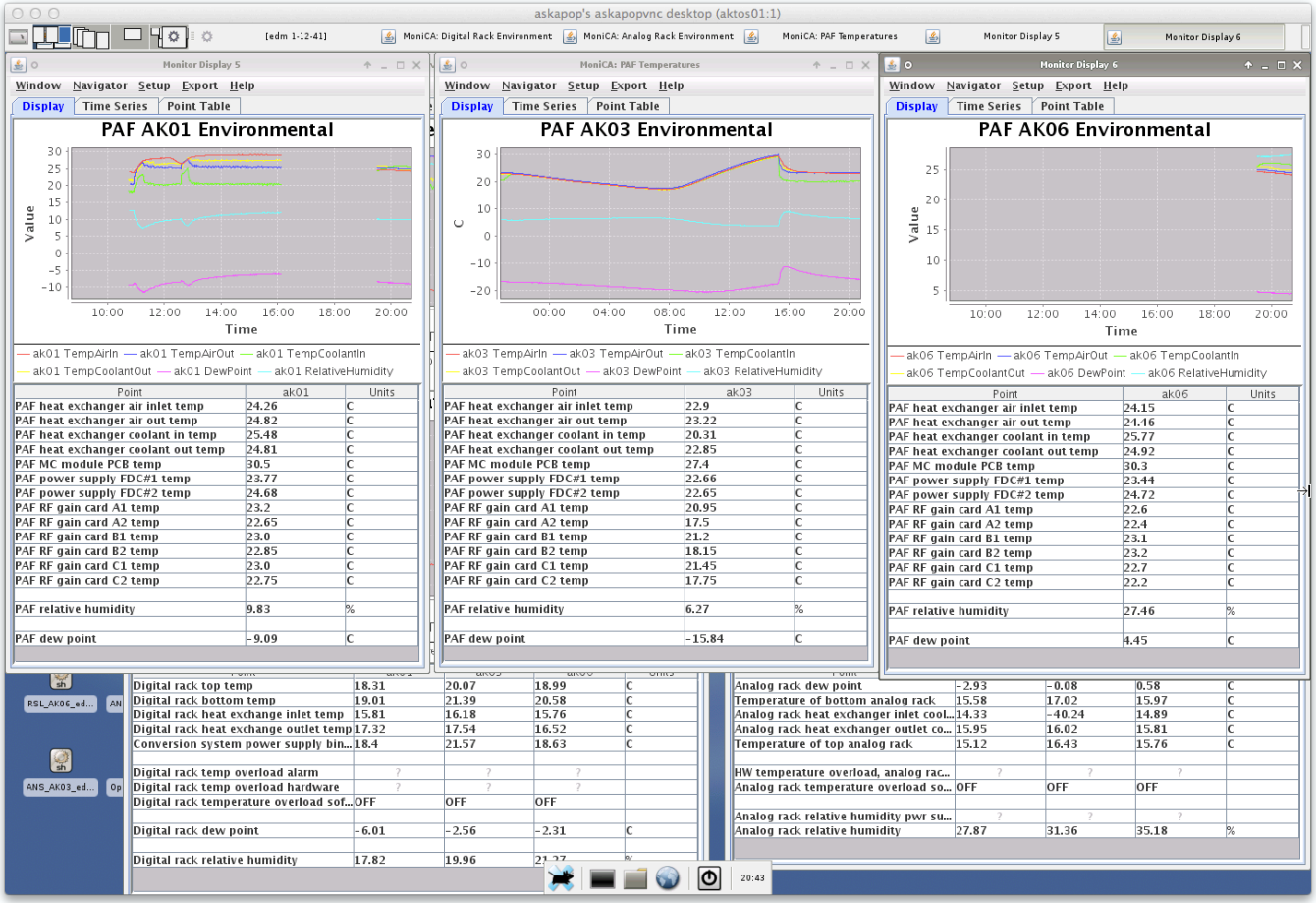
Telescope Control Software demonstration - MRO

Phased Array Feeds (PAFs)

Image Credit: Ben Scandrett

- PAFs #4 and #5 have arrived at the MRO and are now installed on Antennas 1 and 6.
- Integration and commissioning work with the PAFs commenced on 20 June 2012.

Phased Array Feeds (PAFs)



Point	ak01	Units
PAF heat exchanger air inlet temp	24.26	C
PAF heat exchanger air out temp	24.82	C
PAF heat exchanger coolant in temp	25.48	C
PAF heat exchanger coolant out temp	24.81	C
PAF MC module PCB temp	30.5	C
PAF power supply FDC#1 temp	23.77	C
PAF power supply FDC#2 temp	24.68	C
PAF RF gain card A1 temp	23.2	C
PAF RF gain card A2 temp	22.65	C
PAF RF gain card B1 temp	23.0	C
PAF RF gain card B2 temp	22.85	C
PAF RF gain card C1 temp	23.0	C
PAF RF gain card C2 temp	22.75	C
PAF relative humidity	9.83	%
PAF dew point	-9.09	C

Point	ak03	Units
PAF heat exchanger air inlet temp	22.9	C
PAF heat exchanger air out temp	23.22	C
PAF heat exchanger coolant in temp	20.31	C
PAF heat exchanger coolant out temp	22.85	C
PAF MC module PCB temp	27.4	C
PAF power supply FDC#1 temp	22.66	C
PAF power supply FDC#2 temp	22.65	C
PAF RF gain card A1 temp	20.95	C
PAF RF gain card A2 temp	17.5	C
PAF RF gain card B1 temp	21.2	C
PAF RF gain card B2 temp	18.15	C
PAF RF gain card C1 temp	21.45	C
PAF RF gain card C2 temp	17.75	C
PAF relative humidity	6.27	%
PAF dew point	-15.84	C

Point	ak06	Units
PAF heat exchanger air inlet temp	24.15	C
PAF heat exchanger air out temp	24.46	C
PAF heat exchanger coolant in temp	25.77	C
PAF heat exchanger coolant out temp	24.92	C
PAF MC module PCB temp	30.3	C
PAF power supply FDC#1 temp	23.44	C
PAF power supply FDC#2 temp	24.72	C
PAF RF gain card A1 temp	22.6	C
PAF RF gain card A2 temp	22.4	C
PAF RF gain card B1 temp	23.1	C
PAF RF gain card B2 temp	23.2	C
PAF RF gain card C1 temp	22.7	C
PAF RF gain card C2 temp	22.2	C
PAF relative humidity	27.46	%
PAF dew point	4.45	C

Digital rack top temp	18.31	20.07	18.99	C
Digital rack bottom temp	19.01	21.39	20.58	C
Digital rack heat exchange inlet temp	15.81	16.18	15.76	C
Digital rack heat exchange outlet temp	17.32	17.54	16.52	C
Conversion system power supply bin...	18.4	21.57	18.63	C
Digital rack temp overload alarm	?	?	?	
Digital rack temp overload hardware	?	?	?	
Digital rack temperature overload sof...	OFF	OFF	OFF	
Digital rack dew point	-6.01	-2.56	-2.31	C
Digital rack relative humidity	17.82	19.96	21.27	%

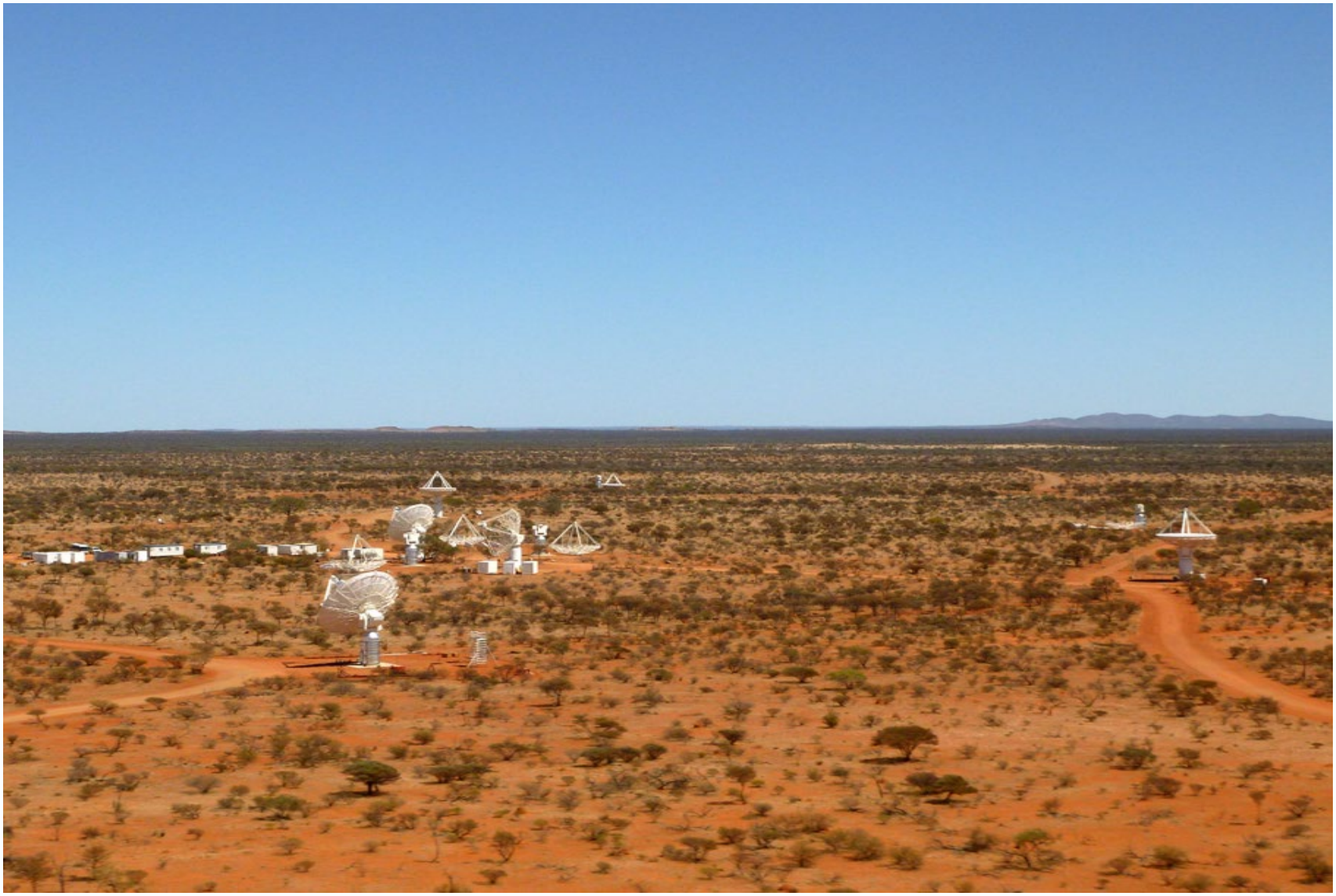
Analog rack dew point	-2.93	-0.08	0.58	C
Temperature of bottom analog rack	15.58	17.02	15.97	C
Analog rack heat exchanger inlet cool...	14.33	-40.24	14.89	C
Analog rack heat exchanger outlet co...	15.95	16.02	15.81	C
Temperature of top analog rack	15.12	16.43	15.76	C
HW temperature overload, analog rac...	?	?	?	
Analog rack temperature overload so...	OFF	OFF	OFF	
Analog rack relative humidity pwr su...	?	?	?	
Analog rack relative humidity	27.87	31.36	35.18	%

Both PAFs are being monitored via MoniCA and registering internal relative humidity of less than 30%.

Murchison Radio Observatory (MRO)

All MRO infrastructure is now complete (MacDow contract)

- Control building, roads, power and fibre distribution.
- Final phase of certified RFI testing scheduled for 2 – 4 July 2012 (TBC).
- Results of these to date have been excellent – this will provide confirmation that the building RFI shielding will meet our demanding requirements.



NBN Access
MRO – Perth Fibre Link

- CSIRO is establishing agreements with AARNet, who are in turn dealing with DIISRTE, DBCDE, NBN Co and Nextgen, for the connection of the MRO to the world.
- Construction of the Geraldton to MRO fibre link is complete. This link includes:

  - Provision of access to high bandwidth for the City of Greater Geraldton's facilities in Mullewa and at Geraldton Airport.

  - Provision of access to high bandwidth to Brookfield Rail.

  - Provision of a redundant high bandwidth link for the Dept. of Defence.

  All of these 3 groups provided funding (capital and ongoing operational).

- Since February 2012 CSIRO has access to an interim 1-GBit/s link between Geraldton and Perth. Once the agreement between AARNet and the four other parties has been finalised work can then proceed on the provision of the high-bandwidth capacity between Geraldton and Perth that will carry ASKAP (and MWA) science data (multiple 10-GBit/s services). This high-bandwidth capacity is expected to be up and running in August 2012.

NBN Access
“MRO Calling”

On 2 April 2012, the first call was placed at the MRO on a new VoIP phone installed at the site using the recently available 1 GBit/s fibre link right through to Perth.

New telephones were installed at strategic locations at the MRO itself, the Boolardy Homestead accommodation facility and Geraldton Offices, all fully integrated with CSIRO's VoIP phone network.

The arrival of high-quality voice and data services marks a significant step forward in ASKAP commissioning.

MRO Support Facility (Geraldton)

Base for MRO support staff

- 800 sqm building located next to Geraldton University Centre.
- Offices for 12-15 CSIRO staff, including visitors.
- Laboratories (for electronics repairs) & small mechanical workshop.
- Termination point for fibre link from MRO.
- Connection to Pawsey Centre via fibre to Perth.
- Operations control room.
- Portal room for local researcher access to Pawsey

Status

- RFT (Request for Tender) for the construction posted on Austender on 27 June 2011.
- Awarded to Mervym Pty Ltd, Trading as EMCO Building (Perth).
- Work commenced on 9 January 2012.
- Occupancy expected December 2012.

MRO Support Facility (Geraldton)

Taken on 8 June 2012

Testing and Commissioning

Two single-pixel L-band receivers have been successfully installed on two antennas at the MRO. These receivers are now being used for BETA system verification testing.

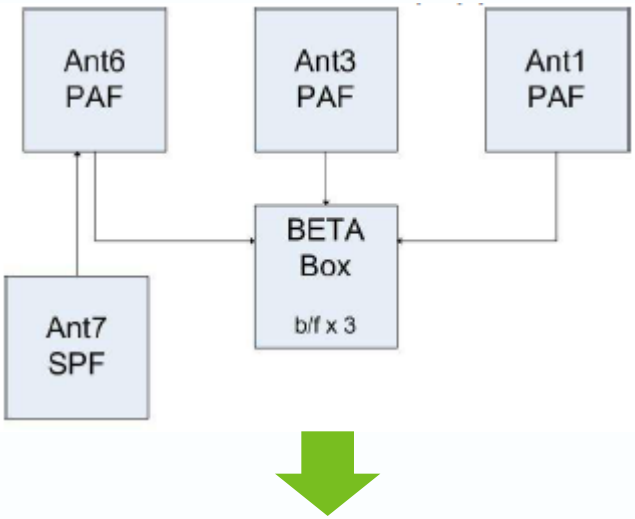
The inaugural meeting of the ASKAP Commissioning Taskforce was held on 17 March at Marsfield. The group is charged with an oversight and advisory role in commissioning BETA and ASKAP. A draft plan for the engineering commissioning for BETA was presented and the board strategy for the next phase – BETA science verification – was mapped out.

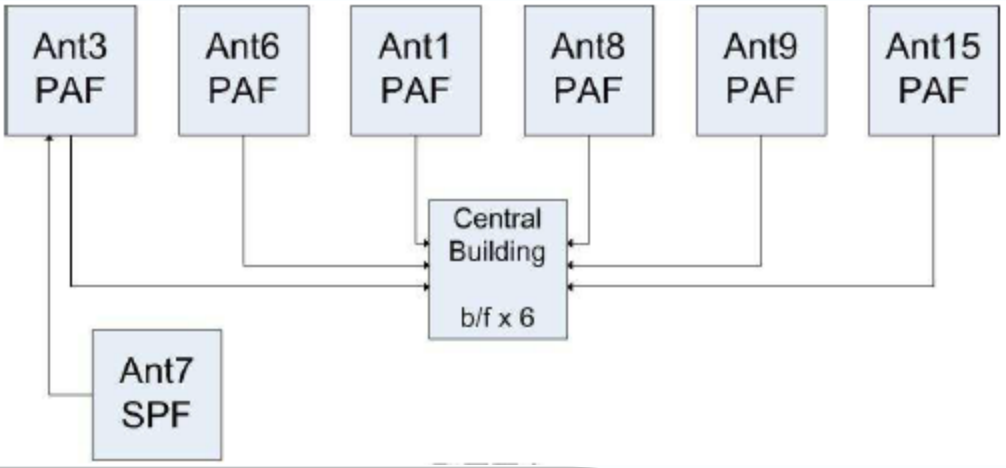
Testing and Commissioning

BETA Engineering Commissioning Plan

Next stages of BETA Engineering Commissioning:

- Antenna synchronisation
- Fringe detection and closure phase
- Scheduled observations using the TOS
- Multi-beam imaging (SW and FW correlator)
-Frequency response/spectral lines
- Polarization characterisation
- Imaging a complex field with interleaving



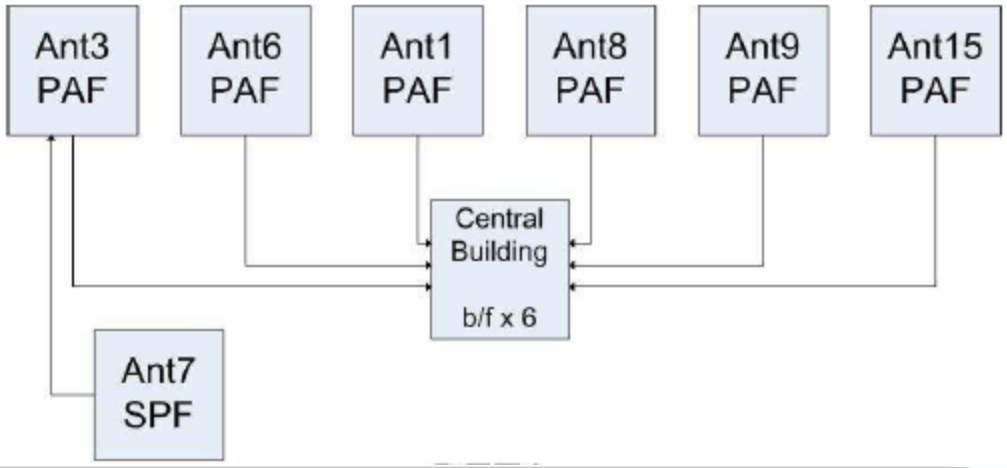


Testing and Commissioning

BETA Engineering Commissioning transitions into BETA Science Commissioning

- Likely to involve greater integration of science processing pipeline, more complex test fields/scenarios, advanced calibration techniques, other… plan not yet written.

- Some limited opportunities for SST involvement. E.g. identification of test cases, running tests, post processing and analysis of results

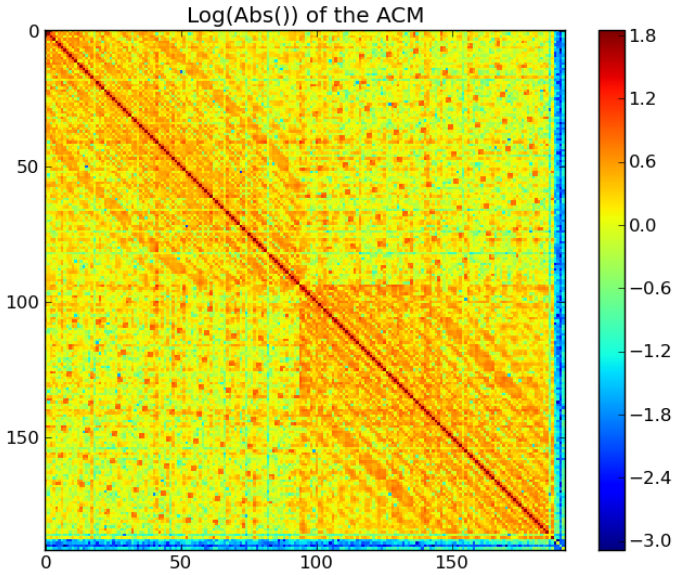


Testing and Commissioning

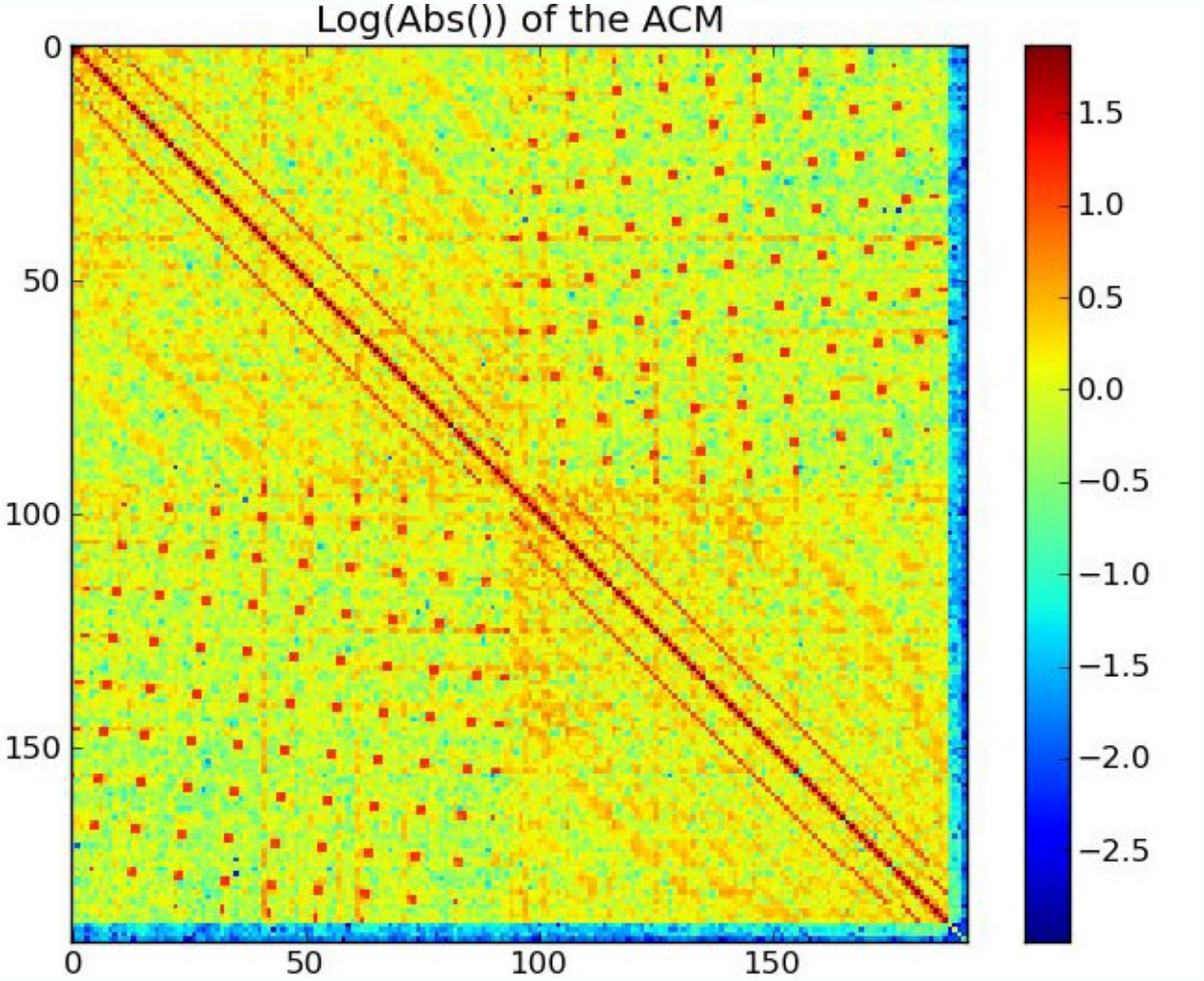
BETA Engineering Commissioning Plan

-Staged integration of BETA systems, incrementally adding layers of hardware abstraction.

- Single dish preliminaries are progressing. ACMs from antennas 1, 3 and 6 demonstrate PAF to Beamformer functionality



BETA PAF Results – ACM from 2nd antenna



BETA Commissioning Team

ASKAP Design Enhancements (ADE)

The Mk II design will also provide:

- Lower cost.
- Improved Design for Manufacturability/Testability.
- Improved reliability and availability.

The ADE Work package kicked off in August 2011, and progress against the original plan has been good.

- Schedule slippage is around 2 months.
- Significant mitigation of technical risks (including wideband PAF performance).
- Recently completed the ADE Critical Design Review

ASKAP Design Enhancements (ADE)

ADE Work-package = Design and production of Mk II ASKAP Receive chain.

New hardware: PAF to beamformer

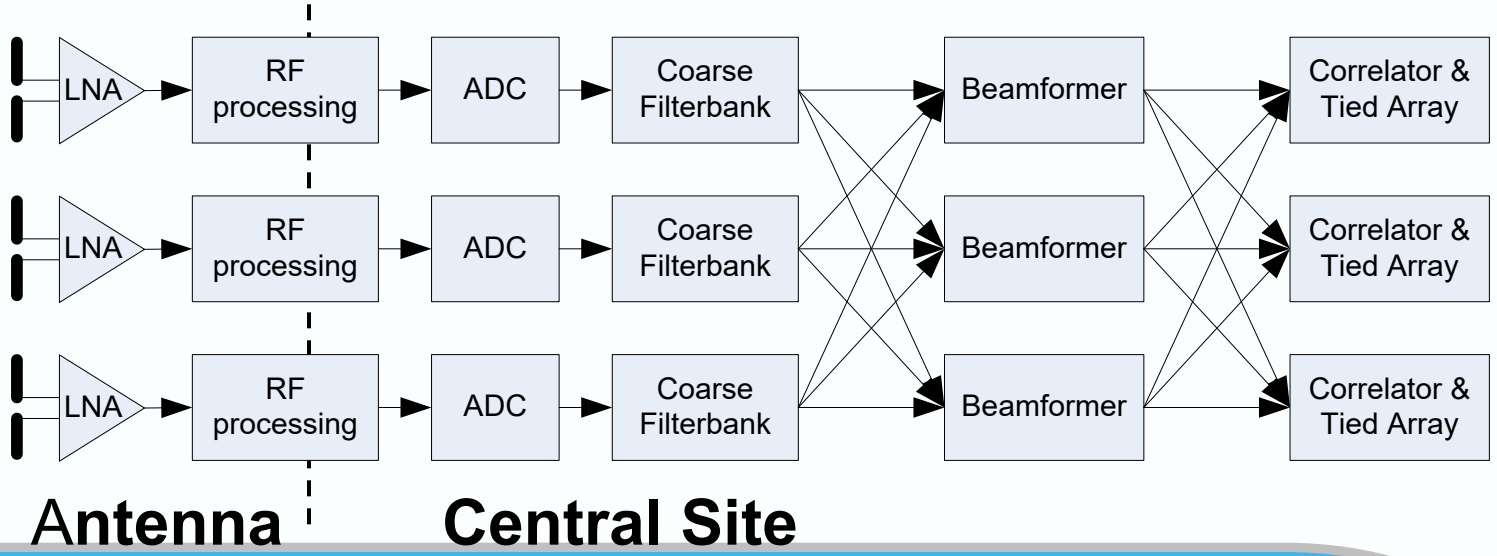
Improvement to PAF Tsys

RF over Fibre transport to ADC at central site

Direct sampling of RF

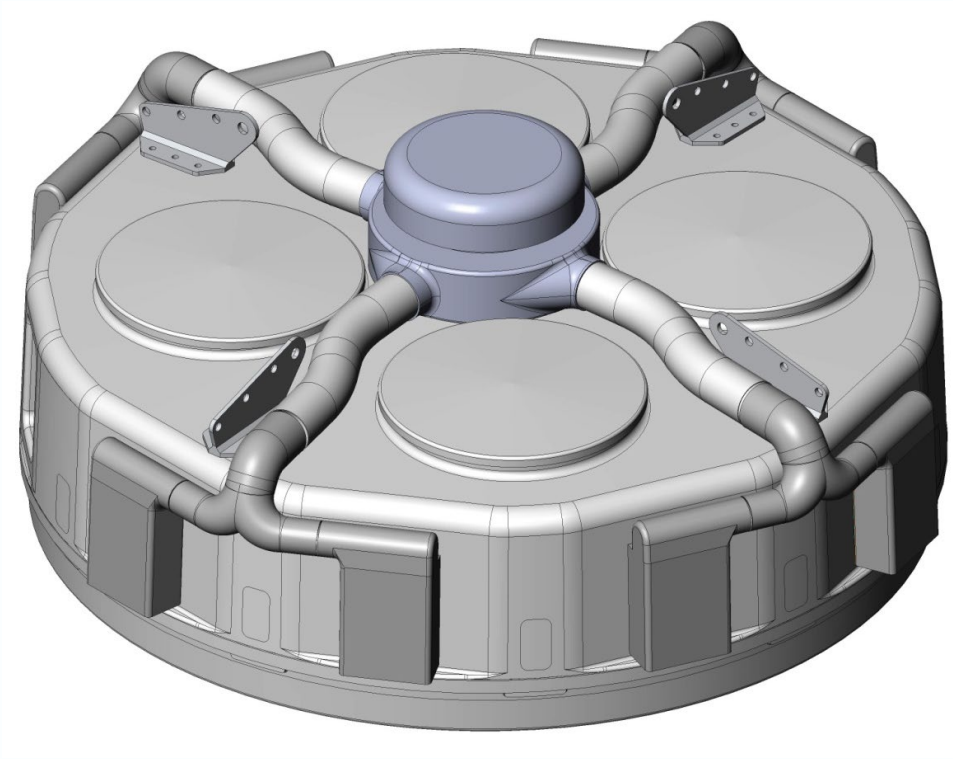
Passive optical cross connect to beamformer, also correlator

Flow on effects to the telescope operating system

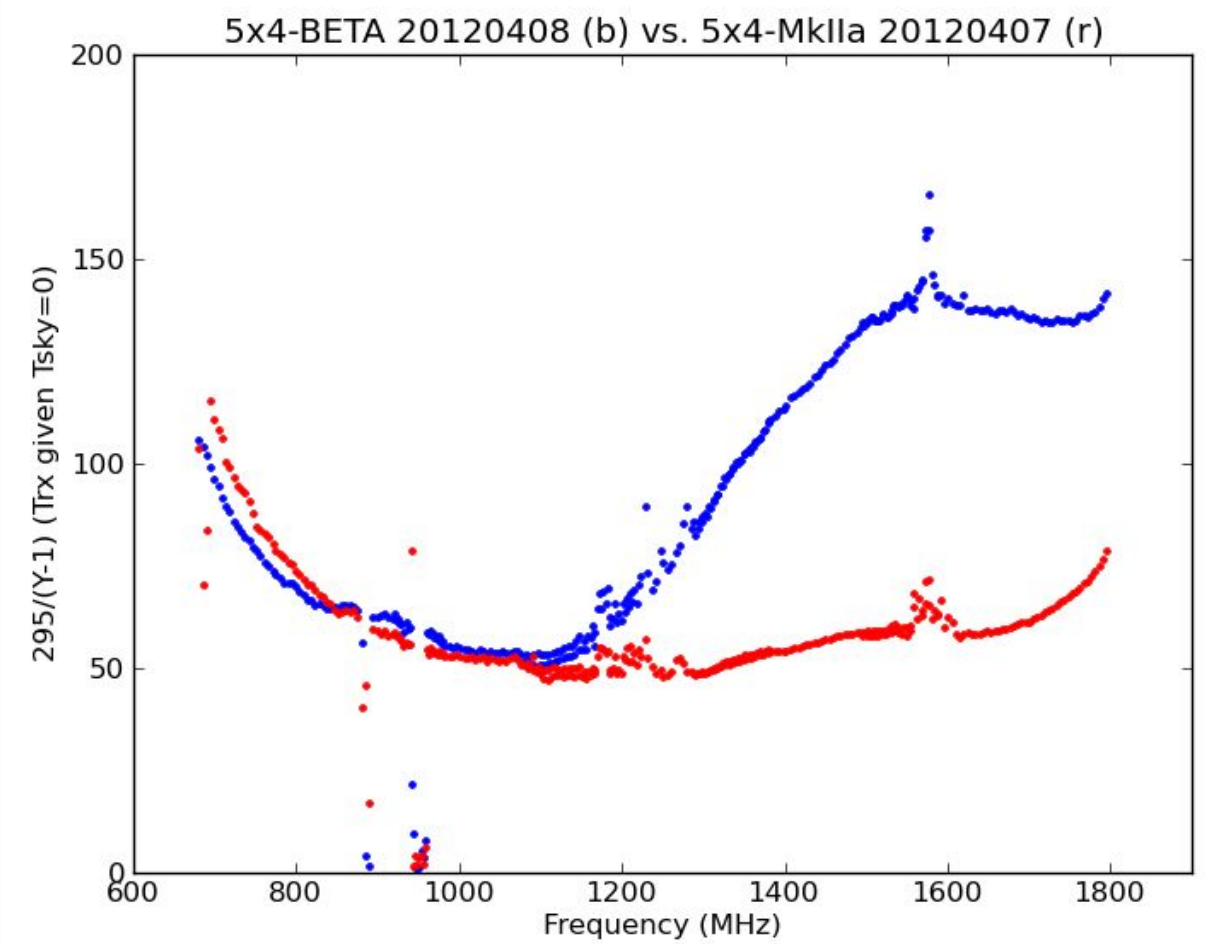


ASKAP Design Enhancements (ADE)

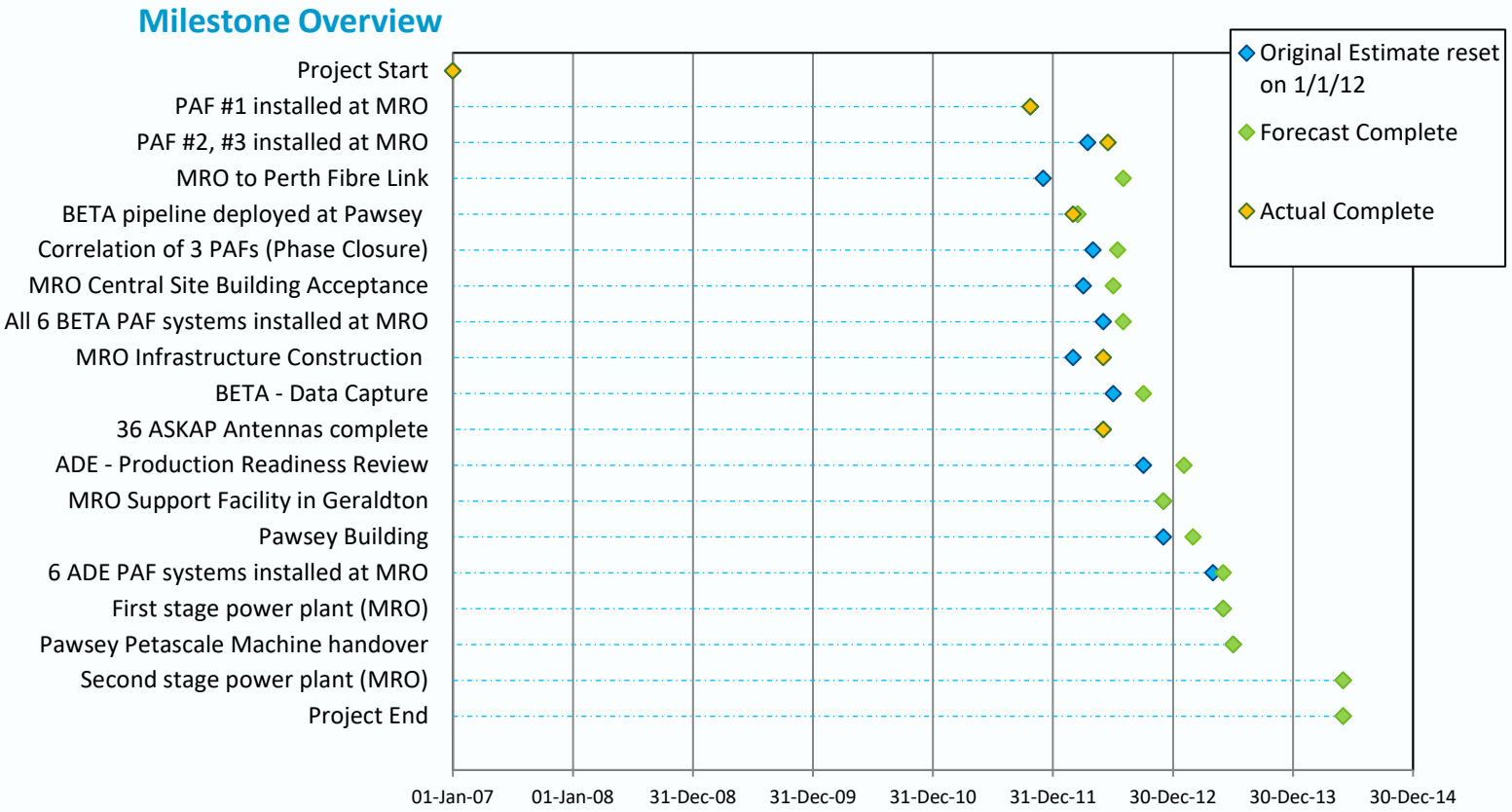
- Upcoming milestones
  - Integration Readiness Review: Gate to commence integration and validation on first-of-type system, end-to-end. (Late 2012)
  - Production Readiness Review: Gate to start production of 6 ADE systems based on results of integration testing. (Early 2013)



ADE PAF Results



ASKAP Milestones Timeline



ATUC Recommendations (Oct 2011)

4a. ATUC strongly recommends that CASS complete the 36 antenna system with PAFs installed, as most projects cannot operate without all 36 PAF-installed antennas.

Completing ASKAP to the full original scope is the top priority for CASS.

4b. ATUC recommends that CASS ensure that the telescope rapidly reach the stage of early science, with a reduced system temperature of the first 6 PAFs, so that the survey science teams can really test the system and publications can start to flow.

CASS will make available the initial 6 BETA antennas with Mark I PAFs for early science as soon as practical. These systems are critical to commissioning the overall ASKAP system, and learning about interferometers using PAFs.

We acknowledge the Wajarri Yamatji people as the traditional owners of the Observatory site.

Thank you

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