

ASKAP Status Update

David Brodrick EPICS [Spring] Collaboration Meeting 22nd October 2014

CSIRO ASTRONOMY AND SPACE SCIENCE www.csiro.au



Australia Telescope Compact Array (Narrabri, NSW)

R Sala

We measure the spatial coherence function

Image

Spatial Frequency domain





Fourier Transform



ASKAP Array Configuration 36 x 12m Antennas

A34

A35

A27

A25 A1

A16

A15

A26

A9

A1-

Google earth

A32

A31

A30

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A36

A28

A19

A8. A7

A14 A13

A11 A20

A28

2 A24

ASS

A29

A22

26*41*50.19* S 116*67*55.00* E day 375 m

Eye alt 9.99 km

ASKAP u-v coverage



Introducing ASKAP

- The Australian SKA Pathfinder is a radio telescope array that uses new receiver technology to improve field of view and provide unprecedented survey speed
- Covers a section of the radio spectrum surrounding rest-frame neutral Hydrogen emission (700 MHz to 1.8 GHz)
- Consists of 36 individual 12m antennas fitted with PAF receivers
- Currently under construction at MRO, a radio quiet environment
- Begins early science operations with a subset of antennas in 2015
 - Some science is already being done with a prototype 6-antenna array (BETA)



The Murchison Radio Observatory (MRO)

Christmas Island Flying Fish Cove

US Dept of State Geographer © 2012 Whereis® Sensis Pty Ltd © 2012 Google Data SIO, NOAA, U.S. Navy, NGA, GEBCO

27°07'55.46" S 126°00'36.04" E elev 458 m

Ther Sea

Ashmore and Cartier Islands

GentStandy Dorati

Arailura Sea

Australia

Lake Eyre



Solomon Islands

Coral Sea Islands



ASKAP Science Priorities

- Most of the observing time will be spent on major survey projects.
 - ASKAP will cater for large international science teams.
 - Observations will be highly automated and done by facility operators.
- 10 major projects were selected to receive time during this first 5 yrs:
 - Evolutionary Map of the Universe (EMU)
 - Widefield ASKAP L-Band Legacy All-Sky Blind Survey (WALLABY)
 - The First Large Absorption Survey in HI (FLASH)
 - An ASKAP Survey for Variables and Slow Transients (VAST)
 - The Galactic ASKAP Spectral Line Survey (GASKAP)
 - Polarization Sky Survey of the Universe's Magnetism (POSSUM)
 - The Commensal Real-time ASKAP Fast Transients survey (CRAFT)
 - Deep Investigations of Neutral Gas Origins (DINGO)
 - The High Resolution Components of ASKAP (VLBI)
 - Compact Objects with ASKAP: Surveys and Timing (COAST)



ATCA mm receiver vs. ASKAP Phased Array Feed







Data Flow at the Telescope





Digitisers and Beamformers





Data Flow out of the Correlator

- Data rate out of the correlator is roughly 2.5 Gb/s, requiring a dedicated high-speed optical fibre link to a supercomputer.
- Imaging occurs via an automated pipeline. Raw visibilities are too large to archive, so processing needs to be right first time!





Pawsey Supercomputing Centre

pawsey centr

Y IVEC

CSIRO

Cray XC30 - 9440 Cores (Galaxy)









MoniCA

- Monitoring and control system used at various radio observatories
- Supports numerous protocols
 - CA aware (via Cosylab JCA/CAJ)
- Archive PVs
- Policy per PV configuration
- CSS databrowser extension to query MoniCA

http://code.google.com/p/open-monica/



Antenna Drives IOC

- Soft IOC
- Interfaces with antenna Bosch-Rexroth PLC via TCP (asyn)
- Presents stateful antenna drives
 - Stowed, Tracking, Slewing, Idle, etc.
 - Built using State Notation Language
- Coordinate conversion (SLAlib)
- Trajectory generation
- Pointing parameters
- Antenna monitoring



ak08: Drives Antenna View

Bimba

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- •Composite Antenna IOC to group heterogeneous subsystems
- •Composite Site IOC used to group homogenous antennas
- •EPICS database for both generated from single CSV file which specifies
 - •PV and which subsystem IOCs contain that PV
 - •optional sequence order to serialize the commands, default is parallel execution



Summary Alarm Records (Craig Haskins)



•Automatically generated from DB parsing script

•Using bigASub (128 I/O version of asub) to collect IOC alarms to single point
•PV name of point(s) in alarm can be propagated up

Interface Developments (Xinyu Wu)

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•Experimenting with WebOPI / WebAlarm

•Some useful additions to CSS alarm handling, will contribute back to project



Observing Large Areas of the Sky (50 square degrees)



5.5 degrees

CSIRC

Image made by Ian Heywood