The Australian SKA Pathfinder (ASKAP)

Antony E.T. Schinckel, David R. DeBoer
CSIRO/ATNF, Epping, NSW 1710, Australia
http://www.atnf.csiro.au/

To address the technical issues related to high-dynamic range, wide field-of-view imaging, Australia is spearheading the design, development and construction of the Australian SKA Pathfinder, or ASKAP. ASKAP will be the fastest cm-wave survey instrument in radio astronomy. It will consist of about 36 12-meter antennas, each with a large phased array feed (PAF) operating from 0.7 to 1.8 GHz, and beamformer. The PAF will have 96 dual-polarization elements (192 receivers) and the beamformer will provide about 30 beams (at 1400 MHz) to yield a 30 square degree field-of-view. Due to the large data-rates involved (~Tb/sec per antenna) and the need to do pipeline processing, the antenna will incorporate a third axis to fix the parallactic angle with respect to the entire optical system (blockage and phased array feed).

Significant advances are required in feed design, data transport and pipeline processing to achieve the ASKAP goals. Extensive use of fibre optic transport with economical transmission/receiver systems is a requirement. Pipeline processing of the data from the beamformer through correlation and imaging requires innovative approaches to the development of FPGA-based hardware, as well as commercial supercomputer systems.

The first antenna will go on-site in late 2009. The site of ASKAP is the Murchison Radio Observatory, 315 kilometres north east of Geraldton, West Australia, which is being developed as an SKA-ready site as part of this program. Fiber connectivity of the MRO site to Geraldton (with the full cable appropriate for the SKA) will occur in early 2010. The world's most robust Radio Quiet Zone has been implemented for the site by the Australian Communications and Media Authority (ACMA), with extremely tight controls on licenccd transmitters.