

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Space Communications and Navigation Systems (1)

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THE AUSTRALIA TELESCOPE NATIONAL FACILITY

Abstract

The Australia Telescope National Facility (ATNF) is operated by CSIRO Astronomy and Space Science, a division of CSIRO—Australia’s national science agency. The facility supports research in radio astronomy and can be used by researchers from institutions all over the world. It has the capability to support a variety of space-related activities such as spacecraft tracking and communication, bi-static interplanetary radar, and passive radar.

The ATNF consists of several radio telescopes in Australia operating in the frequency range 0.5–115 GHz. The Australia Telescope Compact Array (ATCA), near Narrabri, NSW, has six identical 22-m antennas equipped with sensitive receivers in the range 1–100 GHz, with maximum antenna spacing of 6 km. System temperatures ~ 20 K are now achieved over most of the range 1–11 GHz. Instantaneous bandwidths of 4 GHz (with full Stokes polarimetry) are available. The 22-m Mopra Telescope (1–115 GHz) is nearby.

The Australian Square Kilometre Array Pathfinder (ASKAP) is currently being commissioned for the ATNF. ASKAP is a unique survey interferometer consisting of 36 antennas that provides a field of view of 30 square degrees and resolution $10''$ (1.4 GHz) using novel Phased Array Feeds (PAFs). It operates with 0.3 GHz bandwidth in the range 0.7–1.8 GHz. Early science with a 12-antenna ASKAP array began in 2016. Full operation is planned for late 2017.

ASKAP is located at the Murchison Radio-astronomy Observatory (MRO) in remote Western Australia, a location chosen for its radio quietness, and where the Square Kilometre Array low frequency telescope “SKA-LOW”) will be centred. CSIRO also hosts the 80–300 MHz Murchison Widefield Array (MWA) at the MRO. We acknowledge the Wajarri Yamatji people as the traditional owners of the Observatory site.

The Parkes Telescope, a 64-m antenna near Parkes, NSW, has a long history of supporting space communications. Parkes will shortly receive a new ultra-wide-band receiver operating over the range 0.7–4 GHz as part of an upgrade of all its receiving systems aimed at improving capability and decreasing operational costs. A PAF receiver at 1.4 GHz and a broadband high frequency receiver are also planned.

Remote observing is supported with all the ATNF telescopes. The telescopes can be combined with telescopes operated by the University of Tasmania into the Long Baseline Array, a continental scale Very Long Baseline Interferometry (VLBI) telescope. International telescopes in Asia and Africa can be added for higher resolution.