

Statement of introduction

Standing Committee on Infrastructure and Communications
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INTRODUCTION

The Square Kilometre Array (SKA) will be the most powerful instrument for astronomy ever built, with the ability to study the evolution of the Universe, from the present day to the origin of the Universe soon after the Big Bang, over 13 billion years ago, addressing fundamental unsolved questions in physics.

Australia and New Zealand are bidding as a consortium to host the SKA, an estimated €1.5 billion project, competing with Southern Africa for this opportunity. An international site selection process will reach a decision in 2012. The final design work for the SKA will take place over the period 2013 – 2015, with construction to commence in 2016. Full information on the SKA can be found at: <http://www.skatelescope.org> and <http://www.ska.gov.au>.

The Australian and New Zealand bid is supported by both national governments, as well as the Government of Western Australia, CSIRO, and universities in Australia and New Zealand. At the State and Federal levels in Australia, both Labour and Liberal governments have supported investment into radio astronomy over the last decade, to support the bid to host the SKA, including:

- Funding to build two prototype technology demonstrators for the SKA, the Australian SKA Pathfinder (ASKAP) and the Murchison Widefield Array (MWA). Both prototypes are being built in the remote Shire of Murchison, in Western Australia;
- Funding for the Pawsey High Performance Computing Centre for SKA Science, a world class supercomputing centre in Perth, Western Australia;
- Funding to implement green energy solutions for the SKA;
- Funding to establish the International Centre for Radio Astronomy Research, a Joint Venture between Curtin University and The University of Western Australia, based in Perth, Western Australia;
- Funding to establish the Australian Research Council Centre of Excellence for All-sky Astrophysics, based in Sydney, NSW;
- Funding to participate in the international SKA consortium;
- Access to an ultra-high speed network between Geraldton and Perth, in Western Australia, via allocations of fibre capacity to CSIRO and AARNet, as part of the Regional Backbone Blackspots Program (RBBP).

The SKA will require a high level of innovation and cutting edge technology to achieve its aims and Australian investments made thus far attack a range of challenges. One of these challenges is the transport of the massive volumes (terabits per second) of data that the SKA will produce, over long haul fibre networks. Such capacities go well beyond those possible on the NBN and require access to complementary network research capabilities from AARNet in order to ensure that SKA bandwidth targets are achievable

As evidenced in the last bullet point of the list above, the NBN is already playing a crucial role in Australia's demonstration of capacity in radio astronomy, on the Perth to Geraldton route of the RBBP. Australia has built a world-leading expertise in high data rate radio astronomy.

The NBN has the potential to play a very significant role for the SKA, supporting high volume traffic in science data from a number of sites across the Australian continent to a central location in Western Australia. This could perhaps be achieved using a participation model similar to what has been used on the Perth to Geraldton route of the RBBP, utilising co-investment from the SKA project.

PRÉCIS OF PRESENTATION TO COMMITTEE

At the public hearing of this committee in Perth on May 4th, 2011, I will discuss the potential for fast broadband networks to significantly contribute to radio astronomy research, with particular reference to the SKA project. This discussion is relevant to item *g* in the committee Terms of Reference, "...the capacity of the National Broadband Network to contribute to interaction with research and development and related innovation investments".

Specifically, I will outline:

- How the SKA would be distributed across Australia, mirroring the NBN fibre distribution;
- The network specifications required to support the SKA;
- How the Perth to Geraldton route of the RBBP has realised an unprecedented capability for radio astronomy, via a collaboration between the RBBP, CSIRO, AARNet, and the NRN program;
- The potential for a model similar to that used for the Perth to Geraldton RBBP route to have substantial benefits for an SKA built in Australia;
- The international connectivity of the SKA.