

xNTD — A Parallel Radio Telescope

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ABSTRACT

Provoked by the desire to increase sensitivity vastly beyond that available with today's highly optimized radio telescopes, radio astronomers are adopting parallel architectures at the very front end of the telescope. Over the last decade, multiple feed arrays have been used in the Parkes single dish radio telescope to increase the speed of observing. The next step is to use focal plane arrays in synthesis radio telescopes. The extended New Technology Demonstrator (xNTD) currently being designed by CSIRO will have 50 to 100 pixels in the focal plane of each of twenty antennas. Thus each focal plane pixel can be imaged using traditional radio interferometric techniques. This design has excellent speed but brings new challenges and opportunities in both data processing techniques and computation approaches. New techniques will be needed for calibration of the telescope, as well as for image formation. All of this must be implemented on a large parallel computer system - probably about 10,000 processors. If successful in the xNTD, this same technique may be adopted for the next decade's Square Kilometre Array, which is expected to be equivalent to about 100 xNTDs.