# Dish Verification Antenna-1: A Next Generation Antenna for cm-wave Radio Telescopes

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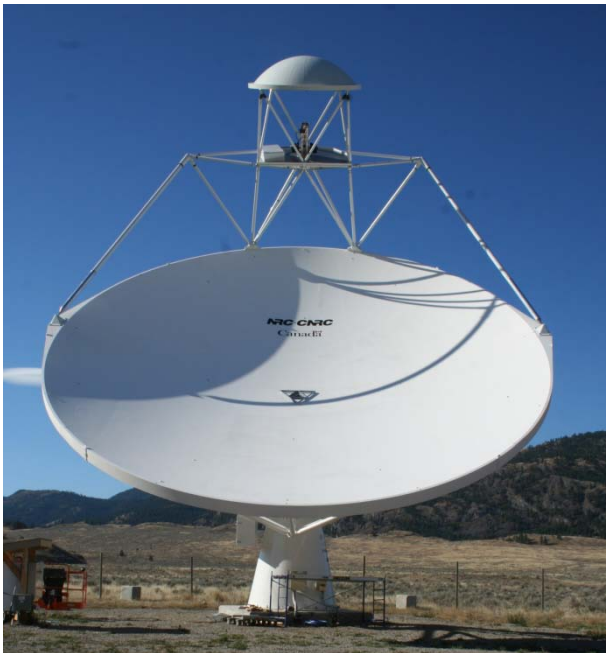


Radio telescopes striving for orders of magnitude more sensitivity in the cm-wave band require reflector antennas with high performance at low relative cost compared to conventional approaches. The Composite Applications for Radio Telescopes (CART) programme at the National Research Council's (NRC's) Dominion Radio Astrophysical Observatory, near Penticton Canada has been investigating ways to build such telescopes since 2005. In 2010 a collaboration between NRC and the US-Technology Development Project (US TDP) was formed to develop a prototype 15m Gregorian offset antenna for the Square Kilometre Array (SKA). The telescope uses NRC's composite carbon fibre reflector technology to implement the highly optimized shaped optics design and innovative mechanical concepts developed by the US TDP. The result is Dish Verification Antenna-1 (DVA1), a next generation antenna that has exceptional sensitivity (> 9 $m^2$/K), with low monotonically decreasing far out sidelobes (< -50 dB), and high stability over environmental conditions. As well, it is modular, highly reliable, and can be produced at competitive cost using mass production techniques.

In this paper we describe the key aspects of the DVA1 optical, composite reflector and mechanical design and present recent measurements of aperture efficiency, system temperature, beam pattern, stability, and surface accuracy using Ku band holography and laser tracker metrology - demonstrating the exceptional performance achieved at competitive cost.