

# Recent antenna- and microwave systems designed at CSIR, DPSS for radar systems

Louis Botha, Kevin Kloke, Johan Smit and Celma Kitching<sup>1</sup>

<sup>1</sup> CSIR, DPSS, South Africa, [lbotha@csir.co.za](mailto:lbotha@csir.co.za)

## ***Common Radar Building Blocks***

We have decided to develop some common building blocks for use in radar system at the CSIR, DPSS. The reasons for doing this are:

- The cost of ad-hoc- developed RF subsystems (using connectorised components) is getting to be prohibitive as a percentage of system cost
- The size and weight of such subsystems is not suitable for airborne use
- The development time required for RF subsystems is often limiting the response times required by our clients

The following building blocks are in the process of being developed:

- A C-band RF front end that includes protection, LNA and STC functions
- A P- to X-band (band selected at build via selection of filters) receiver that can be a single- or dual heterodyne
- A P- to X-band exciter with a similar architecture to the receiver
- An oscillator module that includes two independent synthesizers, of which one includes a DDS function, as well as the ability to lock to a GPS-supplied frequency standard
- Support modules such as backplanes and power supplies

More detail of these building blocks will be supplied.

## ***Transmit Array***

A flexible modern- yet low cost C-band phased array transmit antenna to meet the needs of various experimental radar systems by being low cost, easy to use, modular and scalable is currently in development at DPSS that will enable future phased array radar research and enable new radar systems to be developed with associated advantages. These advantages are of specific local interest as they could include:

- Improved multiple target tracking and track-whilst-scan radars to give reduced minimal detectable velocity to improve the detection of slow moving targets
- Low cost border surveillance radars that could allow improved target classification
- Local AESA surveillance radars
- Improved target detection and classification capabilities (due to flexible dwell and revisit times)
- Optimised phased array aerostat radar antennas that could be lower weight than currently considered concepts

A matching receive phased array panel is also in development that will, together with the transmit array, enable novel radar systems to be developed at DPSS in the near future.

## ***RCS Validation***

For the purposes of validation of the Sigmahat RCS code developed at CSIR, DPSS during the last few years, a set of measurements has been done using our MecORT radar calibrated for RCS. The same aircraft used for the measurements was also laser scanned to a very high fidelity and accurate high fidelity models of the aircraft were built for comparing the RCS. The proper validation of Sigmahat can now proceed.