

# 'NextRAD' – a novel multi-node bistatic/multistatic radar system development

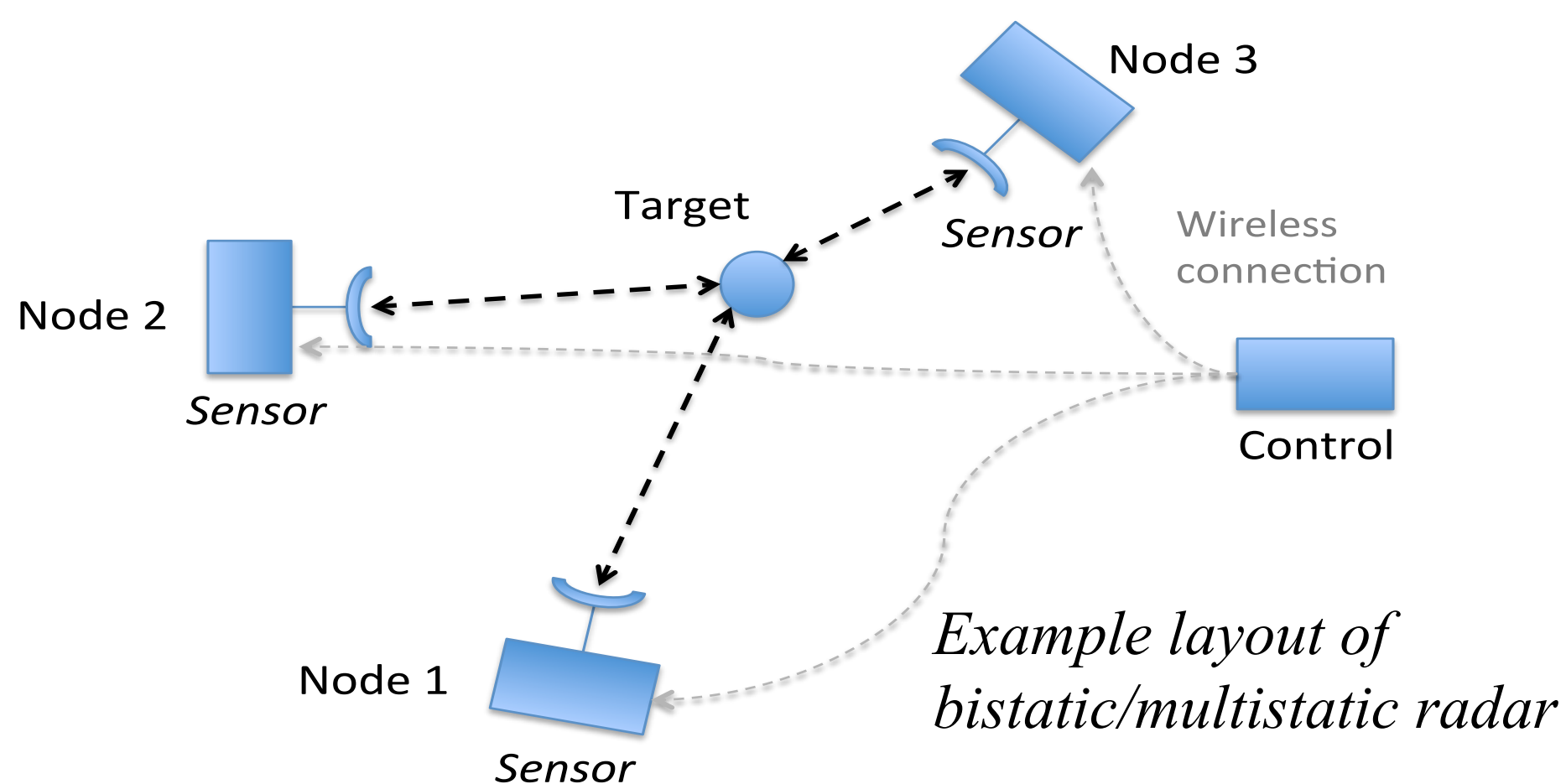
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## Overview

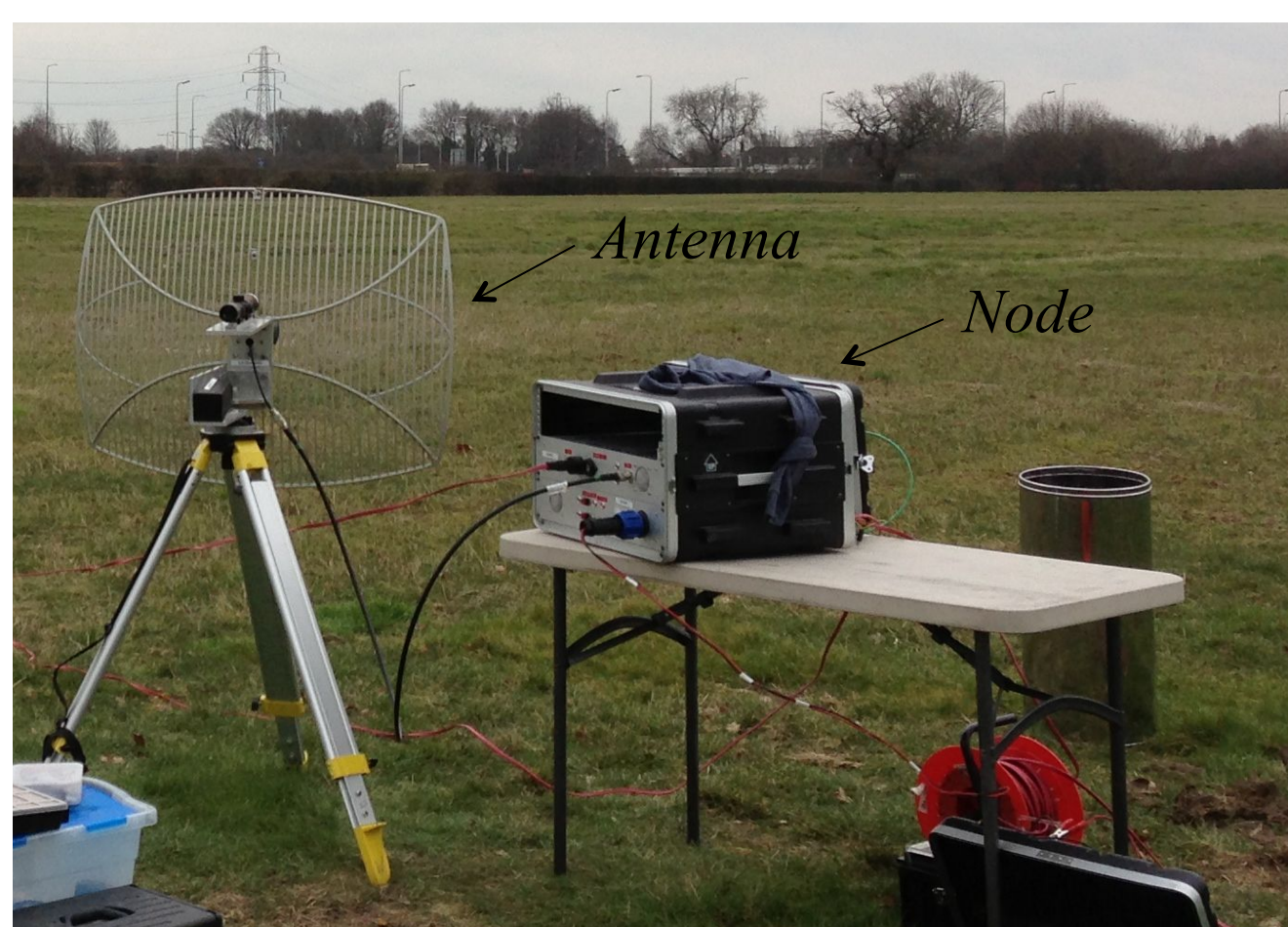
- The UCL Radar Group has just launched a 'NextRAD' experimental radar project.
- A bistatic/multistatic radar has two or more active sensors distributed in a field, with much potential to gather a variety of information about its targets.



- The research will be based on UCL's NetRAD netted radar and the University of Cape Town's 'Rhino' software defined radio (SDR), enabling further research possibilities.

## UCL NetRAD System

- A unique, low-cost netted radar, developed at UCL.
- Consists of three nodes that can transmit and receive S-band signals individually.



NetRAD node connected into a parabolic antenna

- Bistatic sea clutter and target measurements were carried out in 2011 in South Africa, which led to the discovery of a unique characteristic of bistatic/multistatic sea clutter [1].

Reference: [1] H.D. Griffiths, W.A. Al-Ashwal, K.D. Ward, R.J.A. Tough, C.J. Baker and K. Woodbridge, 'Measurement and modeling of bistatic radar sea clutter', Special Issue of IET Radar Sonar and Navigation on Clutter, Vol.4, No.2, pp280–292, March 2010.

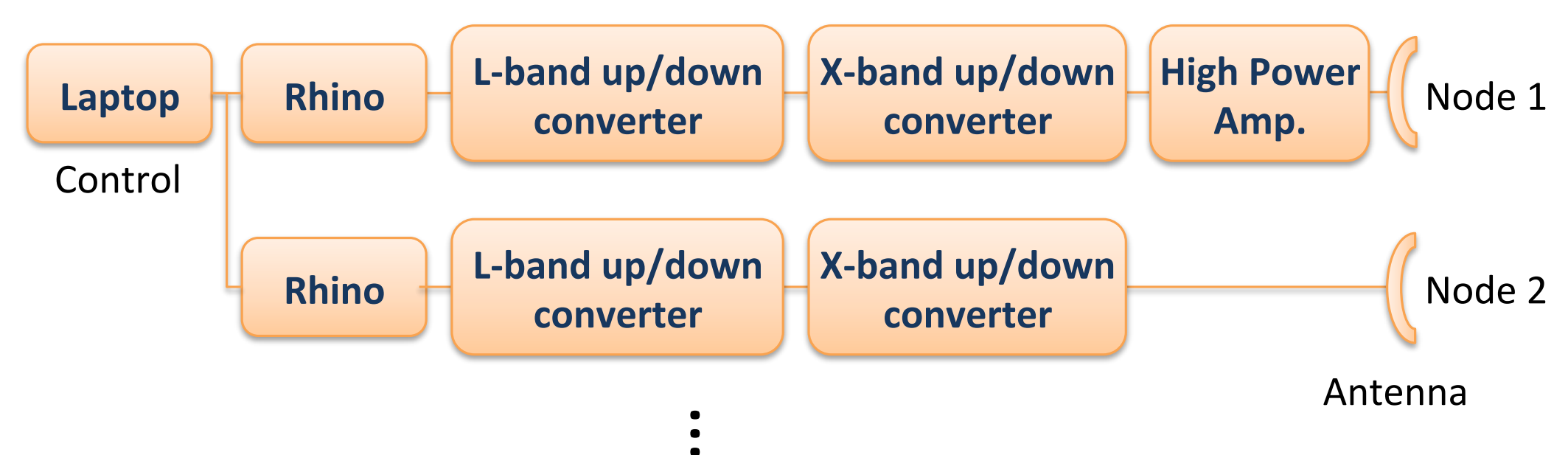
## Expected Features of the New System

- Multiband and wideband transceivers.
- Flexible and powerful signal processing environment enabled by Rhino SDR boards.
- Nodes synchronisation is a primary technical issue, which will be resolved by applying IEEE-1588 precision time protocol for more reliable and flexible clock and frequency synchronisation.
- User-friendly and automation functions.
- Useful in a variety of experiments on such topics as multiband clutter and targets; micro-Doppler; RCS; and MIMO radar.

### Major specifications of NextRAD

	NextRAD system	NetRAD
Frequency Band	X, S and L multiband (being considered)	S-band
Peak Transmit Power	55dBm @ X-band	56dBm
Transmit Waveform	Arbitrary waveform pulse	FM/PM pulse
Bandwidth	> 100MHz	50MHz
Range Resolution	1.5m	3m
Nodes Synchronisation	IEEE-1588 via cables/GPSDOs	LVDS via cables/GPSDOs

LVDS: Low-Voltage Differential Signalling GPSDO: GPS Disciplined Oscillator



Example configuration of NextRAD

- Currently working on an initial system-level design. An X-band frequency converter design is complete.

## Conclusion and Future Work

- Started design. Continue it for hardware and software. Subsequently begin subsystem development such as RF circuits and its tests.
- Integrate University of Cape Town Rhino SDR board.