# IEEE NSW Section

## Antennas & Propagation / Microwave Theory & Techniques Joint Chapter

# *Report of Activities in 2004*

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### Committee

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| *Chairman:* | A/Prof Graham Town | *Members:* | Dr Tim Aubrey |
| *Vice Chairman:* | Dr Andrew Parfitt | | A/Prof Tony Parker |
| *Secretary/Treasurer*: | A/Prof. Karu Esselle | | Dr Trevor Bird |

### Membership

As at November 2004 there was a total of 79 members of the AP and MTT Societies in New South Wales, including 2 Associate Members, 10 Student Members, 52 Members, 8 Senior Members, 3 Fellows, and 2 Life Members.

### Technical Meetings

Three meetings were held in 2004, as follows.

**1. CELLULAR BASESTATION ANTENNAS, Dr Bevan Jones – Thursday 25th May 2004.**

Increasingly developments in cellular basestation antennas are being driven by the difficulty and cost of acquiring antenna sites and by increasing traffic densities. These factors have lead to a need for antenna features such as polarization diversity, adjustable electrical downtilt, reduced passive intermodulation , multiband operation and case-by-case special solutions. This talk will cover some of the design challenges and techniques used to achieve these features in basestation antennas.

*Attendance: 15 members 18 Non-members*

**2. OPTICAL FEED FOR MICROWAVE ANTENNAS, Professor Tibor Bercelli - Tuesday 21st September 2004.**

The combination of optical and microwave techniques offers new approaches for feeding microwave antennas. That is made possible by the very high bandwidth of the optical devices and the very low attenuation of the optical fibre. The new approaches give new and advantageous features. The lecture will provide a survey of the new optical methods for microwave antennas feeders. The main applications are in antenna remoting and phased arrays.

*Attendance: 10 members 21 Non-members*

**3. EMERGING ISSUES WITH MILLIMETRE-WAVE DEVICES FOR TELECOMMUNICATIONS APPLICATIONS, Dr Jim Rathmell & Mr Peter Blockley (for A/Prof Tony Parker) – Thursday 28th October 2004.**

The GaAs integrated circuit sector typically utilises external foundry facilities that fabricate devices according to a specific (usually proprietary) transistor technology. Circuits are designed to suit that technology to meet criteria critical to market need. The criteria, which depend of the application, include low noise generation for receiving weak signals, high efficiency for transmitting high-power signals, and high linearity to reduce distortion. The number of foundries is limited, so improvements and cost reduction to meet market needs can only be met by extracting the best performance from the technology on offer at the time.

For small-signal applications, distortion and intermodulation is involved and is complicated by effects over a full spectrum of frequencies. This presentation will outline recent work that has investigated the nature of the frequency dependence of distortion and its impact in broadband applications. Issues for large-signal applications include transistor instability, which produces an unusable operating region usually at the high-currents and low-voltage, and breakdown, which is often poorly modelled. These problems are exacerbated in large devices used for high-power application and transistors used for millimetre-wave frequencies. This presentation will review these problems and avenues of investigation to overcome them.

*Attendance: approx. 10 members 15 Non-members*

Three technical meetings are currently scheduled for 2005.

## General

I thank the speakers in 2004 and the Chapter Committee, particularly A/Prof Karu Esselle for his assistance during my extended absence in the second half of the year.

**Graham E. Town**
**Chair**

**10th January 2005**