

Recent Advances in Timekeeping and Time Dissemination Technology

Peter Fisk

Section Manager: RF, Microwave, Time and Frequency

CSIRO National Measurement Laboratory

PO Box 218

Lindfield, NSW 2070

Peter.Fisk@tip.csiro.au

The maintenance and dissemination of accurate time and frequency information is becoming increasingly important in many areas of technology; prime examples being the communications industry, the Global Positioning System, and tests of fundamental physics.

The accuracy of atomic clocks has consequently been improving by approximately an order of magnitude per decade for the past thirty years, and this trend shows no sign of changing. As an example, atomic "fountain" clocks, which use laser light to toss clouds of a few million extremely cold cesium atoms on ballistic trajectories more than one metre in height, have recently demonstrated accuracies of a few parts in 10^{15} . The extraordinary accuracy of such clocks is in turn driving the rapid development of accurate methods for disseminating time.

The talk will give a practical overview of modern time keeping and time dissemination, the fundamental physical principles, which underpin the technology, and the likely future directions in the field.