

GPS ACTIVITIES AT THE NATIONAL MEASUREMENT INSTITUTE, AUSTRALIA

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Abstract

The National Measurement Institute (NMIA) in Sydney, Australia has a long-standing program to develop reliable, high-integrity and remotely-operable GPS-based systems for precise time and frequency transfer. Recent work in this program includes:

- Commissioning of integrated systems for dissemination of UTC(AUS) to key application areas. For example, NMIA have previously developed hardware and software for a ‘speaking clock’ service using a local time and frequency standard. Two such systems were commissioned earlier this year for an Australian company in Melbourne, together with GPS time-transfer to maintain traceability to UTC(AUS). These integrated systems now support Australia’s main speaking clock service, making UTC(AUS) widely accessible while maintaining metrological integrity.
- Calibration of receiver internal delays, including participation in the recent campaign conducted by BIPM circulating a calibrated Ashtech Z12 geodetic receiver. The agreement observed between this receiver and NMIA receivers calibrated independently using a GPS simulator is especially encouraging.
- Continued support for an intercomparison of GPS receiver internal delays among APMP member laboratories, using a portable system developed at NMI under contract for the Telecommunications Laboratory of Taiwan. The system has visited the majority of APMP laboratories across three completed rounds, and has been compared to calibrated receivers at NIST and at LNE-SYRTE (twice).
- Operation of the NMIA time-transfer system with new receivers, including several from the Javad family. We have also operated the system with the Trimble Resolution T receiver, as part of a separate program to develop a compact and low-cost system; the aim of this program is to enable large-scale dissemination of UTC(AUS) at lower precision for a wide variety of applications.
- Development and commissioning of GPS carrier-phase time and frequency transfer between high stability oscillators at the University of Western Australia in Perth and at NMIA in Sydney. This is combined with TWSTFT to link both institutions by high precision time and frequency transfer, in part to prepare for participation in the Atomic Clock Ensemble in Space (ACES) mission proposed by the European Space Agency.
- Commissioning of a new geodetic reference station at Parkes, New South Wales, in partnership with the national mapping agency Geoscience Australia and Australia’s national research organisation CSIRO. The system uses a variant of the NMIA time-

transfer system based on the Javad/Topcon Euro-160 receiver, originally developed for the SYDN node of the International GNSS Service (IGS) network currently in operation at NMIA. CSIRO operates a large radio-astronomy facility at Parkes which is particularly active in observations of millisecond pulsars; the NMIA system provides precise time-transfer from the station reference maser to UTC(AUS), thereby linking millisecond pulsar timescales to TAI.