

Canadian VLBI Technology Development Center

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Abstract

The Canadian Technology Development Center has developed an “end-to-end” geodetic VLBI system built on S2 equipment. The development of this system has led to an operational IVS network. Development work continues to streamline operations and improve S2 instrumentation. The Technology Development Center is actively preparing to engage in the development of the VLBI2010 systems.

1. Introduction

The Canadian VLBI Technology Development Center is a collaborative effort of the National partners interested in the advancement of VLBI technology, namely the Geodetic Survey Division of Natural Resources Canada (GSD/NRCan) and the Dominion Radio Astrophysical Observatory (DRAO) of the Herzberg Institute for Astrophysics of the National Research Council of Canada, (DRAO/HIA/NRC).

2. S2 VLBI Geodesy

The S2 VLBI observation program continued in 2005 as the operational “E3” IVS observing network. The “E3” Network consists of Algonquin, Yellowknife, the Canadian Transportable VLBI Antenna (CTVA), Kokee Observatory, Svetloe Observatory, and the Transportable Integrated Geodetic Observatory (TIGO) located in Concepcion, Chile. The Gilmore Creek antenna in Fairbanks, Alaska participated in the E3 network during the winter months of 2005, when Yellowknife was not operational.

3. S2 VLBI System

The S2-DAS is designed to accommodate up to four VLBA/Mark IV-type single sideband baseband converters (BBCs), each with a local oscillator (LO) independently frequency switchable under computer control. The recording system uses 8 modified super-VHS recorders.

The Canadian Correlator is a six station correlator (expandable to ten stations) using S2 playback terminals and is designed to handle S2 frequency-switched bandwidth synthesis data.

4. Canadian Transportable VLBI Antenna (CTVA)

The CTVA is a 3.6m radio telescope acquired to facilitate densification of the VLBI measurements of the Canadian Spatial Reference System (CSRS). The antenna will be co-located with GPS elements of the Canadian Active Control System (CACS), part of the CSRS, to provide fiducial station positions. The Canadian Technology Development Center is responsible for CTVA system development.

The CTVA spent all of 2005 in St. John’s, Newfoundland. CTVA uses a group of local university and college students for all observing operations.

The CTVA communication system was upgraded in late 2004 allowing for high-speed Internet, web-based cameras, and automated site monitoring in 2005, improving site reliability and safety. In December of 2005 XM radio began broadcasting in Canada, unfortunately, a local terrestrial repeater saturated the S-band receiver. A study is currently underway to determine an optimum solution to the problem, which will require either new on site hardware or relocation of the CTVA.



Figure 1. Local visitor examines the tie between IGS station STJO and CTVASTJ

5. S2 Geodetic Experiment Scheduling, Operations and Analysis

The “E3” network continues to contribute with monthly EOP sessions using 6 stations. The EOP results are comparable to R4 sessions but have slightly greater uncertainty due to network configuration and sensitivity.

6. VLBI2010

Following the release of the VLBI2010 report, Bill Petrachenko was appointed to chair the VLBI2010 committee, which is tasked with continuing the work outlined in the report. NRC has also presented a concept for a low cost 12-metre carbon fibre antenna, and has established a small laboratory for concept testing.