Technology Coordinator Report

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Abstract This report summarizes the main activities of the IVS Technology Coordinator during the period 2023–2024. Key areas included the organization and support of VTC teleconferences, technical assistance to IVS stations, maintenance of the VGOS Equipment Tables to promote technical compatibility, and collaboration with the EVN. Significant effort was also dedicated to the development of new DBBC3 firmware and software versions to meet the latest VGOS requirements. In addition, the DBBC4 project has included a dedicated focus on VGOS observations to optimize the signal chain.

1 VTC Activities

Throughout the 2023–2024 biennium, activities related to the organization of teleconferences and support of the VGOS Technical Committee (VTC) continued steadily.

Monthly Zoom teleconferences consistently attracted a large number of participants, each contributing based on their area of expertise. The previously established working groups remained active, and new initiatives were launched.

The most prominent topics on the agenda concerned the main sub-groups focusing on:

a) The study of shorter integration periods (proposed and led by B. Petrachenko), supported by a series of RD observation sessions. Additionally, following a proposal by H. Hase and with active support from B. Petrachenko, frequency slots within the full VGOS band were evaluated for possible new observing frequency schemes, aimed at mitigating the impact of Radio Frequency Interference (RFI).

b) The effects of source structure on observations and potential correction processes (sub-group led by P. Charlot).

c) RFI mitigation methods at the stations, addressing the growing challenge of observing in RFI-affected environments, particularly in the lower part of the VGOS spectrum (sub-group led by L. Hilliard). This group coordinates efforts from various IVS teams to develop shared solutions.

d) Fixed frequency strategies for VGOS observations (sub-group led by C. Ruszczyk).

Following the IVS General Meeting held in March 2024 in Japan, I stepped down as the lead of the VGOS Technical Committee (VTC), and José Antonio ("Pepe") López Pérez was appointed as the new chair of the VTC.

2 VGOS Compatibility Tables and Technology Coordinator Web Pages

The VGOS Equipment Tables are continuously updated with the latest available information on the relevant equipment at existing and upcoming VGOS stations. This effort plays a vital role in promoting technical compatibility across the IVS network and serves as a reference for new stations.

These data points are hosted on the dedicated Technology Coordinator web pages: https://www.ivs-

INAF-Istituto di Radioastronomia and Max Planck Institut fuer Radioastronomie

technology-coordinator.info, where additional information about VTC activities is available.

Registered users can access recordings of the VTC teleconferences at: https://www.ivs-technology-coordinator.info/recordings.

3 Firmware and New Instrumentation Development for the Network

The DBBC3 system is now widely deployed within the IVS network, as well as in the EVN. Continuous efforts have been made to improve the hardware performance of this system, leading to the release of new firmware and software versions that address evolving requirements from both the VGOS and legacy IVS networks.

Several dedicated instrumental solutions have been developed to improve capability and accommodate new VGOS observing modes. The main developments include:

a) The ADBCore3 board for DBBC3, designed as a replacement for the existing ADB3L+CORE3 in both current and future systems. This board features a single high-performance sampler that eliminates the need for calibration within more samplers, along with a new, higher-capacity FPGA. Optionally, it can be equipped with two samplers to support configurations requiring both polarizations in the same processing chain, such as for polarization conversion from linear to circular.

b) The DIFREND-VGOS system, which incorporates a dual-polarization sampler covering the full VGOS frequency range of 2–14 GHz. The observing band can be digitally selected within the sampled bandwidth, providing flexibility across the spectrum. This system can operate in conjunction with a DBBC3 or, with reduced performance, as a complete backend system producing VDIF data ready for recording or direct correlation.

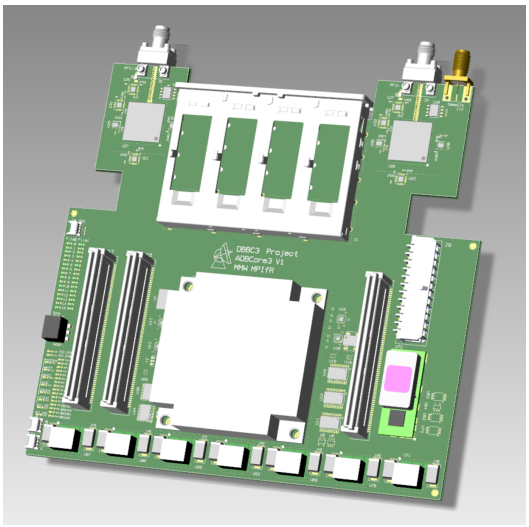

Fig. 1 The new DBBC3 board, ADBCore3.

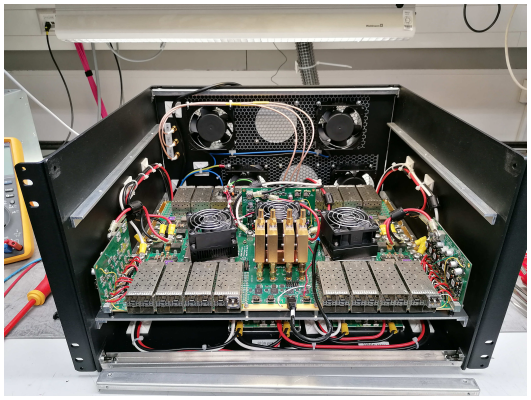

Fig. 2 DIFREND-VGOS system.

Fig. 3 The DIFREND-VGOS system can feed a DBBC3.

4 Liaison with the EVN

Regular contact has been maintained with the EVN Technical and Operations Group (TOG) to facilitate the exchange of technical information relevant to both networks. This collaboration ensures that knowledge, developments, and technical solutions are shared effectively between the IVS and EVN communities.