

## Radio astronomy interferometer network testing for a Malaysia–China real-time e-VLBI

### ABSTRACT

The uv-coverage of the current VLBI network between Australia northern Asia will be significantly enhanced with an existence of a middle baseline VLBI station located in Malaysia. This paper investigated the connecting route of the first half of the Asia-Oceania VLBI network i.e. from Malaysia to China. The investigation of transmission network characteristics between Malaysia and China was carried out in order to perform a real-time and reliable data transfer within the e-VLBI network for future eVLBI observations. MyREN (Malaysia) and CSTNET (China) high-speed research networks were utilized for this proposed e-VLBI connection. Preliminary network test was performed by ping, traceroute, and iperf prior to data transfer tests, which were evaluated with three types of protocols namely FTP, Tsunami-UDT and UDT. The results showed that, on average, there were eighteen hops between Malaysia and China networks with 98 ms round trip time (RTT) delay. Overall UDP protocol has a better throughput compared to TCP protocol. UDP can reach a maximum rate of 90 Mbps with 0% packet loss. In this feasibility test, the VLBI test data was successfully transferred between Malaysia and China by utilizing the three types of data transfer protocols.

**Keyword:** Ue-VLBI; Radio astronomy instrumentation; Network performance; Data transfer protocol ultra-high-performance concrete; Amang; Lead glass; Radiation; Attenuation;  $\gamma$ -Rays