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a bi-directional fixed-latency clock distribution system

The Askar'yan Radio Array (ARA) is an ultrahigh-energy neutrino telescope, currently under construction at the geographic South Pole.It is designed to detect GZK neutrinos (E > 100 PeV) by means of radiofrequency emission from electromagnetic cascades formed when these neutrinos interact with nuclei in the ice.The full array will contain 37 stations that cover 160 km2 surface area. Each station consists of 4, 15 cm diameter boreholes spaced up to 70 m apart and 200 m deep. In each hole there are 2 VPOL and 2 HPOL antennas to pick up the weak radio signals, a custom designed ASIC is used to digitize the signals in excess of 3 GSPS. It requires synchronized clocks for all channels within a station: clocks in 4 holes need exactly the same frequency and must maintain a fixed phase difference amongst each other, a skew jitter less than 50 ps being acceptable.
A prototye of clock distribution system through optical fiber has been designed and tested, by using GTP embedded in spartan6 FPGA and an external jitter cleaner, a clean copy of a main clock can be generated from the recovered clock, a skew jitter less than 30ps is achieved .In addition , a bi-directional fixed latency link can be established by a fixe delay jitter cleaner and a custom designed comma detect and clock alignment module. The poster will explain the architecture of the clock distribution system as well as the implementation of the bi-directional fixed-latency link.

quote your primary experiment

ARA

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