

SKAO an introduction (Part1) :
SKAO organisation and Project status

L. Stringhetti

Abstract

The Square Kilometre Array Observatory (SKAO) is a next-generation international radio astronomy facility of the 21st century that will revolutionize our understanding of the universe and the laws of fundamental physics. It will have a uniquely distributed character: one observatory, operating two telescopes, on three continents for the benefit of the global scientific community. It is the first Inter-Governmental Organization (IGO) fully devoted to radio astronomy.

The objective of the this first part of presentation is to describe the SKAO organization and to introduce the current status of the SKA telescope project with the most new updates from the fields. The engineering office in HQ will be also presented.

SKAO an introduction (Part2) :
Overview of SKAO's Synchronisation and Timing system
(SAT)

A. Hendre

Abstract

If we look at SKAO's science goals, they are vast and ambitious, looking back into the history of the Universe as far as the Cosmic Dawn, when the very first stars and galaxies formed, to seek answers to some of the biggest questions in astrophysics. We are also expecting some questions which we even don't know at this point. We are discovering truly unknowns. SKAO's telescopes can detect signals from extraterrestrial's intelligence.

To achieve all these vast objectives, SKAO's telescope needs very high sensitivity. And to achieve that level of sensitivity, it needs a very stable reference frequency and accurate time signals for digitising the astronomical data. These time and frequency standards need to be realised locally for each telescope site (SKA1-Mid and SKA1-Low) before being distributed to each remote location. All these operations are performed by the Synchronisation and Timing (SAT) systems in each telescope. SAT system in each telescope realises and maintains local time and frequency standards (UTC(k)) and distributes them to remote locations with their signal quality and integrity intact. These standards are used for digitising and timestamping the astronomical data received from the receptors.

The stability and accuracy of distributed references are highly important for coherently sampling the astronomical data which is one of the parameters for maintaining the overall sensitivity of the telescope. These reference signals are distributed using long-distance fibres (with a maximum distance of $\sim 175\text{km}$) which are susceptible to environmental perturbations which deteriorate the signal quality at remote locations. The SAT system overcomes the effects of perturbations by actively counteracting the noise during fibre transmission to achieve desired reference signal stability and nanosecond level of timing accuracy.

This presentation highlights the importance of SAT system with its challenging performance requirements and detailed descriptions of its sub-systems.

SKAO Objective (Part 3)

Term of Reference for Advisory Committee

L. Stringhetti

Abstract

SKAO is looking forward to establishing an advisory group to get guidance from people who have practical everyday experience in operating and maintaining UTC instances. SKAO is also looking for general advice on the installation and operation of its two clocks. This group will be helpful for SKAO if anomalies arise during the implementation and operation of its clocks, especially during the initial phase of construction and operation