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Active phase correction using a VCSEL for clock tones transmitted along a 24 km optical fibre link

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Abstract content
   (Max 300 words)
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Abstract- Africa, together with Australia will host the world's larger radio telescope, the Square Kilometre Array (SKA). The combined surface area of the dishes or telescopes within the SKA equates one million square metres. Stable clock tones are essential for time stamping the received data and for driving the digitizers located at the individual antennae. Furthermore the dissemination of high precision, stable clock tones via optical fibre from the principle processing station to each dish is a primary requirement for the SKA. Temperature variations and vibrations give rise to temporal changes along an optical fibre link. These factors result in the random variations of optical path and refractive index properties of the optical fibre. In this paper, an active phase compensation scheme based on real time phase correction is proposed. This technique exploits the wavelength tuneability of a 4.25 Gbps vertical cavity surface emitting laser (VCSEL), along with the inherent chromatic dispersion properties of the fibre. The fundamental principle for phase delay correction up to 1702.77 ps is proposed, along a 24 km G.652 single mode optical fibre, by tuning the VCSEL across a 3.95 nm wavelength range. The active phase correction occurred within the lower frequency region of the X-band (8 – 14.5 GHz) around the 1550 nm transmission region.

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PhD

Main supervisor (name and email)
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