

## Integrated dissemination system of frequency, time and data for radio astronomy

For radio telescope array application, the precise time and frequency reference largely determine the quality of the observation. Here, we demonstrate an integrated dissemination system which can achieve the highly-stable frequency dissemination, time synchronization and data transfer simultaneously over a single optical fiber link. With this system, the time and frequency reference signal in one site can be recovered at the remote site. Using one optical fiber can save a lot of fiber resources, and makes the system simpler. The test of the integrated system was carried out over the 28 km fiber link, part of the e-Merlin Array Telescopes, which consisted of two 14 km buried fibers between Jodrell Bank and Pickmere, and looped back at Pickmere. And it have been experimentally demonstrated that the frequency transfer stability is  $2 \times 10^{-14}/s$ , the time synchronization uncertainty is sub-nanosecond, and the error bit rate of data transfer is  $10^{-7}$ .

### Suggested duration

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