

## Original Paper

# Distance Scale Calibration of Optical Time Domain Reflectometer Using Active Intensity Modulation

O. Terra 

National Institute for Standard (NIS), Tersa St. Haram, P.O.Box: 136 Giza, Gizah 12211, Egypt

 **R.H. Sardjono**

Email: [hadisardjono@gmail.com](mailto:hadisardjono@gmail.com) ; [Sar\\_djono@yahoo.com](mailto:Sar_djono@yahoo.com)

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### Abstract

In this paper calibration of optical time domain reflectometer (OTDR) distance scale using active intensity modulation (AIM) is discussed. A setup is proposed to calibrate an OTDR over a distance range of 100 km based on AIM method. A commonly used method based on a recirculating loop (RL) is used to calibrate the same OTDR. The RL artefact is independently measured at the English National Physical Laboratory and therefore helps to validate the result obtained by the AIM setup. The parameters contributing the calibration uncertainty are investigated. Using our AIM setup, OTDRs can be calibrated over distances up to 100 km with uncertainty as low as  $\pm 4.4$  cm for location offset and  $\pm 8.2 \times 10^{-7}$  for distance scale deviation.

### Keywords

Optical time domain reflectometer – Fiber length measurement – OTDR calibration – External source method