

## **An Appraisal of Duct – Related Microwave Link Degradation in Nigeria.**

**O.D. Oyedum**

Department of Physics, Federal University of Technology, Minna, Nigeria.

### ***Abstract***

*Drop in power (or field strength) of free-air radiowaves sometimes occur in line-of-sight paths within the radio horizon of the transmitter due to discontinuities in refractivity gradient. Field strength fading within the radio horizon may result from defocusing of the lobe pattern of the transmitter, and may simultaneously give rise to enhanced field strengths beyond the horizon, with potential for adverse interference on co-channel circuits and other degradation effects related to such anomalous propagation. These effects increase with the duct strength, which depends on the prevailing refractivity gradient within the duct. In a duct-prevalent region, anomalous propagation problems can be significant on terrestrial and slant earth-satellite paths, depending on the penetration angle and strength of the prevailing ducts. Studies have revealed considerable prevalence of surface ducts in Nigeria. This effort examines the climatic conditions that give rise to ducts and assesses their potential for degradation of microwave links in the country. The result based on analysis of clear-air meteorological data shows prevalence of strong surface ducts with maximum and mean penetration angles of 15 milliradians and 6-8 milliradians respectively. Thus, high-elevation slant earth-satellite paths may not be affected by duct-related propagation problems in Nigeria, but low-elevation terrestrial microwave links may be significantly impaired.*

***Key words: radio refractivity, surface duct, penetration angle, refractivity gradient***

Received: Novemeber, 2010

Accepted: 16th December, 2010