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Fibre-to-the-Hut Technology: A Solution to Cheap Access for High-Speed Optical Network in South Africa

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Abstract content
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Fibre-to-the-Home (FTTH) is a technology where optical fibre networks are deployed from a central access point to individual homes to provide high-speed broadband access. FTTH has been most successfully deployed in countries with high population density within large cities and urban centres and high per capital income. However, African countries are still facing some challenges like uneven population distribution with isolated remote villages and socio-economic challenges. This hinders the implementation of traditional FTTH solutions in Africa. It is for these reasons that we specially customize the FTTH based on challenges facing Africa and design a Fibre-to-the-Hut (FTTHut) optical network to suit the African scenario. We propose the use of VCSEL within a Raman amplified optical fibre framework to support FTTHut technology in South Africa. VCSELs offer high bandwidth at low drive currents, while Fibre Raman amplifiers offer longer amplification spans. We therefore investigate experimentally the Noise Figure (NF) and Optical Signal to Noise Ratio (OSNR) of a Fibre Raman Amplifier (FRA) using a VCSEL as a signal source. A 1550nm VCSEL is directly modulated with an effective bit rate of 4.25 Gbps. An (OSNR) of 6.8 dB and 6.4 dB was achieved for co- and counter pumping schemes, respectively, for 25 km SMF-Reach. An (OSNR) of 4.5 dB and 4.3 dB was attained for 50 km fibre for co- and counter pumping respectively. A NF of -1.3dB and -0.7 dB was achieved for Co- and Counter pumping schemes, respectively, for 25 km fibre at 23 dB pump power. The NF also increased with increase in fibre. This work is extremely valuable in providing South Africa with increased Hut-to-Hut broadband access especially in long-reach networks serving rural populations at reasonable low cost.

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