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Energy harvesting in GPON fiber optic receivers with SLIPT for the Internet of Things

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Abstract

The new concept of smart city requires numerous electronic devices such as actuator sensor interface distributed across multiple outdoor environment. The internet of things (IoT) plays a crucial role in connected devices via the internet. In fibre optics (FO) communication networks, light-emitting diodes (LEDs) or Laser diodes (LDs) are often utilised as a light source. An energy harvesting (EH) unit could be attached to the receivers to charge a battery and supply low-power modules in the IoT network and terminal devices. This paper deals with a Gigabit Passive Optics Network (GPON) FO system that incorporates an EH unit to harvest energy while transmitting data. As we know, most cities have an already installed GPON, using it to interconnect and supply low-power devices will go a long way to ease the already much needed power in IoTs devices. A model proposed in this paper is such that energy will be harvested from LEDs lights and the output power determined base on the simultaneous light-wave information and power transfer (SLIPT). The illustration shows that more energy can be harvested with an initial increase in the surface area of the solar panel for a decreased noise power. Finally, proposed GPON fiber optic receivers with SLIPT energy harvesting system numerical results are presented to evaluate the performance.