Chapter 4
The SWIPT-Enabled Cooperative Full-Duplex Relaying Communication for 6G Radio Networks

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ABSTRACT

This chapter presents the simultaneously wireless information and power transfer (SWIPT)-enabled cooperative communication for 6th generation (6G) radio networks. These networks integrate many applications and use tiny internet-of-thing (IoT) devices that need large amounts of power to maintain energy threshold level of the networks for a long time. Therefore, the energy harvesting (EH) is a promising technique to provide sufficient power to small IoT devices and energy constrained user terminals in the 6G radio networks. For this purpose, the authors consider two-way full-duplex (FD) relaying network to derive closed-form expressions of end-to-end ergodic capacity by exploiting power splitting (PS) and time switching (TS) protocols for Rayleigh fading channels. From the numerical results, they observe that the proposed FD-based EH policies perform better as compared to half-duplex EH policies. Finally, this chapter provides future research directions.

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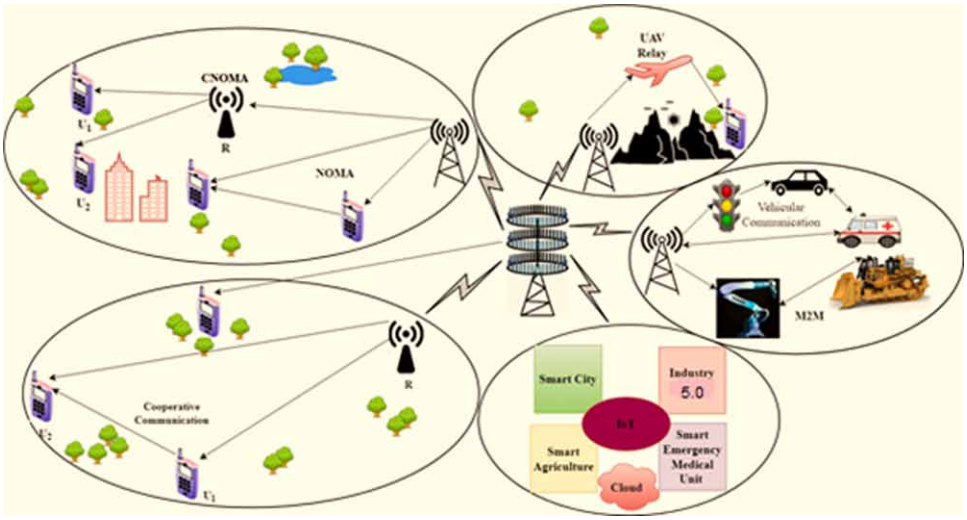
INTRODUCTION

Cooperative communication has been involved more in integration of energy harvesting (EH) and information processing (IP) with assistance of the relay in recent years. The key ideas of enabling advanced technologies such as millimeter wave, ultra MIMO, full-duplex, Terahertz wave, visible light, and EH, integrated frequency bands transceiver, communication on large integrated surface, integrated terrestrial, airborne and satellite networks, and edge artificial intelligence will be provided concrete roadmap for 6G radio services (Saad et al.; Chataut, & Akl, 2020). In 6G radio system, wireless device needs more power as compare to existing radio system for data services, video conversations, gamming, and provides an integrated service of Internet-of-Things (IoT) etc.. Thereby, it causes to battery draining problem. To mitigate this, the EH is a latest-and-promising technology that provides implicit power supply to energy constraint wireless devices.

The EH components and power management circuits have been addressed (Vullers et al., 2009), where an energy in form of electrical power is harvested from energy sources such as solar/light, thermoelectric, mechanical motion/vibration and electromagnetic radiation (EMR). In practical applications such as cellular systems, multisensory devices, robotics and autonomous systems, brain computer interactions, IoT, and blockchain, and distributed ledger technologies which is shown in Fig. 1, the EH technique can be used to enhance data rates, energy efficiency and lifetime of the 6G radio networks.

Figure 1. Proposed diagram of the SWIPT-enabled cooperative communication for 6G radio systems



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