

# Chapter 9

## Sustainable Mobile and Wireless Computing Solutions

**Ranita Ganguly**

 <https://orcid.org/0000-0003-3123-2093>

*Delaware State University, USA*

**Priyam Ganguly**

 <https://orcid.org/0009-0005-3280-1747>

*Widener University, USA*

**Thrushna Matharasi**

*University of Bridgeport, USA*

### ABSTRACT

*This chapter considers environmental impacts of mobile and wireless computing technology which appears to be a threat to its consistent growth. Consequences of this challenge include energy-intensive production processes, e-waste, and carbon footprints of devices and networks. Hardware optimization, appropriate networking solutions, and circular economy are targeted as effective approaches for reducing ecological impact. Stakeholders – governments, industries and end-users contribute to the construction of a sustainable environment by formulating policies, partnerships, and changing the way people behave. The chapter deals with AI, IoT, and bio-inspired computing and sets out their potential to reduce energy demands and the life cycles of devices. It is presented through critical case studies and expert analysis of what the goals of sustainability are and how these goals can be achieved without inhibiting progress in technology. This chapter promotes solutions to sustainability issues through alignment of risks and opportunities in the context of international*

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*sustainability goals.*

## **1. INTRODUCTION**

Sustainability has become essential in the contemporary era when mobile and wireless computing are intricately integrated into the lives of modern humans. The span of mobile devices has increased in terms of their convenience and value. However, growth without constraints can have negative consequences. Currently, there are widespread environmental and energy problems, from manufacturing processes to the ever-growing demand for Wireless Networks and data centers. This chapter deals with current issues, technological advancements, and future developments directed toward making Mobile and Wireless computing solutions more sustainable. Overall, this chapter covers the scope, structure, and key focus areas; the research methods employed; and the expected contributions in the context of the broader field of sustainable technological development.

### **1.1. Significance of Sustainable Mobile and Wireless Computing Solutions**

According to estimates for 2024, mobile technologies, including mobile phones, account for approximately 2–3% of global energy consumption, and the share will continue to increase with the rise of Internet of Things (IoT) devices, 5G networks, and mobile users. This ecosystem is composed of the following environmental footprints.

- Energy-intensive manufacturing owing to the mass production of mobile handsets.
- E-waste resulting from old or discarded smartphones, tablets, and other handheld devices.
- The high-energy demands of wireless networks and cloud infrastructure support these networks.

### **1.2. Introduction to sustainability in mobile and wireless computing**

Energy efficiency may be described as the use of less energy to provide the same service or achieve the same result. This entails the use of devices and practices that reduce energy use but save the same for better performance. For instance, energy-efficient LED light bulbs provide similar lighting to traditional incandescent bulbs

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