

Chapter 11

Mitigating the Environmental Impact of Smartphones with Device Reuse

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ABSTRACT

The rapid growth of information technology has not only brought substantial economic and societal benefit but also led to an unsustainable disposable model in which mobile devices are replaced in a matter of months. The environmental impact of this stream of handsets in terms of manufacturing energy, materials, and disposal costs is alarming. This chapter aims at raising today's environmental issues of the increasing smartphone market, as well as providing a quantitative analysis on the environmental impact of different life-cycle stages of the smartphones, including the manufacturing stage, using stage, and recycling. To achieve sustainable computing and best utilize the energy consumed during manufacturing the large number of devices, this chapter demonstrates the methodology and techniques towards reusing smartphones by presenting a case study on reusing smartphones for elementary school education.

1. AN INTRODUCTION TO SMARTPHONES

During the last 10 years, there has been a rapid increase in the power and popularity of mobile devices. The consumer enthusiasm generated by the latest devices has led to a dramatic shift in personal computing. This shift is characterized by consumers moving away from traditional desktop computers in favor of their mobile devices. The magnitude of consumer enthusiasm and the degree to which the personal computing shift can be felt are made tangible by observing the sheer volume of mobile devices sold around the world. For example, roughly one million units of the iPhone 3G model were sold worldwide in the first weekend

it was being sold (Dalrymple, 2010). Similarly, over three hundred thousand iPads were sold on the first day of its release (Lance, 2009). This excitement inevitably means that the number of these devices is increasing extremely quickly.

1.1. The Cellphone Market

The increasing number of cellular phones in the United States is of particular interest. In accordance with demand, the number of cellular phone shipments to the United States has grown very quickly in the last few decades, and the result is the enormous volume of devices currently observed. As can be seen in Figures 1 and 2, the amount of these devices that have been used and replaced in

Figure 1. This graph depicts the trend in phone sales worldwide from 1997-2009. The units for the Y-axis is millions of smartphones. The X-axis, of course, shows the relevant year (Kairer, 2005).

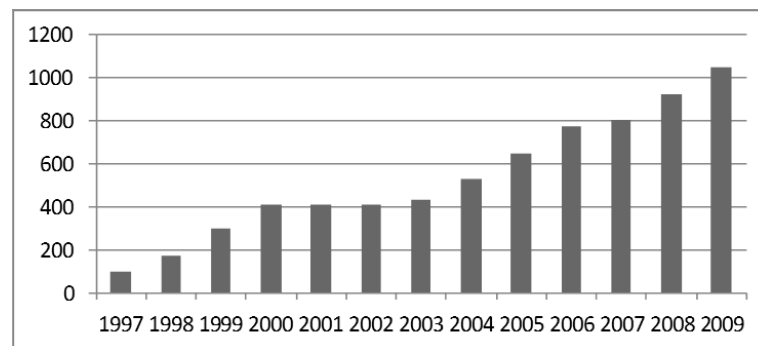
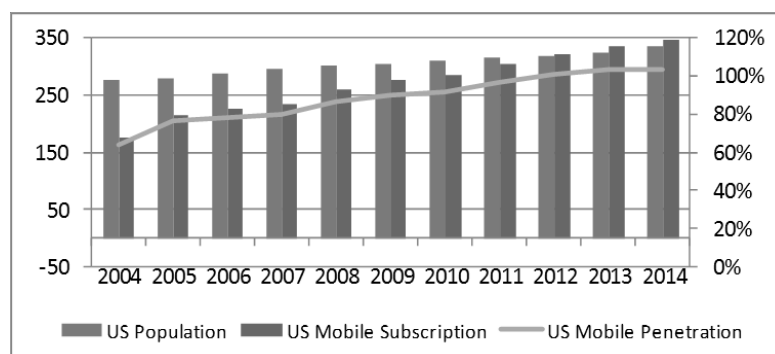


Figure 2. This graph depicts the number of US cell phone subscribers from 2004-2008 and provides a forecast for how the trend will look in later years (Ortiz, 2008).



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