Wireless Grids

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INTRODUCTION

Grid computing concept has evolved with an idea of utilizing idle resources of billions of computers connected to the Internet around the world. It is an important initiative for coordinated problem solving and resource sharing. Grid Computing is defined as (Buyya, 2002; Foster & Kesselman, 2004) a distributed system that enables the aggregation and sharing of geographically distributed resources such as Computers (e.g., PCs, clusters,...), Softwares (e.g., special purpose applications), Databases (e.g., access to human genome database), Special Instruments (e.g., radio telescope), and People (e.g., researchers, scientists) across the Internet and presents them as an unified integrated (single) resource. It has attracted worldwide attention in a variety of applications ranging from physics, chemistry, environment, aerospace and healthcare.

Wireless grid extends the capability of grid computing to wireless devices such as laptops, Personal Digital Assistants (PDAs), cell phones, etc. It supports sharing of resources by mobile and fixed wireless devices within the virtual organizations, where people from different institutions work together to solve a common goal. It is defined as a large scale, complex, heterogeneous, distributed wireless network environment in which resource consumers and resource providers from different administrative domains will have different policies, preferences, and goals (Birje, Manvi & Das, 2014). Wireless grid has broad application prospects in e-learning, mobile e-business, smart home, modern healthcare, wireless sensor networks, disaster management, and so on.

In this article we provide an insight of wireless grid by discussing its background, various classification models, issues and its applications.

BACKGROUND

Advancements in wireless and mobile technologies have enhanced the capabilities of wireless (or mobile) devices. With increasing number of users owning wireless devices and developments in grid, scientists and engineers have paved the way for wireless grid evolution. A future enterprise with wireless grid may request other enterprises (equipped with either a wireless grid or a wired grid or a combination of both) for service, on some agreement or payment basis. Some devices (such as camera, printer) provide only specialized services, whereas others (such as mobile phones, laptops) can provide multiple services. A device can request other devices to do some job on its behalf in a wireless grid.

Figure 1 shows wireless grid, where some wireless devices can also have access to wired grid infrastructure. It is comprised of wireless devices like wireless PCs, laptops, PDAs, cell phones, etc., which are resource constrained having limited battery power, bandwidth, processing capacity and memory. However, due to continuous increase in device capabilities and number of users, an aggregated resource pool can offer a tremendous capacity such that any complex application can execute. Wireless devices communicate with BTS (Base Transceiver Station) using wireless communication technologies such as IEEE 802.11x, IEEE 802.16x, IEEE 802.15x, IEEE 802.20x, Bluetooth,

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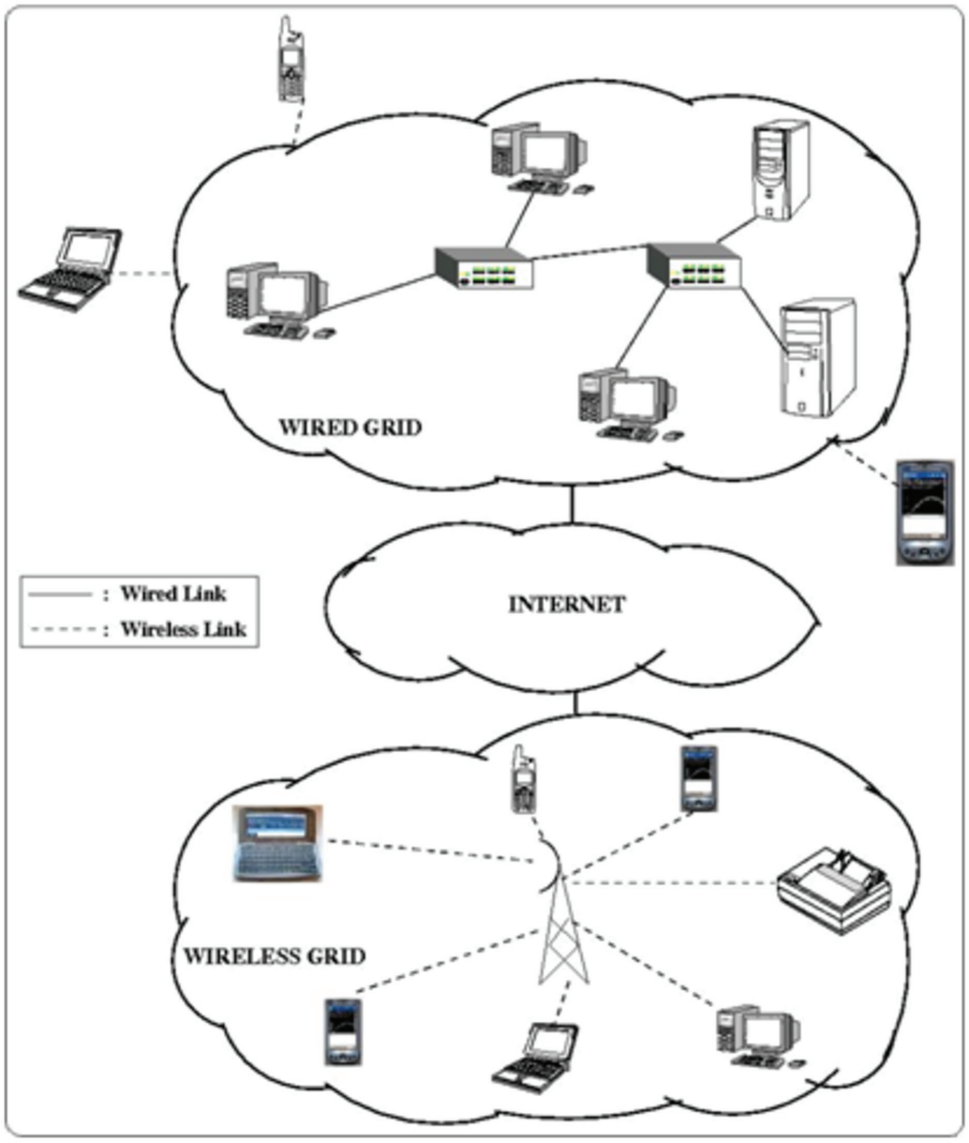
Figure 1. Wireless grid



Zigbee, wireless ad hoc networks, cellular networks, etc.. The BTS is connected to the wired grid. Using a particular user interface wireless devices get connected with a grid service providers or applications via BTS.

CLASSIFICATION MODELS OF WIRELESS GRIDS

Based on different factors, wireless grids ARE classified into three categories as follows:

1. Geographical distribution or organizational scope,
2. Type of service they offer, and
3. Predominant devices and their mobility.

Figure 2 shows various types of wireless grids in each of this category.

1. Based on Geographical Distribution or Organizational Scope

A wireless grid is classified into three types as described in the following.