Chapter 3

IoT System Resource Sharing Mechanisms

ABSTRACT

As the IoT technology continues to grow, it needs to support an increasing range of services. Therefore, IoT networking over which services are provided has become an area of great importance. In particular, the management of IoT resources and the way new technology integrates into the network operator’s infrastructure is critical to the success of IoT. The key to supporting a large number of services is IoT system resource. Therefore, all performance guarantees in IoT systems are conditional on currently available resource capacity. In this chapter, we focus our attention on the IoT resource allocation problem. First, an effective bandwidth allocation algorithm for heterogeneous networks is introduced. And then, a new Bitcoin mining protocol with the incentive payment process is explained. To share the computation resource, this Bitcoin protocol adopts the concept of the group bargaining solution by considering a peer-to-peer relationship.
PRINCIPAL-AGENT GAME BASED RESOURCE ALLOCATION (PARA) SCHEME

In order to provide more comprehensive network services, a concept of integrated heterogeneous network system was introduced. Until now, lots of researchers have focused on how to efficiently integrate different types of wireless and mobile networks. To exploit the heterogeneous network system operation, an important issue is how to properly manage bandwidth. Recently, S. Kim designed the Principal-Agent game based Resource Allocation (PARA) scheme, which is a new bandwidth management algorithm based on the principal-agent game model. Among heterogeneous networks, the PARA scheme has analyzed the asymmetric information situation and developed an effective bandwidth allocation algorithm. Under diverse network condition changes, this principal-agent game approach is essential to provide a suitable tradeoff between conflicting requirements.

Development Motivation

In the past few years, wireless and mobile networks have experienced a great success. However, any single type of existing wireless networks cannot provide all types of services. In order to provide more comprehensive multimedia services, a concept of integrated network system was introduced by combing different types of wireless and mobile networks. In modern times, heterogeneous network systems are used for new business scenarios allowing ubiquitous networking and Internet of Things (IoT) services. To implement these techniques, current trends show that many different wireless networks coexist and cooperate with each other to provide internetworking accesses (Shen, 2008; Xue, 2012).

Based on the interdependence among different networks, the heterogeneous network system is envisaged to be a novel network structure to achieve a high network performance and broad coverage while bringing more flexible and plentiful access options for mobile users. However, it faces great challenges such as resource management problems among multiple networks. Therefore, proper resource management strategies, including bandwidth allocations in each network, are of great importance to exploit the potential network diversity (Shen, 2008; Xue, 2012).

Over the years, a lot of research work has been done to build new resource management schemes and to evaluate them. They have focused on the bandwidth management techniques based on the diversity of the services provided by different networks (Lopez-Benitez, 2011; Xue, 2012). However, they did
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