Chapter 80
Resource Management for Multimedia Services in Long Term Evaluation Networks

Vinod Kumar Mishra
B. T. Kumaon Institute of Technology, India

Tanuja Pathak
B. T. Kumaon Institute of Technology, India

ABSTRACT

Long-term evolution (LTE) is one of the quickest developing technologies that support a variety of applications like video conferencing, video streaming, VoIP, file transfer, and web browsing. Radio resource management (RRM) procedure is one of the key configuration parts for enhancing the system performance. The admission control is one of the resource management mechanisms. The task of admission control is to admit or reject the establishment request for the new session. In this chapter, the authors provide an overview of the resource management and analyze the media degradation path (MDP) and non-MDP-based admission control algorithms in the LTE network and compare the session establishment success. This chapter also enables for reader to know the current and future trend of research on resource management of multimedia services in LTE networks.

INTRODUCTION

Wireless multimedia networks are becoming progressively popular, which provide the mobile phone user to accommodate of access to information and services at any time, any place and in any configuration with user desire and due to demand of high speed internet and growing wireless multimedia communication systems, future communication systems are expected to transmit large amount of multimedia traffic such as video, voice and text with a variety of Quality of Service (QoS). The important issue for future communication systems and upto certain extend in current communication system is the time and frequency being used for scarce resources and the requirement of QoS for multimedia applications which are sensitive in nature. Long Term Evolution (LTE) is one of the fastest growing technology which

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supports a variety of applications like video conferencing, video streaming, VoIP, file transfer, web browsing etc. In order to support multiple applications, radio resource management (RRM) procedure is one of the key design that has a role in improving the system performance. Long Term Evolution (LTE) establishes a significant milestone in the evolution of 3G systems towards the fourth generation (4G) technologies. The expanding utilization of complex multimedia services requires an advanced resource management mechanism in particular in wireless network environment. The mechanism that is responsible for managing and controlling radio resources are known as resource management. The admission control is one of the resource management mechanisms, and task of admission control is to admit or reject the establishment request for the new session.

The performance targets promised by LTE, make it an ideal solution to accommodate the ever increasing demand for wireless broadband. LTE's promised performance targets were made possible due to improvements such as implied system access architecture and a fully IP-based platform. LTE has also great enhancements in its enabling radio technologies by introducing orthogonal frequency division multiplexing (OFDM) and advanced antenna technologies (Astély et al., 2009). In addition, LTE capabilities are further improved with enhanced Quality of Service (QoS) support for multiple data services, such as voice and other multimedia applications.

The main challenges in 3G, 4G and in next generation cellular networks are maintaining the quality of service (QoS) requirements for each class of the multi-service traffic in the presence of the limited radio resources (Ghaderi & Boutaba, 2006). The components that are in-charge of over-seeing and controlling the radio resources are known as radio resource management (RRM). The procurement of wireless multimedia services to mobile users with a certain quality of service, force stringent necessities on the configuration of radio resource systems. Admission control for wireless system has been generally concentrated on under distinctive system architectures and systems heads approaches.

In this chapter, we introduce the fundamental idea of the admission control design and quality of service (QoS) procurement in wireless and mobile network. Provide, in brief, the call admission control (CAC) mechanisms, under a radio resource management (RRM) to support multimedia applications in the next generation wireless cellular networks with different QoS requirements prerequisites e.g. transfer speed (bandwidth), delay/jitter, and priority. CAC schemes enable the system to provide QoS for the new and also for the existing calls. Resource reservation scheme, such as Guard Channel, is utilized to hold the resources for certain high priority calls. On the other hand, network is required to exploit the resource sharing among traffic to accomplish better channel utilization. Acquiring a right harmony between the two restricting criteria is again a huge challenge. This schemes cover RRM outline for the channel-based wireless system, such as the time division multiple access (TDMA) and the frequency division multiple access (FDMA) systems, as well as the interference-based code division multiple access (CDMA) system. We focus on the implementation of the admission control algorithm in the long term evolution (LTE) network which enhancing session establishment success. For this we use the concept of service degradation (also known as media degradation path (MDP)) for handling multimedia multi-class services in admission control. The next generation network will be supported via various service classes with different QoS. Each service class call will treated differently according to the set criteria and adopted operating principle for the admission procedure. Since multimedia service may contain several media flows and user preference regarding flow importance may also vary so "user" and "service" related knowledge can be used at session initiation to specify alternative service configuration. We apply this knowledge in the context of admission control in non-MDP algorithm. In this approach the algorithm allows the sessions to be admitted with lower quality configurations, in cases when there are