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

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 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

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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 multiclass 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 not enough resources to admitting optimal (highest quality) configurations. Algorithm is implementing on LTE Simulator (LTE-Sim) while previously this is implemented in other simulators. The result of simulation of this approach shows that by using this approach in existing algorithm the session admission probability will increase over non-MDP algorithm.

BACKGROUND

Numerous previous research works have been published that allow higher priority for handover calls over new calls. Most of these proposed schemes are in light of the thought of "guard band," where various channels are reserved for the restrictive utilization of handover calls. Although schemes based on guard bands are simple and capable of reducing the dropping probability, these schemes also result in reduced bandwidth utilization. To improve resource utilization of the guard channel algorithm, Ramjee et al. (1997) proposed fractional guard channel algorithm. The fractional guard channel algorithm decides an acknowledgment or a dismissal of new calls with choice probabilistically changed as the quantity of occupied channels. In case that channel is sufficient available, handoff calls are accepted, but new calls can be rejected. In this way, in the fractional guard channel algorithm, dropping probability of handoff calls may be smaller than that of new calls. Ghaderi and Boutaba (2006) also introduced guard channel based schemes, in their scheme guard channel algorithm reserves some channels among the total number of channels for handoff and calls admission control procedure. Guard channel algorithm is straightforward and its implementation is simple. In addition, the guard channel algorithm may decrease the use of physical resources as the quantity of holding channels increments. Wang et al. (2003), Wu (2005) and Bae et al. (2009) have introduced Quality of service related admission