

# Radio Resource Management Techniques for QoS Provisioning in Wireless Cellular Networks

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New generations wireless cellular networks, including 3G and 4G technologies, are envisaged to support more mobile users and a variety of wireless multimedia services. With an increasing demand for wireless multimedia services, effective Radio Resource Management (RRM) is needed to improve system performance by maximizing the overall system capacity and maintaining the Quality of Service (QoS) of multimedia traffic. In the presence of multiple QoS requirements for different multimedia traffic, the key problem in the design of a multimedia wireless system is to balance the two opposing objectives of the network operator (or service provider) and mobile users. The former wants to achieve high system utilization so that more users can be accommodated by the system and more revenue can thus be obtained while the latter wants to receive better QoS. In such systems, QoS guarantees are required at three different levels: (i) at the connection-level, users expect that the new call blocking probability and handoff call dropping probability be small, (ii) at the class-level, constraints might be placed on how the call rejection (blocking or dropping) probabilities of various classes of calls may be related, and (iii) at the packet-level, users require guarantees on maximum packet delay, delay jitter and packet dropping probability.

In this tutorial, we first present a comprehensive overview of the next generation wireless cellular networks and limitations in such networks. We then explain the importance of existing an effective RRM technique that overcomes the limitations of wireless cellular networks and maintain service continuity with QoS guarantees to the multimedia services users. RRM components are then discussed in terms of QoS that are classified at three different levels. Finally, we presents two case studies that integrate RRM components such as call admission control and bandwidth reservation and adaptation, to provide seamless handoffs to mobile users under hard constraints at both the connection and class levels.