

Cross-layer design issues for quality of service provisioning in wireless networks

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Abstract

Abstract: Next generation wireless networks are envisioned to provide integrated services via inexpensive low-powered mobile computing devices. End users often expect seamless transition from wire-line to wireless networks. That requires quality of service provisioning that is compatible in the wireless and the wire-line parts of the network. Wireless networks though exhibit peculiarities due to which meeting stringent quality of service requirements becomes a rather challenging task. The volatile, error-prone mobile channel on one hand and the interference limited radio medium on the other, necessitate a cross-layer approach in the design of higher layers. We will present various approaches for network control at the access and network layer where the controller should rely on channel state information passed from the physical layer, while making resource allocation decisions. Furthermore several considerations belonging typically to the physical layer like channel coding rate, signal constellation selection as well as power level adjustments, frequency selection and beam steering in multiple antenna systems are to the disposal of the access controller in several current schemes for broadband wireless access. We will present approaches for dealing with these design choices and discuss related state-of-the art broadband access technologies. The impact of these techniques on the efficiency in terms of bandwidth, spectrum utilization and energy consumption will be discussed.