Abstract

This paper suggests a generic scheme for provisioning of QoS under largely fluctuating channel quality and flat fading conditions for multimedia communication over satellite. A resolution scalable source is matched to a hierarchical constellation in order to achieve an adaptive decoding capability to combat fluctuations in signal to noise ratio (SNR). The receiver
estimates the SNR and if the SNR is found to be below a certain threshold, it reduces the rate by dropping off a higher order constellation which is riding on a baseline QPSK constellation. Thus, the first tier of the scheme guarantees service at lower resolution in poor channel conditions. The second tier of the scheme facilitates near coherent demodulation under frequency nonselective fading conditions. It makes use of pilot symbols which are embedded in the information symbols to probe the fading channel. The received pilots provide an estimate of multiplicative distortion encountered in slow & flat fading channel. This estimated amplitude and phase reference are used to adjust the level and angle of the incoming symbols to the reference constellation. This receiver based rate adaptation scheme is typically suitable for broadcast applications and addresses the issue of service quality provision for a multitude of receivers. It provides a stable reference for demodulation under fading and supports graceful degradation for deteriorating channel conditions. Exhaustive simulations are carried out to examine the validity of the concept.

### Reference

- Ezio Biglieri, John Proakis, and Shlomo Shamai (Shitz), “Fading Channels:

**Index Terms**

Computer Science  
Communications

**Key words**

Resolution scalability  
Unequal error protection

Hierarchical constellation  

Pilot symbol assisted modulation