



Multimedia Signal Processing & Communications

Bell Canada Chair in Multimedia

Efficient Resource Allocation Strategies for Wireless Multimedia Communications

A major objective of future-generation communication networks is to provide high-quality multimedia content to users. Examples are wireless video communications and wireless telemedicine. This demand necessitates more efficient utilization of limited resources. Ultimately, the two fundamental resources in communications are power and spectrum. While it is essential to minimize consumption of limited resources, the conservation should not come at the cost of inferior quality of service (QoS). As a result, power and spectrum efficient strategies, which can also guarantee some level of QoS, are highly desirable. A fundamental limitation in systems currently deployed is that, for the most part, the infrastructures of these systems are optimized for a specific application, e.g. voice communication. To a certain extent, adaptability is present in some current systems to cope with varying channel conditions. However, these techniques are incorporated in a rather ad hoc manner, without a structured framework. The approaches taken are also conservative and done independently at various layers in the systems. As a result, these systems are not inherently suitable for transmitting high-rate multimedia content.

We consider a more productive design approach based on a paradigm shift: adaptability, e.g. using more advanced signal processing techniques, should not simply be an after-thought but should be built-in at all layers in the design. Moreover, provisions for QoS management need to be adopted for coordinating various layers optimally. In this manner, a structured framework for resource allocation can be built.

Recent Publications:

1. F. Bui and D. Hatzinakos, "Biometric methods for secure communications in body sensor networks: Resource-efficient key management and signal-level data scrambling", *Eurasip Journal on Applied Signal Processing*, in print.
2. F. Bui and D. Hatzinakos, "An Interpolation and Resampling Framework for Efficient Reduction of Peak-to-Average Power Ratio in OFDM Systems", *PIMRC'07*, Athens, Greece, Sept. 3-7 2007
3. F. M. Bui and D. Hatzinakos, "Resource allocation strategies for secure and efficient communications in biometrics-based body sensor networks", *Biometrics Symposium, BSYM-2007*.
4. Francis M. Bui and Dimitrios Hatzinakos, "Spectrally Efficient Communication over Time-Varying Frequency-Selective Mobile Channels: Variable-Size Burst Construction and Adaptive Modulation," *EURASIP Journal on Applied Signal Processing*, *Eurasip Journal of Applied Signal Processing*, vol. 2006, pp. 1-16, September 2006.
5. Lin, D., Pacheco, R., Lim, T.J. and Hatzinakos, D., "Joint Estimation of Channel Response, Frequency Offset and Phase Noise in OFDM", *IEEE Transactions on Signal Processing*, Vol. 54(9), pp. 3542-3554, Sept. 2006.
6. Bui, F. and Hatzinakos, D., "Identification and Tracking of Rapidly Time-Varying Mobile Channels for Improved Equalization - A Basis Expansion Model Approach", *CSNDSP'06*, pp. 190-194, Patras, Greece, July 2006
7. R. Pacheco, O. Ureten, D. Hatzinakos and N. Serinken, "Bayesian Frame Synchronization Using Periodic Preamble for OFDM Based WLANs", *IEEE Signal Processing Letters*, Vol. 12(7), pp. 524-527, July 2005.
8. F. Bui, and D. Hatzinakos, "A Receiver-based Variable Size Burst Equalization Strategy for Spectrally Efficient Wireless Communications", *IEEE Trans. on Signal Processing*, 11 transaction pages, accepted January 2005.