Near-Capacity Wireless Multimedia System Design: Error-Resilient Source-Compression, Multi-Functional MIMOs and Efficient Streaming

Abstract: Most multimedia source signals are capable of tolerating lossy, rather than lossless, delivery to the human eye and ear, since the audio-visual impairment-masking properties of the human 'receiver' may be exploited. Hence the coding-induced impairments may be rendered almost imperceptible. The standardized multimedia source codecs however exhibit unequal error sensitivity, which is not the case for Shannon's ideal entropy codec. In this research-review, a unified treatment of near-capacity multimedia communication systems is offered, where we focus our attention not only on source and channel coding aspects but also on their iterative decoding, streaming and transmission problems. The design examples considered include cutting-edge near-capacity variable-length codes, multi-layer video streaming systems supported by multi-functional antenna arrays (MFAA) and three-stage concatenated receivers.

- Shannonian lessons on multimedia communications - is the source- and channel-coding separation theorem still valid for the high-compression multimedia codecs of the 21st century?
- Audio/video compression basics, video standards and multi-layer coding
- Iterative detection and Extrinsic Information Transfer (EXIT) charts
- Near-capacity variable-length codes for multimedia communications
- How closely can we approach capacity and what is the price of it?
- Audio/video streaming and Multi-Functional Antenna Arrays (MFAA)
- The benefits of short block codes, unity-rate codes and three-stage concatenated transceivers

The tutorial is based on:

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