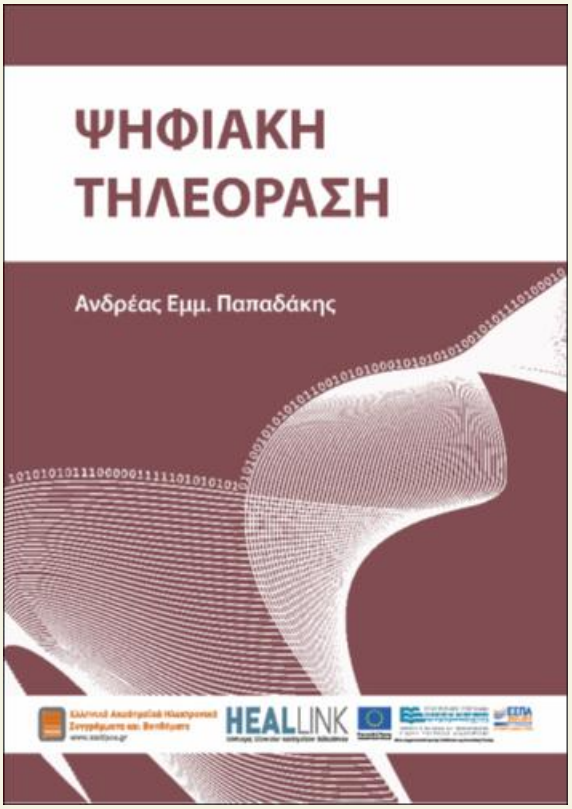

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Abstract

The book describes the main technologies following the route of the digital broadcasting signal, from its generation, encoding and compression to its modulation and transmission. It consists of four main sections. The first main section discusses the generation of digital television signal. Video and audio signal properties are described including resolution, sampling rate, frame rate and bandwidth requirements, color conversions (RGB / YcbCr) as well as TV-specific techniques including interlacing and horizontal / vertical synch. In the second main section, video and audio coding and compression techniques are described based on MPEG standards, including color subsampling, motion compensation, discrete cosine transform (DCT), Huffman and arithmetic coding and run length encoding (RLE). Compression impact on quality is quantified using image/video quality metrics (such PNSR and VQE). In terms of audio coding, removing of redundant (or human imperceivable) information and frequency and temporal masking techniques are examined.

In addition, encapsulation mechanisms, program and mainly transport streams, are described. The following main section describes channel coding and forward error correction techniques, including block and convolutional codes, as well as modulation for terrestrial transmission using the VHF/UHF spectrum. Digital modulation techniques (QAM) and OFDM are discussed with brief reference to analog modulation which employs AM and FM for luma, chrominance and audio signals respectively. In the last main section, Internet Television, Internet Protocol Television (IPTV), is also discussed as a two-way, interactive, multimedia network service. In addition the main modules of the (digital and analog) TV tuner are identified and briefly discussed as they perform the reverse process of signal receiving, demodulation and decoding. The book closes with a brief reference to the upcoming technological developments including the provision of value-added services on top of TV signal and more efficient coding techniques to support ultra-HD.

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