

Identification and Characterisation of the Modulation of Digital Signals

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Executive Summary

The evolution from analogue to digital technology brings with it great opportunity for innovation and improvements in communications. However the automatic identification and characterisation of the modulation of digital signals presents a challenge.

The recognition and estimation of the parameters of the modulation format of a signal, an intermediate step between the detection of the signal and its demodulation, is a key task in current radio systems, especially with respect to the issue of spectrum management.

This is in fact an issue of great topicality and a problem that is relevant to:

- new commercial systems, especially due to the development of Software Defined Radio (SDR) technology, where the receivers receive supplementary information from the transmitter for their reconfiguration, thereby allowing more efficient spectrum use;
- regulatory bodies with spectrum management responsibilities, which have to perform checks as to conformity of its use, as well as identify and locate sources of signals which are unauthorised or cause interference;
- military applications, in the implementation of advanced services and information systems where “friendly” signals need to be received securely, while “hostile” signals need to be located and identified.

Since the transmission parameters are not known in advance, it is a difficult task and becomes a greater challenge in a real scenario where there is a series of restrictions on the transmission channel which alter the reception conditions of the transmitted signals.

The development of a method which performs the automatic classifications (identification and estimation of the parameters) of the modulation format of digital signals (a process which involves the modulations to be classified, their merit factors and the equipment which carries out their reception and characterisation) has been ongoing for over twenty years.

In this presentation, which addresses the issue of the Identification and Characterisation of the Modulation of Digital Signals, reference is made to the digital modulations, the advantages and applications, as well as the merit factors for appraising their performance. Note is also made of the various studies carried out and presented in the technical press for the development of an Automatic Classifier of the Modulation of Radio Signals.