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Review of the dissertation thesis by Ing. Ladislav Polák entitled

ANALYSIS AND SIMULATION OF THE SIGNALS TRANSMISSION IN THE DVB-H/SH STANDARDS

The topic of this thesis is Digital Video Broadcast (DVB), recent standards that allow the transmission of video signals in various formats depending on bandwidth and channel situations even to handheld devices (DVB-H). Through the penetration of mobile phones, such standards have become very visible in our daily life and it is very important to understand their transmission behavior over wireless channels in order to set up the multitude of parameters that the standards allow to their optimal values.

The thesis comprises of eight chapters. In the first chapter Ladislav Polák provides an introduction into DVB standards in general and explains his major aims. Chapter 2 gives an introduction in the main functional parts of the DVB-H standard while Chapter 3 provides the same for the DVB-SH standard, that is, for satellite to handheld transmissions. Due to the harsh satellite channel conditions, particular coding techniques need to ensure a good transmission quality. In both chapters all signals and functional units that are relevant in the further investigations of this thesis are explained and thus make the thesis self-contained and complete. In more detail the concepts of time slicing are explained, the MPE forward error correction coding and the in-depth interleaving. Finally, the three modes of operation 2K,4K and 8K for the three transmission environments 'mobile', 'portable' and "fixed" are described.

Chapter 4 describes the channel models that have been used in the investigations of the transmission scenarios. Next to a classical AWGN channel, there are models for mobile channels, RA6, TU6, VU30, and MR 100 describing Rural Area, Typical Urban, Vehicular Urban and Motorway Rural channels, respectively. There is furthermore Pedestrian in- and outdoor channels as well as Ricean and Rayleigh fading channels for fixed scenarios.

In Chapter 5 Ladislav Polák describes in flowcharts the two programs he developed to analyze the transmission behavior of the two standards.

Finally in Chapter 6 the analysis of the first standards DVB-T/H is described. It is analyzed by the program described in the previous chapter as well as measurements using standard industrial equipment to emulate the standards and channels. Mobile, portable as well as fixed transmission scenarios are investigated. In many figures the results of coded and uncoded transmissions in various mobile environments are plotted and simulations are

compared to measurement results. Finally for some SNR points, reference values are available from the standards, and are being compared. While the simulations typically show a 1dB too high value and the measurements a 1dB too low value, the agreement is in all cases very good and quite acceptable.

In Chapter 7 the procedure of Chapter 6 is repeated, now using the DVB-SH standard. However, now only simulation results are shown and no measurement results. The achieved results are reported, compared and discussed at the end of each chapter.

Eventually, Chapter 8 closes the thesis, providing a summary of the achievements and an outlook of further potential for investigations.

A list of references as well as a list of publications by the author of the thesis and finally a short appendix with applications of the standards are provided at the end of the thesis.

The thesis is written in a simple English but sufficient to follow its statements. To have written it in English certainly improves the quality as it offers the thesis results to a much wider audience.

The main achievements of this thesis are to make a simulation environment available that allows the prediction of the transmission behavior of DVB-H/SH standards over a wide range of wireless channels.

While the transmitter and receiver can simply be tested by checking their functionality, the correct implementation of the various wireless channels is a tedious task. In this thesis there is no mentioning of how the implementation of the channel models has been tested other than the final comparison to exemplary reference points from the standards and the comparison to available measurement equipment. As it can be expected that the implementation in emulation devices such as the measurement equipment are somewhat different, it would be very important to analyze such differences and investigate their influence on the achieved transmission quality. Also, an analysis of the confidence intervals of simulations and measurements would have been helpful to find out whether there has been taken sufficient observations to draw conclusions. While a rigorous comparison of simulation and measurement results in Chapter 6 is very useful, Chapter 7 seems to offer only simulation results and thus offers little to validate the data.

The candidate has published in numerous national and international conferences all together 32 publications. However, there is not a single conference contribution in a well established IEEE conference in communications (such as ICC, Globecom, SPAWC, VTC, European Wireless) which somewhat lowers the potential value of the contributions.

In summary the contributions of this thesis are novel and interesting and obtained by a consistent engineering process. They are well documented and worth being defended. I thus recommend the thesis to be accepted for defense.



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