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Scheduling in digital video broadcasting second generation terrestrial (DVB-T2) systems

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Abstract

The ever-increasing need for high quality video and new video content in digital video broadcasting comes with a demand for more bandwidth. However, bandwidth is already a scarce resource and the challenge faced is how to satisfy this demand in the limited bandwidth. The most recent digital terrestrial television (DTT) standards and video compression algorithms attempt to use the spectrum more efficiently but this is still not enough. Proper resource management procedure, particularly scheduling, are therefore essential in ensuring that the spectrum is used even more efficiently. The objective of this research is to design and implement resource allocation solutions for Digital Video Broadcasting Second Generation Terrestrial (DVB-T2) in order to use resources more efficiently and improve the system performance while considering quality of service requirements (QoS). Another problem in DVB-T2 is that resource allocation is not standardized and this comes with disadvantages such as lack of interoperability between hardware from different vendors which limits customers to single vendor. This research therefore proposes standardization of scheduling for DVB-T2.

The research addresses resource allocation in DVB-T2 at three levels. Firstly, physical layer pipes (PLP) scheduling schemes namely dynamic statistical multiplexing (D-StatMux), modified largest weighted buffer occupancy first (MLWBOF) and exponential proportional fair (EXP/PF) are presented and analyzed. Secondly, a service scheduling scheme for scalable videos is also presented in order to exploit the bit rate adaptability of scalable video coding (SVC). Lastly, an existing time slice allocation scheme is adopted in this study for timely delivery of services. The schedulers are implemented for three scenarios: PLP scheduling with increasing number of services, Service and PLP scheduling with over-packing and Service and PLP Scheduling with time slice allocation with over-packing. Results obtained from carrying out simulations show that the proposed schedulers give better overall performance than existing solutions.

On this basis, it is recommended that scheduling be standardized for DVB-T2 and the proposed scheduling schemes should be considered.