Tutorial A2: DVB-S2/RCS: Protocols and Resource Management

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The tutorial will provide a comprehensive survey on protocols and resource management (RM) issues in DVB-S2 and DVB-RCS. DVB-S2 and RCS offer a variety of different resource management capabilities, ranging from frequency/polarization reuse, power control, adaptive coding and modulation to scheduling, congestion control, dynamic capacity assignment and call admission control. The standards support the resource management by a set of protocols to exchange information between network operation center and terminals.

Next generation DVB-S2 will challenge the operators with powerful applications of fade mitigation techniques. These techniques might require adaptivity of the DVB-S2/RCS systems. The tutorial will show how higher layer protocols need to support the physical layer flexibility. Today, there is also substantial effort in standardization for the higher layer protocols.

Several promising FMTs have been in depth studied and optimum combinations in the identified system scenarios have been devised. Power control, ACM and Dynamic Rate Adaptation (return link) have been traded-off and their performances assessed. DVB-S2 and enhanced DVB-RCS, including high order modulations, are investigated. The boost in capacity with respect to current system will be shown.

The MAC protocols and signaling information needed to support the devised techniques will be examined and the impact on current standards are assessed. Also a novel encapsulation protocol for efficient delivery of IP content in ACM DVB-S2 system will be presented and an important advantage with respect to currently utilized MPE/MPEG approach shown.

Resource allocation algorithms suitable to operate with time-variant conditions have been studied and simulated for both the forward and the return link case. In particular, the very challenging problem of maximizing efficiency while supporting QoS, with physical layer adaptation in a time-variant capacity channel, is tackled. Several scheduling solutions are compared and their performances are assessed through comprehensive system simulations.

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Axel Jahn is with TriaGnoSys GmbH, a satellite and aeronautical communications company, as managing director since 2002. He was with DLR the German Aerospace Center DLR from 1990-2004 as project manager and group leader. Axel received the Ph.D. and the Diplom-Ingenieur degree in Electrical Enginneering in 1999 and 1990 from the FernUniversity at Hagen and University Fridericana at Karlsruhe, Germany, respectively. After the studies, he joined the Institute of Communications and Navigation of the German Aerospace Center (DLR). Axel received the DLR science award in 2002 and the Best Paper Award of ITG conference "Mobile Communications" in 1993. He co-authored more than 120 publications, with two scientific textbooks and 13 scientific journal papers.