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Editorial
Satellite Communications

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We are delighted to bring to you this special issue on satellite communications, which we have prepared as part of the spreading of excellence remit of the satellite communications network of excellence (SatNEx). The SatNEx project, which began in 2004, is funded for five years under the European Union's Sixth Framework Programme (FP6) Information Society Technologies (IST) Thematic Area. Led by the German Aerospace Center, SatNEx brings together a network of 24 partners, distributed throughout Europe, with membership drawn from ten countries.

The philosophy underlying the SatNEx approach revolves around the selection of focused actions under Joint Programmes of Activities, which are carried out collectively by the partners and include research, integration, and dissemination activities. Training represents an important part of the SatNEx remit and is supported through a number of initiatives including the hosting of internship projects and an annual summer school.

The call for papers resulted in a high number of submissions, from which we have been able to select 12 excellent papers dealing with the different aspects of satellite communications and navigation.

Multiple-input multiple-output (MIMO) techniques are attracting a considerable amount of attention from within the terrestrial wireless community. The first paper of this special issue, "Multisatellite MIMO communications at Ku band and above: investigations on spatial multiplexing for capacity improvement and selection diversity for interference mitigation," considers the application of such technology over a satellite platform operating in the Ku band and above. The paper considers how MIMO can be used to increase capacity by using a satellite spatial multiplexing system and how antenna selection can be used to mitigate interference. The next paper "Investigations in satellite MIMO channel modeling: accent on polarization" looks at MIMO systems from the polarization diversity point of view and dwells on the satellite cooperative communication concepts.

Switch and stay combining (SSC) is a form of diversity technique used in digital receivers to compensate for fade events introduced by the mobile channel. The third paper "Performance analysis of SSC diversity receivers over correlated Ricean fading satellite channels" investigates the performance of dual-branch SSC receivers for different fading channel characteristics.

The next four papers deal with the emerging scenario of mobile digital video broadcasting (DVB-S2 and RCS mobile). Alternative approaches to counteracting fading channels introduced when operating in a train environment receiving satellite DVB-S2 are presented in the paper "Advanced fade countermeasures for DVB-S2 systems in railway scenarios." Here, as a result of simulation analysis, antenna diversity and packet-level forward error correction mechanisms are proposed and their impact is evaluated with respect to the receiver design and system complexity. The theme of DVB-S2 is continued with the paper "Capacity versus bit error rate trade-off in the DVB-S2 forward link," which investigates how satellite capacity can be optimised for DVB-S2 transmissions. The DVB return channel via satellite (DVB-RCS) is then addressed in "Frequency estimation in iterative interference cancellation applied to multibeam satellite systems," which considers the application of interference cancellation on the reverse link of a multibeam satellite system, using DVB-RCS with convolutional coding as an example. The paper "A QoS architecture for DVB-RCS next-generation satellite networks" proceeds to design and emulate a quality-of-service (QoS) architecture that demonstrates using real multimedia applications how QoS can be supported over a DVB-RCS network.

Synchronization aspects are dealt with in "Maximum likelihood timing and carrier synchronization in burst-mode satellite transmissions." The paper addresses the problem of achieving synchronisation for a burst-mode satellite transmission over an AWGN channel. The subject of burst transmission continues with the paper "Burst format design for optimum joint estimation of Doppler-shift and Doppler-rate in packet satellite communications," which considers optimising the burst-format of packet-oriented transmissions by proposing very-low-complexity algorithms for carrier Doppler-shift and Doppler-rate estimation.

A network comprising satellite and high-altitude platforms is considered in the paper "TCP-call admission control interaction in multiplatform space architectures." Cross-layer techniques are implemented by means of TCP feeding back into call admission control (CAC) procedures for the purpose of prevention of congestion and improvement in QoS.

Finally, since navigation is an extremely important part of the satellite system family, we have included two papers. The first paper "Efficient delay tracking methods with sidelobes cancellation for BOC-modulated signals" deals with binary offset carrier (BOC) modulation, which is adopted in typical navigation systems. The paper considers how to improve the tracking of the main lobe of the BOC-modulated signal by using sidelobe suppression techniques. An alternative approach based on filter bank processing is presented in "Analysis of filter-bank-based methods for fast serial acquisition of BOC-modulated signals" to conclude the special issue.

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It has been a pleasure for us to have put together this special issue, which we hope you will find interesting. We would like to thank the editorial staff at Hindawi for their support and assistance during the preparation of this special issue. We would like to thank the contributing authors for the excellent quality of their submissions and our SatNEx colleagues for their valuable assistance in the reviewing of papers. SatNEx is partially funded by the European Commission under the Sixth Framework Programme. Further information on SatNEx can be found on the project web site: http://www.satnex.org/.

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