

ACADEMIC CALL FOR PAPERS – SESSION 2

This panel will present a set of scientific works that were submitted to the Call for Papers promoted annually by SET.

The selected works will be published in the SET International Journal of Broadcast Engineering (SET IJBE) an international scientific journal whose objective is the dissemination of knowledge about communications engineering, especially in the areas of broadcast and new media.

Moderator: Cristiano Akamine, Professor - Universidade Presbiteriana Mackenzie

ATSC 3.0 DIVERSITY RECEIVER TRIALS

Sungjun Ahn, Senior Researcher - ETRI (Electronics and Telecommunications Research Institute)

This paper identifies the practical gain of diversity receivers by introducing the broadcast field trials conducted in South Korea. The presented results are primarily on the on-vehicle reception of ATSC 3.0 services and were obtained in an operating commercial network. Through the technical review in the first part, it is emphasized that multi-antenna diversity brings a significant reliability gain to mobile broadcasting delivering HD content. This paper also presents original field results that verify the diversity gain in distributing ultra-HD services.

AN IOT BASED PROPOSAL FOR TELEMETRY AND TELECOMMAND SYSTEMS FOR TV 3.0

Alberto Botelho, PhD student in electrical engineering (Mackenzie) | LM Telecom

With the forthcoming evolution of television broadcast systems from TV 2.0 to TV 3.0, the equipment used for remote monitoring and maintaining the quality of services will have to go through a technological update in order to add greater efficiency and interaction between computer networks and the physical world. Telemetry and remote control are widely used in TV 2.0 by means of using GPRS technology. TV 3.0 will need an increased level of interactivity to meet the expected requirements for performance and features. In this context, the joint use of Internet of Things and TV 3.0 in an intelligent and collaborative way is a natural evolution of current Telemetry and Telecommand systems.

AUDIENCE AND COMPLEXITY AWARE ORCHESTRATION

Dr. Mickaël Raulet, CTO at ATEME

Video encoding services are known to be computationally intensive. In a software environment, it is desirable to be able to adapt to the available computing resources. Therefore, modern live video encoders have the “elasticity” feature. That is, their algorithmic complexity adapts automatically to the number and capabilities of available CPU cores. In other words, the more CPU are allocated to a live video encoder, the higher the encoding performance. Until recently, the elasticity feature was used as an ad-hoc adaptation to uncontrollably varying conditions. In this paper, mechanisms allowing to take control of the computing resource are presented. Two real-time resource optimizations strategies are then proposed. The first one is based on video content complexity and manages the video head-end costs, while the second relates to audience measurements and targets network bandwidth usage optimization.

CHANNEL BONDING AND MIMO OF ATSC 3.0 BROADCASTING SYSTEM

Bo-mi Lim - Senior Researcher - ETRI (Electronics and Telecommunications Research Institute) Korea

This paper introduces channel bonding and multiple-input multiple-output (MIMO) technologies adopted in Advanced Television Systems Committee (ATSC) 3.0, a recently developed digital terrestrial television standard. Channel bonding and MIMO are aimed at enhancing the channel capacity, so they enable to deliver rich media services such as 8K ultra-high definition (UHD) video. Several researches to evaluate the two technologies through intensive computer simulation, laboratory tests, and field experiments are also introduced briefly, in addition to a newly conducted laboratory test of channel bonding.

IMPLEMENTATION OF RECONFIGURABLE COMMUNICATION SYSTEMS FOR LOW EARTH ORBIT SATELLITES BASED ON SIMULINK

Marcos Roberto Martins de Souza - Telecommunications Engineering Student at the State University of Campinas

he initiatives to create constellations of low-orbiting satellites have paved the way for the development of communication systems for them. Given that these systems have to be robust, in order to provide unlimited connectivity across the planet, helping to connect the unconnected.

Thus, the article describes an implementation of a reconfigurable system for low-orbit satellites based on Simulink. Reconfigurability is possible through Software Defined Radio technology, which allows some or all of the physical layer functions to be implemented via software. This is a great advantage for satellites, since in space it is not feasible to change the hardware. Thus, it is possible to modify the communication parameters through a radio base station, that is, remotely.

Therefore, through the simulation in the Simulink software, reconfigurability becomes capable insofar as it makes it possible to change the parameters of the blocks and the blocks themselves. In it, the system presents the receiving chair that receives information from the subsystem called Command, that is, command data from the ERB related to the proper functioning of the satellite systems. These data, modulated in BFSK (Binary Frequency-shift Keying) and in FM (Frequency Modulation), are demodulated. Then, in the transmitting chair, called Telemetry, it is modulated in BPSK (Binary Phase-shift

Keying) to be sent back to the ERB with information related to the health and status of the satellite.

MOBILE RECEPTION ON TV 3.0: A CASE STUDY WITH ADVANCED ISDB-T TECHNOLOGY

Pedro Vladimir Gonzalez Castellanos, *Professor - Universidade Federal Fluminense*

This article presents the results of mobile reception tests in the field of Advanced ISDB-T in Rio de Janeiro, taking as parameters the requirements defined in the call for proposals for TV 3.0. This scenario is particularly challenging due to the rugged topography and the presence of large bodies of water. It is noteworthy that, unlike the tests in Japan, which sought a high transmission rate, the tests carried out in the city of Rio de Janeiro aim to evaluate the robustness and performance of the system under various reception conditions, thus validating pre-established criteria.



Cristiano Akamine - Professor - Universidade Presbiteriana Mackenzie

Received the B.Sc.degree from Mackenzie Presbyterian University, Sao Paulo, Brazil, in 1999, and the M.Sc. and Ph.D. degrees from the State University of Campinas, Sao Paulo, in 2004 and 2011, respectively, all in electrical engineering. He is a Professor of Embedded Systems, Software Defined Radio, and Advanced Communication Systems, Mackenzie Presbyterian University. Since 1998, he has been a Researcher with the Digital TV Research Laboratory, Mackenzie Presbyterian University, where he had the opportunity to work with several digital TV systems. His research interests are in SoC for broadcast TV and software defined radio.



Sungjun Ahn - Senior Researcher - ETRI (Electronics and Telecommunications Research Institute)

Sungjun Ahn is currently a Senior Research Engineer of Electronics and Telecommunications Research Institute (ETRI), where he has participated in Media Research Division since 2017. Mainly focused on media transmissions, his research covers the physical-layer design, system implementation, HW field experiments, and theoretic modeling/analysis for digital broadcasting and wireless system applications. He has authored more than 50 technical publications in peer-reviewed journals and conference proceedings. He is currently involved in research activities on the inter/intra-network cooperation of broadcasting and 5G.



Alberto Botelho - PhD student in electrical engineering (Mackenzie) | LM Telecom

Is a PhD student in electrical engineering (Mackenzie). Has degree in Electrical Engineering (UNIP), specialized in Engineering of Digital Television Systems (Inatel) and Engineering of Telecommunications Networks (Inatel), MBA in Project Management (FGV) and Master of Science in electrical engineering (Mackenzie). Worked on Rede TV! and currently works at LM Telecom as a broadcast project engineer, since 2002.



Dr. Mickaël Raulet - CTO at ATEME

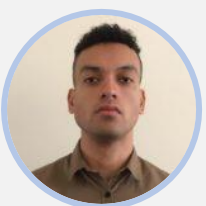
Dr. Mickaël Raulet is CTO at ATEME, where he drives research and innovation with various collaborative R&D projects. He represents ATEME in several standardization bodies: ATSC, DVB, 3GPP, ISO/IEC, ITU, MPEG, DASH-IF, CMAF-IF, SVA and UHD Forum. He is the author of numerous patents and more than 100 conference and journal

scientific papers. In 2006 he received his Ph.D. from INSA in electronic and signal processing, in collaboration with Mitsubishi Electric ITE (Rennes, France).



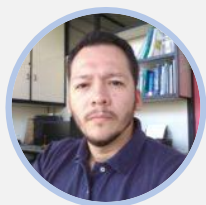
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Bo-mi Lim received the B.S. degree from Ajou University, Suwon, Republic of Korea, in 2008, and the M.S. degree from the Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea, in 2010. Since 2010, she has been a Member of Research Staff with the Media Research Division, Electronics and Telecommunications Research Institute. Her research interests are in areas of wireless communication system design and digital broadcasting.



Marcos Roberto Martins de Souza - Telecommunications Engineering Student at the State University of Campinas

Marcos Roberto Martins de Souza, Telecommunications Engineering student at the State University of Campinas, passionate about the areas of digital signal processing and wireless communications. Developer of the project financed by CNPq (Conselho Nacional de Pesquisa e Desenvolvimento) with the: Reconfigurable communication system for low space orbit satellites using Software Defined Radio technology.



Pedro Vladimir Gonzalez Castellanos - Professor - Fluminense Federal University

Professor Pedro holds a degree in Systems Engineering – Universidad Francisco de Paula Santander (2001), a degree in Computer Engineering recognized by the Federal University of Rio de Janeiro – UFRJ in 2010, a Master's degree in Electrical Engineering from the Pontifical Catholic University of Rio de Janeiro.(2003), PhD in Electrical Engineering from the Pontifical Catholic University of Rio de Janeiro (2008). He has experience in Electrical Engineering, with emphasis on Electromagnetic Theory, Microwaves, Wave Propagation, Antennas, working mainly on the following topic: Characterization and Modeling of the propagation channel for wireless communication systems. He has knowledge in C, C++ programming languages and extensive experience in Matlab. He is currently an adjunct professor at the Fluminense Federal University, working at undergraduate and graduate levels.