대학원 AI융합네트워크학과 & 인공지능학과

AI Convergence Network & Artificial Intelligence Colloquium

TITLE Rate Splitting Multiple Access for Satellite Communications

When : 2021.12.8.(WED) P.M.4:30~

Where : Zoom
링크 https://zoom.us/j/97444017066?pwd=bGg3ZDRpNjBpcm1XOENBZ2R6M2E2UT09
회의 ID: 974 4401 7066, 암호 : 3647

Speaker : Prof. Bruno Clerckx(Imperial College London)

Abstract : Rate Splitting Multiple Access (RSMA), based on (linearly or nonlinearly) precoded Rate-Splitting (RS) at the transmitter and Successive Interference Cancellation (SIC) at the receivers, has emerged as a novel, general and powerful framework for the design and optimization of non-orthogonal transmission, multiple access, and interference management strategies in future MIMO wireless networks. RSMA relies on the split of messages and the non-orthogonal transmission of common messages decoded by multiple users, and private messages decoded by their corresponding users. This enables RSMA to softly bridge and therefore reconcile the two extreme strategies of fully decode interference and treat interference as noise. RSMA has been shown to generalize, and subsume as special cases, four seemingly different strategies, namely Space Division Multiple Access (SDMA) based on linear precoding (currently used in 5G), Orthogonal Multiple Access (OMA), Non-Orthogonal Multiple Access (NOMA) based on linearly precoded superposition coding with SIC, and physical-layer multicasting. RSMA boils down to those strategies in some specific conditions, but outperforms them all in general. Through information and communication theoretic analysis, RSMA is shown to be optimal (from a Degrees-of-Freedom region perspective) in a number of scenarios and provides significant room for spectral efficiency, energy efficiency, fairness, reliability, QoS enhancements in a wide range of network loads and user deployments, robustness against imperfect Channel State Information at the Transmitter (CSIT), as well as feedback overhead and complexity reduction over conventional strategies used in 5G. The benefits of RSMA have been demonstrated in a wide range of scenarios (MU-MIMO, massive MIMO, multi-cell MIMO/CoMP, overloaded systems, NOMA, multigroup multicasting, mmwave communications, communications in the presence of RF impairments and superimposed unicast and multicast transmission, relay,…) and systems (terrestrial, cellular, satellite, …). Thanks to its versatility, RSMA has the potential to tackle challenges of modern communication systems and is a gold mine of research problems for academia and industry, spanning fundamental limits, optimization, PHY and MAC layers, and standardization. This lecture will share key principles of RSMA and will specifically focus on emerging applications in satellite communications. More information about RSMA can be found on the IEEE special interest group https://sites.google.com/view/ieee-comsoc-wtc-sig-rsma/home.

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BIO : Bruno Clerckx is a (Full) Professor, the Head of the Wireless Communications and Signal Processing Lab, and the Deputy Head of the Communications and Signal Processing Group, within the Electrical and Electronic Engineering Department, Imperial College London, London, U.K. He received the M.S. and Ph.D. degrees in Electrical Engineering from the Université Catholique de Louvain, Louvain-la-Neuve, Belgium, in 2000 and 2005, respectively. From 2006 to 2011, he was with Samsung Electronics, Suwon, South Korea, where he actively contributed to 4G (3GPP LTE/LTE-A and IEEE 802.16m) and acted as the Rapporteur for the 3GPP Coordinated Multi-Point (CoMP) Study Item. Since 2011, he has been with Imperial College London, first as a Lecturer from 2011 to 2015, Senior Lecturer from 2015 to 2017, Reader from 2017 to 2020, and now as a Full Professor. From 2014 to 2016, he also was an Associate Professor with Korea University, South Korea, and from 2021 to 2022, he is a visiting Professor at Seoul National University, South Korea. He also held various long or short-term visiting research appointments at Stanford University, EURECOM, National University of Singapore, The University of Hong Kong, Princeton University, The University of Edinburgh, The University of New South Wales, and Tsinghua University.

He has authored two books on “MIMO Wireless Communications” and “MIMO Wireless Networks”, 250 peer-reviewed international research papers, and 150 standards contributions, and is the inventor of 80 issued or pending patents among which 15 have been adopted in the specifications of 4G standards and are used by billions of devices worldwide. His research spans the general area of wireless communications and signal processing for wireless networks. He has been a TPC member, a symposium chair, or a TPC chair of many symposia on communication theory, signal processing for communication and wireless communication for several leading international IEEE conferences. He was an Elected Member of the IEEE Signal Processing Society “Signal Processing for Communications and Networking” (SPCOM) Technical Committee. He served as an Editor for the IEEE TRANSACTIONS ON COMMUNICATIONS, the IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, and the IEEE TRANSACTIONS ON SIGNAL PROCESSING. He has also been a (lead) guest editor for special issues of the EURASIP Journal on Wireless Communications and Networking, IEEE ACCESS, the IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, the IEEE JOURNAL OF SELECTED TOPICS IN SIGNAL PROCESSING, and the PROCEEDINGS OF THE IEEE. He was an Editor for the 3GPP LTE-Advanced Standard Technical Report on CoMP. He received the prestigious Blondel Medal 2021 for exceptional work contributing to the progress of Science and Electrical and Electronic Industries. He is a Fellow of the IEEE and an IEEE Communications Society Distinguished Lecturer 2021-2022.

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