Aalto University
School of Electrical Engineering

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Reliable Machine-Type Random Access

Title of the dissertation	Physical and Control Layer Solutions for Reliable Machine-Type Random Access
Contents of the dissertation	A particular challenge in 5G networks is facilitating random uplink access that is reliable within a strict latency budget. This dissertation considers control layer coding solutions which employ preallocated *k*-repetition patterns and successive interference cancellation (SIC) to meet ultra-reliable low-latency communication (URLLC) targets in the 5G random access channel. This work shows that deterministic repetition diversity is critical for limiting packet losses to less than five nines. Additionally, this dissertation considers the impact of the physical layer uplink waveform on reliability. It introduces measures of time-frequency localisation (TFL) for stochastic signals which complement those traditionally used in prototype filter design. These measures characterise the interference potential between small packets of waveforms in a machine-type multiple-access scenario.
Field of the dissertation	Communications Engineering
Doctoral candidate	Christopher Boyd, M.Sc. Born in Brisbane, Australia, 1988
Time of the defence	8.3.2019 time 12:00
Place of the defence	Aalto University, School of Electrical Engineering, lecture hall TU2, Maarinte 8, Espoo
Opponents	Professor Gerald Matz, Vienna University of Technology, Austria Professor Ming Xiao, KTH Royal Institute of Technology, Sweden
Custos	Professor Olav Tirkkonen, Aalto University School of Electrical Engineering, Department of Communications and Networking
Electronic dissertation	https://aaltodoc.aalto.fi/handle/123456789/53
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A doctoral dissertation is a public document and shall be available at Aalto University, School of Electrical Engineering, Maarintie 8, main hall at the latest 10 days prior to public defence.