**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

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| **Proposed Project Title: Low-latency communications in the 5G era** |
| **Principal Supervisor: Dr Michalis Matthaiou Second Supervisor: Dr Hien Quoc Ngo** |
| **Project Description:** There are more than five billion wirelessly connected mobile devices in service today, most of which are handheld terminals or mobile-broadband devices such as computers and tablets. By 2020, mobile communications data traffic is expected to increase 1,000-fold, by which time there will be an estimated 50 billion Internet-capable devices. This transition will be catalysed by the fifth generation (5G) wireless systems. The successful roll-out of 5G that introduce game-changing constraints will leverage two distinct features, namely Ultra-Reliable Communication (URC) and massive machine-type-communications (mMTC). The former refers to an operation mode not present in today's cellular systems and involves the provision of essentially error-free communication service almost 100% of the time. Representative examples include reliable cloud connectivity and computing, critical connections for industrial automation, and reliable wireless coordination among vehicles. The latter mode already emerges as an extension of the 4G LTE systems and refers to support of a massive number (tens of thousands) machines in a given area. Towards the diverse communication paradigms of URC and mMTC of the future, there is an urgent need to address reliable and low-latency links with short packets. Unfortunately, the PHY layer of legacy wireless systems, such as LTE/LTE-A is not designed for short packet transmission and unless the underlying Physical (PHY) layer solutions are present to accommodate the required short packet transmission, the latency targets may not materialise. In this PhD project, we will develop a holistic communication framework along with metrics and simulation environments for theoretical and algorithmic development of ultra-reliable communications in the 5G era. |
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