

Project proposal template – Faculty studentships Summer 2014

<i>Project title</i>	<input type="text" value="Cross-layer design to provide security, privacy, and trust in 5G wireless networks"/>	<i>Director of Study</i>	<input type="text" value="Dr M. Martini (50%)"/>
<i>Second Supervisor</i>	<input type="text" value="Dr E. Pfluegel (50%)"/>	<i>School</i>	<input type="text" value="Computing and Infor"/>
<i>Other members of supervisory team</i>	<input type="text"/>	<i>Any requirements from applicant (eg degree in specific subject area)</i>	<input type="text"/>

**Project summary
(max 1,000 characters)**

Cross-layer design to provide security, privacy, and trust in 5G wireless networks

Research on the next generation of wireless networks (5G) has started and different aspects are investigated. In particular, security and trust will need to be supported by 5G networks. Often, the data exchanged is expected to include information from critical services, such as emergency or medical applications, that must have security and confidentiality protection measures besides network availability. Wireless networks, compared to traditional wired networks, are more likely to suffer from malicious attacks and it is expected that the trust guarantees of future network providers will vary greatly [1]. Most current security methods consider physical layer and application layer security technologies separately. Both of them have an important contribution towards the security performance and a joint framework involving both physical and application layer (cross-layer) security technologies can be beneficial, as proposed in [2].

The goal of this project is to study and model physical layer and application layer security and propose effective cross-layer schemes [3][4] suitable for multimedia transmission over 4G and 5G networks. The models will be based on information theory [5] and signal processing. For instance, secrecy capacity can be considered at the physical layer, whereas authentication and selective encryption strategies can be considered at the application layer. Novel cross-layer strategies will be proposed based on the developed models. The proposed solutions will be validated via analysis and/or simulation.

This project will require background in networking and wireless communications, as well as security and multimedia signal processing.