Séminaire ETIS : Arsenia Chorti

09 Octobre 2018, 11:00 – 12:00

Titre du séminaire et oratrice

Delay and security aware resource allocation for 5G applications.

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Date et lieu

Mardi 9 octobre 2018, 11h.

Université de Cergy-Pontoise, site de St-Martin 2, espace des colloques.

Abstract

Low latency and security are two of the most critical requirements of fifth generation (5G) networks. In this talk, we discuss our recent results on three different topics related to delay and security aware resource allocation for 5G.

In the first topic, noting that video content accounts for more than 70% of the global IP traffic, we build on the premise that content delivery infrastructures should rapidly detect and respond to changes in content popularity dynamics. In this framework, we illustrate a content distribution scenario in which video traffic is allocated using a DNS-based load-balancer, that quickly adapts to changes in content popularity. The latter is achieved with the employment of on-line change point (CP) analysis that allows us to implement real-time, autonomous and low-complexity video content popularity detection. The proposed algorithm, denoted as “real-time content popularity detection” (RCPD), is evaluated against synthetic and real youtube video views data while the proposed load-balancer is demonstrated through a toy example.

In the second topic, we discuss the possibility of employing wireless shared randomness techniques to generate symmetric secret keys in narrow-band Internet of things (NB IoT) applications. Assuming a time division duplex protocol (compatible with release v.15 of the NB IoT standard), we investigate whether the NB IoT resource block of 12 OFDM subcarriers, can be used for “joint” data transmission and secret key generation. By imposing a security constraint on the proportionality of the data to the key rate, we formulate the respective power and subcarrier resource allocation problem. Using convex and combinatorial optimization tools, we show that under realistic security constraints the weakest OFDM subcarriers should optimally be used for the generation of secret keys.

In the third topic, we investigate the performance of non-orthogonal multiple access (NOMA) techniques when both medium access delay and security metrics are taken into consideration. We introduce the novel concept of the “effective secrecy capacity” (ESC) and investigate the downlink of a NOMA network with

either an internal (i.e., one of the NOMA users) or an external eavesdropper. Lower and upper bounds are proposed for the ESC in both cases. Interestingly, it is shown that - in contrast to our earlier results for the OMA case - increasing the size of the network results in a reduction of the ESC in both eavesdropping scenarios.

Short Bio

Arsenia (Ersi) Chorti obtained an M.Eng. degree in EEE from the University of Patras (Greece), a DEA degree in Electronics at the University Pierre et Marie Curie (France) and a PhD in EE from Imperial College London (UK). She undertook post-doctoral positions at the Universities of Southampton (UK), TCU, ICS (Greece), UCL (UK), and Princeton University (US). She has served as a Lecturer and Senior Lecturer at Middlesex University (UK) and the University of Essex (UK) between 2008-2010 and 2013-2017 respectively. Since September 2017, she is an Associate Professor at ENSEA (France) and a visiting research scholar at Essex University. Her research interests span the areas of communications, security and networking.