Caltech

EE163B – Spring 2017
Communication Theory:
Enabling Innovations for Next Generation Networks

Course Description

Next generation networks are envisioned to have tens of billions of nodes forming cyber-physical systems and the Internet of Things. This has spurred a number of fundamental scientific and technological challenges to overcome as the smartness is to be redistributed from the cloud across the network (as fog) and towards the edge. This course offers a study of a selected set of these problems, the state-of-the-art in their solutions, and the challenges ahead. Specifically, the topics are covered by instruction on the fundamentals, followed by review of selected literature. Students undertake a course project on a related topic of their choice.

Course Topics

1. How to boost the efficiency and reliability in large networks?
    a. Throughput gain by network coding
    b. Distributed storage (in the fog)
    c. Distributed caching (at the edge)
2. How to manage wireless access in massive scale?
    a. Random access and contention resolution
    b. Cognitive networks and the Rendezvous problem
    c. Topology formation in ad hoc networks
3. New vistas in networks
    a. Distributed computing
    c. Crowdsourcing

Class Information

The students are expected to have maturity in mathematics (taken a course on Linear Algebra ACM104 and a course on probability and random processes ACM/EE116 or their equivalents). Related material from EE163A and basics of networking and coding theory will be briefly covered in class as required. *EE163A is not a pre-requisite.*

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Class: MW 15:00-16:30, ANB 107 Office Hours: MW 16:30-17:30