www.networks.imdea.org

Student Perspective on Institute IMDEA Networks

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Outline

1. Building a career in engineering: the usual path
2. Why do a PhD?
3. A PhD with Institute IMDEA Networks
4. Research at Institute IMDEA Networks
5. Q&A

Building a career in engineering: the usual path

- 4-5 years of studying for a degree is no easy thing
  - Little sleep
  - A lot of math
  - Sometimes more theory than "hands-on"
  - Little money

- The immediate temptation: get a job with a company
  - Less/no math
  - More/only "hands-on"
  - Money: problem solved

Building a career in engineering: the usual path

- A job with a serious company may look like a good way to go, BUT
  - Routine comes in fast
  - You don't always do things the way you'd like to
  - You may end up dealing only with non-technical issues

Building a career in engineering: the usual path

Q: What did I do?

A: I took a job with a big telecom manufacturer

Boss was OK

Compensations were OK

Business trips to a couple of countries

After a while there were few challenges

Couldn't see any NEXT STEP

Felt I'm getting old too early

Why do a PhD?

- You are still young and time does not come back
- Time spent doing a PhD: an investment in yourself
- Research involves new challenges every day
    - Up to date with the latest innovations
- You travel if you publish at conferences
- Better options for a future job
- You can even pursue a teaching career

What is it all about?

- Finding solutions to real problems
- Simulations and some programming
- Some math
- Reading scientific literature: being up to date
- Prototyping: prove it works!
- Publishing & standardizing
- Making a change!

A PhD with Institute IMDEA Networks

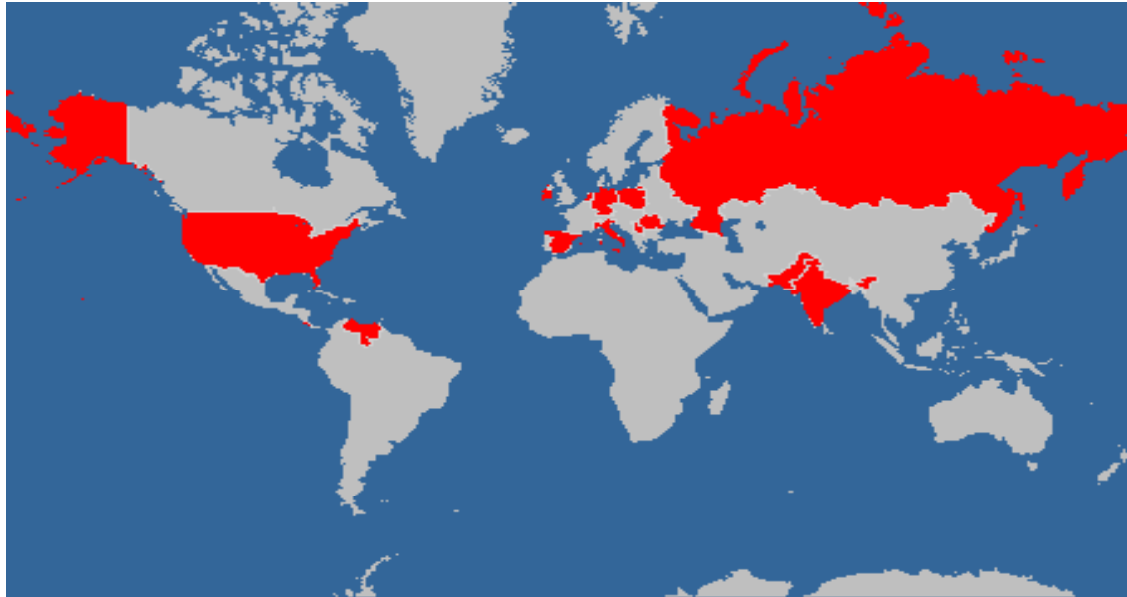- We are a growing team of international researchers

  Right now….
  - 18 Research Assistants (7 nationalities)
  - 13 Chief/Senior/Staff/Post-doc Researchers (7 nationalities)
  - Visiting Researchers (always new people coming)
  - A great research support team
  - Very good collaboration with the researchers & teaching assistants at University Carlos III of Madrid and other Universities & Companies

A PhD with Institute IMDEA Networks

- Institute IMDEA Networks in one picture:

A PhD with Institute IMDEA Networks

- Funding for a up to 4 years (including coffee)
- Travelling to conferences and EU project meetings

Aveiro, PT – DAIDALOS II Project

A PhD with Institute IMDEA Networks

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Dublin, IE – CARMEN Project

A PhD with Institute IMDEA Networks

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Rio de Janeiro, BR – INFOCOM '09

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Heidelberg, DE – CARMEN Project

A PhD with Institute IMDEA Networks

- Opportunities to study with prestigious research groups in other countries

Rice University, Houston, USA

Research at Institute IMDEA Networks

- Research in wireless networks
  - Performance optimisation based on **Control Theoretic** techniques applied to WiFi
    - centralised and distributed
  - Enhancements for providing QoS
  - Multi-hop wireless test-beds evaluation (FloorNet)
  - Detection of miss-behaving nodes
  - Ongoing: green/energy efficient WLANs
  - Ongoing: Dynamic spectrum access/wide-spectrum nets.

Research at IMDEA Networks

- A control theoretic approach for efficient video transmission in IEEE 802.11 WLANs

Research at IMDEA Networks

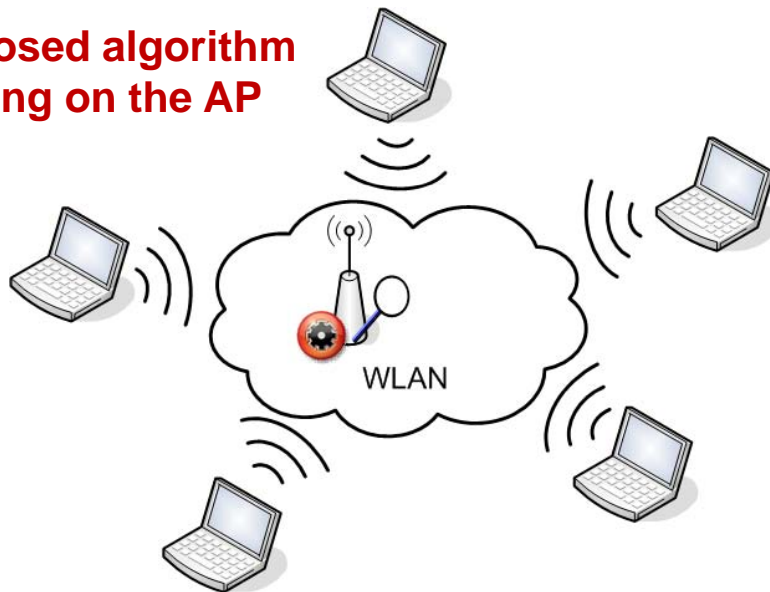- A control theoretic approach for efficient video transmission in IEEE 802.11 WLANs

Standard configuration

Research at IMDEA Networks

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Standard configuration

Research at Institute IMDEA Networks

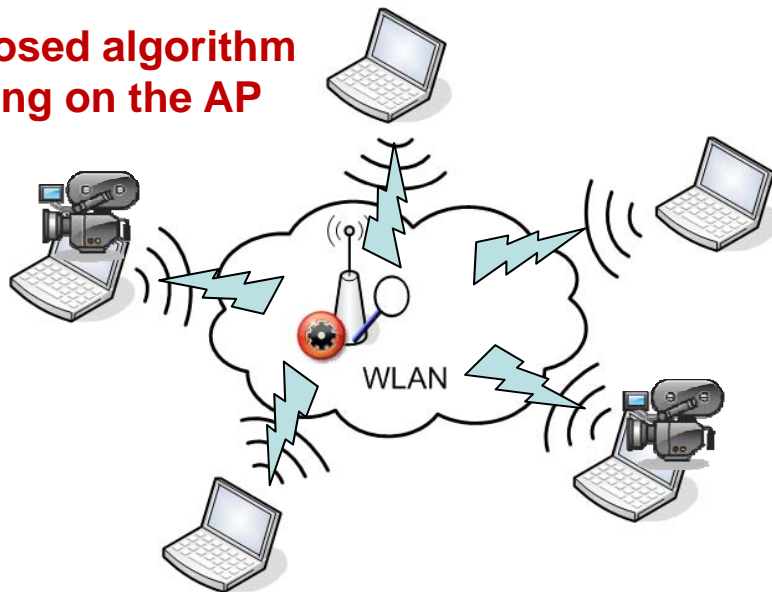- A control theoretic approach for efficient video transmission in IEEE 802.11 WLANs

Proposed algorithm running on the AP

WLAN

Research at Institute IMDEA Networks

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Proposed algorithm running on the AP

WLAN

Research at Institute IMDEA Networks
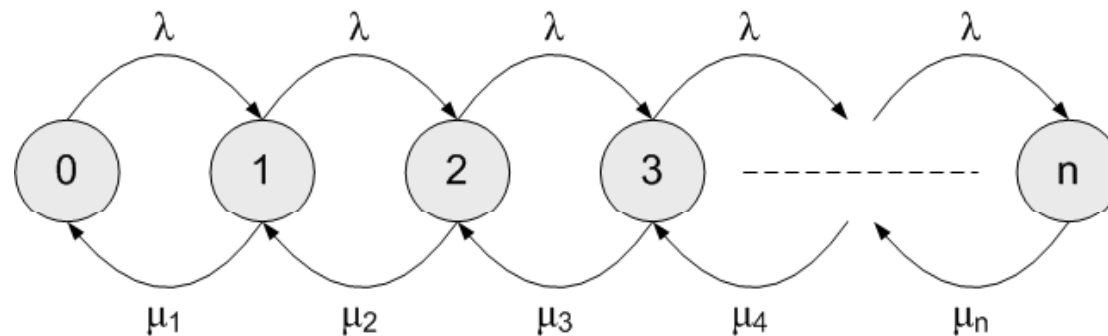
- The proposed algorithm provides users with significantly higher quality of experience
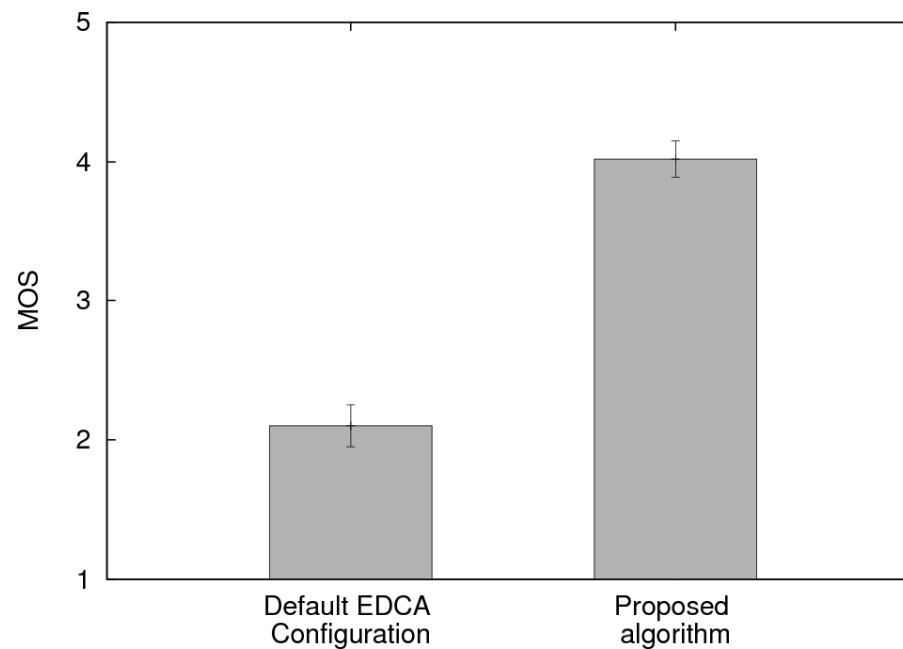
Research at Institute IMDEA Networks

- We first model the WLAN as a Markov chain where state *i* represents the number of backlogged stations


- Goals:
  - minimize the access delay
  - reduce the number of discarded frames due to exceeding their playout time $\longrightarrow$ improve quality of experience (QoE)

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- In order to minimize the number of backlogged stations we derive the optimal collision probability that maximizes the departure rate μ_i

$$p_{opt} \approx \frac{\lambda}{\mu}\left(1 - e^{-\sqrt{\frac{2T_e}{T_c}}}\right)$$

- We drive the collision probability in the network to the optimal value by changing the CW of the stations
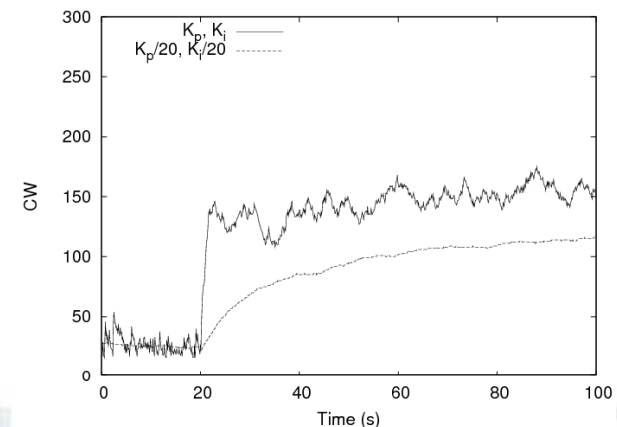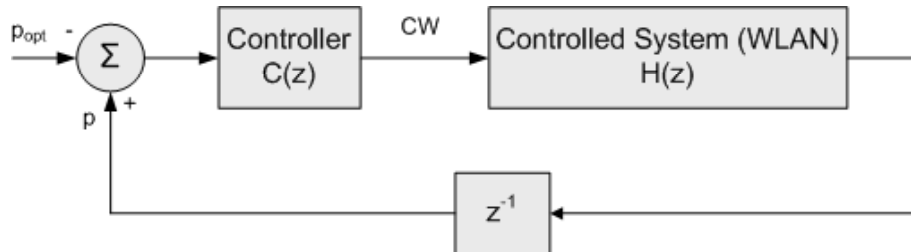
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Things do not always work from the first try...

other 'research' skills need to be acquired

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but then we take a break…   …and afterwards work harder