Report for evaluation and feedback 2012-2016

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April, 2013, Barcelona

Outline

Collaborations (not exhaustive list)

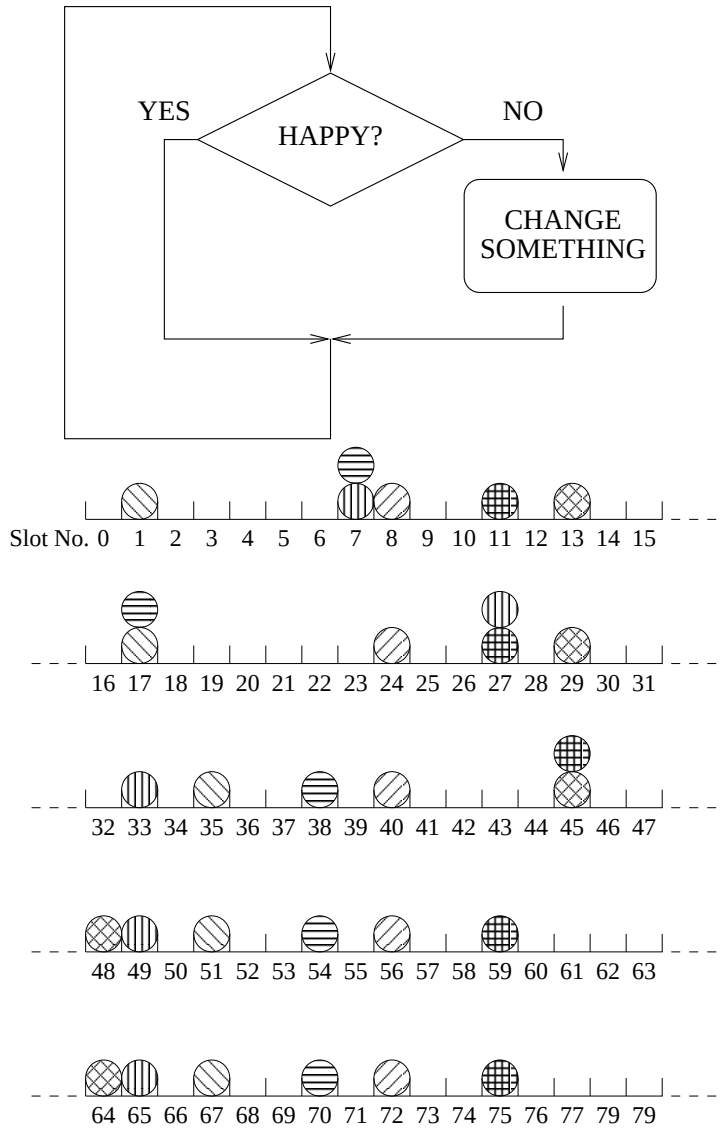
- Boris Bellalta
- Alex Bikfalvi
- Cristina Cano
- Alessandro Checco
- Ken Duffy
- Azadeh Faridi
- Nuria Garcia
- Ruizhi Liao
- David Malone
- Gabriel Martorell
- Joan Melia
- Simon Oechsner
- Miquel Oliver
- Luis Sanabria-Russo

Challenges in Medium Access Control (MAC)

- successful standards evolve
- IEEE 802.11 WiFi WLANs: High speed cost efficient Internet access for mobile devices. Support many devices, offer high throughput, low delay, low jitter. Increase coverage using multi-hop. Efficient use of multiple antennae and channel bonding.
- IEEE 802.15.4 ZigBee WSN: Simple, low-power battery devices. Save energy.
- EPC Gen2 RFID: Identification and tracking of tags. Read all the tags in a short time.

Our favorite tool: A decentralized CSP solver

- Decentralized resource allocation problems.
- A decentralized constraint satisfaction solver.
- The only information available to me, as a participant, is whether the constraints I am involved in are satisfied.
- Simple. Change your choice if you are not satisfied.



First Results

- A subtle modification of the IEEE 802.11 protocol to allow collision-free operation in crowded scenarios (backward compatibility preserved, need for more exhaustive evaluation).
- A first solution to achieve collision-free operation in multi-hop wireless mesh networks (still room for improvement).
- A model for a simple solver for decentralized constraint satisfaction problems.
- Assessment of the performance improvement by collision-free operation when ARF is taken into account.
- Evaluation of the impact of queueing processes on MAC protocols supporting MU-MIMO.
- USRP spectrum occupancy sensor.

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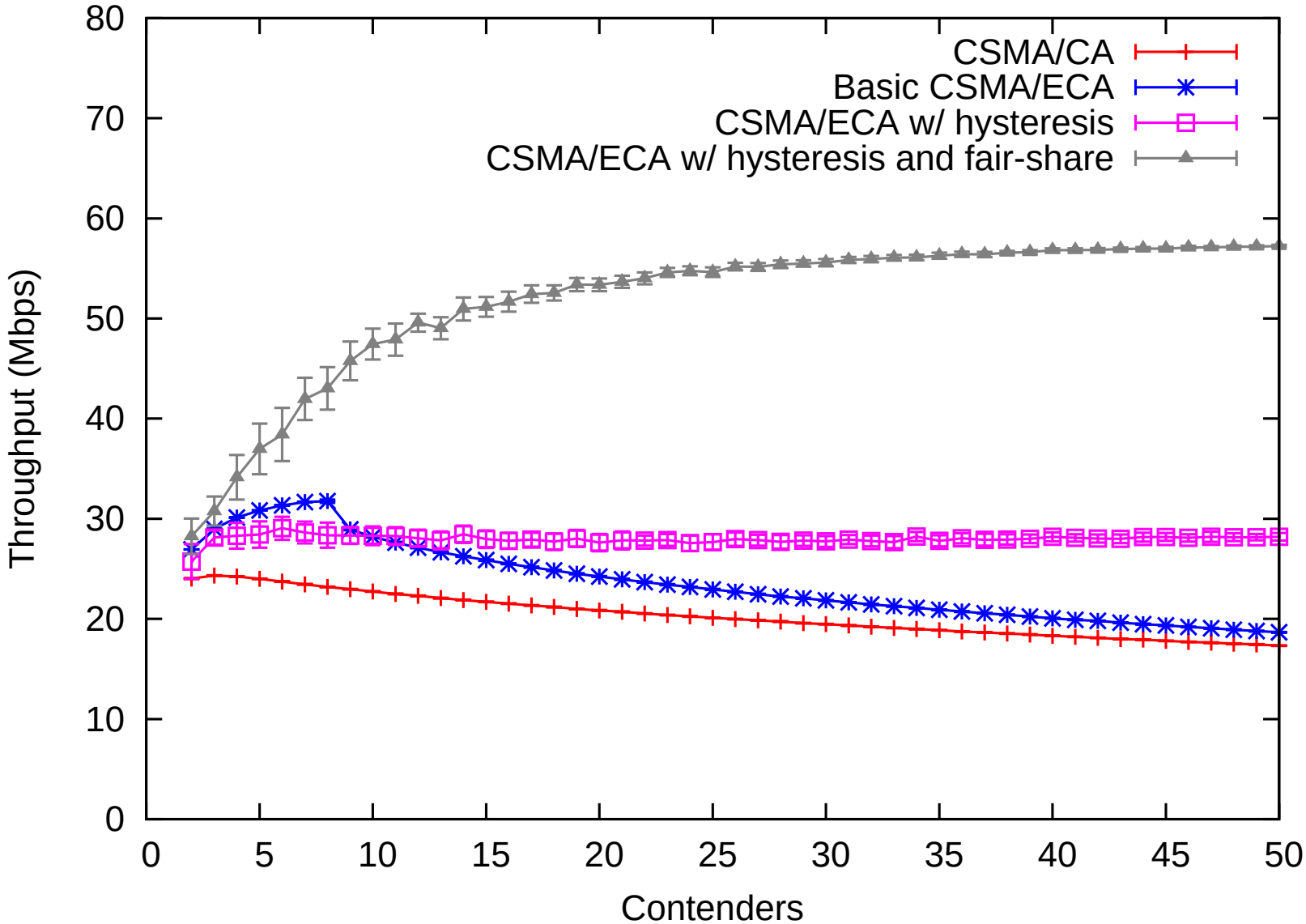
An Example (not to be explained in detail)



Next Steps

- Trade-offs of frame aggregation.
- Collaboration in the “Wireless MAC Processors” front.
- Modeling of link activation problem in mesh networks as a decentralized constraint satisfaction problem with sensing restrictions.
- Collision-free techniques in RFID contention protocols.
- Prototyping with the “Demo tag”.
- QoS in next-gen MAC protocols.
- Construction of a collision-free schedule of beacons (WSNs, 802.11s, 802.11p)

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Projects

- CONTADORES. CUIDATS. CISNETs: Collaboration in WSNs.
- Commons for Europe. Bottom-up Broadband for Europe.
  - Create a pool of common resources to be shared by European cities (and citizens).
  - Grassroots networking initiatives.
  - High educational value.
  - Move from a market/competition economy to a commons/collaboration economy (think of wikipedia, open source, creative commons, etc.).
  - Shift from profit to benefit.
  - Four pilots: Free Europe WiFi (Nacho), Fiber From The X (Jorge), Mobile Node (Fernando), Open Sensor Network (Alejandro). We involve last year undergrad students in real projects.
- Reviewer offer for IP project and CHIST-ERA project proposal.

Teaching, coordination and promotion

- Opened two undergrad courses. Renewed one.
  - QoS
  - WSN (with Luis)
  - Networking Laboratory (with Ray, Alex, Albert)
- Graduate seminar on contention protocols
- Two undergrad thesis (Alejandro and Fernando), one Ph.D. thesis (Luis).
- Student mentoring program
- Escolab (with Luis and Alejandro)
- School's promotional talk
- "Coordinador docent telematica" (School appointment)
- "Comissio docent" (Department's appointment)

External Evaluation

- Positive evaluation (“Acreditacio de Recerca”, “agregat”) by the Catalan university quality agency (Agencia per a la Qualitat del Sistema Universitari, AQU).


MANITOU

Summary

- Integrated in a research environment.
- Some research results. More to be done.
- Participation in projects and technology transfer.
- Teaching and backing the school and the department.

Thank you for your attention.