EJCP 2013 — PhD students' presentations

Security against denial of service attacks in wireless sensor networks

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Présentation

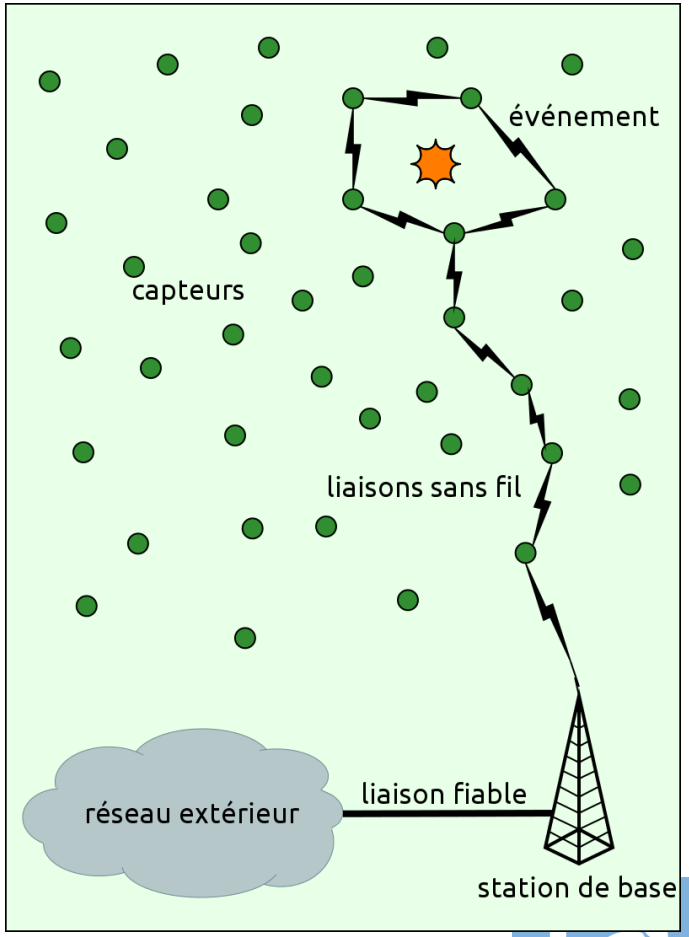
Wireless sensor networks (WSNs)

Architecture of the network

- sensors (*nodes*)
  (...sometimes gathered into *clusters*)
- base station

Properties of the sensors

- Wireless communication
- Restricted resources:
  - low computation power
  - few available memory
  - limited energy (batteries)



Application domains

Civil application domains

- detection of forest fires
- measure of pollution level in the air / the water
- monitoring of urban traffic
- measure of sismic activity
- *et cætera*

Military application domains

- communications on battlefield
- detection of chemical / biological / nuclear agents
- *et cætera*

Network security

Several issues:

- confidentiality
- authentication
- traceability / non-repudiation
- availability

My goal:

Fight against denial of service (DoS) attacks
(by preventing them, or detecting and reacting to them)

Denial of service

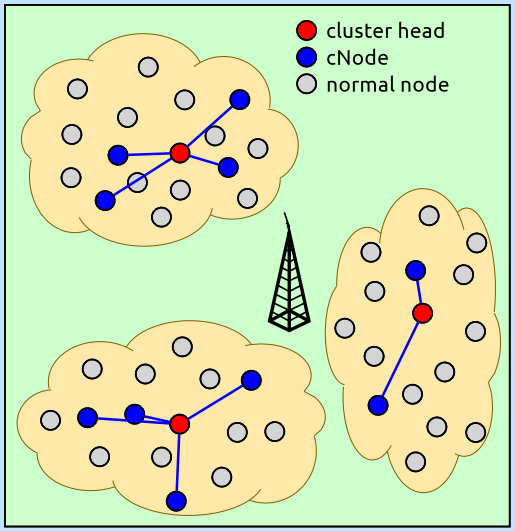
Examples of attacks on every layer (TCP/IP stack)

1. **physical:** jamming
2. **data link:** collisions, energy exhaustion, unfair use
3. **network:** routing attacks (black holes, worm holes, selective drops)
4. **transport:** flooding, resynchronization
5. **application**

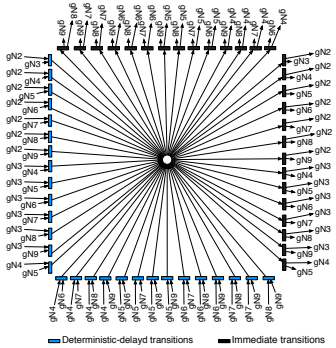
Achieved work

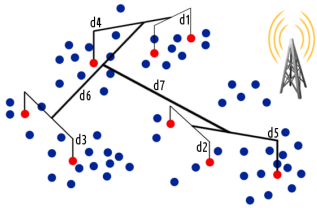
Solution based on nodes monitoring the traffic

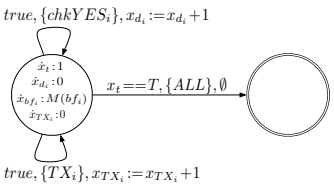
- fight against compromised nodes commiting flooding and energy exhaustion
- some nodes are designated to watch over the traffic volume
- monitors are periodically re-elected
- in case of detection: sending alert and bypassing the node



Achieved work

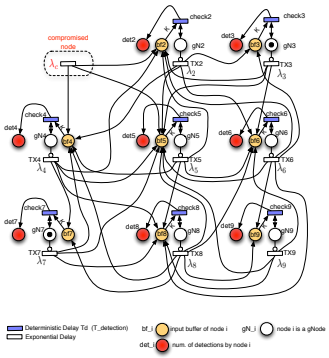


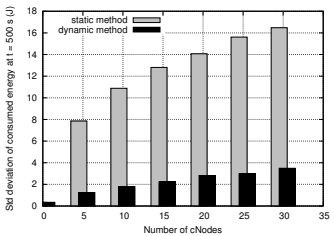


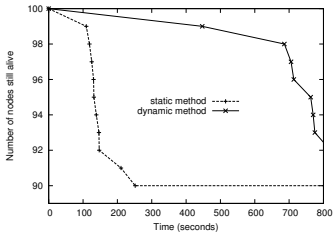


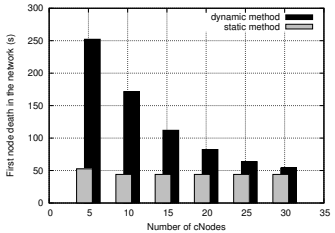
Modelisation — simulation

- Markovian processes
- Petri networks
- simulations with ns-3





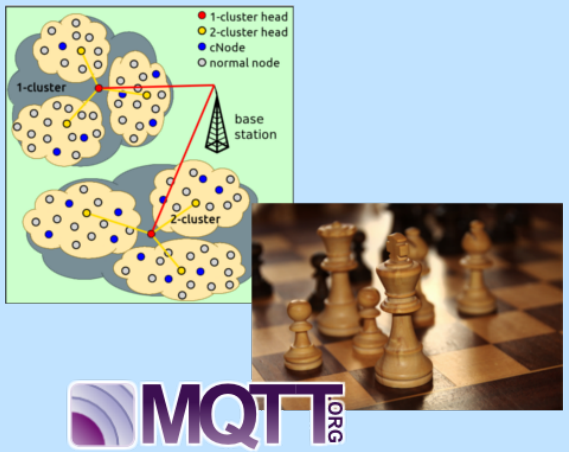




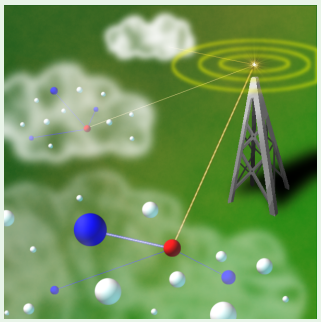
Future work

Several possibilities

- Carry on / extend simulations
- Analyse MAC layer protocols for WSNs
- Theory of games
- MQTT (*machine to machine*)



Thank you!



Do you have any questions?

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