Routing Over Multiple Technologies with RODENT

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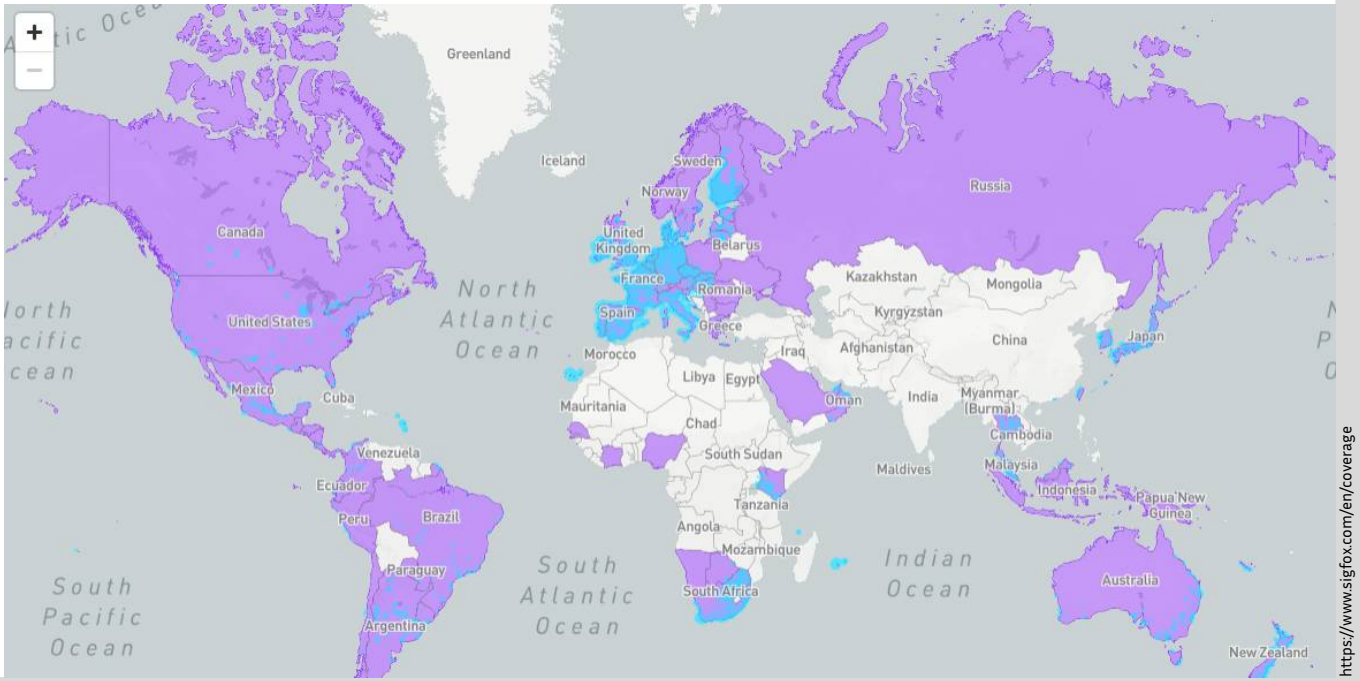
Wireless sensor networks: a tool to help farmers

- Automate the collection of climate data
- Prevent risks (e.g. frost)
- Decision making (e.g. better use of pesticides)

https://www.terre-net.fr/actualite-agricole/economie-social/article/revenus-agricoles-2017-en-hausse-202-133225.html

Each Radio Access Technology (RAT) have limitations, *e.g.* Sigfox

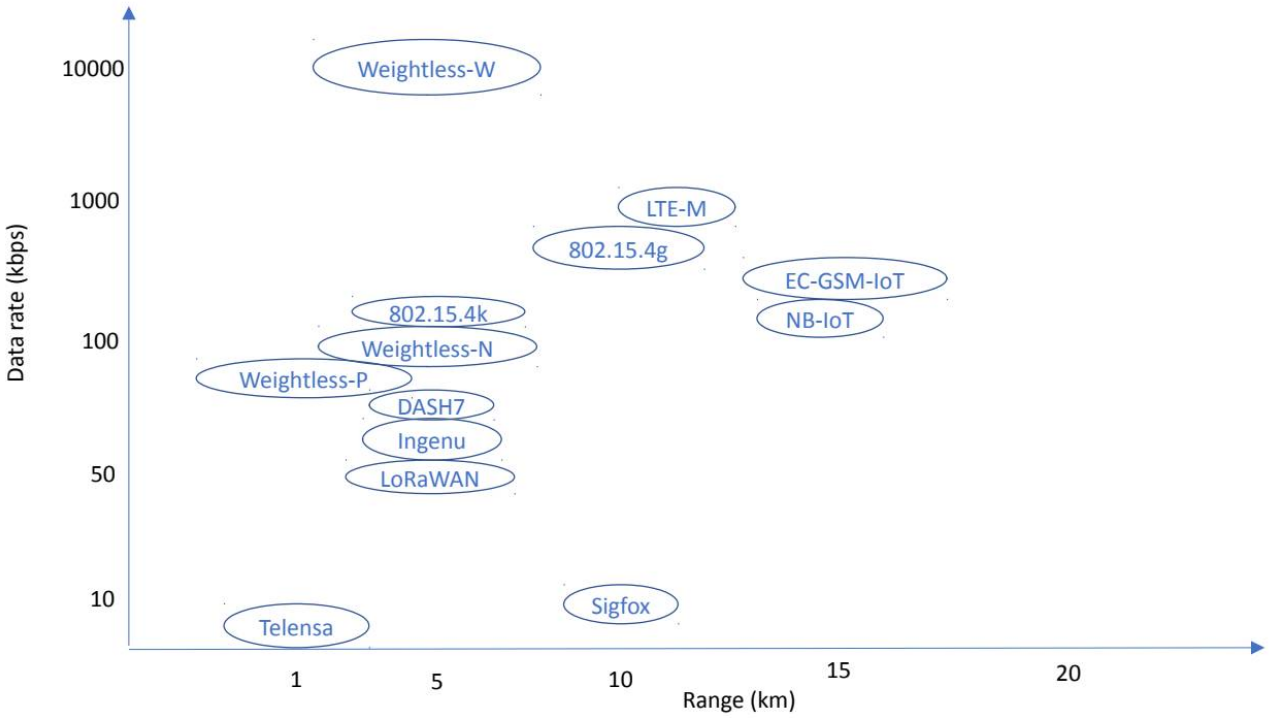
- Max 12 bytes per message
- Max 140 messages per day
- Limited worldwide coverage



https://www.sigfox.com/en/coverage

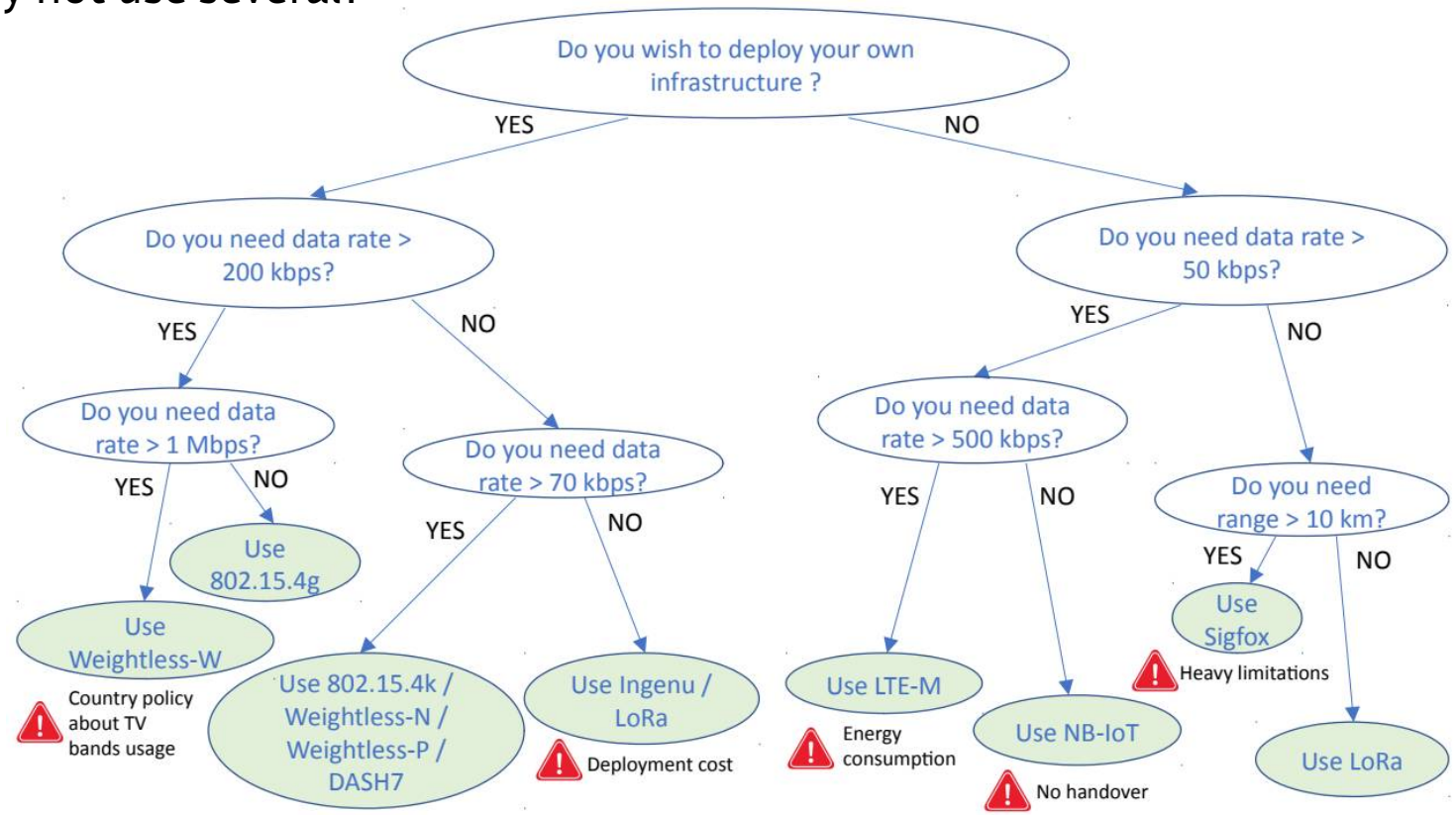
Many RAT, always a trade-off

- Spectrum congestion
- Energy consumption
- Financial cost
- Coverage
- Range
- …



Hard to find the best fitted RAT

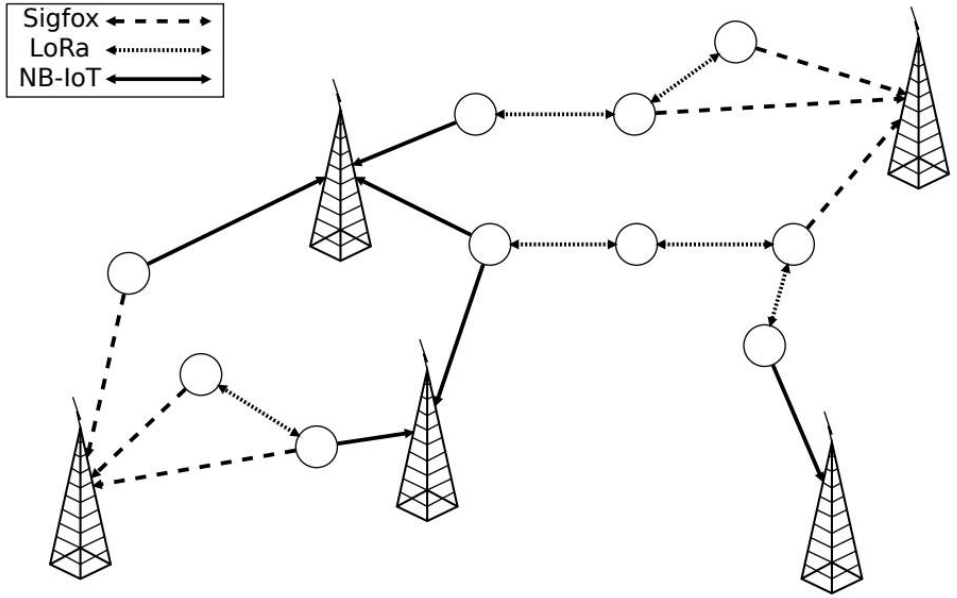
- So why not use several?



Introducing multi-technologies networks, with multi-RAT nodes

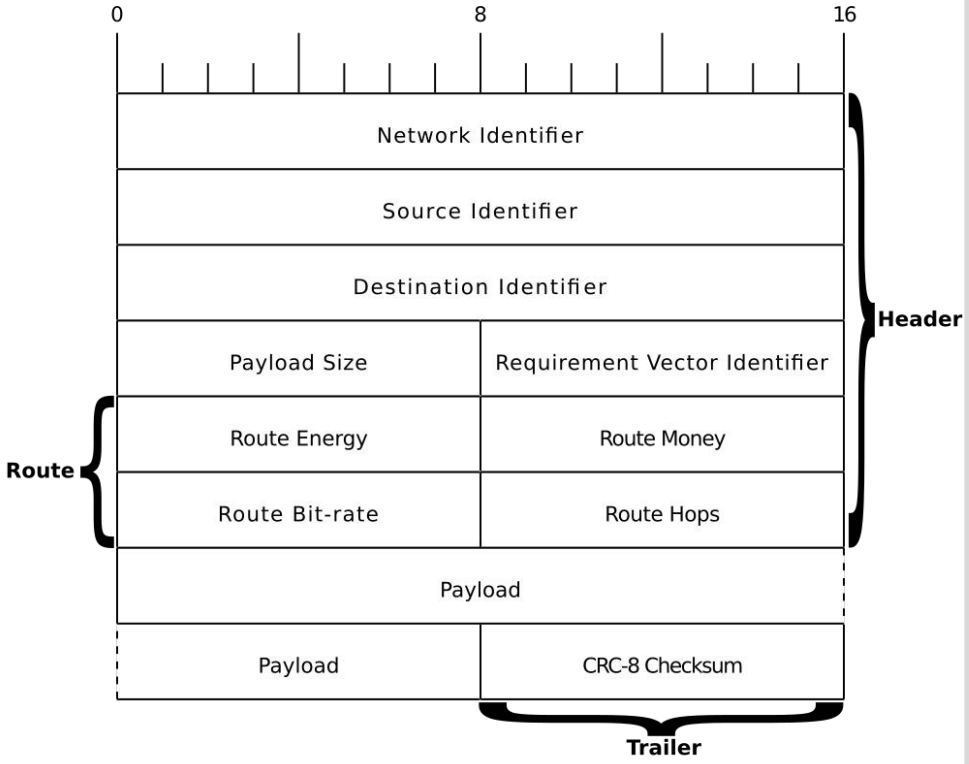
- Multi-RAT multi-hop networks
- Several radio links between two neighbors
- Several use cases (e.g. monitoring, video)

→ Need an efficient routing scheme



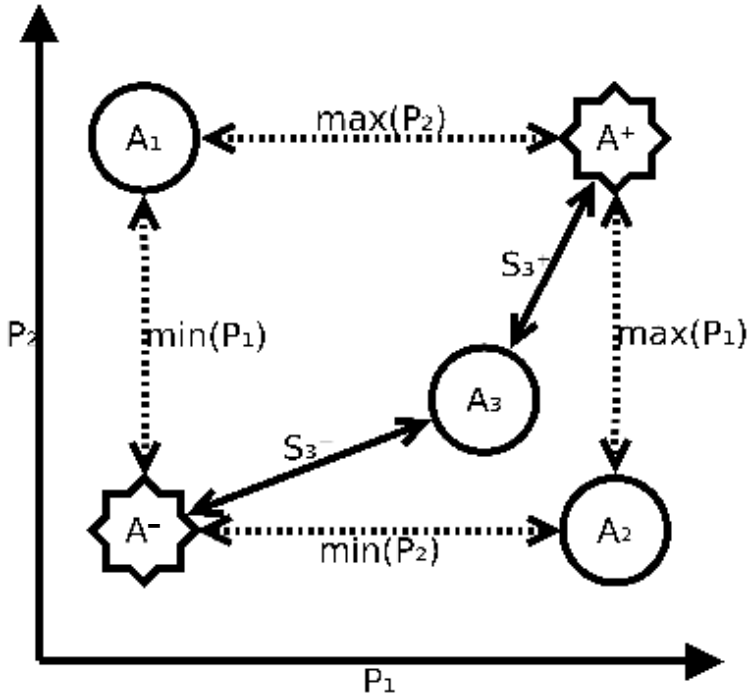
Routing Over Different Existing Network Technologies (RODENT)

- Takes a list of available links
- Considers multi-RAT
- Selects the best route per use case based on data requirements
- Control communication piggybacked on data packets

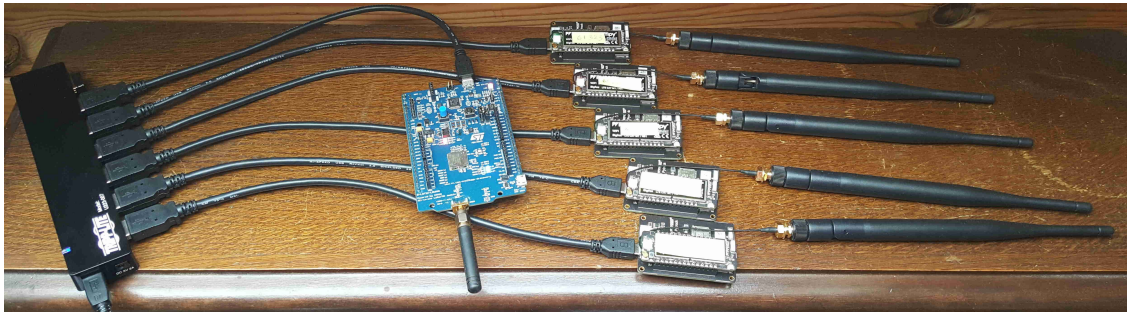


Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)

- Ranks each candidate from best to worst
- Ranks are determined based on:
  - closeness to best solution
  - farness to worst solution

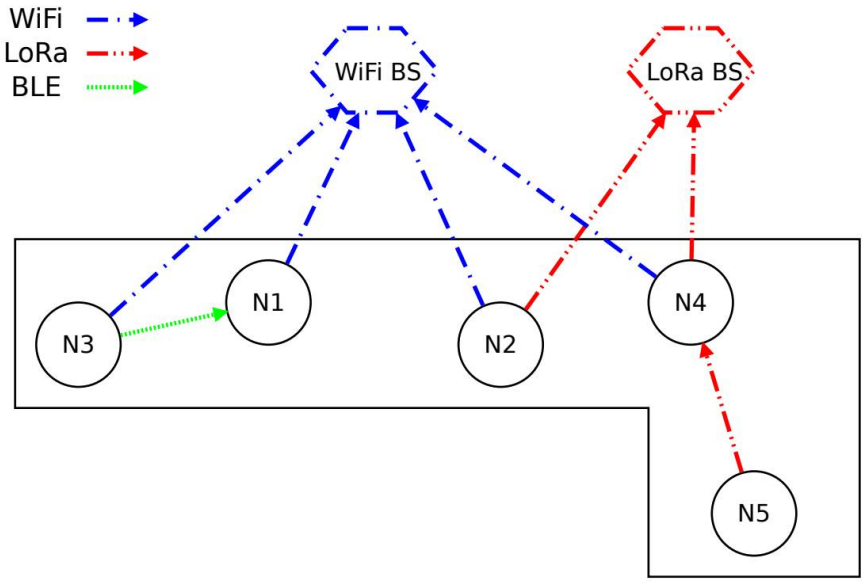


Experiments with RODENT



- 5 nodes
- 2 use cases, monitoring & alarm
- WiFi & LoRa base stations
- Video:

http://chercheurs.lille.inria.fr/bfoubert/ressources/rodent.mp4



Thank you for your attention!
Any questions?

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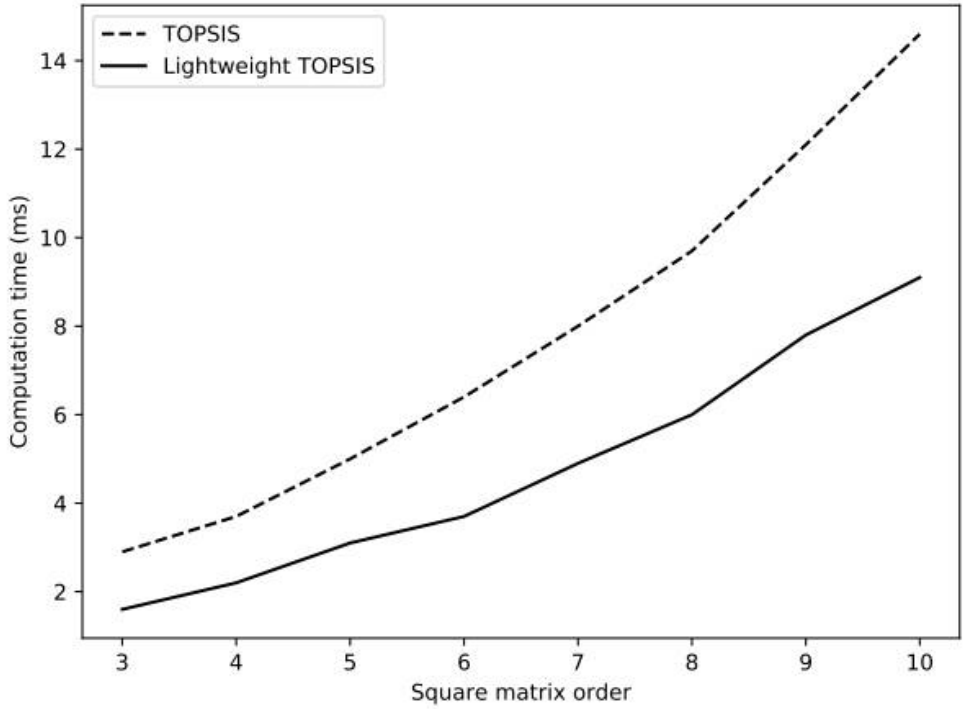
Inria

Lightweight TOPSIS results

- Mean speed up of 39%
- 82% NIS similarity with vanilla TOPSIS
- Saves 448µJ per TOPSIS run (based on FiPy data-sheet)



RODENT results

- Increase network's flexibility
- Saves energy
- Maintain a good PDR