

Inria

Routing in Multi- Technologies Wireless Sensor Networks

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17 February 2021

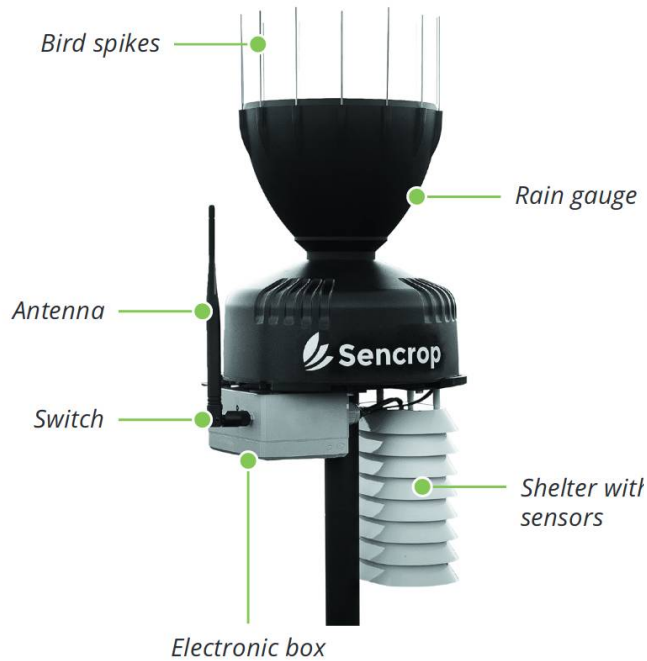
Wireless Sensor Networks: Provide help to agricultural workers

- Automate the collection of data
- Records climate data
- Ultra-precise data



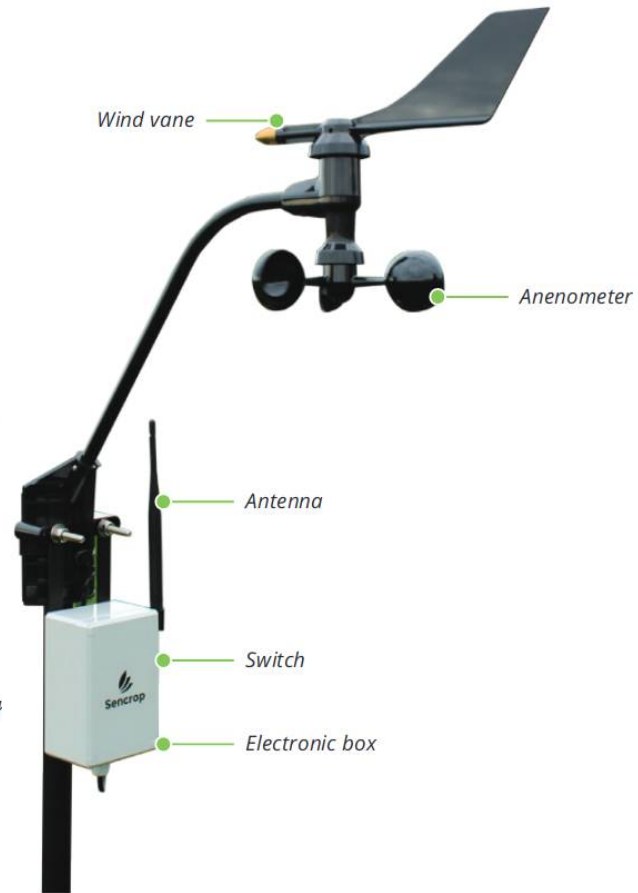
<https://www.terre-net.fr/actualite-agricole/economie-sociale/article/revenus-agricoles-2017-en-hausse-202-133225.html>

Sencrop



Raincrop

- Rain gauge
- Temperature
- Air humidity



Windcrop

- Wind speed
- Gusts
- Wind direction



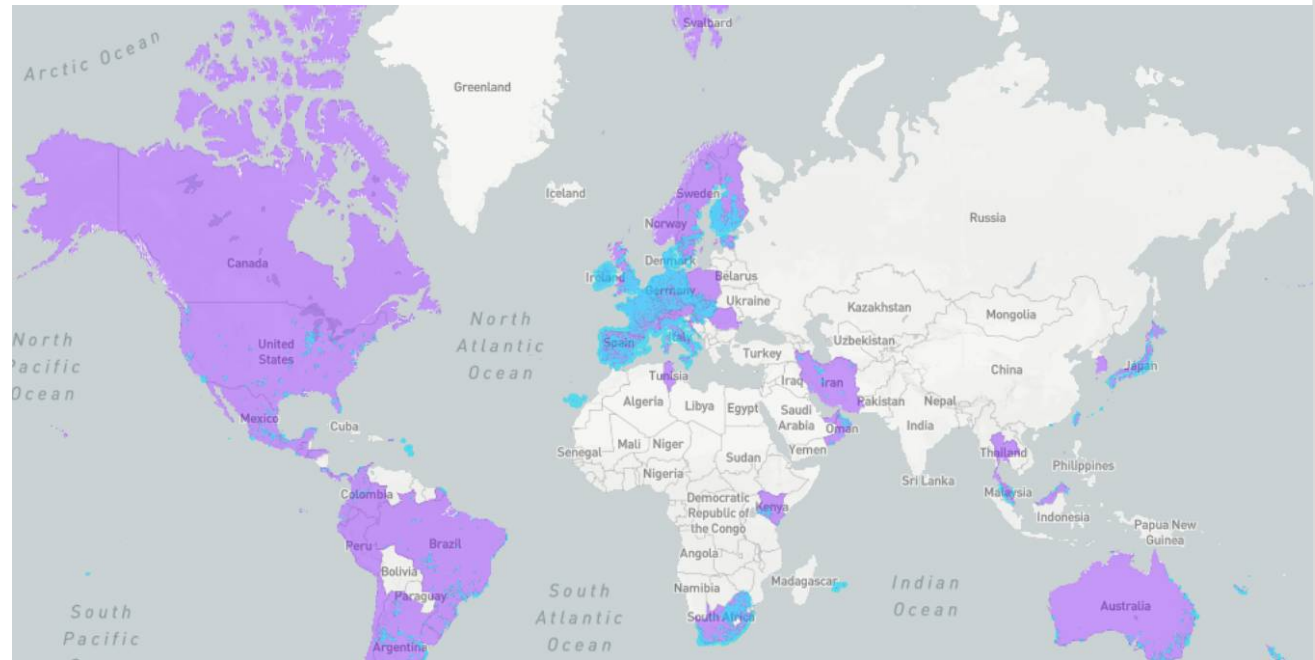
Leafcrop

- Temperature
- Humidity
- Dew point
- Wet bulb temperature

<https://sencrop.com/>

Numerous limitations, *e.g.* Sigfox

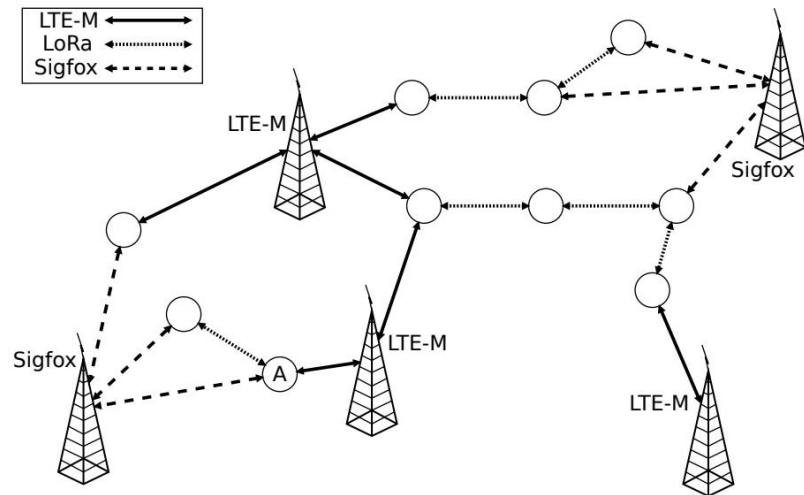
- Max 12B / message
- Max 140 messages / day
- Limited coverage



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

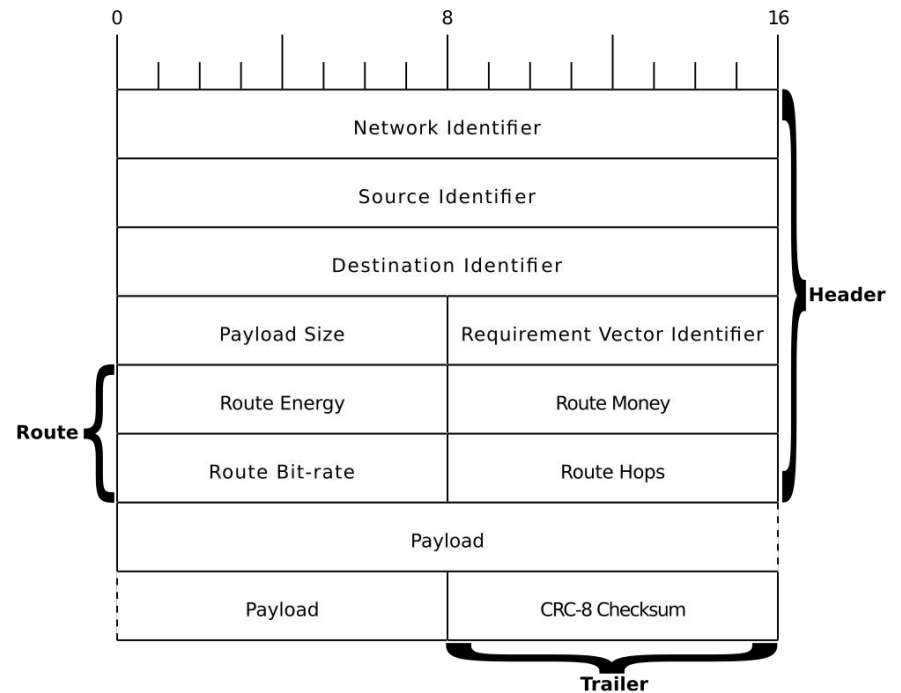
Multi-technologies networks: Need an efficient routing scheme

- Link with base stations not always available
- Consider all links with every neighbors
- Autonomous route selection based on the use case



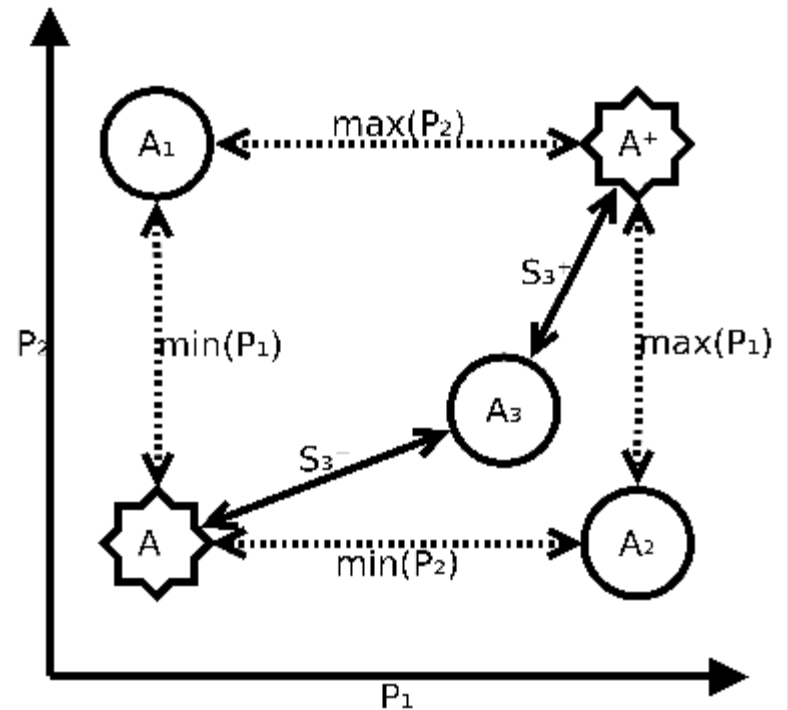
RODENT: Routing for multi-RAT networks

- Routing Over Different Existing Network Technologies (RODENT)
- Consider multiple Radio Access Technologies (RAT)
- Support several use cases

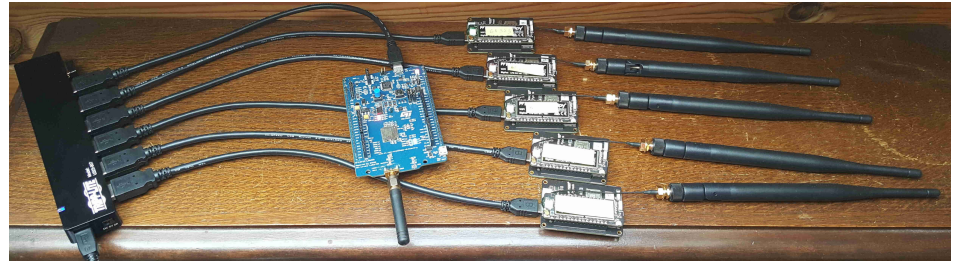


Lightweight TOPSIS: Multi-criteria decision method

- Rank routes based on the routes' attributes' importances
- Select best route
- Custom method optimized for wireless sensor networks' hardware

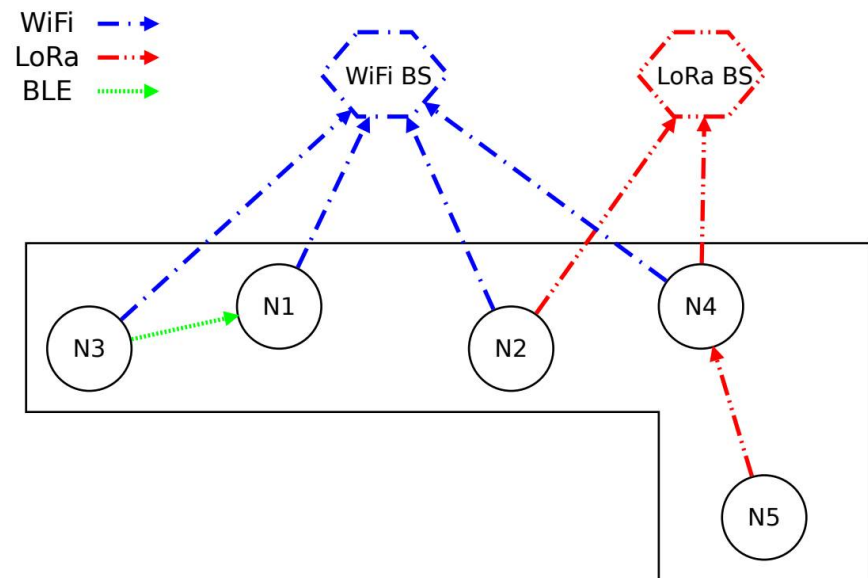


Experiments on Pycom Fipy



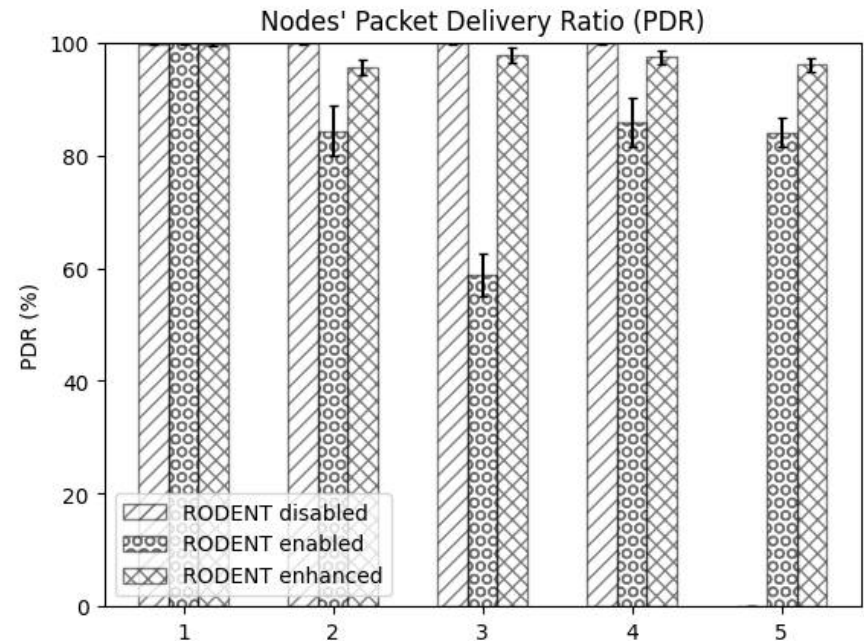
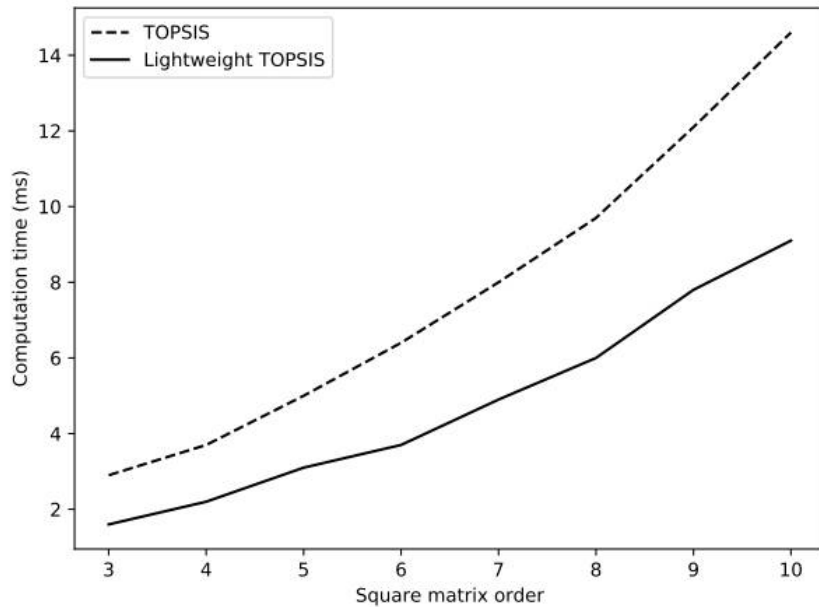
- 5 nodes
- 2 use cases, monitoring & alarm
- WiFi & LoRa base stations
- Video:

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



Results

- Increased flexibility
- Energy savings



Recap & future works

- RODENT, routing in multi-technologies networks
- Based on a custom multi-criteria route selection method
- Increase flexibility, energy savings and keep good PDR

- Plan to support bidirectionnal communication
- Plan to add data reduction scheme to increase energy savings

Thank you for your attention!
Any questions?

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