

INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture



Intel-Irris



Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture



Building the INTEL-IRRIS IoT platform Annex-2: antenna tests



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INDOOR ANTENNAS

Antennas placed indoor

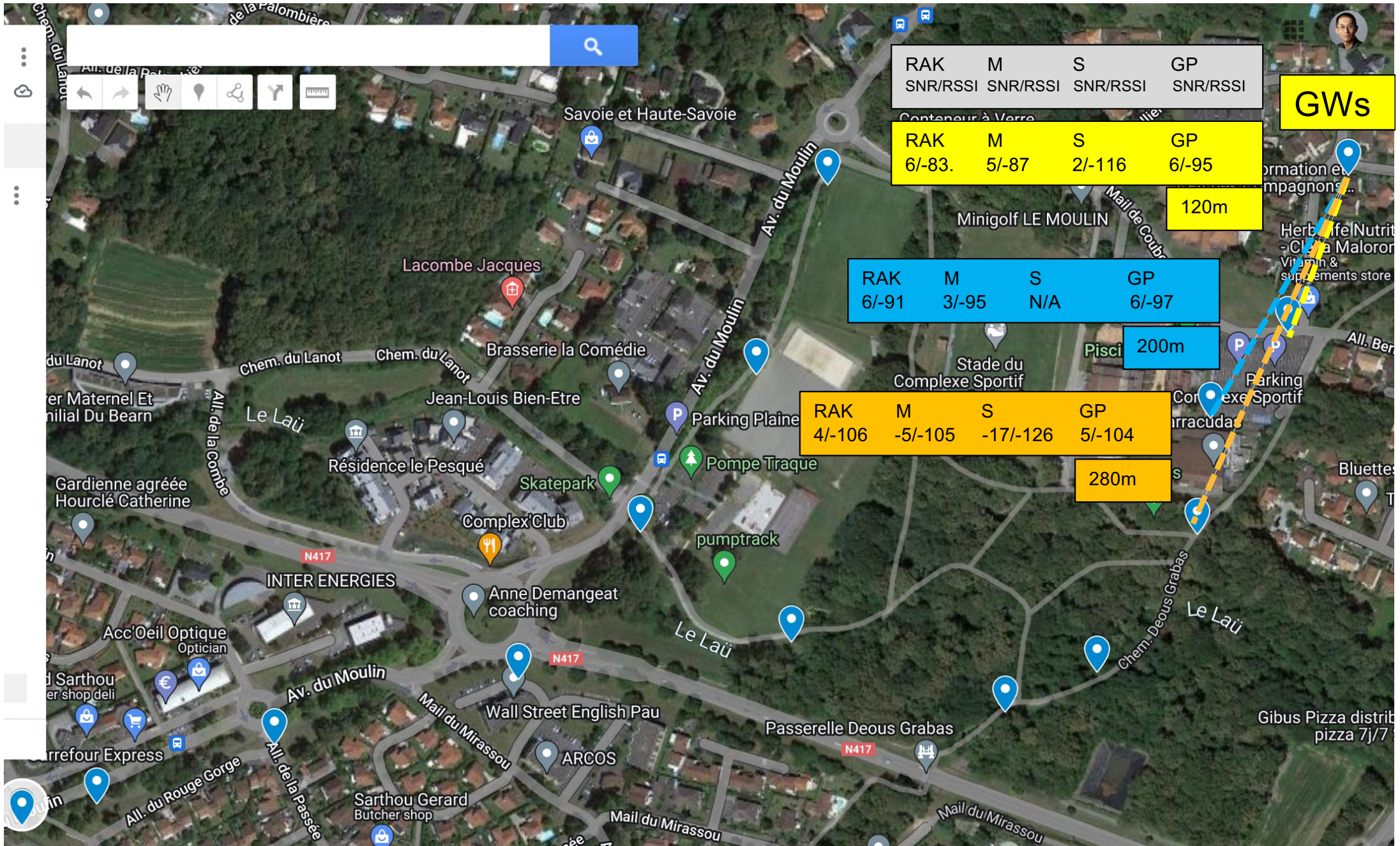
- 4 different antennas at the same location, receiving same packets
- 4 Gateways, 433Mhz
- DIY Ground Plane
- 3dBi fiber glass (RAK)
- "3dBi" -> referred to as "Small" (S)
- "5dBi" -> referred to as "Medium" (M)

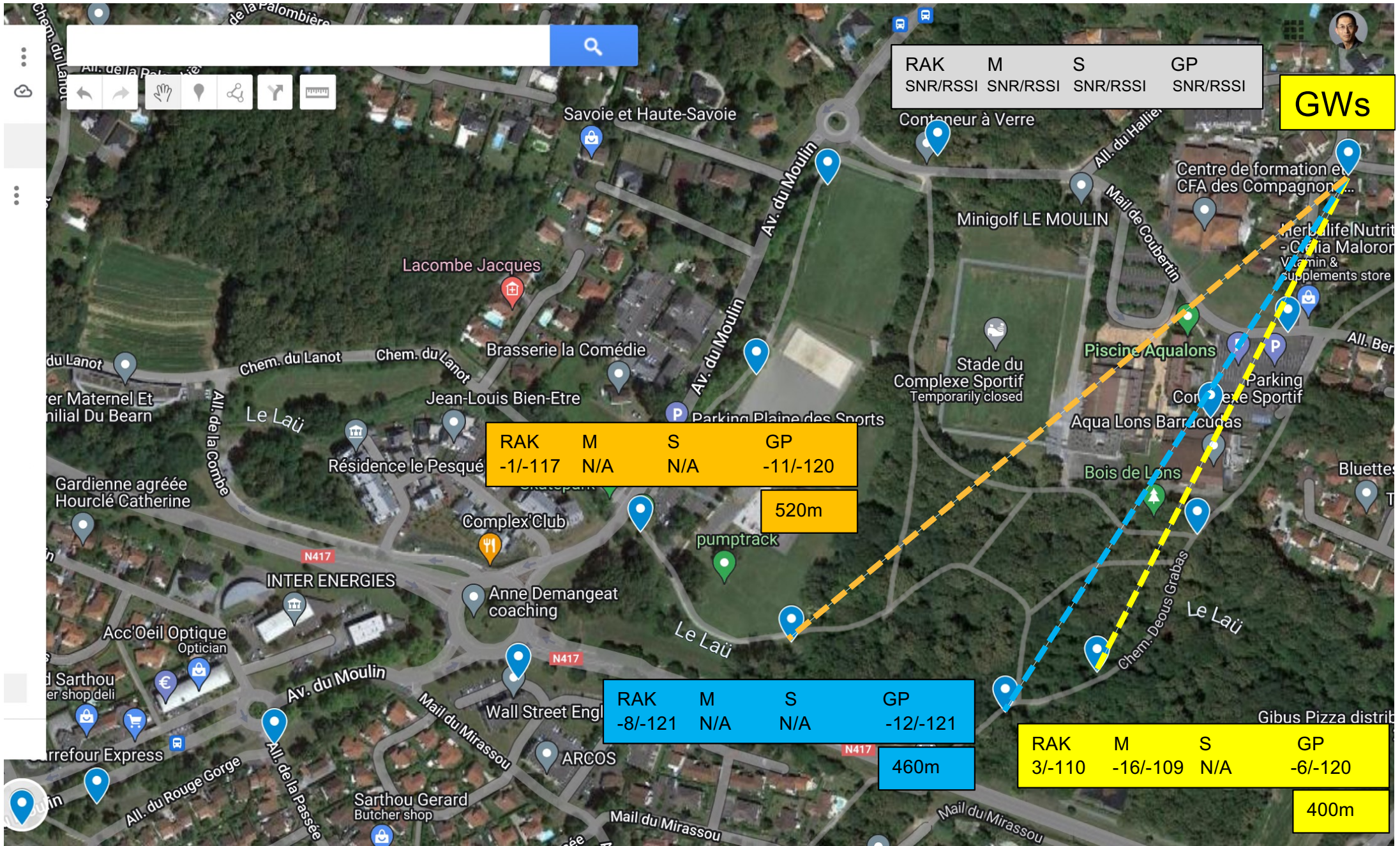


Transmitter device (1)

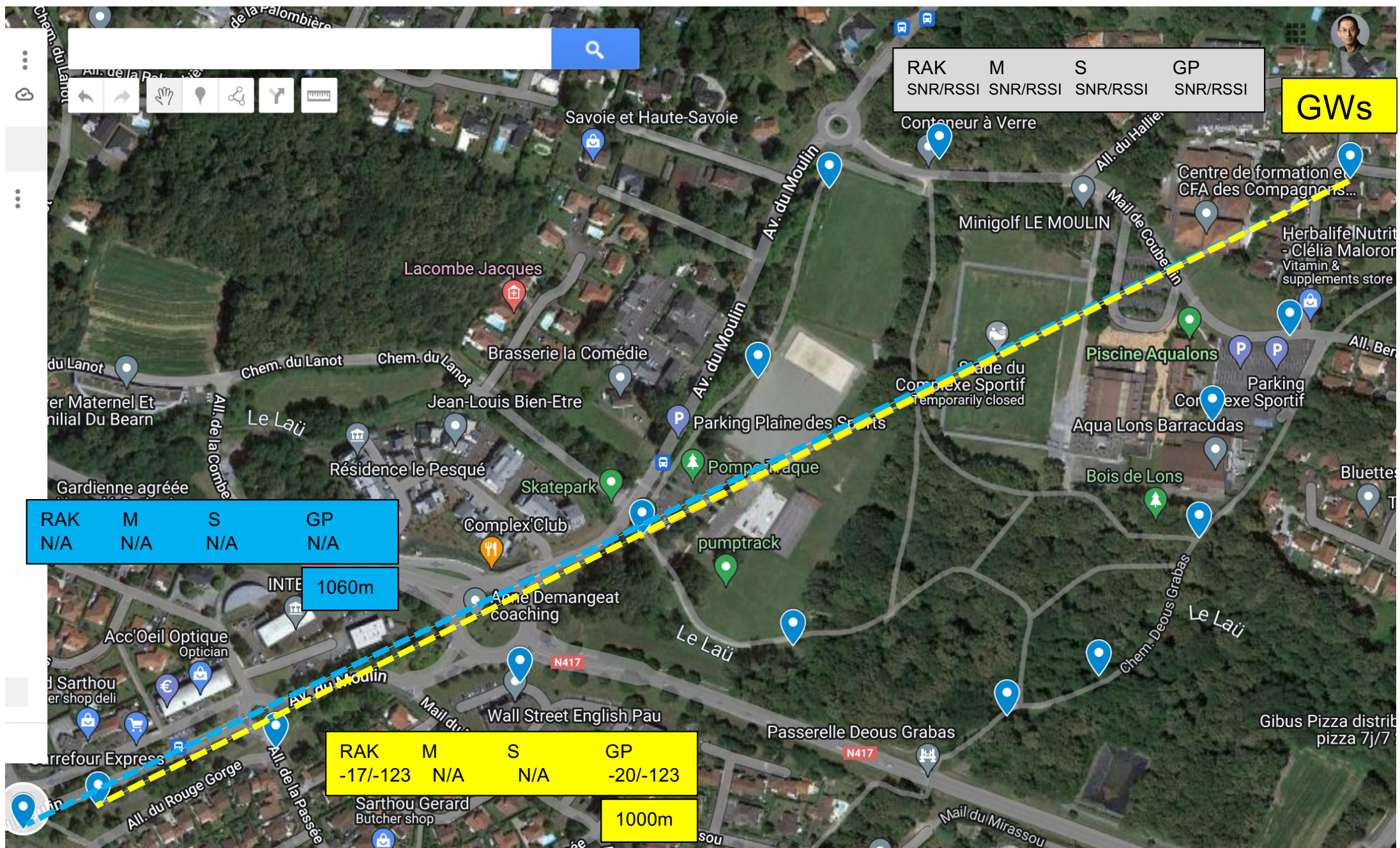
- ◉ We use the Field Tester device but we did not expect any correct acknowledgment from gateways as since there are 4 gateways, their ACKs will most probably collide and interfere each other
- ◉ The transmitter antenna is the "Small" one

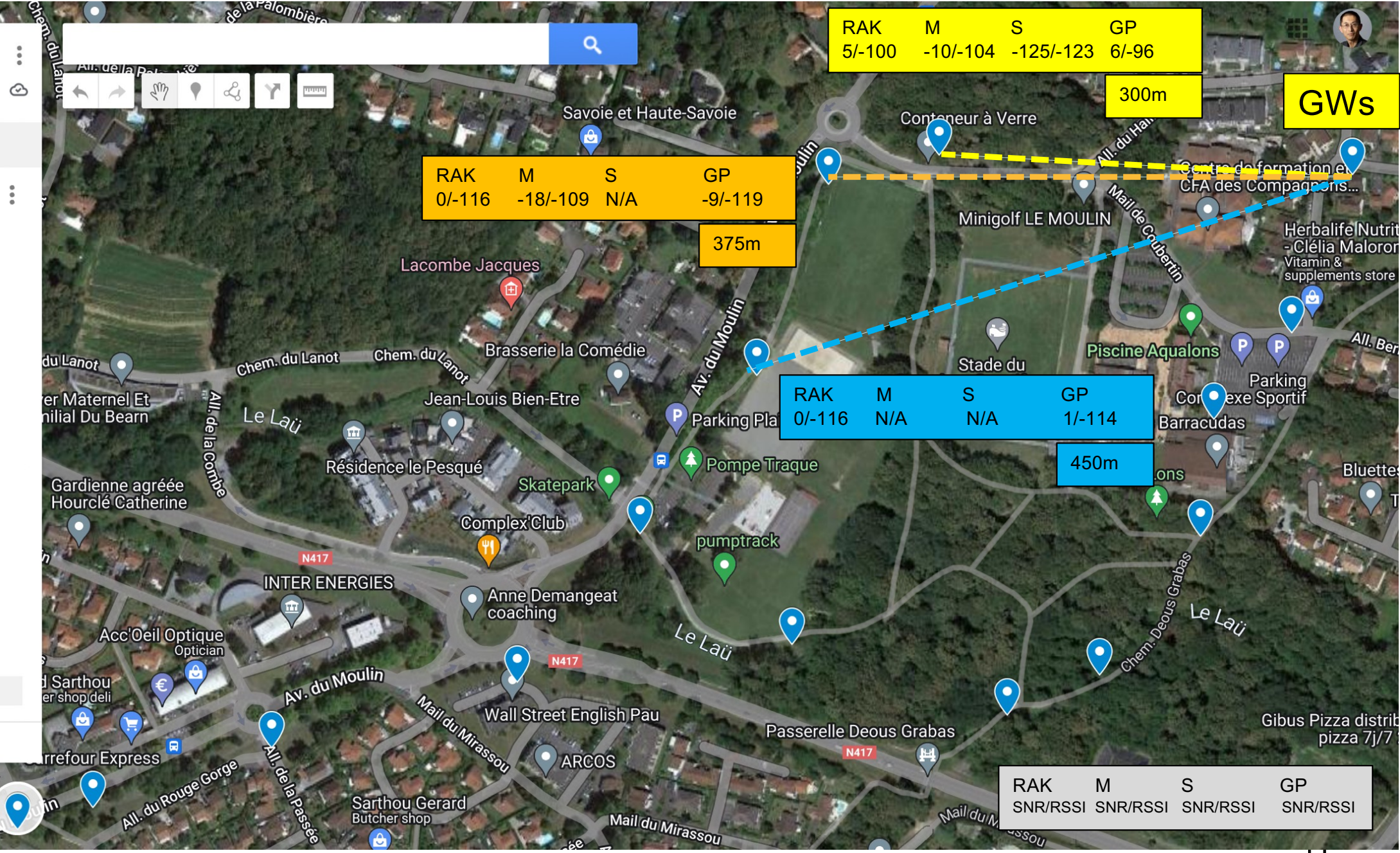












RAK	M	S	GP
5/-100	-10/-104	-125/-123	6/-96

300m

GWs

RAK	M	S	GP
0/-116	-18/-109	N/A	-9/-119

375m

RAK	M	S	GP
0/-116	N/A	N/A	1/-114

450m

RAK	M	S	GP
SNR/RSSI	SNR/RSSI	SNR/RSSI	SNR/RSSI

Transmitter device (2)

- ◉ We use the Field Tester device with the medium antenna to see if this would improve transmission & reception
- ◉ The transmitter antenna is now the "Medium" one
- ◉ We start at the position where no reception were received (blue)





RAK	M	S	GP
-20/-123	N/A	N/A	-21/-124

1060m

RAK	M	S	GP
-17/-123	N/A	N/A	N/A

1000m

RAK	M	S	GP
SNR/RSSI	SNR/RSSI	SNR/RSSI	SNR/RSSI

GWs

With the "Medium" antenna, some packets have been received at the limit of LoRa's sensitivity.

At the yellow position, the previous experiment with the "Small" antenna gave the same SNR.

In conclusion, the "Medium" antenna on the device can only improve by a bit the reception.

We believe it is not worth having "Medium" or bigger antenna at device side.

Conclusions on indoor antennas

- ⦿ The small "3dBi" has limit at about 300m
- ⦿ The medium "5dBi" has limit at about 400m, if less obstacle it can probably receive at 600m
- ⦿ The RAK fiber glass & DIY GP has limit at about 1km
- ⦿ The RAK fiber glass is more performant than the DIY GP but costs about 30€, with the base, it is about 50€
- ⦿ The DIY GP costs about 10€ with the extension cable SMA male-> N-male. The DIY GP is quite good actually!
- ⦿ In typical agriculture fields, with less obstacle, we could probably add 300m to 500m to all the reached distances
- ⦿ Having "bigger" antenna at device side is not really interesting, it is probably better to put gateway's antenna in higher position
- ⦿ Having the gateway's antenna outdoor, at 3m height, in typical agriculture fields, can probably add an extra 1km!