ALBORA
TECHNOLOGIES

Snapshot RTK cloud-based solution

ESA-NAVISP2-AlboraSRTK

May 2023

Agenda

Albora Technologies Limited

Agenda

- **Company background**
- Project background and objectives
- Product performance
- Test campaign results
- Conclusions

Company background

Albora Technologies Limited

Vision

Provide high-accuracy geolocation to everyone, everywhere

Mission

Softwarize to disrupt geolocation technology from device-centric to information-centric for mass-market applications

Us

Experts in distributed systems and GNSS.

LONDON - BARCELONA

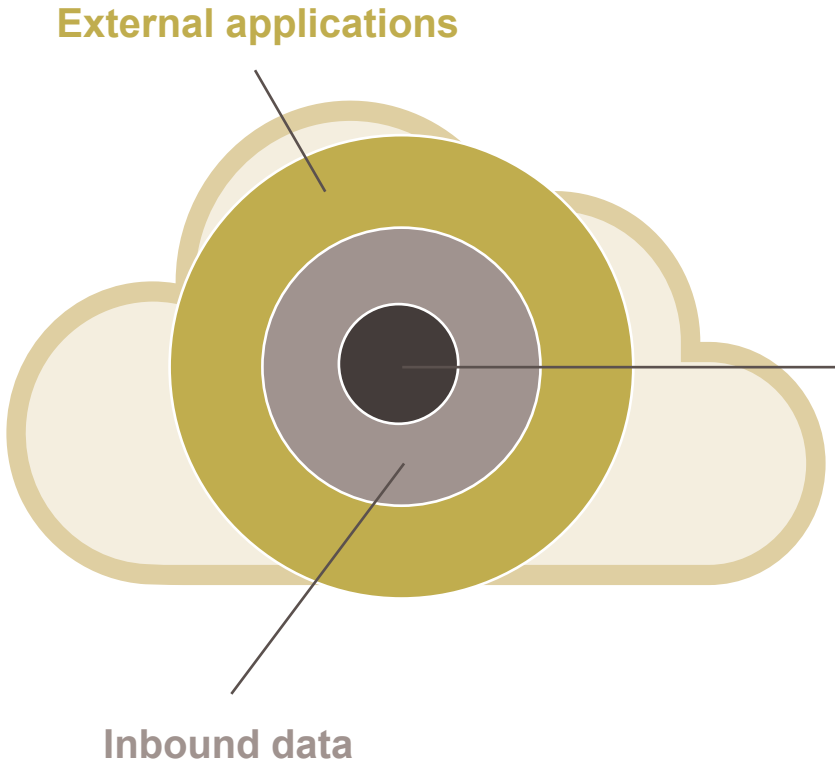
Albora’s cloud/edge platform

Scalable, ubiquitous, interoperable and extensible

Albora’s approach

- Software-based
- Ubiquitous
- User-friendly (HW-agnostic + Plug & Play service)
- Affordable SaaS model

Ideal approach for the mass-market

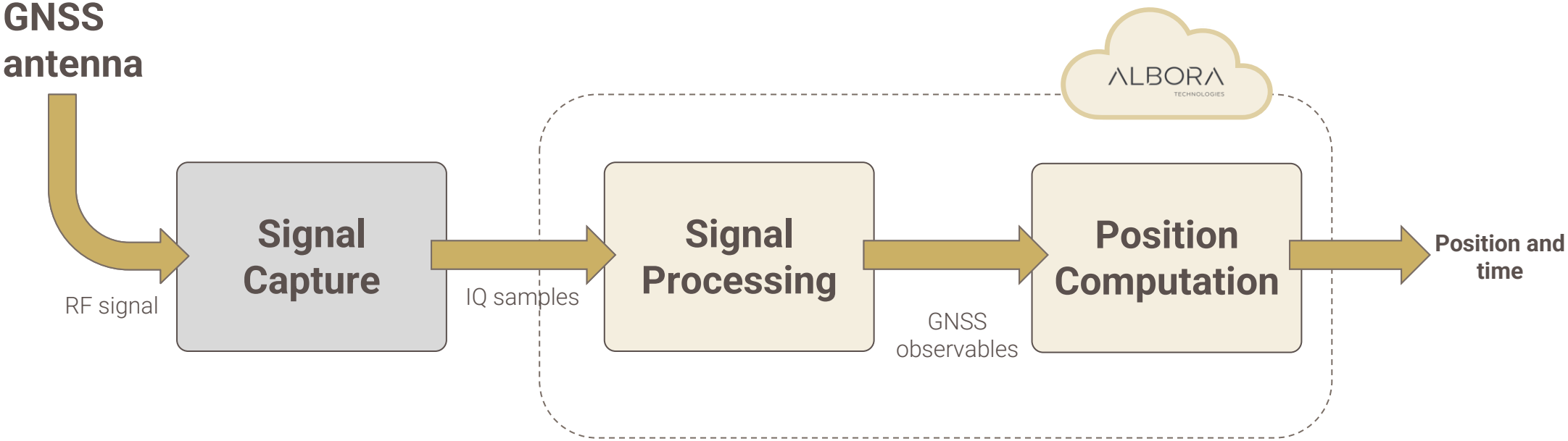


Algorithms

- Anti-jamming
- Anti-spoofing
- Analytics
- High-sensitivity
- **High-accuracy**

Albora Cloud Positioning Services

Augment the capabilities of hardware devices with Albora's cloud-platform



Relevant use cases for high-accuracy location services

Improved geolocation data to widen location-based services value proposition

Micro-mobility

- Geofencing for parking in authorized areas
- Improve fleet management
- Improve user experience

Critical infrastructure

- Location of sensitive assets
- Regulation compliance.
- Safety.

Industry 4.0

- Soft-indoor geolocation.
- Geo-fencing
- Logistics support.

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Project background and objectives

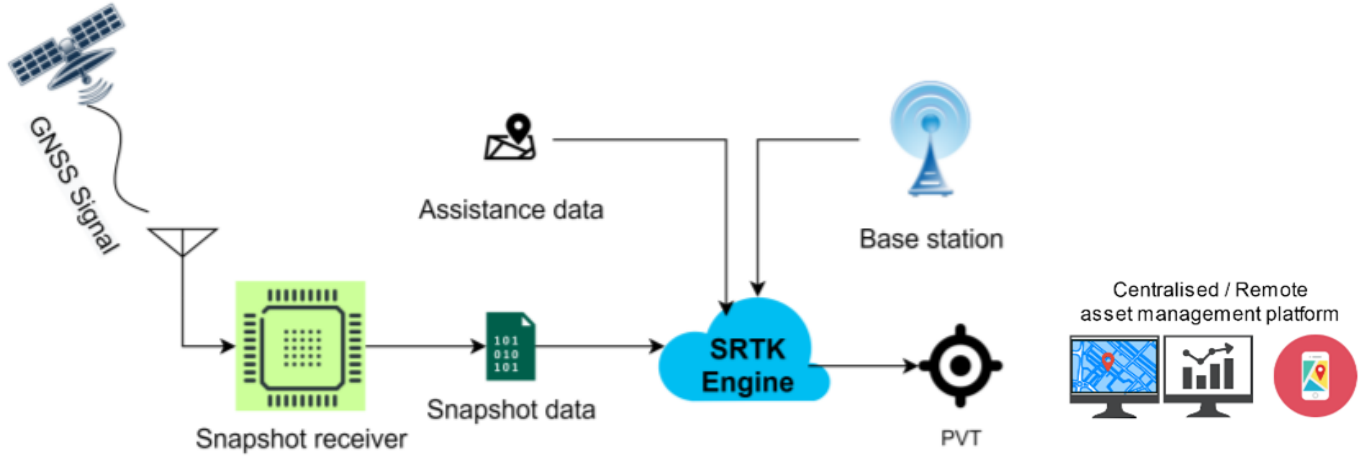
Background

AlbaSRTK

The product is a **cloud-based snapshot GNSS solution** that provides high accuracy solutions (1 cm CEP).

Key Features of **SRTK** technology:

- High accuracy.
- Low power streamlined receiver.
- Cloud-based, software-centric architecture.



Project background and objectives

Development objectives

Low power receiver with high accuracy capabilities:

- L1 support
- Ultra low power mode
- RTK solutions
- Low bandwidth (<200KB)

High-precision GNSS snapshot processing with RTK:

- GNSS data corrections and products centralized
- Scalable module-based algorithms and features
- High accuracy solutions

Test campaign and validation consolidation:

- Validating the end-to-end technology in relevant environments.
- Benchmarking against COTS
- SRTK technology trade-offs and KPI assessment

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Product performance

Evolution

Heritage product

Snapshot	100 ms
Bands	L1/G1
Signals	Galileo E1C, GPS L1CA, BeiDou B1C, Glonass L1OF
Horizontal accuracy	2.5 m CEP
Time-to-first-fix	10 second
Integrity	✓
Antijamming	✓
RTK enabled	✗
Real time GPS LNAV bits	✗

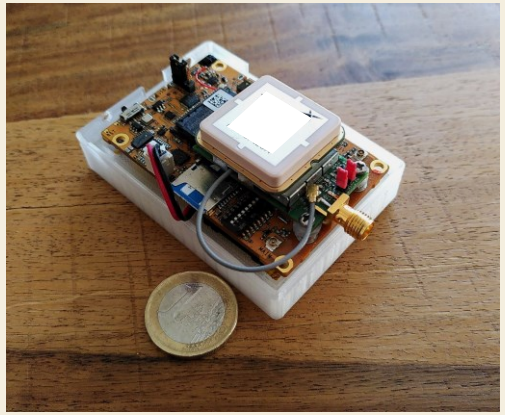
Product at the end of the activity

Snapshot	20 ms
Bands	L1
Signals	Galileo E1C, GPS L1CA
Horizontal accuracy	1 cm CEP
Time-to-first-fix	5 second
Integrity	✓
Antijamming	✓
RTK enabled	✓
Real time GPS LNAV bits	✓

Product performance

SnapTwo receiver

- Ultra low power mode
- Streamlined receiver
- Credit card form factor
- Low bandwidth
- Dual band: L1 and L5 ready



High accuracy

- Open sky static conditions
- Near baselines (<5 Km)
  - RTK Fix rate > 90 %
  - Horizontal CEP < 1 cm
- Medium baselines (<15 Km)
  - RTK Fix rate > 60 %
  - Horizontal CEP < 10 cm

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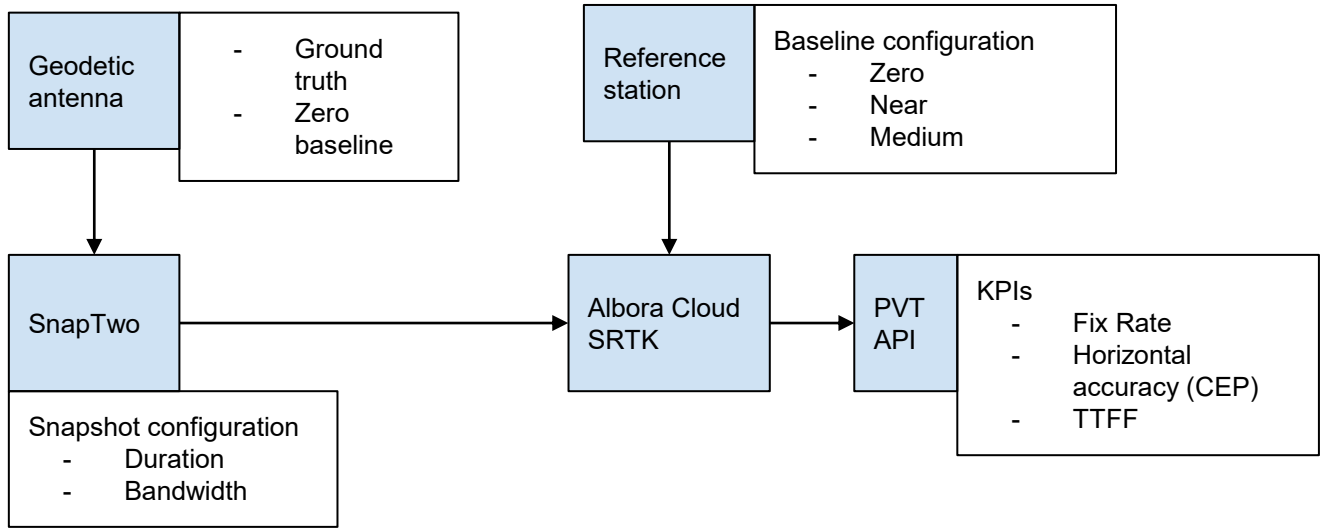
Test campaign results

Controlled environment

- SnapTwo connected to geodetic antenna via splitter
- Static, open sky conditions
- Four different baselines considered
  - Zero baseline
  - Near baseline (<5Km)
  - Medium baselines at two different locations (<15Km)
- KPIs:
  - Snapshot duration
  - Fix Rate
  - Sampling frequency and bandwidth
- Energy consumption characterization



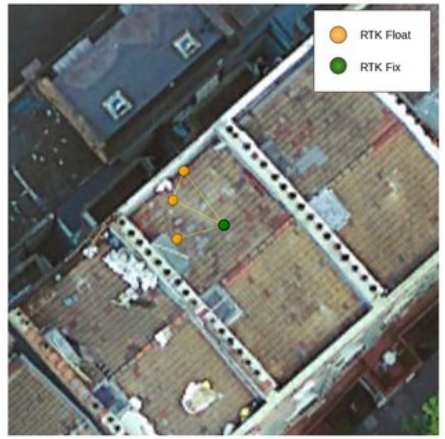
Test campaign results

Controlled environment

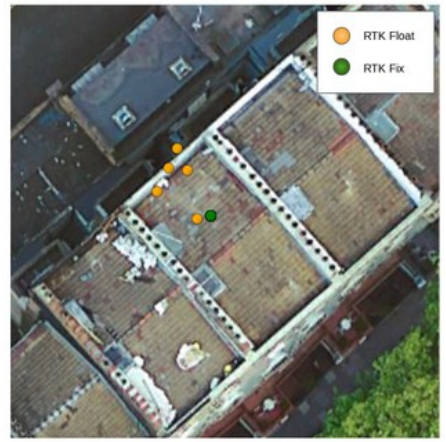
- Open sky environment
- KPIs assessment
- Best configuration selection
- Geodetic antenna

Results

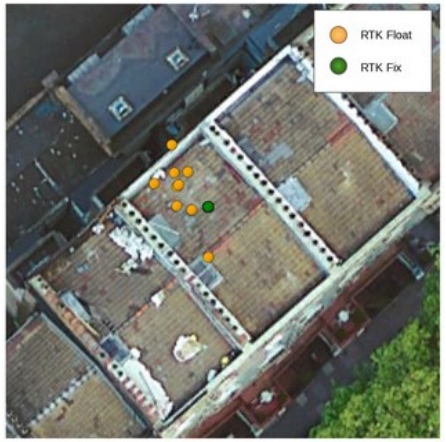
TTFF (s) for 20 ms	Baseline	Integration time (ms)	
		20	
		Fix Rate (%)	H. CEP [cm]
5	Medium (TEDD)	62	2.4
	Medium (STRA)	82	2.4
	Near	90	0.6
	Zero	94	0.2



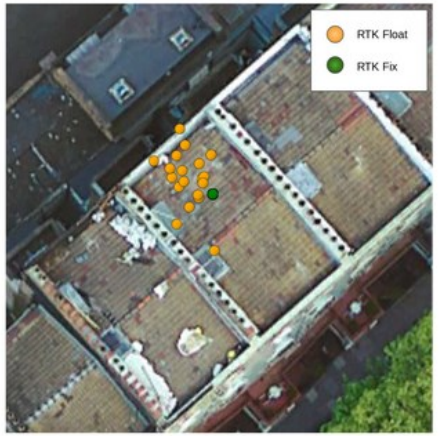
a) Zero baseline



b) Near baseline



c) Medium baseline (STRA)



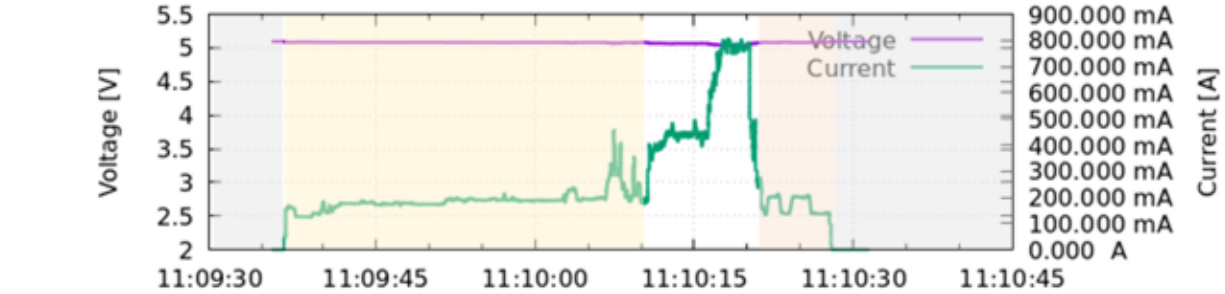
d) Medium baseline (TEDD)

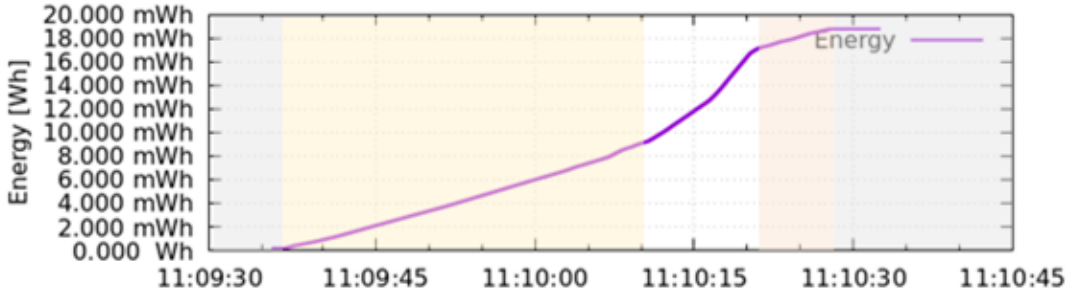
Test campaign results

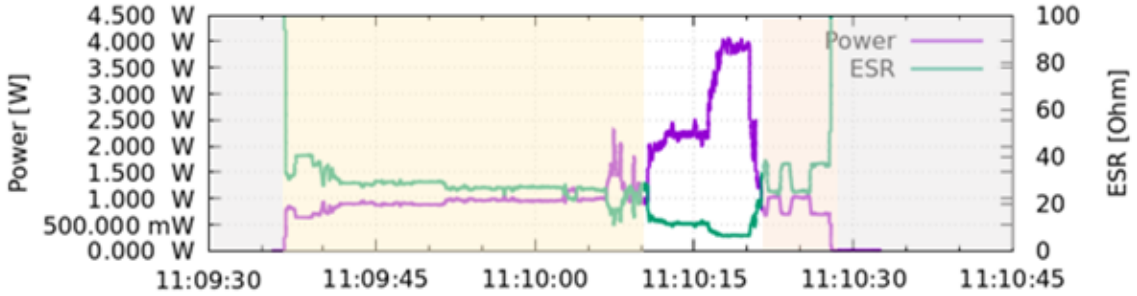
Energy consumption

- Capture: ~19mWh / snapshot
- ULPM mode: steady consumption of 6.5mWh (1.3mA @ 5V)

SnapTwo configuration	Capacity [mAh]	Autonomy - 6 snapshots per day	
		Snapshots	Battery life
20 ms	500	46	7.5 days
	2000	187	31 days



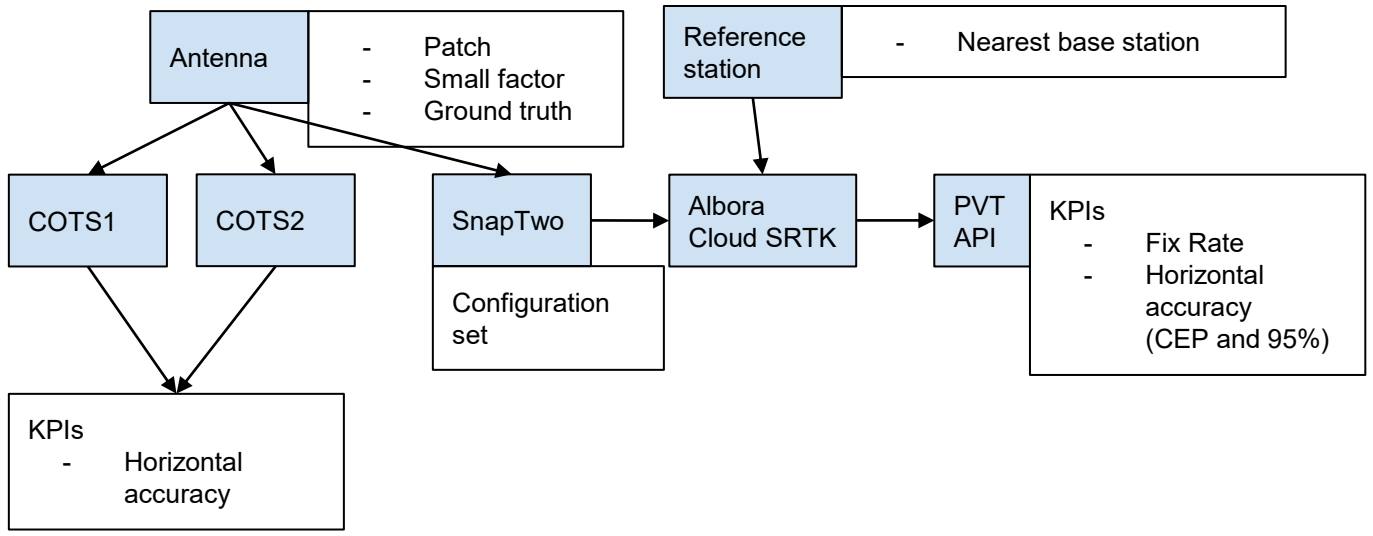




Test campaign results

Urban environment and benchmarking

- SnapTwo connected to patch or small factor antenna
- Three different urban scenarios:
  - Soft
  - Mild
  - Challenging
- Ground truth with COTS receiver
- Best configuration using 20 ms signal
- Benchmarking against two COTS
- KPIs:
  - Fix Rate
  - Horizontal accuracy



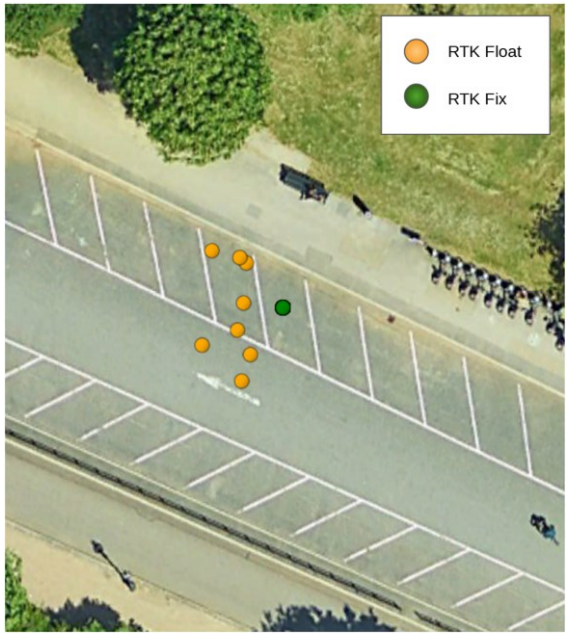
Test campaign results

Soft Urban environment

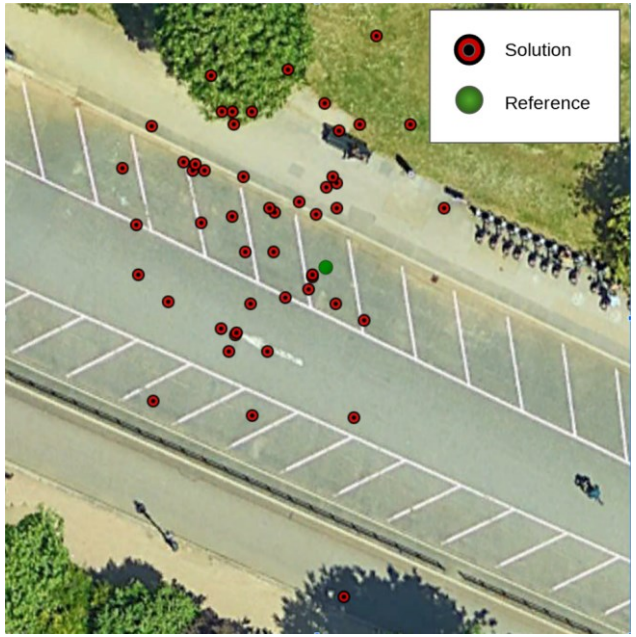
- Patch and small factor antenna
- Benchmarking

Results

Device	Fix rate	Horizontal		
		CEP [m]	95% [m]	RMS [m]
SnapTwo	84%	0.014	4.096	1.496
COTS1	-	3.647	6.666	4.222
COTS2	-	7.135	11.984	7.882



a) SnapTwo receiver



b) COTS2 receiver

Test campaign results

Mild Urban environment

- Patch and small factor antenna
- Benchmarking

Results

Device	Fix rate	Horizontal		
		CEP [m]	95% [m]	RMS [m]
SnapTwo	45%	0.768	9.433	3.791
COTS1	-	6.163	8.608	6.459
COTS2	-	8.293	17.661	9.624

a) SnapTwo receiver

b) COTS1 receiver

Test campaign results

Challenging Urban environment

- Patch and small factor antenna
- Benchmarking

a) SnapTwo receiver

b) COTS2 receiver

Results

Device	Float rate	Horizontal		
		CEP [m]	95% [m]	RMS [m]
SnapTwo	100%	2.922	8.650	4.085
COTS1	-	8.368	10.802	8.597
COTS2	-	6.501	15.143	7.947

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Conclusions

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Conclusion

- Development objectives achieved
  - High accuracy positioning
  - Streamlined receiver
  - Low power solution
  - Cloud-based, software-centric
- Test campaign
  - Controlled environment testing
    - Different baselines tested
    - 90% RTK fix-rate obtained with 20 ms signal
    - CEP 1 cm and TTFF of 5 seconds
  - Urban environment testing and benchmarking
    - Soft-urban
      - Over 80% RTK Fix-rate, CEP < 10cm
    - Mild-urban
      - 45% RTK Fix-rate, CEP < 1 m
    - SRTK outperform COTS receiver in all scenarios

Future work

- Expanding L1 band signal support with more signals
- Adding L2/L5 band support
- Enhancing algorithms for challenging conditions
- Selecting a more suitable antenna that minimises multipath effects
- Revision and optimization of SnapTwo Hardware

Q&A

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Contact Us

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http://www.albora.io/