Geolocation for the IoT

Never lost again in the Internet of Things

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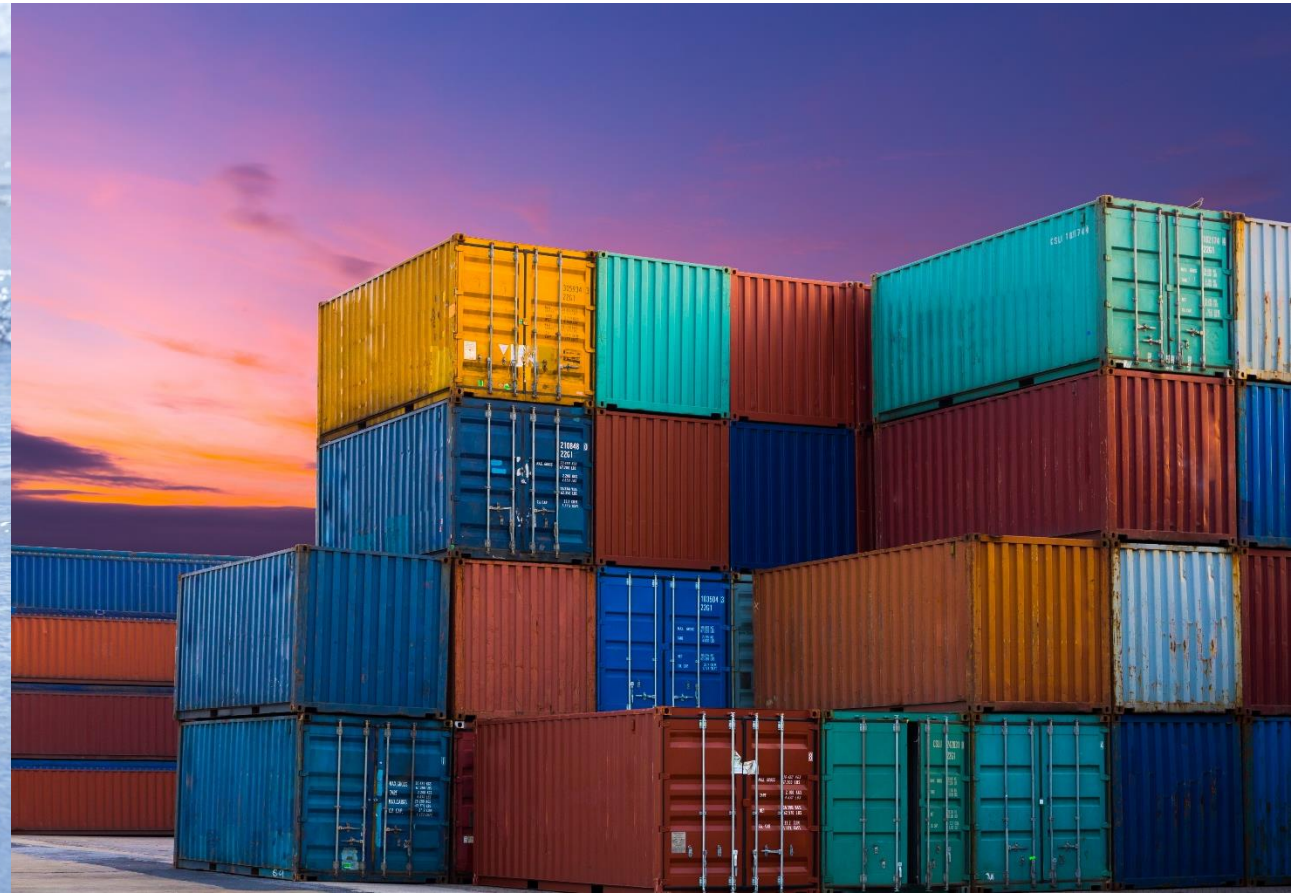

Where’s the bike?

“even with GPS integration…the bikes weren't at their supposed locations”

“Eight out of 10 times, those who tried Mobike could not find the bicycle.”

Company Overview

- Nestwave develops signal processing technology and solutions enabling **accurate, low-power geolocation, both indoor and outdoor**
- Over 10 patents granted, pending or being filed
- Our company is based in Paris (2014)

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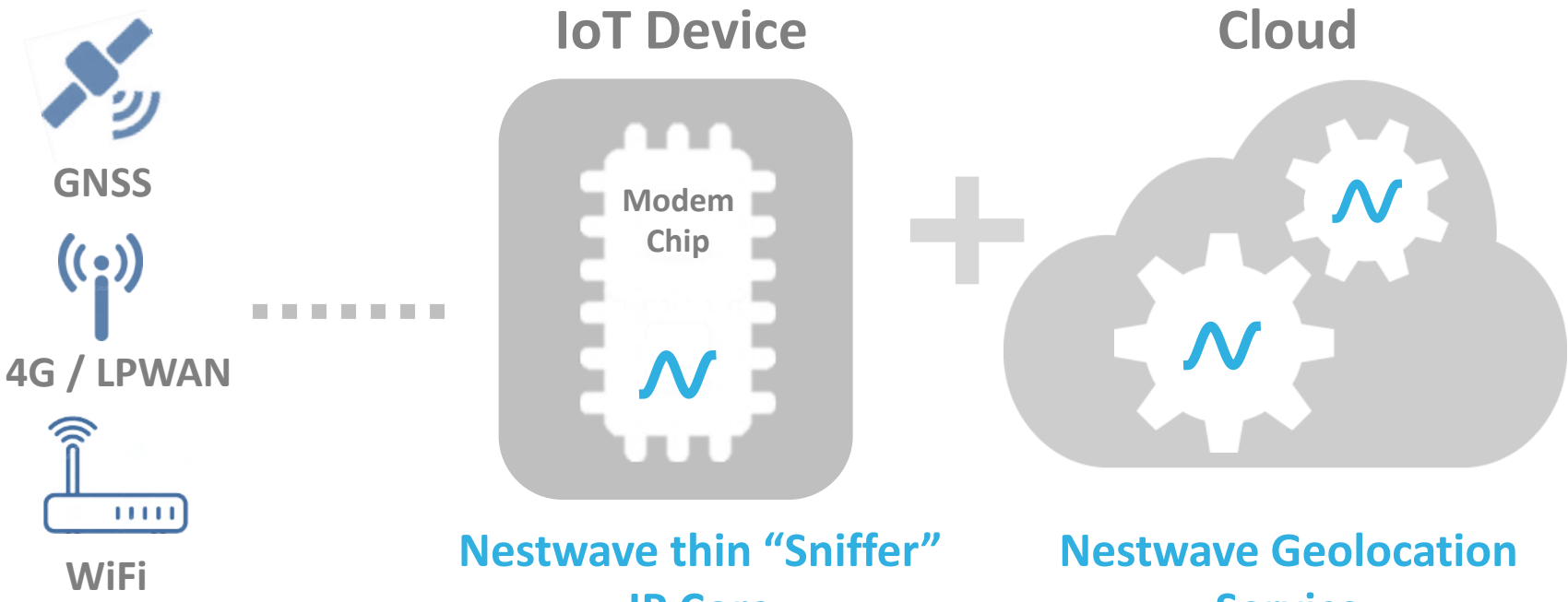
Our Solution

Low power, multi-signal beacon receiver IP and cloud service:
GPS/4G/WiFi/LoRa sniffing with cloud offloading



Nestwave thin "Sniffer" IP Core

Advanced Multipath Mitigation

Nestwave Geolocation Service

Optimal signal combining

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Powered by Technology

10 **Patents granted & pending**

+ Timestamp Algorithms

+ Multilateration Solution

+ System and antenna database optimization

= Dramatic accuracy gains in high multipath and low signal environments, and reduced power consumption

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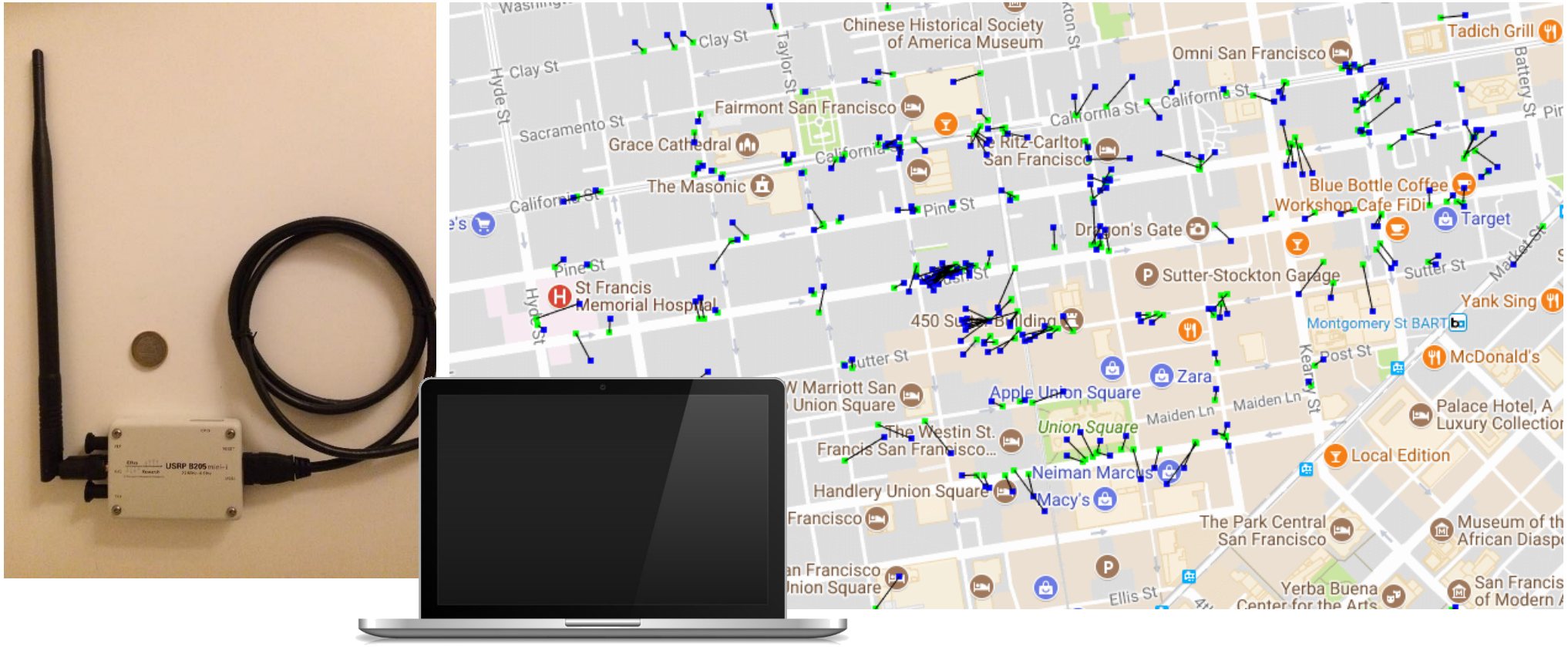
Fast Prototyping with MATLAB

MATLAB enables very efficient development cycle of novel algorithms and solutions:

Research → Prototyping → Field Test → Analysis → Research



Created by Microvector - Freepik.com

Easy deployment with MATLAB

- MATLAB allows a direct and quick path from prototype to production
- Native vectorization in MATLAB
- Parallel and GPU computing also supported

➔ Server software mainly written in MATLAB: extremely fast deployment, maintenance, evolution and upgrade

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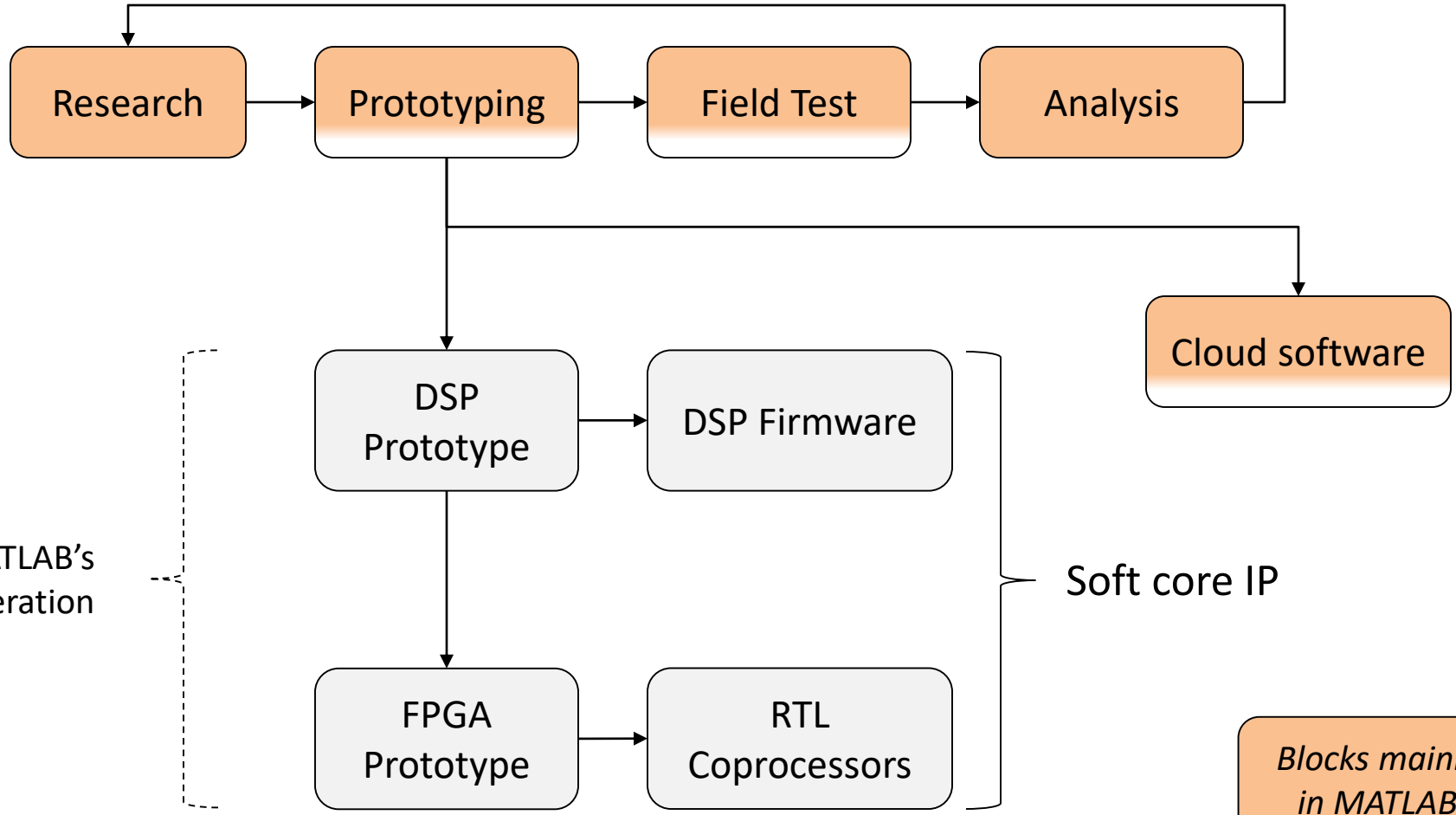
End-to-End Solution using MATLAB

Fast end-to-end development cycle from research to product



Support from MATLAB's automatic code generation

Blocks mainly in MATLAB

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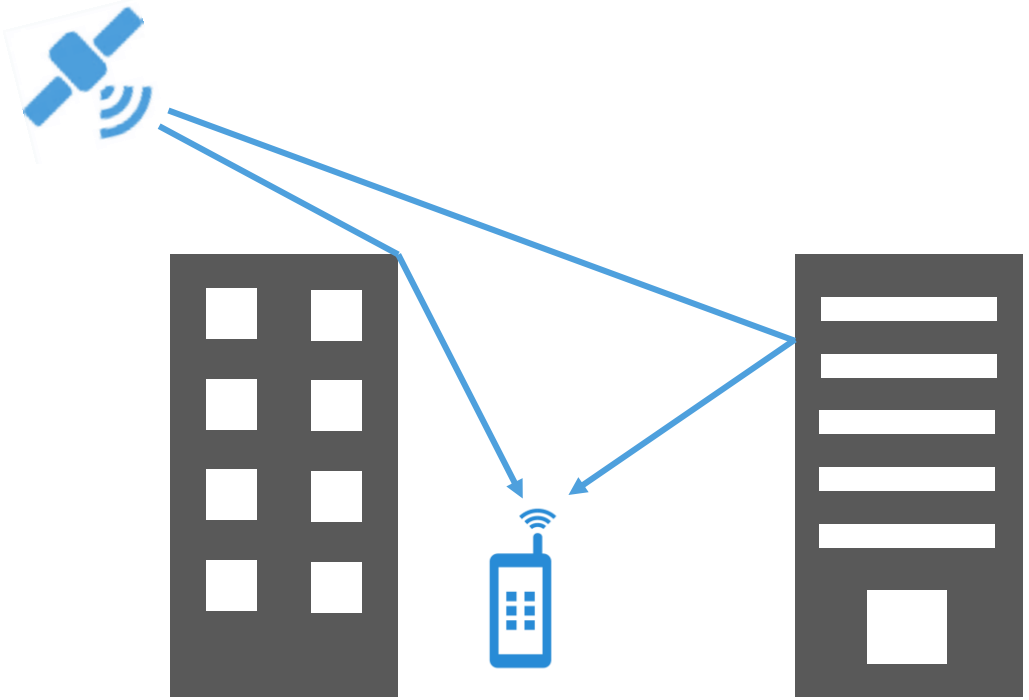
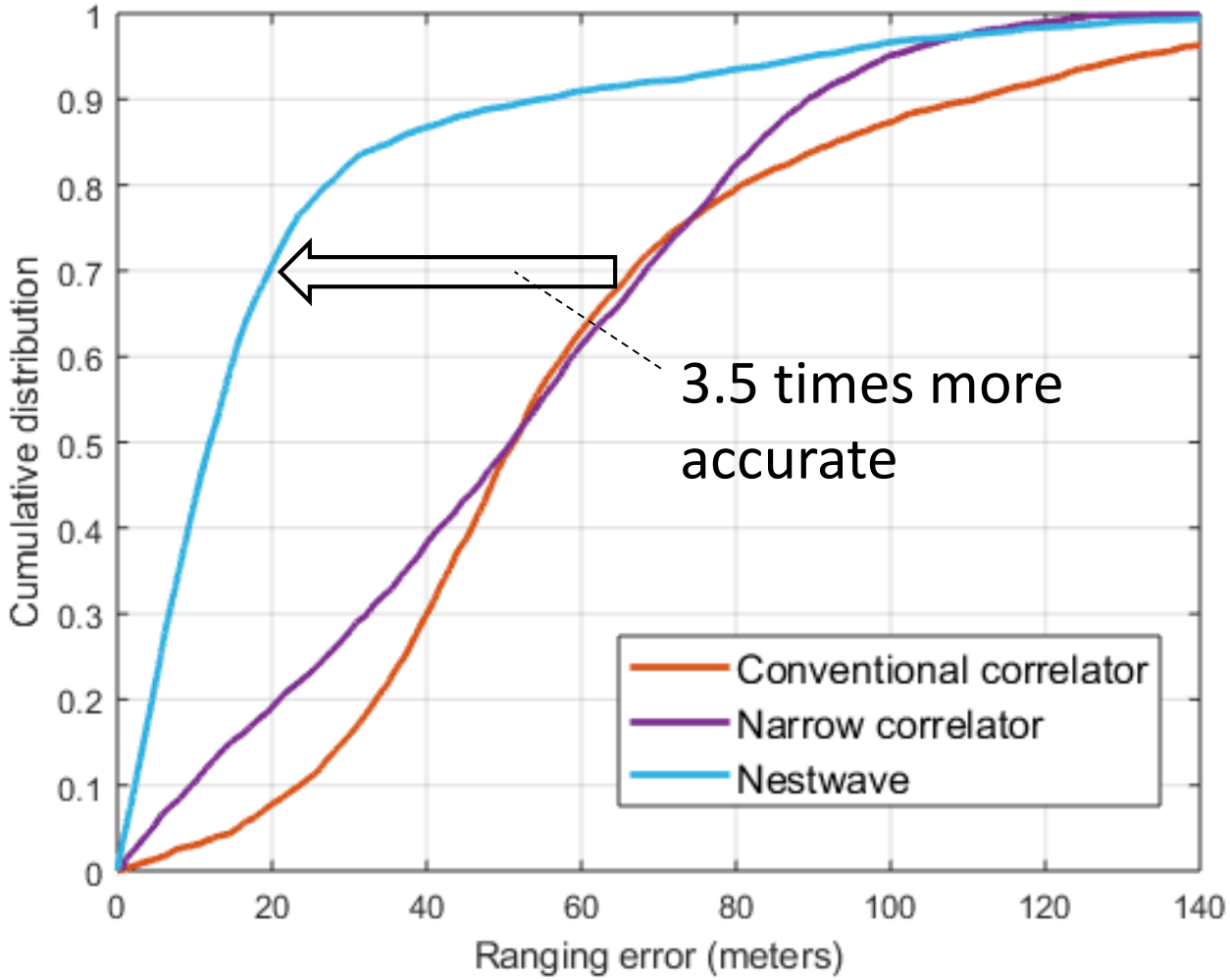
Our Multipath Mitigation in GPS

- Simulation of multipath mitigation at low SNR with 2 interfering paths
- Current multipath mitigation algorithms fail at low SNR





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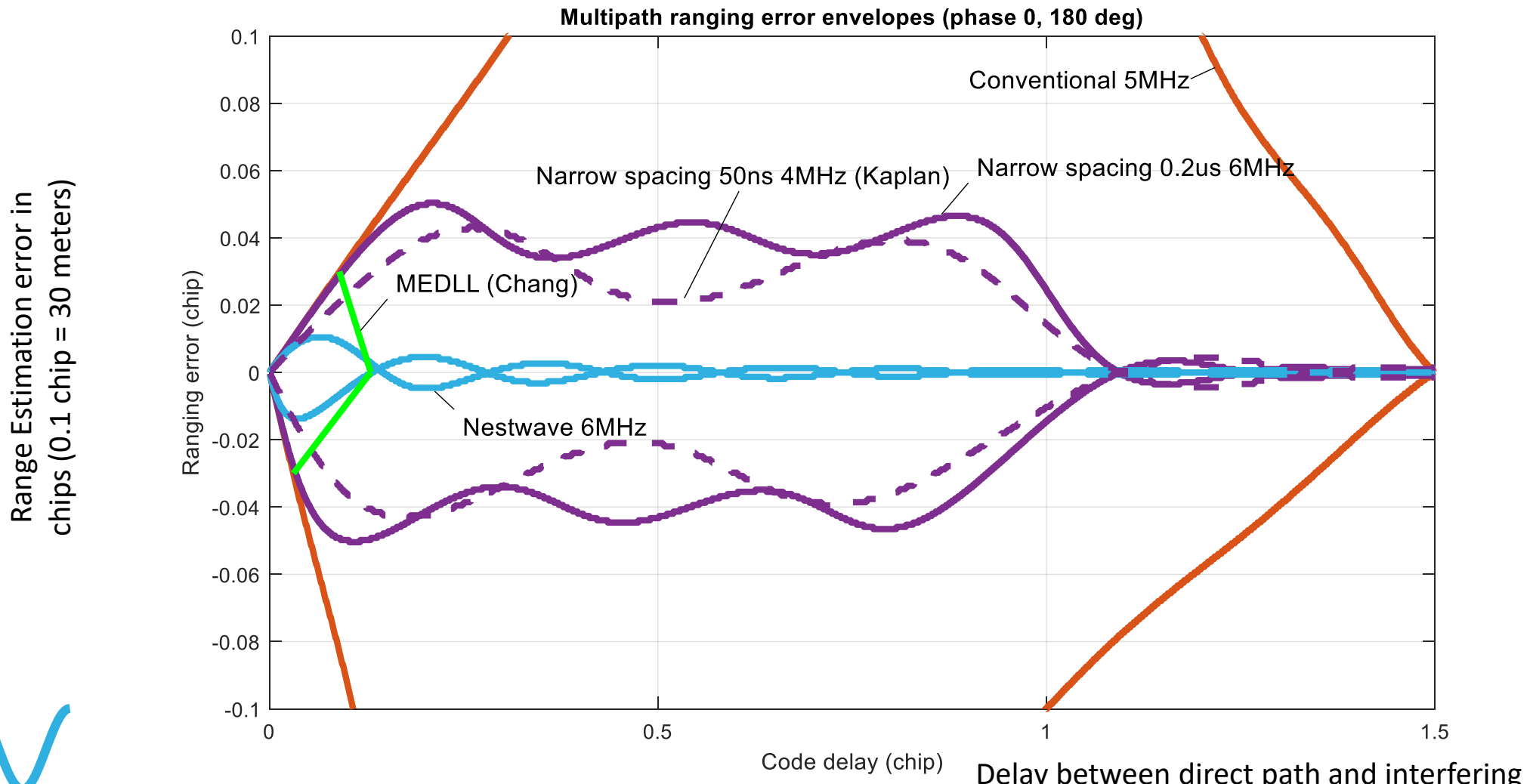
Our Multipath Mitigation in GPS

Standard comparison of ranging error envelopes for 1 interfering path



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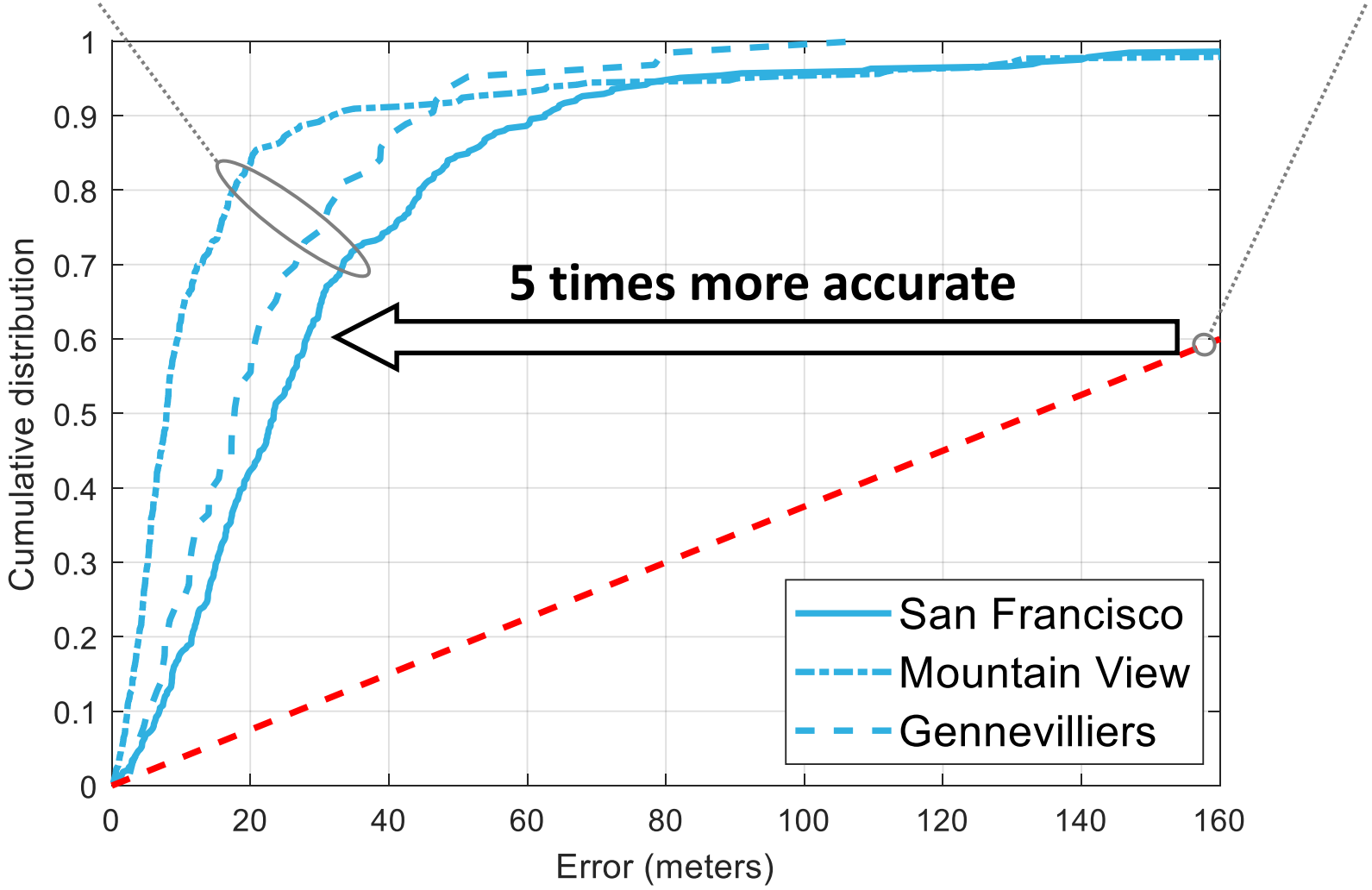
Our Indoor & Outdoor Field Results

Our Solution

Competition in 2013



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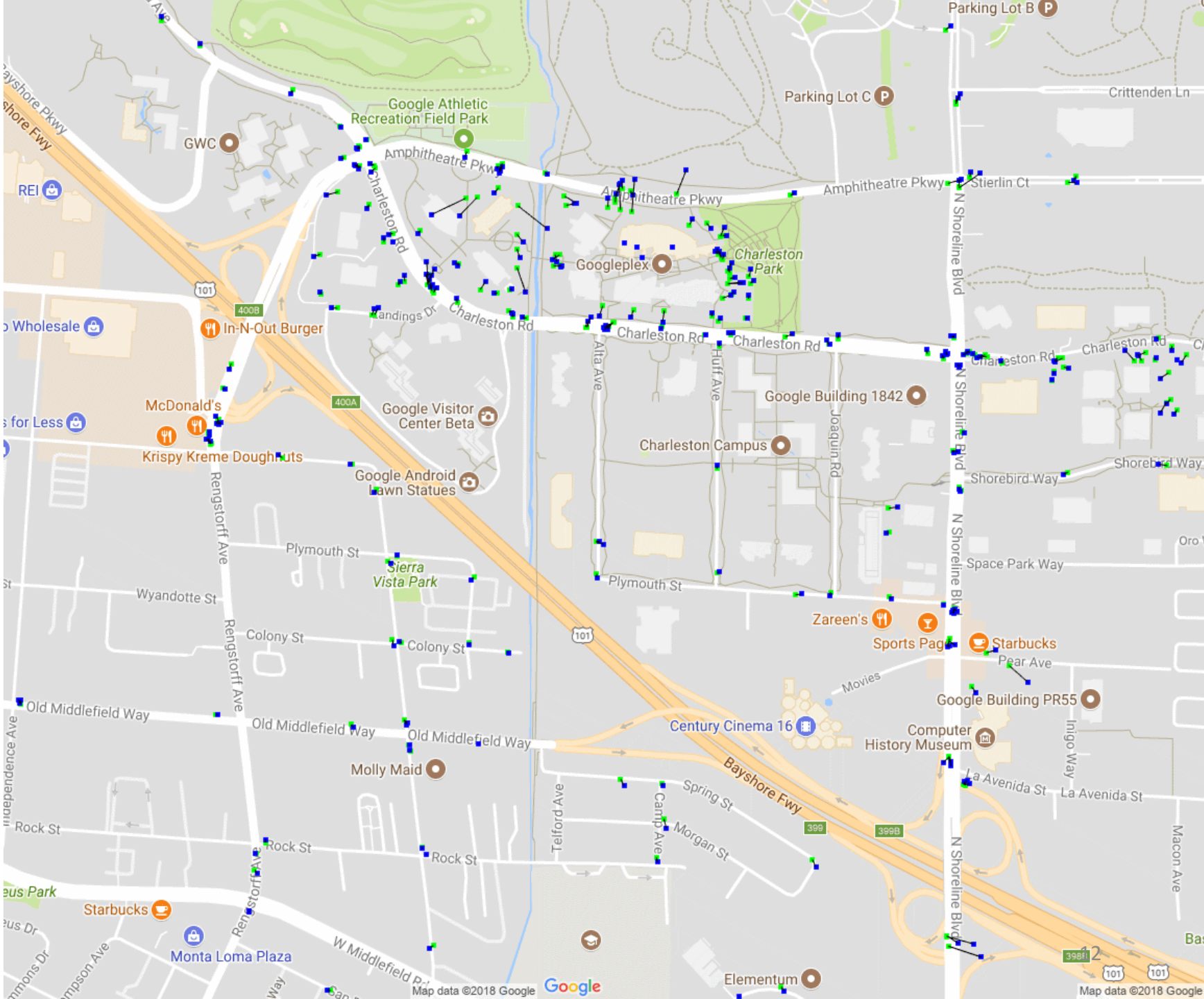
Mountain View 4G Trial

- True position
- Estimated position



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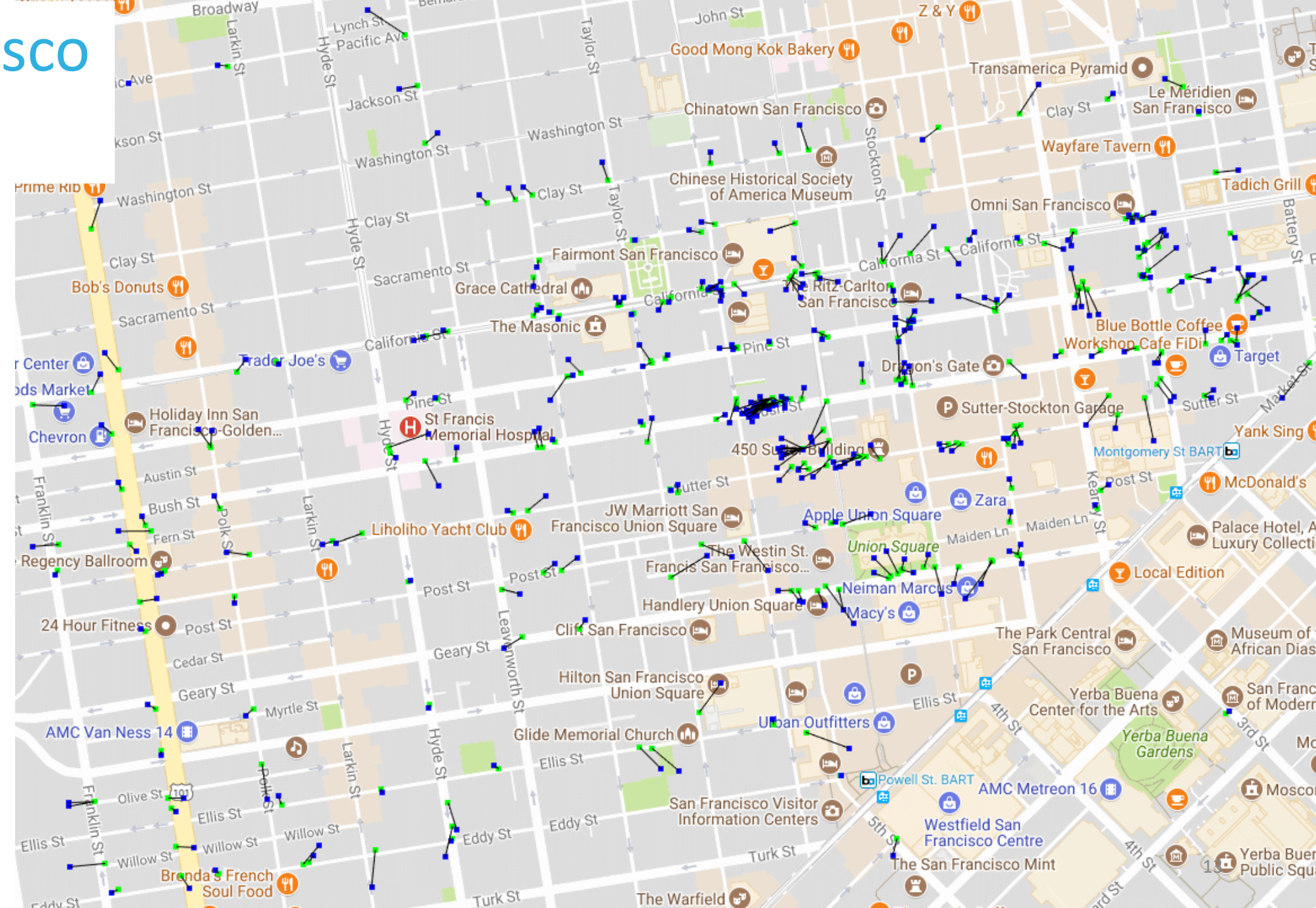
San Francisco 4G Trial

- True position
- Estimated position



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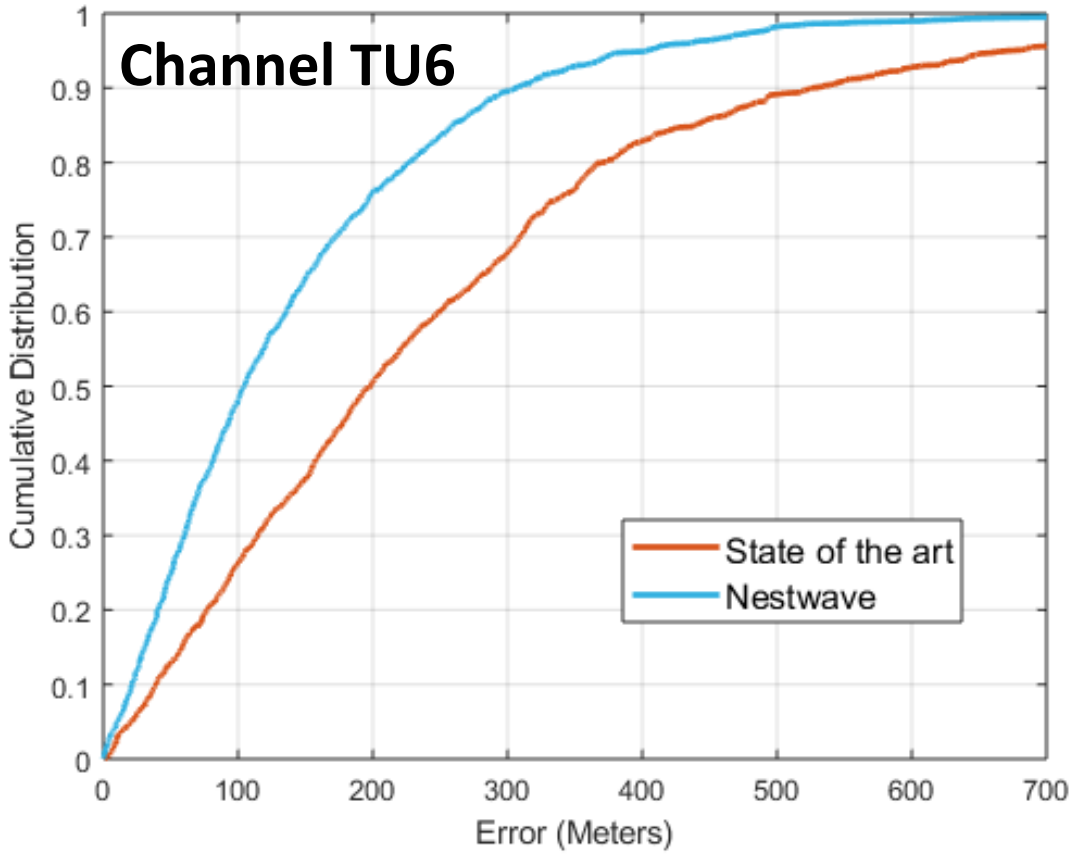
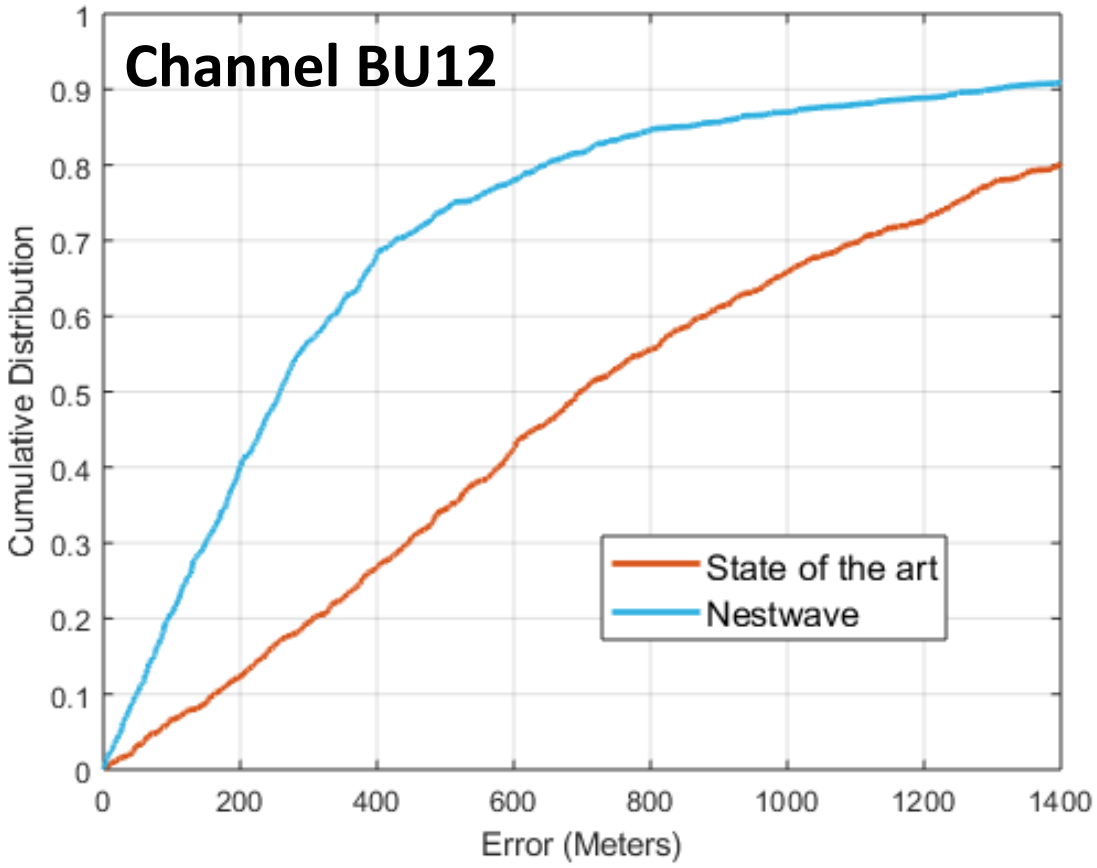
Multipath Mitigation in LoRa

Timestamp Estimation: simulation comparison for LoRa in two different channels

Nestwave's algorithm achieves strong gains in difficult channels (i.e. in worst case scenarios)





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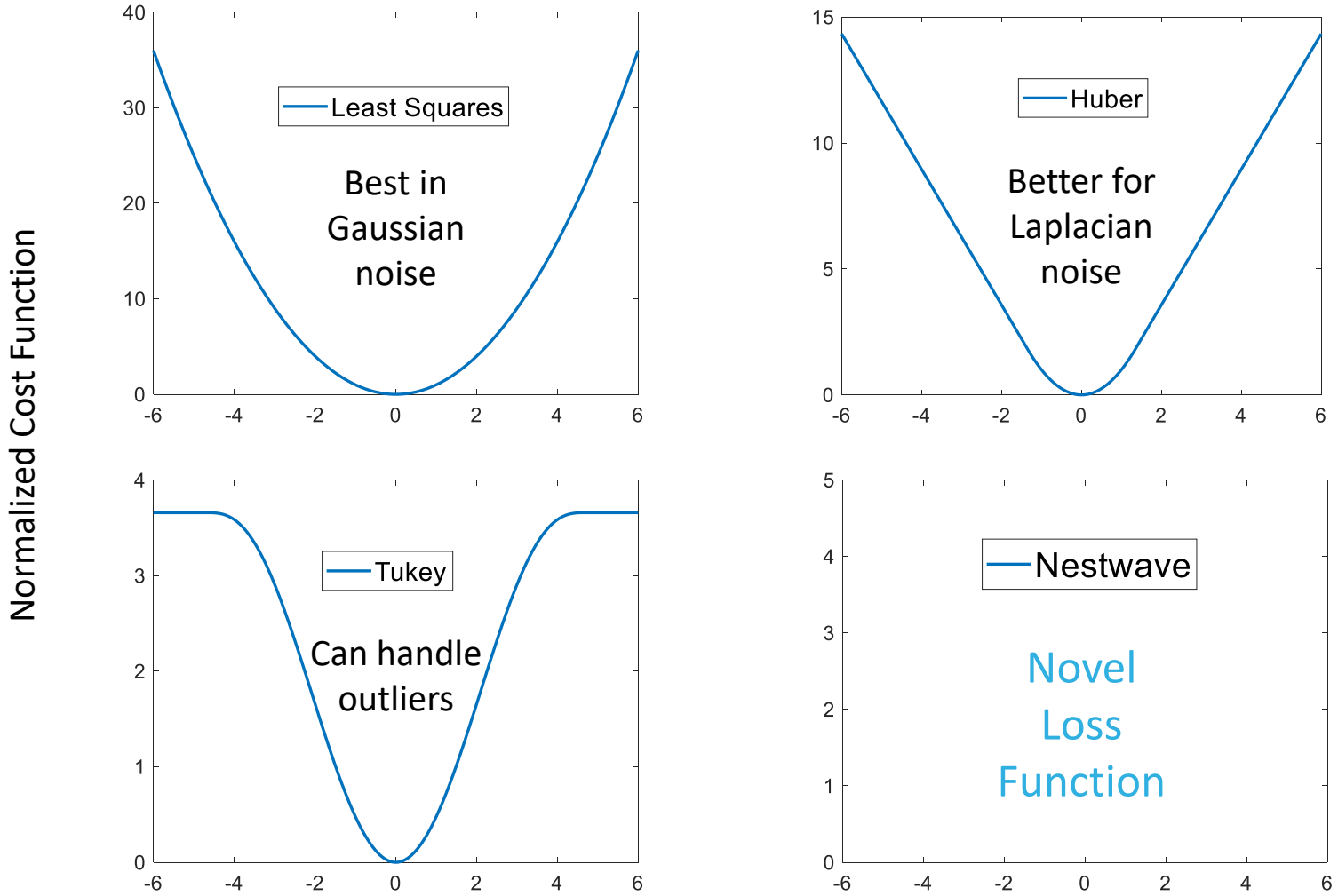
Multilateration Solver

Our multilateration Solver for GPS, 4G and LoRa incorporates several advanced features such as novel M-Estimation



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