



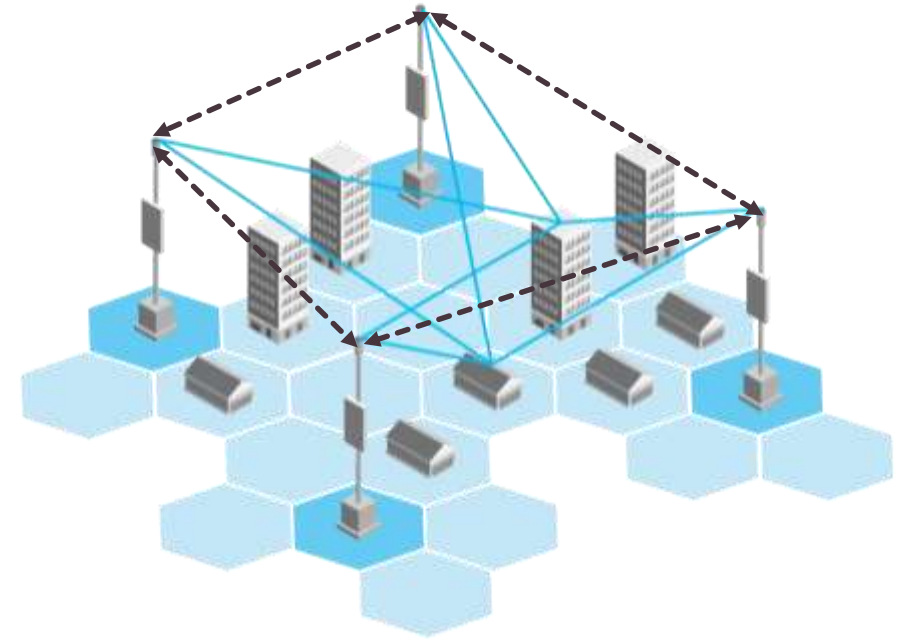
# Welcome to Next Generation GNSS

MORE AVAILABLE  
MORE RESILIENT  
MORE ACCURATE

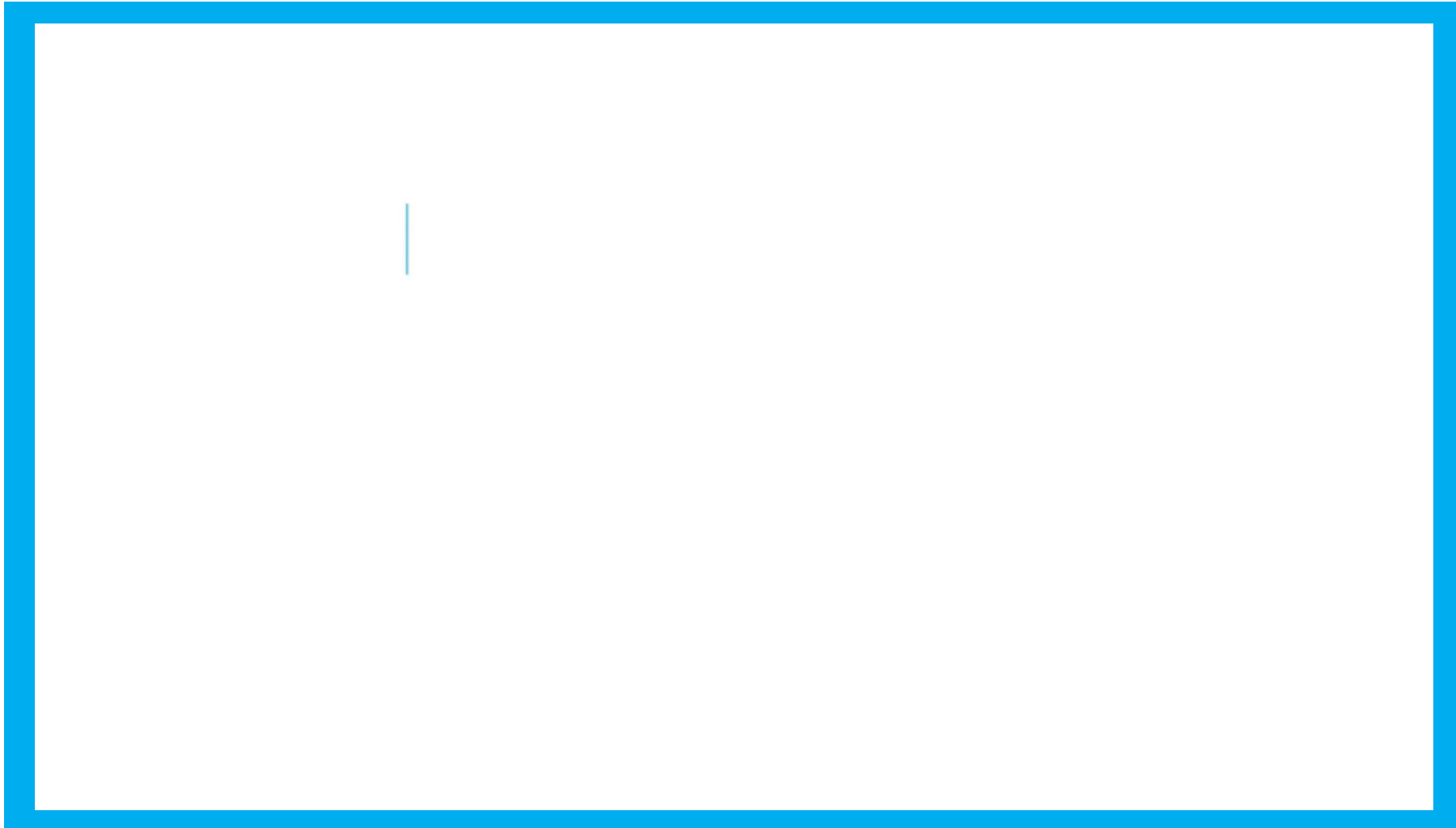
# TerraPoiNT – ‘Terrestrial GPS’

Full Position, Navigation and Timing (PNT) capabilities

- Scalable: Terrestrial broadcast beacons provides wide area macro or campus coverage
- Secure: Resistant to spoofing and jamming
  - Over 100,000x stronger than GPS & encrypted signal
- Independent of GPS: built-in atomic clocks and ability to self-synchronize (nanosecond sync) with absolute time source
- Mass market capable: Integrates into GPS/LTE/5G chipsets at minimal to no cost
- Relatively frequency agile: US: 920-928 MHz; Japan: 855-860 MHz



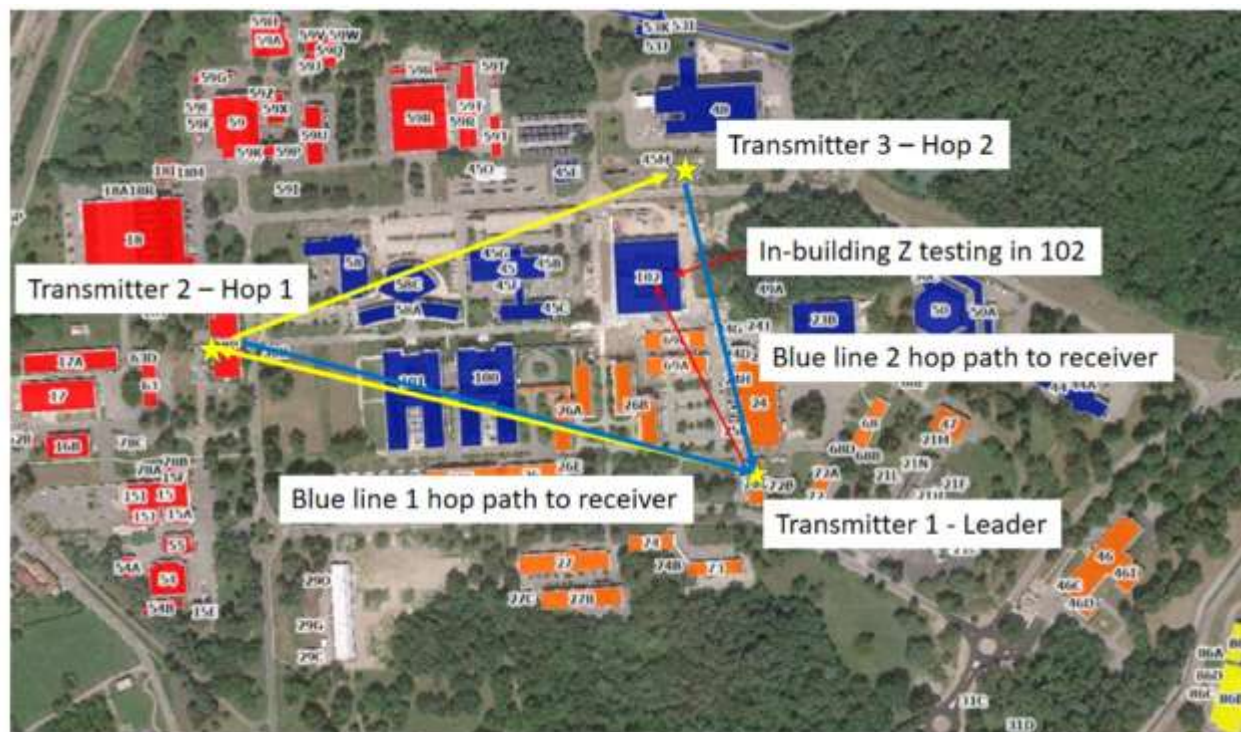
# Helicopter & Car Demo Video



# JRC Testing Summary

## Tests Conducted:

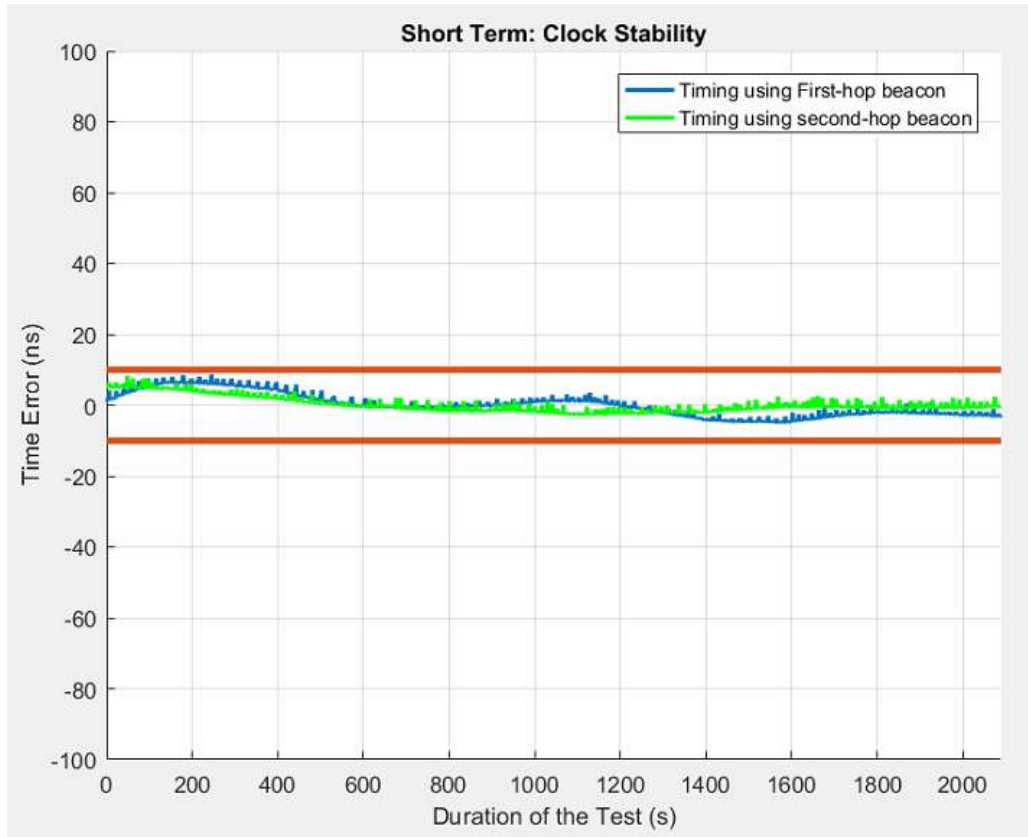
- Timing Stability within 15 ns 90% of the time across the network and end receiver
- Z Vertical Accuracy within +/- 1m 90% of the time through the entire test



- 3 Beacon timing and z-only network
- Leader beacon utilizes an absolute time source
- All beacons capable of listening to the others to synchronize through time transfer
  - Demonstrating scalability to a larger network
  - Multiple beacon paths for time transfer improves redundancy and robustness
- Network was operating in GNSS-free mode 30 mins prior to the tests

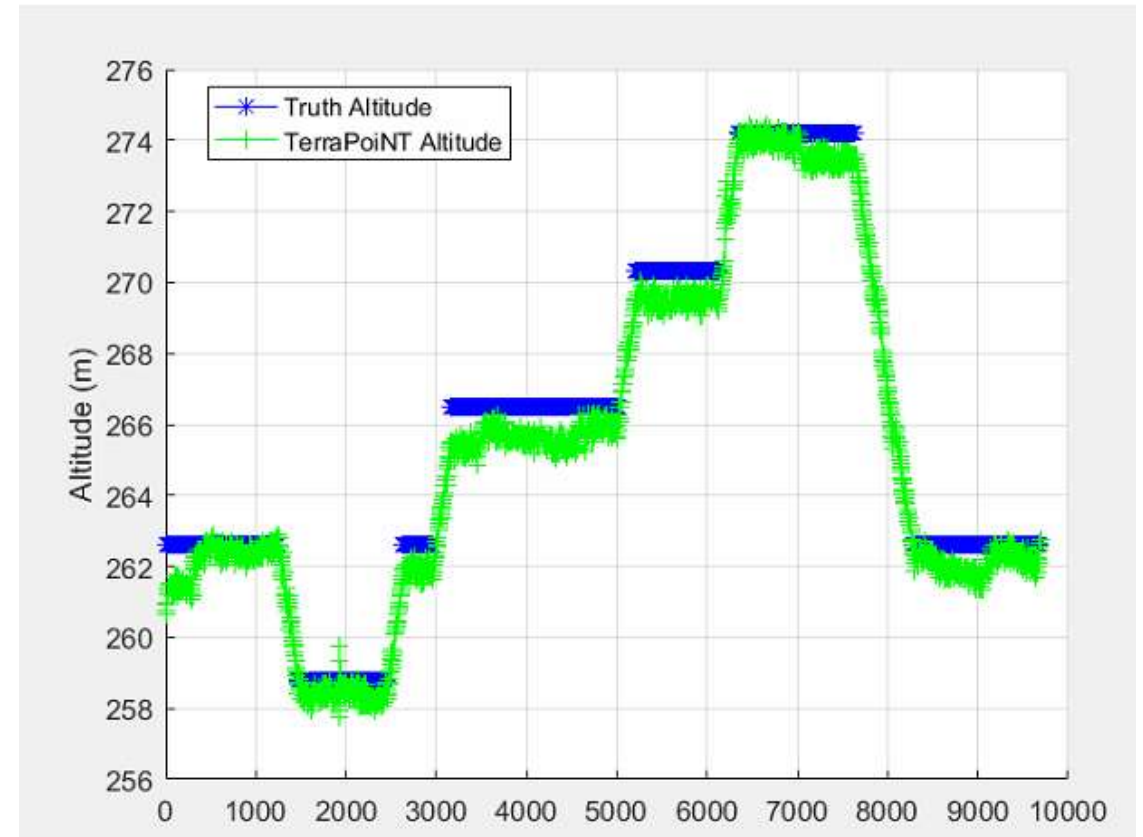
# Tests at JRC

[Test Title]



Timing Stability within 15 ns (90%)

[Test Title]

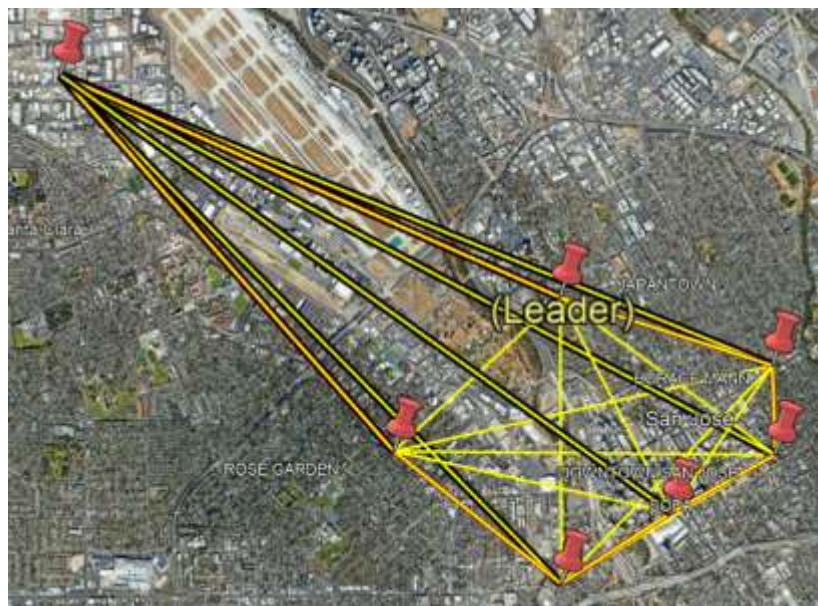


Z Accuracy within +/- 1m (90%)

# San Jose, Ca (SJC) Testing Summary

## Tests Conducted:

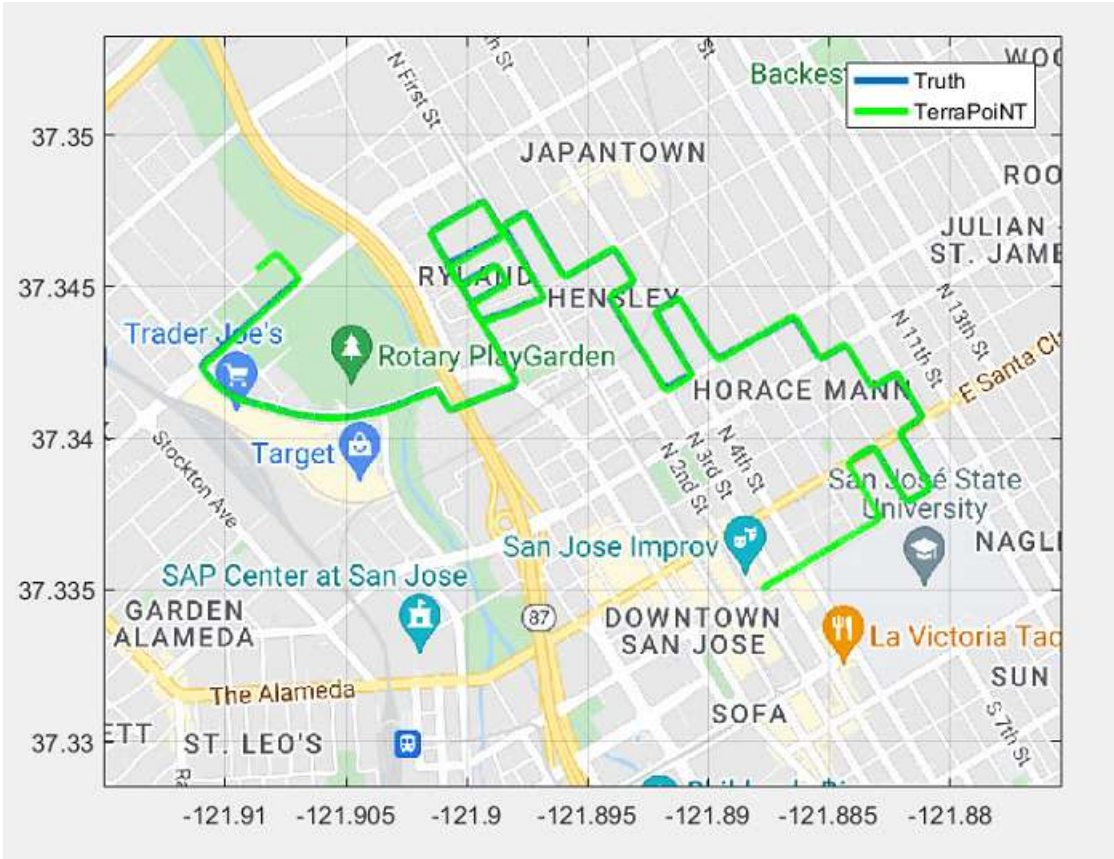
- Outdoor Kinematic X/Y Positioning within 10m 90% of the time
- Outdoor Static X/Y Positioning within 10m 90% of the time
- Indoor Static X/Y Positioning within 15m 90% of the time
- Z Vertical Accuracy within +/- 1 m 90% of the time through the entire test
- Timing Stability within 20 ns 90% of the time across the network and end receiver over ~12 days



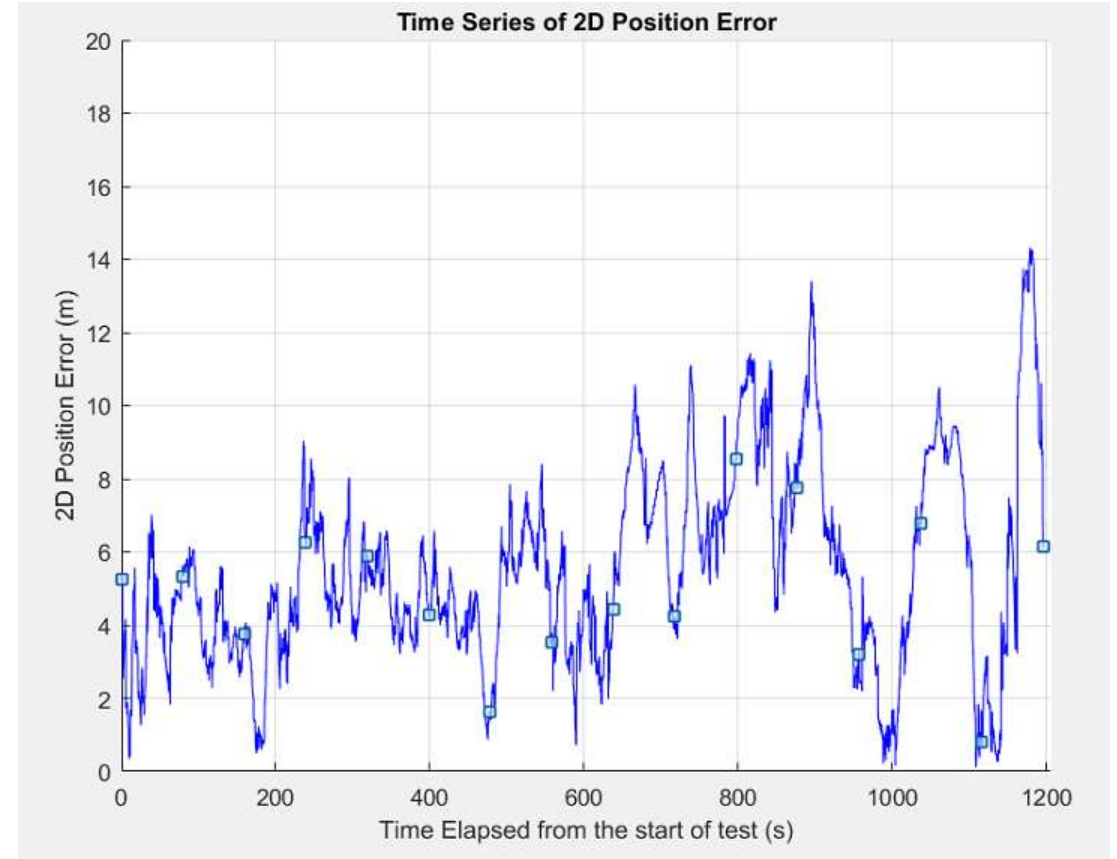
TerraPoiNT Beacon

- 7-beacon APNT Network
- Multiple possible time-transfer path per beacon providing inherent resilience
- Network was operating in GNSS-free mode 15 days prior to the tests

# T6A: Kinematic Drive (SJC)



Test Drive Route



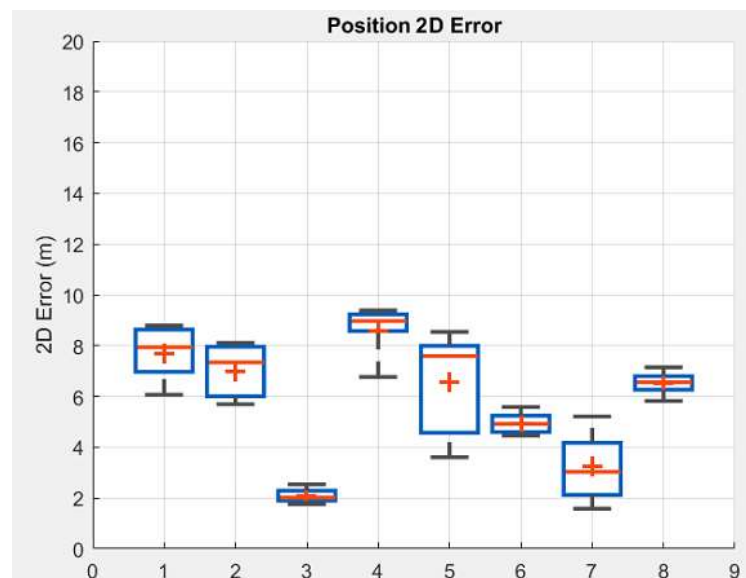
Time series of 2D Position Error

# T7D: Static 3D Positioning Tests (at SJC)



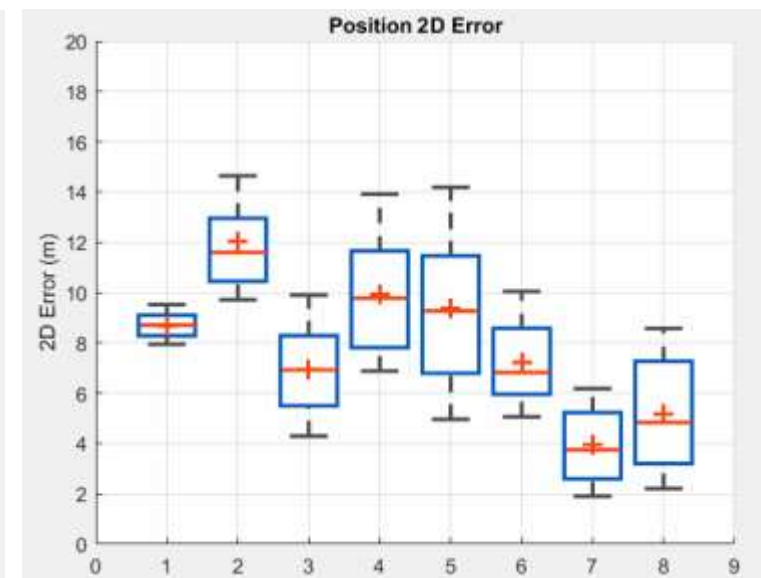
Test point TerraPoiNT Beacon

Outdoor



Position 2D Accuracy  
within 10m (90%) for  
outdoor test points

Indoor

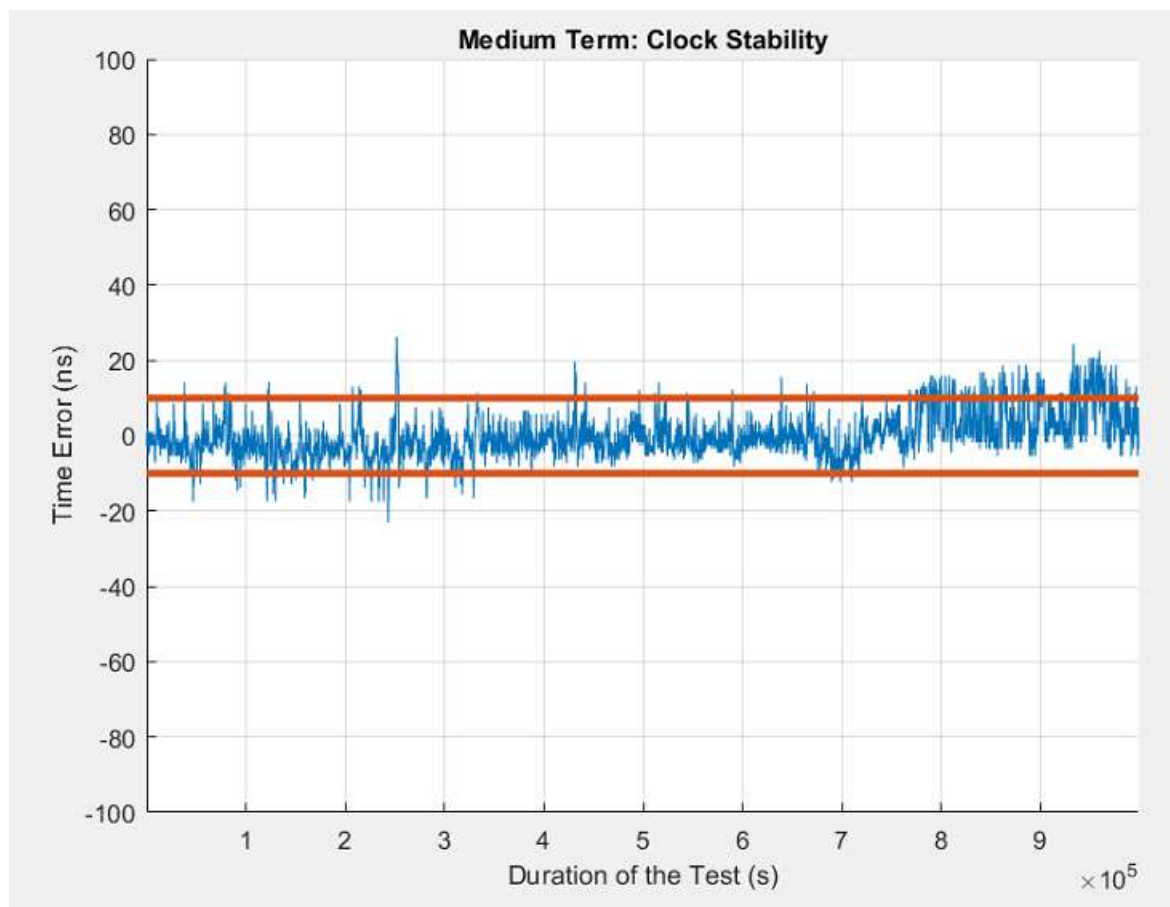


Position 2D Accuracy  
within 15 m(90%) for  
indoor test points

Z Accuracy within 1 m (90%) for all test points



# T3H:Medium Term Timing Test (at SJC)



Time Stability within 20ns (90%) over 11.55 days



*Next Generation GPS is here.*