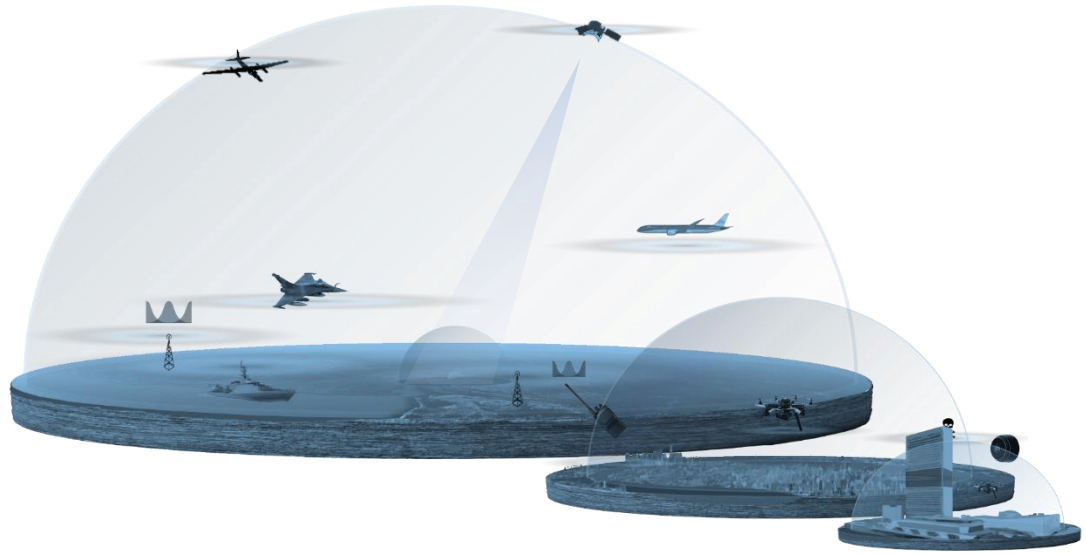
RFeye AirDefense

Passive long-range 3D geolocation and tracking of aircraft, UAS & missiles

CRFS Capabilities

Concept of Operations (ConOps) Operational View – 1 (OV1)

Wide Area Monitoring
Macro/Urban Monitoring
Micro Monitoring – Compounds & TSCM
Forensic Analysis – Captured Signals



OV-1: Operational View - Wide

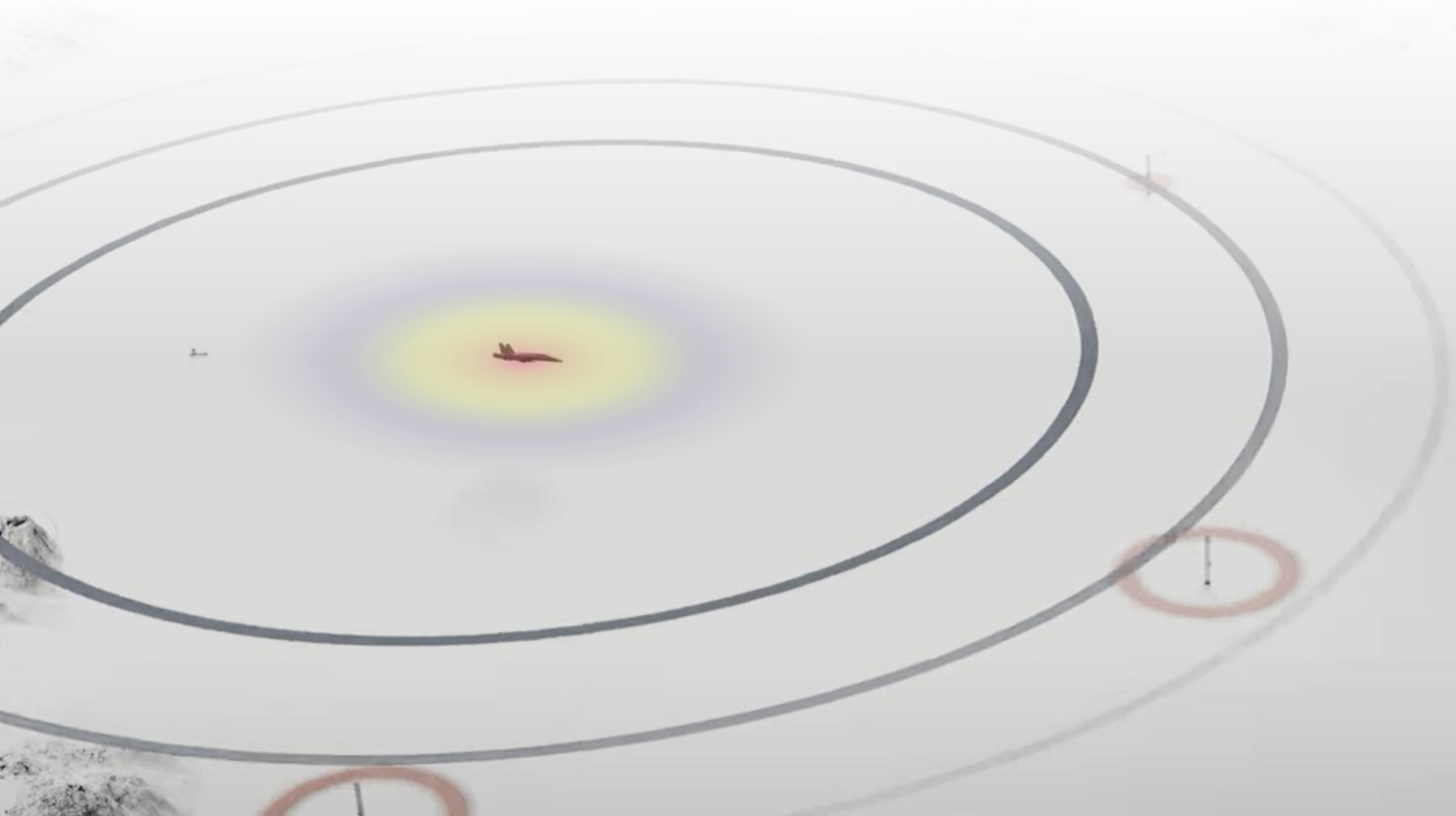
CRFS Concept of operations

Wide Area Monitoring:

- Marine Surveillance
- Air Defense & Space – 3 Dimensional
- Civil Aviation
- Spectrum Management
- Interference Hunting
- TDOA, AOA & Hybrid geolocation

RFeye AirDefense

Passive long-range 3D geolocation



- Wide-area (400+km) RF 3D geolocation and intelligence system
- Identify and track aircraft RF emissions while remaining invisible to electronic detection.
- Ideal for border monitoring, radar augmentation, target acquisition, spoofing detection, jamming detection
- 3D TDOA to achieve highly accurate tracking of "low and high-speed RF emitters"

RFeye AirDefense Applications

Multi-mission capabilities

Missile cueing

Can provide key data to create a cue for a missile defense system

Surveillance

Provides covert intelligence on the movements of adversarial aircraft

Jammer location

Can provide precise geolocation of jamming source – In built GPS Holdover

Missile tracking

Can track missile flight paths and act as part of a missile early warning system

Drone/UAS detection

The same technology can be configured the detect and alert to the presence of drones/UAS

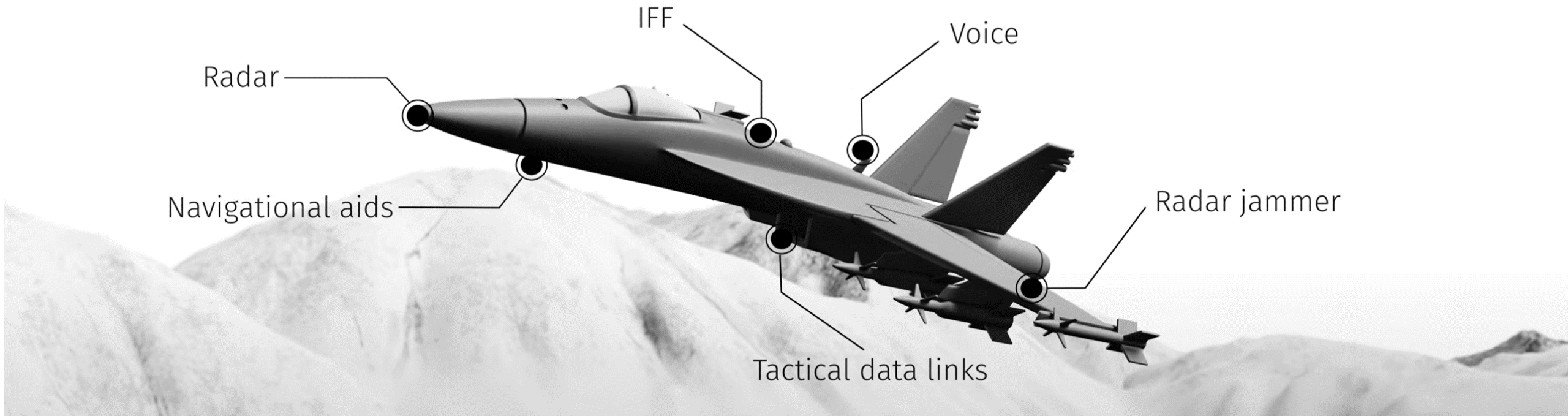
Training

Flying dark, verified EMCON training

See without being seen

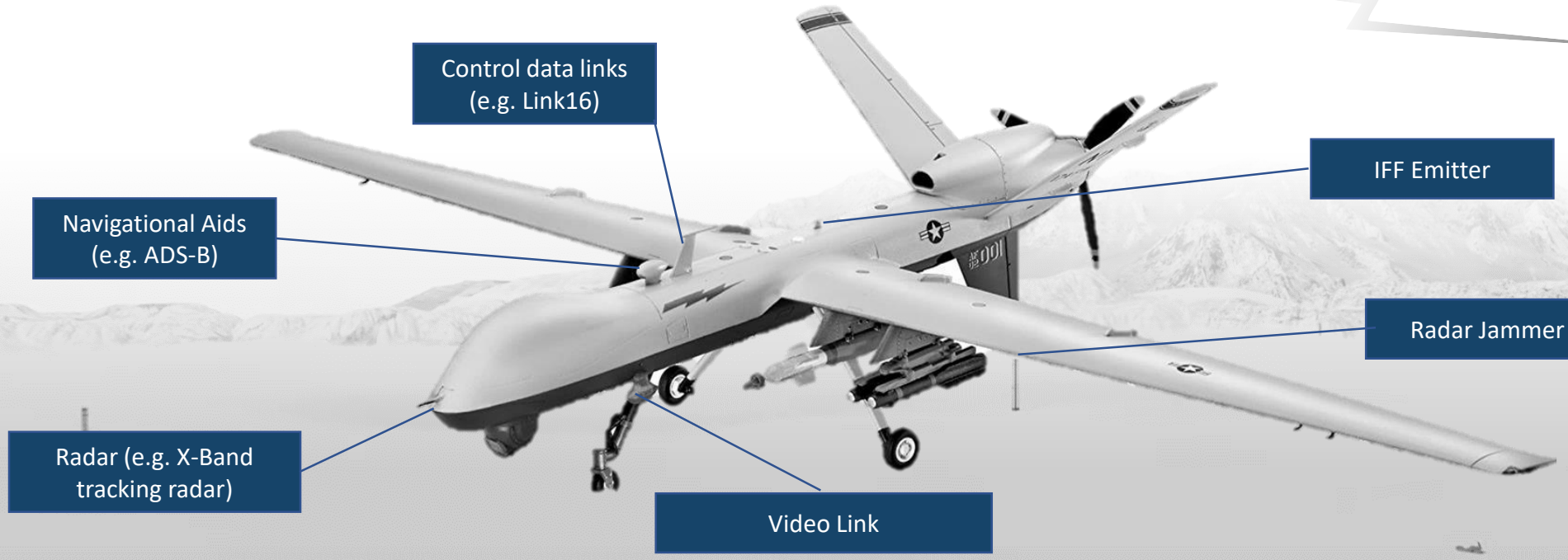
Passive RF detection

- Most aircraft will emit some sort of RF signal
- RFeye AirDefense can detect and geolocate these transmissions
- While you can monitor their RF transmissions, they won't be able to see you.



Drone Emissions

Known & Unknown Energy Sources



Augmenting radar

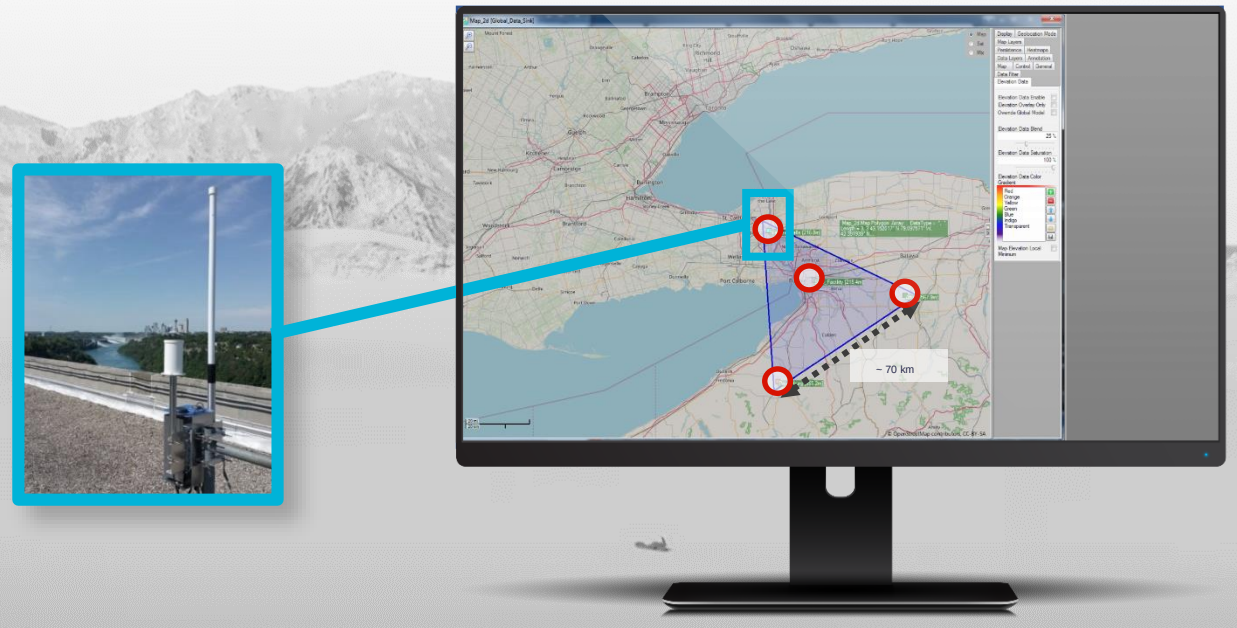
Adding another pair of eyes

- Radar stations can be detected and identified by their EM emissions
- An enemy aircraft detecting the radar could:
  - Change their flight path
  - Deploy jamming counter measures
  - Destroy the radar with radar seeking missiles
- RFeye AirDefense can passively detect the hostile aircraft without them being aware they are being tracked.
- RF geolocations data can be feed into command-and-control systems, so the radar only turned on when it is needed.

How it works

AirDefense setup

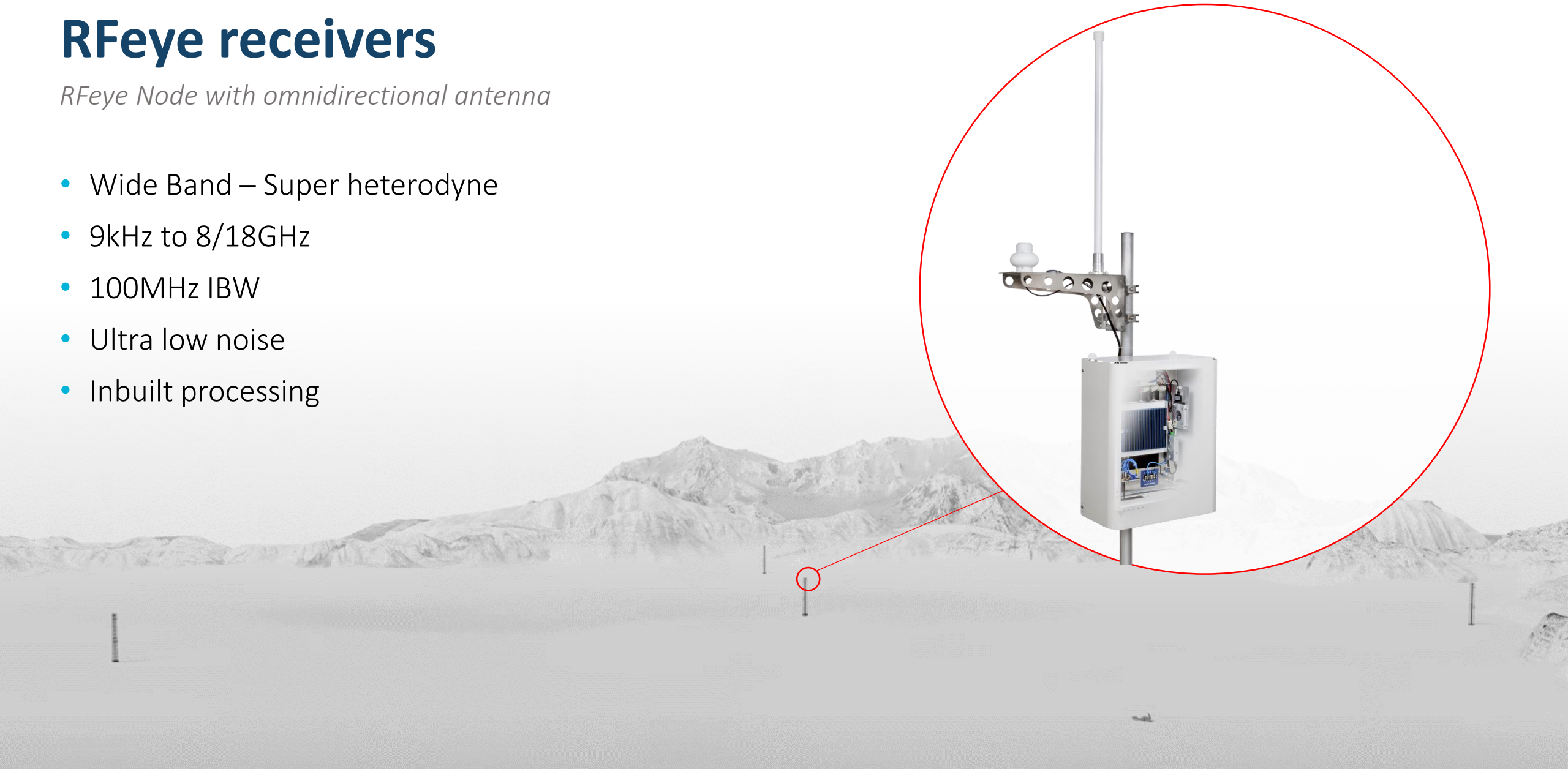
- RFeye AirDefense uses a network of four or more RFeye receiver Nodes
- Received signals are geolocated using 3D TDOA (Time Difference of Arrival)
- Results displayed within RFeye Site include:
  - Current and previous location: Lat/Long
  - Predicted flight track
  - Altitude: ft/m
- This information can be used to calculate
  - Course
  - Heading
  - Speed



RFeye receivers

RFeye Node with omnidirectional antenna

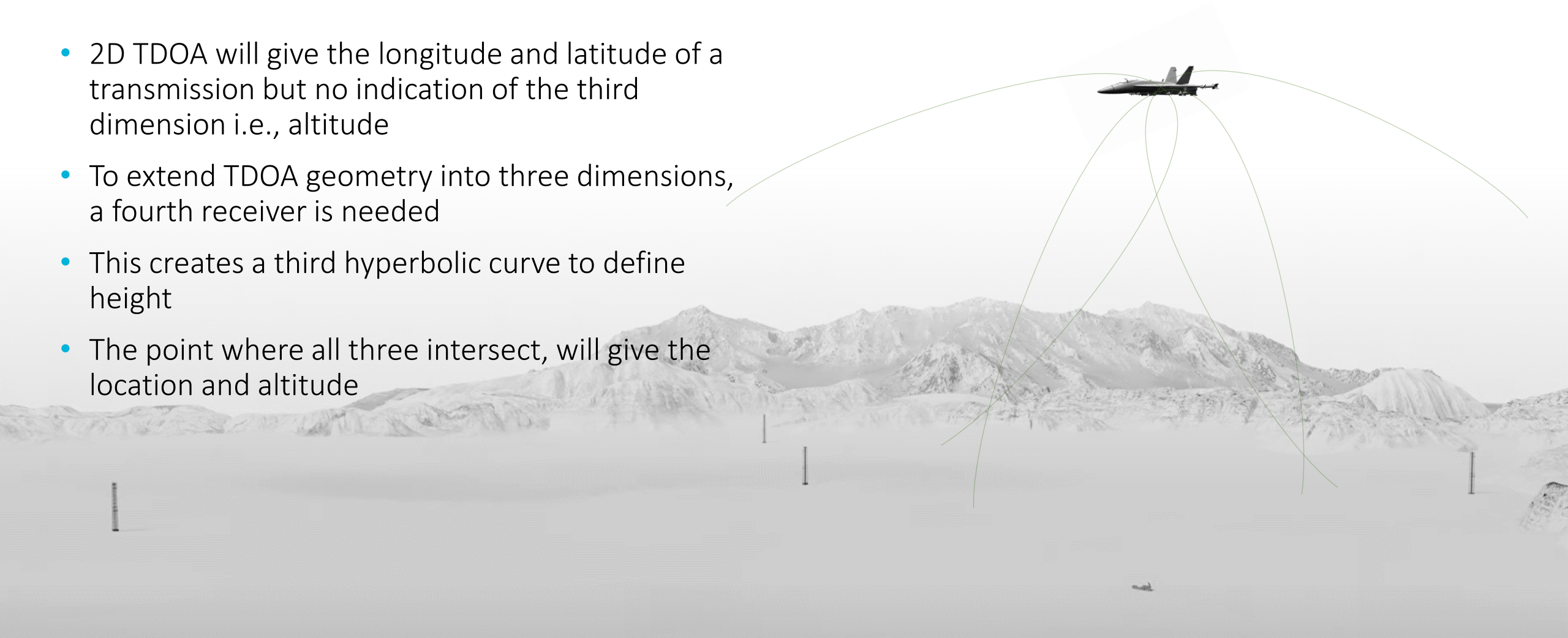
- Wide Band – Super heterodyne
- 9kHz to 8/18GHz
- 100MHz IBW
- Ultra low noise
- Inbuilt processing



3D-TDOA

Three-dimensional geolocation of airborne targets

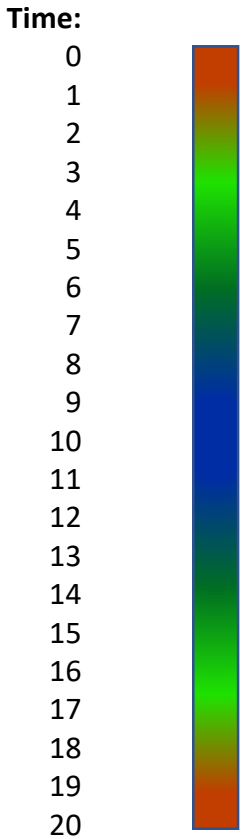
- 2D TDOA will give the longitude and latitude of a transmission but no indication of the third dimension i.e., altitude
- To extend TDOA geometry into three dimensions, a fourth receiver is needed
- This creates a third hyperbolic curve to define height
- The point where all three intersect, will give the location and altitude

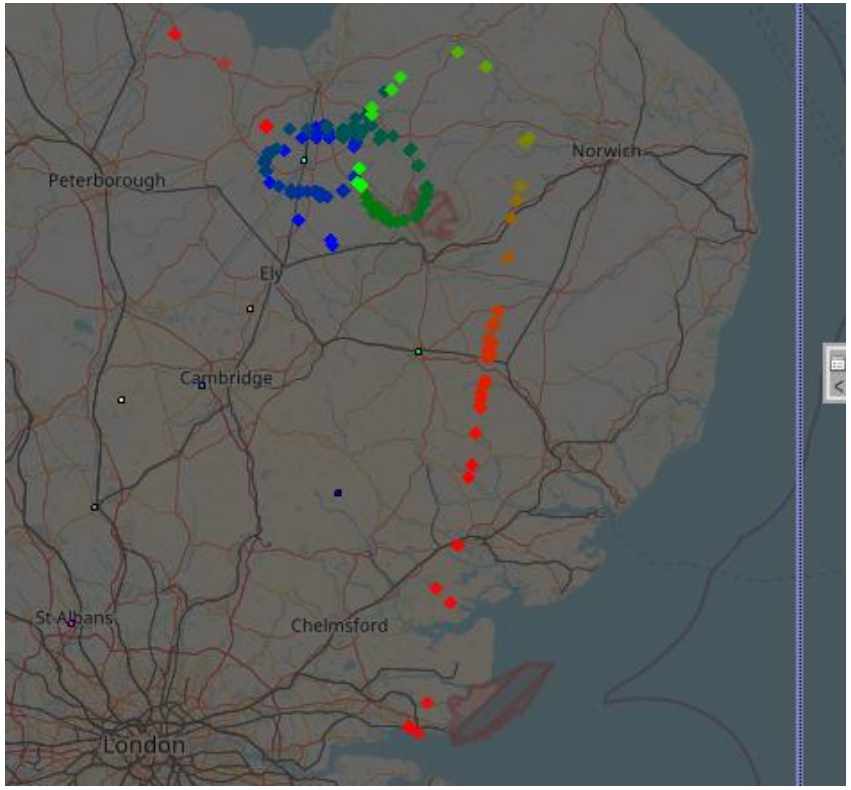


Flight path v Time

Aircraft Link-16 Track vs. Time

- Aircraft transmitting Link-16
- Time indicating presentation
- Blue is oldest
- Red is most recent
- Aircraft was not transmitting either DME/TACAN or ADS-B
- Second aircraft entered from north after first aircraft departed area



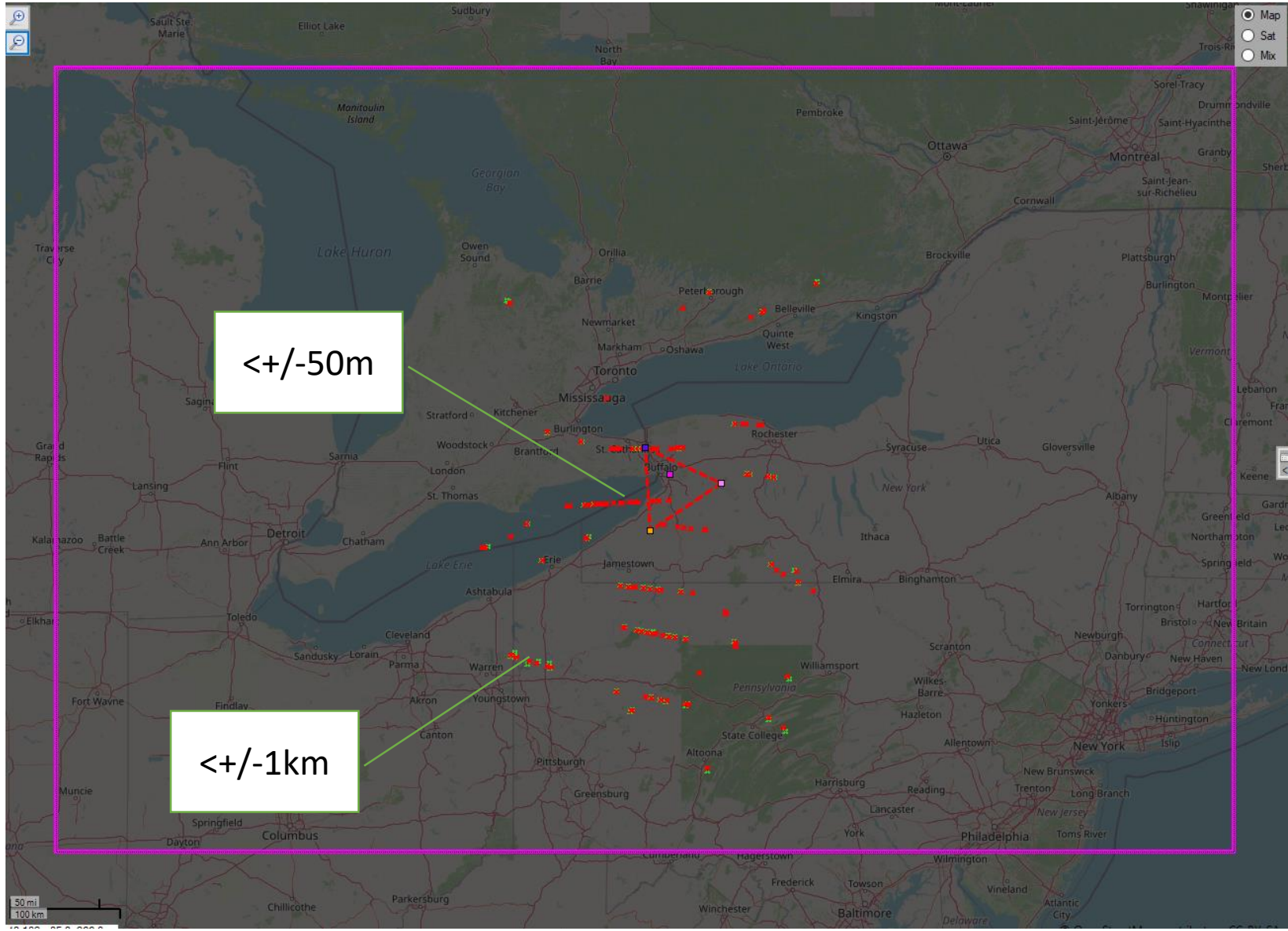


Here we see a Link-16 emission revealing an aircrafts flight path over the UK in real time

Accuracy

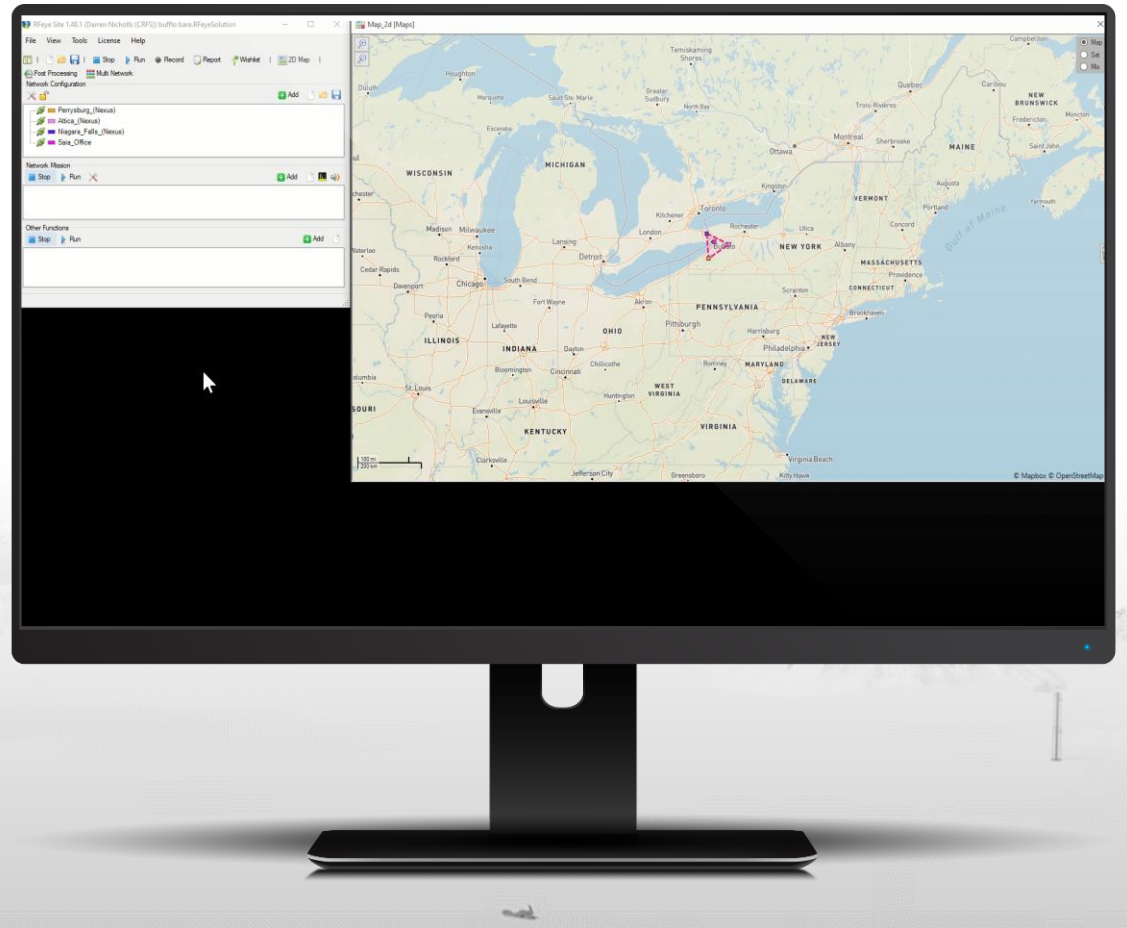
Live analysis

If I run a comparison of ADS decoded against our ADS geolocated data then close to the network we have in the region of < +/- 50m.
If I then look at target 200km from network the accuracy is in the region of <+/- 1km



Live Prosecution

Recorded for brevity



Conclusion

DETECT – LOCATE - PROTECT

1. Cue radar targeting without giving away location
2. See across borders – Wide area intelligence picture
3. Train to win - EMCON verification

Any questions?

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Thank You