ROKE

SINGLE SITE LOCATION

Geolocation of targets from a single sensor

SINGLE SITE GEOLOCATION

Using a single Angle of Arrival direction finding (DF) system, and a model of skywave propagation, the Roke-SSL algorithm can geolocate HF emitters. This software uplift delivers multi-site Direction Finding via a single HFDF site with the associated cost benefits.

HOW IT WORKS

HF skywave signals propagate through refraction through the ionosphere and bouncing off the earth's surface. This typically occurs below 10MHz but can occur across the HF spectrum. Roke have created an accurate ray-tracing model, and when combined with a DF system that provides azimuth and elevation bearings this can be used to calculate the emitter location. Skywaves can hop several times from transmitter to receiver, and the Roke-SSL algorithm works with multiple hops.

INTEGRATION

Available within VIPER/PREFIX, as a standalone offline software library or as an HTTP API subscription service, the Roke-SSL capability is easy to access and integrate with new or existing HF geolocation systems from other vendors.

TARGET TRACKING

SSL can be used to locate static or mobile targets. The algorithm is largely autonomous and uses instantaneous DF measurements to enable short duration and mobile targets to be located and tracked. Static targets offer higher accuracy using long term averaging, or fusion with other measurements visualised as density heat maps. SSL can be used to geolocate HF comms or radar emitters.
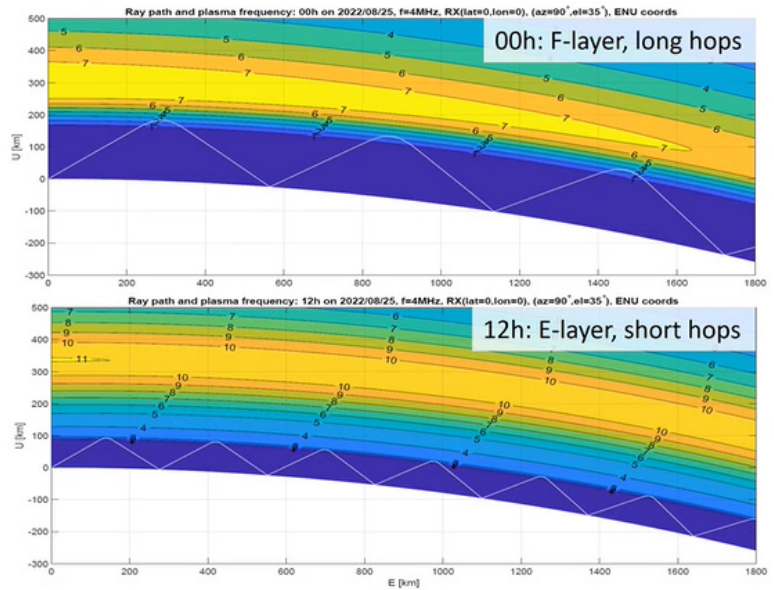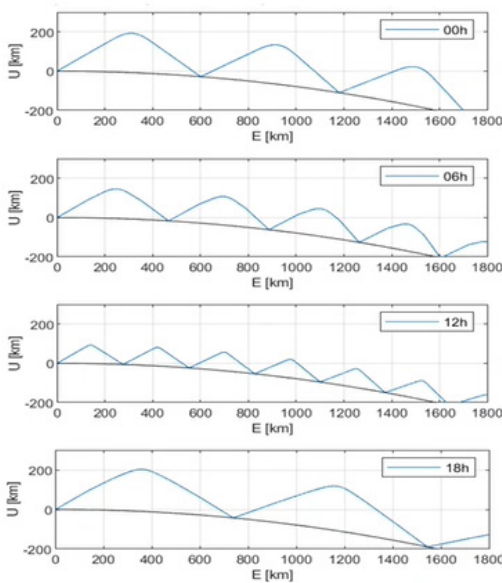
FEATURES

- Accurate Geolocation of skywave HF Emitters (Comms or Radar)

- Reverse compatible with Roke LOCATE and LOCATE-T systems

- Uses open source ionospheric and geomagnetic models

- Fast calculation speed (<10sec)

- Confidence interval reporting

- Works with short duration emitters

BENEFITS

- HF skywave geolocation from a single HF system

- Additional range input into Position Fix algorithm to improve accuracy and confidence

- Geolocation of HF emitters with disadvantaged sensor geometry

- Reduction in operating cost

- Software uplift, no additional hardware needed

IONOSPHERE MODEL: Propogation by time of day, E-Layer and F-Layer

Technical Specifications	
Frequency Range	0.1 to 30MHz.
Signal Type	Skywave propagation.
Calculation Approach	Reciprocal ray-tracing.
Mathematical Models Used	Electron Density model - IRI2020 ionospheric model. Geomagnetic field - IGRF13 geomagnetic model. Integrate other models such as local Ionosound inputs as available. Models can be updated weekly via tactical radios.
Calculation Speed	<10 seconds solve time per hop using Roke-SSL HTTP API service.

SSL Algorithm Interface	
Inputs	Timestamp. Location. Frequency. Azimuth(s) & Elevation(s) observations. Max Hop Count. Mathematical Model Selection.
Outputs	Lat/Long of positon fix centre(s). Range/Bearing positon fix centre(s). Major/Minor/θ of error ellipse(s).
Confidence Interval	95% Ellipse Error Probability (EEP).

Licensing Options	
VIPER/PREFIX	Available as an option within VIPER/PREFIX.
Library	Available as a software library for integration into your ES capability.
Service	Available via the Roke-SSL HTTP API (subscription billing).