

CROSSCUT

ULTRAWIDEBAND MULTIPURPOSE DIRECTION FINDING SYSTEM

AIR



LAND



SEA



CrossCut™ Family of Ultrawideband Direction Finders

The Applied Signal Intelligence (ASI) CrossCut™ family of Ultrawideband, Direction Finding systems provides unparalleled performance with the smallest form factor available in the market.



The CrossCut™ Direction Finding (DF) system is an ultrawide bandwidth, 1-1000 MHz, precision DF system. The system is based on ASI's recent advances in ultrawideband (UWB) vector-sensor DF technology. These advances enable a much smaller system footprint than traditional DF systems.

Major elements of the system include:

- 6-channel DF aperture
- Horizontally and vertically polarized collection antennas (multiple options)
- Low noise front end amplifiers
- 8 channel phase-coherent Digital tuner
- Server and storage
- Multiple workstations



Key Facts

- Electrically small yet very wideband vector sensors ($\ll 1/10\lambda$)
- Low noise amplifiers to mitigate the low gain of small antennas (0.69 dB NF/ 50°K TN)
- AoA estimates with angle errors less than 2° RMS
- Phase coherent channels with 40 MHz instantaneous bandwidth for complete signal detection coverage

CrossCut™ Family of Ultrawideband Direction Finders	1
Key Facts	3
40 MHz Stare and integrated RF Detection	4
Groundbreaking Antenna Technology	5
Signal Processing	6
Signal Analysis	7
LOB Display & Mapping Features	8
Specifications	9
System Variations	10
Performance	13
Applied Signals Intelligence (ASI)	16

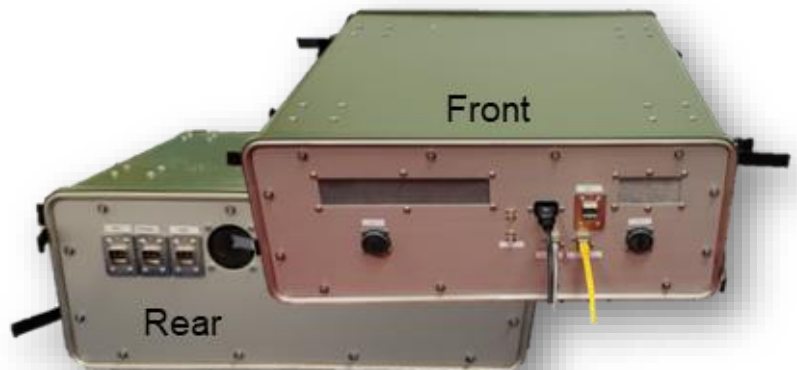
40 MHz Stare and integrated RF Detection



User Interface

Eight phase coherent channels with system Noise Figure (NF) of 3 dB through the digitization stage allow an operator to stare at a wideband swath of the RF spectrum, automatically detect signals of interest and plot lines of bearing for multiple emitters on an integrated map display.

The analog to digital converters (ADC) are 16 bits each and use GPS disciplined sampling clocks. Digital IO is through two 10 Gigabit Ethernet (GbE) SFP+ ports for IQ data and one GbE port for control. The data format is Vita 49 (VRL framing, VRT packets) with 16 bit I and 16 bit Q data payloads.



Groundbreaking Antenna Technology

Vector Sensor Technology

Applied Signals Intelligence, Inc., (ASI) has developed a new class of scalable vector sensor antenna with associated signal processing covered under US patent 9,279,880. The antennas are electrically small (<10% wavelength), lightweight, extremely wide bandwidth and require minimal spacing between elements for optimum performance.

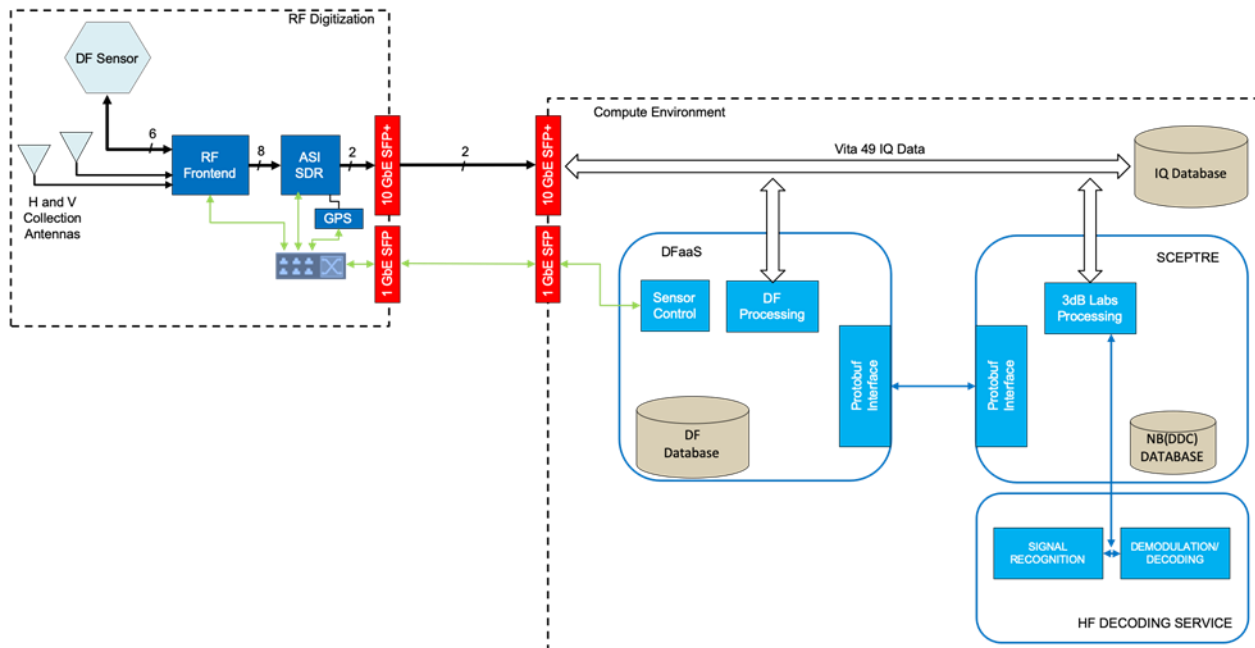
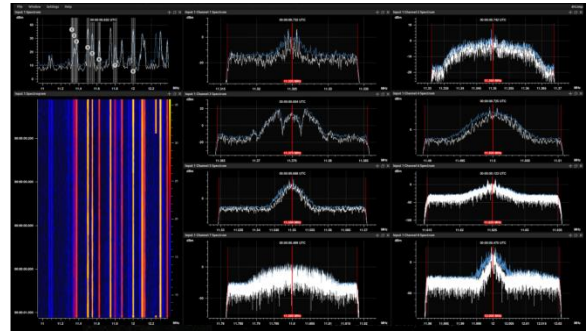
The single array pictured on the right will cover 1-1000 MHz with 1 degrees RMS across the band, no need to switch arrays or components for different bands. Minimal setup time and size of CrossCut™ obsoletes competitor HF arrays that require 50-150 meters of space to setup.

Size: 55.5" x 9.5" x 9.5"
Weight: 26 lbs.



Signal Processing

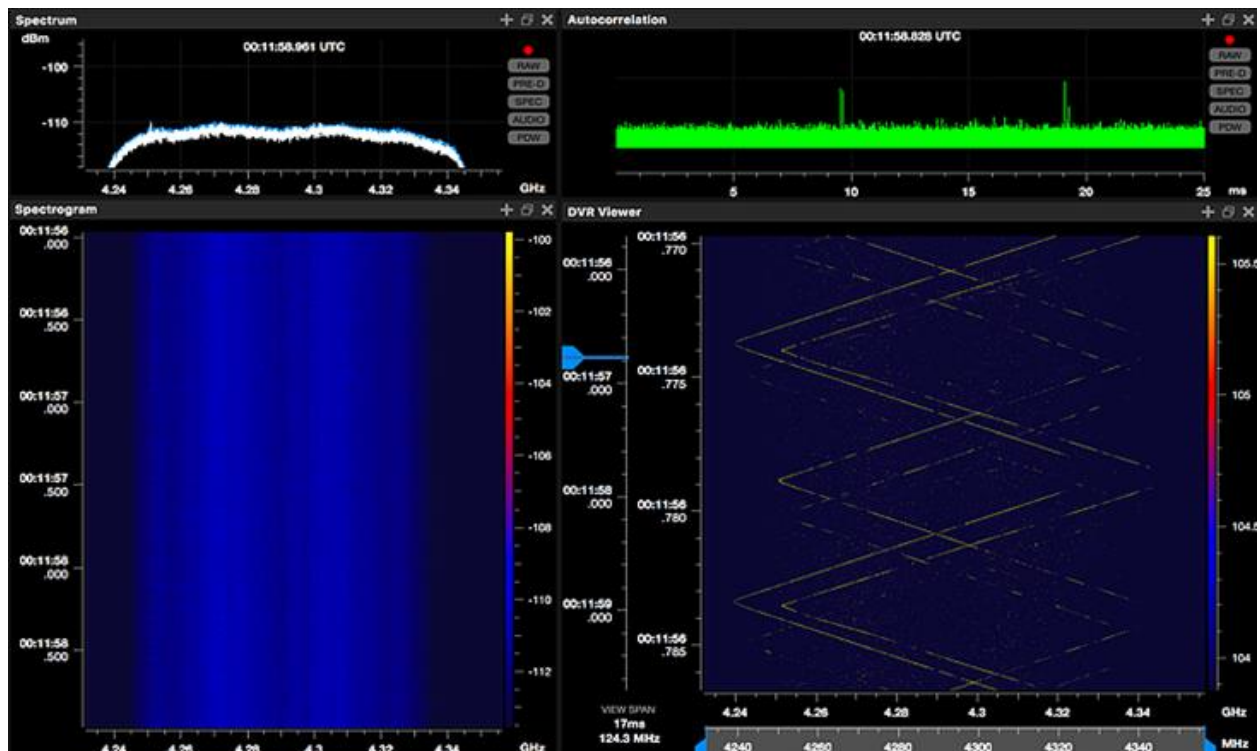
The system stares at a 40 MHz band on all 8 channels. Six of these channels are collecting IQ data for DF and two are collecting IQ data from antennas optimized for horizontally and vertically polarized signals. IQ data is stored to a database where it can be processed in real-time, near real-time, or post analysis. DF is performed by the DF-as-a-Service (DFaaS) software on signals of interest (SOI) identified by 3 dB Lab's SCEPTRE software suite.



Signal Analysis

ASI's DF-as-a-Service (DFaaS) is fully integrated with 3dB Labs SCEPTRE, a deployable, remoteable ISR collection software suite that can act alone or as a network of receivers to perform rapid signal ID, tip and cue and geolocation. The system supplies real-time analysis of COMINT signals. It performs real time bit breakout and data streaming out. The versatile nature of SCEPTRE allows a user to leave it unattended for days with its built-in circular buffer, an ideal solution for remote access, RF surveys, or post event analysis.

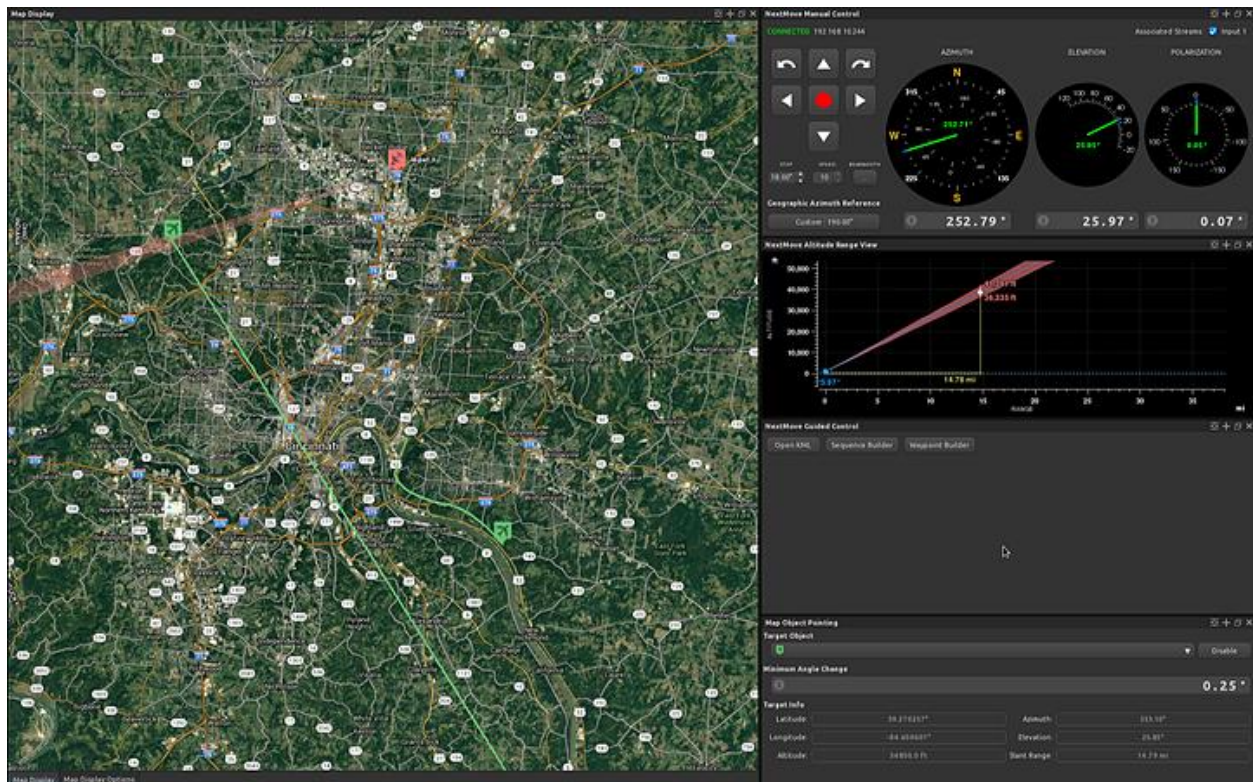
SCEPTRE also provides the ability to stream data directly to commercially available external applications with classification and decoding.



LOB Display & Mapping Features

SCEPTRE Software Suite

SCEPTRE displays LOBS on an integrated map allowing the user to visualize triangulation, plot target locations and maintain situational awareness of friendly forces in the operating area. The user can directly receive LOBs from outstations and automatically calculate an error ellipse using the combined data available.



Specifications

Specification	Value
Channels	8 phase coherent channels
Channel	6 channels assigned to DF aperture
Assignments	2 channels assigned to collection antennas (H and V polarizations)
Operating Band	1-1000 MHz
RF Digitization	8x 16-bit A/D converters
IBW	40 MHz
NF (IEEE)	3 dB
Sensitivity	-129 dBm (3kHz BW and 10dB SNR)
Dynamic Range	107 dB
Digital IO	Data: 2x 10GbE SFP+ Control: 1x GbE SFP or RJ45
IQ Data	Vita 49 (VRL framing, VRT packet) 16 bits I, 16 bits Q
Power	12-28 VDC, 110 VAC 60 Hz or 220 VAC 50 Hz, 60 Watts
Configuration	Ruggedized case and remote antenna

Note: Specifications are based on current software defined radio. Additional channels/digitizers may be added to increase number of sensors available for direction finding and improve system accuracy.

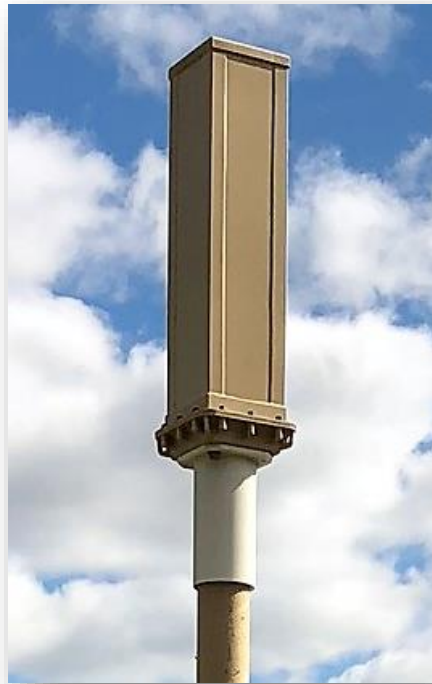
System Variations

Size: 24" x 5.5" x 5.5"

Weight: 7 lbs. (1-6000 MHz)

CrossRoads™

The CrossRoads™ system is a vehicle mounted variant within the ASI product line. The system has the same capability as CrossCut™ with a scaled version of the antenna array that will easily mount on vehicle platforms. The integrated equipment allows the user to conduct on-the-move direction finding during tactical operations. The system can communicate over a mesh network with other systems to supplement LOB data and quickly find emitters.



CrossSeas™

The CrossSeas™ system is a waterborne variant within the ASI product line. The system has the same capability as CrossCut™ with a scaled version of the antenna array that will easily mount on waterborne platforms. The integrated equipment allows the user to conduct on-the-move direction finding during riverine or seaborne operations. The system can communicate over a mesh network with other systems to supplement LOB data and quickly find emitters.



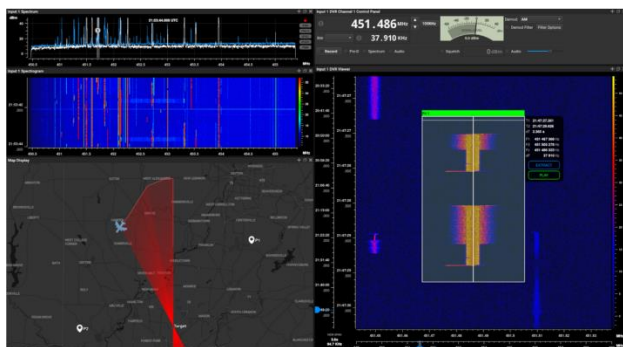
Size: 8.5" x 12" diameter
Weight: 10 lbs. (1-6000 MHz)



CrossWinds™

The CrossWinds™ system is an airborne variant within the ASI product line. The system has the same capability as CrossCut™ with a scaled version of the antenna array that can integrate on manned or unmanned airborne platforms. The integrated equipment allows the user to conduct on-the-move direction finding in support of Intelligence, Surveillance and Reconnaissance (ISR) operations.

Manned airborne platforms fly at a rate of speed that allows users to quickly triangulate targets as a single platform with the integrated error ellipse feature.



Size: 24" x 7.5" x 6"

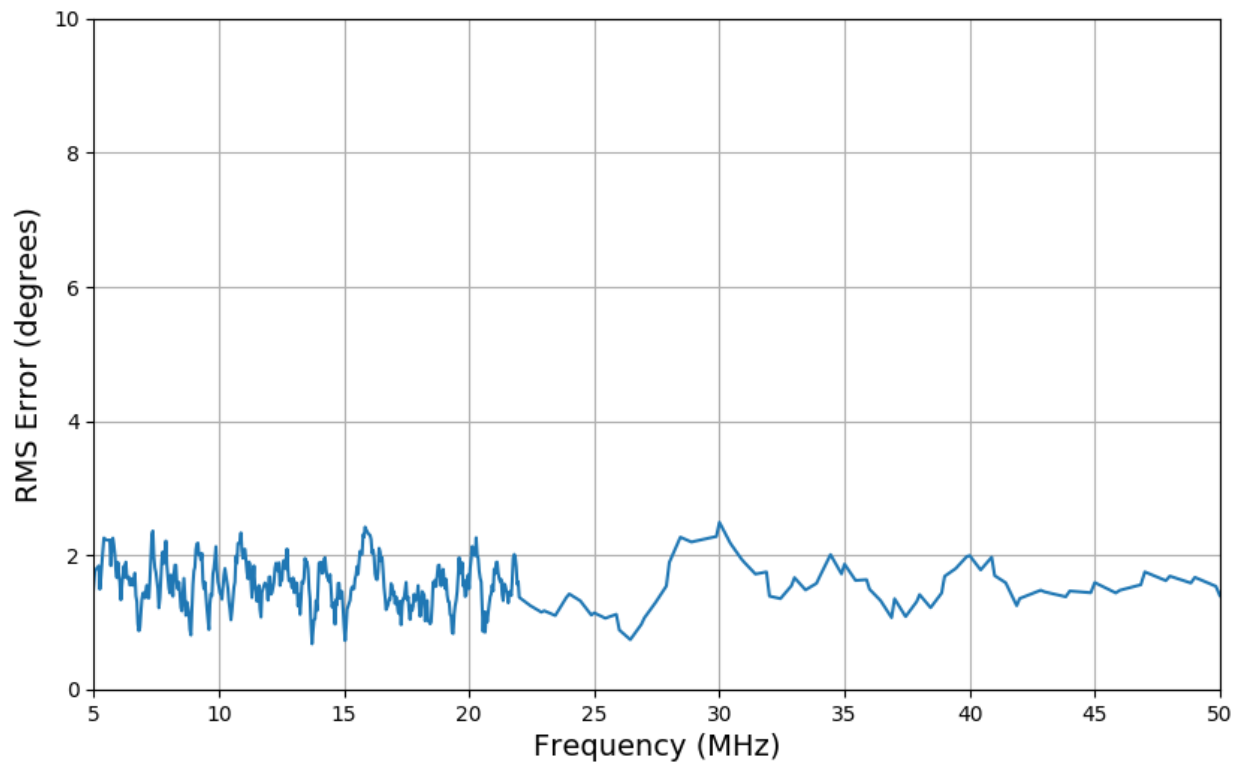
Weight: 9 lbs. (1-1000 MHz)



Performance

DF angle accuracy RMS error from 5 MHz to 50 MHz

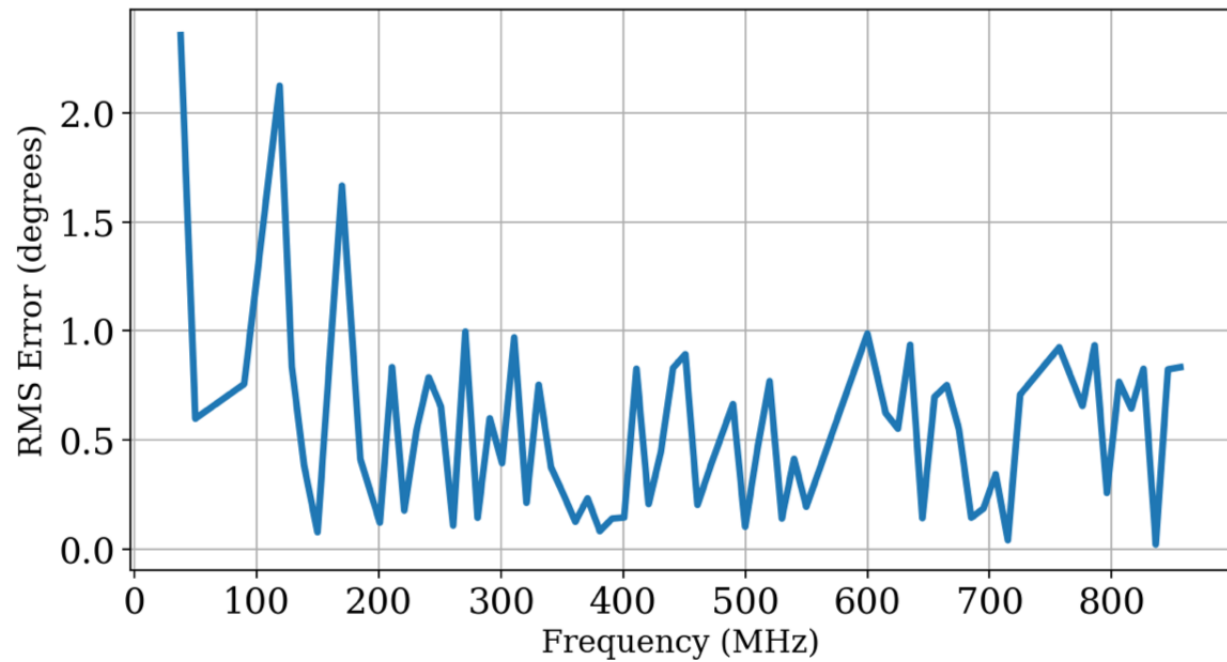
- Horizontal axis is frequency
- Vertical Axis is the RMS error over 360-degree azimuth
- 2-degree average RMS



Note: RMS error is based on a six-channel sensor. The addition of channels and sensors within the array can increase accuracy to below 1-degree.

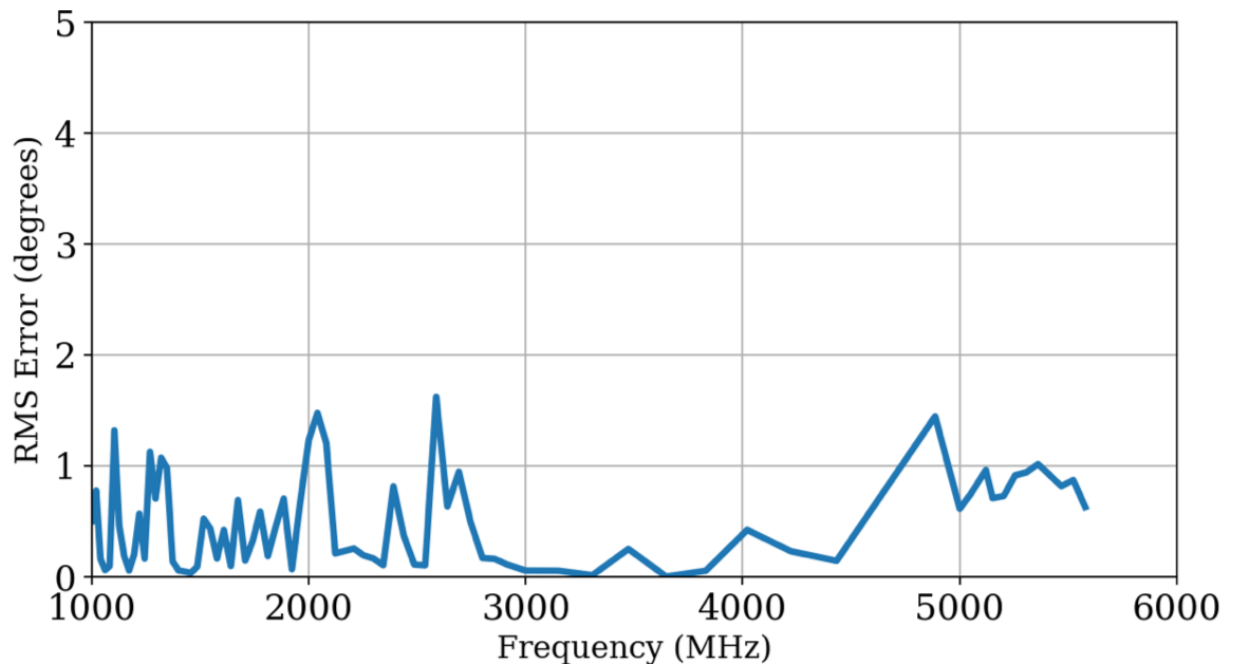
DF angle accuracy RMS error from 30 MHz to 1 GHz

- Horizontal axis is frequency
- Vertical Axis is the RMS error over 360-degree azimuth
- Below 1-degree average RMS



DF angle accuracy RMS error from 1 GHz to 6 GHz

- Horizontal axis is frequency
- Vertical Axis is the RMS error over 360-degree azimuth
- Below 1-degree average RMS



Additional Add-on Features

Additional features are available for inclusion in the CrossCut system.

Automatic Signal Recognition. Using the automatic signal detection and narrowband downconversion capability, multiple narrowband streams can be automatically analyzed and classified by modulation type and content.

Automatic Digital Demodulation and Decoding. The individual narrowband signals classified by the signal recognizer can be streamed to additional demodulation/decoding services installed in the system. Multiple services are available for HF, and V/UHF signal types. The resulting decoded output can be processed in the background and collected along with the narrowband signals in the internal database for subsequent analysis and processing by the user.

Applied Signals Intelligence (ASI)

Delivering Next Generation Direction Finding and Geolocation Solutions

At ASI, our Cyber-EM and ISR engineers and scientists develop new, patented, ultrawideband vector sensor antenna and signal processing technologies that intercept, DF and geolocate adversary threat emitters. The technology is very lightweight, very small and operates over extremely wide instantaneous bandwidths.

Founded in 2007 and located in Sterling, Virginia, we have a team of experts in RF systems, antennas, signal processing, ISR, radar, communications and direction finding. With over 100 patents, we deliver differentiated systems for direction finding, signal intercept and electronic warfare.

www.asigint.com

