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A CRFS GUIDE TO

STRENGTHENING ISR CAPABILITIES WITH RF SENSOR PAYLOADS IN UNMANNED AERIAL VEHICLES

- ISR fundamentals & RF technology
- Advantages of using RF sensors in UAV ISR systems
- Types of UAV ISR missions using RF sensors
- Overcoming engineering payload challenges

CRFS

EXTRAORDINARY
RF TECHNOLOGY

CONTENTS

INTRODUCTION

Unmanned aerial vehicles (UAVs) range from small quadcopters to high-altitude long endurance (HALE) systems that can conduct extensive missions. As UAVs are highly configurable, militaries, border security agencies, and the police need the right mix of sensors to meet the requirements for a wide array of different missions at day, night, and during adverse weather conditions.

This means payload “real estate” on UAVs is at a premium, with different sensors competing for space. Traditionally, video and thermal cameras have been the most popular choices over other types of payloads, such as RF sensors for signals intelligence (SIGINT) and electronic warfare (EW) missions.

However, due to the modern reliance on wireless technologies, spectrum monitoring and geolocation of signals of interest are becoming more prevalent to robust ISR capabilities. To achieve this, a new generation of lightweight, high-performance, EW / ISR sensors are needed for UAV payload integration that match the EMSO capability of land-based RF sensors.

Image: TEKEVER AR3

ISR FUNDAMENTALS & RF TECHNOLOGY

Intelligence, surveillance, and reconnaissance (ISR) is the coordinated and integrated collection, processing, and analysis of data that is disseminated as information to support decision-making and achieve military objectives. ISR can either be executed from a manned or unmanned platform, with both having risks and benefits.

Executing ISR missions across the air, space, land, and sea domains to support decision-making and provide situational awareness is essential for commanders to make informed decisions and achieve tactical and strategic objectives.

Intelligence is the process of collecting and analyzing data to understand adversaries' activities and capabilities. It includes various methods, such as human intelligence (HUMINT), signals intelligence (SIGINT), open-source intelligence (OSINT), and geospatial intelligence (GEOINT).

Surveillance is systematically observing areas, people, or buildings by visual, aural, electronic, photographic, or other means. It can be persistent or targeted, and it focuses on gathering information over time.

Reconnaissance missions are undertaken to collect data about the activities and resources of an enemy or target. These are often conducted through direct observation or other detection methods and are generally short-term and tactical.

Figure 1:
The ISR process

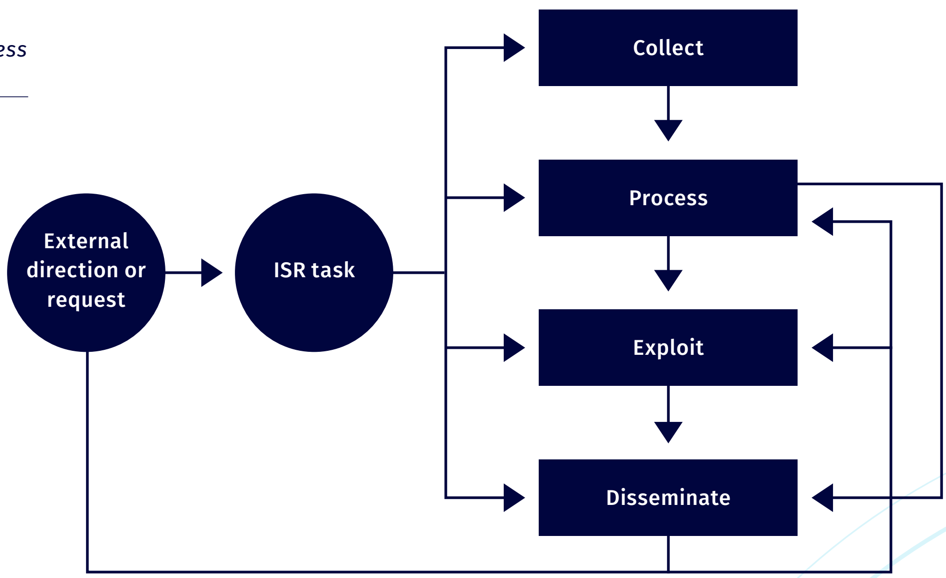


Image: Elistair ORION 2.2 TE Tactical Tethered Drone

Key technologies used for ISR

- Electro-optical (EO) video cameras
- Infrared (IR) imaging sensors
- Synthetic aperture radar (SAR) imaging sensors
- Multispectral imagery (MSI) and hyperspectral imagery (HSI) sensors
- Moving target indicator (MTI)
- Light detection and ranging (LIDAR)
- Radio frequency sensors (RF)

To complement manned reconnaissance aircraft, militaries increasingly rely on unmanned aerial vehicles (UAVs) as they are more economical, can be deployed for long durations, and eliminate human risk.

UAVs can support a multilayered approach involving complementary technologies to gather accurate information on adversary behavior, location, organization, and capabilities. This information can then be disseminated as intelligence at the speed of relevance.

Due to the constant need to protect borders and sovereign territories, UAVs can complement traditional ISR methods by providing high-altitude flexible capabilities that can quickly be deployed to any target area and operate continuously.

When equipped with RF sensor payloads, UAVs help in two key areas: monitoring broad areas and extending line-of-sight. Both are essential for detecting and geolocating signals of interest, which adds SIGINT capabilities to other intelligence sources for accurate Multi-INT assessments.

To maintain a lead over adversaries, UAVs equipped with RF sensors effectively collect data to reduce the time and space element of ISR application, which improves the OODA (Observe, Orient, Decide, and Act) loop.

ADVANTAGES OF USING RF SENSORS IN UAV ISR SYSTEMS

ISR missions are often characterized by long endurance in often dangerous environments. They require high levels of deconfliction and coordination, and a large amount of data is transmitted to the command center for rapid decision-making on the ground. In parallel, tactical EMSO, SIGINT, and DF missions can be executed in less than 5 minutes to protect EMCON.

>>> ***Figure 2:*** *A fixed-wing UAV increases line-of-site in the sea domain*

>>> ***Figure 3:*** *A tethered drone above the tree line, extending line-of-site in the land domain*

UAVs' versatility and flexibility make them uniquely suited to ISR missions. Drones can conduct wide-area surveillance, providing real-time situational awareness as either an individual system or as part of an integrated network that can be scaled to cover different operational needs.

Integrating RF sensors as payloads into UAVs significantly enhances operational capabilities

- Improved line of sight (LOS) enables more precise and comprehensive surveillance over vast areas. This improvement directly contributes to an increased observation radius, allowing for broader coverage and more effective monitoring of the operational environment.

- Variable height antenna, which can be deployed anywhere and anytime, provides flexibility and adaptability to changing mission requirements. This capability reduces the risk to personnel by allowing remote operation in potentially hazardous areas.
- A larger information collection cone provided by UAVs means more data can be gathered, increasing the overall efficiency and effectiveness of intelligence collection.
- Passive RF sensors ensure adversaries remain unaware that they are being monitored. This stealth capability is crucial for maintaining operational security and gaining strategic advantages. Tethered platforms, which can operate with zero RF emissions, further enhance the covert nature of ISR operations, making it harder for adversaries to detect and counter ISR activities.
- UAVs with integrated sensors provide flexibility in connectivity as they can function effectively as standalone units or as part of a networked command and control (C2) system or sub-system.
- The workflow permitted by UAVs monitoring the spectrum is designed to help militaries achieve spectrum superiority. It starts with collecting and capturing RF data, which can then be forensically analyzed. This data can be used to create detectors to geolocate specific signals of interest—to provide comprehensive situational awareness.

AVERAGE PERSONNEL REQUIRED FOR ISR	
Manned ISR	**Unmanned ISR**
Pilots: 2	Pilots: 1
Mission: 7	Mission: 1–2

TYPES OF UAV ISR MISSIONS USING RF SENSORS

UAVs with integrated RF sensors complement traditional aerial ISR methodologies; larger systems can be rapidly deployed to critical areas to conduct ISR missions, offering militaries' pop-up surveillance' capabilities for multiple ISR missions that can be used to extend flight times or as stationary observation within an orbit.

Signals Intelligence (SIGINT)

COMINT: RF sensors deployed on UAVs can intercept RF signals and record I/Q data, which, if analyzed and demodulated, can provide insights into enemy communications. Signals can also be accurately geolocated as part of target identification.

ELINT: RF sensors can detect electromagnetic pulses and signals emitted from radars, missiles, and aircraft. This helps identify and characterize electronic systems used by adversaries and provides alerts about potential threats.

Electronic Warfare (EW)

Detecting Electronic Attack (EA): RF sensors can detect EA and geolocate the source of electromagnetic energy used in EW activities, such as jamming and spoofing, allowing forces to adapt and counter threats.

Electronic Support Measures (ESM): sensors can detect, identify, and geolocate sources of RF emissions that may be threats and collect signals intelligence data for future operational planning and targeting.

Situational awareness over broad areas

Wide-area spectrum monitoring: RF sensors on UAVs can cover large geographic areas—even more so if several are networked together or part of a more extensive network of fixed and mobile assets. This can help with tactical and strategic planning.

Geolocating targets: When part of a network, RF sensors can geolocate signals of interest using methods such as AoA and TDoA (2D and 3D), enabling the geolocation of enemy units, vehicles, and communication hubs.

Real-time data: RF sensors provide actionable real-time data, crucial for maintaining up-to-date situational awareness, and target acquisition in contested environments.

Detecting hidden and camouflaged targets

Non-visual detection: RF sensors can detect and geolocate target emitters that are hidden, camouflaged, or operating in low-visibility conditions (e.g., under foliage, at night, or in adverse weather).

Penetration of obstructions: RF signals can penetrate certain obstructions, providing intelligence where visual sensors might be blocked.

Force protection

Continuous monitoring: UAVs can support constant surveillance of base perimeters and other critical areas, detecting enemy communications and giving early warnings of potential threats or suspicious activities in real time.

Remote reconnaissance: UAVs can conduct reconnaissance missions in hostile or inaccessible areas, gathering valuable intelligence with less risk to personnel.

Over-the-hill reconnaissance: Short-distance surveillance can provide real-time information about potential threats close to forward operating bases.

EW & ISR LIGHTWEIGHT RF SENSOR PAYLOAD TECHNOLOGY

CRFS developed the lightweight Node 100-18-LW (LW Node) to offer a flexible and lightweight solution that could be easily integrated into any UAV.

It was explicitly designed to maintain high RF performance while meeting the stringent weight requirements for UAV integration. Weighing less than 2kg, it aligns with the Maximum Take-off Weight (MTOW) limitations for UAVs. Additionally, it ensures robust environmental protection for connectors, rated at IP65 (minimum), and includes an upgraded GNSS chipset that supports L1, L2 and L5 bands.

Spectrum monitoring and TDoA missions

By positioning RF sensors at higher altitudes on UAVs, the range of both monitoring and the TDoA network is greatly extended. This setup allows for more effective RF spectrum monitoring, leveraging airborne RF sensors to achieve a greater detection range. Additionally, TDoA geolocation can be used to accurately pinpoint targets, with the increased altitude of the airborne sensors providing a more extensive geolocation range.

UAVs with the LW Node can operate with ground-based sensors, creating a comprehensive network. The C2 coordinates this network, receiving data from airborne and ground sensors. This integrated approach ensures a clear line of sight, maximizing the effectiveness of RF detection and geolocation capabilities over vast areas. The result is a robust, adaptable ISR solution leveraging the advantages of high-altitude UAVs and ground-based systems.

Real-time TDoA solution

The LW Node is equipped with a real-time wireless link to the Command Centre (CC)—which is essential for TDoA. When any sensor detects a signal, the CC immediately requests small I/Q time snippets from each UAV sensor. The CC then processes these I/Q time snippets to produce a TDoA geolocation in near real-time.

One I/Q time snippet from each Node is required for each detection event. These snippets and the resulting TDoA geolocations can come from different frequency bands, providing versatility in signal analysis. The maximum I/Q bandwidth captured in a single instance is 100MHz, ensuring a wide range of signal detection and processing.

This setup allows the system to efficiently and accurately determine the location of a target emitter by using data from multiple airborne and ground-based sensors.

CRFS RFEYE NODE 100-18 LW

	RFEYE NODE 100-18 LW
Frequency range	9 kHz - 18 GHz
GNSS chipset	u-blox F9T GNSS L1 / L2 / L5 (Supports all 4 GNSS satellite constellations)
Power consumption	40W
Node case	Node case and heatsink, total weight < 2kg
EMC approvals	EN 55032:2015, EN 61000-3-2:2014, EN 61000-3-3:2013, EN 61326-1:2013
Safety approvals	IEC / EN 60950-1, IEC / EN 60950-22
Ingress protection	IP65 minimum
Thermal dissipation	The system integrator needs to provide forced-air cooling
Vibration rating	The system integrator needs to provide some vibration compensation
Aircraft safety ratings	Aircraft safety testing for manned flights not required

Considerations when integrating a LW Node

Physical considerations: The size and mounting of the Node must be planned carefully, and there must be provisions for vibration damping to ensure stability and durability during operation.

Weight management: To ensure efficient operation, the payload, including the LW Node and any associated equipment, must comply with the UAV's Maximum Take-off Weight (MTOW) limits.

Environmental factors: Adequate cooling and weatherproofing measures must be implemented to protect the LW Node from environmental hazards and to ensure optimal performance under adverse conditions.

Power supply: A 12V DC power supply is optimal, with a maximum consumption of 40W. This requires proper power management and provisioning on the platform.

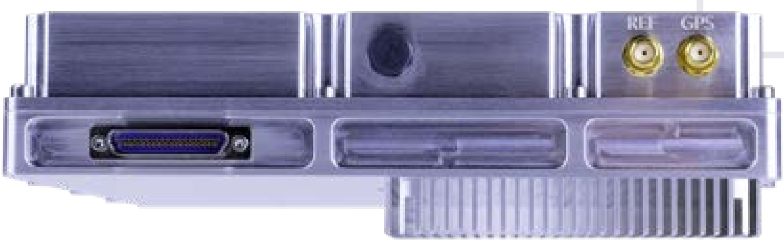
RF components: The integration may require a comprehensive RF survey to identify suitable antennas, RF filters, and RF cables. These components are critical for effective signal detection and processing.

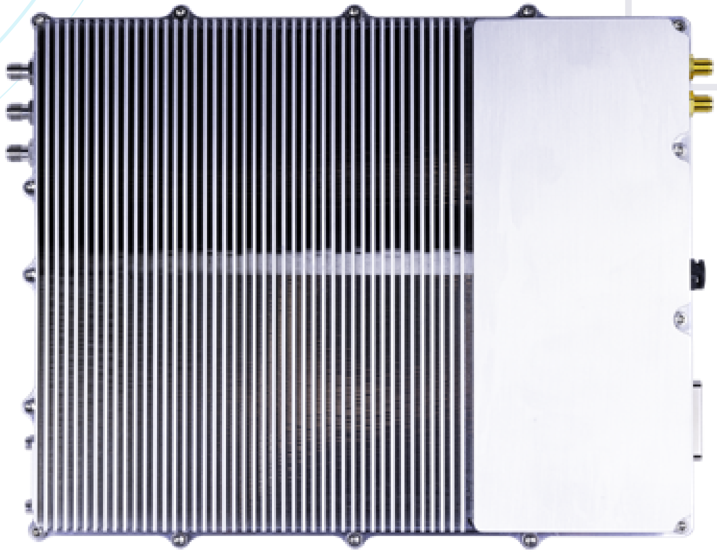
GNSS signal integration: The LW Node must be patched into the platform's GNSS feed to receive accurate positioning data necessary for its operations.

SSD storage: If the LW Node requires local data storage, space must be allocated for the SSD storage unit on the platform.

Data connection: An Ethernet connection is necessary for data transfer, requiring patch-in to the platform's Ethernet switch.

Inspection and maintenance: Provisions should be made for easy access to the Node for regular inspection and maintenance, ensuring long-term reliability and performance.





Problems caused by GNSS jamming

GNSS (Global Navigation Satellite System), including GPS (Global Positioning System), signals are critical for accurate UAV operation, particularly for TDoA geolocation. Therefore, GNSS jamming poses a severe problem. Jamming can disrupt the precision time synchronization essential for TDoA geolocation and hinder the ability to provide precise location data for airborne platforms, which are vital for effective ISR operations.

Several strategies can be employed to mitigate the effects of GNSS jamming, ensuring that UAVs can maintain accurate positioning and timing for effective ISR missions.

Inertial Measurement Unit (IMU): An IMU can track the location of the airborne platform if the GPS signal is lost, ensuring continued navigation and positioning.

GPS anti-jam antennas: Controlled Reception Pattern Antennas (CRPA) use beamforming techniques to nullify the jamming signals, maintaining the integrity of the GPS signal.

GPS Holdover module: This module uses a precision oven-controlled oscillator to maintain accurate timing, even when the GPS signal is disrupted.

High-precision timing source: An atomic clock can serve as a high precision timing source, keeping the system synchronized without relying on GPS signals.

SyncLinc precision timing system: CRFS designed this timing signal system, similar to IEEE 1588 Precision Time Protocol (PTP), which ensures precise timing synchronization. SyncLinc requires dedicated cables, it cannot use the same LAN cables as the existing TCP/IP network as it does not run over TCP/IP.

Software solutions: Alternative software-based timing references can replace or supplement GPS timing, ensuring continued operation despite jamming efforts.

SUCCESSFUL INTEGRATIONS OF RF SENSORS INTO UAVs

TEKEVER AR5 – FIXED WING DRONE

Due to the curvature of the Earth, achieving accurate and reliable geolocation from ground level is challenging because it is impossible to see beyond the radio horizon. Enhancing line-of-sight (LOS) is vital for Time Difference of Arrival (TDoA) systems, as it significantly affects the precision and dependability of positioning measurements. Optimal performance requires a clear, unobstructed LOS between the signal source and receiving antennas. To extend the range of visibility, it is necessary to elevate the position of the receiving antennas.

The TEKEVER AR5 has an endurance range of 20 hours, a payload capacity of 50 kg, and a cruise speed of 100 km/h. Fitting a MALE UAV with an RF receiver allows operators to carry out advanced TDoA and geolocation of ground-based targets over long distances (beyond the horizon) due to the altitude advantage. The data downlink is sent from the platform to the ground station using Silvus radios. The sensors can also be used to capture I/Q data for post-processing analysis.

Fixed-wing drones allow military users to carry out a variety of ISR missions over broad areas: SIGINT, EW, border security, maritime surveillance, and tactical support for ground operations.

By complementing existing ground units with TEKEVER AR5s, users can establish a flexible, multi-domain network of receivers for comprehensive passive ISR across vast regions. Additionally, operating at higher altitudes enables the detection of signals from farther away, allowing spectrum monitoring receivers to function at safe distances from active combat zones.

Photo: TEKEVER AR5

ELISTAIR ORION 2.2 – TETHERED DRONE

An Elistair Orion 2.2 tether offers three key benefits: endurance, a secure connection, and physical security.

Endurance: A tethered drone can remain operational for approximately 48 hours. After this time, conducting brief checks before relaunching the drone is prudent.

Secure connection: The tether allows the secure transmission of data as the backhaul does not have to be sent over a wireless data link, for which there can be security issues such as interception by adversaries and jamming as well as limitations due to environmental factors and in terms of bandwidth. The tether can also make the mission safer by reducing the drone's emissions signature.

Physical security: As the tether restricts the drone's movement – ensuring precise fight – it is restricted to operating within a fixed radius, which is beneficial for sensitive missions.

In contested environments

When conducting ISR in contested environments, a tethered drone can also contribute to the operators' physical security as it can operate while the operators retreat to a safer distance. Depending on the type of tethered drone, the RF emissions can also be hidden, and the operators can control the drone through the tether.

This means that the common wireless frequencies used for drones (such as 2.4 GHz or 433 MHz) are not used as operators can push the command and control over an Ethernet or fiber-optic cable from the ground control station (GCS) through the tether station to the drone. Ethernet cables allow operators to be located a maximum of 50 meters away, while fiber-optic cables allow them to be around 300 meters away. Using 5G could enable them to control the drone from a different country, although this would mean it has a wireless emission.

The Elistair Orion 2.2 tactical tethered drone
Operators can easily swap EW /ISR payloads with other sensors, including AI object identification and target tracking sensors, laser range finders, and high-definition video

Border security

Borders can have areas of weakness, and, in certain circumstances, existing ISR capabilities can be compromised. In these cases, trucks can transport tethered drones to the target area to fill a gap, providing a complementary solution to an existing network.

Also, operating a tethered drone can function as a psychological deterrent, as people know they are being watched.

Force protection

Tethered drones are an excellent tool before balloons or aerostats are used to conduct more long-term ISR when the expeditionary force conducts force protection during the beginning phase of establishing a forward operating base (FOB).

Rapidly deployable pop-up mast

Erecting a traditional 100-meter could take days; however, a tethered drone can reach this height within ten minutes of arriving on the site. This allows operators to gain a height advantage to passively monitor the spectrum almost immediately—providing a better line of sight and increased observation radius. The height at which a tethered drone flies is also variable, so it can fly at full height or conduct ISR missions just above the tree line.

***The Elistair Orion 2.2** shown with agnostic payload platform (can be fully enclosed)*

DATALINKS & SECURE COMMUNICATION NETWORKS FOR UAVs

UAVs historically relied on multiple wireless links, each serving a specific and limited function. For example, a bidirectional datalink was generally used for command and control, while a separate video link transmitted live imagery.

Multiple links led to limitations in performance and efficiency but were necessary due to individual shortcomings: the datalink did not have the capacity for full-motion video, and the video link lacked the bi-directionality and data interfaces needed for command and control.

Additionally, radios using Wi-Fi standards were not complete tactical solutions as their reliability, range, and data capacity were problematic—meaning they were unsuitable for ISR-type missions.

Robust wireless datalinks for tactical missions

UAVs conducting tactical missions with line-of-sight (LOS) communications to the horizon, non-line-of-site (NLOS) communications in urban environments, and beyond-line-of-site (BLOS) require a more robust solution.

Silvus Technologies' Mobile Networked Multiple Input and Multiple Output (MN-MIMO) systems use military technology to provide wireless video and data communications that avoid the shortfalls of traditional systems.

MN-MIMO systems have many benefits, such as coded orthogonal frequency division multiplexing (COFDM) modulation and up to 4x4 MIMO.

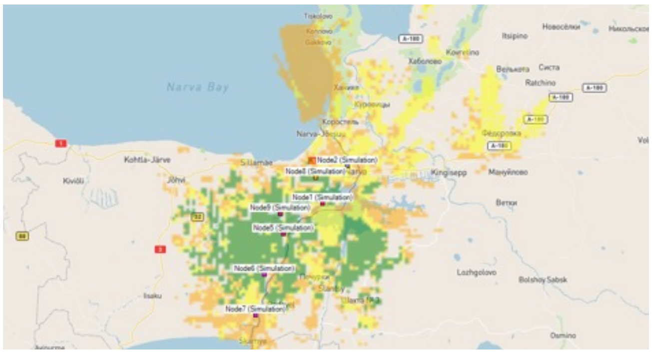
- Increased reliability and resistance to interference
- Higher data transmission rates
- Improved range and coverage
- Robustness to multipath fading
- Low latency for real-time communication
- Support for mesh networking
- Enhanced security features

Silvus StreamCaster radios use MN-MIMO technology to achieve robust wireless datalinks for tactical missions. The system works by two radios creating a robust bidirectional datalink that supports any form of IP data, including video, C2, and telemetry. Adding a third radio that operates on the same frequency creates a mesh network in which each radio serves as a repeater for the others, enabling advanced swarm and relay missions.

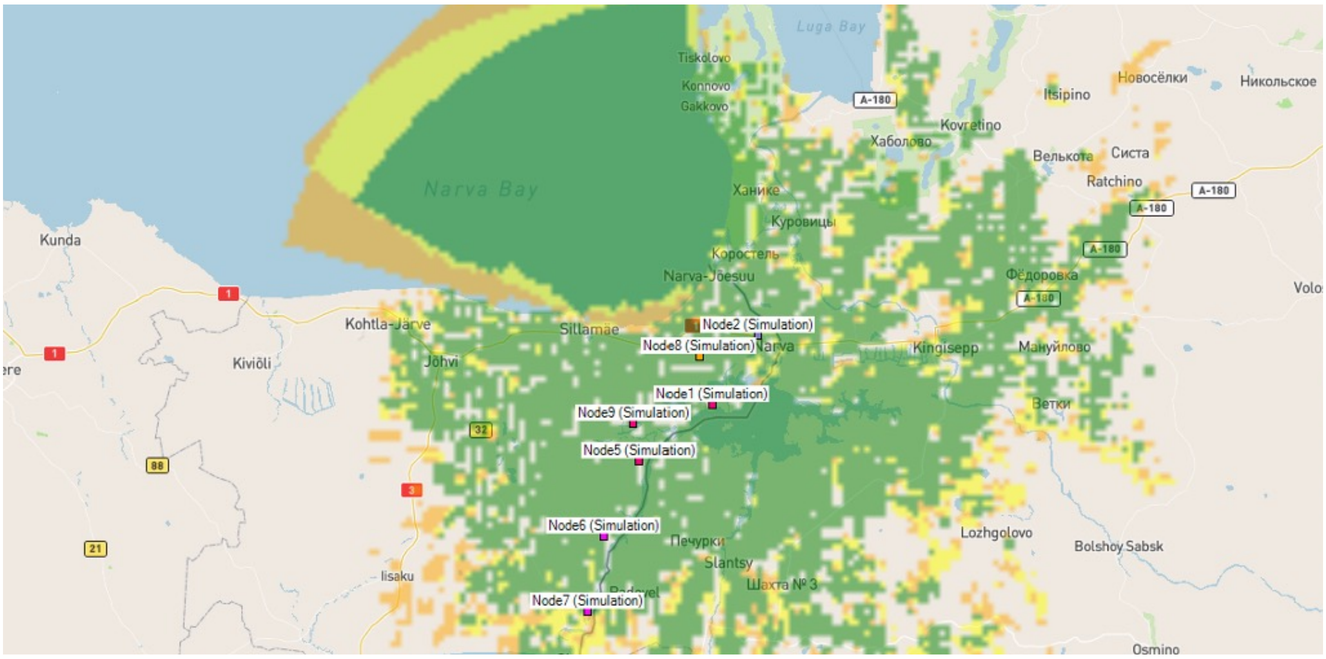
SIMULATION OF THE ESTONIAN LAND BORDER

The following simulations are based on a border security monitoring scenario on a NATO border. They demonstrate how integrating RF sensors onto UAVs increases signal detection and geolocation range.

01 In this simulation, five RFeye Node sensors are situated along a 56km stretch of land-border on 10m masts. On the map, the orange color shows the detection ranges of a handheld push-to-talk PTT radio operating at 430MHz with 1 watt power that is three meters off the ground. With this sensor setup, detections will occur over the entire operating theatre and up to 19 km over the border. Sensitivity is affected by sensor height and terrain—there are obvious blind spots and TDoA blackspots.



02 This simulation displays the same view, highlighting areas where signals can be geolocated in green. These areas indicate where at least three RF sensors can use 2D Time Difference of Arrival (2D TDoA) to detect the signal of interest. Coverage is reasonable but, once again, limited by the 10-meter height of the sensors and the terrain.



03 In this simulation, all five RF sensors remain in the same location; however, three RFeye Nodes are deployed on tethered drones. It takes approximately one minute to deploy the drones to 100 meters. The map shows that the detection radius increases from 19 km to 35 km, and that the geolocation operating theater is significantly enhanced.

OVERCOMING ENGINEERING CHALLENGES WHEN INTEGRATING RF SENSOR PAYLOADS FOR EW & ISR

The growing reliance on UAVs introduces economic, operational, and scientific challenges. To achieve end-user objectives, UAV companies must collaborate with sensor integrators to overcome challenges and co-engineer practical solutions.

Cost of ownership: Implement existing high-performance RF sensors that deliver the same performance, mission capability, and real-time intelligence in a new turnkey format, without the need for a multi-million-dollar R&D program. This approach typically requires modest but fundable non-recurring engineering (NRE) commitments.

Size and weight: Re-engineer the desired functionality into the smallest, lightest form. This involves intelligent board design, minimizing component count while maximizing onboard functional density (such as including FPGAs), and using lightweight materials wherever possible.

Power: Leverage next-generation processors specifically designed for deployment in confined spaces to keep power consumption and heat generation to a minimum.

Cooling: Rethink and minimize fins, fans, and heatsinks, employing a dual approach that focuses on generating minimal heat and developing an innovative, minimal viable cooling architecture.

Miniature antennas, data drives, and accessories: Design small, lightweight accessories that maintain high performance without compromise.

Positioning and location of equipment: Conduct an RF survey to identify the optimal location and minimum effective proximity from other onboard equipment, ensuring the EW/ISR (RF) payload performs as intended.

Filters: Leverage and fine-tune filters to address interference.

>>> ***Table:*** *Integration considerations for different sized UAVs*

	SIZE	MAXIMUM GROSS TAKE OFF WEIGHT (MGTW) KG	OPERATIONAL ALTITUDE (M)	UAV TYPE	INTEGRATION CONSIDERATIONS
Group 1	Small	7–9.5 (for EW payload)	0–600	Rotary, Tethered	Lightweight RF sensor and miniature antennas.
Group 2	Medium	9.5–25	< 900	Fixed wing, Rotory	Lightweight RF sensor and miniature antennas. Filters, location of equipment within airframe, and vibration damping.
Group 3	Large	< 600	< 5,500	Fixed wing, Rotory	Lightweight RF sensor and miniature antennas. Filters, location of equipment within airframe, and vibration damping.
Group 4	Larger	> 600	< 5,500	Fixed wing, Rotory	Lightweight RF sensor and miniature antennas. Filters, location of equipment within airframe, vibration damping, and data storage and streaming.
Group 5	Largest	> 600	> 5,500	Fixed Wing	Lightweight RF sensor and miniature antennas. Filters, location of equipment within airframe, vibration damping, and data storage and streaming.

CONCLUSION

For modern ISR, Radio frequency (RF) technology helps build up the intelligence picture and provides additional capacity. It serves as an early warning system, feeding multilayered surveillance and intelligence gathering for military, government, and commercial operators managing mission-critical operations. It's also vital to achieve spectrum superiority.

Traditionally, however, EW/ISR payloads have been expensive, restricted to large platform architectures, and inaccessible for operators seeking low and medium altitude monitoring and tactical UAV solutions.

Organizations such as the Defense Systems Information Analysis Center (DSIAC) and NATO Communications & Information Agency play crucial roles in reviewing current and future UAS technology. They often dictate specific combinations of UAS platforms, surveillance sensor payloads, and processing, exploitation, and dissemination (PED) methods. While Size, Weight, and Power (SWaP) has been the leading consideration to date and remains key to meeting Maximum Gross Take-off Weight (MGTW), military branches worldwide are demanding expanded EW/ISR mission capabilities.

There is a need for new, low entry cost EW / ISR sensor payload technology that established UAV platforms can access and retrofit, and be leveraged across new, smaller, more economic airframe platforms.

This guide introduced CRFS' RFeye Node 100-18 LW, which offers the same high-performance intelligent RF sensor capabilities used by DoD and NATO MoD operators, but as a lightweight payload integration option.

New generation RF sensors such as the RFeye Node 100-18 LW, supported with APIs and the co-engineering to solve implementation issues, are vital to help UAV operators and UAS airframe platform providers meet common customer objectives, including:

- Gaining intelligence for military and government operations
- Collecting and capture I/Q data
- Disseminating and integrating information
- Fingerprinting the natural operating environment
- Understanding how 'blue forces' look to adversaries
- Finding, detecting ,and geolocating 'red forces'
- Passively monitoring without revealing target acquisition, classification, and collection
- Undertaking electromagnetic Spectrum Operations (EMSO) and gaining spectrum superiority
- Building detectors from this data allows militaries to have increased situational awareness, leading to spectrum superiority

RELATED READING

TEKEVER DEPLOYMENT STORY

Increasing line of sight and geolocating ground-based targets from a long distance

How Tekever and CRFS collaborated to fit their AR5 and AR3 UAVs with RF sensors as a payload to support a military customer with ISR missions.

DETECTOR-BASED TDOA BLOG

Passive air defense: geolocating airborne targets using detector-based 3D TDoA

While radar is a widespread and versatile tool for detecting and locating in the battlespace, it has a critical Achilles heel. As active systems, radars have their own EMS signature to alert the enemy that they are operational, enabling reverse targeting and destruction of the asset. In a conflict environment, active radar should be operated judiciously and has an extremely short half-life.

ELISTAR DATASHEET

Extending your horizon and line of sight

How Elistair and CRFS collaborated to fit their precision flight ISR tethered drone with RF sensors and a swap integration payload kit to add EW sensor and EMSO capability to land-based ISR missions.

RFeye® Receiver (Node)

High-performance spectrum sensor (receive / record) to 40GHz

RFeye® Site

Real-time spectrum monitoring & geolocation toolkit

RFeye® Mission Manager

Automated monitoring & mission management

RFeye® DeepView

Forensic signal analysis software with 100% probability of intercept

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RF TECHNOLOGY

CRFS is an RF technology specialist for the defense industry, national security agencies, and systems integration partners. We provide advanced capabilities for real-time spectrum monitoring, situational awareness, and electronic warfare support to help our customers understand and exploit the electromagnetic environment.

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