IDGA

Institute for Defense and
Government Advancement

Counter-Drone
Discoveries

Survey and Market Report 2021

D-FEND
SOLUTIONS

Introduction

IDGA Counter-Drone Discoveries Survey and Market Report

While there have been previous counter-drone surveys, the Institute for Defense and Government Advancement (IDGA) wanted to focus on an under-examined area: the perspectives of counter-small, unmanned aerial system (C-sUAS) decision-makers. IDGA utilized our extensive database of governmental, military and defense industry contacts to ask them about their counter-drone concerns and better understand their opinions of existing technologies. The resulting survey offers some surprising results and rare insights into C-sUAS users' state of mind and strategies. The acute concerns that C-sUAS practitioners have regarding legacy technologies, and the strong desire for safety and control while contending with the drone threat in sensitive environments, is abundantly clear.

To offer our audience an even fuller picture of the counter-drone space and the threats facing organizations across sectors, IDGA sat down with Zohar Halachmi, the Chairman and CEO of **D-Fend Solutions,** a leader in counter-drone, radio frequency-based takeover technology. During the interview, Zohar explained where he thinks the counter-drone space is heading post-Covid and the importance of allowing authorized drones to continue operating, even while rogue drones are being mitigated.

This IDGA report also includes **a product review,** to help you drill down on how D-Fend's pioneering technology differs from some of the traditional anti-drone technologies, such as radars and directional finders for detection, or jammers and kinetic solutions for mitigation.

Finally, we also helped compile a D-Fend Solutions **company profile,** to help you better understand why we think D-Fend is the perfect partner for this ambitious undertaking. Based on the independent reviews and testimonials the company received, we are not alone in this assessment.

IDGA hopes this wide-ranging report equips you with some actionable insights and strategies that will assist you to more effectively fight the rogue drone scourge.

Jonathan Sanders

Jonathan Sanders
Divisional Director
Institute for Defense and Government
Advancement (IDGA)

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Survey Results and Findings

QUESTION 1

Which type of organization do you work for?

Special Forces & Military	40%
National Security & Homeland Security	23%
Law Enforcement	19%
Other	5%
Critical Facility	3%
Landmarks & Government Buildings	3%
Local Government	3%
Prisons	1%
First Responder	1%
Arenas & Stadiums	1%
VIP & Executive Protection	1%
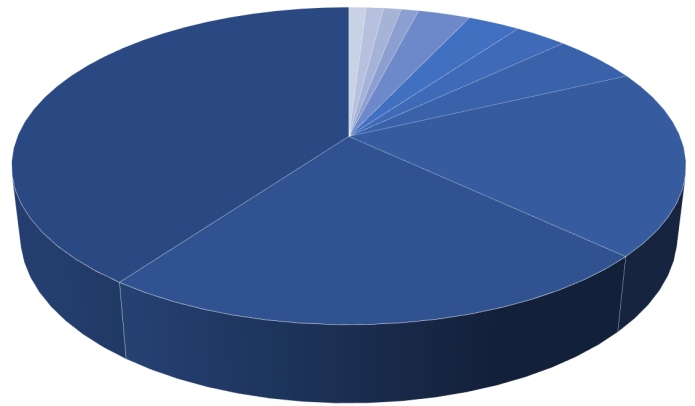
Counter-Drone Deployment Environments

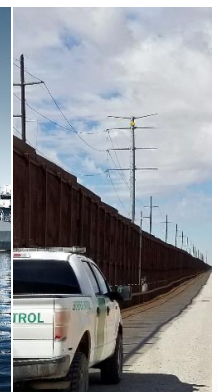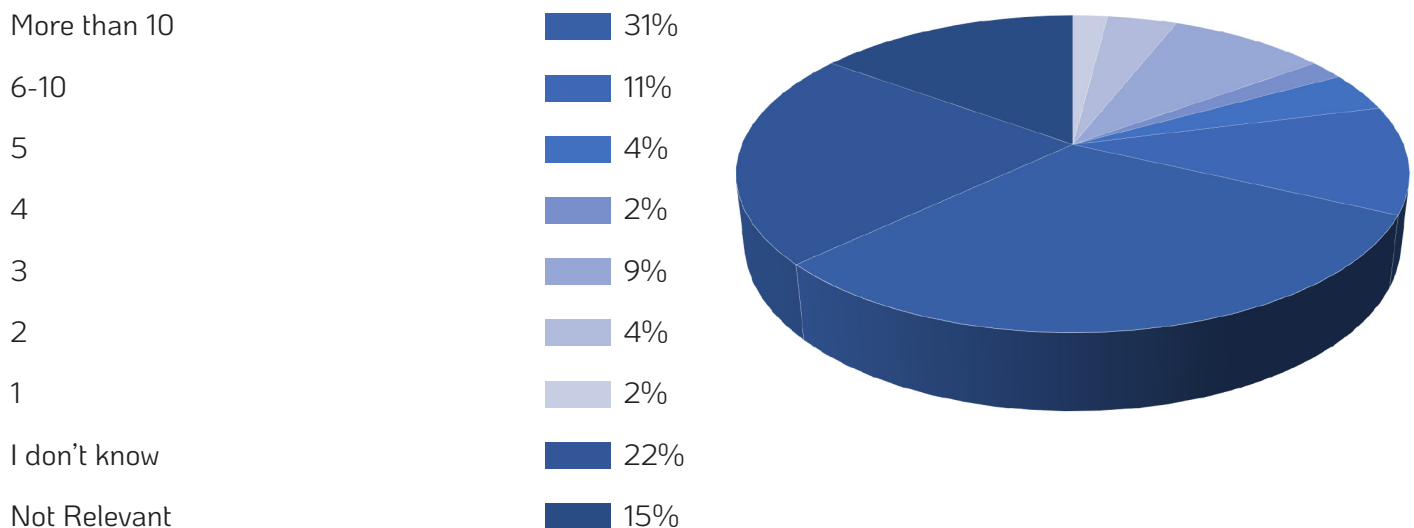| Military & Special Forces | Law Enforcement & First Responders | Air Traffic | Government & VIP Protection | National & Homeland Security | Maritime | Borders |

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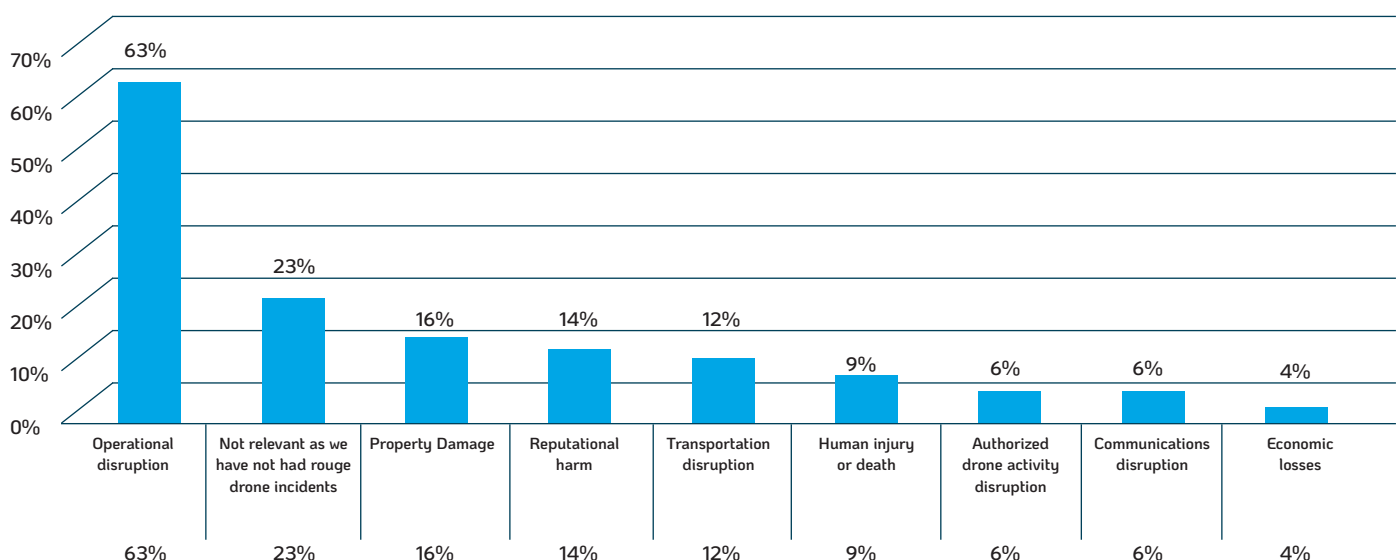Institute for Defense and
Government Advancement

Survey Results and Findings

QUESTION 2

How many rogue drone incidents or intrusions has your organization contended with in the past year?

More than 10	31%
6-10	11%
5	4%
4	2%
3	9%
2	4%
1	2%
I don't know	22%
Not Relevant	15%

QUESTION 3

What were the consequences of the unauthorized or rogue drone incident(s)?

Operational disruption	Not relevant as we have not had rouge drone incidents	Property Damage	Reputational harm	Transportation disruption	Human injury or death	Authorized drone activity disruption	Communications disruption	Economic losses
63%	23%	16%	14%	12%	9%	6%	6%	4%

QUESTION 4

How do drone incidents in 2020 compare with past years?

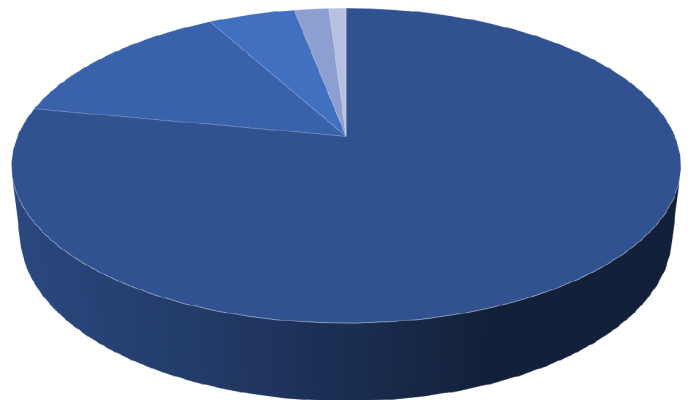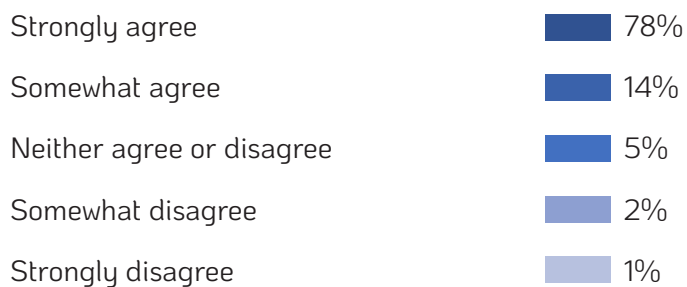|	
Decrease in incidents	6%
No Change	15%
Not Relevant. We have never experienced any drone incidents	16%
Increase in Incidents	63%
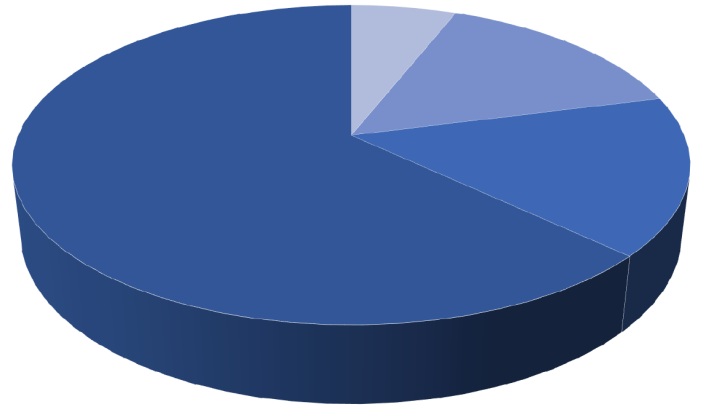
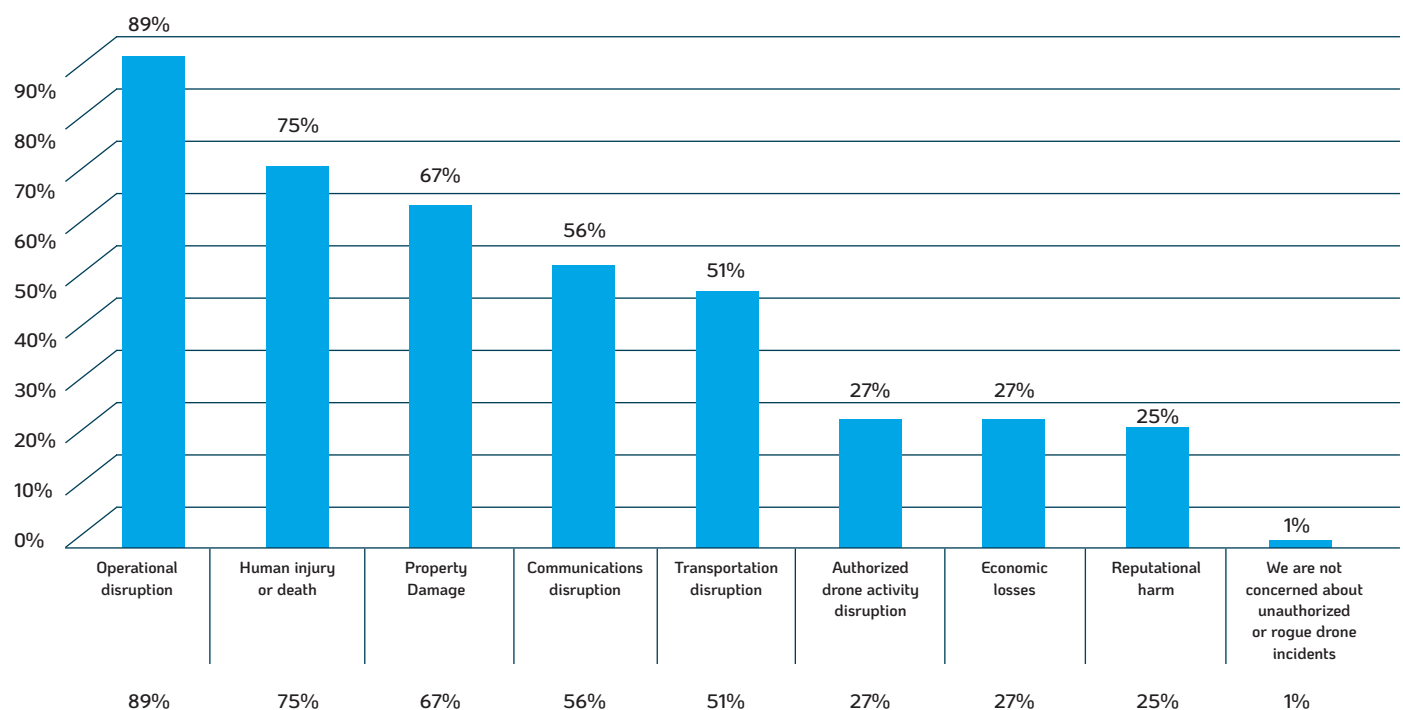# The Drone Threat: Non-Stop Incidents...
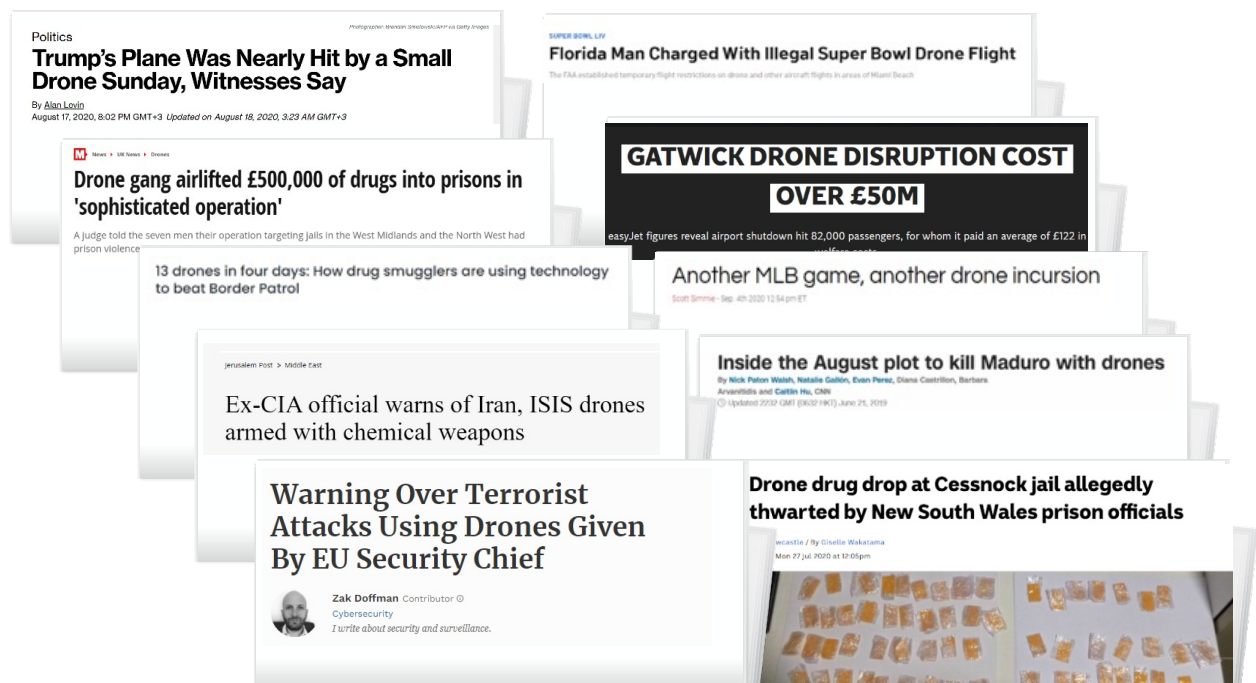
Survey Results and Findings

QUESTION 5

Unauthorized or rogue drones entering your organization's airspace are a threat to operations, facilities and/or people?

Strongly agree	78%
Somewhat agree	14%
Neither agree or disagree	5%
Somewhat disagree	2%
Strongly disagree	1%

QUESTION 6

Which of the following types of unauthorized or rogue drone incident outcomes is your organization concerned about?

Operational disruption	Human injury or death	Property Damage	Communications disruption	Transportation disruption	Authorized drone activity disruption	Economic losses	Reputational harm	We are not concerned about unauthorized or rogue drone incidents
89%	75%	67%	56%	51%	27%	27%	25%	1%

Survey Results and Findings

Solutions Must Contend with All Types of Drones

Long-Range, Heavy-Payload Drones	Do It Yourself (DIY) Drones	Wi-Fi Drones

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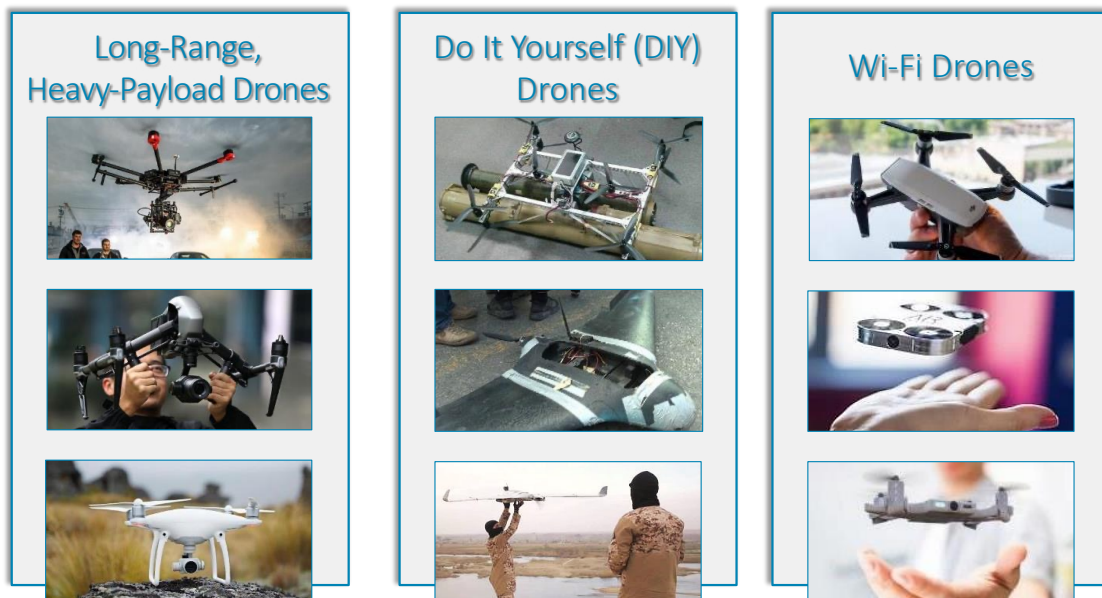
QUESTION 7

Which of the following factors are important when assessing whether a new drone type or model presents a threat to your organization?
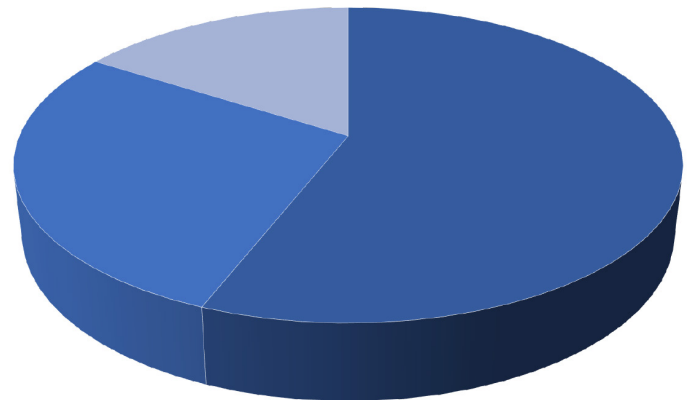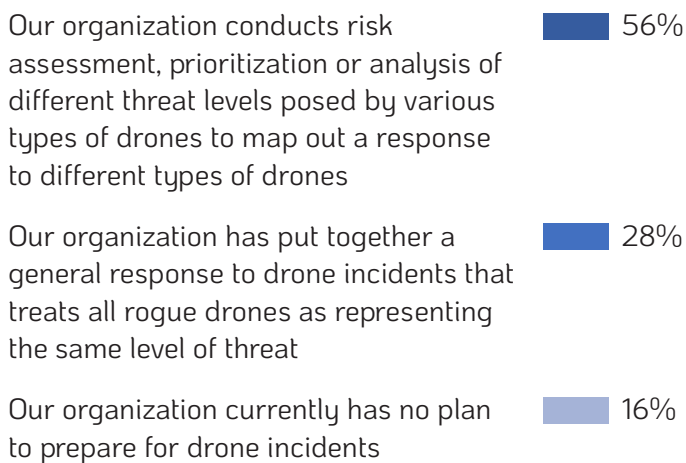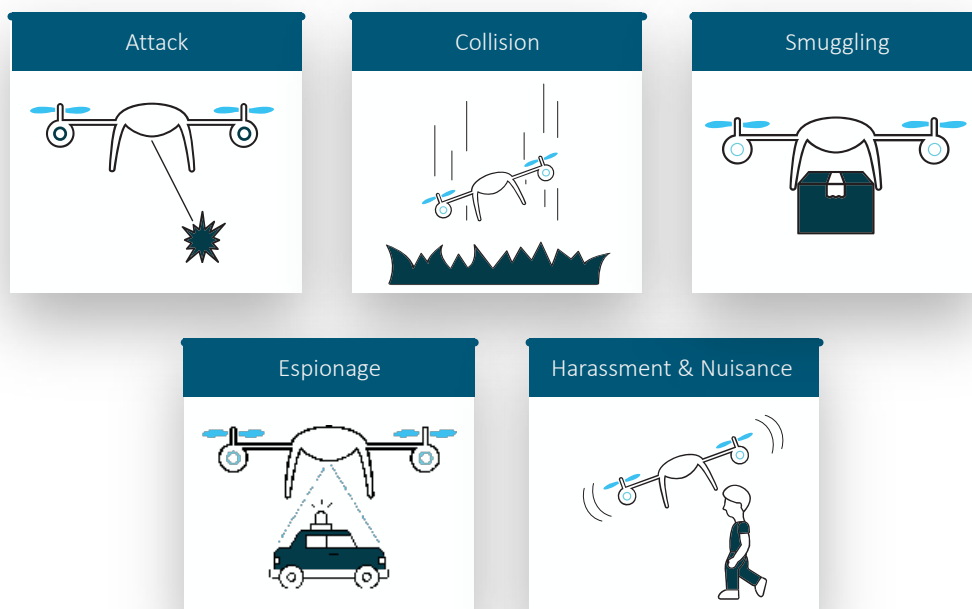

Ability to fly long distances	Ability to carry a heavy payload	Ability to withstand adverse weather
89%	81%	62%
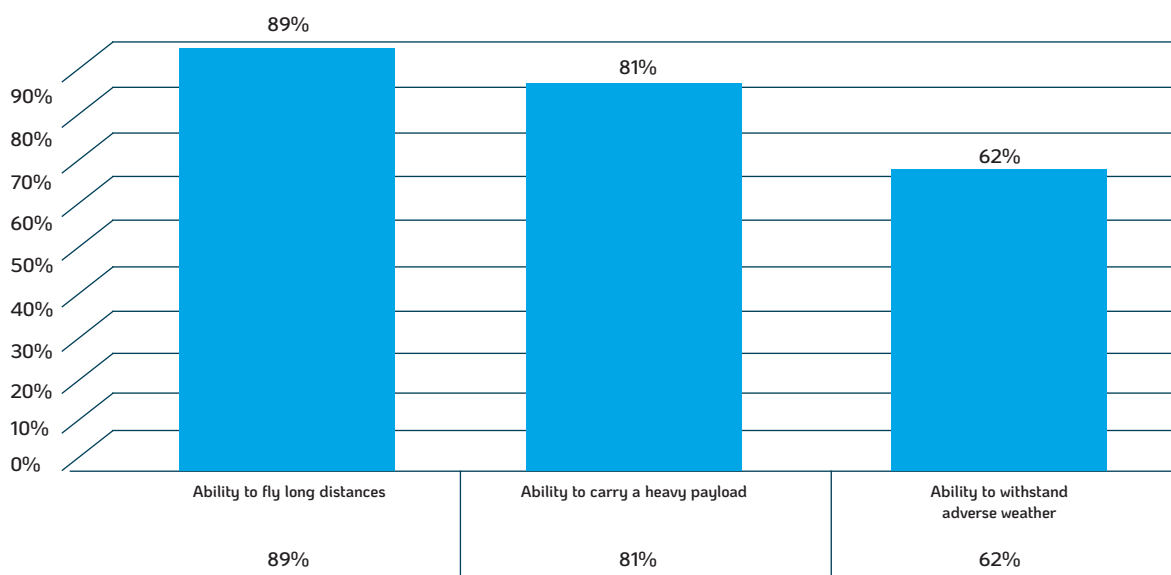
Survey Results and Findings

How is your organization prepared for drone incidents?

Our organization conducts risk assessment, prioritization or analysis of different threat levels posed by various types of drones to map out a response to different types of drones

56%

Our organization has put together a general response to drone incidents that treats all rogue drones as representing the same level of threat

28%

Our organization currently has no plan to prepare for drone incidents

16%

Focus on Range of Drone Threats from Different Drone Types

Attack	Collision	Smuggling

Espionage	Harassment & Nuisance

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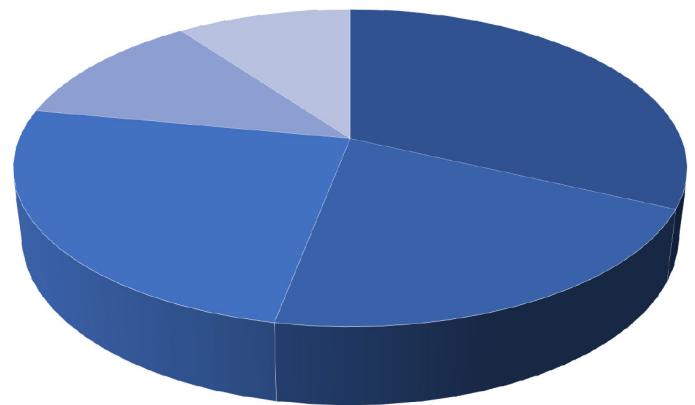Institute for Defense and
Government Advancement

Survey Results and Findings

QUESTION 9

The potential of jamming-based C-UAS systems to disrupt internal or nearby communications systems is problematic enough to avoid adoption of such a system.
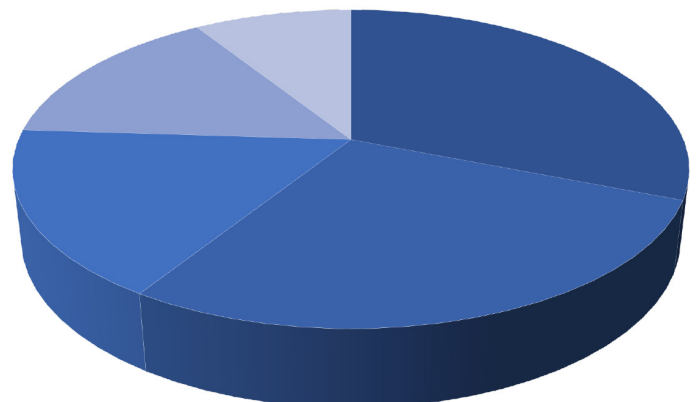
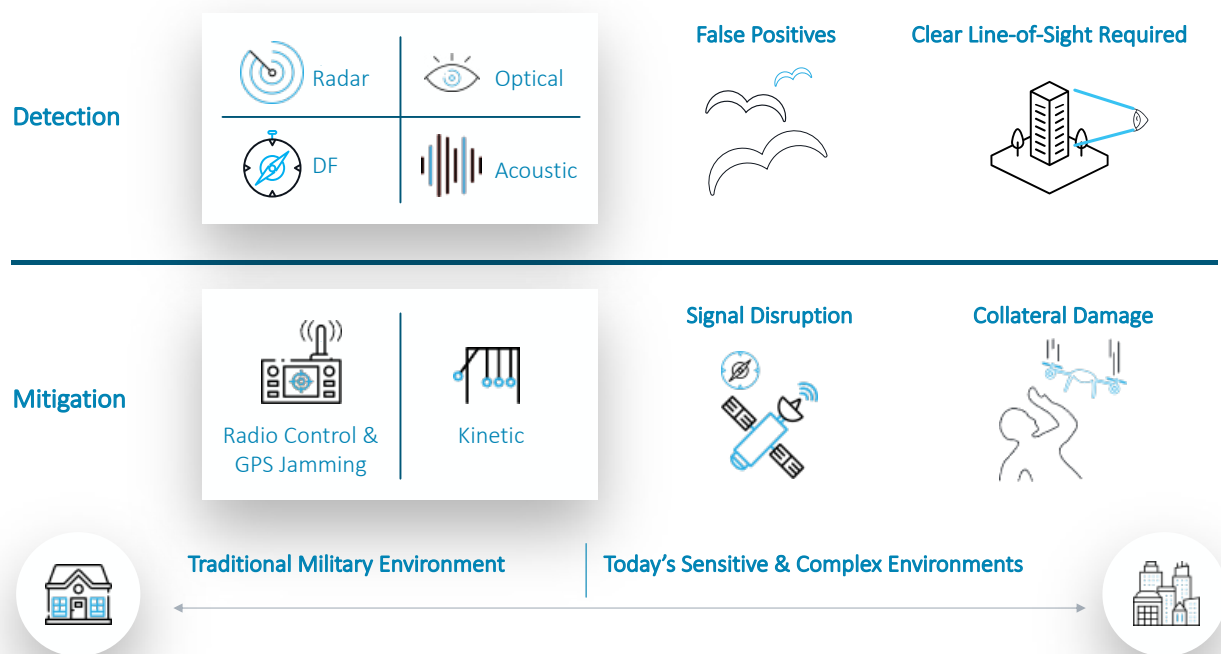|	
Strongly agree	32%
Somewhat agree	21%
Neither agree or disagree	25%
Somewhat disagree	12%
Strongly disagree	10%

QUESTION 10

The potential of collateral damage caused by physical/kinetic C-sUAS solutions — from the projectile used to shoot down or capture the drone, the falling drone itself, or debris — is problematic enough to avoid adoption of such a system.

Strongly agree	31%
Somewhat agree	28%
Neither agree or disagree	17%
Somewhat disagree	15%
Strongly disagree	9%

Traditional Technologies Struggle in Sensitive Scenarios

Detection

Radar | Optical
DF | Acoustic

False Positives

Clear Line-of-Sight Required

Mitigation

Radio Control & GPS Jamming | Kinetic

Signal Disruption

Collateral Damage

Traditional Military Environment | Today's Sensitive & Complex Environments
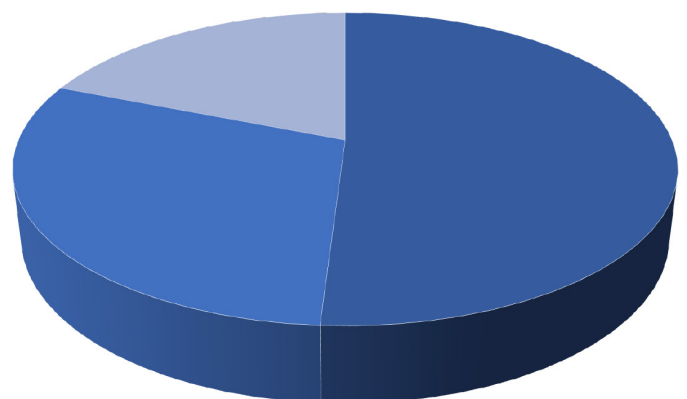
QUESTION 11

Do you believe that the risk of damage caused by such counter-drone system mitigation actions or methods could be worse than the damage from the rogue drone itself?

Possibly ▮ 51%

No ▮ 30%

Yes ▮ 19%

Survey Results and Findings

QUESTION 12

Are you concerned that a counter-drone system could harm or disable internal or nearby authorized "friendly" drones during a rogue drone incident?

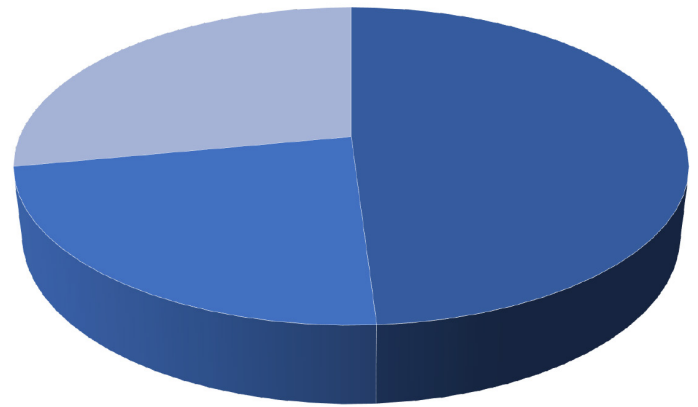|	
Possibly	49%
No	23%
Yes	28%

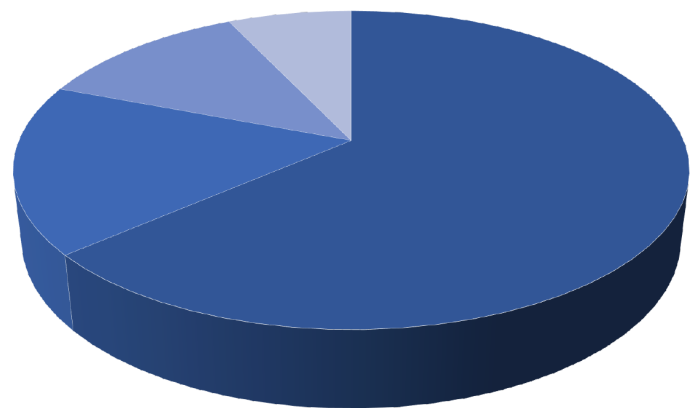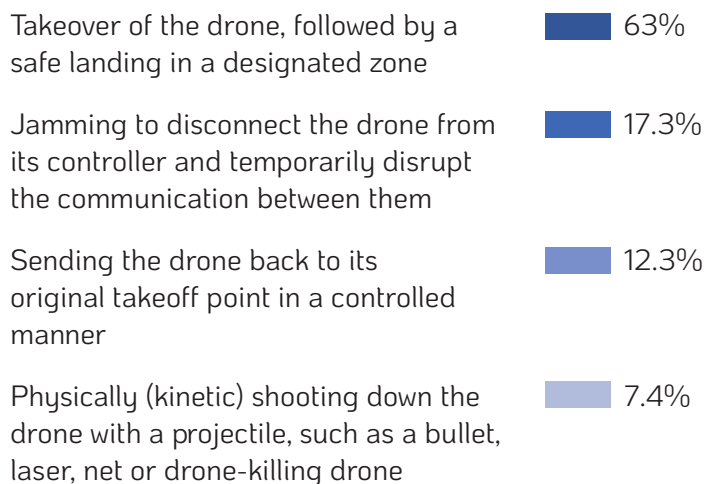# Drone Identification
Friendly or Hostile?

- Authorized drones play critical roles across society

- Must distinguish between Friendly and Authorized versus Rogue and Hostile, and enable continuity for authorized drones

Survey Results and Findings

QUESTION 13

What is the best possible outcome of a threatening rogue drone incident?

Takeover of the drone, followed by a safe landing in a designated zone — 63%

Jamming to disconnect the drone from its controller and temporarily disrupt the communication between them — 17.3%

Sending the drone back to its original takeoff point in a controlled manner — 12.3%

Physically (kinetic) shooting down the drone with a projectile, such as a bullet, laser, net or drone-killing drone — 7.4%

QUESTION 14

While mitigating a rogue drone incident, how important is it to preserve continuity at your site, including full function of communications, transportation, commerce and everyday life?

Very Important — 86%

Somewhat important — 11%

Unimportant — 3%
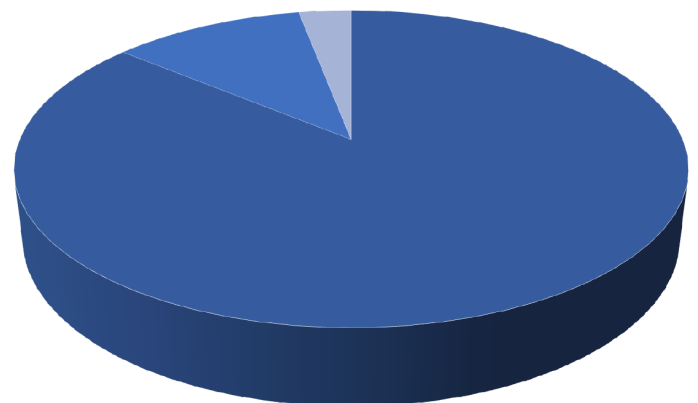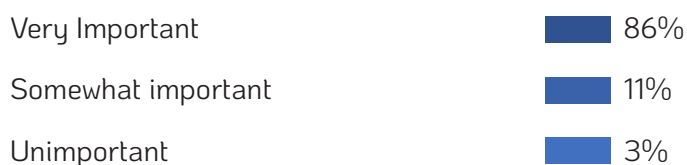
Capabilities for Control and Safety Across the Rogue Drone Incident Lifecycle

Detect & Alert

Locate & Track

Identify the Drone (IFF)

Discover Pilot Position & Identification

Fend-Off

Take Control & Land

PASSIVE

ACTIVE-RF
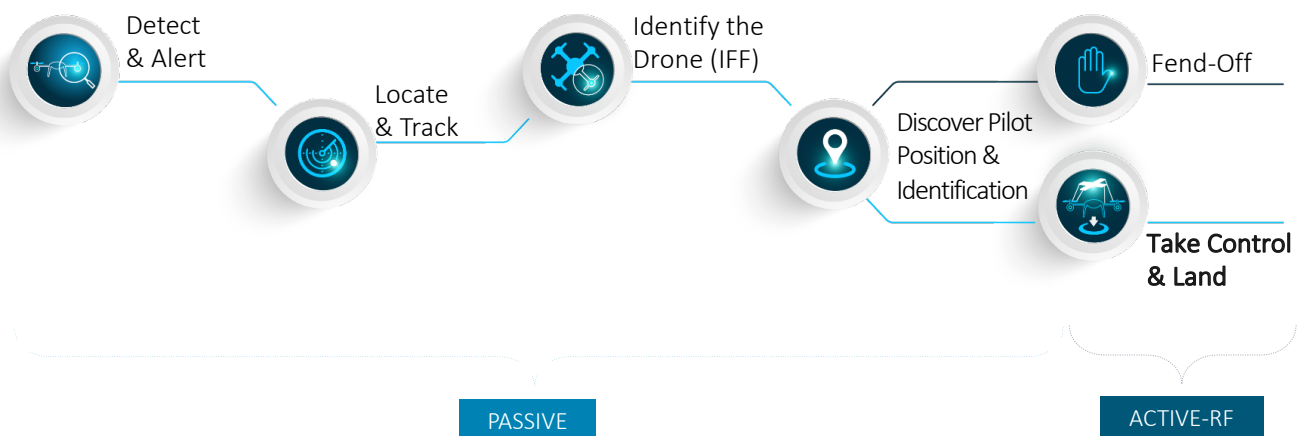
IDGA C-UAS Industry:
Leader Perspective
CEO Interview

D-Fend Solutions Chairman & CEO Zohar Halachmi on the Race for Safety, Control, and Continuity in the Counter-Drone Space

Zohar Halachmi, the Chairman and CEO of D-Fend Solutions, is busy running the world's leading, radio frequency (RF takeover technology)-based, counter-drone company. D-Fend has been rapidly expanding, even during the global pandemic and economic slowdown. The Institute for Defense & Government Advancement (IDGA) met with this innovative thought leader to hear his views on the current state of the counter-drone space and future trends.

Thank you for making time for IDGA! Let's cut right to the chase — what is unique about D-Fend Solutions' counter-small, unmanned aerial system (C-sUAS) technology?

Traditional C-UAS solutions were created many years ago for the conventional battlefield. They were useful in specific military scenarios, but security teams later realized that legacy solutions are insufficient as the main component of a counter-drone defense for homeland security, law enforcement, military and special forces, airports, urban environments, critical infrastructure, border patrol and prison scenarios.

Traditional solutions do not offer full incident lifecycle, end-to-end detection and mitigation. This necessitates multiple systems, making the overall counter-drone defense strategy more difficult to implement and operate.

D-Fend Solutions is unique in empowering large organizations to automatically take control of rogue or unauthorized drones. EnforceAir, our flagship counter-small, unmanned aerial system (c-sUAS), puts the system operator in control throughout the entire drone incident lifecycle.

Maybe equally as important, EnforceAir offers control of the surroundings, with no disruptions or collateral damage. Communications, commerce, transportation and everyday life flow smoothly, enabled by surgically precise detection and then takeover to mitigate the drone.

Does your technology possess any integration capabilities that would benefit our core audience — military and special forces, law enforcement and national security organizations — and their existing infrastructure and systems?

EnforceAir features open architecture and application programming interfaces (APIs) for integration with components of C-UAS systems and countermeasures — including radars, jammers and kinetic devices — as well as with multiple command & control (C2) systems.

These partnerships drive real-time, situational awareness. By providing EnforceAir users with a holistic view of their area of operation, C2 platforms' graphical user interfaces (GUIs) fuse the sensor data from multiple EnforceAir systems into a single view for situational awareness and real-time decision support. Users will benefit from a unified picture of multiple threats, including drones and other potential intrusions.

Many of these platforms enable users to communicate with law enforcement, fire or first responder personnel from the same interface they are using to mitigate not only drone threats, but all risks that potentially impact operations. This integration significantly improves ease of use by making the experience more intuitive and synthesizing threat response.

Why do military users adopt new generation

C-sUAS technologies like takeover, versus traditional methods?

EnforceAir has been tested, selected and trusted by operational units and security agencies in sensitive environments. It is deployed at high-level U.S. government agencies — including military, federal law enforcement and homeland security departments — as well as international airports. The reason for this adoption is because government agencies know they must adapt quickly to cope with evolving threats.

Military units contend with military drones, but also face small commercial drones deployed by terrorist groups. Kinetic options, which involve shooting down the drone, could lead to "friendly fire" incidents in some scenarios. Radar and other traditional detection methods could reveal location information. Non-jamming solutions are also preferable, because of jamming's potential negative effect on surrounding communication systems.

Also, many military units use authorized drone for surveillance and other tasks. Takeover technology allows those drones to keep functioning while counter-drone detection and mitigation is occurring.

How do you support military units or other groups that need to be on the move and remain mobile, while staying protected against rogue drones?

Drone threats vary by mission, use case and environment, so one of D-Fend Solutions major differentiators is offering multiple deployment options, providing optimized coverage for a wide variety of scenarios, conditions and terrain types, with rapid and easy set-up. Our EnforceAir flagship system can be affixed to vehicles or ships, covertly if necessary, or set up as stationary deployments on low or high ground. The hardware is lightweight and compact, and can be rapidly taken apart, moved and reassembled in minutes.

One of our deployment options, the Military Vehicle kit, is ideal for mobile military scenarios. It includes a shock-absorbing cradle for the autonomous software-defined radio (SDR) unit and the ground-level military antenna radome. This mobile equipment offers a moving dome of coverage for the convoy, soldiers and their equipment.

What do you predict will happen in the coming years in terms of frequency and severity of rogue drone incidents?

With the introduction of effective vaccines, we are seeing a reduction in the corona virus, which should help free up travel and reopen the global economy. That global economy is becoming increasingly dependent on drones to power it. Diverse sectors such as insurance, agriculture, airports, first responders and law enforcement, the military, and stadiums and arenas all utilize drone technology to function at their best.

Having all these drones in the sky means we will likely see a significant increase in drone collisions and crime, as careless or malicious actors' drones blend in with the many authorized ones.

FAA reports indicate that there are more than 200 drone sightings a month at and around airports in the U.S., and pilot-reported near-collisions with a UAS now account for more than half of all reported incidents at airports. Both types of interactions seem certain to rise from their current COVID-19 levels as air traffic normalizes. Organizations should be prepared in 2021 and beyond.

You spoke about how the economy is increasingly dependent upon drones. But won't mitigating rogue drones potentially risk shutting down authorized drones as well?

D-Fend Solutions' innovative drone identification and classification capabilities are an essential element in the way our solution manages an incident EnforceAir passively and continuously scans and detects unique communication signals used by commercial drones. Once detected, our system extracts the drone identifiers for the classification process and decodes the telemetry signal to extract the drone position with GPS accuracy. This includes the take-off position near the pilot in real-time. Authorized drones can continue to function without interruption while rogue drones are taken over and landed safely. Continuity is key for modern organizations.

After looking at your company's approach, I've been impressed by the focus on accurate risk assessment and actual threat prioritization. Explain why this is important.

I'm glad you raised this issue because the whole issue of drone risk differentiation has not received the attention it warrants in the defense and security community. There seems to be a misguided notion promoted by some in the counter-drone industry that an effective C-sUAS strategy must equally concentrate on every single type and model of drone. But when we think about this belief for moment…there are lightweight, Wi-Fi drones that are used mostly by the youth, a hobbyist segment. These drones cannot fly long distances, they are unable to carry a payload and they are not weather or wind resistant. This type of drone would obviously not typically be used by a terrorist, drug smuggler, or spy.

D-Fend Solutions covers the full spectrum of the drone world, but intensively focuses on the acute threats, the most dangerous drones, so that organizations around the world can maintain full control of drone incidents in complex environments and be prepared for future threats. Our effective counter-drone strategic approach employs drone risk analysis, assessment and prioritization that factor in drone prevalence, payload capacity and flight range.

I know that there are constantly new drones and models introduced into this fast-growing market. How can the counter-drone world keep up?

Our ability to prepare for the future is based on the strength of our world-class experts. D-Fend Solutions is staffed with highly advanced technology teams that are committed to developing cutting-edge capabilities to detect, identify and mitigate rogue drones. We developed tools and methodologies that enable us to cope with new drone threats efficiently and relatively quickly. These accelerators have been key to expanding the lead D-Fend Solutions has gained over our competitors.

D-Fend Solutions takes on this challenge by bringing together all the competencies needed, employing a robust and experienced research and development group with experience from the most elite military intelligence technology units.

Where do you see the counter-drone space heading?

Demand is increasing for new approaches that put control and safety first, which means non-jamming, non-kinetic technologies. An increasing awareness is developing that RF-based drone takeover is an optimal solution to serve as the core element of a security agency's C-sUAS.

Traditional counter-drone technologies still have a role to play in a multi-layered defense strategy, but the next evolution of counter-drone solutions will feature takeover technology as a core component. No other approach comes close to matching the control and safety benefits it provides, and the operational continuity it facilitates.

Zohar Halachmi is the Chairman and CEO at D-Fend Solutions, which offers the leading cyber-takeover solution to help organizations protect against rogue drones. Before co-founding D-Fend Solutions, he was the founder and CEO of multiple mobile and enterprise application start-up companies. He also held VP and C-level positions at global and public telecommunication enterprises. While managing multi-disciplinary large and small-scale organizations, Zohar created fast-growth and profitable businesses, bringing innovative solutions and services to the market. He graduated cum laude with a B.Sc. from the Technion — Israel Institute of Technology and M.Sc. from Tel Aviv University, and was a lecturer at both institutions.

D-Fend Solutions' C-sUAS Takes Over Multiple Rogue Drones while Maintaining Continuity

IDGA Product Review

Early leadership in the next generation counter-drone, cyber-takeover space has been achieved by D-Fend Solutions and its flagship product, EnforceAir.

This counter-small, unmanned aerial system (C-sUAS) solution features leading radio frequency-based, cyber-takeover technology. The offering, in either autonomous or manual mode, detects, locates and identifies rogue drones in the airspace and then neutralizes the threats. System operators take full control over drones and land them safely in a predefined zone, or alternatively, fending them off and sending them to their point of origin.

D-Fend's cyber-takeover technology is unique as a counter-drone method that offers operators complete control and preserves continuity while confronting and mitigating the most dangerous drone threats.

What It is Not

EnforceAir does not depend upon radars, acoustics or optics for detection, or on kinetics or jamming for mitigation. While these traditional technologies have their role in a multi-layered defense, they can be inadequate or problematic as standalone solutions in urban and other sensitive environments. They are not always able to detect or identify drones, and sometimes generate false positives.

Traditional mitigation solutions can hamper communications, sometimes mitigate only temporarily and risk collateral damage from attempting to shoot down drones. Additionally, some traditional C-sUAS solutions may be unable to classify drones as "authorized" or "unauthorized," and to permit authorized drones to continue operating during mitigation of rogue drones.

Fast & Easy Set-Up

The light weight and compact EnforceAir system, which weighs approximately 120 pounds/54 kilograms, can be carried by two people and set up by a single security team member.

The tripod, software-defined radio (SDR) system and antenna radome take mere minutes to set up. Set-up is easy and intuitive, even for non-technical personnel.

EnforceAir offers maximum operational flexibility. It can be deployed for stationary, 24/7 scenarios; affixed to vehicles or ships, covertly if necessary; and set-up tactically in the field for ground-level, or high-altitude engagements.

Focused on the Most Dangerous Drones, the Real Threat

D-Fend Solutions' air defense, electronic warfare and cybersecurity experts target the drones most likely to pose a potential danger. These are drones that can fly long distances, carry heavy payloads and are easily accessible to the public.

Understanding Takeover

D-Fend Solutions can demonstrate a takeover scenario with multiple drones flying in the area simultaneously. These are a mix of dangerous drones (described above), along with a friendly drone authorized to be in the area.

As the drones progress toward their destination, within seconds they are automatically detected and tracked. The drones appear on EnforceAir's graphical user interface (GUI), along with their dimensions and progress.

EnforceAir extracts the drone identifiers for

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classification process. It decodes the telemetry signal to extract the drone position with GPS accuracy. This includes the take-off position near the pilot in real-time. This information can be passed to law enforcement during an unlawful drone intrusion for apprehension, which helps ensure that future incidents are not repeated.

Alerts are triggered as the drones enter EnforceAir's defined and protected area. The authorized drone can continue to function without interruption, while the system tracks the rogue drone remote controller position for selected drone communication protocols.

If the system is running on automatic mode, the dangerous drones would enter the defined protected area and without anybody pushing a single button on the system's GUI, the sUASs would be disconnected from their controllers. The drones get taken over and automatically reprogrammed, within seconds, to fly via a safe route and land in a predetermined safe zone. No matter how much the pilots move their controllers and try to regain control, the takeover progresses.

The preset flight path maneuvers the drones around the nearby buildings in the urban setting and lands them in an empty parking lot, without causing any disturbance. It is startling to see data disappear from the drone operators' screen while the drone continues flying and embarks on its predefined route.

EnforceAir can also operate in manual mode. Everything would progress similarly, except the monitoring EnforceAir operator would hit "Mitigate" and then the drone would be sent on the safe route.

Everyday life continues during EnforceAir's detection and mitigation processes, with no disruption to surrounding communications, traffic, commerce, etc.

The classification process allows friendly drones to operate as usual. Continuity is preserved.

The simplicity of EnforceAir's GUI, plus the full takeover capabilities, offer operators a sense of complete control. EnforceAir also has a "Fend-Off" option to send the drone back to its pilot take-off position, or have it hover in place if desired, instead of a full takeover and land.

Proven and Future-Proof

There have been hundreds of deployments of EnforceAir across four continents, including forward operating bases, highly traveled borders and ports, and major international airports.

D-Fend's solution has been tested by operational units and security agencies in sensitive environments and is considered a leading technology in the cyber-takeover space. It is deployed by high-level government agencies — including within military, federal law enforcement and homeland security organizations.

Drones are becoming more compact, faster, harder to detect and more durable, which along with their payload and long-range capacities, poses safety and security risks to nearly every type of environment. D-Fend's system includes continuous software updates to contend with the constantly evolving drone market.

D-Fend's ability to detect and mitigate multiple drones, while permitting authorized drones to continue operating, fulfills a critical need for agencies and organizations across security sectors and use cases

D-Fend Solutions' Leading Counter-Drone RF-Cyber Takeover Technology Assists Military, Defense & Government Agencies

Selected, Tested and Trusted

D-Fend Solutions — a leader in the counter-drone, radio frequency (RF)-based, cyber-takeover technology space — helps organizations across sectors and sensitive environments win the evolving battle against hostile drones:

- Military and special forces units
- National and homeland security organizations
- Law enforcement and border agencies
- Many other sectors

EnforceAir, D-Fend Solutions' flagship counter-small, unmanned aerial system (C-sUAS) solution:

- Selected as a best-in-class cyber system
- Acquired by top-tier federal government agencies
- Deployed hundreds of times across four continents

Safeguarding:

- Forward-operating military bases
- Highly traveled borders and ports
- Major international airports

Entrusted to protect large-scale events and high-level government officials around the world, D-Fend's innovative technology has protected tens of thousands of attendees and politicians at major stadiums, arenas and open-air venues.

Hyper-Growth, Global Company with an Award-Winning Solution

2020 was a year of growth for D-Fend Solutions. The company:

- Tripled the size of its installed base
- Enlarged North American operations
- Established a direct presence in Canada
- Commenced sales in Europe
- Added five executives to its management team
- Recruited the former head of the FAA, Michael Huerta, to its advisory board

The global organization maintains offices in:

- U.S.
- UK
- Germany
- Japan
- Israel

D-Fend's solution is award-winning:

- Frost & Sullivan — North America Enabling Technology Leadership award
- Black Dart 2019 — D-Fend was one of 19 C-UAS systems that was evaluated by the Defense Innovation Unit (DIU) of the Department of Defense (DoD in the U.S.)
- Counter Drone 2 2020 — from the 19 systems that were selected for Black Dart and Counter Drone participation, DIU and its DoD partners chose EnforceAir and two other systems for inclusion in the Counter Drone 2 test

Independent Reviews and Testimonials

Industry analysts and media outlets have taken notice of D-Fend Solutions' leading technology:

"…what was more remarkable about the demonstration was that D-Fend's technology was

able to hack multiple drones at the same time...In other words, preventing a drone swarm attack — the holy grail of anti-drone technology once thought years away — has already been achieved, and not just during a demonstration.”

— J Post

“We were given an exclusive demonstration of the technology at a small farm just outside of Washington, D.C. The system picks up the signal of any drones in the area and assembles a list. Press a button and the drone you were fretting over is now yours to land where you like — and without interfering with other radio-connected devices.”

— Defense One

“Unlike other solutions available in the market, EnforceAir provides complete control and offers operators the choice to fend-off, or safely land, hostile drones.”

— iHLS

Founding Leadership & Talented Team

D-Fend's management team is steering the company to success:

Zohar Halachmi, Chairman & CEO — before co-founding D-Fend Solutions, he was the founder and CEO of two mobile and enterprise application start-up companies. He also held VP and C-level positions at Amdocs and ECI Telecom (global and public telecommunication enterprises).

Yaniv Benbenisti, President & Chief Product Officer — Yaniv held management positions at publicly traded intelligence solutions enterprises prior to co-founding D-Fend Solutions. Yaniv was also the head of the Cyber Access Division in the Israel Defense Force's 8200 intelligence unit, leading hundreds of cyber experts and engineers.

Assaf Monsa, Chief Technology Officer — he possesses more than 20 years of experience as a serial entrepreneur, technology and business executive. Prior to co-founding D-Fend Solutions, Assaf managed large, international, multi-disciplinary teams at organizations across business verticals, developing complex products with innovative technology.

D-Fend Solutions employs an experienced research and development group with personnel from the most elite military intelligence technology units to foresee future drone threats. The company develops new capabilities, with an eye to proactively building next-generation solutions.

Safe Landings & Outcomes

The founders of D-Fend Solutions designed EnforceAir as an end-to-end solution that seamlessly handles detection and mitigation without the drawbacks associated with traditional solutions.

In either autonomous or manual mode, EnforceAir:
- Detects, locates and identifies rogue drones in the airspace
- Passively and continuously scans and detects unique communication signals used by commercial drones
- Once detected, EnforceAir extracts the drone identifiers for classification
- Decodes the telemetry signal to extract the drone position with GPS accuracy. This includes the take-off position near the pilot in real-time
- Authorized drones can continue to function without interruption, while the system tracks the rogue drone remote controller position for selected drone communication protocols
- Neutralizes the threat by allowing the system operator to take full control over the drone and land it safely in a predefined zone

Continuity

During the mitigation process:
- The takeover process commences and the pilot loses all control of the drone, including video and telemetry information, and cannot regain it
- D-Fend's C-sUAS transmits a precise and short signal that takes control over the rogue drone without interfering with other drones and communication signals
- Since the system does not rely upon jammers or kinetic technology, EnforceAir avoids collateral damage, interference, disruption or disturbance

Continuity prevails as communications, commerce, transportation and everyday life smoothly proceed.

Third-Party Integration & Operational Flexibility

D-Fend's software is flexible and open. D-Fend partners with industry-leaders in three categories:
- Technology and integration partners whose

innovative technology is integrative with our leading RF-based, cyber-takeover technology.

- Influential and trusted channel partners that help market and resell D-Fend Solutions' offerings in their respective regions and/or verticals.
- Governmental organizations that closely evaluate our flagship offering, EnforceAir, and help introduce it to adjacent or interrelated governmental agencies.

The company's technology and integration partners offer:
- Complementary capabilities in the areas of UAS and cyber
- Integration to top military and law enforcement and command & control (C2) systems

The integration of EnforceAir with C2 systems enables operators to view EnforceAir's drone information on general map-based C2 platforms, with an option to trigger a mitigation process via the C2 platforms. Organizations can seamlessly integrate EnforceAir into their work processes and expand operational awareness beyond the tactical team operating EnforceAir.

Operational Flexibility

Drone threats vary, so D-Fend Solutions offers multiple deployment options, providing optimized coverage for a wide variety of scenarios, conditions and terrain types. The hardware is lightweight and compact, and can be rapidly taken apart, moved and reassembled in minutes. Deployment options:

Vehicular:
- The Military Vehicle kit deployment option is tailored for mobile military scenarios. The kit includes a shock-absorbing cradle for the autonomous software-defined radio (SDR) unit and a ground-level antenna
- The Vehicle kit is a discreet way to deploy EnforceAir. It is designed for sensitive, and sometimes mission-critical mobile scenarios, such as VIP protection

Tactical:
- The High-Altitude Tactical kit is suitable for urban and sensitive environments, covering drones coming at both high and low altitudes

- The Ground-Level Tactical kit provides complete support for ground forces and law enforcement personnel, with 360-degree azimuth coverage
- With hundreds of deployments and thousands of operational hours, this deployment kit has been tested and proven

Stationary:
- Designed primarily for stationary, long-range coverage deployments, such as protecting airports and borders airspaces, the Long-Range Directional kit provides a unique dual-sensor solution
- The High-Altitude Stationary kit is ideal for stationary, 24/7 deployment settings

Training & Support

Beyond providing the most innovative and modern cyber-takeover system, D-Fend Solutions also ensures that its new customers understand how to leverage the technology to its utmost capabilities. Detailed training is a key element in successfully onboarding the EnforceAir system. Sessions combine theoretical knowledge of the counter-drone field and the system, accompanied by practical, hands-on field exercises.

D-Fend Solutions is in the business of delivering control and safety via its EnforceAir counter-drone solution, which means the company is committed to resolving software and hardware issues speedily. Support personnel ensure smooth implementation and operation of the EnforceAir system.

The technical support team is available 24/7, 365 days a year, assisting and troubleshooting with any issue encountered by customers.

The Future

As the number of drones in use continues to expand exponentially, the threat of rogue drones is also constantly evolving, presenting security challenges for nearly every environment and scenario. D-Fend's continuous software updates result in an up-to-date response to new drone models and do it yourself (DIY) radio components.

D-Fend Solutions contact details:
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Taking Control of the Drone Threat

Counter-drone solutions for sensitive environments

Enabling a Drone-Powered Society

Drones bring tangible value and benefits to millions around the world and are reshaping the way modern societies function. Small, unmanned aerial systems (sUASs), also known as drones, are changing the way various fields and industries operate. But as drones continue to proliferate, there is a small portion of bad actors, as well as inexperienced operators, who can cause tremendous damage. By mitigating this threat, D-Fend Solutions helps support today's drone-powered society.

The Drone Threat

Drones are becoming, faster, harder to detect and more durable. Many can fly long distances and carry heavy payloads, and are quite easy to operate, which poses safety and security risks to nearly every type of environment.

Affordable, easy to obtain drones can be used to conduct reconnaissance on soldiers and law enforcement, target critical facilities, smuggle drugs into a prison or across borders, disrupt major events and pose dangers to planes that are taking off and landing.

Traditional Solutions Struggle in Sensitive Scenarios

Traditional technologies have a role to play in a layered defense strategy, but they are insufficient in sensitive scenarios. During detection, radars often have trouble as the main counter-drone component differentiating between small drones and other flying objects, and they are complicated to operate. Radars generate false alarms and the issue with many acoustic solutions is they are often ineffective in noisy environments.

Jamming-based solutions, or hybrid solutions featuring jammers for mitigation, emit large amounts of energy to block drones' controller signals. Jammer-based tools may affect other radio communications, which could pose a problem for nearby broadcasts, or security personnel. Jamming solutions do not provide full control, as drone operators can regain control of the drone once the jamming ceases. Kinetic counter-drone solutions, which involve shooting down the sUAS, are risky in crowded situations, because they can cause collateral damage. And optical solutions are ineffective without clear line-of-sight.

Sensitive environments require a surgical and innovative anti-drone defense, considering severe detection difficulties from tall buildings and other objects, potential collateral damage, fears of disrupting adjacent communication signals and the need to distinguish between authorized and adversarial drones.

**Flying Object
False Positives**

**Requires Clear
Line-of-Sight**

**Signal
Disruption**

**Collateral
Damage**

EnforceAir: Proven, Tested & Selected By the Top Tier

Global Success

Hundreds of deployments of EnforceAir, D-Fend Solutions' flagship counter-unmanned aerial system (C-UAS) product, worldwide across four continents, including forward operating bases, highly traveled borders and ports, and major international airports.

Chosen

Selected as a best-in-class cyber, radio frequency (RF) system and acquired by top-tier federal government agencies.

Proven

Tested, selected and trusted by operational units and security agencies in sensitive environments. Deployed at high-level U.S. government agencies — including military, federal law enforcement and homeland security departments.

Selected for Large-Scale Events

Entrusted to protect large-scale events and high-level government officials around the world, with tens of thousands of attendees at major stadiums, arenas and open-air venues.

A Solution for Every Scenario

D-Fend deals with different drone threats across different environments:

- Military
- National security
- Law enforcement
- Airports
- Borders
- Ports and harbors
- VIP executive protection
- Maritime operations
- Critical infrastructure
- Enterprise business
- Events
- Stadiums
- Media
- Prisons
- Landmarks and government buildings
- First responders
- Local government
- Safe city

D-Fend Solutions Counter-Drone Core Concepts

Control

The best way to **control** the drone threat and ensure **continuity** is to **take control of the drone**

Safety

A **safe landing** or fending off of the rogue drone is the best possible outcome for **safe airspace and continuity**

Focus

Counter-drone measures must **focus on the real risk, the most dangerous drones,** and assess and prioritize detection and mitigation efforts on those major threats

Future

The constantly changing and increasingly complex drone threat requires foreseeing the future and **always staying a drone threat ahead**

EnforceAir Takes Control of the Drone and Takes Control of the Threat

Safe Landings for Safe Outcomes

EnforceAir, D-Fend Solutions' proven C-UAS product, features the world's premier counter-drone, cyber, RF-based **takeover technology**. Our system, in either autonomous or manual mode, detects, locates and identifies rogue drones in your airspace, and then neutralizes the threat by allowing you to take **full control over the drone** and land it safely in a predefined zone.

Key Benefits & Advantages

- Unique capability to mitigate risk by TAKING CONTROL of drones
- Land rogue drones safely in a predefined safe zone
- Employs non-jamming, non-kinetic technology that does not require line-of-sight
- IFF distinguishes between authorized and unauthorized drones
- Advanced, autonomous system
- Wide variety of deployment configurations and complete operational flexibility
- End-to-end C-UAS capabilities for any scenario or environment
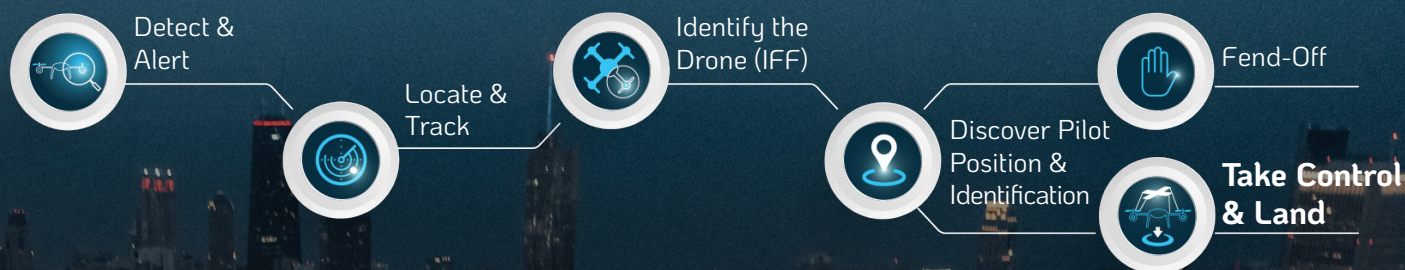- Open API for integration with Command & Control systems
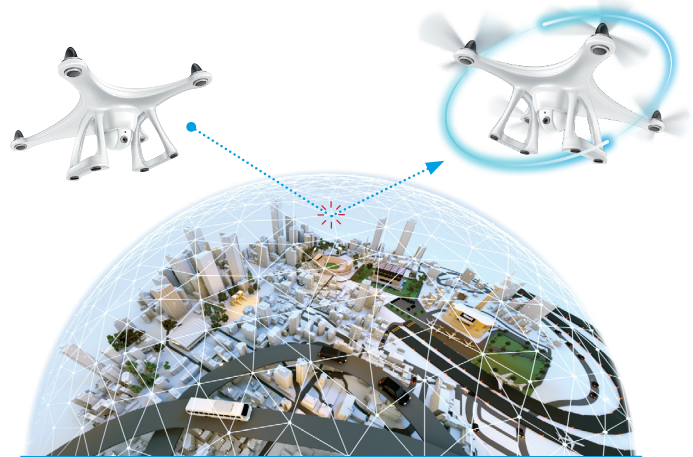
Preserve Operational Continuity

EnforceAir passively and continuously scans and detects unique communication signals used by commercial drones. Once detected, EnforceAir extracts the drone identifiers for an "identification: friend or foe" (IFF) process. It decodes the telemetry signal to extract the drone position with GPS accuracy. This includes the take-off position near the pilot in real-time. Authorized drones can continue to function without interruption, while the system tracks the rogue drone remote controller position for selected drone communication protocols.

During the mitigation process, the takeover process commences and the pilot loses all control of the drone, including video and telemetry information, and cannot regain it. EnforceAir empowers organizations with operational flexibility for large organizations across domains, environments and scenarios.

Since the system does not rely upon jammers or kinetic technology, EnforceAir avoids collateral damage, interference, disruption or disturbance. EnforceAir transmits a precise and short signal that takes control over the rogue drone without interfering with other drones and communication signals. Continuity prevails as communications, commerce, transportation and everyday life smoothly proceeds.

EnforceAir
Capabilities & Benefits
Across the
Drone Incident Lifecycle

Detect & Alert

Locate & Track

Identify the Drone (IFF)

Discover Pilot Position & Identification

Fend-Off

Take Control & Land

Detect & Alert

There is an alert when a drone is detected according to its unique communication signal:

- Passive & long distance
- No need for clear line-of-sight
- Designed to operate in noisy and sensitive environments

Locate & Track

Real-time location tracking by extracting the drone's GPS position:

- Passive & accurate
- No need for clear line-of-sight

Identify the Drone (IFF)

Extraction of the drone's unique communication identifier ("tail number"):

- Passive
- Selective — distinguishes between authorized and unauthorized drones in the area (IFF)

Discover Pilot Position & Identification

Discovery of the drone's take-off position (home point) with GPS accuracy while in midair:

- Passive
- Indicates drone pilot's position and remote controller location for most advanced protocols at time of take-off

Fend-Off

Disconnecting the signal of the drone operator's remote control, causing it to fly back to its take-off position, or to act in accordance with the drone's original configuration:

- Active-RF
- No reprogramming or data intervention

Take Control & Land

Setting a new flight path for safe landing of the drone to a pre-defined position:

- Active-RF (brief time period)
- Defines exact behavior of drone when controlled by the system
- Facilitates **safe** landing path, preserving **continuity**

Multiple Deployment Options for Operational Flexibility

EnforceAir provides the ultimate in operational flexibility. Its core components can be easily transferred, mounted and configured within a matter of minutes, providing the ability to move anywhere at any time.

EnforceAir Deployments
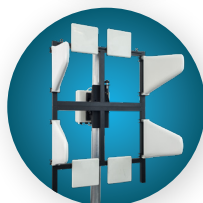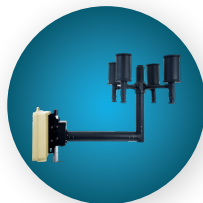
Vehicular Deployments

Military Vehicle
An optional, dual-use kit for mobile and ad hoc static deployment that can be combined with the ground-level military tactical deployment kit.

Vehicle
For sensitive mobile scenarios, the system is easily mounted and transferred between different vehicles within minutes, without drawing undue attention, or modifying the vehicle.

Tactical Deployments

High-Altitude Tactical
Suitable for urban and sensitive environments, covering drones coming at both high and low altitudes, with a folding antenna that is specifically designed for installation at high altitudes.

Ground-Level Tactical
Complete support for ground forces, with 360-degree omni-directional coverage.

Stationary Deployments

High-Altitude Stationary
For stationary, 24/7 deployment settings. It features a high-performance, omni-directional antenna.

Long-Range Directional
Intended primarily for stationary, long-range coverage deployments protecting airports and border airspaces, this kit combines unique technology to enable not only detection, but also safe mitigation of these sensitive areas.

Complex Challenges Require a Multi-Disciplinary Approach

D-Fend Solutions' talented team is comprised of experts with extensive experience in air defense, electronic warfare and cybersecurity, including personnel from elite military intelligence technology units. We attack the most difficult counter-drone challenges with a multi-disciplinary approach that encompasses a diverse set of technologies.

Additional D-Fend Differentiators

Advanced Proprietary Protocols
EnforceAir supports the most advanced long-range drones, and commercial and proprietary radio (DIY) protocols, with unique ability to reprogram them to fly a new route and land them controllably and securely in a pre-defined safe zone. We target the real threat — the most dangerous drones.

High Performance
- Ability to handle swarming and massing
- 360° perimeter security using omni antennas
- Support for both manual and pre-configured autopilot flight modes

Easy Deployment & Operation
- Autonomous
- Configurable mitigation methods, fend-off or takeover control/land
- Stationary and/or mobile deployments operations with quick and easy setup
- Low power and small footprint

Future-Ready — Always A Drone Threat Ahead

D-Fend Solutions is committed to foreseeing future drone threats. We relentlessly develop new capabilities to stay ahead and anticipate even the most unpredictable drone challenges, with an eye to proactively building next-generation, optimal solutions for the coming dangers. Continuous software updates result in an up-to-date response to new drone models and DIY radio components.

D-Fend Solutions takes on this challenge by bringing together all the necessary competencies, employing a robust and experienced research and development group with extensive, cross-domain experience. Our experts possess advanced skillsets, knowledge of best practices and real-world trade craft for counter-drone threat reaction and response.

Control the Drone to Control the Threat

About D-Fend Solutions

D-Fend Solutions is the leading counter-drone takeover technology provider. We focus on the real threats from potentially dangerous drones, so that varied organizations around the world can maintain full control of drone incidents in complex environments and be prepared for future threats. EnforceAir, our flagship offering, automatically executes radio frequency, cyber takeovers of rogue drones for safe landings and safe outcomes. Authorized drones that enable modern society can proceed uninterrupted. D-Fend Solutions facilitates continuity by ensuring the smooth flow of communications, commerce, transportation and everyday life.

D-FEND
SOLUTIONS

For more information, please visit:
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